

INSTRUCTION MANUAL

DC METER RELAY

MRLC-110

Thank you for purchasing DAIICHI ELECTRONICS product.

Read this instruction manual carefully before installation, wiring, and using this product.

Safety precautions

■ Environment conditions

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 °C, humidity 30 to 85% RH.
- Environment with low corrosive gas, dust, salt and oil smoke. (Corrosive gas : SO₂ / H₂S, etc.)
- Environment that is not affected by vibration or shock.
- Environment with less external noise.
- Altitude 1000m or less.

■ Outdoor use conditions

- These products are not a dustproof, waterproof, and splash proof construction.

Please avoid the place with much dust. Moreover, please install in the place not exposed to rain or water drop.

- Please do not install in the place where sunlight hits directly.

Discoloration and degradation of a name plate, and deformation of the case by the surface temperature rise may occur.

■ Mounting and wiring

Please refer to this instruction manual for mounting and the wiring.

 CAUTION	● Please refer to connection diagram for the wiring. ● Please avoid hot line work. ● Please use an electrical wire size suitable with the rated current. ● Please check the tightening of the screw.
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■ Preparation

- When connecting this product directly to the main power supply, attach an appropriate fuse to the outside.
- This product must be set before use. Please set correctly after reading this instruction manual.

■ 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 does not cause any trouble. Disappears when control power is applied for 2 hours.

■ Maintenance and inspection

- Inspection in energized state is dangerous.
- This product has no parts to replace during regular inspections.
- Please wipe off lightly with the dry soft cloth. Please do not use the organic solvent, chemicals, cleaners, etc., such as an alcohol, for cleaning.

The LCD may light up during cleaning on the LCD screen. This is a phenomenon that static electricity occurs in the filter. There is no problem with the product. Leave the unit as it is for a while, and the display goes out due to natural discharge. Do not press the LCD screen strongly. Pressing the LCD screen may cause the filter and the liquid crystal surface to remain in contact (such as a round pattern).

■ Storage

Please store in a place that meets the following conditions.

- The ambient temperature within -25 to +70 °C (storage temperature).
- Daily average temperature 40 °C or less.
- Location corresponding to the usage environment and use conditions.
- Aluminum electrolytic capacitors are used in products. Please energize the power supply within one year after purchase.

■ Countermeasures against troubles

If trouble occurs within the warranty period, DAIICHI ELECTRONICS will repairs this product.

■ Disposal

Please dispose this product as industrial waste (non-combustible).

Mercury parts and a nickel-cadmium battery are not used for this product.

■ Warranty period

The warranty period of the product is one year after the date of delivery.

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1. Product outline

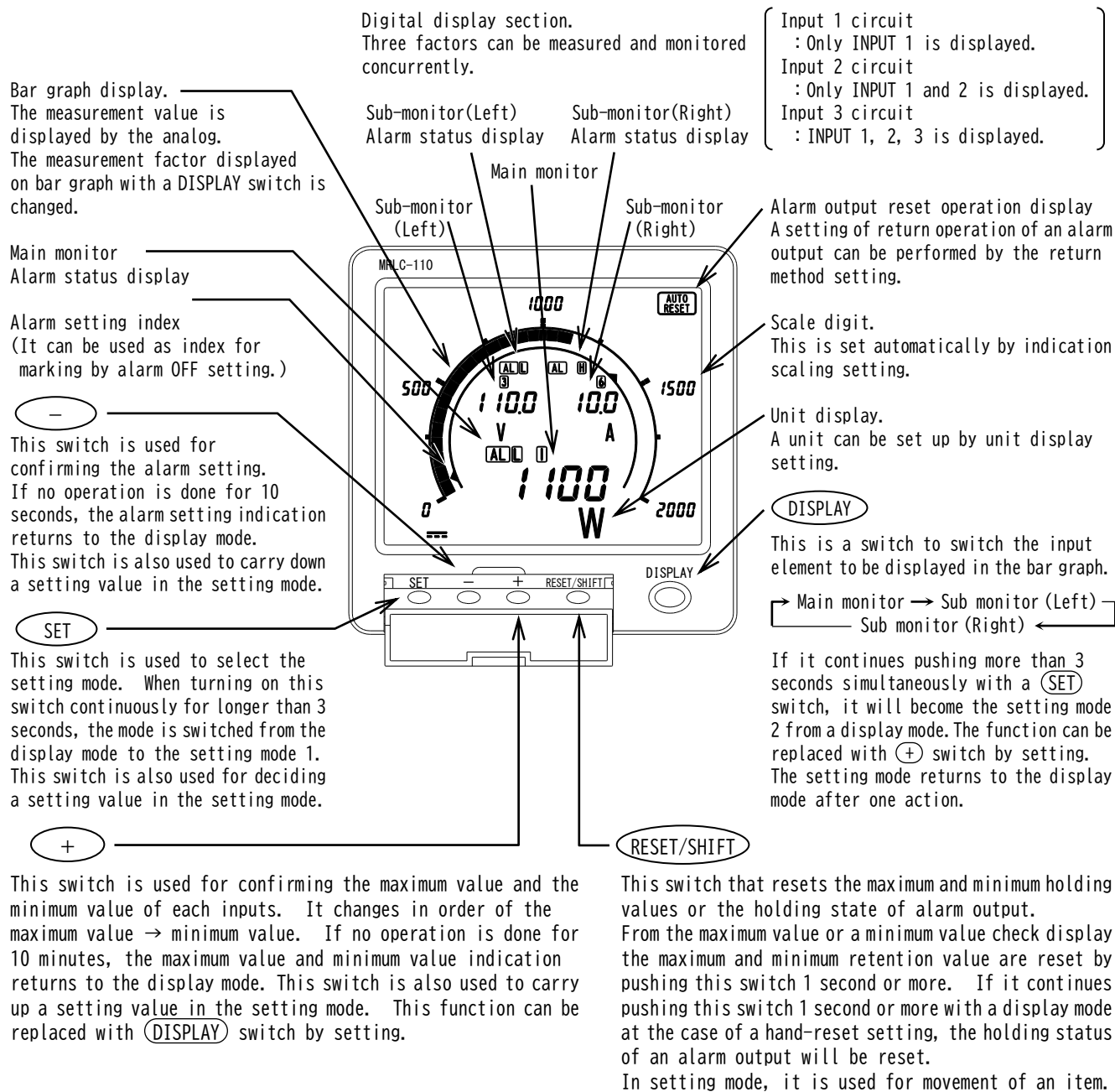
1.1 Usage of product

This product can do 3 circuit (maximum) measurement of the voltage or current of a direct current circuit. And, it has six upper limit detection and lower limit detection function, and the contact of 6 circuits can be outputted.

1.2 Features of product

- Three measurement displays are simultaneously possible.
The alarm output has equipped 6 circuits standardly.
- This product has a scaling function that allows the full-scale to be set to any value.
- DC power can be calculated and displayed from the measured values of DC current and DC voltage.
- The operating value can be set from -25% to +125% of the input.
With DC4 to 20mA input, it can be used as disconnection detection by setting L detection to less than 0%.
- The operation setting can be set for upper limit detection and lower limit detection, and the operation can be selected from excitation / non-excitation / OFF.
- Start delay function and contact delay function are standard equipment.
- Isolation of AC2000V between inputs, AC2000V between outputs, and AC2000V between inputs and outputs.
- The bar graph display (1 measurement) can be checked as if it were a meter.
- Maximum and minimum values can be held.
- External operation input (reset of maximum and minimum values) is possible. (Alarm reset or display switching is also possible by setting)
- The power supply is AC85 to 253V, DC80 to 143V for both AC and DC, DC20 to 56V can also be manufactured.
- This product is compatible with conventional 110-square mechanical indicating instruments in terms of installation method. (Mounting is diagonal 2 points)

2. The name and function of each section

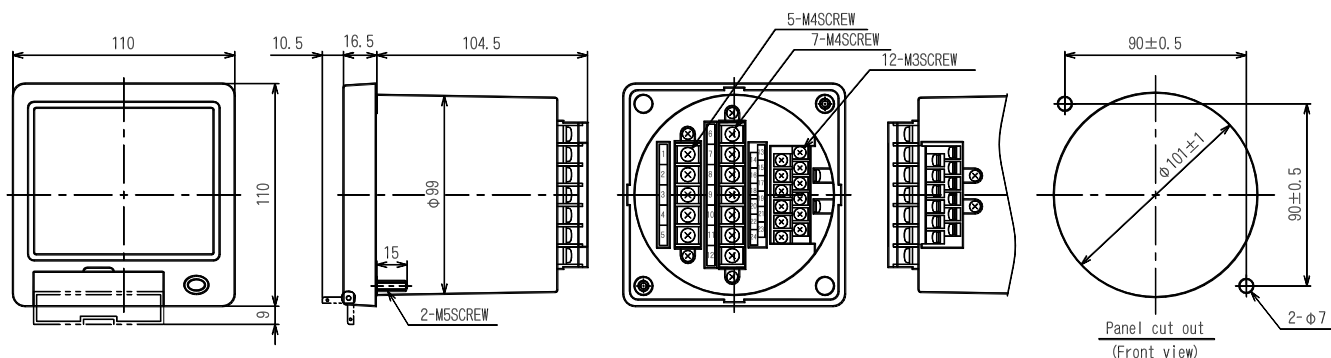


3. Preparation

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.

3.1.1 Outline dimension

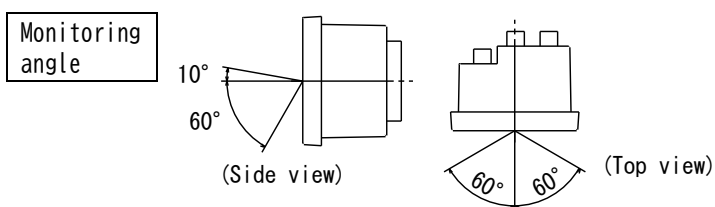


3.1.2 Cautions on installation

Mounting :

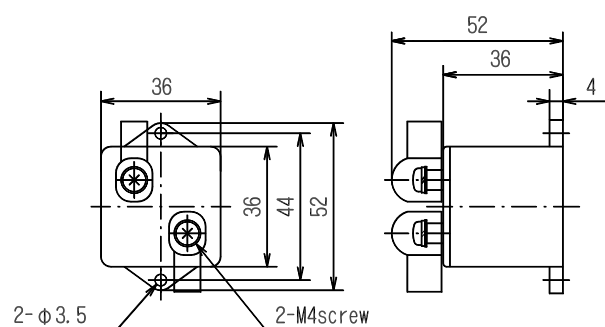
Mount the LCD to obtain an optimum angle, since the contrast changes according to the monitoring angle.

The mounting panel should be less than 10mm in thickness.



3.1.3 Series-resistance DM-1 (accessories) outline-dimension

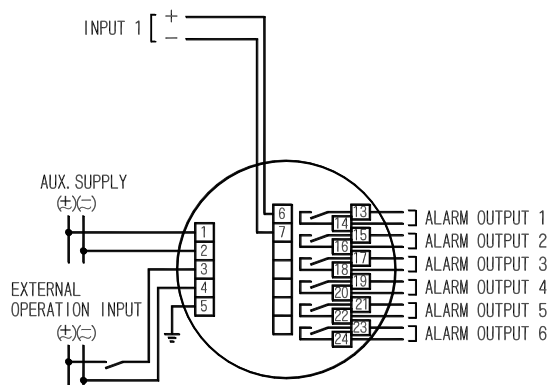
(A voltage input should use series resistance instrument DM-1 more than 301V, attaching it outside.)



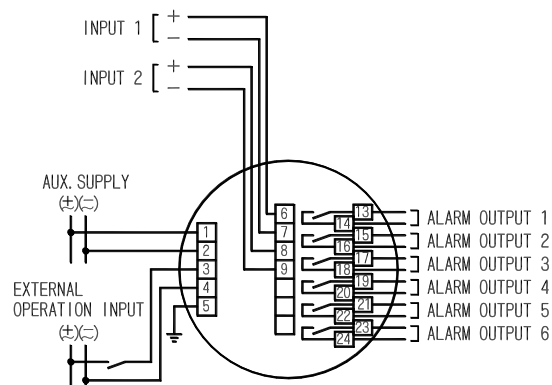
3.2 Connection

3.2.1 Connection diagram

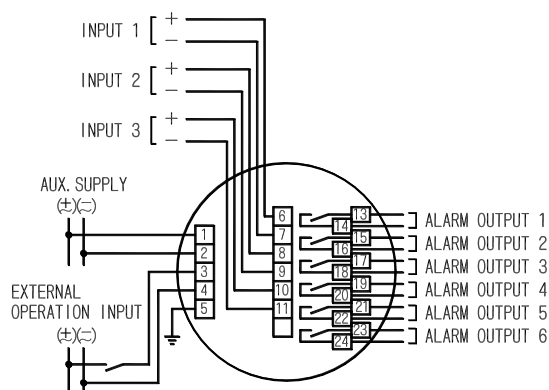
Input 1 circuit.



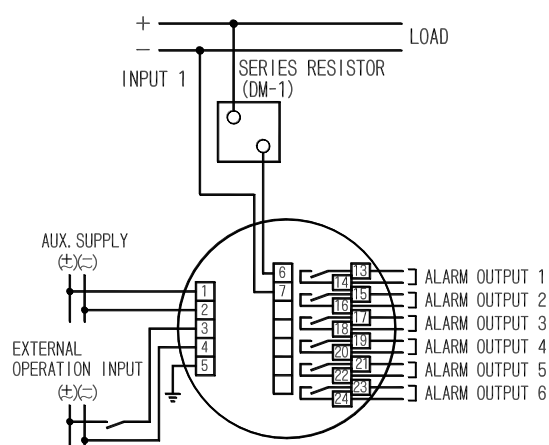
Input 2 circuits.



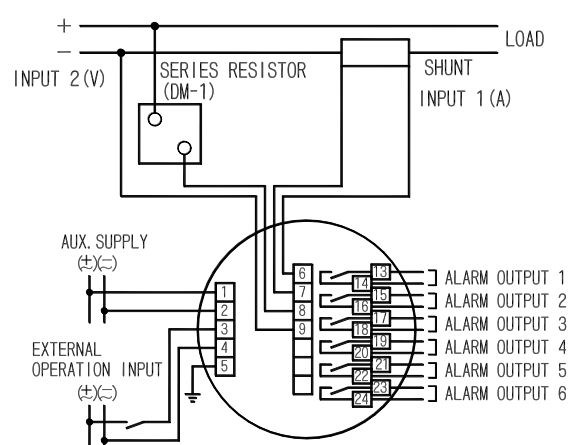
Input 3 circuits.



The example of connection of series resistor
A series resistor (DM-1, accessories) is given to
1mA instrument outside voltage input more than 301V.



The example of DC power measurement.
A shunt is sell separately.



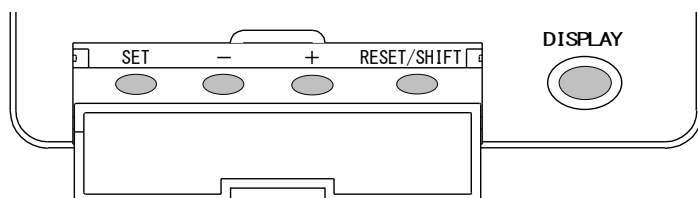
From the measurement value of the DC current
input 1 (A) and the DC voltage input 2 (V),
a DC power is calculated, and display.

3.2.2 Cautions on connections

- (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. 5 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 as much as possible of between this unit and the circuit breaker as well as between this unit and the relay contact signal line.
- (5) In case it connects an inductive load to an alarm output, we recommend you to install a surge killer external. The life of contact may become short in case there is no surge killer.
- (6) In the case of beyond voltage input 301V, a series resistor (DM-1) is attached.
DM-1 is adjusted combining the meter. Be sure to use an attached series resistor (DM-1).
In case you consist of one meter and multiple DM-1, please combine the thing suitable for an input factor.

4. Operation

4.1 Explanation of switch



Switches	Functions
SET	By pushing this switch for longer than 3 seconds, the mode is switched from display mode to setting mode 1. By pushing this switch for longer than 3 seconds together with DISPLAY switch, the mode is switched from display mode to setting mode 2. This mode can be reset to the display mode by DISPLAY switch. If it pushes simultaneously with a RESET/SHIFT switch, the input number measured in the digital-display is displayed, and display position can be checked. If it continues pushing 1 second above simultaneously with a + switch, relay operation of an alarm output can be checked.
-	Alarm setting value can be checked. This mode can be reset to the display mode by DISPLAY switch.
+	Maximum value and minimum value can be checked. This function can be replaced with a DISPLAY switch.
RESET/SHIFT	If it continues pushing 1 second above on the maximum value or a minimum value check screen, maximum value or minimum value can be reset. If it continues pushing 1 second above from a display mode at the case of manual reset setting, the holding status of an alarm output will be reset.
DISPLAY	The input factor on which bar graph is displayed can be changed. Its function can be replaced with + switch.

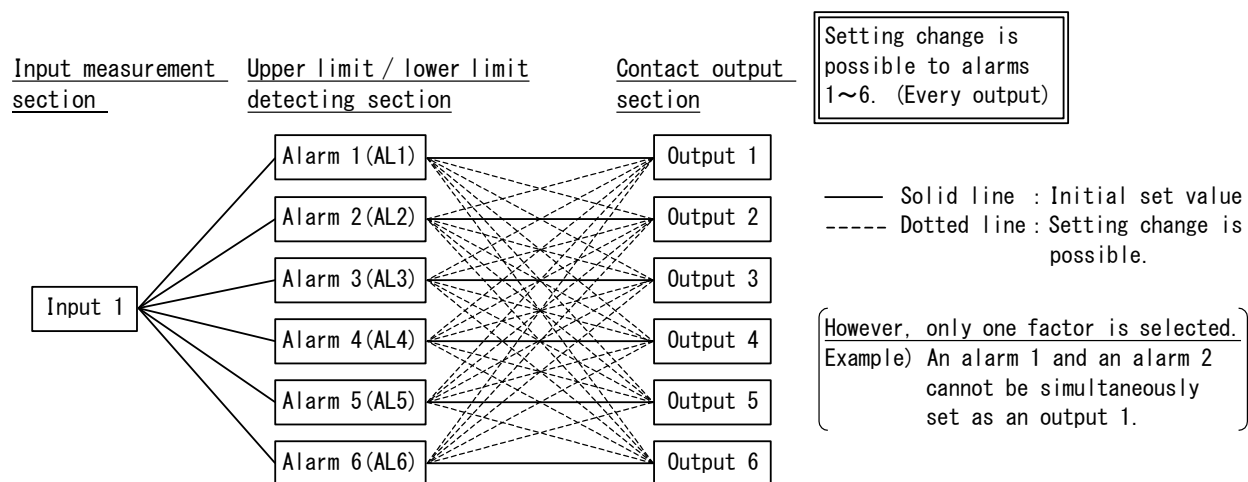
● Convenient functions

Even if the unit is stopped operating, it returns to the display mode in 10 minutes.

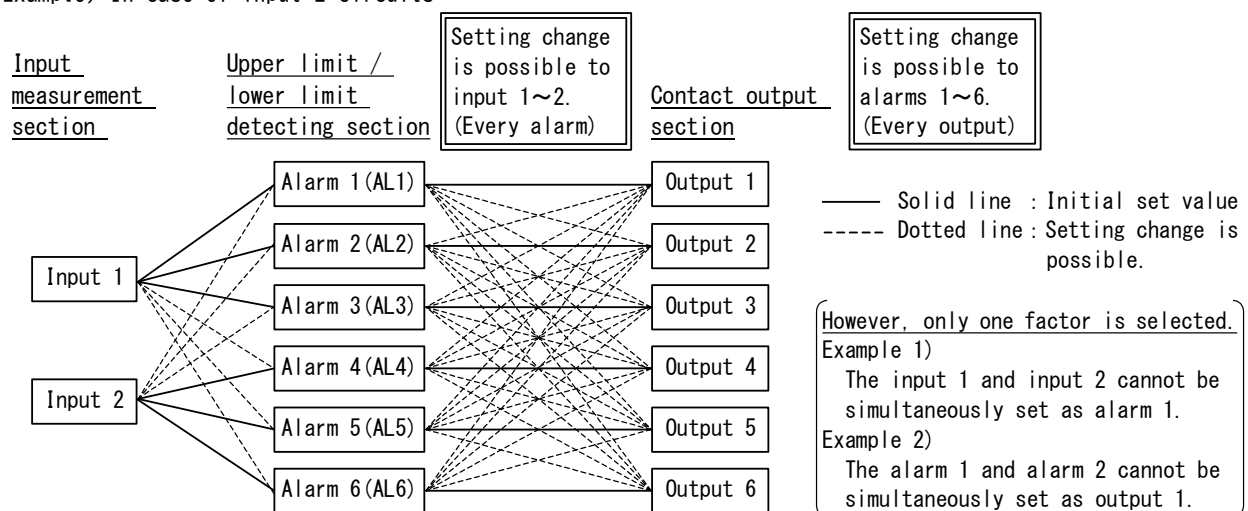
4.2 Block diagram

The upper limit / lower limit detecting element, and the contact-output section who became independent six systems are equipped. Setting makes arbitrary combination and it is possible of the contact-output composition united with the system.

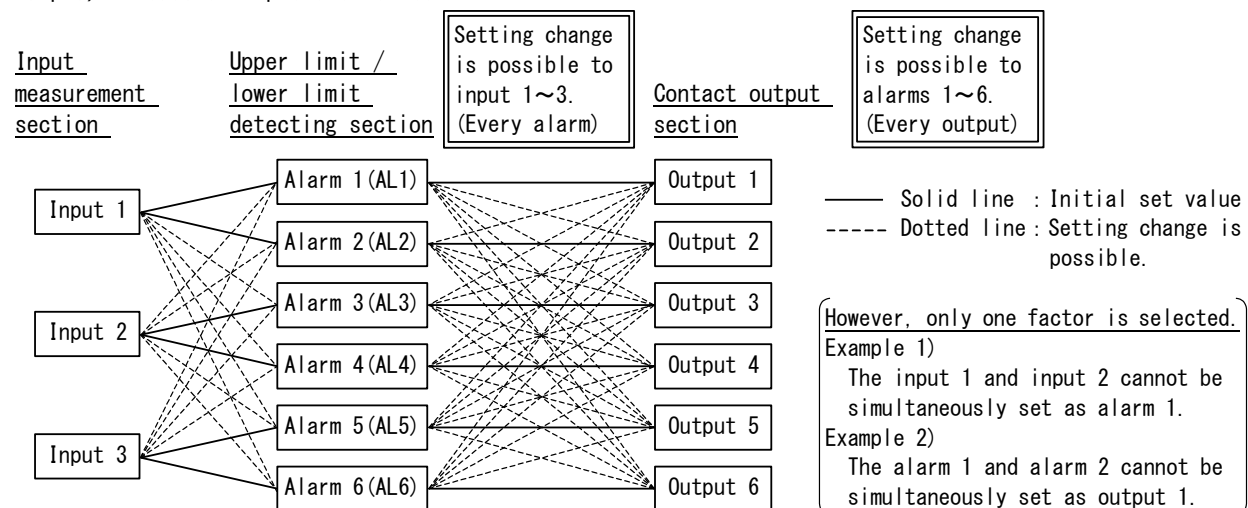
Example) In case of input 1 circuit



Example) In case of input 2 circuits



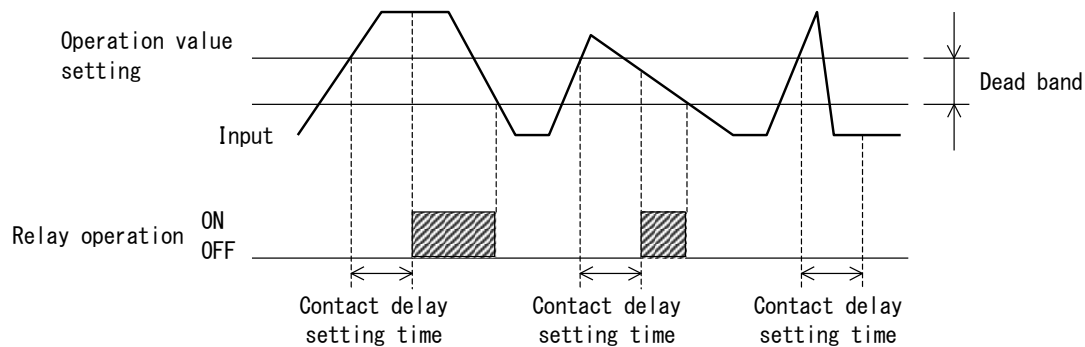
Example) In case of input 3 circuits



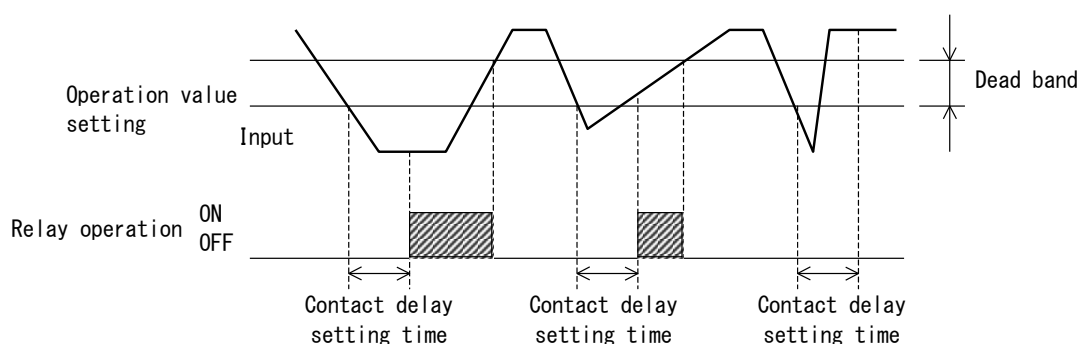
4.3 Relay action

■ Contact delay function

(1) Relay operation in over input detection. (Output mode: Excitation, H)



(2) Relay operation in shortage input detection. (Output mode: Excitation, L)

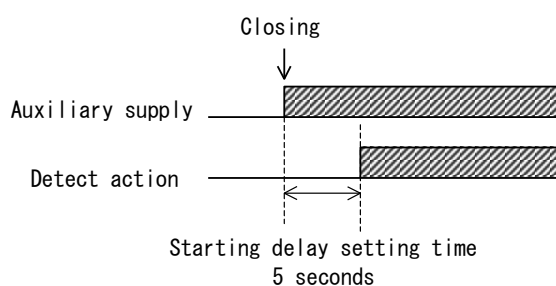


<Note> In case of non-excitation for relay excitation operation setting, operation of relay becomes reverse.

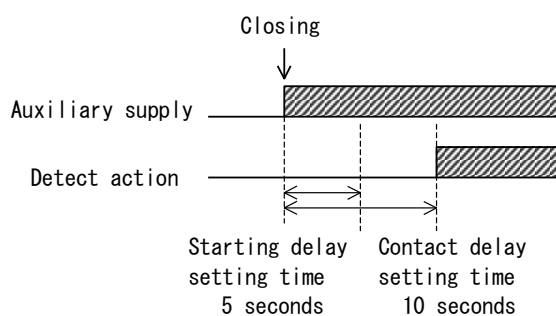
■ Starting delay function

After an auxiliary supply apply, detection operation is performed after a starting delay time.

(1) Starting delay time 5 seconds $\cong$ Contact delay time 0 second

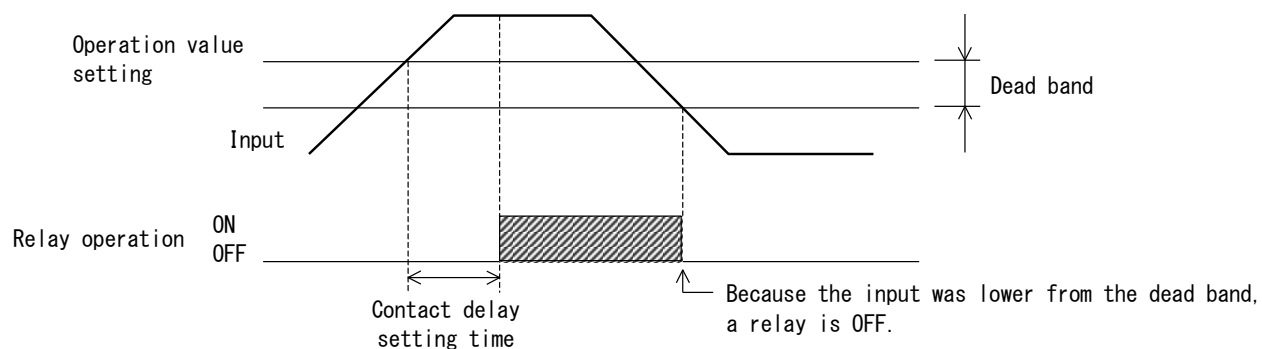


(2) Starting delay time 5 seconds < Contact delay time 10 seconds

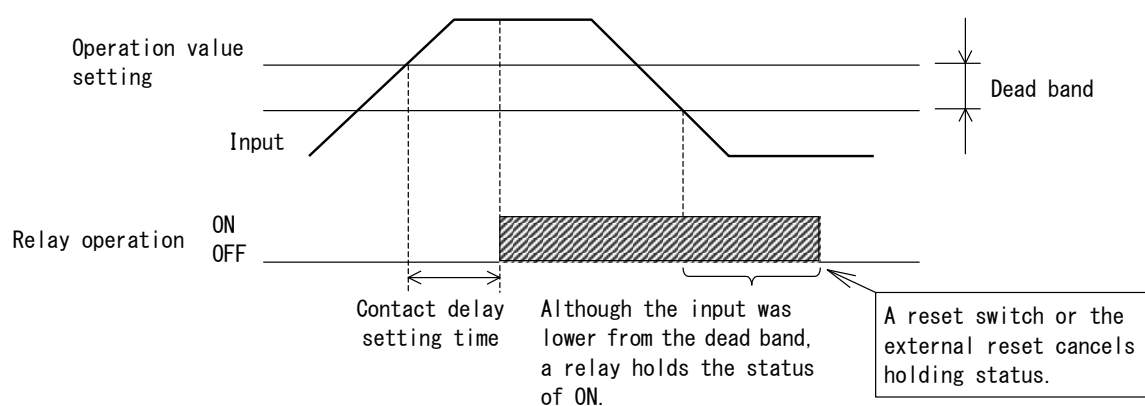


■ Reset method

(1) Relay operation in automatic reset setting. (Output mode : Excitation, H)



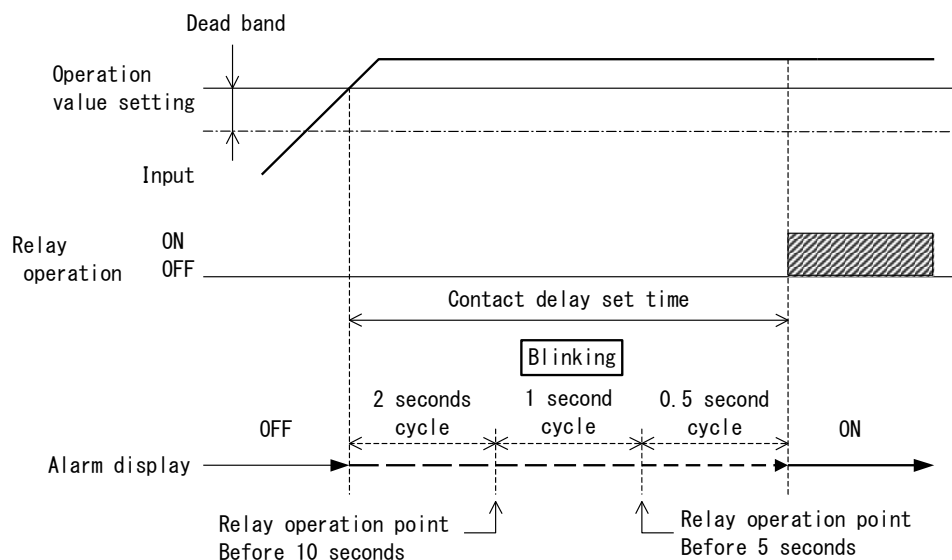
(2) Relay operation in manual reset setting. (Output mode : Excitation, H)



4.4 Function to blink alarm display

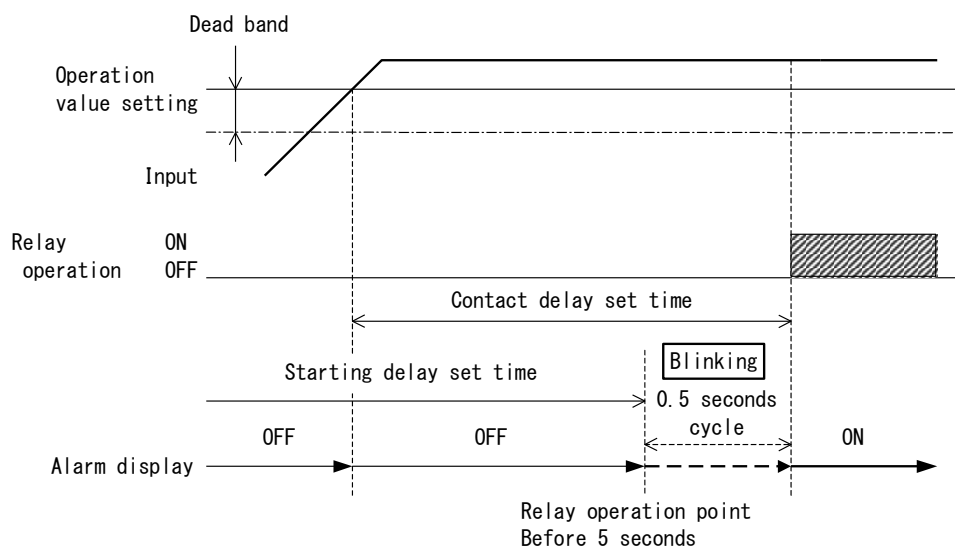
(1) Setting ON

It is the function in which the relay operation point can be checked in contact delay.
The input exceeds an operation value and blinking of alarm display becomes early gradually as the relay operation point is approached.



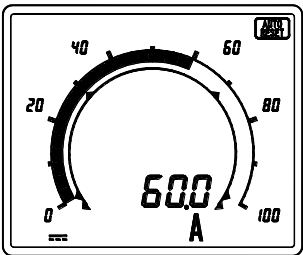
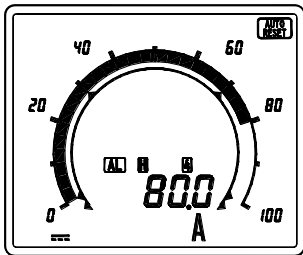
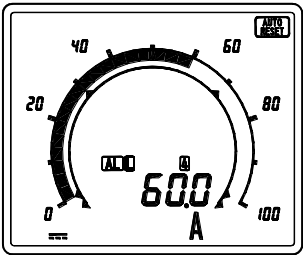
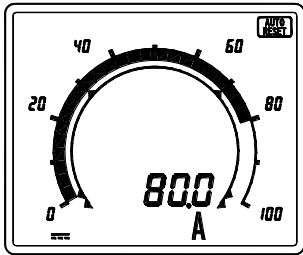
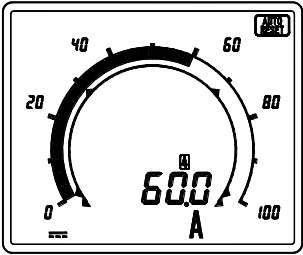
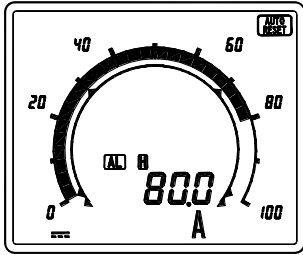
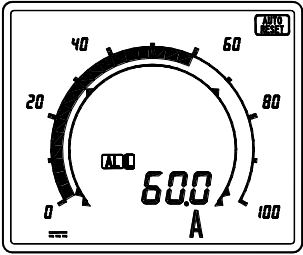
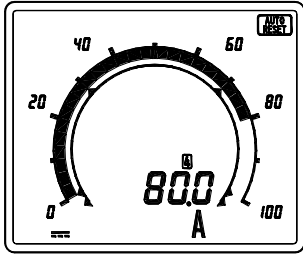
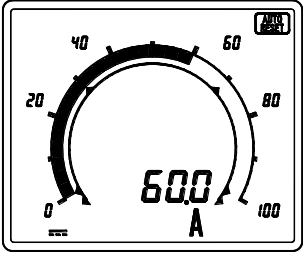
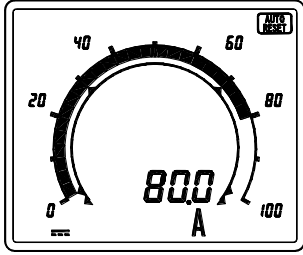
(2) Blinking display in starting delay. (Setting ON)

A blinking timer is invalidity from starting delay. Even if input exceeds operation value, a blink isn't displayed.



4.5 Operation of alarm output

Example) Display of input 1 circuit. Setting of alarm 4 (Output mode : H or L, Excitation or non-excitation)

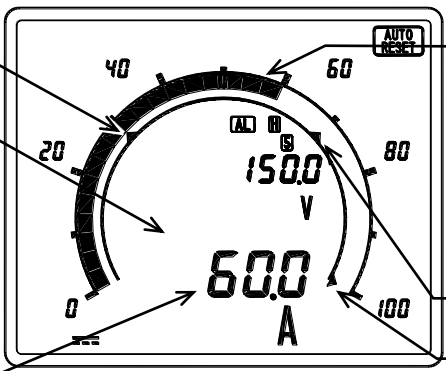
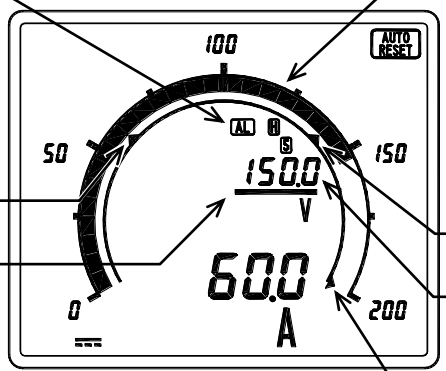
Output mode		Relay and alarm display operating state	
		An operation value : 70.0A Input 60.0A ← ▽ → Input 80.0A	
Excitation	H	Alarm display 	Displays AL H 4 
	Relay	OFF(Non-excitation)	ON(Excitation)
	L	Alarm display 	Displays AL H 4 
	Relay	ON(Excitation)	OFF(Non-excitation)
Non-excitation	H	Alarm display 	Displays AL H 
	Relay	ON(Excitation)	OFF(Non-excitation)
	L	Alarm display 	Displays AL H 
	Relay	OFF(Non-excitation)	ON(Excitation)
OFF (Excitation - Non-excitation)		Alarm display 	Alarm display 
		Relay	OFF(Non-excitation)

5. Display

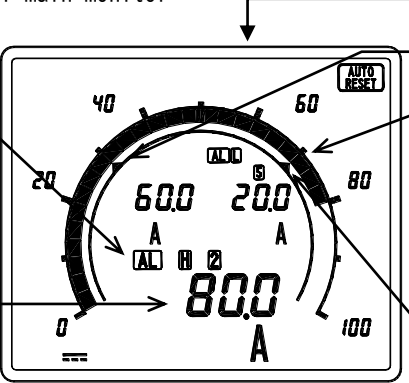
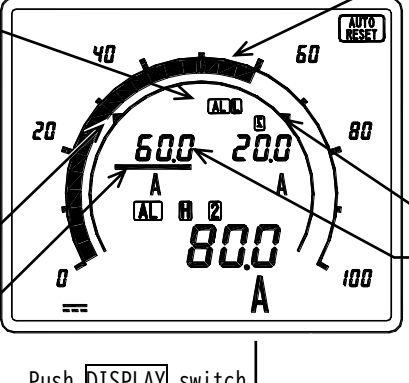
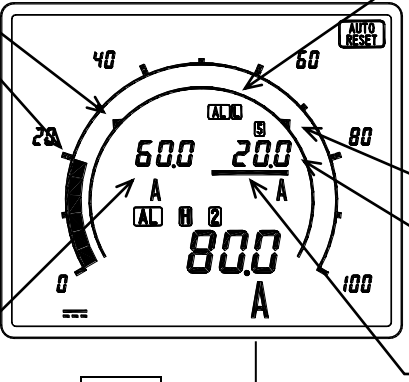
5.1 Example of display of input 1 circuit

Display combination	Pattern 1 Main monitor : INPUT 1
Display scaling	INPUT 1 : 0.0 to 100.0A
Alarm setting	Alarm 1 : L detection, Operation value -25.0A Alarm 2 : L detection, Operation value 0.0A Alarm 3 : L detection, Operation value 30.0A Alarm 4 : H detection, Operation value 70.0A Alarm 5 : H detection, Operation value 100.0A Alarm 6 : H detection, Operation value 125.0A
Display	Index of alarm 3 <u>Alarm display</u> [Main monitor] Because the input exceeded operation value 70.0A of an alarm 4, an alarm 4 does H detection, and alarm is displayed. Index of alarm 2 Index of alarm 1 Index of alarm 4 <u>Bar graph display</u> [Main monitor] The measurement value of input 1 is displayed by the analog. <u>Digital display</u> [Main monitor] The measurement value of input 1 is displayed. Index of alarm 5 Index of alarm 6

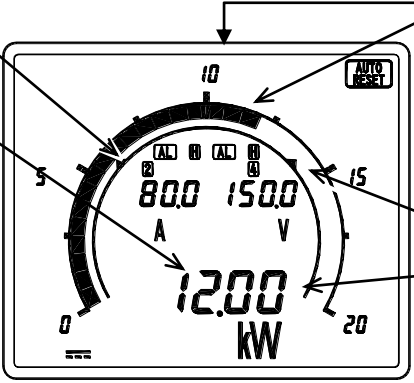
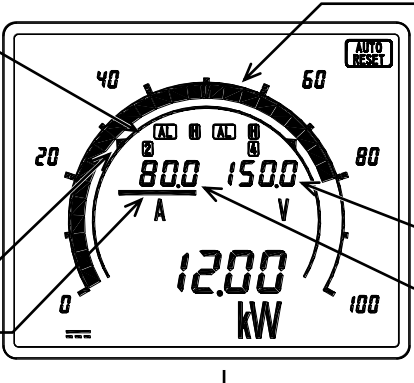
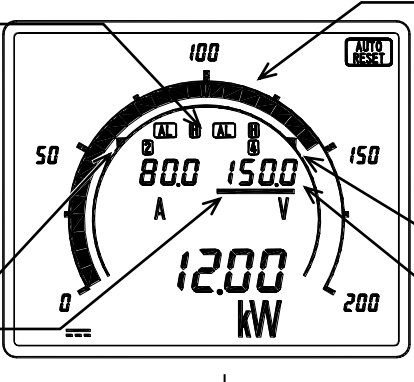
5.2 Example of display of input 2 circuits

Display combination	Pattern 2 Main monitor : INPUT 1, Sub monitor (Right) : INPUT 2
Display scaling	INPUT 1 : 0.0 to 100.0A INPUT 2 : 0.0 to 200.0V
Alarm setting	Alarm 1 : L detection, Operation value 30.0A (Input 1) Alarm 2 : H detection, Operation value 70.0A (Input 1) Alarm 3 : H detection, Operation value 100.0A (Input 1) Alarm 4 : L detection, Operation value 60.0A (Input 2) Alarm 5 : H detection, Operation value 140.0A (Input 2) Alarm 6 : H detection, Operation value 200.0A (Input 2)
Display	① Bar graphical display of main monitor  Index of alarm 1 Alarm display [Main monitor] Because the input is not over the operation value of alarms 1 to 3, alarms 1 to 3 do not detect. Therefore, alarm display is not displayed. Digital display [Main monitor] The measurement value of input 1 is displayed. Push DISPLAY switch Bar graph display [Main monitor] When it changes to a "main monitor" with a DISPLAY switch, the measurement value of an input 1 is displayed by the analog. Index of alarm 2 Index of alarm 3 ② Bar graphical display of sub-monitor (right)  Alarm display [Sub-monitor (right)] Because the input exceeded operation value 140.0V of an alarm 5, an alarm 4 does H detection, and alarm is displayed. Index of alarm 4 Sub-monitor (right) Underbar display Bar graphical display [Sub-monitor (right)] When it changes to a "sub-monitor (right)" with a DISPLAY switch, the measurement value of an input 2 is displayed by the analog. An underbar display. Index of alarm 5 Digital display [Sub-monitor (right)] The measurement value of input 2 is displayed. Index of alarm 6

5.3 Example of display of input 3 circuits

Display combination	Pattern 1 Main monitor : INPUT 1 , Sub monitor (Left) : INPUT 2 , Sub monitor (Right) : INPUT 3
Display scaling	INPUT 1 : 0.0 to 100.0A INPUT 2 : 0.0 to 100.0A INPUT 3 : 0.0 to 100.0A In case display scaling is the same also as three inputs.
Alarm setting	Alarm 1 : L detection, Operation value 30.0A (Input 1) Alarm 2 : H detection, Operation value 70.0A (Input 1) Alarm 3 : L detection, Operation value 30.0A (Input 2) Alarm 4 : H detection, Operation value 70.0A (Input 2) Alarm 5 : L detection, Operation value 30.0A (Input 3) Alarm 6 : H detection, Operation value 70.0A (Input 3)
Display	① Bar graphical display of main monitor  Alarm display [Main monitor] Because the input exceeded operation value 70.0A of an alarm 2, an alarm 2 does H detection, and alarm is display. Digital display [Main monitor] The measurement value of input 1 is displayed. Index of alarm 1 Bar graph display [Main monitor] When it changes to a "main monitor" with a DISPLAY switch, the measurement value of an input 1 is displayed by the analog. Index of alarm 2 Push DISPLAY switch ② Bar graphical display of sub-monitor (left)  Alarm display [Sub-monitor (left)] Because the input is not over the operation value of alarms 3,4, alarms 3,4 do not detect. Therefore, alarm display is not displayed. Index of alarm 3 Sub-monitor (left) Underbar display Bar graphical display [Sub-monitor (left)] When it changes to a "sub-monitor (left)" with a DISPLAY switch, the measurement value of an input 2 is displayed by the analog. An underbar display. Index of alarm 4 Digital display [Sub-monitor (left)] The measurement value of input 2 is displayed. Push DISPLAY switch ③ Bar graphical display of sub-monitor (right)  Index of alarm 5 Bar graphical display [Sub-monitor (right)] When it changes to a "sub-monitor (right)" with a DISPLAY switch, the measurement value of an input 3 is displayed by the analog. An underbar display. Sub-monitor (right) Underbar display Alarm display [Sub-monitor (right)] Because the input exceeded operation value 30.0A of an alarm 5, an alarm 5 does H detection, and alarm is display. Index of alarm 6 Digital display [Sub-monitor (right)] The measurement value of input 3 is displayed. Sub monitor (right) underbar lights Push DISPLAY switch

5.4 Example of display of input 2 circuits + DC power measurement.

Display combination	Pattern 7 Main monitor : DC power(W) , Sub monitor (Left) : INPUT 1(A) , Sub monitor (Right) : INPUT 2(V)
Display scaling	INPUT 1(A) : 0.0 to 100.0A INPUT 2(V) : 0.0 to 200.0V DC power(W) calculations value : 0.00 to 20.00kW The display scaling value of DC power (W), automatic scaling is done from the display scaling value of input 1(A) and input 2(V). However, scaling change is manually possible.
Alarm setting	Alarm 1 : L detection, Operation value 30.0A [Input 1(A)] Alarm 2 : H detection, Operation value 70.0A [Input 1(A)] Alarm 3 : L detection, Operation value 60.0V [Input 2(V)] Alarm 4 : H detection, Operation value 140.0V [Input 2(V)] Alarm 5 : L detection, Operation value 6.00kW [DC power(W)] Alarm 6 : H detection, Operation value 14.00kW [DC power(W)]
Display	① Bar graphical display of main monitor  Bar graph display [Main monitor] When it changes to a "main monitor" with a DISPLAY switch, the measurement value of W measurement (W) is displayed by the analog. Index of alarm 5 Alarm display [Main monitor] Because the W measurement is not over the operation value of alarms 5, 6, alarms 5, 6 do not detect. Therefore, alarm display is not displayed. Index of alarm 6 Digital display [Main monitor] The measurement value of DC power (W) is displayed. Push DISPLAY switch ② Bar graphical display of sub-monitor (left)  Bar graph display [Sub-monitor (left)] When it changes to a "sub-monitor (left)" with a DISPLAY switch, the measurement value of an input 1(A) is displayed by the analog. An underbar display. Index of alarm 2 Digital display [Sub-monitor (left)] The measurement value of input 1(A) is displayed. Index of alarm 1 Sub-monitor (left) Underbar display Push DISPLAY switch ③ Bar graphical display of sub-monitor (right)  Bar graph display [Sub-monitor (right)] When it changes to a "sub-monitor (right)" with a DISPLAY switch, the measurement value of an input 2 is displayed by the analog. An underbar display. Index of alarm 4 Digital display [Sub-monitor (right)] The measurement value of input 2(V) is displayed. Index of alarm 3 Sub-monitor (right) Underbar display Push DISPLAY switch

6. Setting

6.1 Function table and default setting

At the case of shipment, it is a following initial value. Please set up according to an operating condition.
In addition, about setting products, it is shipped by the appointed set point.

Setting mode 1. Function table. (1/2)

Set No.	Function		Functional description	Default setting			Important setting	Page
				INPUT 1	INPUT 2	INPUT 3		
111	Display combination setting		The combination pattern of a digital display is set up. By patterns 1 to 6, the position of the digital display of maximum 3 circuits can be changed arbitrarily. In pattern 7 to C, in case the display of the DC power measurement is done, it sets up.	Pattern 1			○	31 to 33
112	Unit display setting	INPUT 1	The unit display of input 1 is set up.	With no unit display			○	31 to 33
113		INPUT 2	The unit display of input 2 is set up.	With no unit display			○	
114		INPUT 3	The unit display of input 3 is set up.	With no unit display			○	
121A	ALARM 1 (AL1)	Output mode	The output mode of alarm 1 is set up.	L : Low	L : Low	L : Low	○	34 to 37
121b		Operation value	The operation value of alarm 1 is set up.	~25% for input span	30% for input span	30% for input span	○	
121C		Dead band	The dead band of alarm 1 is set up.	3.0%				
121d		Excitation / non-excitation	The excitation / non-excitation of alarm 1 is set up.	ON : Excitation			○	
121E		Contact delay time	The contact delay time of alarm 1 is set up.	0s			○	
121F		Input factor	The input factor of alarm 1 is set up.	Input 1	Input 1	Input 1	○	
122A	ALARM 2 (AL2)	Output mode	The output mode of alarm 2 is set up.	L : Low	H : High	H : High	○	34 to 37
122b		Operation value	The operation value of alarm 2 is set up.	0% for input span	70% for input span	70% for input span	○	
122C		Dead band	The dead band of alarm 2 is set up.	3.0%				
122d		Excitation / non-excitation	The excitation / non-excitation of alarm 2 is set up.	ON : Excitation			○	
122E		Contact delay time	The contact delay time of alarm 2 is set up.	0s			○	
122F		Input factor	The input factor of alarm 2 is set up.	Input 1	Input 1	Input 1	○	
123A	ALARM 3 (AL3)	Output mode	The output mode of alarm 3 is set up.	L : Low	H : High	L : Low	○	34 to 37
123b		Operation value	The operation value of alarm 3 is set up.	30% for input span	100% for input span	30% for input span	○	
123C		Dead band	The dead band of alarm 3 is set up.	3.0%				
123d		Excitation / non-excitation	The excitation / non-excitation of alarm 3 is set up.	ON : Excitation			○	
123E		Contact delay time	The contact delay time of alarm 3 is set up.	0s			○	
123F		Input factor	The input factor of alarm 3 is set up.	Input 1	Input 1	Input 2	○	
124A	ALARM 4 (AL4)	Output mode	The output mode of alarm 4 is set up.	H : High	L : Low	H : High	○	34 to 37
124b		Operation value	The operation value of alarm 4 is set up.	70% for input span	30% for input span	70% for input span	○	
124C		Dead band	The dead band of alarm 4 is set up.	3.0%				
124d		Excitation / non-excitation	The excitation / non-excitation of alarm 4 is set up.	ON : Excitation			○	
124E		Contact delay time	The contact delay time of alarm 4 is set up.	0s			○	
124F		Input factor	The input factor of alarm 4 is set up.	Input 1	Input 2	Input 2	○	

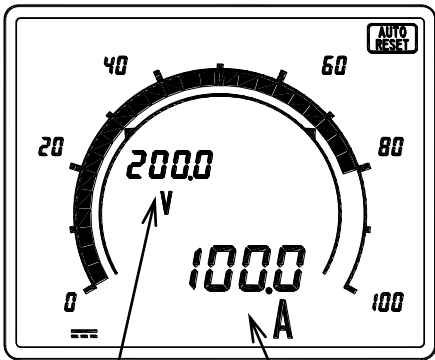
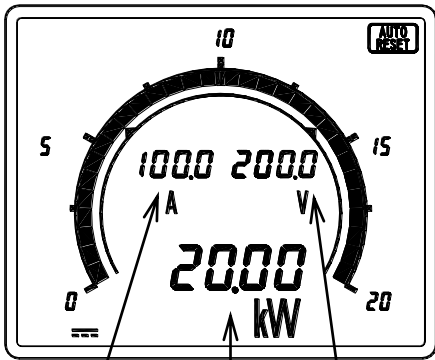
Setting mode 1. Function table. (2/2)

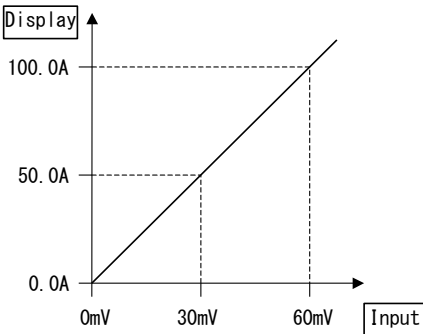
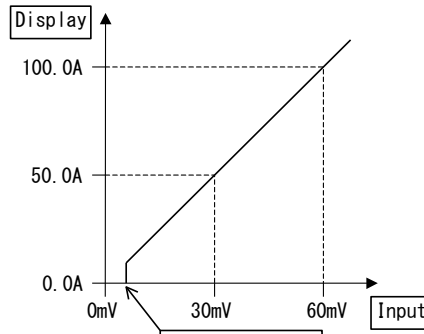
Set No.	Function		Functional description	Default setting			Important setting	Page
				INPUT 1	INPUT 2	INPUT 3		
125A	ALARM 5 (AL5)	Output mode	The output mode of alarm 5 is set up.	H : High	H : High	L : Low	○	34 to 37
125b		Operation value	The operation value of alarm 5 is set up.	100% for input span	70% for input span	30% for input span	○	
125C		Dead band	The dead band of alarm 5 is set up.	3.0%				
125d		Excitation / non-excitation	The excitation / non-excitation of alarm 5 is set up.	ON : Excitation			○	
125E		Contact delay time	The contact delay time of alarm 5 is set up.	0s			○	
125F		Input factor	The input factor of alarm 5 is set up.	Input 1	Input 2	Input 3	○	
126A	ALARM 6 (AL6)	Output mode	The output mode of alarm 6 is set up.	H : High	H : High	H : High	○	34 to 37
126b		Operation value	The operation value of alarm 6 is set up.	125% for input span	100% for input span	70% for input span	○	
126C		Dead band	The dead band of alarm 6 is set up.	3.0%				
126d		Excitation / non-excitation	The excitation / non-excitation of alarm 6 is set up.	ON : Excitation			○	
126E		Contact delay time	The contact delay time of alarm 6 is set up.	0s			○	
126F		Input factor	The input factor of alarm 6 is set up.	Input 1	Input 2	Input 3	○	
127A	Alarm output factor	Output 1	The output factor of alarm output 1 is set up.	1 : Alarm 1(AL1)			○	34 to 37
127b		Output 2	The output factor of alarm output 2 is set up.	2 : Alarm 2(AL2)			○	
127C		Output 3	The output factor of alarm output 3 is set up.	3 : Alarm 3(AL3)			○	
127d		Output 4	The output factor of alarm output 4 is set up.	4 : Alarm 4(AL4)			○	
127E		Output 5	The output factor of alarm output 5 is set up.	5 : Alarm 5(AL5)			○	
127F		Output 6	The output factor of alarm output 6 is set up.	6 : Alarm 6(AL6)			○	
128	Starting delay time		The starting delay time is set up.	5s			○	34 to 37
129	Function to blink alarm display		The display method of the alarm display at the case of alarm detection action (AL1 to 6) is set up.	OFF				
12A	Digital-display flicker		The digital-display method at the case of alarm detection is set up.	OFF				
131	Reset method		The reset method of an alarm output is set up.	0 : Automatic reset (Instant reset)				38
141	External operation input function		An external operation input function is set up.	0 : Maximum and minimum value reset				39
151	DISPLAY switch function change setting		Set this function when changing the  switch and DISPLAY switch.	0 { DISPLAY switch Bar graph display change  switch Maximum and minimum value display change				40
			0  DISPLAY switch : Bar graph display change					
			 switch : Maximum and minimum value display change					
			1  DISPLAY switch : Maximum and minimum value display change					
			 switch : Bar graph display change					

Setting mode 2. Function table.

Set No.	Function		Functional description	Default setting	Important setting	Page
211b	Input 1. Display scaling setting	BIAS	Display bias value setting of Input 1.	0.0	○	42 to 44
212F		MAX.	Display Max value setting of input 1.	100.0	○	
213P		Decimal point	Decimal point setting of input 1.	□□□.□	○	
214		COS ϕ , Hz, var	COS ϕ , Hz, var display scaling setting of input 1.	0 (Standard scale)	○	
215b	Input 2. Display scaling setting	BIAS	Display bias value setting of Input 2.	0.0	○	42 to 44
216F		MAX.	Display Max value setting of input 2.	100.0	○	
217P		Decimal point	Decimal point setting of input 2.	□□□.□	○	
218		COS ϕ , Hz, var	COS ϕ , Hz, var display scaling setting of input 2.	0 (Standard scale)	○	
219b	Input 3. Display scaling setting	BIAS	Display bias value setting of Input 3.	0.0	○	42 to 44
21AF		MAX.	Display Max value setting of input 3.	100.0	○	
21bP		Decimal point	Decimal point setting of input 3.	□□□.□	○	
21C		COS ϕ , Hz, var	COS ϕ , Hz, var display scaling setting of input 3.	0 (Standard scale)	○	
221b	Input 1. Input calibration	BIAS	Zero adjustment of the input 1 at the case of a bias input can be performed.	0.00		45
222F		SPAN	The input 1 display adjustment at the case of an input apply can be performed. It is effective to unite a display with other meter.	0.00		
223b	Input 2. Input calibration	BIAS	Zero adjustment of the input 2 at the case of a bias input can be performed.	0.00		45
224F		SPAN	The input 2 display adjustment at the case of an input apply can be performed. It is effective to unite a display with other meter.	0.00		
225b	Input 3. Input calibration	BIAS	Zero adjustment of the input 3 at the case of a bias input can be performed.	0.00		45
226F		SPAN	The input 3 display adjustment at the case of an input apply can be performed. It is effective to unite a display with other meter.	0.00		
231	Input sensitivity	Input 1	The full-scale of input 1 bar graph display is changed.	100		46
232		Input 2	The full-scale of input 2 bar graph display is changed.	100		
233		Input 3	The full-scale of input 3 bar graph display is changed.	100		
261	Low input cut	Input 1	At the case of display scaling 0 to N, and -N to 0 to N (example: -100 to 0 to 100), less than 0.5% of inputs is made to zero display. It does not function at the case of -N' to 0 to N (example: -10 to 0 to 100) and -N to 0.	OFF		47
262		Input 2		OFF		
263		Input 3		OFF		
271	Display dead band	Input 1	In case the input is unsteady, this setting can drop the sensitivity of a display and it can see.	0.0		48
272		Input 2		0.0		
273		Input 3		0.0		
281	Measurement display ON/OFF	Input 1	ON/OFF of an input 1-measurement display is set up.	ON		49
282		Input 2	ON/OFF of an input 2-measurement display is set up.	ON		
283		Input 3	ON/OFF of an input 3-measurement display is set up.	ON		
291	Return to default setting		Initialize all settings.	—		50

6.2 Example of setting function

Functional example ①	When measuring DC power, DC current is inputted into an input 1 and DC voltage is inputted into an input 2. INPUT 1(A) : 0 to 60mV, Display : 0.0 to 100.0A INPUT 2(V) : 0 to 200V, Display : 0.0 to 200.0V However, only input 2 circuit and 3 circuit specification are effective. The input 1 circuit specification cannot be set. DC power (W) display : 0.00 to 20.00kW ↑ An automatic scaling is done from an INPUT 1(A) and INPUT 2(V).	
Setting function	Please use "display combination setting" (setting No.111) in the setting mode 1. → If it is set as a pattern 7 to C, DC power (W) will be measured.	
Function explanation	Before (Set : Pattern 1) Example. 2 input specification  INPUT 2 : DC voltage INPUT 1 : DC current	After (Set : Pattern 7) Example. 2 input specification + DC power measurement  INPUT 1 : DC current DC power INPUT 2 : DC voltage The automatic scaling of the scale of DC power (W) is done from the scale of INPUT1 (A) and INPUT2 (V). And, the scale change by manual operation is also possible.

Functional example ②	Input : 0 to 60mV, Display : 0.0 to 100.0A If you want to fix displayed value to 0, at the case of fine input near 0mV of inputs.	
Setting function	Please use "low input cut setting" (setting No.261 to 263) in the setting mode 2. → Displayed value is fixed to 0 at the case of the fine input equivalent to less than 0.5% of an input span. (Example. In case of 0 to 60mV, less than 0.3mV → display : 0.0A) However, effective only at the case of the display scaling 0 to N and -N to 0 to N (Example : -100 to 0 to 100). It does not function at the case of -N' to 0 to N (example : -10 to 0 to 100).	
Function explanation	Before (SET : OFF)  Input : 0.3mV → Display : 0.5A Input : 0mV → Display : 0.0A	After (SET : ON)  Input : Less than 0.3mV → Display : 0.0A Input : 0mV → Display : 0.0A

Functional example ③	Input : $\pm 60\text{mV}$, Display : $\pm 100.0\text{A}$ Fixes the display value to 0 when the input is minute input near 0mV .	
Setting function	Please use "low input cut setting" (setting No.261 to 263) in the setting mode 2. → Displayed value is fixed to 0 at the case of the fine input equivalent to less than 0.5% of an input span. (Example. In case of $\pm 60\text{mV}$, less than $\pm 0.3\text{mV}$ → display : 0.0A) However, effective only at the case of the display scaling 0 to N and $-N$ to 0 to N (Example : -100 to 0 to 100). $-N'$ to 0 to N (example -10 to 0 to 100) does not work.	
Function explanation	Before (SET : OFF)	After (SET : ON)
	Input : 0.3mV → Display : 0.5A Input : 0mV → Display : 0.0A	Input : Less than 0.3mV → Display : 0.0A Input : 0mV → Display : 0.0A
Functional example ④	To reduce display variation due to input fluctuations.	
Setting function	Please use "display dead band setting" (setting No.271 to 273) in the setting mode 2. → The sensitivity of a display is dropped and the variation in displayed value is suppressed. The setting range becomes 0.0% to 2.0% (0.1% step).	
Function explanation	Before (SET : 0.0%)	After (SET : 1.0%)
	Example. Near 60.0A, it varies from 59.3A to 60.8A.	Example. Variation is suppressed of near 60.0A.
Functional example ⑤	In case the span or zero has shifted at the displayed value.	
Setting function	Please use "input calibration setting" (setting No.221b to 226F) in the setting mode 2. → A span or zero is adjusted of displayed value. The setting range becomes -9.99% to 9.99% of an input span (0.01% step).	
Function explanation	Before (SET : BIAS 0.00%)	After (SET : BIAS -0.50%)
	Example. At the case of 0mV of inputs, it is displayed as place 0.5A whose displayed value is 0.0A.	Example. At the case of 0mV of inputs, displayed value can be adjusted to 0.0A.

6.3 Setting table

Each parenthesized number shows a setting number and this number is displayed on the setting screen.
 <Caution> There is a setting item excepted by input circuits or measurement display ON/OFF setting.

(1) Display combination, unit display setting

Items	Setting and operation procedures	Page
Setting of display combination. (111)	Push SET for longer than 3 seconds → Select an display combination pattern by + and - . (111) → Push SET → Selected display combination pattern is entered. → Push DISPLAY → Returns to display mode.	31 to 33
Setting of unit display in input 1. (112)	Push SET for longer than 3 seconds → Push RESET/SHIFT → Select an unit by + and - . (111) (112) → Push SET → Selected unit is entered → Push DISPLAY → Returns to display mode.	31 to 33
Setting of unit display in input 2. (113)	Push SET for longer than 3 seconds → Push RESET/SHIFT → Push RESET/SHIFT → (111) (112) (113) Select an unit by + and - → Push SET → Selected unit is entered → Push DISPLAY → Returns to display mode.	31 to 33
Setting of unit display in input 3. (114)	Push SET for longer than 3 seconds → Push RESET/SHIFT → Push RESET/SHIFT → (111) (112) (113) Push RESET/SHIFT → Select an unit by + and - → Push SET → Selected unit is entered. (114) → Push DISPLAY → Returns to display mode.	31 to 33

(2) Alarm setting

Items	Setting and operation procedures	Page
Setting of output mode in input 1. (121A)	Push SET for longer than 3 seconds → Push + and RESET/SHIFT together → Push SET → (111) (121) (121A) Select an output mode by + and - . → Push SET → Selected output mode is entered. → Push DISPLAY → Returns to display mode.	34 to 37
Setting of operation value in input 1. (121b)	Push SET for longer than 3 seconds → Push + and RESET/SHIFT together → Push SET → (111) (121) (121A) Push RESET/SHIFT → Select an operation value by + and - . → Push DISPLAY → (121b) Selected operation value is entered. → Push DISPLAY → Returns to display mode.	34 to 37
Setting of dead band in input 1. (121C)	Push SET for longer than 3 seconds → Push + and RESET/SHIFT together → Push SET → (111) (121) (121A) Push RESET/SHIFT → Push RESET/SHIFT → Select an dead band by + and - . → Push SET → (121b) (121C) Selected dead band is entered. → Push DISPLAY → Returns to display mode.	34 to 37
Setting of excitation / non-excitation in input 1. (121d)	Push SET for longer than 3 seconds → Push + and RESET/SHIFT together → Push SET → (111) (121) (121A) Push RESET/SHIFT → Push RESET/SHIFT → Push RESET/SHIFT → (121b) (121C) (121d) Select an excitation / non-excitation by + and - . → Push SET → Selected excitation / non-excitation is entered. → Push DISPLAY → Returns to display mode.	34 to 37
Setting of contact delay time in input 1. (121E)	Push SET for longer than 3 seconds → Push + and RESET/SHIFT together → Push SET → (111) (121) (121A) Push RESET/SHIFT → Push RESET/SHIFT → Push RESET/SHIFT → Push RESET/SHIFT → (121b) (121C) (121d) (121E) Select an contact delay time by + and - . → Push SET → Selected contact delay time setting is entered. → Push DISPLAY → Returns to display mode.	34 to 37

Items	Setting and operation procedures	Page
Setting of input factor in input 1. (121F)	Push SET for longer than 3 seconds → Push + and RESET/SHIFT together → Push SET → (111) (121) (121A) Push RESET/SHIFT → Push RESET/SHIFT → Push RESET/SHIFT → Push RESET/SHIFT → (121b) (121C) (121d) (121E) Push RESET/SHIFT → Select an input factor by + and -. → Push SET → (121F) Selected input factor setting is entered. → Push DISPLAY → Returns to display mode.	34 to 37
Setting of output factor in alarm output 1. (127A)	Push SET for longer than 3 seconds → Push + and RESET/SHIFT together → (111) (121) Push RESET/SHIFT → Push RESET/SHIFT → Push RESET/SHIFT → Push RESET/SHIFT → (122) (123) (124) (125) Push RESET/SHIFT → Push RESET/SHIFT → Push SET → (126) (127) (127A) Select an output factor by + and -. → Push SET → Selected output factor setting is entered. → Push DISPLAY → Returns to display mode.	34 to 37
Setting of output factor in alarm output 2. (127b)	Push SET for longer than 3 seconds → Push + and RESET/SHIFT together → (111) (121) Push RESET/SHIFT → Push RESET/SHIFT → Push RESET/SHIFT → Push RESET/SHIFT → (122) (123) (124) (125) Push RESET/SHIFT → Push RESET/SHIFT → Push SET → Push RESET/SHIFT → (126) (127) (127A) (127b) Select an output factor by + and -. → Push SET → Selected output factor setting is entered. → Push DISPLAY → Returns to display mode.	34 to 37
Setting of starting delay time. (128)	Push SET for longer than 3 seconds → Push + and RESET/SHIFT together → (111) (121) Push RESET/SHIFT → Push RESET/SHIFT → Push RESET/SHIFT → Push RESET/SHIFT → (122) (123) (124) (125) Push RESET/SHIFT → Push RESET/SHIFT → Push RESET/SHIFT → (126) (127) (128) Select an starting delay time by + and -. → Push SET → Selected starting delay time setting is entered. → Push DISPLAY → Returns to display mode.	34 to 37

(3) Reset method (hold function) setting.

(5) Reset method (not a function) setting.		
Items	Setting and operation procedures	Page
Setting of reset method. (131)	Push SET for longer than 3 seconds → Push + and RESET/SHIFT together → (111) (121) Push + and RESET/SHIFT together → Select an reset method by + and -. → Push SET → (131) The selected reset method is entered. → Push DISPLAY → Returns to display mode.	38

(4) External operation input function setting.

(1) External operation input function settings.		
Items	Setting and operation procedures	Page
Setting of function in external operation input. (141)	Push SET for longer than 3 seconds → Push + and RESET/SHIFT together → (111) (121) Push + and RESET/SHIFT together → Push + and RESET/SHIFT together → (131) (141) Select an function by + and -. → Push SET → Selected function is entered → Push DISPLAY → Returns to display mode.	39

(5) DISPLAY switch and + switch function change setting

Items	Setting and operation procedures	Page
DISPLAY switch and + switch function change setting. (151)	Push SET for longer than 3 seconds → Push + and RESET/SHIFT together → (111) (121) Push + and RESET/SHIFT together → Push + and RESET/SHIFT together → (131) (141) Push + and RESET/SHIFT together → Select an function by + and -. → Push SET → (151) Selected function is entered → Push DISPLAY → Returns to display mode. (Explanatory) Display in setting. 0 : DISPLAY Bar graph display change, + Maximum and minimum value display change. 1 : DISPLAY Maximum and minimum value display change. + Bar graph display change,	40

(6) Display scaling setting

Items	Setting and operation procedures	Page
Setting of input 1 bias value. (211b) (¹)	Push SET and DISPLAY together for longer than 3 seconds. → (211b) Setting an bias value by + and -. → Push SET → Setting bias value is entered. → Push DISPLAY → Returns to display mode.	42 to 44
Setting of input 1 max value. (212F) (¹)	Push SET and DISPLAY together for longer than 3 seconds. → Push RESET/SHIFT → (211b) (212F) Setting an max value by + and -. → Push SET → Setting max value is entered → Push DISPLAY → Returns to display mode.	42 to 44
Setting of input 1 decimal point position. (213P) (¹)	Push SET and DISPLAY together for longer than 3 seconds. → Push RESET/SHIFT → (211b) (212F) Push RESET/SHIFT → Setting an decimal point position by + and -. → Push SET → (213P) Setting decimal point position is entered. → Push DISPLAY → Returns to display mode.	42 to 44
Setting of input 1 COS φ , Hz, var. (214)	Push SET and DISPLAY together for longer than 3 seconds. → Push RESET/SHIFT → (211b) (212F) Push RESET/SHIFT → Push RESET/SHIFT → Select an COSφ, Hz, var by + and -. → (213P) (214) Push SET → Selected COSφ, Hz, var is entered. → Push DISPLAY → Returns to display mode.	42 to 44

Note (¹) The bias value and max value and decimal point position setting (211b to 213P) of an input 1 is excepted, at the case of COS φ , Hz, var display (214) setting of input 1.

6.4 Measurement display mode in detail explanation

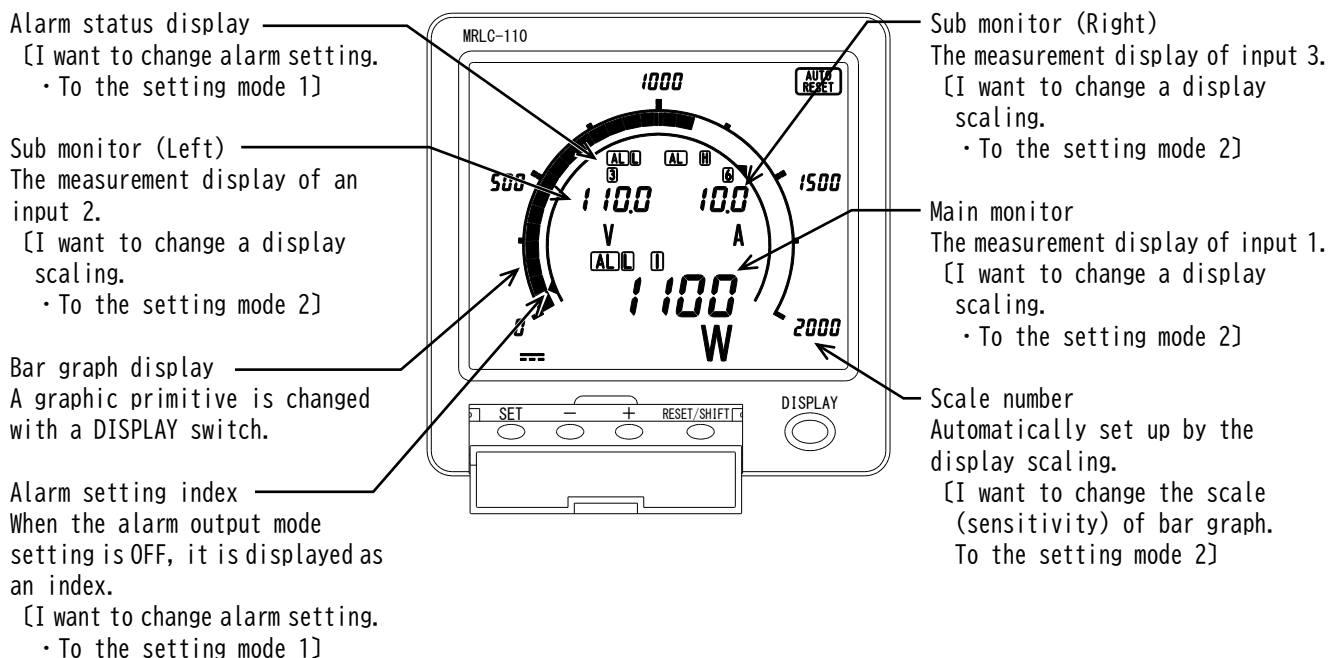
■ If a supply is put into this product, it will become a measurement display mode.

Digital display [Main monitor, Sub monitor (Left), Sub monitor (Right)]

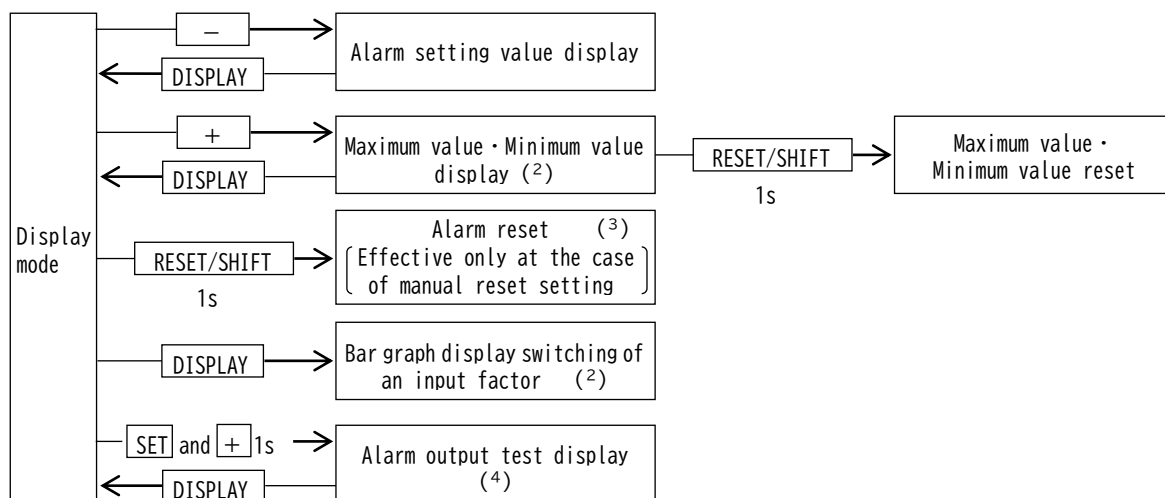
The measurement display of three factors can be performed simultaneously.

[I want to change display position. · To the setting mode 1]

· An input 2 and input 3 change with numbers of input circuits.



■ Switch operation from a measurement display mode



Note ⁽²⁾ By "DISPLAY switch function change setting", in case it is set as "⊕: bar graph display change" and "DISPLAY: maximum and the minimum value", if DISPLAY is pushed, maximum and the minimum value will be displayed.

Note ⁽³⁾ Alarm reset cannot be done at the case of automatic reset setting.

Note ⁽⁴⁾ In case of all detection in alarms 1 to 6, it does not change to an alarm output test display.

- By continuing pushing a SET switch for 3 seconds, it becomes the setting mode 1. ⇒ 30 pages
- By continuing pushing more than 3 seconds simultaneously in SET switch and DISPLAY switch, it becomes the setting mode 2. ⇒ 41 pages

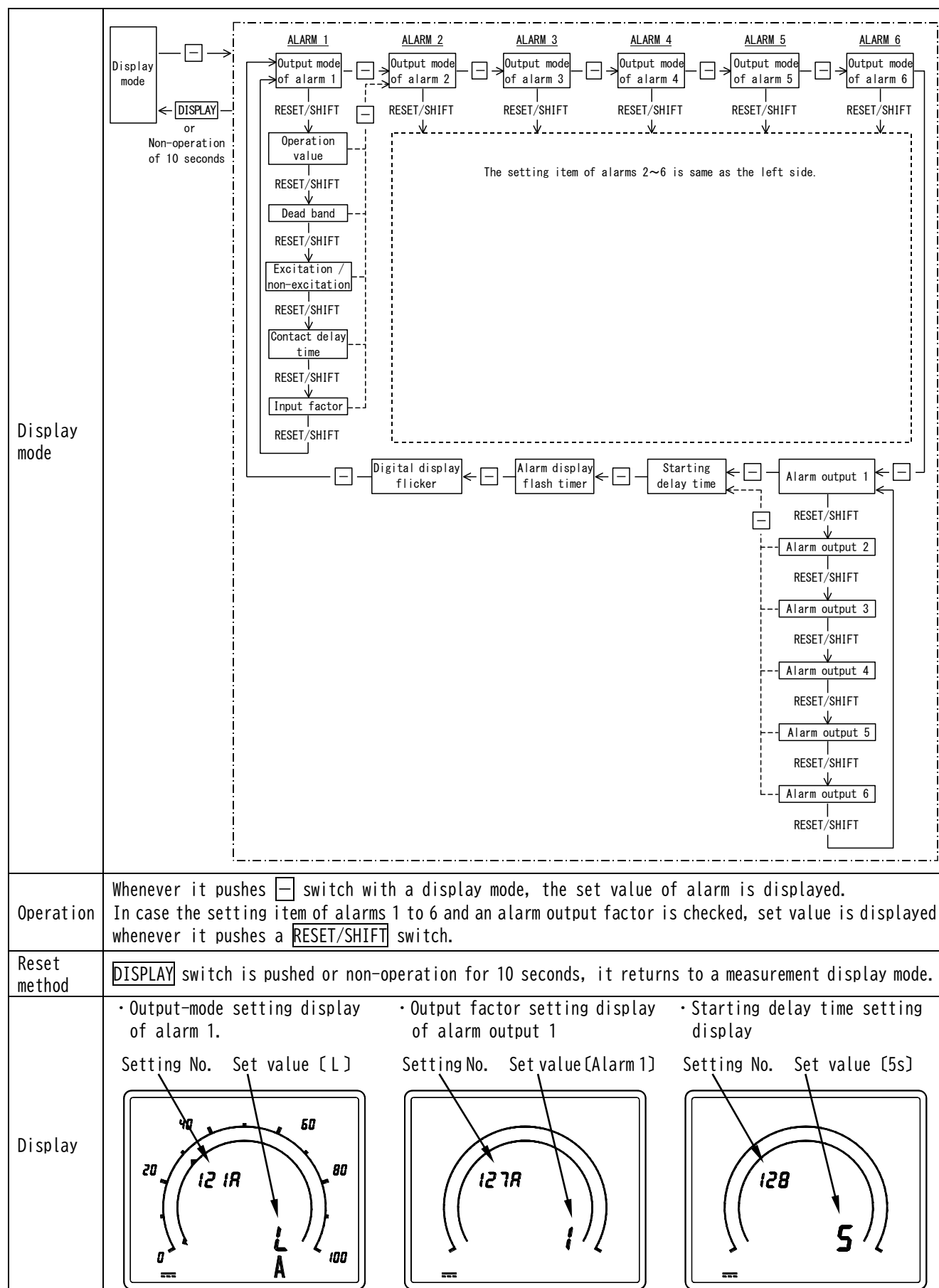
<Caution> There is a display item excepted by the number of input circuits or measurement display ON/OFF setting.

- In case of input 1 circuit specification, there is no display item of input 2 and input 3.
- In case of input 2 circuit specification, there is no display item of input 3.
- Please keep in mind that not all measurement values display in case a measurement display is OFF altogether.

■ Operation from a measurement display mode

(1) Alarm setting value display

The check of the set value of an alarm can be performed.



(2) Maximum value and minimum value display

The check of the maximum value and minimum value of an input factor can be performed.

The value is held even if maximum value and the minimum value turn off a power supply.

Display mode	
Operation	Whenever it pushes $\boxed{+}$ switch with a display mode, the maximum and minimum value of input factor is displayed. The maximum value and the minimum value are judged with a value including polarity. Example) In case of -10.0A and 5.0A. Maximum value : 5.0A, Minimum value : -10.0A Note⁽⁵⁾ By "DISPLAY switch function change setting", in case it is set as "$\boxed{+}$: bar graph display change" and "$\boxed{\text{DISPLAY}}$: maximum value and minimum value", if $\boxed{\text{DISPLAY}}$ is pushed, maximum and the minimum value will be displayed.
Reset method	$\boxed{\text{DISPLAY}}$ switch is pushed or non-operation for 10 minutes, it returns to a measurement display mode.
Display (Pattern 1)	•Maximum value display of input 1. •Minimum value display of input 1. Maximum value display Minimum value display

(3) Maximum and minimum value reset.

The maximum and the minimum holding value of an input factor are reset.

Reset procedure	
Reset method	$\boxed{+}$ switch is pushed from a display mode and it is made the maximum value and a minimum value display. If a $\boxed{\text{RESET/SHIFT}}$ switch is pushed for 1 continuous seconds above out of the maximum value and a minimum value display, the maximum hold value and minimum hold value of all input factors are reset.
After reset	Maximum value and minimum value are in agreement with the present input value after reset.
Display (Pattern 1)	• Maximum value and minimum value reset display A $\boxed{\text{RESET/SHIFT}}$ switch is pushed more than 1 second. Flashing the $\boxed{\text{MAX.}}$ and $\boxed{\text{MIN.}}$ for 3 seconds simultaneously.

(4) Alarm reset (Effective only at the case of manual reset setting.)

At the case of manual reset setting, the alarm output after detection and the holding status of alarm display can be reset. At the case of automatic reset setting, alarm reset cannot be performed.

Reset procedure	
Reset method	Among a display mode, if a RESET/SHIFT switch is pushed for 1 continuous second above, an alarm output and the holding status of alarm display will be reset.
After reset	An alarm output and alarm display show the present detection status after reset.
Display (Pattern 1)	• Alarm reset display

(5) Bar graph display change

The input factor that carries out a bar graph display can be changed.

Display change procedure			
Display change means	Among a display mode, whenever it pushes a DISPLAY switch, the bar graph displays of an input factor changes. Note⁽⁶⁾ By "DISPLAY switch function change setting", in case it is set as "+ : bar graph display change" and "DISPLAY : maximum value and minimum value", if + is pushed, the bar graph display of an input factor changes.		
Display (Pattern 1)	• Bar graph display of main monitor.	• Bar graph display of sub monitor (Left). Under-bar display of sub monitor (left).	• Bar graph display of sub monitor (Right). Under-bar display of sub monitor (right).

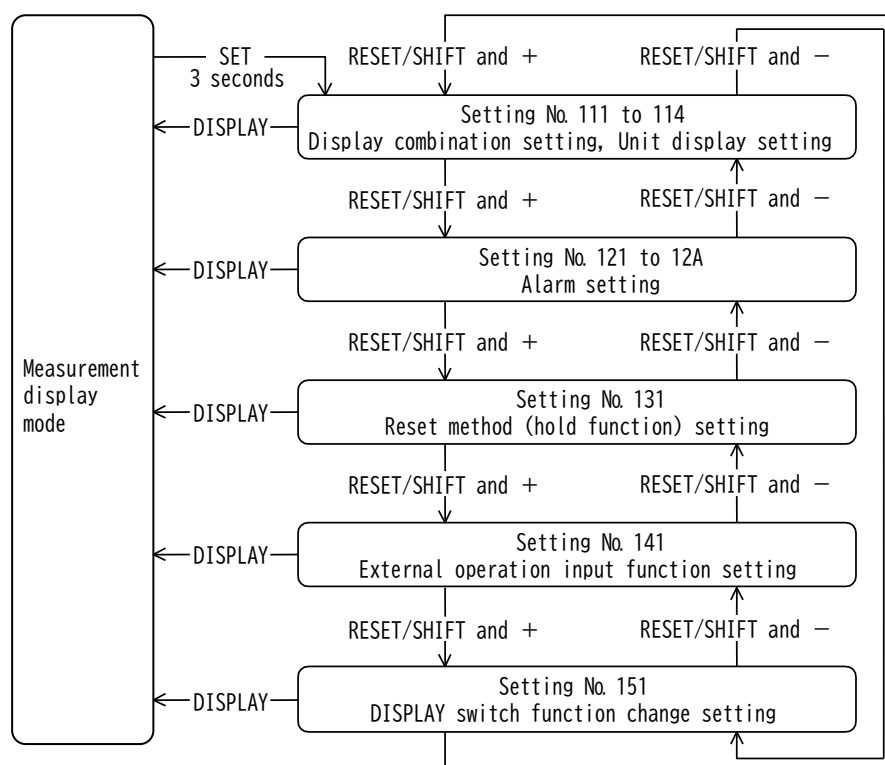
(6) Alarm output test

Relay operation of an alarm output can be checked. However, the detected factor cannot do an operation check. In case the set alarm factor is ON or OFF by alarm output factor setting, the relay movement and the warning display can be checked.

Display mode	Display mode SET and + Pushes more than 1 second. DISPLAY or Non-operation of 10 minutes ALARM 1 ON/OFF RESET/SHIFT OFF SET ON SET ALARM 2 ON/OFF RESET/SHIFT OFF SET ON SET ALARM 3 ON/OFF RESET/SHIFT OFF SET ON SET ALARM 4 ON/OFF RESET/SHIFT OFF SET ON SET ALARM 5 ON/OFF RESET/SHIFT OFF SET ON SET ALARM 6 ON/OFF RESET/SHIFT OFF SET ON SET	
Operation	If a SET switch and + switch are simultaneously pushed 1 second above from a display mode, it will go into an alarm-output test mode. However, because the detected factor cannot be checked, it is excepted from a test item. Whenever it pushes a SET switch, relay operation and alarm display are ON/OFF. An alarm output operates in ON or OFF an alarm factor (it set with output factor). It does not operate, in case it has set without a factor with the output factor.	
Reset method	DISPLAY switch is pushed or non-operation for 10 minutes, it returns to a measurement display mode.	
Display	Alarm display	• OFF display of an alarm 1 Alarm No. OFF is displayed Alarm display off • ON display of an alarm 1 Alarm No. ON is displayed Alarm display on Contents of setting (Excitation / non-excitation of alarm 1 : Excitation Alarm-output factor : Alarm 1
	Alarm output	OFF ON In case of non-excitation operation, relay operation becomes reverse.

6.5 Setting detail explanatory

6.5.1 Setting mode 1



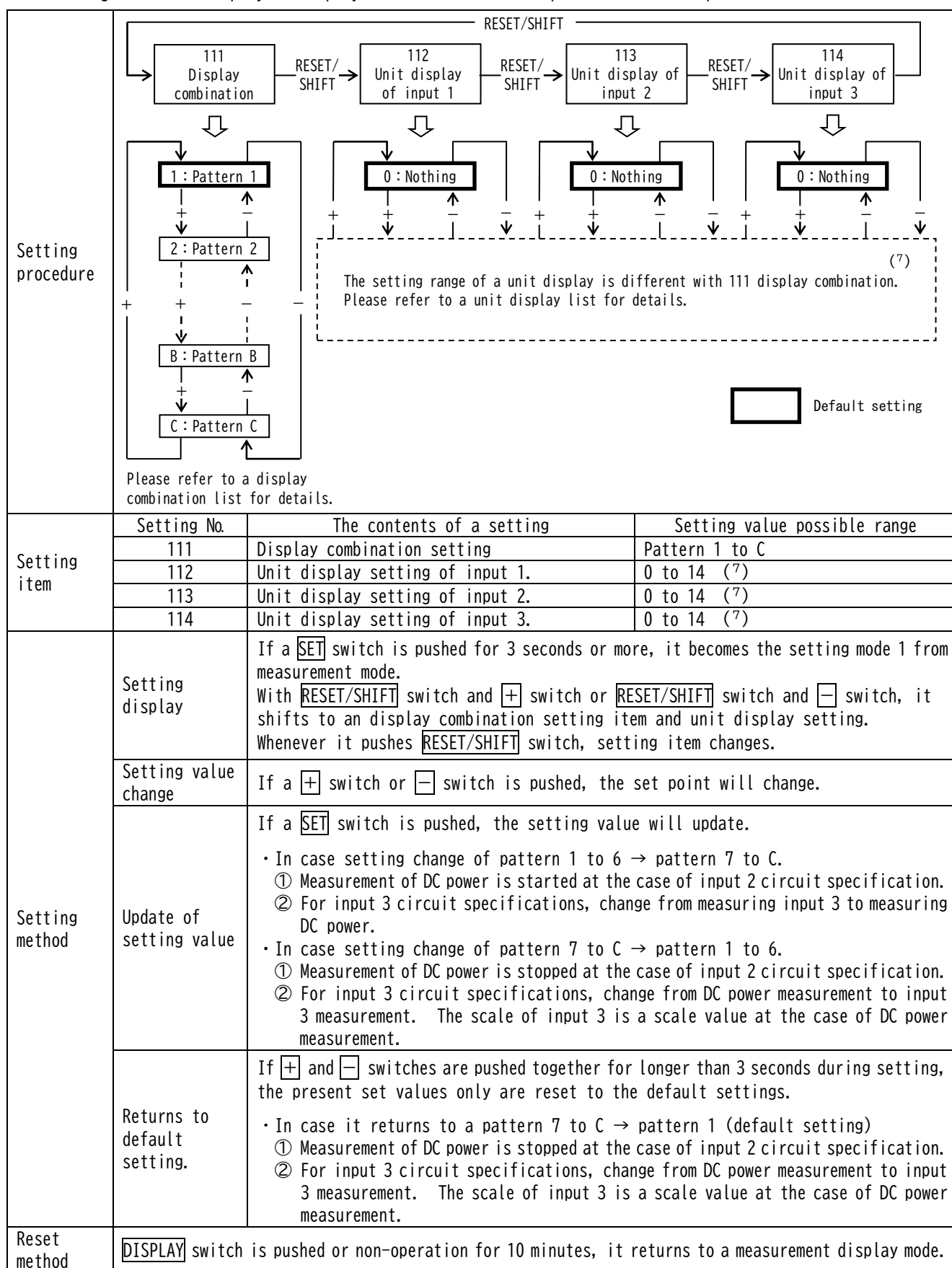
Setting mode 1 is selected by pushing **SET** switch for longer than 3 seconds. For shifting the setting items, push **+** and **RESET/SHIFT** or **-** and **RESET/SHIFT** together. The present mode can be returned to the display mode by pushing **DISPLAY** switch.

If **+** and **-** switches are pushed together for longer than 3 seconds during setting, the present set values only are reset to the default settings.

<Caution> There is a display item excepted by the number of input circuits or measurement display ON/OFF setting.

- In case of input 1 circuit specification, there is no display item of input 2 and input 3.
- In case of input 2 circuit specification, there is no display item of input 3.
- Please keep in mind that it does not become the setting mode 1 in case a measurement display is turned OFF altogether.

- (1) Display combination setting, Unit display setting (Setting No. 111 to 114)
Setting of a unit display of display combination and an input factor can be performed.



Note ⁽⁷⁾ By setting of display combination, there is set value which does not display by the unit in the position of a submonitor. The set value of the unit that cannot be displayed is excepted.

Display	• Display combination setting In case of pattern 1. Setting No. Present setting. Input 3 is displayed on sub-monitor (right). Input 1 is displayed on main monitor. Input 2 is displayed on sub-monitor (left). New setting • Unit display setting of an input 1 (Pattern 1) Setting No. Present setting. Unit display New setting	In case of pattern 7. Setting No. Present setting. Input 2(V) is displayed on sub-monitor (right). DC power (W) is displayed on main monitor. Input 1(A) is displayed on sub-monitor (left). New setting																																																																																																																																											
	Display position change and DC power measurement can be set by display combination. Pattern 1 : Standard , Pattern 2 to 6 : At the case of change designation of display position , Pattern 7 to C : At the case of DC power measurement designation. (In case A measurement and the input 2 of an input 1 are V measurement.) <table><tr><th>Pattern No.</th><th colspan="3">1 input specification</th><th colspan="3">2 input specification</th><th colspan="3">3 input specification</th></tr><tr><th></th><th>Main monitor</th><th>Sub monitor (Left)</th><th>Sub monitor (Right)</th><th>Main monitor</th><th>Sub monitor (Left)</th><th>Sub monitor (Right)</th><th>Main monitor</th><th>Sub monitor (Left)</th><th>Sub monitor (Right)</th></tr><tr><td>Pattern 1</td><td>INPUT 1</td><td>—</td><td>—</td><td>INPUT 1</td><td>INPUT 2</td><td>—</td><td>INPUT 1</td><td>INPUT 2</td><td>INPUT 3</td></tr><tr><td>Pattern 2</td><td></td><td></td><td></td><td>INPUT 1</td><td>—</td><td>INPUT 2</td><td>INPUT 1</td><td>INPUT 3</td><td>INPUT 2</td></tr><tr><td>Pattern 3</td><td></td><td></td><td></td><td>INPUT 2</td><td>INPUT 1</td><td>—</td><td>INPUT 2</td><td>INPUT 1</td><td>INPUT 3</td></tr><tr><td>Pattern 4</td><td></td><td></td><td></td><td>INPUT 2</td><td>—</td><td>INPUT 1</td><td>INPUT 2</td><td>INPUT 3</td><td>INPUT 1</td></tr><tr><td>Pattern 5</td><td></td><td></td><td></td><td>—</td><td>INPUT 1</td><td>INPUT 2</td><td>INPUT 3</td><td>INPUT 1</td><td>INPUT 2</td></tr><tr><td>Pattern 6</td><td></td><td></td><td></td><td>—</td><td>INPUT 2</td><td>INPUT 1</td><td>INPUT 3</td><td>INPUT 2</td><td>INPUT 1</td></tr><tr><td>Pattern 7</td><td></td><td></td><td></td><td>W</td><td>A</td><td>V</td><td>W</td><td>A</td><td>V</td></tr><tr><td>Pattern 8</td><td></td><td></td><td></td><td>W</td><td>V</td><td>A</td><td>W</td><td>V</td><td>A</td></tr><tr><td>Pattern 9</td><td></td><td></td><td></td><td>A</td><td>V</td><td>W</td><td>A</td><td>V</td><td>W</td></tr><tr><td>Pattern A</td><td></td><td></td><td></td><td>A</td><td>W</td><td>V</td><td>A</td><td>W</td><td>V</td></tr><tr><td>Pattern B</td><td></td><td></td><td></td><td>V</td><td>A</td><td>W</td><td>V</td><td>A</td><td>W</td></tr><tr><td>Pattern C</td><td></td><td></td><td></td><td>V</td><td>W</td><td>A</td><td>V</td><td>W</td><td>A</td></tr></table>		Pattern No.	1 input specification			2 input specification			3 input specification				Main monitor	Sub monitor (Left)	Sub monitor (Right)	Main monitor	Sub monitor (Left)	Sub monitor (Right)	Main monitor	Sub monitor (Left)	Sub monitor (Right)	Pattern 1	INPUT 1	—	—	INPUT 1	INPUT 2	—	INPUT 1	INPUT 2	INPUT 3	Pattern 2				INPUT 1	—	INPUT 2	INPUT 1	INPUT 3	INPUT 2	Pattern 3				INPUT 2	INPUT 1	—	INPUT 2	INPUT 1	INPUT 3	Pattern 4				INPUT 2	—	INPUT 1	INPUT 2	INPUT 3	INPUT 1	Pattern 5				—	INPUT 1	INPUT 2	INPUT 3	INPUT 1	INPUT 2	Pattern 6				—	INPUT 2	INPUT 1	INPUT 3	INPUT 2	INPUT 1	Pattern 7				W	A	V	W	A	V	Pattern 8				W	V	A	W	V	A	Pattern 9				A	V	W	A	V	W	Pattern A				A	W	V	A	W	V	Pattern B				V	A	W	V	A	W	Pattern C				V	W	A	V	W
Pattern No.	1 input specification			2 input specification			3 input specification																																																																																																																																						
	Main monitor	Sub monitor (Left)	Sub monitor (Right)	Main monitor	Sub monitor (Left)	Sub monitor (Right)	Main monitor	Sub monitor (Left)	Sub monitor (Right)																																																																																																																																				
Pattern 1	INPUT 1	—	—	INPUT 1	INPUT 2	—	INPUT 1	INPUT 2	INPUT 3																																																																																																																																				
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Pattern 3				INPUT 2	INPUT 1	—	INPUT 2	INPUT 1	INPUT 3																																																																																																																																				
Pattern 4				INPUT 2	—	INPUT 1	INPUT 2	INPUT 3	INPUT 1																																																																																																																																				
Pattern 5				—	INPUT 1	INPUT 2	INPUT 3	INPUT 1	INPUT 2																																																																																																																																				
Pattern 6				—	INPUT 2	INPUT 1	INPUT 3	INPUT 2	INPUT 1																																																																																																																																				
Pattern 7				W	A	V	W	A	V																																																																																																																																				
Pattern 8				W	V	A	W	V	A																																																																																																																																				
Pattern 9				A	V	W	A	V	W																																																																																																																																				
Pattern A				A	W	V	A	W	V																																																																																																																																				
Pattern B				V	A	W	V	A	W																																																																																																																																				
Pattern C				V	W	A	V	W	A																																																																																																																																				
Display combination list																																																																																																																																													

Unit display list	With display combination, the setting range of a unit display is different.			
	Unit display No.	Main monitor	Sub-monitor (Left)	Sub-monitor (Right)
	0	With no unit	With no unit	With no unit
	1	A	A	A
	2	kA	kA	kA
	3	V	V	V
	4	kV	kV	kV
	5	W	W	W
	6	kW	kW	kW
	7	MW	MW	MW
	8	°C	°C	°C
	9	%	%	%
	10	$\cos\varphi$	—	$\cos\varphi$
	11	Hz	Hz	—
	12	var	var	—
	13	kvar	kvar	—
	14	Mvar	Mvar	—

The unit of lettering is designation.

About the display at the case of DC power measurement

DC power is measured if display combination setting is set as a pattern 7 to C.

Please refer to the following table about operation of display.

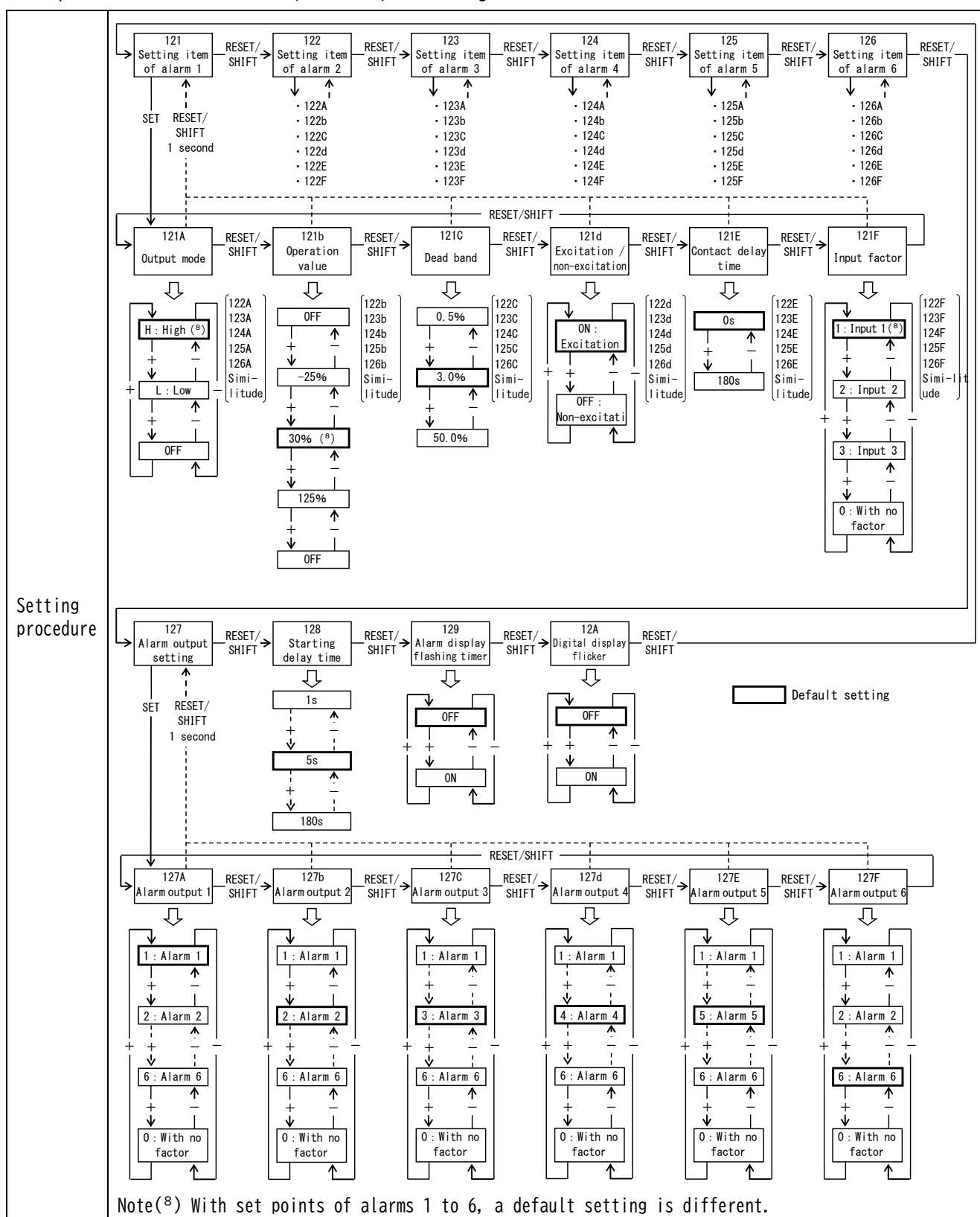
The automatic scaling of the scale of DC power is done from the scaling of input 1(A) and input 2(V).

Example ①	Input 1(A) : 0 to 60mV, Display : 0.0 to 100.0A Input 2(V) : 0 to 200V, Display : 0.0 to 200.0V DC power (W) display : 0.00 to 20.00kW	Example ②	Input 1(A) : ± 60 mV, Display : ± 100.0 A Input 2(V) : 0 to 200V, Display : 0.0 to 200.0V DC power (W) display : ± 20.00 kW
Display	DC power(W) display	Display	DC power (W) display

Example ③	Input 1(A) : ± 60 mV, Display : ± 100.0 A Input 2(V) : ± 200 V, Display : ± 200.0 V DC power (W) display : ± 20.00 kW
Display	DC power (W) display

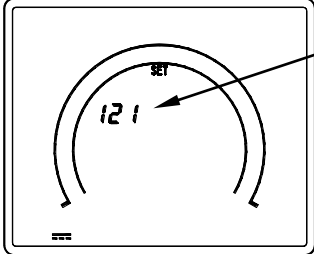
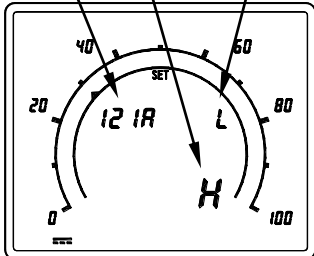
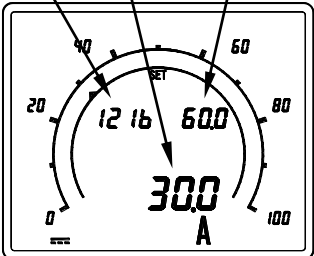
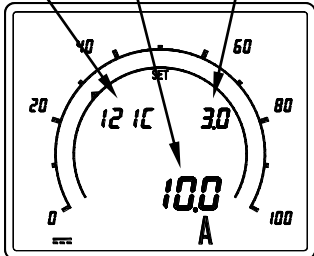
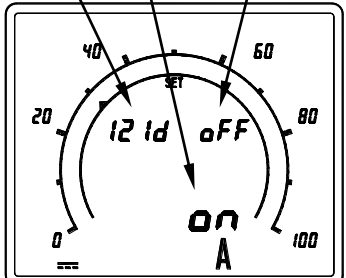
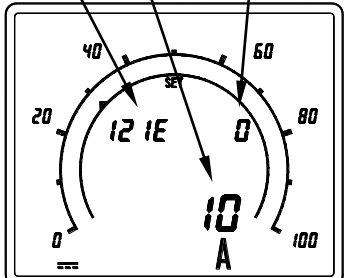
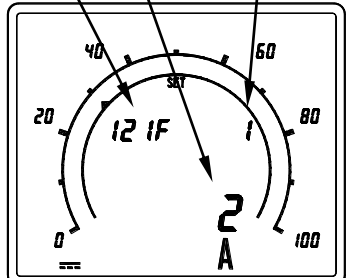
(2) Alarm setting (Setting No.121 to 12A)

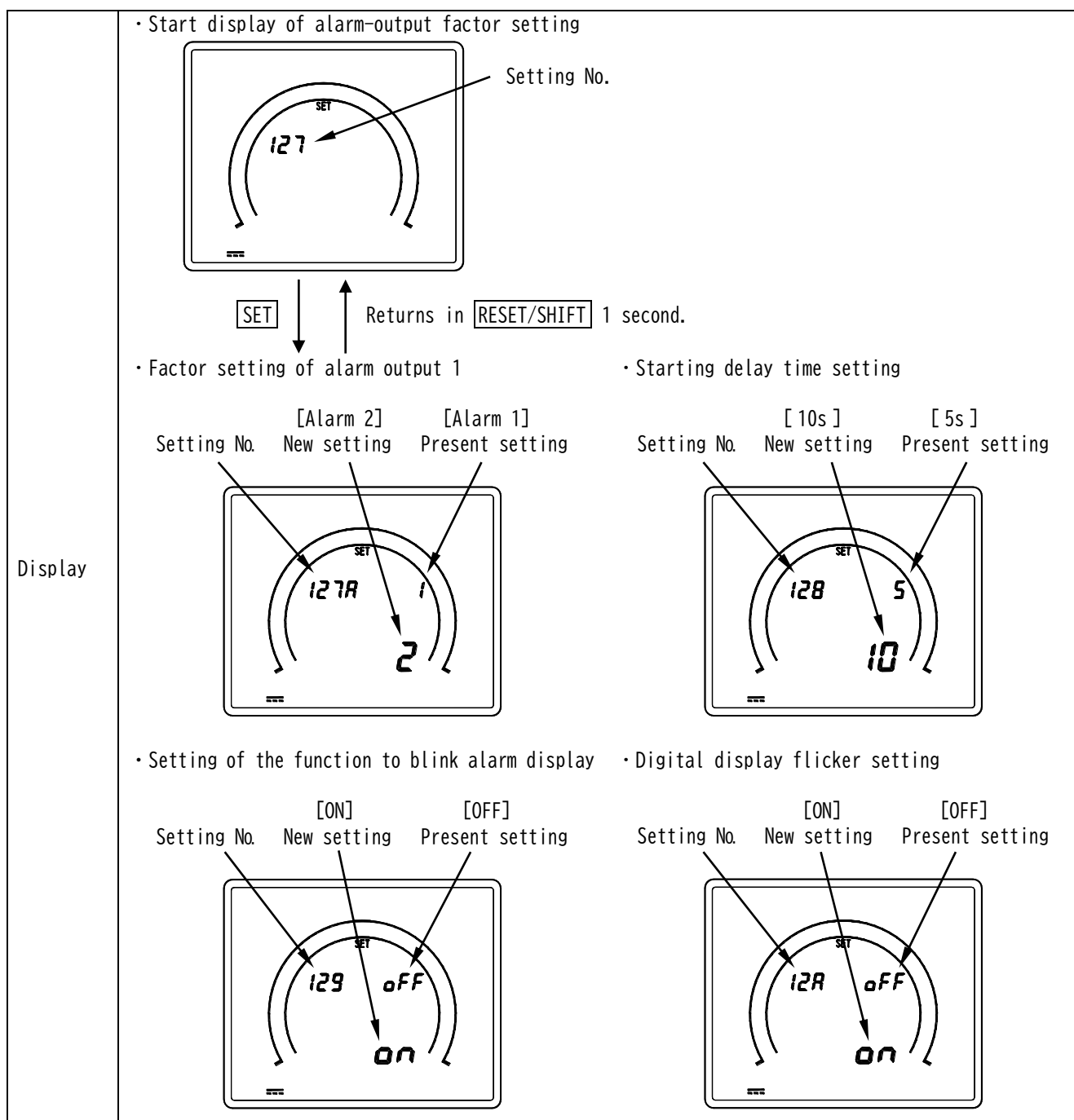
Operation of alarms 1 to 6 (AL 1 to 6) is setting.



Setting item	Setting No.	Contents of setting	Setting possible range	
	121A	Output mode setting of alarm 1	H: Upper limit , L: Lower limit , OFF	
	121b	Operation value setting of alarm 1	-25 to 125% for display span (°)	
	121C	Dead-band setting of alarm 1	0.5 to 50.0% for input span	
	121d	Excitation / non-excitation setting of alarm 1	ON: Excitation , OFF : Non-excitation	
	121E	Contact delay time setting of alarm 1	0 to 180s	
	121F	Input factor setting of alarm 1	Input 1 to 3, With no factor	
	122A	Output mode setting of alarm 2	H: Upper limit , L: Lower limit , OFF	
	122b	Operation value setting of alarm 2	-25 to 125% for display span (°)	
	122C	Dead-band setting of alarm 2	0.5 to 50.0% for input span	
	122d	Excitation / non-excitation setting of alarm 2	ON: Excitation , OFF : Non-excitation	
	122E	Contact delay time setting of alarm 2	0 to 180s	
	122F	Input factor setting of alarm 2	Input 1 to 3, With no factor	
	123A	Output mode setting of alarm 3	H: Upper limit , L: Lower limit , OFF	
	123b	Operation value setting of alarm 3	-25 to 125% for display span (°)	
	123C	Dead-band setting of alarm 3	0.5 to 50.0% for input span	
	123d	Excitation / non-excitation setting of alarm 3	ON: Excitation , OFF : Non-excitation	
	123E	Contact delay time setting of alarm 3	0 to 180s	
	123F	Input factor setting of alarm 3	Input 1 to 3, With no factor	
	124A	Output mode setting of alarm 4	H: Upper limit , L: Lower limit , OFF	
	124b	Operation value setting of alarm 4	-25 to 125% for display span (°)	
	124C	Dead-band setting of alarm 4	0.5 to 50.0% for input span	
	124d	Excitation / non-excitation setting of alarm 4	ON: Excitation , OFF : Non-excitation	
	124E	Contact delay time setting of alarm 4	0 to 180s	
	124F	Input factor setting of alarm 4	Input 1 to 3, With no factor	
	125A	Output mode setting of alarm 5	H: Upper limit , L: Lower limit , OFF	
	125b	Operation value setting of alarm 5	-25 to 125% for display span (°)	
	125C	Dead-band setting of alarm 5	0.5 to 50.0% for input span	
	125d	Excitation / non-excitation setting of alarm 5	ON: Excitation , OFF : Non-excitation	
	125E	Contact delay time setting of alarm 5	0 to 180s	
	125F	Input factor setting of alarm 5	Input 1 to 3, With no factor	
	126A	Output mode setting of alarm 6	H: Upper limit , L: Lower limit , OFF	
	126b	Operation value setting of alarm 6	-25 to 125% for display span (°)	
	126C	Dead-band setting of alarm 6	0.5 to 50.0% for input span	
	126d	Excitation / non-excitation setting of alarm 6	ON: Excitation , OFF : Non-excitation	
	126E	Contact delay time setting of alarm 6	0 to 180s	
	126F	Input factor setting of alarm 6	Input 1 to 3, With no factor	
	127A	Alarm output factor setting of alarm output 1 (ALARM OUTPUT 1, No. 13-14 terminal)	0 to 6	0: With no factor 1: The detection factor of alarm 1 is outputted. 2: The detection factor of alarm 2 is outputted. 3: The detection factor of alarm 3 is outputted. 4: The detection factor of alarm 4 is outputted. 5: The detection factor of alarm 5 is outputted. 6: The detection factor of alarm 6 is outputted.
	127b	Alarm output factor setting of alarm output 2 (ALARM OUTPUT 2, No. 15-16 terminal)		
	127C	Alarm output factor setting of alarm output 3 (ALARM OUTPUT 3, No. 17-18 terminal)		
	127d	Alarm output factor setting of alarm output 4 (ALARM OUTPUT 4, No. 19-20 terminal)		
	127E	Alarm output factor setting of alarm output 5 (ALARM OUTPUT 5, No. 21-22 terminal)		
	127F	Alarm output factor setting of alarm output 6 (ALARM OUTPUT 6, No. 23-24 terminal)		
	128	Setting of starting delay time	1 to 180s	
	129	Setting of the alarm display (AL1 to 6) at the case of alarm detection	OFF/ON	
12A	Setting of the digital display at the case of alarm detection	OFF/ON		

Note⁽⁹⁾ The setting value possible range at the case of COS Ψ display setup becomes 0 to 100% of display span.

Setting method	Setting display	If a [SET] switch is pushed for 3 seconds or more, it becomes the setting mode 1 from measurement mode. With [RESET/SHIFT] switch and [+] switch or [RESET/SHIFT] switch and [-] switch, it shifts to an alarm setting item. By pushing a [SET] switch, it shifts to an alarm setting item display (example : 121A) from the start display (example : 121) of alarm setting. Whenever it pushes [RESET/SHIFT] switch, setting item changes. If a [RESET/SHIFT] switch is pushed for 1 seconds or more, it will return to a start display (example : 121) of alarm setting.
	Setting value change	If a [+] switch or [-] switch is pushed, the set point will change. In case operation value setting, dead-band setting, and contact delay time setting are set, set value can change by high-speed operation gradually by continuing pushing a [+] switch or [-] switch.
	Update of setting value	If a [SET] switch is pushed, the setting value will update.
	Returns to default setting	If a [+] switch and a [-] switch are pushed together for 3 seconds or more from setting, the set alarm setting item returns to a default value.
Reset method	[DISPLAY] switch is pushed or non-operation during 10 minutes, it returns to a measurement display mode.	
Display	• Start display of alarm 1 setting  ↓ [SET] ↑ Returns in [RESET/SHIFT] 1 second.	
	• Output-mode setting of alarm 1	[H] [L] New setting Present setting Setting No. 
	• Operation value setting of alarm 1	[30.0A] [60.0A] New setting Present setting Setting No. 
	• Dead-band setting of alarm 1	[10.0%] [3.0%] New setting Present setting Setting No. 
	• Excitation / non-excitation setting of alarm 1	[ON] [OFF] New setting Present setting Setting No. 
	• Contact delay time setting of alarm 1	[10s] [0s] New setting Present setting Setting No. 
	• Input factor setting of alarm 1	[Input 2] [Input 1] New setting Present setting Setting No. 



(3) Reset method (hold function) setting (Setting No.131)

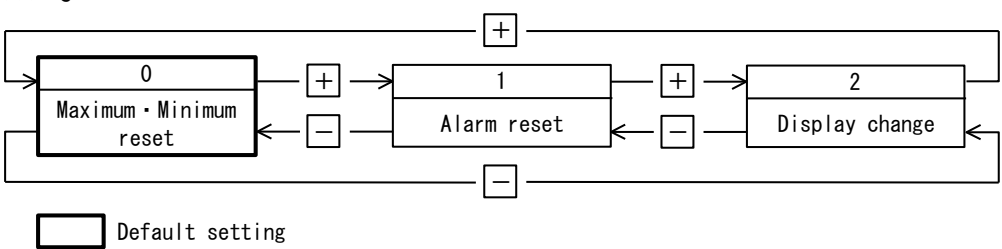
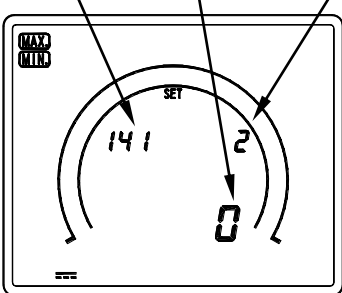
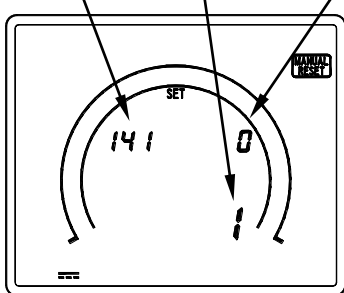
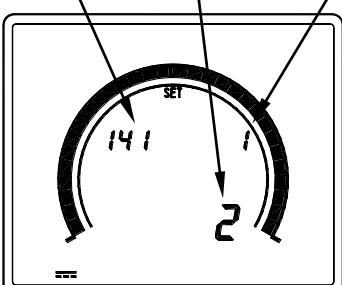
Return operation of an alarm output can be set up.

Setting procedure	Setting No.131 0 Automatic reset (Instant reset) 1 Manual reset (Self hold) Default setting		
Setting item	Setting No.	Contents of setting	Setting possible range
	131	Setting of the reset method of alarm output	0 : Automatic reset 1 : Manual reset
Setting method	Setting display	If a SET switch is pushed for 3 seconds or more, it becomes the setting mode 1 from measurement mode. With RESET/SHIFT switch and + switch or RESET/SHIFT switch and - switch, it shifts to an reset method setting item.	
	Setting value change	If a + switch or - switch is pushed, the set point will change.	
	Update of setting value	If a SET switch is pushed, the setting value will update.	
	Returns to default setting	If a + switch and a - switch are pushed together for 3 seconds or more from setting, the set alarm setting item returns to a default value.	
Reset method	DISPLAY switch is pushed or non-operation for 10 minutes, it returns to a measurement display mode.		
Display	• Automatic reset setting		
	Setting No. New setting Present setting 131 0 SET Default setting		
Display	• Manual reset setting		
	Setting No. New setting Present setting 131 1 SET Default setting		

(4) External operation input function setting (Setting No.141)

The function (three functions of the maximum value and minimum value reset, alarm reset, or display change) of an external input can be set up.

However, an alarm reset function is excepted at the case of automatic return setting (setting No.131).

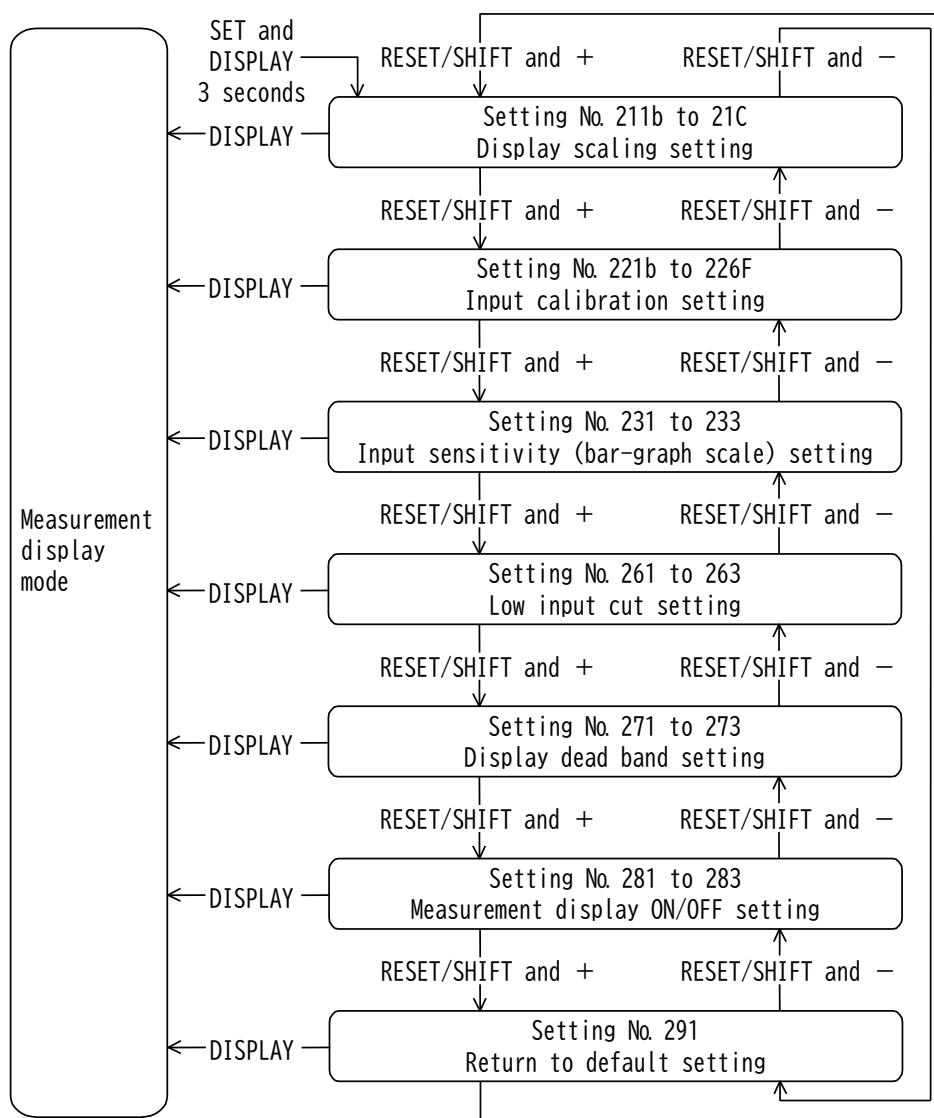
Setting procedure	Setting No.141 		
Setting item	Setting No.	Contents of setting	Setting possible range
	141	Setting of the function of external operation input.	0 : Maximum · Minimum reset 1 : Alarm reset 2 : Display change
Setting method	Setting display	If a SET switch is pushed for 3 seconds or more, it becomes the setting mode 1 from measurement mode. With RESET/SHIFT switch and + switch or RESET/SHIFT switch and - switch, it shifts to an external operation input function setting item.	
	Setting value change	If a + switch or - switch is pushed, the set point will change.	
	Update of setting value	If a SET switch is pushed, the setting value will update.	
	Returns to default setting	If a + switch and a - switch are pushed together for 3 seconds or more from setting, the set alarm setting item returns to a default value.	
Reset method	DISPLAY switch is pushed or non-operation for 10 minutes, it returns to a measurement display mode.		
Display	• Maximum value and minimum value reset setting • Alarm reset setting		
	Setting No. New setting Present setting 		
	Setting No. New setting Present setting 		
Display	• Display change setting		
	Setting No. New setting Present setting 		

(5) DISPLAY switch function change setting (Setting No. 151)

The function of DISPLAY switch and + switch can be replaced.

Setting procedure	Setting No. 151 0 DISPLAY : Bar graph display change. + : Maximum and minimum value display change. 1 DISPLAY : Maximum and minimum value display change + : Bar graph display change. + + - - Default setting		
Setting item	Setting No.	The contents of a setting	Setting value possible range
	151	The function change of DISPLAY switch and + switch.	0, 1
Setting method	Setting display	If a SET switch is pushed for 3 seconds or more, it becomes the setting mode 1 from measurement mode. With RESET/SHIFT switch and + switch or RESET/SHIFT switch and - switch, it shifts to an DISPLAY switch function change setting item.	
	Setting value change	If a + switch or - switch is pushed, the set point will change.	
	Update of setting value	If a SET switch is pushed, the set point will update.	
	Return to default setting	If + and - switches are pushed together for longer than 3 seconds during setting, the now set values only are reset to the default settings.	
Return method	DISPLAY switch is pushed or non-operation for 10 minutes, it returns to a measurement display mode.		
Display	• DISPLAY switch function change setting.		
	DISPLAY : In case of bar graph display change. DISPLAY : In case of maximum value and minimum value change. Setting No. New setting Present setting Setting No. New setting Present setting		

6.5.2 Setting mode 2



If **SET** switch and **DISPLAY** switch are simultaneously pushed for more than 3 seconds continuous, it will become the setting mode 2 from display mode.

For shifting the setting items, push **+** and **RESET/SHIFT** or **-** and **RESET/SHIFT** together.

The present mode can be returned to the display mode by pushing **DISPLAY** switch.

If **+** and **-** switches are pushed together for longer than 3 seconds during setting, the present set values only are reset to the default settings.

<Caution> There is a display item excepted by the number of input circuits or measurement display ON/OFF setting.

In case of input 1 circuit specification, there is no display item of input 2 and input 3.

In case of input 2 circuit specification, there is no display item of input 3.

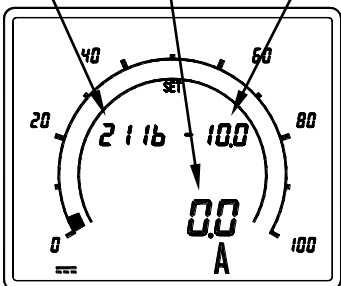
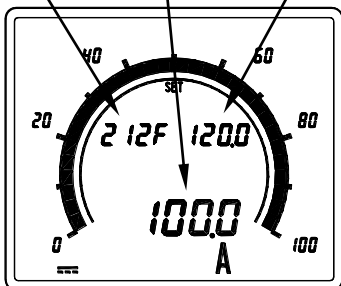
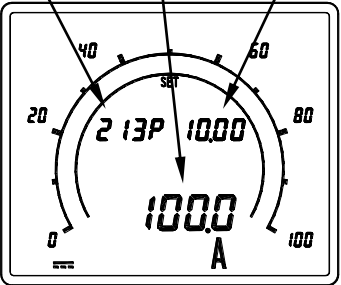
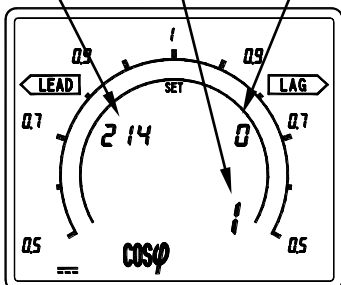
In case all measurement displays are OFF, it is possible of setting only of "Return to default setting" and "Measurement display ON/OFF setting" in the setting mode 2.

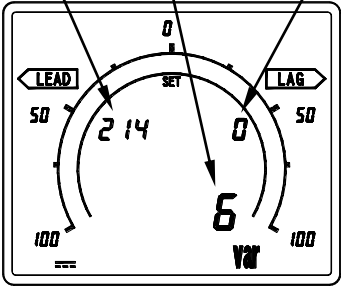
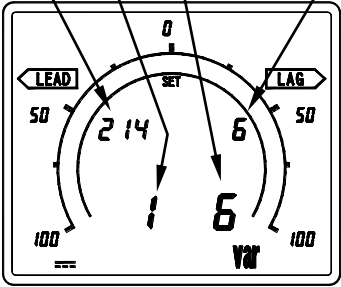
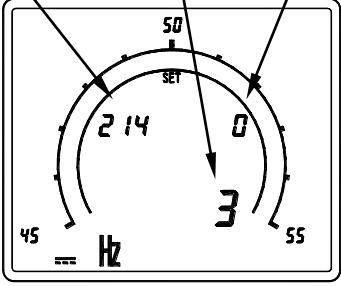
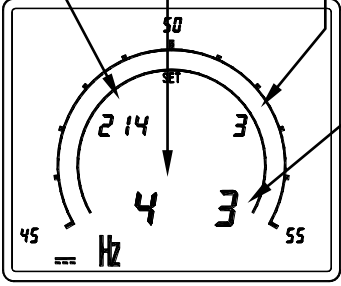
(1) Display scaling setting (Setting No. 211b to 21C)

Scaling setting of the displayed value of an input factor can be performed.

However, setting of BIAS value and MAX value turns into setting in the range of BIAS value < MAX value.

Setting procedure	RESET/SHIFT 211b BIAS value of input 1 RESET/SHIFT 212F MAX value of input 1 RESET/SHIFT 213P Decimal point of input 1 RESET/SHIFT 214 COS , Hz, var display of input1 215b~218 Setting item of input 2 219b~21C Setting item of input 3 (215b 219b similitude) (216F 21AF similitude) (217P 21bP similitude) (218 21C similitude) (215b 216F 217P 218 219b 21AF 21bP 21C (211b~214 similitude) (211b~214 similitude) -9999 0 9998 -9998 100.0 9999 □□□□ □□□.□ □□.□□ □.□□□ 0 : OFF 1 : Power factor 0.5~1~0.5 2 : Power factor 0~1~0 3 : Frequency 45~55Hz 4 : Frequency 55~65Hz 5 : Frequency 45~65Hz 6 : Reactive power LEAD□~0~LAG□ Default setting		
Setting item	Setting No.	The contents of a setting	Setting value possible range
	211b	Display BIAS value setting of input 1	-9999 to 9998 (var setting: LEAD 9999 to 1)
	212F	Display MAX value setting of input 1	-9998 to 9999 (var setting: LAG 1 to 9999)
	213P	Display decimal point setting of input 1	No decimal point to 3 digits decimal point
	214	COSφ, Hz, var display setting of input 1	COSφ: 0.5 to 1 to 0.5, 0 to 1 to 0 Hz : 45 to 55Hz , 55 to 65Hz , 45 to 65Hz var: LEAD□ to 0 to LAG□ (□ is set up in 211b to 213P)
	215b	Display BIAS value setting of input 2	-9999 to 9998 (var setting: LEAD 9999 to 1)
	216F	Display MAX value setting of input 2	-9998 to 9999 (var setting: LAG 1 to 9999)
	217P	Display decimal point setting of input 2	No decimal point to 3 digits decimal point
	218	COSφ, Hz, var display setting of input 2	COSφ: 0.5 to 1 to 0.5, 0 to 1 to 0 Hz : 45 to 55Hz , 55 to 65Hz , 45 to 65Hz var: LEAD□ to 0 to LAG□ (□ is set up in 215b to 217P)
	219b	Display BIAS value setting of input 3	-9999 to 9998 (var setting: LEAD 9999 to 1)
	21AF	Display MAX value setting of input 3	-9998 to 9999 (var setting: LAG 1 to 9999)
	21bP	Display decimal point setting of input 3	No decimal point to 3 digits decimal point
	21C	COSφ, Hz, var display setting of input 3	COSφ: 0.5 to 1 to 0.5, 0 to 1 to 0 Hz : 45 to 55Hz , 55 to 65Hz , 45 to 65Hz var: LEAD□ to 0 to LAG□ (□ is set up in 219b to 21bP)
Setting method	Setting display	If SET switch and DISPLAY switch are simultaneously pushed for more than 3 seconds continuous, it will become the setting mode 2 from display mode. With RESET/SHIFT switch and + switch or RESET/SHIFT switch and - switch, it shifts to an display scaling setting item. Whenever it pushes RESET/SHIFT switch, setting item changes If COSφ or Hz display setting is being done by display scaling setting, display (bias value, Max value, decimal point) setting of the input factor is excepted.	

Setting method	Setting value change	If a $\boxed{+}$ switch or $\boxed{-}$ switch is pushed, the set point will change. The set point can change in high-speed operation gradually by continuing pushing $\boxed{+}$ switch or $\boxed{-}$ switch. At the case of DC power measurement (pattern 7 to C) setting, the automatic scaling of the scale (219b to 21bP) of power is done from the scale of input 1 (current) and input 2 (voltage). The scaling change by manual operation is possible. However, please give only as the number of digits of the numerical value that did the automatic scaling, and change of decimal point. (Please keep in mind that displayed value will shift.) If a display change (3 digit display $\leftrightarrow$ 4 digit display) is done at the case of Hz display setting, it changes by $\boxed{\text{SET}}$ switch pushing and pushing $\boxed{+}$ switch. In case of 4 digit display, it is displayed as "4" on the 4th digit of a digital display. Even if it is at the COSϕ and var setting case and has selected other input factors as bar graph, in case LEAD/LAG is given priority to and displayed selection will be possible if $\boxed{\text{SET}}$ switch is pushed and with a $\boxed{+}$ switch pushed. It is displayed on the 4th digit of a digital display as "1".
	Update of setting value	If a $\boxed{\text{SET}}$ switch is pushed, the set value will update. The upper limit and lower limit flicker value of the updated input factor return to default setting. (There is no change of alarm ON/OFF setting.)
	Return to default setting	$\boxed{+}$ and $\boxed{-}$ switch are simultaneously pushed 3 seconds above from setting. The alarm setting which has set the input factor and display scaling value of input factor which have been set now returns to default setting.
Return method	$\boxed{\text{DISPLAY}}$ switch is pushed or non-operation for 10 minutes, it returns to a measurement display mode.	
Display	• Bias setting of input 1 Setting No. New setting Present setting 	• Max setting of input 1 Setting No. New setting Present setting 
	• Decimal point setting of input 1 Setting No. New setting Present setting 	• COSϕ setting of input 1 In case of COSϕ : 0.5 to 1 to 0.5 Setting No. New setting Present setting 

Display	• var setting of input 1 Setting No. New setting Present setting  ↔ In case the LEAD/LAG is display by priority Indicate Setting No. New setting Present setting 
	• Hz setting of input 1 Frequency : 45 to 55Hz (3 digit) Setting No. New setting Present setting  ↔ Frequency : 45 to 55Hz (4 digit) Setting No. 4 digit indicate Present setting New setting 

(2) Input calibration setting (Setting No. 221b to 226F)

Displayed value adjustments (zero adjustment etc.) of an input factor can be performed.

Setting procedure	RESET/SHIFT 221b BIAS value of input 1 223b 225b similitude -9.99% + 0.00% + 9.99% - RESET/SHIFT 222F SPAN value of input 1 224F 226F similitude -9.99% + 0.00% + 9.99% - 223b~224F Setting item of input 2 • 213b • 214F 225b~226F Setting item of input 3 • 215b • 216F Default setting		
Setting item	Setting No.	The contents of a setting	Setting value possible range
	221b	Calibration (BIAS) setting of input 1	-9.99% to 9.99% of input span.
	222F	Calibration (SPAN) setting of input 1	-9.99% to 9.99% of input span.
	223b	Calibration (BIAS) setting of input 2	-9.99% to 9.99% of input span.
	224F	Calibration (SPAN) setting of input 2	-9.99% to 9.99% of input span.
	225b	Calibration (BIAS) setting of input 3	-9.99% to 9.99% of input span.
	226F	Calibration (SPAN) setting of input 3	-9.99% to 9.99% of input span.
Setting method	setting display	If [SET] switch and [DISPLAY] switch are simultaneously pushed for more than 3 seconds continuous, it will become the setting mode 2 from display mode. With [RESET/SHIFT] switch and [+] switch or [RESET/SHIFT] switch and [-] switch, it shifts to an input calibration setting item. Whenever it pushes [RESET/SHIFT] switch, setting item changes	
	Setting value change	If a [+] switch or [-] switch is pushed, the set point will change. The set value can change by high-speed operation gradually by continuing pushing a [+] switch or [-] switch.	
	Update of setting value	If a [SET] switch is pushed, the set point will update.	
	Return to default setting	[+] and [-] switch are simultaneously pushed 3 seconds above from setting. The value set now returns to default setting.	
Return method	[DISPLAY] switch is pushed or non-operation for 10 minutes, it returns to a measurement display mode.		
Display	•Bias setting of input 1. Setting No. Setting value 22 1b 002 00 A Measurement value now •Span setting of input 1. Setting No. Setting value 222F -002 80.0 A Measurement value now		

(3) Input sensitivity setting (Setting No. 231 to 233)

Sensitivity change of the bar graph display of an input factor can be performed.

Setting procedure	RESET/SHIFT 231 Input sensitivity of an input 1 (Bar graph full-scale) ↓ 100% ↑ ↓ 50% ↑ ↓ 1% RESET/SHIFT 232 Input sensitivity of an input 2 (Bar graph full-scale) ↓ 100% ↑ ↓ 50% ↑ ↓ 1% RESET/SHIFT 233 Input sensitivity of an input 3 (Bar graph full-scale) ↓ 100% ↑ ↓ 50% ↑ ↓ 1% Default setting		
Setting item	Setting No.	The contents of a setting	Setting value possible range ⁽¹⁰⁾
	231	Input sensitivity (bar graph full-scale) setting of an input 1	1% to 100% of full-scale.
	232	Input sensitivity (bar graph full-scale) setting of an input 2	1% to 100% of full-scale.
	233	Input sensitivity (bar graph full-scale) setting of an input 3	1% to 100% of full-scale.
Setting method	setting display	If SET switch and DISPLAY switch are simultaneously pushed for more than 3 seconds continuous, it will become the setting mode 2 from display mode. With RESET/SHIFT switch and + switch or RESET/SHIFT switch and - switch, it shifts to an input sensitivity setting item. Whenever it pushes RESET/SHIFT switch, setting item changes. They are COSφ or the case where Hz display setting is being done, by display scaling setting, only the item of the input factor is excepted.	
	Setting value change	If a + switch or - switch is pushed, the set point will change.	
	Update of setting value	If a SET switch is pushed, the set point will update.	
	Return to default setting.	If + and - switches are pushed together for longer than 3 seconds during setting, the present set values only are reset to the default settings.	
Return method	DISPLAY switch is pushed or non-operation for 10 minutes, it returns to a measurement display mode.		
Display	•Sensitivity setting of input 1 Setting No. New setting Present setting 		

Note ⁽¹⁰⁾ As for 39% or less of input sensitivity setting, the accuracy class of bar graph display differs.

(4) Low input cut setting (Setting No. 261 to 263)

Displayed value is fixed to 0 at the case of the minute input equivalent to less than 0.5% of an input span. However, it is effective only at the case of display scaling 0 to N, and -N to 0 to N (example : -100 to 0 to 100).

Please don't function at the case of -N' to 0 to N (example : -10 to 0 to 100).

Setting procedure	RESET/SHIFT 261 Low input cut setting of input 1 RESET/ SHIFT 262 Low input cut setting of input 2 RESET/ SHIFT 263 Low input cut setting of input 3 RESET/SHIFT OFF ON OFF ON OFF ON Default setting		
Setting item	Setting No.	The contents of a setting	Setting value possible range
	261	Low input cut setting of input 1	ON/OFF
	262	Low input cut setting of input 2	ON/OFF
	263	Low input cut setting of input 3	ON/OFF
Setting method	setting display	If SET switch and DISPLAY switch are simultaneously pushed for more than 3 seconds continuous, it will become the setting mode 2 from display mode. With RESET/SHIFT switch and + switch or RESET/SHIFT switch and - switch, it shifts to an low input cut setting item. Whenever it pushes RESET/SHIFT switch, setting item changes.	
	Setting value change	If a + switch or - switch is pushed, the set point will change.	
	Update of setting value	If a SET switch is pushed, the set point will update.	
	Return to default setting.	If + and - switches are pushed together for longer than 3 seconds during setting, the present set values only are reset to the default settings.	
Return method	DISPLAY switch is pushed or non-operation for 10 minutes, it returns to a measurement display mode.		
Display	•Low input cut setting of input 1 Setting No. New setting Present setting 		

(5) Display dead band setting (Setting No. 271 to 273)

Setting in case it suppresses the variation in the displayed value by input change.

Setting procedure	RESET/SHIFT 271 Display dead band setting of input 1 0.0% 1.0% 2.0% RESET/SHIFT 272 Display dead band setting of input 2 0.0% 1.0% 2.0% RESET/SHIFT 273 Display dead band setting of input 3 0.0% 1.0% 2.0% Default setting		
Setting item	Setting No.	The contents of a setting	Setting value possible range
	271	Display dead band setting of input 1	0.0% to 2.0%
	272	Display dead band setting of input 2	0.0% to 2.0%
	273	Display dead band setting of input 3	0.0% to 2.0%
Setting method	setting display	If [SET] switch and [DISPLAY] switch are simultaneously pushed for more than 3 seconds continuous, it will become the setting mode 2 from display mode. With [RESET/SHIFT] switch and [+] switch or [RESET/SHIFT] switch and [-] switch, it shifts to an display dead band setting item. Whenever it pushes [RESET/SHIFT] switch, setting item changes.	
	Setting value change	If a [+] switch or [-] switch is pushed, the set point will change.	
	Update of setting value	If a [SET] switch is pushed, the set point will update.	
	Return to default setting.	If [+] and [-] switches are pushed together for longer than 3 seconds during setting, the present set values only are reset to the default settings.	
Return method	[DISPLAY] switch is pushed or non-operation for 10 minutes, it returns to a measurement display mode.		
Display	•Display dead band setting of input 1 Setting No. New setting Present setting 		

(6) Measurement display ON/OFF setting (Setting No. 281 to 283)

Setting of measurement display ON/OFF of an input factor.

It becomes impossible setting the alarm related to the input factor OFF by this setting.

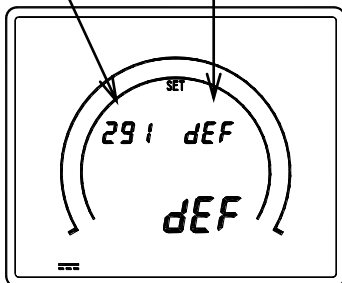
In case measurement display setting is ON from OFF, alarm setting is still OFF.

Please redo setting of the alarm setting.

Setting procedure	RESET/SHIFT 281 Measurement display ON/OFF setting of input 1 RESET/SHIFT 282 Measurement display ON/OFF setting of input 2 RESET/SHIFT 283 Measurement display ON/OFF setting of input 3 ON OFF ON OFF ON OFF Default setting		
Setting item	Setting No.	The contents of a setting	Setting value possible range
	281	Measurement display ON/OFF setting of input 1	ON/OFF
	282	Measurement display ON/OFF setting of input 2	ON/OFF
	283	Measurement display ON/OFF setting of input 3	ON/OFF
Setting method	setting display	If SET switch and DISPLAY switch are simultaneously pushed for more than 3 seconds continuous, it will become the setting mode 2 from display mode. With RESET/SHIFT switch and + switch or RESET/SHIFT switch and - switch, it shifts to an measurement display ON/OFF setting item. Whenever it pushes RESET/SHIFT switch, setting item changes.	
	Setting value change	If a + switch or - switch is pushed, the set point will change.	
	Update of setting value	If a SET switch is pushed, the set point will update.	
	Return to default setting.	If + and - switches are pushed together for longer than 3 seconds during setting, the present set values only are reset to the default settings.	
Return method	DISPLAY switch is pushed or non-operation for 10 minutes, it returns to a measurement display mode.		
Display	•Measurement display ON/OFF setting of input 1 Setting No. New setting Present setting 		

(7) Return to default setting (Setting No. 291)

All set values are returned to default setting.

Setting procedure	291 Default setting — SET is pushed 3 seconds or more. → Returns to default setting.		
Setting item	Setting No.	The contents of a setting	Setting value possible range
	291	Setting returned to default setting	—
Setting method	setting display	If SET switch and DISPLAY switch are simultaneously pushed for more than 3 seconds continuous, it will become the setting mode 2 from display mode. With RESET/SHIFT switch and + switch or RESET/SHIFT switch and - switch, it shifts to an “returns to default setting value” item.	
	Return to default setting.	If the SET switch is pushed 3 seconds above, all set values will return to default setting.	
Return method	DISPLAY switch is pushed or non-operation for 10 minutes, it returns to a measurement display mode.		
Display	• Setting returned to initial setting value. Setting No. Displayed when initialized. 		

6.6 About the scale of bar graph

- (1) The scale of the bar graph is automatically selected from the standard scales below to display the closest scale that includes the full-scale value of the display.

And, a standard bar graph display becomes two kinds. (0 to N, -N to 0 to N)

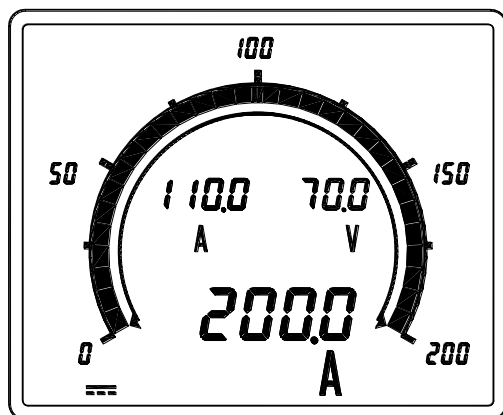
Bar graph display of standard

Fragment swing	0 to N
Both swing	-N to 0 to N

$-9900 \leq N \leq 9900$

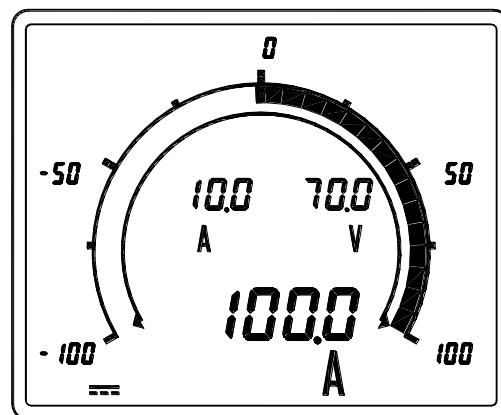
<Caution> The bar graphical representation -N to 0 cannot be displayed. In case display scaling is -100 to 0, bar graphical representation is set to -100 to 0 to 100 (both swings).

Example) Fragment swing



In case of display scaling setting 0 to 200.0A of input 1.

Example) Both swing

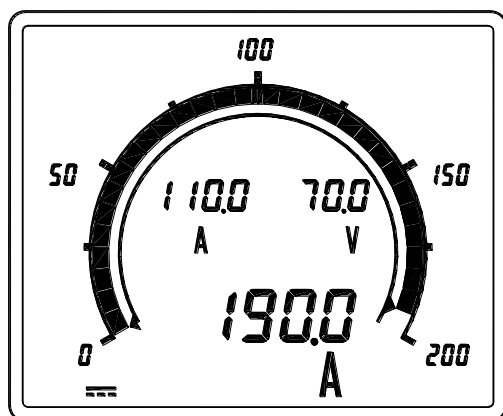


In case of display scaling setting -100 to 0 to 100.0A of input 1.

Standard scale	1, 1.2, 1.5, 1.6, 1.8, 2, 2.4, 2.5, 3, 3.2, 3.6, 4, 4.5, 4.8, 5, 6, 6.4, 7.2, 7.5, 8, 9, 9.6 ($\times 10^n$, n =Integral multiple.)
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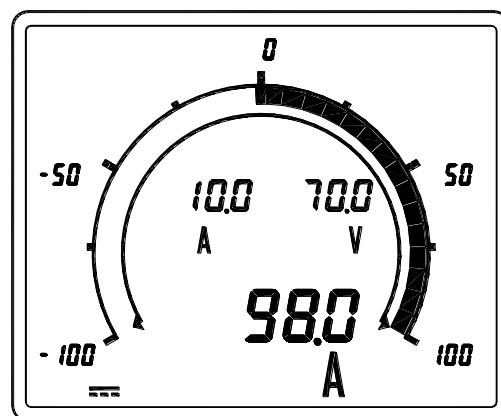
- (2) In case a display full-scale value becomes between the above scale division by setting of a display scaling. The nearest bar graph scale including the value is selected.

Example) In case of display scaling setting 0 to 190.0A of input 1.



The scale of 200 is selected because there is no scale 190. (The nearest bar scale including 190.0 values is selected.)

Example) In case of display scaling setting -98.0 to +98.0A of input 1.



The scale of 100 is selected because there is no scale 98. (The nearest bar scale including 98.0 values is selected.)

<Caution>

- In case of the scale which does not contain 0, such as 10 to 2000, display as the standard bar graph scale is 0 to 2000.
- In case of unbalanced scales, such as -10 to 0 to 100, display as the standard bar graph scale is -100 to 0 to 100.

Please consult, in case you wish to have bar graph scales other than the above.

- (3) Please refer to an attached chart 1 "Bar graph scale division details" about the details of each scale division.

7. Specification

7.1 Type and specification code

Type		Specification code									
①	②	③	④	⑤	⑥	⑦	⑧	⑨			
Type	Hardware model	Input 1	Input 2	Input 3	Auxiliary supply	External operation input	Communication output	Alarm output			
MRLC-110 Without backlight	A Hardware model A	—	0 Without input ⁽¹⁴⁾	0 Without input ⁽¹⁴⁾	1 AC85 to 253V DC80 to 143V common use	2 With external operation input (Function change is possible)	0 Without communication output	6 6 output a contact			
		1 DC1 to 5V	1 DC1 to 5V	1 DC1 to 5V	2 DC20 to 56V		Z Other ⁽¹⁵⁾				
		2 DC0 to 1V	2 DC0 to 1V	2 DC0 to 1V							
		3 DC0 to 5V	3 DC0 to 5V	3 DC0 to 5V							
		4 DC0 to 10V	4 DC0 to 10V	4 DC0 to 10V	Z Other						
		5 DC4 to 20mA	5 DC4 to 20mA	5 DC4 to 20mA							
		6 DC0 to 1mA	6 DC0 to 1mA	6 DC0 to 1mA							
		7 DC0 to 5mA	7 DC0 to 5mA	7 DC0 to 5mA							
		8 DC0 to 10mA	8 DC0 to 10mA	8 DC0 to 10mA							
		9 DC0 to 16mA	9 DC0 to 16mA	9 DC0 to 16mA							
		A DC0 to 20mA	A DC0 to 20mA	A DC0 to 20mA							
		B DC0 to 50mV	B DC0 to 50mV	B DC0 to 50mV							
		C DC0 to 60mV	C DC0 to 60mV	C DC0 to 60mV							
		D DC0 to 100mV	D DC0 to 100mV	D DC0 to 100mV							
		E DC0 to 50V	E DC0 to 50V	E DC0 to 50V							
		F DC0 to 75V	F DC0 to 75V	F DC0 to 75V							
		G DC0 to 100V	G DC0 to 100V	G DC0 to 100V							
		H DC0 to 150V	H DC0 to 150V	H DC0 to 150V							
		J DC0 to 200V	J DC0 to 200V	J DC0 to 200V							
		Y DC±301 to ±800V ⁽¹¹⁾	Y DC±301 to ±800V ⁽¹¹⁾	Y DC±301 to ±800V ⁽¹¹⁾							
		Z Other ⁽¹²⁾	Z Other ⁽¹²⁾	Z Other ⁽¹²⁾							
		DC power measurement specification ⁽¹³⁾									
		B DC0 to 50mV	E DC0 to 50V	W DC power measurement ⁽¹³⁾							
		C DC0 to 60mV	F DC0 to 75V								
		D DC0 to 100mV	G DC0 to 100V								
			H DC0 to 150V								
			J DC0 to 200V								
			Y DC±301 to ±800V ⁽¹¹⁾								
Z Other ⁽¹²⁾	Z Other ⁽¹²⁾										

Function change is possible by setting.

① Maximum value and minimum value reset

② Alarm reset

③ Display change

Function change is possible by setting.
 ① Maximum value and minimum value reset
 ② Alarm reset
 ③ Display change

Note ⁽¹¹⁾ If voltage input more than $\pm 301V$, it is used attaching series resistor DM-1 (accessories).

Note ⁽¹²⁾ 1) Input range standard range 1. Voltage input $\pm 50mV$ to $\pm 650V$

2. Current input $\pm 500\mu A$ to $\pm 50mA$

2) Input range special range 1. Voltage input $\pm 651V$ to $\pm 800V$

2. Current input $\pm 100\mu A$ to $\pm 499\mu A$

(Digital display accuracy changes to 1.0 $\rightarrow$ 1.5)

3) If current input exceeds $\pm 50mA$, please select the rating which matched the shunt (option) to be used.

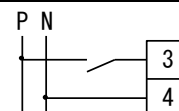
Note ⁽¹³⁾ DC power measurement is calculated and displayed from the measurement value (current value) of input 1, and the measurement value (voltage value) of input 2. In case of selection of DC power measurement specification, please select an input 1 from code B to D and input 2 from code E to J and Y. Please designate code Z, in case inputs 1 and 2 are except the above code. And, a display pattern should select 7 to C.

Note ⁽¹⁴⁾ In case of one input, input 2 and 3 should select a code 0. In case of two inputs, input 3 should select a code 0.

Note ⁽¹⁵⁾ An alarm output can also make a b contact. (Option)

7.2 Specification

Item	Specification			
Number of input circuits	Maximum of 3 circuits (Mutual interval, insulates by AC2000V.)			
Input range	Code	Input	Input resistance	Note
	0	Input nothing	—	Standard range of input range Voltage input : $\pm 50\text{mV}$ to $\pm 650\text{V}$ Current input : $\pm 500\mu\text{A}$ to $\pm 50\text{mA}$
	1	DC1 to 5V	About $1\text{M}\Omega$	
	2	DC0 to 1V		
	3	DC0 to 5V		
	4	DC0 to 10V		
	5	DC4 to 20mA	About 50Ω	Special range of input range Voltage input : $\pm 651\text{V}$ to $\pm 800\text{V}$ Current input : $\pm 100\mu\text{A}$ to $\pm 499\mu\text{A}$ (Digital display accuracy changes to 1.0→1.5)
	6	DC0 to 1mA	About $1\text{k}\Omega$	
	7	DC0 to 5mA	About 200Ω	
	8	DC0 to 10mA	About 100Ω	
	9	DC0 to 16mA	About 50Ω	If voltage input more than $\pm 301\text{V}$, it is used attaching series resistor DM-1 (accessories). If current input exceeds $\pm 50\text{mA}$, it is used attaching shunt (option).
	A	DC0 to 20mA		
	B	DC0 to 50mV	About $1\text{M}\Omega$	
	C	DC0 to 60mV		
	D	DC0 to 100mV		
	E	DC0 to 50V		
	F	DC0 to 75V		
	G	DC0 to 100V		
	H	DC0 to 150V		
	J	DC0 to 200V		
	W	DC power measurement	—	
Y	DC ± 301 to $\pm 800\text{V}$	About 301 to $800\text{k}\Omega$		
Z	Other	—		
External operation input	Number of input circuits	1 circuit		
	Input specification	External reset : By applying a voltage signal from the outside, the maximum value, the minimum value, or an alarm reset. Same function as the RESET/SHIFT switch. An input is the same rating as an auxiliary supply. External display change : By applying a voltage signal, a display can be changed from the outside. Same function as the DISPLAY switch. An input is the same rating as an auxiliary supply. Minimum operation pulse width : 300ms. Continuation applying is possible. (1) AC100/110V 0.4VA, AC200/220V 1.4VA, DC100/110V 0.4W. AC/DC common use Contact capacity : About 3mA (AC, DC100/110V), About 6mA (AC200/220V) (2) DC24V 0.3W, DC48V 1.2W Contact capacity : About 10mA (DC24V), About 20mA (DC48V)		
	Caution of operation item	Power consumption of external operation input. AC110V : 0.4VA, DC110V : 0.4W, AC220V : 1.4VA. When using a relay or switch for power supply, use a minimum applicable load of about 1mA.		
Number of output circuits	6 circuits. No-voltage 1a contact (Mutual interval, insulates by AC2000V.)			
Contact capacity	Maximum switching load	AC250V 8A, DC125V 0.3A (Resistance load) AC250V 2A, DC125V 0.1A (Inductive load, $\cos\phi=0.4$, $L/R=7\text{ms}$)		
	Minimum switching load	DC5V 10mA		



Item	Specification									
Digital display range	Digital display	-9999 to 9999						Arbitrarily setting of the position of the number of digits and decimal point.		
	Power factor (COS φ) display	(1) LEAD 0.500 to 1.000 to LAG 0.500 (2) LEAD 0.000 to 1.000 to LAG 0.000						4 digits fixation. The position of decimal point is fixed.		
	Frequency display	(1) 45.0 to 55.0Hz or 45.00 to 55.00Hz (2) 55.0 to 65.0Hz or 55.00 to 65.00Hz (3) 45.0 to 65.0Hz or 45.00 to 65.00Hz						3 digits or 4 digits fixation. The position of decimal point is fixed.		
	Reactive power display (LEAD, LAG)	LEAD 9999 to 0 to LAG 9999						Arbitrarily setting of the position of the number of digits and decimal point.		
Bar graph display range	Maximum scale value	1, 1.2, 1.5, 1.6, 1.8, 2, 2.4, 2.5, 3, 3.2, 3.6, 4, 4.5, 4.8, 5, 6, 6.4, 7.2, 7.5, 8, 9, 9.6 (×10 ⁿ , n=Integral multiple.)						However range of -9900≤N≤9900		
	Power factor (COS φ) display	(1) LEAD 0.5 to 1 to LAG 0.5 (2) LEAD 0 to 1 to LAG 0						A scale value is fixed. Only at the case of power factor display selection, LEAD and LAG displays. ⁽²¹⁾		
	Frequency display	(1) 45 to 55Hz (2) 55 to 65Hz (3) 45 to 65Hz						A scale value is fixed.		
	Reactive power display (LEAD, LAG)	LEAD□ to 0 to LAG□ □ is the same numerical value as the above maximum scale.						However, range of LEAD 9900 to 0 to LAG 9900. Only at the case of reactive power display selection, LEAD and LAG displays. ⁽²¹⁾		
Standard unit	LCD (15 types) ⁽¹⁶⁾		Unit lettering display (63 types) ⁽¹⁹⁾							
	(1)	A	(1)	APm	(19)	kWh	(37)	m ³ /s	(55)	SPm
	(2)	kA	(2)	bar	(20)	L	(38)	MPa	(56)	t
	(3)	V	(3)	cm	(21)	L/h	(39)	Mvar	(57)	t/h
	(4)	kV	(4)	COS φ	(22)	L/min	(40)	MW ⁽²⁰⁾	(58)	TPm
	(5)	W	(5)	ELm	(23)	m	(41)	N	(59)	W ⁽²⁰⁾
	(6)	kW	(6)	Hz	(24)	mA	(42)	N·m	(60)	YPm
	(7)	MW	(7)	J	(25)	mg/L	(43)	Nm ³ /h	(61)	μm
	(8)	°C	(8)	K	(26)	min	(44)	Nm ³ /min	(62)	μS/cm
	(9)	%	(9)	kg	(27)	min ⁻¹	(45)	N/m ²	(63)	度
	(10)	COS φ ⁽¹⁷⁾	(10)	kg/h	(28)	mL/min	(46)	N/mm ²		
	(11)	Hz ⁽¹⁸⁾	(11)	kg/m ²	(29)	mm	(47)	OPm		
	(12)	var ⁽¹⁸⁾	(12)	kg/m ³	(30)	m/h	(48)	Pa		
	(13)	kvar ⁽¹⁸⁾	(13)	kL	(31)	m/min	(49)	pH		
	(14)	Mvar ⁽¹⁸⁾	(14)	kN	(32)	m/s	(50)	ppm		
	(15)	Nothing	(15)	kPa	(33)	mV	(51)	R		
			(16)	kvar	(34)	m ³	(52)	rad		
			(17)	kvarh	(35)	m ³ /h	(53)	rpm		
		(18)	kW ⁽²⁰⁾	(36)	m ³ /min	(54)	r/min			

Note ⁽¹⁶⁾ LCD, Main monitor : 15 types. Sub monitor (Left) : 14 types. Sub monitor (Right) : 11 types.

Note ⁽¹⁷⁾ The LCD of COS ϕ can be displayed on the main monitor and sub monitor (right).

Note ⁽¹⁸⁾ The LCD of Hz and var can be displayed on the main monitor and sub monitor (left).

Note ⁽¹⁹⁾ Lettering display. Main monitor : 60 types, Sub monitor : 63 types.

Lettering character height. Main monitor : 8.5mm, Sub monitor : 5mm.

Character color of lettering. Gray (DIC, 13th version, 541)

Note ⁽²⁰⁾ Lettering display is possible only for sub-monitor. The main monitor becomes a LCD.

Note ⁽²¹⁾ Setting No. 214 and 218 and 21C, LEAD/LAG can be displayed in priority.

7.3 Performance

Item		Specification	
Digital display class		1.0	
Bar graph display class		5.0	
Setting accuracy		±0.5% (% for span)	
Reproducibility of the operating point		±0.5% (% for span)	
Operating time accuracy		±0.25 seconds of contact delay time set value (However, in the case of setting value = 0 second, it is 0.25 ±0.25 seconds.)	
Reset time		0.5 seconds or less	
Starting delay time accuracy		±0.25 seconds of starting delay time set value	
Influence of temperature		23±10°C, within 100% of class index.	
Conformity technical standard		JIS C 1102-1 : 1997 ... Direct acting indicating analogue electrical measuring instruments and their accessories. Part 1 : Definitions and general requirements common to all parts.	
		JIS C 1102-2 : 1997 ... Direct acting indicating analogue electrical measuring instruments and their accessories. Part 2 : Special requirements for ammeters and voltmeters.	
		JIS C 1102-7 : 1997 ... Direct acting indicating analogue electrical measuring instruments and their accessories. Part 7 : Special requirements for multi-function instruments.	
		JIS C 1102-8 : 1997 ... Direct acting indicating analogue electrical measuring instruments and their accessories. Part 8 : Special requirements for accessories.	
		JIS C 1102-9 : 1997 ... Direct acting indicating analogue electrical measuring instruments and their accessories. Part 9 : Recommended test methods.	
		JIS C 1010-1 : 2005 ... Safety requirements for electrical equipment for measurement, control, and laboratory use.	
Display updating time		About 1 second (Bar graph is about 0.25 second)	
Display device, Display composition		Main monitor	Character height 10mm, 4 digit
		Sub monitor (Left), (Right)	Character height 6mm, 4 digit
		Bar graph	30 dots
Auxiliary supply	Power supply range, Consumption VA	(1) AC85 to 253V 50/60Hz 10VA (Rated voltage AC100/110V, 200/220V) DC80 to 143V 4W (Rated voltage DC100/110V) for both AC and DC uses	
		(2) DC20 to 56V 6W (Rated voltage DC24/48V)	
	Rush current (Time constant)	Rated voltage AC110V	Less than 4.0A (About 3.2ms)
		Rated voltage AC220V	Less than 8.0A (About 3.2ms)
		Rated voltage DC110V	Less than 2.8A (About 3.2ms)
		Rated voltage DC24V	Less than 4.4A (About 4.4ms)
Rated voltage DC48V	Less than 8.9A (About 4.4ms)		
Overload capacity		Voltage circuit	2 times 10 seconds, 1.2 times continuation of rated voltage
		Current circuit	10 times 5 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 circuit and a case (earth).	Above 50MΩ at DC500V.
		Between input, output, auxiliary supply.	
		Between inputs.	
		Between alarm outputs.	
Withstand voltage		Between electric circuit and a case (earth).	AC2000V (50/60Hz) 1 minute ⁽²²⁾
		Between input, output, auxiliary supply.	
		Between inputs.	
		Between alarm outputs.	
Impulse withstand voltage		Between electric circuit and a case (earth).	5kV 1.2/50μs Both positive and negative polarity, for 3 times each

Item	Specification
Noise-capacity	(1) Oscillatory surge voltage The measurement error is within $\pm 10\%$ when a damped vibration waveform (1 to 1.5MHz, peak voltage : 2.5 to 3kV) is applied repeatedly. Voltage circuit, current circuit (Common) Auxiliary supply circuit (Normal / common) (2) Square wave impulse noise. When $1\mu\text{s}$, 100ns width noise is applied repeatedly for 5 minutes, measurement error should be within $\pm 10\%$. Voltage, current circuit (Common) Over 1.5kV Auxiliary supply circuit (Normal / common) Over 1.5kV External operation input (Common) Over 1.0kV Alarm output (Common) Over 1.0kV (3) Wave noise 150MHz, 400MHz band radio waves (5W, 1m) and mobile phone radio waves (1m) are intermittently irradiated, and the measurement error is within $\pm 10\%$. (4) Electrostatic noise The error is within $\pm 10\%$ at 8kV when energized. No damage at 10kV when not energized. Capacitor charge method.
Vibration, shock	Vibration : Single amplitude 0.15mm, 10 to 55Hz, Each minute octave in 5 times sweep Shock : 490m/s^2 Each direction 3 times
Construction	Contour : 110 (Width) $\times$ 110 (length) $\times$ 105 (depth) mm Body diameter : $99\text{mm}\phi$ (With terminal cover)
Case materials	ABS(V-0)
Color	Black (Munsell N1.5)
Mass	Approx. 570g
Blackout guarantee	Maximum value, Minimum value, Setting value. Integrated value. Nonvolatile memory in data holds.
Operating temperature and humidity limits	-10 to $+55^\circ\text{C}$, 30 to 85% RH Non condensing.
Storage temperature limits	-25 to $+70^\circ\text{C}$

Note ⁽²²⁾ The circuit voltage 651 to 800V is withstand voltage AC2200V.

8. Trouble shooting

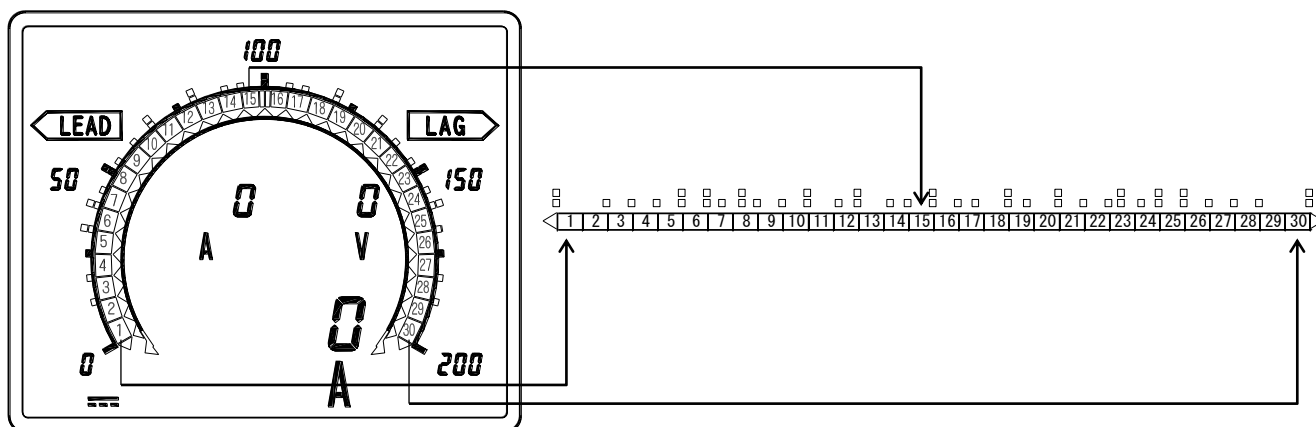
Symptoms	Possible causes	Remedial measures
This product is not displayed.	The auxiliary power is not supplied. (Connection is not done. Power-supply voltage is low.)	The check of an auxiliary power. Auxiliary power is applied again.
	Measurement display ON/OFF setting is set to OFF.	Setting check.
	Device is defective.	Replace the device.
The error of measurement value is large.	Range is not set correctly.	Resetting
Alarm output is not outputted.	The auxiliary power is not supplied. (Connection is not done. Power-supply voltage is low.)	The check of an auxiliary power. Auxiliary power is applied again.
	Alarm-output mode setting is OFF.	Setting check.
	Input factor setting of alarm is "with no factor".	
	Measurement display ON/OFF setting is set to OFF.	The check of input value.
	The abnormalities of input.	
Alarm output does not return.	Device is defective.	Replace the device.
	The return method setting is "manual reset".	Setting check.

Attached chart 1

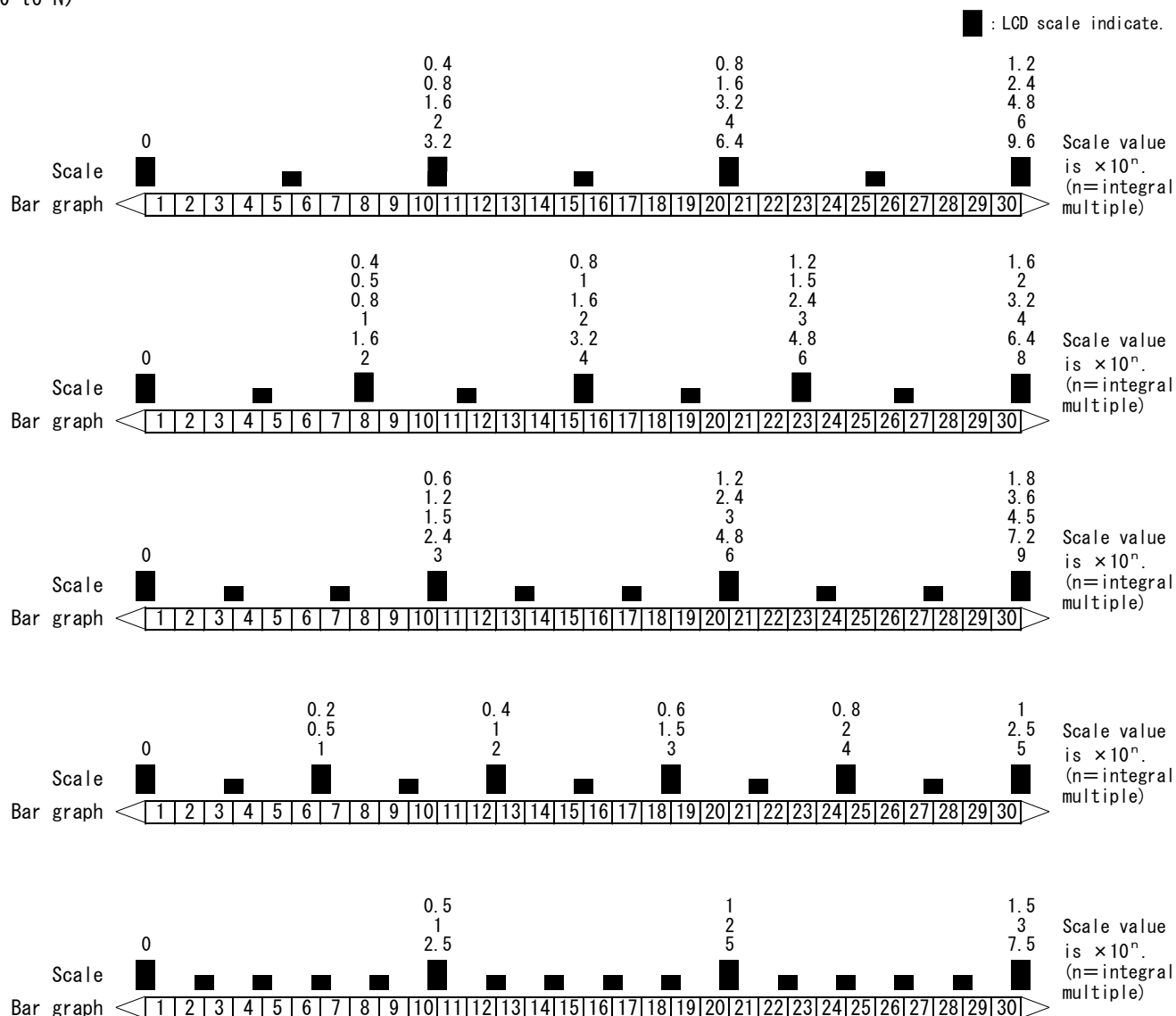
Bar graph scale division details.

The number in a bar graph scale is equivalent to the number of the following figure liquid crystal screen.
(A number is not displayed on actual liquid crystal.)

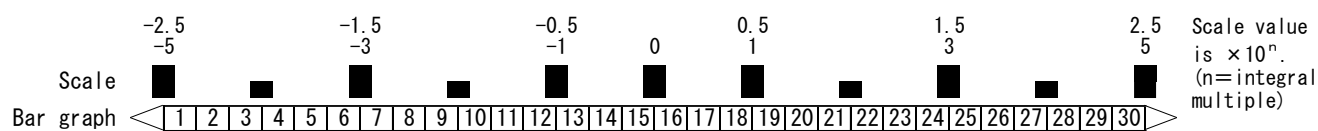
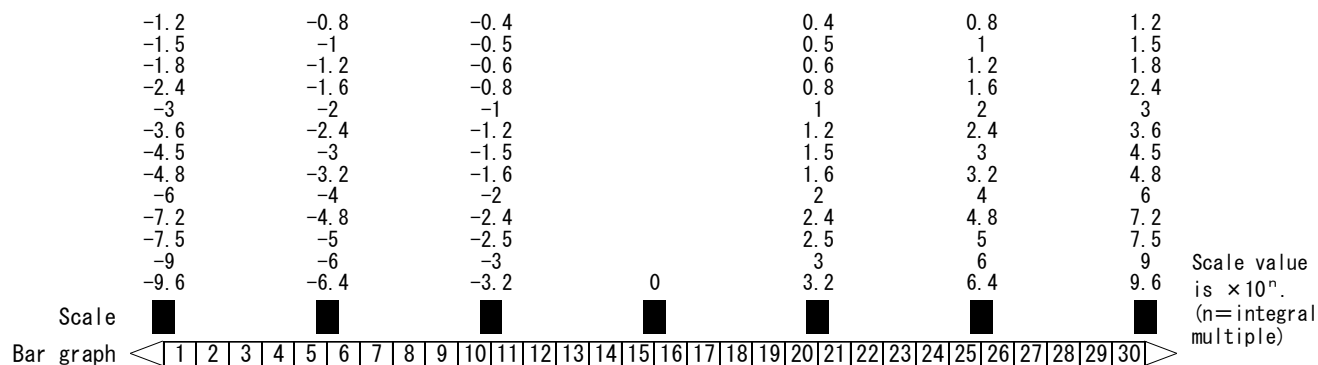
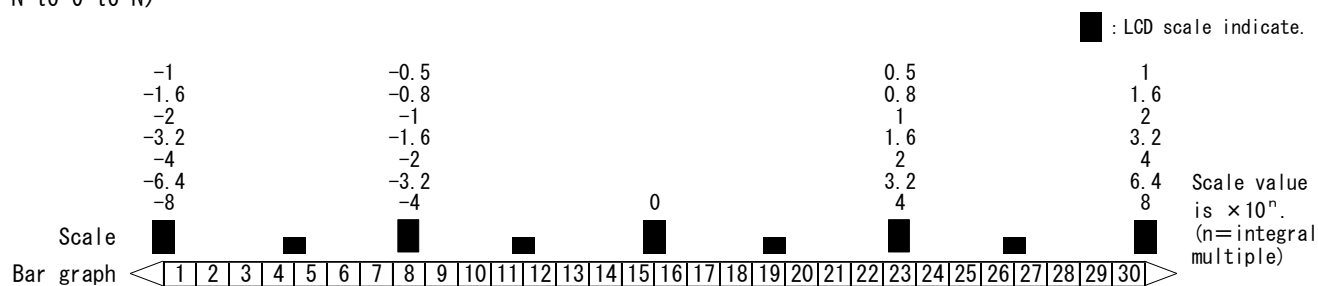
And, scale division changes with full-scale values.



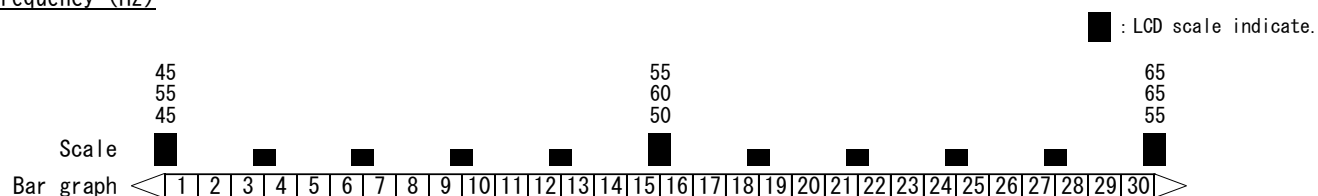
At fragment swing
(0 to N)



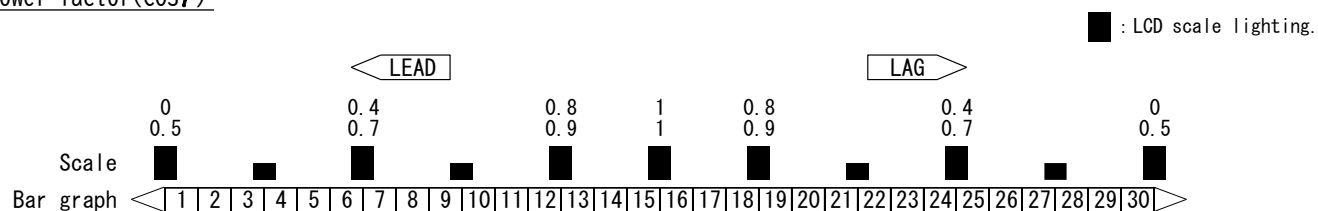
At both swing
(-N to 0 to N)



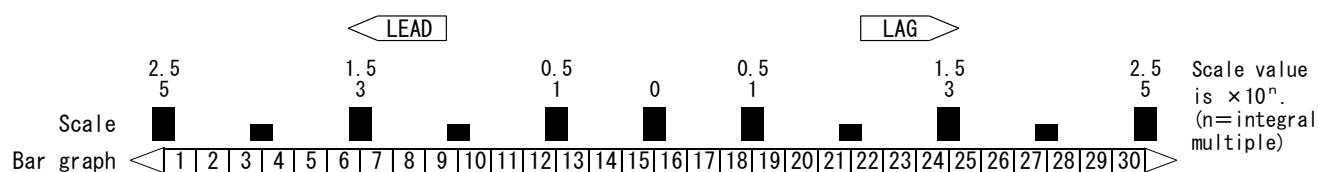
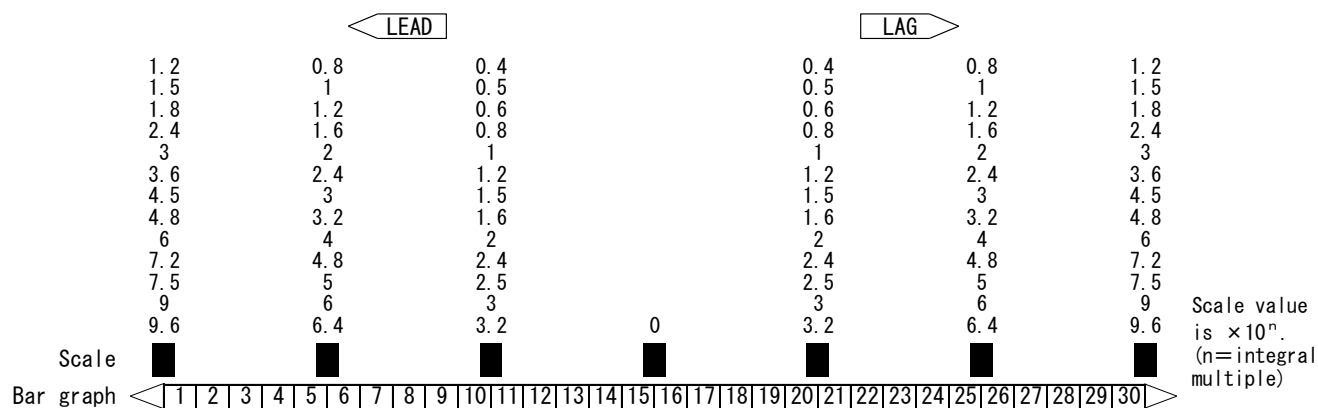
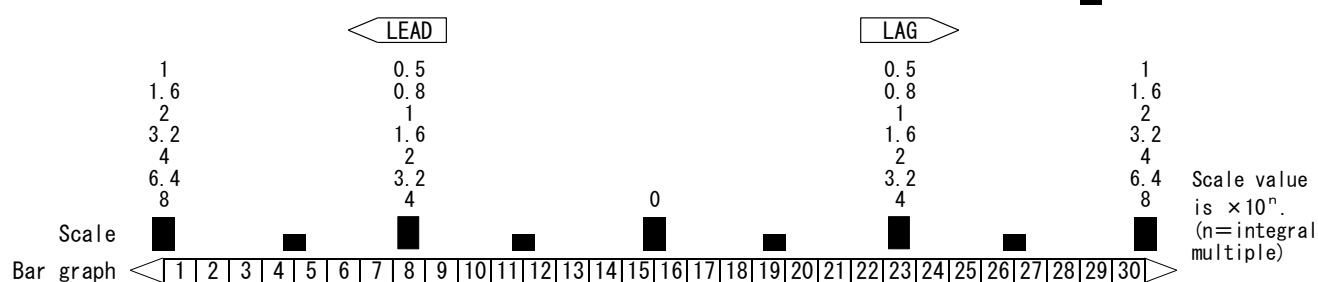
Frequency (Hz)



Power factor(COS ϕ)



Reactive power (var)

 : LCD scale indicate.


Appendix table 1

Power measurement scaling list. (The example of a display)

The automatic scaling of the power value is done from a voltage value and current value.

And, the scaling change by manual operation is also possible.

	30V	50V	60V	75V	100V	150V	200V	250V	300V	400V	500V	600V	750V	800V
1A	30.00W (30)	50.0W (50)	60.0W (60)	75.0W (75)	100.0W (100)	150.0W (150)	200.0W (200)	250.0W (250)	300.0W (300)	400W (400)	500W (500)	600W (600)	750W (750)	800W (800)
1.2A	36.00W (36)	60.0W (60)	72.0W (72)	90.0W (90)	120.0W (120)	180.0W (180)	240.0W (240)	300.0W (300)	360.0W (360)	480W (480)	600W (600)	720W (720)	900W (900)	960W (960)
1.5A	45.0W (45)	75.0W (75)	90.0W (90)	112.5W (120)	150.0W (150)	225.0W (240)	300.0W (300)	375.0W (400)	450W (450)	600W (600)	750W (750)	900W (900)	1125W (1200)	1200W (1200)
2A	60.0W (60)	100.0W (100)	120.0W (120)	150.0W (150)	200.0W (200)	300.0W (300)	400W (400)	500W (500)	600W (600)	800W (800)	1000W (1000)	1200W (1200)	1500W (1500)	1600W (1600)
2.5A	75.0W (75)	125.0W (150)	150.0W (150)	187.5W (200)	250.0W (250)	375.0W (400)	500W (500)	625W (640)	750W (750)	1000W (1000)	1250W (1500)	1500W (1500)	1875W (2000)	2000W (2000)
3A	90.0W (90)	150.0W (150)	180.0W (180)	225.0W (240)	300.0W (300)	450W (450)	600W (600)	750W (750)	900W (900)	1200W (1200)	1500W (1500)	1800W (1800)	2250W (2400)	2400W (2400)
4A	120.0W (120)	200.0W (200)	240.0W (240)	300.0W (300)	400W (400)	600W (600)	800W (800)	1000W (1000)	1200W (1200)	1600W (1600)	2000W (2000)	2400W (2400)	3000W (3000)	3200W (3200)
5A	150.0W (150)	250.0W (250)	300.0W (300)	375.0W (400)	500W (500)	750W (750)	1000W (1000)	1250W (1500)	1500W (1500)	2000W (2000)	2500W (2500)	3000W (3000)	3750W (4000)	4.00kW (4)
6A	180.0W (180)	300.0W (300)	360.0W (360)	450W (450)	600W (600)	900W (900)	1200W (1200)	1500W (1500)	1800W (1800)	2400W (2400)	3000W (3000)	3600W (3600)	4.50kW (4.5)	4.80kW (4.8)
7.5A	225.0W (240)	375.0W (400)	450W (450)	563W (600)	750W (750)	1125W (1200)	1500W (1500)	1875W (2000)	2250W (2400)	3000W (3000)	3750W (4000)	4.50kW (4.5)	5.63kW (6)	6.00kW (6)
8A	240.0W (240)	400W (400)	480W (480)	600W (600)	800W (800)	1200W (1200)	1600W (1600)	2000W (2000)	2400W (2400)	3200W (3200)	4.00kW (4)	4.80kW (4.8)	6.00kW (6)	6.40kW (6.4)
10A	300.0W (300)	500W (500)	600W (600)	750W (750)	1000W (1000)	1500W (1500)	2000W (2000)	2500W (2500)	3000W (3000)	4.00kW (4)	5.00kW (5)	6.00kW (6)	7.50kW (7.5)	8.00kW (8)
12A	360.0W (360)	600W (600)	720W (720)	900W (900)	1200W (1200)	1800W (1800)	2400W (2400)	3000W (3000)	3600W (3600)	4.80kW (4.8)	6.00kW (6)	7.20kW (7.2)	9.00kW (9)	9.60kW (9.6)
15A	450W (450)	750W (750)	900W (900)	1125W (1200)	1500W (1500)	2250W (2400)	3000W (3000)	3750W (4000)	4.50kW (4.5)	6.00kW (6)	7.50kW (7.5)	9.00kW (9)	11.25kW (12)	12.00kW (12)
20A	600W (600)	1000W (1000)	1200W (1200)	1500W (1500)	2000W (2000)	3000W (3000)	4.00kW (4)	5.00kW (5)	6.00kW (6)	8.00kW (8)	10.00kW (10)	12.00kW (12)	15.00kW (15)	16.00kW (16)
25A	750W (750)	1250W (1500)	1500W (1500)	1875W (2000)	2500W (2500)	3750W (4000)	5.00kW (5)	6.25kW (6.4)	7.50kW (7.5)	10.00kW (10)	12.50kW (15)	15.00kW (15)	18.75kW (20)	20.00kW (20)
30A	900W (900)	1500W (1500)	1800W (1800)	2250W (2400)	3000W (3000)	4.50kW (4.5)	6.00kW (6)	7.50kW (7.5)	9.00kW (9)	12.00kW (12)	15.00kW (15)	18.00kW (18)	22.50kW (24)	24.00kW (24)
40A	1200W (1200)	2000W (2000)	2400W (2400)	3000W (3000)	4.00kW (4)	6.00kW (6)	8.00kW (8)	10.00kW (10)	12.00kW (12)	16.00kW (16)	20.00kW (20)	24.00kW (24)	30.00kW (30)	32.00kW (32)
50A	1500W (1500)	2500W (2500)	3000W (3000)	3750W (4000)	5.00kW (5)	7.50kW (7.5)	10.00kW (10)	12.50kW (15)	15.00kW (15)	20.00kW (20)	25.00kW (25)	30.00kW (30)	37.50kW (40)	40.0kW (40)
60A	1800W (1800)	3000W (3000)	3600W (3600)	4.50kW (4.5)	6.00kW (6)	9.00kW (9)	12.00kW (12)	15.00kW (15)	18.00kW (18)	24.00kW (24)	30.00kW (30)	36.00kW (36)	45.0kW (45)	48.0kW (48)
75A	2250W (2400)	3750W (4000)	4.50kW (4.5)	5.63kW (6)	7.50kW (7.5)	11.25kW (12)	15.00kW (15)	18.75kW (20)	22.50kW (24)	30.00kW (30)	37.50kW (40)	45.0kW (45)	56.3kW (60)	60.0kW (60)
80A	2400W (2400)	4.00kW (4)	4.80kW (4.8)	6.00kW (6)	8.00kW (8)	12.00kW (12)	16.00kW (16)	20.00kW (20)	24.00kW (24)	32.00kW (32)	40.0kW (40)	48.0kW (48)	60.0kW (60)	64.0kW (64)
100A	3000W (3000)	5.00kW (5)	6.00kW (6)	7.50kW (7.5)	10.00kW (10)	15.00kW (15)	20.00kW (20)	25.00kW (25)	30.00kW (30)	40.0kW (40)	50.0kW (50)	60.0kW (60)	75.0kW (75)	80.0kW (80)
120A	3600W (3600)	6.00kW (6)	7.20kW (7.2)	9.00kW (9)	12.00kW (12)	18.00kW (18)	24.00kW (24)	30.00kW (30)	36.00kW (36)	48.0kW (48)	60.0kW (60)	72.0kW (72)	90.0kW (90)	96.0kW (96)
150A	4.50kW (4.5)	7.50kW (7.5)	9.00kW (9)	11.25kW (12)	15.00kW (15)	22.50kW (24)	30.00kW (30)	37.50kW (40)	45.0kW (45)	60.0kW (60)	75.0kW (75)	90.0kW (90)	112.5kW (120)	120.0kW (120)
200A	6.00kW (6)	10.00kW (10)	12.00kW (12)	15.00kW (15)	20.00kW (20)	30.00kW (30)	40.0kW (40)	50.0kW (50)	60.0kW (60)	80.0kW (80)	100.0kW (100)	120.0kW (120)	150.0kW (150)	160.0kW (160)
250A	7.50kW (7.5)	12.50kW (15)	15.00kW (15)	18.75kW (20)	25.00kW (25)	37.50kW (40)	50.0kW (50)	62.5kW (64)	75.0kW (75)	100.0kW (100)	125.0kW (150)	150.0kW (150)	187.5kW (200)	200.0kW (200)

Full-scale value for digital display. () becomes the full-scale value of bar graph.

<Caution> In less than 4000 full-scale, it is 4 digit display. In more than 4000 full-scale, it is 3 digit display.

Example) 20MW → 20.00MW

48MW → 4.80MW

	30V	50V	60V	75V	100V	150V	200V	250V	300V	400V	500V	600V	750V	800V
300A	9.00kW (9)	15.00kW (15)	18.00kW (18)	22.50kW (24)	30.00kW (30)	45.0kW (45)	60.0kW (60)	75.0kW (75)	90.0kW (90)	120.0kW (120)	150.0kW (150)	180.0kW (180)	225.0kW (240)	240.0kW (240)
400A	12.00kW (12)	20.00kW (20)	24.00kW (24)	30.00kW (30)	40.0kW (40)	60.0kW (60)	80.0kW (80)	100.0kW (100)	120.0kW (120)	160.0kW (160)	200.0kW (200)	240.0kW (240)	300.0kW (300)	320.0kW (320)
500A	15.00kW (15)	25.00kW (25)	30.00kW (30)	37.50kW (40)	50.0kW (50)	75.0kW (75)	100.0kW (100)	125.0kW (150)	150.0kW (150)	200.0kW (200)	250.0kW (250)	300.0kW (300)	375.0kW (400)	400kW (400)
600A	18.00kW (18)	30.00kW (30)	36.00kW (36)	45.0kW (45)	60.0kW (60)	90.0kW (90)	120.0kW (120)	150.0kW (150)	180.0kW (180)	240.0kW (240)	300.0kW (300)	360.0kW (360)	450kW (450)	480kW (480)
750A	22.50kW (24)	37.50kW (40)	45.0kW (45)	56.3kW (60)	75.0kW (75)	112.5kW (120)	150.0kW (150)	187.5kW (200)	225.0kW (240)	300.0kW (300)	375.0kW (400)	450kW (450)	563kW (600)	600kW (600)
800A	24.00kW (24)	40.0kW (40)	48.0kW (48)	60.0kW (60)	80.0kW (80)	120.0kW (120)	160.0kW (160)	200.0kW (200)	240.0kW (240)	320.0kW (320)	400kW (400)	480kW (480)	600kW (600)	640kW (640)
1000A	30.00kW (30)	50.0kW (50)	60.0kW (60)	75.0kW (75)	100.0kW (100)	150.0kW (150)	200.0kW (200)	250.0kW (250)	300.0kW (300)	400kW (400)	500kW (500)	600kW (600)	750kW (750)	800kW (800)
1200A	36.00kW (36)	60.0kW (60)	72.0kW (72)	90.0kW (90)	120.0kW (120)	180.0kW (180)	240.0kW (240)	300.0kW (300)	360.0kW (360)	480kW (480)	600kW (600)	720kW (720)	900kW (900)	960kW (960)
1500A	45.0kW (45)	75.0kW (75)	90.0kW (90)	112.5kW (120)	150.0kW (150)	225.0kW (240)	300.0kW (300)	375.0kW (400)	450kW (450)	600kW (600)	750kW (750)	900kW (900)	1125kW (1200)	1200kW (1200)
2kA	60.0kW (60)	100.0kW (100)	120.0kW (120)	150.0kW (150)	200.0kW (200)	300.0kW (300)	400kW (400)	500kW (500)	600kW (600)	800kW (800)	1000kW (1000)	1200kW (1200)	1500kW (1500)	1600kW (1600)
2.5kA	75.0kW (75)	125.0kW (150)	150.0kW (150)	187.5kW (200)	250.0kW (250)	375.0kW (400)	500kW (500)	625kW (640)	750kW (750)	1000kW (1000)	1250kW (1500)	1500kW (1500)	1875kW (2000)	2000kW (2000)
3kA	90.0kW (90)	150.0kW (150)	180.0kW (180)	225.0kW (240)	300.0kW (300)	450kW (450)	600kW (600)	750kW (750)	900kW (900)	1200kW (1200)	1500kW (1500)	1800kW (1800)	2250kW (2400)	2400kW (2400)
4kA	120.0kW (120)	200.0kW (200)	240.0kW (240)	300.0kW (300)	400kW (400)	600kW (600)	800kW (800)	1000kW (1000)	1200kW (1200)	1600kW (1600)	2000kW (2000)	2400kW (2400)	3000kW (3000)	3200kW (3200)
5kA	150.0kW (150)	250.0kW (250)	300.0kW (300)	375.0kW (400)	500kW (500)	750kW (750)	1000kW (1000)	1250kW (1500)	1500kW (1500)	2000kW (2000)	2500kW (2500)	3000kW (3000)	3750kW (4000)	4.00MW (4)
6kA	180.0kW (180)	300.0kW (300)	360.0kW (360)	450kW (450)	600kW (600)	900kW (900)	1200kW (1200)	1500kW (1500)	1800kW (1800)	2400kW (2400)	3000kW (3000)	3600kW (3600)	4.50MW (4.5)	4.80MW (4.8)
7.5kA	225.0kW (240)	375.0kW (400)	450kW (450)	563kW (600)	750kW (750)	1125kW (1200)	1500kW (1500)	1875kW (2000)	2250kW (2400)	3000kW (3000)	3750kW (4000)	4.50MW (4.5)	5.63MW (6)	6.00MW (6)
8kA	240.0kW (240)	400kW (400)	480kW (480)	600kW (600)	800kW (800)	1200kW (1200)	1600kW (1600)	2000kW (2000)	2400kW (2400)	3200kW (3200)	4.00MW (4)	4.80MW (4.8)	6.00MW (6)	6.40MW (6.4)
10kA	300.0kW (300)	500kW (500)	600kW (600)	750kW (750)	1000kW (1000)	1500kW (1500)	2000kW (2000)	2500kW (2500)	3000kW (3000)	4.00MW (4)	5.00MW (5)	6.00MW (6)	7.50MW (7.5)	8.00MW (8)
12kA	360.0kW (360)	600kW (600)	720kW (720)	900kW (900)	1200kW (1200)	1800kW (1800)	2400kW (2400)	3000kW (3000)	3600kW (3600)	4.80MW (4.8)	6.00MW (6)	7.20MW (7.2)	9.00MW (9)	9.60MW (9.6)
15kA	450kW (450)	750kW (750)	900kW (900)	1125kW (1200)	1500kW (1500)	2250kW (2400)	3000kW (3000)	3750kW (4000)	4.50MW (4.5)	6.00MW (6)	7.50MW (7.5)	9.00MW (9)	11.25MW (12)	12.00MW (12)
20kA	600kW (600)	1000kW (1000)	1200kW (1200)	1500kW (1500)	2000kW (2000)	3000kW (3000)	4.00MW (4)	5.00MW (5)	6.00MW (6)	8.00MW (8)	10.00MW (10)	12.00MW (12)	15.00MW (15)	16.00MW (16)
25kA	750kW (750)	1250kW (1500)	1500kW (1500)	1875kW (2000)	2500kW (2500)	3750kW (4000)	5.00MW (5)	6.25MW (6.4)	7.50MW (7.5)	10.00MW (10)	12.50MW (15)	15.00MW (15)	18.75MW (20)	20.00MW (20)
30kA	900kW (900)	1500kW (1500)	1800kW (1800)	2250kW (2400)	3000kW (3000)	4.50MW (4.5)	6.00MW (6)	7.50MW (7.5)	9.00MW (9)	12.00MW (12)	15.00MW (15)	18.00MW (18)	22.50MW (24)	24.00MW (24)
40kA	1200kW (1200)	2000kW (2000)	2400kW (2400)	3000kW (3000)	4.00MW (4)	6.00MW (6)	8.00MW (8)	10.00MW (10)	12.00MW (12)	16.00MW (16)	20.00MW (20)	24.00MW (24)	30.00MW (30)	32.00MW (32)
50kA	1500kW (1500)	2500kW (2500)	3000kW (3000)	3750kW (4000)	5.00MW (5)	7.50MW (7.5)	10.00MW (10)	12.50MW (15)	15.00MW (15)	20.00MW (20)	25.00MW (25)	30.00MW (30)	37.50MW (40)	40.0MW (40)
60kA	1800kW (1800)	3000kW (3000)	3600kW (3600)	4.50MW (4.5)	6.00MW (6)	9.00MW (9)	12.00MW (12)	15.00MW (15)	18.00MW (18)	24.00MW (24)	30.00MW (30)	36.00MW (36)	45.0MW (45)	48.0MW (48)
75kA	2250kW (2400)	3750kW (4000)	4.50MW (4.5)	5.63MW (6)	7.50MW (7.5)	11.25MW (12)	15.00MW (15)	18.75MW (20)	22.50MW (24)	30.00MW (30)	37.50MW (40)	45.0MW (45)	56.3MW (60)	60.0MW (60)
80kA	2400kW (2400)	4.00MW (4)	4.80MW (4.8)	6.00MW (6)	8.00MW (8)	12.00MW (12)	16.00MW (16)	20.00MW (20)	24.00MW (24)	32.00MW (32)	40.0MW (40)	48.0MW (48)	60.0MW (60)	64.0MW (64)
100kA	3000kW (3000)	5.00MW (5)	6.00MW (6)	7.50MW (7.5)	10.00MW (10)	15.00MW (15)	20.00MW (20)	25.00MW (25)	30.00MW (30)	40.0MW (40)	50.0MW (50)	60.0MW (60)	75.0MW (75)	80.0MW (80)

Full-scale value for digital display. () becomes the full-scale value of bar graph.

<Caution> In less than 4000 full-scale, it is 4 digit display. In more than 4000 full-scale, it is 3 digit display.

Example) 20MW → 20.00MW

48MW → 4.80MW

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