Mitsubishi Programmable Controller

MELSEC Q series

Energy Measuring Module
User’s Manual (Details)

QE84WH
SAFETY PRECAUTIONS
(Read these precautions before using this product.)

This manual contains important instructions for MELSEC-Q series QE81WH. Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the user’s manual of the CPU module used.

In this manual, the safety precautions are classified into two levels: "DANGER" and "CAUTION".

Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Under some circumstances, failure to observe the precautions given under "CAUTION" may lead to serious consequences. Observe the precautions of both levels because they are important for personal and system safety.

Keep this manual in an accessible place for future reference whenever needed, and make sure it is delivered to the end user.

[Precautions for Operating Environment and Conditions]

Caution

- Do not use this product in the places listed below. Failure to follow the instruction may cause malfunctions or decrease of product-life.
  - Places the Ambient temperature exceeds the range 0 to +55°C.
  - Places the Relative humidity exceeds the range 5 - 95% or condensation is observed.
  - Altitude exceeds 2000 m.
  - Places exposed to rain or water drop.
  - Dust, corrosive gas, saline and oil smoke exist.
  - Vibration and impact exceed the specifications.
  - Installation on excluding the control board

[Design Precautions]

Danger

- Do not write data into "System Area" in the buffer memory of the intelligent function module. Also, do not output (turn ON) the "use prohibited" signal in the output signal sent from the sequencer CPU to the intelligent function module. Doing so may cause a malfunction to the sequencer system.
Caution
Do not install the input signal wire together with the main circuit lines or power cables. Keep a distance as below. (Except for the terminal input part) Failure to do so may result in malfunction due to noise.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 600V, or 600A power lines</td>
<td>300mm or more</td>
</tr>
<tr>
<td>Other power lines</td>
<td>600mm or more</td>
</tr>
</tbody>
</table>

[Installation Precautions]

Caution
- Any person who is involved in the installation and the wiring of this Sequencer should be fully competent to do the work.
- Use the programmable controller in an environment that meets the general specifications in the User’s manual of the CPU module used. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount the module, while pressing the module-mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place. Incorrect mounting may cause a malfunction, failure or a fall of the module.
- When using the Sequencer in an environment of frequent vibrations, fix the module with a screw.
- Tighten the screws within the specified torque range.
  - Fixing-Module screw (arranged by user): M3 x 12mm
  - Tightening torque of the fixing-module screws: 0.36 - 0.48 N•m
  - When the screw tightening is loose, it causes a fall, short-circuit, and a malfunction. Over-tightening can damage the screws and the module, and it may cause a fall, short-circuit, or a malfunction.
- Shut off the external power supply for the system in all phases before mounting or removing the module. Failure to do so may result in damage to the product.
- Do not touch directly any conductive parts and electronic parts of the module. Doing so can cause a malfunction or failure of the module.

[Wiring Precautions]

Danger
- For installation and wiring works, make sure that the power source is shut off for all outside phases. If all phases are not turned off, it may cause an electric shock or product damages.
Caution

- FG terminal must be grounded according to the D-type ground (Type 3) dedicated for sequencer. Failure to do so may result in electric shock or malfunction.
- When using this product, make sure to use it in combination with current sensor (EMU-CT***, EMU-CT***-A or EMU2-CT5). Please not to exceed the ratings of this product for input of current sensor. For further details, please refer to current sensor manual to maintain the functionality and the accuracy of this product.
- Current sensor (EMU-CT***, EMU-CT***-A (Excluding EMU-CT5-A)) is used only for low voltage circuit. It cannot be used with a high voltage circuit. Also, EMU2-CT5 and EMU-CT5-A should be used with the secondary side (5 A) of transformer transfixed. If it is connected with a high-voltage circuit by mistake, it may cause a burnout of the device and a fire. It is critically dangerous. For the Allowable maximum voltage, refer to Appendix 2 "Optional devices".
- Current sensor has a polarity (directionality). Be careful about it when installing the module.
- Do not open the secondary side of current sensor.
- Take care not entering any foreign objects such as chips and wire pieces into the module. It may cause a fire, failure or a malfunction.
- In order to prevent the module from incoming foreign objects such as wire pieces during wiring work, a foreign-object preventive label is placed on the module. While a wiring work is performed, keep the label on the module. Before operating the system, peel off the label for heat release. If the foreign-object preventive label is not peeled and the system is in use, residual heat inside the module may reduce the product life.
- The wires to be connected to the module shall be put in a duct or fixed together by clamp. If not, the loosening and unstable wire or careless stretching results in poor contact of electric wires. That may cause a breakage of the module or wire or a malfunction.
- After wiring, confirm whether there is a wiring forgetting or a faulty wiring. They may cause a device malfunction, a fire, or an electric shock.
- If the wires connected to the module are strongly pulled off, it may cause a malfunction or a breakage to the module or the wire. (Tensile load: 22N or less)
- Ensure the wiring to the module properly, checking the rated voltage and current of the product and the terminal pin assignment. If the input voltage exceed the rated voltage or the wiring is improper, it may cause a fire or a breakage.
- Do not exceed the specified voltage when doing an insulation resistance test and a commercial frequency withstand voltage test.
- To protect persons who do not have adequate knowledge of electric equipment from electric shocks, any of the following measures should be taken for the panel.
  (a) To lock the panel so that only trained persons having adequate knowledge of electric equipment can open it.
  (b) To design the structure so that the power is automatically interrupted upon opening of the panel. The protection class of the panel should be IP2X or higher.
- Terminal screws must be tightened to the specified torque. Loose terminal screws may cause a short circuit or malfunction.
  If terminal screws are over-tightened, the screws or the module may be damaged, causing a short circuit or malfunction.
  For specified torque, refer to Section 8.1 Precautions for handling.
- Use an applicable solderless terminal for the current input line and tighten it to the specified torque. If a spade terminal is used, it may fall, causing a breakage of the module when the terminal screw is loosened.
- Use appropriate size of electric wires. If inappropriate size of electric wire is used, it may cause a fire due to generated heat. For appropriate size of electric wires, refer to Section 8.5.2 How to connect wires.
- In case using stranded wire, take measures so that the filament should not vary by processing the point twisted.
- To prevent persons with little knowledge about electric equipment from electric shock, panel must be taken either following measure. Lock the panel so that only those who get an education about electric equipment and have sufficient knowledge can unlock, or shut off power supply automatically by opening the panel. Cover the dangerous part of this unit.
### [Start-up Precautions]

<table>
<thead>
<tr>
<th>Caution</th>
</tr>
</thead>
</table>
| - Use the product within the ratings specified in this manual. When using it outside the ratings, it not only causes a malfunction or failure but also there is a fear of igniting and damaging by a fire.  
- Before operating the product, check that active bare wire and so on does not exist around the product. If any bare wire exists, stop the operation immediately, and take an appropriate action such as isolation protection.  
- Do not disassemble or modify the module. It may cause failure, a malfunction, an injury or a fire.  
- Attaching and detaching the module must be performed after the power source is shut off for all outside phases. If not all phases are shut off, it may cause failure or a malfunction of the module.  
- Do not touch the live terminal. It may cause a malfunction. |

### [Maintenance Precautions]

<table>
<thead>
<tr>
<th>Caution</th>
</tr>
</thead>
</table>
| - Cleaning and additional tightening of screws must be performed after the input power source is shut off for all outside phases. If not all phases are shut off, it may cause failure or a malfunction of the module.  
- Use a soft dry cloth to clean off dirt of the module surface.  
- Do not let a chemical cloth remain on the surface for an extended period nor wipe the surface with thinner or benzene.  
- Check for the following items for using this product properly for long time.  
  <Daily maintenance>  
  (1) No damage on this product  
  (2) No abnormality with LED indicators  
  (3) No abnormal noise, smell or heat.  
  <Periodical maintenance> (Once every 6 months to 1 year)  
  (4) Confirm there is loosing in installation, wire connection to terminal blocks, and the connection of the connectors. (Check these items under the power failure condition.) |

### [Storage Precautions]

<table>
<thead>
<tr>
<th>Caution</th>
</tr>
</thead>
</table>
| - To store this product, turn off the power and remove wires, and put it in a plastic bag.  
  For long-time storage, avoid the following places. Failure to follow the instruction may cause a failure and reduced life of the product.  
  - Places the Ambient temperature exceeds the range -25 to +75°C.  
  - Places the Relative humidity exceeds the range 5 - 95% or condensation is observed.  
  - Dust, corrosive gas, saline and oil smoke exist, and vibration and frequent physical impact occur.  
  - Places exposed to rain or water drop. |

### [Disposal Precautions]

<table>
<thead>
<tr>
<th>Caution</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Dispose of the product as an industrial waste.</td>
</tr>
<tr>
<td>Printed date</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>July, 2012</td>
</tr>
<tr>
<td>Jan, 2016</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Jul, 2017</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

This manual does not guarantee to protect or does not give permission to any industrial property and any related rights. Also, our company shall not be held any responsible for any issues related to industrial properties due to product usage described in this manual.

© 2012 MITSUBISHI ELECTRIC CORPORATION
Table of Content

Safety precautions ........................................................................................................... A-1
Revision history ............................................................................................................... A-5
Table of content ............................................................................................................. A-6
Compliance with the EMC and Low Voltage Directives ............................................. A-8
Product configuration .................................................................................................... A-8

Chapter 1: Overview ....................................................................................................... 1-1

1.1 Features ................................................................................................................... 1-1

Chapter 2: System Configuration .................................................................................... 2-1 - 2-4

2.1 Applicable system ..................................................................................................... 2-1
2.2 Precautions for system configuration ...................................................................... 2-3
2.2 How to check the function version, serial number, and module version ................. 2-3

Chapter 3: Specifications ................................................................................................ 3-1 - 3-3

3.1 General specifications .............................................................................................. 3-1
3.2 Electrical and mechanical specifications .................................................................. 3-2

Chapter 4: Functions ....................................................................................................... 4-1 - 4-18

4.1 List of functions ........................................................................................................ 4-1
4.2 Functions in detail ..................................................................................................... 4-2

Chapter 5: I/O signal to CPU module ............................................................................. 5-1 - 5-8

5.1 List of I/O signals ...................................................................................................... 5-1
5.2 Details of I/O signals ............................................................................................... 5-2

Chapter 6: Buffer memory .............................................................................................. 6-1 - 6-33

6.1 Buffer memory assignment ...................................................................................... 6-1
6.2 Configurable sections (Un\G0 to Un\G99) ................................................................. 6-6
6.3 Measurement sections (Un\G100 to Un\G2999) ....................................................... 6-17
6.4 Common sections (Un\4500 to Un\G4999) .............................................................. 6-32

Chapter 7: Current measuring mode ............................................................................... 7-1 - 7-18

7.1 Measuring functions in the current measuring mode ................................................ 7-1
7.2 Selecting the current measuring mode ..................................................................... 7-1
7.3 List of I/O signals ..................................................................................................... 7-2
7.4 Buffer memory ......................................................................................................... 7-3
7.5 Names and functions of LEDs ................................................................................ 7-4
7.6 Names of signals of terminal block ......................................................................... 7-5
7.7 Wiring ....................................................................................................................... 7-6
7.8 Setting from GX Works2 ......................................................................................... 7-8
7.9 Setting from GX Developer .................................................................................... 7-14
Compliance with the EMC and Low Voltage Directives

(1) For programmable controller system
To configure a system meeting the requirements of the EMC and Low Voltage Directives when incorporating the Mitsubishi programmable controller (EMC and Low Voltage Directives compliant) into other machinery or equipment, refer to QCPU User's Manual (Hardware Design, Maintenance and Inspection).
The CE mark, indicating compliance with the EMC and Low Voltage Directives, is printed on the rating plate of the programmable controller.

(2) For the product
For the compliance of this product with the EMC and Low Voltage Directives, refer to Section 8.5 Wiring.

(3) CE marking conformity combination module
This module conforms to CE marking standard in a condition to make combination use with following current censor and cable.

(a) Current input

<table>
<thead>
<tr>
<th>current censor</th>
<th>EMU-CT50, EMU-CT100, EMU-CT250, EMU-CT400, EMU-CT600, EMU-CT400-A, EMU-CT600-A</th>
<th>EMU2-CT5</th>
</tr>
</thead>
<tbody>
<tr>
<td>cable or current censor cable</td>
<td>CE marking cable (twisted pair cable) Stranded wire: AWG20 – AWG18 (0.5 - 0.8 mm²) Solderless terminal: R1.25-3 (No solderless terminal with insulation sleeve can be used.)</td>
<td>EMU2-CB-Q5B (indispensable) EMU2-CB-T1M, EMU2-CB-T5M EMU2-CB-T10M, EMU2-CB-T1MS EMU2-CB-T5MS, EMU2-CB-T10MS</td>
</tr>
<tr>
<td>Max. cable length</td>
<td>50m</td>
<td>11m (EMU2-CT5 include)</td>
</tr>
</tbody>
</table>

(b) Voltage input

<table>
<thead>
<tr>
<th>cable</th>
<th>CE marking cable (twisted pair cable) Single wire: AWG24 – AWG16 (φ0.5 - 1.3mm) Stranded wire: AWG24 – AWG16 (0.2 – 1.3 mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. cable length</td>
<td>50m</td>
</tr>
</tbody>
</table>

Product configuration

The following describes the product configuration.

<table>
<thead>
<tr>
<th>Model name</th>
<th>Product name</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>QE84WH</td>
<td>Energy Measuring Module</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Voltage input terminals</td>
<td>1</td>
</tr>
</tbody>
</table>
Chapter 1: Overview

This manual explains specifications, handling methods, and programming of Energy Measuring Module QE84WH (hereinafter, abbreviated as QE84WH) supporting MELSEC-Q series.

1.1 Features

(1) This Energy Measuring Module can measure four channels of various types of electric quantity.
   It can measure four channels of electric energy, reactive energy, current, voltage, electric power, reactive power, power factor, and frequency.
   Both consumption and regeneration of the electric energy can be measured.

(2) Extensive monitoring functions
   In addition to memorizing the maximum and minimum values, two types of alarm monitoring for upper and lower limit can be performed for each channel.

(3) It also can measure the electric energy for a certain period.
   It can measure the electric energy for the duration of time for which the output device is on.
   This feature enables to acquire the electric energy needed during device operation or energy per tact.

(4) Equipped with the current measuring mode where eight channels of current can be measured.
   By selecting the current measuring mode using the intelligent function module switch, you can measure only the current through eight channels.
   Note that the input/output signals and buffer memory to be used in the current measuring mode are different from those used in the regular operation mode. For details, refer to Chapter 7.
Chapter 2: System Configuration

2.1 Applicable system

The following describes applicable systems.

(1) Applicable module and the quantity of attachable pieces

(a) When mounted with CPU module

CPU module to which QE84WH can be attached and the number of attachable pieces are shown below.

Depending on the combination of the attached module and the number of attached pieces, lack of power capacity may occur.

When attaching the module, please consider the power capacity.

If the power capacity is insufficient, reconsider the combination of modules to be attached.

Since the number of attachable modules are limited by the power module which used, please refer to the notes on the 2.2 precautions for system configuration.

<table>
<thead>
<tr>
<th>Attachable CPU Module</th>
<th>CPU Type</th>
<th>CPU Model</th>
<th>Attachable quantity.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmable controller CPU</td>
<td>Basic model QCPU</td>
<td>Q00JCPU</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q00CPU</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q01CPU</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High performance model QCPU</td>
<td>Q02CPU</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q02HCPU</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q06HCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q12HCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q25HCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Process CPU</td>
<td>Q02PHCPU</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q06PHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q12PHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q25PHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Redundant CPU</td>
<td>Q12PRHCPU</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q25PRHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Universal model QCPU</td>
<td>Q00UJCPU</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q00UCPU</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q01UCPU</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q02UCPU</td>
<td>36</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q03UDCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q04UDHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q06UDHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q10UDHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q13UDHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q20UDHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q26UDHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q03UDECPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q04UDEHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q06UDEHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q10UDEHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q13UDEHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q20UDEHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q26UDEHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q05UDEHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q100UDEHCPU</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# 2 System configuration

## 2 System configuration

### Attachable CPU Module

<table>
<thead>
<tr>
<th>CPU Type</th>
<th>CPU Model</th>
<th>Attachable quantity</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmable controller CPU</td>
<td>High-speed Universal model QCPU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QCPU</td>
<td>Q03UDVCPU</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q04UDVCPU</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q06UDVCPU</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q13UDVCPUE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q26UDVCPUE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q04UDPVCPUE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q06UDPVCPUE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q13UDPVCPUE</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q26UDPVCPUE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C Controller module</td>
<td>Q06CCPU-V</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q06CCPU-V-B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q12DCCPU-V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q24DHCCPU-LS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q24DHCCPU-V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q26DHCCPU-LS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) When mounted with MELSECNET/H remote I/O station

The table below shows the network modules applicable to the QE84WH and the number of network modules to be mounted. Depending on the combination with other modules or the number of mounted modules, power supply capacity may be insufficient. Pay attention to the power supply capacity before mounting modules, and if the power supply capacity is insufficient, change the combination of the modules.

### Applicable Network Module

<table>
<thead>
<tr>
<th>Network Module</th>
<th>Number of modules</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>QJ72LP25-25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>QJ72LP25G</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>QJ72BR15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(c) Attachable base unit

QE84WH can be attached to any I/O slot of the basic base unit and expansion base unit (*1) (*2).

*1 In the case of dual CPU, it can be attached only to an expansion base unit. It cannot be attached to the base unit.

*2 It has to be within the range of I/O slots of the CPU module.

(2) For multiple CPU system

The function version of the first released CT input module is C, and the CT input module supports multiple CPU systems.

When using the CT input module in a multiple CPU system, refer to the following.

*QCPU User’s Manual (Multiple CPU system)
(3) Applicable software package

QE84WH supported software packages are as follows:

(a) Software package for sequencer

<table>
<thead>
<tr>
<th>Product name</th>
<th>Model name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>GX Works2</td>
<td>SW1DNC-GXW2</td>
<td>iQ Platform compatible programmable controller engineering software</td>
</tr>
<tr>
<td>GX Developer</td>
<td>SWnD5C-GPPW</td>
<td>MELSEC sequencer programming software “n” in the model name is 4 or larger.</td>
</tr>
</tbody>
</table>

2.2 Precautions for system configuration

(1) When attaching it to an expansion base without a power module

If QE84WH is attached to an expansion base without a power module, refer to the user’s manual of the sequencer CPU to be used in order to select the power module and expansion cable.

2.3 How to check the function version, serial number, and module version

(1) How to check the module version

It can be checked with the serial number label (placed on the right side of QE84WH).
(2) How to check the function version and serial number
(a) Checking on the front of the module
The serial number and function version on the rating plate is shown on the front
(at the bottom) of the module.

(b) Checking on the System monitor dialog box (Product Information List)
To display the system monitor, select [Diagnostics] → [System monitor] and
click the Product Information List button of GX Developer.

Point
The serial number displayed on the Product Information List dialog box of GX
Developer may differ from that on the rating plate and on the front of the module.

- The serial number on the rating plate and front part of the module indicates
  the management information of the product.
- The serial number displayed on the Product Information List dialog box of GX
  Developer indicates the function information of the product.
  The function information of the product is updated when a new function is
  added.
Chapter 3: Specifications

3.1 General specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase wire system</strong></td>
<td>single-phase 2-wire / single-phase 3-wire / three-phase 3-wire</td>
</tr>
<tr>
<td><strong>Rating</strong></td>
<td><strong>Voltage</strong> circuit</td>
</tr>
<tr>
<td></td>
<td>single-phase 2-wire, three-phase 3-wire</td>
</tr>
<tr>
<td></td>
<td>100 – 220 V AC</td>
</tr>
<tr>
<td></td>
<td>single-phase 3-wire</td>
</tr>
<tr>
<td></td>
<td>110V AC (1 - 2 line, 2 - 3 line) 220 V (1 - 3 line)</td>
</tr>
<tr>
<td><strong>Current circuit</strong></td>
<td>50 A, 100 A, 250 A, 400 A, 600 A AC</td>
</tr>
<tr>
<td></td>
<td>(Current sensor is used. Each value refers to the current at the prime side of current sensor.)</td>
</tr>
<tr>
<td></td>
<td>5 AAC</td>
</tr>
<tr>
<td></td>
<td>(Current sensor is used together with current transformer (CT), and the primary-side current is configurable up to 6000 A.)</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>50-60 Hz</td>
</tr>
<tr>
<td><strong>Allowable tolerance of main module (excluding current sensor)</strong></td>
<td>Current, current demand *4 : ±1.0% (100% of the rating)</td>
</tr>
<tr>
<td></td>
<td>Voltage : ±1.0% (100% of the rating)</td>
</tr>
<tr>
<td></td>
<td>Electric power, electric power demand *4 : ±1.0% (100% of the rating)</td>
</tr>
<tr>
<td></td>
<td>Reactive power : ±1.0% (100% of the rating)</td>
</tr>
<tr>
<td></td>
<td>Frequency : ±1.0% (45 – 65 Hz range of the rating)</td>
</tr>
<tr>
<td></td>
<td>Power factor : ±3.0% (against the electric angle 90°)</td>
</tr>
<tr>
<td></td>
<td>Electric energy : ±2.0% (5 – 100% range of the rating, power factor = 1)</td>
</tr>
<tr>
<td></td>
<td>Reactive energy : ±2.5% (10 – 100% range of the rating, power factor = 0)</td>
</tr>
<tr>
<td><strong>Measurable circuit count</strong></td>
<td>4 circuits (4 channels) under the same voltage system, or 8 circuits (8 channels) in the current measuring mode</td>
</tr>
<tr>
<td><strong>Data update cycle</strong></td>
<td>500 ms *5 (100 ms in the current measuring mode)</td>
</tr>
<tr>
<td><strong>Response time</strong></td>
<td>2 seconds or less</td>
</tr>
<tr>
<td><strong>Backup for electric blackout</strong></td>
<td>Backup is made using nonvolatile memory.</td>
</tr>
<tr>
<td></td>
<td>(Stored items: settings, the max./min. values and time of occurrence, electric energy (consumption, regenerated), reactive energy (consumption lag), and periodic electric energy)</td>
</tr>
<tr>
<td><strong>I/O occupation</strong></td>
<td>32 points (I/O assignment: intelligence 32 points)</td>
</tr>
</tbody>
</table>

*1: 100 - 220V AC direct connection is possible. For the circuit over this voltage, transformer (VT) is necessary (Primary voltage of VT can be set up to 6600V, and secondary voltage of VT can be set up to 220V as optional setting). Star – delta connection and delta – star connection transformer instead of VT cannot measure definitely to be out of phase. Please use a transformer of the same connection.

*2: 5 A primary current can be set when using the current sensor is as follows.


*3: The ratio error of the current sensor : ±1.0% (5 – 100% range of the rating)

*4: Demand shows the moving average of a set period.

*5: Always accumulating the integrated values of Wh and varh. It can capture short-cycled load fluctuation (500 ms or shorter).
### 3 Specifications

#### 3.2 Electrical and mechanical specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consumed VA</strong></td>
<td>Each phase 0.1 VA (at 110 V AC), Each phase 0.2 VA (at 220 V AC)</td>
</tr>
<tr>
<td><strong>Current circuit</strong></td>
<td>Each phase 0.1 VA (secondary side of current sensor)</td>
</tr>
<tr>
<td><strong>Internal current consumption (5 V DC)</strong></td>
<td>0.46 A</td>
</tr>
<tr>
<td><strong>Operating temperature</strong></td>
<td>0 – +55°C (Average daily temperature 35°C or below)</td>
</tr>
<tr>
<td><strong>Operating humidity</strong></td>
<td>5 – 95% RH (No condensation)</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>-25° – +75°C</td>
</tr>
<tr>
<td><strong>Storage humidity</strong></td>
<td>5 – 95% RH (No condensation)</td>
</tr>
<tr>
<td><strong>Operating altitude</strong></td>
<td>2000m or below</td>
</tr>
<tr>
<td><strong>Installation area</strong></td>
<td>Inside a control panel</td>
</tr>
<tr>
<td><strong>Operating environment</strong></td>
<td>No corrosive gas</td>
</tr>
<tr>
<td><strong>Vibration resistance</strong></td>
<td>Conforms to JIS B 3502, IEC 61131-2</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>Constant acceleration</td>
</tr>
<tr>
<td><strong>Intermittent vibration</strong></td>
<td>5 – 8.4 Hz</td>
</tr>
<tr>
<td></td>
<td>8.4 – 150 Hz</td>
</tr>
<tr>
<td><strong>Continuous vibration</strong></td>
<td>5 – 8.4 Hz</td>
</tr>
<tr>
<td></td>
<td>8.4 – 150 Hz</td>
</tr>
<tr>
<td><strong>Impact resistance</strong></td>
<td>Conforms to JIS B 3502, IEC 61131-2 (147m/s², XYZ each direction 3 times)</td>
</tr>
<tr>
<td><strong>Over voltage category</strong></td>
<td>II or less</td>
</tr>
<tr>
<td><strong>Pollution degree</strong></td>
<td>2 or less</td>
</tr>
<tr>
<td><strong>Equipment category</strong></td>
<td>Class I</td>
</tr>
<tr>
<td><strong>Applicable wire (Usable electric wire)</strong></td>
<td><strong>Voltage input terminal</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Stranded wire</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Current input terminal</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Stranded wire</strong></td>
</tr>
<tr>
<td><strong>Tightening torque</strong></td>
<td>Current input terminal block fixing screws (M3.5)</td>
</tr>
<tr>
<td></td>
<td>Module-fixing screws (M3 screw)</td>
</tr>
<tr>
<td><strong>Commercial frequency withstand voltage</strong></td>
<td>Between voltage/current input terminals - FG terminal</td>
</tr>
<tr>
<td></td>
<td>Between voltage/current input terminals - sequencer power source and GND terminals</td>
</tr>
<tr>
<td><strong>Insulation resistance</strong></td>
<td>5 MΩ or more (500 V DC) at locations above</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>27.4 mm (W) x 98 mm (H) x 112 mm (D) excluding protruding portions</td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td>0.19 kg</td>
</tr>
<tr>
<td><strong>Product life expectancy</strong></td>
<td>10 years (used under the average daily temperature 35°C or less)</td>
</tr>
</tbody>
</table>
3 Specifications

*1. This indicates the assumed area of electric distribution to which the device is connected, the area ranging from public distribution to factory machinery. The category II applies to the device power-supplied from fixed facility. The surge voltage of this product is 2500 V up to the rated voltage of 300 V.

*2. The index indicates the level of conductive substance at the device’s operating environment. Contamination level 2 means only non-conductive substance. However, occasional condensation may lead to temporary conduction.

*3. At the connection between the secondary terminal of current sensor (k, l) and the main module terminal (1k, 1l, 3k, 3l), use twisted pair cable.

*4. When using stranded wires for the voltage input terminals, strand the wire edges to prevent thin wires from loosening.

*5. When using stranded wires for the current input terminals, use applicable solderless terminals. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure. In addition, no solderless terminal with insulation sleeve can be used.

*6. The module can be fixed easily to the base unit, using the hook on top of the module. However, if it is used under a vibrating environment, we strongly recommend that the module be fixed with screws.

*7. When combine this unit with a CT (Model: EMU2-CT5, EMU-CT50, EMU-CT100, EMU-CT250, EMU-CT400-A, EMU-CT600-A), it becomes UL standard.
Chapter 4: Functions

4.1 List of functions

Functions of QE84WH are provided in Table 4.1-1. The “n” that is used in this and later chapters (for example: Xn0, Yn0, Un\G0, etc.) refers to the number that appears at the beginning of QE84WH.

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
<th>Descriptions</th>
<th>Reference section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Measurement</td>
<td>It measures current, current demand, voltage, electric power, electric power demand, reactive power, power factor, frequency, electric energy (consumption, regeneration), and reactive energy (consumption lag) and sequentially stores the records into the buffer memory.</td>
<td>Section 4.2.1</td>
</tr>
<tr>
<td>2</td>
<td>Periodic electric energy</td>
<td>The electric energy only for a period of time when a certain output signal is ON will be stored in the buffer memory. Periodic energy 1 and 2 can be measured independently.</td>
<td>Section 4.2.2</td>
</tr>
<tr>
<td>3</td>
<td>Hold max./min. values</td>
<td>For current demand, voltage, electric power demand, and power factor, each maximum/minimum values and date/time of occurrence are stored.</td>
<td>Section 4.2.3</td>
</tr>
<tr>
<td>4</td>
<td>Upper/lower limit alarm monitoring</td>
<td>Of current demand, voltage, electric power demand, and power factor, you can select two items for which their upper/lower limit can be monitored. If it exceeds the upper limit or goes below the lower limit, the specified input signal is turned on.</td>
<td>Section 4.2.4</td>
</tr>
<tr>
<td>5</td>
<td>Test</td>
<td>Selecting the test mode using the intelligent function module switch enables pseudo-storage of the specified value into the buffer memory, even with non-existence of input from voltage and current (sensor). Using this module, you can create a sequence, etc.</td>
<td>Section 4.2.5</td>
</tr>
<tr>
<td>6</td>
<td>Integrated value set</td>
<td>Set the integrated value (electric energy (consumption, regeneration), reactive energy (consumption lag)) to an arbitrary value. It is used to clear integrated value.</td>
<td>Section 4.2.6</td>
</tr>
<tr>
<td>7</td>
<td>Current measuring mode function</td>
<td>By selecting the current measuring mode using the intelligent function module switch, you can measure eight channels of current and sequentially store the records into the buffer memory.</td>
<td>Chapter 7</td>
</tr>
</tbody>
</table>
4 Functions

4.2 Functions in detail

4.2.1 Measuring functions

(1) Measured items

Measured items of each channel are described as follows:
Each measured item is stored in the buffer memory every 500 ms.

<table>
<thead>
<tr>
<th>Measured items</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>1 - phase current</td>
</tr>
<tr>
<td></td>
<td>2 - phase current(^1)</td>
</tr>
<tr>
<td></td>
<td>3 - phase current(^1) average</td>
</tr>
<tr>
<td>Current demand</td>
<td>1 - phase current demand</td>
</tr>
<tr>
<td>* The average of fluctuation for the set period of current demand time is indicated.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 - phase current demand(^1)</td>
</tr>
<tr>
<td></td>
<td>3 - phase current demand(^1)</td>
</tr>
<tr>
<td></td>
<td>Max. value</td>
</tr>
<tr>
<td></td>
<td>Min. value</td>
</tr>
<tr>
<td></td>
<td>Date of max. value occurrence</td>
</tr>
<tr>
<td></td>
<td>Date of min. value occurrence</td>
</tr>
<tr>
<td>Voltage</td>
<td>1 - 2 line voltage (voltage V12)</td>
</tr>
<tr>
<td></td>
<td>2 - 3 line voltage(^1) (voltage V23)</td>
</tr>
<tr>
<td></td>
<td>3 - 1 line voltage(^1) (voltage V31)</td>
</tr>
<tr>
<td></td>
<td>average voltage</td>
</tr>
<tr>
<td></td>
<td>Max. value</td>
</tr>
<tr>
<td></td>
<td>Min. value</td>
</tr>
<tr>
<td></td>
<td>Date/time of max. value occurrence</td>
</tr>
<tr>
<td></td>
<td>Date/time of min. value occurrence</td>
</tr>
<tr>
<td>Electric power</td>
<td>Present value</td>
</tr>
<tr>
<td>Electric power demand</td>
<td>Present value</td>
</tr>
<tr>
<td>* The average of fluctuation for the set period of electric power demand time is indicated.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Max. value</td>
</tr>
<tr>
<td></td>
<td>Min. value</td>
</tr>
<tr>
<td></td>
<td>Date/time of max. value occurrence</td>
</tr>
<tr>
<td></td>
<td>Date/time of min. value occurrence</td>
</tr>
<tr>
<td>Reactive power</td>
<td>Reactive power</td>
</tr>
<tr>
<td>Power factor</td>
<td>Present value</td>
</tr>
<tr>
<td></td>
<td>Max. value</td>
</tr>
<tr>
<td></td>
<td>Min. value</td>
</tr>
<tr>
<td></td>
<td>Date/time of max. value occurrence</td>
</tr>
<tr>
<td></td>
<td>Date/time of min. value occurrence</td>
</tr>
<tr>
<td>Frequency</td>
<td>Present value</td>
</tr>
<tr>
<td>Electric energy</td>
<td>Electric energy (consumption)</td>
</tr>
<tr>
<td></td>
<td>Electric energy (regeneration)</td>
</tr>
<tr>
<td>Reactive energy</td>
<td>Reactive energy (consumption lag)</td>
</tr>
<tr>
<td>Periodic electric energy</td>
<td>Periodic electric energy 1</td>
</tr>
<tr>
<td></td>
<td>Periodic electric energy 2</td>
</tr>
</tbody>
</table>

\(^1\): If phase wire system is set to single-phase 2-wire, measurement will not be taken.
(2) Total, maximum, and minimum values

The following describes how to calculate the maximum, minimum, and total values.

<table>
<thead>
<tr>
<th>Item</th>
<th>Phase wire system</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average current</td>
<td>single-phase 2-wire</td>
<td>Average current = 1-phase current</td>
</tr>
<tr>
<td></td>
<td>single-phase 3-wire</td>
<td>Average current = (1-phase current + 3-phase current) / 2</td>
</tr>
<tr>
<td></td>
<td>three-phase 3-wire</td>
<td>Average current = (1-phase current + 3-phase current) / 2</td>
</tr>
<tr>
<td>Average voltage</td>
<td>single-phase 2-wire</td>
<td>Average voltage = voltage V12</td>
</tr>
<tr>
<td></td>
<td>single-phase 3-wire</td>
<td>Average voltage = (voltage V12 + voltage V23) / 2</td>
</tr>
<tr>
<td></td>
<td>three-phase 3-wire</td>
<td>Average voltage = (voltage V12 + voltage V23) / 2</td>
</tr>
<tr>
<td>Maximum current demand</td>
<td>single-phase 2-wire</td>
<td>Maximum value of 1-phase current demand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The highest value after the max./min. value was reset.)</td>
</tr>
<tr>
<td></td>
<td>single-phase 3-wire</td>
<td>Highest value of either 1-phase current demand or 3-phase current demand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The highest value after the max./min. value was reset.)</td>
</tr>
<tr>
<td></td>
<td>three-phase 3-wire</td>
<td>Highest value among 1-phase current demand, 2-phase current demand, or 3-phase current demand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The highest value after the max./min. value was reset.)</td>
</tr>
<tr>
<td>Minimum current demand</td>
<td>single-phase 2-wire</td>
<td>Minimum value of 1-phase current demand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The lowest value after the max./min. value was reset.)</td>
</tr>
<tr>
<td></td>
<td>single-phase 3-wire</td>
<td>Lowest value of either 1-phase current demand or 3-phase current demand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The lowest value after the max./min. value was reset.)</td>
</tr>
<tr>
<td></td>
<td>three-phase 3-wire</td>
<td>Lowest value among 1-phase current demand, 2-phase current demand, or 3-phase current demand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The lowest value after the max./min. value was reset.)</td>
</tr>
<tr>
<td>Maximum voltage</td>
<td>single-phase 2-wire</td>
<td>Highest value of the 1 - 2 line voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The highest value after the max./min. value was reset.)</td>
</tr>
<tr>
<td></td>
<td>single-phase 3-wire</td>
<td>Highest value of either the 1 - 2 line voltage or the 2 - 3 line voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The highest value after the max./min. value was reset.)</td>
</tr>
<tr>
<td></td>
<td>three-phase 3-wire</td>
<td>Highest value among the 1 - 2 line voltage, the 2 - 3 line voltage, or 3 - 1 line voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The highest value after the max./min. value was reset.)</td>
</tr>
<tr>
<td>Minimum voltage</td>
<td>single-phase 2-wire</td>
<td>Lowest value of the 1 - 2 line voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The lowest value after the max./min. value was reset.)</td>
</tr>
<tr>
<td></td>
<td>single-phase 3-wire</td>
<td>Lowest value of either the 1 - 2 line voltage or the 2 - 3 line voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The lowest value after the max./min. value was reset.)</td>
</tr>
<tr>
<td></td>
<td>three-phase 3-wire</td>
<td>Lowest value among the 1 - 2 line voltage, the 2 - 3 line voltage, or 3 - 1 line voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(The lowest value after the max./min. value was reset.)</td>
</tr>
</tbody>
</table>
(3) Resolution of measured data
Resolution of measured data according to the rating (phase wire system, primary voltage, and primary current) is described as follows.

1) Current, current demand

<table>
<thead>
<tr>
<th>Rated primary current setting</th>
<th>Multiplier</th>
<th>Resolution*</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 A to 30 A</td>
<td>-3</td>
<td>2 digits after the decimal point 0.01 A</td>
</tr>
<tr>
<td>40 A to 300 A</td>
<td>-3</td>
<td>1 digit after the decimal point 0.1 A</td>
</tr>
<tr>
<td>400 A to 3000 A</td>
<td>-3</td>
<td>Integer 1 A</td>
</tr>
<tr>
<td>4000 A to 6000 A</td>
<td>-3</td>
<td>×10 10 A</td>
</tr>
</tbody>
</table>

* Digits lower than the resolution are fixed to 0.

2) Voltage

<table>
<thead>
<tr>
<th>Rated primary voltage setting</th>
<th>Multiplier</th>
<th>Resolution*</th>
</tr>
</thead>
<tbody>
<tr>
<td>110 V to 220 V</td>
<td>-3</td>
<td>1 digit after the decimal point 0.1 V</td>
</tr>
<tr>
<td>440 V to 2200 V</td>
<td>-3</td>
<td>Integer 1 V</td>
</tr>
<tr>
<td>3300 V to 6600 V</td>
<td>-3</td>
<td>×10 10 V</td>
</tr>
</tbody>
</table>

* Digits lower than the resolution are fixed to 0.

3) Electric power, electric power demand, reactive power

<table>
<thead>
<tr>
<th>Full load power W*1</th>
<th>Multiplier</th>
<th>Resolution*23</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.  W &lt;12 kW</td>
<td>-3</td>
<td>3 digits after the decimal point 0.001 kW</td>
</tr>
<tr>
<td>II. 12 kW ≤ W &lt; 120 kW</td>
<td>-3</td>
<td>2 digits after the decimal point 0.01 kW</td>
</tr>
<tr>
<td>III. 120 kW ≤ W &lt; 1200 kW</td>
<td>-3</td>
<td>1 digit after the decimal point 0.1 kW</td>
</tr>
<tr>
<td>IV. 1200 kW ≤ W &lt; 12000 kW</td>
<td>-3</td>
<td>Integer 1 kW</td>
</tr>
<tr>
<td>V. 12000 kW ≤ W &lt; 120000 kW</td>
<td>-3</td>
<td>×10 10 kW</td>
</tr>
</tbody>
</table>

*1 For calculating full load power W, refer to Table 4.2.1-1.
*2 Digits lower than the resolution are fixed to 0.
*3 In the case of reactive power, the unit will be kvar.

4) Power factor

<table>
<thead>
<tr>
<th>Power factor</th>
<th>Multiplier</th>
<th>Resolution*</th>
</tr>
</thead>
<tbody>
<tr>
<td>All setting ranges</td>
<td>-3</td>
<td>1 digit after the decimal point 0.1%</td>
</tr>
</tbody>
</table>

* Digits lower than the resolution are fixed to 0.

5) Frequency

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Multiplier</th>
<th>Resolution*</th>
</tr>
</thead>
<tbody>
<tr>
<td>All setting ranges</td>
<td>-3</td>
<td>1 digit after the decimal point 0.1 Hz</td>
</tr>
</tbody>
</table>

* Digits lower than the resolution are fixed to 0.
6) Electric energy, Reactive energy, periodic electric energy

<table>
<thead>
<tr>
<th>Full load power $W$</th>
<th>Multiplier</th>
<th>Resolution</th>
<th>Range $[\text{kWh}, \text{kvarh}]$</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. $W &lt; 12\ kW$</td>
<td>-5</td>
<td>5 digits after the decimal point</td>
<td>0.00001 kWh, kvarh</td>
</tr>
<tr>
<td>II. $12\ kW \leq W &lt; 120\ kW$</td>
<td>-4</td>
<td>4 digits after the decimal point</td>
<td>0.0001 kWh, kvarh</td>
</tr>
<tr>
<td>III. $120\ kW \leq W &lt; 1200\ kW$</td>
<td>-3</td>
<td>3 digits after the decimal point</td>
<td>0.001 kWh, kvarh</td>
</tr>
<tr>
<td>IV. $1200\ kW \leq W &lt; 12000\ kW$</td>
<td>-2</td>
<td>2 digits after the decimal point</td>
<td>0.01 kWh, kvarh</td>
</tr>
<tr>
<td>V. $12000\ kW \leq W &lt; 120000\ kW$</td>
<td>-1</td>
<td>1 digit after the decimal point</td>
<td>0.1 kWh, kvarh</td>
</tr>
</tbody>
</table>

*1 For calculating full load power $W$, refer to Table 4.2.1-1.

*2 Because the higher resolution than a typical watt-hour meter, the minimum digit values will change more than 2 at once update. According to setting value of input voltage, primary current, primary voltage of VT and the condition of load.

Table 4.2.1-1 How to calculate full load power

(a) single-phase 2-wire system

<table>
<thead>
<tr>
<th>Primary voltage $[\text{V}]$</th>
<th>110</th>
<th>220</th>
<th>440</th>
<th>690</th>
<th>1100</th>
<th>2200</th>
<th>3300</th>
<th>6600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary current $[\text{A}]$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.5</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>750</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1600</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2500</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3000</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4000</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5000</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6000</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$W, \text{var}$ : 3 digits after the decimal point
$Wh, \text{varh}$ : 2 digits after the decimal point

$W, \text{var}$ : 2 digits after the decimal point
$Wh, \text{varh}$ : 1 digit after the decimal point

$W, \text{var}$ : 1 digit after the decimal point
$Wh, \text{varh}$ : Integer

$W, \text{var}$ : Integer
$Wh, \text{varh}$ : $\times 10$

$W, \text{var}$ : $\times 10$
$Wh, \text{varh}$ : $\times 100$
(b) single-phase 3-wire system

Primary voltage [V]

5
6
7.5
8
10
12
15
20
25
30
40
50
60
75
80
100
120
150
200
250
300
400
500
600
750
800
1000
1200
1500
1600
2000
2500
3000
4000
5000
6000

W, var : 3 digits after the decimal point
Wh, var h: 2 digits after the decimal point

Primary current [A]

W, var: 2 digits after the decimal point
Wh, var h: 1 digit after the decimal point

W, var: 1 digit after the decimal point
Wh, var h: Integer

W, var: Integer
Wh, var h: x 10
### 4 Functions

#### (c) three-phase 3-wire system

<table>
<thead>
<tr>
<th>Primary voltage [V]</th>
<th>110</th>
<th>220</th>
<th>440</th>
<th>690</th>
<th>1100</th>
<th>2200</th>
<th>3300</th>
<th>6600</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>750</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>800</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1600</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>W, var : 3 digits after the decimal point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wh, varh : 2 digits after the decimal point</td>
</tr>
</tbody>
</table>

### Conversion Factors

- W, var : Integer
- Wh, varh : × 10
- W, varh : × 100
(4) Restrictions for measuring data

- Measurement cannot be performed immediately after the power loading to the sequencer system (Module ready signal is under the OFF condition). After checking that Module ready (Xn0) is ON, obtain measuring data.
- Measurement cannot be performed immediately after operating conditions are set up to the module. After checking that Operating condition setting completion flag (Xn9) becomes ON, obtain measuring data.
- Behaviors during operation are as follows:

<table>
<thead>
<tr>
<th>Measuring Item</th>
<th>Behavior of the module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>When the input current is less than 0.4% of the rating current, it becomes 0A.</td>
</tr>
<tr>
<td>Current demand</td>
<td>Current demand is obtained by current moving average. Therefore, even if current is 0A, current demand may not be 0A.</td>
</tr>
<tr>
<td>Voltage</td>
<td>When the input voltage is less than 10% of the rating voltage, it becomes 0V.</td>
</tr>
<tr>
<td>Electric power, Reactive power</td>
<td>When current is 0A (at all phases are 0A) or when voltage is 0V (all in-between wires are 0V), it becomes 0kW.</td>
</tr>
<tr>
<td>Electric power demand</td>
<td>Electric power demand is obtained by electric power moving average. Therefore, even if electric power is 0kW, electric power demand may not be 0kW.</td>
</tr>
<tr>
<td>Electric energy</td>
<td>The electric energy is measured with a load that is about 0.4% or more of all load power. Even if the indicated value is “0”, measurement value will increase.</td>
</tr>
<tr>
<td>Power factor</td>
<td>When current is 0A (at all phases are 0A) or when voltage is 0V (all in-between wires are 0V), it becomes 100%.</td>
</tr>
<tr>
<td>Frequency</td>
<td>Voltage condition When the input voltage is less than 10% of the rating voltage, it becomes 0Hz.</td>
</tr>
<tr>
<td></td>
<td>Frequency condition When it is less than 44.5Hz, it is fixed to 44.5Hz.</td>
</tr>
</tbody>
</table>
4 Functions

4.2.2 Measuring function for periodic electric energy

This function is to measure electric energy for a certain period, and stores it into the buffer memory. It can be used to measure electric energy for a certain tact or energy (standby power) when the facility or equipment is not in operation.

(1) Overview

1) It can measure two periodic electric energy (periodic electric energy 1 and periodic electric energy 2) of each channel. Each of these can be measured independently.
2) During the time when Periodic electric energy 1 measurement flag / Periodic electric energy 2 measurement flag is ON, periodic electric energy can be measured.
3) Periodic electric energy is stored in the nonvolatile memory, so that it can be retained even at a power source reset.
4) I/O signals and buffer memory corresponding to each periodic electric energy 1 and 2 are provided below.

<table>
<thead>
<tr>
<th>CH</th>
<th>Periodic electric energy 1</th>
<th>Periodic electric energy 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH1</td>
<td>UniG114, 115</td>
<td>Yn5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Xn5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yn7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Xn7</td>
</tr>
<tr>
<td>CH2</td>
<td>UniG116, 117</td>
<td>Yn6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Xn6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yn8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Xn8</td>
</tr>
<tr>
<td>CH3</td>
<td>UniG2114, 2115</td>
<td>Yn11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Xn11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yn13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Xn13</td>
</tr>
<tr>
<td>CH4</td>
<td>UniG3114, 3115</td>
<td>Yn17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Xn17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yn19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Xn19</td>
</tr>
</tbody>
</table>

Measurement of periodic electric energy is performed every measuring cycle (500 ms). Therefore, if the time to turn ON the periodic electric energy measurement flag is set to 500 ms or less, measurement may not be taken.
(2) Basic procedure

1) Measuring periodic electric energy
   (a) Check that CH1 periodic electric energy 1 measurement flag (Yn5) is OFF.
   (b) Check CH1 periodic electric energy 1 (Un\G114, 115).
   (c) When starting measurement, set CH1 periodic electric energy 1 measurement flag (Yn5) to ON.
   This module starts measuring the specified periodic electric energy, and CH1 periodic electric energy 1 data completion flag (Xn5) will be turned OFF.
   (d) When stopping measurement, set CH1 periodic electric energy 1 measurement flag (Yn5) to OFF.
   This module stops measuring the specified periodic electric energy, and CH1 periodic electric energy 1 data completion flag (Xn5) will be turned ON.
   (e) Check that CH1 periodic electric energy 1 data completion flag (Xn5) becomes ON, and obtain the value of periodic electric energy.

2) Resetting periodic electric power
   (a) Check that CH1 periodic electric energy 1 measurement flag (Yn5) is OFF and CH1 periodic electric energy 1 reset request (Yn7) is OFF.
   (b) Set CH1 periodic electric energy 1 reset request (Yn7) to ON. The specified periodic electric energy is reset to 0 kWh, and CH1 periodic electric energy 1 reset completion flag (Xn7) will be turned ON.
   (c) Check that CH1 periodic electric energy 1 reset completion flag (Xn7) has become ON, and then set CH1 periodic electric energy 1 reset request (Yn7) to OFF.
   CH1 periodic electric energy 1 reset completion flag (Xn7) will be turned OFF.

---

**Figure 4.2.2-1 Basic procedure of measuring the periodic electric energy**

**Figure 4.2.2-2 How to reset the periodic electric energy**
(3) Sample use case

1) Procedure for continuously measuring periodic electric energy
   If you turn CH1 periodic electric energy 1 measurement flag to ON only for the extent of time you want to measure, this module accumulates the power starting at the previously measured amount. Usage procedure is the same as 1) in (2).
   An example is provided below.

   Figure 4.2.2-3 Example of continuous measurement of periodic electric energy

2) Procedure for measuring periodic electric energy after every reset
   If you turn Periodic electric energy measurement flag (Yn1/Yn2) to ON only for the extent of time you want to measure, this module accumulates the power starting at the previously measured amount. The following describes the usage procedure.

   (a) Check that CH1 periodic electric energy 1 measurement flag (Yn5) is OFF and CH1 periodic electric energy 1 reset request (Yn7) is OFF.
   (b) Set CH1 periodic electric energy 1 reset request (Yn7) to ON.
       The specified periodic electric energy is reset to 0 kWh, and CH1 periodic electric energy 1 reset completion flag (Xn7) will be turned ON.
   (c) Check that CH1 periodic electric energy 1 reset completion flag (Xn7) has become ON, and then set CH1 periodic electric energy 1 reset request (Yn7) to OFF.
       CH1 periodic electric energy 1 reset completion flag (Xn7) will be turned OFF.
   (d) When starting measurement, set CH1 periodic electric energy 1 measurement flag (Yn5) to ON.
       This module starts measuring the specified periodic electric energy, and CH1 periodic electric energy 1 data completion flag (Xn5) will be turned OFF.
   (e) When stopping measurement, set CH1 periodic electric energy 1 measurement flag (Yn5) to OFF.
       This module stops measuring the specified periodic electric energy, and CH1 periodic electric energy 1 data completion flag (Xn5) will be turned ON.
   (f) Check that CH1 periodic electric energy 1 data completion flag (Xn5) becomes ON, and obtain the value of periodic electric energy.

   Figure 4.2.2-4 Example of measurement of periodic electric energy after every reset
4.2.3 Max./min. value hold function

It memorizes the max./min. value for each measured item, and retains it until the max./min. value clear is performed.

(1) Max./min. value memory
1) It memorizes the max. and min. values of the following measured items of each channel.
   - Current demand
   - Voltage
   - Electric power demand
   - Power factor
2) It memorizes the date and time of occurrence (year/month/day/hour/minute/second/day of the week) together with the max. and min. values.
3) The max. and min. values and the date of occurrence are stored in the nonvolatile memory, so that these values can be retained even at a power source reset.

(2) How to clear the max. and min. values
1) You can use the I/O signal to clear the max. and min. values.
2) The max. and min. values immediately after the clear will be the present values and the date of occurrence will be the present date and time.
3) The following describes how to clear the max. and min. values.

   (a) Check that Max./min. values clear request (Yn4) is OFF.
   (b) In the max./min. value clear target (UnG56), set the measured items of the channel you want to clear.
   (c) Set Max./min. values clear request (Yn4) to ON.
       This module clears the max./min. values of the measured items of the channel you selected in step (b) above and their date of occurrence and turns Max./min. values clear completion flag (Xn4) to ON.
   (d) Check that Max./min. values clear completion flag (Xn4) is ON, and then set Max./min. values clear request (Yn4) to OFF. Max./min. values clear completion flag (Xn4) will be turned OFF.

![Figure 4.2.3-1 Procedure for clearing max./min. value](image-url)
### 4.2.4 Upper/lower limit alarm monitoring function

You can set an upper and lower limit alarm for maximum two points for each channel and implement a monitoring function for them. During the alarm monitoring, it can monitor the input signal to check for the occurrence.

1. **Setting the upper/lower limit alarm monitoring**
   - Setting items and setting range for the alarm monitoring are described below.

<table>
<thead>
<tr>
<th>Items set in the buffer memory</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm item 0: No monitoring</td>
<td>1: Current demand upper limit</td>
<td>For respective alarm 1 and alarm 2, set the measuring item and either upper or lower limit for monitoring target.</td>
</tr>
<tr>
<td>2: Current demand lower limit</td>
<td>3: Voltage upper limit</td>
<td></td>
</tr>
<tr>
<td>4: Voltage lower limit</td>
<td>5: Power demand upper limit</td>
<td></td>
</tr>
<tr>
<td>6: Power demand lower limit</td>
<td>7: Power factor upper limit</td>
<td></td>
</tr>
<tr>
<td>8: Power factor lower limit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alarm value</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2147483648 – 2147483647</td>
<td>[Unit] Current:×10^-3 A Voltage:×10^-3 V Power:×10^-3 kW PF:×10^{-3}%</td>
<td>The value to be monitored for the alarm. Set the value according to the unit of the measuring item that is set as an alarm monitoring item. (Double words)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alarm reset method</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0: Self-retention</td>
<td>Set whether or not the alarm-occurrence condition should be retained if the value goes below the upper limit alarm value or goes over the lower limit alarm value after the upper/lower limit alarm occurred.</td>
<td></td>
</tr>
<tr>
<td>1: Auto reset</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alarm delay time</th>
<th>Setting range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 300</td>
<td>[Unit] second</td>
<td>If it exceeds the upper limit alarm value or if it goes below the lower limit alarm value, and the situation continues for the period of the alarm delay time, then it is considered as an alarm occurrence.</td>
</tr>
</tbody>
</table>

The table below shows I/O signals and buffer memory for alarm 1 and alarm 2.

<table>
<thead>
<tr>
<th>CH1</th>
<th>Alarm request</th>
<th>Alarm flag</th>
<th>Buffer memory (Double words)</th>
<th>Alarm reset method</th>
<th>Alarm delay time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm 1</td>
<td>Yn9</td>
<td>Xn9</td>
<td>UniG1</td>
<td>UniG12, 13</td>
<td>UniG14</td>
</tr>
<tr>
<td>Alarm 2</td>
<td>YnA</td>
<td>XnA</td>
<td>UniG21</td>
<td>UniG22, 23</td>
<td>UniG24</td>
</tr>
<tr>
<td>CH2</td>
<td>Alarm 1</td>
<td>YnF</td>
<td>XnF</td>
<td>UniG1011</td>
<td>UniG1012, 1013</td>
</tr>
<tr>
<td>Alarm 2</td>
<td>Yn10</td>
<td>Xn10</td>
<td>UniG1021</td>
<td>UniG1022, 1023</td>
<td>UniG1024</td>
</tr>
<tr>
<td>Alarm 2</td>
<td>Yn16</td>
<td>Xn16</td>
<td>UniG2021</td>
<td>UniG2022, 2023</td>
<td>UniG2024</td>
</tr>
<tr>
<td>CH4</td>
<td>Alarm 1</td>
<td>Yn1B</td>
<td>Xn1B</td>
<td>UniG3011</td>
<td>UniG3012, 3013</td>
</tr>
<tr>
<td>Alarm 2</td>
<td>Yn1C</td>
<td>Xn1C</td>
<td>UniG3021</td>
<td>UniG3022, 3023</td>
<td>UniG3024</td>
</tr>
</tbody>
</table>
2) Setting procedures are as follows:
   (a) Check that Operating condition setting request (Yn2) is OFF.
   (b) Set the alarm item, alarm value, alarm reset method, and alarm 2 delay time in the buffer
       memory. For the address of buffer memory for alarm 1 and alarm 2, refer to Chapter 6.
   (c) Set Operating condition setting request (Yn2) to ON. Operation starts at each set value,
       and then Operating condition setting completion flag (Xn2) is turned ON.
   (d) Check that Operating condition setting completion flag (Xn2) becomes ON, and then set
       Operating condition setting request (Yn2) to OFF. Operating condition setting completion
       flag (Xn2) will be turned OFF.

   Figure 4.2.4-1 Time chart of alarm monitoring setting

3) Each item of the alarm monitoring is stored in the nonvolatile memory, so that values can be
   retained even at a power source reset.

(2) Behavior of the upper/lower limit alarm
1) When the alarm reset method is set to "0: self-retention" (example of the upper limit
   monitoring with CH1 alarm 1)
   (a) If the measured value that was set with the alarm 1 item exceeds the upper limit and the
       situation continues and remains for the alarm 1 delay time, CH1 alarm 1 flag (Xn9) will turn
       ON. At the same time, ALM1 LED flashes.
   (b) Even if the measured value goes below the upper limit, CH1 alarm 1 flag (Xn9) remains in
       the ON status (self-retention). During the self-retention, ALM1 LED is lit.
   (c) By turning CH1 alarm 1 reset request (Yn9) to ON, CH1 alarm 1 flag (Xn9) will turn OFF.
       At this time, ALM1 LED is turned off.
   (d) Check that CH1 alarm 1 flag (Xn9) becomes OFF, and then set CH1 alarm 1 reset request
       (Yn9) to OFF.

   Figure 4.2.4-2 Time chart of the upper/lower limit alarm (alarm reset method = “self-retention”)
2) When the alarm reset method is set to "1: auto reset" (example of the upper limit monitoring with CH1 alarm 1)
   (a) If the measured value that was set with the alarm 1 item exceeds the upper limit and the situation continues and remains for the alarm 1 delay time, CH1 alarm 1 flag (Xn9) will turn ON. At the same time, ALM1 LED flashes.
   (b) If the measured value goes below the upper limit, CH1 alarm 1 flag (Xn9) will turn OFF. At this time, ALM1 LED is turned off.
   (c) If the measured value that was set with the alarm 1 item exceeds the upper limit but goes below the upper limit within the alarm 1 delay time, then CH1 alarm 1 flag (Xn9) will remain in the OFF status.

3) An example of the alarm 1 was indicated in 1) and 2) above. The alarm 2 will be in accordance with the same behavior.

   For the setting items for the buffer memory that corresponds to the alarm 2 and the I/O signals, refer to Chapters 5 and 6. The following describes a case with the alarm 2.

   [When the alarm reset method is set to "1: auto reset" (example of the lower limit monitoring with CH1 alarm 2)]
   (a) If the measured value that was set with the alarm 2 item goes below the lower limit and the situation continues and remains for the alarm 2 delay time, CH1 alarm 2 flag (XnA) will turn ON. At the same time, ALM2 LED flashes.
   (b) If the measured value exceeds the lower limit, CH1 alarm 2 flag (XnA) will turn OFF. At this time, ALM2 LED is turned off.
   (c) If the measured value that was set with the alarm 2 item goes below the lower limit but exceeds the lower limit within the alarm 2 delay time, then CH1 alarm 2 flag (XnA) will remain in the OFF status.
(3) How to reset Alarm flag

1) When Alarm flag is ON during the alarm occurrence or the self-retention (in the case of the alarm reset method = "self-retention"), Alarm flag can be reset (turned OFF) using Alarm reset request.

2) How to reset Alarm flag during alarm occurrence (example of the upper limit alarm monitoring with CH1 alarm 1)

(a) If the measured value that was set with the alarm 1 item exceeds the upper limit, CH1 alarm 1 flag (Xn9) will turn ON. At the same time, ALM1 LED flashes.
(b) By turning CH1 alarm 1 reset request (Yn9) to ON, CH1 alarm 1 flag (Xn9) will turn OFF. At this time, ALM1 LED will remain flashing (because ALM1 LED is synchronized with the alarm status, it will not turn off).
(c) Check that CH1 alarm 1 flag (Xn9) becomes OFF, and then set CH1 alarm 1 reset request (Yn9) to OFF.
(d) If the measured value goes below the upper limit, ALM1 LED will turn off.
(e) After that, if the measured value exceeds the upper limit, CH1 alarm 1 flag (Xn9) will turn ON again. At the same time, ALM1 LED flashes.

(4) Precautions during the alarm monitoring

1) When current demand time and electric power demand time are set to anytime except 0 second, current demand and electric power demand become lower than the actual values (closer to 0) immediately after the power source ON and the CPU reset. When current demand and electric power demand are being monitored for their lower limit, the alarm occurrence flag may turn ON. Thus, to avoid this from happening, follow the procedure below.
(a) Set the alarm monitoring target to "no monitoring" immediately after the power source ON and the CPU reset.
(b) After passing for a 3-times longer period than the demand time, set the alarm monitoring target again, and start the alarm monitoring.
4 Functions

4.2.5 Test function

This function is to output pseudo-fixed value to a buffer memory for debugging sequence program. The value can be output to the buffer memory without input of voltage and current.

(1) How to use the test function
1) Using the intelligent function module switch setting, you can start the test mode to output the fixed value.
2) For procedure for the intelligent function module switch setting, refer to the following.
   For GX Works2, refer to 8.6.2.
   For GX Developer, refer to 8.7.2.
3) To finish the test mode, the set value is returned by the intelligent function module switch setting, and after that, it enters to a measuring mode by resetting it.
   (It resumes with the previous set value, electric energy and periodic electric energy.)

(2) Content of fixed-output
For the value to be output to the buffer memory, refer to Table 6.1-1 to 6.1-3 in 6.1 Buffer memory assignment.

(3) LED display when using the test function
All LED lights.

(4) I/O signals when using the test function
Unit READY (Xn0) only ON. Other input and output signals are all OFF.

(5) Precautions for using the test function
Because fixed-output is output to the buffer memory, isolate the actual device to avoid unexpected operation before running the sequence program.
4.2.6 Integrated value set function

This is a function that can set the integrated value (electric energy (consumption, regeneration), reactive energy (consumption lag)) to an arbitrary value.

It is used to clear integrated value.

(1) Setting procedure

(a) Set integrated value setting target (Un\G51) in the buffer memory. Setting range is as follows:

<table>
<thead>
<tr>
<th>Setting value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH1 CH2 CH3 CH4 All CHs</td>
<td>No set</td>
</tr>
<tr>
<td>0</td>
<td>Electric energy (consumption)</td>
</tr>
<tr>
<td>11</td>
<td>Electric energy (regeneration)</td>
</tr>
<tr>
<td>12</td>
<td>Reactive energy (consumption lag)</td>
</tr>
<tr>
<td>13</td>
<td>Total integrated value</td>
</tr>
</tbody>
</table>

(b) Set integrated value setting value (Un\G52, 53) in the buffer memory.
- Configurable range: 0 to 999999999
- The unit used for the setting value is the same as that used for the electric energy and reactive energy that are output to the buffer memory.
  For details, refer to section 6.3.2.

(c) Turn Integrated value setting request (Yn3) from OFF to ON to enable* the setting.

Integrated value set completion flag (Xn3) turns ON after Integrated value set request (Yn3) is set OFF to ON.

(d) After checking that integrated value set completion flag (Xn3) turns ON and setting is completed, set the integrated value set request (Yn3) to OFF.

After detected that the integrated value set request (Yn3) turns OFF, the integrated value set completion flag (Xn3) turns OFF.

(2) Default value

integrated value setting target (Un\G51) is set to 0 (No set).
integrated value setting value (Un\G52, Un\G53) is set to 0.
Chapter 5: I/O signals for the CPU module

5.1 List of I/O signals

I/O signals of QE84WH are listed in Table 5.1-1.

<table>
<thead>
<tr>
<th>Input signal (signal direction from QE84WH to CPU module)</th>
<th>Output signal (signal direction from CPU module to QE84WH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device #</td>
<td>Signal name</td>
</tr>
<tr>
<td>Xn0</td>
<td>Module ready</td>
</tr>
<tr>
<td>Xn1</td>
<td>Data acquisition clock</td>
</tr>
<tr>
<td>Xn2</td>
<td>Operating condition setting completion flag</td>
</tr>
<tr>
<td>Xn3</td>
<td>Integrated value set completion flag</td>
</tr>
<tr>
<td>Xn4</td>
<td>Max./min. values clear completion flag</td>
</tr>
<tr>
<td>Xn5</td>
<td>CH1 periodic electric energy 1 data completion flag</td>
</tr>
<tr>
<td>Xn6</td>
<td>CH1 periodic electric energy 2 data completion flag</td>
</tr>
<tr>
<td>Xn7</td>
<td>CH1 periodic electric energy 1 reset completion flag</td>
</tr>
<tr>
<td>Xn8</td>
<td>CH1 periodic electric energy 2 reset completion flag</td>
</tr>
<tr>
<td>Xn9</td>
<td>CH1 alarm 1 flag</td>
</tr>
<tr>
<td>XnA</td>
<td>CH1 alarm 2 flag</td>
</tr>
<tr>
<td>XnB</td>
<td>CH2 periodic electric energy 1 data completion flag</td>
</tr>
<tr>
<td>XnC</td>
<td>CH2 periodic electric energy 2 data completion flag</td>
</tr>
<tr>
<td>XnD</td>
<td>CH2 periodic electric energy 1 reset completion flag</td>
</tr>
<tr>
<td>XnE</td>
<td>CH2 periodic electric energy 2 reset completion flag</td>
</tr>
<tr>
<td>XnF</td>
<td>CH2 alarm 1 flag</td>
</tr>
<tr>
<td>Xn10</td>
<td>CH2 alarm 2 flag</td>
</tr>
<tr>
<td>Xn11</td>
<td>CH3 periodic electric energy 1 data completion flag</td>
</tr>
<tr>
<td>Xn12</td>
<td>CH3 periodic electric energy 2 data completion flag</td>
</tr>
<tr>
<td>Xn13</td>
<td>CH3 periodic electric energy 1 reset completion flag</td>
</tr>
<tr>
<td>Xn14</td>
<td>CH3 periodic electric energy 2 reset completion flag</td>
</tr>
<tr>
<td>Xn15</td>
<td>CH3 alarm 1 flag</td>
</tr>
<tr>
<td>Xn16</td>
<td>CH3 alarm 2 flag</td>
</tr>
<tr>
<td>Xn17</td>
<td>CH4 periodic electric energy 1 data completion flag</td>
</tr>
<tr>
<td>Xn18</td>
<td>CH4 periodic electric energy 2 data completion flag</td>
</tr>
<tr>
<td>Xn19</td>
<td>CH4 periodic electric energy 1 reset completion flag</td>
</tr>
<tr>
<td>Xn1A</td>
<td>CH4 periodic electric energy 2 reset completion flag</td>
</tr>
<tr>
<td>Xn1B</td>
<td>CH4 alarm 1 flag</td>
</tr>
<tr>
<td>Xn1C</td>
<td>CH4 alarm 2 flag</td>
</tr>
<tr>
<td>Xn1D</td>
<td>Use prohibited</td>
</tr>
<tr>
<td>Xn1E</td>
<td>Use prohibited</td>
</tr>
<tr>
<td>Xn1F</td>
<td>Error flag</td>
</tr>
</tbody>
</table>

Point

*1 These signals cannot be used by the user since they are for system use only. If these are set to on or off by the sequence program, the performance of the QE84WH cannot be guaranteed.
5.2 Details of I/O signals

Detailed explanation about I/O signals of QE84WH is provided as follows:

5.2.1 Input signals

(1) Module ready (Xn0)
   (a) When the power of CPU module is turned on or the CPU module reset is performed, it will turn ON as soon as the measurement is ready.
   (b) This signal (Xn0) is turned OFF when energy measuring module displays a hardware error, and RUN LED is turned off.

(2) Data acquisition clock (Xn1)
   • Regular operating mode
     (a) When the power is supplied to the CPU module and immediately after the initial computation is performed, this signal (Xn1) is turned ON and count of the output period of data acquisition clock is started. After that, this signal turns ON at the timing when the measurement data is completely written into the buffer memory after the elapse of the output period of data acquisition clock.
     If the settings of the input voltage, primary current, primary voltage of VT, secondary voltage of VT, primary current of CT and output period of data acquisition clock are changed, this signal turns ON immediately after the change of the settings and count of the output period of data acquisition clock is started.
     (b) This signal (Xn1) turns OFF 150 ms after it turns ON.
   • Current measuring mode
     (a) When the power is supplied to the CPU module and immediately after the initial computation is performed, this signal (Xn1) is turned ON and count of the output period of data acquisition clock is started. After that, this signal turns ON at the timing when the measurement data is completely written into the buffer memory after the elapse of the output period of data acquisition clock.
     If the settings of the primary current, primary current of CT and output period of data acquisition clock are changed, this signal turns ON immediately after the change of the settings and count of the output period of data acquisition clock is started.
     (b) This signal (Xn1) turns OFF 150 ms after it turns ON.

• When output period of data acquisition clock is 1 from 100, this signal (Xn1) turns OFF 50 ms after it turns ON.
• When output period of data acquisition clock is 101 from 200, this signal (Xn1) turns OFF 100 ms after it turns ON.
• When output period of data acquisition clock is more than 201, this signal (Xn1) turns OFF 150 ms after it turns ON.
(3) Operating condition setting completion flag (Xn2)

(a) When Operating condition setting request (Yn2) is turned ON, the following settings are changed and this signal (Xn2) turns ON.

- Phase wire system (Un\G0)
- Primary voltage (Un\G1)
- Primary current (Un\G2/1002/2002/3002)
- Current demand time (Un\G3/1003/2003/3003)
- Electric power demand time (Un\G4/1004/2004/3004)
- Primary voltage of VT (Un\G5)
- Secondary voltage of VT (Un\G6)
- Primary current of CT (Un\G7/1007/2007/3007)
- Alarm 1 item (Un\G11/1011/2011/3011)
- Alarm 1 value (Un\G12, 13/1012, 1013/2012, 2013/3012, 3013)
- Alarm 1 reset method (Un\G14/1014/2014/3014)
- Alarm 1 delay time (Un\G15/1015/2015/3015)
- Alarm 2 item (Un\G21/1021/2021/3021)
- Alarm 2 value (Un\G22, 23/1022, 2023/3022, 3023)
- Alarm 2 reset method (Un\G24/1024/2024/3024)
- Alarm 2 delay time (Un\G25/1025/2025/3025)
- Output period of data acquisition clock (Un\G60, 61/1060, 1061/2060, 2061/3060, 3061)

(b) When Operating condition setting request (Yn2) is turned OFF, this signal (Xn2) turns OFF.
(4) Integrated value set completion flag (Xn3)
   (a) When Integrated value set request (Yn3) is turned ON and preset of each integrated value such as electric energy (consumption), electric energy (regeneration), and reactive energy (consumption delay) is completed, this signal (Xn3) turns ON.
   (b) When Integrated value set request (Yn3) is turned OFF, this signal (Xn3) turns OFF.

(5) Max./min. values clear completion flag (Xn4)
   (a) When Max./min. values clear request (Yn4) is turned ON and the data of max./min. value (maximum value, minimum value, and their date and time of occurrence) are cleared, this signal (Xn4) turns ON.
   (b) When Max./min. values clear request (Yn4) is turned OFF, this signal (Xn4) turns OFF.

(6) CH1 periodic electric energy 1 data completion flag (Xn5)
   (a) When CH1 periodic electric energy 1 measurement flag (Yn5) is turned OFF and calculation of CH1 periodic electric energy 1 is stopped, this signal (Xn5) turns ON.
   (b) When CH1 periodic electric energy 1 measurement flag (Yn5) is turned ON and calculation of CH1 periodic electric energy 1 is started, this signal (Xn5) turns OFF.
   (c) In order to acquire the data under the condition where CH1 periodic electric energy 1 is checked after the accumulation of the periodic electric energy is stopped, obtain the data while this signal (Xn5) is ON.
      *For specific usage procedures, refer to Section 4.2.2.

(7) CH1 periodic electric energy 2 data completion flag (Xn6)
   The usage procedure is the same as that of CH1 periodic electric energy 1 data completion flag (Xn5). Refer to (6).

(8) CH1 periodic electric energy 1 reset completion flag (Xn7)
   (a) When CH1 periodic electric energy 1 reset request (Yn7) is turned ON and CH1 periodic electric energy 1 that is stored in the buffer memory is reset, this signal (Xn7) turns ON.
   (b) When CH1 periodic electric energy 1 reset request (Yn7) is turned OFF, this signal (Xn7) turns OFF.
      *For specific usage procedures, refer to Section 4.2.2.

(9) CH1 periodic electric energy 2 reset completion flag (Xn8)
   The usage procedure is the same as that of CH1 periodic electric energy 1 reset completion flag (Xn7). Refer to (8).
(10) CH1 alarm 1 flag (Xn9)

(a) If the measured value of CH1 alarm 1 item (Un\G11) exceeds the upper limit (or if it goes below the lower limit in the case of the lower alarm), after the elapse of CH1 alarm 1 delay time (Un\G15), this signal (Xn9) turns ON.

(b) Operations after this signal (Xn9) is turned ON vary depending on the setting of CH1 alarm 1 reset method (Un\G14).

[When CH1 alarm 1 reset method (Un\G14) is "0: self-retention"]
Even if the measured value of CH1 alarm 1 monitoring target goes below the upper limit (or it exceeds the lower limit in the case of lower limit alarm), this signal (Xn9) remains ON. When CH1 alarm 1 reset request (Yn9) is turned ON, this signal (Xn9) turns OFF.

[When CH1 alarm 1 reset method (Un\G14) is "1: auto reset"]
If the measured value of CH1 alarm 1 monitoring target goes below the upper limit (or it exceeds the lower limit in the case of lower limit alarm), this signal (Xn9) turns OFF.

(c) When the measured value of the alarm 1 monitoring target is set to "not monitoring", this signal (Xn9) always turns OFF.

*For the actual behavior of alarm monitoring, refer to Section 4.2.4.

(11) CH1 alarm 2 flag (XnA)
The usage procedure is the same as that of CH1 alarm 1 flag (Xn9). Refer to (10).

(12) Error flag (Xn1F)

(a) If an outside-set-value error occurs or a hardware error occurs, this signal (Xn1F) turns ON.

(b) The description of the error can be checked with latest error code (Un\G4500).

*For description of error codes, refer to Section 10.1.

(c) If an outside-set-value error occurs, this signal (Xn1F) is turned OFF by setting a value within the range again.
5.2.2 Output signals

(1) Operating condition setting request (Yn2)
(a) When switching this request (Yn2) from the OFF status to the ON status, the following operating conditions will be set.
- Phase wire system (Un\G0)
- Primary voltage (Un\G1)
- Primary current (Un\G2/1002/2002/3002)
- Current demand time (Un\G3/1003/2003/3003)
- Electric power demand time (Un\G4/1004/2004/3004)
- Primary voltage of VT (Un\G5)
- Secondary voltage of VT (Un\G6)
- Primary current of CT (Un\G7/1007/2007/3007)
- Alarm 1 item (Un\G11/1011/2011/3011)
- Alarm 1 value (Un\G12, 13/1012, 1013/2012, 2013/3012, 3013)
- Alarm 1 reset method (Un\G14/1014/2014/3014)
- Alarm 1 delay time (Un\G15/1015/2015/3015)
- Alarm 2 item (Un\G21/1021/2021/3021)
- Alarm 2 value (Un\G22, 23/1022, 1023/2022, 2023/3022, 3023)
- Alarm 2 reset method (Un\G24/1024/2024/3024)
- Alarm 2 delay time (Un\G25/1025/2025/3025)
- Output period of data acquisition clock (Un\G60, 61/1060, 1061/2060, 2061/3060, 3061)
(b) When the operating condition setting is completed, Operating condition setting completion flag (Xn2) turns ON.
(c) When this request (Yn2) is turned OFF, Operating condition setting completion flag (Xn2) turns OFF.

(2) Integrated value set request (Yn3)
(a) If you want to set the electric energy (consumption and regeneration) and the reactive energy to an arbitrary value, write Integrated value setting target (Un\G51) and Integrated value setting value (Un\G52, 53) into it, and after that, turn this request (Yn3) to ON.
(b) When switching this request (Yn3) from the OFF status to the ON status, the integrated value setting value will be set. When the integrated value setting is completed, Integrated value set completion flag (Xn3) turns ON.
(c) When this request (Yn3) is set to OFF, Integrated value set completion flag (Xn3) turns OFF.

(3) Max./min. values clear request (Yn4)
(a) When the max./min. value data (max./min. value and their date/time of occurrence) is reset, this request (Yn4) turns ON.
(b) After writing max./min. values clear item (Un\G56), switching this request (Yn4) from the OFF status to the ON status will clear the max./min. values. When clearing the max./min. data is completed, Max./min. values clear completion flag (Xn4) turns ON.
(c) When this request (Xn4) is set to OFF, Max./min. values clear completion flag (Xn4) turns OFF.
(4) CH1 periodic electric energy 1 measurement flag (Yn5)
   (a) When switching this signal (Yn5) from the ON status to the OFF status, CH1 periodic electric energy 1 is measured and stored in the buffer memory.
   (b) When this signal (Yn5) is turned OFF, CH1 periodic electric energy 1 data completion flag (Xn5) turns ON at the time that CH1 periodic electric energy 1 is checked for that period, and then CH1 periodic electric energy 1 is retained.
   (c) In order to read the checked data of CH1 periodic electric energy 1 using the sequence program, use CH1 periodic electric energy 1 data completion flag (Xn5) as the interlock condition.
   *For specific usage procedures, refer to Section 4.2.2.

(5) CH1 periodic electric energy 2 measurement flag (Yn6)
   The usage procedure is the same as that of CH1 periodic electric energy 1 measurement flag (Yn5). Refer to (4).

(6) CH1 periodic electric energy 1 reset request (Yn7)
   (a) When this request (Yn7) is turned ON from the OFF status, CH1 periodic electric energy 1 reset completion flag (Xn7) turns ON, and CH1 periodic electric energy 1 that has been stored in the buffer memory is reset.
   (b) Regardless of the status of CH1 periodic electric energy 1 measurement flag (Yn5), either OFF or ON, the periodic electric energy 1 can be reset using this request (Yn7). When CH1 periodic electric energy 1 measurement flag (Yn5) is ON, and the measurement is taking place, the measurement will resume immediately after the reset.
   (c) When this request (Yn7) is set to OFF, CH1 periodic electric energy 1 reset completion flag (Xn7) turns OFF.
   *For specific usage procedures, refer to Section 4.2.2.

(7) CH1 periodic electric energy 2 reset request (Yn8)
   The usage procedure is the same as that of CH1 periodic electric energy 1 reset request (Yn7). Refer to (6).

(8) CH1 alarm 1 reset request (Yn9)
   (a) When CH1 alarm 1 flag (Xn9) is reset, this request (Yn9) turns ON. (b) When this request (Yn9) is switched from the OFF status to the ON status, CH1 alarm 1 flag (Xn9) will forcibly be turned OFF regardless of the present alarm occurrence status.
   (b) Check that CH1 alarm 1 flag (Xn9) becomes OFF, and then set this request (Yn9) to OFF.

(9) CH1 alarm 2 reset request (YnA)
   The usage procedure is the same as that of CH1 periodic electric energy 1 reset request (Yn9). Refer to (8).
(10) Error clear request (Yn1F)

(a) When switching this request (Yn1F) from the OFF status to the ON status while an outside-set-value error is present, Error flag (Xn1F) turns OFF, and the latest error code in the buffer memory (Un\G4500) will be cleared.

(b) At the same time as clearing the error above, the values that were set in the buffer memory below will be replaced with the previously set values, and integrated value setting target (Un\G51) and integrated value setting value (Un\G52, 53) will be reset to 0.

   [Set values to be replaced with the previously set values]
   - Phase wire system (Un\G0)
   - Primary voltage (Un\G1)
   - Primary current (Un\G2/1002/2002/3002)
   - Current demand time (Un\G3/1003/2003/3003)
   - Electric power demand time (Un\G4/1004/2004/3004)
   - Primary voltage of VT (Un\G5)
   - Secondary voltage of VT (Un\G6)
   - Primary current of CT (Un\G7/1007/2007/3007)
   - Alarm 1 item (Un\G11/1011/2011/3011)
   - Alarm 1 value (Un\G12, 13/1012, 1013/2012, 2013/3012, 3013)
   - Alarm 1 reset method (Un\G14/1014/2014/3014)
   - Alarm 1 delay time (Un\G15/1015/2015/3015)
   - Alarm 2 item (Un\G21/1021/2021/3021)
   - Alarm 2 value (Un\G22, 23/1022, 2023/3022, 3023)
   - Alarm 2 reset method (Un\G24/1024/2024/3024)
   - Alarm 2 delay time (Un\G25/1025/2025/3025)
   - Output period of data acquisition clock (Un\G60, 61/1060, 1061/2060, 2061/3060, 3061)

(c) While a hardware error is present (error code: 0000h to 0FFFh), it will not be cleared even if this signal (Yn1F) turns ON.
6 Buffer memory

Chapter 6: Buffer memory

6.1 Buffer memory assignment

The following describes buffer memory assignment.

In the buffer memory, do not write data to the "system area" or area where data writing data from sequence programs is disabled. Doing so may cause malfunction.

(1) Configurable sections (CH1: Un\G0 to Un\G99, CH2: Un\G1000 to Un\G1099, CH3: Un\G2000 to Un\G2099, CH4: Un\G3000 to Un\G3099)

<table>
<thead>
<tr>
<th>Item</th>
<th>Address (decimal)</th>
<th>Data type</th>
<th>Description</th>
<th>Default value</th>
<th>R/W</th>
<th>Back up*1</th>
<th>Output value during the test mode*2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting value</td>
<td>CH1 CH2 CH3 CH4</td>
<td></td>
<td>System area</td>
<td></td>
<td></td>
<td></td>
<td>CH1 CH2 CH3 CH4</td>
</tr>
<tr>
<td>0</td>
<td>1000</td>
<td>Pr</td>
<td>Phase wire system</td>
<td>3</td>
<td>R/W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1002</td>
<td>Pr</td>
<td>Primary voltage</td>
<td>2</td>
<td>R/W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1003</td>
<td>Pr</td>
<td>Current demand time</td>
<td>120</td>
<td>R/W</td>
<td></td>
<td>100 200 300 400</td>
</tr>
<tr>
<td>4</td>
<td>1004</td>
<td>Pr</td>
<td>Electric power demand time</td>
<td>120</td>
<td>R/W</td>
<td></td>
<td>150 250 350 450</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Pr</td>
<td>Secondary voltage of VT</td>
<td>0</td>
<td>R/W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1007</td>
<td>Pr</td>
<td>Primary current of CT</td>
<td>0</td>
<td>R/W</td>
<td></td>
<td>0 0 0 0</td>
</tr>
<tr>
<td>10</td>
<td>1010</td>
<td>Pr</td>
<td>Alarm 1 item</td>
<td>0</td>
<td>R/W</td>
<td></td>
<td>1 3 5 7</td>
</tr>
<tr>
<td>12</td>
<td>1012</td>
<td>Pr</td>
<td>Alarm 1 value</td>
<td>0</td>
<td>R/W</td>
<td></td>
<td>1100 2100 3100 4100</td>
</tr>
<tr>
<td>13</td>
<td>1013</td>
<td>Pr</td>
<td>Alarm 1 delay time</td>
<td>0</td>
<td>R/W</td>
<td></td>
<td>110 120 130 140</td>
</tr>
<tr>
<td>14</td>
<td>1014</td>
<td>Pr</td>
<td>Alarm 1 reset method</td>
<td>0</td>
<td>R/W</td>
<td></td>
<td>0 1 0 1</td>
</tr>
<tr>
<td>15</td>
<td>1015</td>
<td>Pr</td>
<td>Alarm 1 delay time</td>
<td>0</td>
<td>R/W</td>
<td></td>
<td>110 120 130 140</td>
</tr>
<tr>
<td>16</td>
<td>1016</td>
<td>Pr</td>
<td>Primary voltage</td>
<td>2</td>
<td>R/W</td>
<td></td>
<td>510 520 530 540</td>
</tr>
<tr>
<td>21</td>
<td>1021</td>
<td>Pr</td>
<td>Alarm 2 item</td>
<td>0</td>
<td>R/W</td>
<td></td>
<td>0 1 2 3</td>
</tr>
<tr>
<td>22</td>
<td>1022</td>
<td>Pr</td>
<td>Alarm 2 value</td>
<td>0</td>
<td>R/W</td>
<td></td>
<td>210 220 230 240</td>
</tr>
<tr>
<td>24</td>
<td>1024</td>
<td>Pr</td>
<td>Alarm 2 reset method</td>
<td>0</td>
<td>R/W</td>
<td></td>
<td>0 1 2 3</td>
</tr>
<tr>
<td>25</td>
<td>1025</td>
<td>Pr</td>
<td>Alarm 2 delay time</td>
<td>0</td>
<td>R/W</td>
<td></td>
<td>210 220 230 240</td>
</tr>
<tr>
<td>50</td>
<td>1053</td>
<td>Pr</td>
<td>Integrated value setting target</td>
<td>0</td>
<td>W</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>52</td>
<td></td>
<td>Pr</td>
<td>Integrated value setting value</td>
<td>0</td>
<td>W</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>54</td>
<td>1054</td>
<td>Pr</td>
<td>Max./min values clear item</td>
<td>0</td>
<td>W</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>55</td>
<td>1055</td>
<td>Pr</td>
<td>Output period of data acquisition clock</td>
<td>0</td>
<td>R/W</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>59</td>
<td>1061</td>
<td>Pr</td>
<td>System area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 Even if the power failure is restored, data is held because data is backed up by the nonvolatile memory.

*2 For the procedure for using the test mode, refer to section 4.2.5.
### Table 6.1-2 Measurement sections 1/3

<table>
<thead>
<tr>
<th>Item</th>
<th>Address (Decimal)</th>
<th>Data Type</th>
<th>Description</th>
<th>Default value</th>
<th>R/W</th>
<th>Back up*1</th>
<th>Output value during the test mode*2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CH1 CH2 CH3 CH4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CH1 CH2 CH3 CH4</td>
</tr>
<tr>
<td>Electric energy</td>
<td>100 1100</td>
<td>2100 3100</td>
<td>Md</td>
<td>Multiplier of Electric energy, reactive energy</td>
<td>-4</td>
<td>R</td>
<td>-4</td>
</tr>
<tr>
<td></td>
<td>101 1101</td>
<td>2101 3101</td>
<td>—</td>
<td>System area</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>102 1102</td>
<td>2102 3102</td>
<td>Md</td>
<td>Electric energy (consumption)</td>
<td>0</td>
<td>R</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>103 1103</td>
<td>2103 3103</td>
<td>Md</td>
<td>Electric energy (regeneration)</td>
<td>0</td>
<td>R</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>104 1104</td>
<td>2104 3104</td>
<td>Md</td>
<td>Electric energy (consumption lag)</td>
<td>0</td>
<td>R</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>105 1105</td>
<td>2105 3105</td>
<td>—</td>
<td>System area</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>106 1106</td>
<td>2106 3106</td>
<td>—</td>
<td>System area</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>107 1107</td>
<td>2107 3107</td>
<td>—</td>
<td>System area</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>108 1108</td>
<td>2108 3108</td>
<td>Md</td>
<td>Periodic energy (consumption)</td>
<td>0</td>
<td>R</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>109 1109</td>
<td>2109 3109</td>
<td>Md</td>
<td>Periodic energy (regeneration)</td>
<td>0</td>
<td>R</td>
<td>O</td>
</tr>
<tr>
<td>Current</td>
<td>200 1200</td>
<td>2200 3200</td>
<td>Md</td>
<td>Multiplier of current</td>
<td>-3</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>201 1201</td>
<td>2201 3201</td>
<td>—</td>
<td>System area</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>202 1202</td>
<td>2202 3202</td>
<td>Md</td>
<td>1-phase current</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>203 1203</td>
<td>2203 3203</td>
<td>Md</td>
<td>2-phase current</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>204 1204</td>
<td>2204 3204</td>
<td>Md</td>
<td>3-phase current</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>205 1205</td>
<td>2205 3205</td>
<td>—</td>
<td>System area</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>206 1206</td>
<td>2206 3206</td>
<td>—</td>
<td>System area</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>207 1207</td>
<td>2207 3207</td>
<td>Md</td>
<td>1-phase current demand</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>208 1208</td>
<td>2208 3208</td>
<td>Md</td>
<td>2-phase current demand</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>209 1209</td>
<td>2209 3209</td>
<td>Md</td>
<td>3-phase current demand</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>210 1210</td>
<td>2210 3210</td>
<td>—</td>
<td>System area</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>211 1211</td>
<td>2211 3211</td>
<td>Md</td>
<td>Average current</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>212 1212</td>
<td>2212 3212</td>
<td>Md</td>
<td>Maximum current</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>213 1213</td>
<td>2213 3213</td>
<td>Md</td>
<td>Year of time of max. current demand</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>214 1214</td>
<td>2214 3214</td>
<td>Md</td>
<td>Month and day of time of max. current demand</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>215 1215</td>
<td>2215 3215</td>
<td>Md</td>
<td>Hour and minute of time of max. current demand</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>216 1216</td>
<td>2216 3216</td>
<td>Md</td>
<td>Second and day of the week of max. current demand</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>217 1217</td>
<td>2217 3217</td>
<td>Md</td>
<td>Minimum current</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>218 1218</td>
<td>2218 3218</td>
<td>Md</td>
<td>Year of time of min. current demand</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>219 1219</td>
<td>2219 3219</td>
<td>Md</td>
<td>Month and day of time of min. current demand</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>220 1220</td>
<td>2220 3220</td>
<td>Md</td>
<td>Hour and minute of time of min. current demand</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>221 1221</td>
<td>2221 3221</td>
<td>Md</td>
<td>Second and day of the week of min. current demand</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
</tbody>
</table>

*1 Even if the power failure is restored, data is held because data is backed up by the nonvolatile memory.
*2 For the procedure for using the test mode, refer to section 4.2.5.
### Table 6.1-2 Measurement sections 2/3

<table>
<thead>
<tr>
<th>Item</th>
<th>Address(Decimal)</th>
<th>Data Type</th>
<th>Description</th>
<th>Default value</th>
<th>R/W</th>
<th>Back up*1</th>
<th>Output value during the test mode*2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td></td>
<td></td>
<td>Md</td>
<td>Multiplier of voltage</td>
<td>-3</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>301</td>
<td>1301 2301 3301 4301</td>
<td></td>
<td></td>
<td>System area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>302</td>
<td>1302 2302 3302 4302</td>
<td></td>
<td>Md</td>
<td>1-2 line voltage</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>303</td>
<td>1303 2303 3303 4303</td>
<td></td>
<td>Md</td>
<td>2-3 line voltage</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>304</td>
<td>1304 2304 3304 4304</td>
<td></td>
<td>Md</td>
<td>3-1 line voltage</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>305</td>
<td>1305 2305 3305 4305</td>
<td></td>
<td>—</td>
<td>System area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>306</td>
<td>1306 2306 3306 4306</td>
<td></td>
<td>Md</td>
<td>Average voltage</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>307</td>
<td>1307 2307 3307 4307</td>
<td></td>
<td>Md</td>
<td>Maximum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>308</td>
<td>1308 2308 3308 4308</td>
<td></td>
<td>Md</td>
<td>Minimum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>311</td>
<td>1311 2311 3311 4311</td>
<td></td>
<td>—</td>
<td>System area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>312</td>
<td>1312 2312 3312 4312</td>
<td></td>
<td>Md</td>
<td>Maximum value of electric power demand</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>313</td>
<td>1313 2313 3313 4313</td>
<td></td>
<td>Md</td>
<td>Minimum value of electric power demand</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>316</td>
<td>1316 2316 3316 4316</td>
<td></td>
<td>—</td>
<td>System area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>317</td>
<td>1317 2317 3317 4317</td>
<td></td>
<td>—</td>
<td>System area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>318</td>
<td>1318 2318 3318 4318</td>
<td></td>
<td>—</td>
<td>System area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>320</td>
<td>1320 2320 3320 4320</td>
<td></td>
<td>Md</td>
<td>Multiplier of electric power</td>
<td>-3</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>321</td>
<td>1321 2321 3321 4321</td>
<td></td>
<td>Md</td>
<td>Electric power</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>322</td>
<td>1322 2322 3322 4322</td>
<td></td>
<td>Md</td>
<td>Electric power demand</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>325</td>
<td>1325 2325 3325 4325</td>
<td></td>
<td>Md</td>
<td>Minimum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>326</td>
<td>1326 2326 3326 4326</td>
<td></td>
<td>Md</td>
<td>Average voltage</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>327</td>
<td>1327 2327 3327 4327</td>
<td></td>
<td>Md</td>
<td>Maximum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>328</td>
<td>1328 2328 3328 4328</td>
<td></td>
<td>Md</td>
<td>Minimum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>330</td>
<td>1330 2330 3330 4330</td>
<td></td>
<td>Md</td>
<td>Average voltage</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>331</td>
<td>1331 2331 3331 4331</td>
<td></td>
<td>Md</td>
<td>Maximum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>332</td>
<td>1332 2332 3332 4332</td>
<td></td>
<td>Md</td>
<td>Minimum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>333</td>
<td>1333 2333 3333 4333</td>
<td></td>
<td>Md</td>
<td>Average voltage</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>334</td>
<td>1334 2334 3334 4334</td>
<td></td>
<td>Md</td>
<td>Maximum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>335</td>
<td>1335 2335 3335 4335</td>
<td></td>
<td>Md</td>
<td>Minimum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>336</td>
<td>1336 2336 3336 4336</td>
<td></td>
<td>Md</td>
<td>Average voltage</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>337</td>
<td>1337 2337 3337 4337</td>
<td></td>
<td>Md</td>
<td>Maximum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>338</td>
<td>1338 2338 3338 4338</td>
<td></td>
<td>Md</td>
<td>Minimum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>339</td>
<td>1339 2339 3339 4339</td>
<td></td>
<td>Md</td>
<td>Average voltage</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>340</td>
<td>1340 2340 3340 4340</td>
<td></td>
<td>Md</td>
<td>Maximum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>341</td>
<td>1341 2341 3341 4341</td>
<td></td>
<td>Md</td>
<td>Minimum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>342</td>
<td>1342 2342 3342 4342</td>
<td></td>
<td>Md</td>
<td>Average voltage</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>343</td>
<td>1343 2343 3343 4343</td>
<td></td>
<td>Md</td>
<td>Maximum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>344</td>
<td>1344 2344 3344 4344</td>
<td></td>
<td>Md</td>
<td>Minimum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>345</td>
<td>1345 2345 3345 4345</td>
<td></td>
<td>Md</td>
<td>Average voltage</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>346</td>
<td>1346 2346 3346 4346</td>
<td></td>
<td>Md</td>
<td>Maximum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>347</td>
<td>1347 2347 3347 4347</td>
<td></td>
<td>Md</td>
<td>Minimum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
<tr>
<td>348</td>
<td>1348 2348 3348 4348</td>
<td></td>
<td>Md</td>
<td>Average voltage</td>
<td>0</td>
<td>R</td>
<td>—</td>
</tr>
<tr>
<td>349</td>
<td>1349 2349 3349 4349</td>
<td></td>
<td>Md</td>
<td>Maximum voltage</td>
<td>0</td>
<td>R</td>
<td>○</td>
</tr>
</tbody>
</table>

*1 Even if the power failure is restored, data is held because data is backed up by the nonvolatile memory.

*2 For the procedure for using the test mode, refer to section 4.2.5.
<table>
<thead>
<tr>
<th>Item</th>
<th>Address(Decimal)</th>
<th>Data Type</th>
<th>Description</th>
<th>Default value</th>
<th>R/ W</th>
<th>Back up*1</th>
<th>Output value during the test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CH1</td>
<td>CH2</td>
<td>CH3</td>
<td>CH4</td>
<td>CH1</td>
<td>CH2</td>
<td>CH3</td>
</tr>
<tr>
<td>Reactive power</td>
<td>500</td>
<td>1500</td>
<td>2500</td>
<td>3500</td>
<td>Md</td>
<td>Multiplier of reactive</td>
<td>-3</td>
</tr>
<tr>
<td></td>
<td>501</td>
<td>1501</td>
<td>2501</td>
<td>3501</td>
<td>—</td>
<td>System area</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>502</td>
<td>1502</td>
<td>2502</td>
<td>3502</td>
<td>Md</td>
<td>Reactive power</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>503</td>
<td>1503</td>
<td>2503</td>
<td>3503</td>
<td>—</td>
<td>System area</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>504</td>
<td>1504</td>
<td>2504</td>
<td>3504</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>699</td>
<td>1699</td>
<td>2699</td>
<td>3699</td>
<td>—</td>
<td>System area</td>
<td>—</td>
</tr>
<tr>
<td>Power factor</td>
<td>700</td>
<td>1700</td>
<td>2700</td>
<td>3700</td>
<td>Md</td>
<td>Multiplier of power factor</td>
<td>-3</td>
</tr>
<tr>
<td></td>
<td>701</td>
<td>1701</td>
<td>2701</td>
<td>3701</td>
<td>—</td>
<td>System area</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>702</td>
<td>1702</td>
<td>2702</td>
<td>3702</td>
<td>Md</td>
<td>Power factor</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>703</td>
<td>1703</td>
<td>2703</td>
<td>3703</td>
<td>—</td>
<td>System area</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>704</td>
<td>1704</td>
<td>2704</td>
<td>3704</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>719</td>
<td>1719</td>
<td>2719</td>
<td>3719</td>
<td>—</td>
<td>System area</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>720</td>
<td>1720</td>
<td>2720</td>
<td>3720</td>
<td>Md</td>
<td>Maximum power factor</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>721</td>
<td>1721</td>
<td>2721</td>
<td>3721</td>
<td>—</td>
<td>System area</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>722</td>
<td>1722</td>
<td>2722</td>
<td>3722</td>
<td>Md</td>
<td>Year of time of max. power factor</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>723</td>
<td>1723</td>
<td>2723</td>
<td>3723</td>
<td>Md</td>
<td>Month and day of time of max. power factor</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>724</td>
<td>1724</td>
<td>2724</td>
<td>3724</td>
<td>Md</td>
<td>Hour and minute of time of max. power factor</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>725</td>
<td>1725</td>
<td>2725</td>
<td>3725</td>
<td>Md</td>
<td>Second and day of the week of max. power factor</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>726</td>
<td>1726</td>
<td>2726</td>
<td>3726</td>
<td>Md</td>
<td>Minimum power factor</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>727</td>
<td>1727</td>
<td>2727</td>
<td>3727</td>
<td>—</td>
<td>System area</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>728</td>
<td>1728</td>
<td>2728</td>
<td>3728</td>
<td>Md</td>
<td>Year of time of min. power factor</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>729</td>
<td>1729</td>
<td>2729</td>
<td>3729</td>
<td>Md</td>
<td>Month and day of time of min. power factor</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>730</td>
<td>1730</td>
<td>2730</td>
<td>3730</td>
<td>Md</td>
<td>Hour and minute of time of min. power factor</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>731</td>
<td>1731</td>
<td>2731</td>
<td>3731</td>
<td>Md</td>
<td>Second and day of the week of min. power factor</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>732</td>
<td>1732</td>
<td>2732</td>
<td>3732</td>
<td>—</td>
<td>System area</td>
<td>—</td>
</tr>
<tr>
<td>Frequency</td>
<td>800</td>
<td>1800</td>
<td>2800</td>
<td>3800</td>
<td>Md</td>
<td>Multiplier of frequency</td>
<td>-3</td>
</tr>
<tr>
<td></td>
<td>801</td>
<td>1801</td>
<td>2801</td>
<td>3801</td>
<td>—</td>
<td>System area</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>802</td>
<td>1802</td>
<td>2802</td>
<td>3802</td>
<td>—</td>
<td>System area</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>803</td>
<td>1803</td>
<td>2803</td>
<td>3803</td>
<td>Md</td>
<td>Frequency</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>804</td>
<td>1804</td>
<td>2804</td>
<td>3804</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>999</td>
<td>1999</td>
<td>2999</td>
<td>3999</td>
<td>—</td>
<td>System area</td>
<td>—</td>
</tr>
</tbody>
</table>

*1 Even if the power failure is restored, data is held because data is backed up by the nonvolatile memory.
*2 For the procedure for using the test mode, refer to section 4.2.5.
### (3) Common sections (Un\G4500 to Un\G4999)

#### Table 6.1-3 Common sections (Un\G4500 to Un\G4999)

<table>
<thead>
<tr>
<th>Item</th>
<th>Address (Decimal)</th>
<th>Data Type</th>
<th>Description</th>
<th>Default value</th>
<th>R/W</th>
<th>Backup*1</th>
<th>Output value during the test mode*2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CH1</td>
<td>CH2</td>
<td>CH3</td>
<td>CH1</td>
<td>CH2</td>
<td>CH3</td>
<td>CH1</td>
</tr>
<tr>
<td>Error</td>
<td>4500</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
</tr>
<tr>
<td></td>
<td>4501</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
</tr>
<tr>
<td></td>
<td>4502</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
</tr>
<tr>
<td></td>
<td>4503</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
</tr>
<tr>
<td></td>
<td>4504</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
</tr>
<tr>
<td></td>
<td>4505~4549</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
</tr>
<tr>
<td></td>
<td>4550</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
</tr>
<tr>
<td></td>
<td>4551~4999</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
<td>━</td>
</tr>
</tbody>
</table>

*1 Even if the power failure is restored, data is held because data is backed up by the nonvolatile memory.

*2 For the procedure for using the test mode, refer to section 4.2.5.
6 Buffer memory

6.2 Configurable sections (CH1: Un\G0 to Un\G99, CH2: Un\G1000 to Un\G1099, CH3: Un\G2000 to Un\G2099, CH4: Un\G3000 to Un\G3099)

6.2.1 Phase wire system (Un\G0)

Phase wire system for target electric circuits is configured below. This setting is common to all channels.

(1) Setting procedure
(a) Set the phase wire in the buffer memory. Setting range is as follows:

<table>
<thead>
<tr>
<th>Setting value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>single-phase 2-wire</td>
</tr>
<tr>
<td>2</td>
<td>single-phase 3-wire</td>
</tr>
<tr>
<td>3</td>
<td>three-phase 3-wire</td>
</tr>
</tbody>
</table>

(b) Turn Operating condition setting request (Yn2) from OFF to ON to enable the setting. (Refer to 5.2.2 (1).)

(2) Default value
It is set to 0 (three-phase 3-wire).
6.2.2 Primary voltage (Un\G1), Primary voltage of VT (Un\G5), Secondary voltage of VT (Un\G6)

- Primary voltage (Un\G1): set the primary voltage of the target electric circuit. This setting is common to all channels.
- Primary voltage of VT (Un\G5): when use for primary voltage of voltage transformer that is not in the primary voltage (Un\G1) setting, set the voltage of the primary side of voltage transformer.
- Secondary voltage of VT (Un\G6): when use for primary voltage of voltage transformer that is not in the primary voltage (Un\G1) setting, set the voltage of the secondary side of voltage transformer.

(1) Setting procedure
(a) Set the primary voltage, primary voltage of VT and secondary voltage of VT in the buffer memory. Setting range is as follows:
   - When set other than "1 to 9" the value of this setting, set to “0: any setting” this setting, and set primary / secondary voltage of VT (Un\G5 / Un\G6).
   - Please setup the primary voltage is 110V (Direct connection) in 1 phase 3 wire.
   - When the value of this setup is set as “1 to 9”, primary/secondary voltage of VT are disabled.

<table>
<thead>
<tr>
<th>Setting value</th>
<th>Description</th>
<th>Primary voltage of VT (Un\G5)</th>
<th>Secondary voltage of VT (Un\G6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Any setting</td>
<td>1 - 6600</td>
<td>1 - 220</td>
</tr>
<tr>
<td>1</td>
<td>110 V (Direct connection)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>220 V (Direct connection)</td>
<td>1100/110 V</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>220/110 V</td>
<td>440/110 V</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>690/110 V</td>
<td>6600/110 V</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1100/110 V</td>
<td>2200/110 V</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>3300/110 V</td>
<td>6600/110 V</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>6600/110 V</td>
<td>0 – 6600 (However, this setting is disabled)</td>
<td>0 – 220 (However, this setting is disabled)</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) Turn Operating condition setting request (Yn2) from OFF to ON to enable the setting. (Refer to 5.2.2 (1).)

(2) Default value
   - Primary voltage (Un\G1) is set to 220 V (2).
   - Primary voltage of VT (Un\G5) is set to 0.
   - Secondary voltage of VT (Un\G6) is set to 0.
6 Buffer memory

6.2.3 CH1 primary current (Un\G2), CH1 primary current of CT (Un\G7)

- CH1 primary current (Un\G2): set the primary current of the target electric circuit.
- CH1 primary current of CT (Un\G7): when use for primary current of current transformer that is not in the CH1 primary current (Un\G2) setting, set the current of the primary side of current transformer.

Secondary current of CT cannot be set. Because secondary current of CT is fixed to 5A.

(1) Setting procedure

(a) Set the primary current and primary current of CT in the buffer memory. Setting range is as follows: Please choose the settings to match the current sensor to be used.

When set other than "1 to 5, 501 to 536" the value of this setting, set to "0: any setting" this setting, and set primary current of CT (Un\G7).

When the value of this setup is set as “1 to 5, 501 to 536", primary current of CT is disabled.

<table>
<thead>
<tr>
<th>CH1 primary current (Un\G2)</th>
<th>CH1 primary current of CT (Un\G7)</th>
<th>Current sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting value</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Any setting</td>
<td>1 - 6000</td>
</tr>
<tr>
<td>1</td>
<td>50A</td>
<td>EMU2-CT5,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EMU-CT5-A</td>
</tr>
<tr>
<td>2</td>
<td>100A</td>
<td>EMU-CT50,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EMU-CT100-A</td>
</tr>
<tr>
<td>3</td>
<td>250A</td>
<td>EMU-CT250,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EMU-CT250-A</td>
</tr>
<tr>
<td>4</td>
<td>400A</td>
<td>EMU-CT400,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EMU-CT400-A</td>
</tr>
<tr>
<td>5</td>
<td>600A</td>
<td>EMU-CT600,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EMU-CT600-A</td>
</tr>
<tr>
<td>501</td>
<td>5/5A</td>
<td>0 – 6000 (However, this setting is disabled)</td>
</tr>
<tr>
<td>502</td>
<td>6/5A</td>
<td>EMU2-CT5,</td>
</tr>
<tr>
<td>503</td>
<td>7.5/5A</td>
<td>EMU-CT5-A</td>
</tr>
<tr>
<td>504</td>
<td>8/5A</td>
<td>EMU-CT50,</td>
</tr>
<tr>
<td>505</td>
<td>10/5A</td>
<td>EMU-CT100-A</td>
</tr>
<tr>
<td>506</td>
<td>12/5A</td>
<td>EMU-CT250,</td>
</tr>
<tr>
<td>507</td>
<td>15/5A</td>
<td>EMU-CT250-A</td>
</tr>
<tr>
<td>508</td>
<td>20/5A</td>
<td>EMU-CT400,</td>
</tr>
<tr>
<td>509</td>
<td>25/5A</td>
<td>EMU-CT400-A</td>
</tr>
<tr>
<td>510</td>
<td>30/5A</td>
<td>EMU-CT600,</td>
</tr>
<tr>
<td>511</td>
<td>40/5A</td>
<td>EMU-CT600-A</td>
</tr>
<tr>
<td>512</td>
<td>50/5A</td>
<td>EMU2-CT5,</td>
</tr>
<tr>
<td>513</td>
<td>60/5A</td>
<td>EMU-CT5-A</td>
</tr>
<tr>
<td>514</td>
<td>75/5A</td>
<td>EMU-CT5-A</td>
</tr>
<tr>
<td>515</td>
<td>80/5A</td>
<td>EMU-CT5-A</td>
</tr>
</tbody>
</table>
### 6 Buffer memory

<table>
<thead>
<tr>
<th>CH1 primary current (Un\G2)</th>
<th>CH1 primary current of CT (Un\G7)</th>
<th>Current sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting value</td>
<td>Description</td>
<td>0 – 6000 (However, this setting is disabled)</td>
</tr>
<tr>
<td>516</td>
<td>100/5A</td>
<td></td>
</tr>
<tr>
<td>517</td>
<td>120/5A</td>
<td></td>
</tr>
<tr>
<td>518</td>
<td>150/5A</td>
<td></td>
</tr>
<tr>
<td>519</td>
<td>200/5A</td>
<td></td>
</tr>
<tr>
<td>520</td>
<td>250/5A</td>
<td></td>
</tr>
<tr>
<td>521</td>
<td>300/5A</td>
<td></td>
</tr>
<tr>
<td>522</td>
<td>400/5A</td>
<td></td>
</tr>
<tr>
<td>523</td>
<td>500/5A</td>
<td></td>
</tr>
<tr>
<td>524</td>
<td>600/5A</td>
<td></td>
</tr>
<tr>
<td>525</td>
<td>750/5A</td>
<td></td>
</tr>
<tr>
<td>526</td>
<td>800/5A</td>
<td></td>
</tr>
<tr>
<td>527</td>
<td>1000/5A</td>
<td></td>
</tr>
<tr>
<td>528</td>
<td>1200/5A</td>
<td></td>
</tr>
<tr>
<td>529</td>
<td>1500/5A</td>
<td></td>
</tr>
<tr>
<td>530</td>
<td>1600/5A</td>
<td></td>
</tr>
<tr>
<td>531</td>
<td>2000/5A</td>
<td></td>
</tr>
<tr>
<td>532</td>
<td>2500/5A</td>
<td></td>
</tr>
<tr>
<td>533</td>
<td>3000/5A</td>
<td></td>
</tr>
<tr>
<td>534</td>
<td>4000/5A</td>
<td></td>
</tr>
<tr>
<td>535</td>
<td>5000/5A</td>
<td></td>
</tr>
<tr>
<td>536</td>
<td>6000/5A</td>
<td></td>
</tr>
</tbody>
</table>

(b) Turn Operating condition setting request (Yn2) from OFF to ON to enable the setting. (Refer to 5.2.2 (1).)

(2) Default value

- CH1 Primary current (Un\G2) is set to 2 (100 A).
- CH1 Primary current of CT (Un\G7) is set to 0.

#### 6.2.4 CH1 current demand time (Un\G3)

Set a time duration for which the average fluctuation of current demand is measured from the measured current value.

If current demand time is set short, the response to change of current will be quick; however, the fluctuation range may be too large. Adjust the duration according to the load and purposes.

(1) Setting procedure

(a) Set current demand time in the buffer memory.
   - Configurable range: 0 to 1800 (seconds)
   - Set the value in seconds.

(b) Turn Operating condition setting request (Yn2) from OFF to ON to enable the setting. (Refer to 5.2.2 (1).)

(2) Default value

- It is set to 120 (seconds).
6 Buffer memory

6.2.5 CH1 electric power demand time (Un\G4)

Set a time duration for which the average fluctuation of electric power demand is measured from the measured power value. If electric power demand time is set short, the response to change of power will be quick; however, the fluctuation range may be too large. Adjust the duration according to the load and purposes.

(1) Setting procedure
   (a) Set electric power demand time in the buffer memory.
      - Configurable range: 0 to 1800 (seconds)
      - Set the value in seconds.
   (b) Turn Operating condition setting request (Yn2) from OFF to ON to enable the setting. (Refer to 5.2.2 (1).)

(2) Default value
   It is set to 120 (seconds).
6 Buffer memory

6.2.6 CH1 alarm 1 item (Un\G11), CH1 alarm 2 item (Un\G21)

Set which measuring item will be monitored for the upper/lower limit alarm. Alarm 1 and 2 operate independently.

(1) Setting procedure

(a) Set the item for alarm 1 and 2 in the buffer memory. Setting range is as follows:

<table>
<thead>
<tr>
<th>Setting value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No monitoring</td>
</tr>
<tr>
<td>1</td>
<td>Current demand upper limit</td>
</tr>
<tr>
<td>2</td>
<td>Current demand lower limit</td>
</tr>
<tr>
<td>3</td>
<td>Voltage upper limit</td>
</tr>
<tr>
<td>4</td>
<td>Voltage lower limit</td>
</tr>
<tr>
<td>5</td>
<td>Electric power demand upper limit</td>
</tr>
<tr>
<td>6</td>
<td>Electric power demand lower limit</td>
</tr>
<tr>
<td>7</td>
<td>Power factor upper limit</td>
</tr>
<tr>
<td>8</td>
<td>Power factor lower limit</td>
</tr>
</tbody>
</table>

(b) Measuring items for the monitoring target are as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Measuring item of monitoring target</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>single-phase 2-wire</td>
</tr>
<tr>
<td>Current demand upper limit</td>
<td>1-phase current demand</td>
</tr>
<tr>
<td>Current demand lower limit</td>
<td>3-phase current demand</td>
</tr>
<tr>
<td>Voltage upper limit</td>
<td>1 - 2 line voltage</td>
</tr>
<tr>
<td>Voltage lower limit</td>
<td>2 - 3 line voltage</td>
</tr>
<tr>
<td>Electric power demand upper limit</td>
<td>2-phase current demand</td>
</tr>
<tr>
<td></td>
<td>3-phase current demand</td>
</tr>
<tr>
<td>Electric power demand lower limit</td>
<td>1 - 2 line voltage</td>
</tr>
<tr>
<td></td>
<td>2 - 3 line voltage</td>
</tr>
<tr>
<td></td>
<td>3 - 1 line voltage</td>
</tr>
<tr>
<td>Power factor upper limit</td>
<td>Power factor *2</td>
</tr>
<tr>
<td>Power factor lower limit</td>
<td></td>
</tr>
</tbody>
</table>

*1 When multiple number of measuring items are targeted for monitoring, the alarm judgment condition will be as following.

<table>
<thead>
<tr>
<th>Upper/lower limits</th>
<th>Alarm judgment conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Condition for occurrence</td>
</tr>
<tr>
<td>Current demand upper limit Voltage</td>
<td>Any one of alarm item exceeds the alarm value.</td>
</tr>
<tr>
<td>upper limit</td>
<td></td>
</tr>
<tr>
<td>Current demand lower limit Voltage</td>
<td>Any one of alarm item go below the alarm value.</td>
</tr>
<tr>
<td>lower limit</td>
<td></td>
</tr>
</tbody>
</table>
6 Buffer memory

*2 The idea of upper and lower for PF upper/lower limit judgment is shown below.

(c) Turn Operating condition setting request (Yn2) from OFF to ON to enable the setting. (Refer to 5.2.2 (1).)

(2) Default value
It is set to 0 (no monitoring).

6.2.7 CH1 alarm 1 value (Un\G12, 13), CH1 alarm 2 value (Un\G22, 23)

Set the upper/lower limit monitoring value for the target that was set in alarm 1 item and alarm 2 item.

(1) Setting procedure
(a) Set the monitoring values for alarm 1 and 2 in the buffer memory.
- Configurable range: -2147483648 to 2147483647
- The unit of the setting value is the same as below which was used for the measuring value of the monitored target configured in alarm 1 item and alarm 2 item.

<table>
<thead>
<tr>
<th>Alarm 1 item</th>
<th>Unit of alarm 1 value and alarm 2 value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current demand upper limit</td>
<td>×10^{-3} A</td>
</tr>
<tr>
<td>Current demand lower limit</td>
<td></td>
</tr>
<tr>
<td>Voltage upper limit</td>
<td>×10^{-3} V</td>
</tr>
<tr>
<td>Voltage lower limit</td>
<td></td>
</tr>
<tr>
<td>Electric power demand upper limit</td>
<td>W (×10^{-3} kW)</td>
</tr>
<tr>
<td>Electric power demand lower limit</td>
<td></td>
</tr>
<tr>
<td>Power factor upper limit</td>
<td>×10^{-3}%</td>
</tr>
<tr>
<td>Power factor lower limit</td>
<td></td>
</tr>
</tbody>
</table>

(b) Turn Operating condition setting request (Yn2) from OFF to ON to enable the setting.

(2) Default value
It is set to 0.
6 Buffer memory

6.2.8 CH1 alarm 1 reset method (Un\G14), CH1 alarm 2 reset method (Un\G24)

Set the reset method of the alarm 1 and alarm 2.
For differences in behavior of alarm monitoring for different reset methods, refer to 4.2.4 (2).

(1) Setting procedure

(a) Set the reset method for alarm 1 and 2 in the buffer memory. Setting range is as follows:

<table>
<thead>
<tr>
<th>Setting value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Self-retention</td>
</tr>
<tr>
<td>1</td>
<td>Auto reset</td>
</tr>
</tbody>
</table>

(b) Turn Operating condition setting request (Yn2) from OFF to ON to enable the setting.

(2) Default value

It is set to 0 (self retention).

6.2.9 CH1 alarm 1 delay time (Un\G15), CH1 alarm 2 delay time (Un\G25)

Set the alarm delay time for the alarm 1 and alarm 2.
Alarm delay time means a grace period that takes from the moment when it exceeds the upper limit or goes under the lower limit of the alarm 1 value or alarm 2 value until the alarm flag is turned ON. For detailed behavior, refer to 4.2.4 (2).

(1) Setting procedure

(a) Set the delay time for alarm 1 and alarm 2 in the buffer memory.
   - Configurable range: 0 to 300 (seconds)
   - Set the value in seconds.

(b) Turn Operating condition setting request (Yn2) from OFF to ON to enable the setting.

(2) Default value

It is set to 0 (seconds).
6 Buffer memory

6.2.10 Integrated value setting target (Un\G51), integrated value setting value (Un\G52, 53)

(1) Setting procedure

(a) Set integrated value setting target (Un\G51) in the buffer memory. Setting range is as follows:

<table>
<thead>
<tr>
<th>Setting value</th>
<th>CH1</th>
<th>CH2</th>
<th>CH3</th>
<th>CH4</th>
<th>All CHs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>No set</td>
</tr>
<tr>
<td>11</td>
<td>21</td>
<td>31</td>
<td>41</td>
<td>91</td>
<td>Electric energy (consumption)</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>22</td>
<td>32</td>
<td>42</td>
<td>92</td>
<td>Electric energy (regeneration)</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>23</td>
<td>33</td>
<td>43</td>
<td>93</td>
<td>Reactive energy (consumption lag)</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>29</td>
<td>39</td>
<td>49</td>
<td>99</td>
<td>Total integrated value</td>
<td></td>
</tr>
</tbody>
</table>

(b) Set integrated value setting value (Un\G52, Un\G53) in the buffer memory.
- Configurable range: 0 to 999999999
- The unit used for the setting value is the same as that used for the electric energy and reactive energy that are output to the buffer memory.
- For details, refer to section 6.3.2.

(c) Turn Integrated value setting request (Yn3) from OFF to ON to enable* the setting.

(d) After checking that integrated value set completion flag (Xn3) turns ON and setting is completed, set the integrated value set request (Yn3) to OFF.

After detected that the integrated value set request (Yn3) turns OFF, the integrated value set completion flag (Xn3) turns OFF.

(2) Default value

- integrated value setting target (Un\G51) is set to 0 (No set).
- integrated value setting value (Un\G52, Un\G53) is set to 0.
6 Buffer memory

6.2.11 Max./min. values clear item (Un¥G56)

Select the max./min. values you want to clear.

- Regular operating mode

  (1) Setting procedure
  
  (a) Set max./min values clear item (Un¥G56) in the buffer memory.

  Setting range is as follows:

<table>
<thead>
<tr>
<th>Setting value</th>
<th>CH1</th>
<th>CH2</th>
<th>CH3</th>
<th>CH4</th>
<th>All CHs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>No clear</td>
</tr>
<tr>
<td>11</td>
<td>21</td>
<td>31</td>
<td>41</td>
<td>91</td>
<td></td>
<td>Current demand</td>
</tr>
<tr>
<td>12</td>
<td>22</td>
<td>32</td>
<td>42</td>
<td>92</td>
<td></td>
<td>Voltage</td>
</tr>
<tr>
<td>13</td>
<td>23</td>
<td>33</td>
<td>43</td>
<td>93</td>
<td></td>
<td>Electric power demand</td>
</tr>
<tr>
<td>14</td>
<td>24</td>
<td>34</td>
<td>44</td>
<td>94</td>
<td></td>
<td>Power factor</td>
</tr>
<tr>
<td>19</td>
<td>29</td>
<td>39</td>
<td>49</td>
<td>99</td>
<td></td>
<td>All items</td>
</tr>
</tbody>
</table>

  (b) Turn Max./min. values clear request (Yn4) from OFF to ON to enable the setting.

(2) Default value

  It is set to 0 (No clear).

- Current measuring mode

  (1) Setting procedure

  (a) Set max./min values clear item (Un¥G4002) in the buffer memory.

  Setting range is as follows:

<table>
<thead>
<tr>
<th>Setting value</th>
<th>CH1</th>
<th>CH2</th>
<th>CH3</th>
<th>CH4</th>
<th>CH5</th>
<th>CH6</th>
<th>CH7</th>
<th>CH8</th>
<th>All CHs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>No clear</td>
</tr>
<tr>
<td>11</td>
<td>21</td>
<td>31</td>
<td>41</td>
<td>51</td>
<td>61</td>
<td>71</td>
<td>81</td>
<td>91</td>
<td></td>
<td>Current demand</td>
</tr>
</tbody>
</table>

  (b) Turn Max./min. values clear request (Yn4) from OFF to ON to enable the setting.

(2) Default value

  It is set to 0 (No clear).
6.2.12 Output period of data acquisition clock (Un\G60, 61)

Set the output period of Data acquisition clock (Xn1). This setting is common to all channels.

- Data acquisition clock (Regular operating mode)

(1) Setting procedure
(a) Set output period of data acquisition clock (Un\G60, 61) in the buffer memory.
   - Configurable range: 0 to 86400000 (ms)
   *When the output period of data acquisition clock is set to 0, Data acquisition clock (Xn1) is always OFF.
(b) Because the data update interval is 500 ms, Data acquisition clock (Xn1) runs every 500 ms.
   Note that the output period of data acquisition clock is not a multiple of 500 ms, Data acquisition clock turns ON at the time of the first data update after the elapse of the output period of data acquisition clock.
   <Example> When the output period of data acquisition clock is 1600 ms:
   Measurement data update count = 1600 ms/500 ms = quotient 3 + remainder 100 ms
   Thus, the input device (Xn1) turns ON once in every four times the measurement data is updated.
   As a result, it is same as the case where the output period of data acquisition clock is 2000 ms.
(c) Turn Operating condition setting request (Yn2) from OFF to ON to enable the setting.

(2) Default value
   It is set to 0 (ms).

- Data acquisition clock (Current measuring mode)

(1) Setting procedure
(a) Set output period of data acquisition clock (Un\G60, 61) in the buffer memory.
   - Configurable range: 0 to 86400000 (ms)
   *When the output period of data acquisition clock is set to 0, Data acquisition clock (Xn1) is always OFF.
(b) Because the data update interval is 100 ms, Data acquisition clock (Xn1) runs every 100 ms.
   Note that the output period of data acquisition clock is not a multiple of 100 ms, Data acquisition clock turns ON at the time of the first data update after the elapse of the output period of data acquisition clock.
   <Example> When the output period of data acquisition clock is 250 ms:
   Measurement data update count = 250 ms/100 ms = quotient 2 + remainder 50 ms
   Thus, the input device (Xn1) turns ON once in every three times the measurement data is updated.
   As a result, it is same as the case where the output period of data acquisition clock is 300 ms.
(c) Turn Operating condition setting request (Yn2) from OFF to ON to enable the setting.

(2) Default value
   It is set to 0 (ms).
6 Buffer memory

6.3 Measurement sections (CH1: Un\G100 to Un\G999, CH2: Un\G1100 to Un\G1999, CH3: Un\G2100 to Un\G2999, CH4: Un\G3100 to Un\G3999)

This product divides the measuring data into the Data and Multiplier, and output them to Buffer memory.

Actual measuring data is obtained by the following formula.

\[ \text{Measuring data} = \text{Data} \times 10^n \] (Multiplier is n).

(Example)
The values output to the Buffer memory are as follows when total current is measured 123.456A.

- Data (Un\G218, 219): 123456
- Multiplier (Un\G200): -3

The actual measuring data is obtained from the value of Buffer memory as follows.

\[ \text{Measuring data} = \text{Data} \times 10^{-3} \]
\[ = 123.456A \]

6.3.1 Multiplier of CH1 electric energy (Un\G100)

Multiplier of electric energy are stored.

As to how the multiplier is determinate, refer to section 4.2.1 (3).

(1) Details of stored data

(a) Storage format
- Data are stored as 16-bit signed binary in the buffer memory.
- Data range: -5 to -1

(b) Update timing
- It will be updated when phase wire system (Un\G0), primary voltage (Un\G1), and CH1 primary current (Un\G2), primary voltage of VT(Un\G5), secondary voltage of VT(Un\G6), and CH1 primary current of CT(Un\G7) are set.

6.3.2 CH1 electric energy (consumption) (Un\G102, 103), CH1 electric energy (regeneration) (Un\G104,105)

Stores the electric energy of the consumption side and the regeneration side will be stored.

(1) Details of stored data

(a) Storage format
- Data are stored as double-word 32-bit signed binary in the buffer memory.
- Data range: 0 to 999999999

When the stored data exceeds 999999999, stored data turns to 0 and continues measuring.

*Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.

(b) Unit
- Unit can be determined by multiplier of CH1 electric energy (Un\G100), as shown below.

<table>
<thead>
<tr>
<th>Multiplier of CH1 electric energy (Un\G100)</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>( \times 10^{-5} ) kWh</td>
</tr>
<tr>
<td>-4</td>
<td>( \times 10^{-4} ) kWh</td>
</tr>
<tr>
<td>-3</td>
<td>( \times 10^{-3} ) kWh</td>
</tr>
<tr>
<td>-2</td>
<td>( \times 10^{-2} ) kWh</td>
</tr>
<tr>
<td>-1</td>
<td>( \times 10^{-1} ) kWh</td>
</tr>
</tbody>
</table>

(c) Update timing
- It will be updated every measuring cycle (500 ms).
6 Buffer memory

6.3.3 CH1 reactive energy (consumption lag) (Un\G106, 107)

Delayed consumption of the reactive energy is stored.

(1) Details of stored data

(a) Storage format

Data are stored as double-word 32-bit signed binary in the buffer memory.
- Data range: 0 to 999999999

When the stored data exceeds 999999999, stored data turns to 0 and continues measuring.
*Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.

(b) Unit

Unit can be determined by multiplier of CH1 electric energy (Un\G100), as shown below.

<table>
<thead>
<tr>
<th>Multiplier of CH1 electric energy (Un\G100)</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>×10^5 kvarh</td>
</tr>
<tr>
<td>-4</td>
<td>×10^4 kvarh</td>
</tr>
<tr>
<td>-3</td>
<td>×10^3 kvarh</td>
</tr>
<tr>
<td>-2</td>
<td>×10^2 kvarh</td>
</tr>
<tr>
<td>-1</td>
<td>×10^1 kvarh</td>
</tr>
</tbody>
</table>

(c) Update timing

It will be updated every measuring cycle (500 ms).

6.3.4 CH1 periodic electric energy 1 (Un\G114, 115), CH1 periodic electric energy 2 (Un\G116, 117)

Stores the periodic electric energy 1 and periodic electric energy 2. The periodic electric energy of the consumption side is measured.

For specific usage procedures for the periodic electric energy, refer to section 4.2.2.

(1) Details of stored data

(a) Storage format

Data are stored as double-word 32-bit signed binary in the buffer memory.
- Data range: 0 to 999999999

When the stored data exceeds 999999999, stored data turns to 0 and continues measuring.
*Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.

(b) Unit

Unit can be determined by multiplier of CH1 electric energy (Un\G100), as shown below.

<table>
<thead>
<tr>
<th>Multiplier of CH1 electric energy (Un\G100)</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>×10^5 kWh</td>
</tr>
<tr>
<td>-4</td>
<td>×10^4 kWh</td>
</tr>
<tr>
<td>-3</td>
<td>×10^3 kWh</td>
</tr>
<tr>
<td>-2</td>
<td>×10^2 kWh</td>
</tr>
<tr>
<td>-1</td>
<td>×10^1 kWh</td>
</tr>
</tbody>
</table>

(c) Update timing

It will be updated every measuring cycle (500 ms).
6 Buffer memory

6.3.5 Multiplier of CH1 electric current (Un\G200)

The multiplier of the electric current is stored.

(1) Details of stored data
(a) Storage format
   Data are stored as 16-bit signed binary in the buffer memory.
   - Data range: -3 (fixed)
(b) Update timing
   Because it is fixed at -3, there is no update.

6.3.6 CH1 1-phase current (Un\G202, 203), CH1 2-phase current (Un\G204, 205),
CH1 3-phase current (Un\G206, 207)

The electric current (effective value) of each phase is stored.

(1) Details of stored data
(a) Storage format
   Data are stored as double-word 32-bit signed binary in the buffer memory.
   - Data range: 0 to 99999999 (0 to 99999.990A)
   *Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.
(b) Unit
   \( \times 10^{-3} \) A *Unit is fixed.
(c) Update timing
   It will be updated every measuring cycle (500 ms).

6.3.7 CH1 1-phase current demand (Un\G210, 211), CH1 2-phase current demand (Un\G212, 213),
CH1 3-phase current demand (Un\G214, 215)

Stores the electric current (effective value) at each phase that is calculated based on the moving average
for the duration of time configured in current demand time (Un\G3).

(1) Details of stored data
(a) Storage format
   Data are stored as double-word 32-bit signed binary in the buffer memory.
   - Data range: 0 to 99999999 (0 to 99999.990A)
   *Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.
(b) Unit
   \( \times 10^{-3} \) A *Unit is fixed.
(c) Update timing
   It will be updated every measuring cycle (500 ms).
6 Buffer memory

6.3.8 CH1 average current (Un\G218, 219)

Stores the average current.
For procedure for storing the average current using phase wire system, refer to section 4.2.1 (2).

(1) Details of stored data
   (a) Storage format
       Data are stored as double-word 32-bit signed binary in the buffer memory.
       - Data range: 0 to 99999999 (0 to 99999.990A)
       *Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.
   (b) Unit
       $\times 10^{-3}$ A *Unit is fixed.
   (c) Update timing
       It will be updated every measuring cycle (500 ms).

6.3.9 CH1 maximum current demand (Un\G220, 221), CH1 minimum current demand (Un\G226,227)

Stores the max./min. values of the electric current demand among phases.
For procedure for storing the max./min. the electric current demand using phase wire system, refer to section 4.2.1 (2).

(1) Details of stored data
   (a) Storage format
       Data are stored as double-word 32-bit signed binary in the buffer memory.
       - Data range: 0 to 99999999 (0 to 99999.990A)
       *Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.
   (b) Unit
       $\times 10^{-3}$ A *Unit is fixed.
   (c) Update timing
       It will be updated every measuring cycle (500ms) if it exceeds the current max. value or goes under the current min. value.
6 Buffer memory

6.3.10 Year of time of CH1 max. current demand (Un\G222),
month and day of time of CH1 max. current demand (Un\G223),
hour and minute of time of CH1 max. current demand (Un\G224),
second and day of the week of time of CH1 max. current demand (Un\G225),
year of time of CH1 min. current demand (Un\G228),
month and day of time of CH1 min. current demand (Un\G229),
hour and minute of time of CH1 min. current demand (Un\G230),
second and day of the week of time of CH1 min. current demand (Un\G231)

Stores year, month, day, hour, minute, second, and day of the week of time when CH1 max. current
demand (Un\G220, 221) and CH1 min. current demand (Un\G226, 227) were updated.

(1) Details of stored data
(a) Storage format
As indicated below, data are stored as BCD code in the buffer memory.

<table>
<thead>
<tr>
<th>Buffer memory address</th>
<th>Storage format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Un\G222 / Un\G228</td>
<td><img src="image" alt="Year 2010 2010h" /></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Month 0730h" /></td>
</tr>
<tr>
<td>Un\G223 / Un\G229</td>
<td><img src="image" alt="Month 0730h" /></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Day 0730h" /></td>
</tr>
<tr>
<td>Un\G224 / Un\G230</td>
<td><img src="image" alt="Hour 1035h" /></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Minute 1035h" /></td>
</tr>
<tr>
<td>Un\G225 / Un\G231</td>
<td><img src="image" alt="Second 4805h" /></td>
</tr>
</tbody>
</table>

(b) Update timing
It will be updated every measuring cycle (500 ms) if it exceeds the current max. value or goes
under the current min. value.
6.3.11 Multiplier of CH1 the electric voltage (Un\G300)

The multiplier of the electric voltage is stored.

(1) Details of stored data
   (a) Storage format
       Data are stored as 16-bit signed binary in the buffer memory.
       - Data range: -3 (fixed)
   (b) Update timing
       Because it is fixed at -3, there is no update.

6.3.12 CH1 1 - 2 line voltage (Un\G302, 303), CH1 2 - 3 line voltage (Un\G304, 305),
   CH1 3 - 1 line voltage (Un\G306, 307)

The electric voltage between every combination of wires (effective value) is stored.

(1) Details of stored data
   (a) Storage format
       Data are stored as double-word 32-bit signed binary in the buffer memory.
       - Data range: 0 to 99999900 (0 to 99,999.900 V)
       *Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.
   (b) Unit
       \( \times 10^{-3} \) V *Unit is fixed.
   (c) Update timing
       It will be updated every measuring cycle (500 ms).

6.3.13 CH1 average voltage (Un\G314, 315)

Stores the average voltage.
For procedure for storing the average voltage using phase wire system, refer to 4.2.1 (2).

(1) Details of stored data
   (a) Storage format
       Data are stored as double-word 32-bit signed binary in the buffer memory.
       - Data range: 0 to 99999900 (0 to 99,999.900 V)
       *Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.
   (b) Unit
       \( \times 10^{-3} \) V *Unit is fixed.
   (c) Update timing
       It will be updated every measuring cycle (500 ms).
6 Buffer memory

6.3.14 CH1 maximum voltage (Un(G320, 321)), CH1 minimum voltage (Un(G326, 327))

Stores the max./min. values of the voltage among in-between wires.
For procedure for storing the max./min. voltage using phase wire system, refer to section 4.2.1 (2).

(1) Details of stored data
(a) Storage format
   Data are stored as double-word 32-bit signed binary in the buffer memory.
   - Data range: 0 to 99999900 (0 to 99,999.900 V)
   *Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.
(b) Unit
   \( \times 10^{-3} \) V *Unit is fixed.
(c) Update timing
   It will be updated every measuring cycle (500 ms) if it exceeds the current max. value or goes under the current min. value.
6 Buffer memory

6.3.15 Year of time of CH1 the max. voltage (Un\G322),
month and day of time of CH1 max. voltage (Un\G323),
hour and minute of time of CH1 max. voltage (Un\G324),
second and day of the week of time of CH1 max. voltage (Un\G325),
year of time of CH1 min. voltage (Un\G328),
month and day of time of CH1 min. voltage (Un\G329),
hour and minute of time of CH1 min. voltage (Un\G330),
second and day of the week of time of CH1 min. voltage (Un\G331)

Stores year, month, day, hour, minute, and the day of the week of time of maximum voltage (Un\G320, 321) and minimum voltage (Un\G326, 327) were updated.

(1) Details of stored data
(a) Storage format
As indicated below, data are stored as BCD code in the buffer memory.

<table>
<thead>
<tr>
<th>Buffer memory address</th>
<th>Storage format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Un\G322 /Un\G328</td>
<td><img src="image" alt="Year" /> e.g.) Year 2010 2010h</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Month" /> <img src="image" alt="Day" /> e.g.) July 30 0730h</td>
</tr>
<tr>
<td>Un\G324 /Un\G330</td>
<td><img src="image" alt="Hour" /> <img src="image" alt="Minute" /> e.g.) 10:35 1035h</td>
</tr>
<tr>
<td>Un\G325 /Un\G331</td>
<td><img src="image" alt="Second" /> <img src="image" alt="Day of the week" /> e.g.) 48sec Firday 4805h</td>
</tr>
</tbody>
</table>

(b) Update timing
It will be updated every measuring cycle (500ms) and if it exceeds the max. value or goes under the min. value.
6 Buffer memory

6.3.16 Multiplier of CH1 power (Un\(G400\))

The multiplier of power is stored.

(1) Details of stored data
   (a) Storage format
       Data are stored as 16-bit signed binary in the buffer memory.
       - Data range: -3 (fixed)
   (b) Update timing
       Because it is fixed at -3, there is no update.

6.3.17 CH1 electric power (Un\(G402,403\))

The electric power (effective value) is stored.

(1) Details of stored data
   (a) Storage format
       Data are stored as double-word 32-bit signed binary in the buffer memory.
       If the power is negative, represents the regenerative power.
       - Data range: -999999999 to 999999999 (-999999.999 to 999999.999 kW)
       *Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.
       *The sign of the data is as shown in the following figure.

   (b) Unit
       \(\times 10^{-3}\) kW  *Unit is fixed.
   (c) Update timing
       It will be updated every measuring cycle (500 ms).
6 Buffer memory

6.3.18 CH1 electric power demand (Un\G404,405)

Stores the electric power that is measured based on the moving average for the duration of time configured in CH1 electric power demand time (Un\G4).

(1) Details of stored data
   (a) Storage format
       Data are stored as double-word 32-bit signed binary in the buffer memory.
       If the power is negative, represents the regenerative power.
       - Data range: -999999999 to 999999999 (-999999.999 to 999999.999 kW)
       *Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.
   (b) Unit
       \( \times 10^{-3} \text{ kW} \)  *Unit is fixed.
   (c) Update timing
       It will be updated every measuring cycle (500 ms).

6.3.19 CH1 maximum value of electric power demand (Un\G420, 421),
CH1 minimum value of electric power demand (Un\G426, 427)

Stores the max./min. values of the electric power demand.

(1) Details of stored data
   (a) Storage format
       Data are stored as double-word 32-bit signed binary in the buffer memory.
       If the power is negative, represents the regenerative power.
       - Data range: -999999999 to 999999999 (-999999.999 to 999999.999 kW)
       *Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.
   (b) unit
       \( \times 10^{-3} \text{ kW} \)  *Unit is fixed.
   (c) Update timing
       It will be updated every measuring cycle (500 ms) if it exceeds the current max. value or goes under the current min. value.
6 Buffer memory

6.3.20 Year of time of CH1 max. electric power demand (Un\G422), month and day of time of CH1 max. electric power demand (Un\G423), hour and minute of time of CH1 max. electric power demand (Un\G424), second and day of the week of time of CH1 max. electric power demand (Un\G425), year of time of CH1 min. electric power demand (Un\G428), month and day of time of CH1 min. electric power demand (Un\G429), hour and minute of time of CH1 min. electric power demand (Un\G430), second and day of the week of time of CH1 min. electric power demand (Un\G431)

Stores year, month, day, hour, minute, second, and day of the week of time when CH1 max. electric power demand (Un\G420, 421) and CH1 min. electric power demand (Un\G426, 427) were updated.

(1) Details of stored data
(a) Storage format
As indicated below, data are stored as BCD code in the buffer memory.

<table>
<thead>
<tr>
<th>Buffer memory address</th>
<th>Storage format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Un\G422 / Un\G428</td>
<td>e.g.) Year 2010 2010h</td>
</tr>
<tr>
<td></td>
<td>b15 ~ b12 b11 ~ b8 b7 ~ b4 b3 ~ b0</td>
</tr>
<tr>
<td>Un\G423 / Un\G429</td>
<td>e.g.) July 30 0730h</td>
</tr>
<tr>
<td></td>
<td>b15 ~ b12 b11 ~ b8 b7 ~ b4 b3 ~ b0</td>
</tr>
<tr>
<td>Un\G424 / Un\G430</td>
<td>e.g.) 10:35 1035h</td>
</tr>
<tr>
<td></td>
<td>b15 ~ b12 b11 ~ b8 b7 ~ b4 b3 ~ b0</td>
</tr>
<tr>
<td>Un\G425 / Un\G431</td>
<td>e.g.) 48sec Friday 4805h</td>
</tr>
<tr>
<td></td>
<td>b15 ~ b12 b11 ~ b8 b7 ~ b4 b3 ~ b0</td>
</tr>
</tbody>
</table>

(b) Update timing
It will be updated every measuring cycle (500 ms) if it exceeds the current max. value or goes under the current min. value.
6.3.21 Multiplier of CH1 reactive power (Un\G500)

The multiplier of reactive power is stored.

(1) Details of stored data
(a) Storage format
   Data are stored as 16-bit signed binary in the buffer memory.
   - Data range: -3 (fixed)
(b) Update timing
   Because it is fixed at -3, there is no update.

6.3.22 CH1 reactive power (Un\G502, 503)

The reactive power is stored.

(1) Details of stored data
(a) Storage format
   Data are stored as double-word 32-bit signed binary in the buffer memory.
   - Data range: -999999999 to 999999999 (-999999.999 to 999999.999 kvar)
   *Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.
   *The sign of the data is as shown in the following figure.

   ![Diagram of reactive power signs]

(b) Unit
   \( \times 10^{-3} \text{ kvar} \) *Unit is fixed.
(c) Update timing
   It will be updated every measuring cycle (500 ms).

6.3.23 Multiplier of CH1 power factor (Un\G700)

The multiplier of the power factor is stored.

(1) Details of stored data
(a) Storage format
   Data are stored as 16-bit signed binary in the buffer memory.
   - Data range: -3 (fixed)
(b) Update timing
   Because it is fixed at -3, there is no update.
6.3.24 CH1 power factor (Un\G702, 703)

Stores the power factor.

(1) Details of stored data

(a) Storage format
Data are stored as double-word 32-bit signed binary in the buffer memory.
- Data range: -100000 to 100000 (-100.000 to 100.000%)
*Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.
*The sign of the data is as shown in the following figure.

(b) Unit
\( \times 10^{-3}\% \) *Unit is fixed.

(c) Update timing
It will be updated every measuring cycle (500 ms).

6.3.25 CH1 maximum power factor (Un\G720, 721), CH1 minimum power factor (Un\G726, 727)

The max./min. power factors are stored.

(1) Details of stored data

(a) Storage format
Data are stored as double-word 32-bit signed binary in the buffer memory.
- Data range: -100000 to 100000 (-100.000 to 100.000%)
*For the resolution, refer to Section 4.2.1.

(b) Unit
\( \times 10^{-3}\% \) *Unit is fixed.

(c) Update timing
It will be updated every measuring cycle (500 ms).
6 Buffer memory

6.3.26 Year of time of CH1 max. power factor (Un\G722), month and day of time of CH1 max. power factor (Un\G723), hour and minute of time of CH1 max. power factor (Un\G724), second and day of the week of time of CH1 max. power factor (Un\G725), year of time of CH1 min. power factor (Un\G728), month and day of time of CH1 min. power factor (Un\G729), hour and minute of time of CH1 min. power factor (Un\G730), second and day of the week of time of CH1 min. power factor (Un\G731)

Stores year, month, day, hour, minute, second, and day of the week of time when CH1 max. power factor (Un\G720, 721) and CH1 min. power factor (Un\G726, 727) were updated.

(1) Details of stored data
(a) Storage format
As indicated below, data are stored as BCD code in the buffer memory.

<table>
<thead>
<tr>
<th>Buffer memory address</th>
<th>Storage format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Un\G722 /Un\G728</td>
<td>b15  b12 b11  b8 b7  b4 b3  b0  e.g.) Year 2010 2010h</td>
</tr>
<tr>
<td></td>
<td>Year</td>
</tr>
<tr>
<td>Un\G723 /Un\G729</td>
<td>b15  b12 b11  b8 b7  b4 b3  b0  e.g.) July 30 0730h</td>
</tr>
<tr>
<td></td>
<td>Month  Day</td>
</tr>
<tr>
<td>Un\G724 /Un\G730</td>
<td>b15  b12 b11  b8 b7  b4 b3  b0  e.g.) 10:35 1035h</td>
</tr>
<tr>
<td></td>
<td>Hour  Minute</td>
</tr>
<tr>
<td>Un\G725 /Un\G731</td>
<td>b15  b12 b11  b8 b7  b4 b3  b0  e.g.) 48sec Friday 4805h</td>
</tr>
<tr>
<td></td>
<td>Second  0 fixed</td>
</tr>
</tbody>
</table>

(b) Update timing
It will be updated every measuring cycle (500 ms) if it exceeds the current max. value or goes under the current min. value.
6 Buffer memory

6.3.27 Multiplier of CH1 frequency (Un\(G800)\)

The multiplier of the frequency is stored.

(1) Details of stored data
   (a) Storage format
       Data are stored as 16-bit signed binary in the buffer memory.
       - Data range: -3 (fixed)
   (b) Update timing
       Because it is fixed at -3, there is no update.

6.3.28 CH1 frequency (Un\(G802, 803)\)

Stores the frequency.

(1) Details of stored data
   (a) Storage format
       Data are stored as double-word 32-bit signed binary in the buffer memory.
       - Data range: 0 to 999999 (0 to 999.999 Hz)
       *Restrictions for measured data including resolution and measuring range, refer to section 4.2.1.
   (b) Unit
       \(\times 10^{-3}\%\) *Unit is fixed.
   (c) Update timing
       It will be updated every measuring cycle (500 ms).
6 Buffer memory

6.4 Common sections (Un\G4500 to Un\G4999)

6.4.1 Latest error code (Un\G4500)

The latest error code that is detected with this module will be stored.
*For the list of error codes, refer to section 10.1.

(1) Details of stored data
   (a) Storage format
       Data are stored as 16-bit signed binary in the buffer memory.
       - Data range: 0000h (normal), 0001h to FFFFh (error code)
   (b) Update timing
       It will be updated at the time of error occurrence and error recovery.

6.4.2 Year of time of the error (Un\G4501), month and day of time of the error (Un\G4502), hour and minute the error (Un\G4503), second and day of the week of time of the error (Un\G4504)

The year, month, day, hour, minute, and day of the week of time of the error will be stored.

(1) Details of stored data
   (a) Storage format
       As indicated below, data are stored as BCD code in the buffer memory.

<table>
<thead>
<tr>
<th>Buffer memory address</th>
<th>Storage format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Un\G4501</td>
<td><img src="image" alt="Year Storage Format" /> e.g.) Year 2010 2010h</td>
</tr>
<tr>
<td>Un\G4502</td>
<td><img src="image" alt="Month and Day Storage Format" /> e.g.) July 30 0730h</td>
</tr>
<tr>
<td>Un\G4503</td>
<td><img src="image" alt="Hour and Minute Storage Format" /> e.g.) 10:35 1035h</td>
</tr>
<tr>
<td>Un\G4504</td>
<td><img src="image" alt="Second and Day of the Week Storage Format" /> e.g.) 48sec 4805h</td>
</tr>
</tbody>
</table>

(b) Update timing
   It will be updated at the time of error occurrence and error recovery.
6.4.3 State of measuring mode (UnYG4550)

Store the state of measuring mode.

(a) Storage format

- Measuring mode: 0
- Current measuring mode: 1
- Test mode: 2

(b) Update timing

It will be updated at the time of changing the setting the intelligent function of the module switch.
Chapter 7: Current measuring mode

7.1 Measuring functions in the current measuring mode

(1) Measured items
By activating the current measuring mode, you can measure only the current data shown below of up to eight circuits. Each measured item is stored in the buffer memory every 100 ms.

<table>
<thead>
<tr>
<th>Measured items</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>Current</td>
</tr>
<tr>
<td>Current demand</td>
<td>Current demand</td>
</tr>
<tr>
<td></td>
<td>Maximum current demand</td>
</tr>
<tr>
<td></td>
<td>Minimum current demand</td>
</tr>
<tr>
<td></td>
<td>Date/time of the maximum current demand</td>
</tr>
<tr>
<td></td>
<td>Date/time of the minimum current demand</td>
</tr>
</tbody>
</table>

(2) Maximum/minimum current demand
The maximum and minimum current demands are obtained as follows:
Maximum current demand: Maximum value obtained since the reset of the maximum and minimum values until now.
Minimum current demand: Minimum value obtained since the reset of the maximum and minimum values until now.

(3) Resolution of measured data
The resolution of the current value is same as those listed in 4.2.1 (3).

(4) Restrictions on measured data
The restrictions on the current value are same as those described in 4.2.1 (4).

7.2 Selecting the current measuring mode

1) How to use the current measuring mode
You can use the current measuring mode by the intelligent function module switch setting.
For GX Works 2, refer to 8.6.2.
For GX Developer, refer to 8.7.2.
### 7 Current measuring mode

#### 7.3 List of I/O signals

I/O signals used in the current measuring mode are listed in Table 7.3-1.

**Table 7.3-1 List of I/O signals**

<table>
<thead>
<tr>
<th>Input signal (signal direction from QE84WH to CPU module)</th>
<th>Output signal (signal direction from CPU module to QE84WH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device #</td>
<td>Signal name</td>
</tr>
<tr>
<td>Xn0</td>
<td>Module ready</td>
</tr>
<tr>
<td>Xn1</td>
<td>Data acquisition clock</td>
</tr>
<tr>
<td>Xn2</td>
<td>Operating condition setting completion flag</td>
</tr>
<tr>
<td>Xn3</td>
<td>Use prohibited</td>
</tr>
<tr>
<td>Xn4</td>
<td>Max./min. values clear completion flag</td>
</tr>
<tr>
<td>Xn5</td>
<td>Use prohibited</td>
</tr>
<tr>
<td>Xn6</td>
<td>Use prohibited</td>
</tr>
<tr>
<td>Xn7</td>
<td>Use prohibited</td>
</tr>
<tr>
<td>Xn8</td>
<td>Use prohibited</td>
</tr>
<tr>
<td>Xn9</td>
<td>CH1 alarm 1 flag</td>
</tr>
<tr>
<td>XnA</td>
<td>CH1 alarm 2 flag</td>
</tr>
<tr>
<td>XnB</td>
<td>CH2 alarm 1 flag</td>
</tr>
<tr>
<td>XnC</td>
<td>CH2 alarm 2 flag</td>
</tr>
<tr>
<td>XnD</td>
<td>CH3 alarm 1 flag</td>
</tr>
<tr>
<td>XnE</td>
<td>CH3 alarm 2 flag</td>
</tr>
<tr>
<td>XnF</td>
<td>CH4 alarm 1 flag</td>
</tr>
<tr>
<td>Xn10</td>
<td>CH4 alarm 2 flag</td>
</tr>
<tr>
<td>Xn11</td>
<td>CH5 alarm 1 flag</td>
</tr>
<tr>
<td>Xn12</td>
<td>CH5 alarm 2 flag</td>
</tr>
<tr>
<td>Xn13</td>
<td>CH6 alarm 1 flag</td>
</tr>
<tr>
<td>Xn14</td>
<td>CH6 alarm 2 flag</td>
</tr>
<tr>
<td>Xn15</td>
<td>CH7 alarm 1 flag</td>
</tr>
<tr>
<td>Xn16</td>
<td>CH7 alarm 2 flag</td>
</tr>
<tr>
<td>Xn17</td>
<td>CH8 alarm 1 flag</td>
</tr>
<tr>
<td>Xn18</td>
<td>CH8 alarm 2 flag</td>
</tr>
<tr>
<td>Xn19</td>
<td>Use prohibited</td>
</tr>
<tr>
<td>Xn1A</td>
<td>Use prohibited</td>
</tr>
<tr>
<td>Xn1B</td>
<td>Use prohibited</td>
</tr>
<tr>
<td>Xn1C</td>
<td>Use prohibited</td>
</tr>
<tr>
<td>Xn1D</td>
<td>Use prohibited</td>
</tr>
<tr>
<td>Xn1E</td>
<td>Use prohibited</td>
</tr>
<tr>
<td>Xn1F</td>
<td>Error flag</td>
</tr>
</tbody>
</table>

**Point**

*1 These signals cannot be used by the user since they are for system use only.

For details about each I/O signal, refer to Section 5.2.
## 7.4 Buffer memory

The following describes buffer memory assignment in the current measuring mode.

### Table 7.4-1 Buffer memory

<table>
<thead>
<tr>
<th>Item</th>
<th>Address/Decimal</th>
<th>Data Type</th>
<th>Description</th>
<th>t value</th>
<th>W/</th>
<th>Back up*2</th>
<th>Output value during the test mode*2</th>
</tr>
</thead>
<tbody>
<tr>
<td>setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4000</td>
<td>4050 4100 4150</td>
<td>Pr</td>
<td>Output period of data acquisition clock</td>
<td>0</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4200 4250 4300</td>
<td>Pr</td>
<td>Max. min. value clear target</td>
<td>0</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4350</td>
<td>Pr</td>
<td>Primary current</td>
<td>2</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4353</td>
<td>Pr</td>
<td>Primary current of CT</td>
<td>0</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4400 4450 4500</td>
<td>Pr</td>
<td>Alarm 1 value</td>
<td>0</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4550 4600 4650</td>
<td>Pr</td>
<td>Alarm 2 value</td>
<td>0</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4700 4750 4800</td>
<td>Pr</td>
<td>Alarm 1 reset method</td>
<td>0</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4850 4900 4950</td>
<td>Pr</td>
<td>Alarm 2 reset method</td>
<td>0</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5000 5050 5100</td>
<td>Pr</td>
<td>Alarm 1 delay time</td>
<td>0</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5150 5200 5250</td>
<td>Pr</td>
<td>Alarm 2 delay time</td>
<td>0</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5300 5350 5400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5450 5500 5550</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5600 5650 5700</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5750 5800 5850</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5900 5950 6000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6050 6100 6150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6200 6250 6300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6350 6400 6450</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6500 6550 6600</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6650 6700 6750</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6800 6850 6900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6950 7000 7050</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7100 7150 7200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7250 7300 7350</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7400 7450 7500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7550 7600 7650</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7700 7750 7800</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7850 7900 7950</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8000 8050 8100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8150 8200 8250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8300 8350 8400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8450 8500 8550</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8600 8650 8700</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8750 8800 8850</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8900 8950 9000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9050 9100 9150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9200 9250 9300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9350 9400 9450</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9500 9550 9600</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9650 9700 9750</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9800 9850 9900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9950</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Set the primary current to the same value between CH1 and CH2, between CH3 and CH4, between CH5 and CH6, and between CH7 and CH8. If you set the CH2 (or CH4, CH6, or CH8) address to any value that is inconsistent with the value of CH1 (or CH3, CH5, or CH7), the value you set becomes invalid and is replaced with the value of CH1 (or CH3, CH5, or CH7) after the operating conditions are set.

---

QE84WH
7 Current measuring mode

7.5 Names and functions of LEDs

The following describes names and functions of LEDs in the current measuring mode.

<table>
<thead>
<tr>
<th>Name</th>
<th>Color</th>
<th>Role</th>
<th>ON/OFF condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 LED</td>
<td>Green</td>
<td>Displays the operation status of this module.</td>
<td>ON: Normal operation&lt;br&gt;OFF: Internal power shut-off, hardware error *1</td>
</tr>
<tr>
<td>1 LED</td>
<td>Green</td>
<td>Displays CH1 current measurement status.</td>
<td>ON: CH1 current &gt; 0 A&lt;br&gt;OFF: CH1 current = 0 A</td>
</tr>
<tr>
<td>2 LED</td>
<td>Green</td>
<td>Displays CH2 current measurement status.</td>
<td>ON: CH2 current &gt; 0 A&lt;br&gt;OFF: CH2 current = 0 A</td>
</tr>
<tr>
<td>3 LED</td>
<td>Green</td>
<td>Displays CH3 current measurement status.</td>
<td>ON: CH3 current &gt; 0 A&lt;br&gt;OFF: CH3 current = 0 A</td>
</tr>
<tr>
<td>4 LED</td>
<td>Green</td>
<td>Displays CH4 current measurement status.</td>
<td>ON: CH4 current &gt; 0 A&lt;br&gt;OFF: CH4 current = 0 A</td>
</tr>
<tr>
<td>5 LED</td>
<td>Green</td>
<td>Displays CH5 current measurement status.</td>
<td>ON: CH5 current &gt; 0 A&lt;br&gt;OFF: CH5 current = 0 A</td>
</tr>
<tr>
<td>6 LED</td>
<td>Green</td>
<td>Displays CH6 current measurement status.</td>
<td>ON: CH6 current &gt; 0 A&lt;br&gt;OFF: CH6 current = 0 A</td>
</tr>
<tr>
<td>7 LED</td>
<td>-</td>
<td>-</td>
<td>Always OFF.</td>
</tr>
<tr>
<td>8 LED</td>
<td>Red</td>
<td>Displays errors and conditions of this module.</td>
<td>Flashing: Out-of-range error *1&lt;br&gt;ON: Hardware error *1&lt;br&gt;OFF: Normal operation</td>
</tr>
<tr>
<td>9 LED</td>
<td>Green</td>
<td>Displays CH7 current measurement status.</td>
<td>ON: CH7 current &gt; 0 A&lt;br&gt;OFF: CH7 current = 0 A</td>
</tr>
<tr>
<td>A LED</td>
<td>Green</td>
<td>Displays CH8 current measurement status.</td>
<td>ON: CH8 current &gt; 0 A&lt;br&gt;OFF: CH8 current = 0 A</td>
</tr>
<tr>
<td>B LED</td>
<td>-</td>
<td>-</td>
<td>Always OFF.</td>
</tr>
<tr>
<td>C LED</td>
<td>-</td>
<td>-</td>
<td>Always OFF.</td>
</tr>
<tr>
<td>D LED</td>
<td>-</td>
<td>-</td>
<td>Always OFF.</td>
</tr>
<tr>
<td>E LED</td>
<td>-</td>
<td>-</td>
<td>Always OFF.</td>
</tr>
<tr>
<td>F LED</td>
<td>-</td>
<td>-</td>
<td>Always OFF.</td>
</tr>
</tbody>
</table>

*1 For details, check with the list of error codes. (Refer to Section 10.1.)
7 Current measuring mode

7.6 Names of signals of terminal block

The following describes names of signals of terminal block in the current measuring mode.

Table 7.6-1 Names of signals of terminal block

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CH1</td>
<td>1k</td>
<td>CH1 current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>1l</td>
<td>CH1 current input terminal (load side)</td>
</tr>
<tr>
<td></td>
<td>3k</td>
<td>CH2 current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>3l</td>
<td>CH2 current input terminal (load side)</td>
</tr>
<tr>
<td>CH2</td>
<td>1k</td>
<td>CH3 current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>1l</td>
<td>CH3 current input terminal (load side)</td>
</tr>
<tr>
<td></td>
<td>3k</td>
<td>CH4 current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>3l</td>
<td>CH4 current input terminal (load side)</td>
</tr>
<tr>
<td>CH3</td>
<td>1k</td>
<td>CH5 current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>1l</td>
<td>CH5 current input terminal (load side)</td>
</tr>
<tr>
<td></td>
<td>3k</td>
<td>CH6 current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>3l</td>
<td>CH6 current input terminal (load side)</td>
</tr>
<tr>
<td>CH4</td>
<td>1k</td>
<td>CH7 current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>1l</td>
<td>CH7 current input terminal (load side)</td>
</tr>
<tr>
<td></td>
<td>3k</td>
<td>CH8 current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>3l</td>
<td>CH8 current input terminal (load side)</td>
</tr>
<tr>
<td>P1</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>P2</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>P3</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>FG</td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

Figure 7.6-1 Placement of the terminal block
7 Current measuring mode

7.7 Wiring

Follow the wiring diagram for external connection in the current measuring mode.

(1) In the case using 5A current sensor.
   (a) Case of using EMU2-CT5

**Figure 7.7(1)-(a) Wiring in the using EMU2-CT5 (with the current transformer)**

(b) Case of using EMU-CT5-A

**Figure 7.7(1)-(b) Wiring in the using EMU-CT5-A (with the current transformer)**
(2) In the case using split-type current sensor.

EMU-CT*** model split current sensor (50/100/250/400/600)
EMU-CT***-A model split current sensor (50/100/250/400/600)

Figure 7.7(2) Wiring in the using split current sensor
This section explains setting from GX Works2 necessary to use QE84WH. Before performing this setting, install GX Works2 and connect the Management CPU with the PC using a USB cable. For details, refer to the manual of CPU module.

Point

To addition the unit, enable the switch setting, parameter setting and auto refresh, write the settings to the CPU module, and reset the CPU module or power on the programmable controller again.

7.8.1 Addition the unit

Add the model name of the energy measuring module to use the project.

(1) Addition procedure

Open the “New Module” window.

Project window→[intelligent Function Module]→Right-click→[New Module…]

Figure 7.8.1-1 Dialog box of “I/O assignment”

Table 7.8.1-1 Setting items on the “I/O assignment” tab

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module Selection</td>
<td></td>
</tr>
<tr>
<td>Module Type</td>
<td>Set [Energy Measuring module].</td>
</tr>
<tr>
<td>Module Name</td>
<td>Set the name of the module to mount.</td>
</tr>
<tr>
<td>Mount Position</td>
<td></td>
</tr>
<tr>
<td>Base No.</td>
<td>Set the base No. where the module is mounted.</td>
</tr>
<tr>
<td>Mounted Slot No.</td>
<td>Set the slot No. where the module is mounted.</td>
</tr>
<tr>
<td>Specify start XY address</td>
<td>The start I/O number (hexadecimal) of the target module is set,</td>
</tr>
<tr>
<td></td>
<td>according to the mounted slot No. Any start I/O number can be set.</td>
</tr>
<tr>
<td>Title Setting</td>
<td></td>
</tr>
<tr>
<td>Title</td>
<td>Set any title.</td>
</tr>
</tbody>
</table>
7 Current measuring mode

7.8.2 Setting the intelligent function of the module switch

Set the operation mode.

(1) Setting procedure
Open the “Switch Setting” window.
Project window → [Intelligent Function Module] → Module name → [Switch Setting]

![Switch Setting](image)

Figure 7.8.2-1 Dialog box to set the intelligent function of the module switch

Table 7.8.2-1 Setting the intelligent function of the module switch

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation mode</td>
<td>Measurement Mode and test mode are changed.</td>
<td>Measuring mode (default) Test mode</td>
</tr>
<tr>
<td>Measuring mode</td>
<td>When set measuring mode above setting, set the kind of measuring mode.</td>
<td>Regular operating mode (default)</td>
</tr>
<tr>
<td></td>
<td>When set test mode above setting, this setting disable.</td>
<td>Current measuring mode</td>
</tr>
</tbody>
</table>
7 Current measuring mode

7.8.3 Parameter Setting

Set the parameters.
Setting parameters on the screen omits the parameter setting in a program.

(1) Setting procedure
Open the “Parameter” window.
Project window→[intelligent Function Module]→Module name→[Parameter]

Figure 7.8.3-1 Dialog box to monitor all buffer memories (a case where the module is attached to the slot 0)

(2) Double-click the item to change the setting, and input the setting value.
- Items to input from the pull-down list
  Double-click the item to set to display the pull-down list. Select the item.
- Items to input from the text box
  Double-click the item to set, and input the setting value.

(3) Setup of CH2 to CH8 is performed by operation of Procedure (2).
7 Current measuring mode

<table>
<thead>
<tr>
<th>Item</th>
<th>Setting value</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary current</td>
<td>0: Any setting</td>
<td>516: 100/5A</td>
</tr>
<tr>
<td></td>
<td>1: 50A</td>
<td>517: 120/5A</td>
</tr>
<tr>
<td></td>
<td>2: 100A</td>
<td>518: 150/5A</td>
</tr>
<tr>
<td></td>
<td>3: 250A</td>
<td>519: 200/5A</td>
</tr>
<tr>
<td></td>
<td>4: 400A</td>
<td>520: 250/5A</td>
</tr>
<tr>
<td></td>
<td>5: 600A</td>
<td>521: 300/5A</td>
</tr>
<tr>
<td></td>
<td>501: 5/5A</td>
<td>522: 400/5A</td>
</tr>
<tr>
<td></td>
<td>902: 8/5A</td>
<td>523: 500/5A</td>
</tr>
<tr>
<td></td>
<td>903: 7.5/5A</td>
<td>524: 600/5A</td>
</tr>
<tr>
<td></td>
<td>904: 8/5A</td>
<td>525: 750/5A</td>
</tr>
<tr>
<td></td>
<td>505: 10/5A</td>
<td>526: 800/5A</td>
</tr>
<tr>
<td></td>
<td>506: 12/5A</td>
<td>527: 1000/5A</td>
</tr>
<tr>
<td></td>
<td>507: 15/5A</td>
<td>528: 1200/5A</td>
</tr>
<tr>
<td></td>
<td>508: 20/5A</td>
<td>529: 1500/5A</td>
</tr>
<tr>
<td></td>
<td>509: 25/5A</td>
<td>530: 1600/5A</td>
</tr>
<tr>
<td></td>
<td>510: 30/5A</td>
<td>531: 2000/5A</td>
</tr>
<tr>
<td></td>
<td>511: 40/5A</td>
<td>532: 2500/5A</td>
</tr>
<tr>
<td></td>
<td>512: 50/5A</td>
<td>533: 3000/5A</td>
</tr>
<tr>
<td></td>
<td>513: 60/5A</td>
<td>534: 4000/5A</td>
</tr>
<tr>
<td></td>
<td>514: 75/5A</td>
<td>535: 5000/5A</td>
</tr>
<tr>
<td></td>
<td>515: 80/5A</td>
<td>536: 6000/5A</td>
</tr>
<tr>
<td></td>
<td>516: 100/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>517: 120/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>518: 150/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>519: 200/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>520: 250/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>521: 300/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>522: 400/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>523: 500/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>524: 600/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>525: 750/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>526: 800/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>527: 1000/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>528: 1200/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>529: 1500/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>530: 1600/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>531: 2000/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>532: 2500/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>533: 3000/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>534: 4000/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>535: 5000/5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>536: 6000/5A</td>
<td></td>
</tr>
<tr>
<td>Demand time setting</td>
<td>Current demand time</td>
<td>0 ~ 6000A</td>
</tr>
<tr>
<td>Data acquisition clock function</td>
<td>Output period of data acquisition clock</td>
<td>0 ~ 19990400 seconds</td>
</tr>
</tbody>
</table>

| Alarm 1 monitoring function | 0: No monitoring |
|                            | 1: Current demand upper limit |
|                            | 2: Current demand lower limit |
| Alarm 1 item              | -2147483648 to 2147483647 |
| Alarm 1 value             | Section 6.2.6 |
| Alarm 1 reset method      | 0: Self-retention |
|                            | 1: Auto reset |
| Alarm 1 delay time        | 0 to 3600 seconds |

| Alarm 2 monitoring function | 0: No monitoring |
|                            | 1: Current demand upper limit |
|                            | 2: Current demand lower limit |
| Alarm 2 item              | -2147483648 to 2147483647 |
| Alarm 2 value             | Section 6.2.6 |
| Alarm 2 reset method      | 0: Self-retention |
|                            | 1: Auto reset |
| Alarm 2 delay time        | 0 to 3600 seconds |

Section 6.2.3
Section 6.2.4
Section 6.2.12
Section 6.2.6
Section 6.2.7
Section 6.2.8
Section 6.2.9
Section 6.2.10
Section 6.2.11
7 Current measuring mode

7.8.4 Auto Refresh
This function transfers data in the buffer memory to specified devices. Programming of reading/writing data is unnecessary.

(1) Setting procedure
1) Start “Auto Refresh”.
   Project window->[intelligent Function Module]->Module name->[Auto Refresh]

2) Start “Auto Refresh”.
   Click the item to set, and input the destination device for auto refresh.

Point
Available devices are X, Y, M, L, B, T, C, ST, D, W, R, and ZR.
When a bit device X, Y, M, L, or B is used, set a number that is divisible by 16 points (example: X10, Y120, M16).
Data in the buffer memory are stored in 16 points of devices starting from the set device No. (Example: When X10 is set, the data are stored in X10 to X1F).
7 Current measuring mode

7.8.5 Debugging program

QE84WH provides a test function so that you can debug a program with no input of voltage or current. Pseudo-value can be stored into the buffer memory. For detailed explanation for the test function, refer to 4.2.5.

⚠️ Caution

Test function stores pseudo-values for setting value and error information as well as measured value. If you use these data to control the sequence program that controls external devices, there is a chance that erroneous control may occur. For safety of external devices, use this function after disconnecting the device.

(1) Setting intelligent function of the module switch

1) Configure the operation mode in switch setting as shown below. (Refer to 8.6.2)
   - Test mode transition : Test mode

2) From the “Online” menu, select “Write to PLC” to display the dialog box of Write to PLC, and then execute the writing to PLC parameter. After resetting the CPU module, the value will become effective.

(2) Starting the test function

1) Reset the CPU module.

2) QE84WH starts in the test function mode. All LEDs are turned on. Pseudo-values are stored in the buffer memory.

(3) Finishing the test function (Move back to the measuring mode)

1) Following 1) in step (1), Configure the operation mode in switch setting as shown below
   - Test mode transition : Test mode

2) Following 2) in step (1), write the data into PLC.

3) Reset the CPU module, then the operation goes back to the measuring mode.
7 Current measuring mode

7.9 Setting from GX Developer

This section explains setting from GX Developer necessary to use QE84WH. Before performing this setting, install GX Developer and connect the Management CPU with the PC using a USB cable. For details, refer to the manual of CPU module.

7.9.1 I/O assignment setting

(1) Double-click the dialog box of “PLC Parameter” in the GX Developer Project.
(2) Click “I/O assignment”.
(3) Set the following item to the slot*1 to which QE84WH has been attached.

![Figure 7.9.1-1 Dialog box of “I/O assignment”]

Table 7.9.1-1 Setting items on the “I/O assignment” tab

<table>
<thead>
<tr>
<th>Item</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Select “Intelli.”</td>
</tr>
<tr>
<td>Model name</td>
<td>Enter the model name of the module.</td>
</tr>
<tr>
<td>Points</td>
<td>Select 32 points.</td>
</tr>
<tr>
<td>Start XY</td>
<td>Enter the initial I/O number of QE84WH.</td>
</tr>
</tbody>
</table>

*1 is a case where QE84WH is attached to the slot 0.
7 Current measuring mode

7.9.2 Setting the intelligent function of the module switch

(1) In the “I/O assignment” of 7.9.1, click the Switch setting button to display the dialog box of “I/O module, intelligent function module switch setting”.

(2) The intelligent function module switch setting displays switches 1 to 5; however, only switches 4 and 5 is used for this purpose. Switch setting is configured using 16-bit data. Settings are as shown in Table 7.9.2-1.

![Switch setting dialog box](image)

Table 7.9.2-1 Setting the intelligent function of the module switch

<table>
<thead>
<tr>
<th>Switch No.</th>
<th>Switch name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not used</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Not used</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Not used</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Measuring mode selection</td>
<td>0: Regular operating mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: Current measuring mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*When switch 5 is set to &quot;1&quot;, the test mode is selected.</td>
</tr>
<tr>
<td>5</td>
<td>Test mode transition</td>
<td>0: Measuring mode (Even when this switch is not set, the module runs in the measuring mode.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: Test mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* For details of test mode, refer to 4.2.5.</td>
</tr>
</tbody>
</table>

(3) When the setting is completed, click the Complete setting button.

(4) From the “Online” menu, select “Write to PLC” to display the dialog box of Write to PLC, and then execute the writing to PLC parameter. After resetting the CPU module, the value will become effective.
7 Current measuring mode

7.9.3 Initial setting

This section explains the setting of the operating condition for phase wire system, primary voltage, primary current, current demand time, voltage demand time, primary voltage of VT, secondary voltage of VT, and primary current of CT that are required for measurement. Once each value is set, these values will be stored in the nonvolatile memory of the module, so that reconfiguration is not needed. You can also perform the setting using sequence program. In this case, you need to create a program, as referring to Chapter 9.

Follow the procedure below for each setting.
(1) Check the current setting
(2) Set the Buffer memory

(1) Check the current setting

1) From the “Online” menu, select “Monitor” – “Buffer memory batch ...”. The dialog box to monitor all buffer memories. After setting the address as shown below, click the Start monitoring button to check the current buffer memory status.

   Module initial address: Set the initial address of this module.
   Buffer memory address: 0
   (Display: 16-bit integer, numerical value: check the number in decimal)

2) Check each item. The following shows items for operating condition settings. For specific setting value, see the provided references.

Table 7.9.3-1 List of setting items

<table>
<thead>
<tr>
<th>Buffer memory address</th>
<th>Item</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH1</td>
<td>Un\G4003 CH2</td>
<td>Primary current</td>
</tr>
<tr>
<td>CH3</td>
<td>Un\G4053 CH4</td>
<td></td>
</tr>
<tr>
<td>CH5</td>
<td>Un\G4103 CH6</td>
<td></td>
</tr>
<tr>
<td>CH7</td>
<td>Un\G4203 Un\G4153 CH8</td>
<td></td>
</tr>
<tr>
<td>CH8</td>
<td>Un\G4253 Un\G4303 Un\G4353</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Current demand time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Primary current of CT</td>
</tr>
</tbody>
</table>

Figure 7.9.3-1 Dialog box to monitor all buffer memories (a case where the module is attached to the slot 0)
(2) Set the Buffer memory

1) In the dialog box to monitor all buffer memories, click the Device test button to display the Device test dialog box.

2) In the Word device / buffer memory, specify the module initial address and buffer address, and click the Set button to apply the setting.

3) Change the setting in 2).

4) In the section of bit device setting in the device test dialog box, select “Y2” and click the FORCE ON button.

5) When the setting is completed without any problem, the Device “X2” changes to ON. Check this using the procedure as follows:
   (a) From the “Online” menu, select “Monitor” – “Device batch ...”. The dialog box to monitor all devices is displayed.
   (b) Set “X0” to the device, and click “Start monitor”
   (c) Check that Device “X2” is in the ON status.

6) After checking that the device “X2” is in the ON status, select “Device: “Y2” in the dialog box of device test, and then click the FORCE OFF button. Setting is completed.

7) If the Device “X2” is not in the ON status, this means an error because the set value is out of range (ERR.LED is flashing). Modify the setting, and change the device “Y2” to the OFF status, then change it back to the ON status.

* Indicates a number in the case where the initial I/O number (initial XY) is set to 0.
7 Current measuring mode

7.9.4 Debugging program

QE84WH provides a test function so that you can debug a program with no input of voltage or current. Pseudo-value can be stored into the buffer memory. For detailed explanation for the test function, refer to 4.2.5.

⚠️ Caution ⏵️

Test function stores pseudo-values for setting value and error information as well as measured value. If you use these data to control the sequence program that controls external devices, there is a chance that erroneous control may occur. For safety of external devices, use this function after disconnecting the device.

(1) Setting intelligent function of the module switch
1) In the “I/O assignment setting” of 7.9.1, click the Switch setting button to display the dialog box of “I/O module, intelligent function module switch setting”. (Refer to 7.9.2)
2) The intelligent function module switch setting displays switches 1 to 5; however, use switch 5 when using the test function. Switch setting is configured using 16-bit data.
   Setting is as follows:
   Switch 5: “1”
3) When the setting is completed, click the End button.
4) From the “Online” menu, select “Write to PLC” to display the dialog box of Write to PLC, and then execute the writing to PLC parameter. After resetting the CPU module, the value will become effective.

(2) Starting the test function
1) Reset the CPU module.
2) QE84WH starts in the test function mode. All LEDs are turned on. Pseudo-values are stored in the buffer memory.

(3) Finishing the test function (Move back to the measuring mode)
1) Following 1) and 2) in step (1), configure the intelligent function switch setting as shown below.
   Switch 5: “0”
2) Following 3) and 4) in step (1), complete the setting and write the data into PLC.
3) Reset the CPU module, then the operation goes back to the measuring mode.
8.1 Precautions for handling

(1) Do not drop or apply strong shock to the module case.

(2) Do not remove the printed-circuit board of the module from the case.
    Doing so may cause failure.

(3) Prevent foreign matter such as dust or wire chips from entering the module.
    Such foreign matter can cause a fire, failure, or malfunction.

(4) A protective film is attached to the top of the module to prevent foreign matter, such as wire chips,
    from entering the module during wiring.
    Do not remove the film during wiring.
    Remove it for heat dissipation before system operation.

(5) Module fixing screws must be tightened within the specified range as described below.
    Loose screws may cause short-circuit, failure, or malfunction.
    *1 The module can be fixed easily to the base unit, using the hook on top of the module. However,
     if it is used under a vibrating environment, we strongly recommend that the module be fixed with
     screws.

<table>
<thead>
<tr>
<th>Locations of screws</th>
<th>Torque range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module fixing screws (M3 x 12 mm)</td>
<td>0.36 - 0.48 N•m</td>
</tr>
<tr>
<td>Terminal screws on the current input terminal block (M3)</td>
<td>0.42 - 0.58 N•m</td>
</tr>
<tr>
<td>Current input terminal block fixing screws (M3.5)</td>
<td>0.66 - 0.89 N•m</td>
</tr>
<tr>
<td>Terminal screws on the voltage input terminal block</td>
<td>0.4 - 0.5 N•m</td>
</tr>
</tbody>
</table>

(6) To attach the module to the base unit, firmly insert the protruding portions for fixing the module into
    the holes on the base unit, and make sure the module is securely attached to the module holes as
    fulcrum points.
    Insecure attachment of the module may case malfunction, failure, and a falling.

(7) Before touching the module, make sure that you need to discharge static electricity on your body by
    touching a metal that is grounded.
    Otherwise, it may cause failure or malfunction to the module.
8.2 Procedure for operation

**Start**

**Attaching the module**
Attach QE84WH to the specified base unit. (Refer to section 8.4.)

**Wiring**
Wire QE84WH for external device. (Refer to section 8.5.)

**Setting the intelligent function of module switch, Initial setting**
- Perform settings using GX Works2 (Refer to section 8.6.)
- Perform settings using GX Developer (Refer to section 8.7.)

**Programming, debugging**
Create and check the sequence program.

Figure 8.2-1 Procedure for operation
8.3 Name and function of each part

Names and functions of parts of QE84WH are provided below.

(1) LED
Operating status of this module is displayed. (Refer to Table 7.5-1, Table 8.3-1.)

(2) Current input terminals
Connect the current wire of the measuring circuit with the secondary output of the dedicated current sensor.

(3) Voltage input terminals
Connect the voltage input wire of the measuring circuit.

Figure 8.3-1 Appearance of the module
(1) Names and functions of LEDs

The following describes names and functions of LEDs.

Table 8.3-1 Names and functions of LEDs

<table>
<thead>
<tr>
<th>Name</th>
<th>Color</th>
<th>Role</th>
<th>ON/OFF condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 LED</td>
<td>Green</td>
<td>Displays the operation status of this module.</td>
<td>ON: Normal operation&lt;br&gt;OFF: Internal power shut-off, hardware error *1</td>
</tr>
<tr>
<td>1 LED</td>
<td>Green</td>
<td>Displays CH1 measurement status of this module.</td>
<td>Flashing: Measuring electric energy (regeneration)&lt;br&gt;ON: Measuring electric energy (consumption)&lt;br&gt;OFF: Not measuring (No measurement)</td>
</tr>
<tr>
<td>2 LED</td>
<td>Green</td>
<td>Displays CH2 measurement status of this module.</td>
<td>Flashing: Measuring electric energy (regeneration)&lt;br&gt;ON: Measuring electric energy (consumption)&lt;br&gt;OFF: Not measuring (No measurement)</td>
</tr>
<tr>
<td>3 LED</td>
<td>Green</td>
<td>Displays CH3 measurement status of this module.</td>
<td>Flashing: Measuring electric energy (regeneration)&lt;br&gt;ON: Measuring electric energy (consumption)&lt;br&gt;OFF: Not measuring (No measurement)</td>
</tr>
<tr>
<td>4 LED</td>
<td>Green</td>
<td>Displays CH4 measurement status of this module.</td>
<td>Flashing: Measuring electric energy (regeneration)&lt;br&gt;ON: Measuring electric energy (consumption)&lt;br&gt;OFF: Not measuring (No measurement)</td>
</tr>
<tr>
<td>5 LED</td>
<td>Green</td>
<td>Displays CH1 3-side measurement status (regeneration) of this module.</td>
<td>ON: Measuring electric energy (regeneration) on side 3&lt;br&gt;OFF: Other than the above</td>
</tr>
<tr>
<td>6 LED</td>
<td>Green</td>
<td>Displays CH2 3-side measurement status (regeneration) of this module.</td>
<td>ON: Measuring electric energy (regeneration) on side 3&lt;br&gt;OFF: Other than the above</td>
</tr>
<tr>
<td>7 LED</td>
<td>-</td>
<td>-</td>
<td>Always OFF.</td>
</tr>
<tr>
<td>8 LED</td>
<td>Red</td>
<td>Displays errors and conditions of this module.</td>
<td>Flashing: Out-of-range error *1&lt;br&gt;ON: Hardware error *1&lt;br&gt;OFF: Normal operation</td>
</tr>
<tr>
<td>9 LED</td>
<td>Green</td>
<td>Displays CH1 1-side measurement status (regeneration) of this module.</td>
<td>ON: Measuring electric energy (regeneration) on side 1&lt;br&gt;OFF: Other than the above</td>
</tr>
<tr>
<td>A LED</td>
<td>Green</td>
<td>Displays CH2 1-side measurement status (regeneration) of this module.</td>
<td>ON: Measuring electric energy (regeneration) on side 1&lt;br&gt;OFF: Other than the above</td>
</tr>
<tr>
<td>B LED</td>
<td>Green</td>
<td>Displays CH3 1-side measurement status (regeneration) of this module.</td>
<td>ON: Measuring electric energy (regeneration) on side 1&lt;br&gt;OFF: Other than the above</td>
</tr>
<tr>
<td>C LED</td>
<td>Green</td>
<td>Displays CH4 1-side measurement status (regeneration) of this module.</td>
<td>ON: Measuring electric energy (regeneration) on side 1&lt;br&gt;OFF: Other than the above</td>
</tr>
<tr>
<td>D LED</td>
<td>Green</td>
<td>Displays CH3 3-side measurement status (regeneration) of this module.</td>
<td>ON: Measuring electric energy (regeneration) on side 3&lt;br&gt;OFF: Other than the above</td>
</tr>
<tr>
<td>E LED</td>
<td>Green</td>
<td>Displays CH4 3-side measurement status (regeneration) of this module.</td>
<td>ON: Measuring electric energy (regeneration) on side 3&lt;br&gt;OFF: Other than the above</td>
</tr>
<tr>
<td>F LED</td>
<td>-</td>
<td>-</td>
<td>Always OFF.</td>
</tr>
</tbody>
</table>

*1 For details, check with the list of error codes. (Refer to section 10.1)
(2) Names of signals of terminal block

The following describes names of signals of terminal block.

<table>
<thead>
<tr>
<th>Terminal symbol</th>
<th>Name of terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH1</td>
<td>1-phase current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>1-phase current input terminal (load side)</td>
</tr>
<tr>
<td></td>
<td>3-phase current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>3-phase current input terminal (load side)</td>
</tr>
<tr>
<td>CH2</td>
<td>1-phase current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>1-phase current input terminal (load side)</td>
</tr>
<tr>
<td></td>
<td>3-phase current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>3-phase current input terminal (load side)</td>
</tr>
<tr>
<td>CH3</td>
<td>1-phase current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>1-phase current input terminal (load side)</td>
</tr>
<tr>
<td></td>
<td>3-phase current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>3-phase current input terminal (load side)</td>
</tr>
<tr>
<td>CH4</td>
<td>1-phase current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>1-phase current input terminal (load side)</td>
</tr>
<tr>
<td></td>
<td>3-phase current input terminal (power source side)</td>
</tr>
<tr>
<td></td>
<td>3-phase current input terminal (load side)</td>
</tr>
<tr>
<td>P1</td>
<td>1-phase voltage input terminal</td>
</tr>
<tr>
<td>P2</td>
<td>2-phase voltage input terminal</td>
</tr>
<tr>
<td>P3</td>
<td>3-phase voltage input terminal</td>
</tr>
<tr>
<td>FG</td>
<td>Frame GND terminal</td>
</tr>
</tbody>
</table>

Figure 8.3-2 Placement of the terminal block
8 Setting and procedure for operation

8.4 Attaching and removing the module

8.4.1 How to attach to the base unit

Insert it securely so that the protruding portion for fixing the module does not come off of the module-fixing hole.

Push the module toward the arrow direction, as the module-fixing hole being a fulcrum point, until you hear a click sound to firmly attach it to the base unit.

Check that the module is firmly inserted to the base unit.

Complete

Caution

- Attach to the base of MELSEC-Q series.
- When attaching the module, make sure to insert the protruding portions for fixing the module into the holes on the base unit. In doing so, insert it securely so that the protruding portion of the module does not come off of the holes. Do not force to attach the module; otherwise the module may break.
- When installing the module at a vibrating area with strong impact, tighten the module to the base unit using screws. Module-fixing screws: M3 x 12 (Prepare them yourself.)

<table>
<thead>
<tr>
<th>Locations of screws</th>
<th>Torque range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module-fixing screws</td>
<td>0.36 - 0.48 N•m</td>
</tr>
</tbody>
</table>

- Attaching and detaching the module and the base unit should be performed 50 times or less (to conform to JIS B3502). If the count exceeds 50 times, it may cause a malfunction.
8.4.2 How to detach it from the base unit

- When module-fixing screws are used, make sure to remove the screws for detaching the module first, and then remove the protruding portion for fixing the module from the holes. Do no force to remove the module; it may break the protruding portions for fixing the module.
8 Setting and procedure for operation

8.5 Wiring

8.5.1 Precautions for wiring

(1) Connect cables. For connecting voltage transformer and current transformer, refer to the corresponding wiring diagram.

(2) For wiring, check with the wiring diagram and check phase wire system for the connecting circuit.

(3) For the current circuit input, Mitsubishi’s current sensor is required. (Refer to section 8.5.3)

(4) If a current sensor is located in a strong magnetic field such as an area nearby a transformer or high-current cable bus bar, the voltage circuit input may be influenced, which in turn affects the measured value. Thus, please ensure sufficient distance between devices.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power line carrying 600 V or lower and 600 A or lower</td>
<td>300 mm or longer</td>
</tr>
<tr>
<td>Other power lines</td>
<td>600 mm or longer</td>
</tr>
</tbody>
</table>

(5) For input wiring of the measurement circuit, use separate cables from other external signals in order to prevent from AC surge and induction.

(6) Keep any object off the cables.

(7) Protect cable coating from scratch.

(8) Cable length should be routed in length with a margin, please take care to avoid causing stress to pull the terminal block. (Tensile load: less than 22N)

(9) For the actual usage, connect the FG terminal to ground. (D-type ground: Type 3) Connect it directly to the ground terminal.
8 Setting and procedure for operation

8.5.2 How to connect wires

(1) Follow the wiring diagram for external connection to QE84WH.

(2) Use appropriate electric wires as described below.

<Voltage input terminals>
1) Stripping length of the wire to be used has to be 7 mm. Check the stripping length using the strip gauge of QE84WH main module.

| Applicable wire (Usable electric wire) | Single wire: AWG24 – AWG16 (φ0.5 - 1.3mm) | Stranded wire: AWG24 – AWG16 (0.2 – 1.3 mm²) |

2) When using a stranded wire, strand the wire edges to prevent thin wires from loosening.

<Current input terminals>
1) For the connection between the secondary terminal of current sensor (EMU-CT***, EMU-CT***-A) and current input terminals, use twisted pair cable.

| Applicable wire (Usable electric wire) | Stranded wire: AWG20 – AWG18 (0.5 - 0.8 mm²) |

2) Use a solderless terminal to prevent thin wires from loosening. No solderless terminal with insulation sleeve can be used.

| Applicable solderless terminal | R1.25-3 |

3) It is recommended to cover the solderless terminals connecting electric cables with a mark tube or insulating tube.
8.5.3 How to wire

Follow the wiring diagram (Figure 8.5.3(1)-(a) to 8.5.3(2)-(b)) for external connection of QE84WH.

(1) In the case using 5A current sensor.

(a) Case of using EMU2-CT5

(b) Case of using EMU-CT5-A

*For a low voltage circuit, grounding of the secondary sides of VT (or CT) is not necessary.
(2) In the case using split-type current sensor.

(a) Case of Three-phase 3-wire system

(b) Case of Single-phase 2-wire system
Setting and procedure for operation

(c) Case of Single-phase 3-wire system

Figure 8.5.3(2) (c) In the case of Single-phase 3-wire system

EMU-CT*** model split current sensor (50/100/250/400/600)
EMU-CT*** A model split current sensor (50/100/250/400/600)
8.5.3.1 Current circuit connection
A dedicated current sensor (EMU-CT ***, EMU-CT ***-A, EMU2-CT5) is required to connect the current circuit.

- How to attach EMU-CT5/CT50/CT100/CT250-A

1) Press the locking claw of the moving core, please open the moving core by removing the engagement (Figure 1). Before inserting the cable, check the symbols K and L to fit the current sensor in the correct direction. (The direction from the power supply side to the load side is indicated with →.) (Figure 3)

2) After checking that the core parting faces are free from dirt, close the moving core. Push down the moving core until the stoppers are securely locked. (Locking claw of the moving core is applied to the stopper, you hear click.) (Figure 2)

3) Pass the tying bands into the current sensor locking holes to secure the sensor with the cable. (Figure 3)

✓ Supplementary

- Make sure that before connecting the cable, the orientation of the current sensor is correct for attachment. K to L is the correct direction. K: power source side, L: load side.
- Do not bend the moving core in a direction other than the operation direction (shown in Fig. 1). The current sensor may be damaged.
- Refer to the table below for appropriate size of electric wires.

<table>
<thead>
<tr>
<th>Usable wires size (reference)</th>
<th>IV cable</th>
<th>EMU-CT5-A</th>
<th>EMU-CT50-A</th>
<th>EMU-CT100-A</th>
<th>EMU-CT250-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV cable</td>
<td>38 mm² or less</td>
<td>38 mm² or less</td>
<td>60 mm² or less</td>
<td>200 mm² or less</td>
<td></td>
</tr>
</tbody>
</table>

Size of electric wires conforms to what is described in the catalog of general PVC insulated wires. Thickness of external PVC insulation is different for different wire. Check with the external dimension diagram of this product and make sure the wire can go through the given space.
How to attach EMU-CT400/CT600-A

1) Press the locking claw of the moving core, please open the moving core by removing the engagement (Figure 1). At this time, the hinge cover opens automatically. Before inserting the cable, check the symbols K and L to fit the current sensor in the correct direction. (The direction from the power supply side to the load side is indicated with →.) (Figure 3)

2) After checking that the core parting faces are free from dirt, close the moving core. Push down the moving core until the stoppers are securely locked. (Locking claw of the moving core is applied to the stopper, you hear click.) After the stopper is securely locked, close the hinge cover. (Figure 2)

3) Pass the tying bands into the current sensor locking holes to secure the sensor with the cable. (Figure 3)

Supplementary

- Make sure that before connecting the cable, the orientation of the current sensor is correct for attachment. K to L is the correct direction. K: power source side, L: load side.
- Do not bend the moving core in a direction other than the operation direction (shown in Fig. 1). The current sensor may be damaged.
- Refer to the table below for appropriate size of electric wires.

<table>
<thead>
<tr>
<th></th>
<th>EMU-CT400-A</th>
<th>EMU-CT600-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usable wires size (reference)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV cable 500 mm² or less</td>
<td>500 mm² or less</td>
<td></td>
</tr>
<tr>
<td>CV cable 400 mm² or less</td>
<td>400 mm² or less</td>
<td></td>
</tr>
</tbody>
</table>

Size of electric wires conforms to what is described in the catalog of general PVC insulated wires. Thickness of external PVC insulation is different for different wire. Check with the external dimension diagram of this product and make sure the wire can go through the given space.
How to attach EMU-CT50/CT100/CT250

Follow the procedure below to attach to the cable of the target circuit.

1) Open the movable core, as shown in the figure on the right.
   Lift slowly the hooks located on both sides of the movable core, and detach them from the stopper. **Do not force to open it. You may break the hook.**

2) Do not let the cable touch on the core-split surface. Thus, carefully pass the cable from underneath. Before passing the cable, check the direction symbols of K and L, in order to attach the sensor in the correct orientation. (Direction from power source side (K) to load side (L) is indicated with the arrow.)

3) Make sure no dust or foreign object is attached on the split-core surface, and after that, close the movable core. Lift the movable core until the stoppers are firmly locked. (When the hooks on both side of movable core are locked to the stoppers, you will hear click sound twice.)

4) Put a binding cable through a hole for fixing the current sensor, and then tie it with the cable. Do not tie it too tightly. (Holes for fixing the current sensor are located on both side of the current sensor.)

5) Cut off the extra portion of binding cable, using a nipper, etc, to avoid interference of the cable.

6) Lift a protective cover of the secondary terminal, by holding the center portion of the protective cover, and remove it. And then, connect the given sensor cable. **Check the terminal symbols printed on the secondary terminal surface, so that connection is performed correctly.**

✓ Supplementary

- When opening the movable core on current sensor, **do not widen the hook for fixing the movable core too widely.** It may break the hook.
- Refer to the table below for appropriate size of electric wires.

<table>
<thead>
<tr>
<th>Usable wires size (reference)</th>
<th>EMU-CT50</th>
<th>EMU-CT100</th>
<th>EMU-CT250</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV cable</td>
<td>60 mm² or less</td>
<td>60 mm² or less</td>
<td>150 mm² or less</td>
</tr>
<tr>
<td>CV cable</td>
<td>38 mm² or less</td>
<td>38 mm² or less</td>
<td>150 mm² or less</td>
</tr>
</tbody>
</table>

Size of electric wires conforms to what is described in the catalog of general PVC insulated wires. Thickness of external PVC insulation is different for different wire. Check with the external dimension diagram of this product and make sure the wire can go through the given space.
How to attach EMU-CT400/CT600

Follow the procedure below to attach the cable to the target circuit.

1) Release the band 1) to the arrow direction (top), and detach the core cover.
2) Remove the terminal cover, and shift the secondary short switch into “short”.
3) Loosen the screw 2), and open the core band to remove the core. Make sure that no dust, etc attaches on the core.
4) Loosen the screw 3). Put this module onto the cable, and fix the module by tightening the screw 3) using the metal bracket that is directly attached to the cable. Tighten the screw as tightly as the metal bracket will not bend.
5) Align the symbol of “K” on the removed core and the “K” on the module to return the core as in the original location. And then, tighten the core band using the screw 2).
6) Attach the core cover and fix it with the band 1).
7) Connect the secondary terminal with multiple-circuit power measuring module, turn the secondary short switch into “open”, and then attach the terminal cover.

Supplementary

Refer to the table below for appropriate size of electric wires.

<table>
<thead>
<tr>
<th>Usable wires size (reference)</th>
<th>EMU-CT400</th>
<th>EMU-CT600</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV cable</td>
<td>500mm²</td>
<td>325mm²</td>
</tr>
<tr>
<td>CV cable</td>
<td>500mm²</td>
<td>325mm²</td>
</tr>
</tbody>
</table>

Size of electric wires conforms to what is described in the catalog of general PVC insulated wires. Thickness of external PVC insulation is different for different wire. Check with the external dimension diagram of this product and make sure the wire can go through the given space.
How to attach EMU2-CT5
- Transfix EMU2-CT5 current sensor to the secondary-side wire of current transformer (/5A rated). Make sure to use it in a correct combination with 5 A current sensor conversion cable: EMU2-CB-Q5B
- EMU2-CT5 has polarities. Make sure to connect to the right symbol on the terminal. Power source side: (k side), load side: (l side).

Follow the procedure below to attach the cable to the target circuit.

1) Slide the lock pin to the arrow direction.
2) Put the electric wire through the clamp, and close the clamp again.
3) Use your finger to hold the clamp in the full close position, and push the lock pin until it locks.

Caution
- The lock pin is made of metal. If you let it touch electrically charged portions, it may cause electric shock or device failure or fire. Be careful handling the lock pin.
- Physical impact to the core may cause breakage. It may directly influence the performance. Be careful handling the core.
- The mating surface on the core is very sensitive. Even a small foreign object on the surface may affect the measurement performance.
- Excessive force to the core during open clamp may cause breakage. Incorrect direction may cause inaccurate measurement.
- For both the transfixing wire and the binding band for fixing the sensor, use the size of W=2.6 mm or less. To fix them together, put a binding band through a hole for fixing the current sensor, and tie it with the cable. Do not tie it too tightly.

(Total four holes for fixing the current sensor exist on both sides of the current sensor).
Setting and procedure for operation

- When wiring single-phase 2-wire circuit
  5 A current sensor is not used L3. As shown below, L3 remove connector , and connector with insulating tape.

- Extending the cable of 5 A current sensor
  If the cable from current sensor is too short, you can extend it by using an extension cable as shown below.

  Extension cable (standard)

<table>
<thead>
<tr>
<th>Model name</th>
<th>EMU2-CB-T1M</th>
<th>EMU2-CB-T5M</th>
<th>EMU2-CB-T10M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable length</td>
<td>1 m</td>
<td>5 m</td>
<td>10 m</td>
</tr>
</tbody>
</table>

  Extension cable (separate)

<table>
<thead>
<tr>
<th>Model name</th>
<th>EMU2-CB-T1MS</th>
<th>EMU2-CB-T5MS</th>
<th>EMU2-CB-T10MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable length</td>
<td>1 m</td>
<td>5 m</td>
<td>10 m</td>
</tr>
</tbody>
</table>

- Connecting 5 A current sensor and the cable

  ◆ Connecting 5 A current sensor and extension cable (standard)

  ◆ Connecting 5 A current sensor and extension cable (separate)
  1) Disconnect the connector

  2) Connect the extension cable

  ✓ Supplementary
  - Cable extension for EMU2-CT5 is 10 m max. (Total cable length is 11m max.)
  - Use extension cable (separate) when 1-phase and 3-phase are set apart.
8.5.3.2 Voltage circuit connection

- If more than 220 V circuit is used, make sure that use a transformer.
- The transformer which has primary voltage of VT less than 6,600 V and secondary voltage of VT not more than 220 V can be used. For connection to P1 to P3 terminals on QE84WH, connect the secondary of transformer. Make sure that terminal symbols are correct.
- In order to perform maintenance work such as changing the wire layout and replacing equipment, we recommend that you connect protective device (breaker) for the voltage input circuit (P1, P2, and P3 terminals).

• Use the voltage input terminal block to enter the circuit voltage to QE84WH. Fix the module by turning the lever until the clicks after inserting the voltage input terminal block.
• When removing a voltage input terminal block from the module, turn the lever in the opposite direction, hold the voltage input terminal part.
This section explains setting from GX Works2 necessary to use QE84WH. Before performing this setting, install GX Works2 and connect the Management CPU with the PC using a USB cable. For details, refer to the manual of CPU module.

Point

To addition the unit, enable the switch setting, parameter setting and auto refresh, write the settings to the CPU module, and reset the CPU module or power on the programmable controller again.

8.6.1 Addition the unit

Add the model name of the energy measuring module to use the project.

(1) Addition procedure

Open the "New Module" window.

Project window→[intelligent Function Module]→Right-click→[New Module…]

Table 8.6.1-1 Setting items on the “I/O assignment” tab

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module Selection</td>
<td></td>
</tr>
<tr>
<td>Module Type</td>
<td>Set [Energy Measuring module].</td>
</tr>
<tr>
<td>Module Name</td>
<td>Set the name of the module to mount.</td>
</tr>
<tr>
<td>Mount Position</td>
<td></td>
</tr>
<tr>
<td>Base No.</td>
<td>Set the base No. where the module is mounted.</td>
</tr>
<tr>
<td>Mounted Slot No.</td>
<td>Set the slot No. where the module is mounted.</td>
</tr>
<tr>
<td>Specify start XY address</td>
<td>The start I/O number (hexadecimal) of the target module is set, according to the mounted slot No. Any start I/O number can be set.</td>
</tr>
<tr>
<td>Title Setting</td>
<td></td>
</tr>
<tr>
<td>Title</td>
<td>Set any title.</td>
</tr>
</tbody>
</table>
8.6.2 Setting the intelligent function of the module switch

Set the operation mode.

(1) Setting procedure
Open the “Switch Setting” window.
Project window → [intelligent Function Module] → Module name → [Switch Setting]

![Switch Setting 0010:QE84WH](image)

Figure 8.6.2-1 Dialog box to set the intelligent function of the module switch

Table 8.6.2-1 Setting the intelligent function of the module switch

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Setting value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation mode</td>
<td>Measurement Mode and test mode are changed.</td>
<td>Measuring mode (default)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Test mode</td>
</tr>
<tr>
<td>Measuring mode</td>
<td>When set measuring mode above setting, set the kind of measuring mode.</td>
<td>Regular operating mode(default)</td>
</tr>
<tr>
<td></td>
<td>When set test mode above setting, this setting disable.</td>
<td>Current measuring mode</td>
</tr>
</tbody>
</table>
8.6.3 Parameter Setting

Set the parameters.
Setting parameters on the screen omits the parameter setting in a program.

(1) Setting procedure
Open the “Parameter” window.
Project window → [Intelligent Function Module] → Module name → [Parameter]

(2) Double-click the item to change the setting, and input the setting value.
   - Items to input from the pull-down list
     Double-click the item to set to display the pull-down list. Select the item.
   - Items to input from the text box
     Double-click the item to set, and input the setting value.

(3) Setup of CH2 to CH4 is performed by operation of Procedure (2).
<table>
<thead>
<tr>
<th>Item</th>
<th>Setting value</th>
<th>Reference</th>
</tr>
</thead>
</table>
| Phase wire system | 1: single-phase 2-wire  
2: single-phase 3-wire  
3: three-phase 3-wire | Section 6.2.1 |
| Primary voltage | 0: Any setting  
1: 110V  
2: 220V  
3: 220/110V  
4: 440/110V  
5: 690/110V  
6: 1100/110V  
7: 2200/110V  
8: 3300/110V  
9: 6600/110V | Section 6.2.2 |
| Primary voltage of VT | 0 - 6600V | Section 6.2.2 |
| Secondary voltage of VT | 0 - 220V | Section 6.2.2 |
| Primary current of CT | 0: Any setting  
1: 516.100/5A  
2: 517.120/5A  
3: 518.150/5A  
4: 519.200/5A  
5: 520.250/5A  
6: 521.300/5A  
7: 522.400/5A  
8: 523.500/5A  
9: 524.600/5A | Section 6.2.3 |
| Primary current | 0: Any setting  
1: 50A  
2: 100A  
3: 250A  
4: 400A  
5: 600A  
501: 5/5A  
502: 6/5A  
503: 7.5/5A  
504: 8/5A  
505: 10/5A  
506: 12/5A  
507: 15/5A  
508: 20/5A  
509: 25/5A  
510: 30/5A  
511: 35/5A  
512: 50/5A  
513: 60/5A  
514: 75/5A  
515: 80/5A  
516: 100/5A  
517: 120/5A  
518: 150/5A  
519: 200/5A  
520: 250/5A  
521: 300/5A  
522: 400/5A  
523: 500/5A  
524: 600/5A  
525: 750/5A  
526: 800/5A  
527: 1000/5A  
528: 1200/5A  
529: 1500/5A  
530: 2000/5A  
531: 2500/5A  
532: 3000/5A  
533: 3500/5A  
534: 4000/5A  
535: 5000/5A  
536: 6000/5A | |
| Primary current | 0 - 6000A | Section 6.2.3 |
| Demand time setting | Current demand time | 0 ~ 1800 seconds | Section 6.2.4 |
| Electric power demand time | 0 ~ 1800 seconds | Section 6.2.5 |
| Data acquisition clock function | Output period of data acquisition clock | Bag non-use: 0  
Bag use: 1 ~ 86400000ms | Section 6.2.12 |
| Alarm 1 item | 0: No monitoring  
1: Current demand upper limit  
2: Current demand lower limit  
3: Voltage upper limit  
4: Voltage lower limit  
5: Electric power demand upper limit  
6: Electric power demand lower limit  
7: Power factor upper limit  
8: Power factor lower limit | Section 6.2.6 |
| Alarm 1 monitoring function | 0: No monitoring  
1: Current demand upper limit  
2: Current demand lower limit  
3: Voltage upper limit  
4: Voltage lower limit  
5: Electric power demand upper limit  
6: Electric power demand lower limit  
7: Power factor upper limit  
8: Power factor lower limit | Section 6.2.6 |
| Alarm 1 value | 2147483648 to 2147483647 | Section 6.2.7 |
| Alarm 1 reset method | 0: Self-retention  
1: Auto reset | Section 6.2.8 |
| Alarm 1 delay time | 0 to 300 seconds | Section 6.2.9 |
| Alarm 2 item | 0: No monitoring  
1: Current demand upper limit  
2: Current demand lower limit  
3: Voltage upper limit  
4: Voltage lower limit  
5: Electric power demand upper limit  
6: Electric power demand lower limit  
7: Power factor upper limit  
8: Power factor lower limit | Section 6.2.6 |
| Alarm 2 monitoring function | 0: No monitoring  
1: Current demand upper limit  
2: Current demand lower limit  
3: Voltage upper limit  
4: Voltage lower limit  
5: Electric power demand upper limit  
6: Electric power demand lower limit  
7: Power factor upper limit  
8: Power factor lower limit | Section 6.2.6 |
| Alarm 2 value | 2147483648 to 2147483647 | Section 6.2.7 |
| Alarm 2 reset method | 0: Self-retention  
1: Auto reset | Section 6.2.8 |
| Alarm 2 delay time | 0 to 300 seconds | Section 6.2.9 |
8.6.4 Auto Refresh
This function transfers data in the buffer memory to specified devices. Programming of reading/writing data is unnecessary.

(1) Setting procedure
1) Start “Auto Refresh”.
   Project window → [intelligent Function Module] → Module name → [Auto Refresh]

2) Start “Auto Refresh”.
   Click the item to set, and input the destination device for auto refresh.

Point
Available devices are X, Y, M, L, B, T, C, ST, D, W, R, and ZR.
When a bit device X, Y, M, L, or B is used, set a number that is divisible by 16 points (example: X10, Y120, M16).
Data in the buffer memory are stored in 16 points of devices starting from the set device No. (Example: When X10 is set, the data are stored in X10 to X1F).
8.6.5 Setting function for integrated value

This function is to set integrated value (electric energy (consumption, regeneration) and reactive energy (consumption lag)) to any value. If you want to clear integrated value, set it to 0.

(1) Setting procedure
   1) Start "Intelligent unit monitor"
   2) Set the integrated value setting target (Un¥G51) and integrated value setting value (Un¥G52,3)
   3) Turn integrated value setting request (Yn3) from OFF to ON to enable the setting.

(Refer to 5.2.2).

---

**Table: Unit monitor1 (0000:QE84WH) – normal measuring mode**

<table>
<thead>
<tr>
<th>Items</th>
<th>Preset value</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH2 Periodic electric energy 1 confirmation flag</td>
<td>ON</td>
<td>X1B</td>
</tr>
<tr>
<td>CH2 Periodic electric energy 2 confirmation flag</td>
<td>ON</td>
<td>X1C</td>
</tr>
<tr>
<td>CH2 Periodic electric energy 1 reset completion flag</td>
<td>OFF</td>
<td>X1D</td>
</tr>
<tr>
<td>CH2 Periodic electric energy 2 reset completion flag</td>
<td>OFF</td>
<td>X1E</td>
</tr>
<tr>
<td>CH2 Alarm 1 flag</td>
<td>OFF</td>
<td>X1F</td>
</tr>
<tr>
<td>CH2 Alarm 2 flag</td>
<td>OFF</td>
<td>X10</td>
</tr>
<tr>
<td>CH3 Periodic electric energy 1 confirmation flag</td>
<td>ON</td>
<td>X11</td>
</tr>
<tr>
<td>CH3 Periodic electric energy 2 confirmation flag</td>
<td>ON</td>
<td>X12</td>
</tr>
<tr>
<td>CH3 Periodic electric energy 1 reset completion flag</td>
<td>OFF</td>
<td>X13</td>
</tr>
<tr>
<td>CH3 Periodic electric energy 2 reset completion flag</td>
<td>OFF</td>
<td>X14</td>
</tr>
<tr>
<td>CH3 Alarm 1 flag</td>
<td>OFF</td>
<td>X15</td>
</tr>
<tr>
<td>CH3 Alarm 2 flag</td>
<td>OFF</td>
<td>X16</td>
</tr>
<tr>
<td>CH4 Periodic electric energy 1 confirmation flag</td>
<td>ON</td>
<td>X17</td>
</tr>
<tr>
<td>CH4 Periodic electric energy 2 confirmation flag</td>
<td>ON</td>
<td>X19</td>
</tr>
<tr>
<td>CH4 Periodic electric energy 1 reset completion flag</td>
<td>OFF</td>
<td>X1A</td>
</tr>
<tr>
<td>CH4 Periodic electric energy 2 reset completion flag</td>
<td>OFF</td>
<td>X1B</td>
</tr>
<tr>
<td>CH4 Alarm 1 flag</td>
<td>OFF</td>
<td>X1C</td>
</tr>
<tr>
<td>CH4 Alarm 2 flag</td>
<td>OFF</td>
<td>X1D</td>
</tr>
<tr>
<td>Error flag</td>
<td>OFF</td>
<td>X1E</td>
</tr>
</tbody>
</table>

Output signal (Y)

- Operating condition setting request
- Max and Min value clear request
- CH1 Periodic electric energy 1 measurement flag
- CH1 Periodic electric energy 2 measurement flag
- CH1 Periodic electric energy 1 reset request
- CH1 Periodic electric energy 2 reset request
- CH1 Alarm reset request
- CH1 Alarm2 reset request
- CH2 Periodic electric energy 1 measurement flag
- CH2 Periodic electric energy 2 measurement flag
- CH2 Periodic electric energy 1 reset request
- CH2 Periodic electric energy 2 reset request
- CH2 Alarm reset request
- CH2 Alarm2 reset request
- CH3 Periodic electric energy 1 measurement flag
- CH3 Periodic electric energy 2 measurement flag
- CH3 Periodic electric energy 1 reset request
- CH3 Periodic electric energy 2 reset request
- CH3 Alarm reset request
- CH3 Alarm2 reset request
- CH4 Periodic electric energy 1 measurement flag
- CH4 Periodic electric energy 2 measurement flag
- CH4 Periodic electric energy 1 reset request
- CH4 Periodic electric energy 2 reset request
- CH4 Alarm reset request
- CH4 Alarm2 reset request
- Error clear request

---

*Not set* | U8051 | Word
---|---|---
*Not clear* | U8032 | Double word

Error code

- H00 | U80340 | Error code
- H01 | U80350 | Time
- H02 | U80360 | Word
4) After checking that the Integrated value setting completion flag (Xn3) is in the ON status, turn off the integrated value setting request (Yn3). The integrated value setting completion flag (Xn3) is OFF, after detect the status is OFF. After detecting Integrated value setting request (Yn3) is in the OFF status, Integrated value setting completion flag (Xn3) turns to OFF.

(2)Default value
Integrated value setting target (Un¥G51) is set to 0 (No set).
Integrated value setting value (Un¥G52,3) is set to 0.
8 Setting and procedure for operation

8.6.6 Debugging program

QE84WH provides a test function so that you can debug a program with no input of voltage or current. Pseudo-value can be stored into the buffer memory. For detailed explanation for the test function, refer to 4.2.5.

Caution

Test function stores pseudo-values for setting value and error information as well as measured value. If you use these data to control the sequence program that controls external devices, there is a chance that erroneous control may occur. For safety of external devices, use this function after disconnecting the device.

(1) Setting intelligent function of the module switch

1) Configure the operation mode in switch setting as shown below. (Refer to 8.6.2)
   Test mode transition : Test mode

2) From the “Online” menu, select “Write to PLC” to display the dialog box of Write to PLC, and then execute the writing to PLC parameter. After resetting the CPU module, the value will become effective.

(2) Starting the test function

1) Reset the CPU module.
2) QE84WH starts in the test function mode. All LEDs are turned on. Pseudo-values are stored in the buffer memory.

(3) Finishing the test function (Move back to the measuring mode)

1) Following 1) in step (1), Configure the operation mode in switch setting as shown below.
   Test mode transition : Test mode

2) Following 2) in step (1), write the data into PLC.
3) Reset the CPU module, then the operation goes back to the measuring mode.
8 Setting and procedure for operation

8.7 Setting from GX Developer

This section explains setting from GX Developer necessary to use QE84WH. Before performing this setting, install GX Developer and connect the Management CPU with the PC using a USB cable. For details, refer to the manual of CPU module.

8.7.1 I/O assignment setting
(1) Double-click the dialog box of “PLC Parameter” in the GX Developer Project.
(2) Click “I/O assignment”.
(3) Set the following item to the slot*1 to which QE84WH has been attached.

Figure 8.7.1-1 Dialog box of “I/O assignment”

Table 8.7.1-1 Setting items on the “I/O assignment” tab

<table>
<thead>
<tr>
<th>Item</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Select “Intelli.”.</td>
</tr>
<tr>
<td>Model name</td>
<td>Enter the model name of the module.</td>
</tr>
<tr>
<td>Points</td>
<td>Select 32 points.</td>
</tr>
<tr>
<td>Start XY</td>
<td>Enter the initial I/O number of QE84WH.</td>
</tr>
</tbody>
</table>

*1 is a case where QE84WH is attached to the slot 0.
8.7.2 Setting the intelligent function of the module switch

(1) In the "I/O assignment" of 8.7.1, click the Switch setting button to display the dialog box of "I/O module, intelligent function module switch setting".

(2) The intelligent function module switch setting displays switches 1 to 5; however, only switches 4 and 5 is used for this purpose. Switch setting is configured using 16-bit data. Settings are as shown in Table 8.7.2-1.

![Figure 8.7.2-1 Dialog box to set the intelligent function of the module switch](image)

Table 8.7.2-1 Setting the intelligent function of the module switch

<table>
<thead>
<tr>
<th>Switch No.</th>
<th>Switch name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not used</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Not used</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Not used</td>
<td>-</td>
</tr>
</tbody>
</table>
| 4          | Measuring mode selection | 0: Regular operating mode  
1: Current measuring mode  
*When switch 5 is set to "1", the test mode is selected.     |
| 5          | Test mode transition   | 0: Measuring mode (Even when this switch is not set, the module runs in the measuring mode.)  
1: Test mode  
* For details of test mode, refer to 4.2.5. |

(3) When the setting is completed, click the Complete setting button.

(4) From the "Online" menu, select "Write to PLC" to display the dialog box of Write to PLC, and then execute the writing to PLC parameter. After resetting the CPU module, the value will become effective.
8.7.3 Initial setting

This section explains the setting of the operating condition for phase wire system, primary voltage, primary current, current demand time, and voltage demand time, primary voltage of VT, secondary voltage of VT, and primary current of CT that are required for measurement. Once each value is set, these values will be stored in the nonvolatile memory of the module, so that reconfiguration is not needed. You can also perform the setting using sequence program. In this case, you need to create a program, as referring to Chapter 9.

Follow the procedure below for each setting.

(1) Check the current setting
(2) Set the Buffer memory

(1) Check the current setting
1) From the “Online” menu, select “Monitor” – “Buffer memory batch ...”. The dialog box to monitor all buffer memories. After setting the address as shown below, click the Start monitoring button to check the current buffer memory status.
   - Module initial address: Set the initial address of this module.
   - Buffer memory address: 0
     (Display: 16-bit integer, numerical value: check the number in decimal)

2) Check each item. The following shows items for operating condition settings. For specific setting value, see the provided references.

<table>
<thead>
<tr>
<th>Buffer memory address</th>
<th>Item</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH1</td>
<td>Un\G1 (Common to all CHs)</td>
<td>Section 6.2.2</td>
</tr>
<tr>
<td>CH2</td>
<td>Un\G1 (Common to all CHs)</td>
<td>Section 6.2.2</td>
</tr>
<tr>
<td>CH3</td>
<td>Un\G2</td>
<td>Section 6.2.3</td>
</tr>
<tr>
<td>CH4</td>
<td>Un\G3</td>
<td>Section 6.2.3</td>
</tr>
<tr>
<td>Un\G4</td>
<td>Un\G4 (Common to all CHs)</td>
<td>Section 6.2.4</td>
</tr>
<tr>
<td>Un\G5</td>
<td>Un\G5 (Common to all CHs)</td>
<td>Section 6.2.5</td>
</tr>
<tr>
<td>Un\G6</td>
<td>Un\G6 (Common to all CHs)</td>
<td>Section 6.2.2</td>
</tr>
<tr>
<td>Un\G7</td>
<td>Un\G7 (Common to all CHs)</td>
<td>Section 6.2.2</td>
</tr>
</tbody>
</table>

Figure 8.7.3-1 Dialog box to monitor all buffer memories (a case where the module is attached to the slot 0)
(2) Set the Buffer memory

1) In the dialog box to monitor all buffer memories, click the **Device test** button to display the Device test dialog box.

2) In the Word device / buffer memory, specify the module initial address and buffer address, and click the **Set** button to apply the setting.

![Device test dialog box](image)

**Figure 8.7.3-2 Device test dialog box (a case where this module is attached to the slot 0)**

3) Change the setting in 2).

4) In the section of bit device setting in the device test dialog box, select "Y2" and click the **FORCE ON** button.

5) When the setting is completed without any problem, the Device "X2" changes to ON. Check this using the procedure as follows:

   (a) From the "Online" menu, select “Monitor” – “Device batch ...”. The dialog box to monitor all devices is displayed.

   (b) Set "X0" to the device, and click “Start monitor”

   (c) Check that Device "X2" is in the ON status.

![Device batch monitor](image)

**Figure 8.7.3-3 Checking the device "X2" in the dialog box to monitor all devices**

6) After checking that the device "X2" is in the ON status, select “Device: “Y2” in the dialog box of device test, and then click the **FORCE OFF** button. Setting is completes.

7) If the Device "X2" is not in the ON status, this means an error because the set value is out of range (ERR.LED is flashing). Modify the setting, and change the device "Y2" to the OFF status, then change it back to the ON status.

* Indicates a number in the case where the initial I/O number (initial XY) is set to 0.
8 Setting and procedure for operation

8.7.4 Integrated value setting

This function is to set integrated value (electric energy (consumption, regeneration) and reactive energy (consumption lag)) to any value. If you want to clear integrated value, set it to 0.

(1) Check the current setting
1) From the “Online” menu, select “Monitor” – “Entry data monitor”. After registering the address as shown below, click the Start monitoring button to check the current buffer memory status.

<table>
<thead>
<tr>
<th>Items</th>
<th>Buffer memory</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated value setting target</td>
<td>Un¥G51</td>
<td>16bit</td>
</tr>
<tr>
<td>Integrated value setting value</td>
<td>Un¥G52</td>
<td>32bit</td>
</tr>
<tr>
<td>Electric energy(consumption)</td>
<td>Un¥G102</td>
<td>16bit</td>
</tr>
<tr>
<td>Integrated value set request</td>
<td>YC</td>
<td>16bit</td>
</tr>
<tr>
<td>Integrated value set completion flag</td>
<td>XC</td>
<td>16bit</td>
</tr>
</tbody>
</table>

2) Check item.
(a) Set integrated value setting target (Un¥G51) in the buffer memory. Setting range is as follows:

<table>
<thead>
<tr>
<th>Setting value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No set</td>
</tr>
<tr>
<td>1</td>
<td>Electric energy (consumption)</td>
</tr>
<tr>
<td>2</td>
<td>Electric energy (regeneration)</td>
</tr>
<tr>
<td>3</td>
<td>Reactive energy (consumption lag)</td>
</tr>
</tbody>
</table>

(b) Set integrated value setting value (Un¥G52, 53) in the buffer memory.
- Configurable range: 0 to 999999999
- The unit used for the setting value is the same as that used for the electric energy and reactive energy that are output to the buffer memory.
  For details, refer to section 6.3.1.

Figure 8.7.4-1 Dialog box to Entry data monitor (a case where the module is attached to the slot 0)
(2) Setting function for integrated value

This function is to set integrated value (electric energy (consumption, regeneration) and reactive energy (consumption lag)) to any value. If you want to clear integrated value, set it to 0.

1) In the dialog box to monitor all buffer memories, click the Device test button to display the Device test dialog box.
2) In the Word device / buffer memory, specify the module initial address and buffer address, and click the Set button to apply the setting.

![Device test dialog box](image)

Figure 8.7.4-2 Device test dialog box (a case where this module is attached to the slot 0)

3) Change the setting in 2).
4) In the section of bit device setting in the device test dialog box, select “YC” and click the FORCE ON button.
5) When the setting is completed without any problem, the Device “XC” changes to ON.

![Entry data monitor](image)

Figure 8.7.4-3 Checking the device “XC” in the dialog box to Entry data monitor

6) After checking that the device “XC” is in the ON status, select “Device: “YC” in the dialog box of device test, and then click the FORCE OFF button. Setting is completes.

* Indicates a number in the case where the initial I/O number (initial XY) is set to 0.
8 Setting and procedure for operation

8.7.5 Debugging program

QE84WH provides a test function so that you can debug a program with no input of voltage or current. Pseudo-value can be stored into the buffer memory. For detailed explanation for the test function, refer to 4.2.5.

Caution
Test function stores pseudo-values for setting value and error information as well as measured value. If you use these data to control the sequence program that controls external devices, there is a chance that erroneous control may occur. For safety of external devices, use this function after disconnecting the device.

(1) Setting intelligent function of the module switch
1) In the “I/O assignment setting” of 8.7.1, click the Switch setting button to display the dialog box of “I/O module, intelligent function module switch setting”. (Refer to 8.7.2)
2) The intelligent function module switch setting displays switches 1 to 5; however, use switch 5 when using the test function. Switch setting is configured using 16-bit data.
   Setting is as follows:
   Switch 5: “1”
3) When the setting is completed, click the End button.
4) From the “Online” menu, select “Write to PLC” to display the dialog box of Write to PLC, and then execute the writing to PLC parameter. After resetting the CPU module, the value will become effective.

(2) Starting the test function
1) Reset the CPU module.
2) QE84WH starts in the test function mode. All LEDs are turned on. Pseudo-values are stored in the buffer memory.

(3) Finishing the test function (Move back to the measuring mode)
1) Following 1) and 2) in step (1), configure the intelligent function switch setting as shown below.
   Switch 5: “0”
2) Following 3) and 4) in step (1), complete the setting and write the data into PLC.
3) Reset the CPU module, then the operation goes back to the measuring mode.
Chapter 9: Programming

This chapter explains about programming for QE84WH. When you apply sample programs introduced in this chapter into the actual system, make sure to verify in advance that there is no problem with the target system control.

Follow the procedure in Figure 9.1-1 to create a sample program using QE84WH. The default setting allows you to use either GX Works2 (Regular operating mode: refer to 8.6. Current measuring mode: refer to 7.8.), GX Developer (refer to 8.7) or the sequence program to make settings; however, if the setting is made for the first time by using GX Works2 or GX Developer, the program for initial setting can be eliminated, which will reduce time for scanning.

9.1 Programming procedure

Follow the procedure in Figure 9.1-1 to create a program for acquiring the measured data, alarm monitoring, calculating periodical electricity amount using QE84WH.

![Programming chart](image)

Figure 9.1-1 Programming chart
9.2 System configuration and usage conditions for sample program

A sample program under the following system and the usage condition is shown below.

(1) System configuration

![Sample system configuration using a sample program](image)

(2) Setting conditions for the intelligent function of the module switch

<table>
<thead>
<tr>
<th>Switch No.</th>
<th>Switch name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not used</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Not used</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Not used</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Measuring mode selection</td>
<td>0 (Regular measuring mode)</td>
</tr>
<tr>
<td>5</td>
<td>Operation mode</td>
<td>0 (Measuring mode)</td>
</tr>
</tbody>
</table>

(3) Programming conditions

(a) Setting the operating conditions
- Phase wire : Three-phase 3-wire
- Primary voltage : 220 V
- Primary current : 250 A
- Current demand time : 30 sec
- Electric power demand time : 30 sec
- Primary voltage of VT : 0
- Secondary voltage of VT : 0
- Primary current of CT : 0

(b) Alarm monitoring setting
- Alarm 1 item : Current demand upper limit
- Alarm 1 value : 100000 (100 A)
- Alarm 1 reset method : Auto reset
- Alarm 1 delay time : 5 sec
- Alarm 2 item : Current demand upper limit
- Alarm 2 value : 120000 (120 A)
- Alarm 2 reset method : Self-retention
- Alarm 2 delay time : 5 sec

(c) Data acquisition clock setting
- Output period of data acquisition clock : 1000 (1sec)

(4) Before creating a program
Before creating a program, attach QE84WH to the base unit, and connect it to external devices.

Electric current sensor: EMU-CT250

Figure 9.2-2 Example of wiring using a sample program
9.2.1 Sample program when make the initial setting using GX Works2 or GX Developer.

(1) List of devices

<table>
<thead>
<tr>
<th>Device</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>D30</td>
<td>Device that stores latest error code</td>
</tr>
<tr>
<td>X0</td>
<td>Module ready</td>
</tr>
<tr>
<td>X2</td>
<td>Operating condition setting completion flag</td>
</tr>
<tr>
<td>X9</td>
<td>CH1 Alarm 1 flag</td>
</tr>
<tr>
<td>XA</td>
<td>CH1 Alarm 2 flag</td>
</tr>
<tr>
<td>XB</td>
<td>CH2 Alarm 1 flag</td>
</tr>
<tr>
<td>XC</td>
<td>CH2 Alarm 2 flag</td>
</tr>
<tr>
<td>X1F</td>
<td>Error flag</td>
</tr>
<tr>
<td>Y2</td>
<td>Operating condition setting request</td>
</tr>
<tr>
<td>YA</td>
<td>CH1 Alarm 2 reset request</td>
</tr>
<tr>
<td>YC</td>
<td>CH2 Alarm 2 reset request</td>
</tr>
<tr>
<td>X21</td>
<td>Device that the user will turn ON in order to cancel error after CH1 alarm 2 occur</td>
</tr>
<tr>
<td>X2E</td>
<td>Device that the user will turn ON in order to support measurement of CH1 periodic electric energy</td>
</tr>
<tr>
<td>X2F</td>
<td>Device that the user will turn ON in order to reset integrated value of CH1</td>
</tr>
<tr>
<td>Y30</td>
<td>Device that turns ON to send an output to the external device when the CH1 alarm 1 occurs</td>
</tr>
<tr>
<td>Y31</td>
<td>Device that turns ON to send an output to the external device when the CH1 alarm 2 occurs</td>
</tr>
<tr>
<td>Y3F</td>
<td>Device that turns ON to send an output to the external device in the case of an error</td>
</tr>
</tbody>
</table>

(2) List of buffer memories to be used

<table>
<thead>
<tr>
<th>Device</th>
<th>Description</th>
<th>Setting value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>U0/G4500</td>
<td>Latest error code</td>
<td>-</td>
<td>Stores latest error code</td>
</tr>
</tbody>
</table>
(3) Sample program

Figure 9.2.1-1 Example of a sample program
9.2.2 Sample program when make the initial setting using sequence program.

(1) List of devices

<table>
<thead>
<tr>
<th>Device</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>D0, D1</td>
<td>Device that stores Multiplier of electric energy</td>
</tr>
<tr>
<td>D2, D3</td>
<td>Device that stores electric energy (consumption)</td>
</tr>
<tr>
<td>D4, D5</td>
<td>Periodic electric energy 1</td>
</tr>
<tr>
<td>D6, D7</td>
<td>Periodic electric energy 2</td>
</tr>
<tr>
<td>D8, D9</td>
<td>Device that stores average current</td>
</tr>
<tr>
<td>D10, D11</td>
<td>Device that stores average voltage</td>
</tr>
<tr>
<td>D12, D13</td>
<td>Device that stores electric power</td>
</tr>
<tr>
<td>D14, D15</td>
<td>Device that stores reactive power</td>
</tr>
<tr>
<td>D16, D17</td>
<td>Device that stores power factor</td>
</tr>
<tr>
<td>D18, D19</td>
<td>Device that stores frequency</td>
</tr>
<tr>
<td>D30</td>
<td>Device that stores latest error code</td>
</tr>
<tr>
<td>X0</td>
<td>Module ready</td>
</tr>
<tr>
<td>X1</td>
<td>Data acquisition clock</td>
</tr>
<tr>
<td>X2</td>
<td>Operating condition setting completion flag</td>
</tr>
<tr>
<td>X9</td>
<td>Alarm 1 flag</td>
</tr>
<tr>
<td>XA</td>
<td>Alarm 2 flag</td>
</tr>
<tr>
<td>X1F</td>
<td>Error flag</td>
</tr>
<tr>
<td>Y2</td>
<td>Operating condition setting request</td>
</tr>
<tr>
<td>Y5</td>
<td>Periodic electric energy 1 measurement flag</td>
</tr>
<tr>
<td>Y6</td>
<td>Periodic electric energy 2 measurement flag</td>
</tr>
<tr>
<td>Y0A</td>
<td>CH1 Alarm 2 reset request</td>
</tr>
<tr>
<td>X21</td>
<td>Device that the user will turn ON in order to cancel error after CH1 alarm 2 occur</td>
</tr>
<tr>
<td>X2E</td>
<td>Device that the user will turn ON in order to support measurement of CH1 periodic electric energy</td>
</tr>
<tr>
<td>X2F</td>
<td>Device that the user will turn ON in order to reset integrated value of CH1</td>
</tr>
<tr>
<td>Y30</td>
<td>Device that turns ON to send an output to the external device when the CH1 alarm 1 occurs</td>
</tr>
<tr>
<td>Y31</td>
<td>Device that turns ON to send an output to the external device when the CH1 alarm 2 occurs</td>
</tr>
<tr>
<td>Y3F</td>
<td>Device that turns ON to send an output to the external device in the case of an error</td>
</tr>
</tbody>
</table>

QE84WH

(X/Y0 to X/Y1F)

QX40

(X20 to X2F)

QY40

(Y30 to Y3F)
Table 9.2.2-2 List of buffer memories to be used

<table>
<thead>
<tr>
<th>Device</th>
<th>Description</th>
<th>Setting value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>U0/G0</td>
<td>Phase wire method</td>
<td>3</td>
<td>Three-phase 3-wire</td>
</tr>
<tr>
<td>U0/G1</td>
<td>Primary voltage</td>
<td>2</td>
<td>220 V</td>
</tr>
<tr>
<td>U0/G2</td>
<td>Primary current</td>
<td>3</td>
<td>250 A</td>
</tr>
<tr>
<td>U0/G3</td>
<td>Current demand time</td>
<td>30</td>
<td>30 sec</td>
</tr>
<tr>
<td>U0/G4</td>
<td>Electric power demand time</td>
<td>30</td>
<td>30 sec</td>
</tr>
<tr>
<td>U0/G5</td>
<td>Primary voltage of VT</td>
<td>0</td>
<td>When Primary voltage(U0/G1) is expect 0</td>
</tr>
<tr>
<td>U0/G6</td>
<td>Secondary voltage of VT</td>
<td>0</td>
<td>When Primary voltage(U0/G1) is expect 0</td>
</tr>
<tr>
<td>U0/G7</td>
<td>Primary current of CT</td>
<td>0</td>
<td>When Primary current (U0/G2) is expect 0</td>
</tr>
<tr>
<td>U0/G11</td>
<td>Alarm 1 item</td>
<td>1</td>
<td>Current demand upper limit</td>
</tr>
<tr>
<td>U0/G12,13</td>
<td>Alarm 1 value</td>
<td>100000</td>
<td>100 A</td>
</tr>
<tr>
<td>U0/G14</td>
<td>Alarm 1 reset method</td>
<td>1</td>
<td>Auto reset</td>
</tr>
<tr>
<td>U0/G15</td>
<td>Alarm 1 delay time</td>
<td>5</td>
<td>5 sec</td>
</tr>
<tr>
<td>U0/G21</td>
<td>Alarm 2 item</td>
<td>1</td>
<td>Current demand upper limit</td>
</tr>
<tr>
<td>U0/G22,23</td>
<td>Alarm 2 value</td>
<td>120000</td>
<td>120 A</td>
</tr>
<tr>
<td>U0/G24</td>
<td>Alarm 2 reset method</td>
<td>0</td>
<td>Self-retention</td>
</tr>
<tr>
<td>U0/G25</td>
<td>Alarm 2 delay time</td>
<td>5</td>
<td>5 sec</td>
</tr>
<tr>
<td>U0/G60,61</td>
<td>Output period of data acquisition clock</td>
<td>1000</td>
<td>1 sec</td>
</tr>
<tr>
<td>U0/G100</td>
<td>Multiplier of electric energy</td>
<td>-</td>
<td>Stores multiplier of electric energy</td>
</tr>
<tr>
<td>U0/G102,103</td>
<td>Electric energy (consumption)</td>
<td>-</td>
<td>Stores electric energy</td>
</tr>
<tr>
<td>U0/G114,115</td>
<td>Periodic electric energy 1</td>
<td>-</td>
<td>Stores Periodic electric energy 1</td>
</tr>
<tr>
<td>U0/G116,117</td>
<td>Periodic electric energy 2</td>
<td>-</td>
<td>Stores Periodic electric energy 2</td>
</tr>
<tr>
<td>U0/G218,219</td>
<td>Average current</td>
<td>-</td>
<td>Stores average current</td>
</tr>
<tr>
<td>U0/G314,315</td>
<td>Average voltage</td>
<td>-</td>
<td>Stores average voltage</td>
</tr>
<tr>
<td>U0/G402,403</td>
<td>Electric power</td>
<td>-</td>
<td>Stores Electric power</td>
</tr>
<tr>
<td>U0/G502,503</td>
<td>Reactive power</td>
<td>-</td>
<td>Stores Reactive power</td>
</tr>
<tr>
<td>U0/G702,703</td>
<td>Power factor</td>
<td>-</td>
<td>Stores power factor</td>
</tr>
<tr>
<td>U0/G802,803</td>
<td>Frequency</td>
<td>-</td>
<td>Stores frequency</td>
</tr>
<tr>
<td>U0/G51</td>
<td>Integrated value setting target</td>
<td>19</td>
<td>CH1 Total integrated value</td>
</tr>
<tr>
<td>U0/G52,53</td>
<td>Integrated value setting value</td>
<td>0</td>
<td>0kWh(kvarh)</td>
</tr>
<tr>
<td>U0/G4500</td>
<td>Latest error code</td>
<td>-</td>
<td>Stores latest error code</td>
</tr>
</tbody>
</table>
(3) Sample program

- Initial setting program for QE84WH
- module READY flag for complete operating condition setting

**Basic operating condition setting**
- Primary voltage
- Primary current
- Current demand time
- Electric Power demand time
- Primary voltage of VT
- Secondary voltage of VT
- Primary current of CT
- Alarm 1 item
- Alarm 1 value
- Alarm 1 reset method
- Alarm 1 delay time
- Alarm 2 item
- Alarm 2 value
- Alarm 2 reset method
- Alarm 2 delay time
- Output period of data acquisition clock

**Request of operating condition setting**
- Set the request of operating condition setting (Y2) to ON
- Set the request of operating condition setting (Y2) to OFF

Figure 9.2.2-1 Example of a sample program
<table>
<thead>
<tr>
<th>Module</th>
<th>Data acquisition clock</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 9.2.2-2 Example of a sample program (continued)
Figure 9.2.2-3 Example of a sample program (continued)
9.3 System configuration and usage conditions for current measuring mode

A sample program is shown below based on the following system and the usage condition.

(1) System configuration

![Sample System Configuration](image)

Figure 9.3-1 Sample system configuration using a sample program

<table>
<thead>
<tr>
<th>Switch No.</th>
<th>Switch name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not used</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Not used</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Not used</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Measuring mode selection</td>
<td>1 (Current measuring mode)</td>
</tr>
<tr>
<td>5</td>
<td>Operation mode</td>
<td>0 (Measuring mode)</td>
</tr>
</tbody>
</table>

(2) Setting conditions for the intelligent function module switch

Setting is as follows:

(a) Operating condition setting
- Channel to be used: CH1, CH2
- Primary current: 250 A
- CH1 and CH2 current demand time: 30 sec. (Setting the operating conditions)
- Primary current of CT: 0 (When Primary current (U0G4003) is expect 0)

(b) Alarm monitoring setting
- CH1 and CH2 alarm 1 item: Maximum current demand
- CH1 and CH2 alarm 1 value: 100000 (100 A)
- CH1 and CH2 alarm 1 reset method: Auto reset
- CH1 and CH2 alarm 1 delay time: 5 sec.
- CH1 and CH2 alarm 2 item: Maximum current demand
- CH1 and CH2 alarm 2 value: 120000 (120 A)
- CH1 and CH2 alarm 2 reset method: Self-retention
- CH1 and CH2 alarm 2 delay time: 5 sec.

(c) Data acquisition clock setting
- Output period of data acquisition clock: 500 (0.5 sec.)
(4) Before creating a program

Before creating a program, attach QE84WH to the base unit, and connect it to external devices.

Electric current sensor: EMU-CT250 (Split type)

![Diagram of wiring using a sample program](image)

Figure 9.3-2 Example of wiring using a sample program
9.3.1 Sample program when make the initial setting using GX Works2 or GX Developer.
A sample program is shown below based on the following system and the usage condition.

(1) List of devices

<table>
<thead>
<tr>
<th>Device</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>D0, D1</td>
<td>Device that stores CH1 current</td>
</tr>
<tr>
<td>D4, D5</td>
<td>Device that stores CH2 current</td>
</tr>
<tr>
<td>D10</td>
<td>Device that stores latest error code</td>
</tr>
<tr>
<td>X0</td>
<td>Module ready</td>
</tr>
<tr>
<td>X1</td>
<td>Data acquisition clock</td>
</tr>
<tr>
<td>X2</td>
<td>Operating condition setting completion flag</td>
</tr>
<tr>
<td>X9</td>
<td>CH1 alarm 1 flag</td>
</tr>
<tr>
<td>XA</td>
<td>CH1 alarm 2 flag</td>
</tr>
<tr>
<td>XB</td>
<td>CH2 alarm 1 flag</td>
</tr>
<tr>
<td>XC</td>
<td>CH2 alarm 2 flag</td>
</tr>
<tr>
<td>X1F</td>
<td>Error flag</td>
</tr>
<tr>
<td>Y2</td>
<td>Operating condition setting request</td>
</tr>
<tr>
<td>YA</td>
<td>CH1 alarm2 reset request.</td>
</tr>
<tr>
<td>YC</td>
<td>CH2 alarm2 reset request.</td>
</tr>
<tr>
<td>X21</td>
<td>Device that the user will turn ON in order to cancel error after CH1 alarm 2 occur</td>
</tr>
<tr>
<td>X23</td>
<td>Device that the user will turn ON in order to cancel error after CH2 alarm 2 occur</td>
</tr>
<tr>
<td>Y30</td>
<td>Device that turns ON to send an output to the external device when the CH1 alarm 1 occurs</td>
</tr>
<tr>
<td>Y31</td>
<td>Device that turns ON to send an output to the external device when the CH1 alarm 2 occurs</td>
</tr>
<tr>
<td>Y32</td>
<td>Device that turns ON to send an output to the external device when the CH2 alarm 1 occurs</td>
</tr>
<tr>
<td>Y33</td>
<td>Device that turns ON to send an output to the external device when the CH2 alarm 2 occurs</td>
</tr>
<tr>
<td>Y3F</td>
<td>Device that turns ON to send an output to the external device in the case of an error</td>
</tr>
</tbody>
</table>

QE84WH
(X/Y0 to X/Y1F)

QE4X0
(X20 to X2F)

QE4Y0
(Y30 to Y3F)
### (2) List of buffer memories to be used

Table 9.3.1-2 List of buffer memories to be used

<table>
<thead>
<tr>
<th>Device</th>
<th>Description</th>
<th>Setting value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>U0\G4003</td>
<td>CH1 and CH2 Primary current</td>
<td>3</td>
<td>250 A</td>
</tr>
<tr>
<td>U0\G4004</td>
<td>CH1 Current demand time</td>
<td>30</td>
<td>30 sec.</td>
</tr>
<tr>
<td>U0\G4054</td>
<td>CH2 Current demand time</td>
<td>30</td>
<td>30 sec.</td>
</tr>
<tr>
<td>U0\G4005</td>
<td>CH1 Primary current of CT</td>
<td>0</td>
<td>When Primary current (U0\G4003) is expect 0</td>
</tr>
<tr>
<td>U0\G4011</td>
<td>CH1 Alarm 1 item</td>
<td>1</td>
<td>Maximum current demand</td>
</tr>
<tr>
<td>U0\G4012, 4013</td>
<td>Alarm 1 value</td>
<td>100000</td>
<td>100 A</td>
</tr>
<tr>
<td>U0\G4014</td>
<td>Alarm 1 reset method</td>
<td>1</td>
<td>Auto reset</td>
</tr>
<tr>
<td>U0\G4015</td>
<td>Alarm 1 delay time</td>
<td>5</td>
<td>5 sec.</td>
</tr>
<tr>
<td>U0\G4021</td>
<td>Alarm 2 item</td>
<td>1</td>
<td>Maximum current demand</td>
</tr>
<tr>
<td>U0\G4022, 4023</td>
<td>Alarm 2 value</td>
<td>120000</td>
<td>120 A</td>
</tr>
<tr>
<td>U0\G4024</td>
<td>Alarm 2 reset method</td>
<td>0</td>
<td>Self-retention</td>
</tr>
<tr>
<td>U0\G4025</td>
<td>Alarm 2 delay time</td>
<td>5</td>
<td>5 sec.</td>
</tr>
<tr>
<td>U0\G4061</td>
<td>CH2 Alarm 1 item</td>
<td>1</td>
<td>Maximum current demand</td>
</tr>
<tr>
<td>U0\G4062, 4063</td>
<td>Alarm 1 value</td>
<td>1000000</td>
<td>100 A</td>
</tr>
<tr>
<td>U0\G4064</td>
<td>Alarm 1 reset method</td>
<td>0</td>
<td>Auto reset</td>
</tr>
<tr>
<td>U0\G4065</td>
<td>Alarm 1 delay time</td>
<td>5</td>
<td>5 sec.</td>
</tr>
<tr>
<td>U0\G4071</td>
<td>Alarm 2 item</td>
<td>1</td>
<td>Maximum current demand</td>
</tr>
<tr>
<td>U0\G4072, 4073</td>
<td>Alarm 2 value</td>
<td>120000</td>
<td>120 A</td>
</tr>
<tr>
<td>U0\G4074</td>
<td>Alarm 2 reset method</td>
<td>0</td>
<td>Self-retention</td>
</tr>
<tr>
<td>U0\G4075</td>
<td>Alarm 2 delay time</td>
<td>5</td>
<td>5 sec.</td>
</tr>
<tr>
<td>U0\G4000, 4001</td>
<td>All CHs Output period of data acquisition clock</td>
<td>500</td>
<td>0.5 sec.</td>
</tr>
<tr>
<td>U0\G4032, 4033</td>
<td>CH1 Current</td>
<td>-</td>
<td>Stores the current measurement.</td>
</tr>
<tr>
<td>U0\G4082, 4083</td>
<td>CH2 Current</td>
<td>-</td>
<td>Stores the current measurement.</td>
</tr>
<tr>
<td>U0\G4500</td>
<td>Latest error code</td>
<td>-</td>
<td>Stores the latest error code.</td>
</tr>
</tbody>
</table>
Figure 9.3.1-1 Example of a sample program
Figure 9.3.1-2 Example of a sample program (continued)
Figure 9.3.1-3 Example of a sample program (continued)
9.3.2 Sample program when make the initial setting using sequence program.

A sample program is shown below based on the following system and the usage condition.

(1) List of devices

<table>
<thead>
<tr>
<th>Device</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>D0, D1</td>
<td>Device that stores CH1 current</td>
</tr>
<tr>
<td>D4, D5</td>
<td>Device that stores CH2 current</td>
</tr>
<tr>
<td>D10</td>
<td>Device that stores latest error code</td>
</tr>
<tr>
<td>X0</td>
<td>Module ready</td>
</tr>
<tr>
<td>X1</td>
<td>Data acquisition clock</td>
</tr>
<tr>
<td>X2</td>
<td>Operating condition setting completion flag</td>
</tr>
<tr>
<td>X9</td>
<td>CH1 alarm 1 flag</td>
</tr>
<tr>
<td>XA</td>
<td>CH1 alarm 2 flag</td>
</tr>
<tr>
<td>XB</td>
<td>CH2 alarm 1 flag</td>
</tr>
<tr>
<td>XC</td>
<td>CH2 alarm 2 flag</td>
</tr>
<tr>
<td>X1F</td>
<td>Error flag</td>
</tr>
<tr>
<td>Y2</td>
<td>Operating condition setting request</td>
</tr>
<tr>
<td>YA</td>
<td>CH1 alarm 2 reset request</td>
</tr>
<tr>
<td>YC</td>
<td>CH2 alarm 2 reset request</td>
</tr>
<tr>
<td>X21</td>
<td>Device that the user will turn ON in order to cancel error after CH1 alarm 2 occur</td>
</tr>
<tr>
<td>X23</td>
<td>Device that the user will turn ON in order to cancel error after CH2 alarm 2 occur</td>
</tr>
<tr>
<td>Y30</td>
<td>Device that turns ON to send an output to the external device when the CH1 alarm 1 occurs</td>
</tr>
<tr>
<td>Y31</td>
<td>Device that turns ON to send an output to the external device when the CH1 alarm 2 occurs</td>
</tr>
<tr>
<td>Y32</td>
<td>Device that turns ON to send an output to the external device when the CH2 alarm 1 occurs</td>
</tr>
<tr>
<td>Y33</td>
<td>Device that turns ON to send an output to the external device when the CH2 alarm 2 occurs</td>
</tr>
<tr>
<td>Y3F</td>
<td>Device that turns ON to send an output to the external device in the case of an error</td>
</tr>
</tbody>
</table>
(2) List of buffer memories to be used

<table>
<thead>
<tr>
<th>Device</th>
<th>Description</th>
<th>Setting value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>U0\G4003</td>
<td>CH1 and CH2</td>
<td>Primary current</td>
<td>3</td>
</tr>
<tr>
<td>U0\G4004</td>
<td>CH1</td>
<td>Current demand time</td>
<td>30</td>
</tr>
<tr>
<td>U0\G4054</td>
<td>CH2</td>
<td>Current demand time</td>
<td>30</td>
</tr>
<tr>
<td>U0\G4005</td>
<td>CH1</td>
<td>Primary current of CT</td>
<td>0</td>
</tr>
<tr>
<td>U0\G4011</td>
<td>CH1</td>
<td>Alarm 1 item</td>
<td>1</td>
</tr>
<tr>
<td>U0\G4012, 4013</td>
<td></td>
<td>Alarm 1 value</td>
<td>100000</td>
</tr>
<tr>
<td>U0\G4014</td>
<td></td>
<td>Alarm 1 reset method</td>
<td>1</td>
</tr>
<tr>
<td>U0\G4015</td>
<td></td>
<td>Alarm 1 delay time</td>
<td>5</td>
</tr>
<tr>
<td>U0\G4021</td>
<td></td>
<td>Alarm 2 item</td>
<td>1</td>
</tr>
<tr>
<td>U0\G4022, 4023</td>
<td></td>
<td>Alarm 2 value</td>
<td>120000</td>
</tr>
<tr>
<td>U0\G4024</td>
<td></td>
<td>Alarm 2 reset method</td>
<td>0</td>
</tr>
<tr>
<td>U0\G4025</td>
<td></td>
<td>Alarm 2 delay time</td>
<td>5</td>
</tr>
<tr>
<td>U0\G4061</td>
<td>CH2</td>
<td>Alarm 1 item</td>
<td>1</td>
</tr>
<tr>
<td>U0\G4062, 4063</td>
<td></td>
<td>Alarm 1 value</td>
<td>1000000</td>
</tr>
<tr>
<td>U0\G4064</td>
<td></td>
<td>Alarm 1 reset method</td>
<td>0</td>
</tr>
<tr>
<td>U0\G4065</td>
<td></td>
<td>Alarm 1 delay time</td>
<td>5</td>
</tr>
<tr>
<td>U0\G4071</td>
<td></td>
<td>Alarm 2 item</td>
<td>1</td>
</tr>
<tr>
<td>U0\G4072, 4073</td>
<td></td>
<td>Alarm 2 value</td>
<td>120000</td>
</tr>
<tr>
<td>U0\G4074</td>
<td></td>
<td>Alarm 2 reset method</td>
<td>0</td>
</tr>
<tr>
<td>U0\G4075</td>
<td></td>
<td>Alarm 2 delay time</td>
<td>5</td>
</tr>
<tr>
<td>U0\G4000, 4001</td>
<td>All CHs</td>
<td>Output period of data acquisition clock</td>
<td>500</td>
</tr>
<tr>
<td>U0\G4032, 4033</td>
<td>CH1</td>
<td>Current</td>
<td>-</td>
</tr>
<tr>
<td>U0\G4082, 4083</td>
<td>CH2</td>
<td>Current</td>
<td>-</td>
</tr>
<tr>
<td>U0\G4500</td>
<td>Latest error code</td>
<td>-</td>
<td>Stores the latest error code.</td>
</tr>
</tbody>
</table>
Figure 9.3.2-1 Example of a sample program
Figure 9.3.2-2 Example of a sample program (continued)
Figure 9.3.2-3 Example of a sample program (continued)
10 Troubleshooting

Chapter 10: Troubleshooting

**CAUTION** If abnormal sound, a smell, smoke, and generation of heat occur from this apparatus, please turn off the power immediately and stop use.

10.1 List of error codes

When the data are written to the CPU module from this module or when a reading error occurs, error codes will be stored into the following buffer memory.

<table>
<thead>
<tr>
<th>Error code (HEX)</th>
<th>Error level</th>
<th>Measuring mode</th>
<th>Descriptions</th>
<th>Action</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001h, 0002h, 0003h</td>
<td>Mid</td>
<td>All modes</td>
<td>Hardware error with the module.</td>
<td>Turn the power OFF/ON. If the error recurs, the module may have a failure. Consult with a nearest sales agent or our company branch for the symptom of the failure.</td>
<td>-</td>
</tr>
<tr>
<td>1001h</td>
<td>Low</td>
<td>Regular operating</td>
<td>Phase wire method is set out of range.</td>
<td>Check phase wire method, and set it within 1-3.</td>
<td>Section 6.2.1</td>
</tr>
<tr>
<td>1002h</td>
<td>Low</td>
<td>Regular operating</td>
<td>Primary voltage is set out of range.</td>
<td>Set it within 0 to 9 according to the primary voltage.</td>
<td>Section 6.2.2</td>
</tr>
<tr>
<td>1003h (CH1), 1013h (CH2), 1023h (CH3), 1033h (CH4)</td>
<td>Low</td>
<td>Regular operating</td>
<td>Primary current is set out of range.</td>
<td>Set it within the range* of 0 to 5, 501 to 536 according to the primary current.</td>
<td>Section 6.2.3</td>
</tr>
<tr>
<td>1004h (CH1), 1014h (CH2), 1024h (CH3), 1034h (CH4)</td>
<td>Low</td>
<td>Regular operating</td>
<td>Current demand time is set out of range.</td>
<td>Set current demand time within the range* of 0 to 1800 (seconds).</td>
<td>Section 6.2.4</td>
</tr>
<tr>
<td>1005h (CH1), 1015h (CH2), 1025h (CH3), 1035h (CH4)</td>
<td>Low</td>
<td>Regular operating</td>
<td>Electric power demand time is set out of range.</td>
<td>Set electric power demand time within the range* of 0 to 1800 (seconds).</td>
<td>Section 6.2.5</td>
</tr>
<tr>
<td>100Dh</td>
<td>Low</td>
<td>Regular operating</td>
<td>Primary voltage of VT is set out of range.</td>
<td>Set primary voltage of VT within the range* of 0 to 6600 (V). However, this setting cannot set 0 (any setting) when primary voltage (UnG1) is 0.</td>
<td>Section 6.2.2</td>
</tr>
<tr>
<td>100Eh</td>
<td>Low</td>
<td>Regular operating</td>
<td>Secondary voltage of VT is set out of range.</td>
<td>Set secondary voltage of VT within the range* of 0 to 220 (V). However, this setting cannot set 0 (any setting) when primary voltage (UnG1) is 0.</td>
<td>Section 6.2.2</td>
</tr>
<tr>
<td>100Fh (CH1), 101Fh (CH2), 102Fh (CH3), 103Fh (CH4)</td>
<td>Low</td>
<td>Regular operating</td>
<td>Primary current of CT is set out of range.</td>
<td>Set primary current of CT within the range* of 0 to 6000 (A). However, this setting cannot set 0 (any setting) when primary current (UnG2) is 0.</td>
<td>Section 6.2.3</td>
</tr>
<tr>
<td>1006h (CH1), 1016h (CH2), 1026h (CH3), 1036h (CH4)</td>
<td>Low</td>
<td>Regular operating</td>
<td>Alarm 1 item is set out of range.</td>
<td>Set alarm 1 item within 1 to 8.</td>
<td>Section 6.2.6</td>
</tr>
<tr>
<td>1007h (CH1), 1017h (CH2), 1027h (CH3), 1037h (CH4)</td>
<td>Low</td>
<td>Regular operating</td>
<td>Alarm 2 item is set out of range.</td>
<td>Set alarm 2 item within 1 to 8.</td>
<td>Section 6.2.6</td>
</tr>
<tr>
<td>1008h (CH1), 1018h (CH2), 1028h (CH3), 1038h (CH4)</td>
<td>Low</td>
<td>Regular operating</td>
<td>Alarm 1 reset method is set out of range.</td>
<td>Set alarm 1 reset method within 0 to 1.</td>
<td>Section 6.2.8</td>
</tr>
<tr>
<td>1009h (CH1), 1019h (CH2), 1029h (CH3), 1039h (CH4)</td>
<td>Low</td>
<td>Regular operating</td>
<td>Alarm 2 reset method is set out of range.</td>
<td>Set alarm 2 reset method within 0 to 1.</td>
<td>Section 6.2.8</td>
</tr>
<tr>
<td>100Ah (CH1), 101Ah (CH2), 102Ah (CH3), 103Ah (CH4)</td>
<td>Low</td>
<td>Regular operating</td>
<td>Alarm 1 delay time is set out of range.</td>
<td>Set alarm 1 delay time within the range* of 0 to 300 (seconds).</td>
<td>Section 6.2.9</td>
</tr>
<tr>
<td>100Bh (CH1), 101Bh (CH2), 102Bh (CH3), 103Bh (CH4)</td>
<td>Low</td>
<td>Regular operating</td>
<td>Alarm 2 delay time is set out of range.</td>
<td>Set alarm 2 delay time within the range* of 0 to 300 (seconds).</td>
<td>Section 6.2.9</td>
</tr>
<tr>
<td>100Ch</td>
<td>Low</td>
<td>Regular operating</td>
<td>Integrated value setting value is set out of range.</td>
<td>Set integrated value setting value within the range* of 0 to 9999999999 in the double word format (32-bit integer).</td>
<td>Section 6.2.10</td>
</tr>
<tr>
<td>1041h</td>
<td>Low</td>
<td>Regular operating</td>
<td>Output period of data acquisition clock is set out of range.</td>
<td>Set the output period of data acquisition clock within the range* of 0 to 86400000 in the double word format (32-bit integer).</td>
<td>Section 6.2.12</td>
</tr>
</tbody>
</table>
## Troubleshooting

<table>
<thead>
<tr>
<th>Error code (HEX)</th>
<th>Error level</th>
<th>Measuring mode</th>
<th>Descriptions</th>
<th>Action</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000h</td>
<td>Low</td>
<td>Current measuring</td>
<td>Output period of data acquisition clock is set out of range.</td>
<td>Set the output period of data acquisition clock within the range* of 0 to 86400000 in the double word format (32-bit integer).</td>
<td>Section 6.2.12</td>
</tr>
<tr>
<td>2001h(CH1), 2021h(CH3)</td>
<td>Low</td>
<td>Current measuring</td>
<td>Primary current is set out of range.</td>
<td>Set it within the range* of 0 to 5 or 501 to 536 according to the primary current.</td>
<td>Section 6.2.3</td>
</tr>
<tr>
<td>2002h(CH1), 2012h(CH2)</td>
<td>Low</td>
<td>Current measuring</td>
<td>Current demand time is set out of range.</td>
<td>Set the current demand time within the range* of 0 to 1800 (seconds).</td>
<td>Section 6.2.4</td>
</tr>
<tr>
<td>2003h(CH1), 2013h(CH2)</td>
<td>Low</td>
<td>Current measuring</td>
<td>Alarm 1 item is set out of range.</td>
<td>Set the alarm 1 item within the range of 0 to 2.</td>
<td>Section 6.2.6</td>
</tr>
<tr>
<td>2004h(CH1), 2014h(CH2)</td>
<td>Low</td>
<td>Current measuring</td>
<td>Alarm 2 item is set out of range.</td>
<td>Set the alarm 2 item within the range of 0 to 2.</td>
<td>Section 6.2.6</td>
</tr>
<tr>
<td>2005h(CH1), 2015h(CH2)</td>
<td>Low</td>
<td>Current measuring</td>
<td>Alarm 1 reset method is set out of range.</td>
<td>Set the alarm 1 reset method within the range of 0 to 1.</td>
<td>Section 6.2.8</td>
</tr>
<tr>
<td>2006h(CH1), 2016h(CH2)</td>
<td>Low</td>
<td>Current measuring</td>
<td>Alarm 2 reset method is set out of range.</td>
<td>Set the alarm 2 reset method within the range of 0 to 1.</td>
<td>Section 6.2.8</td>
</tr>
<tr>
<td>2007h(CH1), 2017h(CH2)</td>
<td>Low</td>
<td>Current measuring</td>
<td>Alarm 1 delay time is set out of range.</td>
<td>Set the alarm 1 delay time within the range* of 0 to 300 (seconds).</td>
<td>Section 6.2.9</td>
</tr>
<tr>
<td>2008h(CH1), 2018h(CH2)</td>
<td>Low</td>
<td>Current measuring</td>
<td>Alarm 2 delay time is set out of range.</td>
<td>Set the alarm 2 delay time within the range* of 0 to 300 (seconds).</td>
<td>Section 6.2.9</td>
</tr>
<tr>
<td>2009h(CH1), 2029h(CH3), 2049h(CH5), 2069h(CH7)</td>
<td>Low</td>
<td>Current measuring</td>
<td>Primary current of CT is set out of range.</td>
<td>Set primary current of CT within the range* of 0 to 6000 (A). However, this setting cannot set 0(any setting) when primary current (UnG2) is 0.</td>
<td>Section 6.2.3</td>
</tr>
<tr>
<td>0000h</td>
<td>-</td>
<td>All mode</td>
<td>Normal</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Also check that it is set in decimal.
10 Troubleshooting

10.2 Troubleshooting

10.2.1 When "0" LED (RUN) is turned off

<table>
<thead>
<tr>
<th>Check item</th>
<th>Action</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is power source is supplied?</td>
<td>Check that supply voltage of the power source is within the rating.</td>
<td>-</td>
</tr>
<tr>
<td>Is capacity of the power source module sufficient?</td>
<td>Calculate the consumption current of CPU module, I/O module, and intelligent function module attached to the base unit, and check that the power capacity is sufficient.</td>
<td>-</td>
</tr>
<tr>
<td>Is the watchdog time an error?</td>
<td>Reset CPU module, and check whether it is turned on. If RUN LED is not turned on even after doing the above, the module may have a failure. Consult with a nearest sales agent or our company branch for the symptom of the failure.</td>
<td>-</td>
</tr>
<tr>
<td>Is the module properly attached to the base unit?</td>
<td>Check the module attachment status.</td>
<td>Section 8.4</td>
</tr>
<tr>
<td>Is the slot type set to &quot;empty&quot; in the I/O assignment setting of the PC parameter at GX Developer?</td>
<td>Set the slot type to &quot;Intelligent&quot;.</td>
<td>Section 8.7.1</td>
</tr>
</tbody>
</table>

10.2.2 When "8" LED (ERR) is turned on or flashing

(1) If it is ON

Table 10.2.2-1 When "8" LED is turned on

<table>
<thead>
<tr>
<th>Check item</th>
<th>Action</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did any error occur?</td>
<td>Check latest error code (UnG4500), and take a corrective action as described in section 10.1. After that, reset CPU module, and check whether it is turned on. If &quot;8&quot; LED is turned on even after doing the above, the module may have a failure. Consult with a nearest sales agent or our company branch for the symptom of the failure.</td>
<td>Section 10.1</td>
</tr>
</tbody>
</table>

(2) If it is flashing

Table 10.2.2-2 When "8" LED is flashing

<table>
<thead>
<tr>
<th>Check item</th>
<th>Action</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did any error occur?</td>
<td>The set value may be out of range. Check that the operating condition settings and the integrated value are correct. Correct configuration or turning Error clear request (Y1F*) ON will clear the error. When the error is cleared by Error clear request (Y1F*), the operation continues according to the previous settings. * In the case where the initial I/O number of this module is 0</td>
<td>Section 5.2.2 Chapter 6 Section 8.6.3 Section 8.7.3</td>
</tr>
</tbody>
</table>
### 10.2.3 If electric energy cannot be measured

The following check has to be performed while current is flowing from the power source side to the load side. Note that electric energy is not measured in the current measuring mode.

#### Table 10.2.3-1 If electric energy cannot be measured

<table>
<thead>
<tr>
<th>Check item</th>
<th>Action</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH1</td>
<td>&quot;1&quot; LED is OFF. &quot;9&quot; LED is OFF. &quot;5&quot; LED is OFF.</td>
<td>1) The type of current sensor may be incorrect. In addition, if the rating of the sensor in use is different from the primary current, measurement cannot be taken correctly.</td>
</tr>
<tr>
<td>CH2</td>
<td>&quot;2&quot; LED is OFF. &quot;A&quot; LED is OFF. &quot;6&quot; LED is OFF.</td>
<td>2) Wiring is not done or wrong. Refer to Section 8.5 to check the wiring.</td>
</tr>
<tr>
<td>CH3</td>
<td>&quot;3&quot; LED is OFF. &quot;B&quot; LED is OFF. &quot;D&quot; LED is OFF.</td>
<td>3) Voltage wiring may be incorrect. Check connection of P1, P2, and P3.</td>
</tr>
<tr>
<td>CH4</td>
<td>&quot;4&quot; LED is OFF. &quot;C&quot; LED is OFF. &quot;E&quot; LED is OFF.</td>
<td></td>
</tr>
<tr>
<td>CH1</td>
<td>&quot;1&quot; LED is flashing. &quot;9&quot; LED is OFF. &quot;5&quot; LED is ON.</td>
<td>1) Current sensors on side 1 and side 3 may be installed in the reverse order or current sensors on side 1 and side 3 may be swapped. Check the connection.</td>
</tr>
<tr>
<td>CH2</td>
<td>&quot;2&quot; LED is flashing. &quot;A&quot; LED is OFF. &quot;6&quot; LED is ON.</td>
<td>2) Voltage wiring may be incorrect. Check connection of P1, P2, and P3.</td>
</tr>
<tr>
<td>CH3</td>
<td>&quot;3&quot; LED is flashing. &quot;B&quot; LED is ON. &quot;D&quot; LED is ON.</td>
<td></td>
</tr>
<tr>
<td>CH4</td>
<td>&quot;4&quot; LED is flashing. &quot;C&quot; LED is ON. &quot;E&quot; LED is ON.</td>
<td></td>
</tr>
<tr>
<td>CH1</td>
<td>&quot;1&quot; LED is ON, flashing, or OFF. &quot;9&quot; LED is ON. &quot;5&quot; LED is OFF.</td>
<td>1) Current sensor on side 1 may be installed in the reverse order. Check the connection.</td>
</tr>
<tr>
<td>CH2</td>
<td>&quot;2&quot; LED is ON, flashing, or OFF. &quot;A&quot; LED is ON. &quot;6&quot; LED is OFF.</td>
<td>2) Voltage wiring may be incorrect. Check connection of P1, P2, and P3.</td>
</tr>
<tr>
<td>CH3</td>
<td>&quot;3&quot; LED is ON, flashing, or OFF. &quot;B&quot; LED is ON. &quot;D&quot; LED is ON.</td>
<td></td>
</tr>
<tr>
<td>CH4</td>
<td>&quot;4&quot; LED is ON, flashing, or OFF. &quot;C&quot; LED is ON. &quot;E&quot; LED is ON.</td>
<td></td>
</tr>
<tr>
<td>CH1</td>
<td>&quot;1&quot; LED is ON, flashing, or OFF. &quot;9&quot; LED is ON. &quot;5&quot; LED is ON.</td>
<td>1) Current sensor on side 3 may be installed in the reverse order. Check the connection.</td>
</tr>
<tr>
<td>CH2</td>
<td>&quot;2&quot; LED is ON, flashing, or OFF. &quot;A&quot; LED is ON. &quot;6&quot; LED is OFF.</td>
<td>2) Voltage wiring may be incorrect. Check connection of P1, P2, and P3.</td>
</tr>
<tr>
<td>CH3</td>
<td>&quot;3&quot; LED is ON, flashing, or OFF. &quot;B&quot; LED is ON. &quot;D&quot; LED is ON.</td>
<td></td>
</tr>
<tr>
<td>CH4</td>
<td>&quot;4&quot; LED is ON, flashing, or OFF. &quot;C&quot; LED is ON. &quot;E&quot; LED is ON.</td>
<td></td>
</tr>
<tr>
<td>CH1</td>
<td>&quot;1&quot; LED is ON. &quot;9&quot; LED is OFF. &quot;5&quot; LED is OFF.</td>
<td>1) Measurement is taken normally. Check for the correct buffer memory address and data format (double word: 32-bit integer).</td>
</tr>
<tr>
<td>CH2</td>
<td>&quot;2&quot; LED is ON. &quot;A&quot; LED is OFF. &quot;6&quot; LED is OFF.</td>
<td></td>
</tr>
<tr>
<td>CH3</td>
<td>&quot;3&quot; LED is ON. &quot;B&quot; LED is OFF. &quot;D&quot; LED is OFF.</td>
<td></td>
</tr>
<tr>
<td>CH4</td>
<td>&quot;4&quot; LED is ON. &quot;C&quot; LED is OFF. &quot;E&quot; LED is OFF.</td>
<td></td>
</tr>
</tbody>
</table>
10.2.4 If the electric current and voltage that are measured using this module do not match with the ones measured with other gauge

Table 10.2.4-1 If current and voltage that are measured using this module do not match with the ones measured with other gauge

<table>
<thead>
<tr>
<th>Check item</th>
<th>Action</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are phase wire method, primary current, and primary voltage correct?</td>
<td>Check the value in the buffer memory for checking the phase wire method, primary current and primary voltage. When the value in the buffer memory is changed, you need to turn the request for operating condition setting into ON. Otherwise, it will not be applied to the measurement.</td>
<td>Section 6.1</td>
</tr>
<tr>
<td>Does the compared gauge measure the effective value correctly?</td>
<td>This module stores the effective value into the buffer memory. If the compared device uses the average value instead of the effective value, the resulted value may largely differ when there is current distortion in the measurement circuit.</td>
<td>-</td>
</tr>
<tr>
<td>Is the secondary of CT short-circuited?</td>
<td>Make sure that the secondary of CT is not short-circuited. If it is connected to Mitsubishi’s current transformer CW-5S(L), check that the secondary switch is not short-circuited.</td>
<td>-</td>
</tr>
<tr>
<td>Are you using other current sensor than recommended ones?</td>
<td>Only the dedicated current sensors can be connected to this module. Check that other company’s sensor is not being used.</td>
<td>-</td>
</tr>
</tbody>
</table>
## 10.3 Q&A

### 10.3.1 General

<table>
<thead>
<tr>
<th>Q</th>
<th>To what degree is the module durable against overvoltage and overcurrent? Is external protective circuit required?</th>
</tr>
</thead>
</table>
| A | Momentary*: Up to 2 times as high as rated voltage and 20 times as high as rated current. Continuous: Up to 1.1 times as high as rated voltage and rated current.  
  * Momentary means: Energizing 9 times for 0.5 seconds at 1-minute intervals, and then 1 time for 5 seconds.  
  External protective circuit is not required. |

<table>
<thead>
<tr>
<th>Q</th>
<th>Can the module be used as an electric energy meter?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>This module can be used to measure the electric energy and to manage the use of electric energy. However, it cannot be used for deal and proof of electric energy measurement stipulated in the measurement law.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q</th>
<th>Are errors in wiring verifiable easily?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>They are verifiable by the illuminating condition of the LEDs on the front of the module. Refer to Section 10.2.3 for details.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q</th>
<th>Is it OK to open the secondary terminals of the current sensor?</th>
</tr>
</thead>
</table>
| A | The secondary side of the models EMU2-CT5, EMU-CT50, EMU-CT100, EMU-CT250, EMU-CT5-A, EMU-CT50-A, EMU-CT100-A, EMU-CT250-A, EMU-CT400-A, and EMU-CT600-A is equipped with the protective circuit against opening of secondary terminals. Opening them during the wiring work causes no problems. However, for safety, please do not continuously energize the module with the terminals open.  
  The secondary side of the models EMU-CT400 and EMU-CT600 is equipped with the protective circuit against opening of secondary terminals. However, during the wiring work, be sure to turn the secondary side short-circuit switch to short. After completion of work, be sure to turn the secondary short-circuit switch to open. Note that failing to turn the switch open results in an inaccurate measurement. |

<table>
<thead>
<tr>
<th>Q</th>
<th>Is measurement of inverter circuit possible?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Measuring the secondary side of the inverter is impossible due to the large fluctuation of frequency. Make measurement on the primary side of the inverter. However, since a current waveform on the primary side of the inverter has a distortion containing the harmonic components, a slight error occurs.</td>
</tr>
</tbody>
</table>
If a load such as welding equipment exists, a current flows only for a short period (e.g. 2-cycle waveform of commercial frequency (50 Hz: 40 ms, 60 Hz: 33 ms)). Is accurate measurement possible?

This module makes measurement with a sampling period of 4340 Hz (for both 50 Hz and 60 Hz). However, measuring part of buffer memory data is updated every 500 ms. The electrical amount such as current, voltage, electric power, power factor, and frequency is measured in a cycle of 500 ms period.

The amount of electricity and reactive power amount are measured separately from the momentary data described above, using a sampling period of 4340 Hz continuously without intermittence. Therefore, measuring the load for a short period is possible.

Obtained values may be different from other measuring instruments. Why is it so?

There are various possible causes. Check the following first, please:

[1] Check for wiring errors (polarity of current sensors, connections of current circuits, and connections of voltage circuits, in particular).


[4] Check that the measuring instrument used for comparison indicates a correct RMS value.

[5] If the measuring instrument used for comparison measures an average value instead of rms value, distortion in the current of the circuit to be measured causes a significant difference of values. This module measures an rms value.


[7] Current sensor connectable to the module is the dedicated current sensor only. Check that the proper current sensor is connected or not.

What accuracy does “measuring accuracy” mean?

In terms of the amount of electricity, it means a range of tolerances in reading values. For example, when the reading value is “10 kWh,” a tolerance is ±0.2 kWh.

In terms of measuring elements other than the amount of electricity, it means tolerance for the rated input. For a current, when a rated current is set to 250 A, ±1% of 250 A is a tolerance.

Is accuracy of a current sensor included?

Accuracy of a current sensor is not included in accuracy of the module. A maximum value of tolerance is obtained by summing tolerance of the module and that of a current sensor.

To what degree an area of microcurrent is measured?

A current value is measured from the area exceeding 0.4% of the rated current. In an area below 0.4%, measurement result is indicated as “0” (zero).

However, in that case, still, the amount of electricity is being measured. Even if the indicated value is “0,” measurement value will increase in continuing measurement for a long time.

The amount of electricity is measured with a load that is about 0.4% or more of all load power.
10 Troubleshooting

**Q** What kind of time is “response time”?

“Response time” is a period of time between a point of sudden change of voltage or current input and a point that an output (computation result) follows up to within ±10% of input.

---

**10.3.3 Q&A about Installing**

**Q** What is wire diameter that allows installing a current sensor?

The following lists the nominal cross-sectional areas of the conductor of 600-V vinyl coated wires that can penetrate (values for reference).

- **IV wire (600-V vinyl insulated wire)**
  - 38 mm² (EMU-CT50-A), 60 mm² (EMU-CT50/CT100, EMU-CT100-A),
  - 150 mm² (EMU-CT250), 200 mm² (EMU-CT250-A),
  - 500 mm² × 1 wire, 325 mm² × 2 wires (EMU-CT400/CT600),
  - 500 mm² (EMU-CT400/CT600-A)

- **CV wire (600-V vinyl insulated wire)**
  - 22 mm² (EMU-CT50-A), 38 mm² (EMU-CT50/CT100), 60 mm² (EMU-CT100-A),
  - 150 mm² (EMU-CT250 (100 mm² is recommended), EMU-CT250-A),
  - 400 mm² (EMU-CT400/CT600-A),
  - 500 mm² × 1 wire, 325 mm² × 2 wires (EMU-CT400/CT600)

The above shows the standard nominal cross-sectional areas. Due to the outer difference of finished vinyl insulation and deformation (bending) depending on manufacturers, a wire may not penetrate. Make verification on site.

**Q** What are the points when installing a current sensor?

Models EMU2-CT5, EMU-CT*** and EMU-CT***-A are split-type. If split surfaces are not engaged sufficiently or a foreign object exists between the split surfaces, adequate performances are not obtained. Pay attention in installation.
### 10.3.4 Q&A about Connection

<table>
<thead>
<tr>
<th>Q</th>
<th>Does polarity exist in connection between a current sensor and the module?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Yes, it does. Make connections so that secondary terminals of current sensor (k, l) and terminal symbols of module agree with each other. If polarity is incorrect, the current value is measurable, but the electric power and the electrical energy can not be measured correctly.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q</th>
<th>Are there any key points in avoiding errors in wiring?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Check polarity of current sensor on the primary current side. Power supply side of the circuit is indicated as “K,” and the load is indicated as “L.” An arrow indicates the direction from K to L. For a 3-wire circuit, check that the current sensor and the module are connected correctly for the 1-side circuit and 3-side circuit. Besides, check that voltage inputs are connected correctly among P1, P2, and P3.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q</th>
<th>How do wires extend between a current sensor and the module?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Model EMU-CT***, EMU-CT***-A are extendable up to 50 m. Model EMU2-CT5 is extendable up to 11 m, using together with extension cable. To extend the wire further, use the current transformer CW-5S(L) for split-type instrument in combination, extending the secondary wiring on CW-5S(L) side.</td>
</tr>
</tbody>
</table>

### 10.3.5 Q&A about Setting

<table>
<thead>
<tr>
<th>Q</th>
<th>Is the setting required?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>At least, settings of phase wires, primary current and primary voltage are required. Specify settings in accordance with a circuit to be connected.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q</th>
<th>If a primary current setting value is different from that of rated current on a connected current sensor, does it cause a breakdown?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>It does not cause breakdown or burning. However, measurement values will be totally incorrect.</td>
</tr>
</tbody>
</table>
Appendix

Appendix 1: External dimensions

Unit [mm]
Appendix 2: Optional devices

- **Split type current sensor**

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>EMU-CT50</td>
</tr>
<tr>
<td>Rated primary current</td>
<td>50A AC</td>
</tr>
<tr>
<td>Rated secondary current</td>
<td>16.66mA</td>
</tr>
<tr>
<td>Rated burden</td>
<td></td>
</tr>
<tr>
<td>Maximum voltage (voltage to ground/line voltage)</td>
<td>460V AC</td>
</tr>
<tr>
<td>Ratio error</td>
<td>±1% (5% to 100% of rating, RL ≤ 10Ω)</td>
</tr>
<tr>
<td>Phase displacement</td>
<td>±0.9 c rad (5% to 100% of rating, RL ≤ 10Ω)</td>
</tr>
<tr>
<td>Measurement (installation) category</td>
<td>III</td>
</tr>
<tr>
<td>Pollution degree</td>
<td>2</td>
</tr>
<tr>
<td>Working temperature range</td>
<td>−5°C to +55°C (daily mean temperature: 35°C or less)</td>
</tr>
<tr>
<td>Working humidity range</td>
<td>5% to 95%RH (no condensation)</td>
</tr>
<tr>
<td>CE marking conformity standard</td>
<td>EN61010-2-32</td>
</tr>
<tr>
<td>Maximum voltage (voltage to ground/line voltage)</td>
<td>460V AC</td>
</tr>
<tr>
<td>Weight (per one)</td>
<td>0.1kg</td>
</tr>
</tbody>
</table>

*Use an electric wire of the size of penetrating this current sensor for a primary side cable, do not use a non-insulation electric wire or a metal for a primary cable.

*EMU-CT400 and EMU-CT600 are stopped.

---

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>EMU-CT50-A</td>
</tr>
<tr>
<td>Rated primary current</td>
<td>50A AC</td>
</tr>
<tr>
<td>Rated secondary current</td>
<td>16.66mA</td>
</tr>
<tr>
<td>Rated burden</td>
<td></td>
</tr>
<tr>
<td>Maximum voltage (voltage to ground/line voltage)</td>
<td>460V AC</td>
</tr>
<tr>
<td>Ratio error</td>
<td>±1% (5% to 100% of rating, RL ≤ 10Ω)</td>
</tr>
</tbody>
</table>
| Phase displacement                | ±1.3 c rad (10% to 100% of rating, RL=10Ω)  
|                                  | ±1.8 c rad (5% of rating, RL=10Ω) |
| Measurement (installation) category | -       | III         |
| Pollution degree                  | -        | 2           |
| Working temperature range         | −5°C to +55°C (daily mean temperature: 35°C or less) |
| Working humidity range            | 30% to 85%RH (no condensation) |
| CE marking conformity standard    | -        | EN61010-2-32 |
| Maximum voltage (voltage to ground/line voltage) | 460V AC |
| Weight (per one)                  | 0.05kg    | 0.1kg       | 0.2kg       | 0.3kg       | 0.4kg       |

*Use an electric wire of the size of penetrating this current sensor for a primary side cable, do not use a non-insulation electric wire or a metal for a primary cable.
■ 5A current sensor

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>EMU2-CT5</td>
</tr>
<tr>
<td>Model</td>
<td>EMU-CT5-A</td>
</tr>
<tr>
<td>Rated primary current</td>
<td>5A AC</td>
</tr>
<tr>
<td>Rated secondary current</td>
<td>1.66mA</td>
</tr>
<tr>
<td>Rated burden</td>
<td>0.1VA</td>
</tr>
<tr>
<td>Maximum voltage (voltage to ground / line voltage)</td>
<td>260V AC</td>
</tr>
<tr>
<td></td>
<td>460V AC</td>
</tr>
<tr>
<td>Ratio error</td>
<td>±1% (5% to 100% of rating, $R_L \leq 10\Omega$)</td>
</tr>
<tr>
<td>Phase displacement</td>
<td>±0.9 c rad (5% to 100% of rating, $R_L \leq 10\Omega$)</td>
</tr>
<tr>
<td></td>
<td>±1.3 c rad (10% to 100% of rating, $RL=10\Omega$)</td>
</tr>
<tr>
<td></td>
<td>±1.8 c rad (5% of rating, $RL=10\Omega$)</td>
</tr>
<tr>
<td>Measurement/installation category</td>
<td></td>
</tr>
<tr>
<td>Pollution degree</td>
<td>-</td>
</tr>
<tr>
<td>Working temperature range</td>
<td>-5°C to +55°C (daily mean temperature: 35°C or less)</td>
</tr>
<tr>
<td>Working humidity range</td>
<td>5% to 95%RH (no condensation)</td>
</tr>
<tr>
<td>CE marking conformity standard</td>
<td>EN61010-2-32</td>
</tr>
<tr>
<td>CE marking conformity standard</td>
<td>-</td>
</tr>
<tr>
<td>Maximum voltage</td>
<td>260V AC</td>
</tr>
<tr>
<td>Weight (per one)</td>
<td>0.1kg</td>
</tr>
<tr>
<td>Weight (per one)</td>
<td>0.05kg</td>
</tr>
</tbody>
</table>

*Use an electric wire of the size of penetrating this current sensor for a primary side cable, do not use a non-insulation electric wire or a metal for a primary cable.
Appendix

Appendix 3: Optional devices

- **Current sensor**
  - EMU-CT50, EMU-CT100, EMU-CT250
  - EMU-CT400, EMU-CT600

### Table 1

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMU-CT50/CT100</td>
<td>31.5</td>
<td>39.6</td>
<td>55.2</td>
<td>25.7</td>
<td>15.2</td>
<td>18.8</td>
</tr>
<tr>
<td>EMU-CT250</td>
<td>36.5</td>
<td>44.8</td>
<td>66</td>
<td>32.5</td>
<td>22</td>
<td>24</td>
</tr>
</tbody>
</table>

**Model**: EMU-CT5, EMU-CT50, EMU-CT100

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMU-CT5-A</td>
<td>37.4</td>
<td>31.6</td>
<td>57.5</td>
<td>12.2</td>
<td>12.8</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>EMU-CT50-A</td>
<td>43.6</td>
<td>33.8</td>
<td>65</td>
<td>16.2</td>
<td>16.2</td>
<td>19</td>
<td>5</td>
</tr>
</tbody>
</table>

**Model**: EMU-CT250, EMU-CT400, EMU-CT600

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMU-CT250-A</td>
<td>42.6</td>
<td>49.4</td>
<td>74.5</td>
<td>24</td>
<td>24</td>
<td>25.2</td>
<td>4.5</td>
</tr>
<tr>
<td>EMU-CT400-A</td>
<td>44.9</td>
<td>67.2</td>
<td>94</td>
<td>36</td>
<td>36</td>
<td>27</td>
<td>4.5</td>
</tr>
</tbody>
</table>

**Model**: EMU2-CT5

**Sensor in detail**
### Dedicated cable
- 5A current sensor cable  EMU2-CB-Q5B

![Diagram of Dedicated cable]

### Extension cable (standard)  EMU2-CB-T**M

<table>
<thead>
<tr>
<th>Model</th>
<th>EMU2-CB-T1M</th>
<th>EMU2-CB-T5M</th>
<th>EMU2-CB-T10M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>1000mm</td>
<td>5000mm</td>
<td>10000mm</td>
</tr>
</tbody>
</table>

### Extension cable (separate)  EMU2-CB-T**MS

<table>
<thead>
<tr>
<th>Model</th>
<th>EMU2-CB-T1MS</th>
<th>EMU2-CB-T5MS</th>
<th>EMU2-CB-T10MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>1000mm</td>
<td>5000mm</td>
<td>10000mm</td>
</tr>
</tbody>
</table>
Index

[5]  5A current sensor cable ........................................ 8-17
[A]  Alarm delay time ........................................ 4-13
     Alarm flag ........................................ 4-16, 5-5
     Alarm item ........................................ 4-13
     Alarm reset method ................................ 4-14
     Alarm reset request ................................ 5-7
     Applicable solderless terminal ................. 8-9
     Applicable wire .................................... 8-9
     Average current .................................. 4-3
     Average voltage .................................. 4-3
[C]  Current demand time ................................... 4-16, 6-9
     Current measuring mode ......................... 7-1
[D]  Demand value ........................................ 4-2, 4-3
[E]  Electric energy
     (consumption, regeneration) ..................... 4-1, 4-2
     Electric power demand time ...................... 4-16, 6-10
     EMU2-CT5 ........................................... 8-17, Appendix-3
     EMU-CT50/100/250/400/600 ...................... 8-15, Appendix-2
     EMU-CT5/50/100/250/400/600-A ................. 8-13, Appendix-2
     Error clear request ................................ 5-8
     Error flag ......................................... 5-5
     External dimensions ............................... Appendix-1
[F]  Full load power ........................................ 4-5
[G]  GX Developer ........................................... 7-14, 8-28
     GX Works2 ......................................... 7-8, 8-20
[I]  Integrated value set completion flag ............ 5-4
     Integrated value set function .................... 4-18
     Integrated value set request ..................... 5-6
[L]  List of functions ..................................... 4-1
     List of I/O signals ................................ 5-1
[M]  Max./min. value hold function ...................... 4-1, 4-12
     Max./min. values clear completion flag (Xn4) .... 4-12, 5-4
     Max./min. values clear request (Yn4) ............ 4-12, 5-6
     Measured items .................................... 4-2
     Module ready ..................................... 5-2
[N]  Name of each part ................................... 8-3
    Operating condition setting completion flag .... 5-3
    Operating condition setting request .............. 5-6
    Output signal ...................................... 5-5
[P]  Periodic electric energy ......................... 4-2, 4-9
    Periodic electric energy data completion flag (Xn5, Xn6) .... 4-10, 5-4
    Periodic electric energy measurement flag (Yn5, Yn6) ....... 4-10, 5-7
    Periodic electric energy reset completion flag (Xn7, Xn8) .... 4-10, 5-4
    Periodic electric energy reset request (Yn7, Yn8) ............ 4-10, 5-7
    Phase wire system ................................ 3-1, 6-6
    Programming ....................................... 9-1
[R]  Rated primary current setting ...................... 4-4
    Rated primary voltage setting .................... 4-4
[S]  Split-type current sensor ......................... 8-13
[T]  Test function ....................................... 4-17
    Troubleshooting .................................. 10-1
[U]  Upper/lower limit alarm monitoring ................. 4-1, 4-13
[W]  Wiring ............................................... 8-8
Warranty

For using this product, please thoroughly read the following product warranty descriptions.

1. Gratis Warranty Period and Gratis Warranty Coverage
   If any failure or defect (hereinafter collectively called "failures") for which our company is held responsible occurs on the product during the gratis warranty period, our company shall replace the product for free through the distributor at which you purchased the product or our service company.

   However, if an international travel is required for replacement, or a travel to an isolated island or remote location equivalent is required for replacement, the actual cost incurred to send an engineer(s) shall be charged.

   [Gratis Warranty Period]
   The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

   Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

   [Gratis Warranty Coverage]
   (1) The gratis warranty shall apply only if the product is being used properly in the conditions, with the methods and under the environments in accordance with the terms and precautions described in the instruction manual, user’s manual, caution label on the product, etc.

   (2) Replacement shall be charged for the following cases even during the gratis warranty period.
   1) Failures occurring due to your improper storage or handling, carelessness or fault, and failures arising from the design contents of hardware or software you use.
   2) Failures arising from modification you performed on the product without prior consent of our company.
   3) Failures occurring in the event that the product is assembled into the device you use and that are acknowledged as avoidable if the device is equipped with a safety mechanism that comply with the legal regulations applicable to the device or with functions/architecture which are considered as necessary to be equipped under conventions of the industry.
   4) Failures due to accidental force such as a fire, abnormal voltage, etc. and force majeure such as an earthquake, thunderstorm, wind, flood, etc.
   5) Failures due to matters unpredictable based on the level of science technology at the time of product
   6) Other failures which are beyond responsibility of our company or which you admit that our company is not held responsible for.

2. Fare-Paying Repair Period after Production Discontinued
   (1) The period our company may accept product replacement with charge shall be seven (7) years after production of the product is discontinued.

   Production stoppage shall be announced in the technical news, etc. of our company.

   (2) The product (including spare) cannot be supplied after production is discontinued.

3. Exemption of Compensation Liability for Opportunity Loss, Secondary Loss, etc.
   Our company shall not be liable to compensate for any loss arising from events not attributable to our company, opportunity loss and lost earning of the customer due to failure of the product, and loss, secondary loss, accident compensation, damage to other products besides our products and other operations caused by a special reason regardless of our company’s predictability in both within and beyond the gratis warranty period.

4. Change of Product Specifications
   Please be advised in advance that the specifications described in catalogs, manuals or technical materials are subject to change without notice.

5. Application of Products
   (1) For use of our general-purpose sequencer MELSEC-Q series and Energy Measuring Unit QE84WH, they shall be used for a purpose which shall not lead to a material accident even when a failure or malfunction of the sequencer occurs, and a backup or fail-safe function shall be implemented systematically at external of the device in the event of a failure or malfunction.

   (2) Our general-purpose sequencers are designed and manufactured as general-purpose products which are targeted for general industry applications. Therefore, use of the sequencer for purposes in nuclear power plants and other power plants of each electric power company which greatly affect public, or for purposes in each JR company and the Defense Agency requiring a special quality assurance system shall be excluded from its applications.

   However, the sequencer may be used for such purposes if the customer acknowledges that it should be used for limited purpose only and agrees not to require special quality.

   Also, if you are considering to use this device for purposes that are expected to greatly affect human life or property and require high reliability especially in safety or control system such as aviation, medical care, railroad, combustion/fuel device, manned carrier device, entertainment machine, safety equipment, please consult with our service representative to exchange necessary specifications.
### Country/Region | Corporation Name | Address | Telephone | Email |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Mitsubishi Electric Australia Pty. Ltd.</td>
<td>348 Victoria Road, Rydalmere, N.S.W. 2116, Australia</td>
<td>+61-2-9884-7777</td>
<td></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>PRECISION TRADING CORPORATION</td>
<td>House No. 9, Aftabog Circular Road, Dighaoner M. Mess, Tongi, Dhaka 1212, Bangladesh</td>
<td>+88-01-9243237</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>Mitsubishi Electric Do Brasil Comercio E Servicos Ltda.</td>
<td>Rua Djalma de Souza 15, 7th Floor, 23030-030 Minas, Belo Horizonte</td>
<td>+55-21-3270-4626</td>
<td></td>
</tr>
<tr>
<td>Cambodia</td>
<td>DHINMIE CO.,LTD</td>
<td>#24, St. Tag Phn, Phon Penh, Cambodia</td>
<td>+855-29-997-125</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>Mitsubishi Electric (China) Ltd.</td>
<td>No.1998, No.9: 1st Ring Road, Xujiahui Park, Shanghai 200030</td>
<td>+86-21-2321-0303</td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>AUTOCONT CONTROL SYSTEMS S.R.O.</td>
<td>Technologicka 3745, CZ-708 00 Olomouc, Czech Republic</td>
<td>+420-599-915-191</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>BELIER ELECTRONICS A/S</td>
<td>Lyngogardsvael 17, DK-4000 Roskilde</td>
<td>+45-9496-76-66</td>
<td></td>
</tr>
<tr>
<td>Egypt</td>
<td>Cairo Electrical Group</td>
<td>9, Royston St. Garden City P.O. Box 165-11516 Mapel ElShaw Cam - Egypt</td>
<td>+92-27-29713637</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>Mitsubishi Electric Europe B.V.</td>
<td>26, Boulevard des Boulevets, F-72974 Nantes Cede</td>
<td>+33 (0) 1 58 65 68 68</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>Mitsubishi Electric Prinze, 40442 Dusseldorf</td>
<td>Mitsubishi Electric Power 1, 40442 Dusseldorf, Germany</td>
<td>+49 (2102) 486000</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>GINO INDUSTRIES LTD.</td>
<td>9F, Pagola Hill, Pagola Pla 1702, Malta</td>
<td>+356-21-632-470</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>MITSUBISHI ELECTRIC AUTOMATION (Hungary) Ltd.</td>
<td>P.O. Box 5405 Kawasaki Industri Park, Budapest, Hungary</td>
<td>+36-24-714-7658</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>Mitsubishi Electric India Private Limited</td>
<td>C/O Mitsubishi Electric India Private Limited, 122 022 Haryana, India</td>
<td>+91-124-4623030</td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>PT. T. Sanahel Indonesia</td>
<td>P.O.Box 5045 Kawasaki Industri Park, Kawasaki, Bangkok, Indonesia</td>
<td>+62-(022)-686-10619-9</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>Mitsubishi Electric Europe B.V.</td>
<td>Westgate Business Park, Ballymount, IRL</td>
<td>+353 (01)-819-8080</td>
<td></td>
</tr>
<tr>
<td>Israel</td>
<td>Gino Industries Ltd.</td>
<td>26, Ophet Street -32255 Haifa, Israel</td>
<td>+972-2-847-6531</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>Mitsubishi Electric Asia Europe Co., Ltd.</td>
<td>Via Colombo 7, LD0541 Aragone (Mi), Italy</td>
<td>+39-03-485021</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>KAESAN MARU INC.</td>
<td>1210, 1-2-21 Higashi Awaori, Kita-ku, Osaka, Japan</td>
<td>+81-6-478-3875</td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td>SAPPANLIO LIMITED</td>
<td>SAPPANLIO VILLAGE, DISTRICT, VIENTIANE CAPITAL, LAOS</td>
<td>+85-29-418599</td>
<td></td>
</tr>
<tr>
<td>Lebanon</td>
<td>Oriental Corporation</td>
<td>Balcervo - Block A, Autodrome Dora, P.O. Box 11-2957 Beirut - Lebanon</td>
<td>+96-1-2944045</td>
<td></td>
</tr>
<tr>
<td>Lithuania</td>
<td>Lituva UAB</td>
<td>Trilu 29A, LT-5300 Panemynys, Lithuania</td>
<td>+370-265-787-75</td>
<td></td>
</tr>
<tr>
<td>Malaysia</td>
<td>Mitsubishi Electric Malaysia Bhd.</td>
<td>No. 5, Jalan Perdana Utama 14/9, Taman Perling Industrial Park, Klang, Selangor, Malaysia</td>
<td>+605-568-3745</td>
<td></td>
</tr>
<tr>
<td>Malta</td>
<td>AL_ATOMIC LTD</td>
<td>99-PAGULA HILL, PAGOLA PLA 1702, Malta</td>
<td>+356-21-632-470</td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>MARCO SARCO</td>
<td>KM 7.2 NOVEILLE ROUTE DE RABAT AIN SEBAA, 20600 Casablanca, Maroco</td>
<td>+212-681-45-96</td>
<td></td>
</tr>
<tr>
<td>Morocco</td>
<td>Mitsubishi Electric Do Brasil Comercio E Servicos</td>
<td>Rua Djalma de Souza 15, 7th Floor, 23030-030 Minas, Belo Horizonte</td>
<td>+55-21-3270-4626</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>Mitsubishi Electric Automation (Netherlands) B.V.</td>
<td>Motijheel, Dhaka -1217, Bangladesh</td>
<td>+880-2-712-7021</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>Mitsubishi Electric Europe B.V.</td>
<td>92741 Nanterre Cedex</td>
<td>+33 (0) 1 / 55 68 55 68</td>
<td></td>
</tr>
<tr>
<td>Pakistan</td>
<td>Prince Electric Co.</td>
<td>2-4512, H-8, IBAHRI F-11, ISLAMABAD, ISLAMABAD, PAKISTAN</td>
<td>+92-3-92732633</td>
<td></td>
</tr>
<tr>
<td>Peru</td>
<td>Mitsubishi Electric Do Brasil Comercio E Servicos</td>
<td>C/0 Mitsubishi Electric Do Brasil, Presidente Vargas 211, Paoa, Peru</td>
<td>+51-292-287929</td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td>Mitsubishi Electric Asia (Phil.), Inc.</td>
<td>1037 Alexandre Road, Mitsubishi Electric Building, Singapore 10943</td>
<td>+65-6432-9258</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>ALTARA ELECTRICAL LTD</td>
<td>36, VAVROMENI, 18542 PIRAEUS, Greece</td>
<td>+30-21921-46-300</td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>Mitsubishi Electric Europe B.V.</td>
<td>P.T. Sanahel Indonesia</td>
<td>+351 (01)-819-8080</td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>SCHIELE MAROC</td>
<td>KM 7,2 NOVEILLE ROUTE DE RABAT AIN SEBAA, 20600 Casablanca, Maroco</td>
<td>+212-681-45-96</td>
<td></td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>Panasonic Consumer Electronics Co., Ltd.</td>
<td>2060 Kishinev, Moldova</td>
<td>+375-14-411-130</td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>Mitsubishi Electric Vietnam Co., Ltd.</td>
<td>122 022 Hanoi, Vietnam</td>
<td>+84-4-3937-8075</td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>Northern Electric &amp; Engineering Co., Ltd.</td>
<td>100017 Karaganda</td>
<td>+7 495 396 89 53</td>
<td></td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>Mitsubishi Electric India Private Limited</td>
<td>C/O Mitsubishi Electric India Private Limited, 122 022 Haryana, India</td>
<td>+91-124-4623030</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>Energy Euro Components AB</td>
<td>Sweden</td>
<td>+46-69040400</td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td>TELESA AG</td>
<td>Uehlenhalsstrasse 136, CH-8220 Schaffhausen</td>
<td>+41-41-326-48-25</td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>SUTTISAK ENTERPRISE CO., LTD.</td>
<td>2597 Beirut, Lebanon</td>
<td>+96-1-2944045</td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>TEERUT RYILAND CO., LTD.</td>
<td>32235 Haifa, Israel</td>
<td>+972-2-847-6531</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Mitsubishi Electric Europe B.V.</td>
<td>Room 221, 1st Fl. Jalan Tun Sambantham, 521000 Kuching, Sarawak, Malaysia</td>
<td>+603-241-8500</td>
<td></td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>Mitsubishi Electric Europe B.V.</td>
<td>52, bld. 3 Komsomolstamothrowska Nab. 115054, Moskva, Russia</td>
<td>+7 495-721-2070</td>
<td></td>
</tr>
</tbody>
</table>

### Specifications
The specifications for all the modules are subject to change without notice.

---

**MITSUBISHI ELECTRIC CORPORATION**

HEAD OFFICE: TOKYO BUILDINGS, 2-1-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8130, JAPAN