INSTRUCTION MANUAL

POWER LINE MULTI-METER
(VOLTMETER)

SVLC-110L

[1φ2W / 1φ3W / 3φ3W
ANALOG OUTPUT]

HARDWARE MODEL E

DAIICHI ELECTRONICS CO., LTD.

Thank you for your purchase of our product.
Read this instruction manual carefully before installation, wiring, and using this product.

Safety concerns

■ Environment and conditions of usage

Please be sure to use this product in a place that meets the following conditions.
In places that do not meet this condition, it may cause malfunction or failure and product life decline.

- Within the range of ambient temperature -10 to +55 ℃, humidity 85% RH or more.
- Place free of dust, corrosive gas, salt and oily smoke. (Corrosive gas : SO_2 / H_2S, etc.)
- Location that is not affected by vibration and shock.
- Location that is not affected by external noise.
- Altitude 2000m or less.
- If this unit directly measures an inverter output of cycle control, SCR phase angle control or PWM control, an error may increase due to its operation principle.

■ The precautions at the case of using by outdoor panel.

- These products are not a dustproof construction, waterproof construction, and splash proof construction. Please avoid the place with much dust. Moreover, please install in the place which requires neither rain nor waterdrop.
- Please do not install in the place where sunlight hits directly.
  Discoloration and degradation of a name plate, and cover is deformed by the surface temperature rise.

■ Installation and wiring

Installation and wiring, refer to the instruction manual, please be conducted by engineers.
And, please observe the following notes.

⚠CAUTION	● Please wire after the connection diagram is checked. ● Please forbid a hot line work. ● Please use the size of the electric wire that is suitable for conducting current. ● Please securely tighten the terminal screws. Please make sure that forgotten tightening of the terminal screw is not.

■ Preparation before use

At the case of connect this product to the main power supply directly, please put the suitable fuse to the outside.
This product must be set before use. Reading this instruction manual, please set correctly.

■ About dew condensation

If the temperature and humidity of an installation change rapidly when a product is a non-energization, the waterdrop by dew condensation may adhere to a display inner side. (The display filter and the LCD surface stick and the pattern of the shape of a circle or an ellipse occur.)
This phenomenon is not trouble. It will disappear, if a control power supply is applied and about 2 hour passes.

■ Maintenance

- Inspection of energized is dangerous.
- There is no parts to be replaced on a regular inspection.
- Please wipe off lightly with the dry soft cloth. When it wipes with the damp cloth or the dry cloth strongly, a surface is damaged. And, the character of a name plate may disappear.
  Please do not use the organic solvent, chemicals, cleaners, etc., such as an alcohol, for cleaning.
  The liquid crystal display (LCD) may light during cleaning on the LCD face. However, this phenomenon is caused by the static electricity that may be produced in the filter, and it does not show any trouble.
  Leave the unit as it is for a while, and the display goes out due to natural discharge.
  Do not press the LCD face strongly, otherwise it may be broken. When the filter has been pressed, it may touch the LCD face to stain the LCD face. However, this phenomenon does not show any trouble, but it is caused by a change of the ambient environment or the like. The LCD face may be restored to its original condition after a while during the use as it is.

■ Storage

Please be storage in a place that meets the following conditions.

- Within the range of ambient temperature -20 to +70 ℃.
- The average temperature (day) 40 ℃ or less.
- Place free of dust, corrosive gas, salt and oily smoke.
- Location that is not affected by vibration and shock.
- The aluminum electrolytic capacitor is used for a product. Please do the energization of the power supply within one year after shipment.

■ Countermeasures against troubles

If the product has failed, we can repair pick up the product.

■ Proper disposal

Please dispose of this product as industrial waste (noncombustible).
Mercury parts and a nickel-cadmium battery are not used for this product.

■ Warranty period

The warranty period of this product is for one year after supplying the appointed place.

■ Operation

Be careful with the following cautions during use.

- Use the input within the rated range. Be careful since negligence of this caution may cause troubles of the unit.
- There is a function to hold the maximum value and the minimum value with a measurement factor in this product. A blackout is guaranteed and this value isn't also cleared by a power supply reset. However, the minimum value may be updated in case input is not applied to a power up. For this reason, in order to make the past minimum value hold by powering on, please apply input within 1 second after switching on a power supply.
- The maximum value, a minimum value measurement factor

Measurement factor	Maximum value measurement	Minimum value measurement
Voltage , Frequency	○	○

⚠CAUTION	● Be careful not to touch any terminal when power is applied to the unit. ● Don't disassemble or modify this unit without any previous permission of our company, otherwise the warranty does not apply to the unit any more. Also, modifications may cause troubles, a fire, or other accidents. For specifications change, etc., please contact us. Please forbid a hot line work.

■ Setting

This unit requires setting and confirmation of the measuring range, etc. before use.
Wrong setting, if any, causes malfunction of the unit. If setting should be wrong, neither measurement nor output becomes correct. Carefully read the instruction manual before setting the unit.

■ Default setting

The default settings are as specified below at the delivery time. Set them according to the working conditions. The input circuit of this product is the common use of 3-phase 3-wire (3φ3W), single-phase 2-wire (1φ2W), and single-phase 3-wire (1φ3W). In case an input circuit is designated at the case of an order, it is shipped by the default value of the designated input circuit. And, in case it does not do designation of the input circuit (with no designation), it is shipped by the default value of 3-phase 3-wire (110V).
The unit will be delivered with your specified setting values, if so specified.

No.	Setting item (2)(3)			3-phase 3-wire		Single-phase 3-wire (R-W-B)	Single-phase	
				110V input	220V input		110V input	220V input
1	Display pattern	Pattern		Pattern 1		Pattern 1	Pattern 1	
		Main monitor		V(RY)		V(RW)	V	
		Sub monitor (Left)		V(YB)		V(BW)	Nothing	
		Sub monitor (Center)		Nothing		Nothing	Nothing	
		Sub monitor (Right)		V(BR)		V(RB)	Nothing	
		Bar graph		V(RY)		V(RW)	V	
2	Alarm output (1)	Factor		Voltage (OR of each line voltage)		Voltage (OR of each line voltage)	Voltage	
		Reset method		AUTO		AUTO	AUTO	
		Contact delay time		0 second		0 second	0 second	
3	Instant measurement detection	Voltage upper limit		OFF		OFF	OFF	
		Voltage lower limit		OFF		OFF	OFF	
4	Backlight	Action		AUTO		AUTO	AUTO	
		Brightness		3 (Middle)		3 (Middle)	3 (Middle)	
5	Measurement range	Voltage range		6600V	220.0V	110.0V	3300V	220.0V
		Digit number of voltage range		4 digits		4 digits	4 digits	
		Frequency range		45.0 to 65.0Hz		45.0 to 65.0Hz	45.0 to 65.0Hz	
		Digit number of frequency range		3 digits		3 digits	3 digits	
6	Analog output (1)	Output factor 1		V(RY)		V(RW)	V	
		Output factor 2		V(YB)		V(BW)	OFF	
		Output factor 3		V(BR)		V(RB)	OFF	
		Low input cut		OFF		OFF	OFF	
7	External operation input (1)			Alarm reset		Alarm reset	Alarm reset	
8	Measurement display ON/OFF	Voltage		ON		ON	ON	
		Frequency		ON		ON	ON	
9	Input circuit	Phase wire change (2)		3φ3W		1φ3W (R-W-B)	1φ2W	
		Input voltage (3)		110V	220V	150V	110V	220V
10	Analog output adjustment (1)	Output 1	Bias adjustment	0.0%		0.0%	0.0%	
			Span adjustment	100.0%		100.0%	100.0%	
		Output 2	Bias adjustment	0.0%		0.0%	0.0%	
			Span adjustment	100.0%		100.0%	100.0%	
		Output 3	Bias adjustment	0.0%		0.0%	0.0%	
			Span adjustment	100.0%		100.0%	100.0%	

Note(1) A setting item is not displayed in case there is no corresponding option.

Note(2) When the input circuit phase line switching setting is changed, the setting values of setting 1 and setting 2 (No. 1 to 8 in the table) return to the default setting values of the switched phase line. However, the value of setting 3 (No. 9, 10 in the table) does not return to the initial setting.

Note(3) When phase wire change setting of an input circuit is set as 3φ3W (or 1φ2W) and the input voltage setting is changed, the voltage range returns to the default value of the phase wire.
(For example : In case of 3φ3W, 6600V at the case of 110V setting, 220V at the case of 220V setting.)

Content

1. Product outline

1.1 Usage of product

This single unit can measure and monitor voltage ×3, frequency.
It is optimum for voltage measurement of a power receiving, a bus, and a low voltage system.
The intensive monitor doubled with the system by option (analog output, alarm output, external operation input) addendum is possible.

1.2 Features of product

- This product is 3-phase 3-wire, single-phase 2-wire, single-phase 3-wire common type.
  Product inventory can be standardized.
- Bar graph 1 measurement and digital 4 measurement are displayed simultaneously.
- Analog output 3 circuit and contact-output can be taken out. (Option)
  And, an output factor can be selected by setting.
- External operation inputs are possible of reset. (Option)
  Choice of an alarm output, the maximum/minimum value, and an alarm output, and the maximum/minimum value is possible at setting.
- Power supply is AC85 to 264V, DC80 to 143V (for both AC and DC uses).
- The mounting method of this unit is compatible with the mounting method of conventional 110 square mechanical meter. This unit is mounted at 2 diagonal points.
- With backlight (white LED backlight) function.
  In addition, the selection of the on / off / auto off and, you can set the brightness.
- LCD can be chosen from 2 kinds, the type to see from the top and the type to see from the bottom.
  (Please designate it at an order.)

1.3 Composition of type

TYPE　　Specification code

SVLC－110L－□□□□□－□□□

Installation position
1 : For an upper installation.
2 : For an lower installation.

Option

Specification code	External operation input	Analog output	Contact output
0－00	Nothing	Nothing	Nothing
1－11	One circuit	DC4 to 20mA×3	Alarm×1

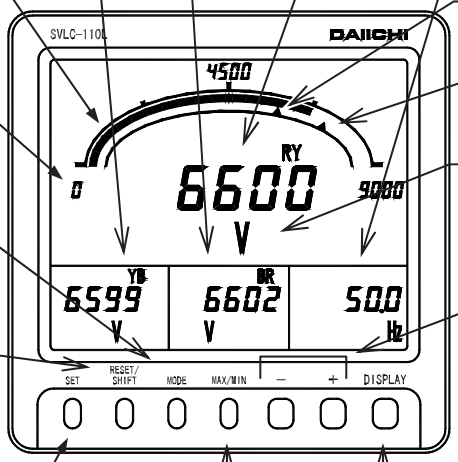
Auxiliary power supply
1 : AC85 to 264V, DC80 to 143V for both AC and DC uses

Input range
D : Common use for 150V, 300V.

Input circuit
F : Common use for 1φ2W, 1φ3W, 3φ3W.

Hardware model
D : R-S-T, White backlight
E : R-Y-B, White backlight
F : U-V-W, White backlight

2. The name and function of each part



Digital display
Measurement monitor can watch 4 elements at the same time.
Sub monitor (Left) Sub monitor (Center) Main monitor Sub monitor (Right)

Bar graph display
The measurement value of the main monitor is indicated by the analog. (Setting which does bar graph display of the measurement value of sub monitor is also possible.)

Scale markings
It sets automatically by measurement-range setting.

Lower limit setting index
An lower limit set point is displayed.

Upper limit setting index
An upper limit set point is displayed.

Unit display
It sets automatically by measurement-range setting.

MODE
In setting mode, it is used as a switch that changes a setting item.

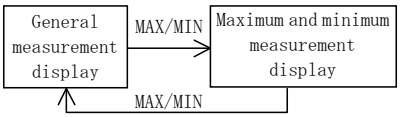
– +
The switch to which measurement displays element of main monitor is changed.
If it is not operated for 10 minutes after a display change, it returns to the original measurement display factor.
In set mode, it is used as a switch that changes a setting value.

RESET/ SHIFT
If this switch is pushed 1 second or more continuously, it will reset an alarm, the maximum value, and the minimum value (factor which it is displaying on the main monitor).
In setting mode, it uses it as a switch to which it moves a setting item (move up).

DISPLAY
It is the switch that changes a line (phase) display of voltage.
If it is not operated for 10 minutes after a display change, it returns to the original phase display.
In setting mode, it is used as a switch that terminates setting mode.

SET
It uses it as a switch which it changes to setting mode.
If it continues pushing 3 seconds or more, it will change to setting mode.
In setting mode, it is used as a switch that determines a set point.

MAX/MIN
The switch to which general measurement display (usually) and the maximum minimum measurement display are changed.
In setting mode, it uses it as a switch to which it moves a setting item (move down).

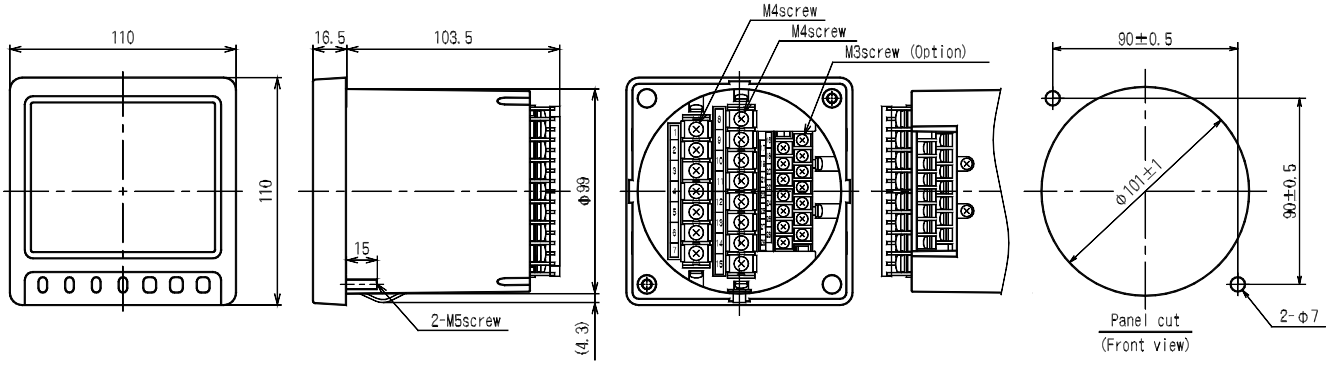


3. Preparation

3.1 Installation

Mount the unit by the attached M5 nuts to a panel of thinner than 10mm, referring to the following external dimensions drawing and panel cutout. Fasten these nuts with tightening torque 2.0 to 2.5N･m.

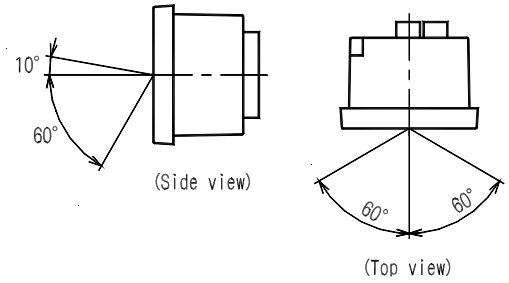
● Dimension diagram



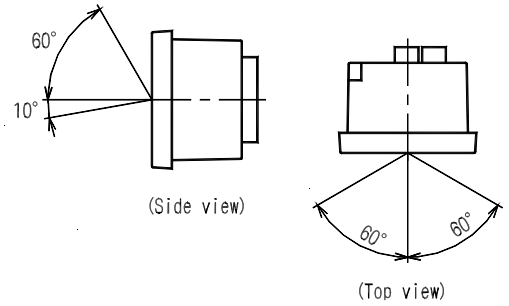
● Caution on handling

Mount the LCD to obtain an optimum angle, since the contrast changes according to the monitoring angle.

(1) For upper case installation



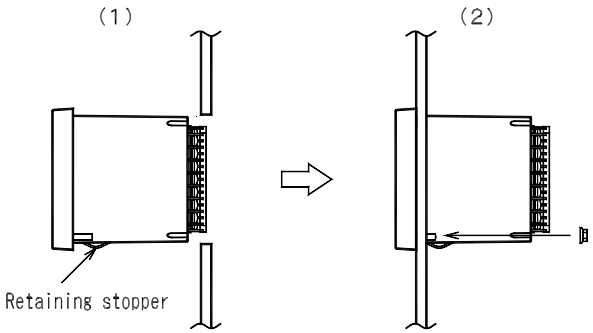
(2) For lower case installation



● Installation

(1) A product is put in a cut hole of a panel from a front. A body is inserted until it exceeds retaining stopper of the lower base.

(2) Please fix a product certainly with attached M5 flange nut for installation. Please give a tightening torque as 2.0 to 2.5N･m.

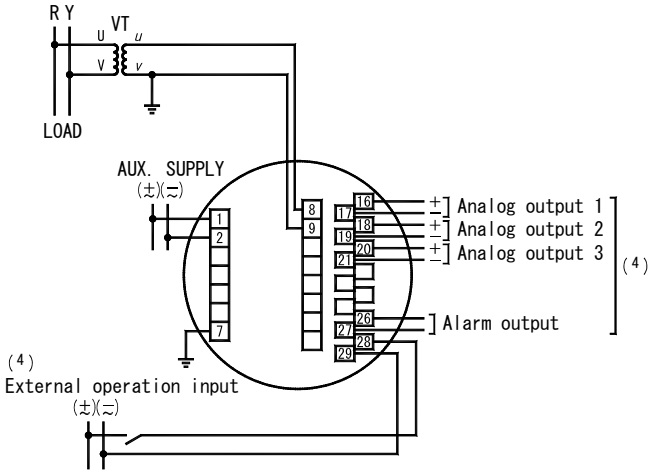


3.2 Connections

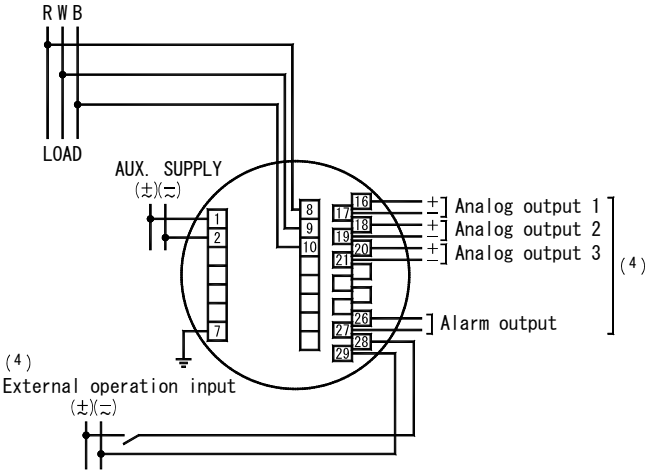
Please perform connection after referring to the following wiring diagram.

● Connection drawing (5)

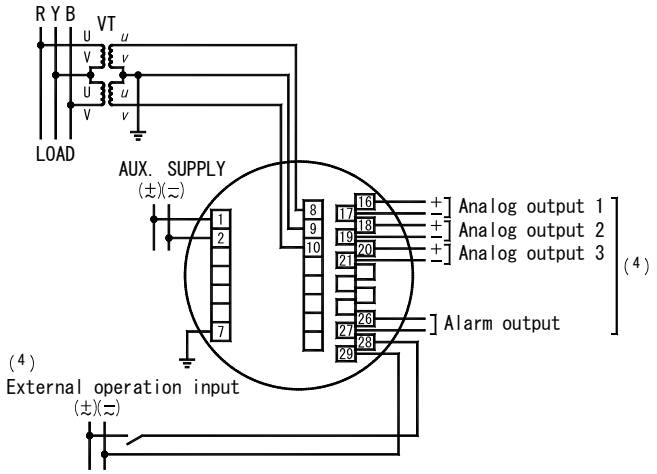
(1) 1φ2W, Analog output.



(2) 1φ3W, Analog output.



(3) 3φ3W, Analog output.



Note(4) Analog output, alarm output, external operation input is an option.

Note(5) In case of low-voltage circuit, secondary side earthing of VT is unnecessary.
And, VT is unnecessary in case it used 110V or direct 220V.

● Caution on connection

(1) Mount the terminal cover without fail for safety after the end of connections.

(2) Separate the input wiring and output wiring from each other without fail, and take a preventive measure against malfunction due to external noises.

(3) Connect the grounding terminal E (No. 7 terminal) to the ground without fail for enhancing the shield effect. Keep the grounding resistance between the grounding terminal and the ground to be lower than 100Ω.

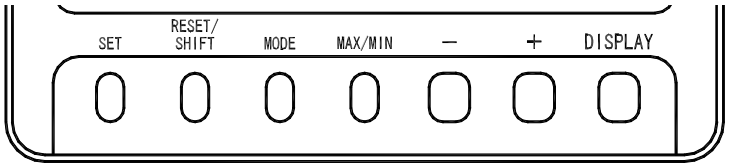
(4) Keep a distance of more than 30cm between this unit and the circuit breaker as well as between this unit and the relay contact signal line.

(5) No protection is necessary for this unit even if the transmission line may be affected by an induced lightning surge or the like when transmitting an analog output to the receiver. Mount an about 500V SPD (arrester) or the like between the line surge protector and the ground as well as between the transmission line and the ground on the receiver side for the purpose of protecting the devices on the receiver side.

(6) It is recommended to mount a surge killer outside when connecting an inductive load to the alarm output. If no surge killer is mounted, the contact life may shorten.

4. Operation

● The function of switch



Switch	Function
SET	If it continues pushing 3 seconds or more, it will change to setting mode. In setting mode, it is used for the determination of a set point.
RESET/SHIFT	Various kinds of alarms are reset. The maximum value and the minimum value are reset in the maximum minimum measurement display. In setting mode, it uses it as a switch to which it moves (move up) a setting item.
MODE	In setting mode, it is used for the change of a setting item.
MAX/MIN	The usual measurement display and maximum value or minimum value display are changed. In setting mode, it uses it as a switch to which it moves (move down) a setting item.
+, −	The measurement display factor of the main monitor is changed. In setting mode, it is used for change of a set point.
DISPLAY	A line (phase) display of voltage is changed. It is used in case it terminates setting mode. And, it is used in case it returns the display combination of a measurement factor.

● Convenient functions

(1) In case a measurement change or a line (phase) change is performed and the original screen composition is not clear anymore, DISPLAY is pushed for more than 3 seconds or it's no-operation for 10 minutes and returns to original screen structure.

(2) If a measurement change is performed and the original main monitor display is not clear anymore. It continues pushing a + or − more than 3 seconds, or returns to the original measurement display factor by no operation for 10 minutes.

(3) Even if it stops operation with setting mode, it returns to the display mode in 10 minutes.

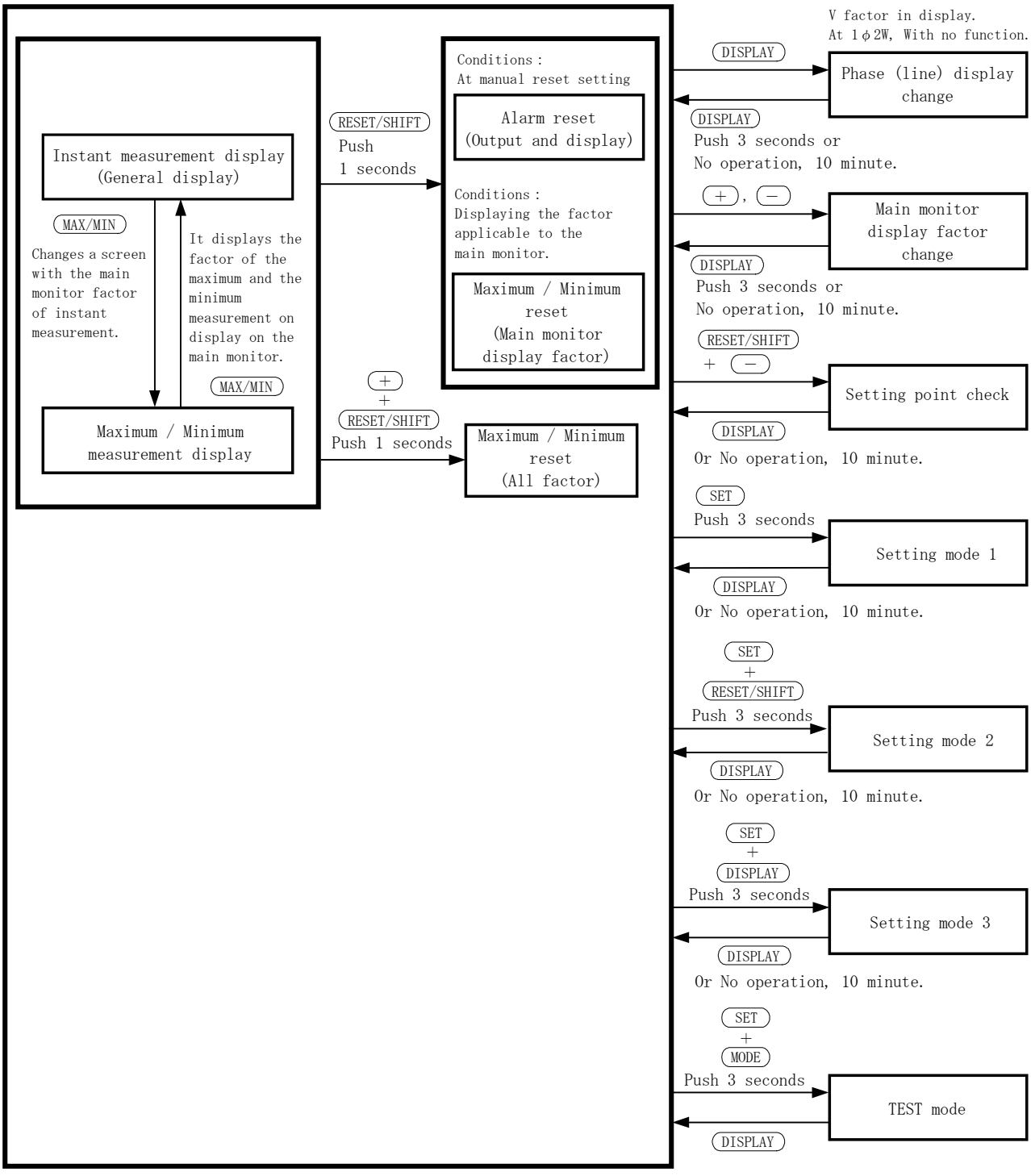
● 7 segment displays

This product shows the guidance in various setting using 7 segment displays besides a display of a measurement value. A digital readout and 7 segment displays corresponding to each alphabet are shown in the following.

A	*B(b)*	*C*	*D(d)*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*
A	b	C	d	E	F	G	H	I	Non-display	Non-display	L	n
N(n)	*O(o)*	*P*	*Q(q)*	*R(r)*	*S*	*T(t)*	*U(u)*	*V*	*W*	*X*	*Y(y)*	*Z*
n	o	P	q	r	S	t	u	V	W	Non-display	y	Z
0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*			
0	1	2	3	4	5	6	7	8	9			

4.1 The screen change and function by switch operation.

This product changes various screens by switch operation. Here, the change step of the screen by switch operation is explained.

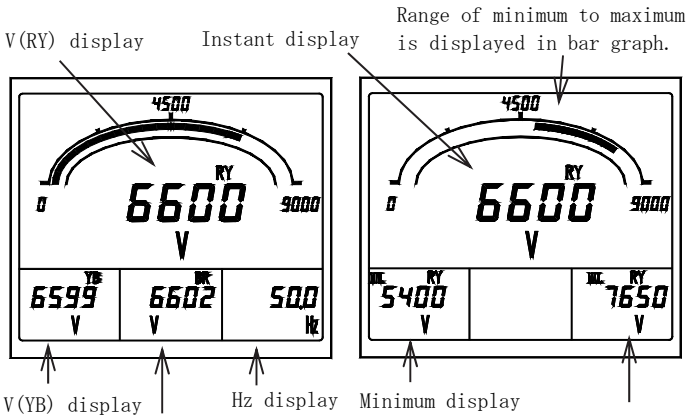


4.2 The kind of display

4.2.1 Measurement display

The change of the measurement display factor of the main monitor by switch operation and the change of the line / phase display of voltage is possible (temporarily).
In a general measurement display, if switch operation is not performed for 10 minutes after changing a display factor, it returns to the original measurement display factor automatically.

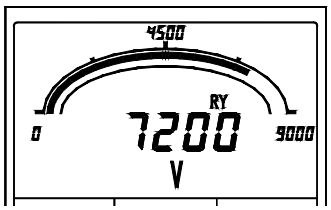
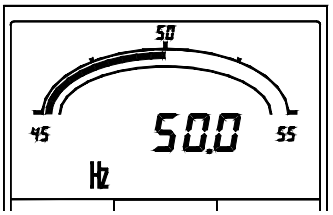
Voltage, frequency, etc. indicate the measurement value of four factors by the maximum.
Setting which always displays a measurement factor is possible. And, it is possible to change to a display of the maximum value and the minimum value, about the measurement factor which performs holding of the maximum value and the minimum value by switch operation.
These maximum values and the minimum value are reset by switch operation (it updates to the instantaneous value at the time).
In addition, as for the maximum value and the minimum value, power-supply reset is not cleared either. And, this display is held by even after 10 minutes of switch non-operation.



General measurement display

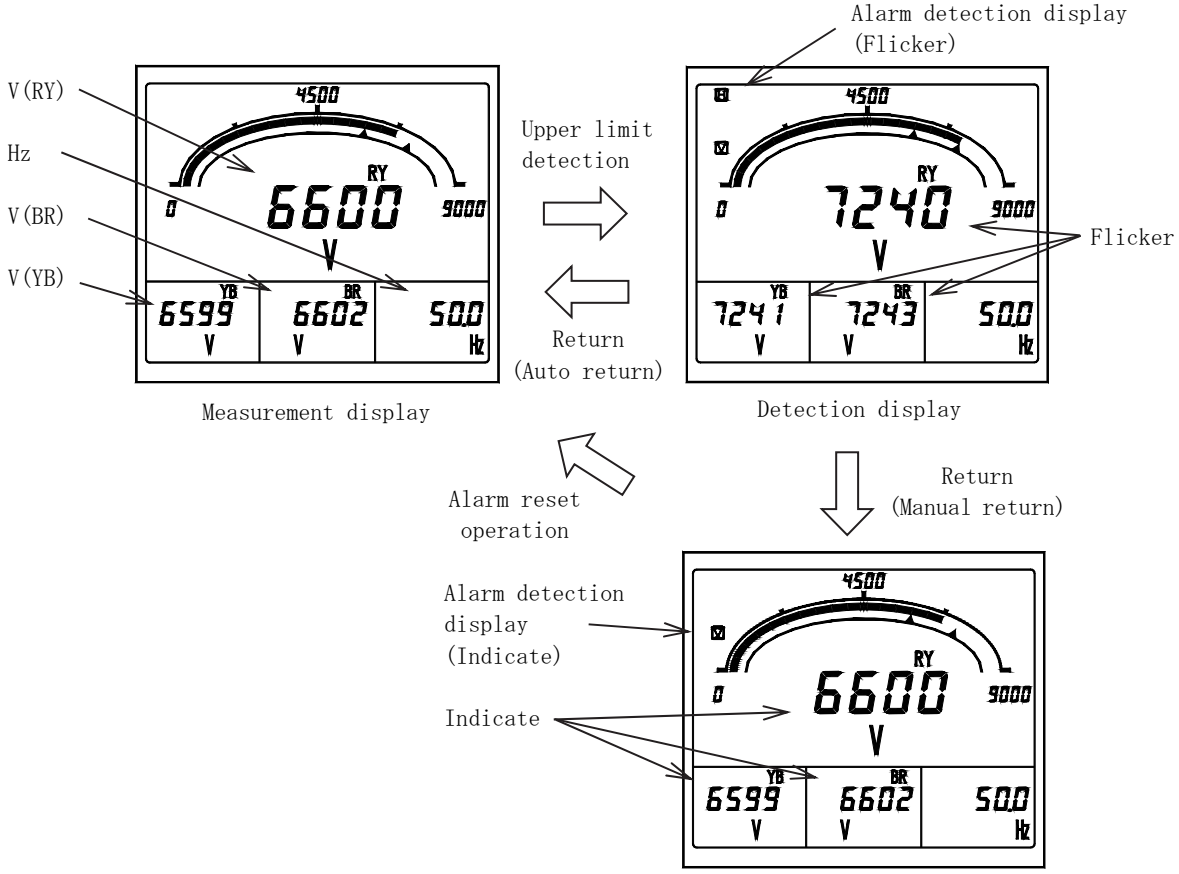
General measurement maximum and minimum display

・The example of a measurement display of each measurement factor (Main monitor)

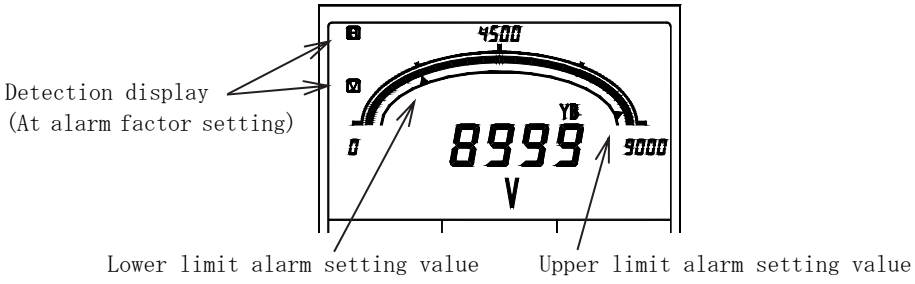
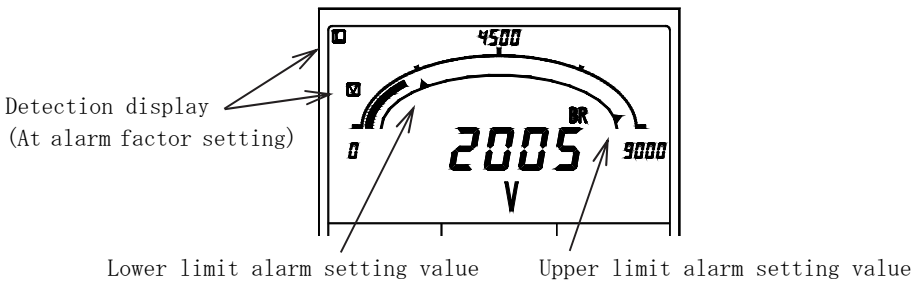
Measurement factor	Example of display
Voltage V	
Frequency Hz	

4.2.2 Alarm detection display

Display was voltage measurement becomes more than a upper limit setting value or less than a lower limit setting value.
If the voltage is being indicated by measurement under the main monitor or the sub-monitor, a measurement value display is flicker. And, if the line (phase) set as the alarm output factor detects, H, or L V flicker-indicates.



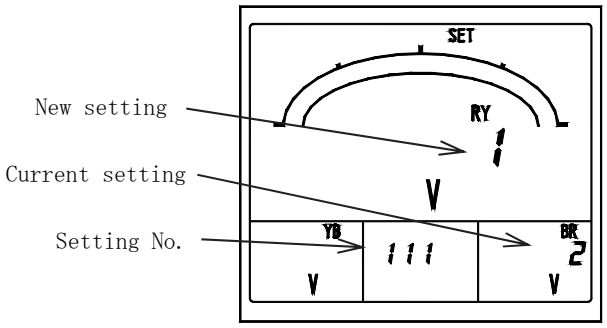
If the return method is manual reset setting, even if it returns from upper limit (lower limit) detection, an alarm detection display is held. The return in this case needs alarm reset operation.
Please refer to "4.3.5 Reset" for alarm reset.

Alarm factor		Example of a display
Voltage	Upper limit	
	Lower limit	

4.2.3 Setting display

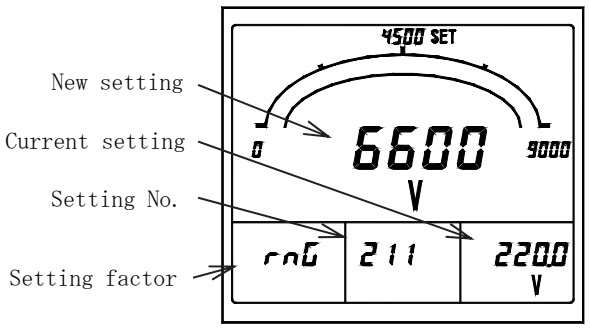
This is the display when making various settings.
There are three types of setting modes according to the contents of a setting.
Operation and the contents of setting (detail) in setting mode, please refer to "5 Setting".

① Setting mode 1
Setting of a measurement display factor, an alarm output, and an alarm value, and backlight is performed.
And, an alarm output can be tested in this setting mode.



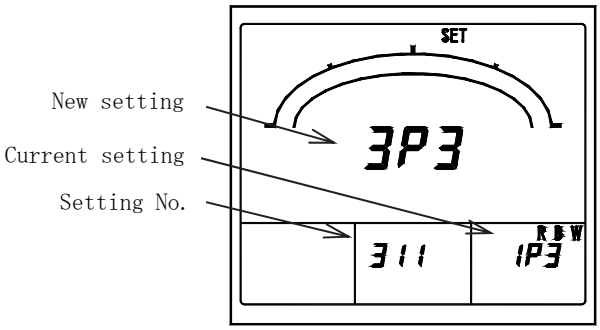
Setting mode 1
(No.111 Display pattern)

② Setting mode 2
Setting of measurement range, analog output, external operation input, and measurement display ON/OFF is performed.
And, it can initialize settings in this setting mode.



Setting mode 2
(No.211 Voltage range)

③ Setting mode 3
Setting of an input circuit is performed.
And, analog output can be adjusted in this setting mode.

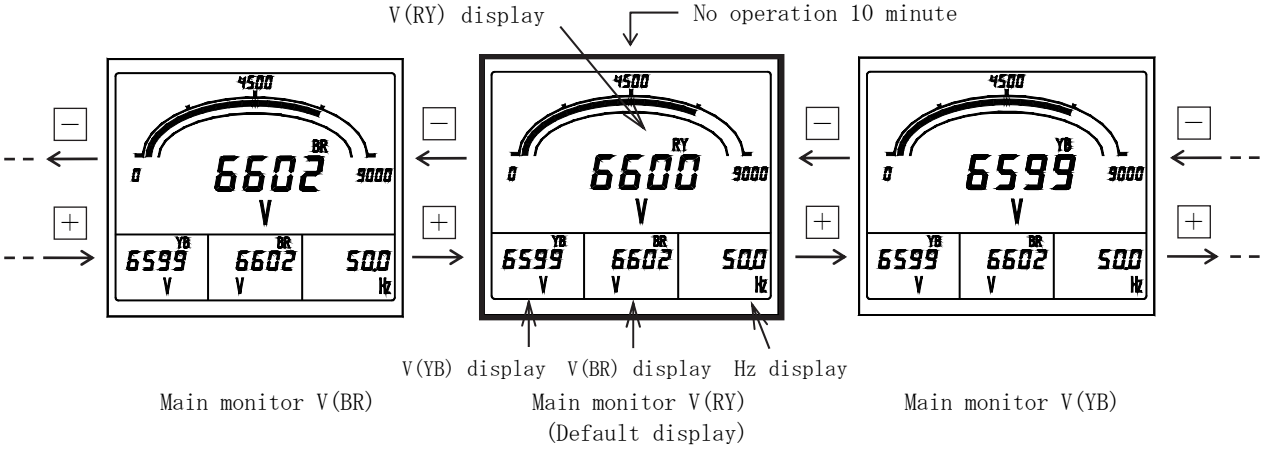


Setting mode 3
(No.311 Input circuit phase wire change)

4.3 Operation

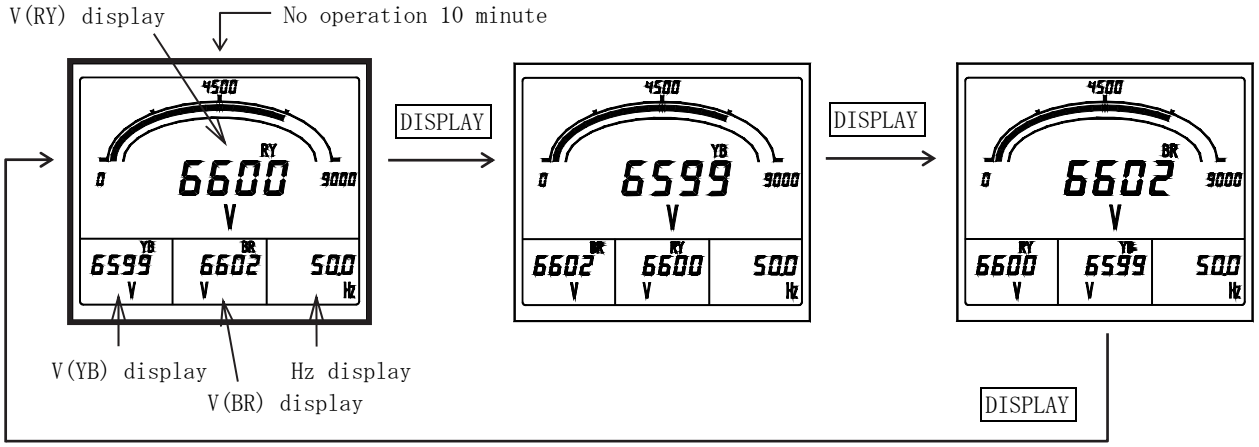
4.3.1 The main monitor display factor change

The measurement display factor of the main monitor is changed. A change is performed by [+] [−].
A measurement display and maximum display, minimum display can also perform this operation.
After changing a measurement display factor, if a switch is not operated for 10 minutes, it will return to the original measurement display factor automatically.
In a maximum display and minimum display, even if a switch is not operated for 10 minutes, it does not return to the original display.



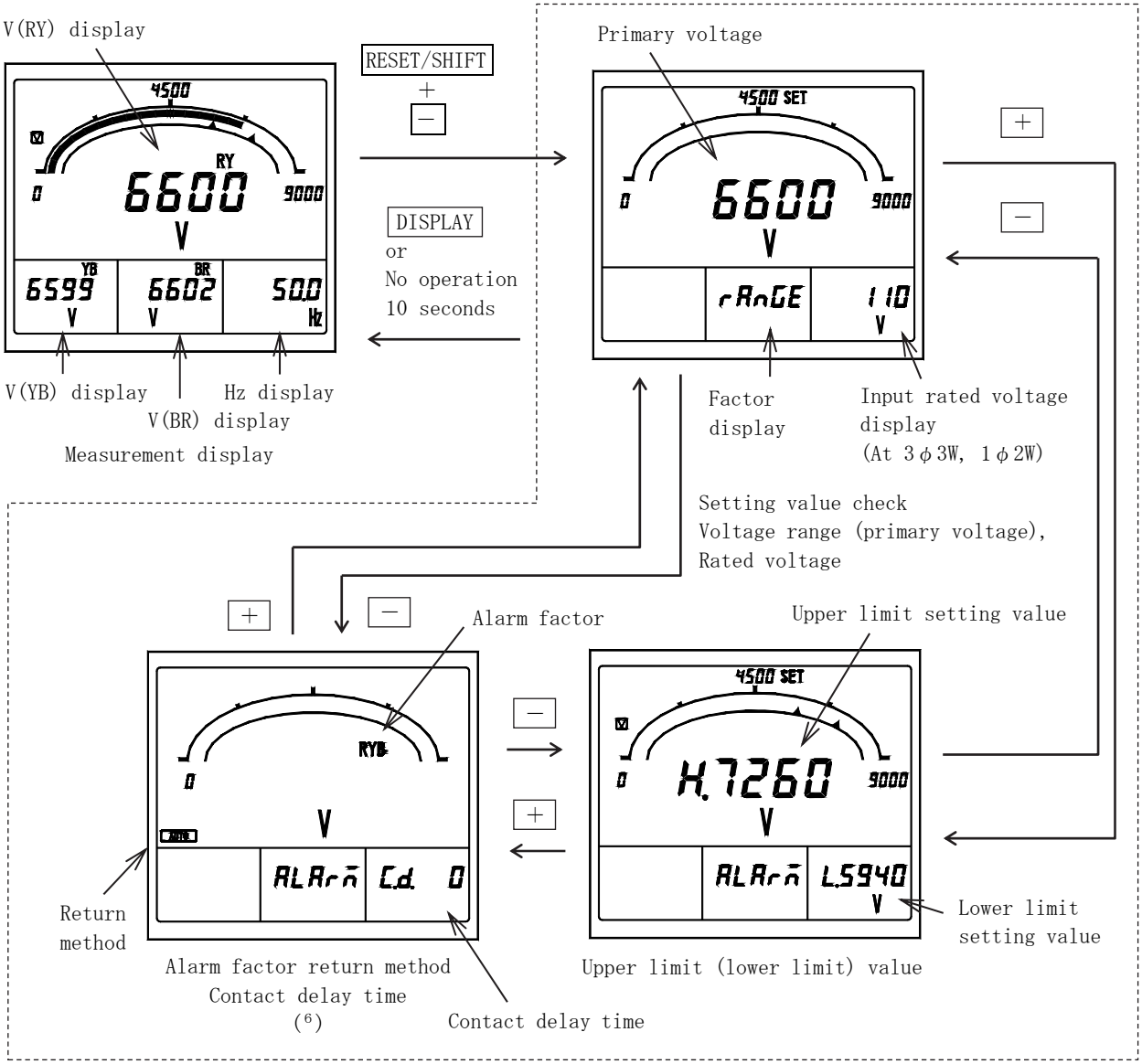
4.3.2 Line (phase) display change (3-phase 3-wire, Single-phase 3-wire)

Line and phase display of voltage is changed. (Everything which is being indicated.)
A change is performed by [DISPLAY].
A measurement display and maximum display, minimum display can also perform this operation.
In addition, after changing a line and phase display, if a switch is not operated for 10 minutes, it will return to the original phase display automatically.
In a maximum display and minimum display, even if a switch is not operated for 10 minutes, it does not return to the original display.



4.3.3 Setting value check

The voltage range (primary voltage), and an alarm-output set point are checked.
Check is [RESET/SHIFT] and [－] are pushed simultaneously and performed.
The change of a set point is carries out by [＋] and [－]. [DISPLAY] is pushed in case it returns to the original measurement display. And, if a switch is not operated for 10 seconds after a set point check, it will return to the original measurement display automatically.



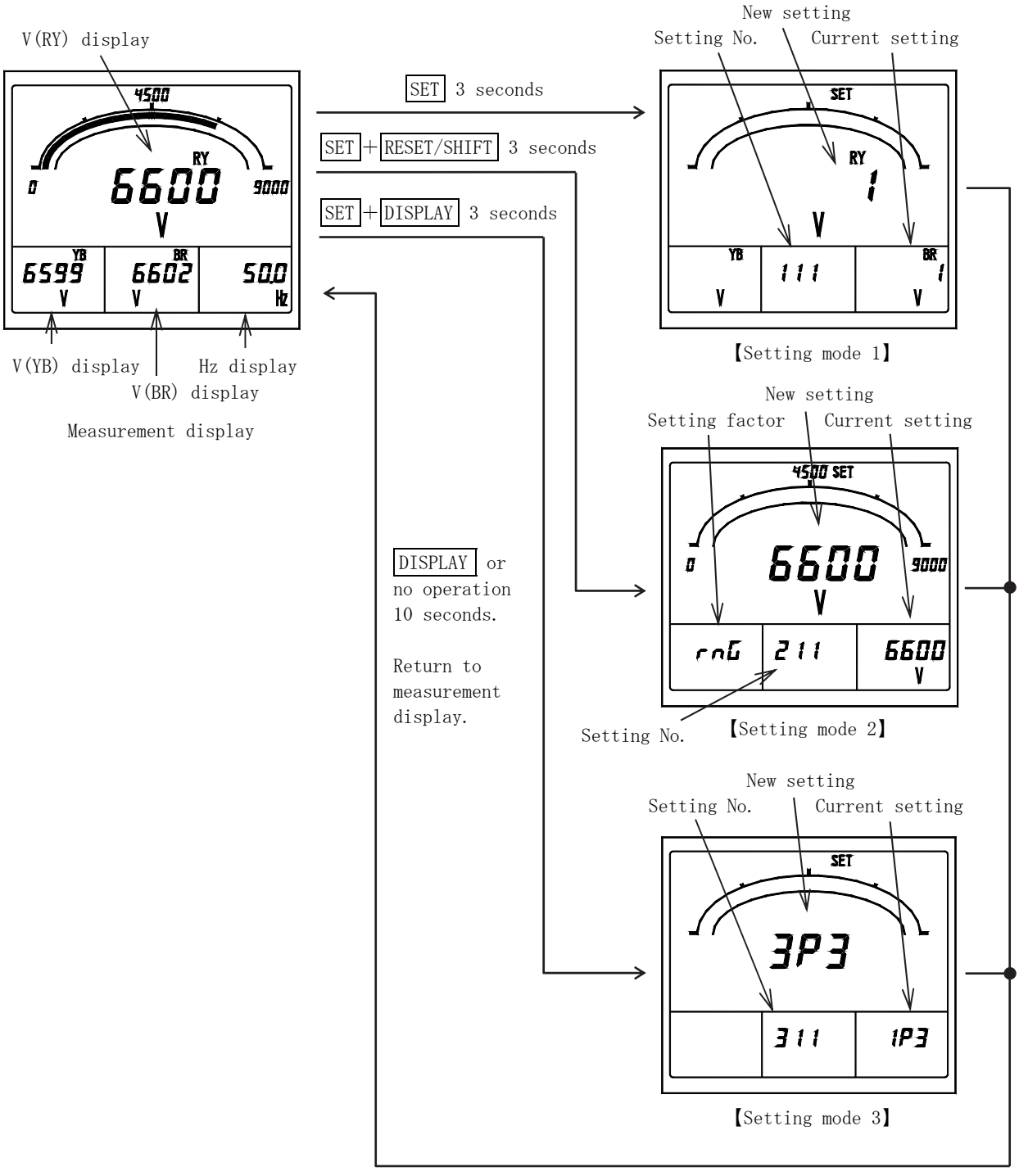
Note(6) It is not displayed if there is no option.

4.3.4 Setting mode

Various kinds of setting are performed. Setting mode is three types, and operations are different. DISPLAY is pushed in case it returns to the original measurement display. And, if a switch is not operated for 10 minute after a set point check, it will return to the original measurement display automatically. Operation and the contents of setting (detail) in setting mode, please refer to "5 Setting".

- Setting mode 1 : Press SET for longer than 3 seconds.
- Setting mode 2 : Press SET and RESET/SHIFT together for longer than 3 seconds.
- Setting mode 3 : Press SET and DISPLAY together for longer than 3 seconds.

<Reference> It can operate by measurement display and maximum (minimum) display.



4.3.5 Reset

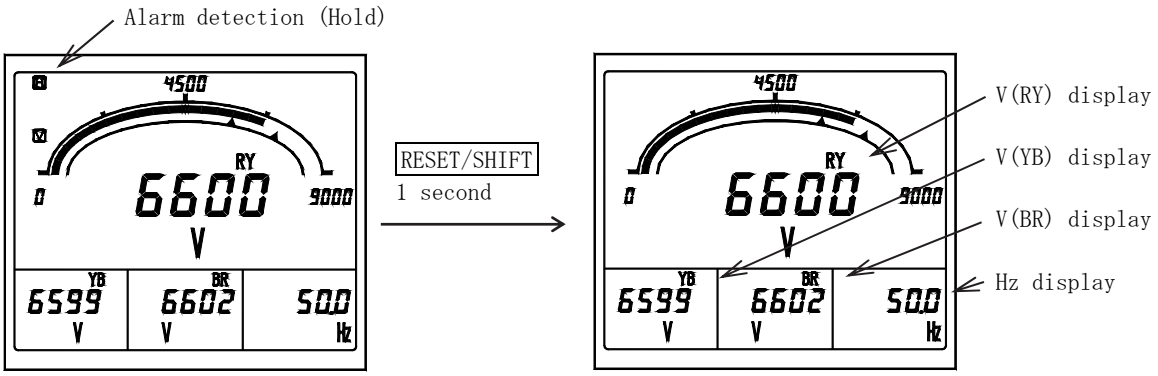
Various kinds of reset are performed. The kind of reset is as follows and operations are different, respectively. Reset of maximum value and minimum value (it updates to the instantaneous value at the time), Alarm-output reset (OFF of an alarm output (at the case of manual reset setting)).
And, the operation from each measurement display constitutes conditions at each reset.

(1) Alarm reset

In case an alarm return method is set to "HOLD (manual return)", an alarm output is reset (output OFF). (With an alarm-output option) However, an output is not turned off by this operation, in case an alarm continues and it has caused. And, this operation is unnecessary if an alarm return method is set as "AUTO (automatic return)". (An output is also OFF to an alarm return.)
In addition, setting can perform same operation in external operation input.
Please refer to "5.3.2 Setting mode 2 (3) external operation input setting" for the setting method.
Please refer to "6.3 Option" for the external operation input.

① It continues pushing RESET/SHIFT 1 second or more by a measurement display, the maximum measurement display, and the minimum measurement display.

<Caution> If a RESET/SHIFT switch performs alarm reset, the maximum value of the measurement factor currently displayed on the main monitor and the minimum value are also reset.

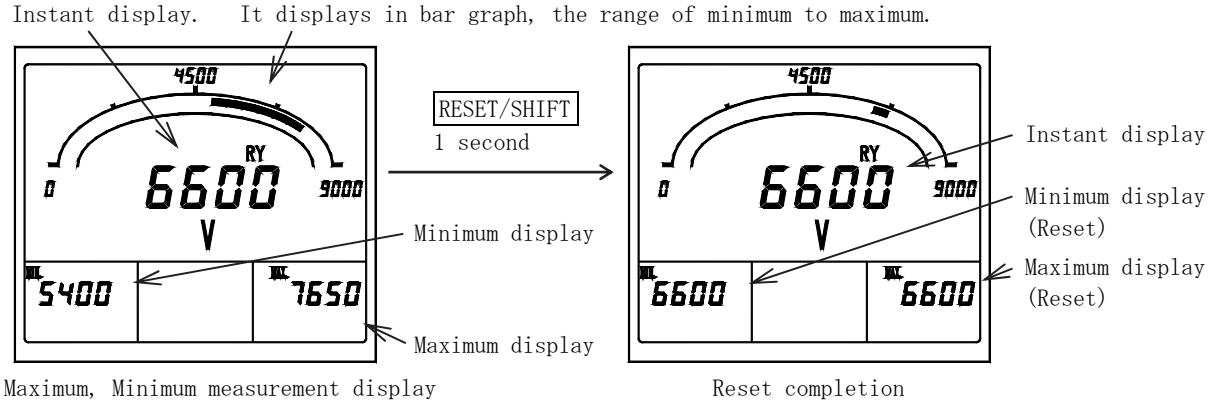


(2) Maximum value and minimum value reset.
Reset of the various measurement values of maximum value and minimum value is performed.
This reset has two types of methods. (How to perform according to a measurement factor individual. How to reset all maximum values and minimum values by package.)

a) Individual reset
It resets the differential maximum value and minimum value. Other maximum values and minimum values are not reset by this operation.

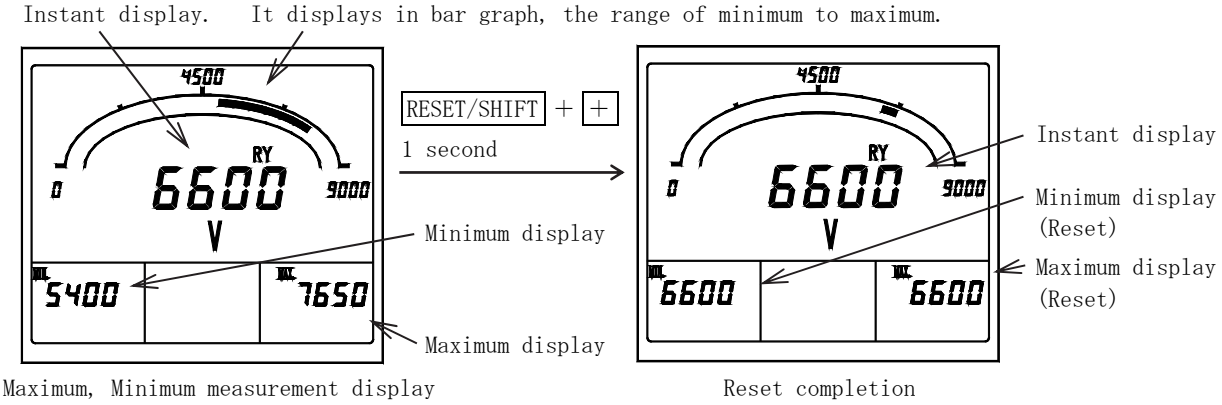
① It displays a measurement factor to reset on the main monitor. (By measurement display and the maximum and the minimum measurement display.)
② Press RESET/SHIFT for longer than 1 seconds.

<Caution> Please be sure to perform this operation after displaying the maximum value and a minimum value measurement factor to reset. And, if the maximum value and minimum value reset are performed, the alarm output of detection will also be reset.



b) All reset of maximum value and minimum value.
It resets all the maximum values and minimum values.
In addition, setting can perform same operation in external operation input.
Please refer to "5.3.2 Setting mode 2 (3) external operation input setting" for the setting method.
Please refer to "6.3 Option" for the external operation input.

① By measurement display and the maximum and minimum measurement display, it continues pushing RESET/SHIFT and ＋ 1 second or more simultaneously.



(3) All reset of alarm reset and maximum value and minimum value.
It resets an alarm in an external operation input. And, it resets all the maximum values and minimum values.
Please refer to "5.3.2 Setting mode 2 (3) external operation input setting" for the setting method.
Please refer to "6.3 Option" for the external operation input.

5. Setting

< Caution >

When changing the input circuit setting, please be sure to perform a setup from an input circuit setting in the setting mode 3. After changing the other setting, when the input circuit setting is changed the set value returns to default value (default value of a changed input circuit).

5.1 Function table

This product has each function setting with a front switch.

<Caution> In case the input circuit is not designated at the case of an order, it is shipping in the default value of 3-phase 3-wire 110V input.

Setting mode 1. Function table

Setting No.	Function	Functional description	Default setting		Important setting	Page
111	Display pattern	Sets the display combination pattern of the digital 4 displays and bar graph display.	Pattern 1		○	26,27
112	Main monitor	Sets the display factor of digital main monitor.	3φ3W	V(RY)	○	26,27
			1φ3W	V(RW)		
			1φ2W	V		
113	Sub monitor (Left)	Sets the display factor of digital sub monitor (left).	3φ3W	V(YB)	○	26,27
			1φ3W	V(BW)		
			1φ2W	Nothing		
114	Sub monitor (Center)	Sets the display factor of digital sub monitor (center).	Nothing		○	26,27
115	Sub monitor (Right)	Sets the display factor of digital sub monitor (right).	3φ3W	V(BR)	○	26,27
			1φ3W	V(RB)		
			1φ2W	Nothing		
116	Bar graph	Sets the display factor of bar graph.	3φ3W	V(RY)	○	26,27
			1φ3W	V(RW)		
			1φ2W	V		
121AL (7)	Alarm factor	Sets the output factor of alarm.	3φ3W	V (OR detection of each line (phase) voltage)	○	28
			1φ3W	V (OR detection of each line (phase) voltage)		
			1φ2W	V		
122AL (7)	Alarm reset method	Sets the output action at the case of an alarm reset.	AUTO (Automatic reset)			28
123AL (7)	Alarm contact delay time	Sets the contact delay time of alarm.	0 second			28
131H	Instant measurement voltage upper limit value	Sets the upper limit alarm value of instant voltage.	OFF (No operation)			29
132L	Instant measurement voltage lower limit value	Sets the lower limit alarm value of instant voltage.	OFF (No operation)			29
141	Backlight action	Sets the ON/OFF of backlight.	AUTO OFF			29
142	Backlight brightness	Sets the brightness of backlight.	3 (Middle)			29

Note(7) A setting item is not displayed in case there is no corresponding option.

Setting mode 2. Function table

Setting No.	Function	Functional description	Default setting		Important setting	Page
211	Voltage range	Sets the voltage measurement range (primary voltage).	3φ3W	6600V (9)	○	31
			1φ3W	110.0V		
			1φ2W	3300V (9)		
212	Digit number of voltage range	Sets the digit number of voltage range.	3φ3W	4 digits		31
			1φ3W	4 digits		
			1φ2W	4 digits		
213	Frequency range	Sets the full-scale of frequency meter, and the output range of analog output.	45.0 to 65.0Hz			31
214	Digit number of frequency range	Sets the digit number of significant figures of frequency range.	3 digits			31,32
221A (8)	A01 output factor	Sets the output factor of A02 (analog output 1).	3φ3W	V(RY)	○	32
			1φ3W	V(RW)		
			1φ2W	V		
222A (8)	A02 output factor	Sets the output factor of A02 (analog output 2).	3φ3W	V(YB)	○	32
			1φ3W	V(BW)		
			1φ2W	OFF		
223A (8)	A03 output factor	Sets the output factor of A03 (analog output 3).	3φ3W	V(BR)	○	32
			1φ3W	V(RB)		
			1φ2W	OFF		
224A (8)	Low input cut	Sets the function which makes a lower limit the analog output at the case of a minute input (adequate to 0.5% or less) in analog output.	OFF (No operation)			32
231 (8)	External operation input function	Sets the function of the external operation input.	Alarm reset		○	33
241	Voltage ON/OFF	Sets the ON/OFF of voltage measurement display.	ON			33
242	Frequency ON/OFF	Sets the ON/OFF of frequency measurement display.	ON			33
251	Set value initialization	Initialize the settings of setting 1 and setting 2 (return to the default settings). (The set value of setting 3 does not return to the default value)	—			33

Setting mode 3. Function table

Setting No.	Function	Functional description	Default setting		Important setting	Page
311	Input circuit phase wire change	Sets the input circuit or phase wire.	3φ3W	3φ3W	○	34
			1φ3W	1φ3W (R-W-B)		
			1φ2W	1φ2W		
312	Input voltage	Sets the input voltage / phase voltage full scale.	3φ3W	110V	○	34,35
			1φ3W	150V		
			1φ2W	110V		
321 (8)	A01 BIAS adjustment	Sets the BIAS value of A01 (analog output 1).	0.0%			35
322 (8)	A01 SPAN adjustment	Sets the SPAN value of A01 (analog output 1).	100.0%			35
323 (8)	A02 BIAS adjustment	Sets the BIAS value of A02 (analog output 2).	0.0%			35
324 (8)	A02 SPAN adjustment	Sets the SPAN value of A02 (analog output 2).	100.0%			35
325 (8)	A03 BIAS adjustment	Sets the BIAS value of A03 (analog output 3).	0.0%			35
326 (8)	A03 SPAN adjustment	Sets the SPAN value of A03 (analog output 3).	100.0%			35

Note(8) A setting item is not displayed in case there is no corresponding option.
Note(9) It is set to "220.0V" (4 digits) in 220V input.

5.2 Setting table

A setting item changes by the specification of a product, or the existence of an option.

(1) Important setting

Each parenthesized number shows a setting number and this number is displayed on the setting screen.

Items	Setting and operation procedures	Page
Sets the phase wire of input circuit. (311)	Press [SET] and [DISPLAY] together for longer than 3 seconds ➡ (311) Select an phase wire by [+] and [−] ➡ Press [SET] for longer than 3 seconds ➡ Selected phase wire is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	34
Sets the input voltage (phase voltage full scale). (312)	Press [SET] and [DISPLAY] together for longer than 3 seconds ➡ Press [RESET/SHIFT] ➡ (311) (312) Select a input voltage (at 1φ3W, phase voltage full-scale) by [+] and [−] ➡ Press [SET] ➡ Selected input voltage (phase voltage full-scale) is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	34, 35
Sets the measurement range of voltmeter (211)	Press [SET] and [RESET/SHIFT] together for longer than 3 seconds ➡ (211) Select a measuring range by [+] and [−] ➡ Press [SET] ➡ Selected measuring range is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	31
Sets the display pattern (111)	Press [SET] for longer than 3 seconds ➡ Select the display pattern by [+] and [−] (111) ➡ Press [SET] ➡ Selected display pattern is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	26, 27
Sets the output factor of analog output 1 (AO1). (221A)	Press [SET] and [RESET/SHIFT] together for longer than 3 seconds ➡ Press [MODE] ➡ (211) (221A) Select an output factor by [+] and [−] ➡ Press [SET] ➡ Selected output factor is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	32
Sets the output factor of analog output 2 (AO2). (222A)	Press [SET] and [RESET/SHIFT] together for longer than 3 seconds ➡ Press [MODE] ➡ (211) (221A) Press [RESET/SHIFT] ➡ Select an output factor by [+] and [−] ➡ Press [SET] ➡ (222A) Selected output factor is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	32
Sets the output factor of analog output 3 (AO3). (223A)	Press [SET] and [RESET/SHIFT] together for longer than 3 seconds ➡ Press [MODE] ➡ (211) (221A) Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] ➡ Select an output factor by [+] and [−] (222A) (223A) ➡ Press [SET] ➡ Selected output factor is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	32
Sets the factor of alarm output. (121AL)	Press [SET] for longer than 3 seconds ➡ Press [MODE] ➡ (111) (121AL) Select an factor by [+] and [−] ➡ Press [SET] ➡ Selected factor is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	28
Sets the function of external operation input. (231)	Press [SET] and [RESET/SHIFT] together for longer than 3 seconds ➡ Press [MODE] ➡ (211) (221A) Press [MODE] ➡ Select an function by [+] and [−] ➡ Press [SET] ➡ (231) Selected function is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	33

(2) A combination except a display pattern.
Each parenthesized number shows a setting number and this number is displayed on the setting screen.

Items	Setting and operation procedures	Page
Sets the display factor of main monitor. (112)	Press [SET] for longer than 3 seconds ➡ Press [RESET/SHIFT] ➡ (111) (112) Select an display factor by [+] and [−] ➡ Press [SET] ➡ Selected display factor is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	26, 27
Sets the display factor of sub monitor (left). (113)	Press [SET] for longer than 3 seconds ➡ Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] (111) (112) ➡ Select an display factor by [+] and [−] ➡ Press [SET] ➡ (113) Selected display factor is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	26, 27
Sets the display factor of sub monitor (center). (114)	Press [SET] for longer than 3 seconds ➡ Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] (111) (112) ➡ Press [RESET/SHIFT] ➡ Select an display factor by [+] and [−] ➡ Press [SET] ➡ (113) (114) Selected display factor is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	26, 27
Sets the display factor of sub monitor (right). (115)	Press [SET] for longer than 3 seconds ➡ Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] (111) (112) ➡ Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] ➡ (113) (114) (115) Select an display factor by [+] and [−] ➡ Press [SET] ➡ Selected display factor is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	26, 27
Sets the display factor of bar graph. (116)	Press [SET] for longer than 3 seconds ➡ Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] (111) (112) ➡ Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] ➡ (113) (114) (115) (116) Select an display factor by [+] and [−] (If a sub monitor is selected, an underbar will be displayed on the bottom of a digital display.) ➡ Press [SET] ➡ Selected display factor is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	26, 27

(3) Setting of frequency measurement range.
Each parenthesized number shows a setting number and this number is displayed on the setting screen.

Items	Setting and operation procedures	Page
Sets the frequency measurement range. (213)	Press [SET] and [RESET/SHIFT] together for longer than 3 seconds ➡ (211) Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] ➡ (212) (213) Select a measurement range by [+] and [−] ➡ Press [SET] ➡ Selected measurement range is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	31

(4) Setting of range digit number.
Each parenthesized number shows a setting number and this number is displayed on the setting screen.

Items	Setting and operation procedures	Page
Sets the digit number of voltage range. (212)	Press [SET] and [RESET/SHIFT] together for longer than 3 seconds ➡ (211) Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] ➡ Select a digit number by [+] and [−] ➡ (212) (213) Press [SET] ➡ Selected digit number is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	31
Sets the digit number of frequency range. (214)	Press [SET] and [RESET/SHIFT] together for longer than 3 seconds ➡ (211) Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] ➡ (212) (213) (214) Select a digit number by [+] and [−] ➡ Press [SET] ➡ Selected digit number is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	31, 32

(5) Setting of analog output.
Each parenthesized number shows a setting number and this number is displayed on the setting screen.

Items	Setting and operation procedures	Page
Sets the output cut function at the case in minute input (0.5% or less) of analog output. (224A)	Press [SET] and [RESET/SHIFT] together for longer than 3 seconds ➡ Press [MODE] ➡ (211) (221A) Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] ➡ Press [RESET/SHIFT] ➡ (222A) (223A) (224A) Select a low Input cut ON/OFF by [+] and [−] ➡ Press [SET] ➡ Selected action is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	32

(6) Setting of alarm output.
Each parenthesized number shows a setting number and this number is displayed on the setting screen.

Items	Setting and operation procedures	Page
Sets the reset method of alarm output. (122AL)	Press [SET] for longer than 3 seconds ➡ Press [MODE] ➡ Press [RESET/SHIFT] ➡ (111) (121AL) (122AL) Select a reset method by [+] and [−] ➡ Press [SET] ➡ The selected reset method is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	28
Sets the contact delay time of alarm output. (123AL)	Press [SET] for longer than 3 seconds ➡ Press [MODE] ➡ Press [RESET/SHIFT] ➡ (111) (121AL) (122AL) Press [RESET/SHIFT] ➡ Select an contact delay time by [+] and [−] ➡ Press [SET] ➡ (123AL) The selected contact delay time is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	28

(7) Voltage detection setting.
Each parenthesized number shows a setting number and this number is displayed on the setting screen.

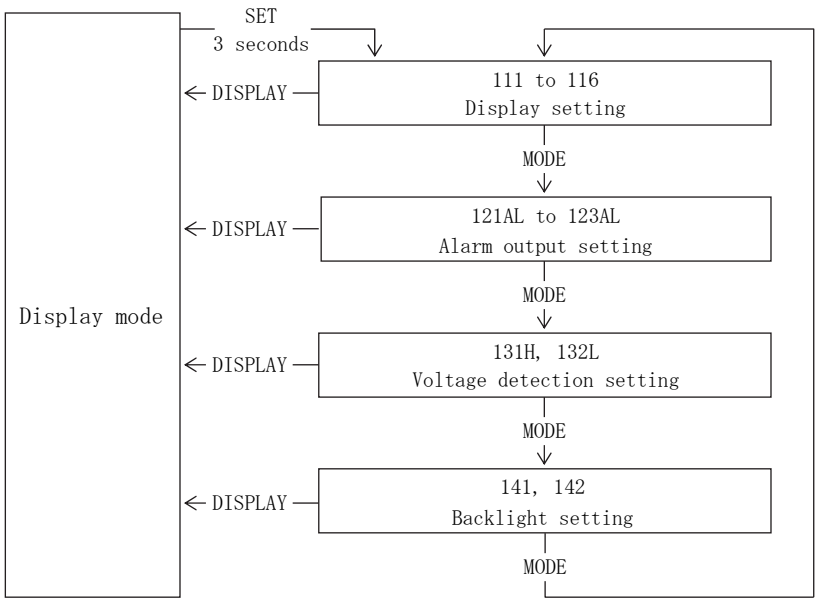
Items	Setting and operation procedures	Page
Sets the upper limit alarm value of instant voltage. (131H)	Press [SET] for longer than 3 seconds ➡ Press [MODE] ➡ (111) (121AL) Press [MODE] (It is operation needlessness if there is no option) ➡ (131H) Select a upper limit alarm value by [+] and [−] ➡ Press [SET] ➡ Selected upper limit alarm value is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	29
Sets the lower limit alarm value of instant voltage. (132L)	Press [SET] for longer than 3 seconds ➡ Press [MODE] ➡ (111) (121AL) Press [MODE] (It is operation needlessness if there is no option) ➡ (131H) Press [RESET/SHIFT] ➡ Select a lower limit alarm value by [+] and [−] ➡ Press [SET] (132L) ➡ Selected lower limit alarm value is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	29

(8) Backlight setting
Each parenthesized number shows a setting number and this number is displayed on the setting screen.

Items	Setting and operation procedures	Page
Sets the action of backlight. (141)	Press [SET] for longer than 3 seconds ➡ Press [MODE] ➡ (111) (121AL) Press [MODE] (It is operation needlessness if there is no option) ➡ Press [MODE] ➡ (131H) (141) Select a backlight action by [+] and [−] ➡ Press [SET] ➡ Selected backlight action is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	29
Sets the brightness of backlight. (142) 〔At white backlight〕	Press [SET] for longer than 3 seconds ➡ Press [MODE] ➡ (111) (121AL) Press [MODE] (It is operation needlessness if there is no option) ➡ Press [MODE] ➡ (131H) (141) Press [RESET/SHIFT] ➡ Select a brightness by [+] and [−] ➡ Press [SET] ➡ (142) Selected backlight brightness is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	29

5.3 Setting in detail explanation

5.3.1 Setting mode 1



Setting mode 1

Setting mode 1 is selected by pressing SET switch for longer than 3 seconds.
Pushing MODE switch performs movement of setting item.
The present mode can be returned to the display mode by pressing DISPLAY switch.

(1) 111 to 116 Display combination setting

● 3-phase 3-wire

No.	Pattern No.	Main monitor	Sub monitor (Left)	Sub monitor (Center)	Sub monitor (Right)	Bar graph
1	Pattern 1	V(RY)	V(YB)	Nothing	V(BR)	V(RY)
2	Pattern 2	V(RY)	V(YB)	V(BR)	Hz	V(RY)

● Displays set factor (3-phase 3-wire)

Main monitor	V(RY), V(YB), V(BR), Hz
Sub monitor (Left)	V(RY), V(YB), V(BR)
Sub monitor (Center)	V(RY), V(YB), V(BR)
Sub monitor (Right)	V(RY), V(YB), V(BR), Hz
Bar graph	V(RY), V(YB), V(BR), Hz

● Line change (3-phase 3-wire)

→ V(RY) → V(YB) → V(BR) → (10)

● Measurement factor change (Measurement display mode)

→ V(RY) → V(YB) → V(BR) → Hz → Nothing →

Note(10) Press DISPLAY to switch.

● Single-phase 3-wire (12)

No.	Pattern No.	Main monitor	Sub monitor (Left)	Sub monitor (Center)	Sub monitor (Right)	Bar graph
1	Pattern 1	V(RW)	V(BW)	Nothing	V(RB)	V(RW)
2	Pattern 2	V(RW)	V(BW)	V(RB)	Hz	V(RW)

● Displays set factor (Single-phase 3-wire)

Main monitor	V(RW), V(BW), V(RB), Hz
Sub monitor (Left)	V(RW), V(BW), V(RB)
Sub monitor (Center)	V(RW), V(BW), V(RB)
Sub monitor (Right)	V(RW), V(BW), V(RB), Hz
Bar graph	V(RW), V(BW), V(RB), Hz

● Phase change (Single-phase 3-wire) (12)

→ V(RW) → V(BW) → V(RB) → (11)

● Measurement factor change (Measurement display mode) (12)

→ V(RW) → V(BW) → V(RB) → Hz → Nothing →

Note(11) Press DISPLAY to switch.

Note(12) The case of single-phase 3-wire (R-Y-B).
The case of single-phase 3-wire (R-W-Y) is voltage (RW-YW-RY).
The case of single-phase 3-wire (Y-W-B) is voltage (YW-BW-YB).

● Single-phase 2-wire

No.	Pattern No.	Main monitor	Sub monitor (Left)	Sub monitor (Center)	Sub monitor (Right)	Bar graph
1	Pattern 1	V	Nothing	Nothing	Nothing	V
2	Pattern 2	V	Nothing	Nothing	Hz	V

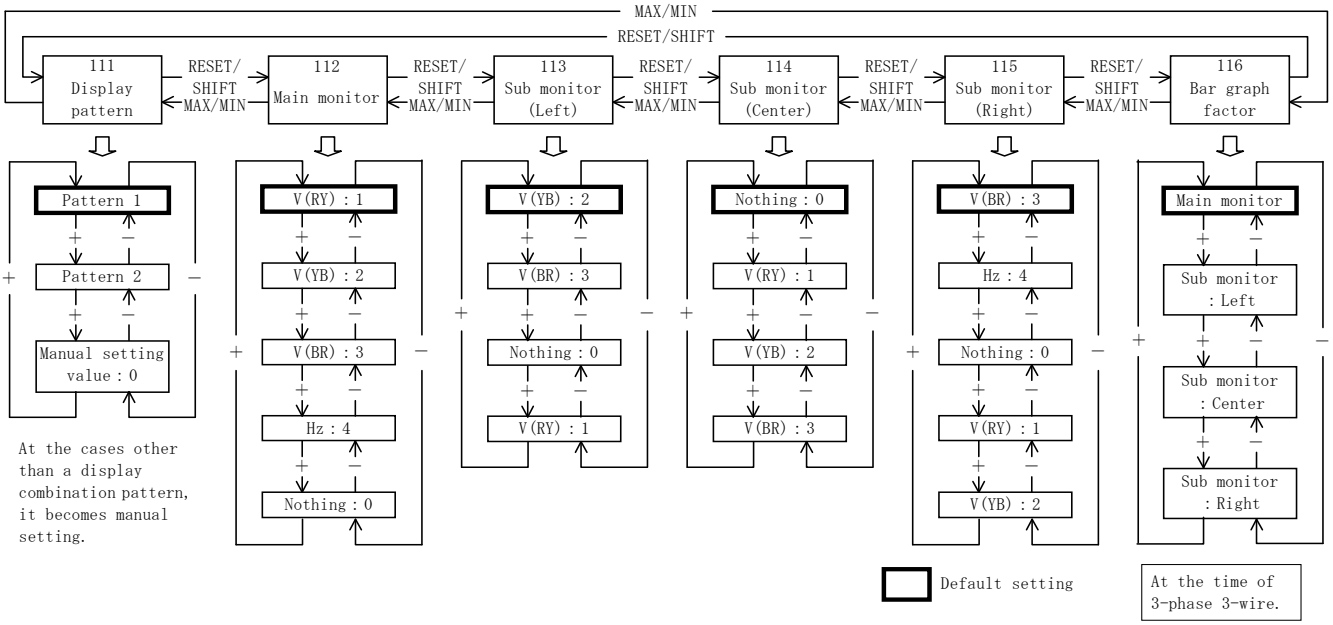
● Displays set factor (Single-phase 2-wire)

Main monitor	V, Hz
Sub monitor (Left)	V
Sub monitor (Center)	V
Sub monitor (Right)	V, Hz
Bar graph	V, Hz

● Measurement factor change (Measurement display mode)

→ V → Hz → Nothing →

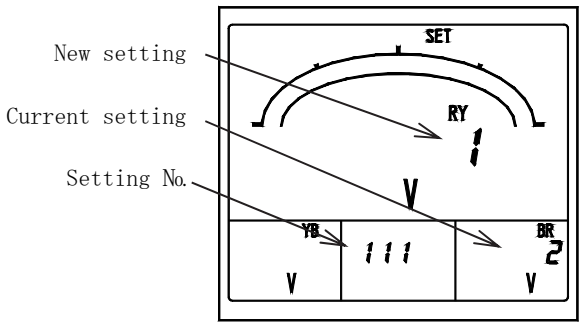
Display combination setting



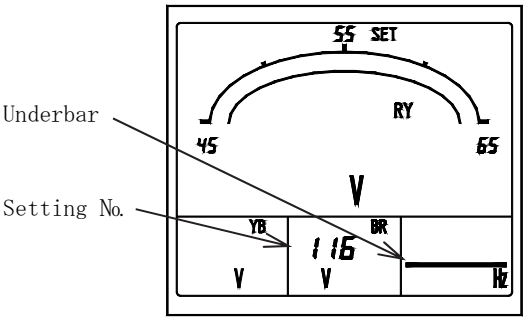
◆ 111 Display pattern
Select the factors to be measured and monitored by 4 digital displays out of combination patterns.
Set values are updated by SET.

◆ 112 to 115 Main monitor, Sub monitor (left), Sub monitor (center), Sub monitor (right)
Sets these items for a display configuration other than combination patterns.
Set values are updated by SET.

◆ 116 Bar graph factor
A factor being monitored in the main monitor is basically displayed by a bar graph.
Set this item for displaying a factor being monitored on a sub monitor by bar graph.
An underbar is attached to the digital display of the setting sub monitor.
Set values are updated by SET.



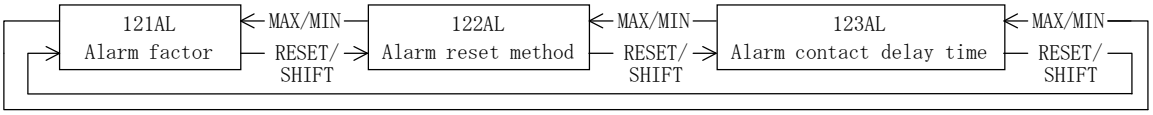
Combination display



Bar graph factor

(2) 121AL to 123AL Alarm output setting 【With option】

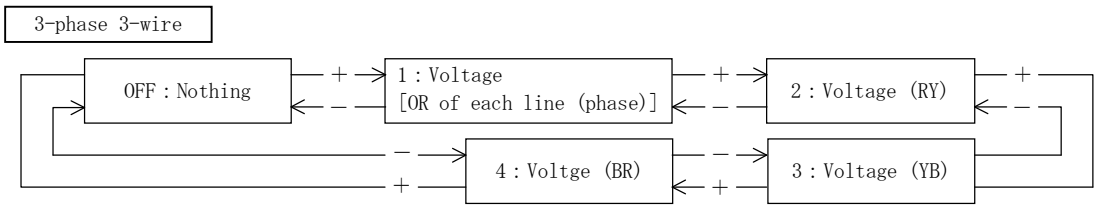
Various setting and an output test are performed about an alarm output.

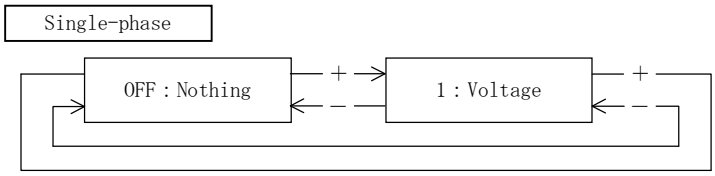


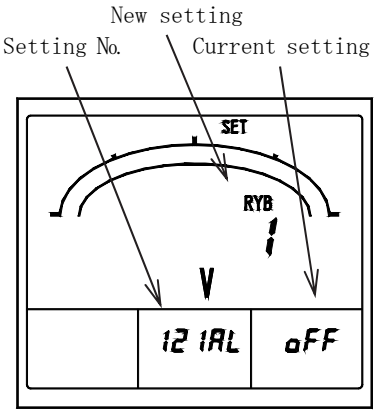
◆ 121AL Alarm output factor setting

Sets the factor of alarms outputs. Selection by [+] and [−], set value is updated by [SET].

Default setting : 1 [Voltage, OR of each line (phase)]







Alarm factor

◆ 122AL Alarm reset method setting.

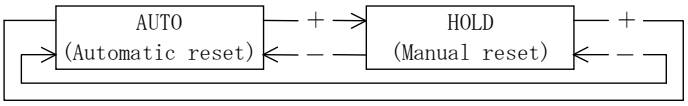
Action at the case of a reset of alarm output can be selected from AUTO (automatic reset) and HOLD (manual reset).

In "AUTO (automatic reset)", an alarm output is OFF according to a reset of an alarm. In "HOLD (manual reset)", even after an alarm reset, an output holds ON.

It performs a return (output OFF) in [RESET/SHIFT].

Selection by [+] and [−], set value is updated by [SET].

Default setting : AUTO (Automatic reset)



◆ 123AL Alarm contact delay time

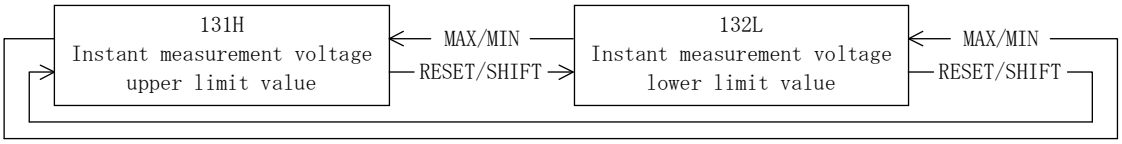
Sets the contact delay time of alarm. The setting range is 0 to 300 seconds (1-second step).

Selection by [+] and [−], set value is updated by [SET].

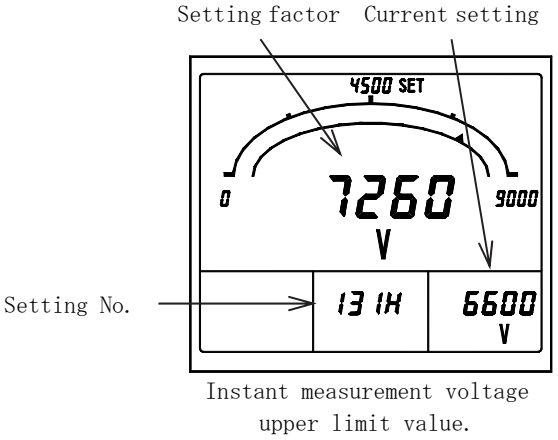
Default setting : 0 second (With no contact delay)

(3) 131H, 132L Voltage detection setting

Sets the upper limit alarm value and lower limit alarm value of instant voltage.

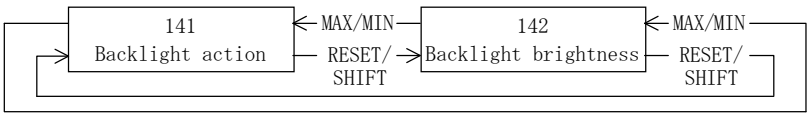


◆ 131H Instant measurement voltage upper limit value.
132L Instant measurement voltage lower limit value.
Sets the upper limit alarm value and lower limit alarm value of instant voltage.
The setting range is 30 to 150% (1% step) and OFF.
(To full scale ＝150%)
Selection by [＋] and [－], set value is updated by [SET].
Default setting : OFF 〔No operation〕 (upper limit value, lower limit value)OFF 80%

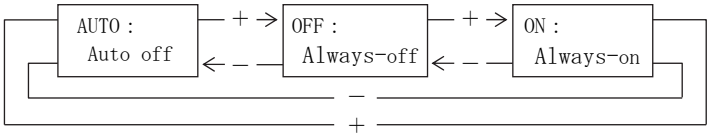


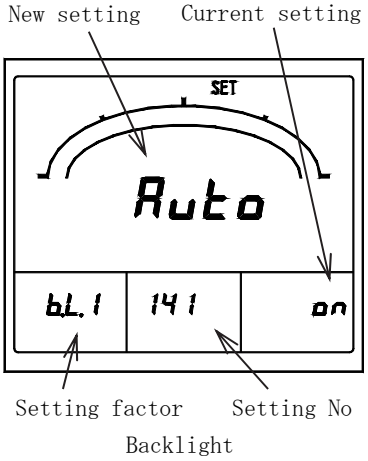
(4) 141, 142 Backlight setting

Sets the action and brightness of backlight.



◆ 141 Backlight action
It can select from ON (always-on), AUTO (auto off), and OFF (always-off) about action of backlight.
If 5 minutes elapses without operating a switch in case it is set as "AUTO (auto off)", backlight will go out automatically. After that, backlight will be turned on if either of switches is operated.
Selection by [＋] and [－], set value is updated by [SET].
Default setting : AUTO (Auto off)

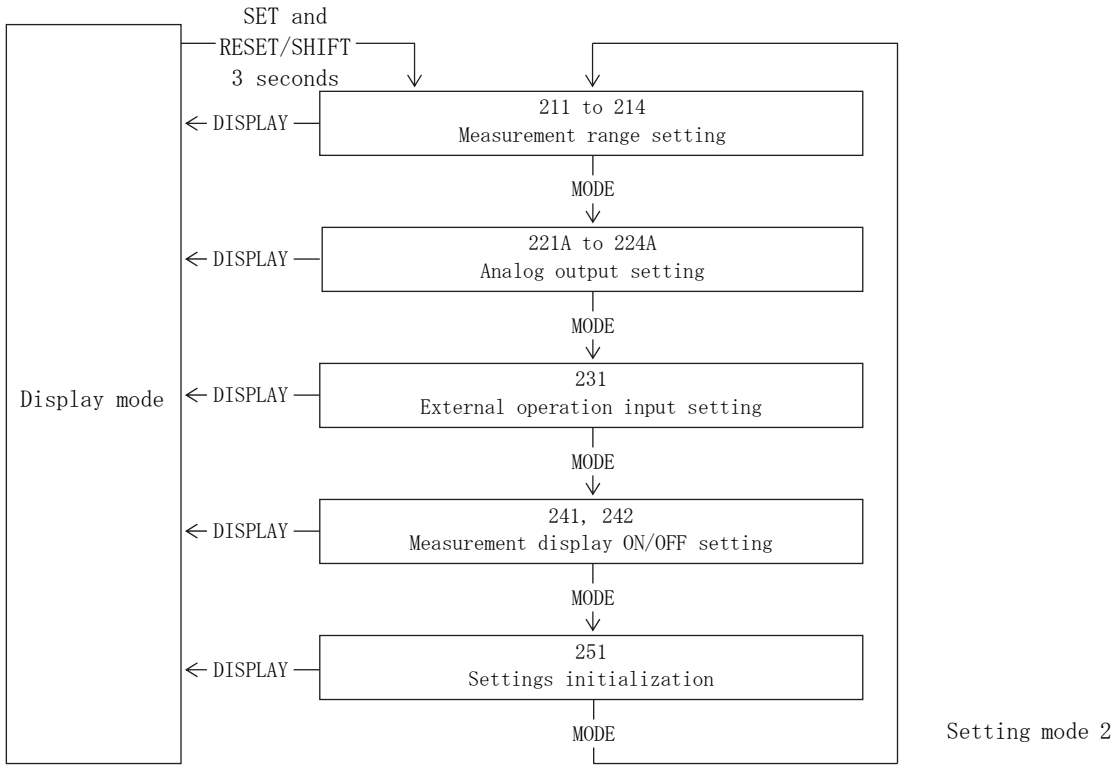




◆ 142 Backlight brightness
It can select the brightness of backlight as five steps of 1 to 5.
Backlight becomes the darkest if it is set as "1".
Backlight becomes the brightest if it is set as "5".
Selection by [＋] and [－], set value is updated by [SET].
Default setting : 3 (Middle)

Setting	Brightness
5	Bright
4	↕
3	
2	
1	Dark

5.3.2 Setting mode 2

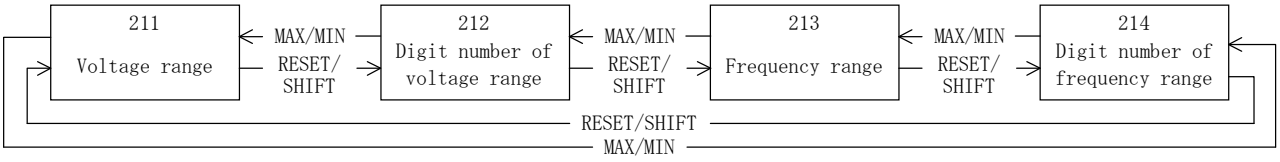


Setting mode 2 is selected by pressing SET and RESET/SHIFT switches continuously for longer than 3 seconds.
Pushing MODE switch performs movement of setting item.
The present mode can be returned to the display mode by pressing DISPLAY switch.

< Caution >
If setting change should have been mistaken, a display and output of measurement are not obtained correctly.
Therefore, users must not set. The setting item without the corresponding option is not displayed.

(1) 211 to 214 Measurement range setting

Sets the measurement range of each measurement factor.



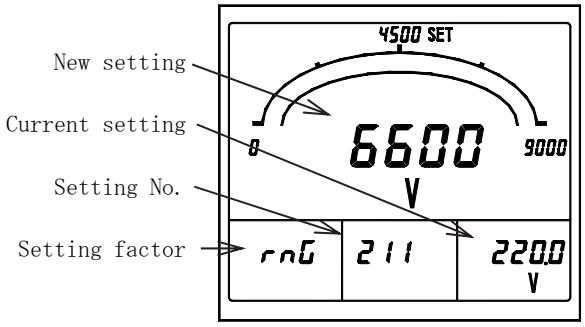
◆ 211 Voltage range

Sets the voltage range (primary voltage). Selection by [+] and [−], set value is updated by [SET].

Default setting : 6600V (3φ3W, 110V input), 110.0V (1φ3W), 3300V (1φ2W, 110V input), 220.0V (3φ3W/1φ2W, 220V input)

Voltage measurement range

150V (110V)	24kV (16.5kV/110V)
300V (220V, 220V/110V)	25kV (18.4kV/110V)
500V (380V/110V)	30kV (22kV/110V)
600V (440V/110V)	45kV (33kV/110V)
600V (460V/110V)	90kV (66kV/110V)
600V (480V/110V)	120kV (77kV/110V)
1200V (880V/110V)	150kV (110kV/110V)
1500V (1100V/110V)	180kV (132kV/110V)
2400V (1650V/110V)	210kV (154kV/110V)
3000V (2200V/110V)	270kV (187kV/110V)
4500V (3300V/110V)	300kV (220kV/110V)
9000V (6600V/110V)	400kV (275kV/110V)
15kV (11kV/110V)	500kV (380kV/110V)
18kV (13.2kV/110V)	750kV (550kV/110V)
18kV (13.8kV/110V)	



Voltage range

◆ 212 Digit number of voltage range

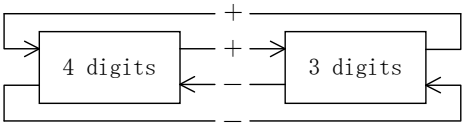
Sets the digit number of voltage range.

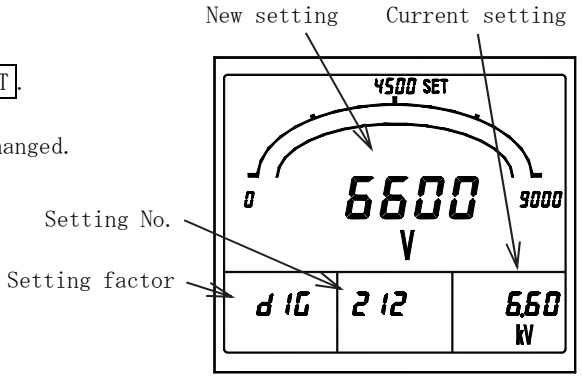
Selection by [+] and [−], set value is updated by [SET].

Default setting : 4 digits

The unit may be changed if the number of digits is changed.

Example) 6000V ⟷ 6.60kV





Digit number of voltage range

◆ 213 Frequency range

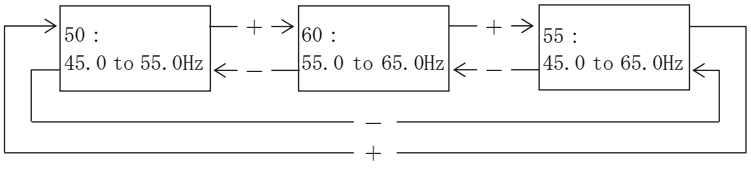
Sets the frequency measurement range.

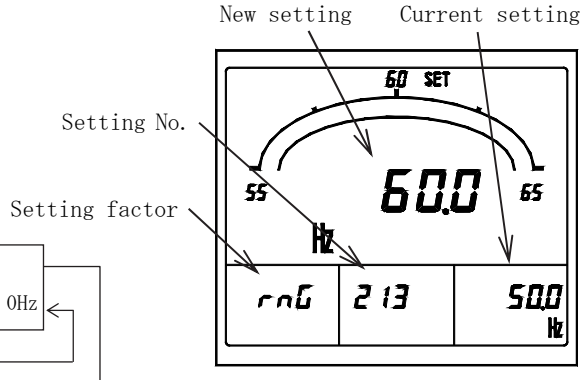
Selects a frequency range from 45.0 to 55.0Hz or 55.0 to 65.0Hz or 45.0 to 65.0Hz.

Change of this setting also sets the analog output range of frequency automatically.

Selection by [+] and [−], set value is updated by [SET].

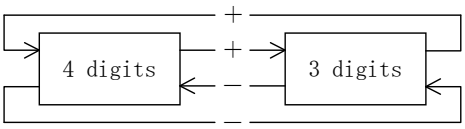
Default setting : 45.0 to 65.0Hz

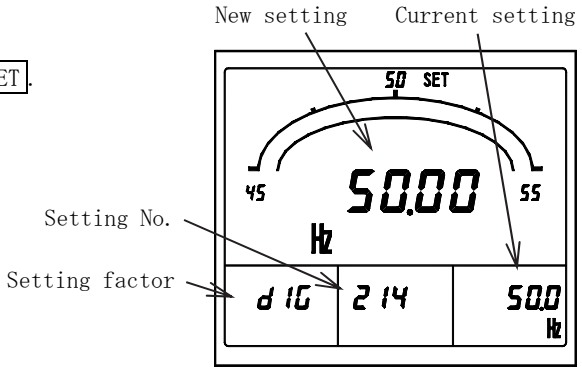




Frequency range

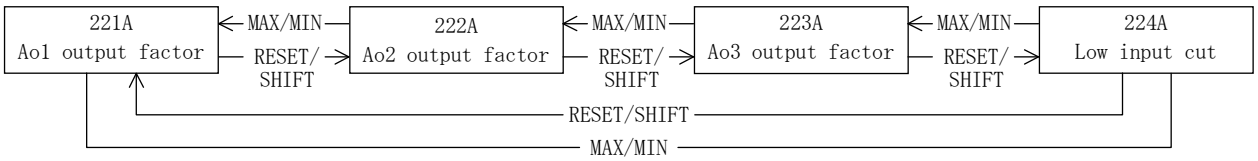
◆ 214 Digit number of frequency range
Sets the digit number of frequency range.
Selection by [+] and [−], set value is updated by [SET].
Default setting : 3 digits



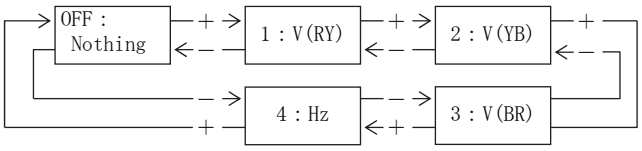


Digit number of frequency range

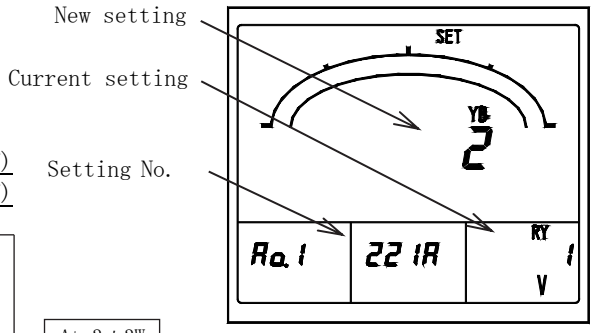
(2) 221A to 224A Analog output setting 【With option】
Various setting of analog output is performed.



◆ 221A to 223A AO (analog output) 1 to 3 output factor.
Sets the output factor of each analog outputs.
Selection by [+] and [−], set value is updated by [SET].
Default setting :
AO1 V(RY) (3φ3W), V(RW) (1φ3W R-W-B), V (1φ2W)
AO2 V(YB) (3φ3W), V(BW) (1φ3W R-W-B), OFF (1φ2W)
AO3 V(BR) (3φ3W), V(RB) (1φ3W R-W-B), OFF (1φ2W)

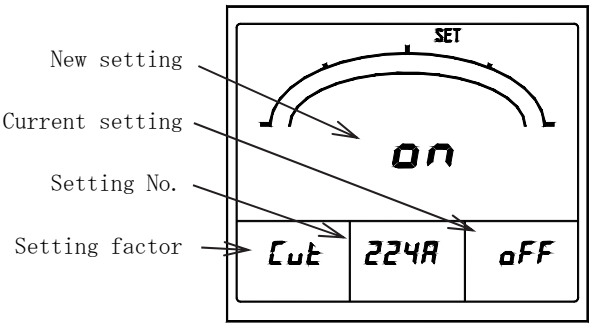


At 3φ3W



Ao1 output factor

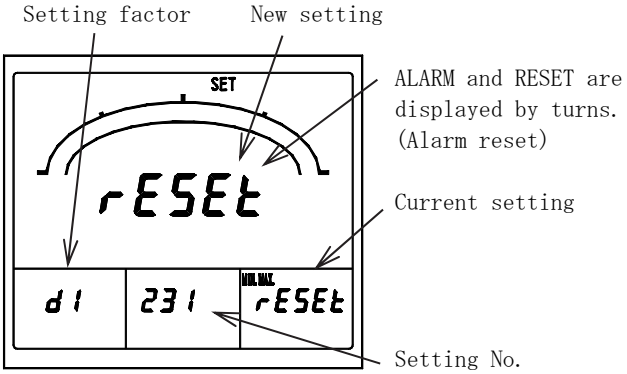
◆ 224A Low input cut
It is the function which makes analog output a lower limit at the case of a minute input (input which corresponds to 0.5% or less).
A function can be selected from ON (Use) and OFF (No operation).
Selection by [+] and [−], set value is updated by [SET].
Default setting : OFF (No operation)



Low input cut

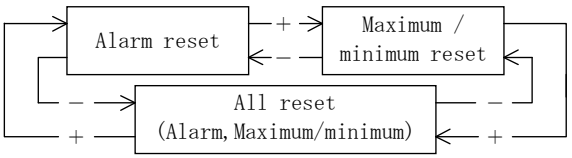
(3) 231 External operation input setting【With option】
Various setting of external operation input is performed.

◆ 231 External operation input function
The function of each external operation input (alarm reset, maximum / minimum reset, all reset) can be selected.
Selection by [+] and [−], set value is updated by [SET].



Default setting (With alarm-output option)

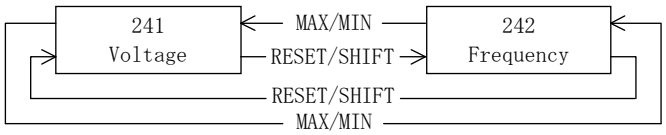
Alarm reset

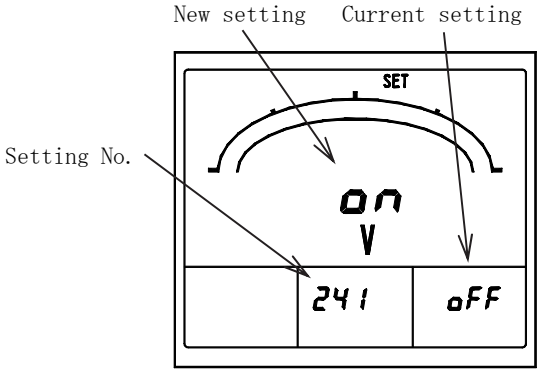


・About the setting display in an external operation input function

Function	The contents of a display at the function setting	Current setting display point	New setting display point
Alarm reset	"ALARM" and "RESET" are displayed by turns by 7 segment display.	Sub monitor (right)	Main monitor
Maximum / minimum reset	"MAX." and "MIN." of guidance and "RESET" are displayed by 7 segment display.		
All reset	"ALL" and "RESET" are displayed by turns by 7 segment display.		

(4) 241, 242 Measurement ON/OFF setting
Measurement display ON/OFF setting of each measurement factor is performed.
Selection by [+] and [−], set value is updated by [SET].
Default setting : ON (All measurement factors)

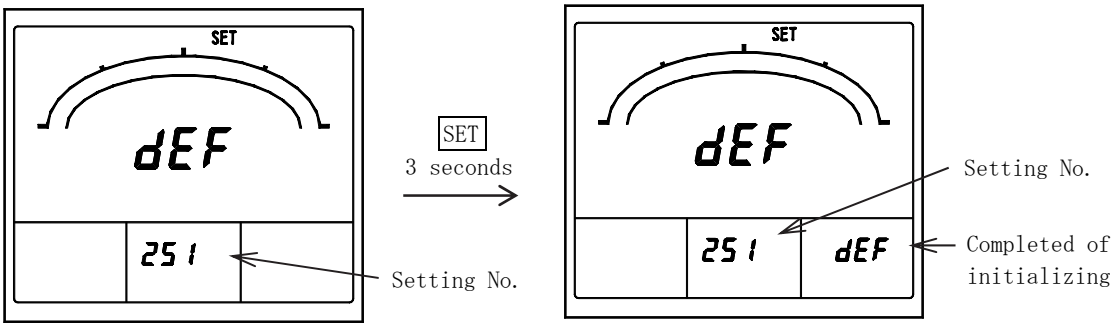




Voltage ON/OFF

(5) 251 Settings initialization
Initializes the each settings (return to a default setting).

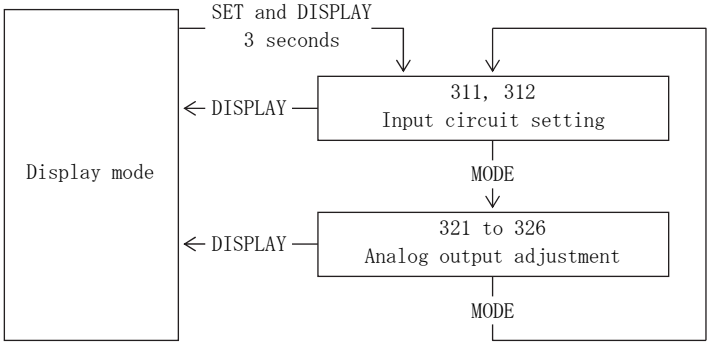
◆ 251 Settings initialization
Initialize the settings of setting 1 and setting 2 (return to the default settings).
Pushing [SET] for 3 seconds or longer to initialize the settings of setting 1 and setting 2.
(The set value of setting 3 does not return to the default value)
By pushing [SET] for 3 seconds, all the settings of setting 1 and setting 2 are initialized.



(Before initialization) (Initialization completion)

Initialization of setting value

5.3.3 Setting mode 3

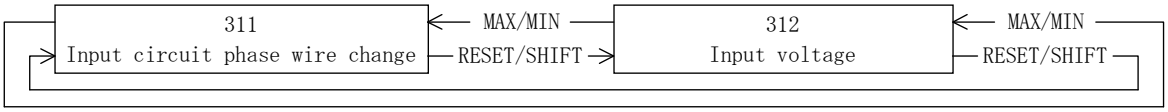


Setting mode 3

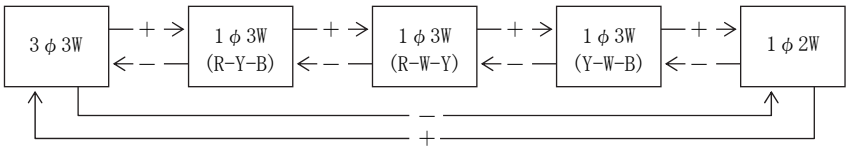
Setting mode 3 is selected by pressing [SET] and [DISPLAY] switches continuously for longer than 3 seconds.
Pushing [MODE] switch performs movement of setting item.
The present mode can be returned to the display mode by pressing [DISPLAY] switch.

< Caution >
If setting change should have been mistaken, a display and output of measurement are not obtained correctly. Therefore, users must not set. The setting item without the corresponding option is not displayed.

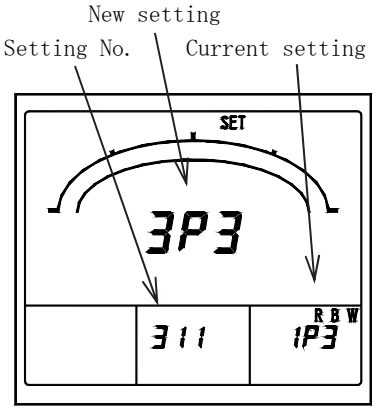
(1) 311, 312 Input circuit setting
Sets the phase wire of an input circuit, and an input voltage / phase voltage full scale.



◆ 311 Input circuit phase wire change
Sets the input circuit and phase wire.
Selection by [+] and [−], set value is updated by pushing [SET] 3 seconds or more.
Default setting : 3φ3W (No designation)



<Caution>
・If this setting is changed, all the settings of setting 1 and setting 2 will turn into a default setting of the input circuit after change.
・The right measurement cannot be performed if setting of actual connection and phase wire are different.

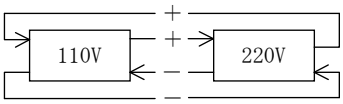


Input circuit phase wire change

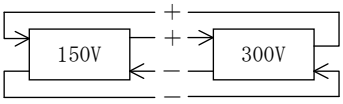
◆ 312 Input voltage

Sets the input voltage (3φ3W, 1φ2W) or phase voltage full-scale (1φ3W).
In 3φ3W/1φ2W and 1φ3W, the contents of a setting are different.
Selection by [＋] and [－], set value is updated by [SET].
Default setting : 150V (1φ3W)
Default setting : 110V (3φ3W, 1φ2W or no designation)

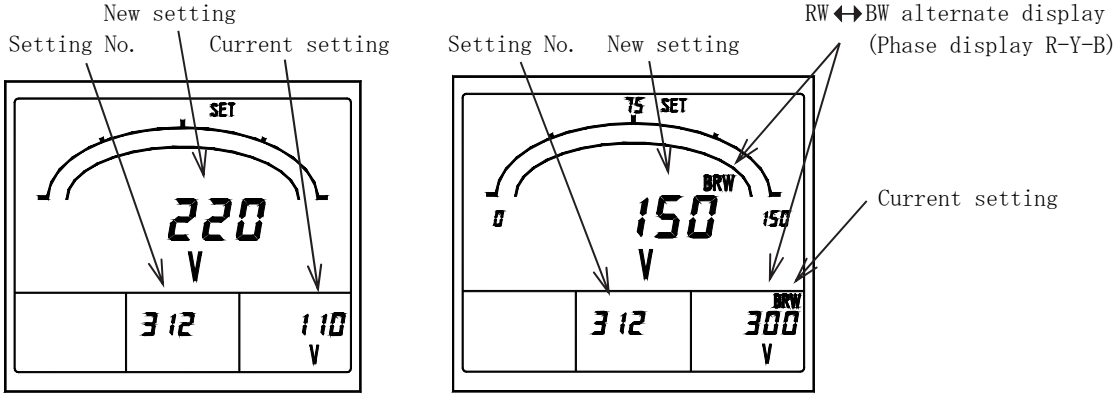
・3φ3W, 1φ2W



・1φ3W

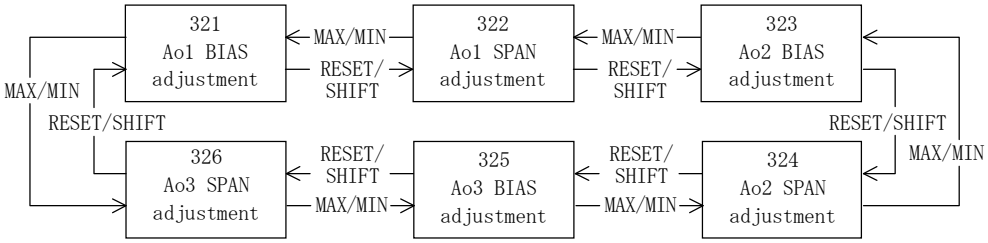


Setting of 300V, Output of phase voltage is AC0 to 150V/DC4 to 12mA.
Setting of 150V, Output of phase voltage is AC0 to 150V/DC4 to 20mA.



(2) 321 to 326 Analog output adjustment 【With option】

The bias and span of each analog output are adjusted.

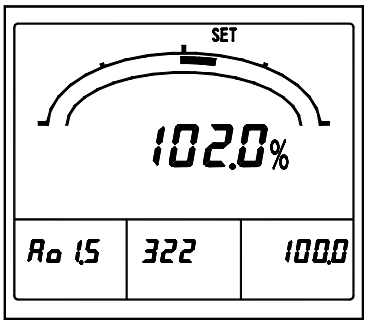


◆ 321 AO (Analog output) 1 bias adjustment,
323 AO (Analog output) 2 bias adjustment,
325 AO (Analog output) 3 bias adjustment.

The bias of each analog output is adjusted.
Setting range : ±10.0% (0.1% step)
Selection by [＋] and [－], set value is updated by [SET].

◆ 322 AO (Analog output) 1 span adjustment,
324 AO (Analog output) 2 span adjustment,
326 AO (Analog output) 3 span adjustment.

The span of each analog output is adjusted.
Setting range : ±10.0% (0.1% step)
Selection by [＋] and [－], set value is updated by [SET].



Ao1 span adjustment

6. Specification

6.1 Specification and intrinsic error.

Input circuit	Input
3-phase 3-wire Single-phase 2-wire	AC110V, 220V common use. 50/60Hz
Single-phase 3-wire	AC100-200V (13) 50/60Hz

Note(13) The rated voltage of each phase and W phase is 100V. However, at the case of input voltage full-scale 150V setting of bar graph is 150V (RW,BW) or 300V(RB). And, at the case of input voltage full-scale 300V setting of bar graph is 300V (RW,BW,RB).

Measurement item	Measurement range / Display specification	Intrinsic error (14)		Maximum measurement	Minimum measurement	Notes
		Digital display	Analog output (15)			
Voltage	AC150V to 750kV	±0.5%	±0.5%	○	○	RY-YB-BR line change (16)
Frequency	45.0 to 55.0Hz or 55.0 to 65.0Hz or 45.0 to 65.0Hz Range select	±0.5%	±0.5%	○	○	0.0Hz in case input is below 20% of voltage range. Output is a lower limit value. (Lower limit value -1% : % for output span)

Item	Specification	
Bar graph display	Bar graph display of the main-monitor factor is done. A display of a sub monitor factor can also be set.	
Operating method	Voltage : Effective value computing type. Frequency : Zero cross cycle computing type.	
The factor in which display setting is possible	Main monitor	Voltage (Each phase and line), Frequency
	Sub monitor (Left)	Voltage (Each phase and line)
	Sub monitor (Center)	Voltage (Each phase and line)
	Sub monitor (Right)	Voltage (Each phase and line), Frequency
	Bar graph	Voltage (Each phase and line), Frequency
Option	Analog output (3 sets). Alarm output. External operation input.	

Note (14) If this unit directly measures an inverter output of cycle control, SCR phase angle control or PWM control, an error may increase due to its operation principle.

Note (15) Analog output, alarm output and external operation input are options.

Note (16) Single-phase 3-wire (R-W-B) : RW-BW-RB, Single-phase 3-wire (R-W-Y) : RW-YW-RY, Single-phase 3-wire (Y-W-B) : YW-BW-YB, Single-phase 2-wire : With no phase display.

● Measurement is possible range.

Measurement factor	Input (17)	Measurement is possible range	
		Display	Analog output
Voltage	AC0 to 150V [AC0 to 300V]	101% of meter full scale.	101% of output span.
Frequency	45 to 55Hz	44.9 to 55.1Hz	-1%, 101% of output span.
	55 to 65Hz	54.9 to 65.1Hz	
	45 to 65Hz	44.8 to 65.2Hz	

Note(17) [ ] is the 300V input case.

6.2 Performance.

Item	Specification			
Intrinsic error	Reference to measure specification and intrinsic error			
Accuracy of bar graph	±10% (% for span)			
Influence by temperature	Within accuracy by 23±10℃.			
Compliance standard	JIS C 1102-1 : 2007 , JIS C 1102-2, -4, -7, -9 : 1997 , JIS C 1111 : 2006			
Safety	JIS C 1010-1 : 2005 CATⅢ (The category to the measurement performed with fabric equipment) Maximum circuit voltage 300V Pollution degree 2 (Usually, environment which only contamination of non-conductivity generates. However, temporary conductivity which originates in dew condensation depending on the case occurs.)			
Display updating time	About 1 second (Bar graph : 0.25 seconds)			
Display device Display composition	LCD (Number, Character, Segment color : Black)	Main monitor	4 digit, character height 11mm	
		Sub monitor (Left)	4 digit, character height 6mm	
		Sub monitor (Center),(Right)	4 digit, character height 6mm	
		Bar graph	20 dots	
LCD view angle	Standard	For upper installation (For lower view)	Upper view angle 10° , Lower view angle 60° , Right and left view angle 60°	
	Special	For lower installation (For upper view)	Upper view angle 60° , Lower view angle 10° , Right and left view angle 60°	
Backlight	LED backlight : White Always-on, Auto off (after 5 minutes without operating), Always-off. Setting is possible. White backlight can select brightness from five steps of 1 to 5. ([18])			
Auxiliary supply	AC85 to 264V 50/60Hz 10VA (Rated voltage, AC100/110V, 200/220V) DC80 to 143V 6W (Rated voltage, DC100/110V) for both AC and DC uses			
Rush current (Time constant)	Rated voltage AC110V 2.2A or less (About 2.5ms)			
	Rated voltage AC220V 4.4A or less (About 2.5ms)			
	Rated voltage DC110V 1.6A or less (About 2.5ms)			
Input consumption VA	Voltage circuit	0.25VA or less (110V) , 0.5VA or less (220V)		
Overload capacity	Voltage circuit	2 times 10 seconds, 1.2 times continuation of rated voltage.		
	Auxiliary supply	1.5 times 10 seconds, 1.2 times continuation of rated voltage. In case of DC110V, 1.5 times 10 seconds, 1.3 times continuation of rated voltage.		
Insulation resistance	Between electric circuits and case (Earth).	Above 50MΩ at DC500V megger		
	Between input and output and auxiliary supply.			
	Between analog output and alarm output.			
	Between analog outputs are not insulation of minus common.			
Voltage test (Commercial frequency withstand voltage) JIS C 1102-1 JIS C 1111	Between electric circuits and case (Earth).	AC2210V (50/60Hz) 5 seconds		
	Between input and output and auxiliary supply.			
	Between analog output and alarm output.			
	Between analog outputs are not insulation of minus common.			
Impulse voltage test (Lightning impulse withstand voltage) JIS C 1111	Between electric circuits and case (Earth). (An analog output is excluded)	5kV 1.2/50μs Both positive and negative polarities, for 3 times each.		
	Between input and auxiliary supply. (Grounds an output.)			

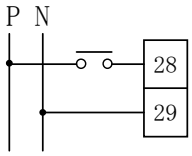
Note([18]) About white backlight.
The white backlight of this product is using white LED which combined the special phosphor and blue LED. In the characteristics of this LED, color tone may be different for each product.

Item	Specification
Noise-capacity JEA B-402	(1) Oscillatory surge voltage When a damping vibration waveform (peak voltage 2.5kV, frequency 1MHz±10%) is repeatedly applied, the measurement error should be within 10% and no malfunction should occur. Auxiliary supply circuit (Normal / Common) , Voltage input circuit (Common) (2) Square wave impulse noise If a noise (1μs, 100ns width) is repeated and added, a measurement error should be within 10%. And, there needs to be no malfunction. Auxiliary supply circuit (Normal / Common) Over 1500V Voltage input circuit (Common) Over 1500V Alarm output (Common) Over 1000V Operation input (Common) Over 1000V Analog output circuit (Induction) Over 1000V (3) Electric wave noise If intermittence irradiation of the electric wave of a 150MHz,400MHz band is done by (5W, 1m), a measurement error should be within 10%. And, there needs to be no malfunction. (4) Electrostatic noise Measurement error should be within 10% at contact discharge 8kV and air discharge 15kV, and malfunction shall not occur.
Vibration JIS C 1102-1	Sweep vibration frequency range : 10 to 55 to 10Hz, Displacement amplitude : 0.15mm, Number of sweep : 5, Sweep velocity : 1 octave /minute
Shock JIS C 1102-1	Peak acceleration : 490m/s^2 , Waveform of pulse : Sine half wave, duration of pulse : 11ms Number of shock : It is each 3 times about a forward reverse to 3 shaft orientations (right-angled to mutual). (Total 18 times)
Construction	Dimension : 110mm(Width)×110mm(Height)×103.5mm(Depth) Body diameter : 99mmϕ With terminal cover, Protection code IP40
Material	Case, Cover : ABS(V-0) , Terminal block : PBT , Terminal cover : Polycarbonate
Color	Black (Munsell N1.5)
Mass	Approx. 600g
Blackout guarantee	Maximum value, Minimum value, Each setting value. Data hold by nonvolatile memory.
Operating temperature and humidity limits	-10 to +55℃, 30 to 85% RH, Non condensing.
Storage temperature limits	-25 to +70℃
Installation altitude	The altitude of 2000m or less.

6.3 Option

Item	Specification		
Analog output	Number of output	3 circuits (Minus common)	
	Output specification	DC4 to 20mA (Below 550Ω)	
	Output factor	Voltage (Each phase or line), Frequency	
	Response time	1 second or less (Time within ±1% of final constant value.)	
	Output ripple	Within the double precision of accuracy (% for output span)	
Alarm output	Alarm factor : Voltage〔OR of each line (phase), Individual of each line (phase)〕, Alarm OFF. Possible to setting one of them.〕 Reset method : Automatic reset or Manual reset (Setting) Output contact : No-voltage a contact (OR of each phase detection) Contact capacity : AC250V 5A, DC125V 0.3A (Resistance load) AC250V 2A, DC125V 0.1A (Inductive load)		
	Alarm factor	Item	Specification
	Voltage	Function	Measurement value ≧ Upper limit setting value, Alarm display, Alarm output. Measurement value ≦ Lower limit setting value, Alarm display, Alarm output.
		Setting accuracy	±0.5% (% for full scale)
		Setting range	Using a full scale as 150%. 30 to 150% (1% step)
External operation input	Function		Three types of following functions can be operated by adding a voltage signal from the outside in addition to switch operation.
		Alarm reset	Alarm output is reset (output OFF). Please refer to "4.3.5 Reset" about operation by the switch.
		Maximum / Minimum value reset	The maximum/minimum value is reset (it updates to the instantaneous value at the time). Please refer to "4.3.5 Reset" about operation by the switch.
		All reset	Resets all of the alarm output and maximum/minimum value. Please refer to "4.3.5 Reset" about operation by the switch.
	Minimum operation pulse width		300ms , Continuation applying is possible.
	Rated input		Input rating becomes the same as that of auxiliary supply. AC100/110V 0.4VA, AC200/220V 1.4VA, DC100/110V 0.4W AC DC two ways. Contact capacity : About 3mA (AC,DC100/110V), About 6mA (AC200/220V)

● Caution on the use of external display selection input (option)
External power consumption is 0.4VA at AC110V or 1.4VA at AC220V or 0.4W at DC110V.
In case a relay or a switch is used for power-supply supply, please use the thing of about 1mA of the minimum application loads.

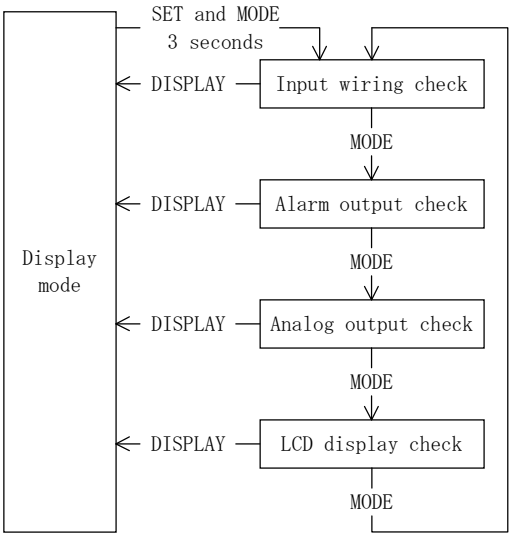


7. Maintenance and check

7.1 Trouble shooting

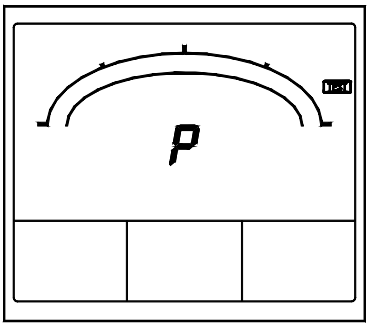
Symptoms	Possible causes	Remedial measures
Indicator does not display.	The power supply is not supplied. (Not connected. or voltage is low)	Check the auxiliary supply. Again, a power supply is supplied.
	Measurement display ON/OFF setting is set to OFF.	Check the setting.
	Trouble of device.	Replace the device.
Backlight does not lights.	The setting is set to AUTO (automatic off) or OFF (always off).	Check the setting.
Have a margin of measurement error.	Setting of a range is not right.	Please set again.
	Wiring is not right.	Check the wiring.
	Outside the rated frequency (45 to 65Hz).	It cannot be used.
	Cycle control, SCR phase angle control, PWM control, or other inverter output is measured.	It cannot be used.
Analog output is not outputted.	Analog output is set to OFF or measurement factor is set to OFF.	Check the setting.
Alarm output does not return.	The return method is a "manual reset".	Check the setting.
Settings changed.	It changed an input circuit setting.	Please set again.

7.2 Test

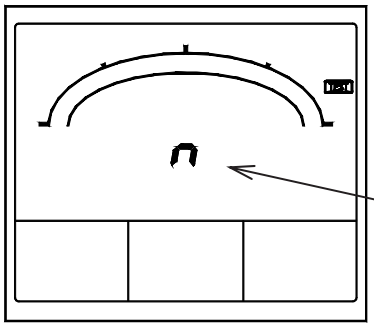


Test mode is selected by pressing SET and MODE switches continuously for longer than 3 seconds.
Pushing MODE switch performs movement of setting item.
The present mode can be returned to the display mode by pressing DISPLAY switch.

(1) Input wiring check
It becomes a wiring check screen and can check the connection status of a voltage input.



Positive phase sequence display.

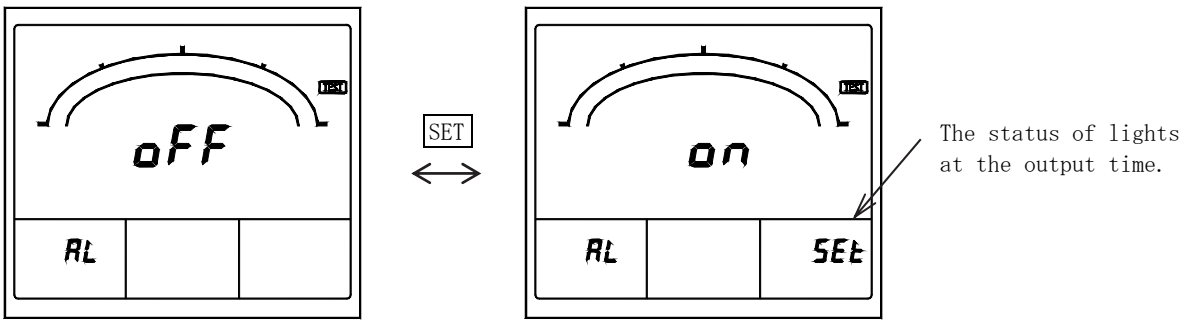


Negative phase sequence display.

The example of a display (3φ3W)
Main monitor (19) : Positive phase sequence, "P" (Positive),
Negative phase sequence, "n" (Negative),
With no input, "－－－－"

Note(19) It is set to "－－－－" if it is used in 1φ3W and 1φ2W circuit.

(2) Alarm output check 【 With an option 】
Even if this product does not have input, it can perform ON/OFF test of an alarm output (relay-contact output).
Whenever it pushes SET, ON and OFF change.
Default : OFF

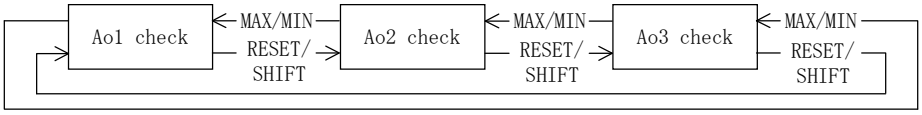


Output OFF　　Output ON

Alarm test

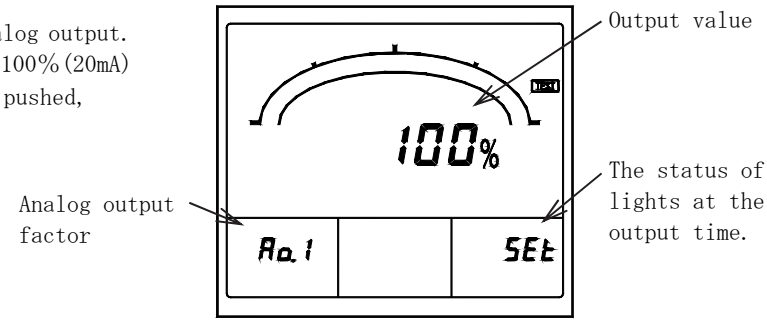
(3) Analog output check 【With an option】

Even if this product does not have input, it can test analog output (three circuits).



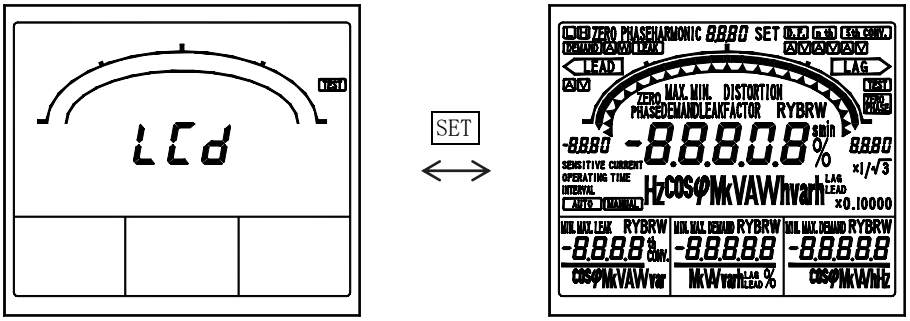
◆ AO (analog output) 1 to 3 check.

Sets the output factor about each analog output.
It selects 0%(4mA), 50%(12mA), and 100%(20mA) with [+] or [−] switch. If [SET] is pushed, analog output will output.
Default : 0% (4mA)



(4) LCD display check

It can check a liquid crystal display. Whenever it pushes [SET], a display changes.
Default : Main monitor "LCD" display



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