# MITSUBISHI ELECTRIC

# MITSUBISHI Electronic Multi-Measuring Instrument

Types
# ME96SSE-MB
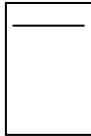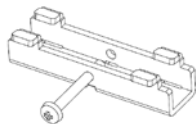
## User's Manual: Detailed Edition

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

## Check on your delivery

Check the following point as soon as you receive Mitsubishi Electronic Multi-Measuring Instrument.

| Parts name | Quantity | Specifications |
|---|---|---|
| User's Manual (Simplified) | 1 | A3 size |
| Attachment lug (with screw) | 2 | |

## About the optional plug-in module sold separately

This product cannot be installed the optional plug-in module.
Please use a combination of other classes (ME96SSH-MB, ME96SSR-MB) and the optional plug-in module, if analog output, CC-Link communication, or contact input and output etc is required.

## Features

This instrument measures the load status by inputting the secondary side of the VT and CT, and displays various measurement values.

● The password protection setting avoids undesired change of settings or deletion of measured data.

● The instruments with transmission functions (MODBUS®RTU communication) are able to transmit the measured data to superior monitoring devices.

● This instrument complies with the requirements of the CE marking, UL standards, KC mark, and FCC/IC.

MODBUS® is a registered trademark of SCHNEIDER ELECTRIC USA, INC in the United States.

# Table of Contents

## Table of Contents

(Always read these instructions before using this equipment)

For personnel and product safety please read the contents of these operating instructions carefully before using.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

Make sure to deliver this manual to the end-user.

If you are considering using this instrument for special purpose such as nuclear power plants, aerospace, medical care or passenger vehicles please refer to our sales representative.

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**HAZARD SYMBOLS**

⚠️

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. Terminal of control power (MA, MB) and voltage inputs (P1, P2, P3, PN) have hazards of electric shock, explosion, or arc flash. Turn off power supplying this device and the equipment in which it is installed before working on it.

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⚠️**CAUTION**

Indicates that incorrect handling may cause hazardous conditions. Always follow the instructions because they are important to personal safety. Otherwise, it could result in electric shock, fire, erroneous operation, and damage of the instrument. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

■ Normal service conditions

　Use the instrument in an environment that meets the Normal service conditions as following points:
- Ambient temperature: -5 to +55°C
- Average day temperature: 35°C or less
- Humidity: 0~85%RH, non condensing.
- Altitude: 2000m or less
- Pollution Degree: 2 or less (Note 1)
- Atmosphere without corrosive gas, dust, salt, oil mist.
- Transient over voltage: 4000V or less (Note 1)
- A place without excessive shocks or vibration.
- Do not expose to rain and water drips.
- Do not expose to direct sunlight.
- An area in where no pieces of metal and an inductive substance disperse.
- Do not expose to strong electromagnetic field and ambient noises.

　Note 1. For the definition of the Pollution Degree and the Transient over voltage category, refer to EN61010-1:2010.

■ Installation instructions

　Make sure to read this manual carefully before Installation and Wiring.

| ⚠️CAUTION | <ul><li>This instrument should be installed and used by a qualified electrician.</li><li>The instrument must not be powered and used until its definitive assembly on the cabinet's door.</li><li>Verify the following points:</li></ul>■Auxiliary power supply and measuring ratings. | | | |
|---|---|---|---|---|
| | Auxiliary power supply | AC100-240V（±15%） 50-60Hz 8VA<br>DC100-240V（-30% ＋15%） 5W | | MA,MB terminals |
| | Ratings | Voltage | 3-PHASE 4-WIRE：max AC277/480V<br>3-PHASE 3-WIRE：(DELTA)max AC220V,<br>　　　　　　　　(STAR)max AC440V<br>1-PHASE 3-WIRE：max AC220/440V<br>1-PHASE 2-WIRE：(DELTA)max AC220V,<br>　　　　　　　　(STAR)max AC440V | CategoryⅢ | P1,P2,P3,PN terminals |
| | | Current | 5A（via current transformer）,maxAC30V | CategoryⅢ | +C1,C1,+C2,C2,+C3,C3 terminals |
| | | Frequency | 50-60Hz | | |
| | Provide the basic insulation externally at the current input terminals.<br>Voltage-measuring and current-measuring circuit terminals should be permanently connected. | | | |

■Others

| MODBUS®RTU communication | T/R+,T/R-,Ter terminals | maxDC35V |
|---|---|---|

⚠CAUTION

- Do not drop this instrument from high place. If you drop it and the display is cracked, do not touch the liquid crystal or get it in your mouth. If the liquid crystal is touched, wash it away at once.
- Work under the electric outage condition when installing and wiring. It may cause electric shock, electric burn injury or damage of the device.
- When tapping or wiring, take care not to entering any foreign objects such as chips and wire pieces into this instrument.
- If the terminal wiring is pulled with a strong force, the terminals may detach. (Tensile load: 39.2N or less)
- Check the connection diagram when wiring. Wrong wiring may cause failure of the instrument, a fire or electric shock.
- In order to prevent invasion of noise, do not bunch the control wires or communication cables with the main circuit or power wire, or install them close to each other. The distance between communicational signal lines, input signal lines and power lines, and high voltage lines when running parallel to each other are shown below.

| Conditions | Length |
|---|---|
| Below 600V, or 600A power lines | 30cm or more |
| Other power lines | 60cm or more |

■ Matters concerning the precaution before use
- Use the instrument in the specified usage environment and conditions.
- The setting of this instrument is necessary before use it. Please read this manual carefully to ensure correct setting.

■ Operation instructions
- 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.
- In the event of a power outage during the setting, the instrument is not set correctly. Please set again after power recovery.

⚠CAUTION

- Do not disassemble or modify this instrument. It may cause failure, malfunction, injury or fire.
- Use this instrument within the ratings specified in this manual. If it is used outside the ratings, it may cause not only malfunction or failure but also fire burnout.

■ Maintenance instructions
- Wipe dirt off the surface with a soft dry cloth.
- Do not contact a chemical dust cloth to the instrument for a long time, or do not wipe it with benzene, thinner, alcohol.
- Check for the following items to use this instrument properly for long time.
  （1）Daily maintenance
    ①No damage on this instrument
    ②No abnormality with LCD indicators
    ③No abnormal noise, smell or heat
  （2）Periodical maintenance
    - No looseness with installation and wire connection. (Once every 6 months to 1 year)

⚠CAUTION | Do periodical maintenance under the electric outage condition. Failure to do so may cause electric shock, failure of the instrument or a fire.

■ Storage conditions
　　To store this instrument, turn off the power and remove wires, and put it in a plastic bag.
　　For long-time storage, store at the following places. Failure to follow the instruction may cause a failure
　　and reduced life of the instrument.
　　● Ambient temperature the: -25 to +75°C
　　● average day temperature: 35°C or less
　　● Humidity range 0 to 85%RH, non condensing.
　　● Atmosphere without corrosive gas, dust, salt, oil mist.
　　● A place without excessive shocks or vibration.
　　● Do not expose to rain and water drips.
　　● Do not expose to direct sunlight.
　　● An area in where no pieces of metal and an inductive substance disperse.

■ Guarantee
　　● Gratis warranty is effective until the earlier of 1 year after the date of your purchase or 18 months after
　　　manufacturing.

　　● The gratis warranty shall apply if the product fails even though it is being used properly in the
　　　conditions, with the methods and under the environments in accordance with the terms and
　　　precautions described in the catalogs, the instruction manual, caution label on the product, etc.

　　● Repair 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.

　　　　② Failures due to faulty workmanship

　　　　③ Failures due to faults in use and undue modification

　　　　④ Failures due to accidental force such as a fire, abnormal voltage, etc. and force majeure

　　　　　such as an earthquake, wind, flood, etc.

　　　　⑤ Failures due to matters unpredictable based on the level of science technology at the time of

　　　　　product.

　　● 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

■ Replacement Cycle
　　Although it depends on the status of use, 10 years is the guideline for renewal.

■ Disposal
　　● When disposing of this product, treat it as industrial waste.
　　● A battery is not used for this product.

■ About packaging materials and this manual
　　For reduction of environment load, packaging materials are produced with cardboard, and this manual
　　is printed on recycled paper.

# EMC Directive Instruction

This section summarizes the precautions on conformance to the EMC Directive of the cabinet constructed using this instrument.
However, the method of conformance to the EMC Directive and the judgment on whether or not the cabinet conforms to the EMC Directive has to be determined finally by the manufacturer.

This instrument complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This instrument may not cause harmful interference, and (2) this instrument must accept any interference received, including interference that may cause undesired operation.

## 1. EMC Standards
- EN 61326-1
- EN 61000-3-2
- EN 61000-3-3

## 2. Installation (EMC directive)
The instrument is to be mounted on panel of a cabinet.
Therefore, the construction of a cabinet is important not only for safety but also for EMC.
The instrument is examined by the following conditions.
- Conductive cabinet is used.
- Six faces of a cabinet have to be ensured conductivity for each other.
- A cabinet has to be connected to earth by a thick wire of low impedance.
- Holes on faces of cabinet have to be 10 cm or less in diameter.
- The terminals for protective earth and functional earth have to be connected to earth by a thick wire of low impedance. (A terminal for protective earth is important not only for safety but also for EMC.)
- All connections must be kept inside the cabinet.
- Wirings outside the cabinet have to be used with the shielded cable.
  The following diagram shows how to provide good contact of the shielded cable.
  ・Remove part of the outer cover.
  ・Remove part of the paint musk on the cabinet.
- ・Connect those parts with the clamp.
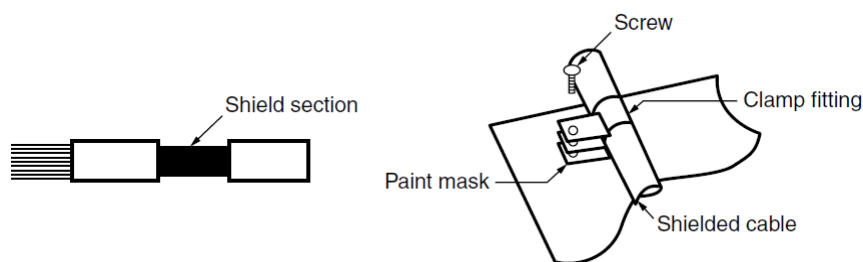


# Precautions for KC mark

사용자안내문

| 기 종 별 | 사 용 자 안 내 문 |
|---|---|
| A급 기기(업무용 방송통신기자재) | 이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다. |

■Precautionary note written in Korean
Distributors and users must understand that this product meets the electromagnetic compatibility requirements and is designed for industrial use (Class A).
Do not use the product in a residential area.
■Applicant for KC mark : MITSUBISHI ELECTRIC AUTOMATION KOREA CO.,LTD
■Manufacturer : MITSUBISHI ELECTRIC CORPORATION
Note 1: This is the notification for the KC mark (Korea Certification)

## Part names

■Front view

LCD with backlight

Operation buttons (For details, refer to page 11.)

■Rear view (main unit)
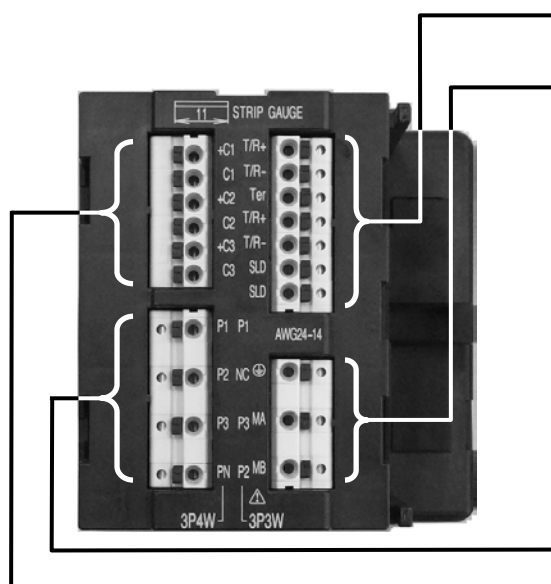
MODBUS®RTU communication terminal
  T/R+: MODBUS®RTU communication
      transmission terminal
  T/R-: MODBUS®RTU communication
      transmission terminal
  Ter: Termination terminal
      (120 Ω termination when short-circuited to
      the terminal T/R-)
  SLD: Shielded wire terminal (Ground resistance
      100 Ω or less)

Auxiliary power input terminals
  MA, MB: Connect to an auxiliary power.
  ⏚ : Ground terminal
      (Ground resistance: 100 Ω or less)

Voltage Input terminals
  P1, P2, P3, PN: Input a circuit voltage.

Current Input terminals
  +C1, C1: Input a circuit current.
  +C2, C2: Input a circuit current.
  +C3, C3: Input a circuit current.
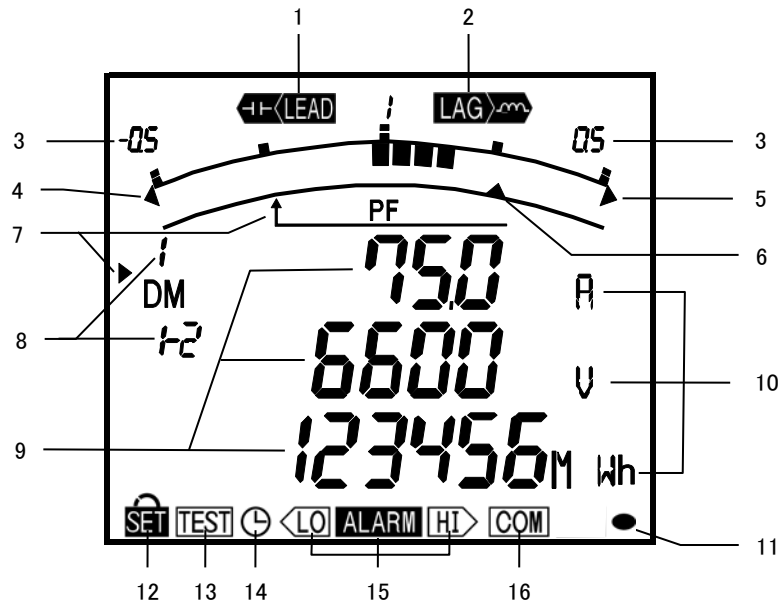
**Display**



Note: The above display is an example for explanation.

| No. | Segment Name | Description |
|-----|-------------|-------------|
| 1 | LEAD status | They show direction of Power Factor on bar graph. |
| 2 | LAG status | |
| 3 | Scale of the bar graph | They show the scales of the bar graph. |
| 4 | Under scale input | Turns on when measuring values fall below the minimum scale. |
| 5 | Over scale input | Turns on when measuring values exceed the maximum scale. |
| 6 | Index indicator | When upper/lower limit alarm set, flickers at the limit setting value. |
| 7 | Bar graph status | They show the item expressed with the bar graph.<br>When the item is the same as a digital displayed item, indicated with「▶」,<br>otherwise indicated with「▲」 |
| 8 | Phase status | They show the phase for each of the digital displays. |
| 9 | Digital display | Measured values displayed in digital. |
| 10 | Unit | Units of measuring value displayed. |
| 11 | Metering status | Flickers when counting active energy.(Note.1)(only active energy imported display) |
| 12 | Setup status | Turns on at setting mode. ( 🔓SET )<br>Flickers at setting value confirmation mode. ( 🔒SET ) |
| 13 | Test mode status | Turns on at the test mode. |
| 14 | Clock status | Turns on when Operation time displayed. |
| 15 | Upper/lower limit alarm status | Flickers when upper/lower limit alarm is generated. |
| 16 | Communication status | <table><tr><th>Specification</th><th>On</th><th>Blinking</th><th>Off</th></tr><tr><td>MODBUS®RTU communication</td><td>Normal</td><td>Communication error (Such as wrong address)</td><td>Hardware error</td></tr></table> |

Note 1. The blinking cycle is constant regardless of the size of the measured input.

## Functions of operation buttons

The operation button have various functions
According to how they are pressed down.



SET — + RESET MAX/MIN PHASE DISPLAY

Set button　＋／－button　Reset button　Maximum/Minimum button　Phase button　Display button
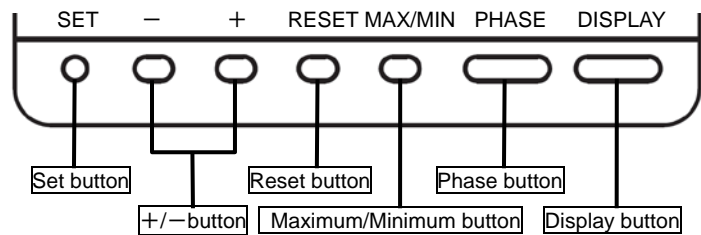
Meaning of code:○(press),□(press on over 1 second),◎(press on over 2 seconds),━━(press simultaneously)

| Mode | Operation | SET | − | + | RESET | MAX/MIN | PHASE | DISPLAY | Function |
|---|---|---|---|---|---|---|---|---|---|
| Operation mode | Display changes operation | | | | | | | ○ | Display changes. |
| | | | | | | | ○ | | Phase changes. |
| | | | | | | ○ | | | Mode changes to the max./min. display and the instantaneous display |
| | | | ○ | ○ | | | | | The item expressed with the bar graph is changed. |
| | | | | | | | | ◎ | Displays change cyclically. (Refer to page 39) |
| | | | | | | | ◎ | | Phases change cyclically. (Refer to page 39) |
| | | | ◎━━━◎ | | | | | | Change the unit of Wh. (Refer to page 41) |
| | Measured value is reset / Canceling the alarm, etc | | | | | ◎ | | | Maximum values and minimum values on the display are reset to the present value. — Only available for maximum/minimum value display |
| | | | ◎━━━◎ | | | | | | All of the Maximum values and minimum values are reset to the present value. |
| | | ◎━━━━━━◎━━━━━━◎ (SET, MAX/MIN, DISPLAY) | | | | | | | Wh is zero reset. |
| | | | | | | ◎ | | | The operation time is zero reset (Screen operation time only) |
| | | | | | | ○ | | | An alarm condition is canceled. (Screen element is canceled) — Available only when manual cancelation is set |
| | | | | | | ◎ | | | All alarm conditions are canceled. (Element is canceled for all screens) |
| | | | | | | ○ | | | Stopping backlight flickering alarm. (Only effective in setting backlight flicker) |
| | Mode changes | ◎━━━━━━◎ (SET, RESET) | | | | | | | The display of Setting mode appears. |
| | | ◎ | | | | | | | The display of Set value confirmation mode appears. |
| | | | | | ◎━━━━━━◎ (RESET, PHASE) | | | | The display of password protection mode appears. |
| Setting/ Setting value confirmation mode | Setting operation | ○ | | | | | | | The setting items are saved, and setting item is changed to next item. |
| | | | | | | | | ○ | Back to the previous item. |
| | | | ○ □ | ○ □ | | | | | The values of setting are changed. (If it presses for 1 sec or more fast forward or fast return.) |
| | | □ | | | | | | | Back to the setting display. |
| | | ○ | | | | | | | Save the settings(Only effective in End display) |
| | | ○ | | | | | | | Cancel the settings(Only effective in CANCEL display) |
| Setting/ mode | Special operation | | | | | □━━━━━━□ (MAX/MIN, PHASE) | | | Meter restart(Only effective in CANCEL display) |
| | | | | | ◎━━━━━━◎ (RESET, PHASE) | | | | Returns set contents to the default settings (the default values, Only effective in CANCEL display) (Refer to page 30) |

Note: While the back light is off, if the operation button is pressed, the back light is always lit. If the operation button
is pressed once again, the function in the above table appears.

| CAUTION | ● If the function of "maximum value and minimum value reset" and "Wh zero reset" are done, data will be lost. If this data is needed, please record the data before the reset operation.<br>● If the function of "meter restart" is done, the entire measurement(measurement display, alarm, analog output, pulse) stops. |
|---|---|

## 2. Function Modes

The following function modes are available for this Multi-Measuring instrument. Operation mode is displayed after auxiliary power turns on. It is then possible to switch to the desired mode.

| Mode | Description | Reference Pages |
|---|---|---|
| Operation Mode | This mode is for displaying each measured value using digital numerical values and bar graphs.<br>Operation mode contains "Current Value Display" that displays the current value, and "Maximum/Minimum Value Display" that displays old maximum/minimum values.<br>In addition, for each display, the cyclic display function can be used to switch between the screens every 5 seconds. | P.37 to P.44 |
| Setting Mode | This mode is for changing the setting values related to measurement and output functions. The following special operations can be executed from the "CANCEL Display" for changing/cancelling setting values.<br>●The instrument is reset.<br>●Reset the settings to the factory defaults | P.13 to P.28, P.30 to P.34 |
| Setting Value confirmation mode (Test Mode) | This mode is for confirming the setting values for each setting item.(In this mode, settings cannot be changed in order to prevent accidental changing of settings.)<br>This mode contains test functions that can be used for equipment startup.<br>・Communication Test : Fixed numerical data can be returned without measurement input (voltage/current). | P.29, P35, P36 |

■　Diagram of Each Mode
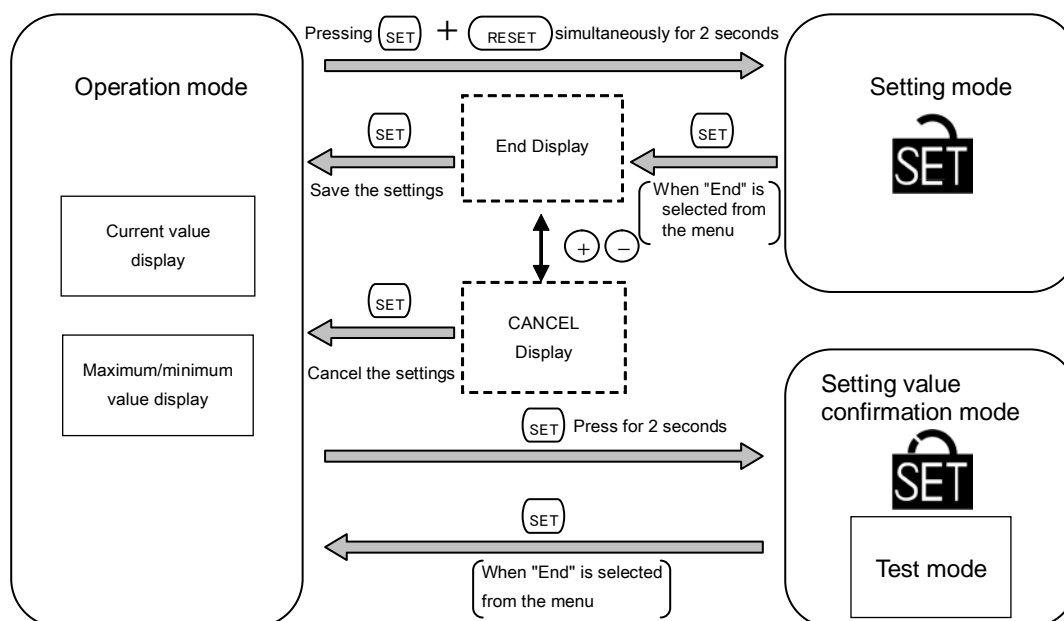
# 3. Setting

## 3.1 Setting flow

To measure, it is necessary to use Setting mode to set the phase wire system, VT / direct voltage, and CT primary current.
From Operation mode, move to Setting mode and then set necessary items. Factory default settings will be used for items that you do not set.
Only the settings in Setting menu 1 (basic setting) are needed for normal use. For more information about the settings, refer to page 15 and after.
For more information about the factory default settings, refer to the setting table on page 64.



Operation Mode

Measurement Display

※1

Setting Menu End

※2

End Display

Save the setting

CANCEL Display

Cancel the settings

Automatic migration

Instrument restart
or
Factory default setting

Password Protection Display

PASS
oFF

Changes
Password

Setting Menu 1

Phase wire system

Display Pattern

VT/direct voltage

CT current

Frequency

Setting Menu 2

MODBUS®RTU address

MODBUS®RTU baud rates

MODBUS®RTU parity

MODBUS®RTU stop bit

Setting Menu 3

Current scale

Voltage scale

Active power scale

Power factor scale

Example of Setting Mode

ON

Example of Setting Value Confirmation Mode

Blinking

| CAUTION | Keep in mind that when a setting is changed, the related setting items and measurement data will be reset to the default settings. (Refer to page 30.) |
| --- | --- |

## 3.1 Setting flow

**<Setting Procedure>**

① Press [SET] and (RESET) simultaneously for 2 seconds to get in the setting mode.

② Select a setting menu number by (+) or (−).

③ Use the [SET] button to select a setting menu number.

④ Set each setting item. (Refer to page 15 and later pages.)

⑤After completion of setting, select 'End' in the setting menu and press [SET].

⑥When the End display appears, press [SET] once again.

Setting Mode or Setting Value Confirmation Mode

| | Setting Menu 4 | Setting Menu 5 | Setting Menu 6 | Setting Menu 7 | Setting Menu 8 | ※3 Setting Value Confirmation Menu 9 |
|---|---|---|---|---|---|---|
| | End 123 45678 | End 123 45678 | End 123 45678 | End 123 45678 | End 123 45678 | End 123 456789 |

| Setting Menu 4 | Setting Menu 5 | Setting Menu 6 | Setting Menu 7 | Setting Menu 8 | ※3 Test Mode |
|---|---|---|---|---|---|
| Model + option code | Alarm item | non | non | Operation time display | |
| Version display | Alarm value | | | Target for counting operation time setting | |
| Backlight brightness | Alarm delay time | | | Operation time threshold | |
| Backlight auto off | Alarm cancel method | | | Phase display setting | |
| Display update time | Back light flickers during alarms | | | Set IEC mode | |
| | Motor starting current delay time | | | | |

Automatic migration (Setting Menu 6)
Automatic migration (Setting Menu 7)

| Arrow in Figure | Action | Button operation | |
|---|---|---|---|
| ⟹ (white) | Shift from the operation mode to the setting mode. | [SET] + (RESET) | Press them simultaneously |
| ⟹ (black) | Shift from the operation mode to the set value confirmation mode. | [SET] | Press it for 2 seconds. |
| ⟷ | Select the menu number to set or "End". | (+) or (−) | Press it several times. |
| ⟹ (cyan) | Get into each setting screen. Shift to the next setting item. | [SET] | Press it. |
| ⟹ (outline) | Go back to the previous setting item. | (DISPLAY) | Press it. |
| Omitted in figure | Select a set value. | (+) or (−) | Press it several times. |
| ⟹ (blue) | Shift to the End screen. | [SET] | Press it. |
| — · — ▶ | Memorize the setting contents, and go back to the operation mode. | [SET] | Press it. |
| ◀ · · · · | Select "CANCEL." | (+) or (−) | Press it. |
| · · · · ▶ | Cancel the settings. | [SET] | Press it. |
| · · · · · · · · · ▶ | Skip remaining setting items during setting. | [SET] | Press it for 1 second. |
| ⟹ (hatched) | Set values return to the factory default value. | (RESET) + (PHASE) | Press it for 2 seconds. |
| — · · ▶ | Shift from the operation mode to the password protection mode. | (RESET) + (PHASE) | Press it for 2 seconds. |

※1. If the password protection setting is enabled, it is necessary to enter the password in shift from the operation mode to the setting mode.

※2. For Setting Value Confirmation, it returns to Operation Mode.

※3. This is not display in Setting Mode.

## 3. Setting

■ Basic Operations for setting

| Function | Operation | Remarks |
|---|---|---|
| Select a set value | Press ⊕ or ⊖. | Fast-forward when pressed over 1 sec. |
| Setting items are saved | Press (SET) | Setting item will be cared and shift to the next item. |
| Go back to the previous setting item | Press (DISPLAY). | The set value for the setting item just before Skip removing setting items returning is still available. |
| Skip removing setting items during setting | Press and hold (SET) for 1 sec. | |

### 3.2 Setting menu 1: Basic Settings (Setting the Phase Wire System, Display Pattern, VT/Direct Voltage, CT Primary Current, etc.)

Set the phase wire method, display pattern, VT/direct voltage, CT primary current, etc.
In the operation mode, after pressing (SET) and (RESET) simultaneously for 2 seconds or more, the following operation becomes available.

**Setting Menu**

Set the setting menu number to "1".
(as shown in the right figure)

**①Phase Wire system**

Set the phase wire system.

3P4 : 3-phase 4-wire
3P3. 2CT : 3-phase 3-wire(2CT)
3P3. 3CT : 3-phase 3-wire(3CT)
1P3. 1N2 : 1-phase 3-wire(1N2 display)
1P3. 1N3 : 1-phase 3-wire(1N3 display)
1P2 : 1-phase 2 -wire

Supplemental Information:
Underlined portions indicate the default values.
(Same from here.)

**②Display Pattern**

Set the display pattern.

The following table shows the measurement elements that can be displayed by each display pattern. (For more details about display patterns, refer to page 45.)
In addition, if there is no display pattern that you want from P01 to P05),
select the special display pattern P00 to configure the screen freely.
( For more information about setting the special display pattern P00,
refer to page 31, 32.)

○：Displayable at this display setting.
△：Set at other additional settings.
□：Select "P00" and set the display order and display position.

（1）For 3-phase 4-wire

| Display Pattern | Current | N Phase Current | Voltage | Active Power | Power Factor | Frequency | Active Energy (Imported) | Active Energy (Imported) | Operation time |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Additional display | |
| P01 | ○ | ○ | ○ | ○ | ○ | | | | △ |
| P02 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | △ |
| P03 | ○ | ○ | ○ | | | | | | △ |
| P04 | ○ | ○ | ○ | ○ | | | | | △ |
| P05 | ○ | ○ | ○ | ○ | | | ○ | ○ | △ |
| P00 | □ | □ | □ | □ | □ | □ | □ | △ | △ |

Note: The following settings are required for displaying elements on an additional display.

| Measurement element on additional display | Setting item | Reference Pages |
|---|---|---|
| Operation time | Setting Menu 8 Operation time display | Page 27 |

### 3.2 Setting menu 1: Basic Settings (Setting the Phase Wire System, Display Pattern, VT/Direct Voltage, CT Primary Current, etc.)

（2）For other phase wire system except 3-phase 4-wire

| Display Pattern | Current | Voltage | Active Power | Power Factor | Frequency | Active Energy (Imported) | Additional display Active Energy (Imported) | Additional display Operation time |
|---|---|---|---|---|---|---|---|---|
| P01 | ○ | ○ | ○ | ○ | | | | △ |
| P02 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | △ |
| P03 | ○ | ○ | | | | | | △ |
| P04 | ○ | ○ | ○ | | | | | △ |
| P05 | ○ | ○ | ○ | | | ○ | ○ | △ |
| P00 | □ | □ | □ | □ | □ | □ | △ | △ |

Note: The following settings are required for displaying elements on an additional display.

| Measurement element on additional display | Setting item | Reference Pages |
|---|---|---|
| Operation time | Setting Menu 8 Operation time display | Page 27 |

Set the VT

When direct input (without VT) ⇒ Select no, and then press (SET), shift to following (1).

When using VT ⇒ Select yES, and then press (SET), shift to following (2)

1. For 3-phase 4-wire

   no ⟷ yES

2. For 3-phase 3-wire or 1-phase 2-wire

   yES ⟷ no
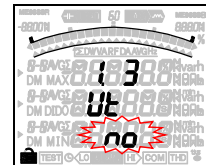
&lt;When ①phase wire system is set to 1-phase 3-wire&gt;
Use only for direct input. This setting will be skipped.

   Note. VT is voltage transformers.

③VT / direct voltage

DISPLAY  SET
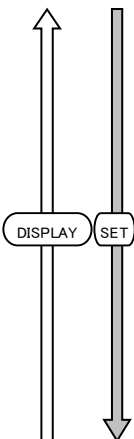
（1）For direct input (without VT)Set the direct voltage.
　（a）For 3-phase 4-wire
　　(phase to neutral voltage / phase to phase voltage)
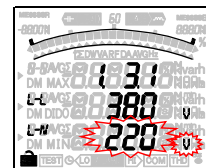
▶63.5/110V ⟷ 100/173V ⟷ 110/190V ⟷ 220/380V ⟷ 240/415V ⟷ 254/440V ⟷ 277/480V◀

　（b）For 3-phase 3-wire (2CT, 3CT) or 1-phase 2-wire

▶110V ⟷ 220V ⟷ 440V◀

　（c）For 1-phase 3-wire（1N2, 1N3）(phase to neutral voltage / phase to phase voltage)

▶110/220V ⟷ 220/440V◀

**3.2 Setting menu 1: Basic Settings (Setting the Phase Wire System, Display Pattern, VT/Direct Voltage, CT Primary Current, etc.)**

Continued form the previous page
（2）When using VT

＜Set the secondary and primary voltages of the VT.＞
（a）For 3-phase 4-wire(Phase to phase Voltage)

```
 ┌→63.5V ←→ 100V ←→ 110V ←→ 115V ←→ 120V ←┐
 └─────────────────────────────────────────┘
```
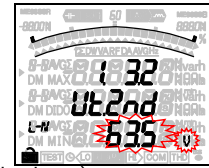
（b）For 3-phase 3-wire (2CT, 3CT) or 1-phase 2-wire（phase to neutral voltage）

```
 ┌→ 100V ←→ 110V ←→ 220V ←┐
 └─────────────────────────┘
```

＜Primary Voltage Settings＞
Default value
For 3-phase 4-wire : 200V(Phase to phase Voltage)
For 3-phase 3-wire or 1-phase 2-wire：10000V
（phase to neutral voltage）
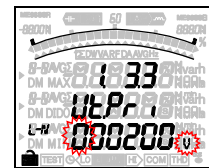
・From top digit, select the value of the flickering digit by (+) and (−)
・The setting digit can be moved to right by (SET) .
・The setting digit can be moved to left by (DISPLAY) .
・Setting is available in range from 60V to 750000V.
　　　Less than 100V : Upper 2 digits setting
　　　Over 100V : Upper 3 digits setting
　※Error display (E05) appears when set out of 60Vto750000V range.
　　After that, please press (SET) review the setting value and set it once Again.
　※When over 100V set over upper 3 digits setting, the display appear switching
　　upper 3 digits setting.
・Press (SET) at the lowest digit, the setting step will shift to the next one.

Set the CT.
Primary / secondary Current Setting

＜Set the secondary current＞

```
 1A ←──────→ 5A
```
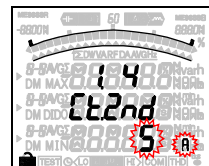
Note. CT is current transformers.

＜Set the primary current＞
Default Setting：5.0A
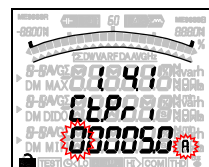
④CT current
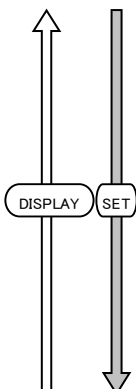
DISPLAY SET

・From top digit, select the value of the flickering digit by (+) and (−).
・The setting digit can be moved to right by the (SET).
・The setting digit can be moved to left by the (DISPLAY).
・Setting is available in range from 1.0A to 30000.0A
　　Less than 10A : Upper 2 digits setting
　　Over 10A : Upper 3 digits setting

　※Error display (E05) appears when set out of 1.0 to 30000.0A
　　range. After that, please press (SET), review the setting value
　　and set it once again.
　※When over 10A set over upper 3 digits setting, the display appear switching
　　upper 3 digits setting.
・Press (SET) at the lowest digit, the setting step will shift to the next one.

**3.2 Setting menu 1: Basic Settings (Setting the Phase Wire System, Display Pattern, VT/Direct Voltage, CT Primary Current, etc.)**

⑤Frequency

Set the frequency.

50Hz ←————→ 60Hz

Note1.The scale value of the frequency of the bar graph display
   is changed, too.
Note2.Scale of the analog output is changed, too.

SET

Setting menu

According to the setting flow (page 14), save the changed
contents, or continue to the other setting menu.
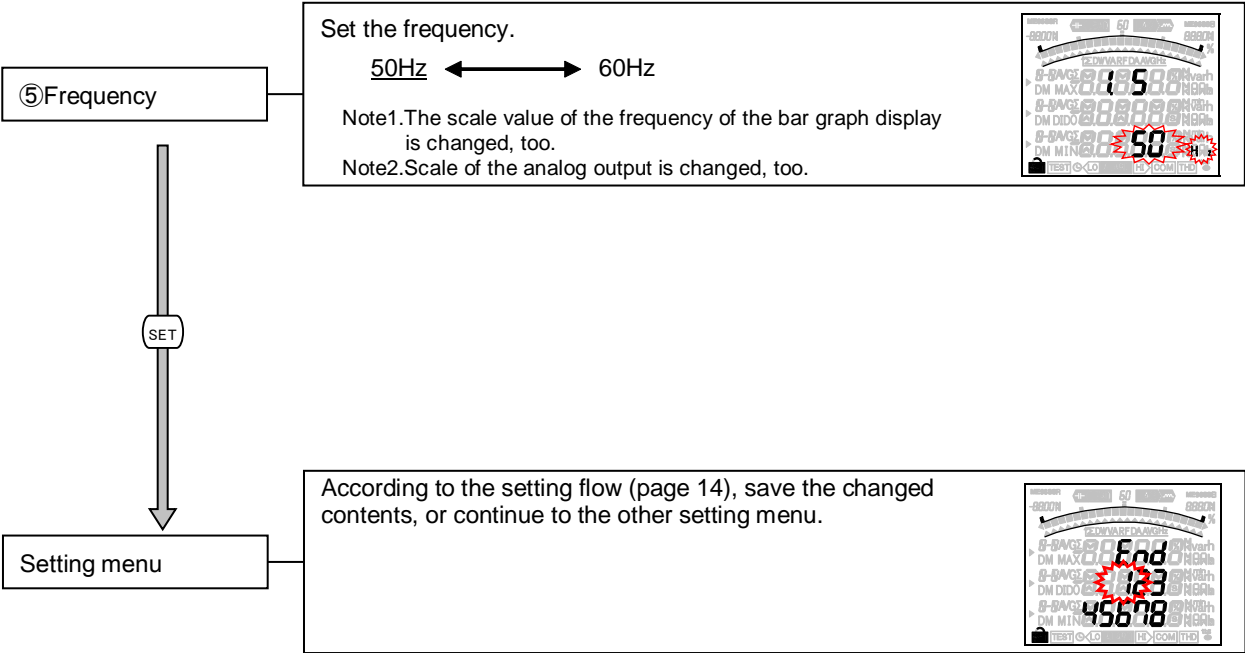
In the case of use only by the Setting menu 1, please go to "5. Operation" (from page 37).
In the case to use additional functions, please go to "Setting Menus 2 - 8" (from page 19).

| **Note** | If the contents in the setting menu 1 are changed, the maximum value, minimum value, demand value of related measurement items will be reset. (However, active energy will not be reset.) |
|---|---|

## 3.3 Setting Menu 2: Communication Settings (Setting the MODBUS®RTU communication)

In the operation mode, press $\boxed{\text{SET}}$ + $\boxed{\text{RESET}}$ simultaneously for 2 seconds or more, and the following operation becomes available.

Setting Menu

Set the setting menu number to "2".
(as shown in the right figure)

DISPLAY  SET

①MODBUS®RTU address

Set the MODBUS®RTU address number.

Selectable addresses: 1  to 255

DISPLAY  SET

②MODBUS®RTU baud rates

Set the MODBUS®RTU baud rate.

2400bps
4800bps
9600bps
19.2kbps
38.4kbps

DISPLAY  SET

③MODBUS®RTU parity

Set the MODBUS®RTU parity.

non
odd
even（EVEn）

DISPLAY  SET

④MODBUS®RTU stop bit

Set the MODBUS®RTU stop bit.

Stop bit 1 ⟷ Stop bit 2

SET

Setting Menu

According to the setting flow diagram (page 14), save the changed contents, or continue to the other setting menu.

## 3.4 Setting Menu 3: Display Settings (Setting Maximum Scale)

This section shows how to set maximum scale of current, voltage, active power and power factor in the bar graph.
In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

Setting menu

Set the setting menu number to "3".

(as shown in the right figure)

DISPLAY / SET
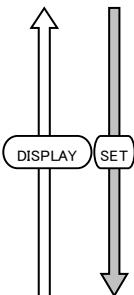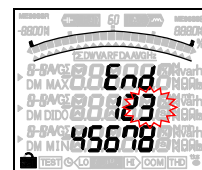
①Current maximum scale

Set the current maximum scale.
 If you have not set current to "Display pattern", this display will be skipped.
（1）Maximum scale value

Primary Current
（1.4.1 Primary Current Setting value）
↔ SP.(Special Setting)

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
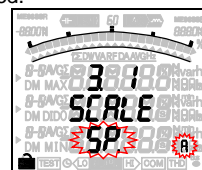
（2）Special current maximum scale
 This display is displayed when you set the "SP" in 3.1.
　　＋ 3 STEP （About 120%）
　　　〳
　　± 　0 STEP (100% : Rating)　(+)(−)
　　　〳
　　－10 STEP （About 40%）
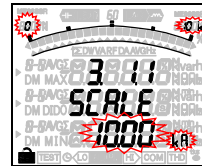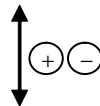
Note：The maximum scale value becomes the value in the table on page 46.

DISPLAY / SET
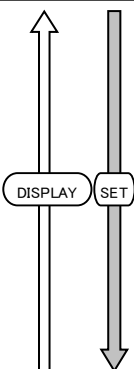
②Voltage maximum scale

Set the voltage maximum scale.
 If you have not set voltage to "Display pattern", this display will be skipped.
Maximum scale value

　　+10 STEP （About 250%）
　　　〳
　　± 0 STEP (100% : Standard maximum scale value)　(+)(−)
　　　〳
　　-18 STEP （About 20%）

Note：The maximum scale value becomes the value in the table on page 46.

DISPLAY / SET
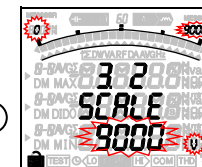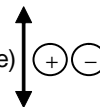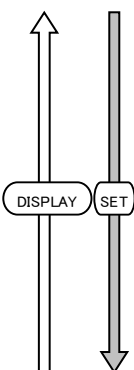
③Active power maximum scale

Set the maximum scale of Active power.
 If you have not set active power to "Display pattern",
 this display will be skipped.

(1)Maximum scale value
　　+3 STEP (About 120%)
　　　〳
　　±0 STEP (100% : Rating)
　　　〳
　　-18 STEP (About 20%)

Note：The maximum scale value becomes the value in the table on page 46.
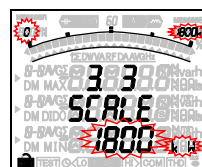
DISPLAY / SET

(2) single deflection / double deflection
 If you have not set active power to "Display pattern",
 this display will be skipped.
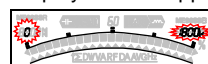
single deflection ↔ double deflection
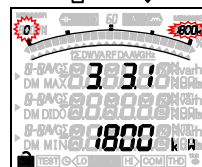
DISPLAY / SET

### 3.4 Setting Menu 3: Display Settings (Setting Maximum Scale, Active Energy Measurement, and Harmonic Display, etc.)

④Power factor scale

Set the power factor scale.
If you have not set power factor to "Display pattern", this display will be skipped.

-0.5 to 1 to 0.5  ←——→  -0 to 1 to 0

(SET)

Setting menu

According to the setting flow diagram (page 14), save the changed contents, or continue to the other setting menu.
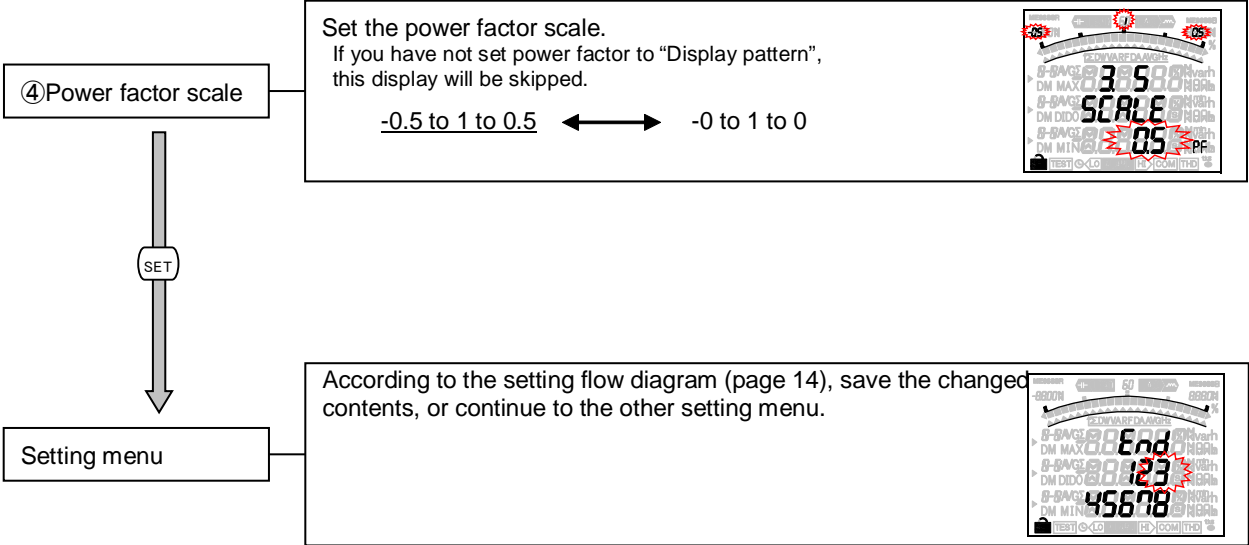
| Note | Accuracy is defined to rated current. Although the maximum scale may display 120% or more of rated current and rated voltage in order to make a scale easy to read depending on the settings of VT/direct voltage and CT primary current, current input is within 100% of rated current. |
|------|------|

### 3.5 Setting Menu 4: LCD Settings (Setting Model Display, Version Display, Backlight, and Display Update Time)

This section is for confirming the model, option code and the product version, and also set the backlight and the display update time. In the operation mode, press (SET) + (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

| | |
|---|---|
| **Setting menu** | Set the setting menu number to "4". (as shown in the right figure) |
| **①Model + option code** | The model can be confirmed. (This is only display, and settings cannot be changed.) |

| Model | |
|---|---|
| SSE-Mb | ME96SSE-MB |

| | |
|---|---|
| **②Version display** | The product version can be checked. (The product version is displayed, but cannot be changed.) |
| **③Backlight brightness** | The backlight brightness can be adjusted. |

1 ←→ 2 ←→ _3_ ←→ 4 ←→ 5

Dark → Bright

| | |
|---|---|
| **④Backlight auto off** | The backlight can be set to continuous on (HoLd) or auto off (Auto). |

_Auto_ ←→ HoLd

(Auto off)　　　(Continuous on)

<When auto off (Auto) is selected>
No button operation for 5 minutes → the backlight turns off
Button operation during off (Note) → the backlight turns on for 5 minutes

Note: When the backlight is off, pressing any button once does not switch the display but only turns on the backlight.
Pressing any button again switches the display.

| | |
|---|---|
| **⑤Display update time** | The display update time for the measured value can be change. If the display switches too quickly for you to read the displayed value, set it to 1.0 second. (Normally, leave this setting to 0.5 second.) |

_0.5second_ ←→ 1second

| | |
|---|---|
| **Setting menu** | According to the setting flow (page 14), save the changed contents, or continue to the other setting menu. |

## 3.6 Setting Menu 5: Alarm Settings (Setting Upper/Lower Limit Alarm, Motor Starting Current Mask Function.)

This section shows how to set the upper/lower limit alarm, backlight flickering during alarm, motor starting current delay time, and pulse output.

In the operation mode, press $\boxed{\text{SET}}$ and $\boxed{\text{RESET}}$ simultaneously for 2 seconds or more, and the following operation becomes available.

> For more details about each function, refer to the corresponding pages.

**Setting menu**

Set the setting menu number to "5".

(as shown in the right figure)



**DISPLAY**  **SET**

Set the Alarm item 1 to be allowed to measurement items.
The upper/lower limit measurement values can be monitored by this setting.

（1）For 3-phase 4-wire

non
A upper limit
A lower limit
AN upper limit
V (L-N) upper limit
V (L-N) lower limit
V (L-L) upper limit
V (L-L) lower limit
W upper limit
W lower limit
PF upper limit
PF lower limit
Hz upper limit
Hz lower limit


Display when "non" is selected


Display when "A upper limit" is selected

**①Alarm item 1**

（2）For other phase wire system except 3-phase 4-wire

non
A upper limit
A lower limit
V upper limit
V lower limit
W upper limit
W lower limit
PF upper limit
PF lower limit
Hz upper limit
Hz lower limit

**DISPLAY**  **SET**

Note 1. Measurement items that are not selected in the display pattern can be selected.
Note 2. V (L-N): Phase to neutral voltage, V (L-L): phase to phase voltage

## 3.6 Setting Menu 5: Alarm Settings (Setting Upper/Lower Limit Alarm, Motor Starting Current Mask Function.)

**②Alarm value 1**

DISPLAY | SET

Set the alarm value for upper/lower limit alarm element 1. The following table shows the setting range.

| Measuring element | Setting range | Setting step(Note) |
|---|---|---|
| A, AN upper limit | 5 to 100 to 120（%） | 1% |
| A lower limit | 3 to 10 to 95（%） | 1% |
| V (L-N), V (L-L) upper limit | 25 to 110 to 135（%） | 1% |
| V (L-N), V (L-L) lower limit | 20 to 70 to 95（%） | 1% |
| W upper limit | -95 to 100 to 120（%） | 1% |
| W lower limit | -120 to 3 to 95（%） | 1% |
| PF upper limit | -0.05 to 1 to 0.05 | 0.05 |
| PF lower limit | -0.05 to -0.5 to 0.05 | 0.05 |
| Hz upper limit | 45 to 65（Hz） | 1Hz |
| Hz lower limit | 45 to 65（Hz） | 1Hz |
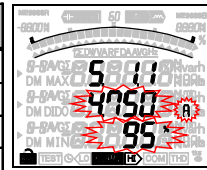
Note: W show the percentage for the maximum scale value (±0 step).

A, AN shows the percentage for the CT primary current.

"V" shows the percentage for the VT primary voltage (or direct voltage).

(The "V" for 1-phase 3-wire is the percentage for phase to neutral voltage. Alarm monitoring is executed using twice the value which set upper/lower limit alarm for the 12-phase and 13-phase.)

**③Alarm item 2 to 4**

DISPLAY | SET
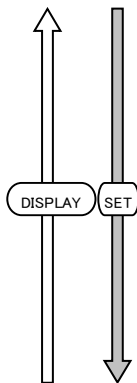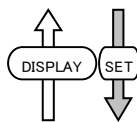
Set the measurement element assigned to the upper/lower limit alarm items 2 to 4. Elements that are set elsewhere cannot be set.

The setting method is the same as ①Alarm item 1 .

**④Alarm value 2 to 4**

DISPLAY | SET
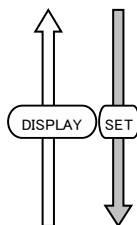
Set the alarm value for the upper/lower limit alarm items 2 to 4.

The setting method is the same as ②Alarm value 1 .

**⑤Alarm delay time**

DISPLAY | SET
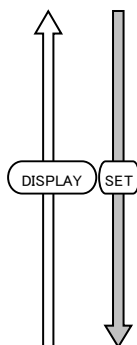
Set the alarm mask time for when you want to prevent a momentary overload or noise alarm.
When this is set, an alarm is generated only when the alarm value over the upper/lower limit alarm value for a longer time than the delay time. On the setting screen, seconds are indicated by "s" and minutes are indicated by "min".
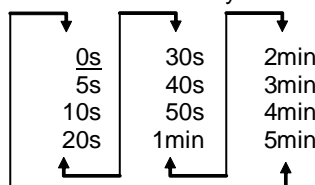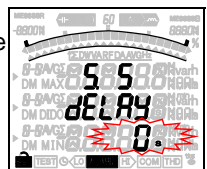
| | | |
|---|---|---|
| 0s | 30s | 2min |
| 5s | 40s | 3min |
| 10s | 50s | 4min |
| 20s | 1min | 5min |

Note:
When all settings for ①Alarm item 1 and ③Alarm item 2 to 4 are set to "non", this setting will be skipped.

**⑥Alarm cancel method**

DISPLAY | SET
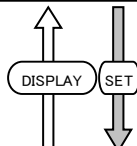
Set the alarm cancel method at generation of alarm. (screen, relay)

| Reset method (Setting value) | Description (Refer to pages 42 and 43) |
|---|---|
| Automatic (Auto) | When there is no alarm generation condition, alarm is automatically reset. |
| Manual (HoLd) | The alarm will continue even when the alarm generated conditions no longer exist. It is necessary to execute button operation to cancel the alarm. |
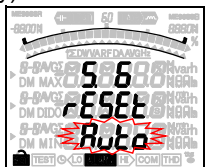
Note: When all settings for ①Alarm item 1 and ③Alarm item 2 to 4 are set to "non," this setting will be skipped.

### 3.6 Setting Menu 5: Alarm Settings (Setting Upper/Lower Limit Alarm, Motor Starting Current Mask Function.)

⑦Backlight flickers during alarms
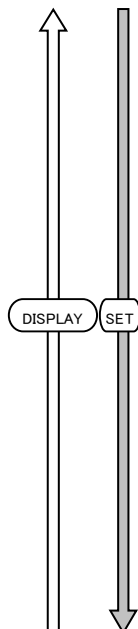
It is possible to make the backlight to flicker when an alarm is generated.

oFF ◄─────► on
(Not flicker)   (Flicker)

Note: When all settings for ①Alarm item 1 and ③Alarm item 2 to 4 are set to "non," this setting will be skipped.

DISPLAY  SET

⑧Motor starting current delay time

By using this setting for motor current monitoring delay time, it is possible to prevent unnecessary maximum value updating and unnecessary alarms caused by the motor startup current.

When this setting is not needed → Select "oFF" and press (SET), and return to the Setting Menu
or go to menu 5.9(ME-4210-SS96)

When this setting is executed → Select "on" and press (SET), and go to (1) below.

oFF ◄─────► on
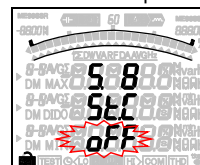
（1） Motor starting current value.

　Set the value for detecting the motor starting current.

| Setting range | Setting step (Note) |
|---|---|
| 3 to 5 to 120 (%) | 1% |

　* This is the percentage for the maximum scale value for the current (±0 step).
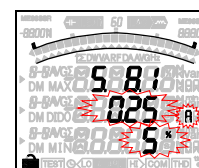
（2） Motor starting current delay time

　After the motor starting current is detected, maximum value update is not executed and an alarm is not generated for the delay time.
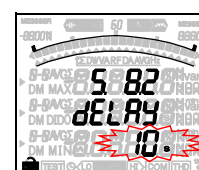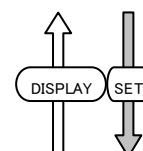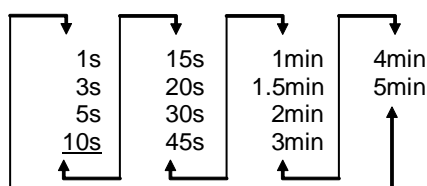
| 1s | 15s | 1min | 4min |
| 3s | 20s | 1.5min | 5min |
| 5s | 30s | 2min | |
| 10s | 45s | 3min | |

DISPLAY  SET

SET

Setting menu

According to the setting flow (page 14), save the changed contents, or continue to the other setting menu.
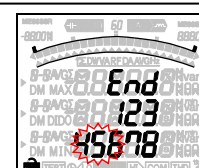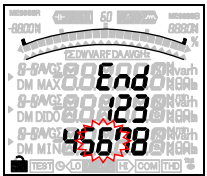
## 3.7 Setting Menu 6:No Settings

Since there is no corresponding function, this setting item is not displayed.
In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following screen is displayed.

| Setting menu | There is no settings if you set the setup menu 6. | |
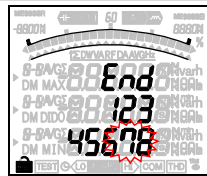
## 3.8 Setting Menu 7:No Settings

Since there is no corresponding function, this setting item is not displayed.
In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following screen is displayed.

| Setting menu | There is no settings if you set the setup menu 7. | |

## 3.9 Setting Menu 8:Special Settings (Setting Operation Time, Phase Display, IEC Mode)

Set the operation time, phase display, IEC mode.
In the operation mode, press $\boxed{\text{SET}}$ and $\boxed{\text{RESET}}$ simultaneously for 2 seconds or more, and the following operation becomes available.

For more details about each function, refer to the corresponding pages.
Operation time ⇒ page 43, IEC mode ⇒ page 41

| | |
|---|---|
| Setting menu | Set the setting menu number to "8". (as shown in the right figure) |

DISPLAY  SET

| | |
|---|---|
| ①Operation time display | Set "on or off" of the Operation time display that integrates the time while the target for counting is input and display it as the load Operation time. |

oFF ←——→ on
（Not displayed）　（Displayed）

DISPLAY  SET

| | |
|---|---|
| ②Target for counting Operation time setting | Select the target for counting Operation time from the auxiliary power, current, and voltage. |

⌐→ AUX ←——→ A ←——→ V ←┐
（Auxiliary power）　（Current）　（Voltage）

| Item | 3-phase 4-wire | 1-phase 2-wire | Others |
|------|----------------|----------------|--------|
| AUX | AUX | AUX | AUX |
| A | $A_{AVG}$ | A | $A_{AVG}$ |
| V | $V_{AVG}$(L-N) | V | $V_{AVG}$(L-L) |

DISPLAY  SET

| | |
|---|---|
| ③Operation time threshold | Set the target for counting Operation time threshold. When the auxiliary power (AUX) is selected for the Operation time, this display will be skipped. (1)When current is set target for counting Operation time. |

⌐→ min ←——→ 1 to 120% ←┐
（Setting step 1%）

(2)When voltage is set target for counting Operation time.

⌐→ min ←——→ 20 to 120% ←┐
（Setting step 1%）

DISPLAY  SET

④Phase display setting

Set the phase display.

123 ◄──────► abc

DISPLAY  SET

⑤Set IEC mode

Set the mode for reactive power/ power factor, etc arithmetic expression and code to normal or IEC.

oFF ◄──────► on

（Normal mode）    （IEC mode）

SET

Setting menu

According to the setting flow (page 14), save the changed contents, or continue to the other setting menu.

**3.10 Setting Value Confirmation Menus 1-9: Confirming the Settings in the Setting Menus 1-8 and Test Mode in Setting Menu 9**

● **Setting Value Confirmation**

When $\boxed{\text{SET}}$ is pressed for at least 2 seconds in the operation mode, the following operation becomes available.

| Setting value confirmation menu | The screen transitions and operations are the same as for Setting Menus 1 to 8. Refer to Setting Menus 1 to 8 (pages 15 to 28). (Note: Settings cannot be changed in the Setting value confirmation mode.) |
|---|---|
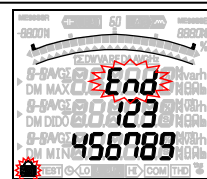
● **Test Mode**

Press $\boxed{\text{SET}}$ for 2 seconds to move the set values confirmation mode.
Select setting value confirmation menu number "9". Press $\boxed{\text{SET}}$ to move to test mode.
For more information about how to use the Test Mode, refer to page 35, 36.

## 3.11 Initializing Related Items by Changing Settings

When a setting value is changed, the related setting items and measurement data (maximum/minimum values) will return to the default settings. Refer to the following list.

| | | | | Phase wire system (Note) | VT / direct voltage | CT secondary current | CT primary current | Upper/lower limit alarm item | Target for counting Operation time | Setting of IEC mode |
|---|---|---|---|:---:|:---:|:---:|:---:|:---:|:---:|:---:|
| | | | | | | **Menu 1** | | | **Menu 5** | **Menu 8** |
| | | | | | | CT current | | | | |
| Initialized item | | | Setting item to be changed | | | | | | | |
| Setting item | Menu 1 | | Phase wire system | | | | | | | |
| | | | Display pattern | ● | | | | | | |
| | | | VT/direct voltage | ○ | | | | | | |
| | Menu 3 | | Current scale | | | | ● | | | |
| | | | Voltage scale | ● | ● | | | | | |
| | | | Power scale | ● | ● | | ● | | | |
| | Menu 5 | | Upper/lower limit alarm item | ● | | | | | | |
| | | | Upper/lower limit alarm value | ● | | | | ● | | |
| | Menu 8 | | Threshold for counting Operation time | | | | | | ● | |
| Measurement data | | | Current Maximum/minimum value | ● | | ● | ● | | | |
| | | | Voltage Maximum/minimum value | ● | ● | | | | | |
| | | | Active power Maximum/minimum value | ● | ● | ● | ● | | | |
| | | | Power factor Maximum/minimum value | ● | ● | ● | ● | | | ● |
| | | | Frequency Maximum/minimum value | ● | | | | | | |

● : The setting value will be reset to the default value.
○ : The setting will be reset to the value corresponding to the phase wire system.
Note: The settings will not return to the default values when the setting is switched only between "1N2 display" and "1N3 display" in the 1-phase 3-wire setting.

## 3.12 Initializing All Settings

When the following operations are executed, all settings are initialized to the factory defaults. Only the settings are initialized to the defaults. The Maximum/minimum value and the measured active energy value, etc are not initialized.
To initialize all settings to the factory defaults, execute the following operation from the CANCEL screen in the setting mode.

For more information about how to get to the CANCEL screen, refer to 3.1 setting flow (page 13).



Setting mode — CANCEL screen

Press the RESET + PHASE for 2 seconds.

Initialization completed — Measurement screen
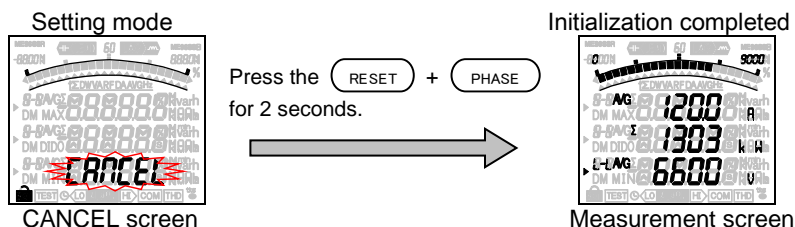
### 3.13 Setting the Special Display Pattern P00

Even if there is no display pattern that you like in the display patterns P01 to P05, individual setting is available by the display pattern P00.

This setting is made in the setting menu 1. Explanation begins with the set "P00" in ②display pattern of the setting menu 1 (page 15). (Others are omitted here, so refer to the setting menu 1.)

(1) The number of settable display is up to 4. And the number of measurement elements to be displayed is up to 12 items.

| Screen 4 - 1 | | Screen 4 - 2 | | Screen 4 - 3 | | Screen 4 - 4 | |
|---|---|---|---|---|---|---|---|
| Upper stage: item 1<br>Middle stage: item 2<br>Lower stage: item 3 | (DISPLAY) | Upper stage: item 4<br>Middle stage: item 5<br>Lower stage: item 6 | (DISPLAY) | Upper stage: item 7<br>Middle stage: item 8<br>Lower stage: item 9 | (DISPLAY) | Upper stage: item 10<br>Middle stage: item 11<br>Lower stage: item 12 | (DISPLAY) |
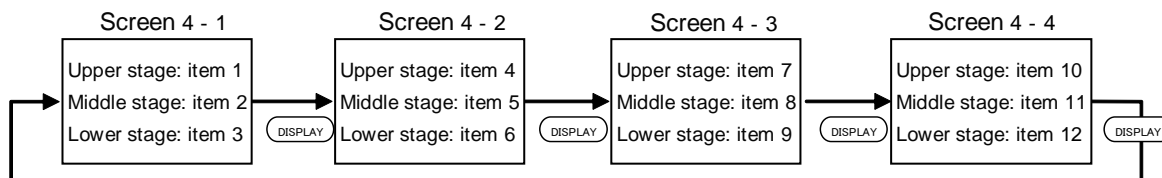
(2) Explanation is made with the example of the following display pattern.

| Screen 2 - 1 | | 画面 2 - 2 | |
|---|---|---|---|
| Upper stage: A<br>Middle stage: V<br>Lower stage: Wh | (DISPLAY) | Upper stage: PF<br>Middle stage: W<br>Lower stage: Non | (DISPLAY) |
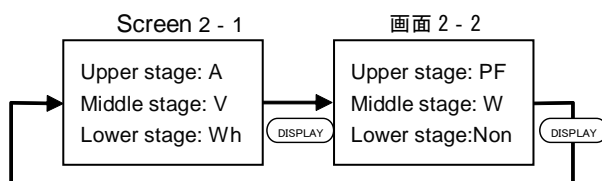
(3) Setting method

Set the display pattern.

(1) Select "P00".
　　Select "P00" by (+) or (−) and press (SET).
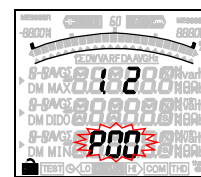
(2) Set the upper stage of the display 4-1 to A.
　　Select "A" by (+) or (−) and press (SET).
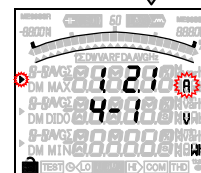
②Display pattern

(3) Set the middle stage of the display 4-1 to V.
　　Select "V" by (+) or (−) and press (SET).
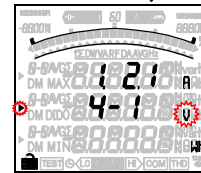
(4) Set the lower stage of the display 4-1 to Wh.
　　Select "Wh" by (+) or (−) and press (SET).

Continued form the previous page
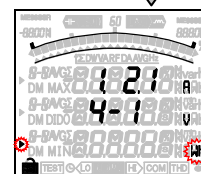
（5）Set the display of the display 4-2.
Select "yES" by (+) or (−) and press (SET) .

When you do not want to display the display 2,
select "no" and press (SET) .

(SET)

（6）Set the upper stage of the display 4-2 to PF.
Select "PF" by (+) or (−) and press (SET) .

(SET)

（7）Set the upper stage of the display 4-2 to W.
Select "W" by (+) or (−) and press (SET) .

(SET)

（8）Set the lower stage of the display 4-2 to no display.
Set the unit code of the lower stage to no display
by (+) or (−) and press (SET) .

(SET)

（9）Set the display 4-3 to no display.
Select "no" by (+) or (−) and press (SET) .

Note: When the display 4-3 is set to no display, the
display 4-4 is also set to no display automatically.
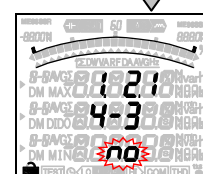
Returns to the setting for
the upper stage of the
display 4-1.

(DISPLAY)

③VT / direct voltage

(hereafter same as the setting menu 1)

| **Note** | 1. Operation time cannot be set by the display pattern "P00". Set it separately in the "Setting menu 8. |
|---|---|
| | 2. The phases of current and voltage cannot be specified. Press the (PHASE) button in the operation mode for switching phases. |
| | 3. For the settings other than the 3-phase 4-wire setting, the following measurement items cannot be set. |
| | N-phase current |

## 3.14 Examples of Simple Settings

The following shows a simple setting example.
■Setting Example    Model: ME96SSE-MB
  Phase wire system : 3-phase 4-wire
  Measuring element : A, V, W, PF
  Input Voltage :220/380V
  CT primary current : 200A
  CT Secondary current:5A
  frequency :50Hz
  MODBUS®RTU：address 1, baud rates 19.2kbps, parity even, stop bit 1

■Setting Procedure
 Items of which setting value need to be changed are indicated by          .

Note: For more details about setting contents, refer to pages 15 to 19.

| Operation Mode | |
| --- | --- |

Press (SET) + (RESET) simultaneously for 2seconds

| Setting menu | Set the setting menu number to "1" and then press S E T . |
| --- | --- |
| SET | |
| Phase wire system | The factory default setting is "3-phase 4-wire," so just press SET. |
| SET | |
| Display pattern | Setting is "P01," so just press SET. |
| SET | |
| VT/direct voltage selection | The factory default setting is "No VT," so just press SET. |
| SET | |
| Direct voltage | The factory default setting is "220/380V," so just press . |
| SET | |
| CT secondary current | The factory default setting is "5A," so just press SET. |
| SET | |
| CT primary current | Set to "200A" and then press SET. |
| SET | |
| frequency | The factory default setting is "50Hz," so just press SET. |
| SET | |
| Setting menu | Set the setting menu number to "2" and then press SET . |
| SET | |

## 3.14 Examples of Simple Settings

| | |
|---|---|
| MODBUS®RTU address | The factory default setting is "1," so just press SET. |

SET

| | |
|---|---|
| MODBUS®RTU baud rates | The factory default setting is "19.2kbps," so just press SET. |

SET

| | |
|---|---|
| MODBUS®RTU parity | The factory default setting is "EVEn(even)," so just press SET. |

SET

| | |
|---|---|
| MODBUS®RTU stop bit | The factory default setting is "1," so just press SET. |

SET

| | |
|---|---|
| Setting menu | Set the setting menu number to "End" and then press SET. |

SET

| | |
|---|---|
| End screen | Press SET again. The changed setting are determined. |

SET

| | |
|---|---|
| Operation mode | Measurement begins according to the settings you changed. |

Test mode includes functions that can be used for start-up of equipment.
The following table shows what can be done in the test mode.

| Test menu | Description |
|---|---|
| 1. Communication test | For models with a communication function, it is possible to monitor fixed numerical data without measurement (voltage/current) input. Use this for checking with the host system. |
| 2 to 5. No function | —— |

■　　Test Procedure

①　Press (SET) for 2 seconds to move to the set value confirmation mode.

②　Select setting value confirmation menu number "9" by (+) and (−).

③　Press (SET) to move to test mode.

④　Execute tests using each test menu. (Refer to pages 36)

■　　Test Mode Flow
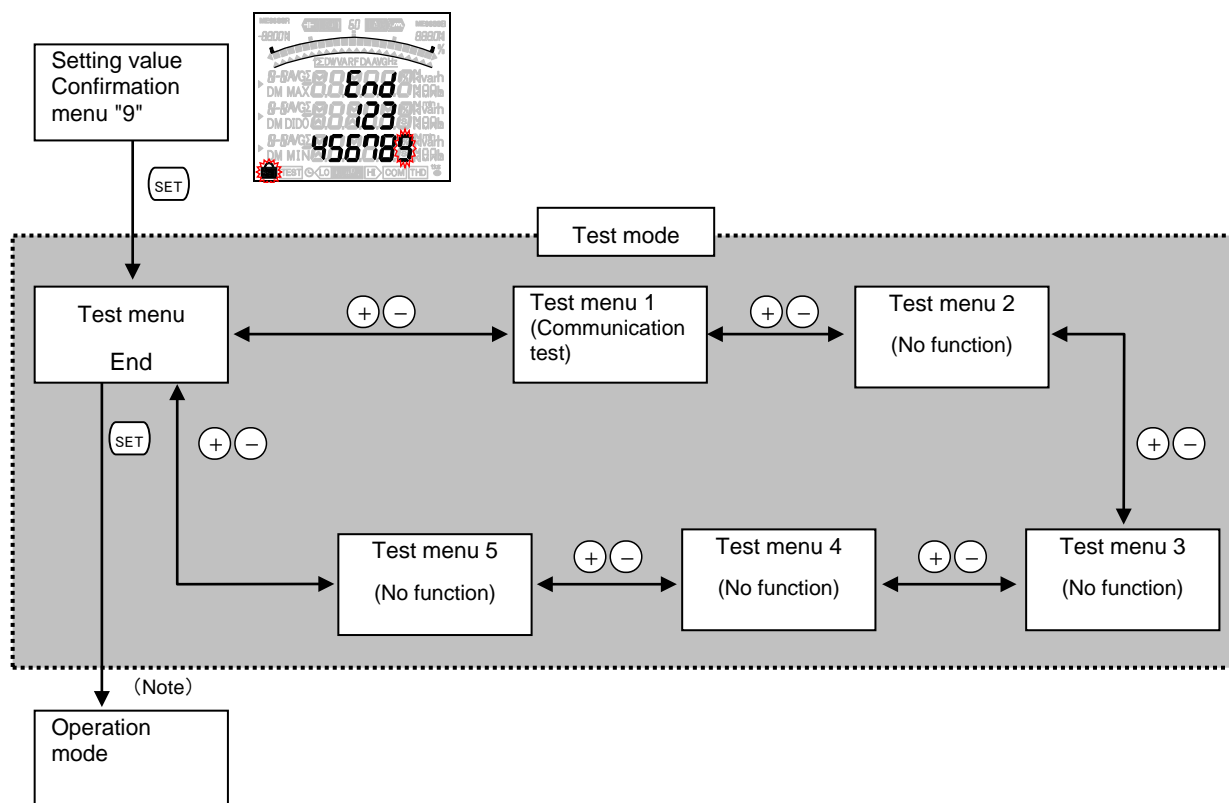


(Note) The screen momentarily turns off.

**4.1 Test Menu 1: Communication Test**

In the setting value confirmation mode, when the menu number is set to "9", you will enter the test mode.

Test menu

Set the test menu number to "1".
(as shown in the right figure)

DISPLAY SET

①Communication test

Execute communication test operation.
(Values other than zero can be monitored even when the voltage and current are not input.)

■ Monitor value by communication
   ・ Values displayed on the screen, can be monitored.
     Measurement elements not displayed on the screen are zero.
   ・ If you set the Alarm item with Setting Menu 5, the display will be the same as
     the alarm is generating.

■ Display screen

・ As with the operation mode, it is displayed according
  to settings such as the display pattern.
・ The maximum/minimum value can be displayed.
  (Cyclic display cannot be executed.)

■ Button operation

| Operation | Function |
|---|---|
| Press (DISPLAY) | Switches the display screen. |
| Press (PHASE) | Switches the phase. |
| Press (MAX/MIN) | Moves or returns to the maximum/minimum value screen. |
| Press (+) or (−) | Switches the analog bar graph element. |
| Press (+) and (−) together for at least 2 seconds. | Change the unit of Wh and varh. |
| Press (SET) | Return to the test menu. |

Note: When executing a communication test, please read the following manual
      in addition to this instruction manual. (For more information refer to page 63.)

      ・Electronic Multi-Measuring Instrument MODBUS®RTU communication I/F Specification

SET

Test menu

Select "End" as the test menu number and then press (SET).
You will return to the operation mode.

### 5.1 Basic Operation

The following explains basic usages during operation.

● **Switch display**

By pressing ( DISPLAY ), the measurement display will switch over.

Display items and the order differ depending on the phase wire method setting display pattern settings and additional screen. For more information about detailed display patterns, refer to pages 45.

Example of display switching(Phase wire System: 3-phase 4-wire,display pattern: P01, without additional display)

DISPLAY

DISPLAY → DISPLAY → DISPLAY →



<Screen 1 of 4>
Upper: Current
Middle: Active Power
Lower: Voltage

<Screen 2 of 4>
Upper: Current
Middle: Active Power
Lower: Power factor

<Screen 3 of 4>
Upper: Current
Middle: Power factor
Lower: Voltage

<Screen 4 of 4>
Upper: Current
Middle: Not displayed
Lower: N-phase current

Screen number display

When switching screens, the left screen appears momentarily. This screen indicates the number of the next screen being displayed in the total number of screens.

● **Switch phase**

By pressing ( PHASE ), the current phase and the voltage phase will switch over.

The phase cannot be switched in the following cases.
・ Measurement elements without phase (Frequency)
・ Active power and power factor for settings other than 3-phase 4-wire
・ When the setting is 1-phase 2-wire

Example of phase switching (Phase wire System: 3-phase 4-wire)



Current average
Active Power (total)
Voltage average (line to neutral)

PHASE →

Current phase 1
Active Power phase 1
Voltage phase 1N

PHASE →

Current phase 2
Active Power phase 2
Voltage phase 2N

PHASE →

Current phase 3
Active Power phase 3
Voltage phase 3N

PHASE ↓

Current phase 3
Active Power phase 3
Voltage phase 31

← PHASE

Current phase 2
Active Power phase 2
Voltage phase 23

← PHASE

Current phase 1
Active Power phase 1
Voltage phase 12

← PHASE

Current average
Active Power (total)
Voltage average (line to line)

PHASE ↑

**5.1 Basic Operation**

● **Bar graph display**

Bar graph displays the measurement element indicated with " ▶" or " ↑___ ".
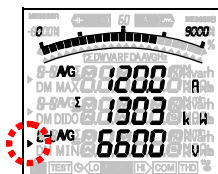


(Example) Lower element (V) displayed on bar graph
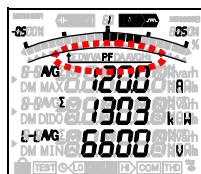


(Example) PF displayed on bar graph

● **Switching measurement factors displayed on bar graphs**

Press the ⊕ or ⊖ button to switch.

The following example is the case of "3 measuring items of screen are different" or "2 measuring items of screen are same". In the case of "3 measuring items of screen are same", the bar graph of average value or total value appear instead of "▶ (Upper)", "▶ (Middle)" and "▶ (Lower)".

> The bar graph cannot be displayed in the following cases.
> ・When active energy / reactive energy / apparent energy are selected
> ・When a line without measurement display is selected

(1) For 3-phase 4-wire ⊕ (Clockwise rotation) ⊖ (Counterclockwise rotation)



(2) For 3-phase 3-wire, 1-phase 3-wire



(3) For 1-phase 2-wire

### 5.1 Basic Operation

● **Cyclic Display**

In cyclic display, display and phases automatically change at every 5 seconds.

When ( DISPLAY ) is pressed for about 2 seconds, the cyclic display appears.

When ( PHASE ) is pressed for about 2 seconds, the cyclic phase appears.

By pressing any other buttons except ( SET ) , cyclic display mode ends.

Note 1: Before shifting to the cyclic display change screen, the display flickering 3 times.
Note 2: In the cyclic display, drawing number is not displayed.
Note 3: In the maximum value and the minimum value display, cyclic display is not available.
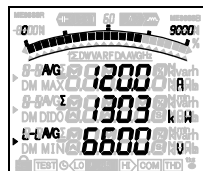
Example Cyclic Display (Phase wire System: 3-phase 4-wire, Display Pattern: P01, without additional screens)
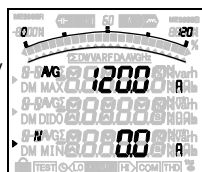
### 5.1 Basic Operation

● **Maximum value and minimum value display**

For the maximum / minimum value display screen, the maximum value, current value,
and minimum value for each measurement item are displayed on one screen.

■ Example Display

＜Example of current＞
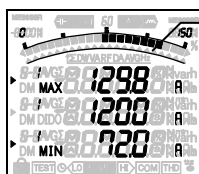


The bar graph turns on only between the maximum value and minimum value.

Upper: Maximum value

Middle: Current value

Lower: Minimum value

● **Display of maximum value and minimum value**

When $(MAX/MIN)$ is pressed, the display is changed into the maximum value and minimum value display.
And when $(MAX/MIN)$ is pressed, the display changes back to the present value display.

Example of switching between present value display and maximum/minimum value display
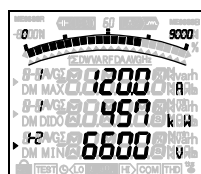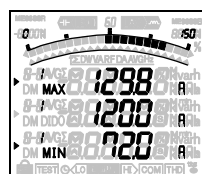


Present value display            Maximum value and minimum value display

On maximum/minimum value display, the following operation is also possible as current value display.

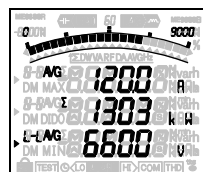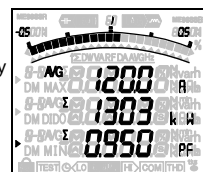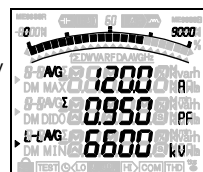| Button operation | Function |
|---|---|
| Press ( DISPLAY ) | Measurement items switch according to the following order. However, measurement items that are not included in the phase wire method display pattern setting and additional screens are not displayed.<br><br>→A→$A_N$→V→W→PF→Hz→   ($A_N$：N-phase current) |
| Press ( PHASE ) | 3-phase 4-wire: A switch as<br><br>→ Average→1 Phase→2 Phase→3 Phase→<br><br>V switches as<br><br>→ $V_{AVG}$(L-N)→$V_{1N}$→$V_{2N}$→$V_{3N}$→$V_{AVG}$(L-L)→$V_{12}$→$V_{23}$→$V_{31}$→<br><br>W, PF switch as<br><br>→ Total→1 Phase→2 Phase→3 Phase →<br><br>$A_N$ and Hz do not have phase switching.<br>3-phase 3-wire, 1-phase 3-wire: Phase for A and V switch.<br>1-phase 2-wire: No phase switch. |
| Press ( DISPLAY ) for 2 seconds | Switches to measurement item cyclic display. |
| Press ( PHASE ) for 2 seconds | Switches to phase cyclic display. |

● **Clear the maximum/minimum value**

On the maximum/minimum value display screen, press the $(RESET)$ for 2 seconds to clear the maximum/minimum
value for the displayed measurement item to the present value.
On the maximum/minimum value display screen, press the $(+)$ and $(RESET)$ together for 2 seconds to clear all
maximum/minimum values to the present value.
When the password protection setting is enabled, maximum/minimum values are cleared after you enter the password.
Also, you can clear all maximum/minimum values by communication function. (In this case, the password is not
necessary.)

### 5.1 Basic Operation

● **Active Energy Display**

■ Display format

The following table shows the display format of active energy based on the total load.

$$\text{Total load power[kW]} = \frac{\alpha \times (\text{VT primary voltage}) \times (\text{CT primary current})}{1000}$$

$$\begin{pmatrix} \alpha : 1 & \text{1-phase 2-wire} \\ 2 & \text{1-phase 3-wire} \\ \sqrt{3} & \text{3-phase 3-wire} \\ 3 & \text{3-phase 4-wire} \end{pmatrix}$$

※ 1. For the direct voltage setting, the direct voltage is used for calculation instead of the VT primary voltage.

※ 2. For 3-phase 4-wire or 1-phase 3-wire, the VT primary voltage and direct voltage are calculated using the line to phase voltage.

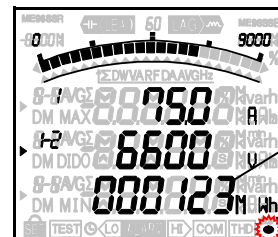| Total load [kW] | Display type | |
|---|---|---|
| | Digital Display | Digital Display |
| Less than 10 | | kWh |
| 10 or higher and less than 100 | | (Unit can be changed from Wh/kWh/MWh.) |
| 100 or higher and less than 1000 | 888888 | |
| 1000 or higher and less than 10000 | | MWh |
| 10000 or higher and less than 100000 | | (Unit can be changed from Wh/kWh/MWh.) |
| 100000 or higher | | |

Active energy measurement value

Metering status

The metering status blinks while the active energy is being counted.
When active energy is not counted, turns OFF.

● **How to change the unit of Wh**

When ⊕ and ⊖ are pressed simultaneously for 2 seconds, the unit of Wh will be changed. This will enable to check the upper digits or lower digits of counts.

Example of change: Case of active energy (imported) = 012,345,678,901,234.567Wh

Press ⊕ and ⊖ simultaneously for 2 seconds

Unit：Mega          Unit：non          Unit：non          Unit：kilo
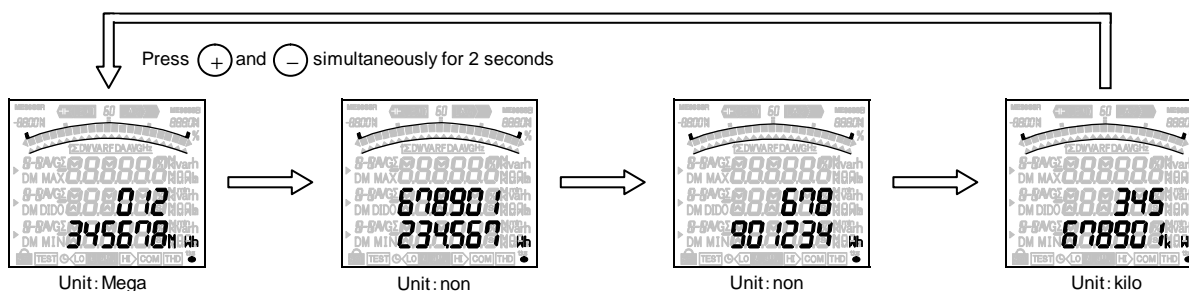
Note: When the setting value of the VT primary voltage and the CT primary current are large, the lower digits less than a measurement range display "0".

● **Wh zero reset**

When (SET), (RESET), and (PHASE) are pressed simultaneously for 2 seconds, the measured values of Wh and will be reset.

When the password protection setting is enabled, Wh are reset after you enter the password.

Also, you can clear all Wh values by communication function. (In this case, the password is not necessary.)

(Note 1: This is effective only in the instantaneous value display.)

● **Each measurement item display during power transmission**

The following table shows the symbol display (±) for each measurement value according to the power reception /power sending status.

Note. Normal mode : "IEC mode" in the Setting Menu 8 is OFF

IEC mode : "IEC mode" in the Setting Menu 8 is ON

(Refer to page 28 about "IEC mode" in the Setting Menu 8.)
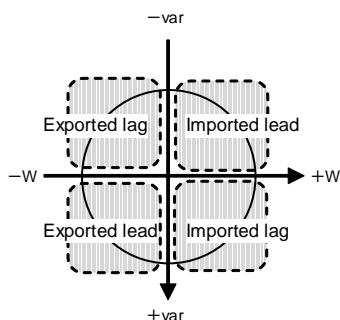
| Quadrant / Measured items | | Imported Lag | Imported Lead | Exported Lag | Exported Lead |
|---|---|---|---|---|---|
| A, AN, V, Hz | | Unsigned | | | |
| W | | Unsigned | | "−"sign | |
| PF | Normal mode | Unsigned `LAG` display※ | "−"sign `LEAD` display※ | "−"sign `LEAD` display※ | Unsigned `LAG` display※ |
| | IEC mode | Unsigned `LAG` display※ | "−"sign `LEAD` display※ | Unsigned `LAG` display※ | "−"sign `LEAD` display※ |

※Turns on when displayed on the bar graph.

## 5.2 Usage According to Purpose (Alarm, Operating Time, Password, etc.)

The following explains usage according to the purpose during operation.

● Display and operation of the upper/lower limit alarm
When the value exceeds the upper or lower limit setting value set in advance, the display flickers and alarm can be output.
(For more information about how to set the upper/lower limit alarm, refer to page 23 and after.)
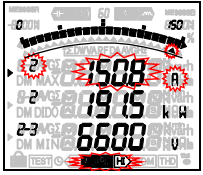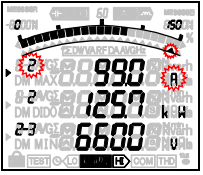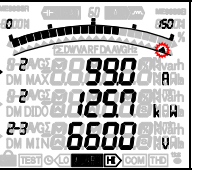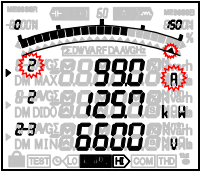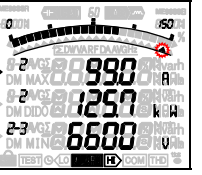
■ Alarm indicator
When the measurement element with an upper/lower limit alarm is displayed on the bar graph, "▲" flickers on the bar graph to indicate the upper/lower limit.

■ Behavior During Alarm Generation

Alarm condition: When measurement value exceeds alarm value, display flicker.

Alarm cancel: When alarm is canceled, display flickers normally.
Note: When the alarm delay time is set, an alarm is generated only when the alarm value is continuously beyond the upper/lower limit alarm value for the delay time.

| Alarm cancel method | | Measurement value ≥ Upper limit value (or Measurement value ≤ Lower limit value) | Measurement value < Upper limit alarm value (or Measurement value > Lower limit alarm value) | |
|---|---|---|---|---|
| Automatic (Auto) | Display | ALARM, HI or LO flickers  | Normal display  Upper/lower limit indicator | |
| Manual (HoLd) | Display | ALARM, HI or LO flickers  (Alarm generation) | ALARM, HI or LO turns ON  (Alarm retention) → RESET → | Normal display  (Alarm cancellation) |

Note 1: When the measurement element where the alarm generated exists on the display screen, the display for the digital value, unit (A, V, W, PF, Hz), and phase (1, 2, 3, N) will be based on the alarm status according to the following table. If it does not exist on the display screen, it does not flicker.

| Alarm status | Digital value | Unit | Phase |
|---|---|---|---|
| Alarm generation | Flickering* | Flickering | Flickering* |
| Alarm retention | On | Flickering | Flickering* |
| Alarm cancellation | On | On | On |

* Does not flicker when displaying phases where no alarm occurred.

Note 2: When the backlight flickering setting is set to ON (flicker) during alarm generation, the backlight also flickers when an alarm is generated.

Note 3: On the maximum/minimum value display screen, the present value (middle of the digital display) and ALARM, HI or LO blinks.

■ Monitoring phase for upper/lower limit alarm element

The phase that monitors the upper/lower limit alarm differs according to the measurement item. For more details, refer to the following table.

| Upper/lower limit alarm element | Monitored phase | | | |
|---|---|---|---|---|
| | 3-phase 4-wire | 3-phase 3-wire (3CT,2CT) | 1-phase 3-wire (1N2) | 1-phase 3-wire (1N3) |
| Upper limit current | 1, 2, 3 | 1, 2, 3 | 1, N, 2 | 1, N, 3 |
| Lower limit current | 1, 2, 3 | 1, 2, 3 | 1, 2 | 1, 3 |
| Upper limit N-phase current | N | — | — | — |
| Lower limit N-phase current | N | — | — | — |
| Upper limit voltage (L-L) (Note 1) | 12, 23, 31 | 12, 23, 31 | 1N, 2N, 12 | 1N, 3N, 31 |
| Lower limit voltage (L-L) (Note 1) | 12, 23, 31 | 12, 23, 31 | 1N, 2N, 12 | 1N, 3N, 31 |
| Upper limit voltage (L-N) | 1N, 2N, 3N | — | — | — |
| Lower limit voltage (L-N) | 1N, 2N, 3N | — | — | — |
| Upper limit active power, power factor | Σ | Σ | Σ | Σ |
| Lower limit active power, power factor | Σ | Σ | Σ | Σ |
| Upper limit frequency | 1N | 12 | 1N | 1N |
| Lower limit frequency | 1N | 12 | 1N | 1N |

Note1: For phase 12 (or phase 31) at 1-phase 3-wire, alarm monitoring is executed using a value that is two times the set upper/lower limit alarm value.

### 5.2 Usage According to Purpose (Alarm, Operating Time, Password, etc.)

● **Canceling the upper/lower limit alarm**

The alarm cancellation method differs depending on the setting for alarm reset. The upper and lower limit alarms can be cancelled also via communication.

| Alarm cancel method | Cancelation method |
|---|---|
| Automatic(Auto) | When the measurement value is below the upper/lower limit set value, the alarm is automatically reset. |
| Manual(HoLd) | The alarm is maintained even after the measurement value is below the upper/lower limit set value. After the measurement value is below the upper/lower limit alarm value, operate the following alarm cancellation operation.<br>(Note: However, alarms cannot be cancelled from the maximum/minimum value display screen, or the digital input/output screen.)<br><Cancelling alarms for selected elements><br>Display the element where the alarm generated, and then press (RESET) to cancel the alarm. When an element has a phase such as current and voltage, it is necessary to press (RESET) for each phase when cancelling an alarm.<br><Cancelling alarms for all elements><br>At the current value display screen, press (RESET) for 2 seconds to cancel all alarms. |

Note: The difference of 0.8% between the maximum scale and alarm value is used for determining whether the measurement value is below the upper/lower limit alarm value in order to prevent chattering.

● **Stopping backlight flickering caused by upper/lower limit alarm generation**

Press (RESET) the button to stop the backlight flickering.

● **Display of operation time**

The measurement time is integrated according to the value set to the target for counting operation time (AUX, A, and V) and displayed as the load operation time.
To display the operation time, the operation time display setting should be configured in advance.
The operation time is counting, even if operation time display setting is OFF.
(For setting of the operation time display, refer to page 27.)

When the following set target for counting the operation time exceeds the threshold, the operation time 1 and operation time 2 are integrated.

| Item | 3-phase 4-wire | 1-phase 2-wire | Others |
|---|---|---|---|
| AUX (Auxiliary power) | AUX | AUX | AUX |
| A (Current) | $A_{AVG}$ | A | $A_{AVG}$ |
| V (Voltage) | $V_{AVG}$(L-N) | V | $V_{AVG}$(L-L) |



Operation time 1    Operation time 2

<Using the operation time 1 and operation time 2 as appropriate>

For example, if you want to check both of the operation time on a monthly basis (the value which is periodically reset) and the cumulative operation time from when the system started to operate (the value which is not periodically reset), use the operation time 1 and operation time 2 accordingly. If it is unnecessary to use the operation time 1 and operation time 2 at the same time, monitor either of them.

This is displayed when the (DISPLAY) button is pressed repeatedly in the operation mode to switch the measurement displays.

● **Resetting the operation time to zero**

Showing the operation time 1 or the operation time 2 on the display and then holding down the (RESET) button for 2 seconds resets the operation time to zero.
(Only the displayed operation time is reset to zero.)
When the password protection setting is enabled, the operation time is reset to zero after the password is entered.
All the operation times can be reset to zero also via communication. (In this case, the password is not necessary)

### 5.2 Usage According to Purpose (Alarm, Operating Time, Password, etc.)

● **Preventing maximum value update by motor starting current**

When the motor current is monitored, use the motor starting current delay function to prevent maximum value update and alarm generation for the current, active power, reactive power, apparent Power ,and power factor due to the motor starting current. It is necessary to set in advance to use the motor starting current delay function. (About settings, refer to page 25.)

■ Movement when the motor starting current delay function is used



Current

Motor starting current delay time

<Motor starting current delay>
The maximum values for the current, active power,reactive power and power factor are not updated during the motor,reactive power and power factor starting current delay time. Also, no alarm generated even if it is over the upper limit alarm value.

Motor starting current

Current upper limit alarm value

<Motor starting current detection>
When the current is over the motor starting current value, the motor current starting current delay time counter begins.

Motor starting current value

Time

Note 1: Set the motor starting current value to a value lower than the lower limit value considering changes in the load current during operation.

Note 2: When the input current is below the motor starting current value, the minimum value update stops.

● **Password protection setting**

In the operation mode, after pressing ( RESET ) and ( PHASE ) simultaneously for 2 seconds or more, the password input display will be displayed. It is possible to set the password protection if you enter the password. Default password is "0000". If you enter the wrong password, to return to the password input display (the highest digit blink).
By pressing ( DISPLAY ) at the highest digit, to return to the operation mode.
If you enable password protection setting, you need to input password when performing the item of the following table.

■Password input

Password input display
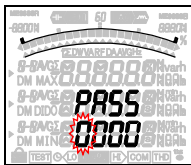


· Select a value of the blinking digit by pressing the (+) or (−) button from the highest digit.
· Pressing the (SET) button moves the setting digit (blinking digit) to a lower digit.
· Pressing the ( DISPLAY ) button moves the setting digit (blinking digit) to a higher digit.
· If you enter a correct password and pressing the (SET) in the lowest digit, password protection item is enabled.
· If you enter an incorrect password and pressing the (SET) in the lowest digit, to return to the highest digit.

■Password protection item

| No. | Item |
| --- | --- |
| 1 | Shift to the setting mode |
| 2 | Clear the maximum/minimum value |
| 3 | Wh zero reset |
| 4 | Clearing the operation time |

■Password protection setting

(1) Set a password protection.

oFF ←——→ on
(Not protected)　(Protected)



(2) Change the password.

no ←——→ yES
(Not change)　(Change)

Note1. Select "no", and go back to the operation mode.

Note2. Select "yES", and the current password is displayed.



(3) Input a new password.

· Select a value of the blinking digit by pressing the (+) or (−) button from the highest digit.
· Pressing the (SET) button moves the setting digit (blinking digit) to a lower digit.
· Pressing the ( DISPLAY ) button moves the setting digit (blinking digit) to a higher digit.
· Pressing the (SET) button at the lowest digit saves the password.
·Setting is available in range from 0000 to 9999
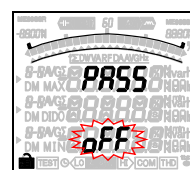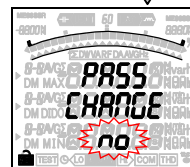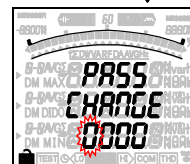


| Important | If You Forget Your Password：It is not possible to cancel the password in the field. Please contact your supplier. |
| --- | --- |

## 6.1 Display Pattern Contents

When the display pattern in the Setting menu 1 and the additional screen in the Setting menu 8 are set,

pressing ( DISPLAY )changes the screens shown in the table below from the left to the right.

【For 3-phase4-wire】

| Display pattern | | Screen set by display pattern | | | | | Additional display (Set in the setting menu 8) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | No.1 | No.2 | No.3 | No.4 | No.5 | No.6 | No.7 | No.8 |
| | | | | | | | Wh | Operation time1 | Operation time2 |
| P01 | Upper | A | A | A | A | | | − | − |
| | Middle | W | W | PF | − | | | hour1 | hour2 |
| | Lower | V | PF | V | AN | | | Operation time | Operation time |
| P02 | Upper | A | A | A | A | A | − | | |
| | Middle | V | W | PF | − | Hz | Wh | ditto | ditto |
| | Lower | Wh | Wh | Wh | AN | Wh | | | |
| P03 | Upper | A1 | V1N | A | A | | | | |
| | Middle | A2 | V2N | − | − | | | ditto | ditto |
| | Lower | A3 | V3N | V | AN | | | | |
| P04 | Upper | A | A1 | V1N | A | | | | |
| | Middle | V | A2 | V2N | − | | | ditto | ditto |
| | Lower | W | A3 | V3N | AN | | | | |
| P05 | Upper | A | A | A1 | V1N | A | − | | |
| | Middle | V | W | A2 | V2N | − | Wh | ditto | ditto |
| | Lower | Wh | Wh | A3 | V3N | AN | | | |
| P00 | Upper | Arbitrary | Arbitrary | Arbitrary | Arbitrary | | − | | |
| | Middle | Arbitrary | Arbitrary | Arbitrary | Arbitrary | | Wh | ditto | ditto |
| | Lower | Arbitrary | Arbitrary | Arbitrary | Arbitrary | | | | |

【For others except 3-phase 4-wire】

| Display pattern | | Screen set by display pattern | | | | | Additional display (Set in the setting menu 8 | | |
|---|---|---|---|---|---|---|---|---|---|
| | | No.1 | No.2 | No.3 | No.4 | No.5 | No.6 | No.7 | No.8 |
| | | | | | | | Wh | Operation time1 | Operation time2 |
| P01 | Upper | A | A | A | | | | − | − |
| | Middle | W | W | PF | | | | hour1 | hour2 |
| | Lower | V | PF | V | | | | Operation time | Operation time |
| P02 | Upper | A | A | A | A | | − | | |
| | Middle | V | W | PF | Hz | | Wh | dito | dito |
| | Lower | Wh | Wh | Wh | Wh | | | | |
| P03 | Upper | A1 | V12 | A | | | | | |
| | Middle | A2 | V23 | − | | | | ditto | ditto |
| | Lower | A3 | V31 | V | | | | | |
| P04 | Upper | A | A1 | V12 | | | | | |
| | Middle | V | A2 | V23 | | | | ditto | ditto |
| | Lower | W | A3 | V31 | | | | | |
| P05 | Upper | A | A | A1 | V12 | | − | | |
| | Middle | V | W | A2 | V23 | | Wh | ditto | ditto |
| | Lower | Wh | Wh | A3 | V31 | | | | |
| P00 | Upper | Arbitrary | Arbitrary | Arbitrary | Arbitrary | | − | | |
| | Middle | Arbitrary | Arbitrary | Arbitrary | Arbitrary | | Wh | dito | dito |
| | Lower | Arbitrary | Arbitrary | Arbitrary | Arbitrary | | | | |

Note 1: When an additional screen is added, a screen number is added.
Note 2: In the table, "Wh" indicates Imported active energy.
Note 3: When 1-phase 2-wire, only phase1 ($A_1$) is displayed for current and only phase12 ($V_{12}$) is displayed for voltage.
   Other phases are not displayed even when they are set in the display pattern.
Note 4: The phases displayed in the display patterns of the above table are displayed on the screen according to the phase wire system setting shown in the table below.

| Phase display in the table above | phase wire | 1-phase 2-wire | 1-phase 3-wire (1N2) | 1-phase 3-wire (1N3) | 3-phase 3-wire |
|---|---|---|---|---|---|
| Current | 1 | Phase not displayed | 1 | 1 | 1 |
| | 2 | Measurement not displayed | N | N | 2 |
| | 3 | Measurement not displayed | 2 | 3 | 3 |
| Voltage | 12 | Phase not displayed | 1N | 1N | 12 |
| | 23 | Measurement not displayed | 2N | 3N | 23 |
| | 31 | Measurement not displayed | 12 | 13 | 31 |

Note 5: When Wh is selected at the screen of from No.1 to No.4, the additional display of Wh appears. (P00)

## 6.2 Maximum Scale Value

Settable primary voltage, primary current, and standard maximum scale value are shown in the tables below.

●Maximum scale value of each item

| Measurement element | | | | Maximum scale value |
|---|---|---|---|---|
| Current, Current demand | Setting of current maximum scale ＝SP. | | | CT Primary current |
| Voltage | In the case with VT (Note 2) | 1-phase 2-wire, 3-phase 3-wire | | VT Primary voltage×150/110 |
| | | 3-phase 4-wire | | VT Primary voltage (Phase voltage)×150/110 |
| | | | | VT Primary voltage (Line voltage)×√3×150/110 |
| | At direct input | 1-phase 2-wire, 3-phase 3-wire | 110V | 150V |
| | | | 220V | 300V |
| | | | 440V | 600V |
| | | 1-phase 3-wire (Phase voltage / Line voltage) | 110/220V | 150V/300V |
| | | | 220/440V | 300V/600V |
| | | 3-phase 4-wire (Phase voltage / Line voltage) | 63.5/110V | 100/150V |
| | | | 100/173V、110/190V | 150/300V |
| | | | 220/380V、240/415V、254/440V | 300/600V |
| | | | 277/480V | 400/640V |
| Active power (Note 1) | | | | VT ratio×CT ratio ×specific power(100%)kW |

Note1 At direct voltage setting, VT ratio = 1. The specific power is according to the table on the right.

Note2 For convenience of scale, this is rounded off to the nearest whole number.

●Specific power value for scale calculation

| Phase line type | CT Secondary | Rated voltage | | Specific power value (100%) |
|---|---|---|---|---|
| 1-phase 2-wire | 5A | At direct input (Line voltage) | 110V | 0.5kW |
| | | | 220V | 1.0kW |
| | | | 440V | 2.0kW |
| | | In the case with VT (Line voltage) | 100V, 110V | 0.5kW |
| | | | 220V | 1.0kW |
| | 1A | At direct input (Line voltage) | 110V | 0.1kW |
| | | | 220V | 0.2kW |
| | | | 440V | 0.4kW |
| | | In the case with VT (Line voltage) | 100V, 110V | 0.1kW |
| | | | 220V | 0.2kW |
| 1-phase 3-wire | 5A | Without VT (Line voltage) | 220V | 1.0kW |
| | | | 440V | 2.0kW |
| | 1A | | 220V | 0.2kW |
| | | | 440V | 0.4kW |
| 3-phase 3-wire | 5A | At direct input (Line voltage) | 110V | 1.0kW |
| | | | 220V | 2.0kW |
| | | | 440V | 4.0kW |
| | | In the case with VT (Line voltage) | 100V, 110V | 1.0kW |
| | | | 220V | 2.0kW |
| | 1A | At direct input (Line voltage) | 110V | 0.2kW |
| | | | 220V | 0.4kW |
| | | | 440V | 0.8kW |
| | | In the case with VT (Line voltage) | 100V, 110V | 0.2kW |
| | | | 220V | 0.4kW |
| 3-phase 4-wire | 5A | At direct input | 63.5/110V | 1.0kW |
| | | | 100/173V 110/190V | 2.0kW |
| | | | 220/380V 240/415V 254/440V | 4.0kW |
| | | | 277/480V | 5.0kW |
| | | In the case with VT (Phase voltage) | 63.5V | 1.0kW |
| | | | 100V、110V、115V、120V | 2.0kW |
| | 1A | At direct input | 63.5/110V | 0.2kW |
| | | | 100/173V 110/190V | 0.4kW |
| | | | 220/380V 240/415V 254/440V | 0.8kW |
| | | | 277/480V | 1.0kW |
| | | In the case with VT (Phase voltage) | 63.5V | 0.2kW |
| | | | 100V、110V、115V、120V | 0.4kW |

## 6.3 Possible Setting Range for Maximum Scale

The maximum scale of current can be selected from about 40% to 120% of rating, and maximum scale of voltage can be selected from about 20% to 250% of rating, and maximum scale of active power can be selected from about 20% to 120% of rating. But for the convenience of scale conditions, the values in the following tables are applied. Also, this is same as with corresponding measured values for maximum scale of analog output.

■Current maximum scale value

Possible setting range:-10 STEP to +3STEP of the rating
Example: When the rating is 100A, the value is from 45A to 160A.

Current maximum scale value (1/3)

| STEP | A unit |
|------|--------|
| 1 | 1A |
| 2 | 1.2A |
| 3 | 1.5A |
| 4 | 1.6A |
| 5 | 1.8A |
| 6 | 2A |
| 7 | 2.2A |
| 8 | 2.4A |
| 9 | 2.5A |
| 10 | 3A |
| 11 | 3.2A |
| 12 | 3.6A |
| 13 | 4A |
| 14 | 4.5A |
| 15 | 4.8A |
| 16 | 5A |
| 17 | 6A |
| 18 | 6.4A |
| 19 | 7.2A |
| 20 | 7.5A |
| 21 | 8A |
| 22 | 9A |
| 23 | 9.6A |
| 24 | 10A |
| 25 | 12A |
| 26 | 15A |
| 27 | 16A |
| 28 | 18A |
| 29 | 20A |
| 30 | 22A |
| 31 | 24A |
| 32 | 25A |
| 33 | 30A |
| 34 | 32A |
| 35 | 36A |
| 36 | 40A |
| 37 | 45A |
| 38 | 48A |
| 39 | 50A |
| 40 | 60A |
| 41 | 64A |
| 42 | 72A |
| 43 | 75A |
| 44 | 80A |
| 45 | 90A |
| 46 | 96A |
| 47 | 100A |
| 48 | 120A |
| 49 | 150A |
| 50 | 160A |

Current maximum scale value (2/3)

| STEP | A unit | kA unit |
|------|--------|---------|
| 51 | 180A | |
| 52 | 200A | |
| 53 | 220A | |
| 54 | 240A | |
| 55 | 250A | |
| 56 | 300A | |
| 57 | 320A | |
| 58 | 360A | |
| 59 | 400A | |
| 60 | 450A | |
| 61 | 480A | |
| 62 | 500A | |
| 63 | 600A | |
| 64 | 640A | |
| 65 | 720A | |
| 66 | 750A | |
| 67 | 800A | |
| 68 | 900A | |
| 69 | 960A | |
| 70 | 1000A | |
| 71 | 1200A | |
| 72 | 1500A | |
| 73 | 1600A | |
| 74 | 1800A | |
| 75 | 2000A | |
| 76 | 2200A | |
| 77 | 2400A | |
| 78 | 2500A | |
| 79 | 3000A | |
| 80 | 3200A | |
| 81 | 3600A | |
| 82 | 4000A | |
| 83 | 4500A | |
| 84 | 4800A | |
| 85 | 5000A | |
| 86 | 6000A | |
| 87 | 6400A | |
| 88 | 7200A | |
| 89 | 7500A | |
| 90 | 8000A | |
| 91 | | 9kA |
| 92 | | 9.6kA |
| 93 | | 10kA |
| 94 | | 12kA |
| 95 | | 15kA |
| 96 | | 16kA |
| 97 | | 18kA |
| 98 | | 20kA |
| 99 | | 22kA |
| 100 | | 24kA |

Current maximum scale value (3/3)

| STEP | kA unit |
|------|---------|
| 101 | 25kA |
| 102 | 30kA |
| 103 | 32kA |
| 104 | 36kA |
| 105 | 40kA |

## 6.3 Possible Setting Range for Maximum Scale

■Voltage maximum scale value

Possible setting range:-18 STEP to +10STEP of the standard maximum scale value.
Example: When the standard maximum scale value is 100V, the value is from 20V to 320V.

Voltage maximum scale value (1/3)

| STEP | V unit |
|------|--------|
| 1 | 15V |
| 2 | 16V |
| 3 | 18V |
| 4 | 20V |
| 5 | 22V |
| 6 | 24V |
| 7 | 25V |
| 8 | 30V |
| 9 | 32V |
| 10 | 36V |
| 11 | 40V |
| 12 | 45V |
| 13 | 48V |
| 14 | 50V |
| 15 | 60V |
| 16 | 64V |
| 17 | 72V |
| 18 | 75V |
| 19 | 80V |
| 20 | 90V |
| 21 | 96V |
| 22 | 100V |
| 23 | 120V |
| 24 | 150V |
| 25 | 160V |
| 26 | 180V |
| 27 | 200V |
| 28 | 220V |
| 29 | 240V |
| 30 | 250V |
| 31 | 300V |
| 32 | 320V |
| 33 | 360V |
| 34 | 400V |
| 35 | 450V |
| 36 | 480V |
| 37 | 500V |
| 38 | 600V |
| 39 | 640V |
| 40 | 720V |
| 41 | 750V |
| 42 | 800V |
| 43 | 900V |
| 44 | 960V |
| 45 | 1000V |
| 46 | 1200V |
| 47 | 1500V |
| 48 | 1600V |
| 49 | 1800V |
| 50 | 2000V |

Voltage maximum scale value (2/3)

| STEP | V unit | kV unit |
|------|--------|---------|
| 51 | 2200V | |
| 52 | 2400V | |
| 53 | 2500V | |
| 54 | 3000V | |
| 55 | 3200V | |
| 56 | 3600V | |
| 57 | 4000V | |
| 58 | 4500V | |
| 59 | 4800V | |
| 60 | 5000V | |
| 61 | 6000V | |
| 62 | 6400V | |
| 63 | | 7.2kV |
| 64 | | 7.5kV |
| 65 | | 8kV |
| 66 | | 9kV |
| 67 | | 9.6kV |
| 68 | | 10kV |
| 69 | | 12kV |
| 70 | | 15kV |
| 71 | | 16kV |
| 72 | | 18kV |
| 73 | | 20kV |
| 74 | | 22kV |
| 75 | | 24kV |
| 76 | | 25kV |
| 77 | | 30kV |
| 78 | | 32kV |
| 79 | | 36kV |
| 80 | | 40kV |
| 81 | | 45kV |
| 82 | | 48kV |
| 83 | | 50kV |
| 84 | | 60kV |
| 85 | | 64kV |
| 86 | | 72kV |
| 87 | | 75kV |
| 88 | | 80kV |
| 89 | | 90kV |
| 90 | | 96kV |
| 91 | | 100kV |
| 92 | | 120kV |
| 93 | | 150kV |
| 94 | | 160kV |
| 95 | | 180kV |
| 96 | | 200kV |
| 97 | | 220kV |
| 98 | | 240kV |
| 99 | | 250kV |
| 100 | | 300kV |

Voltage maximum scale value (3/3)

| STEP | kV unit |
|------|---------|
| 101 | 320kV |
| 102 | 360kV |
| 103 | 400kV |
| 104 | 450kV |
| 105 | 480kV |
| 106 | 500kV |
| 107 | 600kV |
| 108 | 640kV |
| 109 | 720kV |
| 110 | 750kV |
| 111 | 800kV |
| 112 | 900kV |
| 113 | 960kV |
| 114 | 1000kV |
| 115 | 1200kV |
| 116 | 1500kV |
| 117 | 1600kV |
| 118 | 1800kV |
| 119 | 2000kV |
| 120 | 2200kV |

## 6.3 Possible Setting Range for Maximum Scale

■Maximum scale value for active power

Possible setting range:-18 STEP to +3STEP of the rating
Example: When the rating is 1000W, the value is from 200W to 1600W.

Maximum scale value of active power (1/5)

| STEP | W unit |
|---|---|
| 1 | 8W |
| 2 | 9W |
| 3 | 9.6W |
| 4 | 10W |
| 5 | 12W |
| 6 | 15W |
| 7 | 16W |
| 8 | 18W |
| 9 | 20W |
| 10 | 22W |
| 11 | 24W |
| 12 | 25W |
| 13 | 30W |
| 14 | 32W |
| 15 | 36W |
| 16 | 40W |
| 17 | 45W |
| 18 | 48W |
| 19 | 50W |
| 20 | 60W |
| 21 | 64W |
| 22 | 72W |
| 23 | 75W |
| 24 | 80W |
| 25 | 90W |
| 26 | 96W |
| 27 | 100W |
| 28 | 120W |
| 29 | 150W |
| 30 | 160W |
| 31 | 180W |
| 32 | 200W |
| 33 | 220W |
| 34 | 240W |
| 35 | 250W |
| 36 | 300W |
| 37 | 320W |
| 38 | 360W |
| 39 | 400W |
| 40 | 450W |
| 41 | 480W |
| 42 | 500W |
| 43 | 600W |
| 44 | 640W |
| 45 | 720W |
| 46 | 750W |
| 47 | 800W |
| 48 | 900W |
| 49 | 960W |
| 50 | 1000W |

Maximum scale value of active power (2/5)

| STEP | W unit | kW unit |
|---|---|---|
| 51 | 1200W | |
| 52 | 1500W | |
| 53 | 1600W | |
| 54 | 1800W | |
| 55 | 2000W | |
| 56 | 2200W | |
| 57 | 2400W | |
| 58 | 2500W | |
| 59 | 3000W | |
| 60 | 3200W | |
| 61 | 3600W | |
| 62 | 4000W | |
| 63 | 4500W | |
| 64 | 4800W | |
| 65 | 5000W | |
| 66 | 6000W | |
| 67 | 6400W | |
| 68 | 7200W | |
| 69 | 7500W | |
| 70 | 8000W | |
| 71 | | 9kW |
| 72 | | 9.6kW |
| 73 | | 10kW |
| 74 | | 12kW |
| 75 | | 15kW |
| 76 | | 16kW |
| 77 | | 18kW |
| 78 | | 20kW |
| 79 | | 22kW |
| 80 | | 24kW |
| 81 | | 25kW |
| 82 | | 30kW |
| 83 | | 32kW |
| 84 | | 36kW |
| 85 | | 40kW |
| 86 | | 45kW |
| 87 | | 48kW |
| 88 | | 50kW |
| 89 | | 60kW |
| 90 | | 64kW |
| 91 | | 72kW |
| 92 | | 75kW |
| 93 | | 80kW |
| 94 | | 90kW |
| 95 | | 96kW |
| 96 | | 100kW |
| 97 | | 120kW |
| 98 | | 150kW |
| 99 | | 160kW |
| 100 | | 180kW |

Maximum scale value of active power (3/5)

| STEP | kW unit | MW unit |
|---|---|---|
| 101 | 200kW | |
| 102 | 220kW | |
| 103 | 240kW | |
| 104 | 250kW | |
| 105 | 300kW | |
| 106 | 320kW | |
| 107 | 360kW | |
| 108 | 400kW | |
| 109 | 450kW | |
| 110 | 480kW | |
| 111 | 500kW | |
| 112 | 600kW | |
| 113 | 640kW | |
| 114 | 720kW | |
| 115 | 750kW | |
| 116 | 800kW | |
| 117 | 900kW | |
| 118 | 960kW | |
| 119 | 1000kW | |
| 120 | 1200kW | |
| 121 | 1500kW | |
| 122 | 1600kW | |
| 123 | 1800kW | |
| 124 | 2000kW | |
| 125 | 2200kW | |
| 126 | 2400kW | |
| 127 | 2500kW | |
| 128 | 3000kW | |
| 129 | 3200kW | |
| 130 | 3600kW | |
| 131 | 4000kW | |
| 132 | 4500kW | |
| 133 | 4800kW | |
| 134 | 5000kW | |
| 135 | 6000kW | |
| 136 | 6400kW | |
| 137 | 7200kW | |
| 138 | 7500kW | |
| 139 | 8000kW | |
| 140 | | 9MW |
| 141 | | 9.6MW |
| 142 | | 10MW |
| 143 | | 12MW |
| 144 | | 15MW |
| 145 | | 16MW |
| 146 | | 18MW |
| 147 | | 20MW |
| 148 | | 22MW |
| 149 | | 24MW |
| 150 | | 25MW |

Maximum scale value of active power (4/5)

| STEP | MW unit |
|---|---|
| 151 | 30MW |
| 152 | 32MW |
| 153 | 36MW |
| 154 | 40MW |
| 155 | 45MW |
| 156 | 48MW |
| 157 | 50MW |
| 158 | 60MW |
| 159 | 64MW |
| 160 | 72MW |
| 161 | 75MW |
| 162 | 80MW |
| 163 | 90MW |
| 164 | 96MW |
| 165 | 100MW |
| 166 | 120MW |
| 167 | 150MW |
| 168 | 160MW |
| 169 | 180MW |
| 170 | 200MW |
| 171 | 220MW |
| 172 | 240MW |
| 173 | 250MW |
| 174 | 300MW |
| 175 | 320MW |
| 176 | 360MW |
| 177 | 400MW |
| 178 | 450MW |
| 179 | 480MW |
| 180 | 500MW |
| 181 | 600MW |
| 182 | 640MW |
| 183 | 720MW |
| 184 | 750MW |
| 185 | 800MW |
| 186 | 900MW |
| 187 | 960MW |
| 188 | 1000MW |
| 189 | 1200MW |
| 190 | 1500MW |
| 191 | 1600MW |
| 192 | 1800MW |
| 193 | 2000MW |
| 194 | 2200MW |
| 195 | 2400MW |
| 196 | 2500MW |
| 197 | 3000MW |
| 198 | 3200MW |
| 199 | 3600MW |
| 200 | 4000MW |

Maximum scale value of active power (5/5)

| STEP | MW unit |
|---|---|
| 201 | 4500MW |
| 202 | 4800MW |
| 203 | 5000MW |
| 204 | 6000MW |
| 205 | 6400MW |
| 206 | 7200MW |
| 207 | 7500MW |
| 208 | 8000MW |

### 6.4 Measurement Items and Correspondence between Display and Output

The table below shows the measurement items and correspondence between display and output.
○：Data can be displayed or output          Blank：Data cannot be displayed or output

| Measurement item | | 3-phase 4-wire | | | 3-phase 3-wire(3CT) 3-phase 3-wire(2CT) 1-phase 3-wire | | | 1-phase 2-wire | | | Communication |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Inst | Max | Min | Inst | Max | Min | Inst | Max | Min | |
| Current | 1 phase | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | 2 phase | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| | 3 phase | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| | AVG | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| | N phase | ○ | ○ | ○ | | | | | | | |
| Voltage | 1-N phase | ○ | ○ | ○ | | | | | | | |
| | 2-N phase | ○ | ○ | ○ | | | | | | | ○ (Note1) |
| | 3-N phase | ○ | ○ | ○ | | | | | | | |
| | AVG(L-N) | ○ | ○ | ○ | | | | | | | |
| | 1-2 phase | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| | 2-3 phase | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| | 3-1 phase | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| | AVG(L-L) | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| Active power | 1 phase | ○ | ○ | ○ | | | | | | | |
| | 2 phase | ○ | ○ | ○ | | | | | | | |
| | 3 phase | ○ | ○ | ○ | | | | | | | |
| | Σ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| Power factor | 1 phase | ○ | ○ | ○ | | | | | | | |
| | 2 phase | ○ | ○ | ○ | | | | | | | |
| | 3 phase | ○ | ○ | ○ | | | | | | | |
| | Σ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| Frequency | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | |
| Active energy | Imported | | ○ | | | ○ | | | ○ | | |
| Operation time | 1 | | ○ | | | ○ | | | ○ | | |
| | 2 | | ○ | | | ○ | | | ○ | | |

Note 1: The values which can be monitored by communication are same as the values displayed.
Note 2: When 1-phase 3-wire is selected, read the phase for the measurement item according to the following table.

| Phase wire method | 1 -phase | 2 -phase | 3 -phase | 12 -phase | 23 -phase | 31 -phase |
|---|---|---|---|---|---|---|
| 1-phase 3-wire (1N2) | 1 -phase | N -phase | 2 -phase | 1N -phase | 2N -phase | 12-phase |
| 1-phase 3-wire (1N3) | 1 -phase | N -phase | 3 -phase | 1N -phase | 3N -phase | 13 -phase |

**6.5 Measurement Characteristic**

■Metering actions in other than operation mode

| Status | Measurement | Display |
|---|---|---|
| Several seconds just after turning on the auxiliary power supply (Backlight is lit, and LCD is not lit.) | No measurement | No display |
| Setting mode, Set value confirmation mode Password protection mode | Same actions as in operation mode | No display of measured value |
| During power failure | No measurement | No display |

■Metering actions in input status

| Measurement items | Actions | |
|---|---|---|
| Current (A) | 0A when the input current is less than 0.005A | When it is over the upper limit of the possible display range (9999), the upper limit of the possible display range (9999) is displayed. |
| Voltage (V) | 0V when the input voltage (line voltage) is less than11V. For 3-phase 4-wire, 0V when the line to neutral voltage is less than 11V or the line to line voltage is less than 19V. For 1-phase 3-wire, 0V when the voltage between P1-P3 is less than 22V. | When it is over the upper limit of the possible display range (9999), the upper limit of the possible display range (9999) is displayed. (Note 2) |
| Active power (W) | 0W for total when the current and the voltage are 0A and 0V for all 3 phases. 0W for each phase when the current of phase n is 0A or the voltage of phase n is 0V. (where n = 1,2 or 3) | When it is over the upper limit of the possible display range (9999), the upper limit of the possible display range (9999) is displayed. |
| Power factor (PF) | 1.0 for total when the current and the voltage are 0A and 0V for all 3 phases. 1.0 for each phase when the current of phase n is 0A or the voltage of phase n is 0V. (where n = 1,2 or 3) | |
| Frequency (Hz) | When the voltage of phase1 is 0V, ---- is displayed. (Note 3) | When the frequency is less than 44.5Hz or over 99.9Hz, ---- is displayed. |
| Operating Time | 999999 hour is displayed if it is over 999999. | |

Note1: Input current and input voltage means the input to the instrument. They are not to primary sides of VT, CT.
Note2: For direct measurement, it does not input upper maximum scale value.
Note3: Depending on the setting, "----" is displayed when the voltage of phase 1 is not 0V.

## 6.6 Troubleshooting

In the case of abnormal noise, odor, smoke, or heat generation from this instrument, turn it off at once.

Check the followings before you ask for repair.

| | Condition | Possible cause | Solution |
|---|---|---|---|
| **Display** | The display is not lit. | Auxiliary power supply is not impressed on MA and MB terminals. | Impress auxiliary power supply. |
| | When the auxiliary power supply is impressed, display is not lit soon. | This is not an error. For about a few seconds after auxiliary power source is charged, initialization of internal circuit is carried out. | Use it as it is. |
| | The back light is not lit. | The back light may be set to auto off (Auto). (If it turns on after you press an operation button, it means the backlight is set to auto off.) | When the auto off is enabled, it automatically turns off in 5 minutes. Continue using it as it is or change the setting to HoLd (it stays on). (Refer to page 22) |
| | The display becomes black. | It may become black owing to static electricity. | It goes off after a while. |
| | "End" display remains. | The product is still in the setting mode. | Press (SET) . |
| **Measurement error** | The current and voltage have large errors. | The settings for VT / direct voltage and CT primary current may be incorrect. | Please check the set values for VT / direct voltage and CT primary current. |
| | The current and voltage are correct, but the active power, reactive power, and power factor have large errors. | The wiring for VT/CT or for the measurement instrument may be incorrect. | Please check the wiring for VT/CT and for the measurement instrument. |
| | Measured values of PF are including large error. | If the input current is smaller than the rating, error becomes large. (about 5% or below of rated current) | This is not an error, or use it as it is, or if error is troublesome, change the CT according to the actual current to be used. |
| | The displayed active power is different from the active power that is calculated by multiplying the displayed current, voltage, and power factor. | If the AC of the current and voltage deteriorate due to harmonics, it will not be the same as the calculated value. (For AC without harmonics, the calculated value will match with the displayed value.) | Please continue using the instrument as it is. |
| | The current measured by another measurement instrument (such as a clamp meter) is different from the current measured by this instrument. (More than the tolerance) | If another measurement instrument uses the average method for measuring, the measurement instrument used will have a larger error when the AC deteriorates due to harmonics. (This measurement instrument uses the RMS value method.) | Please compare the currents using a measurement instrument that uses the RMS value method. |
| | On the maximum/minimum value display screen, a present value that is outside of the maximum/minimum range is displayed. | During the starting current delay time, the maximum value is not updated, so the present value that is over the maximum value may be displayed. | Please continue using the instrument as it is. |
| **Operation** | Cannot change the settings in the setting mode. | If ![lock] at the bottom of the screen is blinking, you are in the set value confirmation mode. Settings cannot be changed in this mode. | Please go to the setting mode to change settings. |
| | "PASS 0000" appears when trying to change the setting mode. | The password protection setting is turned to valid. | Please enter the set password. Also, the default password is "0000" |
| **Other** | Maximum value and minimum value changed. | These are cleared if the settings for the phase wire , VT/direct voltage, and CT primary current are changed. | Make a note of the values before changing the settings |
| | The values of the setting items that were not supposed to change have changed. | Some setting items return to the default values when settings for the phase wire method, VT/direct voltage, and CT primary current are changed. | Please refer to "Initializing Related Items by Changing Settings" (page 35) and reconfigure the setting items that returned to their default values. |
| | "PASS 0000" appears when trying to clear the energy or maximum/minimum value. | The password protection setting is turned to valid. | Please enter the set password. Also, the default password is "0000" |

ME96SSE–MB
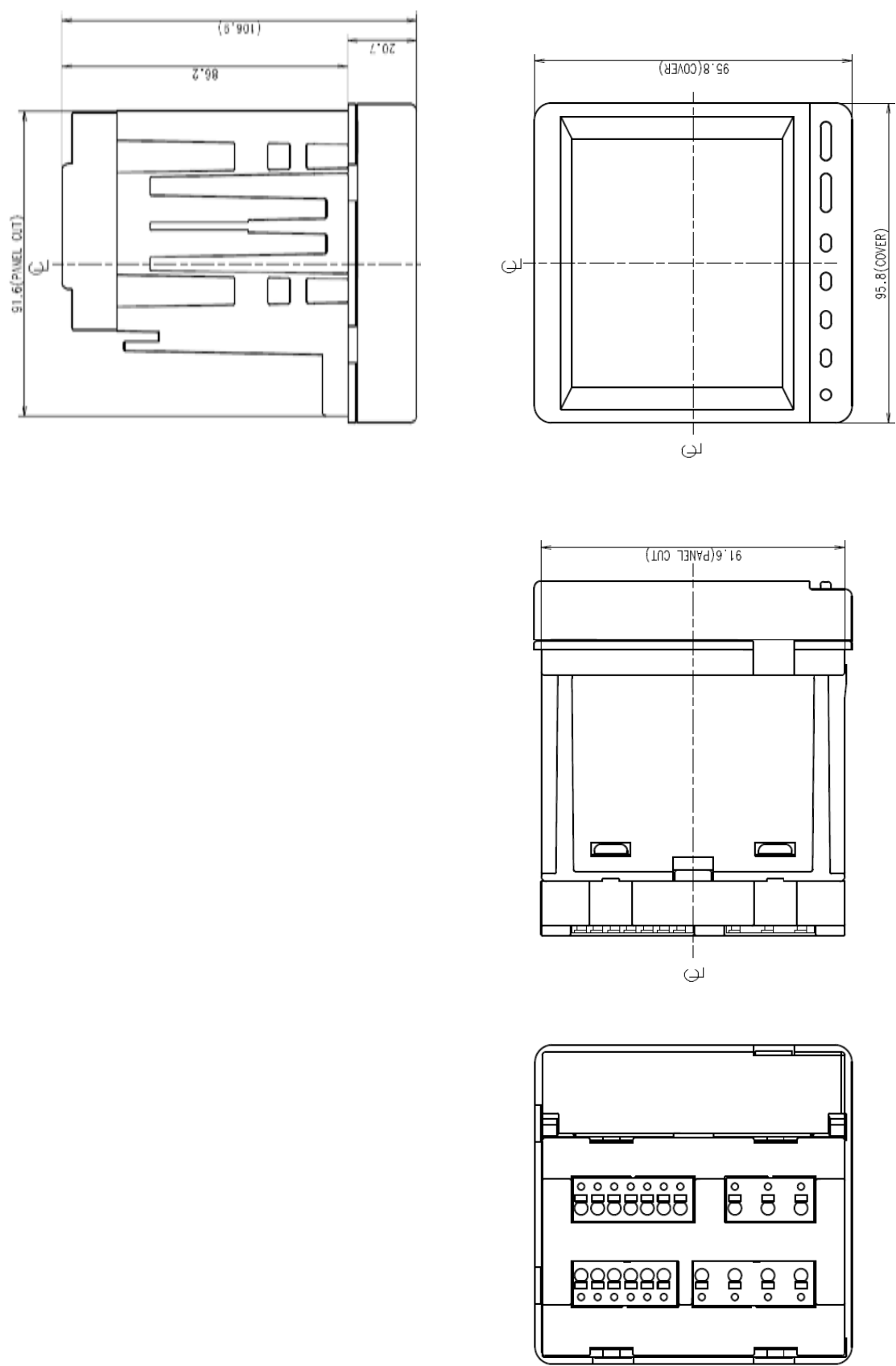
1 Dimensions of mounting holes

The drilling dimensions of the panel are as shown in the right fi
The product can be installed to a panel having a thickness of
1.6 to 4.0 mm.

2 Mounting position

The contrast of the LCD changes depending on the angle at wl

it is viewed.
Mount the product in the easy viewable position.

$92^{+0.5}_{0}$

$92^{+0.5}_{0}$

10°
60°

60° 60°

(Viewed from
the side)

(Viewed from
the top)
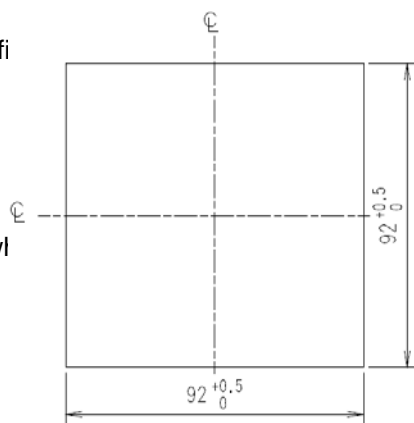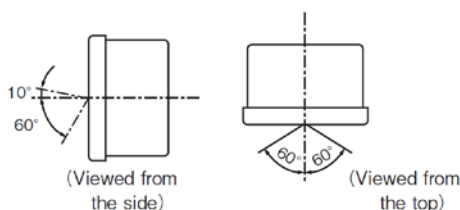
3 Mounting and fixing

Mount the product to the panel of the main unit according to the following procedure.

①Attach the mounting brackets to two areas
each in upper and lower parts of the main unit.

②Tighten the screws of the mounting
brackets to fix them to the panel.
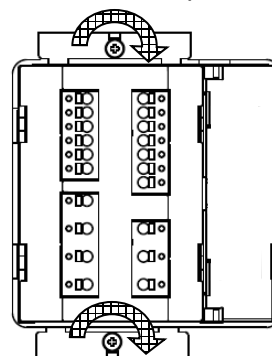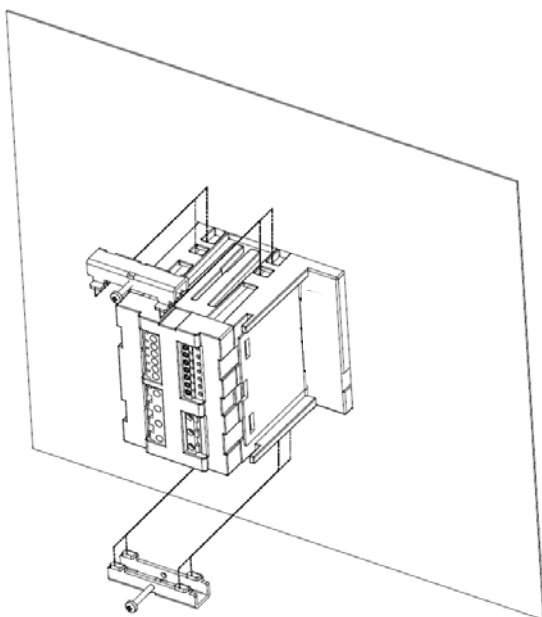
Screw type for mounting to the main unit: M3

| Note | To avoid damage to the panel and screws, do not overtighten the screws. The recommended torque for this product is 0.3 N•m to 0.5 N•m (about half the normal torque). Tighten the upper and lower screws evenly. |
|---|---|

| **Note** | Protecting sheet |
|---|---|
| | The LCD part is covered with a protecting sheet to avoid scratches to the LCD during mounting of the panel. Before starting operation, remove the sheet. When removing the sheet, the LCD may illuminate due to static electricity, but this is not a product failure. After a while, the LCD goes off as it naturally discharges electricity. |
| | Mounting position |
| | To mount the product to the edge of the panel, check the space for wiring work before determining the mounting position. |

### 1 Applicable electric wire

The following table shows applicable electric wire sizes. (Wire coating stripping length：10 to 11mm)

| Section | Screw type | Specification of wire used |
|---|---|---|
| Auxiliary power, voltage input, MODBUS®RTU communication terminal | Without screw | Single wire, Stranded wire: AWG24 to 14 (Stranded wire is bar terminal can be used in combination.)<br><br>Note: UL recognized corresponds, use according to the following conditions.<br>・Single wire, Stranded wire: AWG24 to 18<br>・Bar terminal can be not used in combination. |
| Current input terminal | Without screw | Single wire, Stranded wire: AWG24 to 14 (Stranded wire is bar terminal can be used in combination.)<br><br>Note: UL recognized corresponds, use according to the following conditions.<br>・Single wire: AWG22 to 16<br>・Bar terminal can be not used in combination. |
| Option terminal | Without screw | Single wire, Stranded wire: AWG24 to 14 (Stranded wire is bar terminal can be used in combination.)<br><br>Note: UL recognized corresponds, use according to the following conditions.<br>・Single wire, Stranded wire: AWG24 to 18<br>・Bar terminal can be not used in combination. |

Note ：When using the bar terminal for insert 2 wire, please select insertion length of 12 to 13mm.

10 to 11mm
Electric wire

12 to 13mm
Bar terminal for insert 2 wire
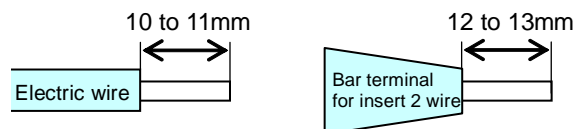
### 2 Connection method

①Peel the cover of the electric wire tip or crimp the bar terminal.

②With the lever pressed, insert the electric wire and then release the lever for connection.。

■Example of the main unit

Insert hole — Lever
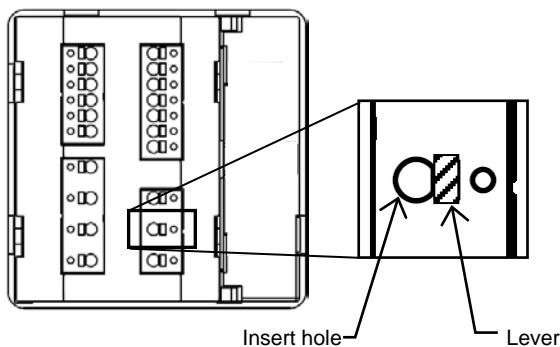
### 3 Checking

Check the following after connection.

□The electric wire is securely connected.

□There is no error in connection.

⚠CAUTION

| Do not work with hot-line jobs |
|---|

Do not connect hot-line jobs. It may cause electric shock, burns, device burn out, or fire. It is recommended that a protection fuse be used for VT and the auxiliary power source.

| Do not open the secondary side of the CT circuit |
|---|

Connect the CT secondary side signal correctly to the terminal for CT connection.
If the CT is not connected properly or if the secondary side of the CT is open, it may result in high voltage on the secondary side of the CT, the insulation of the secondary winding wire may be damaged, and burnout may be caused.

| Do not short the secondary side of the VT circuit |
|---|

Connect the VT secondary side signal correctly to the terminal for VT connection.
If the VT is not connected properly or if the secondary side of the VT shorts, over current may flow to the secondary side of the VT, which can burn out the secondary winding wire. If the secondary winding wire burns out, it can damage the insulation of the primary winding wire, resulting in a short between phases.

| Make sure connections to the connection terminals are tight |
|---|

Electrical wires must be properly tightened to the connection terminal.

Otherwise, heat and measurement errors may be caused.

| Do not forget wiring of "$C_1$","$C_2$" and "$C_3$" for pass. |
|---|

When the L side of CT circuit is common wire, it is necessary to short-circuit "C1","C2", and "C3" terminal of this device.

| Do not use improper electrical wires |
|---|

Make sure that the electrical wires have the proper rating for current and voltage.

If inappropriate electrical wires are used, fire may be caused.

| Do not pull the connection wires with force |
|---|

If the terminal wiring is pulled with a strong force, the output portion may detach.
(Tensile load: 39.2N or less)

| Do not apply an abnormal voltage. |
|---|

If a pressure test is given to a high-pressure device, a ground must be used in order to avoid damaging this measurement instrument. If a high voltage of AC2000V is applied for over one minute to the measurement instrument, damage may occur.

| Do not connect to Non-Connection (NC) terminal. |
|---|

Do not connect to Non-Connection (NC) terminals for the purpose of relay etc.

| Use the proper voltage for the auxiliary power source. |
|---|

Use the proper voltage for the auxiliary power source terminal.
If an improper voltage is used, the instrument may be damaged or fire may be caused.

Rating voltage for every phase wire system

| Phase wire type | Type | Rating voltage | Figure |
|---|---|---|---|
| 3-phase 4-wire type | STAR | max AC277V(L-N)/480V(L-L) | Figure 1 |
| 3-phase 3-wire type | DELTA | max AC220V(L-L) | Figure 2 |
| | STAR | max AC440V(L-L) | Figure 3 |
| 1-phase 3-wire type | — | max AC220V(L-N)/440V(L-L) | Figure 4 |
| 1-phase 2-wire type (Note) | DELTA | max AC220V(L-L) | Figure 5 |
| | STAR | max AC440V(L-L) | Figure 6 |

Note. In case of a circuit which is wired from the delta connection of a 3-phase 3-wire type or a circuit of a transformer of a 1-phase 2-wire type, the maximum rating is "AC220V".
In case of a circuit which is wired from a 3-phase 4-wire type, the star connection of a 3-phase 3-wire type or a 1-phase 3-wire type, the maximum rating is "AC440V".
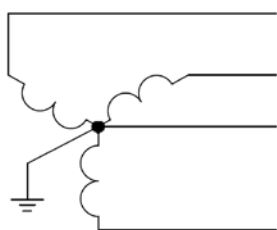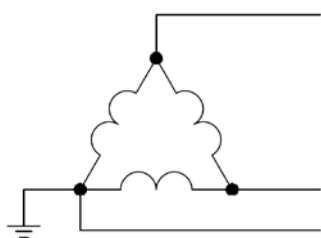


Figure1. 3-PHASE 4-WIRE(STAR)



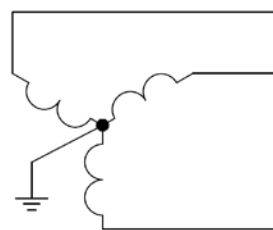Figure2. 3-PHASE 3-WIRE(DELTA)



Figure3. 3-PHASE 3-WIRE(STAR)
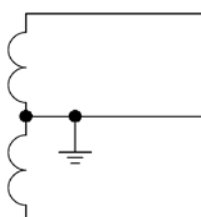


Figure4. 1-PHASE 3-WIRE
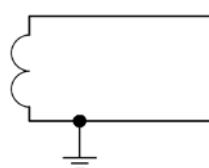


Figure5. 1-PHASE 2-WIRE(DELTA)



Figure6. 1-PHASE 2-WIRE(STAR)

3-phase 4-wire type: Direct input
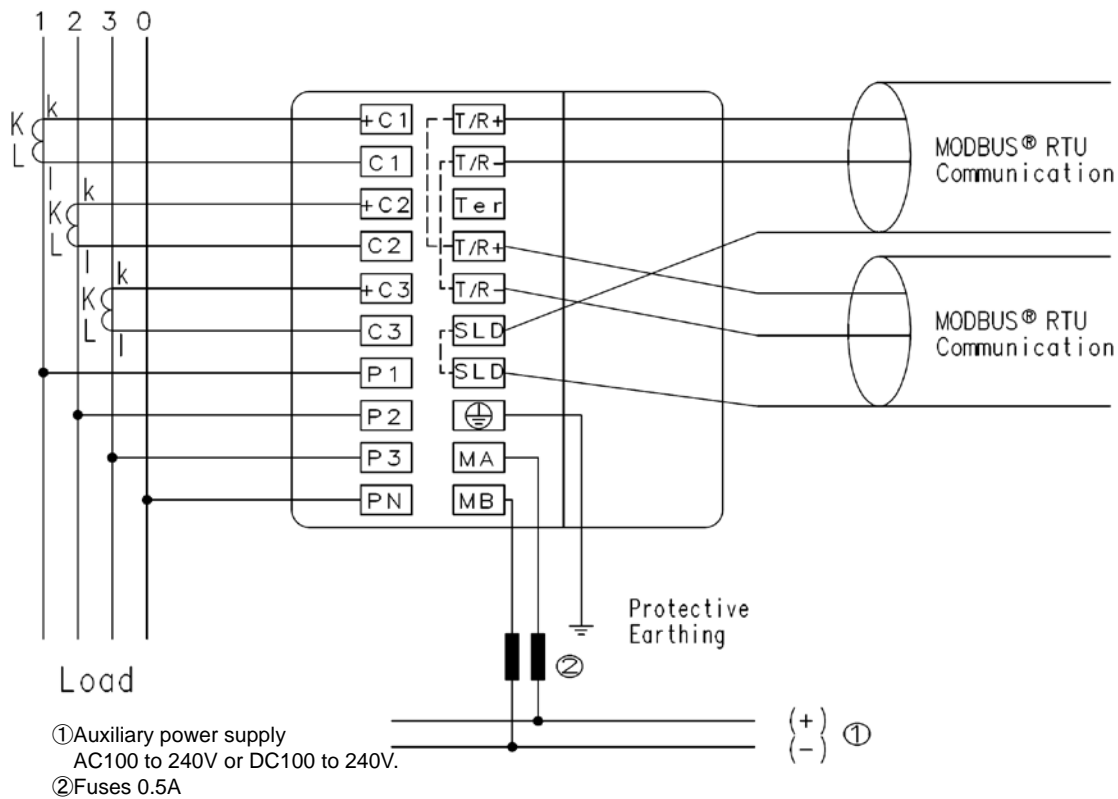


①Auxiliary power supply
   AC100 to 240V or DC100 to 240V.
②Fuses 0.5A

Note 1: For low voltage circuits, grounding the secondary side of VT and CT is not t necessary.

3-phase 4-wire type: With VT
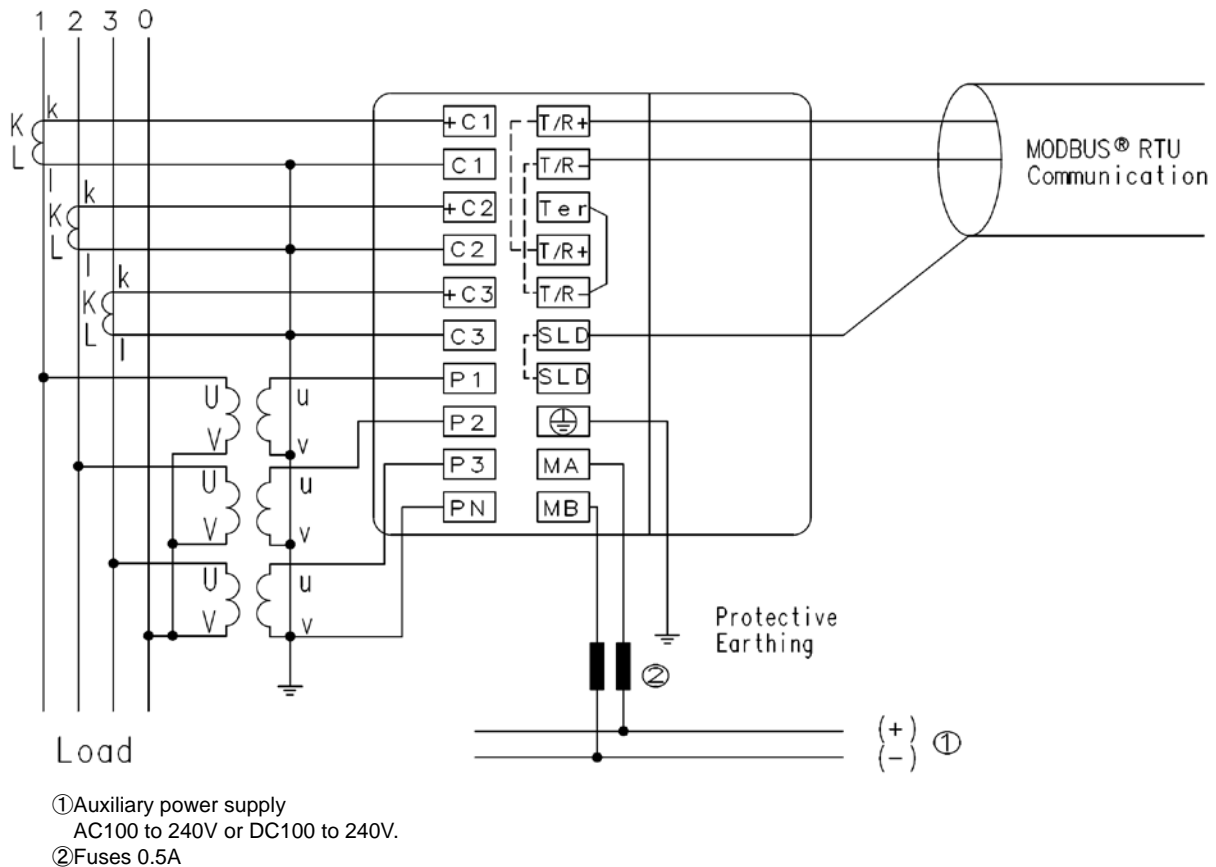


①Auxiliary power supply
   AC100 to 240V or DC100 to 240V.
②Fuses 0.5A

Note 1: For low voltage circuits, grounding the secondary side of VT and CT is not t necessary.

### 3-phase 3-wire(2CT) type: Direct input
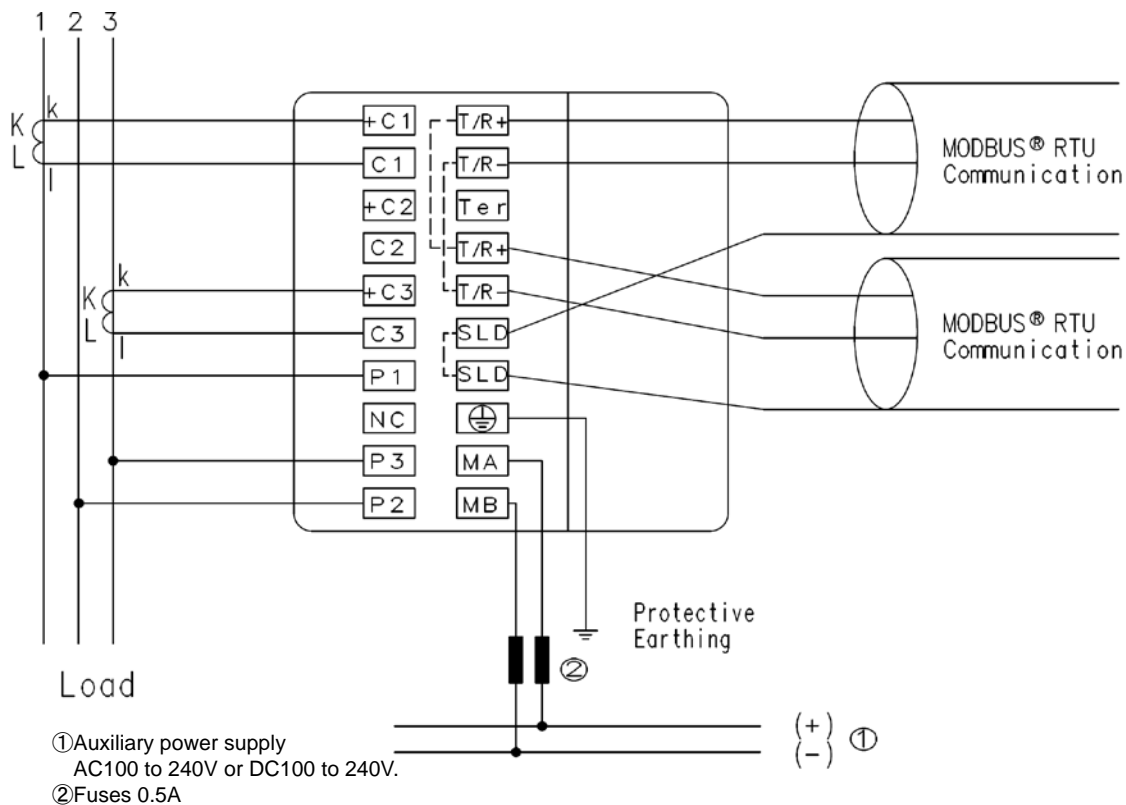


①Auxiliary power supply
   AC100 to 240V or DC100 to 240V.
②Fuses 0.5A

Note 1: For low voltage circuits, grounding the secondary side of VT and CT is not t necessary.
Note 2: Do not connect to NC terminal.

### 3-phase 3-wire(3CT) type: With VT
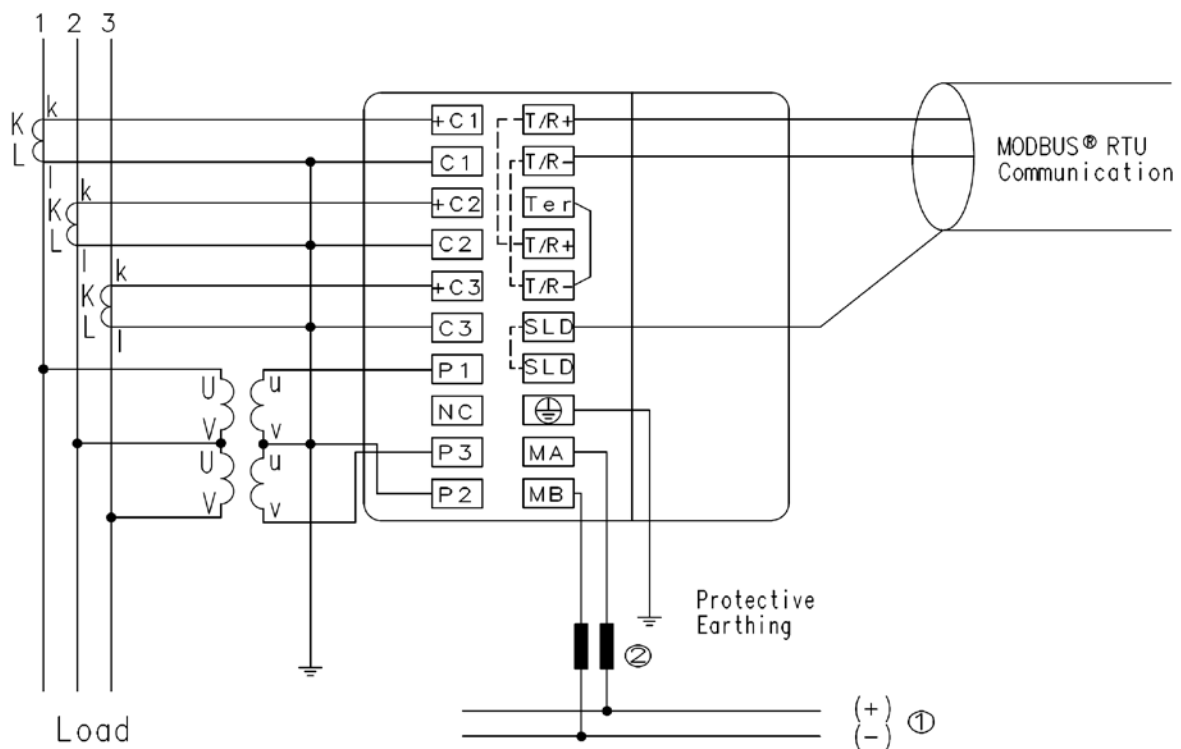


①Auxiliary power supply
   AC100 to 240V or DC100 to 240V.
②Fuses 0.5A

Note 1: For low voltage circuits, grounding the secondary side of VT and CT is not t necessary.
Note 2: Do not connect to NC terminal.

### 1-phase 3-wire type



①Auxiliary power supply
 AC100 to 240V or DC100 to 240V.
②Fuses 0.5A
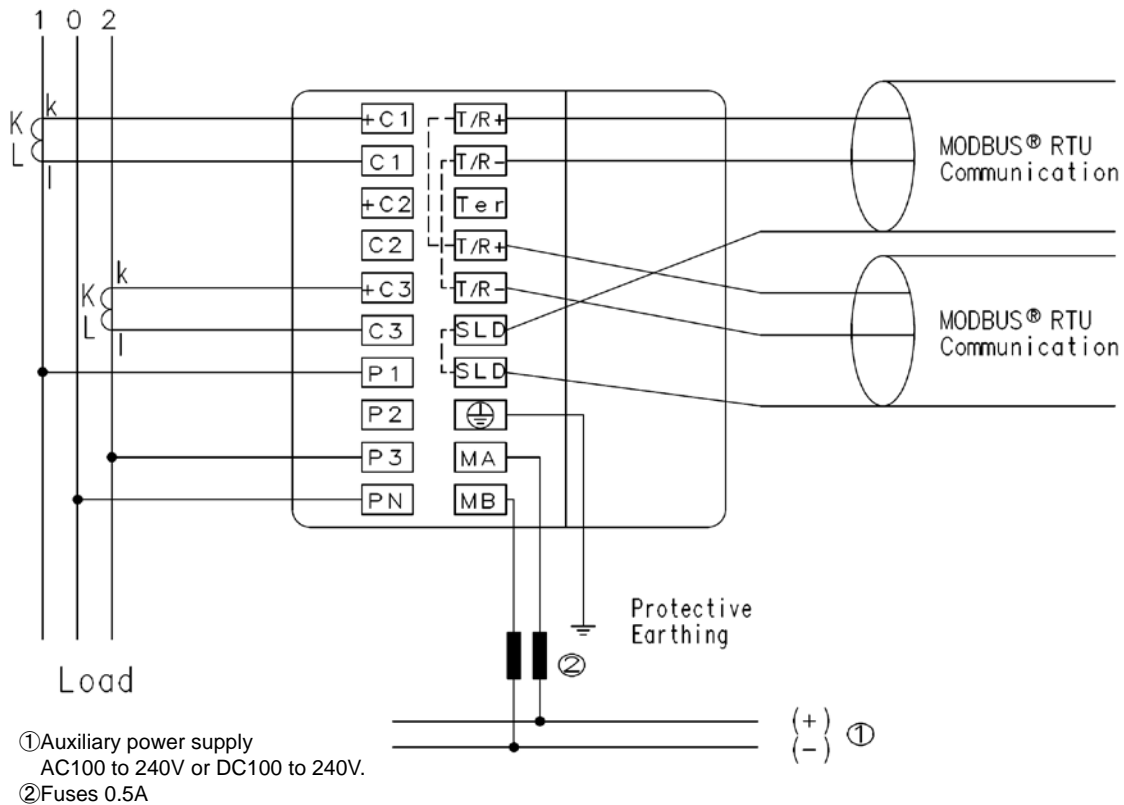
Note 1: For low voltage circuits, grounding the secondary side of CT is not t necessary

### 1-phase 2-wire type: With VT
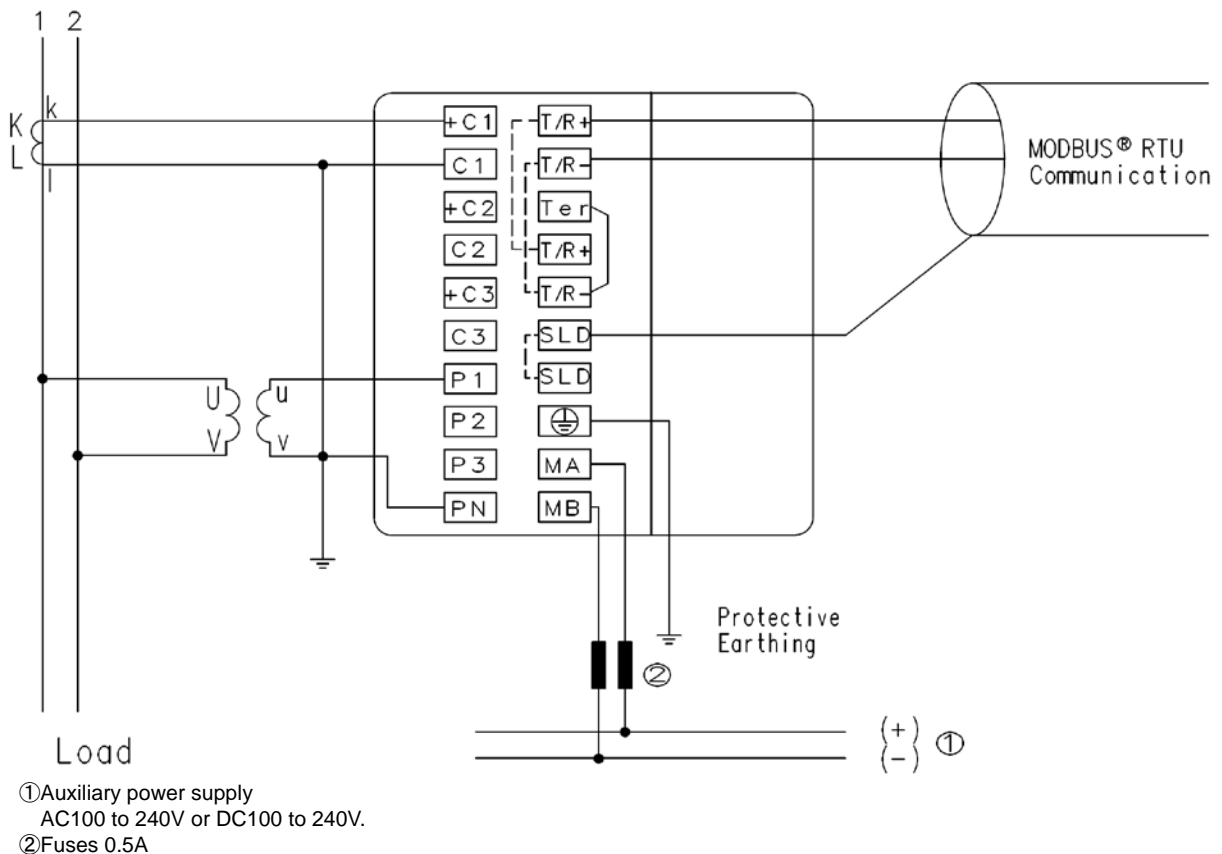


①Auxiliary power supply
 AC100 to 240V or DC100 to 240V.
②Fuses 0.5A

Note 1: For low voltage circuits, grounding the secondary side of VT and CT is not t necessary.

Note for Input

| | |
|---|---|
| **Note** | 1. The voltage input terminals for 3-phase 3-wire are different from those for others.<br>2. If the polarity for VT and CT are wrong, the measurement cannot be executed correctly.<br>3. Do not connect wires to the NC terminals.<br>4. In the case of low voltage, there is no need for grounding of the secondary sides of VT and CT.<br>5. Always earth the ⊕ terminal to the protective earth conductor. Earth the terminal with less than 100 ohm of earth resistance. Otherwise there will be a false operation. |

Note for MODBUS®RTU

| | |
|---|---|
| **Note** | 1. Use the shielded twisted pair cable. (Recommended cables: Refer to page 82.)<br>2. To the units at both ends of the MODBUS®RTU link, the 120-ohm resistance has to be attached. This instrument can perform a 120-ohm termination by short-circuiting the terminal of T/R- and Ter.<br>3. The earthing has to be connected to earth by a thick wire of low impedance.<br>4. Keep the distance between MODBUS®RTU link to power lines.<br>5. Connect to earth the SLD terminal at one end. |

# Specifications

## 1. Specification

| Type | ME96SSE-MB | | |
|---|---|---|---|
| Phase wire system | 3-PHASE 4-WIRE, 3-PHASE 3-WIRE（3CT, 2CT）, 1-PHASE 3-WIRE, 1-PHASE 2-WIRE （common） | | |
| Rating — Current | AC5A, AC1A （common） | | |
| Rating — Voltage | 3-PHASE 4-WIRE：max AC277/480V<br>3-PHASE 3-WIRE：(DELTA)max AC220V, (STAR)max AC440V<br>1-PHASE 3-WIRE：max AC220/440V<br>1-PHASE 2-WIRE：(DELTA)max AC220V, (STAR)max AC440V | | |
| Rating — Frequency | 50-60Hz （common） | | |

| Item | | Measurement Item | Accuracy |
|---|---|---|---|
| Measurement elements | Current（A） | A1、A2、A3、AN、$A_{AVG}$ | ±0.5% |
| | Voltage（V） | V12、V23、V31、$V_{AVG}$(L-L)、V1N、V2N、V3N、$V_{AVG}$(L-N) | |
| | Active Power（W） | W1、W2、W3、ΣW | |
| | Power Factor（PF） | PF1、PF2、PF3、ΣPF | ±2.0% |
| | Frequency（Hz） | Hz | ±0.5% |
| | Active Energy（Wh） | Imported | class1.0 （IEC62053-21） |
| | Operation time（h） | Operation time 1, Operation time 2 | （Reference） |
| Measuring Method | Instantaneous Value | A・V：RMS calculation、W・Wh：Digital multiplication、PF：Power ratio calculation、Hz：Zero-cross | |
| Display | Type | LCD with backlight | |
| | Maximum Number of Display Digits or Segment Number — Number of display digits | Upper stage display：6 digits, Middle stage display：6 digits, Lower stage display：6 digits<br><br>A, V, W, PF：4 digits　　Hz：3 digits　　Wh：9 digits（6 digits or 12 digits possible）<br><br>Operation time：6 digits | |
| | Maximum Number of Display Digits or Segment Number — Bar graph | 21 Segment-Bar graph, 22 Segment-Indicator | |
| | Display updating time interval | 0.5s, 1s | |
| Communication Specification | | MODBUS®RTU communication | |
| Power Failure Compensation | | Non volatile memory（Items　：Setting value, MAX/MIN value, Active energy, Operation time） | |
| VA Consumption | VT | 0.1VA/phase, 0.2VA（at direct input 220V） | |
| | CT | 0.1VA/phase | |
| | Auxiliary power | 7VA（AC110V）, 8VA（AC220V）, 5W（DC100V） | |
| Auxiliary power | | AC100-240V（±15%）, DC100-240V（-30% +15%） | |
| Weight | | 0.5kg | |
| Dimension | | 96（H）×96（W）×86（D） | |
| Attachment Method | | Embedding attachment | |
| Operating temperature/humidity | | -5 to +55℃(average temperature：35℃ or less per day), 0 to 85%RH, non condensing | |
| Storage temperature/ humidity | | -25 to +75℃(average temperature：35℃ or less per day), 0 to 85%RH, non condensing | |

Note1: Accuracy is specified according to the maximum scales value of rated value.

## 2. Applicable Standards

| Electromagnetic Compatibility | | | |
|---|---|---|---|
| | Emissions | | |
| | | Radiated Emission | EN61326-1/CISPR 11, FCC Part15 Subpart B Class A |
| | | Conducted Emission | EN61326-1/CISPR 11 FCC Part15 Subpart B Class A |
| | | Harmonics Measurement | EN61000-3-2 |
| | | Flicker Meter Measurement | EN61000-3-3 |
| | Immunity | | |
| | | Electrostatic discharge Immunity | EN61326-1/EN61000-4-2 |
| | | Radio Frequency Electromagnetic field Immunity | EN61326-1/EN61000-4-3 |
| | | Electrical Fast Transient/Burst Immunity | EN61326-1/EN61000-4-4 |
| | | Surge Immunity | EN61326-1/EN61000-4-5 |
| | | Conducted Disturbances, Induced By Radio Frequency Fields Immunity | EN61326-1/EN61000-4-6 |
| | | Power Frequency Magnetic Field Immunity | EN61326-1/EN61000-4-8 |
| | | Voltage Dips and Short Interruptions | EN61326-1/EN61000-4-11 |

| Safety | |
|---|---|
| Europe | CE, as per EN61010-1 |
| U.S. and Canada | cRUus as per UL61010-1、IEC61010-1 |
| Installation Category | Ⅲ |
| Measuring Category | Ⅲ |
| Pollution Degree | 2 |

## 3. Precautions for MODBUS® RTU Communication

| Item | Specifications |
|---|---|
| Physical interface | RS－485 2wires half duplex |
| Protocol | RTU (Binary data) |
| Synchronization method | Start-stop synchronization |
| Network topology | Daisy-chain |
| Baud rate | 2400, 4800, 9600, 19200, 38400bps |
| Data bit | 8 |
| Stop bit | 1, 2 |
| Parity | Odd, Even, None |
| Slave address | 1 to 255 (0：For broadcast) |
| Distance | 1200m |
| Maximum Number | 31 |
| Response time | 1s or less (time to a response after receiving a query) |
| Terminate | 120Ω 1/2W |
| Recommended cable | Shielded twisted pair, AWG24 to 14 gauge |

■ About Programming
In addition to this manual, read the following documents too.
● Electronic Multi-Measuring Instrument ME96NSR-MB/ ME96SSH-MB/ ME96SSR-MB/ ME96SSE-MB Interface specifications .......................................................................................................................................................... LSPM-0075

## 4. Setting Table (Factory Settings and Customer Setting Note)

| Setting menu No. | | | Setting items | Initial content | Memo |
|---|---|---|---|---|---|
| 1 | 1.1 | | Phase wire system | 3P4(3-phase 4-wire) | |
| | 1.2 | | Display pattern | P02 | |
| | | 1.2.1 | Pattern P00 | — | |
| | 1.3 | | VT/direct selection | — | |
| | | 1.3.1 | Direct voltage | no(No VT) | |
| | | 1.3.2 | VT secondary voltage | 220/380V | |
| | | 1.3.3 | VT primary voltage | — | |
| | 1.4 | | CT secondary current | 5A | |
| | | 1.4.1 | CT primary current | 5A | |
| | 1.5 | | Frequency | 50Hz | |
| 2 | 2.2 | | MODBUS®RTU address | 1 | |
| | | 2.2.1 | MODBUS®RTU baud rate | 19.2kbps | |
| | | 2.2.2 | MODBUS®RTU parity | EVEn(even) | |
| | | 2.2.3 | MODBUS®RTU stop bit | 1 | |
| 3 | 3.1 | | Current maximum scale | 5A(CT primary current) | |
| | | 3.1.1 | Special current maximum scale | — | |
| | 3.2 | | Voltage maximum scale | 300V(±0 STEP) | |
| | 3.3 | | Power maximum scale | 4000W(±0 STEP) | |
| | | 3.3.1 | Single / Double deflection | Single deflection | |
| | 3.5 | | Power factor scale | 0.5（-0.5 to 1 to 0.5） | |
| 4 | 4.1 | | Model name + option code | (Model name) | |
| | 4.2 | | Version display | (Version) | |
| | 4.3 | | Back light brightness | 3 | |
| | 4.4 | | Back light auto off | Auto(Auto off) | |
| | 4.5 | | Display update time | 0.5s | |
| 5 | 5.1 | | Alarm item 1 | non | |
| | | 5.1.1 | Alarm value 1 | — | |
| | 5.2 | | Alarm item 2 | non | |
| | | 5.2.1 | Alarm value 2 | — | |
| | 5.3 | | Alarm item 3 | non | |
| | | 5.3.1 | Alarm value 3 | — | |
| | 5.4 | | Alarm item 4 | non | |
| | | 5.4.1 | Alarm value 4 | — | |
| | 5.5 | | Alarm delay time | — | |
| | 5.6 | | Alarm cancel method | — | |
| | 5.7 | | Back light flickers during alarms | — | |
| | 5.8 | | Motor start-up current masking | oFF | |
| | | 5.8.1 | Motor start-up current threshold | — | |
| | | 5.8.2 | Motor start-up current delay time | — | |
| 8 | 8.1 | | Operating time display | oFF | |
| | | 8.1.1 | Target for counting Operation time setting | AUX（Auxiliary power） | |
| | | 8.1.2 | Operating time threshold | — | |
| | 8.2 | | Switch element information | 123 | |
| | 8.3 | | Set IEC mode | oFF（Normal mode） | |

# MITSUBISHI Electronic Multi-Measuring Instrument

## ■Service Network

| Country/Region | Corporation Name | Address | Telephone |
|---|---|---|---|
| Australia | Mitsubishi Electric Australia Pty. Ltd. | 348 Victoria Road, Rydalmere, N.S.W. 2116, Australia | +61-2-9684-7777 |
| Algeria | Mec Casa | Rue i N 125 Hay-Es-Salem, 02000, W-Chlef, Algeria | +213-27798069 |
| Bangladesh | PROGRESSIVE TRADING CORPORATION | HAQUE TOWER,2ND FLOOR,610/11,JUBILEE ROAD, CHITTAGONG, BANGLADESH | +880-31-624307 |
| | ELECTRO MECH AUTOMATION& ENGINEERING LTD. | SHATABDI CENTER, 12TH FLOOR, SUITES : 12-B, 292, INNER CIRCULAR ROAD, FAKIRA POOL, MOTIJHEEL, DHAKA-1000, BANGLADESH | +88-02-7192826 |
| Belarus | Tehnikon | Oktyabrskaya 19, Off. 705, BY-220030 Minsk, Belarus | +375 (0)17 / 210 46 26 |
| Belgium | Koning & Hartman B.V. | Woluwelaan 31, BE-1800 Vilvoorde, Belgium | +32 (0)2 / 2570240 |
| Brazil | Mitsubishi Electric do Brasil Comércio e Serviços Ltda. | Avenida Adelino Cardana, 293 21 andar Bethaville, Barueri SP, Brasil | +55-11-4689-3000 |
| Cambodia | DHINIMEX CO.,LTD | #245, St. Tep Phan, Phnom Penh, Cambodia | +855-23-997-725 |
| Central America | Automation International LLC | 7050 W. Palmetto Park Road Suite #15 PMB #555, Boca Raton, FL 33433 | +1-561-237-5228 |
| Chile | Rhona S.A. (Main office) | Vte. Agua Santa 4211 Casilla 30-D (P.O. Box) Vina del Mar, Chile | +56-32-2-320-600 |
| China | Mitsubishi Electric Automation (China) Ltd. | Mitsubishi Electric Automation Building, No.1386 Hongqiao Road, Shanghai, China 200336 | +86-21-2322-3030 |
| | Mitsubishi Electric Automation (China) Ltd. BeiJing | 5/F,ONE INDIGO,20 Jiuxianqiao Road Chaoyang District,Beijing, China 100016 | +86-10-6518-8830 |
| | Mitsubishi Electric Automation (China) Ltd. ShenZhen | Level 8, Galaxy World Tower B, 1 Yabao Road, Longgang District, Shenzhen, China 518129 | +86-755-2399-8272 |
| | Mitsubishi Electric Automation (China) Ltd. GuangZhou | Rm.1006, A1 Times E-Park, No.276-282, Hanxi Road East, Zhongcun Street, Panyu Distric, Guangzhou, China 510030 | +86-20-8923-6730 |
| | Mitsubishi Electric Automation (China) Ltd. ChengDu | 1501-1503,15F, Guang-hua Centre Building-C, No.98 North Guang Hua 3th Rd Chengdu, China 610000 | +86-28-8446-8030 |
| | Mitsubishi Electric Automation (Hong Kong) Ltd. | 20/F., Cityplaza One, 1111 king's Road, Taikoo shing, Hong Kong | +852-2510-0555 |
| Colombia | Proelectrico Representaciones S.A. | Carrera 42 Nº 75 – 367 Bodega 109, Itagüi, Medellín, Antioquia, Colombia | +57-4-4441284 |
| Czech Republic | AUTOCONT CONTROL SYSTEMS S.R.O | Technologická 374/6, CZ-708 00 Ostrava - Pustkovec | +420 595 691 150 |
| Denmark | BEIJER ELECTRONICS A/S | LYKKEGARDSVEJ 17, DK-4000 ROSKILDE, Denmark | +45 (0)46/ 75 76 66 |
| Egypt | Cairo Electrical Group | 9, Rostoum St. Garden City P.O. Box 165-11516 Maglis El-Shaab,Cairo - Egypt | +20-2-27961337 |
| France | Mitsubishi Electric Europe B.V. French Branch | FR-92741 Nanterre Cedex | +33 (0)1 55 68 57 01 |
| Germany | Mitsubishi Electric Europe B.V. | Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany | +49 (0) 2102 4860 |
| Greece | KALAMARAKIS - SAPOUNAS S.A. | IONIAS & NEROMILOU STR., CHAMOMILOS ACHARNES, ATHENS, 13678 Greece | +30-2102 406000 |
| | UTECO | 5, MAVROGENOUS STR., 18542 PIRAEUS, Greece | +30-211-1206-900 |
| Hungary | Meltrade Ltd. | Fertö utca 14. HU-1107 Budapest, Hungary | +36 (0)1-431-9726 |
| India | Mitsubishi Electric India Private Limited | 2nd Floor, Tower A&B, Cyber Greens, DLF Cyber City, DLF Phase-III, Gurgaon - 122 022 Haryana, India | +91-124-4630300 |
| | Mitsubishi Electric India Private Limited Pune Sales Office | ICC-Devi Gaurav Technology Park, Unit no. 402, Fourth Floor, Survey no. 191-192 (P), Opp. Vallabh Nagar Bus Depot, Pune – 411018, Maharashtra, India | +91-20-68192100 |
| | Mitsubishi Electric India Private Limited FA Center | 204-209, 2nd Floor, 31FIVE, Corporate Road, Prahladnagar, Ahmedabad 380015,Gujarat. India | +91-79677-77888 |
| Indonesia | PT.Mitsubishi Electric Indonesia | Gedung Jaya 8th floor, JL.MH. Thamrin No.12 Jakarta Pusat 10340, Indonesia | +62-21-3192-6461 |
| | P.T. Sahabat Indonesia | P.O.Box 5045 Kawasan Industri Pergudangan, Jakarta, Indonesia | +62-(0)21-6610651-9 |
| Ireland | Mitsubishi Electric Europe B.V. | Westgate Business Park, Ballymount, IRL-Dublin 24, Ireland | +353 (0)1-4198800 |
| Israel | Gino Industries Ltd. | 26, Ophir Street IL-32235 Haifa, Israel | +972 (0)4-867-0656 |
| Italy | Mitsubishi Electric Europe B.V. | Viale Colleoni 7, I-20041 Agrate Brianza (MI), Italy | +39 039-60531 |
| Kazakhstan | Kazpromavtomatika | Ul. Zhambyla 28, KAZ - 100017 Karaganda | +7-7212-501000 |
| Korea | Mitsubishi Electric Automation Korea Co., Ltd | 9F Gangseo Hangang xi-tower A, 401 Yangcheon-ro, Gangseo-gu, Seoul 07528 Korea | +82-2-3660-9573 |
| Laos | AROUNKIT CORPORATION IMPORT-EXPORT SOLE CO.,LTD | SAPHANMO VILLAGE. SAYSETHA DISTRICT, VIENTIANE CAPITAL, LAOS | +856-20-415899 |
| Lebanon | Comptoir d'Electricite Generale-Liban | Cebaco Center - Block A Autostrade Dora, P.O. Box 11-2597 Beirut - Lebanon | +961-1-240445 |
| Lithuania | Rifas UAB | Tinklu 29A, LT-5300 Panevezys, Lithuania | +370 (0)45-582-728 |
| Malaysia | Mittric Sdn Bhd | No. 5 Jalan Pemberita U1/49, Temasya Industrial Park, Glenmarie 40150 Shah Alam,Selangor, Malaysia | +603-5569-3748 |
| Malta | ALFATRADE LTD | 99 PAOLA HILL, PAOLA PLA 1702, Malta | +356 (0)21-697-816 |
| Maroco | SCHIELE MAROC | KM 7,2 NOUVELLE ROUTE DE RABAT AIN SEBAA, 20600 Casablanca, Maroco | +212 661 45 15 96 |
| Myanmar | Peace Myanmar Electric Co.,Ltd. | NO137/139 Botahtaung Pagoda Road, Botahtaung Town Ship 11161,Yangon,Myanmar | +95-(0)1-202589 |
| Nepal | Watt&Volt House | KHA 2-65,Volt House Dillibazar Post Box:2108,Kathmandu,Nepal | +977-1-4411330 |
| Netherlands | Imtech Marine & Offshore B.V. | Sluisjesdijk 155, NL-3087 AG Rotterdam, Netherlands | +31 (0)10-487-19 11 |
| North America | Mitsubishi Electric Automation, Inc. | 500 Corporate Woods Parkway, Vernon Hills, IL 60061 USA | +847-478-2100 |
| Norway | Scanelec AS | Leirvikasen 43B, NO-5179 Godvik, Norway | +47 (0)55-506000 |
| Mexico | Mitsubishi Electric Automation, Inc. Mexico Branch | Blvd. Miguel de Cervantes Saavedra 301, Torre Norte Piso 5, Col. Ampliación Granada, Miguel Hidalgo, Ciudad de México, CP 11520, México | +52-55-3067-7511 |
| Middle East Arab Countries & Cyprus | Comptoir d'Electricite Generale-International-S.A.L. | Cebaco Center - Block A Autostrade Dora P.O. Box 11-1314 Beirut - Lebanon | +961-1-240430 |
| Pakistan | Prince Electric Co. | 2-P GULBERG II, LAHORE, 54600, PAKISTAN | +92-42-575232, 5753373 |
| Peru | Rhona S.A. (Branch office) | Avenida Argentina 2201, Cercado de Lima | +51-1-464-4459 |
| Philippines | MELCO Factory Automation Philippines Inc. | 128, Lopez Rizal St., Brgy. Highway Hills, Mandaluyong City, Metro Manila, Phillippines | +63-(0)2-256-8042 |
| | Edison Electric Integrated, Inc. | 24th Fl. Galleria Corporate Center, Edsa Cr. Ortigas Ave., Quezon City Metro Manila, Philippines | +63-(0)2-634-8691 |
| Poland | Mitsubishi Electric Europe B.V. Polish Branch | Krakowska 48, 32-083 Balice, Poland | +48 12 347 65 00 |
| Republic of Moldova | Intehsis SRL | bld. Traian 23/1, MD-2060 Kishinev, Moldova | +373 (0)22-66-4242 |
| Romania | Sirius Trading & Services SRL | RO-060841 Bucuresti, Sector 6 Aleea Lacul Morii Nr. 3 | +40-(0)21-430-40-06 |
| Russia | Mitsubishi Electric (Russia) LLC | 2 bld.1, Letnikovskaya street, Moscow, 115114, Russia | +7 495 721-2070 |
| Saudi Arabia | Center of Electrical Goods | Al-Shuwayer St. Side way of Salahuddin Al-Ayoubi St. P.O. Box 15955 Riyadh 11454 - Saudi Arabia | +966-1-4770149 |
| Singapore | Mitsubishi Electric Asia Pte. Ltd. | 307 Alexandra Road, Mitsubishi Electric Building, Singapore 159943 | +65-6473-2308 |
| Slovakia | PROCONT, Presov | Kupelna 1/, SK - 08001 Presov, Slovakia | +421 (0)51 - 7580 611 |
| | SIMAP | Jana Derku 1671, SK - 91101 Trencin, Slovakia | +421 (0)32 743 04 72 |
| Slovenia | Inea RBT d.o.o. | Stegne 11, SI-1000 Ljubljana, Slovenia | +386 (0)1-513-8116 |
| South Africa | CBI-electric: low voltage | Private Bag 2016, ZA-1600 Isando Gauteng, South Africa | +27-(0)11-9282000 |
| Spain | Mitsubishi Electric Europe B.V. Spanish Branch | Carretera de Rubí 76-80, E-08190 Sant Cugat del Vallés (Barcelona), Spain | +34 (0)93-565-3131 |
| Sweden | Mitsubishi Electric Europe B.V. (Scandinavia) | Hedvig Möllers gata 6, 223 55 Lund, Sweden | +46 (0)8-625-10-00 |
| | Euro Energy Components AB | Järnvägsgatan 36, S-434 24 Kungsbacka, Sweden | +46 (0)300-690040 |
| Switzerland | TriElec AG | Muehlentalstrasse 136, CH-8201 Schaffhausen, Switzerland | +41-(0)52-6258425 |
| Taiwan | Setsuyo Enterprise Co., Ltd | 5th Fl., No.105, Wu Kung 3rd, Wu-Ku Hsiang, Taipei, Taiwan, R.O.C. | +886-(0)2-2298-8889 |
| Thailand | United Trading & Import Co., Ltd. | 77/12 Bamrungmuang Road,Klong Mahanak Pomprab Bangkok Thailand | +66-223-4220-3 |
| Tunisia | MOTRA Electric | 3, Résidence Imen, Avenue des Martyrs Mourouj III, 2074 - El Mourouj III Ben Arous, Tunisia | +216-71 474 599 |
| Turkey | Mitsubishi Electric Turkey A.Ş. | Şerifali Mahallesi Kale Sokak No: 41, 34775 Ümraniye, İstanbul, Turkey | +90-216-969-2666 |
| United Kingdom | Mitsubishi Electric Europe B.V. | Travellers Lane, UK-Hatfield, Herts. AL10 8XB, United Kingdom | +44 (0)1707-276100 |
| Uruguay | Fierro Vignoli S.A. | Avda. Uruguay 1274 Montevideo Uruguay | +598-2-902-0808 |
| Vietnam | Mitsubishi Electric Vietnam Co.,Ltd. Head Office | 11th & 12th Floor, Viettel Tower B, 285 Cach Mang Thang 8 Street, Ward 12, District 10, Ho Chi Minh City, Vietnam | +84-28-3910-5945 |
| | Mitsubishi Electric Vietnam Co.,Ltd. Hanoi Branch | 24th Floor, Handico Tower, Pham Hung Road, khu do thi moi Me Tri Ha, Nam Tu Liem District, Hanoi City, Vietnam | +84-24-3937-8075 |

# MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN