

MITSUBISHI

MITSUBISHI Low-Voltage Air Circuit Breakers series

World Super AE

三菱低压空气断路器 World Super AE

Display (DP1/DP2)

显示模块 (DP1/DP2)

INSTRUCTION MANUAL

使用说明书

ACB types covered in this manual

适用于以下空气断路器型号

AE630-SW AE1000-SW AE1250-SW AE1600-SW

AE2000-SWA

AE2000-SW AE2500-SW AE3200-SW

AE4000-SWA

AE4000-SW AE5000-SW AE6300-SW

IMPORTANT NOTE: Before using the device, please read this instruction manual carefully, and make sure that final user receives this manual.


重要注释: 在使用本产品以前, 请务必仔细阅读本说明书, 并确保所有用户也阅读本说明。


Safety precautions



Make sure to observe the following matters of safety



- Before using this device, make sure to read these safety precautions and Instruction manual thoroughly. The cautionary items noted herein are of the utmost importance for the safe use of this device, and should always be strictly followed.
- Make sure that the final user receives this manual.
- This instruction manual is prepared for an electrical expert.

The following symbols have been used:

 DANGER	Failure to follow these instructions may result in dangerous conditions, which in turn could lead to severe personal injury or even death.
---	--

 CAUTION	Failure to follow these instructions may result in dangerous conditions, which could result in moderate to slight personal injury or damage to equipment and facilities
--	---

	Warning for possible electrification under certain conditions.
	Warning for possible outbreak of a fire under certain conditions.

	This means prohibition. Never ignore this indication.
	Be sure to follow these instructions without fail.

⚠ **DANGER**

- Do not use the device on the conditions over range. Otherwise Ground-fault, Short circuit fault may occur due to dielectric breakdown. Or explosion may occur due to a short circuit protection failure.
- Do not touch the terminals. There is a risk of electrical shock.

⚠ **CAUTION**

- An electrician expert should install this equipment.
- Inspection and maintenance should be performed by a qualified electrician and only after shutting off the electric power and verifying that there is no voltage present. Failure to do so may result in an electrical shock.
- Be sure to tighten the terminal screws to the torque specified in the instruction manual. Failure to do so may result in fire.
- Do not install in areas subject to high temperatures, high humidity, dust, corrosive gas, vibrations, shocks, etc. To do so may result in malfunction or fire.
- Install so that trash, concrete dust, iron filings or rainwater cannot get into the circuit breaker unit interior. Failure to do so may result in malfunction or fire.
- When the circuit breaker trip automatically, always clear the source of the malfunction before closing the circuit breaker. Failure to do so may result in fire.
- Terminal screws should be tightened periodically. Failure to do so may result in fire.
- When discard products, dispose of as industrial waste.

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2. Specification

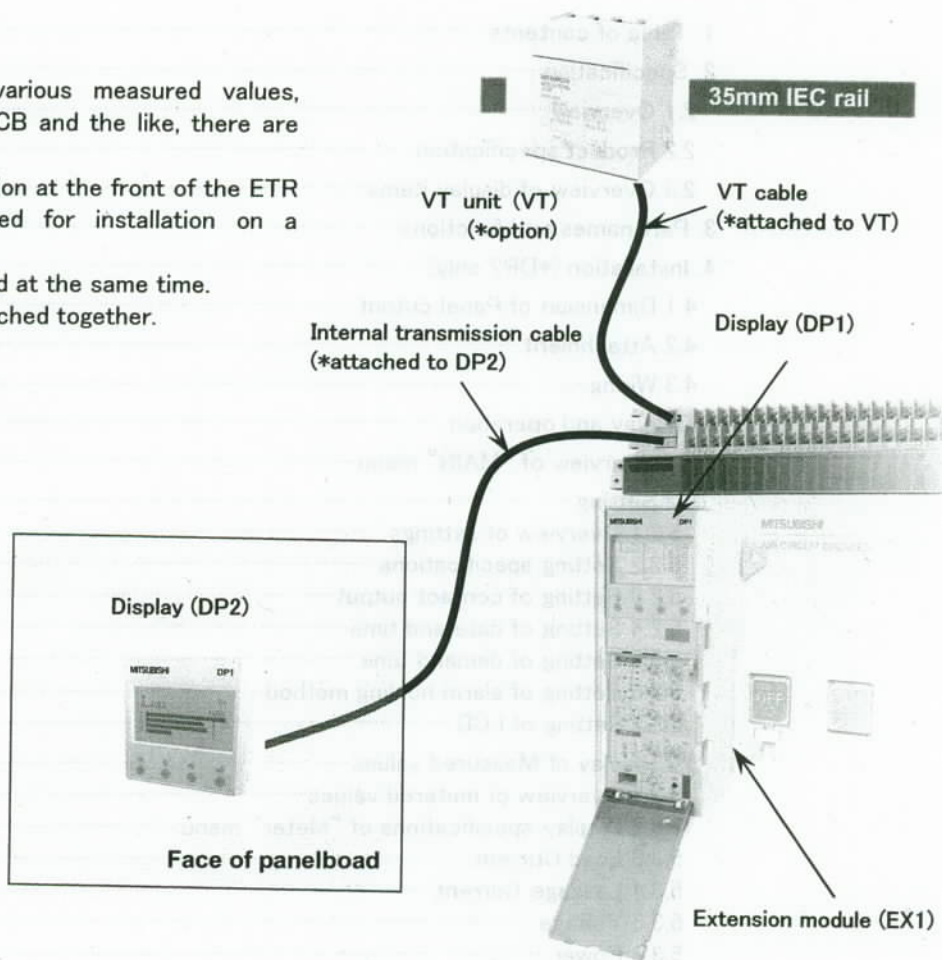
2.1 Overview

As the means for displaying various measured values, trip/alarm information, state of ACB and the like, there are two kinds of display units.

One (DP1) is designed for installation at the front of the ETR and the other (DP2) is intended for installation on a panelboard.

Both DP1 and DP2 may be installed at the same time.

■(Note): Two DP2s cannot be attached together.



2.2 Product specification

The specifications of DP1 and DP2 are shown in Table 2.1.

Table 2.1: Product specification of DP1/DP2

Items	Specifications	
	DP1	DP2
Type name	DP1	DP2
Power supply	Supplied from ETR ¹⁾	
Display	Dot-matrix liquid-crystal-display with backlight	
Weight	80g	100g ²⁾
Response time	4s or less (*In case of measuring harmonic currents: 9s or less)	
Maximum transmission distance	-	5m ³⁾
Applicable model	AE-SW equipped with EX1	
Operating ambient temperature	-5 to +40°C (However, the average of temperature per 24hours must not exceed +35°C)	
Storage ambient temperature	-20 to +60°C (However, the average of temperature per 24hours must not exceed +35°C)	
Operating/Storage ambient humidity	max. 85%RH (no condensation) at the max. +40°C in the clean air conditions.	
Operating/Storage ambience	Do not use and store in atmospheres with sulfide gas, ammonia gas, etc. (H ₂ S ≤ 0.01ppm, SO ₂ ≤ 0.1ppm, NH ₃ ≤ 0.25ppm)	
Operating altitude	max. 2000m (6600ft.)	
Installation	-	Panel holder plate

■1): It is necessary to supply the power to the terminal between P1 and P2 of breaker's control circuit.

■2): Including the weight of panel holder plate.

■3): The standard cable length is 2m.

2.3 Overview of display items

In Table 5.1 shown below, the available display items by DP1/DP2 are presented. As for details, see "5. Display and operation".

Table 2.2: Display items (1/3)

Display items			Required option ¹⁾	Descriptions
■ Items for measurement				
Load current	each phase	instantaneous	-	<p>■ The meaning of terms used in left column are as follows.</p> <ul style="list-style-type: none"> ● each phase: phase 1/phase 2/phase 3/pole N (*except for Voltage) phase 1-N/phase 2-N/phase 3-N (*in case of Voltage) ● each line: line 1-2/line 2-3/line 3-1 ● max. phase/line: the maximum value of the each phase/line values ● demand: approximately average of instantaneous value during a demand time ● max. instantaneous/demand: max. instantaneous/demand value since last reset ● total harmonic rms (THR): total value from 2nd to 20th order harmonic rms ● total harmonic distortion (THD): This value is calculated as follows. THD=THR/(fundamental harmonic rms) ● nth order harmonic ratio: This value is calculated by (nth order harmonic rms)/(fundamental harmonic rms) <p>■ The all min./max. values are stored in the EEPROM of Extension module (EX1) every 2 hours.</p> <p>■ The active and reactive energy are stored in the EEPROM of Extension module (EX1) when the power supply from Power supply module (P1-P5) is cut off.</p>
		max. instantaneous		
		demand		
		max. demand		
Leakage current	max. phase	demand (occurrence time)	E1 and ZCT	
		instantaneous		
		max. instantaneous		
		max. demand (occurrence time)		
Voltage	each line	instantaneous	VT	
	each phase	instantaneous		
	max. line	instantaneous		
		max. instantaneous (occurrence time)		
	max. phase	instantaneous		
		max. instantaneous (occurrence time)		
		demand		
	Active power	total		instantaneous
max. instantaneous				
demand				
max. demand (occurrence time)				
Reactive power	total	instantaneous		
		max. instantaneous		
		demand		
		max. demand (occurrence time)		
Apparent power	total	instantaneous		
		max. instantaneous		
		demand		
		max. demand (occurrence time)		
Power factor		instantaneous	VT	
		min. instantaneous		
		max. instantaneous		
Active energy (in)			VT	
Reactive energy (in)	lag			
		lead		
Frequency		instantaneous	VT	
Harmonic rms current (total/fundamental/3 rd /5 th /.../19 th)	each phase	instantaneous	VT	
		max. instantaneous		
	max. phase	instantaneous		
		max. instantaneous		
Harmonic distortion/ratio current (total/3 rd /5 th /.../19 th)	each phase	instantaneous		
		max. instantaneous		
	max. phase	instantaneous		
		max. instantaneous		
Trip current	LTD/STD/INST		-	Display the trip current when trip has occurred. In case of UVT trip, however, it is not displayed.
	GFR		G1	
	ER		E1 and ZCT	

Table 2.2: Display items (2/3)

Display items		Required option ¹⁾	Descriptions
■ Items for ETR			
Trip cause	LTD	-	Display the trip cause when trip has occurred.
	STD		
	INST		
	GFR	G1	
	ER	E1 and ZCT	
	UVT	UVT	
Trip history (*latest 10 trips)	fault cause	-	The trip information (latest 10 trips) can be displayed. These are stored in the EEPROM. However, when Power supply module (P1-P5) is off, any trip information are not stored. ■Note): In case of UVT trip, the trip value is not displayed.
	current		
	date and time of occurrence		
Alarm cause	PAL1 P.U.	-	Display the alarm cause when alarm has occurred.
	PAL1 OUT		
	PAL2 P.U.		
	PAL2 OUT	AP	
	OVER	-	
	GFR	G1	
	EPAL	E1 and ZCT	
	ER		
	TAL	TAL	
Alarm history (*latest 10 alarms)	alarm cause	-	When a setting of alarm holding method is "Self-Holding", the alarm information (latest 10 alarms) except for PAL1 P.U., PAL2 P.U. and OVER can be displayed. On the other hand, when the setting of alarm holding method is "Auto Reset", any alarm information are not displayed. ■Note): If the Power supply module (P1-P5) is off, any alarm information are not stored.
	date and time of occurrence		
Module info.	main setting module	-	Display the kinds of module attached to ETR.
	optional setting module		
	NP (Neutral pole protection level)		
Characteristics (*DP2 only)	In (CT rating)	-	In case of DP2, the setting of adjustable switches on the face of ETR can be displayed. As for Iep and Tep settings, it is able to change from DP2.
	Ir (current setting)		
	I _p (pre-alarm pickup current)	AP	
	I _{p2} (2 nd additional pre-alarm pickup current)		
	T _{p2} (2 nd additional pre-alarm operating time)		
	I _u /I _L (uninterrupted/LTD pickup current)	-	
	TL (LTD operating time)		
	I _{sd} (STD pickup current)		
	T _{sd} (STD operating time)		
	I _i (INST pickup current)	G1	
	I _g (GFR pickup current)		
	T _g (GFR operating time)	E1 and ZCT	
	I _{ep} (EPAL pickup current)		
	T _{ep} (EPAL operating time)		
	I Δ n (ER pickup current)		
	T _e (ER operating time)		
Self diagnosis	Internal transmission error	-	Display the error information detected by ETR. If these error happens, please contact your nearest MITSUBISHI representative.
	A/D converter error		
	EEPROM error		
	clock IC (RTC) error		
	main setting module error		
	optional setting module error		
	CT Connector error		
	MCR switch error		
	TAL sensor error	TAL	
■ Items for breaker			
CT rated current (In)		-	Display the state of breaker.
Phase-Wire system	3 Φ 3W/3 Φ 4W	-	
Connection	Normal/Inverse	-	

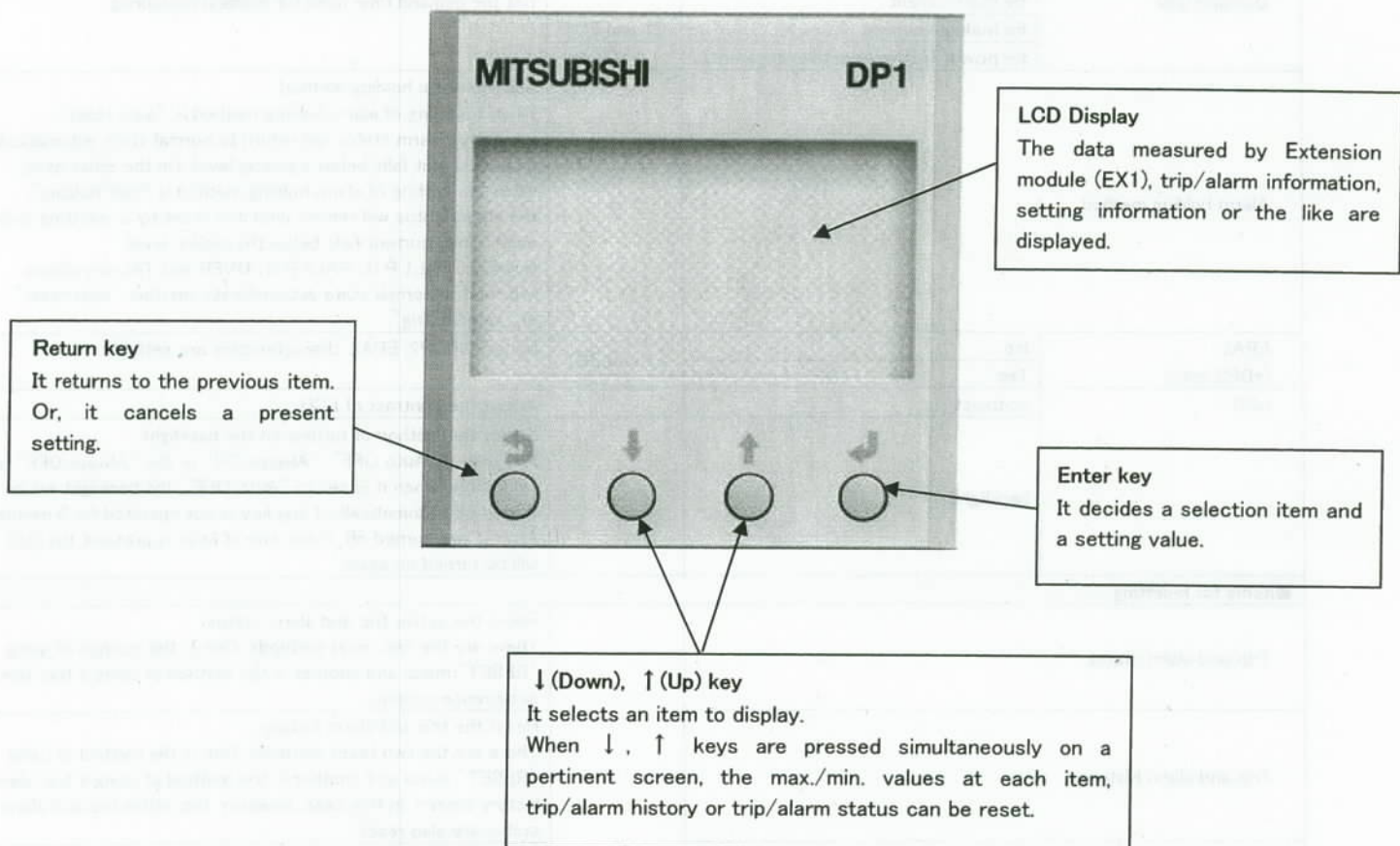
Table 2.2: Display items (3/3)

Display items		Required option ¹⁾	Descriptions										
■ Items for setting													
Date and time	year/month/day/hour/minute/second	-	Setting of date and time are available.										
Contact output elements	output 1 to 5	P3, P4 or P5	In case that the Power supply module is any one of P3, P4 or P5, terminal allocation for contact outputs at breaker's control circuit terminal block can be changed. "Output 1" to "Output 5" corresponds to the following terminals, respectively. ● Output 1... between <table border="1"><tr><td>524</td></tr></table> and <table border="1"><tr><td>513</td></tr></table> ● Output 2... between <table border="1"><tr><td>534</td></tr></table> and <table border="1"><tr><td>513</td></tr></table> ● Output 3... between <table border="1"><tr><td>544</td></tr></table> and <table border="1"><tr><td>513</td></tr></table> ● Output 4... between <table border="1"><tr><td>554</td></tr></table> and <table border="1"><tr><td>513</td></tr></table> ● Output 5... between <table border="1"><tr><td>564</td></tr></table> and <table border="1"><tr><td>513</td></tr></table>	524	513	534	513	544	513	554	513	564	513
524													
513													
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554													
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564													
513													
Demand time	for load current	-	Set the demand time used for demand measuring.										
	for leakage current	E1 and ZCT											
	for power (active/reactive/apparent)	VT											
Alarm holding method		-	Set the alarm holding method. When a setting of alarm holding method is "auto reset", the active alarm status will return to normal state automatically if load current falls below a pickup level. On the other hand, when the setting of alarm holding method is "self-holding", the alarm status will remain until it is reset by a resetting order even if load current falls below the pickup level. However, PAL1 P.U., PAL2 P.U., OVER and TAL are always returned to normal state automatically whether "auto reset" or "self-holding".										
EPAL (*DP2 only)	lep	E1 and ZCT	In case of DP2, EPAL characteristics are settable.										
	Tep												
LCD	contrast	-	Adjust the contrast of LCD.										
	backlight	-	Select the method of turning on the backlight. Any one of "Auto OFF", "Always ON" or the "Always OFF" is selectable. When it is set to "Auto OFF", the backlight will be turned off automatically if any key is not operated for 5 minutes. After it was turned off, if any one of keys is pressed, the light will be turned on again.										
■ Items for resetting													
Trip and alarm status		-	Reset the active trip and alarm status. There are the two reset methods. One is the method of using "RESET" menu and another is the method of using a trip/alarm occurrence screen.										
Trip and alarm history			Reset the trip and alarm history. There are the two reset methods. One is the method of using "RESET" menu and another is the method of using a trip/alarm history screen. In this case, however, the active trip and alarm status are also reset.										
max./min. measured values			Reset the max./min. measured values. There are the two reset methods. One is the method of using "RESET" menu ^{Note)} and another is the method of using each max./min. display screen. ■ Note): All the values except Energy consumption (Wh and varh) are collectively reset by this function.										
Energy consumption			Reset the energy consumption (Wh and varh values). These values are reset individually on each display screen. ■ Note): These can not be reset by using the "RESET" menu.										

■ 1): For details about these accessories, please see "AE-SW CATALOG" or "AE-SW INSTRUCTION MANUAL".

3. Part names and functions

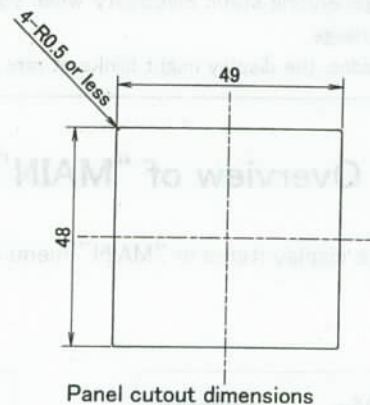
The names and functions of DP1 are shown below.
Also about DP2, it is the same as DP1.



4. Installation (*DP2 only)

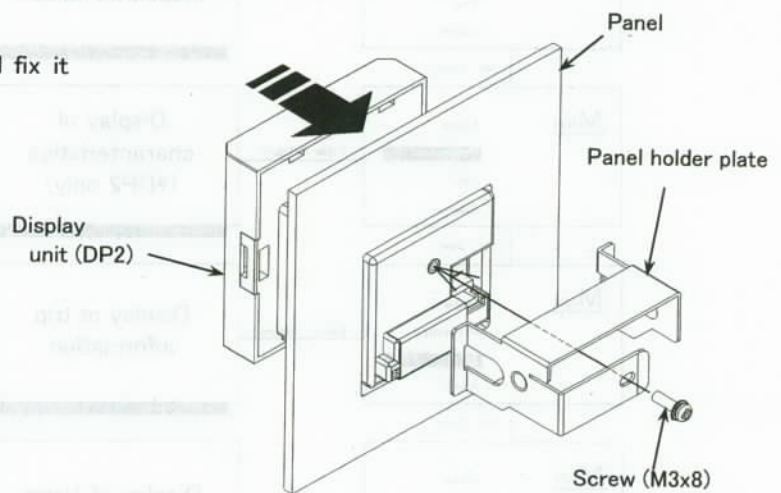
4.1 Dimension of Panel cutout

The panel cutout dimensions are shown below.
It can be attached to a panel of thickness 1.0 – 3.2mm.

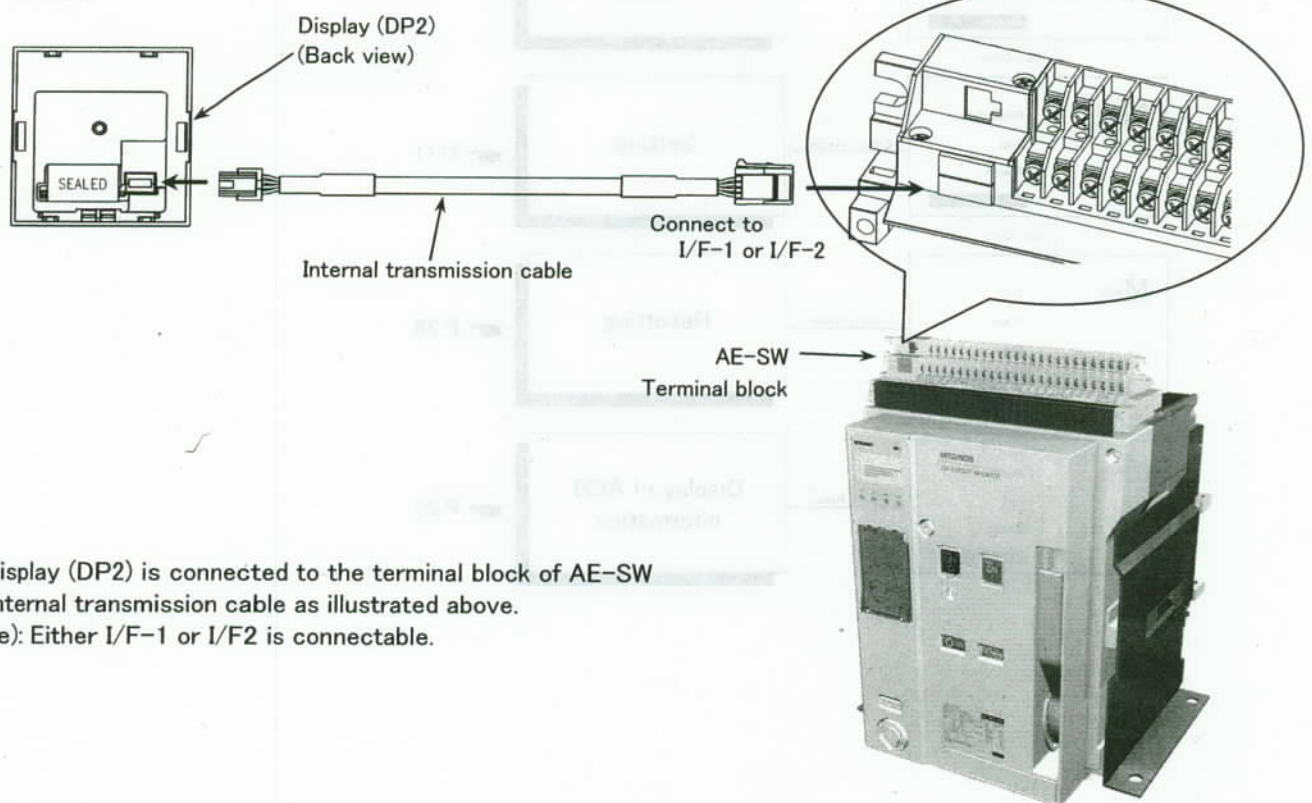


4.2 Attachment

Insert the Display (DP2) into the panel cutout, and fix it with the panel holder plate and screw (M3 × 8).
The tightening torque of the screw is 0.5 N·m.



4.3 Wiring



The Display (DP2) is connected to the terminal block of AE-SW with Internal transmission cable as illustrated above.

■Note): Either I/F-1 or I/F2 is connectable.

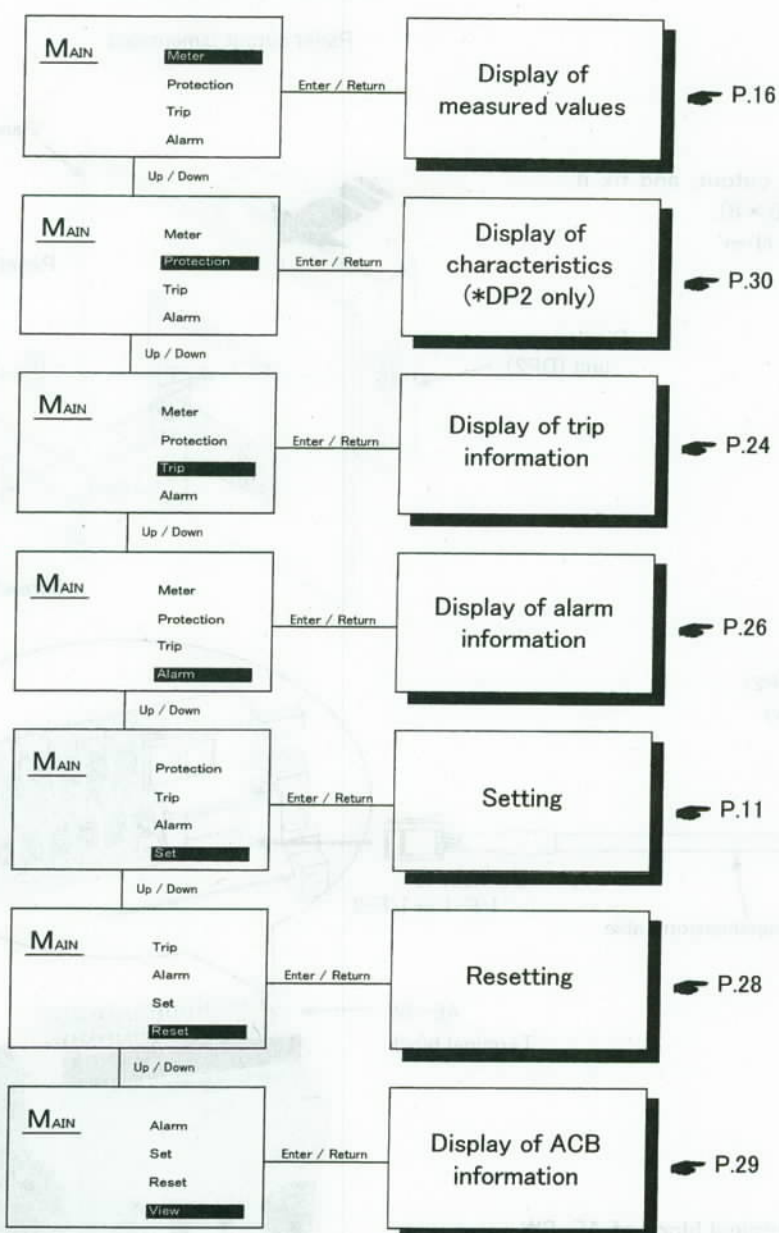
5. Display and operation

The protection seat is put on the screen for the damaged prevention. Please peel off it before use. LCD might displays something by generating static electricity when you peel off the protection seat. However, it disappears after a while by a natural electrical discharge.

Besides, the display might blinks at rare intervals by internal processing for refreshing of display.

5.1 Overview of "MAIN" menu

The display items in "MAIN" menu are shown below.

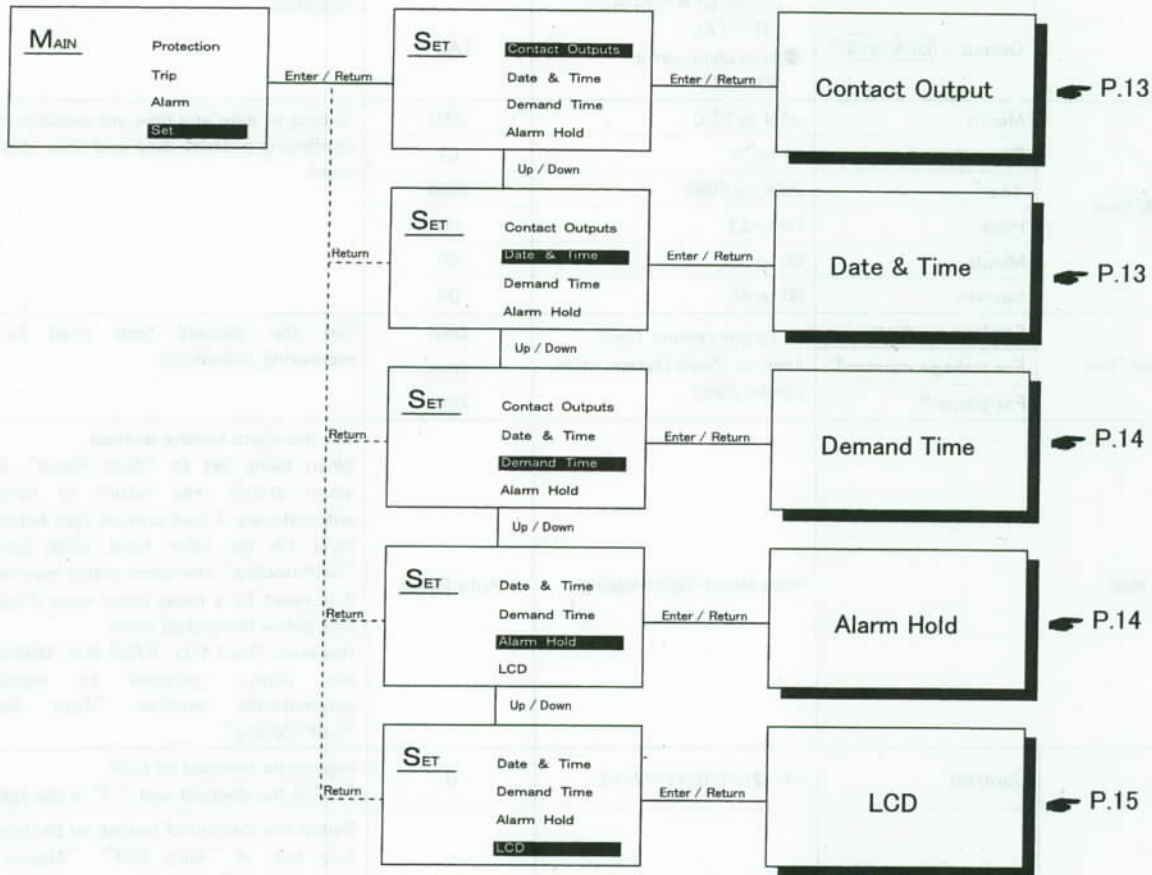


5.2 Setting

5.2.1 Overview of settings

By using the "Set" menu, it is possible to set up the Contact Output elements¹⁾, Date and Time, Demand Time, Alarm Hold method, LCD contrast and LCD backlight.

■ 1): The contact output functions are available only when the Power supply module type is any one of P3-P5.



5.2.2 Setting specifications

Setting specifications are shown in below table.

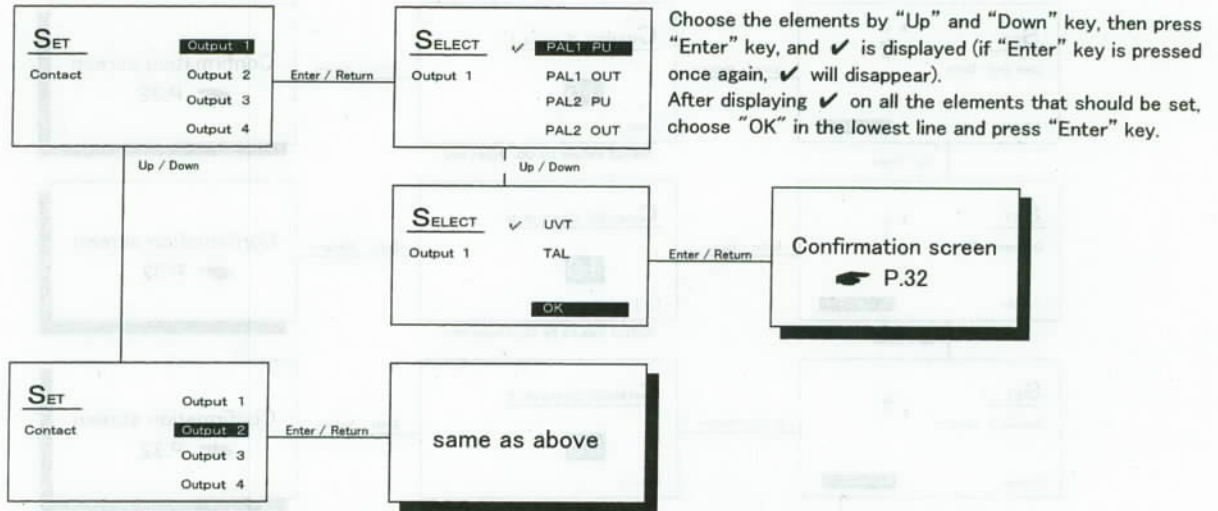
Table 5.1: Setting specifications

Setting items		Settable parameter	Factory setting	Descriptions
Contact Output ¹⁾	Output 1 (524 - 513) ¹⁾	●Items about trip LTD ³⁾ /STD ³⁾ /INST/ GFR ⁴⁾ /ER ⁵⁾ /UVT ⁶⁾	LTD ³⁾	If trips, alarms or errors detected by ETR occur, the contacts at breaker's control circuit terminal block become active. It is possible to assign two or more elements to one output. In this case, this output becomes active when at least one element has been occurred.
	Output 2 (534 - 513) ¹⁾		STD ³⁾ and INST	
	Output 3 (544 - 513) ¹⁾	●Items about alarm PAL1 PU/PAL1 OUT/ PAL2 PU ²⁾ /PAL2 OUT ²⁾ / OVER/GFR ⁴⁾ /EPAL ⁵⁾ / ER ⁵⁾ /TAL ⁷⁾	PAL2 OUT ²⁾ , GFR ⁴⁾ or ER ⁵⁾	
	Output 4 (554 - 513) ¹⁾		PAL1 OUT	
	Output 5 (564 - 513) ¹⁾	●Item about error ERROR ¹⁰⁾	TAL ⁷⁾	
Date & Time	Month	JAN to DEC	JAN	Setting of date and time are available. Also, when confirming present date and time, this screen is used.
	Day	01 to 31	01	
	Year	2000 to 2099	2004	
	Hour	00 to 23	00	
	Minute	00 to 59	00	
	Second	00 to 59	00	
Demand Time	For load current	0s to 50s (*step: 10s)/	2min	Set the demand time used for demand measuring, individually.
	For leakage current ⁸⁾	1min to 15min (*step: 1min)/	2min	
	For power ⁹⁾	20min/30min	2min	
Alarm Hold		Auto Reset/Self-Holding	Auto Reset	Set the alarm holding method. When being set to "Auto Reset", the active alarm status may return to normal state automatically if load current falls below a pickup level. On the other hand, when being set to "Self-Holding", the alarm status may remain until it is reset by a reset order even if load current falls below the pickup level. However, PAL1 P.U., PAL2 P.U., OVER and TAL are always returned to normal state automatically whether "Auto Reset" or "Self-Holding".
LCD	Contrast	-3/-2/-1/0/+1/+2/+3	0	Adjust the contrast of LCD. "+3" is the deepest and "-3" is the lightest.
	Backlight	Auto OFF/Always ON/ Always OFF	Auto OFF	Select the method of turning on the backlight. Any one of "Auto OFF", "Always ON" or "Always OFF" is selectable. When it is set to "Auto OFF", the backlight will be turned off automatically if any key is not operated for 5 minutes. After it was turned off, if any one of keys is pressed, the light will turn on again.

- 1): represents the mark of breaker's control circuit terminal block.
- 2): The contact output for PAL2 PU and PAL2 OUT are selectable only when Optional setting module type is 2nd additional pre-alarm (AP).
- 3): The contact output for LTD and STD are not selectable when Main setting module type is WB relay (WB1/WB2).
- 4): The contact output for GFR is selectable only when Optional setting module type is Ground fault protection (G1).
- 5): The contact output for EPAL and ER are selectable only when Optional setting module type is Earth leakage protection (E1).
- 6): The contact output for UVT is selectable only when Under voltage trip unit (UVT) is equipped.
- 7): The contact output for TAL is selectable only when Temperature alarm (TAL) is equipped.
- 8): The demand time setting for Leakage Current (I_g) is not available when Optional setting module type is not Earth leakage protection (E1).
In this case, "—" is displayed and "CHANGE?" is not appeared.
- 9): The demand time setting of Power (P) is not available when VT unit (VT) is not equipped.
In this case, "—" is displayed and "CHANGE?" is not appeared.
- 10): The element for ERROR is assigned between ~~574~~ and ~~513~~ (fixed). However, it can also be assigned to any output 1 to 5.

5.2.3 Setting of contact output

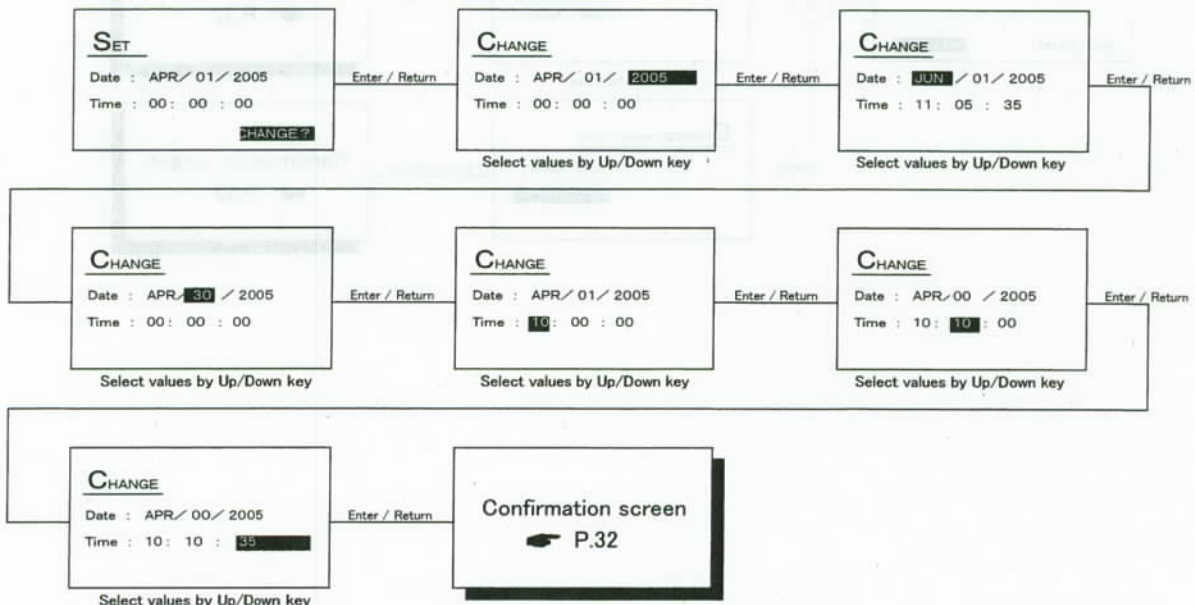
Sample flow for contact output setting is shown below.



5.2.4 Setting of date and time

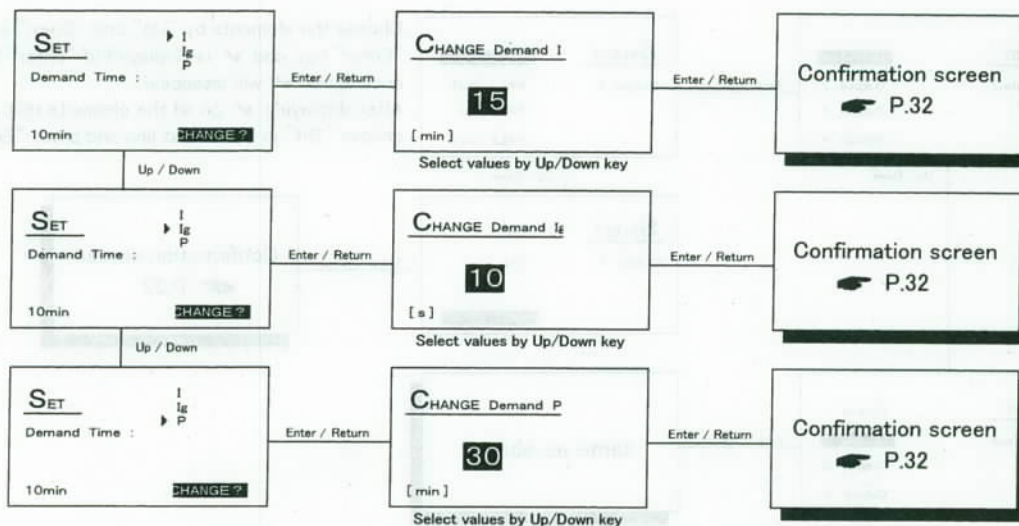
Sample flow for date and time setting is shown below.

- Note): The present date and time should be set before using. Moreover, whenever power supply of Power supply module (type: P1-P5) is turned off, it should be set again after supplying power. Unless this setup is properly performed, the occurrence time of the trip/alarm and the measured min./max. values cannot display correctly.



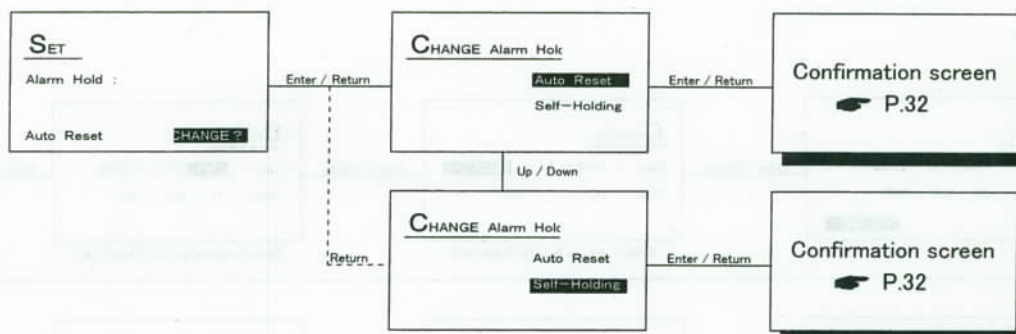
5.2.5 Setting of demand time

Sample flow for demand time setting is shown below.



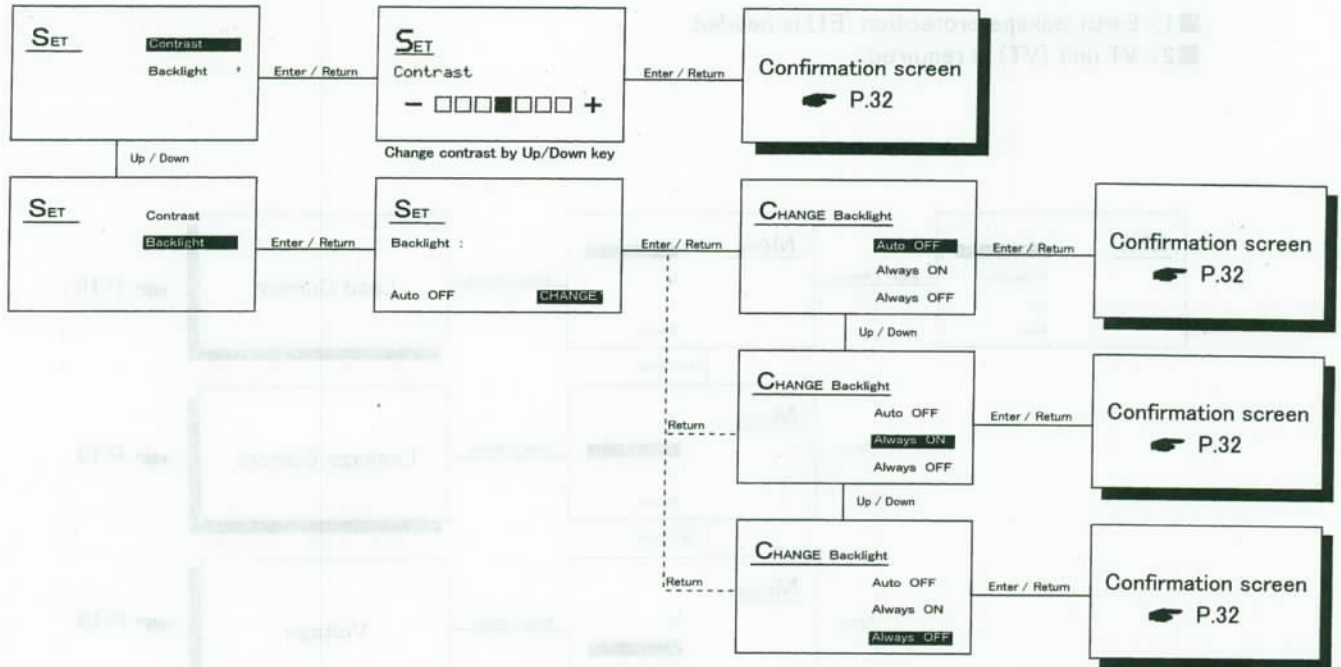
5.2.6 Setting of alarm holding method

Sample flow for setting of alarm holding method is shown below.



5.2.7 Setting of LCD

Sample flow for setting of LCD contrast and LCD backlight is shown below.

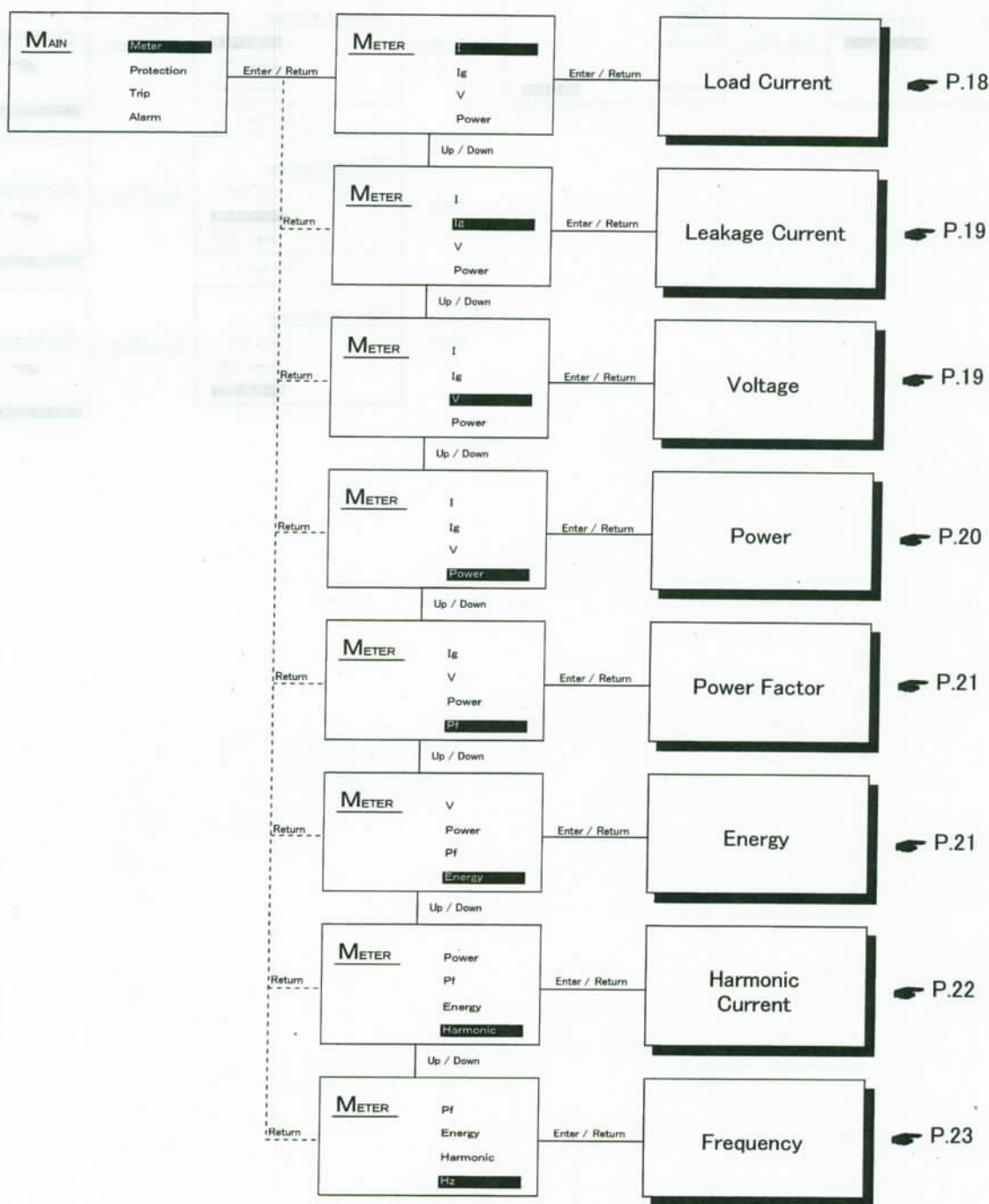


5.3 Display of measured values

5.3.1 Overview of measured values

By using "Meter" menu, it is possible to monitor Load Current (I), Leakage Current (I_g)¹⁾, Voltage (V)²⁾, Power (P)²⁾, Power Factor (Pf)²⁾, Energy (E)²⁾, Harmonic Current (HI)²⁾ and Frequency (Hz)²⁾.

- 1): Earth leakage protection (E1) is needed.
- 2): VT unit (VT) is required.



5.3.2 Display specifications of "Meter" menu

Display specifications of "Meter" menu are shown in below table.

Table 5.2: Display specifications of "Meter" menu

Items (accuracy)		Measurement range	Display	Phase-Wire system ¹⁾		Cut off
				3Φ3W	3Φ4W	
Load Current ⁶⁾ (±2.5% ⁵⁾)		0 to 2xIn	**** [A] (In < 500A)	○ ⁹⁾	○ ¹²⁾	2.0% ⁵⁾
			***** [A] (In ≥ 500A)			
Leakage Current ^{4), 8), 10)} (±15% ^{2), 5)})		0 to 2xIΔn_max	**** [A]	○	○	3.0% ⁵⁾
Voltage ^{4), 8), 11)} (±2.5% ⁵⁾)	line	0 to 725	*** [V]	○	○	10V
	phase	0 to 420	*** [V]	x ⁹⁾	○	10V
Power ^{4), 8), 11)} (±2.5% ⁵⁾)	active	-√3x(2xIn)x725 to √3x(2xIn)x725	(-) **** [kW] (In < 1000A)	○	○	2.0% ⁵⁾
			(-) **** [kW] (In ≥ 1000A)			
	reactive	-√3x(2xIn)x725 to √3x(2xIn)x725	(-) **** [kvar] (In < 1000A)	○	○	2.0% ⁵⁾
			(-) **** [kvar] (In ≥ 1000A)			
apparent	0 to √3x(2xIn)x725	**** [kVA] (In < 1000A)	○	○	2.0% ⁵⁾	
		**** [kVA] (In ≥ 1000A)				
Power Factor ^{4), 7), 11)} (±5.0% ⁵⁾)		-0.999 to -0.001	LEAD ***	○	○	-
		0.000	0.000			
		0.001 to 1.000	LAG ***			
Energy ^{4), 11)} (±2.5% ⁶⁾)	active	0.000 to 99999.999	***** [MWh]	○	○	0.4% ⁵⁾
	reactive	0.000 to 99999.999	***** [Mvarh]	○	○	0.4% ⁵⁾
Harmonic Current ^{8), 11)} (±2.5% ⁵⁾)	rms	0 to 2xIn	**** [A] (In < 500A)	○ ⁹⁾	○ ¹²⁾	2.0% ⁵⁾
			**** [A] (In ≥ 500A)			
	distortion	0.0 to 200.0	**** [%]	○ ⁹⁾	○ ¹²⁾	-
Frequency ^{8), 11)} (±2.5% ⁶⁾)		45 to 65	** [Hz]	○	○	-

■1): "○" and "x" represents "available" and "not available", respectively.

■2): Including the accuracy of ZCT.

■3): When using at 3Φ3W system, the apparent power is calculated by $(\sqrt{3}/2) \times (I1 \times V12 + I3 \times V23)$. Therefore, the accuracy may not be ensured in the unbalanced circuit.

■4): Rated voltage of measurement is 440V. Rated power and energy of measurement is $\sqrt{3} \times In \times 440V$. Rated earth leakage current of measurement is $I\Delta n_{max}$ (=10A). Rated power factor is 90 degrees.

■5): Accuracy and cut off are defined as percentage of rated value.

■6): Accuracy is defined as percentage of true value.

■7): Power factor is measured for only fundamental wave. A waveform distortion is not included for power factor calculation.

■8): When these measured values exceeds the measurement range, the numeric value changes into blinking.

■9): When system is 3Φ3W, measurements for load current in neutral (IN), phase voltages (V1N/V2N/V3N) and harmonic current in neutral (HIN) are not available. In this case, "—" is displayed in the numerical value display area.

■10): The leakage current metering is available only when the Optional setting module type is Earth leakage protection (E1). When the E1 module is not attached to ETR, "—" is displayed in the area of numeric value.

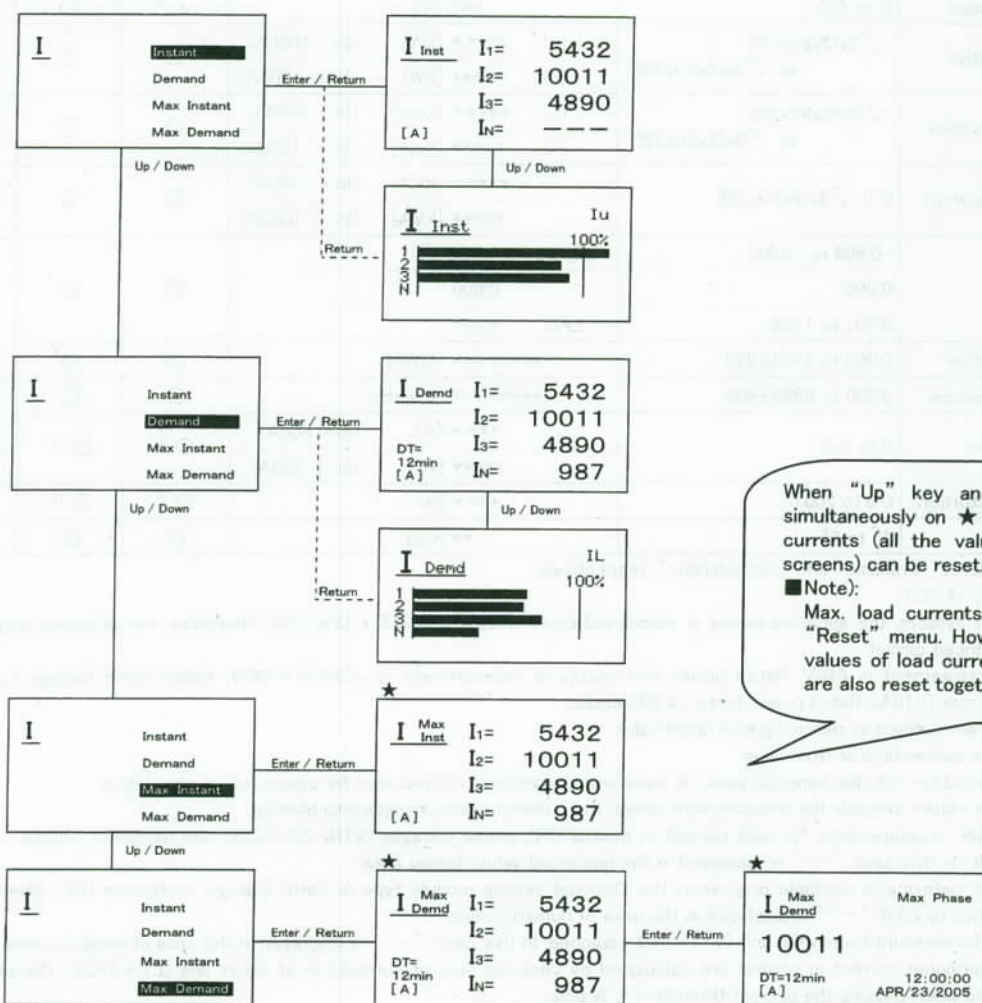
■11): These items cannot be measured when VT unit (VT) is not equipped. In this case, "—" is displayed in the area of numeric value.

■12): Load current and harmonic current in neutral are calculated by vectorial sum of currents in all other line (L1+L2+L3). Therefore, the value is not displayed when passing the current through only N pole.

5.3.3 Load Current

● Display item:

- ⊙ Instantaneous values (numerical/bar graph)
- ⊙ Demand values (numerical/bar graph)
- ⊙ Max. instantaneous values (since last reset)
- ⊙ Max. demand values and occurrence date & time (since last reset)

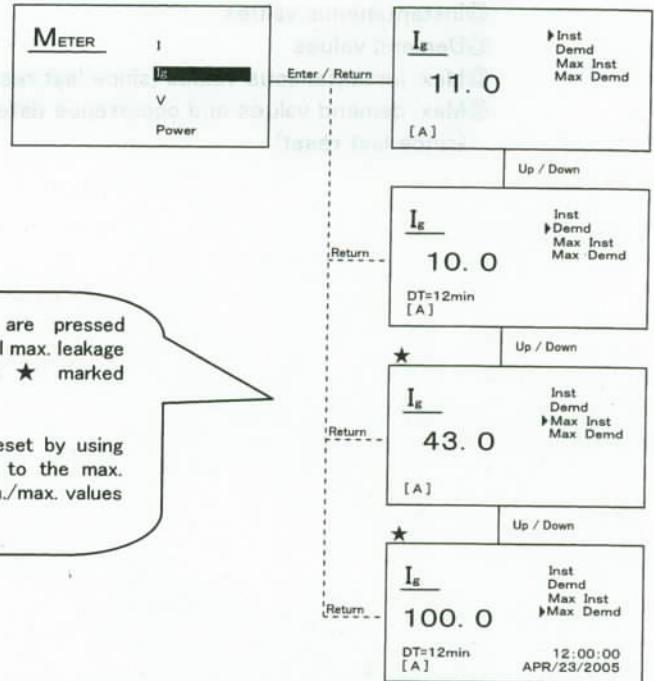


When "Up" key and "Down" key are pressed simultaneously on ★ marked screens, all max. load currents (all the values displayed on ★ marked screens) can be reset.

■ Note):
Max. load currents can also be reset by using "Reset" menu. However, in addition to the max. values of load current, all other min./max. values are also reset together in this case.

5.3.4 Leakage Current

- Display item:
 - ⊙ Instantaneous value
 - ⊙ Demand value
 - ⊙ Max. instantaneous values (since last reset)
 - ⊙ Max. demand values and occurrence date & time (since last reset)

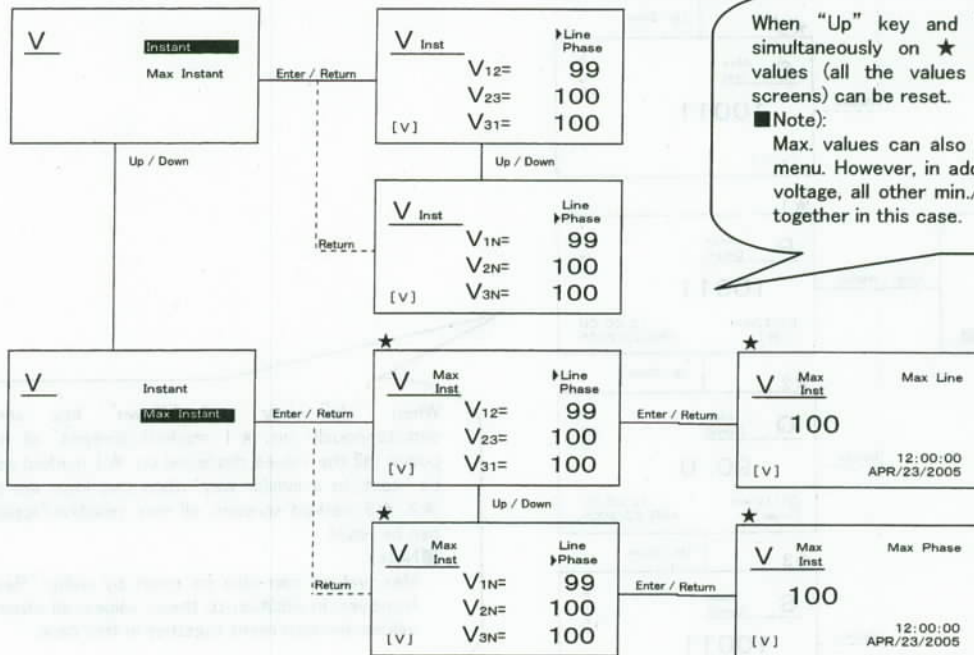


When "Up" key and "Down" key are pressed simultaneously on ★ marked screens, all max. leakage currents (all the values displayed on ★ marked screens) can be reset.

■ Note):
Max. leakage currents can also be reset by using "Reset" menu. However, in addition to the max. values of leakage current, all other min./max. values are also reset together in this case.

5.3.5 Voltage

- Display item:
 - ⊙ Instantaneous line and phase values
 - ⊙ Max. instantaneous line/phase values and occurrence date & time (since last reset)



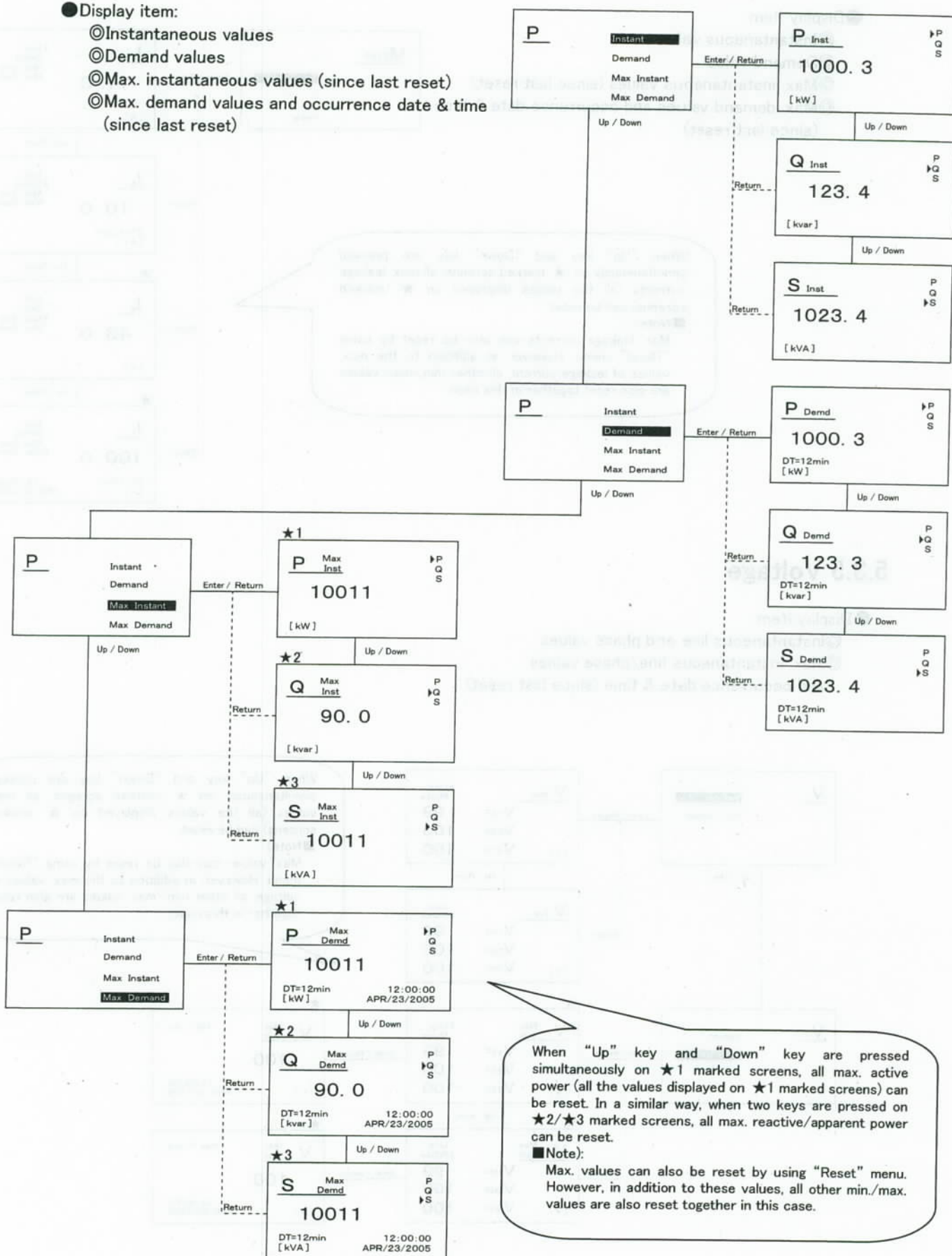
When "Up" key and "Down" key are pressed simultaneously on ★ marked screens, all max. values (all the values displayed on ★ marked screens) can be reset.

■ Note):
Max. values can also be reset by using "Reset" menu. However, in addition to the max. values of voltage, all other min./max. values are also reset together in this case.

5.3.6 Power

● Display item:

- ⊙ Instantaneous values
- ⊙ Demand values
- ⊙ Max. instantaneous values (since last reset)
- ⊙ Max. demand values and occurrence date & time (since last reset)



When "Up" key and "Down" key are pressed simultaneously on ★1 marked screens, all max. active power (all the values displayed on ★1 marked screens) can be reset. In a similar way, when two keys are pressed on ★2/★3 marked screens, all max. reactive/apparent power can be reset.

■ Note):
Max. values can also be reset by using "Reset" menu. However, in addition to these values, all other min./max. values are also reset together in this case.

5.3.7 Power factor

- Display item:
 - ⊙ Instantaneous value
 - ⊙ Max. instantaneous value (since last reset)
 - ⊙ Min. instantaneous value (since last reset)

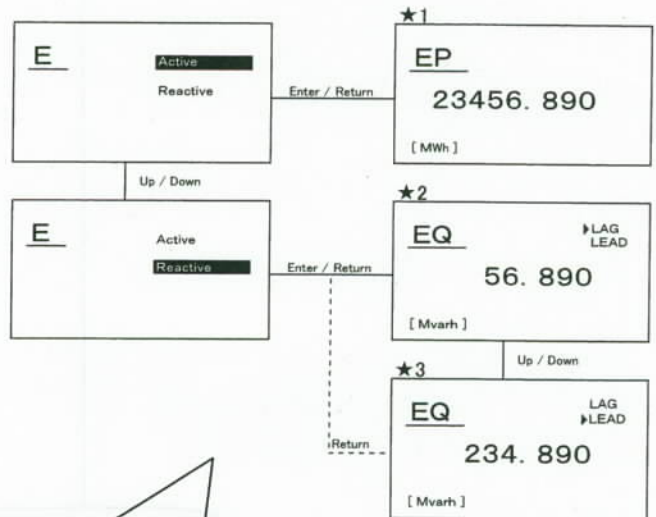
★		<u>Pf Inst</u>	
	LAG		0. 890
Min	LEAD		0. 510
Max	LAG		0. 420

When "Up" key and "Down" key are pressed simultaneously on ★ marked screen, min. and max. value can be reset.

■ Note):
Min./Max. values can also be reset by using "Reset" menu. However, in addition to these values, all other max. values are also reset together in this case.

5.3.8 Energy

- Display item:
 - ⊙ Active energy
 - ⊙ Lagging reactive energy
 - ⊙ Leading reactive energy



When "Up" key and "Down" key are pressed simultaneously on ★1 marked screen, active energy can be reset. In a similar way, when two keys are pressed on ★2/★3 marked screen, lagging/leading reactive energy can be reset.

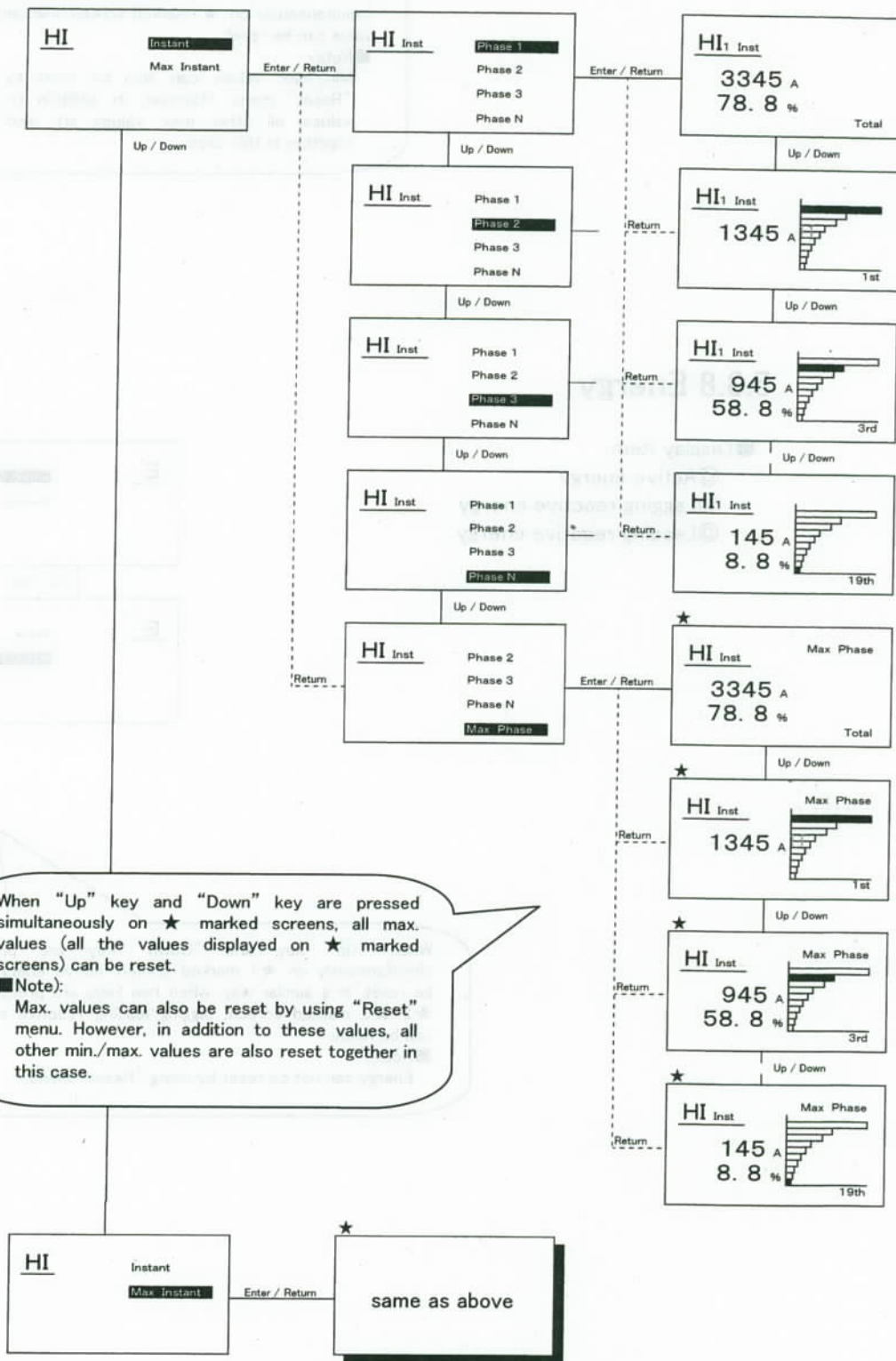
■ Note):
Energy can not be reset by using "Reset" menu.

5.3.9 Harmonic Currents

● Display item:

- ⊙ Instantaneous rms values ¹⁾
- ⊙ Instantaneous distortion ²⁾ (numerical/bar graph)
- ⊙ Max. instantaneous rms values ¹⁾ (since last reset)
- ⊙ Max. instantaneous distortion ^{2), 3)} (since last reset)

- 1): total/fundamental/3rd/.../19th
- 2): total/3rd/5th/.../19th
- 3): Max. value of distortion is defined as a value where the rms value is maximum.



5.3.10 Frequency

- Display item:
- ◎ Instantaneous value

Hz Inst
60
[Hz]

Item (Symbol)	Measurement Unit	Display
LINE-STOP-RESET	0 to 20min	min [A] (Instantaneous value) 0.0000A
ER	0 to 255Δ/nsec	min [B] (Instantaneous value) 0.0000A
UP	0 to 20min	min [A]
UP		

① When the measured value exceeds the measurement range, the measured value changes and displays "0". Accuracy is defined as percentage of true value.
 ② Accuracy of UP is the typical value of the display. The range and accuracy of the display.

5.4.2 Display of trip information (auto display)

When a trip occurs, the trip occurrence screen is displayed automatically and displays both storage and trip. The screen only returns after a reset.

The page to reset the tripped data are:

- ① Selecting "YES" in the text search screen as shown in sample below.
- ② Pressing "Up" and "Down" key simultaneously on the keypad. A confirmation screen is shown in sample below in page 52.
- ③ Selecting "TripAlarm Status" or "TripAlarm History" in "List" menu.
- ④ Pressing a reset button on E18.
- ⑤ Stopping the alarm reset terminal (RS1) and (RS2) at the control system terminal block.

- ◎ Query item
- ◎ Trip cause
- ◎ Triped value
- ◎ Occurrence date and time

When "YES" is selected in the text search screen, the screen returns to the main screen. When "Up" and "Down" key simultaneously is pressed, the screen returns to the main screen. When "TripAlarm Status" or "TripAlarm History" is selected in the "List" menu, the screen returns to the main screen. When a reset button is pressed, the screen returns to the main screen. When the alarm reset terminal (RS1) and (RS2) is stopped at the control system terminal block, the screen returns to the main screen.

When "YES" is selected in the text search screen, the screen returns to the main screen. When "Up" and "Down" key simultaneously is pressed, the screen returns to the main screen. When "TripAlarm Status" or "TripAlarm History" is selected in the "List" menu, the screen returns to the main screen. When a reset button is pressed, the screen returns to the main screen. When the alarm reset terminal (RS1) and (RS2) is stopped at the control system terminal block, the screen returns to the main screen.



5.4 Trip information

5.4.1 Display specifications of trip information

The display specifications of trip information are shown in below table.

Table 5.3: Display specifications of trip information

Items (accuracy)	Measurement range ¹⁾	Display
LTD/STD/INST ($\pm 20\%$ ²⁾)	0 to 20xIn	***** [A] (Measured value < 20000A)
		*** [kA] (Measured value \geq 20000A)
ER ($\pm 20\%$ ²⁾)	0 to 2xI Δn_{max}	***. [A]
GFR ($\pm 20\%$ ²⁾)	0 to 2xIn	***** [A]
UVT ³⁾	-	-

■ 1): When these measured values exceeds the measurement range, the numeric value changes into blinking.

■ 2): Accuracy is defined as percentage of true value.

■ 3): In case of UVT trip, the tripped value is not displayed. (Trip cause and occurrence time are displayed.)

5.4.2 Display of trip information (auto display)

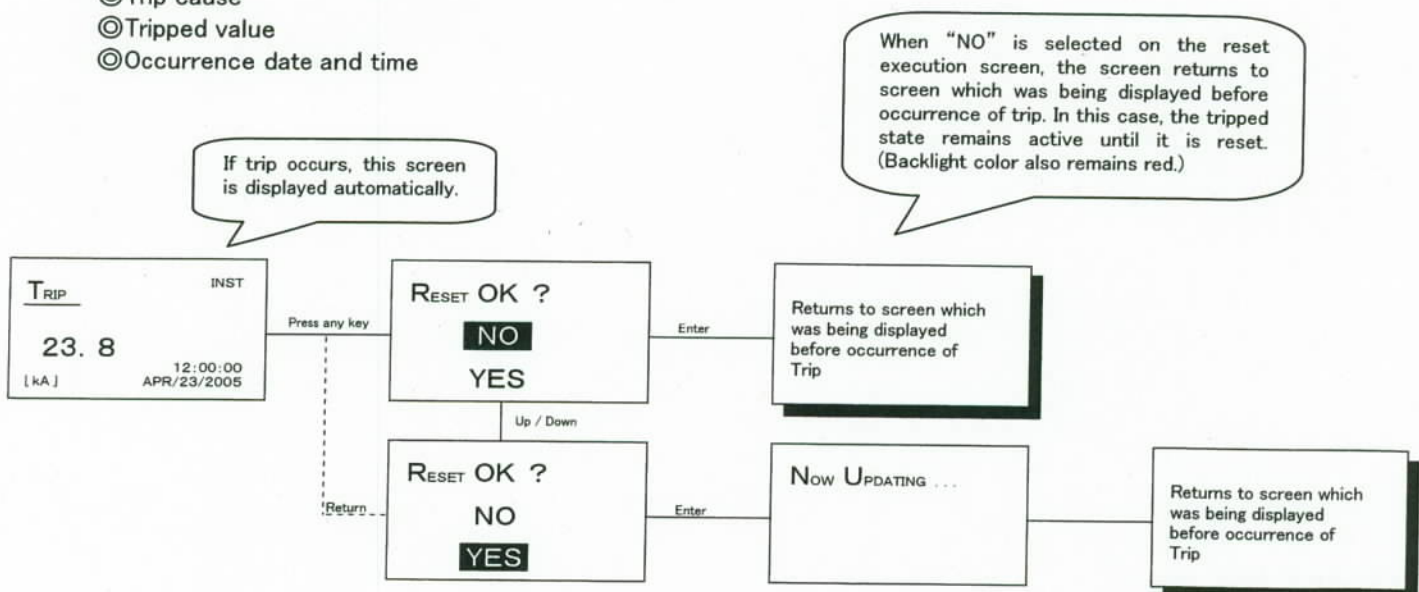
When a trip occurs, the trip occurrence screen is displayed automatically and backlight color changes into red. This screen may remain until it is reset.

The ways to reset its tripped state are:

- ⊙ Selecting "YES" on the reset execution screen as shown in sample below.
- ⊙ Pressing "Up" and "Down" key simultaneously on ☆ marked or ★ marked screen as shown in sample screen on page 25.
- ⊙ Selecting "Trip/Alarm Status" or "Trip/Alarm History" in "Reset" menu.
- ⊙ Pressing a reset button on ETR.
- ⊙ Shorting the alarm reset terminal **RS1** and **RS2** at the control circuit terminal block.

● Display item:

- ⊙ Trip cause
- ⊙ Tripped value
- ⊙ Occurrence date and time



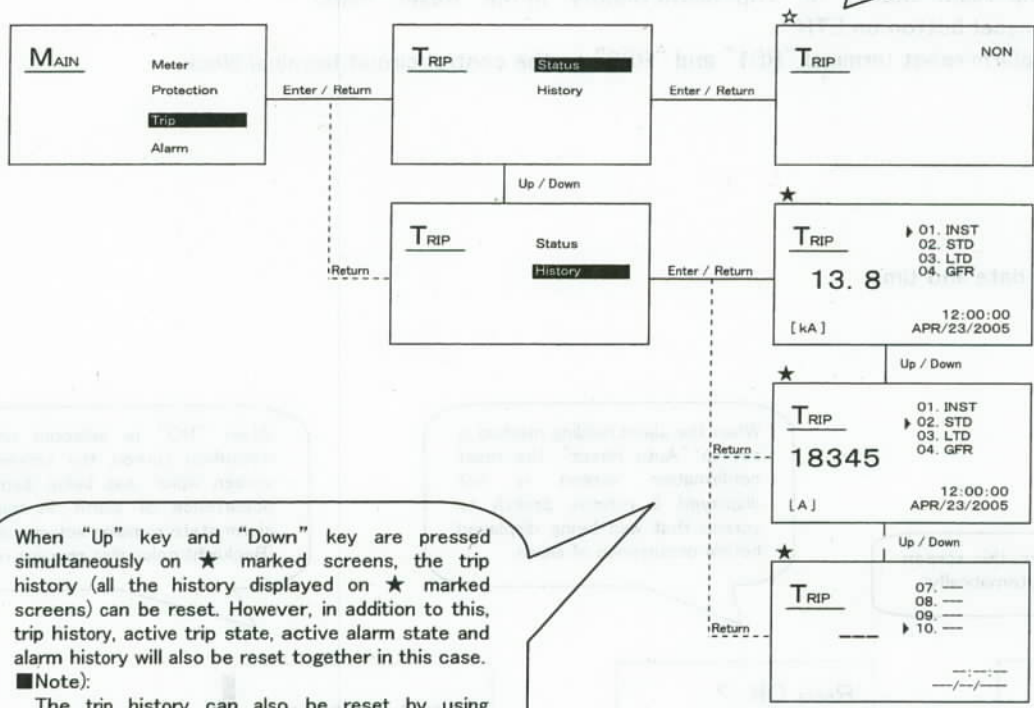
5.4.3 Display of trip information

In this menu, trip status and history of latest 10 trips are displayed.

- Display item:
 - Trip cause
 - Tripped value
 - Occurrence date and time

When "Up" key and "Down" key are pressed simultaneously on ☆ marked screens, the active trip state can be reset. In this case, however, in addition to this, the active alarm state will also be reset together.

■ Note):
The active trip state can also be reset by using "Trip/Alarm Status" in "Reset" menu. In this case, in addition to this, the active alarm state will also be reset together.



When "Up" key and "Down" key are pressed simultaneously on ☆ marked screens, the trip history (all the history displayed on ☆ marked screens) can be reset. However, in addition to this, trip history, active trip state, active alarm state and alarm history will also be reset together in this case.

■ Note):
The trip history can also be reset by using "Trip/Alarm History" in "Reset" menu. In this case, in addition to this trip history, active trip state, active alarm state and the alarm history will also be reset together.

5.5 Alarm information

5.5.1 Display of alarm information (auto display)

When an alarm occurs, the alarm occurrence screen is displayed automatically and backlight color changes into red. When the alarm holding method is set to "Auto Reset", the alarm screen will return to screen that was being displayed before occurrence of alarm if load current falls below a pickup level. On the other hand, when the alarm holding method is set to "Self-Holding", the alarm screen will remain until it is reset by reset order even if load current falls below the pickup level¹⁾.

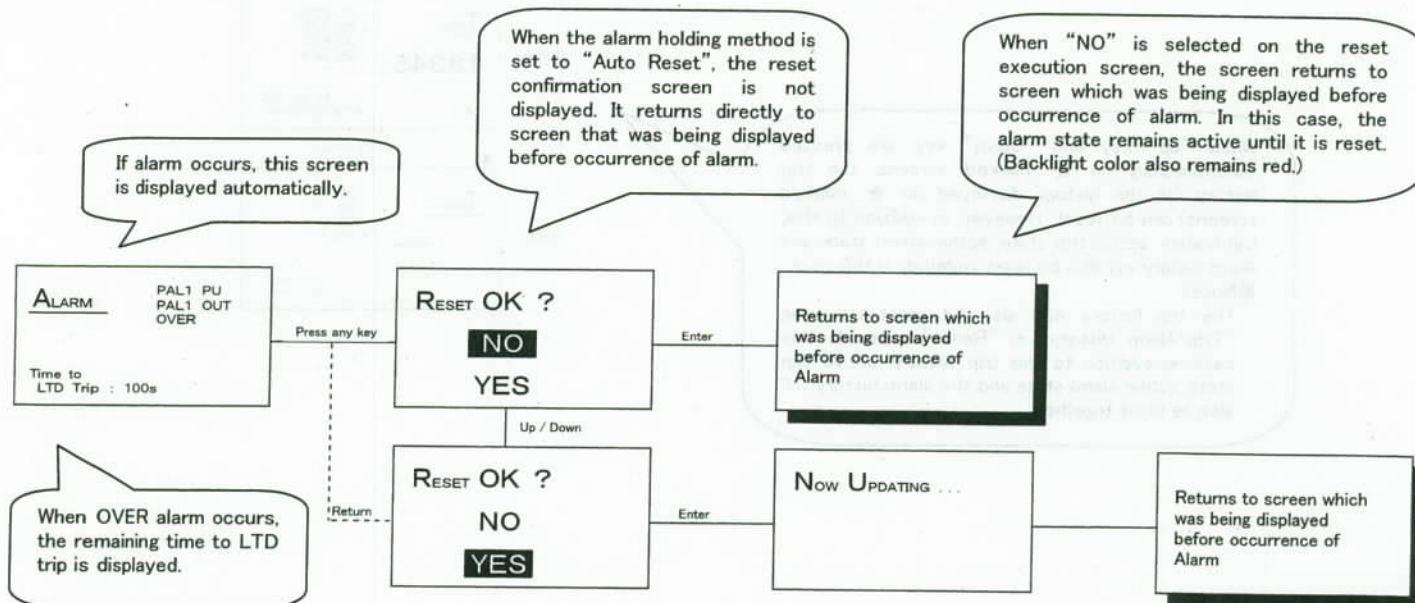
- 1): Pre-alarm pickup (PAL1 P.U.), 2nd pre-alarm pickup (PAL2 P.U.), Overload (OVER) and Temperature alarm (TAL) are always reset automatically whether "Auto Reset" or "Self-Holding".

The ways to reset these alarm states are:

- ⊙ Selecting "YES" on the reset execution screen as shown in the sample below.
- ⊙ Pressing "Up" key and "Down" key simultaneously on ☆ marked or ★ marked screen as shown in sample screen on page 27.
- ⊙ Selecting "Trip/Alarm Status" or "Trip/Alarm History" in the "Reset" menu.
- ⊙ Pressing the reset button on ETR.
- ⊙ Shorting the alarm reset terminal "RS1" and "RS2" on the control circuit terminal block.

● Display item:

- ⊙ Alarm cause
- ⊙ Occurrence date and time



5.5.2 Display of alarm information

In this menu, alarm status and history of latest 10 alarms⁵⁾ are displayed.
It is possible to check about:

- ⊙ Pre-alarm pickup (PAL1 P.U.)
- ⊙ Pre-alarm output (PAL1 OUT)
- ⊙ Overload (OVER)
- ⊙ 2nd pre-alarm pickup (PAL2 P.U.)¹⁾
- ⊙ 2nd pre-alarm output (PAL2 OUT)¹⁾
- ⊙ Ground fault alarm (GFR)²⁾
- ⊙ Earth leakage pre-alarm (EPAL)³⁾
- ⊙ Earth leakage alarm (ER)³⁾
- ⊙ Temperature alarm (TAL)⁴⁾

- 1): 2nd additional pre-alarm (AP) is required.
- 2): Ground fault protection (G1) is required.
- 3): Earth leakage protection (E1) is required.
- 4): Temperature alarm (TAL) is required.
- 5): When the alarm holding method is set to "Auto Reset", any alarms are not stored in EEPROM and cannot checked the history of alarms in "alarm history" menu.
When the alarm holding method is set to "Self-Holding", all alarms except for PAL1 P.U., PAL2 P.U. and OVER can be stored in EEPROM and can be checked in "alarm history" menu.

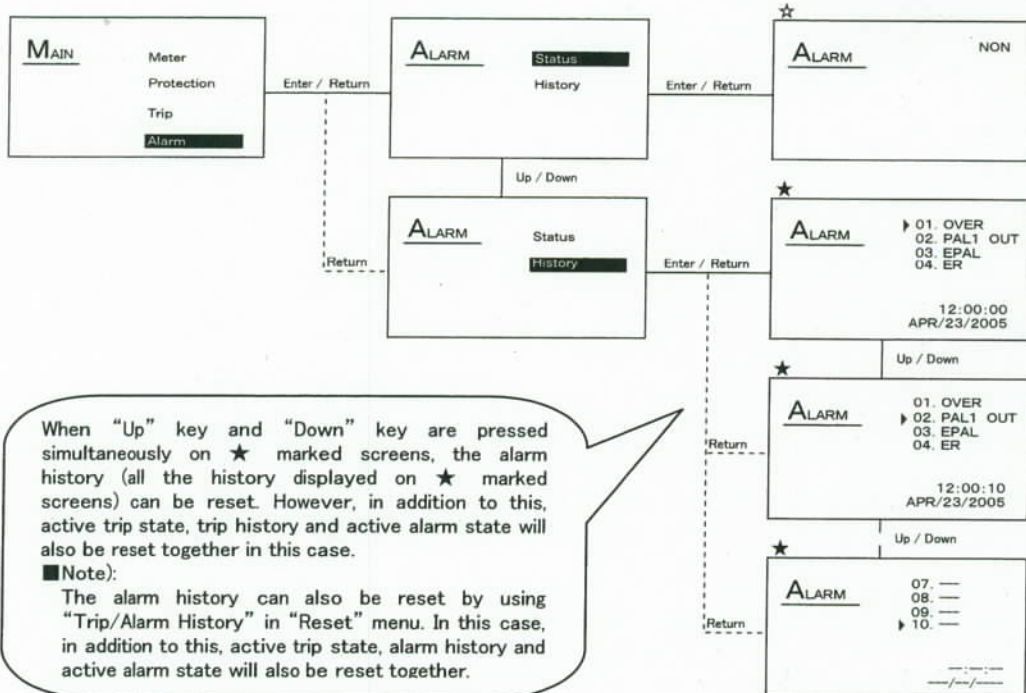
● Display item:

- ⊙ Alarm cause
- ⊙ Occurrence date and time

When "Up" key and "Down" key are pressed simultaneously on ☆ marked screens, the active alarm state can be reset. In this case, however, in addition to this, the active trip state will also be reset together.

■ Note):

The active alarm state can also be reset by using "Trip/Alarm Status" in "Reset" menu. In this case, in addition to this, the active trip state will also be reset together.



When "Up" key and "Down" key are pressed simultaneously on ☆ marked screens, the alarm history (all the history displayed on ☆ marked screens) can be reset. However, in addition to this, active trip state, trip history and active alarm state will also be reset together in this case.

■ Note):

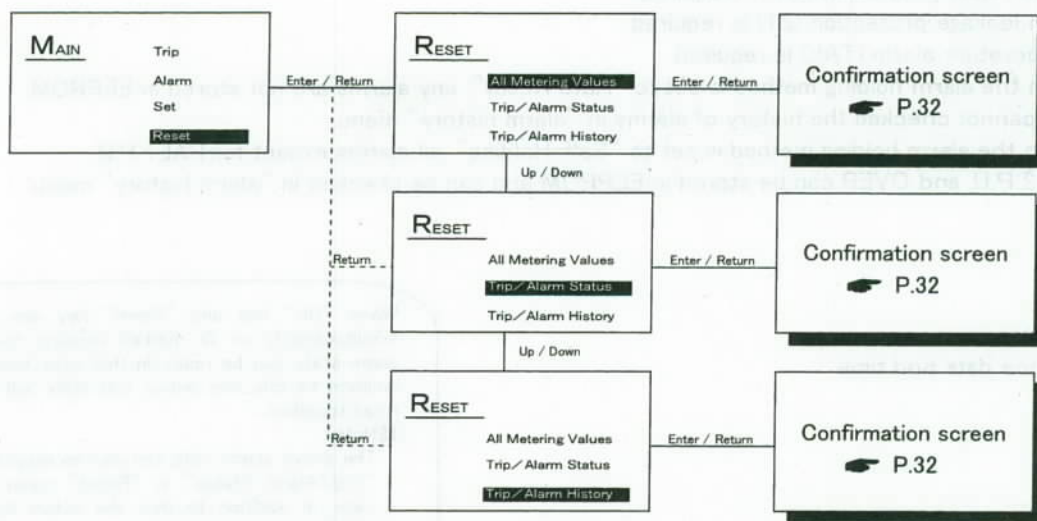
The alarm history can also be reset by using "Trip/Alarm History" in "Reset" menu. In this case, in addition to this, active trip state, alarm history and active alarm state will also be reset together.

5.6 Resetting

Reset items and flowchart are shown below.

Table 5.4: Reset items

Resetting items	Description
All Metering Values	Resets all min./max. metered values. However, active and reactive energy are not reset.
Trip/Alarm Status	Resets active trip status and active alarm status.
Trip/Alarm History	Resets all trip and alarm information. (active trip status, active alarm status, trip history and alarm history are all reset.)

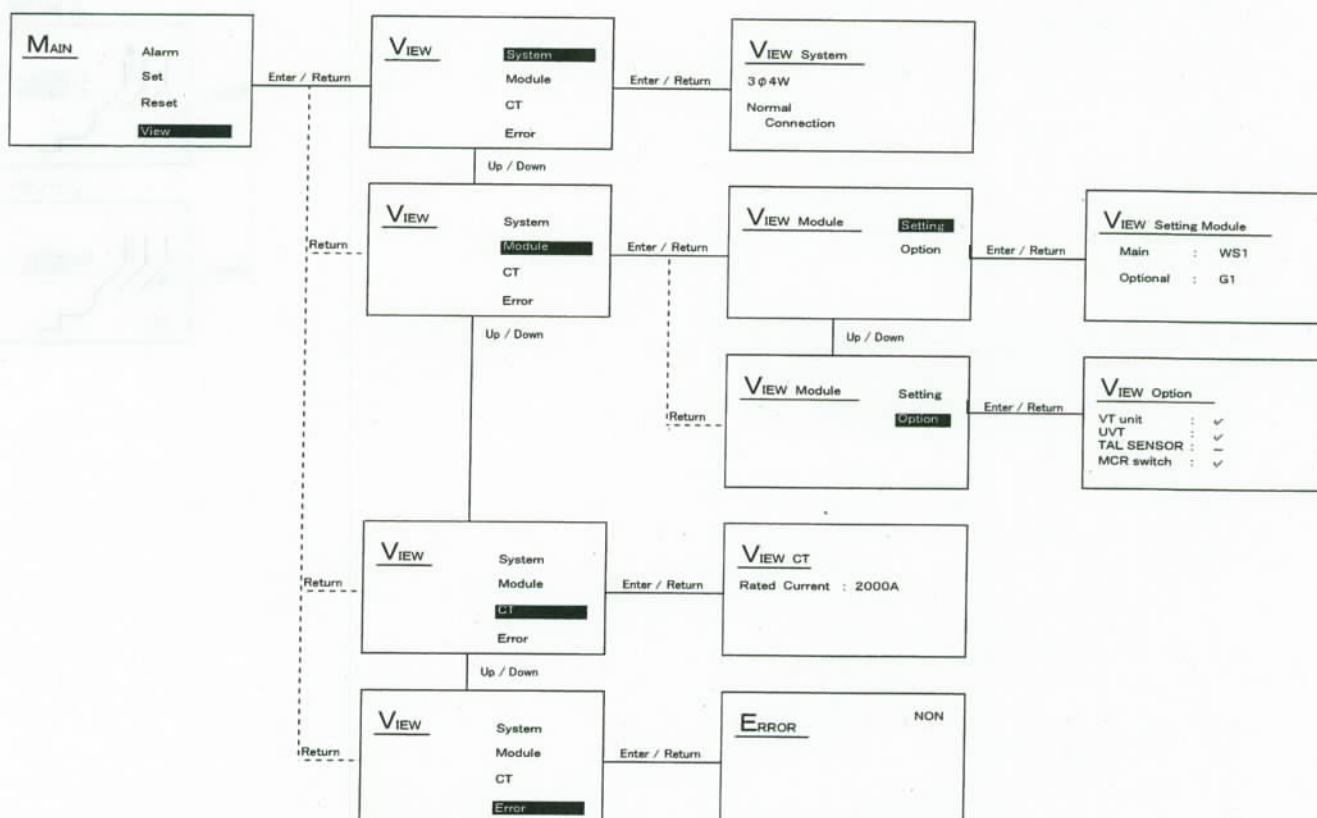


5.7 Display of ACB information

The display items and flowchart are shown below.

Table 5.5: Display of ACB information

Display items	Descriptions	
System	Displays phase-Wire system (3Φ3W/3Φ4W) and Connection (Normal/Inverse).	
Module	Setting	Displays the type name of Main/Optional setting module attached to the ETR.
	Option	Displays the installed option modules with "✓" mark.
CT	Displays the CT rated current (In).	
ERROR	Displays the following errors detected by ETR. ◎Internal transmission error ◎A/D converter error ◎EEPROM error ◎Clock IC (RTC) error ◎Main setting module error ◎Optional setting module error ◎CT Connector error ◎MCR switch error ◎TAL sensor error	



5.8 Characteristics setting (*DP2 only)

By using Display for panelboard (type: DP2), it is possible to check the status of adjustable switches on the face of ETR from outside a panelboard.

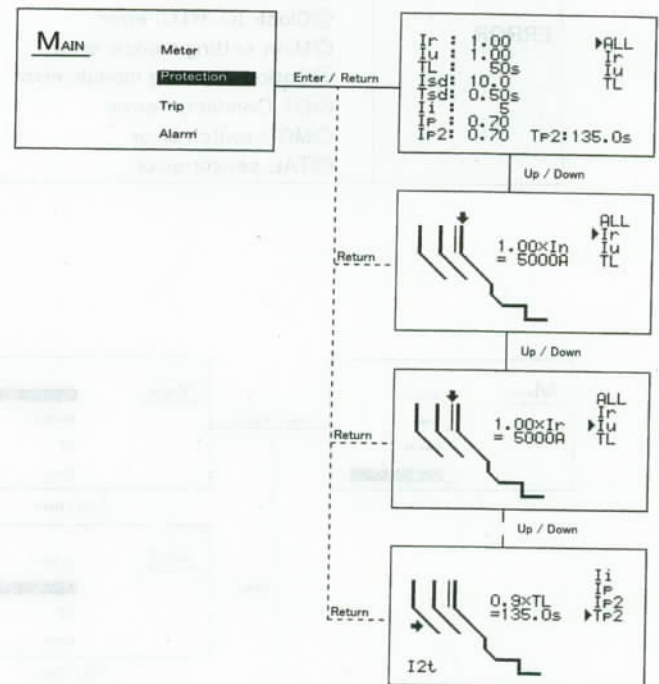
In addition, if Earth leakage protection (E1) is equipped, the earth leakage pre-alarm (EPAL) pickup current (I_{ep})¹⁾ and operating time (T_{ep})¹⁾ can be changed by DP2.

■ 1): Factory setting is OFF. Therefore, when EPAL function is used, the setting should be change before using.

5.8.1 Display of characteristics

● Display item:

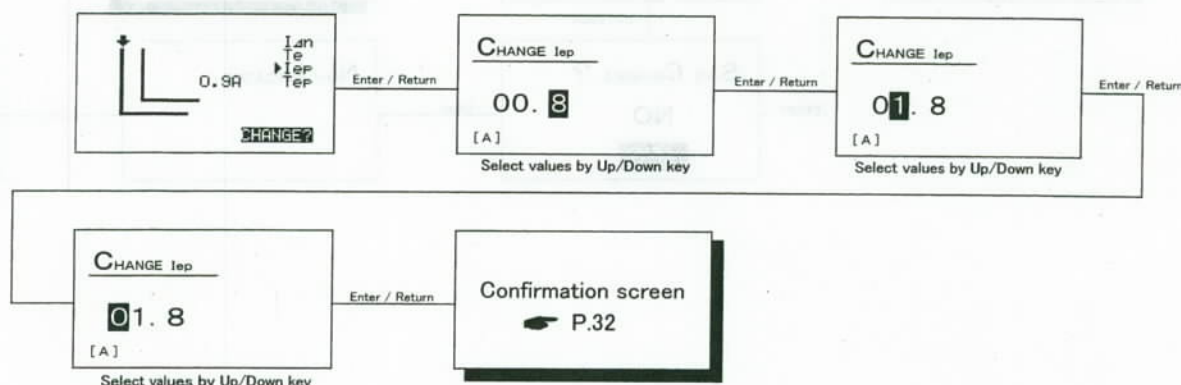
◎ Characteristics (numerical/curve)



5.8.2 Setting of earth leakage pre-alarm (EPAL) pickup current (Iep)

Earth leakage pre-alarm pickup current (Iep) can be set in this menu.
If earth leakage current exceeds Iep, EPAL will occur after the operating time (Tep).

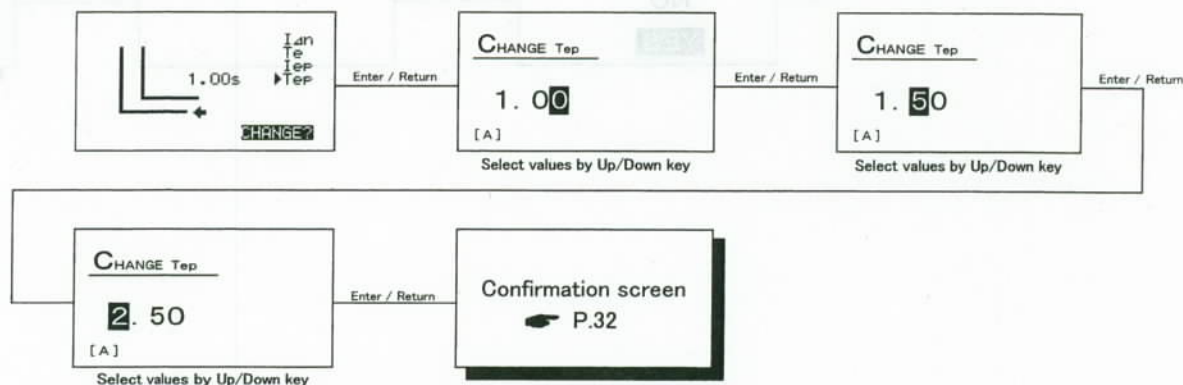
- Available setting range: $0.0^{1)}/0.5A/0.6A/0.7A/\dots/I\Delta n^{2)}$
Setting step: 0.1A
- 1): When Iep is set to 0.0, the EPAL function is disabled.
(*Factory setting is OFF. Therefore, when EPAL function is used, the setting should be change before using.)
- 2): Iep cannot be set exceeds the earth leakage pick-up current (IΔn) that is adjustable switch on the face of Earth leakage protection (E1) module.



5.8.3 Setting of earth leakage pre-alarm (EPAL) operating time (Tep)

Earth leakage pre-alarm time operating (Tep) can be set in this menu.
If earth leakage current exceeds Iep, EPAL will occur after the operating time (Tep).

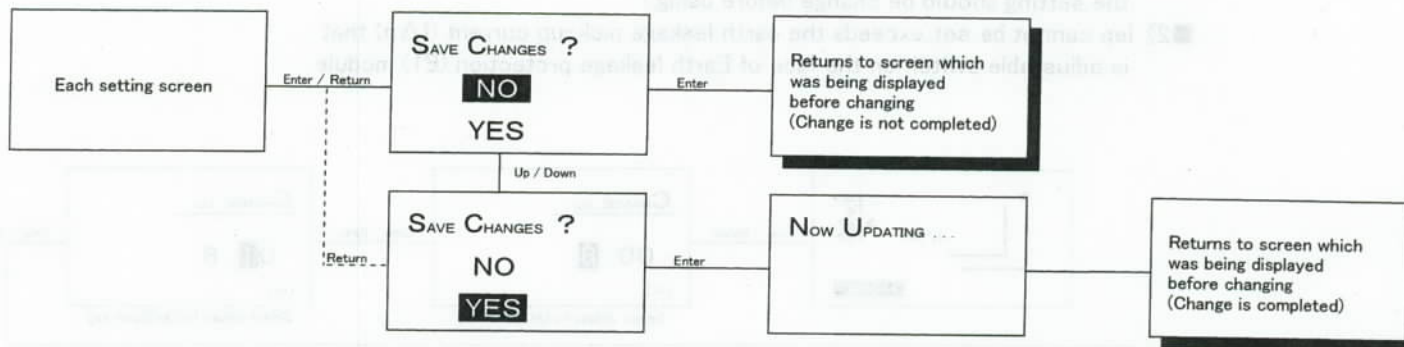
- Available setting range: 0.1s/0.2s/.../3.0s
Setting step: 0.1s
- Note): When Iep is set to 0.0, "CHANGE?" is not displayed and the Tep cannot be changed.
(*Factory setting is OFF. Therefore, when EPAL function is used, the Iep setting should be change before using.)



5.9 About confirmation screen

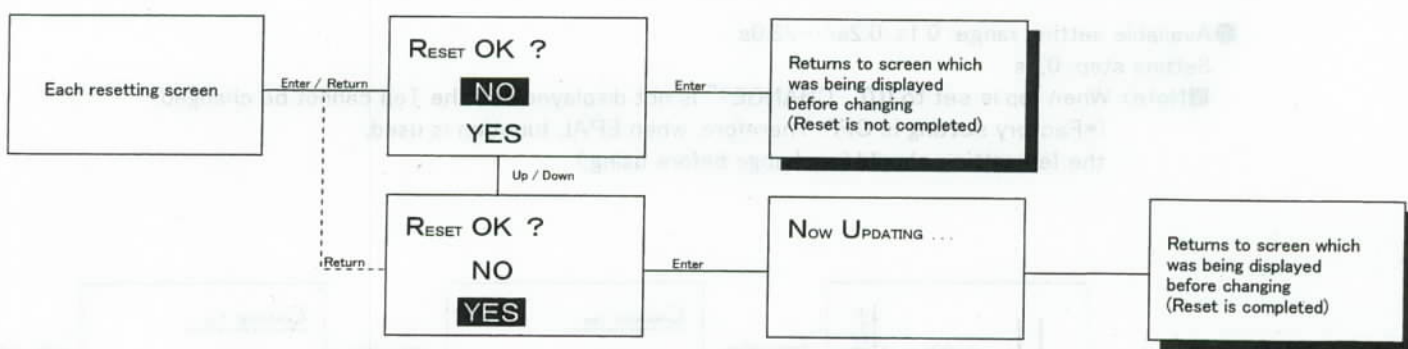
5.9.1 Confirmation of change

When changing a setting value, the confirmation screen as shown below is displayed.
 "NO" is chosen when not permitting change, and "YES" is chosen when permitting change.



5.9.1 Confirmation of reset

When resetting some data, the confirmation screen as shown below is displayed.
 "NO" is chosen when not permitting reset, and "YES" is chosen when permitting reset.



6. Service network

Country / Region	Company	Address	Telephone
Australia	Mitsubishi Electric Australia Pty. Ltd	348 Victoria Road, Rydalmere, N.S.W. 2116, Australia	612-9684, 7586
Belgium	Emac S.A.	Industrialaan 1, B-1702 Groot-Bijgaarden, Belgium.	32-(0)2-4810211
Chile	RHONA S.A.	Vte. Agua Santa 4211 Casilla 30-D (P.O. Box) Viña Del Mar. Chile	(32)-320600
China	RYODEN AUTOMATION (SHANGHAI) LTD.	(Shanghai) 3F, Block 5, 103 Cao Bao Road, Shanghai, China	021-6475-3228
	SHANGHAI SETSUYO TRADING CO.,LTD.	Shanghai Everbright Convention & Exhibition Center Room2306. Block D. 80, Cao bao Rd., Xuhui District Shanghai, P.R.China	021-6432-6698
Colombia	Proelectrico Representaciones S.A.	Cra 53 No 29C-73 U.I.C.- Medellin. COLOMBIA.	574-235-00-28
Denmark	Louis Poulsen CO. A/S	Geminivej 32, DK-2670 Greve, Denmark.	45-(0)43-95-95-95
Egypt	CAIRO ELECTRICAL GROUP	9 Rostoum Street Garden City, APT. 5, P.O. BOX: 165-11516, Cairo-Egypt.	20-2-7961337
Germany	Mitsubishi Electric Europe B.V. German Branch.	Gothaer Strasse 8, 40880 Ratingen, Germany.	49-(0)2102-4860
Greece	Drepanias Antonios S.A.	52, Arkadias STR.GR 121 32. Peristeri Athens Greece.	30(1)57 81 599 699
Hong Kong	RYODEN AUTOMATION LIMITED	10/F Manulife Tower 169 Electric Road North Point. Hong Kong.	28878870
Indonesia	P.T.SAHABAT INDONESIA.	JL. Muara Karang Selatan Blok A/Ulara No.1 kav. NO.11 P.O. Box 5045/Jakarta/11050. Jakarta Indonesia.	021-6621780
Ireland	Mitsubishi Electric Europe B.V. Irish Branch.	Westgate Business Park, IRL-Dublin 24	353-(0)1-4198800
Italy	Mitsubishi Electric Europe B.V. Italy	C.D.Colleoni-P.Perseo Ing.2, Via Paracelso 12 1-20041 Agrate Brianza (M1)	39-(0)39 60 531
Korea	HAN NEUNG TECHNO Co., Ltd.	2 Fl. Dong Seo Game Channel Bldg ., 1F 660-11 Deungchon-Dong, Kanguseo-Ku, Seoul, 157-030 Korea	82-2-3668-6567
Kuwait	SALEM M AL-NISF ELECTRICAL CO.W.L.L.	P.O. Box 4784. Safat. 13048 Kuwait.	965-484-5660
Lao PDR	SOCIETE LAO IMPORT-EXPORT	43-47 Lane Xang Road P.O. BOX 2789 VT Vientiane Lao PDR.	21-215043, 21-215110
Lebanon	COMPTOIR D'ELECTRICITE GENERALE INTERNATIONAL	Cebaco Center-Block A. Autostrade Dora, P.O. BOX: 90-1314 Beirut-Lebanon.	961-1-240430
Myanmar	PEACE MYANMAR ELECTRIC CO., LTD.	NO. 137/139 Botataung Pagoda Road, Botataung Town Ship 11161, Yangon, Myanmar.	95-01-202589, 202449, 202590
Nepal	Watt & Volt House Co., Ltd.	KHA 2-65, Volt House Dilli Bazar Post Box: 2108, kathmandu, Nepal	977-1-411330
New Zealand	Melco Sales (N.Z.) Ltd.	1 Parliament Street Lower Hutt. New Zealand.	644-569-7350
Norway	SCANELEC AS	Leirvikasen 43B, N5020 Bergen, Norway.	47-55-506000
Pakistan	Prince Electric Co.	16 Brandreth Road Lahore 54000. Pakistan.	042-7654342
Philippines	EDISON ELECTRIC INTEGRATED, INC.	24th Fl. Galleria Corporate Center Edsa Cr, Ortigas Ave. Quezon City, Metro Manila. Philippines.	02-643-8691
Poland	MPL Technology Sp zo.o.	ul. Sliczna 36 31-444 Krakow, Poland.	48-(0)12 632-28-85
Saudi Arabia	CENTER OF ELECTRICAL GOODS	Al-Nabhaniya Street-4Th Crossing, Al-Hassa Road, P.O. BOX: 15955, Riyadh 11454, Saudi Arabia.	966-1-4770149
Singapore	MITSUBISHI ELECTRIC ASIA PTE LTD.	307 Alexandra Road #05-01/02 Mitsubishi Electric Building Singapore 159943	65-473-2308
Slovenia	INEA d.o.o.	Ljubljanska 80, SI-61230 Domzale, Slovenia.	386-(0)17 21 80 00
South Africa	Circuit Breaker Industries LTD.	Private Bag 2016. Isando 1600, Johannesburg, South Africa	27-11-928-2000
Spain	Mitsubishi Electric Europe B.V. Spanish Branch.	Caretera De Rubi 76-80, 08190 - Sant Cugat Del Valles (Barcelona) Spain	34-93-595-3131
Sweden	Euro Energy Components AB	Box 103 48 S-434 24 Kungsbacka, Sweden.	46-(0)300-69 00 40
Switzerland	Trielec A G	Mühlentalstrasse 136, 8201 Schaffhausen, Switzerland	41-(0)52-6258425
Taiwan	Setsuyo Enterprise Co., Ltd.	6F, NO. 105 Wu-Kung 3rd rd., Wu-Ku Hsiang. Taipei Hsien Taiwan	02-2298-8889
Thailand	UNITED TRADING & IMPORT CO. LTD.	77/12 Bumrungruang Road, Klong Mahanak, Pomprab Bangkok 10100.	223-4220-3
Turkey	GTS	Fahri Gizden Sokak,Hacaloglu Apt. No.22/6 TR-80280 Gayrettepe/Istanbul,Turkey.	90-(0)212-2674011
U.K.	Mitsubishi Electric Europe B.V. UK-Branch.	Travellers Lane, Hatfield, Herts, AL10 8xB, U.K.	44-(0)1707-276-100
Uruguay	Fierro Vignoli S.A.	P.O. box 20022/Suc Upae, Montevideo. Uruguay.	598-2-92-08-08
Venezuela	ADESCO C.A.	Lle 8, Calpon Elinsu, La Urbina-EDO, Miranda P.O. BOX 78034 Caracas 1074A., Venezuela	58-2-241-7634
Vietnam	Sa Giang Techno Co., Ltd.	207/4 Nguyen Van Thu St., Dist 1, Ho Chi Minh City, Vietnam	848-821-6453

MITSUBISHI Low-Voltage Air Circuit Breakers World Super AE

Display (DP1/DP2)

Model	Rating	Frame	Dimensions	Weight
DP1-100	100A	100	100x100x100	10kg
DP1-150	150A	150	150x150x150	15kg
DP1-200	200A	200	200x200x200	20kg
DP1-250	250A	250	250x250x250	25kg
DP1-300	300A	300	300x300x300	30kg
DP1-350	350A	350	350x350x350	35kg
DP1-400	400A	400	400x400x400	40kg
DP1-450	450A	450	450x450x450	45kg
DP1-500	500A	500	500x500x500	50kg
DP1-550	550A	550	550x550x550	55kg
DP1-600	600A	600	600x600x600	60kg
DP1-650	650A	650	650x650x650	65kg
DP1-700	700A	700	700x700x700	70kg
DP1-750	750A	750	750x750x750	75kg
DP1-800	800A	800	800x800x800	80kg
DP1-850	850A	850	850x850x850	85kg
DP1-900	900A	900	900x900x900	90kg
DP1-950	950A	950	950x950x950	95kg
DP1-1000	1000A	1000	1000x1000x1000	100kg
DP2-100	100A	100	100x100x100	10kg
DP2-150	150A	150	150x150x150	15kg
DP2-200	200A	200	200x200x200	20kg
DP2-250	250A	250	250x250x250	25kg
DP2-300	300A	300	300x300x300	30kg
DP2-350	350A	350	350x350x350	35kg
DP2-400	400A	400	400x400x400	40kg
DP2-450	450A	450	450x450x450	45kg
DP2-500	500A	500	500x500x500	50kg
DP2-550	550A	550	550x550x550	55kg
DP2-600	600A	600	600x600x600	60kg
DP2-650	650A	650	650x650x650	65kg
DP2-700	700A	700	700x700x700	70kg
DP2-750	750A	750	750x750x750	75kg
DP2-800	800A	800	800x800x800	80kg
DP2-850	850A	850	850x850x850	85kg
DP2-900	900A	900	900x900x900	90kg
DP2-950	950A	950	950x950x950	95kg
DP2-1000	1000A	1000	1000x1000x1000	100kg

MITSUBISHI ELECTRIC CORPORATION
 HEAD OFFICE: TOKYO BLDG, MARUNOUCHI, 2-7-3, CHYODAKU, TOKYO 100-8310. TELEX: J24532 CABLE: MELCO TOKYO