INSTRUCTION MANUAL

POWER LINE MULTI-METER
(AMMETER)

SALC-110L

[1φ2W / 1φ3W / 3φ3W ANALOG OUTPUT]

(HARDWARE MODEL B [Green backlight]
HARDWARE MODEL E [White backlight])

DAIICHI ELECTRONICS CO., LTD.

Introduction

Thank you for your purchase of our product.
Read this instruction manual carefully before installation, wiring, and using this product.
Keep this instruction manual handy for reference at any time.
Have a contact with us or sales agent in case that this instruction manual is lost or damaged.

<Caution>
Have a contact with us when you have any questions or are aware of missing article.

Safety precaution

Important contents are mentioned in this instruction manual to prevent any damage / use this product appropriately.
Keep the following safety precaution in mind after understanding each sign.

⚠DANGER	Improper use may lead to death or severe injury.
⚠WARNING	Improper use may possibly lead to death or severe injury.
⚠ATTENTION	Improper use may lead to medium injury.

- ■ We are not responsible for the damage caused by following condition (earthquake / fire which is not caused by us, action by third party, other accident, damage caused by our customer, misuse, product usage under abnormal condition).
- ■ We are not responsible for secondary damage caused by product use / product malfunction(loss of profit, halt of business operation). We are also not responsible for damage caused by false operation in combination with connecting equipment which is beyond our control.

⚠DANGER

- ● Do not disassemble, remodel and repair this product.
  Have a contact with us or sales agent when product failure happens to prevent fire / electric shock / injury.
- ● Do not get this product wet to prevent heat generation / ignition / product failure. When this product gets wet, stop using it.
- ● Do not connect metal excepting wiring to terminal in order to prevent heat generation/ignition.
- ● Do not get this product near the inflammables / combustible chemicals / gas to prevent fire.

⚠WARNING

- ● Connect specified power supply.
  Connecting power supply beyond specification causes fire / product failure.
- ● When dust is on the terminal, wipe it off after power is OFF to prevent fire.
- ● Follow the below-mentioned procedure when abnormality (fuming / bad odor) happens.
  (1) Stop a power supply and input, and stop using.
  (2) Contact our company or a distributing agent.

⚠ATTENTION

- ● Do not use this product in a environment of high temperature / high humidity to prevent any damage.
- ● Do not touch the terminal during operation to prevent electric shock.
- ● Do not pull/bend connecting cable with force. Cable damage causes heat generation / burn and contact failure leads to equipment damage.
- ● Do not connect/inspect with wet hands to prevent electric shock.

Other precaution

■ Don't mount or store this unit in the following environment.
Places where corrosive gas (SO_2 / H_2S / etc.)([1]) is generated.
Places where dust is generated.
Places with much vibration and shock.
Places with influence of external magnetic field ([2]).
Note ([1]) Corrosive gas = Sulfur dioxide SO_2 / Hydrogen sulfide H_2S / etc.
Note ([2]) Large current bus / saturable reactor / etc.

■ Wipe off dirt on the surface with dry cloth softly. Keep in mind that strong rubbing of nameplate leads to character disappearance. Organic solvent and chemicals and cleaner is not appropriate for cleaning.

■ Mercury component, Nickel-cadmium battery are not used in this product.

■ Please dispose of this product as industrial waste (noncombustible).

■ The precautions at the case of using by outdoor board.
① This product is not dust-proof structure and not waterproof structure. In using by the outdoor panel, please avoid the place, which dust causes. And, please install in the place that requires neither rain nor waterdrop.
② Please do not install in the place of sunlight. A display of this product may become hard to see. And, deformation of a case may take place by the surface temperature rise.

The warranty period and warranty scope.

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

■ Warranty scope.
In the state of the normal use of product-specification within the range according to this instruction manual, the trouble within the warranty period performs exchange or repair gratuitously.
However, the shipping expenses and the packing cost in the case of shipping obtain as payment on a customer.
And, if it corresponds to the next, it does not warrant.
(1) If it breaks down when converted or repaired except our company.
(2) If it breaks down by use out of specification range.
(3) If the cause of trouble is based on cause other than this product.
(4) Transportation, movement, damage by falling, and trouble.
(5) A natural disaster, disaster, etc., if it is the trouble which is irresponsible for a payment side (our company or distributing agent).

This warranty is a warranty of a product simplex. It cannot warrant the damage induced by trouble of this product.

Change of instruction manual written contents.

This instruction manual changes written contents without a notice by product improvement etc.

The precaution for use.

1. Environment of usage and storage.

Don't mount or store this product in the following environments. If the unit becomes defective due to the use in an environment other than specified, it may be repaired for pay even during its warranty period (one year after the date of delivery).

① Don't mount or store the unit at a place where the ambient temperature is other than a range of -10～+55℃ or the relative humidity is higher than 85% RH.
② Don't mount or store the unit at a place where a corrosive gas such as SO_2, H_2S, etc. is generated.
Corrosive gas = Sulfur dioxide SO_2 / Hydrogen sulfide H_2S / etc.
Large current bus / saturable reactor / etc.
③ Don't mount or store the unit at a dusty place.
④ Don't mount or store the unit at a place subjected to noticeable vibrations or shocks.
⑤ Don't mount or store the unit at a place subjected to noticeable external noises.
⑥ 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.

2. Cautions on use in an outdoor panel

Be careful with the following items when using this unit in an outdoor panel.

① Don't mount the unit at a place where it is directly exposed to rain or water drops, otherwise this unit may become defective because of no water-proof or drip-proof structure.
② Don't mount the unit at a dusty place.
③ Don't mount the unit at a place exposed to direct sunlight. Avoid exposing the unit to direct sunlight even through a glass window.
If the meter is directly exposed to sunlight, the surface temperature of the meter rises and the case may be deformed if the temperature exceeds 80℃.
④ If the average temperature around the meter exceeds 40℃, the life of the unit may shorten.

3. 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 improves by doing the power distribution of the auxiliary power and leaving it for about 2 hours.

4. Mounting and wiring

Mount and connect the unit by a technician while referring to the instruction manual and observing the following cautions.

CAUTION	● Connect the unit after confirming the connection diagram. An improper connection may cause troubles such as the generation of a high voltage on the secondary side of its current transformer or burning of the unit or the occurrence of a fire. ● Don't perform any connection in a hot line without turning off the power supply in advance, otherwise an electric shock accident, troubles or burning of the unit, a fire, gas explosion, or other very dangerous accidents may occur. ● The terminal cover is mounted for preventing an electric shock accident. Mount the terminal cover without fail after the end of work.

5. 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 (5)			3-phase 3-wire	Single-phase 3-wire (R-B-W)	Single-phase
1	Display pattern	Pattern		Pattern 1	Pattern 1	Pattern 1
		Main monitor		A(Y)	A(R)	A
		Sub monitor (Left)		A(R)	A(B)	Nothing
		Sub monitor (Center)		Nothing	Nothing	Nothing
		Sub monitor (Right)		A(B)	A(W)	Nothing
		Bar graph		A(Y)	A(R)	A
2	Alarm output (3)	Factor		Demand current (OR of each phase current)	Demand current (OR of each phase current)	Demand current (OR of each phase current)
		Reset method		AUTO	AUTO	AUTO
		Contact delay time		0 second	0 second	0 second
3	Demand current detection	Upper limit		80.0A	400.0A	40.00A
		Time interval		0 second	0 second	0 second
4	Backlight	Action		AUTO	AUTO	AUTO
		Brightness (4)		3 (Middle)	3 (Middle)	3 (Middle)
5	Measurement range	Current range		100.0A	500.0A	50.00A
		Current display intrinsic sensitivity		100.0A	500.0A	50.00A
		Digit number of current range		4 digits	4 digits	4 digits
6	Analog output (3)	Output factor 1		A(Y)	A(R)	A
		Output factor 2		A(R)	A(B)	OFF
		Output factor 3		A(B)	A(W)	OFF
		Current output intrinsic sensitivity		100.0%	100.0%	100.0%
		Low input cut		OFF	OFF	OFF
7	External operation input (3)			Alarm reset	Alarm reset	Alarm reset
8	Measurement display ON/OFF	Current		ON	ON	ON
		Demand current		ON	ON	ON
9	Input circuit	Phase line change		3φ3W	1φ3W (R-B-W)	1φ2W
10	Analog output adjustment (3)	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(3) A setting item is not displayed in case there is no corresponding option.
Note(4) In the case of green backlight, it does not indicate the setting item of brightness.
Note(5) If input circuit phase wire change setting is changed, the value (No. 1 to 8) of setting 1 and setting 2 will return to the default setting of the switched phase wire.

6. 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
Current , Demand current	○	○

- 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.

7. Maintenance and check

① Wipe off the surface of the unit with a dry soft cloth. 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. Please keep in mind that it will break if a LCD is pushed strongly.
And, if a filter is pushed, a LCD face will touch a filter. Therefore, the pattern of the shape of a circle or an ellipse may occur. Please do not push a filter strongly.

② Check the following items.
◎ Check the unit for damage in appearance.
◎ Check if indications conform to the inputs.
◎ Check if the unit is mounted normally without any loose connections of the terminal board after turning off the power supply.

If a question has arisen or if the unit seems to be defective, please contact us.

8. Explanation of LCD.

This product (hardware model A) has the part displayed in Japanese.
Please refer to explanation of a display.

Content

1. Product outline

1.1 Usage of product

This single unit can measure and monitor current ×3, demand-current ×3.
It is optimum for load monitors, such as a transformer and a feeder, and current measurement of a power receiving circuit.
The intensive monitor doubled with the system by option (analog output, alarm output, external operation input) addendum is possible.

1.2 Features of product

- It is common type product of 3-phase 3-wire, single-phase 2-wire, single-phase 3-wire.
  It's possible to share stock.
- 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 AC85～264V, DC80～143V (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.
- A backlight function is equipped. Selection of backlight-on, backlight-off, and auto backlight-off and setting of brightness (only white backlight) are possible. Automatic turning off the lights at the time of non-operation can be established. LED : Green or White (appoints by order).
- 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

SALC－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	DC4～20mA×3	Alarm×1

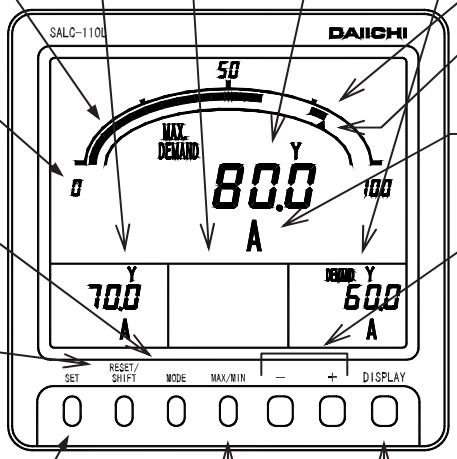
Auxiliary power supply
1 : AC85～264V, DC80～143V for both AC and DC uses

Input range
5 : 5A

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

Hardware model
A : R-S-T, Green backlight
B : R-Y-B, Green backlight
D : R-S-T, White backlight
E : R-Y-B, 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.

Maximum demand value

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.

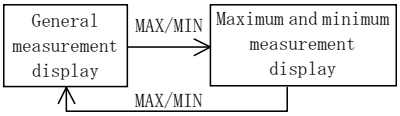
– +
The switch to which measurement displays element of main monitor is changed.
If it is not operated for 10 minutes after a display change, it returns to the original measurement display factor.
In set mode, it is used as a switch that changes a setting value.

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 phase display of current.
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).

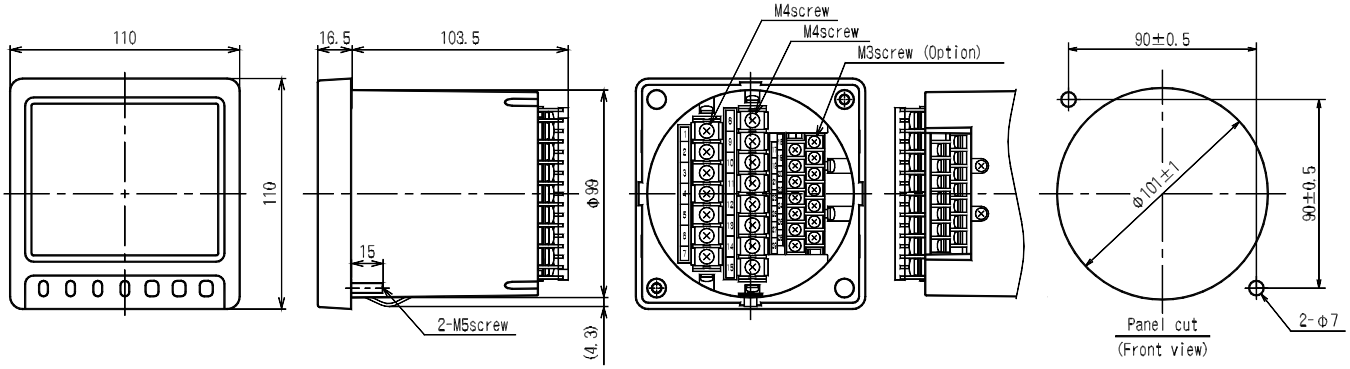


3. Preparation

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 2.0～2.5N･m.

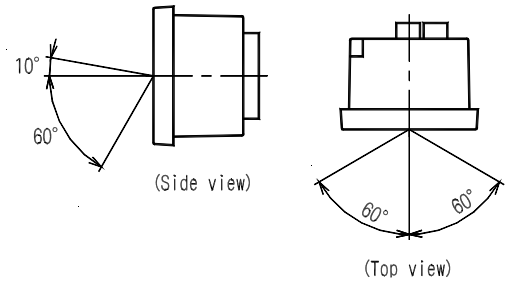
● Dimension diagram



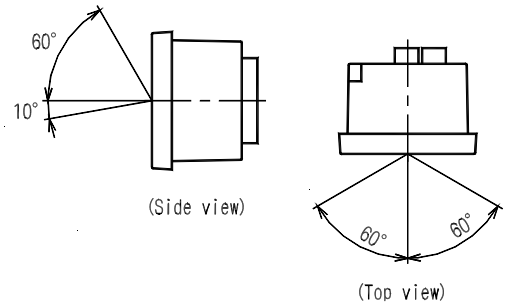
● Caution on handling

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

(1) For upper case installation



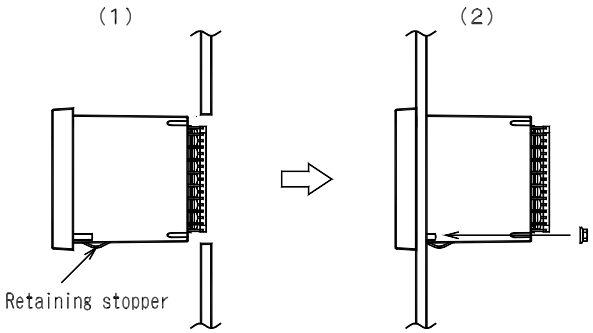
(2) For lower case installation



● 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 2.0～2.5N･m.

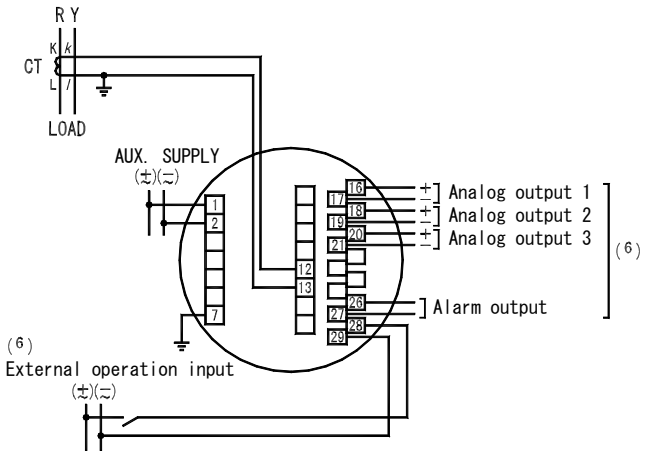


3.2 Connections

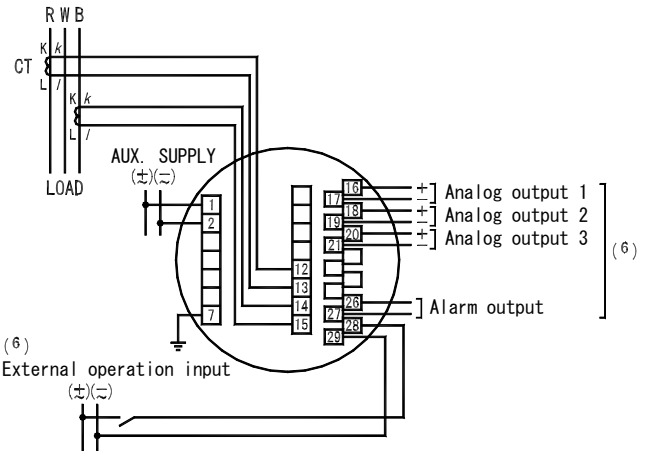
Please perform connection after referring to the following wiring diagram.

● Connection drawing (7)

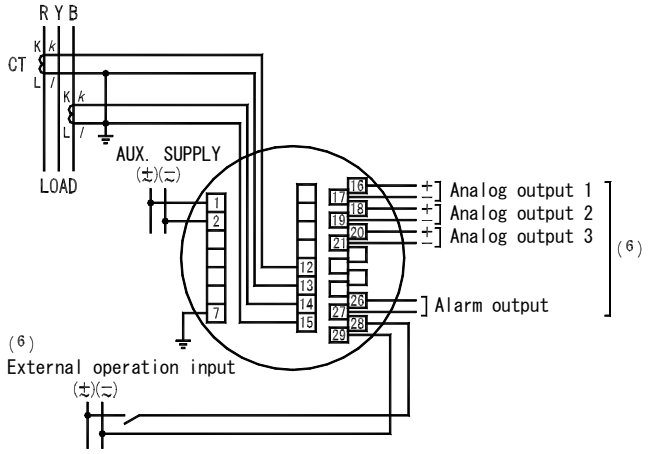
(1) 1φ2W, Analog output.



(2) 1φ3W, Analog output.



(3) 3φ3W, Analog output.



Note(6) Analog output, alarm output, external operation input is an option.

Note(7) In case of low-voltage circuit, secondary side earthing of CT is unnecessary.

● 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.

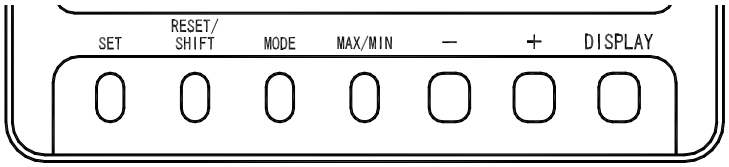
(4) Keep a distance of more than 30cm between this unit and the circuit breaker as well as between this unit and the relay contact signal line.

(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 phase display of current 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

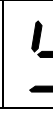
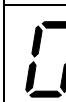
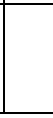
(1) In case a measurement change or a phase change is performed and the original screen composition is not clear anymore, DISPLAY is pushed for more than 3 seconds or it's no-operation for 10 minutes and returns to original screen structure.

(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.

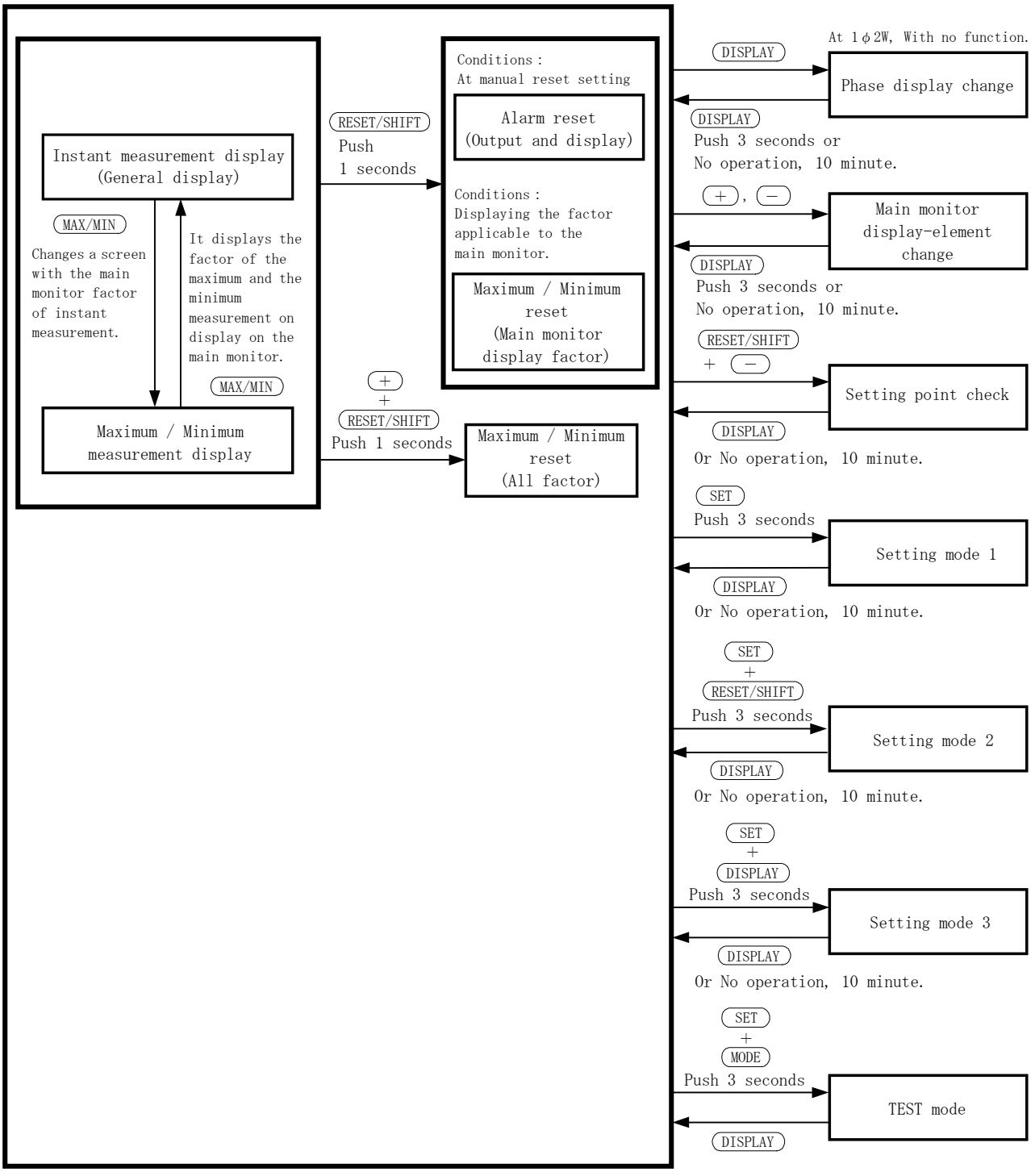
● 7 segment displays

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*
									Non-display	Non-display		
N(n)	*O(o)*	*P*	*Q(q)*	*R(r)*	*S*	*T(t)*	*U(u)*	*V*	*W*	*X*	*Y(y)*	*Z*
										Non-display		
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.

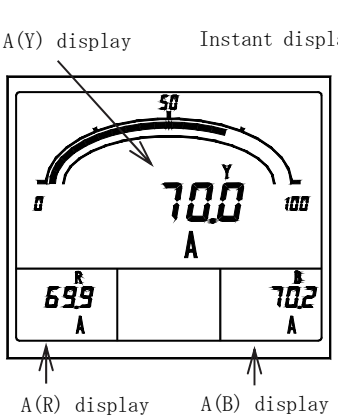


4.2 The kind of display

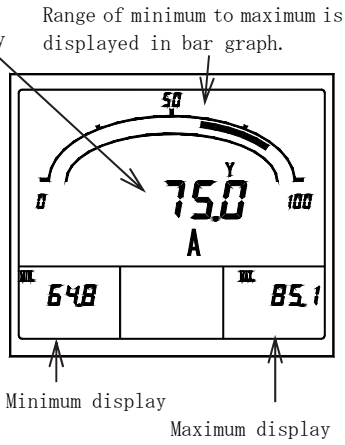
4.2.1 Measurement display

The change of the measurement display factor of the main monitor by switch operation and the change of the phase display of current 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.

Current, demand current, 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.

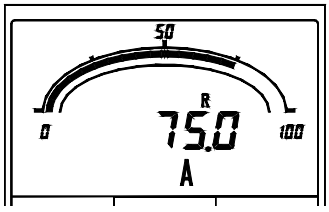
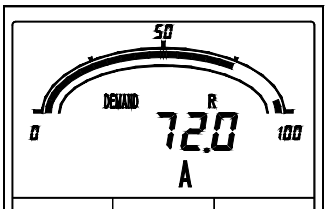
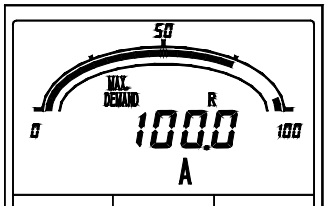


General measurement display



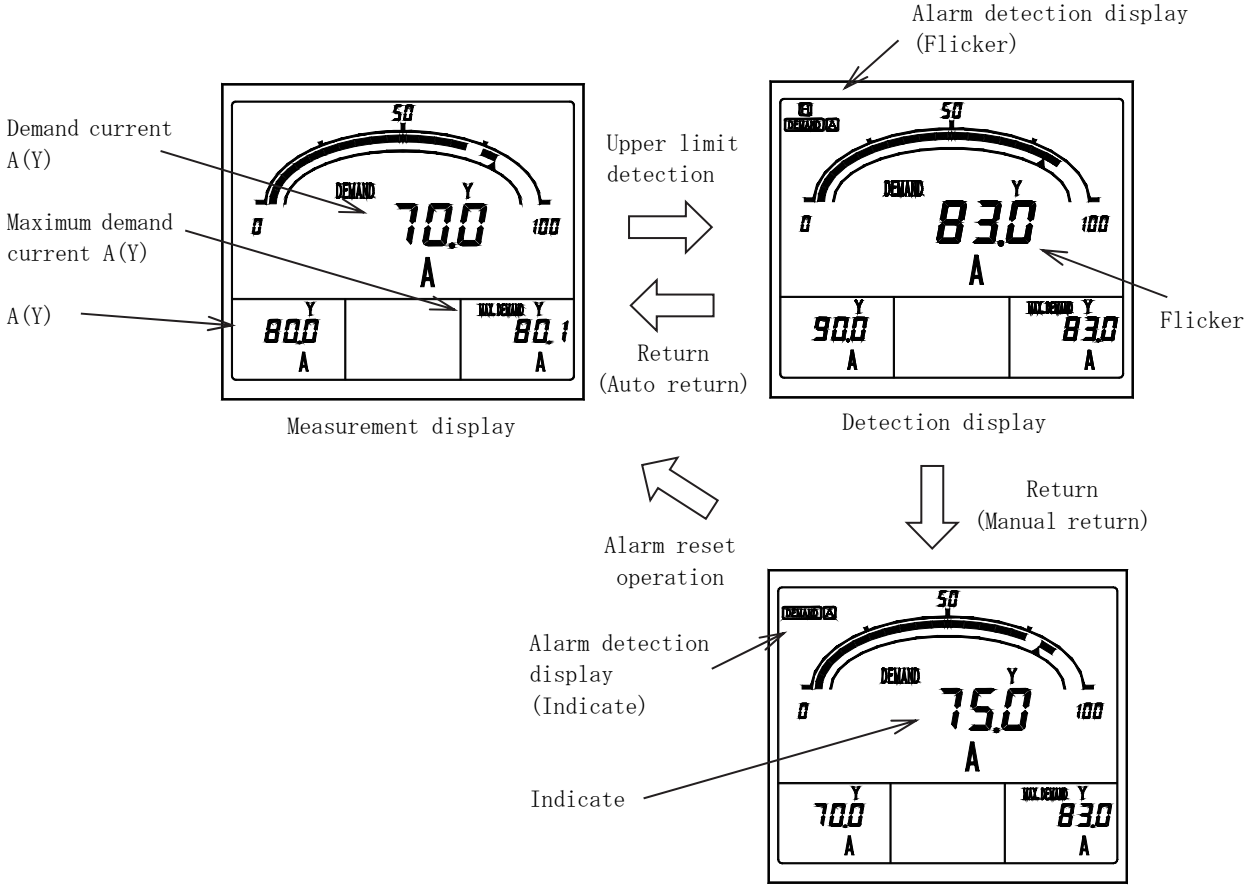
General measurement maximum and minimum display

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

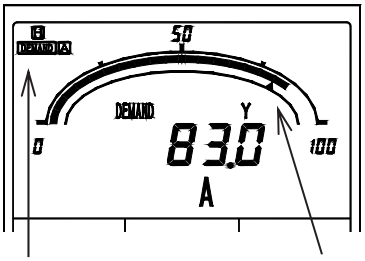
Measurement factor	Example of display	Note
Current A		
Demand current DA		“DEMAND” is displayed
Maximum demand current MDA		“MAX DEMAND” is displayed

4.2.2 Alarm detection display

It is a display when demand current measurement becomes more than a upper limit setting value.
If the demand current is being indicated by measurement under the main monitor or the sub-monitor, a measurement value display is flicker. And, if the phase set as the alarm output factor detects, H, DEMAND, and A flicker-indicates.



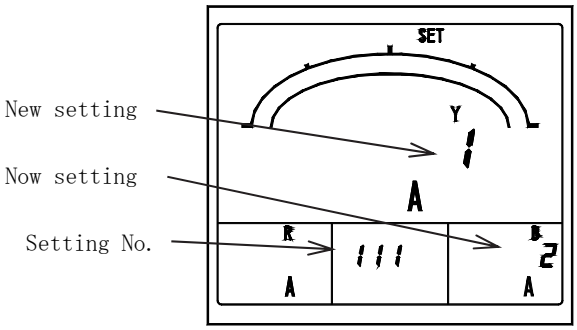
If the return method is manual reset setting, even if it returns from upper limit detection, an alarm detection display is held. The return in this case needs alarm reset operation.
Please refer to "4.3.5 Reset" for alarm reset.

Alarm factor		Example of a display
Demand current	Upper limit	

4.2.3 Setting display

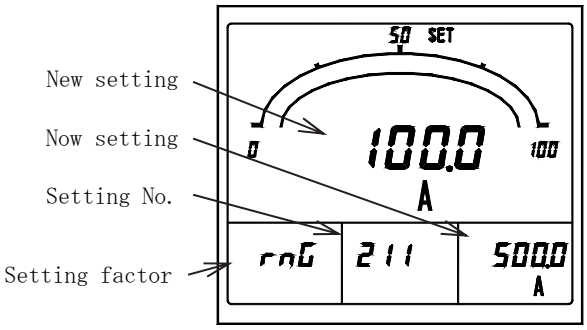
It is the display at the case of various setting. There are three types of setting modes according to the contents of a setting.
Operation and the contents of setting (detail) in setting mode, please refer to "5 Setting".

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.



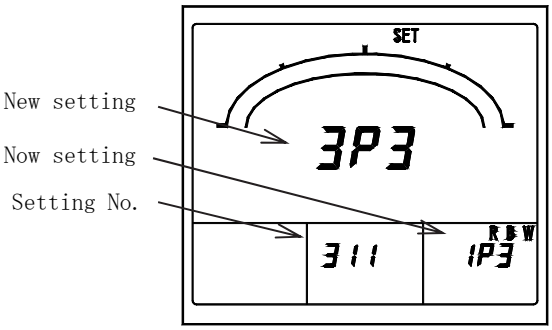
Setting mode 1
(No.111 Display pattern)

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.

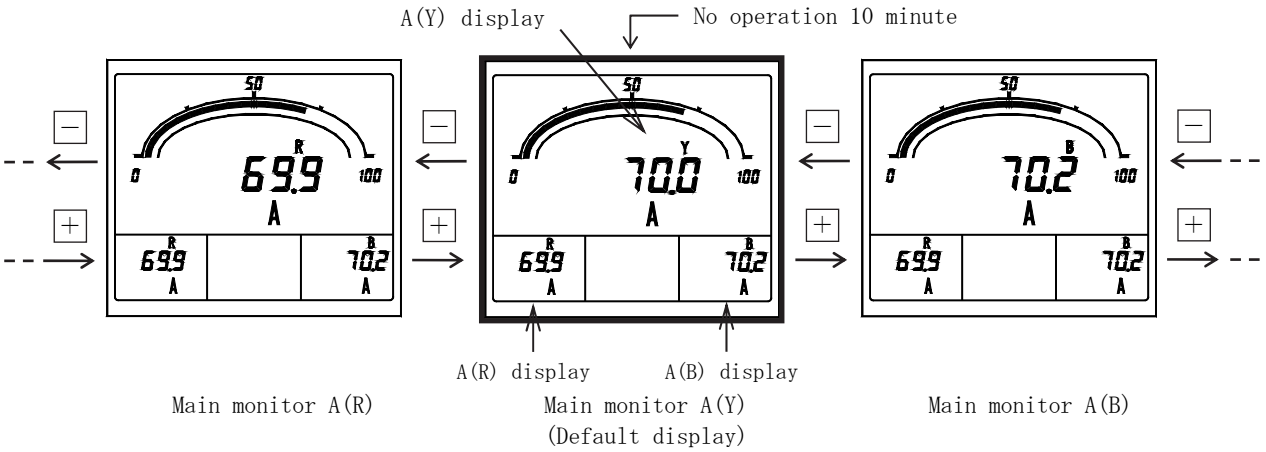


Setting mode 3
(No.311 Input circuit phase line change)

4.3 Operation

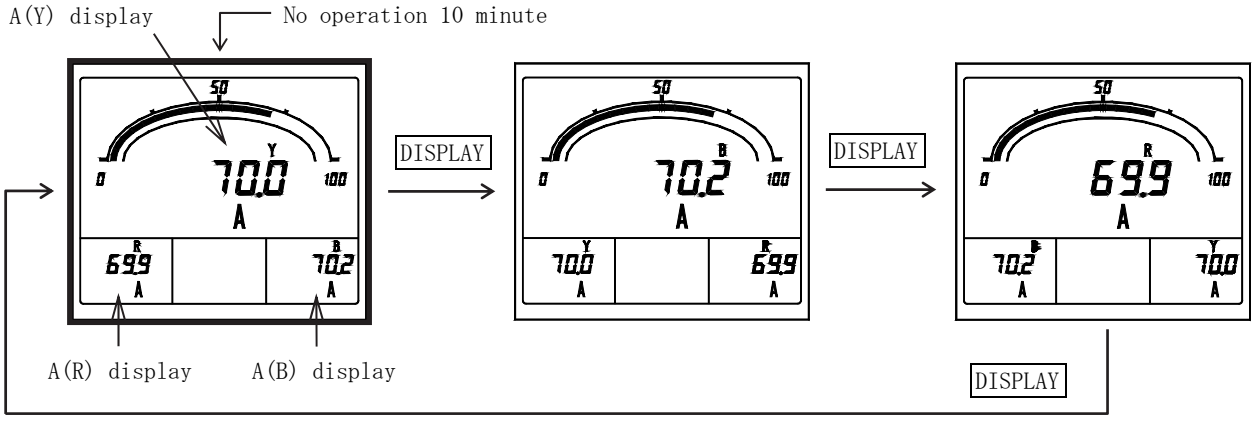
4.3.1 The main monitor display factor change

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.



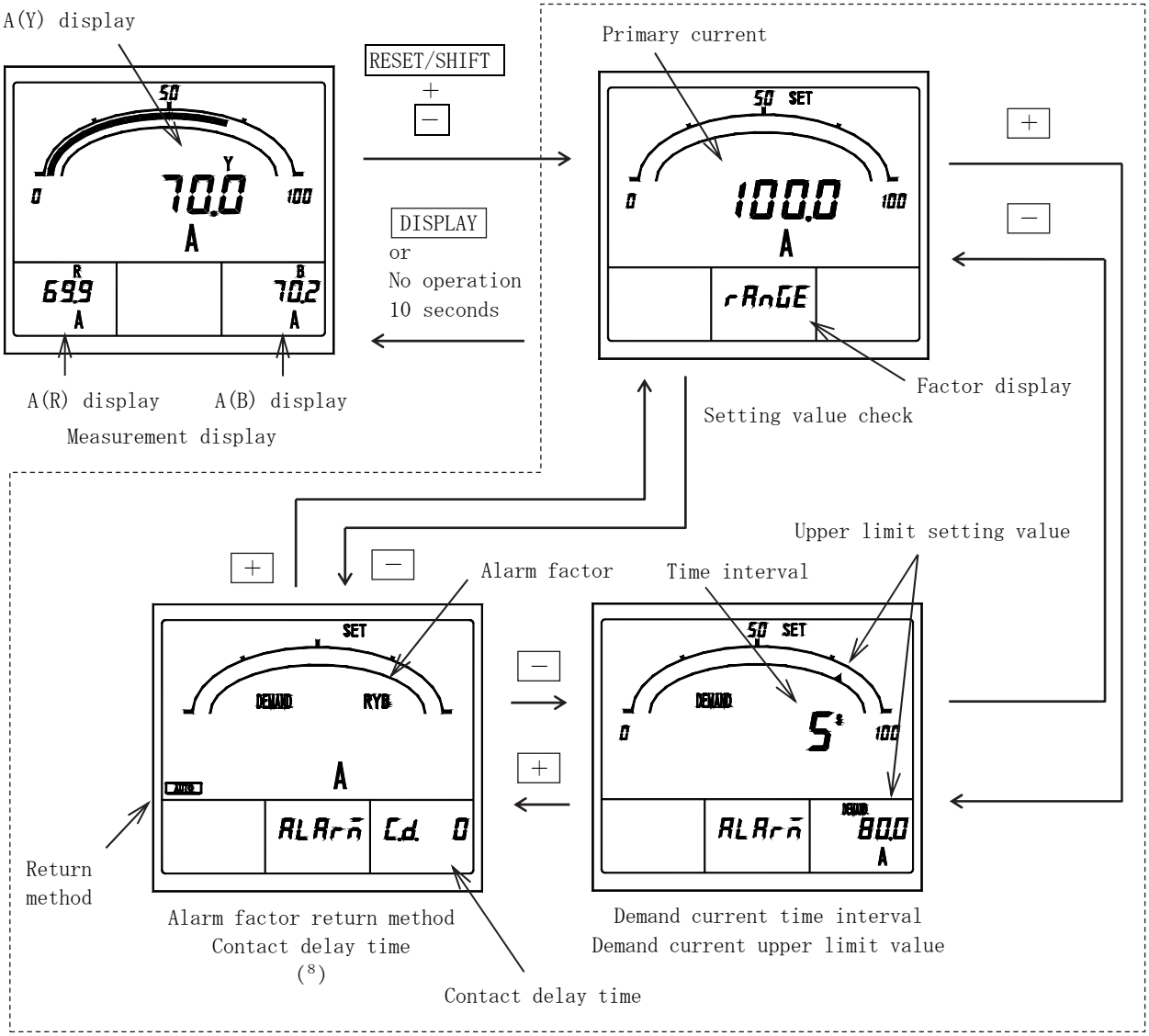
4.3.2 Phase display change (3-phase 3-wire, Single-phase 3-wire)

A phase display of current 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 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

A current range (primary current), 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.



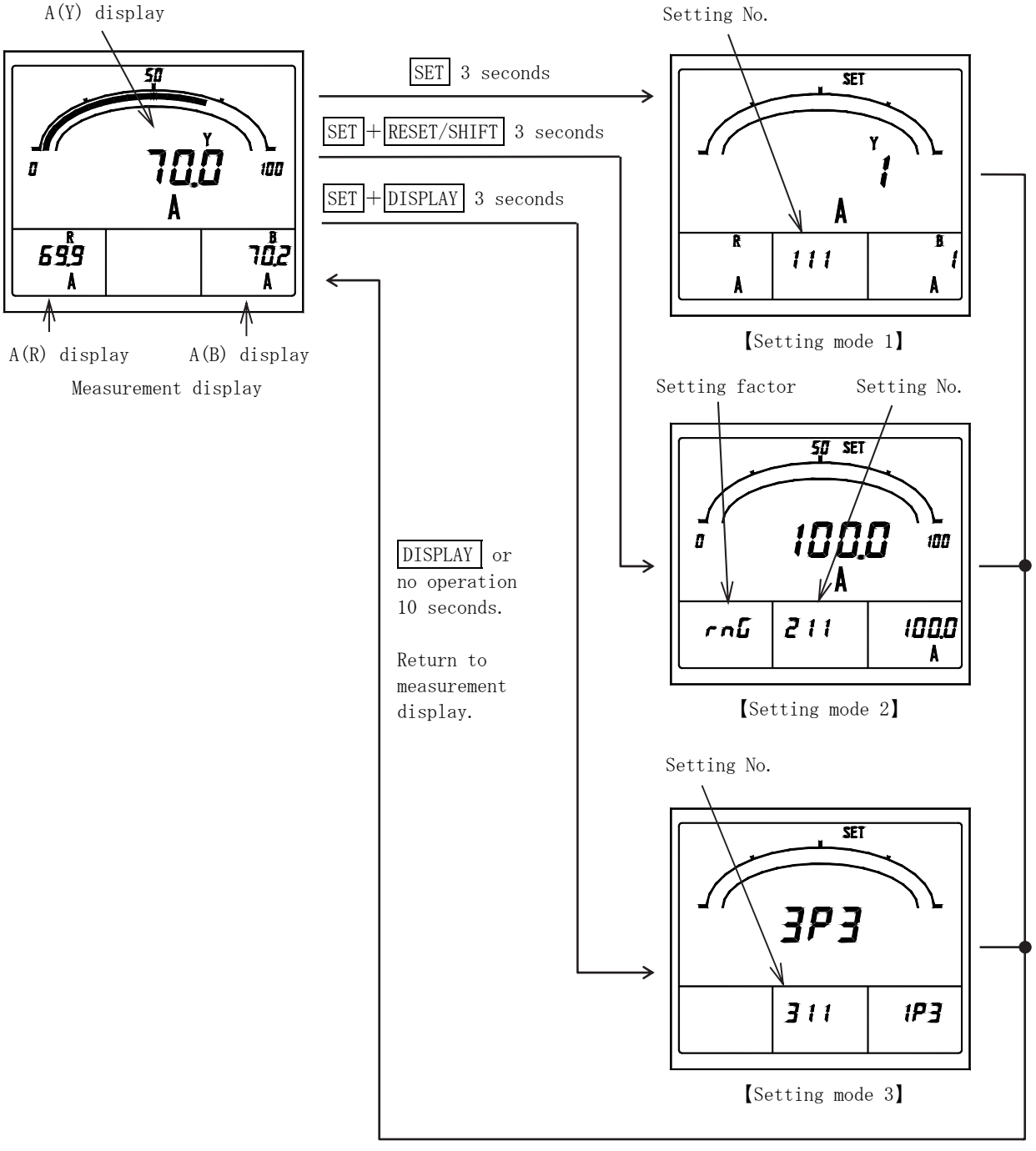
Note(8) It is not displayed if there is no option.

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

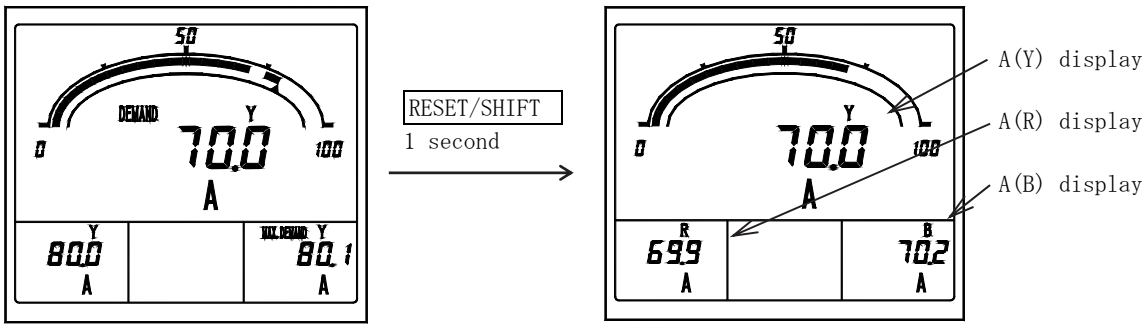
Various kinds of reset are performed. The kind of reset is as follows and operations are different, respectively. Reset of maximum value and minimum value (it updates to the instantaneous value at the time), Alarm-output reset (OFF of an alarm output (at the case of manual reset setting)).
And, the operation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



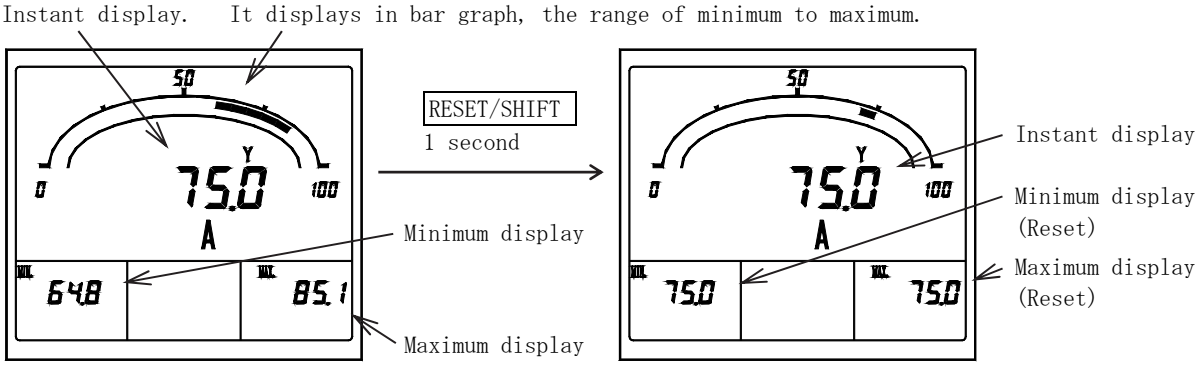
Measurement display　　Reset completion

(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.

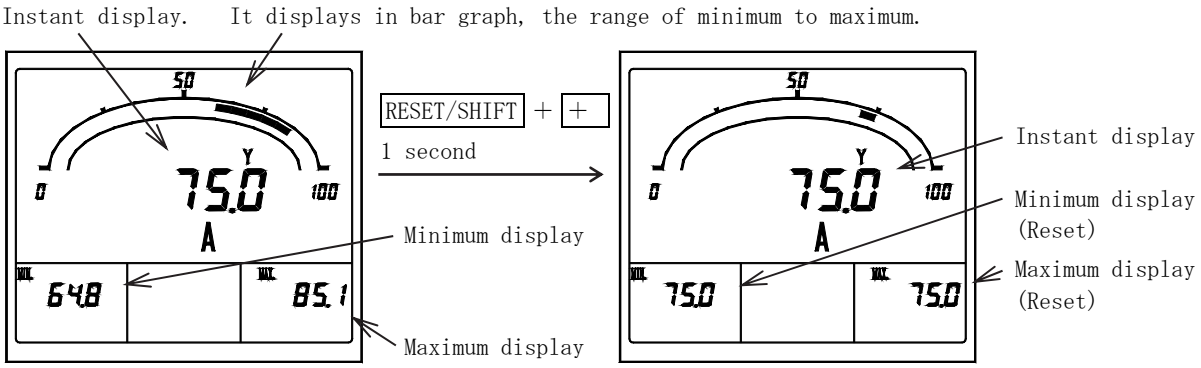
① It displays a measurement factor to reset on the main monitor. (By measurement display and the maximum and the minimum measurement display.)
② Press RESET/SHIFT for longer than 1 seconds.

<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		○	27,28
112	Main monitor	Sets the display factor of digital main monitor.	3φ3W	A(Y)	○	27,28
			1φ3W	A(R)		
			1φ2W	A		
113	Sub monitor (Left)	Sets the display factor of digital sub monitor (left).	3φ3W	A(R)	○	27,28
			1φ3W	A(B)		
			1φ2W	Nothing		
114	Sub monitor (Center)	Sets the display factor of digital sub monitor (center).	Nothing		○	27,28
115	Sub monitor (Right)	Sets the display factor of digital sub monitor (right).	3φ3W	A(B)	○	27,28
			1φ3W	A(W)		
			1φ2W	Nothing		
116	Bar graph	Sets the display factor of bar graph.	3φ3W	A(Y)	○	27,28
			1φ3W	A(R)		
			1φ2W	A		
121AL (9)	Alarm factor	Sets the output factor of alarm.	3φ3W	DA (OR detection of each phase current)	○	29
			1φ3W	DA (OR detection of each phase current)		
			1φ2W	DA		
122AL (9)	Alarm reset method	Sets the output action at the case of an alarm reset.	AUTO (Automatic reset)			29
123AL (9)	Alarm contact delay time	Sets the contact delay time of alarm.	0 second			29
131H	Demand current upper limit value	Sets the high-alarm value of demand current.	80% (Full scale＝100%)			30
132	Demand current time interval	Sets time interval of demand current.	0 second		○	30
141	Backlight action	Sets the ON/OFF of backlight.	AUTO OFF			31
142 (10)	Backlight brightness	Sets the brightness of backlight.	3 (Middle)			31

Note(9) A setting item is not displayed in case there is no corresponding option.
Note(10) In the case of green backlight, it does not indicate the setting item of brightness.

Setting mode 2. Function table

Setting No.	Function	Functional description	Default setting		Important setting	Page
211	Current range	Sets the current-measurement range (primary current).	3φ3W	100.0A	○	33
			1φ3W	500.0A		
			1φ2W	50.00A		
212	Current display intrinsic sensitivity	Sets the full scale of current meter.	3φ3W	100.0A		33
			1φ3W	500.0A		
			1φ2W	50.00A		
213	Digit number of current range	Sets the digit number of current range.	3φ3W	4 digits		33
			1φ3W	4 digits		
			1φ2W	4 digits		
221A (11)	A01 output factor	Sets the output factor of A01 (analog output 1).	3φ3W	A(Y)	○	34
			1φ3W	A(R)		
			1φ2W	A		
222A (11)	A02 output factor	Sets the output factor of A02 (analog output 2).	3φ3W	A(R)	○	34
			1φ3W	A(B)		
			1φ2W	OFF		
223A (11)	A03 output factor	Sets the output factor of A03 (analog output 3).	3φ3W	A(B)	○	34
			1φ3W	A(W)		
			1φ2W	OFF		
224A (11)	Current output intrinsic sensitivity	Sets the analog output sensitivity (% of a rated input power value to an output upper limit) of current.	100.0%			34
225A (11)	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)			34
231 (11)	External operation input function	Sets the function of the external operation input.	Alarm reset		○	35
241	Current ON/OFF	Sets the ON/OFF of current measurement display.	ON			35
242	Demand current ON/OFF	Sets the ON/OFF of demand current measurement display.	ON			35
251	Set value initialization	Initializes the settings in the setting mode 1 and the setting mode 2. (Return to default setting.)	—			35

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	○	36
			1φ3W	1φ3W(R-B-W)		
			1φ2W	1φ2W		
321 (11)	A01 BIAS adjustment	Sets the BIAS value of A01 (analog output 1).	0.0%			36
322 (11)	A01 SPAN adjustment	Sets the SPAN value of A01 (analog output 1).	100.0%			36
323 (11)	A02 BIAS adjustment	Sets the BIAS value of A02 (analog output 2).	0.0%			36
324 (11)	A02 SPAN adjustment	Sets the SPAN value of A02 (analog output 2).	100.0%			36
325 (11)	A03 BIAS adjustment	Sets the BIAS value of A03 (analog output 3).	0.0%			36
326 (11)	A03 SPAN adjustment	Sets the SPAN value of A03 (analog output 3).	100.0%			36

Note(11) A setting item is not displayed in case there is no corresponding option.

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.	36
Sets the measurement range of ammeter (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.	33
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.	27, 28
Sets the output factor of analog output 1 (A01). (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.	34
Sets the output factor of analog output 2 (A02). (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.	34
Sets the output factor of analog output 3 (A03). (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.	34
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.	29
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.	35
Sets the time interval of demand current. (132)	Press [SET] for longer than 3 seconds ➡ Press [MODE] ➡ Press [MODE] ➡ (111) (121AL) (131H) Press [RESET/SHIFT] ➡ Select an time interval by [+] and [−] ➡ Press [SET] ➡ (132) Selected time interval is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	30

(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.	27, 28
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.	27, 28
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.	27, 28
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.	27, 28
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.	27, 28

(3) Setting of current display intrinsic sensitivity.
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 sensitivity (% of a display to an input) of current. (212)	Press [SET] and [RESET/SHIFT] together for longer than 3 seconds ➡ (211) Press [RESET/SHIFT] ➡ Select a display sensitivity by [+] and [−] ➡ Press [SET] ➡ (212) Selected display sensitivity is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	33

(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 current range. (213)	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.	33

(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 analog output sensitivity (% of a rated input power value to an output upper limit) of current. (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 output sensitivity by [+] and [−] ➡ Press [SET] ➡ Selected output sensitivity is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	34
Sets the output cut function at the case in minute input (0.5% or less) of analog output. (225A)	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) Press [RESET/SHIFT] ➡ Select a low Input cut ON/OFF by [+] and [−] ➡ Press [SET] ➡ (225A) Selected action is entered ➡ Press [DISPLAY] ➡ Returns to display mode.	34

(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.	29
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.	29

(7) Demand current 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 demand current. (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.	30

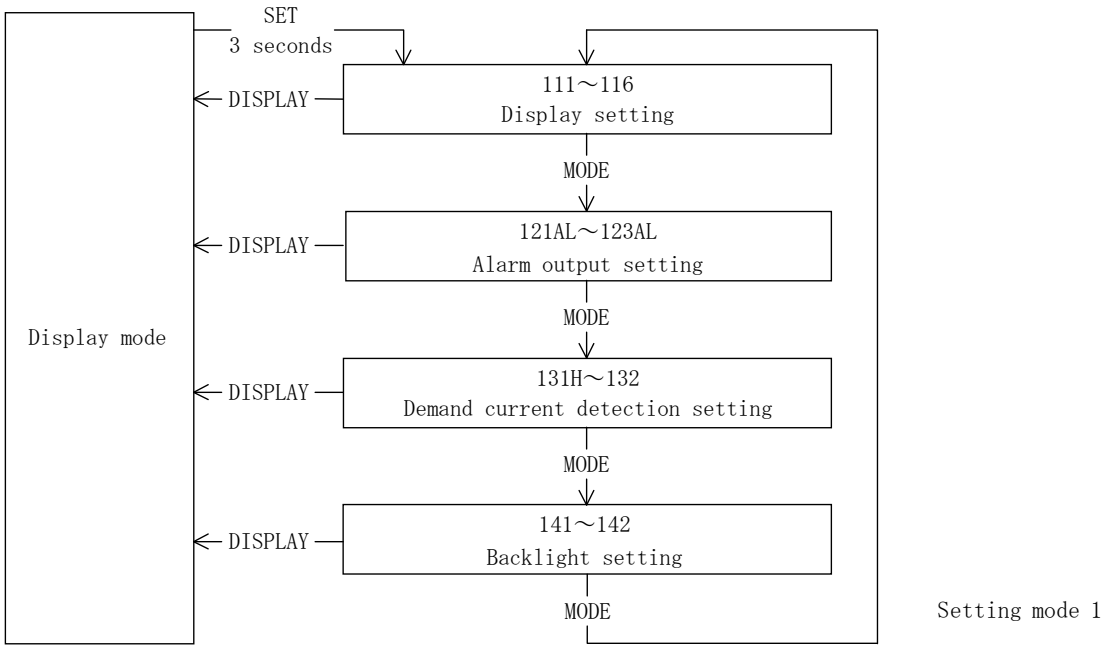
(8) Backlight setting

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.	31
Sets the brightness of backlight. (142)	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.	31

5.3 Setting in detail explanation

5.3.1 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) 111～116 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	A(Y)	A(R)	Nothing	A(B)	A(Y)
2	Pattern 2	DA(Y)	A(Y)	Nothing	MDA(Y)	MDA＋DA(Y)
3	Pattern 3	MDA(Y)	A(Y)	Nothing	DA(Y)	MDA＋DA(Y)
4	Pattern 4	DA(Y)	A(Y)	DA(Y)	MDA(Y)	MDA＋DA(Y)

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

Main monitor	A(R), A(Y), A(B), DA(R), DA(Y), DA(B), MDA(R), MDA(Y), MDA(B)
Sub monitor (Left)	A(R), A(Y), A(B)
Sub monitor (Center)	A(R), A(Y), A(B), DA(R), DA(Y), DA(B), MDA(R), MDA(Y), MDA(B)
Sub monitor (Right)	A(R), A(Y), A(B), DA(R), DA(Y), DA(B), MDA(R), MDA(Y), MDA(B)
Bar graph	A(R), A(Y), A(B), DA(R), DA(Y), DA(B), MDA(R), MDA(Y), MDA(B)

● Phase change (3-phase 3-wire)

→ A(Y) → A(B) → A(R) → [12]

Note[12] DA and MDA also change.

● Measurement factor change (Measurement display mode)

→ A(R) → A(Y) → A(B) → DA(R) → DA(Y) →
→ DA(B) → MDA(R) → MDA(Y) → MDA(B) → Nothing →

● Single-phase 3-wire [14]

No.	Pattern No.	Main monitor	Sub monitor (Left)	Sub monitor (Center)	Sub monitor (Right)	Bar graph
1	Pattern 1	A(R)	A(B)	Nothing	A(W)	A(R)
2	Pattern 2	DA(R)	A(R)	Nothing	MDA(R)	MDA＋DA(R)
3	Pattern 3	MDA(R)	A(R)	Nothing	DA(R)	MDA＋DA(R)
4	Pattern 4	DA(R)	A(R)	DA(R)	MDA(R)	MDA＋DA(R)

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

Main monitor	A(R), A(B), A(W), DA(R), DA(B), DA(W), MDA(R), MDA(B), MDA(W)
Sub monitor (Left)	A(R), A(B), A(W)
Sub monitor (Center)	A(R), A(B), A(W), DA(R), DA(B), DA(W), MDA(R), MDA(B), MDA(W)
Sub monitor (Right)	A(R), A(B), A(W), DA(R), DA(B), DA(W), MDA(R), MDA(B), MDA(W)
Bar graph	A(R), A(B), A(W), DA(R), DA(B), DA(W), MDA(R), MDA(B), MDA(W)

● Phase change (Single-phase 3-wire) [14]

→ A(R) → A(B) → A(W) → [13]

● Measurement factor change (Measurement display mode) [14]

→ A(R) → A(B) → A(W) → DA(R) → DA(B) →
→ DA(W) → MDA(R) → MDA(B) → MDA(W) → Nothing →

Note[13] DA and MDA also change.

Note[14] It is the case of single-phase 3-wire (R-B-W).
The case of single-phase 3-wire (R-Y-W) is current (R-Y-W).
The case of single-phase 3-wire (Y-B-W) is current (Y-B-W).

● Single-phase 2-wire

No.	Pattern No.	Main monitor	Sub monitor (Left)	Sub monitor (Center)	Sub monitor (Right)	Bar graph
1	Pattern 1	A	Nothing	Nothing	Nothing	A
2	Pattern 2	DA	A	Nothing	MDA	MDA＋DA
3	Pattern 3	MDA	A	Nothing	DA	MDA＋DA
4	Pattern 4	DA	A	DA	MDA	MDA＋DA

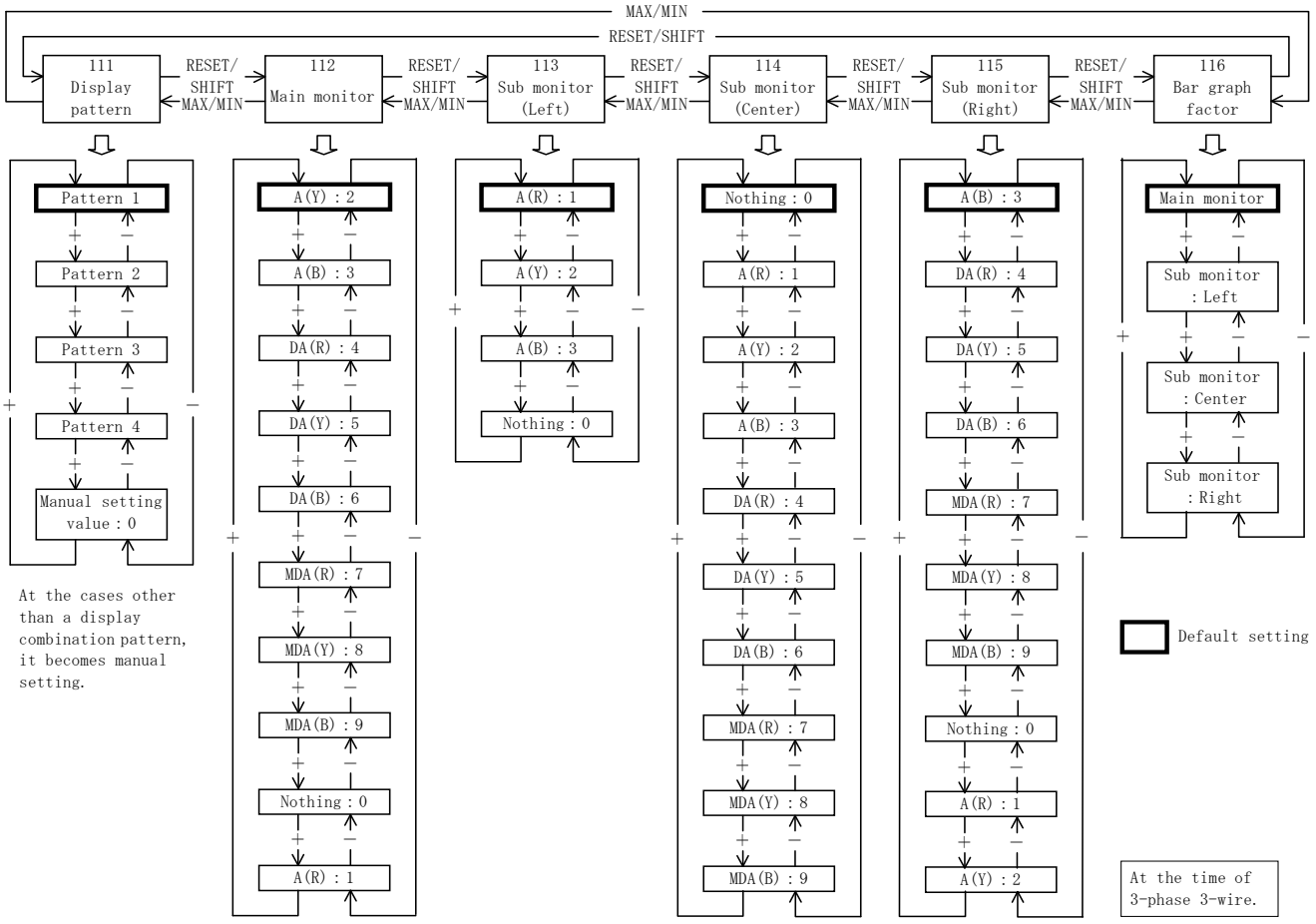
● Displays set factor (Single-phase 2-wire)

Main monitor	A, DA, MDA
Sub monitor (Left)	A
Sub monitor (Center)	A, DA, MDA
Sub monitor (Right)	A, DA, MDA
Bar graph	A, DA, MDA

● Measurement factor change (Measurement display mode)

→ A → DA → MDA → Nothing →

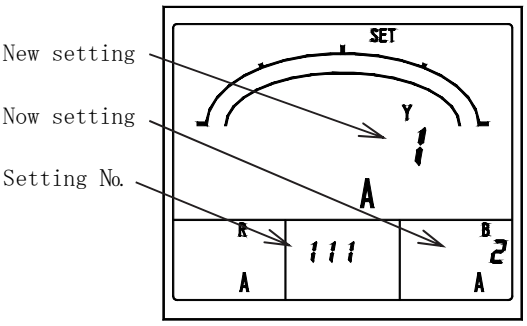
Display combination setting



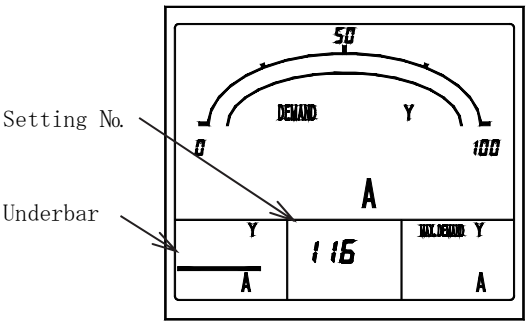
◆ 111 Display pattern
Select the factors to be measured and monitored by 4 digital displays out of combination patterns.
Set values are updated by SET.

◆ 112～115 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.



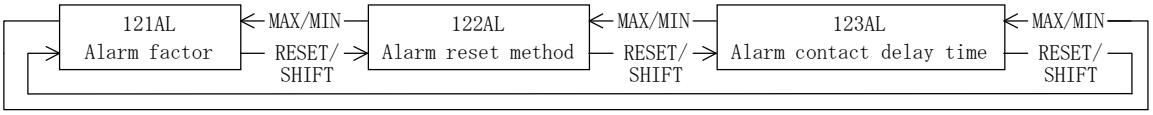
Combination display



Bar graph factor

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

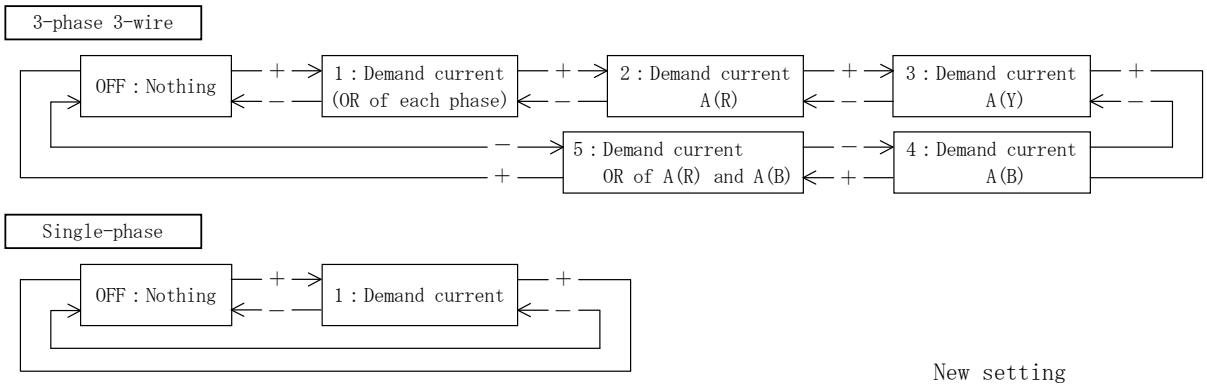
Various setting and an output test are performed about an alarm output.



◆ 121AL Alarm output factor setting

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

Default setting : 1 (Demand current, OR of each phase)



◆ 122AL Alarm reset method setting.

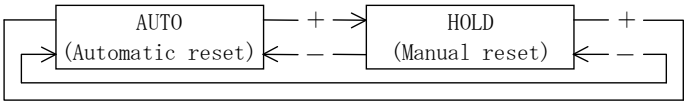
Action at the case of a reset of alarm output can be selected from AUTO (automatic reset) and HOLD (manual reset).

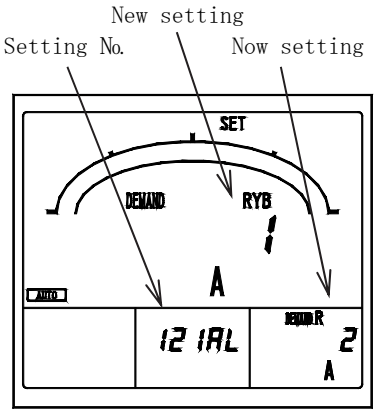
In "AUTO (automatic reset)", an alarm output is OFF according to a reset of an alarm. In "HOLD (manual reset)", even after an alarm reset, an output holds ON.

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

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

Default setting : AUTO (Automatic reset)





Alarm factor

◆ 123AL Alarm contact delay time

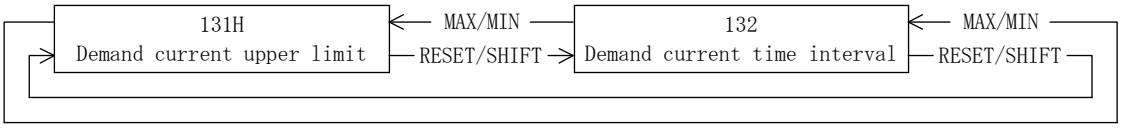
Sets the contact delay time of alarm. The setting range is 0 to 300 seconds (1-second step).

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

Default setting : 0 second (With no contact delay)

(3) 131H～132 Demand detection setting

The next operation method is setting. Demand current, Upper limit alarm value, Time interval.

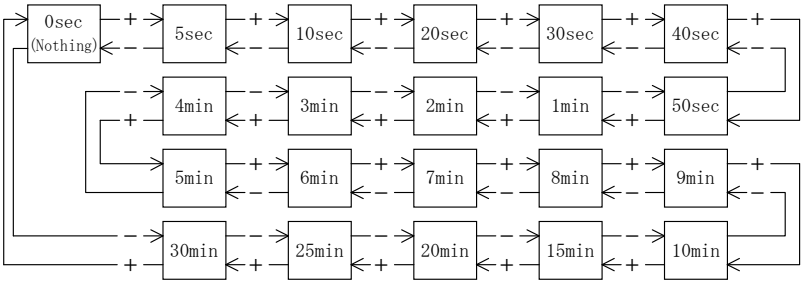


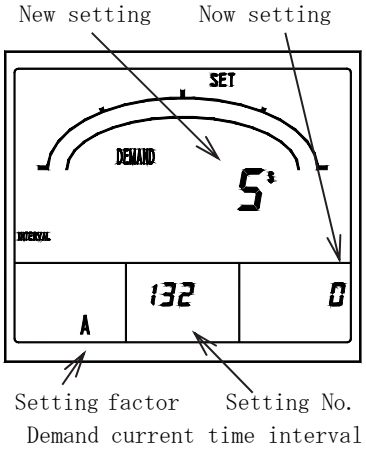
◆ 131H Demand current upper limit

Sets the upper limit alarm value of demand current (DA).
The setting range is 5 to 100% (1% step) and OFF. (To full scale ＝100%)
Selection by [＋] and [－], set value is updated by [SET].
Default setting : 80%

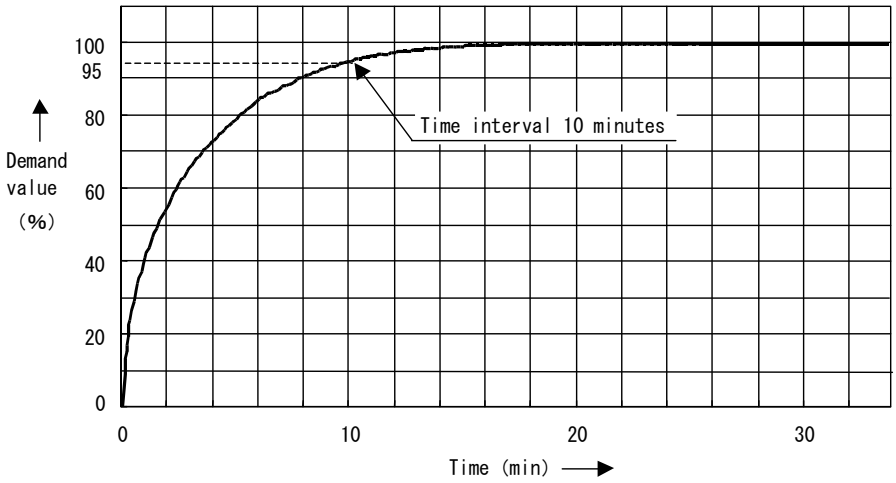
◆ 132 Demand current time interval

Sets the time interval (95% time interval) of demand current(DA).
Selection by [＋] and [－], set value is updated by [SET].
Default setting : 0 second





● Demand time delay characteristic



Arithmetic method

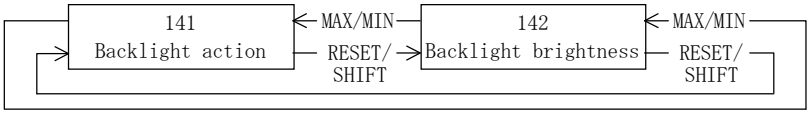
Demand current measurement : Arithmetic method according with bimetallic type.
(95% indication time of an ultimate stationary value.)

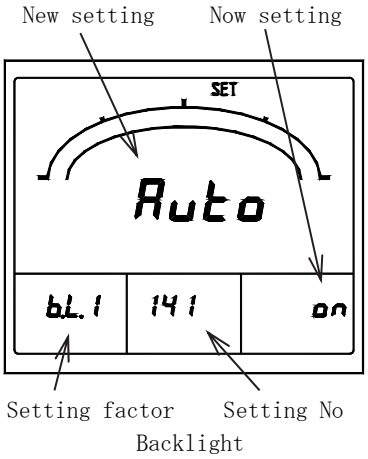
100% indication time is about 3 times the time interval. (In case of 10 minutes/95% of time interval, time to reach to 100% is about 30 minutes.)

Demand measurement is measured to the 2 times of the rated current.

(4) 141～142 Backlight setting

Sets the action and brightness of backlight.





◆ 141 Backlight action

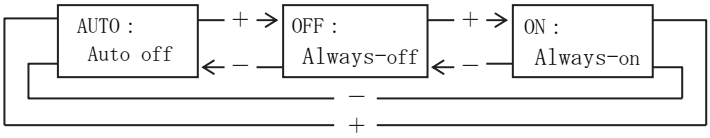
It can select from ON (always-on), AUTO (auto off), and OFF (always-off) about action of backlight.

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 【white backlight products only】

It can select the brightness of backlight as five steps of 1 to 5.

Backlight becomes the darkest if it is set as "1".

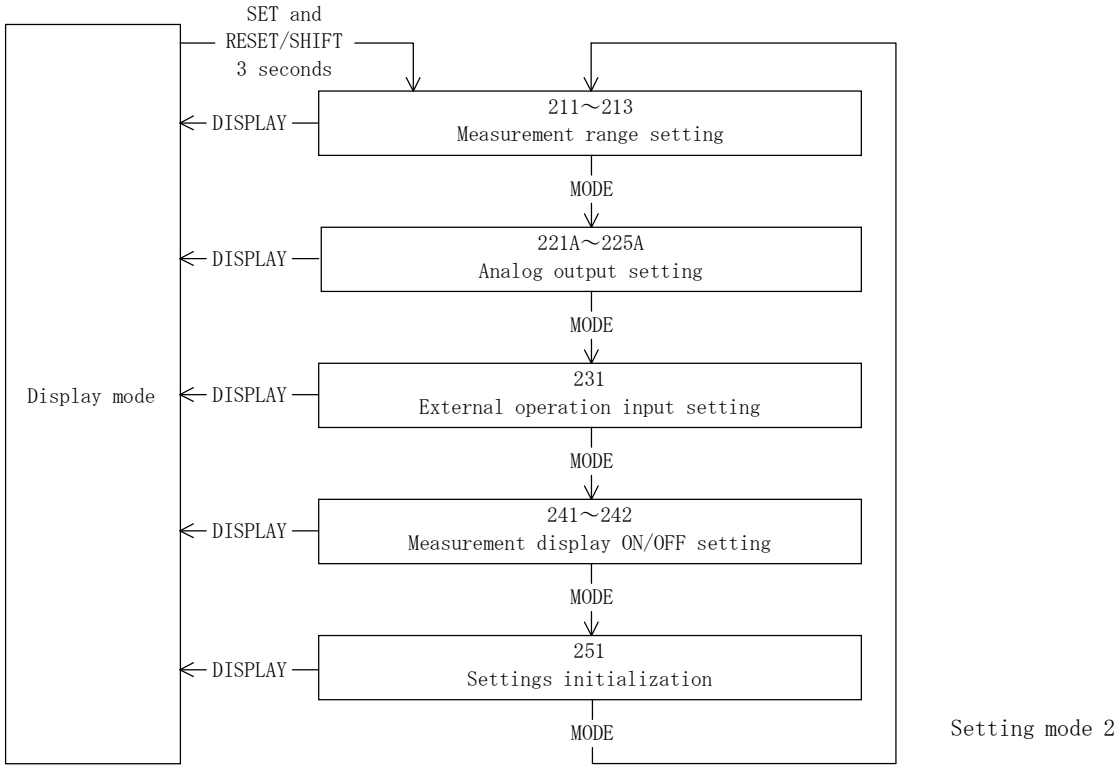
Backlight becomes the brightest if it is set as "5".

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

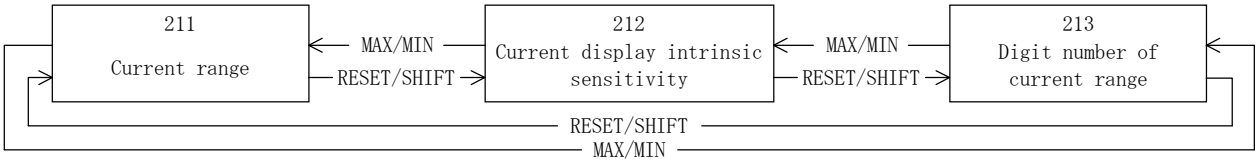


Setting mode 2 is selected by pressing SET and RESET/SHIFT switches continuously for longer than 3 seconds.
Pushing MODE switch performs movement of setting item.
The present mode can be returned to the display mode by pressing DISPLAY switch.

< 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) 211～213 Measurement range setting

Sets the measurement range of each measurement factor.

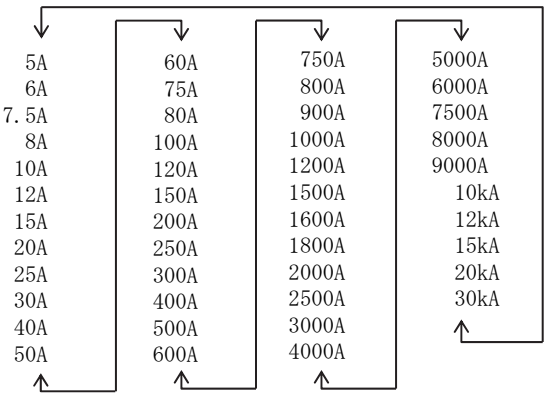


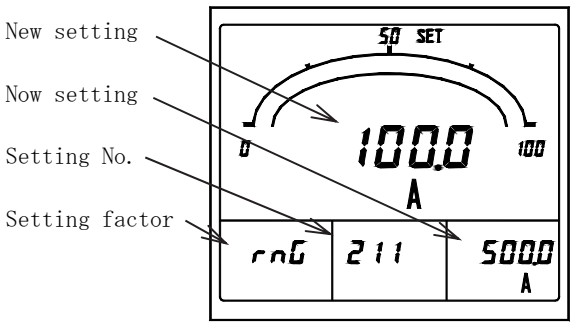
◆ 211 Current range

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

Default setting : 100.0A (3φ3W), 500.0A (1φ3W), 50.00A (1φ2W)

Current-measurement range





Current range

◆ 212 Current display intrinsic sensitivity

Sets the full scale of current meter. The setting range is 40 to 120% of CT ratio.

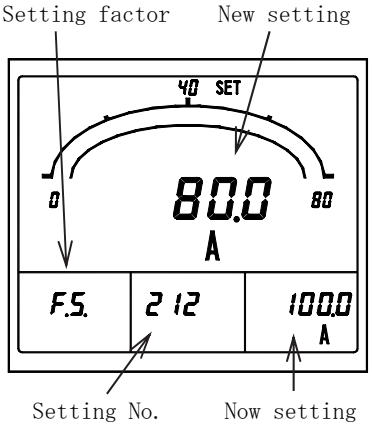
And, it can select from the following values.

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

Default setting : 100.0A (3φ3W), 500A (1φ3W), 50.0A (1φ2W)

The current measurement range which can be set. ($\times 10^n$)	
1.☐	1.0 / 1.2 / 1.4 / 1.5 / 1.6 / 1.8
2.☐	2.0 / 2.4 / 2.5 / 2.8
3.☐	3.0 / 3.2 / 3.6
4.☐	4.0 / 4.2 / 4.5 / 4.8
5.☐	5.0 / 5.6
6.☐	6.0 / 6.4
7.☐	7.2 / 7.5
8.☐	8.0 / 8.4
9.☐	9.0 / 9.6

Example)
In case of CT ratio＝100.0A.
・40% of 100A is 40A.
・120% of 100A is 120A.
A measurement range can be selected within the 40 to 120A.
Therefore, can select a measurement range from the following. [40 / 42 / 45 / 48 / 50 / 56 / 60 / 64 / 72 / 75 / 80 / 84 / 90 / 96 / 100 / 120A].



Current display intrinsic sensitivity

◆ 213 Digit number of current range

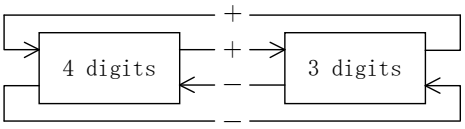
Sets the digit number of current range.

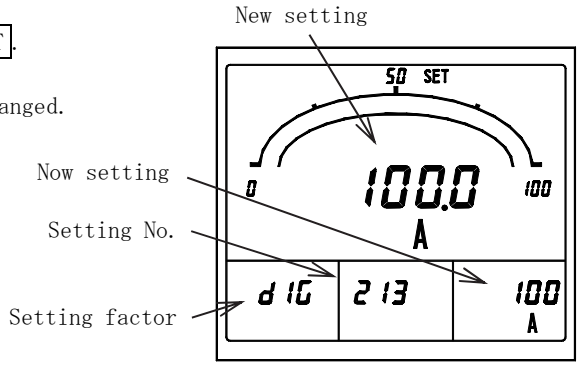
Selection by [＋] and [－], set value is updated by [SET].

Default setting : 4 digits

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

Example) 1000A ⟷ 1.00kA

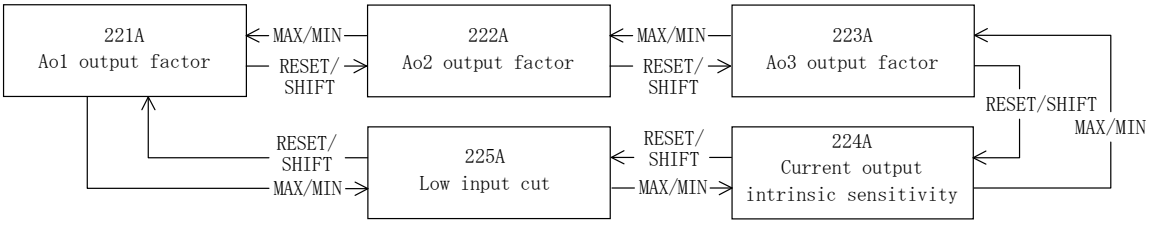




Digit number of current range

(2) 221A～225A Analog output setting 【With option】

Various setting of analog output is performed.



◆ 221A～223A AO (analog output) 1～3 output factor.

Sets the output factor of each analog outputs.

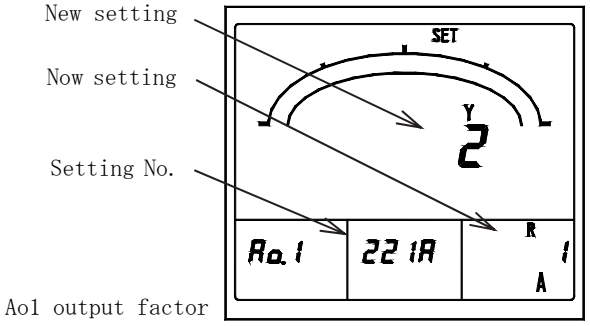
Selection by [＋] and [－], set value is updated by [SET].

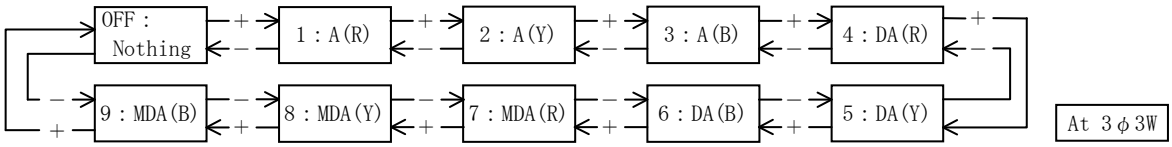
Default setting :

AO1 A(Y)(3φ3W), A(R)(1φ3W R-B-W), A(1φ2W)

AO2 A(R)(3φ3W), A(B)(1φ3W R-B-W), OFF(1φ2W)

AO3 A(B)(3φ3W), A(W)(1φ3W R-B-W), OFF(1φ2W)





◆ 224A Current output intrinsic sensitivity,

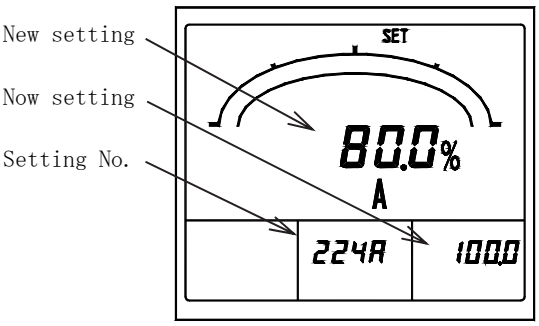
Output intrinsic sensitivity (% of rated input power value to an output upper limit value) is set about each analog output of current.

The setting range can be selected from the following.

Setting range : 40.0～120.0% (0.1% step)

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

Default setting : 100.0% (Current)



Current output
intrinsic sensitivity

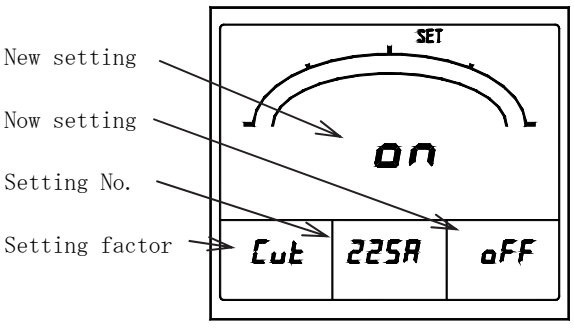
◆ 225A Low input cut

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].

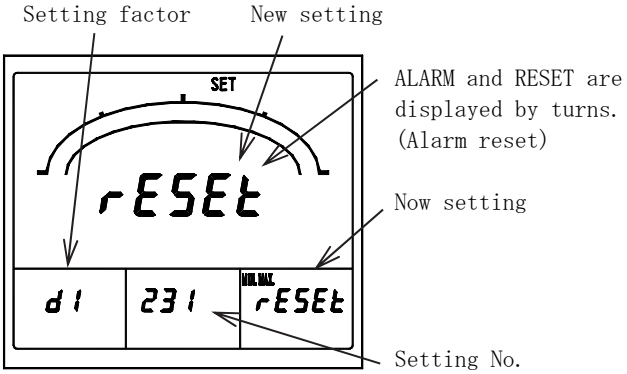
Default setting : OFF (No operation)



Low input cut

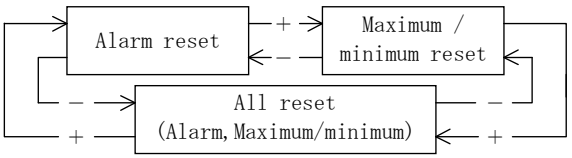
(3) 231 External operation input setting【With option】
Various setting of external operation input is performed.

◆ 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

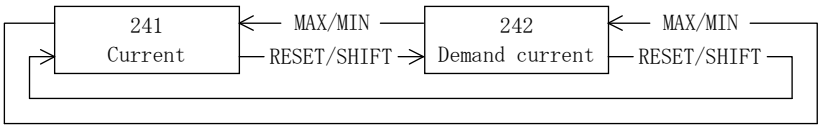


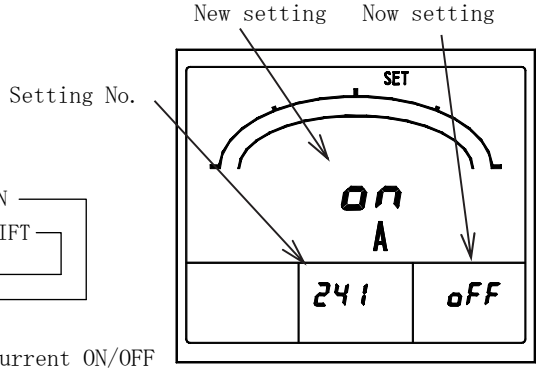
・About the setting display in an external operation input function

Function	The contents of a display at the function setting	Now 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].

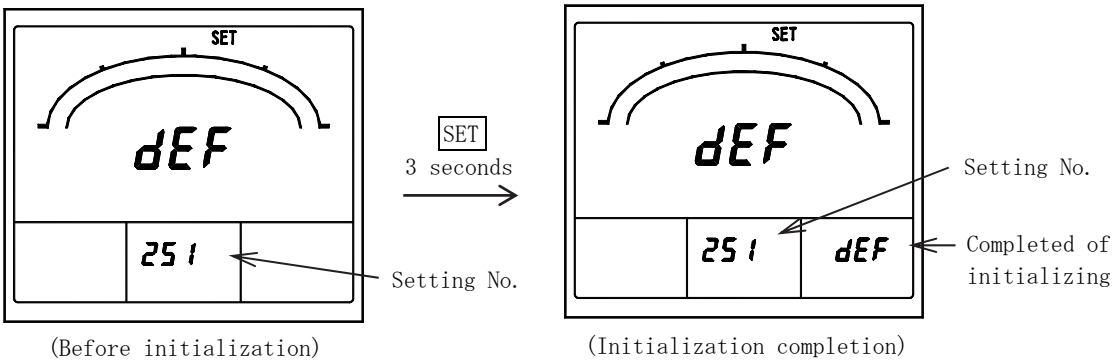
Default setting : ON (All measurement factors)





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

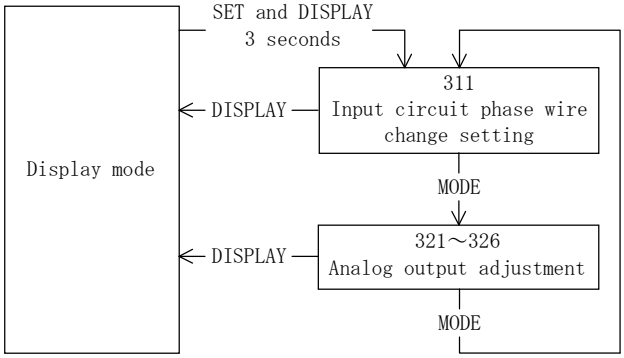
◆ 251 Settings initialization
Initializes the each settings (return to a default setting).
By pushing [SET] for 3 seconds, all the settings of setting 1 and setting 2 are initialized.



(Before initialization) (Initialization completion)

Initialization of setting value

5.3.3 Setting mode 3



Setting mode 3

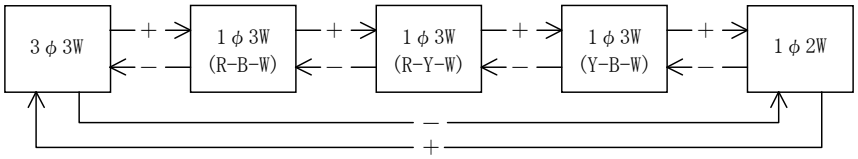
Setting mode 3 is selected by pressing SET and DISPLAY switches continuously for longer than 3 seconds. Pushing MODE switch performs movement of setting item.
The present mode can be returned to the display mode by pressing DISPLAY switch.

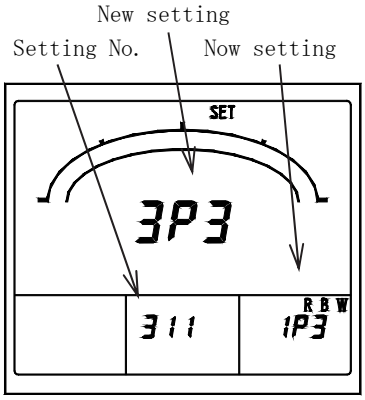
< Caution >
If setting change should have been mistaken, a display and output of measurement are not obtained correctly. Therefore, users must not set.
The setting item without the corresponding option is not displayed.

(1) 311 Input circuit phase wire change setting
It sets about the phase wire of an input circuit.

◆ 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)

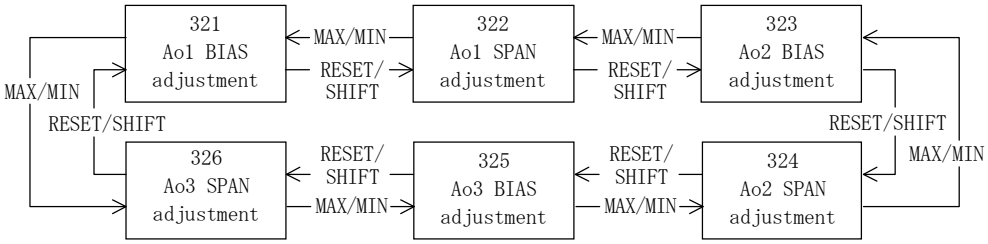
<Caution>
・If this setting is changed, all the settings of setting 1 and setting 2 will turn into a default setting of the input circuit after change.
・The right measurement cannot be performed if setting of actual connection and phase wire are different.





Input circuit phase wire change

(2) 321～326 Analog output adjustment 【With option】
The bias and span of each analog output are adjusted.

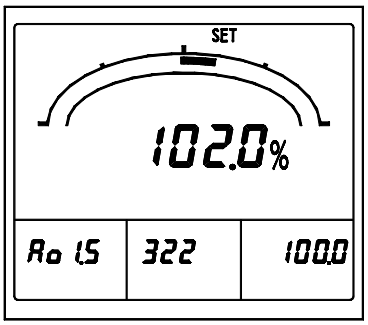


◆ 321 AO(Analog output) 1 bias adjustment,
323 AO(Analog output) 2 bias adjustment,
325 AO(Analog output) 3 bias adjustment.

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 3-wire Single-phase 2-wire	AC5A　50/60Hz

Measurement item	Measurement range / Display specification	Intrinsic error (15)		Maximum measurement	Minimum measurement	Notes
		Digital display	Analog output (16)			
Current	Maximum demand, Demand, Instant AC5A～30kA	±0.5%	±0.5%	○	○	R-Y-B phase change (17) Apart from a measurement range, range setting of a display and an output is possible.

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	Current : Effective value computing type. Demand current : Arithmetic method according with bimetallic type.	
Time interval setting	Demand current	0 second / 5 seconds / 10 seconds / 20 seconds / 30 seconds / 40 seconds / 50 seconds / 1 minute / 2 minutes / 3 minutes / 4 minutes / 5 minutes / 6 minutes / 7 minutes / 8 minutes / 9 minutes / 10 minutes / 15 minutes / 20 minutes / 25 minutes / 30 minutes (95% time interval)
The factor in which display setting is possible	Main monitor	Current (Each phase), Demand current (Each phase), Maximum demand current (Each phase)
	Sub monitor (Left)	Current (Each phase)
	Sub monitor (Center)	Current (Each phase), Demand current (Each phase), Maximum demand current (Each phase)
	Sub monitor (Right)	Current (Each phase), Demand current (Each phase), Maximum demand current (Each phase)
	Bar graph	Current (Each phase), Demand current (Each phase), Maximum demand current (Each phase)
Option	Analog output (3 sets). Alarm output. External operation input.	

Note (15) 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 (16) Analog output, alarm output and external operation input are options.

Note (17) Single-phase 3-wire (R-B-W) : R-B-W, Single-phase 3-wire (R-Y-W) : R-Y-W, Single-phase 3-wire (Y-B-W) : Y-B-W, Single-phase 2-wire : With no phase display.

● Measurement is possible range.

Measurement factor	Input	Measurement is possible range	
		Display	Analog output
Current	AC0～5A	120% of meter full scale. (18)	120% of output span.
Demand current		200% of meter full scale. (18)	120% of output span.

Note (18) If the number of display digits is exceeded in spite of the measurable range, it becomes to 9999 (four-digit display) or 999 (three digit display).

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, -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 : Green or 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. (19)			
Auxiliary supply	AC85～264V 50/60Hz 10VA (Rated voltage, AC100/110V, 200/220V) DC80～143V 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	Current circuit	0.1VA or less (5A)		
Overload capacity	Current circuit	40 times 1 second, 20 times 4 seconds, 10 times 16 seconds, 1.2 times continuation of rated current.		
	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 Positive and negative polarities, for each 3 time.		
	Between input and auxiliary supply. (Grounds an output.)			

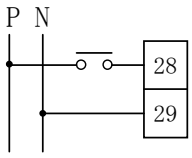
Note(19) About white backlight.
The white backlight of this product is using white LED which combined the special phosphor and blue LED. In the characteristics of this LED, color tone may be different for each product.

Item	Specification
Noise-capacity JEA B-402	(1) Oscillatory surge voltage If a vibration damping waveform (1～1.5MHz, Peak voltage : 2.5～3kV) is repeated and added, a measurement error should be within ±10%. And, there needs to be no malfunction. Current input circuit (Common), Auxiliary supply circuit (Normal / 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 Current 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 150,400,900MHz band is done by (5W, 1m), a measurement error should be within ±10%. And, there needs to be no malfunction. (4) Electrostatic noise It is within ±10% of errors in 8kV electrostatic noise at the case of an energization. There needs to be no 10kV damage at the case of a non-energization. Condenser charge form.
Vibration JIS C 1102-1	Sweep vibration frequency range : 10～55～10Hz, 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)×104mm(Depth) Body diameter : 99mmφ Case materials : ABS(V-0) Outward color : Black (Munsell N1.5) Mass : Approx. 600g With terminal cover, Protection code IP40
Blackout guarantee	Maximum value, Minimum value, Each setting value. Data hold by nonvolatile memory.
Operating temperature and humidity limits	-10～+55℃, 30～85% RH, Non condensing.
Storage temperature limits	-25～+70℃
Installation altitude	The altitude of 2000m or less.

6.3 Option

<table>
<tr><th>Item</th><th colspan="4">Specification</th></tr>
<tr><td rowspan="5">Analog output</td><td colspan="2">Number of output</td><td colspan="2">3 circuits (Minus common)</td></tr>
<tr><td colspan="2">Output specification</td><td colspan="2">DC4～20mA (Below 550Ω)</td></tr>
<tr><td colspan="2">Output factor</td><td colspan="2">Current (Each phase), Demand current (each phase),
Maximum demand current (Each phase)</td></tr>
<tr><td colspan="2">Response time</td><td colspan="2">1 second or less (Time within ±1% of final constant value.)</td></tr>
<tr><td colspan="2">Output ripple</td><td colspan="2">Within the double precision of accuracy (% for output span)</td></tr>
<tr><td rowspan="5">Alarm output</td><td colspan="4">Alarm factor : Demand current〔OR of each phase, Individual of each phase, Each phase OR except a synthetic 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)</td></tr>
<tr><td>Alarm factor</td><td colspan="2">Item</td><td>Specification</td></tr>
<tr><td rowspan="3">Demand current</td><td colspan="2">Function</td><td>Demand measurement value ≧ Upper limit setting value,
Alarm display, Alarm output.</td></tr>
<tr><td colspan="2">Setting accuracy</td><td>±0.5% (% for full scale)</td></tr>
<tr><td colspan="2">Setting range</td><td>5～100% to the maximum scale. (1% step)</td></tr>
<tr><td rowspan="5">External operation input</td><td colspan="2">Function</td><td colspan="2">Three types of following functions can be operated by adding a voltage signal from the outside in addition to switch operation.</td></tr>
<tr><td></td><td>Alarm reset</td><td colspan="2">Alarm output is reset (output OFF).
Please refer to "4.3.5 Reset" about operation by the switch.</td></tr>
<tr><td></td><td>Maximum / Minimum value reset</td><td colspan="2">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.</td></tr>
<tr><td></td><td>All reset</td><td colspan="2">Resets all of the alarm output and maximum/minimum value.
Please refer to "4.3.5 Reset" about operation by the switch.</td></tr>
<tr><td colspan="2">Minimum operation pulse width</td><td colspan="2">300ms , Continuation applying is possible.</td></tr>
<tr><td colspan="2">Rated input</td><td colspan="2">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)</td></tr>
</table>

● 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.	It is set as AUTO (auto 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 (45～65Hz).	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 Check

Be careful with the following items periodically.

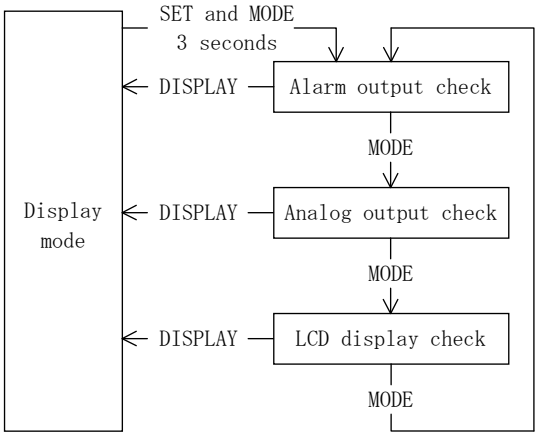
(1) Check if the measuring values, scale digits, units, etc. are displayed correctly.

(2) Check if LCD is free of a color change, breakage of case, or other defects.

(3) Check the unit for loose wiring and loose mounting screws.

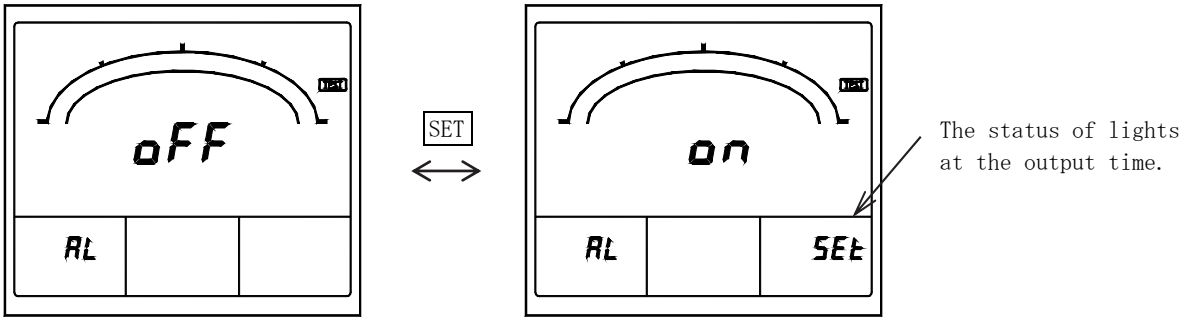
(4) Please remove, if dust has adhered to the product.

7.3 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.

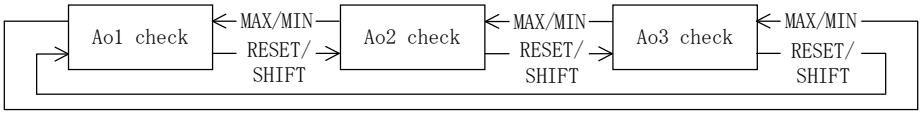
(1) Alarm output check 【 With an option 】
Even if this product does not have input, it can perform ON/OFF test of an alarm output (relay-contact output).
Whenever it pushes [SET], ON and OFF change.
Default : OFF



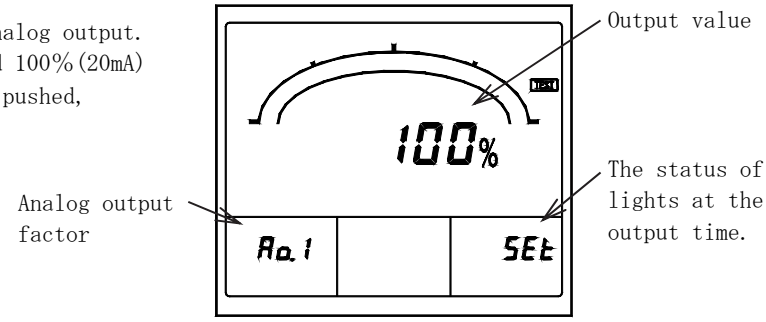
Output OFF　　Output ON

Alarm test

(2) Analog output check 【With an option】
Even if this product does not have input, it can test analog output (three circuits).



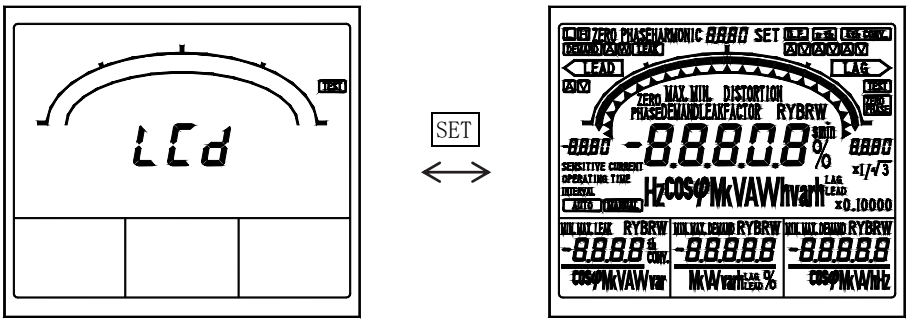
◆ AO (analog output) 1 to 3 check.
Sets the output factor about each analog output.
It selects 0%(4mA), 50%(12mA), and 100%(20mA) with [+] or [−] switch. If [SET] is pushed, analog output will output.
Default : 0% (4mA)



(3) LCD display check

It can check a liquid crystal display. Whenever it pushes SET, a display changes.

Default : Main monitor "LCD" display



7.4 Maintenance

(1) Please do not make a wiring change of the input and auxiliary supply in an energization.

(2) In case you check an output in an energization, please warn to be unable to touch output wiring and a human body to an input and an auxiliary supply terminal.

(3) If it checks an input, an output, and an auxiliary power, please carry out after checking schematics.

(4) If a name-plate is wiped with solvents (an alcoholic nature), a display item may disappear.
Please wipe off with the dry cloth.

7.5 Storage

(1) Please avoid storage in the next space. Low temperature, high temperature, high humidity, and sunny place.

(2) The aluminum electrolytic capacitor is used for a product. Please do the energization of the power supply within one year after shipment.

7.6 Countermeasures against troubles

As our principle, we recall product in question and repair it. If judged as product failure, have a contact with us or sales agent for repairing work (Also have a contact with us or sales agent for specification change). Product failure which we are not responsible for (When responsibility in manufacturing process is not recognized, when product is disassembled/remodeled, in case of false operation by customer, etc.) is beyond our warranty.

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