Changes for the Better

MITSUBISHI ELECTRIC

MITSUBISHI ELECTRONIC MULTI-MEASURING INSTRUMENT

MODEL

ME96NSR

NS Series

Small & Flexible

Empowering Industries

Evolution of Electronic Multi-Measuring Instrument NS Series

MITSUBISHI Electronic Multi-Measuring Instrument NS Series features high performance and crystal clear display.
With simple operating functions, NS Series is the best support your measuring and monitoring systems.

- DIN Size 96×96mm
- 3P4W/3P3W Common Use
- Add-on Type Output Options
- CE Marking
- Conforms to EU RoHS Directive (2002/95/EC)

Monitoring

High accuracy monitoring functions by our dedicated ASIC

- Upper/lower limit monitoring up to 4 items
- Harmonics monitoring
- Measures import/export active energy

Display

Easy to read display functions

- 4 items displayable
- Backlight automatic off function

Output

Wide range of output functions from measuring data to alarm

- Output functions for 7 items
- Pulse width settable
- Pulse output at 2 points
- Analog output range settable

Communication

Communication functions to support open networks

- ModBus communication
- CC-Link communication

Operation

"High-tech, yet simple" operating functions

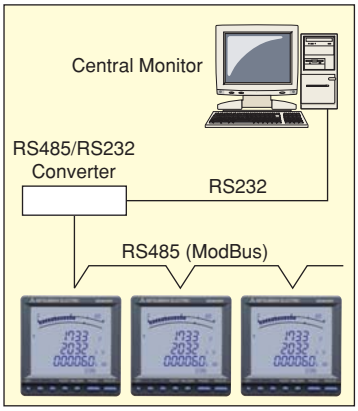
- Simple settings
- Simple operations

Contents

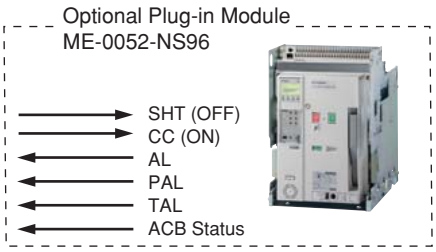
Features

NS Series

ModBus Transmission System (ME96NSR-MB, Optional Plug-in Module ME-0052-NS96)



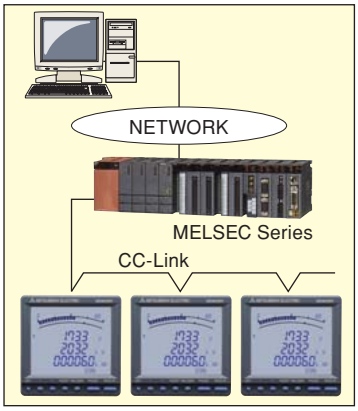
- **ModBus communication system to monitor computers.**
- **By adding the optional plug-in module ME-0052-NS96, monitoring of contact input signal and ON/OFF of contact output signal can be controlled remotely.**
- **Digital input signal can be latched for over 30ms, and there is no need for external latch circuits.**



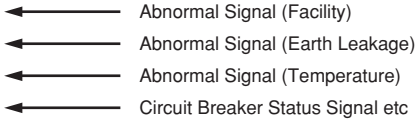
<ModBus Interface Specifications>
- Max. Baud Rate 38.4kbp
- Max. Connection Distance 1000m
- Max. Connection Units 31

<Optional Plug-in Module ME-0052-NS96>
- Digital Input 5 points (24VDC)
- Digital Output 2 points (35VDC)

CC-Link Transmission System (ME96NSR, Optional Plug-in Module ME-0040C-NS96)

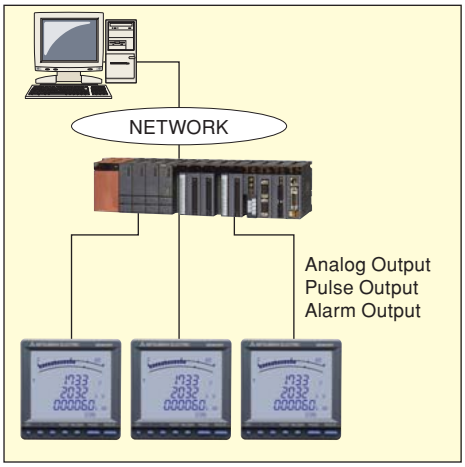


- **Optimum transmission system for remote monitoring using MITSUBISHI PLC.**
- **Remote monitoring of contact signal leading to less wiring, less spacing.**
- **Digital input signal can be latched for over 30ms, and there is no need for external latch circuits.**



<CC-Link Interface>
- Max. Baud Rate 10Mbps
- Max. Connection Distance 100m (10Mbps) to 1000m (156kbps)
- Max. Connection Units 42
- Digital Input 4 points (24VDC)

Analog Pulse Transimission System (ME96NSR, Optional Plug-in Module ME-4201-NS96)



- **Can remotely monitor A, DA, V, W, var, VA, PF, Hz, Harmonics Current RMS Value, and Harmonics Voltage RMS Value at 4 to 20mA output. (Max. of 4 outputs)**
- **Active energy and reactive energy can be remotely monitored by pulse output. (Max. of 2 pulses)**
- **Can remotely monitor upper/lower limit alarm by contact output. (Max. 1 point)**

<Alanog Output Specification>
- 4 to 20mA
- 4 outputs
- Maximum 600Ω

<Pulse Output Specification>
- No-voltage a contact
- 35VDC 0.1A
- Pulse width 0.125, 0.5, 1s is selectable

<Contact Output Specification>
- No-voltage a contact
- 35VDC 0.2A

<Product Line-up>

■ Basic Device

Model Name	Transmission
ME96NSR	–
ME96NSR-MB	ModBus Communication

■ Optional Plug-in Modules

Model Name	Analog Output	Pulse Output	Contact Input	Contact Output (Note)	Transmission Function	Used with
ME-4201-NS96	4	2	–	1	–	ME96NSR
ME-0040C-NS96	–	–	4	–	CC-Link	
ME-0052-NS96	–	–	5	2	–	ME96NSR-MB

(Note): Contact Output for ME-4201-NS96 closes at the time of high and low alarm occurrence.
Contact Output for ME-0052-NS96 switches according to 16 bit set of ModBus communication.

Features

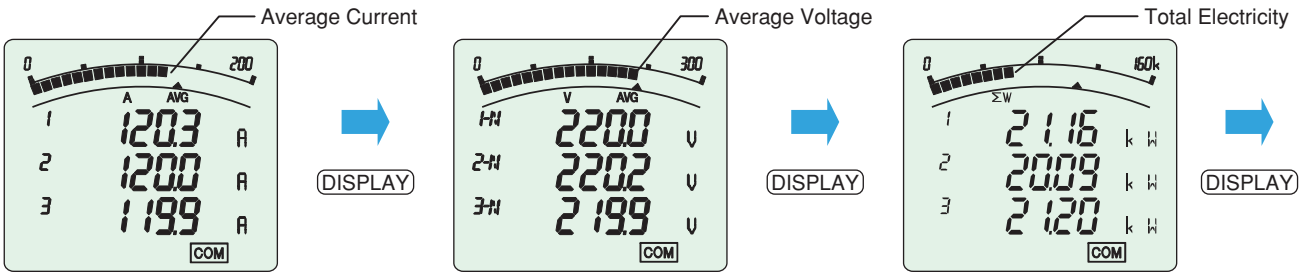
Variety of Display Functions

● Desired Display can be Chosen

Desired display can be chosen by selecting from existing patterns or selecting displays. (For the details of display patterns, please refer to “Display Pattern Contents” on page 22.)

(1) All Phase Simultaneous Display

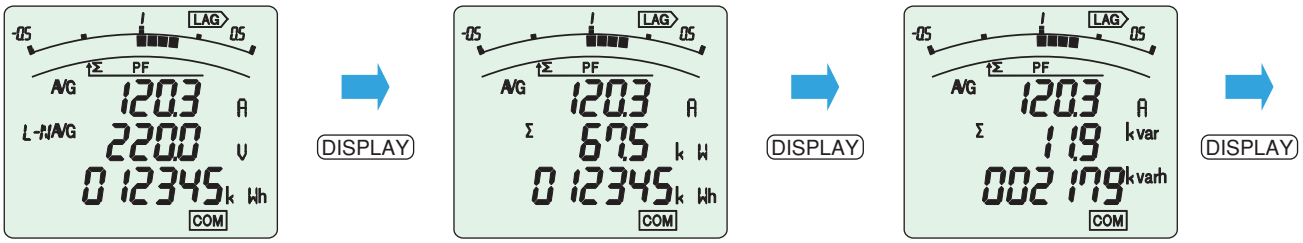
Displays measuring value for each phase digitally, and shows average value or total value by bar graph.



Note: Average value or total value can be displayed by numbers by pressing the (PHASE) button.

(2) Four Measuring Items Simultaneous Display

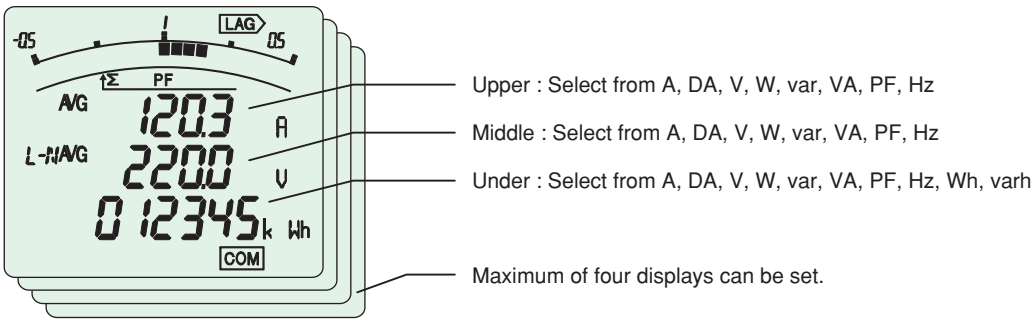
Four measuring items can be displayed simultaneously by tri-level digital display and bar graph.



Note: Digital display of each phase is possible by pressing the (PHASE) button.

(3) Special Display by Display Pattern P00

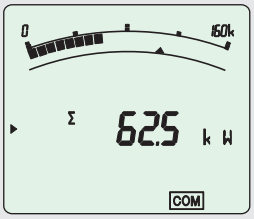
Display can be selected as desired in Display Pattern P00.



<Functions Available>

■ Keep the display unchanged.
■ Keep the display unchanged even when (DISPLAY) button is pressed. ⇒ Set only one display

■ Use ME96NSR instead of electric energy meter by displaying electric power.



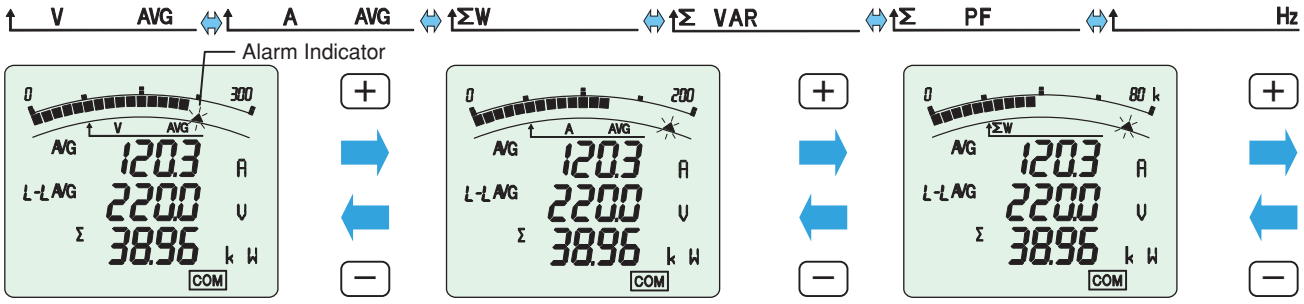
● Bar Graph

Each measuring items can be displayed by a bar graph. With bar graph display, one can grasp the rated value and percentage against the alarm value instantly.

(1) Bar Graph Fixed Display

Measuring items displayed by bar graph can be fixed. ↑ shows that display is fixed.

Also, display can be changed between average voltage, average current, total power, total reactive power, total power ratio, frequency by pressing (+), (−) button.

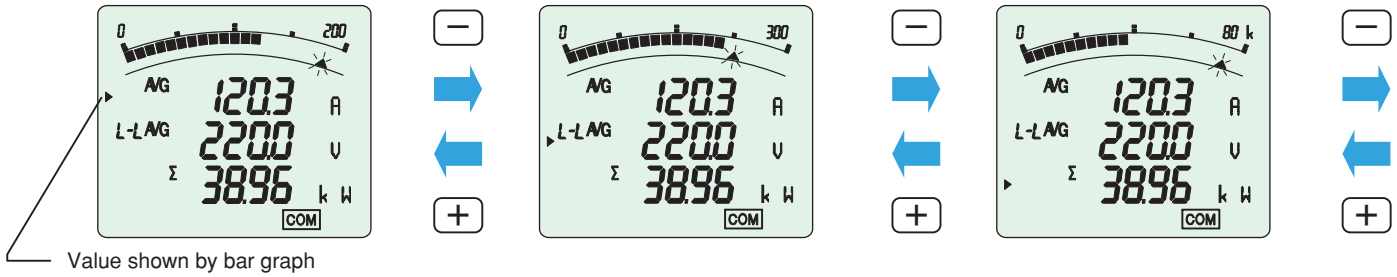


Note: Alarm Indicator blinks when it is set on alarm mode.

(2) Digital Value Display by Bar Graph

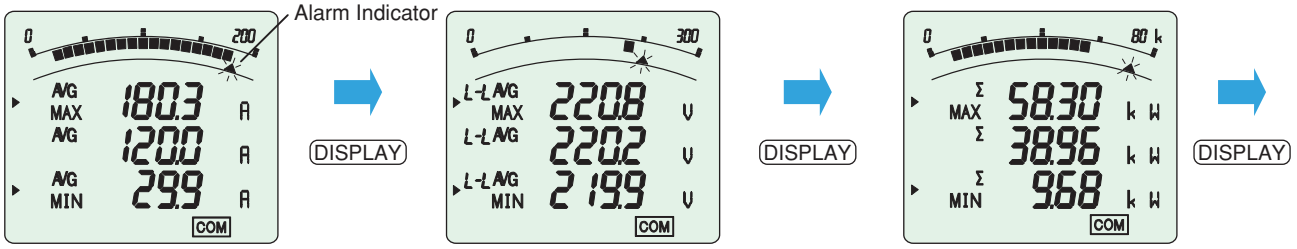
Values shown on the tri-level digital display can be displayed by bar graph. (Except when the tri-level display is measuring the same items)

Bar graph shows the digital value of ▶.



● Maximum/Minimum Value Display

The maximum and minimum value of each measuring items can be displayed. Both the maximum and minimum value show the current status, so monitoring by the maximum and minimum value is possible. Also, range of minimum value to maximum value is shown by bar graph.



● Cyclic Display

In cyclic display, the display changes automatically every five seconds. Even when this device is used in a very high place or inside of a panel, measuring items and measuring value of each phase can be checked without pushing (DISPLAY), (PHASE) buttons.

Operation	Behavior
Press (DISPLAY) for 2 seconds	Measuring items change automatically every 5 seconds
Press (PHASE) for 2 seconds	Phase display changes automatically every 5 seconds

<Features of Cyclic Display>

- ■ Cyclic display can display current status, maximum/minimum value
- ■ Cyclic display continues even after power failures (No need for cyclic display operation)

Features

Measuring Functions

● Accurate Measurement by Our Own ASIC

Our own ASIC allows for accurate measurements. (For details on measurement accuracy, please refer to “Specifications” on page 26.)

● Harmonics Measurement

Measuring of harmonics current, harmonics voltage is possible. This device can also be used for harmonics monitoring.

<Harmonics Measurement Items>

Measuring Items / Degree	Harmonics Current (other than phase N)		Harmonics Current (phase N)		Harmonics Voltage	
	RMS Value	Distortion Ratio	RMS Value	Distortion Ratio	RMS Value	Distortion Ratio
Synthesis	○	○	○	—	○	○
1st	○	—	○	—	○	—
3rd	○	○	○	—	○	○
5th	○	○	○	—	○	○
7th	○	○	○	—	○	○
9th	○	○	○	—	○	○
11th	○	○	○	—	○	○
13th	○	○	○	—	○	○

Note: When the 1st RMS value is 0 (zero), the distortion ratio shows 0%.

● Measurement of Active Energy/Reactive Energy

This device can be used to measure active power/reactive energy for particular type of power distribution facility, such as private power generating facility or condenser panel.

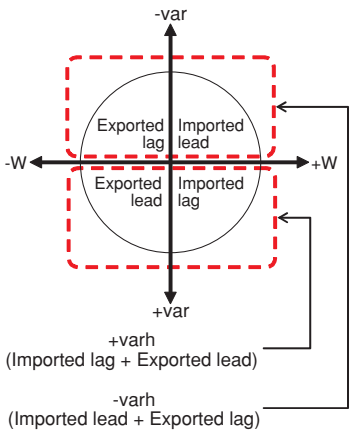
<Measuring Items for Active Energy/Reactive Energy>

Energy Measurement Setting (Setting 4.1)	Wh		varh				Remark
	Imported	Exported	Imported Lag	Imported Lead	Exported Lag	Exported Lead	
Ⅰ	○		○				Measurement of reactive energy is by 2 quadrants
Ⅱ	○		○	○			
Ⅲ	○	○	○		○		Measurement of reactive energy is by 4 quadrants
Ⅳ	○	○	○	○	○	○	

■ Measurement of 2 Quadrants/4 Quadrants by Reactive Energy

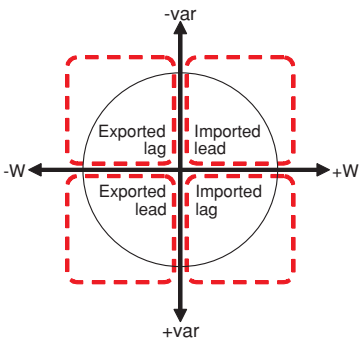
There are two ways of counting quadrant in measurement of reactive energy.

<2 Quadrants Measurement>



Counts imported lag and exported lead as 1 segment, and imported lead and exported lag as 1 segment. Dead region occurs only in around var=0 (Power ratio: 1). Since dead region does not occur around Power ratio=0, this is suited for facility without private power generator or measurement of reactive power with condenser load of Power ratio=0.

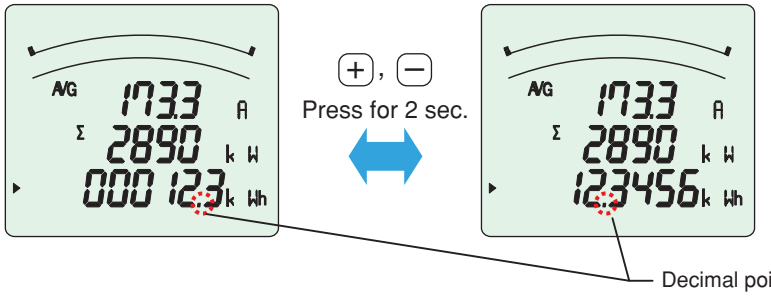
<4 Quadrants Measurement>



Counts each import lag, import lead, export lag, and export lead as one segment.
It is generally felt that a dead region occurs in the border of each segment.
This is suited for measurement of facilities with private power generators.

■ Lower Digit Expanded Display

Pressing the (+), (−) button at the same time for 2 seconds displays lower 3 digits. Small amount of value change of measuring value can be checked.



Note: Lower digit expanded display is displayed only when active/reactive energy is shown on the display. When the expanded display is operated during active energy screen, reactive energy’s lower digit is not expanded. For displaying lower digits reactive energy, please operate by displaying reactive energy screen.

Monitoring of Upper/Lower Limit

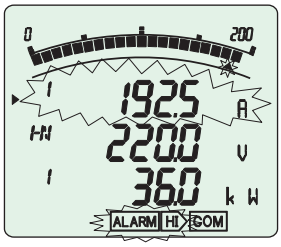
● Monitoring of Upper/Lower Limit (Max. 4 points)

There is an output of upper/lower limit alarm when plug-in optional module ME-4201-NS96 is mounted.
(Since contact output is 1 point, it becomes OR output set in upper/lower limit alarm item)

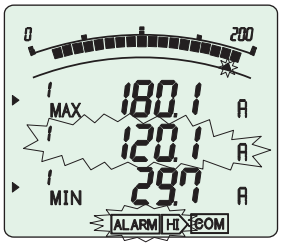
■ Upper/Lower Limit Alarm Display by LCD

Alarm occurrence status can be checked by current status display and maximum/minimum value display.

<Alarm display on current status screen>

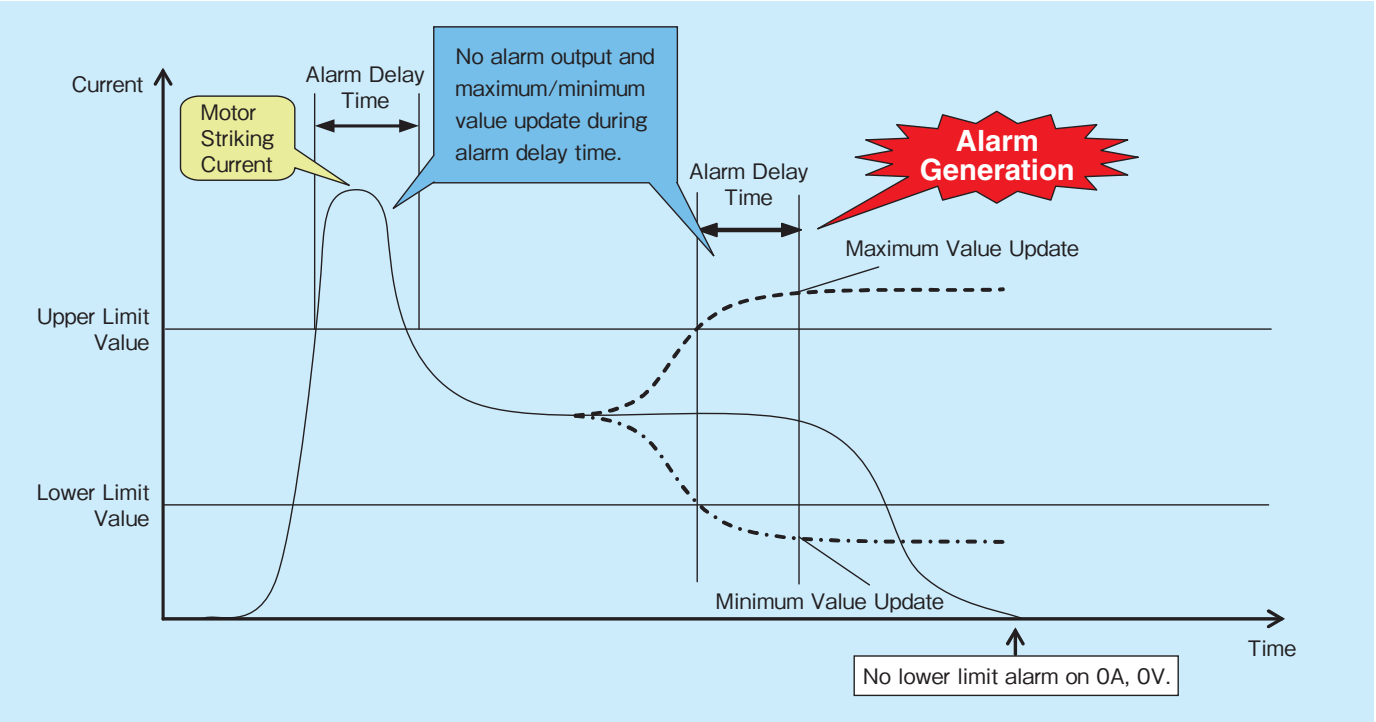


<Alarm display on maximum/minimum value screen>



● Setting of Alarm Output Delay

Time of alarm output after the maximum value and minimum value is reached can be set.
With this function, alarm output caused by frequency change at start-up current of a motor and start-up of private power generating facility can be avoided.
Furthermore, maximum value and minimum value do not update during alarm delay.

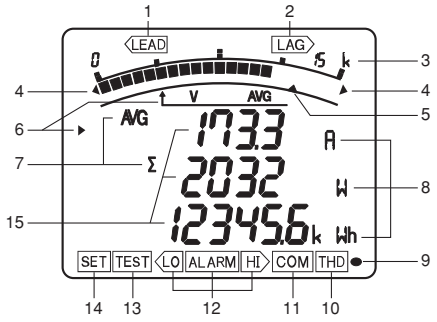


Test Function

Even during a setup of a facility, where no current/voltage input is found, analog output, pulse output, contact output, and communication data is replied. This allows for checkup of wiring and monitoring program system.

Functions

Functions of LCD



Note: The above display is an example for explanation.

1	LEAD status	They show direction of Power Factor or Reactive Power on bar graph.
2	LAG status	They show the type of counting of Reactive Energy on Reactive Energy Display.
3	Scale of the bar graph	They show the scales of the bar graph.
4	Outside range	Measurement value is outside range of scale of the bar graph.
5	Alarm indicator	It shows the setting value of the upper limit or lower limit.
6	Bar graph status	They show the item expressed with the bar graph.
7	Phase status	They show the phase for each of the digital displays.
8	Unit	They show the unit for each of the digital displays.
9	Metering status	When it is blinking, the instrument is counting active energy.
10	Harmonics	It means that the digital displays are harmonics values.
11	Communication status	It shows that the instrument is equipped with a communication function.
12	Alarm status	They show that the upper limit value or lower limit value was exceeded.
13	Test status	It shows that the output of the option module is tested.
14	Setup status	It appears at Set-up mode.
15	Digital	The measured value is displayed in a digital number.

Functions of Buttons

Basic functions		Special functions		
Buttons	Functions	Buttons	Operations	Functions
SET	Set up setting items such as primary voltage or primary current, and choose and indicate setting items.	DISPLAY	Press for 2 sec.	Manual display change ⇔ Cyclic display change
		PHASE	Press for 2 sec.	Manual phase change ⇔ Cyclic phase change
+ or −	Change settings and bar graph display.	+ & −	Press for 2 sec.	Zoom display of Wh, varh values (last 3 digits)
MAX/MIN	Change display from Max/Min to instantaneous value.	+ & RESET	Press for 2 sec.	Reset all the Max/Min values.
PHASE	Change phases.	+ or −	Press for 1 sec.	Fast forward or fast return values when setting.
DISPLAY	Change display.	SET & RESET & PHASE		Reset Wh, varh values to zero by holding down the buttons for 2 sec.

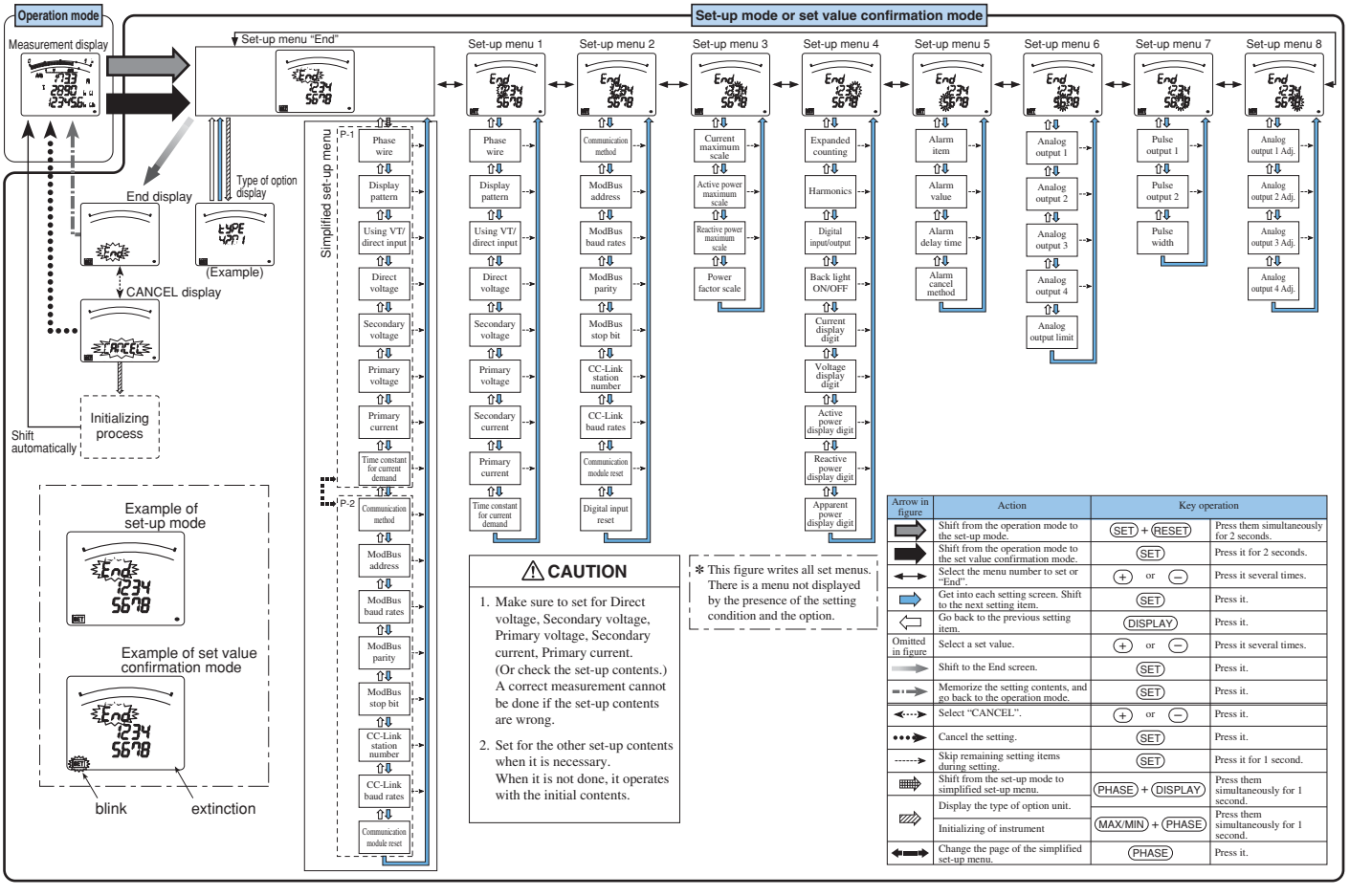
Settings

● Set-up Diagram

For correct measurement, it is necessary to set the primary voltage and the primary current, etc. in the Set-up mode. It can set necessary items, after it shifts from the Operation mode to Set-up mode. Items not set are on the initial setting. In case of regular use, it can be used by setting only the Set-up menu 1(basic set-up).
In case of using the communication function, set Set-up menu 2. Refer to the next page or later for the set-up items.

● How to access Set-up

① Press SET and RESET simultaneously for 2 seconds to get in the Set-up mode.
② Select a Set-up menu number by + or −.
③ Change the contents in each Set-up menu. (Refer to pages 7-14.)
④ After completion of set-up, select 'End' in the Set-up menu and press SET.
⑤ When the End display appears, press SET once again.



⚠ CAUTION

1. Make sure to set for Direct voltage, Secondary voltage, Primary voltage, Secondary current, Primary current. (Or check the set-up contents.) A correct measurement cannot be done if the set-up contents are wrong.
2. Set for the other set-up contents when it is necessary. When it is not done, it operates with the initial contents.

✻ This figure writes all set menus. There is a menu not displayed by the presence of the setting condition and the option.

Arrow in figure	Action	Key operation	
	Shift from the operation mode to the set-up mode.	SET + RESET	Press them simultaneously for 2 seconds.
	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.
	Get into each setting screen. Shift to the next setting item.	SET	Press it.
	Go back to the previous setting item.	DISPLAY	Press it.
Omitted in figure	Select a set value.	+ or −	Press it several times.
	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 setting.	SET	Press it.
	Skip remaining setting items during setting.	SET	Press it for 1 second.
	Shift from the set-up mode to simplified set-up menu.	PHASE + DISPLAY	Press them simultaneously for 1 second.
	Display the type of option unit.	MAX/MIN + PHASE	Press them simultaneously for 1 second.
	Initializing of instrument		
	Change the page of the simplified set-up menu.	PHASE	Press it.

Settings (Continued)

● Setting Procedure

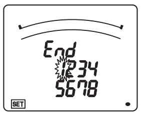
Display the setting screen with (SET), and setup the items with (+)/(−).
Settings can be registered for each setup menu number. Display the [End] screen and register with (SET).

■ Set-up Menu 1 (Basic Set-up)

In this set-up menu 1, set-up the basic contents as following for correct measurement .
In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.
The underline shows the initial value.

Set-up menu — (+), (−) — DISPLAY / SET

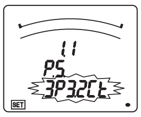
Set the set-up menu number to “1”.



① Phase wire (t 1) — (+), (−) — DISPLAY / SET

① Set the phase wire system.

- 3P3.2Ct : Three phase 3-wire (2CT)
- 3P3.3Ct : Three phase 3-wire (3CT)
- 3P4 : Three phase 4-wire

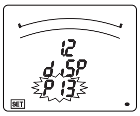


② Display pattern (t 2) — (+), (−) — DISPLAY / SET

② Set the display pattern. (Initial content: P13)

Note: As for detailed display patterns, refer to page 22.
- ○ : Displayed in display setting
- △ : Set by the set-up menu 4 (page 9)
- □ : Select “P00”, and set display sequence and display position (Please refer to the user’s manual)

DA : current demand, HI: harmonic current, HV: harmonic voltage
DI : digital input, DO: digital output (DI/DO: only when option module is installed)
VA : Three phase 4-wire only



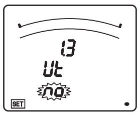
Display pattern	A	DA	V	W	PF	var	Hz	VA	Wh	varh	Wh Exported active energy	varh Special	HI	HV	DI	DO
P01	○		○	○	○								△	△	△	△
P02	○		○	○	○				○		△		△	△	△	△
P03	○		○	○	○	○	○	○					△	△	△	△
P04	○		○	○	○	○	○	○	○	○	△	△	△	△	△	△
P05				○	○	○	○	○					△	△	△	△
P06	○		○										△	△	△	△
P07	○		○	○									△	△	△	△
P08	○		○	○					○		△		△	△	△	△
P09	○	○	○										△	△	△	△
P10	○	○	○	○									△	△	△	△
P11	○	○	○						○		△		△	△	△	△
P12	○	○	○	○					○		△		△	△	△	△
P13	○		○	○	○	○	○	○	○	○	△	△	△	△	△	△
P00	□	□	□	□	□	□	□	□	□	□	△	△	△	△	△	△

③ Using VT/direct input (t 3) — (+), (−) — DISPLAY / SET

③ Choose VT or direct input (without VT).

- YES : using VT
- no : direct input

Initial setting
Three phase 3-wire : using VT
Three phase 4-wire : direct input

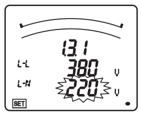


④ Direct voltage (t 3.1) — (+), (−) — DISPLAY / SET

④ Set-up the rated voltage for scaling of the bar graph.
If you set “YES” on set up No.③, this display does not appear.

Three phase 4-wire (phase to phase(L-L)/phase to neutral(L-N)):
110V/63.5V, 173V/100V, 190V/110V, 380V/220V, 415V/240V, 440V/254V, 480V/277V

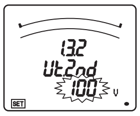
Three phase 3-wire (phase to phase(L-L)):
110V ↔ 220V



⑤ VT secondary voltage (t 3.2) — (+), (−) — DISPLAY / SET

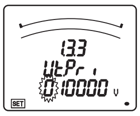
⑤ Set the secondary voltage values of VT.
If you set “no” on set up No.③, this display does not appear.

Three phase 4-wire: 63.5V, 100V, 110V, 115V, 120V
Three phase 3-wire: 100V, 110V, 220V



⑥ VT primary voltage (t 3.3) — (SET), (DISPLAY), (+), (−) — DISPLAY / SET

⑥ Set the primary voltage value of VT in the case of using VT.
If you select “no” on set up No.③, this display does not appear.
Initial setting
Three phase 3-wire : 10000V
Three phase 4-wire : 200V

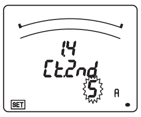


- From top digit, select the value of the flickering digit by (+) and (−).
- The setting digit can be moved to right by (SET).
- The setting digit can be moved to left by (DISPLAY).
- The number of settable digits are upper 3 digits. Setting is available in the range from 60V to 750kV (750000V).
  ✻ If it is set on range other than 60V to 750kV, error display (E05) appears. At the moment of the error display, press (SET) and review the set value, and set it once again.
- When (SET) is pressed at the lowest digit, the setting item goes to the next one.

⑦ CT secondary current (t 4) — (+), (−) — DISPLAY / SET

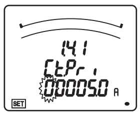
⑦ Set the secondary current value of CT.

5A ↔ 1A



⑧ CT primary current (t 4.1) — (SET), (DISPLAY), (+), (−) — DISPLAY / SET

⑧ Set the primary current value of CT. (The initial value is 5A.)

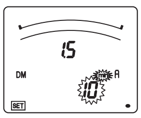


- From top digit, select the value of the flickering digit by (+) and (−).
- The setting digit can be moved to right by (SET).
- The setting digit can be moved to left by (DISPLAY).
- The number of settable digits are upper 2 digits. Setting is available in the range from 5A to 30kA (30000A).
  ✻ If it is set on range other than 5A to 30kA, error display (E05) appears. At the moment of the error display, press (SET) and review the set value, and set it once again.
- When (SET) is pressed at the lowest digit, the setting item goes to the next one.

⑨ Time constant for current demand (t 5) — (+), (−) — SET

⑨ Set up the time constant for calculating current demand.

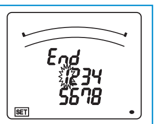
0 second	40 seconds	3 minutes	7 minutes	15 minutes
10 seconds	50 seconds	4 minutes	8 minutes	20 minutes
20 seconds	1 minute	5 minutes	9 minutes	25 minutes
30 seconds	2 minutes	6 minutes	10 minutes	30 minutes



Note: Even when the display pattern do not display the current demand, this screen appears. If the current demand is not necessary, press (SET).

Set-up menu — (+), (−)

According to the set-up diagram (page 6), save the changed contents, or continue to the other set-up menu.



Note

If the contents in the Set-up Menu 1 are changed, maximum value, minimum value, and demand value of related measurement items will be reset. (However, all of the counting values are not reset.)

Functions

Settings (Continued)

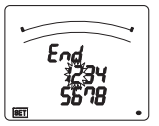
■ Set-up Menu 2 (Set-up of Communication, Contact Input Reset Procedure)

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

Set-up menu

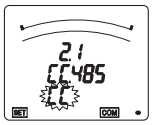
DISPLAY / SET 2. 1 → ① Communication method

Set the set-up menu number to "2".



① Set the "CC-Link" or "ModBus" as the communication method.
This display appears only if the type ME96NSR-MB has the type ME-0040C-NS96 option module.

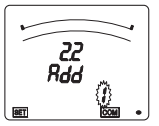
CC : CC-Link
485 : ModBus



DISPLAY / SET 2. 2 → ② ModBus address

② Set the ModBus address number.
In case of CC-Link, this display does not appear.

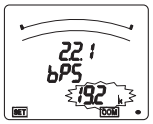
Settable addresses: 1 to 255



DISPLAY / SET 2. 2.1 → ③ ModBus baud rates

③ Set the ModBus baud rate.
In case of CC-Link, this display does not appear.

Settable baud rate: 2400 bps / 4800 bps / 9600 bps / 19.2 kbps / 38.4 kbps



DISPLAY / SET 2. 22 → ④ ModBus parity

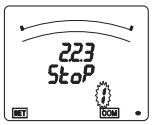
④ Set the ModBus parity.
In case of CC-Link, this display does not appear.

Settable parity : non / odd / EVEn

DISPLAY / SET 2. 23 → ⑤ ModBus stop bit

⑤ Set the ModBus stop bit.
In case of CC-Link, this display does not appear.

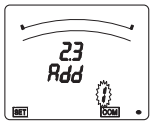
Stop bit : 1 / Stop bit : 2



DISPLAY / SET 2. 3 → ⑥ CC-Link station number

⑥ Set the CC-Link station number.
In case of ModBus, this display does not apper.

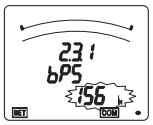
Settable addresses: 1 to 64



DISPLAY / SET 2. 3.1 → ⑦ CC-Link baud rates

⑦ Set the CC-Link baud rates.
In case of ModBus, this display does not apper.

Settable baud rates: 0 : 156k / 1 : 625k / 2 : 2.5M / 3 : 5M / 4 : 10M



DISPLAY / SET 2. 4 → ⑧ Communication module reset

⑧ Reset of communication module.
In case of ModBus, this display does not apper.

Set it ON. oFF ⟷ on

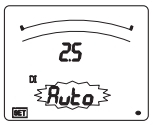
Note: When it is not set on ON, changed station number and baud rate do not become valid.

DISPLAY / SET 2. 5 → ⑨ Digital input reset

⑨ Set the digital input(DI) reset method.
Without digital input, this display does not apper.

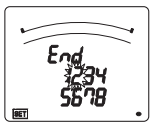
Auto: Automatic method ⟷ HoLd: Manual method

Note: When selected the manual method(HoLd), input state is kept until the cancel operation is done manually. For the method of the cancel operation, refer to page 21.



SET → Set-up menu

According to the set-up diagram (page 6), save the changed contents or continue to the other set-up menu.



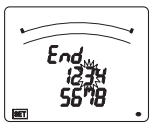
■ Set-up Menu 3 (Bar Graph Set-up)

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

Set-up menu

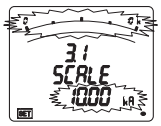
DISPLAY / SET 3. 1 → ① Current maximum scale

Set the set-up menu number to "3".



① Set the current maximum scale.
The maximum scale is set in the range of about 40% to about 120% of the rated current.

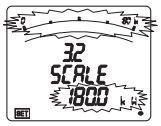
Note: This insturument's rating is 100% value. For the maximum scale value, please refer to the user's manual.



DISPLAY / SET 3. 2 → ② Active power maximum scale

② Set the maximum scale of active power.
The maximum scale is set in the range of about 40% to about 120% of the rated full load power.

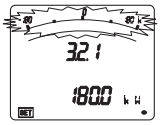
Note: This insturument's rating is 100% value. For the maximum scale value, please refer to the user's manual.



DISPLAY / SET 3. 2.1 → ③ Active power scale

③ Set the single / double deflection of active power.

When (+) and (−) are pressed, the scale value of bar graph flickers at single / double deflection.



DISPLAY / SET 3. 3 → ④ Reactive power maximum scale

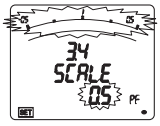
④ Set the reactive power maximum scale.

The setting method is same as that of ② maximum scale value of active power.

DISPLAY / SET 3. 4 → ⑤ Power factor scale

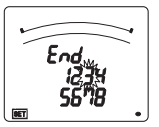
⑤ Set the power factor scale.

0.5 ⟷ 0



SET → Set-up menu

According to the set-up diagram (page 6), save the changed contents or continue to the other set-up menu.



Note

1. 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 the scale easy to read, current input is within 100% of rated current.
2. When the display pattern that does not display power, reactive power, active energy, and reactive energy is selected, the setting item related to them is skipped.

■ Set-up Menu 4 (Set-up of Various Measurement Display, Special Type Display)

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

Set-up menu

DISPLAY / SET

4 1 ① Expanded counting

4 2 ② Harmonics

4 3 ③ Digital input/output

4 4 ④ Back light ON/OFF setting

4 5 ⑤ Current display digit

4 6 ⑥ Voltage display digit

4 7 ⑦ Active power display digit

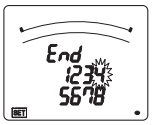
4 8 ⑧ Reactive power display digit

4 9 ⑨ Apparent power display digit

SET

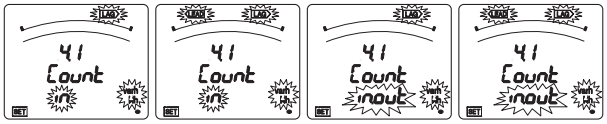
Set-up menu

Set the set-up menu number to "4".



① Set the combination of display for active energy and reactive energy.
Combination of imported/exported and lag/lead can be selected. Combination Ⅰ in the diagram is for standard use.

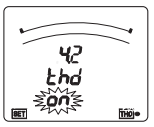
Combination	Active energy (Wh)		Reactive energy (varh)					
			Imported (Exported)	Imported (Exported)	Imported		Exported	
	Imported	Exported	lag (lead)	lead (lag)	lag	lead	lag	lead
Ⅰ	○		○					
Ⅱ	○		○	○				
Ⅲ	○	○			○		○	
Ⅳ	○	○			○	○	○	○



Display of combination Ⅰ　Display of combination Ⅱ　Display of combination Ⅲ　Display of combination Ⅳ

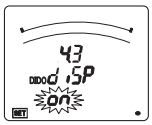
② Set the harmonic measurement.

on : Harmonic measurement value is displayed.
oFF : Harmonic measurement value is not displayed.



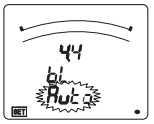
③ Set the display of the digital input/output state.
When the ME-0052-NS96 or ME-0040C-NR96 type option module is not installed, this menu is not displayed.

on : The state of the digital input/output is displayed.
oFF : The state of the digital input/output is not displayed.



④ Set the back light auto off (Auto) / continuous on (HoLd).
(Setting this is usually unnecessary.)

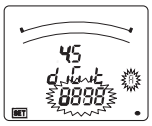
HoLd (Continuous ON) ⟷ Auto (Auto OFF)



If you set to 'Auto off', the back light turns off when there is no key operation for 5 minutes. When the operation key is pressed, it is lit for 5 minutes. At this moment, the display is not changed.
When the operation key is pressed once again, the display is changed.

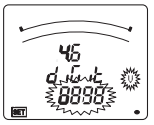
⑤ Set the current display digit.

888: 3 digits
8888: 4 digits



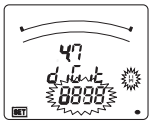
⑥ Set the voltage display digit.

888: 3 digits
8888: 4 digits



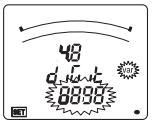
⑦ Set the active power display digit.

888: 3 digits
8888: 4 digits



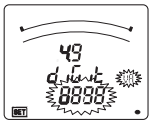
⑧ Set the reactive power display digit.

888: 3 digits
8888: 4 digits

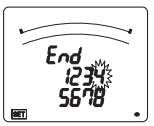


⑨ Set the apparent power display digit.

888: 3 digits
8888: 4 digits



According to the set-up diagram (page 6), save the changed contents or continue to the other set-up menu.



Note

In No.⑤ to No.⑨, the measurement elements that are not included in the display pattern setting are skipped.

Functions

Settings (Continued)

■ Set-up Menu 5 (Alarm Set-up)

This sets the upper and lower limit alarm. The upper and lower limit set value mark "▲ (blinking)" is displayed on the bar graph. From the display items, four items can be set.

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

Set-up menu

(+), (−)

DISPLAY SET

5. 1 ① Alarm item 1

(+), (−)

DISPLAY SET

5. 11 ② Alarm value 1

(+), (−)

DISPLAY SET

5. 2 to 5. 4 ③ Alarm item 2 to 4

(+), (−)

DISPLAY SET

5. 5 ④ Alarm delay time, delay time of max/min value

(+), (−)

DISPLAY SET

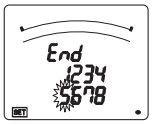
5. 6 ⑤ Alarm cancel method

SET

Set-up menu

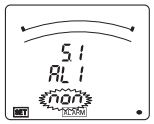
(+), (−)

Set the set-up menu number to "5".

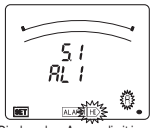


① Set the alarm item to be allowed to measurement items.

Three phase 3-wire	Three phase 4-wire
non	non
A upper limit	A upper limit
A lower limit	A lower limit
Demand A upper limit	AN upper limit
Demand A lower limit	Demand A upper limit
V(L-L) upper limit	Demand A lower limit
V(L-L) lower limit	Demand AN upper limit
W upper limit	V(L-N) upper limit
W lower limit	V(L-N) lower limit
var upper limit	V(L-L) upper limit
var lower limit	V(L-L) lower limit
PF upper limit	W upper limit
PF lower limit	W lower limit
Hz upper limit	var upper limit
Hz lower limit	var lower limit
Harmonic current total RMS value	PF upper limit
Harmonic voltage total distortion ratio	PF lower limit
	Hz upper limit
	Hz lower limit
	Harmonic current total RMS value
	Harmonic current phase N RMS value
	Harmonic voltage total distortion ratio



Display of non upper and lower limit alarm

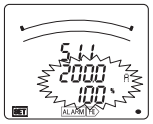


Display when A upper limit is set to upper and lower limit alarm

Note 1: A measurement item that is not selected in the display pattern can be selected.
Note 2: The alarm of W, var, and PF is judged from the total RMS value.
The upper alarm of A and DA is judged from the phase of 1, 2, 3 and N.
The lower alarm of A and DA is judged from the phase of 1, 2 and 3. (N is excluded.)
Note 3: The alarm of the total distortion ratio is judged from the phase of 1, 2 and 3.
(N is excluded.)

✻ Refer to page 19 for details.

② Set the alarm value of alarm item 1.
The set-up range is shown below.



Example display when A upper limit is set to 100%

Alarm item	Set-up range	Step
A, DA, AN, DAN upper limit	5 to 100 to 120%	1%
A,DA lower limit	3 to 10 to 95%	1%
V upper limit	25 to 110 to 135%	1%
V lower limit	20 to 70 to 95%	1%
W, var upper limit	–95 to 100 to 120%	1%
W, var 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 65Hz	1Hz
Hz lower limit	45 to 65Hz	1Hz
Harmonic current total RMS value upper limit	5 to 35 to 120%	1%
Harmonic voltage total distortion ratio upper limit	0.5 to 3.5 to 20%	0.5%

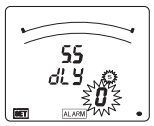
Note 1: The upper and lower limit alarm mark by the bar graph is displayed in the step of about 5% though the digital value can be set in the above-mentioned step on A, DA, V, W and var. However, the alarm is generated with the accuracy of the digital value.
DA: current demand
Note 2: V alarm value is set according to the value of primary voltage (direct voltage).
A, DA, W, and var is set for value of rated scale.

③ Set the upper and lower limit alarm item 2 to 4 (AL2, AL3, AL4) in the same method.

④ Set the alarm delay time.

If the condition of limit exceeding continues for more than the delay time, the alarm generates.
And if it does not continue during this time, the maximum/minimum value is not updated.

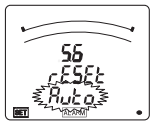
0 seconds	30 seconds	2 minutes
5 seconds	40 seconds	3 minutes
10 seconds	50 seconds	4 minutes
20 seconds	1 minute	5 minutes



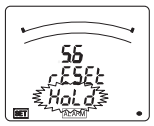
⑤ Set the alarm cancel method at generation of alarm. (screen, relay)

Method	Cancel method
Automatic (Auto)	When there is no alarm generating condition, alarm is automatically reset.
Manual (HoLd)	Alarm is reset by pressing (RESET). Alarm continues until (RESET) is pressed.

Please refer to page 19 for details.

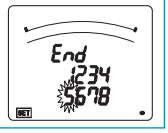


Display of automatic reset method



Display of manual reset method

According to the set-up diagram (page 6), save the changed contents or continue to the other set-up menu.



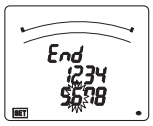
■ Set-up Menu 6 (Analog Output Set-up)

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.
The set-up screen can be displayed for measurement items that are not selected in display pattern.
When the ME-4201-NS96 type optional plug-in module is not installed, this menu cannot be set.

Set-up menu

(+), (−)

Set the set-up menu number to "6".



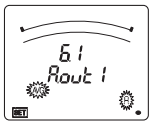
DISPLAY SET

6. 1

① Analog output CH1 measurement item

(+), (−)

① Set the measurement item for analog output CH1.
Select measurement element output from below.



Three phase 3-wire	Three phase 4-wire
non	non
A_1	A_1
A_2	A_2
A_3	A_3
A_{AVG}:CH1	A_N
DA_1	A_{AVG}:CH1
DA_2	DA_1
DA_3	DA_2
DA_{AVG}	DA_3
V_{12}	DA_N
V_{23}	DA_{AVG}
V_{31}	V_{1N}
V_{LLAVG}:CH2	V_{2N}
ΣW:CH3	V_{3N}
Σvar	V_{LNAVG}:CH2
ΣPF:CH4	V_{12}
Hz	V_{23}
HI_1	V_{31}
HI_2	V_{LLAVG}
HI_3	W_1
HV_{12}	W_2
HV_{23}	W_3
	ΣW:CH3
	var_1
	var_2
	var_3
	Σvar
	VA_1
	VA_2
	VA_3
	ΣVA
	PF_1
	PF_2
	PF_3
	ΣPF:CH4
	Hz
	HI_1
	HI_2
	HI_3
	HI_N
	HV_{1N}
	HV_{2N}
	HV_{3N}

DISPLAY SET

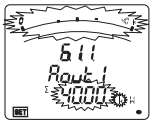
6. 11 to 6. 12

② Analog output CH1 detailed set-up

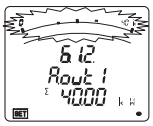
(+), (−)

② Detailed analog output set-up

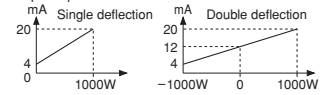
(1) When A, DA are set (6.1.1)
- Current value is set to the maximum output value of analog output.
  It can be set in the range of about 40% to about 120% of ratings.
  As for detailed set values, refer to the user's manual.



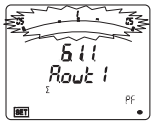
(2) When W, var are set
- Power value and reactive power value are set to the maximum output value of analog output. (6.1.1)
  It can be set in the range of about 20% to about 120% of ratings.
  As for detailed set values, refer to the user's manual.
- In the case of W, set to the single/double deflection. (initial content : single deflection) (6.1.2)

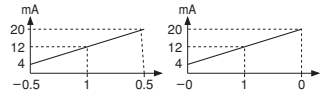


Example of power 1000W



(3) When PF is set
- The power factor value to the maximum output value of analog output CH1 is set from −0.5−1−0.5/−0−1−0





(4) When Hz is set
- The frequency range of analog output is set.

60Hz → 50Hz

Note: When it is set to 50Hz, output is made at span 45 to 55Hz.
When it is set to 60Hz, output is made at span 55 to 65Hz.

These settings can be set separately from measurement items.

DISPLAY SET

6. 2 to 6. 4

③ Analog output CH2 to CH4 measurement item

(+), (−)

③ Analog output CH2 to CH4 measurement item set-up

Analog outputs CH2 to CH4 are set also in the same method as ① analog output CH1 measurement item set-up.

DISPLAY SET

6. 21 to 6. 42

④ Analog output CH2 to CH4 detailed set-up

(+), (−)

④ Analog output CH2 to CH4 detailed set-up

Analog outputs CH2 to CH4 are set also in the same manner as ② analog output CH1 detailed set-up.

DISPLAY SET

6. 5

⑤ Analog output limit

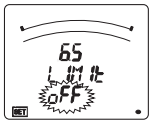
(+), (−)

⑤ Setting of the analog output limit.

Set to cut undefined analog output.

on : Cut undefined analog output.
oFF : Don't cut undefined analog output.

Setting	Output Range
on	Span of −1% to 101%
oFF	Span of −5% to 105%

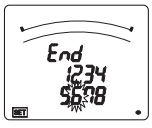


DISPLAY SET

Set-up menu

(+), (−)

According to the set-up diagram (page 6), save the changed contents or continue to the other set-up menu.



Functions

Settings (Continued)

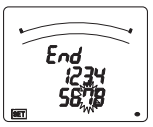
■ Set-up Menu 7 (Pulse Output Set-up)

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.
When the ME-4201-NS96 optional plug-in module is not installed, this menu cannot be set.

Set-up menu
DISPLAY SET
① Pulse output item 1
DISPLAY SET
② Pulse output item 1 pulse value
DISPLAY SET
③ Pulse output item 2
DISPLAY SET
④ Pulse output item 2 pulse value
DISPLAY SET
⑤ Pulse width
SET
Set-up menu

(+) , (−)

Set the set-up menu number to "7".

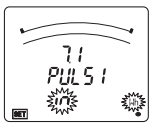


① Set the output element to pulse output 1.

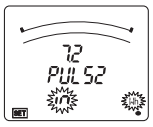
At initial setting, imported active energy is set to pulse output 1, press (SET) to go to the next setting.

Settable elements

Display	Pulse output element
Wh	Imported active energy (Pulse output 1)
– Wh	Exported active energy
varh (LAG)	Imported lag reactive energy (Pulse output 2)
varh (LEAD)	Imported lead reactive energy
– varh (LAG)	Exported lag reactive energy
– varh (LEAD)	Exported lead reactive energy
non	No output



Example of pulse output 1



Example of pulse output 2

② Set the pulse value of pulse output 1.
Pulse value is selected from the table below, according to total load [kW].

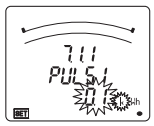
$$\text{Total load [kW]} = \frac{\alpha \times (\text{Primary voltage}) \times (\text{Primary current})}{1000}$$

$\alpha = \sqrt{3}$ (Three-phase 3-wire)
$\alpha = 3$ (Three-phase 4-wire)

✻ Primary voltage value is calculated by phase to newtral.

Total load [kW]	Digital display	Settable pulse value [kW/pulse]				
1 or higher and below 10	8888.88	1	0.1	0.01	0.001	kWh/Pulse
10 or higher and below 100	88888.8	10	1	0.1	0.01	kWh/Pulse
100 or higher and below 1000	888888	100	10	1	0.1	kWh/Pulse
1000 or higher and below 10000	8888.88	1	0.1	0.01	0.001	MWh/Pulse
10000 or higher and below 100000	88888.8	10	1	0.1	0.01	MWh/Pulse
100000 or higher	888888	100	10	1	0.1	MWh/Pulse

In case of reactive energy, kW in the above table is exchanged into kvar and kWh into kvarh.



Example of pulse output 1

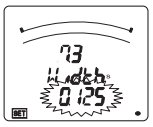
③ Set the output element to pulse output 2.
Pulse output 2 is set in the same method as ① pulse output item 1 set-up. (At initial setting, imported lag reactive energy is set to pulse output 2.)

④ Set the pulse value of pulse output 2.
Pulse output 2 is set in the same method as ② pulse output item 1 set-up.

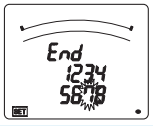
⑤ Set the pulse width of output pulse.

0.125s → 0.500s → 1.000s

Note: When the pulse width is set to 0.500s, 1.000s, and pulse unit is set to lowest settable unit, pulse output cannot follow, and the counting pulse may decrease when load is large.



According to the set-up diagram (page 6), save the changed contents or continue to the other set-up menu.



■ Set-up Menu 8 (Analog Output Adjustment)

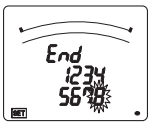
When the ME-4201-NS96 optional plug-in module is installed, zero adjustment and span adjustment of analog output is possible.
(Only for circuits set on analog output)

Please adjust it only when the matches with the receiving instrument or the output have changed.
In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.

Set-up menu
DISPLAY SET
① Zero Adj. for CH1
DISPLAY SET
② Span Adj. for CH1
DISPLAY SET
CH2, CH3 and CH4 can be adjusted the same as above.
SET
Set-up menu

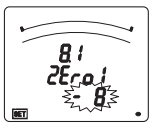
(+) , (−)

Set the set-up menu number to "8".



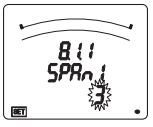
① Set the zero adjustment for CH1.

±50 steps can be set. (about ±0.3mA)

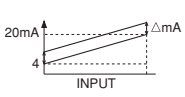


② Set the span adjustment for CH1.

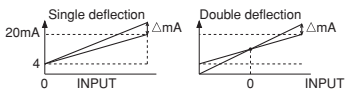
±50 steps can be set. (about ± 0.3mA)



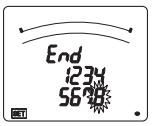
Zero adjustment



Span adjustment



According to the set-up diagram (page 6), save the changed contents, or continue to the other set-up menu.



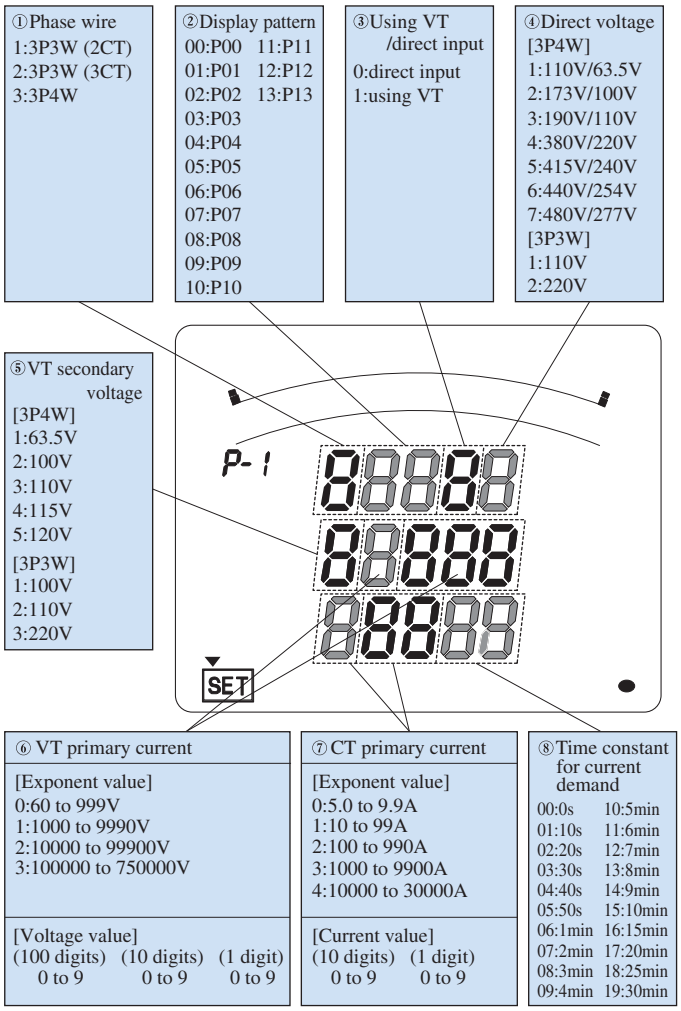
● Simplified Set-up

The setting contents of the main 16 items can be set by using two displays. It can be set by the method of substituting numerical value.
For the setting contents, refer to the following table.

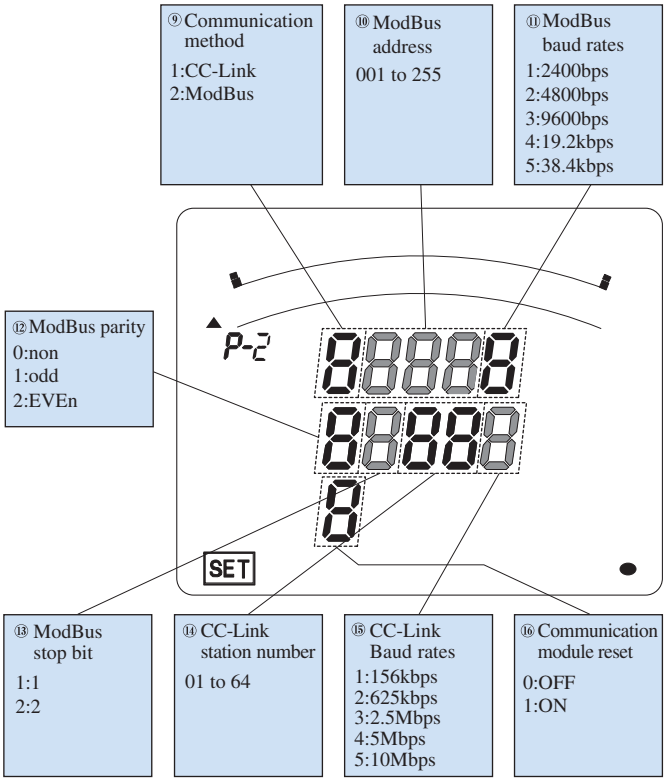
Simplified setting page: P-1				Simplified setting page: P-2			
No.	Content	No.	Content	No.	Content	No.	Content
①	Phase wire	⑤	VT secondary voltage	⑨	Communication method	⑬	ModBus stop bit
②	Display pattern	⑥	VT primary voltage	⑩	ModBus address	⑭	CC-Link station number
③	Using VT/direct input	⑦	CT primary current	⑪	ModBus baud rates	⑮	CC-Link baud rates
④	Direct voltage	⑧	Time constant for current demand	⑫	ModBus parity	⑯	Communication module reset

■ Simplified Set-up Contents List

<Setting page: P-1>

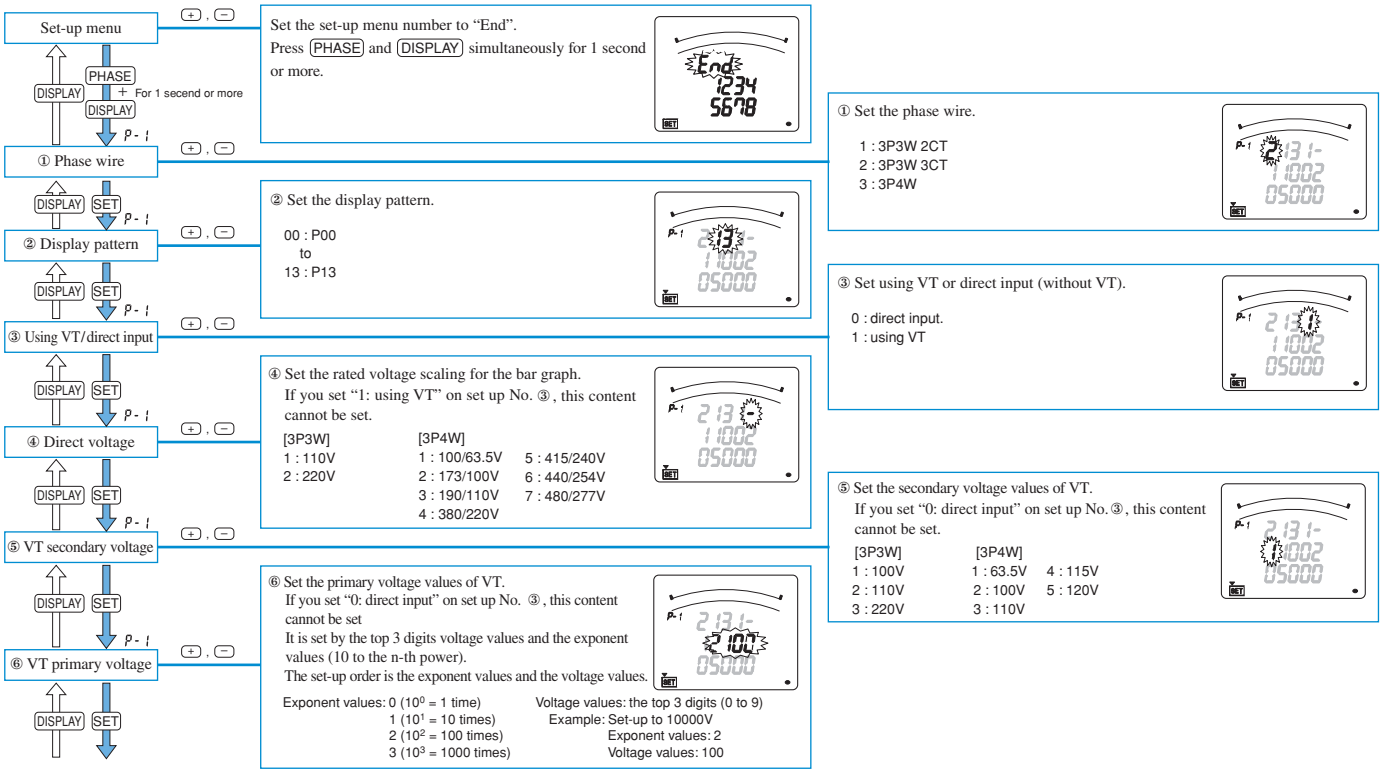


<Setting page: P-2>



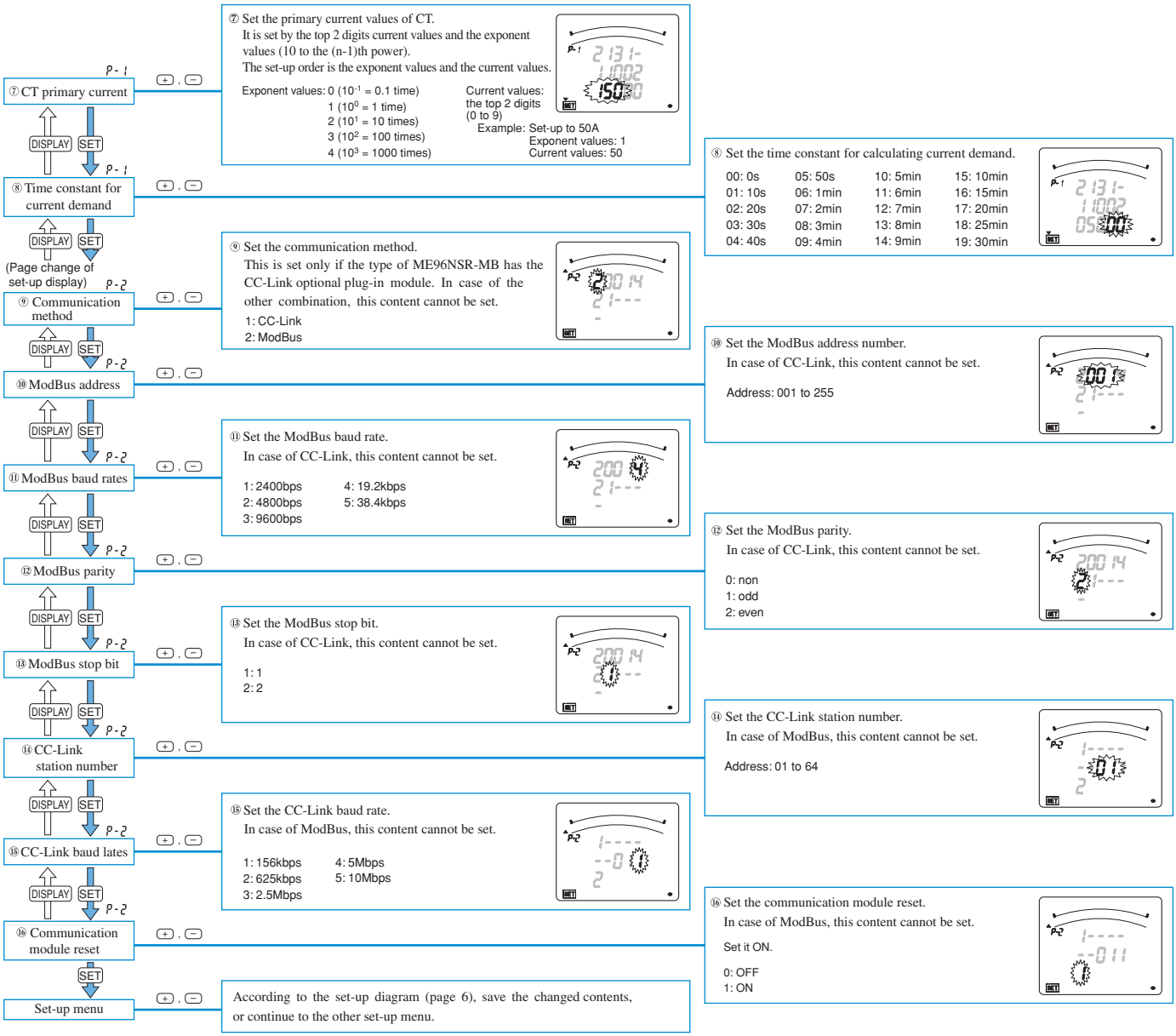
■ Simplified Set-up

In the operation mode, press (SET) and (RESET) simultaneously for 2 seconds or more, and the following operation becomes available.
By pressing (PHASE) in the simplified set-up mode, the simplified setting page is changed.



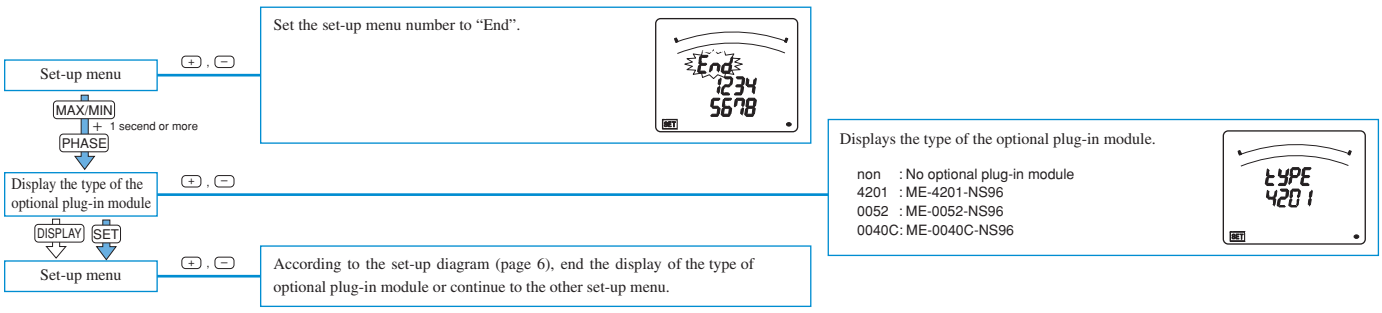
Functions

Settings (Continued)



■ Display of the Type of Optional Plug-in Module

It is possible to display the type of the optional plug-in module when the optional plug-in module is mounted.
In the operation mode, after pressing (SET) and (RESET) simultaneously for 2 seconds or more, the following operation becomes available.



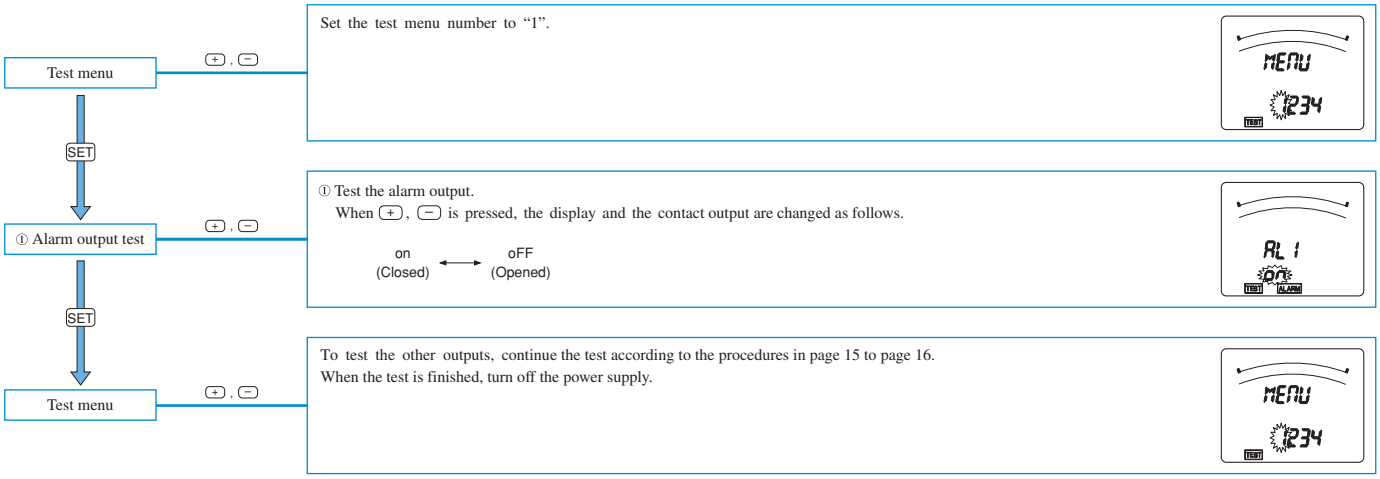
Note	Even in the set value confirmation mode, the type of the optional plug-in module can be displayed. The procedure is the same as the above-mentioned.

Test Function

● Alarm Output Test

When the ME-4201-NS96 optional plug-in module is installed, simulated signal output to test the alarm output circuit can be put out.

The following operation becomes possible when you turn on the power supply while pressing (DISPLAY) at the state of power failure.
It is not possible to test without the optional plug-in module.



● Analog Output Test

When the ME-4201-NS96 optional plug-in module is installed, simulated signal output to test the analog output circuit can be put out.

The following operation becomes possible when you turn on the power supply while pressing (DISPLAY) at the state of power failure.
It is not possible to test without the optional plug-in module.

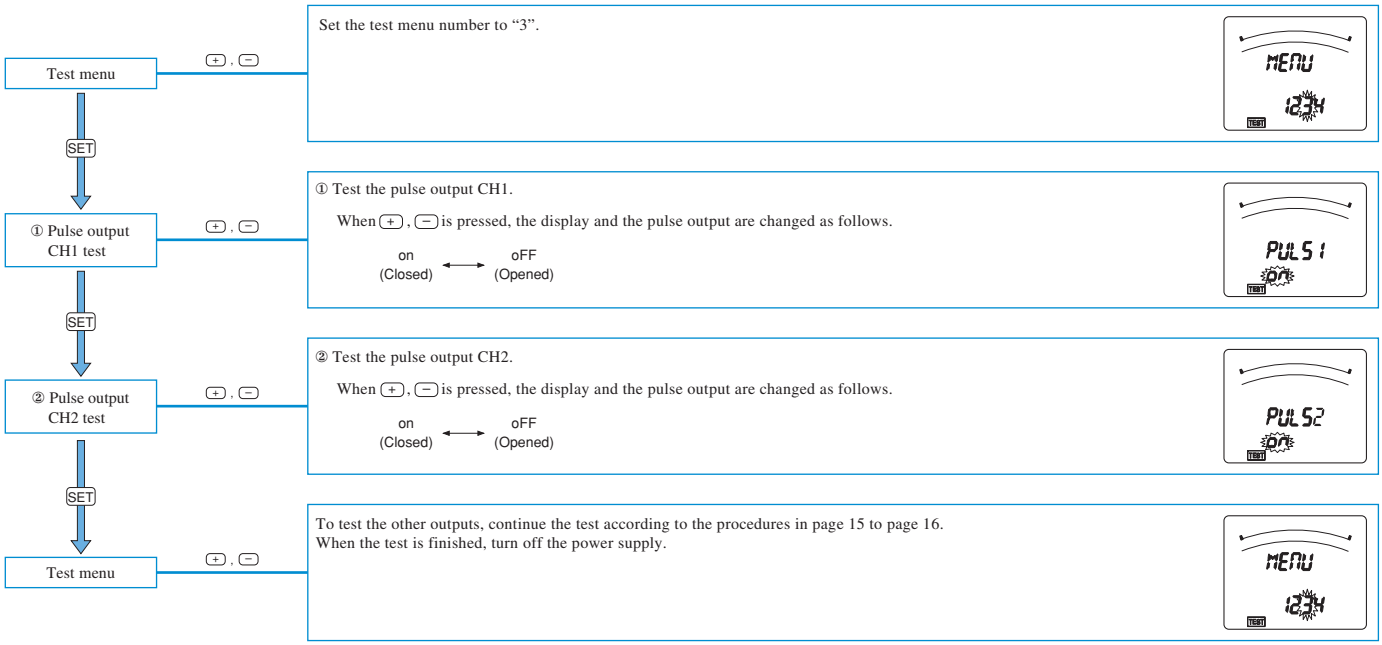
Functions

Test Function (Continued)

● Pulse Output Test

When the ME-4201-NS96 optional plug-in module is installed, simulated signal output to test the pulse output circuit can be put out.

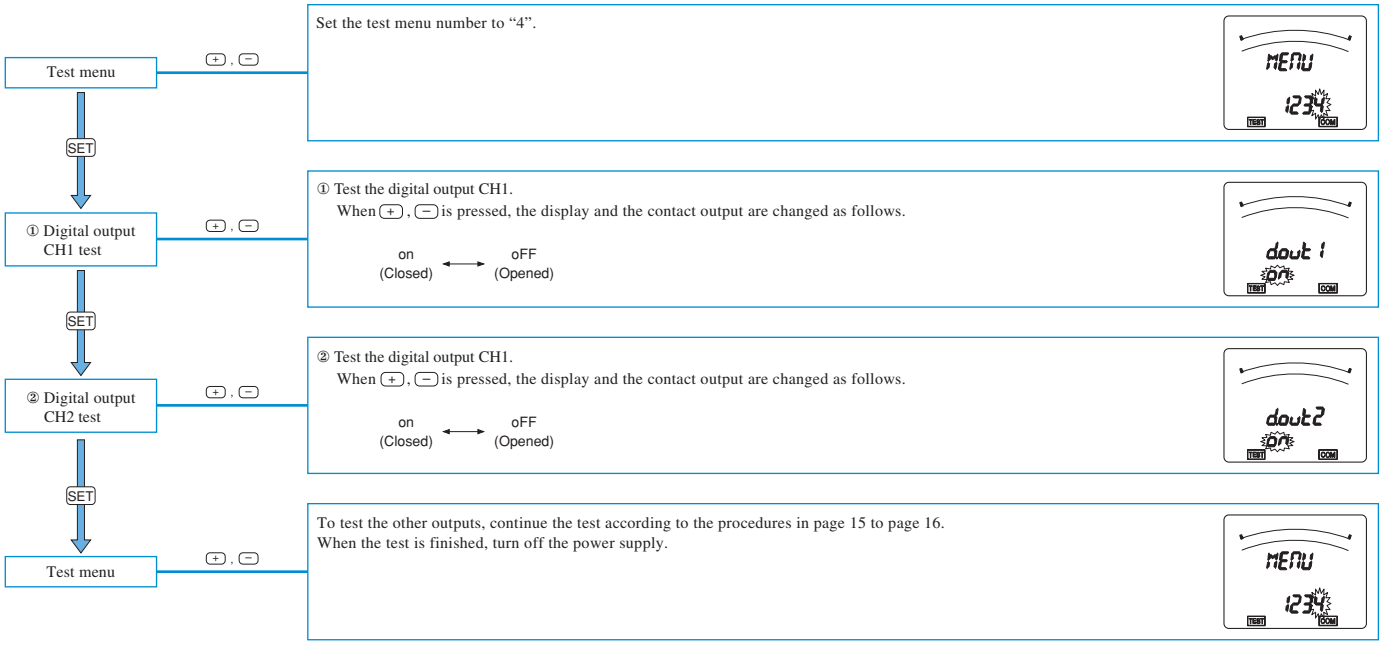
The following operation becomes possible when you turn on the power supply while pressing (DISPLAY) at the state of power failure.
It is not possible to test without the optional plug-in module.



● Digital Output Test

When the ME-0052-NS96 optional plug-in module is installed, simulated signal output to test the digital output circuit can be put out.

The following operation becomes possible when you turn on the power supply while pressing (DISPLAY) at the state of power failure.
It is not possible to test without the optional plug-in module.



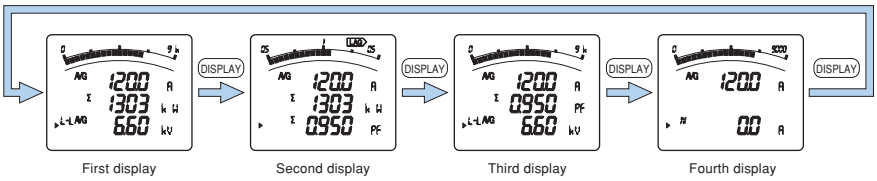
Note	The initial value of each CH of this test mode is “Open”. If CH is changed or this test mode ends, the output becomes “Open”.

Operation

● Display Change

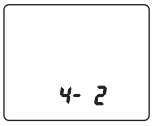
By pressing (DISPLAY) , the measurement display switches over.

Display change example (Display pattern: P01, Phase wire: Three phase 4 wire)



First display　Second display　Third display　Fourth display

Note 1: When the display is changed by pressing (DISPLAY), the following display is displayed just for a few seconds.



← This shows that second display of the four displays is being displayed.

Display number

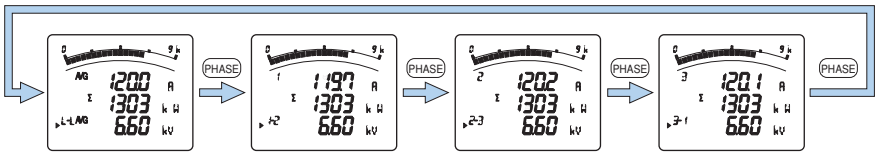
Note 2: Even in the maximum and minimum value display, when the (DISPLAY) is pressed, the display will switch over.

Reference　Display items and sequences vary with display patterns (P01 to P13) and additional display. For detailed display pattern, refer to page 22.

● Phase Change

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

Display change example (Phase wire: Three phase 3 wire)



Current average value
Power (total)
Voltage average value

Current phase 1
Power (total)
Voltage phase 1-2

Current phase 2
Power (total)
Voltage phase 2-3

Current phase 3
Power (total)
Voltage phase 3-1

Note: When (PHASE) is pressed, the phase will switch over, even in the maximum and minimum value display.

● Bar Graph Display

Measurement item to be displayed on bar graph can be selected. By displaying one item by a bar graph and other three items by digital numbers, four elements can be displayed at once.

■ Explanation of Bar Graph

In the bar graph, measurement elements shown by " ▶" or " ⌊___ " are displayed. As for voltage, current, active power, reactive power, power factor, and frequency, they can be displayed on the bar graph even if they are not set on display pattern.

■ Selection of Bar Graph

Press (+) or (−) to select measurement elements to be displayed on the bar graph.

The display element in the bar graph changes as follows by the display pattern that has been selected.

(i) When digital tri-level display are the same items

[Three-phase 3 wire]

AVG (or Σ) of display measuring items ⇔ V(L-L) AVG ⇔ AAVG ⇔ ΣW ⇔ Σvar ⇔ ΣPF ⇔ Hz

[Three-phase 4 wire]

AVG (or Σ) of display measuring items ⇔ V(L-N) AVG ⇔ V(L-L) AVG ⇔ AAVG ⇔ ΣW ⇔ Σvar ⇔ ΣPF ⇔ Hz

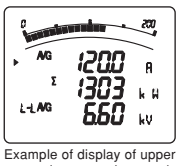
(ii) When the measuring items are all different

[Three-phase 3 wire]

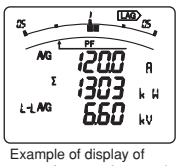
Upper ⇔ V(L-L) AVG ⇔ AAVG ⇔ ΣW ⇔ Σvar ⇔ ΣPF ⇔ Hz ⇔ Lower ⇔ Middle

[Three-phase 4 wire]

Upper ⇔ V(L-N) AVG ⇔ V(L-L) AVG ⇔ AAVG ⇔ ΣW ⇔ Σvar ⇔ ΣPF ⇔ Hz ⇔ Lower ⇔ Middle



Example of display of upper stage element on bar graph



Example of display of power factor on bar graph

Functions

Operation (Continued)

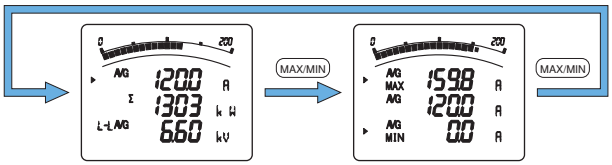
● Maximum Value and Minimum Value Display

The maximum values and the minimum values can be displayed.

■ Display of maximum value and minimum value

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

Display change example (Display pattern : P01)



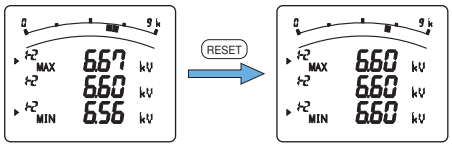
Present value display

Maximum value and minimum value display

Note 1: In the maximum value and minimum value display, bar graph is lit only between the maximum value and the minimum value.
Note 2: When the screen shifts to the maximum value and minimum value display, the following are displayed in the order below.
A→An→DA→DAn→V→W→var→VA→PF→Hz→HI→HIn→HV
However, item that are not set for display are not displayed.
Note 3: For harmonics, only the following maximum values are displayed.
Harmonic current total effective value, 1st, 3rd, 5th, 7th, 9th, 11th, 13th current effective values
Harmonic voltage total distortion ratio, 1st voltage effective value, 3rd, 5th, 7th, 9th, 11th, 13th containing ratio

■ Reset of Maximum Value and Minimum Value

When (RESET) is pressed for 2 seconds or more, the displayed maximum value and minimum value can be reset.
(The maximum/minimum value and the present value become the same.)



Note 1: The maximum values and minimum values not displayed are not reset.
Note 2: All degrees are reset for harmonics.

When (RESET) and (+) are pressed simultaneously for 2 seconds or more, all the maximum values and minimum values are reset.

■ Update of Delay Time

If maximum/minimum values do not continue for a long time since delay time, it is not updated. (Delay time is set by set-up menu 5.)
Please set the delay time when you do not want to make the maximum value updated in the condition of excessive value in short time such as starting currents of the motor.

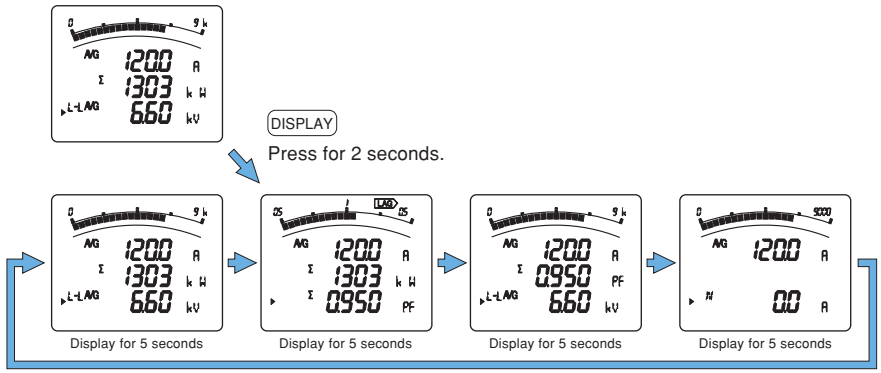
Note 1: When delay time is set, the value whose value of middle stage is larger than the maximum value might be displayed until delay time passes.
Note 2: The demand current, harmonics current, and harmonics voltage are not delayed, so the current and voltage may display larger value than the present value.

● Cyclic Display

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

■ Cyclic Display

When (DISPLAY) is pressed for 2 seconds, the cyclic display screen appears.
Cyclic display is possible even on the maximum value and minimum value display.

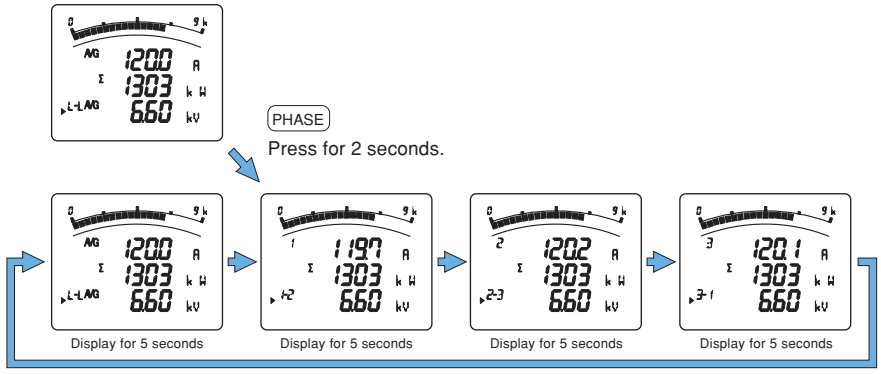


Display for 5 seconds | Display for 5 seconds | Display for 5 seconds | Display for 5 seconds

Note 1: Before shifting to the cyclic display screen, the display blinks 3 times.
Note 2: By pressing any key other than the (SET), it goes back to manual display change.
Note 3: In the cyclic display, display number is not displayed.

■ Phase Cyclic Display

When (PHASE) is pressed for 2 seconds, the phase cyclic display screen appears.
Phase cyclic display is possible even on the maximum value and minimum value display.



Display for 5 seconds | Display for 5 seconds | Display for 5 seconds | Display for 5 seconds

Note 1: Before shifting to the cyclic display screen, the display blinks 3 times.
Note 2: By pressing any key other than the (SET), it goes back to manual display change.

● Generation and Cancel of Upper/Lower Limit Alarm

When the value exceeds the upper or lower limit setting value set in advance, the display blinks and alarm can be output.
(No alarm output when all of the input voltage/input current is zero)

■ Set-up

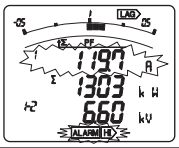
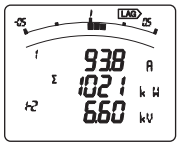
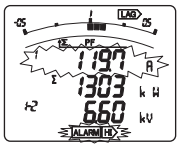
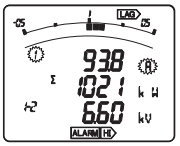
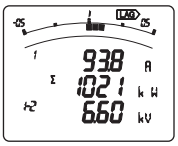
Refer to set-up menu 5. (see page 10)

■ Alarm Indicator

If the item that had alarm set-up is displayed on the bar graph, the alarm indicator appears.
By blinking of " ▲ ", upper or lower limit is shown.

■ Behavior During Alarm Generation

Alarm condition: When measurement value exceeds alarm value, display blinks and alarm contact closes.
Alarm cancel: When alarm is canceled, display blinks normally and alarm contact opens.

<table>
<tr><th colspan="2">Alarm Cancel Method</th><th>Measurement value > Upper limit value
(or Measurement value < Lower limit value)</th><th colspan="2">Measurement value < Upper limit value
(or Measurement value > Lower limit value)</th></tr>
<tr><td rowspan="2">Automatic
(Auto)</td><td>Display</td><td>ALARM, HI〉 or 〈LO : blink
  </td><td colspan="2">Normal display
  </td></tr>
<tr><td>Alarm contact</td><td>Closed</td><td colspan="2">Opened</td></tr>
<tr><td rowspan="2">Manual
(HoLd)</td><td>Display</td><td>ALARM, HI〉 or 〈LO : blink
  </td><td>ALARM, HI〉 or 〈LO : appear
 
(Alarm retention)</td><td>Normal display
  </td></tr>
<tr><td>Alarm contact</td><td>Closed</td><td>Closed</td><td>Opened</td></tr>
</table>

Note 1: In alarm condition, the digital value, the unit (A, V, W, var, VA, PF, Hz), and the phase (1, 2, 3, N, AVG, Σ, DM) of the measurement items blink. There is no blinking when the item is not on the display.
Note 2: In alarm hold condition, the unit (A, V, W, var, VA, PF, Hz) and the phase (1, 2, 3, N, AVG, Σ, DM) of the measurement items blink. There is no blinking when the element is not on the display.
Note 3: Only the present value (middle digital display) blinks on maximum and minimum value screen.
Note 4: In harmonics, only total distortion ratio and RMS value blink. The display of degree does not blink.

■ Alarm Cancel Method

Timing of alarm cancel differs by alarm cancel method.

Automatic (Auto)	When the measurement value falls below the upper setting value or exceeds the lower setting value, alarm automatically resets.
Manual (HoLd)	After the measurement value falls below the upper value or exceeds the lower setting value, alarm is maintained. When the item that generates the alarm is displayed, and (RESET) button is pressed, the alarm resets. When (RESET) button is pressed for two seconds or more, all items of alarm are reset.

Note: In contact input screen, alarm reset (including all items batch reset) cannot be operated.

■ Alarm Delay

When alarm delay time is set, alarm is not generated until status of measurement value exceeding upper/lower setting value continues for delay time.
Phase that judge upper/lower limit alarm differs by measuring items. Please refer to the following table.

Alarm item (*1)	Phase wire	Phases							
		Phase 1	Phase 2	Phase 3	Phase N	Phase 1-2	Phase 2-3	Phase 3-1	AVG/Σ
A upper limit	3P3W/3P4W	○	○	○					
A lower limit	3P3W/3P4W	○	○	○					
AN upper limit (*2)	3P4W				○				
Demand A upper limit	3P3W/3P4W	○	○	○					
Demand A lower limit	3P3W/3P4W	○	○	○					
Demand AN upper limit (*2)	3P4W				○				
V(L-N) upper limit	3P4W	○	○	○					
V(L-N) lower limit	3P4W	○	○	○					
V(L-L) upper limit	3P3W/3P4W					○	○	○	
V(L-L) lower limit	3P3W/3P4W					○	○	○	
W upper limit	3P3W/3P4W								○
W lower limit	3P3W/3P4W								○
var upper limit	3P3W/3P4W								○
var lower limit	3P3W/3P4W								○
PF upper limit	3P3W/3P4W								○
PF lower limit	3P3W/3P4W								○
Hz upper limit	3P3W/3P4W	○							
Hz lower limit	3P3W/3P4W	○							
Harmonic current total RMS value	3P3W	○	○	○					
	3P4W	○	○	○					
Harmonic current phase N RMS value (*2)	3P4W				○				
Harmonic voltage total distortion ratio	3P3W					○	○		
	3P4W	○	○	○					

*1: The apparent power is not included in the alarm element.
*2: Phase N is a alarm element to be independent.

Functions

Operation (Continued)

● Harmonics Display

Harmonic RMS value, distortion ratio, and content rate can be displayed.

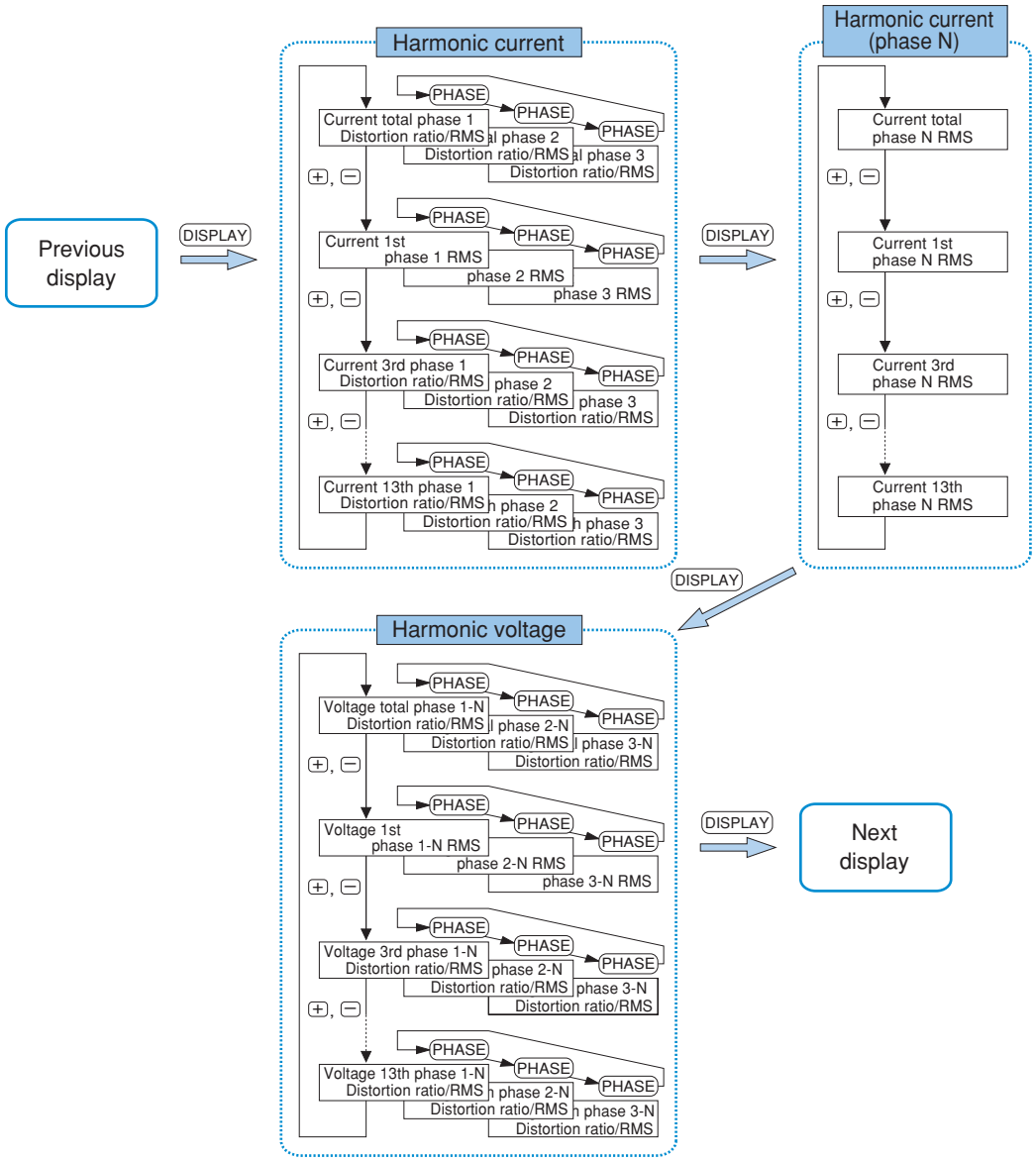
■ Measuring Items

Degree	Current (other than phase N)		Current (phase N)		Voltage	
	RMS value	Distortion ratio	RMS value	Distortion ratio	RMS value	Distortion ratio
Harmonic total	○	○	○	–	○	○
1st	○	–	○	–	○	–
3rd	○	○	○	–	○	○
5th	○	○	○	–	○	○
7th	○	○	○	–	○	○
9th	○	○	○	–	○	○
11th	○	○	○	–	○	○
13th	○	○	○	–	○	○

Note: When a fundamental harmonic is 0, the distortion ratio display 0%.

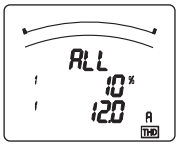
■ Degree Change Method

When (+) and (−) are pressed, harmonic degree changes. When PHASE is pressed, harmonic phase changes.

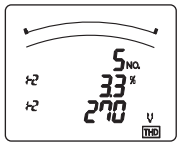


* When used as 3P3W, transition is only for 1-2 phase, 2-3 phase.

■ Harmonic Display Examples



(Example of harmonic current total display)



(Example of harmonic voltage 5th display)

Note: Harmonic total is shown by "ALL".

● Expanded Counting Display

Measured value display and enlarged 3 digital figures display of active energy and reactive energy can be displayed.

■ Display of Active Energy and Reactive Energy Display

Active energy and reactive energy are displayed on the lower stage.
Display type is shown in the right table according to total load power.

$$\text{Total load [kW]} = \frac{\alpha \times (\text{Primary voltage value}) \times (\text{Primary current value})}{1000}$$

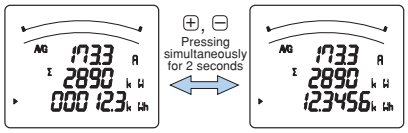
$\alpha = 3$ Three-phase 4-wire type
(Primary voltage value: phase to neutral)
$\sqrt{3}$ Three-phase 3-wire type
(Primary voltage value: phase to phase)

In the case of reactive power, kW in the right table is exchanged into kvar, and kWh into kvarh.

Total load [kW]	Digital display	Unit (k/M)
1 or higher and below 10	8888. 88	k
10 or higher and below 100	88888. 8	
100 or higher and below 1000	888888	
1000 or higher and below 10000	8888. 88	M
10000 or higher and below 100000	88888. 8	
100000 or higher	888888	

■ Enlarged 3 Digital Figures

When (+) and (−) are pressed simultaneously for 2 seconds, values of active energy and reactive energy are enlarged by 3 figures.



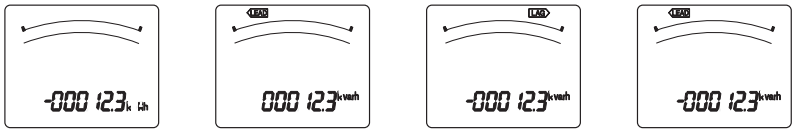
Note: This function is made only on active energy and reactive energy display.
(Example: When 3 digital figures are enlarged on active energy screen, reactive energy is not enlarged. In order to enlarge digital figures of reactive energy, display reactive energy on the screen and operate the same way.)

■ Wh and varh Reset

When (SET), (RESET), and (PHASE) are pressed simultaneously for 2 seconds, the measured values of active energy (Wh) and reactive energy (varh) are reset. (This is effective only in the present value display.)

Note: All of active energy (Wh) and reactive energy (varh) not displayed are also reset.

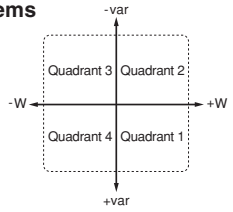
■ Example of Display



Exported active energy | Imported lead reactive energy | Exported lag reactive energy | Exported lead reactive energy

■ Polar Display of Each Measuring Items

The polar display of each measuring items are as follows.



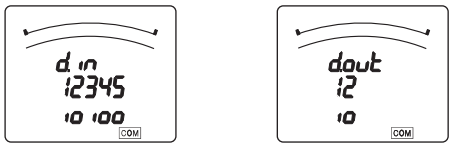
Items \ Quadrant	1	2	3	4
A, DA, V, VA Hz, HI, HV	Unsigned	Unsigned	Unsigned	Unsigned
W	Unsigned	Unsigned	"–" sign	"–" sign
var, PF	LAG Display* Unsigned	LEAD Display* "–" sign	LAG Display* Unsigned	LEAD Display* "–" sign

* When displaying var or PF by bar graph, LEAD/LAG display is lit.

● Display of Digital Input and Digital Output

Displays the digital input and digital output state.
When the type ME-0052-NS96 or ME-0040C-NS96 optional plug-in module is not installed, this operation cannot be done.

■ Display of Digital Input and Digital Output



(Example of digital input display) (Example of digital output display)

■ Reset Method of Digital Input

There are "Auto reset method" and "Latch method" for digital input reset method.
When set on the latch method, the input status is continued until the latch canceling operation.
For example, when the alarm contact is input and the alarm is stopped, you cannot miss the alarm because the alarm generated status is continued in the basic device.

■ Canceling of the Latch

① In the operation mode, press (DISPLAY) and digital input (d.in) screen is displayed.
② In the digital input screen, the latch is canceled by pressing (RESET) for 2 seconds.

Note: To display digital input screen, it is needed to set "display of the digital input/output" on "on". The initial setting is set on "on".

● Setting Value Confirmation Mode

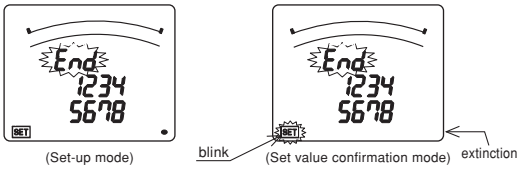
When confirming the setting value, use the setting value confirmation mode.
In this mode, the contents of the set-up items cannot be set, which prevents changing other set values by mistake during operation.

■ Going into Setting Value Confirmation Mode

In the operation mode, press (SET) for 2 seconds.

■ Setting Value Confirmation

As same as in the set-up diagram (page 6), select the set-up menu number to confirm, and press (SET).
The way to get back into the operation mode is same as in the set-up diagram.
However, the simplified set-up menu canot be confirmed in the setting value confirmation mode.



(Set-up mode) (Set value confirmation mode)

Functions

Operation (Continued)

● Display Patten Contents

When the display elements are set in the set-up menu 1 and the set-up menu 4, by pressing (DISPLAY), the display transits from No.1 in the order shown in the following table.

Three phase 4-wire

Display pattern	Digital display	Screen set on display pattern									Additional screen (displays when Set-up Menu 4 is set)								
		NO.1	NO.2	NO.3	NO.4	NO.5	NO.6	NO.7	NO.8	NO.9	NO.10	NO.11	NO.12	NO.13	NO.14	NO.15	NO.16	NO.17	NO.18
											Exported active energy	Imported lead reactive energy	Exported lag reactive energy	Exported lead reactive energy	Harmonic current	Harmonic phase N current	Harmonic voltage	Digital input state	Digital output state
P01	Upper	A	A	A	A										Degree	Degree	Degree	di	do
	Middle	W	W	PF	–										Ratio	–	Ratio	DI No.	DO No.
	Lower	V	PF	V	AN										RMS value	RMS value	RMS value	State	State
P02	Upper	A	A	A	A						–				Degree	Degree	Degree	di	do
	Middle	V	W	PF	–						–				Ratio	–	Ratio	DI No.	DO No.
	Lower	Wh	Wh	Wh	AN						Exported active energy				RMS value	RMS value	RMS value	State	State
P03	Upper	A	A	A	A	A	A								Degree	Degree	Degree	di	do
	Middle	PF	PF	PF	PF	PF	–								Ratio	–	Ratio	DI No.	DO No.
	Lower	V	W	var	VA	Hz	AN								RMS value	RMS value	RMS value	State	State
P04	Upper	A	A	A	A	A	A	A			–	–	–	–	Degree	Degree	Degree	di	do
	Middle	V	W	var	VA	PF	Hz	–			–	–	–	–	Ratio	–	Ratio	DI No.	DO No.
	Lower	Wh	Wh	varh	Wh	Wh	Wh	AN			Exported active energy	Imported lead reactive energy	Exported lag reactive energy	Exported lead reactive energy	RMS value	RMS value	RMS value	State	State
P05	Upper	PF	Hz	VA											Degree	Degree	Degree	di	do
	Middle	W	W	W											Ratio	–	Ratio	DI No.	DO No.
	Lower	var	var	var											RMS value	RMS value	RMS value	State	State
P06	Upper	A1	V1N	A	A										Degree	Degree	Degree	di	do
	Middle	A2	V2N	–	–										Ratio	–	Ratio	DI No.	DO No.
	Lower	A3	V3N	V	AN										RMS value	RMS value	RMS value	State	State
P07	Upper	A	A1	V1N	A										Degree	Degree	Degree	di	do
	Middle	V	A2	V2N	–										Ratio	–	Ratio	DI No.	DO No.
	Lower	W	A3	V3N	AN										RMS value	RMS value	RMS value	State	State
P08	Upper	A	A	A1	V1N	A					–				Degree	Degree	Degree	di	do
	Middle	V	W	A2	V2N	–					–				Ratio	–	Ratio	DI No.	DO No.
	Lower	Wh	Wh	A3	V3N	AN					Exported active energy				RMS value	RMS value	RMS value	State	State
P09	Upper	A	A1	DA1	V1N	A	DA								Degree	Degree	Degree	di	do
	Middle	DA	A2	DA2	V2N	–	–								Ratio	–	Ratio	DI No.	DO No.
	Lower	V	A3	DA3	V3N	AN	DAN								RMS value	RMS value	RMS value	State	State
P10	Upper	A	A	A1	DA1	V1N	A	DA							Degree	Degree	Degree	di	do
	Middle	DA	DA	A2	DA2	V2N	–	–							Ratio	–	Ratio	DI No.	DO No.
	Lower	V	W	A3	DA3	V3N	AN	DAN							RMS value	RMS value	RMS value	State	State
P11	Upper	A	A	DA1	V1N	A	DA				–				Degree	Degree	Degree	di	do
	Middle	DA	V	DA2	V2N	–	–				–				Ratio	–	Ratio	DI No.	DO No.
	Lower	Wh	Wh	DA3	V3N	AN	DAN				Exported active energy				RMS value	RMS value	RMS value	State	State
P12	Upper	A	A	A	DA	W	A	DA			–				Degree	Degree	Degree	di	do
	Middle	DA	W	V	V	V	–	–			–				Ratio	–	Ratio	DI No.	DO No.
	Lower	Wh	Wh	Wh	Wh	Wh	AN	DAN			Exported active energy				RMS value	RMS value	RMS value	State	State
P13	Upper	A1	V1N	W1	var1	VA1	PF1	V	V	A	–	–	–	–	Degree	Degree	Degree	di	do
	Middle	A2	V2N	W2	var2	VA2	PF2	Hz	Hz	–	–	–	–	–	Ratio	–	Ratio	DI No.	DO No.
	Lower	A3	V3N	W3	var2	VA3	PF3	Wh	varh	AN	Exported active energy	Imported lead reactive energy	Exported lag reactive energy	Exported lead reactive energy	RMS value	RMS value	RMS value	State	State
P00	Upper	Arbitrary measuring item				For details, refer to the user's manual					–	–	–	–	Degree	Degree	Degree	di	do
	Middle										–	–	–	–	Ratio	–	Ratio	DI No.	DO No.
	Lower										Exported active energy	Imported lead reactive energy	Exported lag reactive energy	Exported lead reactive energy	RMS value	RMS value	RMS value	State	State

Wh: Imported active energy, varh: Imported reactive energy

Note: When an additional screen is added, a screen number is added.

Three phase 3-wire

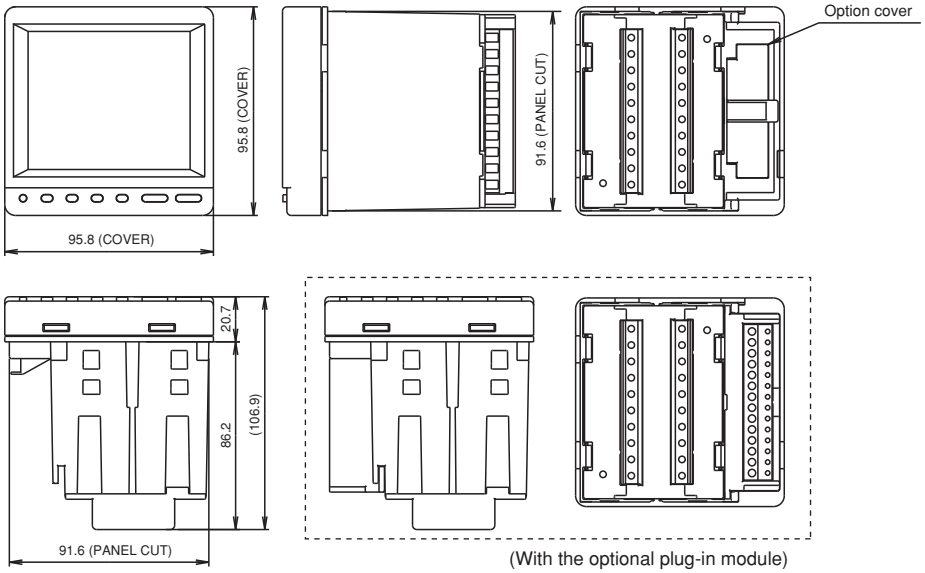
Display pattern	Digital display	Screen set on display pattern						Additional screen (displays when Set-up Menu 4 is set)							
		NO.1	NO.2	NO.3	NO.4	NO.5	NO.6	NO.7	NO.8	NO.9	NO.10	NO.11	NO.12	NO.13	NO.14
								Exported active energy	Imported lead reactive energy	Exported lag reactive energy	Exported lead reactive energy	Harmonic current	Harmonic voltage	Digital input state	Digital output state
P01	Upper	A	A	A								Degree	Degree	di	do
	Middle	ΣW	ΣW	ΣPF								Ratio	Ratio	DI No.	DO No.
	Lower	V	ΣPF	V								RMS value	RMS value	State	State
P02	Upper	A	A	A				–				Degree	Degree	di	do
	Middle	V	ΣW	ΣPF				–				Ratio	Ratio	DI No.	DO No.
	Lower	Wh	Wh	Wh				Exported active energy				RMS value	RMS value	State	State
P03	Upper	A	A	A	A							Degree	Degree	di	do
	Middle	ΣPF	ΣPF	ΣPF	ΣPF							Ratio	Ratio	DI No.	DO No.
	Lower	V	ΣW	Σvar	Hz							RMS value	RMS value	State	State
P04	Upper	A	A	A	A	A		–	–	–	–	Degree	Degree	di	do
	Middle	V	ΣW	Σvar	ΣPF	Hz		–	–	–	–	Ratio	Ratio	DI No.	DO No.
	Lower	Wh	Wh	varh	Wh	Wh		Exported active energy	Imported lead reactive energy	Exported lag reactive energy	Exported lead reactive energy	RMS value	RMS value	State	State
P05	Upper	ΣPF	Hz									Degree	Degree	di	do
	Middle	ΣW	ΣW									Ratio	Ratio	DI No.	DO No.
	Lower	Σvar	Σvar									RMS value	RMS value	State	State
P06	Upper	A1	V12	A								Degree	Degree	di	do
	Middle	A2	V23	–								Ratio	Ratio	DI No.	DO No.
	Lower	A3	V31	V								RMS value	RMS value	State	State
P07	Upper	A	A1	V12								Degree	Degree	di	do
	Middle	V	A2	V23								Ratio	Ratio	DI No.	DO No.
	Lower	W	A3	V31								RMS value	RMS value	State	State
P08	Upper	A	A	A1	V12			–				Degree	Degree	di	do
	Middle	V	ΣW	A2	V23			–				Ratio	Ratio	DI No.	DO No.
	Lower	Wh	Wh	A3	V31			Exported active energy				RMS value	RMS value	State	State
P09	Upper	A	A1	DA1	V12							Degree	Degree	di	do
	Middle	DA	A2	DA2	V23							Ratio	Ratio	DI No.	DO No.
	Lower	V	A3	DA3	V31							RMS value	RMS value	State	State
P10	Upper	A	A	A1	DA1	V12						Degree	Degree	di	do
	Middle	DA	DA	A2	DA2	V23						Ratio	Ratio	DI No.	DO No.
	Lower	V	ΣW	A3	DA3	V31						RMS value	RMS value	State	State
P11	Upper	A	A	DA1	V12			–				Degree	Degree	di	do
	Middle	DA	V	DA2	V23			–				Ratio	Ratio	DI No.	DO No.
	Lower	Wh	Wh	DA3	V31			Exported active energy				RMS value	RMS value	State	State
P12	Upper	A	A	A	DA	ΣW		–				Degree	Degree	di	do
	Middle	DA	ΣW	V	V	V		–				Ratio	Ratio	DI No.	DO No.
	Lower	Wh	Wh	Wh	Wh	Wh		Exported active energy				RMS value	RMS value	State	State
P13	Upper	A1	V12	ΣW	V	V		–	–	–	–	Degree	Degree	di	do
	Middle	A2	V23	Σvar	Hz	Hz		–	–	–	–	Ratio	Ratio	DI No.	DO No.
	Lower	A3	V31	ΣPF	Wh	varh		Exported active energy	Imported lead reactive energy	Exported lag reactive energy	Exported lead reactive energy	RMS value	RMS value	State	State
P00	Upper	Arbitrary measuring item				For details, refer to the user's manual		–	–	–	–	Degree	Degree	di	do
	Middle							–	–	–	–	Ratio	Ratio	DI No.	DO No.
	Lower							Exported active energy	Imported lead reactive energy	Exported lag reactive energy	Exported lead reactive energy	RMS value	RMS value	State	State

ΣW: Total active power, Σvar: Total active power, ΣPF: Total power factor

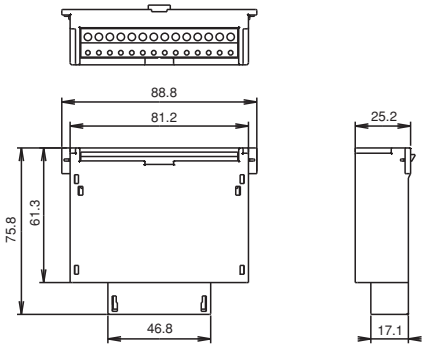
Dimensions / Mounting / Wiring

Dimensions

ME96NSR, ME96NSR-MB



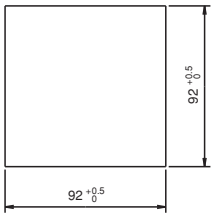
Optional Plug-in Module



Mounting

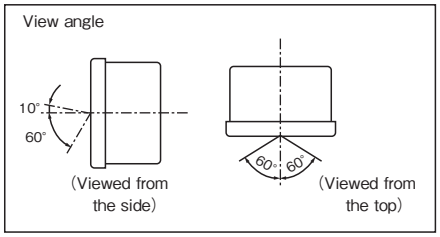
1 Dimensions of Panel

The panel hole dimensions are shown below.
It can be attached to a panel with thickness of 1.6 to 4.0mm.



2 View Angle

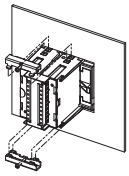
The contrast of the display changes at view angles.
Mount it at the position that is easy to see.



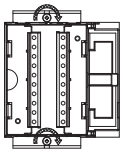
3 Attachment

For attachment of the basic device into the panel hole, attach according to the following procedure.

①The attachment lug is installed in two holes of the top and bottom of the basic device.



②Tighten the screws of the lug, and fix onto the panel.



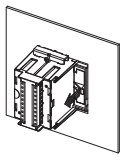
Note

Please do not tighten too strongly to prevent panel and screw from breaking.
Tightening torque for this product: 0.3N·m to 0.5N·m
(Half the torque applied normally for this type of screw)
Also, please tighten the upper and lower screws at the same time.

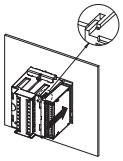
4 Installing the Optional Plug-in Module

When installing the optional plug-in module onto the basic device, install according to the following procedure.

①The option cover is removed.



②The optional plug-in module is installed.



Note

Protective sheet

A protective sheet is attached to the display for protection against scratch during the attachment to panel. Before using, remove the protective sheet.
When you remove it, the display may light up due to generation of static electricity, but it is not an error. It goes off by natural discharge after a while.

Attachment position

In the case to attaching to the end of the panel, check the wiring work space and decide the attachment position.

Optional Plug-in module

Install the optional plug-in module after the power is turned off.
The option is not recognized when installed while power is on.
In this case, the option is recognized by power suspension/power resumption or restarting the basic device.

Dimensions / Mounting / Wiring

Wiring

1 Applicable Cable Size

The table on the right describes the applicable wire size.

	Input and output terminals of the basic device	Terminals of the optional plug-in module
Applicable wire size	AWG24 to 14	AWG 24 to 14 • When using a stranded wire, use a ferrule. (AWG 16)
Tightening torque	0.4N·m	–
Strip Gauge	10mm	10mm

2 Wiring

■ Input and Output Terminals of the Basic Device

①Strip top of the cable or crimp the ferrule.

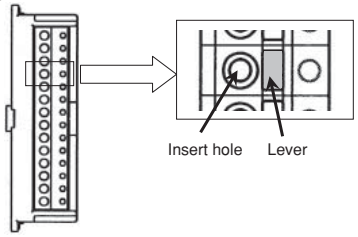
②Slacken screws of the terminal block, and insert the cables into terminal hole.

③Tighten the terminal screws according to the tightening torque mentioned above.

■ Terminals of the Optional Plug-in Module

①Strip top of the cable or crimp the ferrule.

②Insert the cables by pushing the lever, and connect by releasing the lever.



3 Confirmations

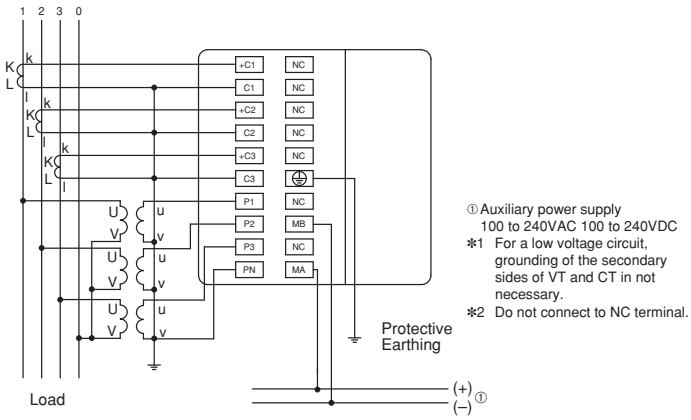
After wiring, make sure the following:

☐ The wires are connected correctly.

☐ There is no mistake in wiring.

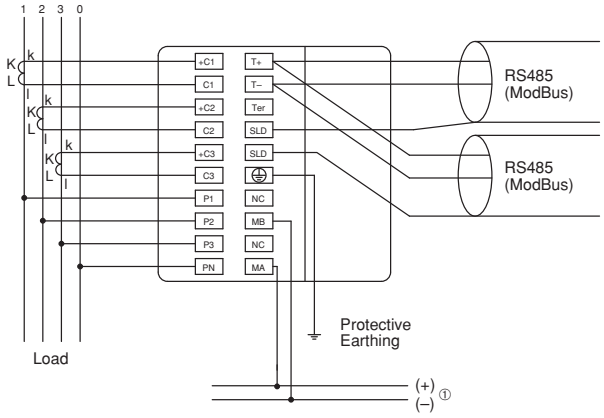
Wiring Diagram

Three phase 4-wire type : Example of ME96NSR (with VT)



①Auxiliary power supply
100 to 240VAC 100 to 240VDC
✻1 For a low voltage circuit, grounding of the secondary sides of VT and CT in not necessary.
✻2 Do not connect to NC terminal.

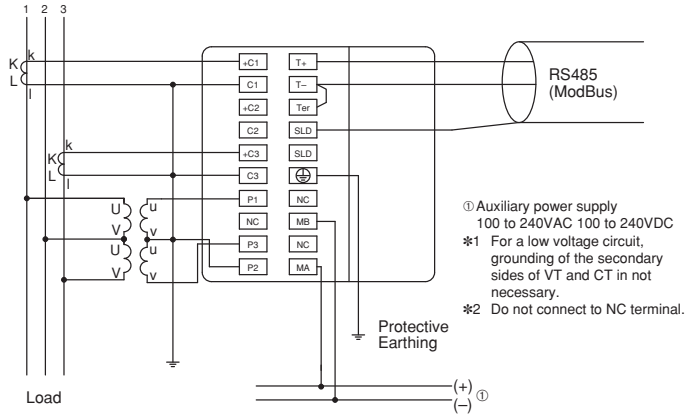
Three phase 4-wire type : Example of ME96NSR-MB (for direct input)



Note

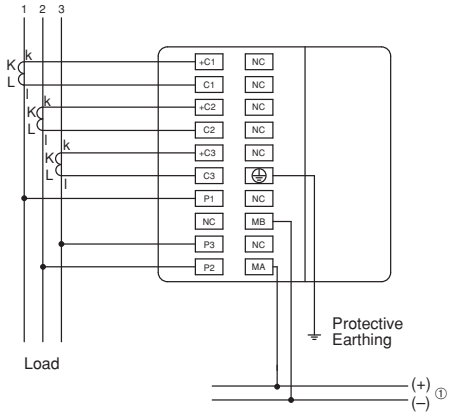
1. If the polarity of VT and CT is not correct, it cannot be measured correctly.
2. In case of DC auxiliary power, it should be wired correctly because it has polarity. In case of AC auxiliary power, it does not have polarity.
3. For a low voltage circuit, grounding of the secondary sides of VT and CT is not necessary.
4. Always earth the ⏚ terminal to the protective earth conductor. Earth the terminal with under 100 ohm of earth resistance. Otherwise, there will be a false operation.

Three phase 3-wire type : Example of ME96NSR-MB (with VT, wiring 2CT)



①Auxiliary power supply
100 to 240VAC 100 to 240VDC
✻1 For a low voltage circuit, grounding of the secondary sides of VT and CT in not necessary.
✻2 Do not connect to NC terminal.

Three phase 3-wire type : Example of ME96NSR (for direct input, wiring 3CT)

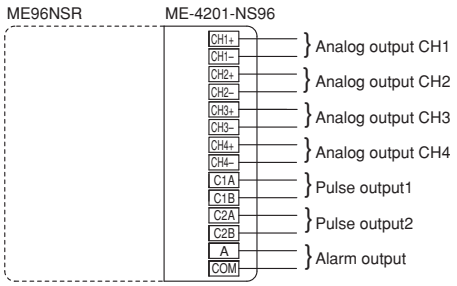


Note

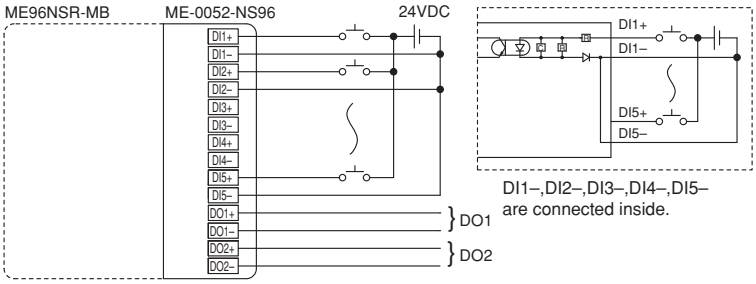
1. Use the shielded twisted pair cable.
2. To the units of both the end of ModBus link, the 120 ohm resistance has to be attached.
   This instrument can perform 120 ohm termination by short-circuiting the terminal of “T-”and “Ter”.
3. The earth has to be connected to earth by a thick wire of low impedance.
4. Keep the distance between ModBus link to power line.
5. When the setting is 2CT, the use by 3CT wiring cannot correctly measure for phase 2.

Wiring Diagram (Continued)

Optional Plug-in Module : ME-4201-NS96



Optional Plug-in Module : ME-0052-NS96



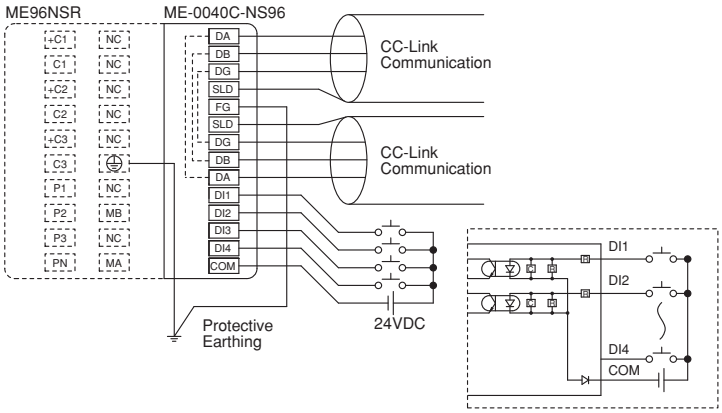
Note

1. Do not bunch the digital input/output signal cables with the main circuit or power cables, or install them close to each other. Keep the distance between the digital input/output signal cables, the main circuit or power cables, and high voltage lines shown below, when they run parallel to each other.

Conditions	Distance
Below 600V power lines	30cm or more
Other power lines	60cm or more

2. Analog output signal cables should keep the distance from the other power cables and input signal (VT, CT and auxiliary power) cables, and should not be bunched. And use the shielded cables or twisted pair cables so that it is not affected noise, serge, and induction.
   Also, the wiring cables should be as short as possible.
3. In case of ME96NSR-MB with ME-4201-NS96, the ModBus interface and the analog outputs do not have the insulation between them.

Optional Plug-in Module : ME-0040C-NS96



Note

1. As for CC-Link cable, use the designated cable. Each of Ver.1.10 compatible CC-Link cables, CC-Link specified cables, and CC-Link specified high-performance cables cannot be used together with other cable types. If used together, correct data transmission will not be guaranteed.
   The terminating resistor is different depending on the applied cable.
2. Connect the shielded wire of the CC-Link specified cable to “SLD” of each module, and earth the both ends of the shielded wire “FG”. The SLD and FG are connected into the module.
3. Keep the distance between CC-Link cables to power lines (At least 10cm). When connecting long distance in parallel, please set apart more than 30cm.
4. Fill the requirements of total wire distance, station distance, and terminal resistance value according to baud rate and type of cable. (As for detail of the requirements, refer to the operation manual for CC-Link master unit.)
5. To the units of both the end of CC-Link line, the terminal resistors should be attached. And the terminal resistors should be attached in between DA and DB.

Specifications

Specifications

Type			ME96NSR, ME96NSR-MB			
Phase wire			Three phase 4-wire	Three phase 3-wire		
Rating		Current	5AAC/1AAC	5AAC/1AAC		
		Voltage	max 277V/480VAC	110VAC, 220VAC		
		Frequency	50-60Hz	50-60Hz		
Measuring Items	Current (A)		A_1, A_2, A_3, A_N, Aavg	A_1, A_2, A_3, Aavg		
	Current Demand (DA)		DA_1, DA_2, DA_3, DA_N, DAavg	DA_1, DA_2, DA_3, DAavg		
	Voltage (V)		V_{12}, V_{23}, V_{31}, V_{LL}avg, V_{1N}, V_{2N}, V_{3N}, V_{LN}avg	V_{12}, V_{23}, V_{31}, V_{LL}avg		
	Active Power (W)		ΣW, W_1, W_2, W_3	ΣW		
	Reactive Power (var)		Σvar, var_1, var_2, var_3	Σvar		
	Apparent Power (VA)		ΣVA, VA_1, VA_2, VA_3	–		
	Power Factor (PF)		ΣPF, PF_1, PF_2, PF_3	ΣPF		
	Frequency (Hz)		Hz			
	Active Energy (Wh)		Imported, Exported			
	Reactive Energy (varh)		Imported lag, Imported lead, Exported lag, Exported lead			
	Harmonics Current (HI)		HI_1, HI_2, HI_3, HI_N	HI_1, HI_2, HI_3		
			THD, h_1, …, h_{13} RMS value and Distortion ratio (max.60%)			
	Harmonics Voltage (HV)		HV_{1N}, HV_{2N}, HV_{3N}	HV_{12}, HV_{23}		
			THD, h_1, …, h_{13} RMS value and Distortion ratio (max.20%)			
Measuring Range and Accuracy			Measuring Range	Display		Analog Output, Pulse Output	
				5AAC	1AAC	5AAC	1AAC
	Current		0 to Rated×120%	0.5%	1.0%	0.5%	1.0%
	Current Demand						
	Voltage		0 to Rated×15/11×120%				
	Active Power		±Rated×110%				
	Reactive Power		±Rated/2×110%				
	Apparent Power		0 to Rated×110%				
	Frequency		45 to 55Hz or 55 to 65Hz				
	Power Factor		Lead 0 to 1 to Lag 0	2.0%	3.0%	2.0%	3.0%
	Active Energy			1.0%	2.0%	1.0%	2.0%
	Reactive Energy			2.0%	2.0%	2.0%	2.0%
	Harmonics Current		0 to Rated	2.5%		2.5%	
						(Total RMS, 0 to Rated×60%)	
	Harmonics Voltage		0 to 20%	2.5%		2.5%	
						(T.H.D, 0 to 20%)	
Measuring Method	Instantaneous Value		A, V: RMS calculation, W, var, Wh, varh: Digital multiplication, PF: Power ratio calculation				
			Hz: Zero-cross, HV, HI: FFT				
	Demand Value		Thermal type calculation				
Display	Type		LCD with backlight				
	Number of Display Digits and Segments	Digital Display	A, DA, V, W, var, VA; 4 digits or 3 digits PF; 4 digits, Hz; 3 digits Wh, varh; 6 digits HI (Distortion ratio); 3 digits, HV (Distortion ratio); 4 digits, HV, HI (RMS); 3 digits				
		Bar Graph	21 Segment-Bar Graph Displays on the digital part by selecting upper, middle, lower display. (Excluding Wh, varh, Harmonics) Or displays current, voltage, active power, reactive power, frequency, power factor which is independent from digital display.				
			22 Segment-Indicator Displays values that were set on alarm setting in the setting mode according to elements shown on bar graph elements.				
	Display Updating Time Interval	Digital Display	0.5s				
		Bar Graph	0.5s				
Response Time			Display: 2s or less, Analog output: 2s or less In HI and HV, 10s or less				
Time Constant of Current Demand			Select from 0, 10, 20, 30, 40, 50s, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30min.				
Temperature Influence			Within class index at 23 ±10 degrees celsius				
Power Failure Compensation			Non-volatile memory (Items: setting value, max/min value, active/reactive energy)				
VA Consumption	VT		0.1VA/phase, 0.2VA/phase (at direct input)				
	CT		0.1VA/phase				
	Auxiliary Power Circuit		7VA at 110VAC, 8VA at 220VAC, 5W at 100VDC				
Auxiliary power			100 to 240VAC (+10%,-15%) 50/60Hz 100 to 240VDC (+10%,-30%)				
Weight			0.5kg				
Dimensions			96(H)x96(W)x86(D)				
Enclosure			Thermoplastic self-extinguish (UL94V0)				
Operating Temperature			-5 to 50 degrees celsius (average operating temperature ; 35 or less per day)				
Operating Humidity			30 to 85%RH, non condensing				
Storage Temperature			-20 to 60 degrees celsius				
Standard			EMC···EN61326-1:2006 LVD···EN61010-1:2001				

Note1: Accuracy is specified according to the maximum scales value of rated value.
Note2: Measurement of harmonics which its distortion ratio is exceeded 100% may exceed the accuracy.
Note3: Harmonics cannot be measured without voltage input.

Transmission

● ModBus Specifications

Item	Specifications
Interface	RS485, 2 wires half duplex
Protocol	ModBus RTU
Speed	2400, 4800, 9600, 19200, 38400bps
Distance	1000m
Address	1 to 255 (FFh)
Station Number	31
Terminal Resistance	120Ω 1/2W
Recommended Cables	Shielded twisted pair, AWG26 (or wider) gauge

● CC-Link Specifications

Item	Specifications
Numbers of Occupied Stations	1 Station Remote device station (I/O data and word data can be transmitted)
CC-Link Version	CC-Link Ver 1.10
Baud Rate	10Mbps/5Mbps/2.5Mbps/625kbps/156kbps
Maximum Number of Connected Units	The following conditions should be satisfied. If the system is configured by only this instrument, up to 42 units can be connected. Condition 1 : {(1 × a) + (2 × b) + (3 × c) + (4 × d)} ≤ 64 a: number of units occupied by 1 station, b: number of units occupied by 2 stations c: number of units occupied by 3 stations, d: number of units occupied by 4 stations Condition 2 : {(16 × A) + (54 × B) + (88 × C)} ≤ 2304 A: number of remote I/O stations, B: number of remote device stations, C: number of local stations
Remote Station Number (Station Number)	1 to 64

● Twist Pair Cable Specifications

Part of recommended cables of twist pair cables to be used in CC-Link are introduced below.
As for details, refer to “Mitsubishi Electric Open Field Network CC-Link”.
CC-Link performance is not guaranteed with other than the recommended cables.

Name	CC-Link Exclusive Cable	CC-Link Exclusive High Performance Cable	Contact
Type	FANC-SB	FANC-SBH	Mitsubishi Electric System & Service Co., Ltd. Kuramo Electric Co., Ltd.
	FA-CBL200SB, etc.	FA-CBL200SBH	MITSUBISHI ELECTRIC ENGINEERING, CO., LTD.

Name	CC-Link Exclusive New Cable (CC-Link Ver.1.10)	Contact
Type	FANC-SB110H	Kuramo Electric Co., Ltd.

Notes: 1. As for terminal resistance, be sure to use 110Ω (1/2W) when using CC-Link exclusive cable, and 130Ω (1/2W) when using CC-Link exclusive high performance cable.
If other combination than the above is used, normal data transmission is not guaranteed.
2. CC-Link exclusive cable and CC-Link exclusive high performance cable cannot be used in mixture.
3. System construction is easier by using CC-Link exclusive cable in 10Mbps and CC-Link exclusive high performance cable under 5Mbps.
4. The CC-Link Exclusive New Cable is more suited for system constructed with CC-Link Ver.1.10 products.

As for details of twist pair cable, refer to CC-Link catalog “CC-Link Cable Wiring Manual” and “MELFANS Web”.

“MELFANS Web” : http://wwwf2.mitsubishielectric.co.jp/melfansweb/english/index.html

■ About Programming

Necessary information for operating this device by MELSEC-A/Q series sequencer loading CC-Link interface unit are as follows.
In addition to this operation manual, read the following documents also.

● PLC I/F unit user’s manual
● Electronic Multi-Measuring Instrument programming manual (CC-Link) LAN040503

■ Data Collection for ModBus

● Electronic Multi-Measuring Instrument ModBus I/F specification LSPM0075

Output Specification

Output	Specification		Optional Plug-in Module Type
Analog Output	Output	4 to 20mADC	ME-4201-NS96
	Load Resistance	600Ω max	
Pulse Output	No-voltage ‘a’ contact Contact Capacity: 35VDC, 0.1A		ME-4201-NS96
Digital Input	Rated 24VDC (19 to 30VDC), under 4mA Signal Width over 30ms (with ‘DI’ latch HoLd, over 30ms of pulse can be latched)		ME-0052-NS96 ME-0040C-NS96
Digital Output	No-voltage ‘a’ contact Contact Capacity: 35VDC, 0.2A		ME-4201-NS96 ME-0052-NS96

Related Products

Three-phase Automatic Power Factor Adjustment Device

This device automatically controls power condenser input and adjusts power factor.
Power loss and voltage rise can be prevented by using this device.

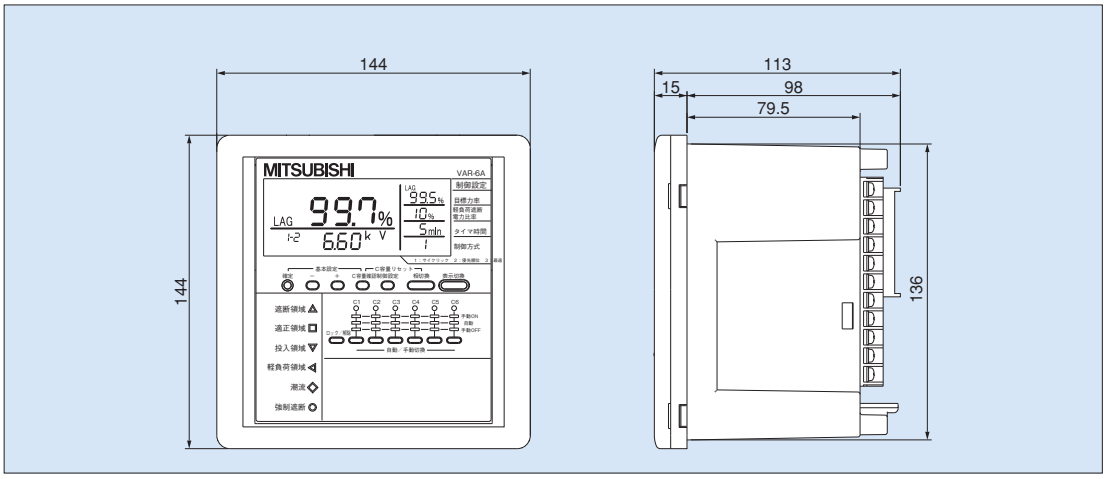
VAR-6A

● Features

- Lineup of 6-Circuit and 12-Circuit Control Types
  Only one device is needed where many condensers are needed in 12-circuit control such as large facility or low-voltage control.
- Better Accuracy for Power Factor Measurement
  Accuracy has improved compared to the previous model from ±5% to ±2% leading to better power factor control.
- Automatic Condenser Capacity Awareness Function
  Inherits our own condenser capacity awareness function, and set-up of the device is very easy.
  New function of condenser capacity lock is added.
- Better Visibility with Large LCD Display
  With the large LCD display, current power ratio plus (voltage, current, active power, reactive power) and various setting value can be displayed.

● Dimensions

Unit : mm



● Specifications

Model Name			VAR-6A / VAR-12A	
Phase Line			3-Phase/3-Wire, 3-Phase/4-Wire Common Use	
Instrument Rating	Current		5AAC	
	Voltage		110VAC, 220VAC (3-Phase/3-Wire) Max. 254/440VAC (3-Phase/4-Wire)	
	Frequency		50-60Hz Common Use	
Measuring Items	Alternating Current (A), AC Voltage (V), Active Power (W), Reactive Power (var), Apparent Power (VA)		Degree 1.0	Conforms to JIS C 1102
	Power Factor (cos ϕ)		Degree 2.0	
Control Specifications	Control Method	Automatic	Cyclic Control / Preference Control / Optimum Control	
		Manual	Manual ON / Automatic / Manual OFF	
	Relay Output	Output Contact	Full-time Excitation, No Voltage a Contact, 6-Circuits / 12-Circuits, One-way Common	
		Contact Capacity	250VAC 1.0A, 110VDC 0.1A	
Input/Output Specifications	Operation Complete Signal		Input Complete Signal, Cutoff Complete Signal No Voltage a Contact, One-way Common, Contact Capacity 24VDC 0.1A	
	Operation Prohibited Output		Input Prohibited Signal, Cutoff Prohibited Signal 5VDC 15mA, Enforced Cutoff Signal 5VDC 25mA	
Auxiliary Power Supply			100 to 240VAC (+10%, -15%), 100VDC (-25%, +40%)	

Note: VAR-6A/VAR-12A does not have CE marking.

Safety Precaution

(Always read these instructions before using this equipment)

For personnel and product safety please read the contents of these operating instructions carefully before using.
Please save this manual to make it accessible when required and always forward it to the end user.

⚠ 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.

■ Normal Service Conditions

⚠ CAUTION

Use the instrument in an environment that meets the normal service conditions as following points:

- Ambient temperature :-5 to +50 ˚C, average day temperature exceeds 35 ˚C
- Humidity :30 to 85%RH, non condensing.
- Altitude: 1000m or less
- Pollution Degree : 2
- 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.
- Do not expose to strong electromagnetic field and ambient noises.

■ Installation Instructions

⚠ CAUTION

- This instrument should be installed and used by a qualified electrician.
- The instrument must not be powered and used until its definitive assembly on the cabinet's door.
- Verify the following points;
  - ☐ Auxiliary power supply and measuring ratings

Auxiliary power supply			100 to 240VAC$^{+10}_{-15}$%(50-60Hz) 100 to 240VDC$^{+10}_{-30}$%
Ratings	Current		5A/1A
	Voltage	3P4W	max. 277V/480VAC (phase voltage/line voltage)
		3P3W	110VAC, 220VAC (line voltage)
	Frequency		50/60Hz

  - ☐ Current circuits, C1, C2 and C3 are Measurement category Ⅰ.
  - ☐ Voltage circuits, P1, P2 and P3 are Measurement category Ⅲ.
- This instrument is to be mounted on a panel. All connections must be kept inside the cabinet.
- Tighten the terminal screws with the specified torque and use the suitable pressure connectors and suitable wire size.
- When wiring the instrument, be sure that it is done correctly by checking the instrument's wiring diagrams.
- Be sure there are no foreign substances such as sawdust or wiring debris inside the instrument.
- 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.
- 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, high voltage lines running parallel to each other are shown below.

Conditions	Distance
Below 600V, or 600A power lines	30cm or more
Other power lines	60cm or more

■ Operation Instructions

⚠ CAUTION

- When the external terminals are connected to the external equipments, the instrument and the external equipments must not be powered and used until its definitive assembly on the cabinet's door.
- The rating of the terminal of the external equipment should satisfy the rating of the external terminal of this instrument.
- Do not use this product for special purpose equipments or systems such as nuclear, aerospace, and medical procedure.

■ Maintenance Instructions

⚠ CAUTION

- Do not touch the terminals while all the circuits connected to this instrument are alive.
- Do not disassemble or modify the instrument.
- Do not contact a chemical dust cloth to the instrument for a long time, or do not wipe it with benzene, thinner, alcohol.

- Wipe dirt off the surface with a soft dry cloth.
- Check the following points,
  - ☐ Condition of the appearance
  - ☐ Condition of the display
  - ☐ Unusual sound, smell, and generation of heat
  - ☐ Condition of the wiring and the attachment (at the cycle of six months to one year)

■ Storage Conditions

- Ambient temperature: -20 to +60˚C, average day temperature exceeds 35˚C
- Humidity: less than 90%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.

■ Disposal

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

■ Guarantee

The period of guarantee is earlier date of either 18 months from the manufacture date or 1 year from the sale date, except in the case that the failure has been caused by bad handling of the product, provided that it has been installed according to the manufacture's instructions.
We cannot take responsibility about the loss and lost profits caused by the damage, failure of the product caused by no fault of our company.

■ Replacement Cycle

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

■Service Network

Country / Region	Company	Address	Telephone
China	Mitsubishi Electric Automation (Shanghai) Limited	17/F., ChuangXing Financial Center, No.288 West Nanjing Road, Huang Pu district, SHANGHAI 20003 P.R.CHINA	+86-(0)21-2322-3030
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Indonesia	P.T.SAHABAT INDONESIA.	JL Muara Karang Selatan Blok A/Utara No.1 kav. NO.11 P.O. Box 5045/Jakarta/11050. Jakarta Indonesia.	+62-(0)21-6621780
Korea	MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD.	2 Fl. Dong Seo Game Channel Bldg., 1F 660-11 Deungchon-Dong, Kanguseo-Ku, Seoul, 157-030 Korea	+82-2-3668-6567
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Philippines	EDISON ELECTRIC INTEGRATED, INC.	24th Fl. Galleria Corporate Center Edsa Cr, Ortigas Ave. Quezon City, Metro Manila. Philippines.	+63-(0)2-643-8691
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