IM300

Operational Manual

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1. Introductions

1.1. Function Specification

IM300 is an intelligent multipurpose power parameter monitoring and control device which has an extensive range of applications in 6~35kV or 0.4kV power systems. It has the data acquisition, control and statistical functions, such as electrical parameters measurement, calculation and statistics, fault records, 2 ~ 31st harmonics monitoring function, 4-ch digital inputs and 2-ch relay outputs, 1-ch 4~20mA DC transmission output, over-limit alarm and other functions. IM300 is equipped with RS485 communications and MODBUS-RTU protocol for integration into any power monitoring and control system. The appearance is shown in fig 1.1.1.

Fig 1.1.1 The appearance of IM300

1.2. Features

1.2.1.IM300 functions

- Applied in 3-phase 3-wire system and 3-phase 4-wire system . It can measure and calculate 3-phase voltage, 3-phase current, Zero-sequence current, active power, reactive power, apparent power, power factor, system frequency, active energy and reactive energy.
- Harmonic distortion ratio of voltage and current.(Including total harmonic distortion ratio THD, odd harmonic distortion ratio , even harmonic distortion ratio), 2~31st harmonic occupancy of voltage, 2~31st harmonic occupancy of current, the RMS of voltage and current base wave, etc.
- 2-ch relay control outputs.

- 4-ch digital inputs, up to 32 SOE (the Sequence of Events) of digital inputs can be recorded.
- 1-ch 4 ~ 20mA DC transmission output which can be associated with any voltage, current, power.
- forward/reverse total active energy, reactive energy in four quadrants.
- Multi-rate energy statistics (4 rates, 48 time-periods) of the forward/reverse total active energy, reactive energy in four quadrants.
- The value and occurrence time of the maximum forward/reverse active and reactive power demand. The maximum/minimum value and occurrence time of the voltage, current, frequency, power factor, active power, reactive power, apparent power.
- Unbalanced degree of three-phase voltage and current.
- The over limit alarm function, such as over-current, zero-current, grounding, low-voltage, over-voltage, low-frequency, over- frequency, low-power factor, can be associated with relay outputs.
- Checking and modifying the various electrical parameters, running status and controlling the relays locally.
- Communication protocol is MODBUS-RTU.
- The clock can be set manually.

Note: The above functions are selected according to the specific models of the meter (see appendix C).

1.2.2.High safety and reliability

IM300 can run steadily in the complex power system.

- Electrostatic discharge immunity test : level 3
- Electric fast transient immunity test : level 3
- The surge immunity test : level 3
- Frequency magnetic field immunity test : level 3
- Oscillation wave immunity test : level 3
- The IP level of panel: IP50, the IP level of shell: IP20

1.2.3.Easy installation

IM300 dimensions conform DIN96 × 96 standard. It can be mounted on the

cabinet panel easily.

1.2.4.The wiring of system

- 3-phase 4-wire 3CT (3P4W 3CT)
- 3-phase 4-wire 1CT (3P4W 1CT)
- 3-phase 3-wire 3CT (3P3W 3CT)
- 3-phase 3-wire 2CT (3P3W 2CT)
- 3-phase 3-wire 1CT (3P3W 1CT)

1.2.5.The human-machine interface

The LCD screen can display various of information with bright backlighting. It's very easy to operate IM300 by the human-machine interface.

1.2.6.Application field

Medium and low voltage distribution system, intelligent switch cabinet, load control system, industrial automation, building automation and Energy management system.

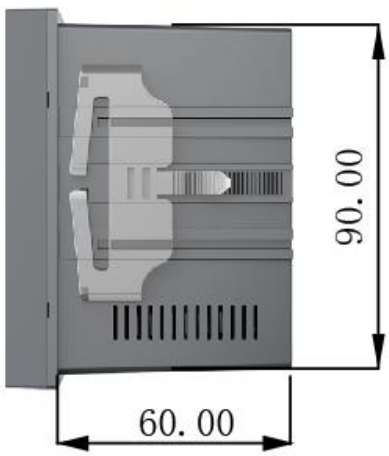
2. The installation, wiring and configuration

This chapter details the installation method, wiring and configuration of the IM300. Please read carefully before installation.

2.1. Dimensions and installation

2.1.1. Dimensions of mechanical devices

Front view



Side View

Fig 2.1.1. Device size fig. (Unit: mm)

2.1.2. Installation

The IM300 should be mounted on the switch gear panel.

- Panel opening dimensions shown in fig. 2-1-2-1:

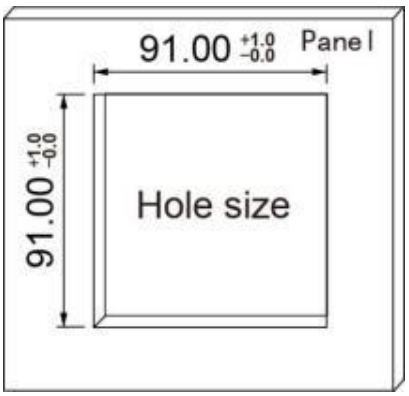


Fig 2.1.2.1 Slots on the panel (unit: mm)

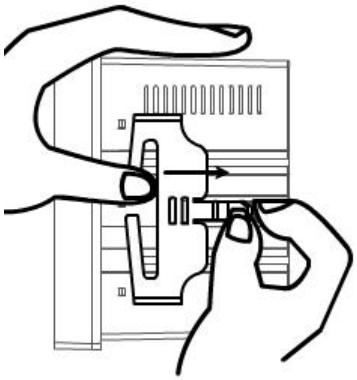


Fig 2.1.2.2 Card is removed

- Taking into account the length of wire, the rear panel must be 100mm depth for accommodating IM300. Actual installation, it normally takes the rear there is some space (at least 130 × 130 × 100mm), ease of installation and wiring.
- Take off the installation card on both sides of the device., as shown in fig. 2.1.2.2, with the thumb and forefinger of one hand the fixed head gently lift (lift force is not too large, otherwise it may cause the fixed head fracture), the thumb of the other hand in the direction of the arrow shown in FIG by pushing the catches can be removed. When installing the device on the front panel push into the mounting hole, then from the trench along the rear of the device will be installed on clip. As shown in fig. 2.1.2.3, his hands were holding down the top and bottom sides of the device, the top two in the thumb of the clip ends, even before the direction of the arrow to push hard to make catches squeezing panel. After the installation of two cards are installed, the device will be firmly fixed on the panel.

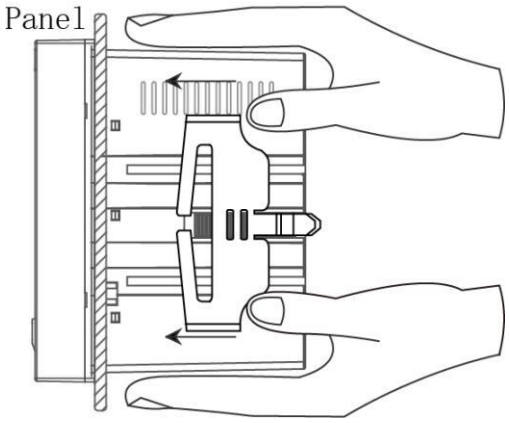


Fig 2.1.2.3 Fixed on the panel by the mounting blocks

2.1.3. Safety Warnings

- 警告！只能由专业电工进行安装。
- Warning! Installation by person with electrotechnicalexpertise only.
- Warnung! Installation nur durch elektrotechnische Fachkraft.
- Avvertenza! Fare installare solo da un elettricista qualificato.
- Avertissement! Installation uniquement par des personnes qualifiées en électrotechnique.
- ¡Advertencia! La instalacióndeberáserrealizadaúnicamentepor electricistasespecializados.

www.abb.com/lowvoltage/directives

2.1.4. Installation Notes

- Inside of the product is no user-adjustable components, do not open during installation.
- Installation with power on is not allowed..
- Run should meet the ambient temperature -25 ℃ ~ + 70 ℃, humidity 0 to 95%, atmospheric pressure 70kPa ~ 106kPa. Avoid placing the device into strong source of interference, radiation, heat sources and dusty environment.

2.2. Wiring and Configuration

2.2.1. Terminal Definition

IM300 back of a total of three sets of terminals, terminal diagram shown in fig. 2-2-1:

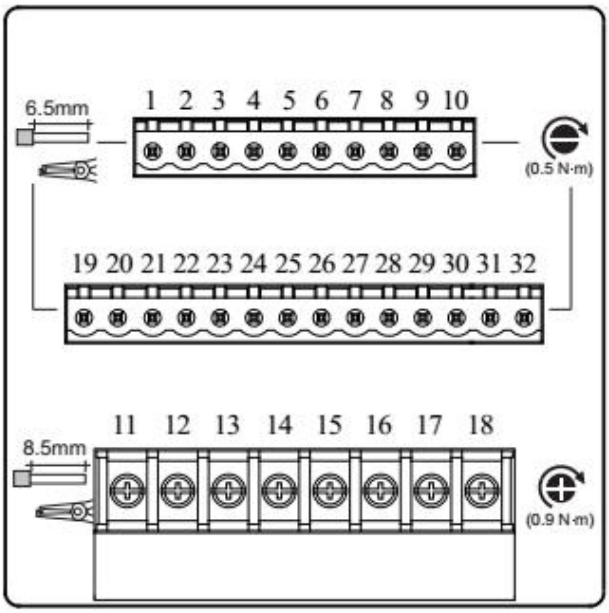


Fig 2.2.1. Terminals fig. (back view)

The definition of the terminals shown in table :

Power Supply	PE	1		I41	17
	L	2		I42	18
	N	3	Relay Outputs	RO1	19
Voltage Inputs	U1	4		RO1	20
	U2	5		RO2	21
	U3	6		RO2	22
	Un	7	Analog Outputs	NC	23
Communication	SHIEL	8		AO+	24
	RS+	9		AO-	25
	RS-	1		NC	26
Current Inputs	I11	1		NC	27
	I12	1	Digital Inputs	DI1	28
	I21	1		DI2	29
	I22	1		DI3	30
	I31	1		DI4	31
	I32	1		COM	32

Note: ① IM300 device varies according to the specific models (see appendix C. Order description). The corresponding terminals that do not have functions are empty (NC).

② In the 3-phase 4-wire system, the Un is connected to the voltage common end; In 3-phase 3-wire system, the Un is connected to B-phase voltage. DI means Digital Input; RO means Relay Output;Transmitter output is self-powered, AO + is forward current output , AO- is reverse current output.

2.2.2. Power supply wiring

Power supply range of IM300 is 85 ~ 265VAC or 85 ~ 265VDC, it suggested a independent power supply wiring as shown in fig. 2-2-2.

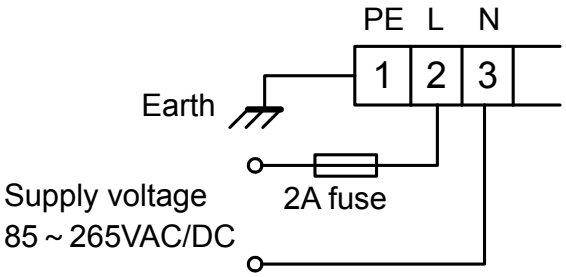


Fig 2.2.2. Power wiring diagram

2.2.3. Electric wiring

- **3-phase 4-wire system: 3CT**

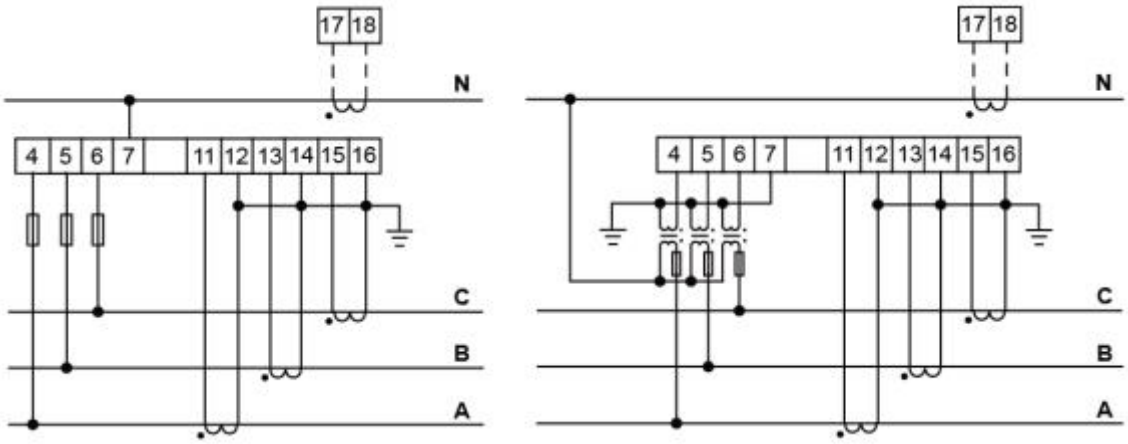


Fig 2.2.3.1 3P4W+3CT

- **3-phase 4-wire system: 1CT**

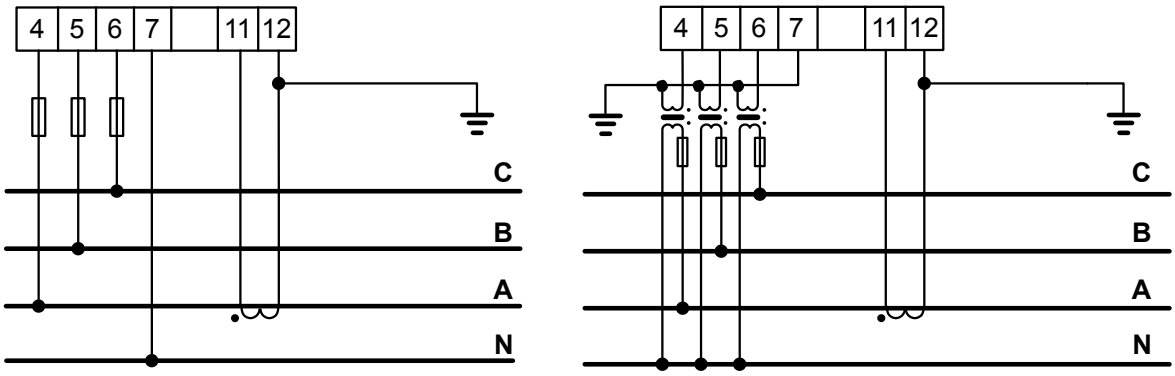


Fig 2.2.3.2 3P4W+1CT

- **3-phase 3-wire system: 3CT**

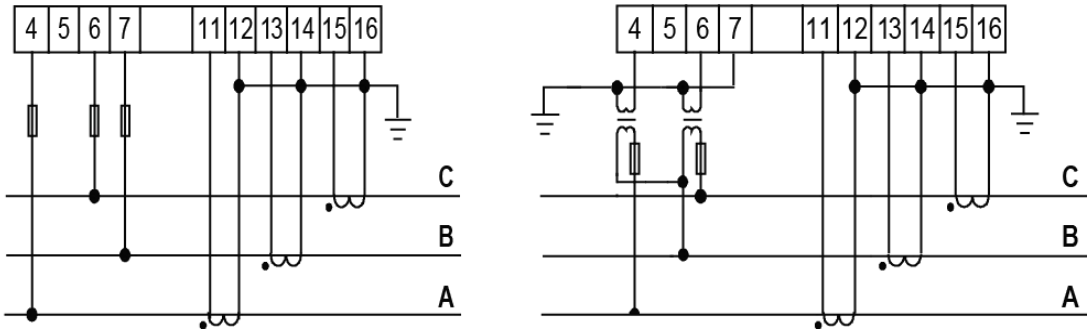


Fig2.2.3.3 3P3W+3CT

- **3-phase 3-wire system: 2CT**

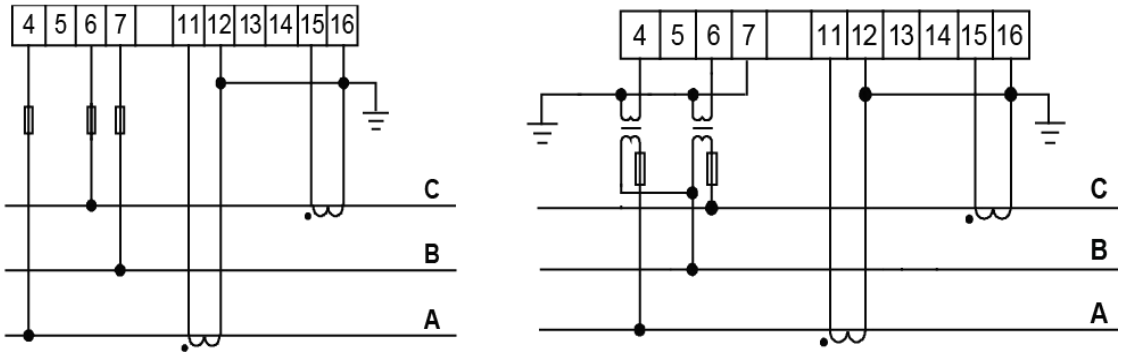


Fig 2.2.3.4 3P3W/3PT+2CT

- **3-phase 3-wire system: 1CT**

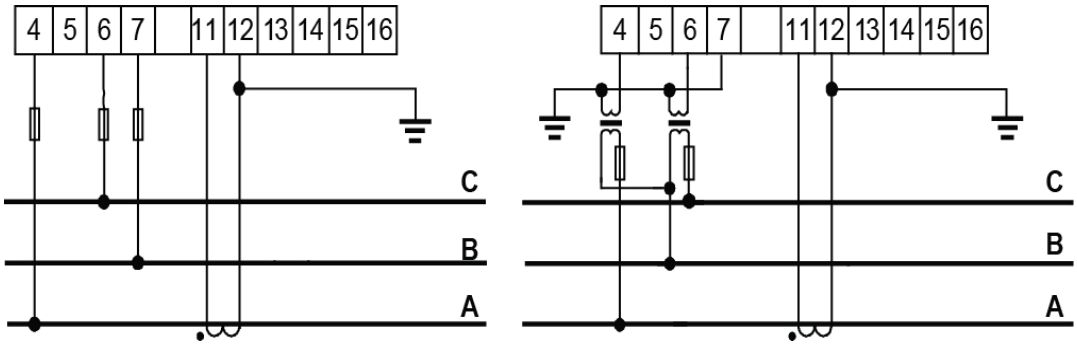


Fig 2.2.3.5 3P3W+1CT

2.2.4. Communication wiring

- **Straight-line Wiring Method:**

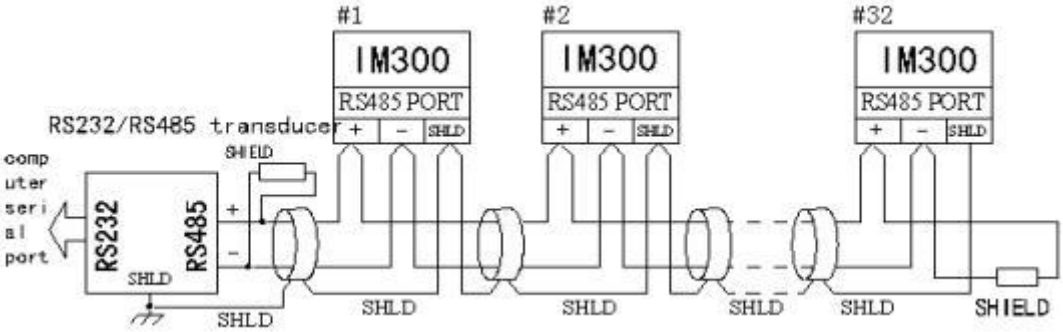


Fig. 2-2-3-6 RS485 straight-line wiring method

Note: The straight-line wiring method should consider impedance matching resistor is about 100 ~ 120Ω.

2.2.5. Digital input wiring

IM300 monitors the number of switches / digital inputs entered by 4 dry nodes, the use of optical isolation input, isolation voltage 1500VDC, The 24VDC isolated from the internal output of the device provides input circuit power for the dry node. Wiring is shown in fig. 2-2-4.

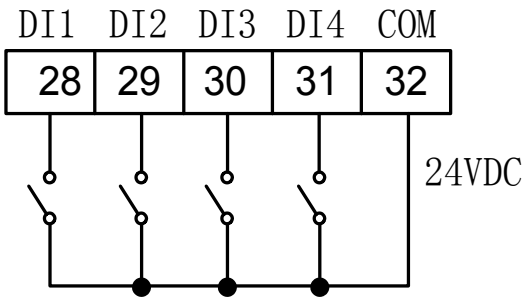


fig. 2-2-4 Digital inputs wiring diagram

2.2.6. Relay wiring

Control relay outputs node capacity 5A / 30VDC or 5A / 250VAC. When the load current is greater than the above value should use intermediate relay. Wiring as shown in fig. 2-2-5.

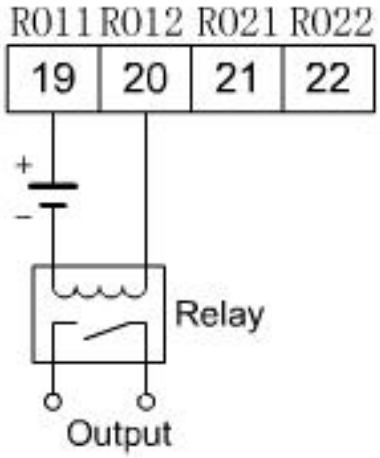


fig. 2-2-5 Relay wiring diagram.

IM300 provides "always maintain the output" and "pulse output" in two relay output modes, see "Parameter Settings seventh screen" description.

2.2.7. DC 4 ~ 20mA analog outputs wiring

DC 4 ~ 20mA analog outputs is optically isolated output, maximum isolation voltage 500VDC. Maximum load resistance RL 600Ω (including line resistance), open-circuit voltage u is not greater than 24V, wiring is shown in fig. 2-2-6.

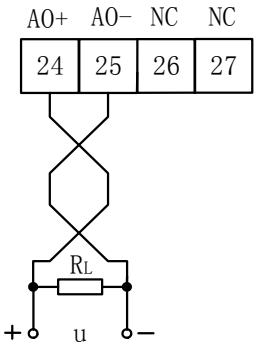


fig. 2-2-6 DC analog outputs wiring diagram

2.2.8. Wiring Precautions

- The conductor cross section of the connecting wire to the device should meet the following requirements: the cross section of current wires is not less than 2.5 mm^2, the cross section of voltage wires is not less than 1.0 mm^2.
- Communication lines must be shielded twisted pair, communication line RS485 +, RS485- can not be reversed.
- The wires of power supply and voltage input must be connected with 2A fuse in series..
- To reduce the impact of current at startup, it is recommended each power cord does not exceed 40 devices.
- When the communication connection using the linear connection, respectively access line should match 100 ~ 120Ω resistor is located between the beginning and the ending of the communication cable at the RS485 + and RS485- terminals.
- Baud rate is 9600bps, the cable length <1200 meters.
- The maximum load of the analog outputs includes the line resistance. Be careful when wiring.

3. Operating Instructions

This chapter details IM300 man-machine interface, including how to read the data, set parameters, and local operations.

Note: IM300 means depending on each particular model (see Appendix C. ordering), does not have a corresponding function corresponding to the interface does not display.

3.1. Button operation

Fig 3.1.1 button

The operation of IM300 is divided into single button operate mode and combination button operate mode.

The single button operate mode only use one of the four buttons to display all the monitored data of the device:

- Single button ▭ — Measurement data display: display voltage, current, power factor, power, frequency and other data.
- Single button ◁ —The harmonic data show that the harmonic distortion ratio, the harmonic share, the voltage current and the voltage current are not equal.
- Single button △ — Operating parameters: Display all operating parameters information system.
- Single button ↵ — Display accumulated value: Displays various energy information.

Operation button combination:

- ↵ combined with ▭: Output for local operations and other special functions.
- ↵ combined with ◁: Used to modify local parameters.
- ↵ combined with △: Queries the device memory SOE records, statistics, demand.
- ▭ combined with ◁: Inquire the time and the internal temperature

Combination mode entry and exit introduction:

In the single button mode, press the combinatorial button at the same time and then loosen, you can enter the corresponding combinatorial button function; use the combinatorial button again you will go back to the single button display screen (except the fourth button combination).

3.2. Data read（non SOE）

Display content	Explanation
Four rows of 8 in the data display field	Display measurement data, including: current, voltage, power, power factor, frequency and so on. Second, display parameters, SOE, time, local operations, etc.
ab/∑ bc/∑ ca/∑ n/Avg	The “a“, “b“, “c“ denotes a ,b and C-phase respectively; “∑“denotes summation; “Avg” denotes average; “-” denotes minus; “n” denotes zero-sequence
Three at the top left corner	Consists of English semantic abbreviations, used to indicate the current interface meaning: such as voltage 'U', current 'I', etc.
Current load size indication.	The actual load current is relative to the percentage of rated load current, from left to right, respectively, Ia/Ib/Ic.
Digital identifier: on off	The switch volume identification indicates the state of input of the corresponding switch in 1 ~ 4(on or off).
Load character identifier	Inductance identifier(upper) indicate inductive load Capacitance identifier(below) indicate capacitive load
Communication status identifier	Display this identifier indicates the communication work in normal Does not display this identifier indicate the communication out of work
More warning signs	Display this sign indicates that there is more alarm, no indication that there is no more alarm.
Switch quantization SOE identification.	Display this sign indicates that there is a switch quantifier SOE record in memory, which does not show that there is no switch quantifier SOE record in memory.
10 little 8 in data accumulated display field	Display energy, temperature of the equipment and time.

Units: **kVA** **MkW** **%** **Mkvar** **MkVA** **Hz** **kWh** **kvarh**	The unit of measuring data: Current: A, KA; Voltage: V, KV; Active power: W, KW, MW; Reactive power: Var, KVar, MVar; Apparent power: VA, KVA, MVA; Frequency: Hz; Percentage: %; Active energy: KWh; Reactive energy: Kvarh;
Total sharp peak shoulder off-peak electricity demand	Electrical ruler type and demand tips

Table 3-1

3.2.1. Run the display of measurement data

In either a single bond display press button, the measurement data display area will show the measured data. Time display area (bottom row small 8) remains unchanged.

In the measurement data display mode, press button until the top left of the screen display after the words 'UP', then press button to scroll upward; press button until the top left of the screen displays the word 'DWN', then scroll down to press button.

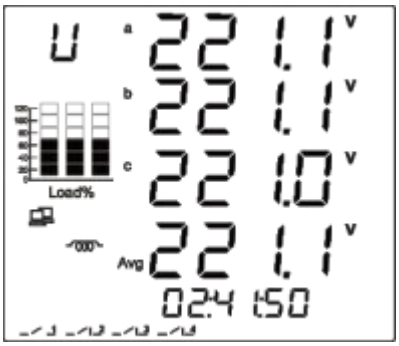


Fig 3.2.1. 3-phase voltage

Screen 1: Display the phase voltage Ua, Ub, Uc and UAvg (the average value of three phase voltages).

As shown in fig. 3.2.1: Ua = 221.1V; Ub = 221.1V;

Uc = 221.0V; UAvg = 221.1V.

Note: Only when the 3-phase 4-wire system wiring for the displayed page, otherwise the page is not displayed.

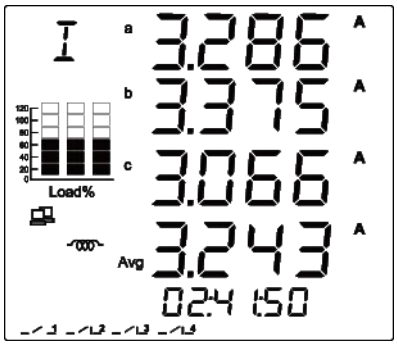


Fig 3.2.2 3-phase current

Screen2 : Display the phase current Ia, Ib, Ic and IAvg(the average value of three phase currents).

As shown in fig. 3.2.2: Ia = 3.286A; Ib = 3.375A;

Ic = 3.066A; IAvg = 3.243A.

Screen 3: Display the line voltage U_{ab}, U_{bc}, U_{ca} and U_{avg} (the average value of line voltage).

The parameter value is shown in fig 3.2.3:

U_{ab}=382.8V; U_{bc}=382.9V;

U_{ca}=383.0V; U_{Avg}=382.9V

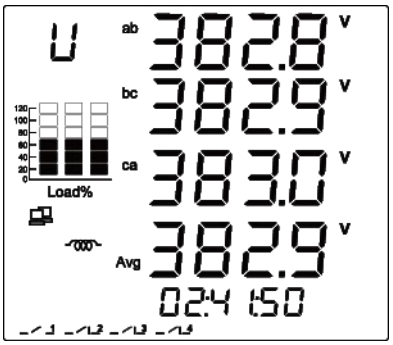


Fig 3.2.3 line voltage

Screen 4:Display the phase current Ia, Ib, Ic and In (the zero-sequence current) .

The parameter value is shown in fig 3.2.4:

Ia=3.286A; Ib=3.375A;

Ic=3.066A; In=0.211A

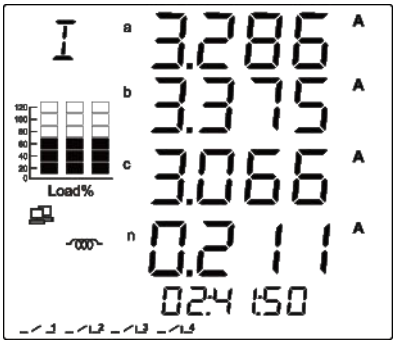


Fig 3.2.4 3-phase current and zero-sequence

Screen 5: when the connection mode is set as 3-phase 4-wire,

each phase power factor PFa, PFb, PFc and total power factor PF displayed on the screen.

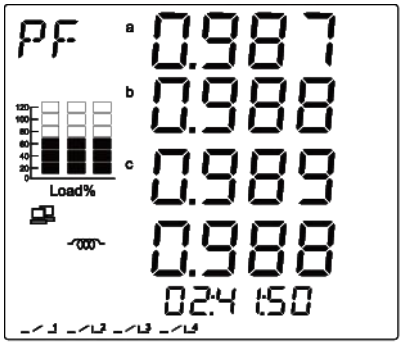
PF=0.988; PFa=0.987;

PFb=0.988; PFc=0.989

When the connection mode is set as 3-phase 3-wire, total power factor PF displayed only.

PF=0.988

The symbol of power factor complies with IEC symbol regulation



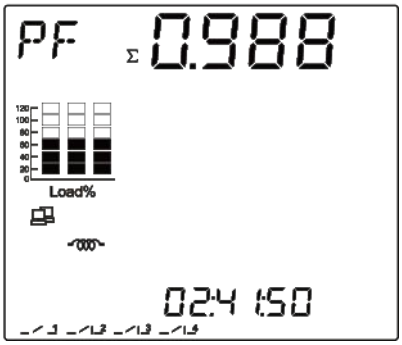


Fig 3.2.5 Power factor

Screen 6: Display the total active power $P_{\sum}$, total reactive power $Q_{\sum}$, total apparent power $S_{\sum}$ and frequency F

The parameter value is shown in fig 3.2.6:

$P_{\sum}$=0.717KW； $Q_{\sum}$=0.114Kvar；

$S_{\sum}$=0.726KVA；F=50.03Hz

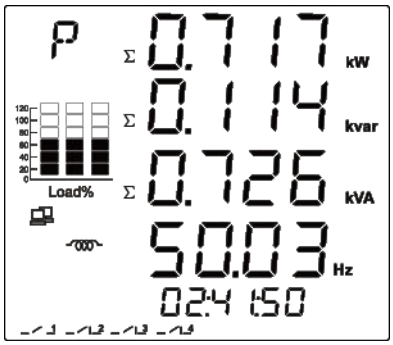


Fig 3.2.6 Total power parameter and frequency

Screen 7: Display A-phase active power Pa, A-phase reactive power Qa, A-phase apparent power Sa and frequency Fa.

The parameter value is shown in fig 3.2.7:

Pa＝0.239KW；Qa＝0.038Kvar；

Sa＝0.242KVA；Fa＝50.03Hz.

Note: This screen will be displayed when the connection mode is set as 3-phase 4-wire.

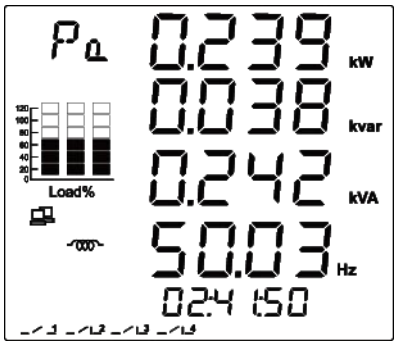


Fig 3.2.7 Power parameter and frequency of phase A

Screen 8: Display B-phase active power Pb, B-phase reactive power Qb, B-phase apparent power Sb, frequency Fb.

The parameter value is shown in fig 3.2.8:

Pb＝0.239KW；Qb＝0.038Kvar；

Sb＝0.242KVA；Fb＝50.03Hz.

Note: This screen will be displayed when the connection mode is set as 3-phase 4-wire.

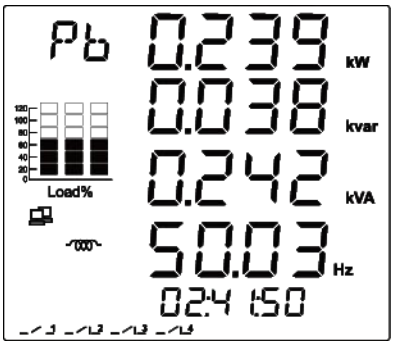


Fig 3.2.8 Power parameter and frequency of phase B

Screen 9: Display C-phase active power Pc, C-phase reactive power Qc, C-phase apparent power Sc, frequency Fc.

The parameter value is shown in fig 3.2.9:

Pc＝0.239KW；Qc＝0.038Kvar；

Sc＝0.242KVA；Fc＝50.03Hz.

Note: This screen will be displayed when the connection mode is set as 3-phase 4-wire.

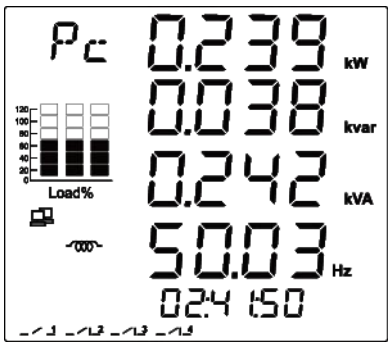


Fig 3.2.9 Power parameter and frequency of phase C

3.2.2. Harmonic distortion ratio and harmonic components

In either a single bond display press button display area harmonic distortion ratio, harmonic components,voltage /current unbalanced degree and K-factor of current, etc.

In the harmonic content display mode, press button until the top left of the screen display after the words 'UP', then press button to scroll upward; press button until the top left of the screen display after the words 'DWN', press button to scroll down.

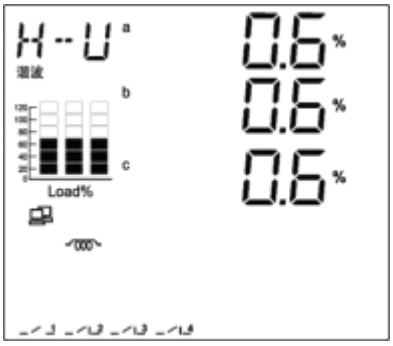


Fig 3.2.10 THD of 3-phase voltage

Screen 1: Display the total harmonic distortion ratio of 3-phase voltage

"H－U" displayed at the left top corner of the screen .

When the connection mode is set as 3-phase 4-wire system, 3-phase voltage Ua, Ub, Uc of THD is shown as fig 3.2.10:

THD_Ua＝0.6%； THD_Ub＝0.6%；

THD_Uc＝0.6%；

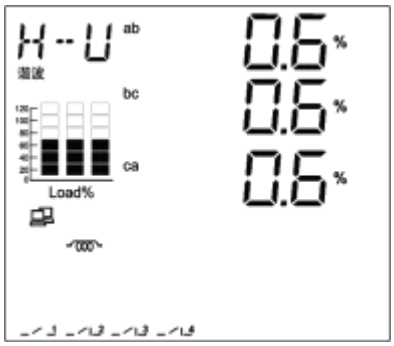


Fig 3.2.11 THD of 3-phase line voltage

When the connection mode is set as 3-phase 3-wire system, 3-phase line voltage Uab, Ubc, Uca of THD is shown as fig 3.2.11:

THD_Uab＝0.6%； THD_Ubc＝0.6%；

THD_Uca＝0.6%；

Screen 2: Display the total harmonic distortion ratio of 3-phase current and zero-sequence current.

"H－I" displayed at the left top corner of the screen.

The parameters are shown in fig 3.2.12:

THD_Ia＝0.6%； THD_Ib＝0.6%；

THD_Ic＝0.6%； THD_In＝0.6%；

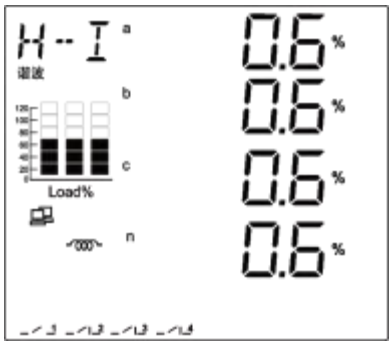


Fig 3.2.12 THD of 3-phase current and zero-sequence current

Screen 3: Display the odd harmonic distortion ratio of 3-phase voltage

"HUO" displayed at the left top corner of the screen.

when the connection mode is set as 3-phase 4-wire system, 3-phase voltage Ua, Ub, Uc of odd THD is shown as fig 3.2.13:

THD_O_Ua＝0.6%； THD_O_Ub＝0.6%；

THD_O_Uc＝0.6%；

when the connection mode is set as 3-phase 3-wire system, 3-phase line voltage Uab, Ubc, Uca of odd THD is shown in fig 3.2.14:

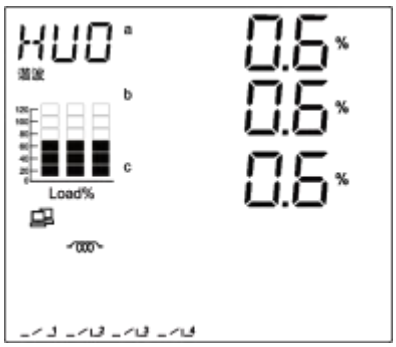


Fig 3.2.13 Odd THD of 3-phase voltage

THD_O_Uab＝0.6%；THD_O_Ubc＝0.6%；
THD_O_Uca＝0.6%；

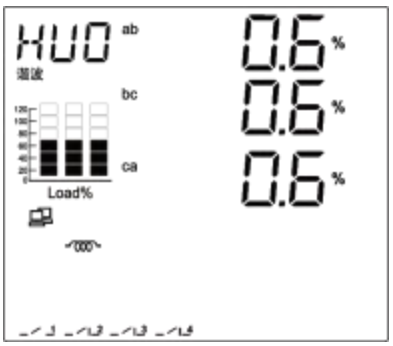


Fig 3.2.14 Odd THD of 3-phase line voltage

Screen 4: Display the odd harmonic distortion ratio of 3-phase current

"HIO" displayed at the left top corner of the screen.
Ia, Ib, Ic and In of odd THD is shown as fig 3.2.15:
THD_O_Ia＝0.5%；THD_O_Ib＝0.5%；
THD_O_Ic＝0.5%；THD_O_In＝0.5%；

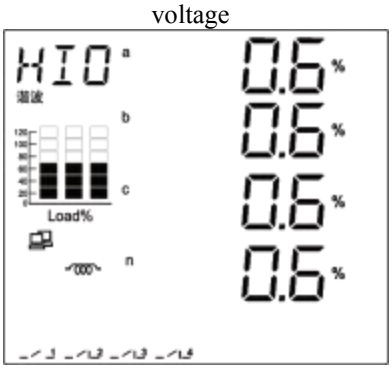


Fig 3.2.15 Odd THD of 3-phase current

Screen 5: Display the even harmonic distortion ratio of 3-phase voltage

"HUE" displayed at the left top corner of the screen denotes THD-U-E.
The screen display is similar to screen 3.

Screen 6: Display the even harmonic distortion ratio of 3-phase current

"HIE" displayed at the left top corner of the screen denotes THD-I-E.
The screen display is similar to screen 4.

Screen 7: Display fundamental RMS of 3-phase voltage

"H-U" displayed at the left top corner of the screen denotes harmonic voltage. The index is displayed at the bottom of the screen, "01" denotes fundamental wave.
When the connection mode is set as 3-phase 4-wire system, 3-phase voltage Ua,Ub, Uc of fundamental value is shown in fig 3.2.16:
Ua_1＝220.1V；Ub_1＝220.0V；
Uc_1＝220.1V；

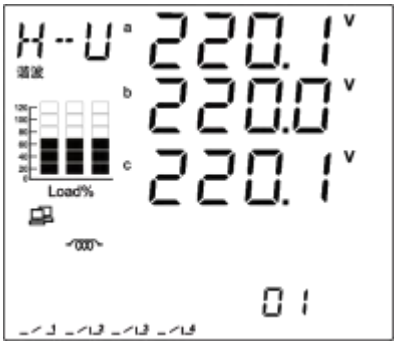


Fig 3.2.16 Fundamental RMS of 3-phase voltage

When the connection mode is set as 3-phase 3-wire system, 3-phase voltage Uab, Ubc, Uca of fundamental value is shown in fig 3.2.17:
Uab_1＝220.1V；Ubc_1＝220.0V；
Uca_1＝220.1V.

Fig 3.2.17 Fundamental RMS of 3-phase voltage

Screen 8 to screen 37: Display the 2~31th harmonic ratio of 3-phase voltage in turn

"H-U" displayed at the left top corner of the screen denotes harmonic voltage. The index is displayed at the bottom of the screen.

When the connection mode is set as 3-phase 4-wire system, 3-phase voltage Ua, Ub, Uc of second harmonic ratio is shown in fig 3.2.18:

HP_2_Ua＝0.4％；HP_2_Ub＝0.4％；

HP_2_Uc＝0.4％；

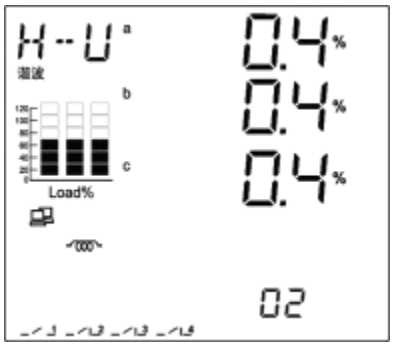


Fig 3.2.18 2th harmonic ratio of 3-phase voltage

When the connection mode is set as 3-phase 3-wire system,

3-phase line voltage Uab, Ubc, Uca of second harmonic ratio is shown in fig 3.2.19:

HP_2_Uab＝0.4％；HP_2_Ubc＝0.4％；

HP_2_Uca＝0.4％；

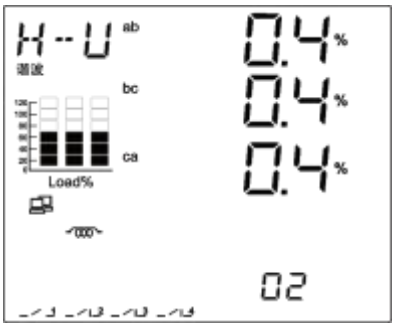


Fig3.2.19 2 the harmonic ratio of 3-phase line voltage

Screen 38: Display the fundamental value of 3-phase current and zero-sequence current

"H-I" displayed at the left top corner of the screen denotes harmonic voltage.The index is displayed at the bottom of the screen, "01" denotes fundamental wave. Fundamental value of 3-phase current is shown in fig 3.2.20:

Ia_1＝5000A；Ib_1＝4999A；

Ic_1＝5001A；In_1＝102A；

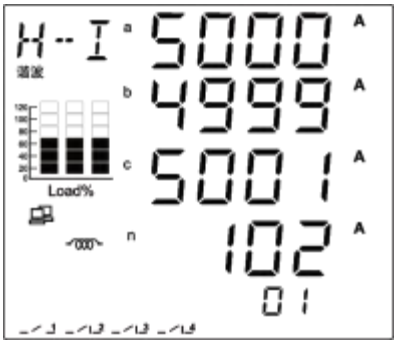


Fig 3.2.20 Fundamental value of current

Screen 39 to screen 68: Display the 2~31th harmonic ratio of 3-phase current in turn：

"H-I" displayed at the left top corner of the screen denotes harmonic current. The index is displayed at the bottom of the screen.

3-phase current Ia, Ib, Ic and zero-sequence current In of second harmonic is shown in fig 3.2.21:

HP_2_Ia＝0.5％；HP_2_Ib＝0.5％；

HP_2_Ic＝0.5％；HP_2_In＝0.5％；

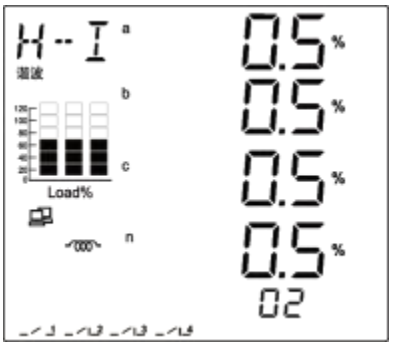


Fig 3.2.21 2th harmonic ratio of 3-phase current

Screen 69: Display voltage imbalance and current imbalance

"UNB" displayed at the left top corner of the screen denotes unbalanced degree. See in fig 3.2.22:

Unbalanced degree of current：10.8％；

Unbalanced degree of voltage：9.6％；

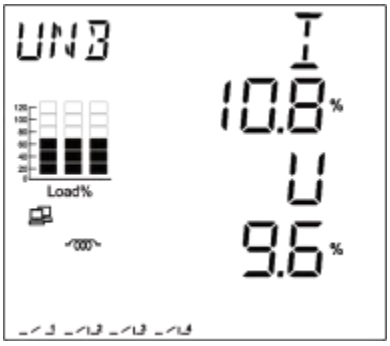


Fig3.2.22 Voltage imbalance and current imbalance

3.2.3. Display operating parameters

Press △ button operating parameters displayed on the screen in either a single bond display.

After long press △ button until the top left of the screen displays the word 'DWN'; △ in button operating parameters display mode, press △ button until the top left of the screen display after the words 'UP', then press the button to scroll up △ press △ button to scroll down.

Screen 1：Communication parameters

The upper left corner of the screen displays "PAR" parameter indicates the word (parameter), the top of the screen displays the word "COMM" indicates the communication. As shown in fig. 3-2-24: Address Number 16, the baud rate is 9.6k, transport format code 1.

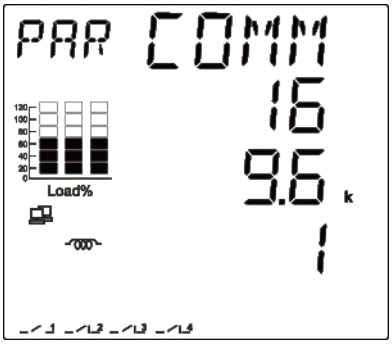


Fig 3-2-24 Communication parameters

Transmission Format Code explanation:

Code number	Expression
0	1 start bit,8 data bits,no parity check,2 end bits
1	1 start bit, 8 data bits, odd check, 1 end bit.
2	1start bit, 8 data bits, even check, 1 end bit.
3	1 start bit,8 data bits,no parity check,1 end bit

Note: The default value of address number is 254 baud rate is 9.6k, transport format code is 0.

Screen 2：System Wiring

The upper display shows "SYS" the word that the system wiring, as shown in fig. 3-2-25: The system wiring for the 3-phase 4-wire system, 3PT, 3CT.

Note: The factory default is 3P4L, 3PT, 3CT.

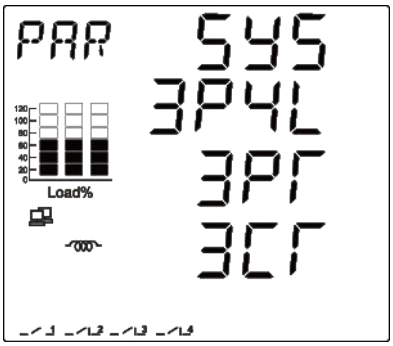


Fig 3-2-25 Wiring Systems

Screen 3：PT ratio

The upper display shows "PT" word represents PT ratio.

As shown in fig. 3-2-26: PT secondary rating is 220V, PT primary rating is 1000V.

Note: The factory default value, PT primary rating is 220V, PT secondary rating is 220V.

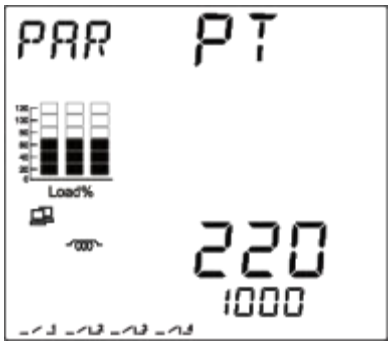


Fig 3-2-26 PT ratio

Screen 4：CT ratio

The upper display shows "CT" indicates the CT ratio. As shown in fig. 3-2-27: CT secondary rating two options for a total is1A and 5A, CT primary rating is 100A.

Note: The factory default values, CT primary rating is 5000A, CT secondary rating is 5A.

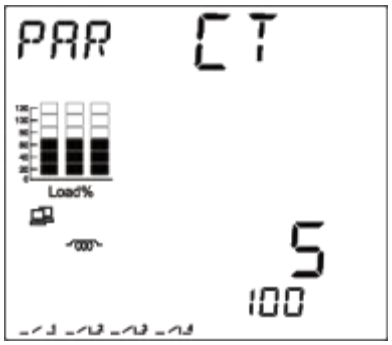


Fig 3-2-27 CT ratio

Screen 5：Zero-sequence CT ratio

The upper display shows "CT0" word for zero-sequence CT ratio. As shown in fig. 3-2-28: CT0 secondary rating two options for a total is 1A and 5A, CT0 primary rating is 100A.

Note: The factory default value, CT0 primary rating is 5000A, CT0 secondary rating is 5A.

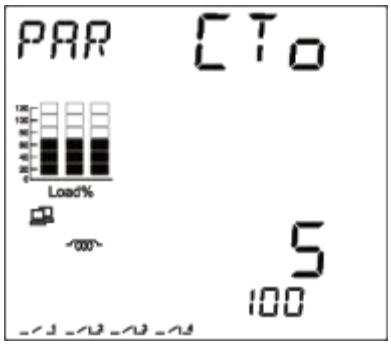


Fig 3-2-28 Zero-sequence CT ratio

Screen 6：Direction of CT wiring and system frequency

The upper display shows "SYS2" word represents 2 system parameters, including direction of CT wiring and system frequency. As shown in fig. 3-2-29.

The first line shows ABC, used to represent the respective second row are A, B, C 3-phase CT.

The second line represents CT wiring direction: from left to right direction A, B, C 3-phase CT, and 0 represents a forward direction, represents the opposite direction.

The third line represents the system frequency: 50 / 60Hz optionally, It's the frequency of analog capture when no voltage inputs..

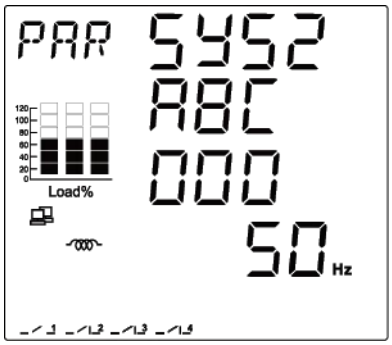


Fig 3-2-29 Setting CT wiring system frequency and direction

Screen 7：Relay output mode

The upper display shows "RO-M" word indicates output mode.

As shown in fig. 3-2-30: output mode 1.

Output mode 1: relay output for the pulse output. That relay after receiving the closing instructions, the node is closed, a certain time delay (relay output pulse width, see parameter setting eighth screen) is disconnected.

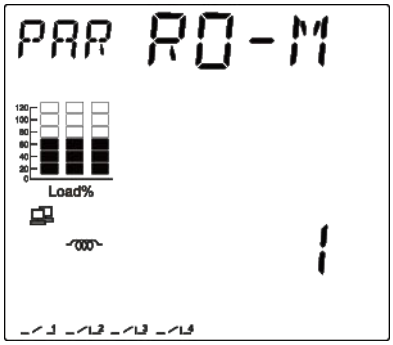


Fig 3-2-30 Relay output Mode setting

Output mode 2: relay output is self-maintained. Ie after receiving the closing instructions, the output node is closed; after receiving the opening command, output node disconnected.

Note: The factory default value, the output mode 1.

Screen 8: Relay output pulse width

The upper display shows "RO-T" word indicates relay output pulse width in milliseconds.

As shown in fig. 3-2-31: Relay output pulse width is 2000 milliseconds.

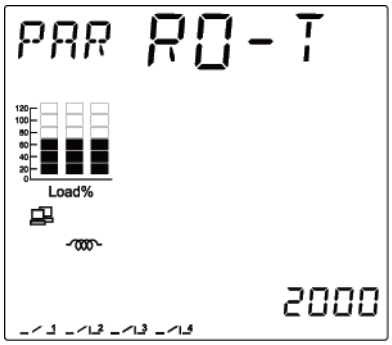


Fig 3-2-31Relay output pulse width

Note: The factory default value, the relay output pulse width is 2000 milliseconds. Only when the output mode is selected as mode 1, that relay output pulse type, in order to enter this page.

Screen 9 ： Transmission output parameters

The upper display shows "AO" the word indicates the transmitter output parameters.

The first line indicates unidirectional / bidirectional: 0 for unidirectional, 1 for bidirectional;

The second line indicates the type of association, as described in the ninth parameter setting screen;

The third line indicates the electric parameters sent to the output range of the association.

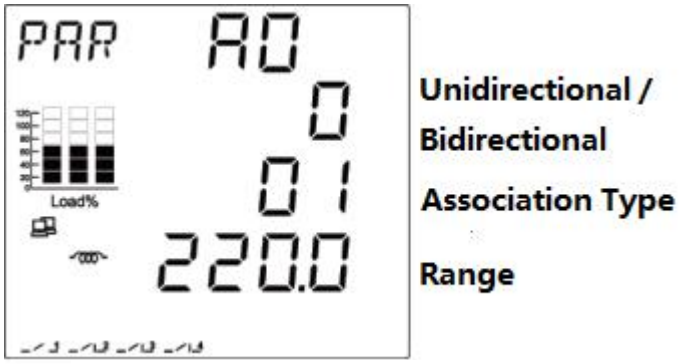


Fig 3-2-32 Transmission output settings page

Screen 10：Time of back-light lighting

The upper display shows "Ld-T" word represents the time of back-light lighting.

As shown in fig. 3-2-33: the time of back-light lighting is 30 minutes, that is, within 30 minutes of no buttons are pressed, the back-light lighting automatically turns off; When it is zero, indicating that the back-light lighting is on.

Note: the time of back-light lighting **default is 5 minutes.**

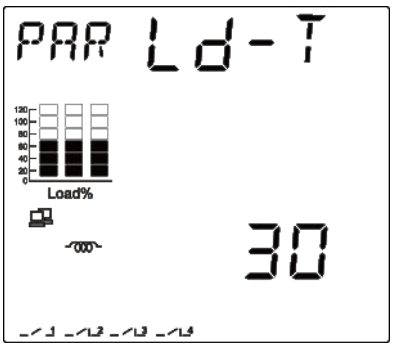


fig. 3-2-33 Backlight lighting time

Screen 11： Statistical interval of the energy max/min value

The upper display shows "S - T" word indicates the statistical interval of the energy max/min value.

As shown in fig. 3-2-34: the time of statistical interval of energy max/min value is 1440 minutes.

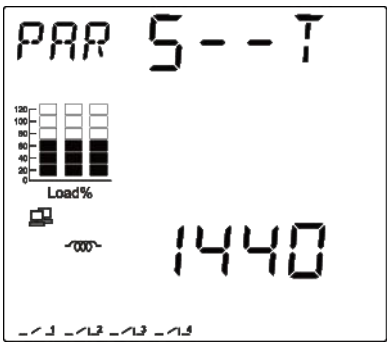
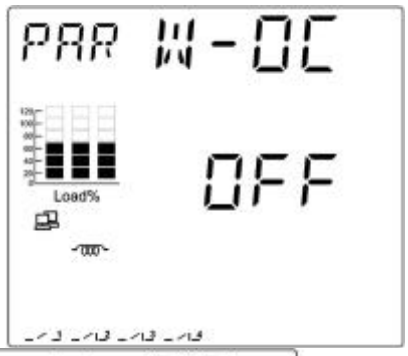


Fig 3-2-34 Statistical interval of the energy max/min value

Note: The statistical interval of the energy max/min default value is 10 minutes.

Screen 12：Over current alarm parameter



The word "w-oc" is displayed on the top of the screen indicating that the current is over limited.

When the over current is not allowed, the screen is shown in fig. 3-2-35: 'OFF' indicates that the over current alarm is not allowed.

When the overload alarm is allowed, the screen is shown as shown in fig. 3-2-35:

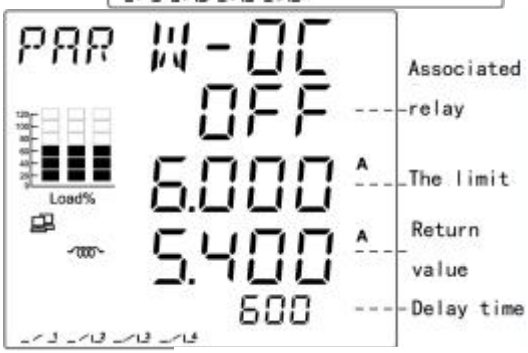


Fig. 3-2-35 Over current alarm parameters.

The "OFF" indicates that the current limit alarm is not related to the relay (' 1 'means the related relay 1; The '2' indicates the related relays 2).

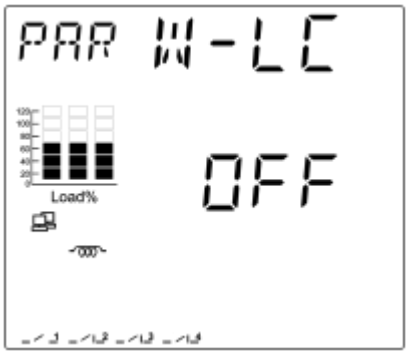
'6.000A' indicates the primary side limit value of the over current alarm.

The "5.400A" indicates primary side return value of the over current alarm.

The "600" indicates that the alarm delay time is 600ms.

Note: the over current alarm allows the default value to be not allowed; The default value of the correlation relay is not associated; The default value is 6000A; The default value of the return value is 5000A; The default value of the delay time is 60000ms.

Screen 13：Zero-current (low current) alarm parameters



The word "w-lc" is displayed on the top of the screen to indicate that the zero current alarm parameter.

When the zero-current alarm is not allowed, the screen is shown in fig. 3-2-36: 'OFF' indicates that the zero-current alarm is not allowed.

When the zero-current alarm is allowed, the screen is shown as shown in fig. 3-2-36: '1' indicates that the zero-current alarm relays 1.

'1.000A' indicates the primary side limit value of the zero-current alarm.

The '1.100A' represents the primary side return value of the zero-current alarm.

The '600' indicates that the delay time of zero-current is 600ms.

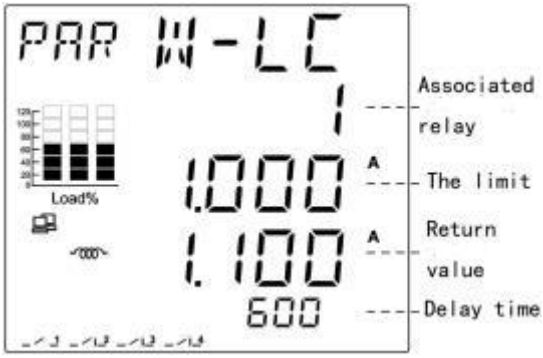


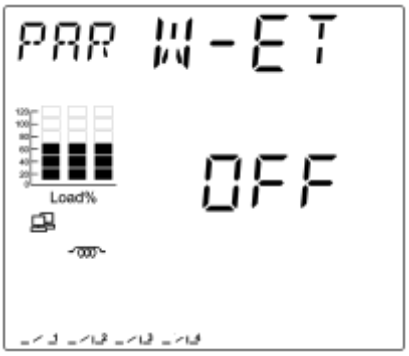
Fig. 3-2-36 Zero current alarm parameters

Note: the default value of zero-current alarm allows to be not allowed; The default value of the correlation relay is not associated; The default value is 0A; The default value of the return value is 200A; The default value of the delay time is 60000ms.

Screen 14 : Over ground current alarm parameters.

The word "w-et" is displayed on the top of the screen to indicate the alarm parameters of over ground current.

When the over ground current alarm is not allowed, the screen is shown in fig. 3-2-37: 'OFF' indicates that the over ground current alarm is not allowed.



When the over ground current alarm is allowed, the screen is shown as shown in fig. 3-2-37: '1' indicates that the over ground current alarm relays 1.

'6.000A' represents the primary side limit value of the over ground current alarm.

The '5.400A' indicates primary side return value of the alarm.

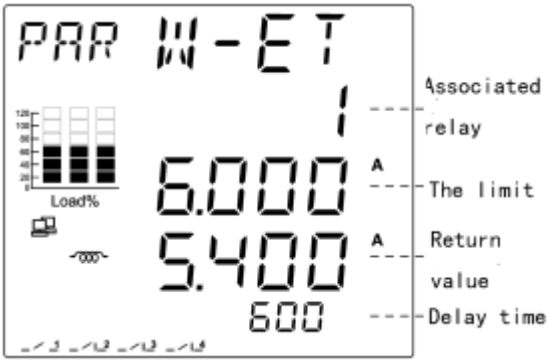


Fig. 3-2-37 Over ground current alarm

The '600' indicates that the delay time of over ground current is 600ms.

Note: the over ground current alarm allows the default value to be not allowed; The default value of the correlation relay is not associated; The default value is 6000A; The default value of the return value is 5000A; The default value of the delay time is 60000ms.

Screen 15：Lower voltage alarm parameters.

The word "w-lv" is displayed on the top of the screen, indicating that the lower voltage alarm parameter.

When the lower voltage alarm is not allowed, the screen is shown in fig. 3-2-38: 'OFF' indicates that the lower voltage alarm is not allowed.

When the low voltage alarm is allowed, the screen is shown as shown in fig. 3-2-38:

The "1" indicates that the lower voltage alarm associated relay 1.

The '190.0V' indicates primary side limit value of the lower voltage .

"200.0v" indicates primary side return value of the lower voltage.

The '60.0' indicates that the lower voltage alarm delay time is 60s.

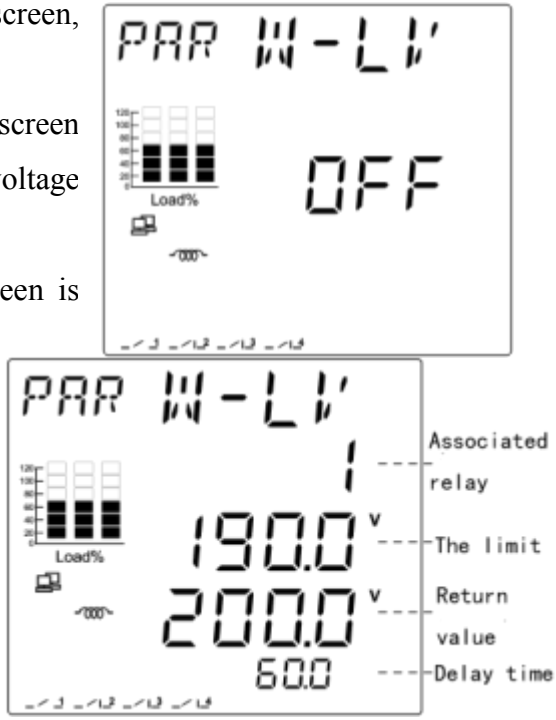


Fig. 3-2-38 Lower voltage alarm parameters.

Note: the lower voltage alarm allows the default value to be not allowed; The default value of the correlation relay is not associated; The default value is 0V; The default value of the return value is 50V; The default value for delay time is 1800s.

Screen 16：Over voltage alarm parameter.

The word "w-ov" on the top of the screen indicates that the over voltage alarm parameter.

When the over voltage alarm is not allowed, the screen is shown in fig. 3-2-39: 'OFF' indicates that the over voltage alarm is not allowed.

When the over voltage alarm is allowed, the screen is shown in fig. 3-2-39:

The "1" indicates that the over voltage alarm relays 1.

"200.0v" indicates the primary side limit value

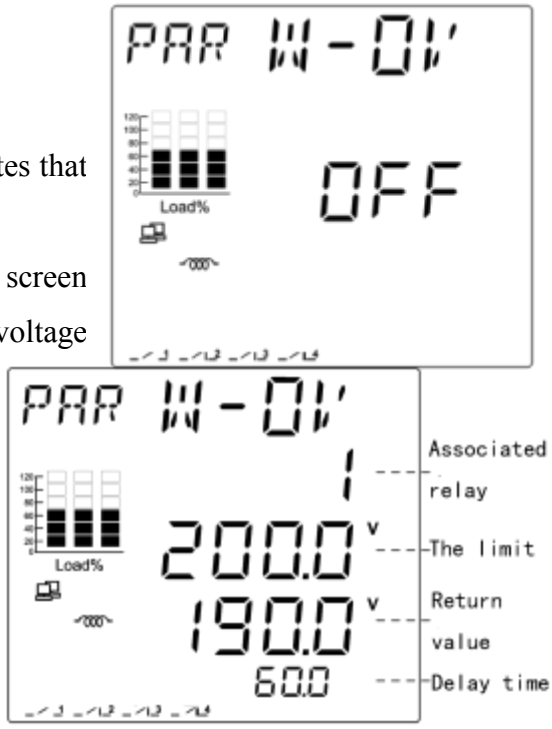


Fig. 3-2-39 Over voltage alarm parameters.

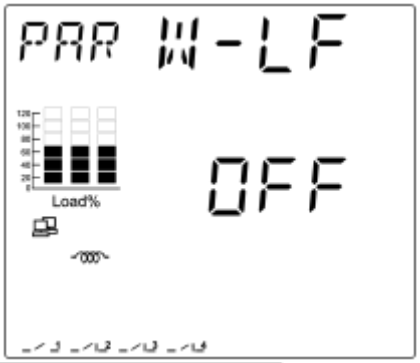
of over voltage .

'190.0V' indicates primary side return value of the over voltage alarm.

'60.0' indicates that the over voltage alarm delay time is 60 seconds.

Note: the over voltage alarm allows the default value to be not allowed; The default value of the correlation relay is not associated; The default value is 260V. The default value of the return value is 220V; The default value for delay time is 1800s.

Screen 17：Lower frequency alarm parameters



The word "w-lf" is displayed on the top of the screen to indicate the lower frequency alarm parameters.

When the lower frequency is not allowed, the screen is shown in fig. 3-2-40: 'OFF' indicates that the lower frequency is not allowed.

When the lower frequency alarm is allowed, the screen is shown as shown in fig. 3-2-40:

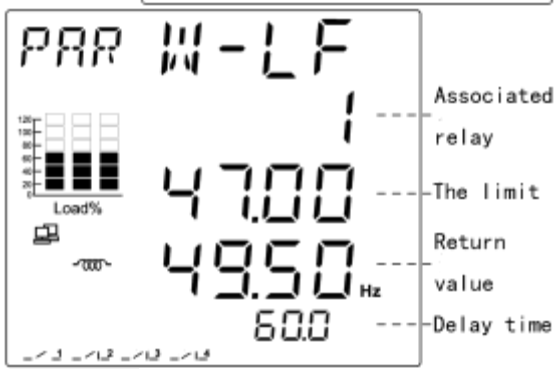


Fig. 3-2-40 Lower frequency alarm parameters.

The "1" indicates that the lower frequency alarm correlation relay 1.

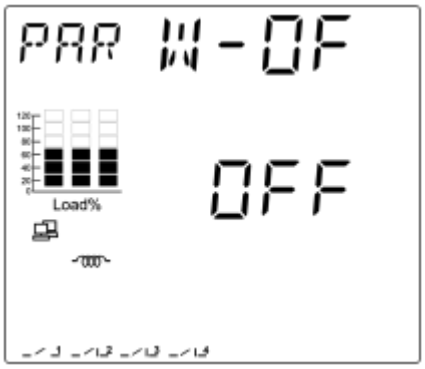
The '47.00Hz' indicates that the primary side limit value of lower frequency alarm.

'49.50Hz' indicates primary side return value of lower frequency alarm.

The '60.0' indicates that the lower frequency of the alarm delay time is 60s.

Note: the lower frequency alarm allows the default value to be not allowed; The default value of the correlation relay is not associated; The default value is 45.0Hz; The default value of the return value is 46.0Hz; The default value for delay time is 1800s.

Screen 18：Over frequency alarm parameters.



The "w-of" is displayed above the screen to indicate the frequency OF the alarm parameters.

When the over-frequency alarm is not allowed, the screen display is shown in fig. 3-2-41: 'OFF' indicates that

the frequency limit is not allowed.

When the over-frequency alarm is allowed, the screen is shown as shown in fig. 3-2-41:

The "1" indicates the frequency limit alarm associated relay 1.

The "54.00Hz" indicates the primary side limit value of the alarm.

The '51.50Hz' indicates the primary side return value of the alarm.

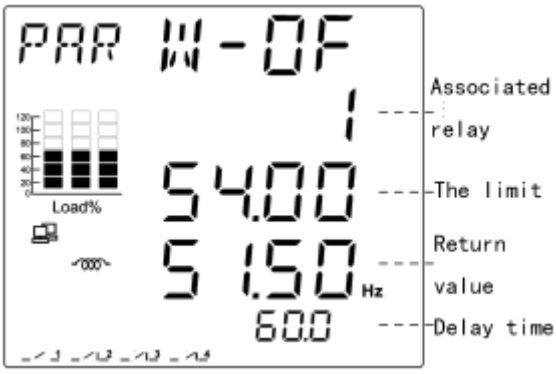


Fig. 3-2-41 Over frequency alarm parameters

The "60.0" indicates that the time limit of alarm delay is 60 seconds.

Note: the over-frequency alarm allows the default value to be not allowed; The default value of the correlation relay is not associated; The default value is 55.0Hz; The default value of the return value is 54.0Hz; The default value for delay time is 1800s.

Screen 19：Low power factor alarm parameters.

The word "w-pf" is displayed on the top of the screen to indicate the low power factor alarm parameters.

When the low power factor is not allowed, the screen is shown in fig. 3-2-42: 'OFF' indicates that the low power factor is not allowed.

When the low power factor is allowed, the screen is shown as shown in fig. 3-2-42:

The "OFF" indicates that the low power factor alarm unconnected relay.

The '0.900' indicates the primary side limit value of the low power factor alarm

The '0.950' indicates the primary side return value of the low power factor alarm.

The '60.0' indicates that the low power factor alarm delay time is 60s.

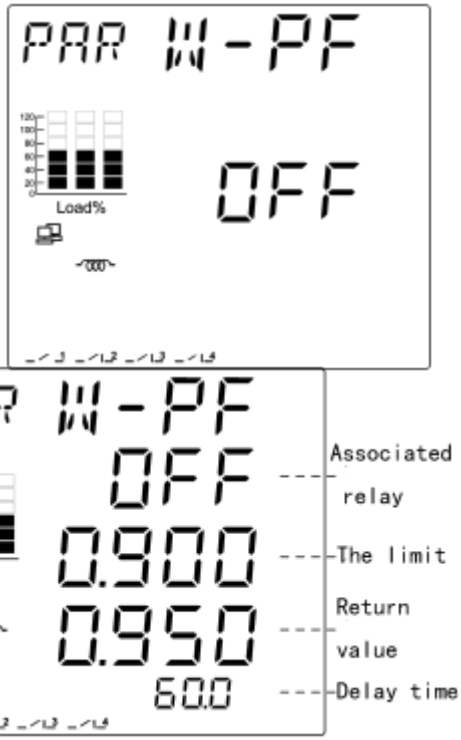


Fig. 3-2-42 Low power factor alarm parameters.

Note: the lower power factor alarm allows the default value to be not allowed; The default value of the correlation relay is not associated; The default value is 0.5; The default value of the return value is 0.6. The default value for delay time is 1800s.

Screen 20：Hardware and software version numbers

Top of the screen to display "VER" word represents the version number.

At right 3-2-43: "H 1.0" represents the hardware version is version 1.0;

"S 1.0" indicates the software version number is version 1.0

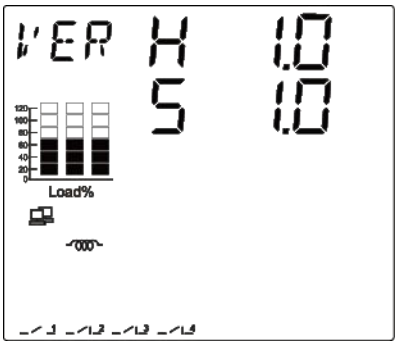


Fig 3-2-43 Hardware and software version numbers

3.2.4. Display energy

In the single button mode press button will display the energy.

Press the top left button until the screen shows word 'UP', then press button to scroll upward; press button until the top left of the screen display after the words 'DWN', press the button again will turn to next page.

Screen 1: Display the absolute value of total active energy

"EP" displayed on the top， "∑" displayed in the accumulated display area.

See in fig 3.2.44: Ep＝5037.6 kWh

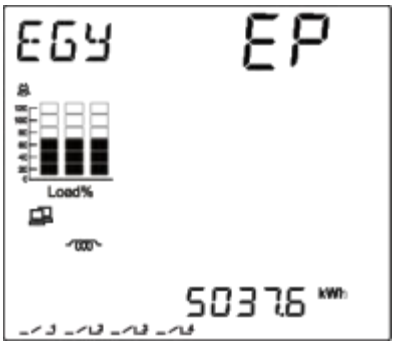


Fig 3.2.44 Total active energy

Screen 2: Display the absolute value of total reactive energy

Top of the screen shows "total"and " Eq" word.

See in fig 3.2.45: Eq＝37.1kvarh

Fig 3.2.45Total reactive energy

Screen 3 to screen 5: Display the absolute value of per phase active energy

“EP” displayed on the top, “a”, “b”, “c” displayed in the accumulated display area respectively. The screen display is similar to screen 1.

Note: This screen will be displayed when the connection mode is set as 3-phase 4-wire.

Screen 6 to screen 8: Display the absolute value of per phase reactive energy

“Eq” displayed on the top, “a”, “b”, “c” displayed in the accumulated display area respectively. The screen display is similar to screen 2.

Note: This screen will be displayed when the connection mode is set as 3-phase 4-wire.

Screen 9: Display the absolute value of total forward active energy

Top of the screen shows "total"and "+ Eq" word.

See in fig 3.2.46: +EP＝691.4 kWh

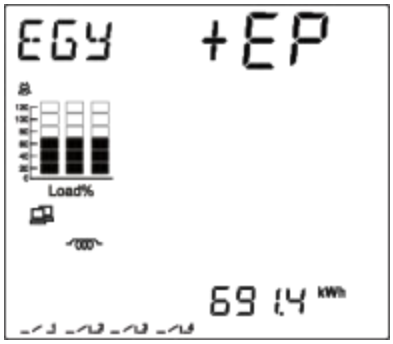


Fig 3.2.46 The absolute value of total forward active energy

Screen 10 to screen 13: Display the absolute value of forward active energy at sharp,peak, shoulder or off-peak rate

Top of the screen displays "+ EP" words, the top left of the screen with "sharp","peak ","shoulder","off-peak"the words prompt, the screen display screen similar to the ninth.

Screen 14: Display the absolute value of total reverse active energy

Top of the screen shows "total"and "- Eq" word.

-Ep＝691.4 kWh。

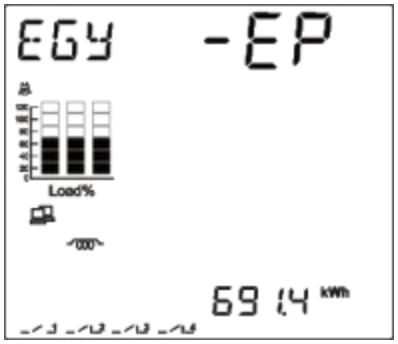


Fig 3.2.47 The absolute value of total reverse active energy

Screen 15 to screen 18: Display the absolute value of reverse active energy at sharp,peak, shoulder or off-peak rate

Top of the screen shows "-EP" words,rate types are sharp peak, shoulder or off-peak ,the screen display screen similar to the fourteenth.

Fig 3.2.48 The absolute value of total forward reactive energy

Screen 19: Display the absolute value of total forward reactive energy

Top of the screen shows "total"and "+ Eq" word.

See in fig 3.2.48: +Eq＝571.1kvarh

Screen 20 to screen 23: Display the absolute value of forward reactive energy at sharp,peak, shoulder or off-peak rate

Top of the screen displays "+ Eq" words,rate types are sharp,peak, shoulder or off-peak, the screen display screen similar to the nineteenth.

Fig 3.2.49 The absolute value of total reverse reactive energy

Screen 24: Display the absolute value of total reverse reactive energy

“-Eq” displayed on the top, “∑” displayed in the accumulated

See in fig 3.2.49: -Eq＝571.1kvarh

Fig 3.2.50 The absolute value of the 1th quadrant total reactive energy

Screen 25 to screen 28: Display the absolute value of reverse reactive energy at sharp,peak, shoulder or off-peak rate

“-Eq” displayed on the top.The screen display is similar to screen 24.

Screen 29: Display the absolute value of

the 1th quadrant total reactive energy

Top of the screen shows "total"and "+ Eq" word.

See in fig 3.2.50: $-E_{q-1}$＝11.1kvarh

Screen 30 to screen 33: Display the absolute value of the 1th quadrant reactive energy at sharp,peak, shoulder or off-peak rate

“Eq-1” displayed on the top.the screen display is similar to screen 29.

Screen 34: Display the absolute value of the 4th quadrant total reactive energy

“Eq-4” displayed on the top, the screen display is similar to screen 29.

Screen 35 to screen 38: Display the absolute value of the 4th quadrant reactive energy at sharp,peak, shoulder or off-peak rate

“Eq-4” displayed on the top, the screen display is similar to screen 29.

Screen 39: Display the absolute value of the 2th quadrant total reactive energy

“Eq-2” displayed on the top, the screen display is similar to screen 29.

Screen 40 to screen 43: Display the absolute value of the 2th quadrant reactive energy at sharp,peak, shoulder or off-peak rate

“Eq-2” displayed on the top.the screen display is similar to screen 29.

Screen 44:Display the absolute value of the 3th quadrant total reactive energy

“Eq-3” displayed on the top, the screen display is similar to screen 29.

Screen 45 to screen 48: Display the absolute value of the 3th quadrant reactive energy at sharp,peak, shoulder or off-peak rate

"Eq-3" displayed on the top.The screen display is similar to screen 29.

3.3. Parameter Settings

In the single button mode, you can enter the parameter setup mode by pressing "◁" and "⏎" at the same time, "SET" will display at the left top corner of the screen.

3.3.1. button function in parameter setup mode

- Press "▢", a bit of the parameter on the screen will twinkle, and the next bit will twinkle by pressing ▢ again. You can press "△" or "◁" to plus or minus the value of the bit.
- ◁ is the plus button, the flash bit will plus 1 when you press "◁" once.
- △ is the minus button, the flash bit will minus 1 when you press "△" once..
- ⏎ is the page down button and validated button. When parameter setting is accomplished, press "⏎" to validate the parameter, and "Y--N" (YES--NO) will displays on the top of the screen. Press "▢" to select "Y" or "N". Select "Y" and press "⏎", the parameter will be saved , select "N" and press "⏎", the parameter will be not saved.

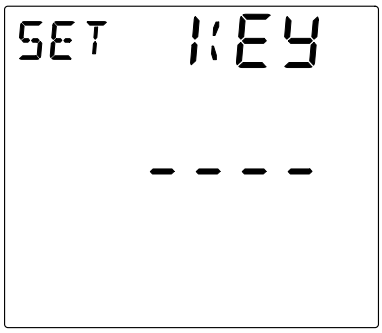


Fig 3-3-1 Password input

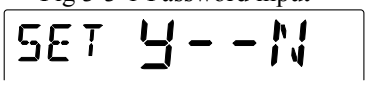


Fig 3-3-2 Is stored tips

3.3.2. Parameter Settings

Starting interface parameter setting mode for password confirmation. Each time you enter the parameter setting mode are first prompted for a password, the password is displayed as "----." Password total of four, ranging from 0000 to 9999, the factory default is 0000. ▢ Press to toggle between four digit password to cycle selection, press △ or ◁ button to choose positioning subtraction operation, range 0 to 9, the button to confirm the entry is complete. Parameters can be set only after the confirmation

password, or to stay on this page.

When entering the parameter setting screen, as this page parameter setting is completed, press the top button will be prompted to save the current screen to set the parameters as shown in fig. 3-3-2. "Y" on behalf of YES, that is, the set parameters are stored, "N" on behalf of NO, that is not stored parameters. Press button to make "Y" or "N" option, press button.

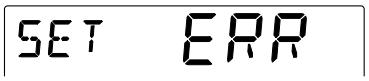


Fig 3-3-3 Parameter error

Select the parameters are valid after the "Y" and press the button to confirm , such as setting, then store the current parameters; if not legitimate, upper display shows "ERR" word prompts, as shown, the parameter is not stored 3-3-3. At this point press button to re-set parameters, scroll buttons can also be.

Note: No matter which screen parameter setting page, press the button and button to exit the parameter setting mode,returns single button display mode. In the parameter setting page, if you do not press button to activate the current settings page, this page or activation button and did not press or button parameter modification, then press button will scroll directly, this page is not stored in the parameter. The screen will go back to the single button mode automatically if there is no operation on buttons in ten minute. .

Press the top left button until the screen shows word 'UP', then press button to scroll upward; press button until the top left of the screen display after the words 'DWN', press the button down scroll.

Screen 1: Communication parameters settings

This page is used to set the IM300 communication address, baud rate and transmission format. Top of the screen displays the word "COMM", indicating the current page for the communications parameter setting page.

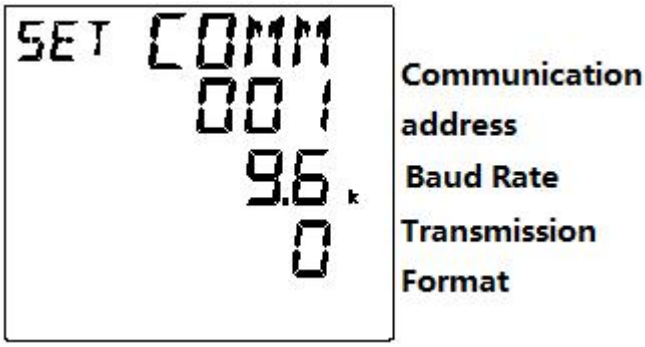


Fig. 3-3-4 Communication parameter settings page

As shown in fig. 3-3-4, communication address range is 1 to 254; baud total of 1.2k, 2.4k, 4.8k, 9.6k, 19.2kbps five kinds to choose from; there are four kind of transmission formats: 0,1,2,3. (The details refer to 3.2.3 display

system parameter, screen 1)

Screen 2：Wiring system settings

This page is used to set the system wiring. Top of the screen displays the word "SYS", indicates that the current page to the system wiring setup page, as shown in fig. 3-3-5.

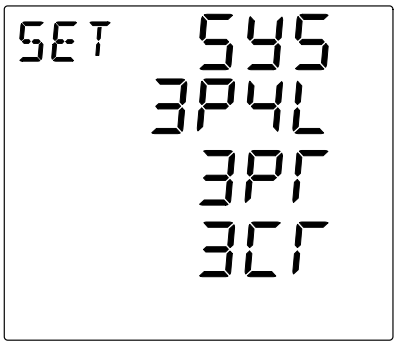


Fig 3-3-5 System wiring setup page

There are five options:

Mode 1：3P4L 3PT 3CT

Mode 2：3P4L 3PT 1CT

Mode 3：3P3L 3PT（2PT） 3CT

Mode 4：3P3L 3PT（2PT） 2CT

Mode 5：3P3L 3PT（2PT） 1CT

Screen 3：PT Settings

This page is used to set the PT primary side and the secondary side rated voltage value of PT. Top of the screen displays the word "PT", it indicates this page is PT settings page, as shown in fig. 3-3-6.

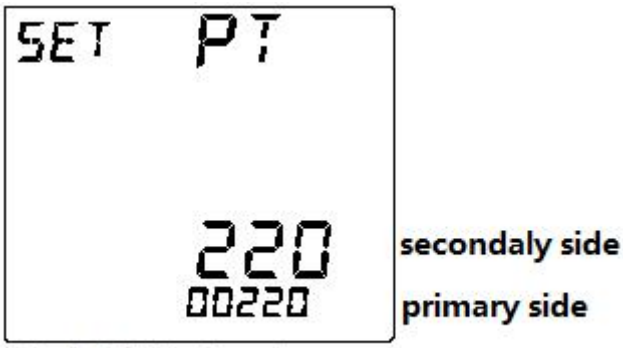


Fig 3-3-6 PT ratio settings page

PT secondary rating range from 100V to 220V, PT primary rating range from 100V to 35000V.

Screen 4：CT settings

This page is used to set the primary side and secondary side rated current value of CT. Top of the screen displays the word "CT", expressed this page as CT setup page, as shown in fig. 3-3-7.

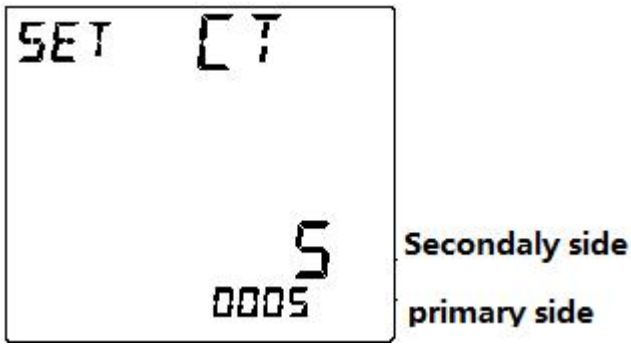


Fig 3-3-7 CT ratio settings page

CT secondary rating is 1A or 5A,CT primary rating range from 1A to 9999A.

Note: primary side of the rated

current value can not be less than the rated current value of the secondary side.

Screen 5：CT0 (Zero-sequence CT) settings

This page is used to set the primary side and secondary side rated current value of CT.0 The upper display shows the word "CT0", expressed this page to CT0 Settings page, as shown in fig. 3-3-8.

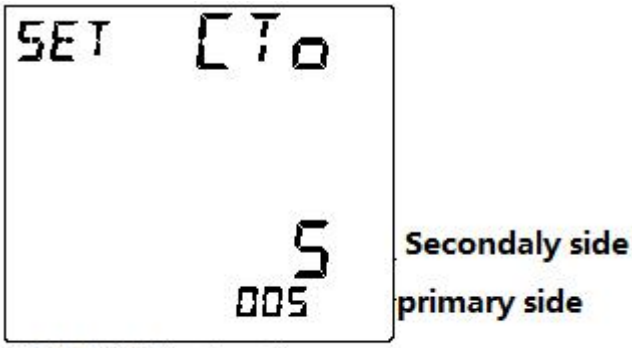


Fig 3-3-8 CT0 ratio settings page

CT0 secondary rating is 1A or 5A, CT0 primary rating range from 1A to 9999A.

Note: primary side of the rated current value can not be less than the rated current value of the secondary side.

Screen 6：Direction of CT wiring and the system frequency settings

This page is used to set the direction of CT wiring and system frequency. The upper display shows the word "SYS2" indicates this page for the direction of CT wiring,and system frequency settings page, as shown in fig. 3-3-9.

Fig 3-3-9 Input Mode Settings page

The first row shows the ABC: the representative of a respective second row are A, B, C 3-phase CT connection settings.

The second row is used to set the direction of CT wiring ; from left to right as A, B, C 3-phase CT , 0 represents a forward direction, represents the opposite direction.

The third row is used to set the system frequency: 50 / 60Hz optionally,It’s the frequency of analog capture when no voltage inputs.

Screen 7：Relay output mode settings

This page is used to set the relay output mode. The upper display shows "RO-M" word, this page indicates relay output mode settings page, as shown in fig. 3-3-10.

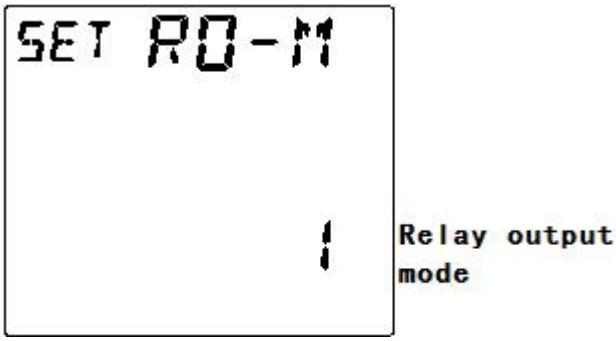


Fig 3-3-10 Relay output mode settings page

There are two kinds of modes of relay output:
Mode 1: relay output for the pulse output.

Mode 2: Relay output is self-maintained.

Screen 8：Relay output pulse width settings

When the relay is set to pulse output mode, the page is used to set the output pulse width. The upper display shows "RO-T" word to make prompt, as shown in fig. 3-3-11.

A pulse width range of 50 to 20000 milliseconds.

Note: Only when the output mode is selected as mode 1, this screen is displayed, otherwise the page is not displayed.

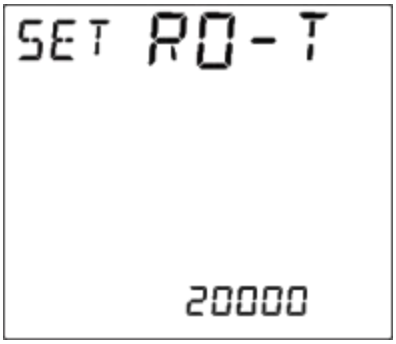


Fig 3-3-11 Relay pulse width settings page

Screen 9：Transmission output parameter settings

This screen is used to set the parameters of transmission output . "AO" on top of the page donates transmission output 。

The first row is used to set the direction of AO, unidirectional or bidirectional: 0 for unidirectional, 1 for bidirectional.

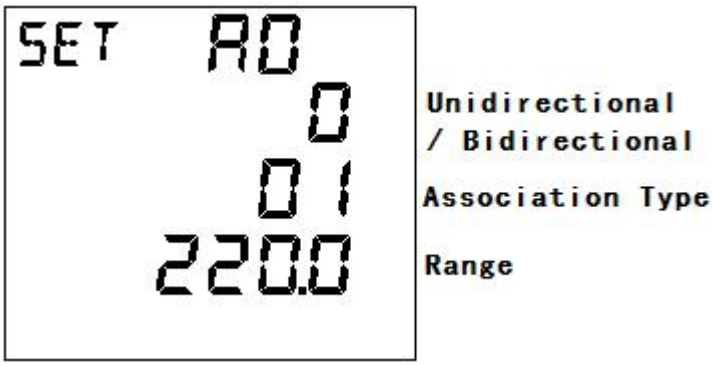


fig. 3-3-12 Transmission output settings page

The second row is used to set the associated type of AO. As shown in the table below.

The third row indicates the range of the corresponding electrical parameter, and the

range is used to set the range of the measurement associated with the transmission output.

Only when the association type is active power, reactive power, power factor, or frequency, the direction can be set to Bidirectional. 4mA represents 0 and 20mA represents full scale when set to unidirectional. When set to Bidirectional, 4mA represents the reverse range, 20mA represents the forward range.

Example 1: When the range is set to 1.000kW, if set to unidirectional, the output of 4mA represents 0kW, the output of 20mA represents 1.000kW, the output of 12mA represents 0.500kW; if set to bidirectional, the output of 4mA represents -1.000kW, 20mA represents 1.000 kW, 12mA represents 0kW.

Example 2: If the frequency F is set to Bidirectional, real-scale range is 50Hz ± range, and 12mA represents 50Hz.

Association type is used to select energy which is associated to transmission output

Association Type	Description	Remark	Association Type	Description	Remark
1	Related Uab	Unidirectional	16	Related P	Unidirectional / Bidirectional
2	Related Ubc	Unidirectional	17	Related Q	Unidirectional / Bidirectional
3	Related Uca	Unidirectional	18	Related S	Unidirectional
4	Related average of line voltage	Unidirectional	19	Related PFa	Unidirectional / Bidirectional
5	Related Uan	Unidirectional	20	Related PFb	Unidirectional / Bidirectional
6	Related Ubn	Unidirectional	21	Related PFc	Unidirectional / Bidirectional
7	Related Ucn	Unidirectional	22	Related Pa	Unidirectional / Bidirectional
8	Related average of phase voltage	Unidirectional	23	Related Pb	Unidirectional / Bidirectional
9	Related Ia	Unidirectional	24	Related Pc	Unidirectional / Bidirectional
10	Related Ib	Unidirectional	25	Related Qa	Unidirectional / Bidirectional
11	Related Ic	Unidirectional	26	Related Qb	Unidirectional / Bidirectional
12	Related average of current	Unidirectional	27	Related Qc	Unidirectional / Bidirectional
13	Related In	Unidirectional	28	Related Sa	Unidirectional
14	Related F	Unidirectional / Bidirectional , Bidirectional	29	Related Sb	Unidirectional

		indicates 50Hz ±range			
15	Related PF	Unidirectional / Bidirectional	30	Related Sc	Unidirectional

Screen 10：Back-light time settings

This page is used to set the backlight lighting time. The upper display shows the word "Ld-T", indicates that the current page as the backlight time setting page, as shown in fig. 3-3-13.

Backlight time range is from 0 to 30 minutes, when set to 0, the backlight is on.

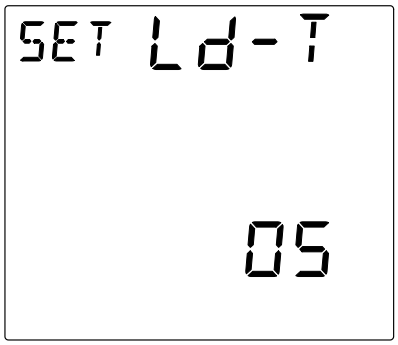


Fig 3-3-13 Backlight time settings page

Screen 11：Statistical interval of electric parameter maximum/minimum value settings

"S—T" on the top of the screen denotes the statistical interval of electric parameter maximum/minimum value settings page. as shown in fig 3-3-14: The range of maximum or minimum statistics interval is from 1 minute to 1440 minutes.

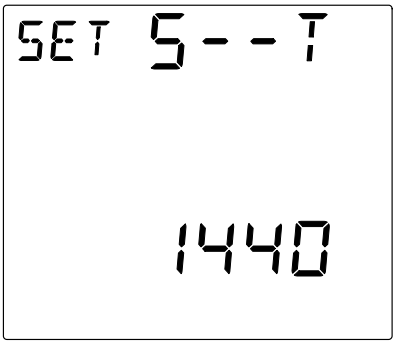


Fig 3-3-14 Statistical interval of electric parameter maximum/minimum value settings

Screen 12：Over current alarm parameter settings.

.The word "w-oc" is displayed at the top of the screen, indicating that the current page is over current alarm parameter settings page.

The permitted range of the alarm is 0~1. 0 indicates that the alarm is not allowed, and 1 indicates that the alarm is allowed.

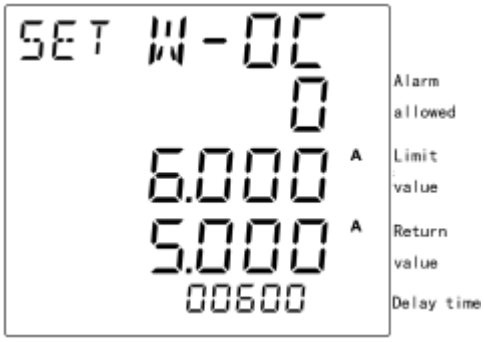


Fig 3-3-15 Over current alarm parameter settings page

The limit value and return value range from 0 to 6000A; the delay time range from 1 to 60000 ms.

.

Screen 13：zero-current (low current) alarm parameters settings

The top of the screen displays "W-LC", the screen display and settings similar to the twelfth screen.

Note: The limit value must be less than the return value.

Screen 14：Over ground current alarm parameters settings

The top of the screen shows "W-ET", the screen display and settings similar to the twelfth screen.

Note: The limit value must be more than the return value.

Screen 15：Low voltage alarm parameters settings

This page is used to set the low voltage alarm parameters. The word "W-LV" is displayed at the top of the screen, indicating the page is the low voltage alarm parameters settings page, as shown in fig. 3-3-16.

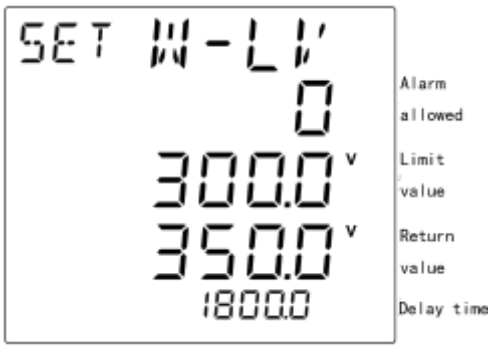


Fig 3-3-16 Low voltage alarm settings page

The allowed range of the alarm is 0 ~ 1, 0 means the alarm is not allowed, and 1 means the alarm is allowed.

The limit value, the return value range is 0 ~ 42kV; delay time range is 0.1 ~ 1800.0s;

Note: The limit value must be less than the return value.

Screen 16：Over voltage alarm parameters settings

The top of the screen shows "W-OV", the screen display and settings similar to the fifteenth screen.

Note: The limit value must be more than the return value.

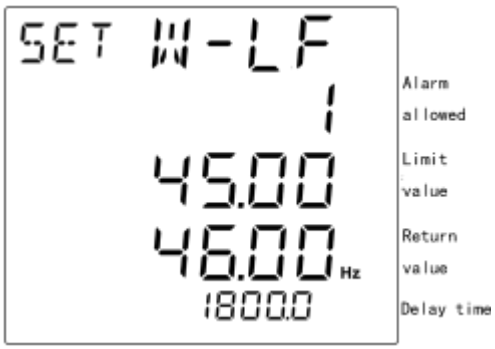


Fig 3-3-17 Lower frequency alarm parameter settings page

Screen 17 ： Low frequency alarm parameters settings

This page is used to set low frequency alarm parameters. The upper part of the screen displays "W-LF", indicating the page is the low frequency alarm parameters settings page, as shown in fig. 3-3-17.

The allowed range of the alarm is 0 ~ 1, 0 means the alarm is not allowed, and 1 means the alarm is allowed.

The limit value, the return value of the range of 0 ~ 99.99Hz; delay time range of 0.1 ~ 1800.0s;

Note: The limit value must be less than the return value.

Screen 18：Over frequency alarm parameters settings

The top of the screen shows the word "W-OF", the screen display and settings similar to the seventeenth screen.

Note: The limit value must be more than the return value.

Screen 19：Low power factor alarm parameters settings

This page is used to set the low power factor alarm parameters. The word "W-PF" is displayed at the top of the screen, indicating the page is the low power factor alarm parameters settings page.

The allowed range of the alarm is 0 ~ 1, 0 means the alarm is not allowed, and 1 means the alarm is allowed.

The limit value, the range of return value is 0 ~ 0.999; The delay time range is 0.1 ~ 1800.0s;

Note: The limit value must be less than the return value.

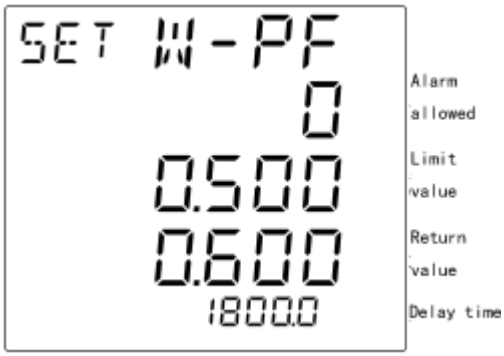


Fig 3-3-18 Low power factor alarm parameter settings page.

Screen 20 ： Over-limit alarm associated relay settings

This page is used to set the over-limit alarm associated relay. At the top of the screen, "RO-R" is displayed, indicating the page is the over-limit alarm related relay settings page.

As shown in fig. 3-3-19: The bottom 8 digits

Fig 3-3-19 Over-limit alarm associated relay settings page.

represent 8 kinds of alarm related relays, as the following table:

Alarm association type code	Explanation
①	Low power factor alarm associated relay
②	Over frequency alarm associated relay
③	Low frequency alarm associated relay
④	Over voltage alarm associated relay
⑤	Low voltage alarm associated relay
⑥	Over ground current alarm associated relay
⑦	Zero-current alarm associated relay
⑧	Over current alarm associated relay

Alarm associated relays range from 0 to 2, 0 stands for no relays; 1 stands for relays 1; 2 stands for relays 2.

Note: A relay can not be associated with multiple alarms at the same time. Relay associated alarm, no longer subject to local and remote control.

Screen 21：System time settings

This page is used to set the system time. The upper display shows the word "TIME", indicates the page to the system time setup page, as shown in fig. 3-3-20.

As shown, showing at 16:19 on December 10 2008.。

Fig 3-3-20 System Time Settings Page

Screen 22：Password protection settings

This page is used to set the system password protection. Top of the screen displays the words "button", expressed this page to protect your password settings page, as shown in fig. 3-3-21.

Password has been set will be displayed on the screen the password range 0000 to 9999.

Note: The parameter settings and local operations with this password.

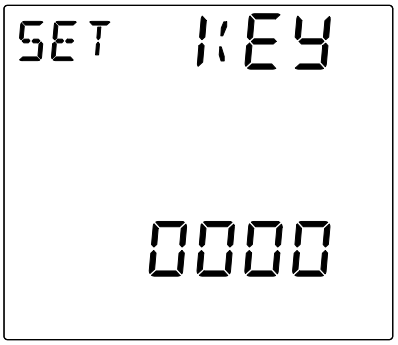


Fig 3-3-21 Password protection settings page

Screen 23：Period rates setting 1

This page is used to set 00:00 ~ 06:00 of the period rates. Top of the screen displays "ET-1" displayed, it indicates this page to set the period rates 1, as shown in fig. 3-3-22.

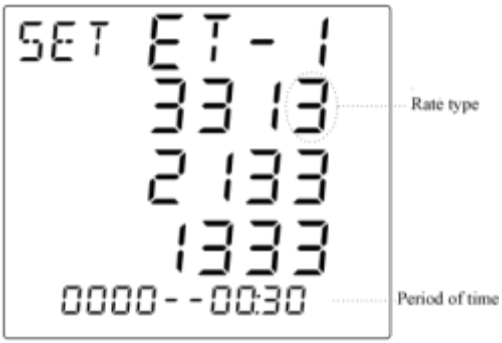


Fig. 3-3-22 Rates setting page.

Each digit represents a step time (0.5 hours), the display time period after activation, each number ranging from 1 to 4, the representative rates in the following table:

Rate Type Code	Explanation
1	Sharp, Rates
2	Peak Rates
3	Shoulder Rates
4	Off-peak Rates

Screen 24：Period rates setting 2

This page is used to set 06:00 ~ 12:00 of the period rates. Top of the screen displays "ET-2" words, similar methods of operation and the display screen and the fourteenth.

Screen 25：Period rates setting 3

This page is used to set 12:00 ~ 18:00 of the period rates. Top of the screen displays "ET-3" words, similar methods of operation and the display screen and the fourteenth.

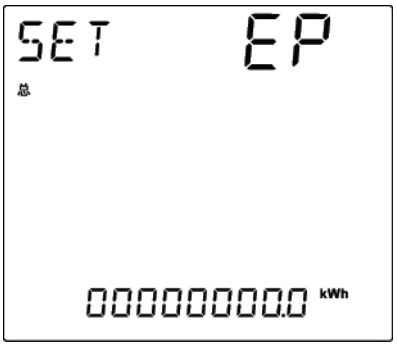


Fig 3-3-23 Setting the base value of total active energy

Screen 26：Period rates setting 4

This page is used to set the 18: 00 hours fee rates: 00 to 24. Top of the screen displays "ET-4" words, similar methods of operation and the display screen and the fourteenth.

Screen 27：Setting the base value of total active energy

This page is used to setting the base value of total active

Fig 3-3-24 Setting the base value of total reactive energy

energy, as shown in fig. 3-3-23, top of the screen displays "EP" and "total" refers to the total active energy, the base value is displayed at the bottom of the screen and the range is from 0 to 99999999.9kWh.

Screen 28：Setting the base value of total reactive energy

This page is used to setting the base value of total reactive energy, as shown in fig. 3-3-24, the top of the screen shows "Eq" and "total" refers to the total reactive energy, the base value is displayed at the bottom of the screen and the range is from 0 to 99999999.9kvarh.

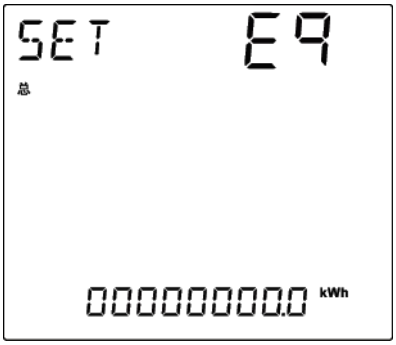


Fig 3-3-25 Setting the base value of A-phase active energy

Screen 29： Setting the base value of A-phase active energy

When wiring for the 3-phase 4-wire system, the page used to setting the base value of A-phase energy, as shown in fig. 3-3-25, top of the screen displays "EP", are setting the active energy, "a" represents the A-phase, the base value is displayed at the bottom of the screen and the range is from 0 to 99999999.9.

Screen 30、31：Setting the base value of B/C-phase active energy

When wiring for the 3-phase 4-wire system, it was used to setting the base value of B,C-phase active energy. "b" represents phase B, "c" represents a C-phase. Similar methods of operation and the Twenty-screen display.

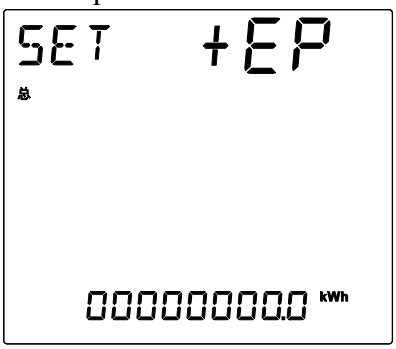


Fig 3-3-26 Setting the base absolute value of total forward active energy

Screen 32~34：Setting the base value of A/B/C-phase reactive energy

When wiring for the 3-phase 4-wire system, it is used to setting the base value of A, B, C-phase reactive energy. The top of the screen shows "Eq", bottom right of the screen displays

"kvarh" expressed as reactive power, "a" represents the A-phase, "b" represents phase B, "c" represents a C-phase. Similar methods of operation and the Twenty-screen display.

Screen 35：Setting the base absolute value of total forward active energy

This page is used to setting the base absolute value of total forward active energy . As shown in fig. 3-3-26: the top of the screen shows the "total" and "+ EP", the base value is displayed at the bottom of the screen and the range is from 0 to 99999999.9kWh.

Screen 36：Setting the forward base value of total active energy at sharp rate

This page is used to setting the forward base value of total active energy at sharp rate, similar to the methods of operation and the display screen with the twenty-sixth.

Screen 37~39:Setting the forward base value of total active energy at peak, shoulder or off-peak rate

They are used to setting the forward base value of total active energy at peak, shoulder, off-peak rates. Top of the screen displays "+ EP" type rate were similar peak, shoulder, off-peak, methods of operation and the display screen and twenty-sixth.

Screen 40：Setting the base absolute value of total reverse active energy

This page is used to setting the base absolute value of total reverse active energy . Top of the screen display similar to "-EP", methods of operation and the display screen and twenty-sixth.

Screen 41~44： Setting the reverse base value of total active energy at sharp,peak, shoulder or off-peak rate

They are used to setting the reverse base value of total active energy at sharp,peak, shoulder or off-peak rate. Top of the screen displays "-EP" rate type were sharp,peak,shoulder, off-peak, methods of operation and display screen similar to the

twenty-sixth.

Screen 45： Setting the base absolute value of total forward reactive energy

This page is used to setting the base absolute value of total forward reactive energy. As shown in fig. 3-3-27: the top of the screen shows the "total" and "+ Eq", the base value is displayed at the bottom of the screen and the range is from 0 to 99999999.9kvarh.

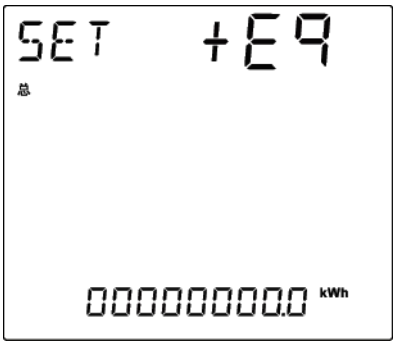


Fig 3-3-27 Setting the base absolute value of total forward reactive energy

Screen 46：Setting the forward base value of total reactive energy at sharp rate

This page is used to setting the forward base value of total reactive energy at sharp rate,methods of operation and the display screen similar to the thirty-sixth.

Screen 47~49：Setting the forward base value of total reactive energy at peak, shoulder or off-peak rate

They are used to setting the forward base value of total reactive energy at peak, shoulder or off-peak rates. Top of the screen displays "+ Eq" rate types are similar peak, shoulder, off-peak, methods of operation and the screen displays thirty-sixth.

Screen 50：Setting the base absolute value of total reverse reactive energy

This page is used to setting the base absolute value of total reverse reactive energy. Top of the screen display similar to "-Eq", methods of operation and the screen displays thirty-sixth.

Screen 51~54:Setting the reverse base value of total reactive energy at sharp,peak, shoulder or off-peak rate

They are used to setting the reverse base value of total reactive energy at sharp,peak, shoulder or off-peak rates. Top of the screen displays "-Eq" rate type were sharp, peak, shoulder, off-peak, methods of operation and the display screen similar to the thirty-sixth.

Screen 55：Setting the absolute base value of the 1th quadrant total reactive energy

This page is used to setting the absolute base value of the 1th Quadrant total reactive energy. The top of the screen shows "Eq-1", the bottom right of the screen displays "kvarh" expressed as reactive power, methods of operation and the display screen similar to the thirty-sixth.

Screen 56~59： Setting the base value of the 1th quadrant total reactive energy at sharp,peak, shoulder or off-peak rate

They are used to setting the base value of the 1th quadrant total reactive energy at sharp,peak, shoulder or off-peak rates. The top of the screen shows "Eq-1" rate type are sharp, peak, shoulder, off-peak, the bottom right of the screen displays "kvarh" expressed as reactive power, methods of operation and the display screen similar to the thirty-sixth.

Screen 60：Setting the absolute base value of the 4th quadrant total reactive energy

This page is used to setting the absolute base value of the 4th quadrant total reactive energy. The top of the screen shows "Eq-4", bottom right of the screen displays "kvarh" expressed as reactive power, methods of operation and the display screen similar to the thirty-sixth.

Screen 61~64： Setting the base value of the 4th quadrant total reactive energy at sharp,peak, shoulder or off-peak rate

They are used to seting the base value of the 4th quadrant total reactive energy at sharp,peak, shoulder or off-peak rates. The top of the screen shows "Eq-4" rate type were sharp, peak, shoulder, off-peak, the bottom right of the screen displays "kvarh" expressed as reactive power, methods of operation and the display screen similar to the thirty-sixth.

Screen 65：Setting the absolute base value of the 2th quadrant total reactive energy

This page is used to setting the absolute base value of the 2th quadrant total reactive energy. The top of the screen shows "Eq-2", the bottom right of the screen displays "kvarh" expressed as reactive power, methods of operation and the display screen similar to the thirty-sixth.

Screen 56~69： Setting the base value of the 2th quadrant total reactive energy at sharp,peak, shoulder or off-peak rate

They are used to setting the base value of the 2th quadrant total reactive energy at sharp,peak, shoulder or off-peak rate. The top of the screen shows "Eq-2" rate type were sharp, peak, shoulder, off-peak, the bottom right of the screen displays "kvarh" expressed as reactive power, methods of operation and the display screen similar to the thirty-sixth.

Screen 70：Setting the absolute base value of the 3th quadrant total reactive energy

This page is used to seting the absolute base value of the 3th quadrant total reactive energy. The top of the screen shows "Eq-3", the bottom right of the screen displays "kvarh" expressed as reactive power, methods of operation and the display screen similar to the thirty-sixth.

Screen 71~74： Setting the base value of the 3th quadrant total reactive

energy at sharp,peak, shoulder or off-peak rate

They are used to setting the base value of the 3th quadrant total reactive energy at sharp,peak, shoulder or off-peak rates. The top of the screen shows "Eq-3" type rate were sharp, peak, shoulder, off-peak, the bottom right of the screen displays "kvarh" expressed as reactive power, methods of operation and the display screen similar to the thirty-sixth.

After completing all of the parameter settings, press button to return to the first screen.

3.4. Local Operation

In the single button mode, you can enter the local operation mode by pressing "" and "" at the same time, "OPR" will display at the left top corner of the screen.

Note: In the local operation mode, press "" and "" will exit and go back to the single button mode. If you don't press "" to activate the page, press "" will turn to next screen. The screen will go back to the single button mode automatically if there is no operation on buttons in ten minutes.

3.4.1. Local operation features

In local mode of operation can be performed:

- Control the two relays output are opened or closed;
- Clear SOE, clear power base, clear maximum demand;
- Maximum electrical parameters of the minimum reset;
- The alarm reset;
- System reset operation.

3.4.2. Each local operation screen presentation

Starting interface for local operation mode password confirmation each time to enter the local mode of operation are first prompted for a password, the password is displayed as "----." Password total of four, ranging from 0000 to 9999, the factory default value "0000." To enhance the confidentiality, is only display digital digit

password set, the other bits are displayed as "-." After the input is complete press button to confirm, if you enter the correct password is entered the local operation of the first screen, otherwise stay on this page.

Screen 1: Output operation of relay 1

This page is used to control the on-off status of relay 1. The top of the screen shown in fig. 3-4-2 displays the word "OUT", expressed as output operation of relay 1 , the middle of the screen displays "1" indicating that the relay 1.

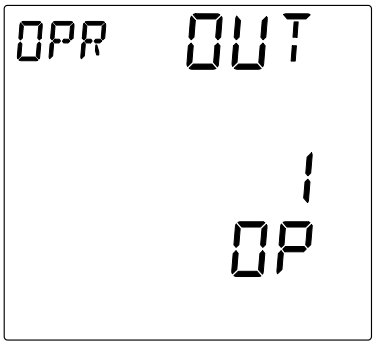


Fig 3-4-2 The first relay operation

Relay status after Press buttons "OP" blinking, press the button or bond can be "OP" or "CL" option. "OP" that is "OPEN" indicates relay operation points, "CL" ie "CLOSE" indicates relay closing operation.

Note: When the relay output is set to pulse output, you can not select "OP", can only choose to "CL".

After selecting relay status, press button appears to confirm whether or not the current operation prompts, as shown in fig. 3-4-3. "Y" on behalf of YES, confirms that the local operation, "N" on behalf of NO, that is, no local operation. Press button to make "Y" or "N" option, press button.

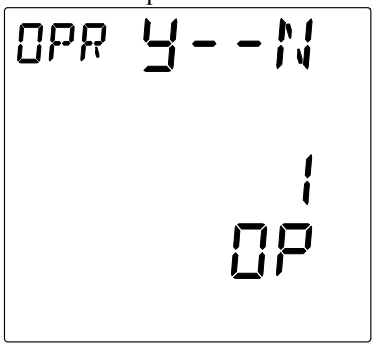


Fig 3-4-3 Relay action confirmation

Select "N" press button to confirm, the relay does not operate. Select Y press button is not immediately operate the relay, but first check the current status of the relay: If the relay is currently not operating, then the relay will be operated; current relay under operation, the relay will not operate while the top of the screen display "ERR" word indicates that the operation failed, as shown in fig. 3-4-4. Now press button will turn to the next screen; press button to reset the relay status.

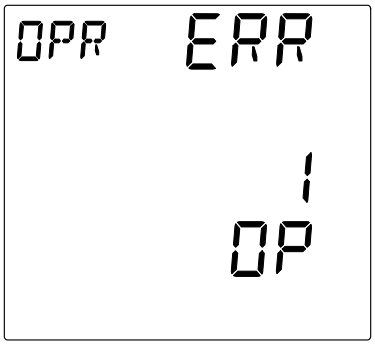


Fig 3-4-4 Relay operation failed

Screen 2：Output operation of relay 2

This page is used to control the on-off status of relay 2. The middle of the screen

shows "2", means the relay 2.

Operation method of relay 2 and the relay 1 is exactly the same, please refer to the operation method of relay 1.

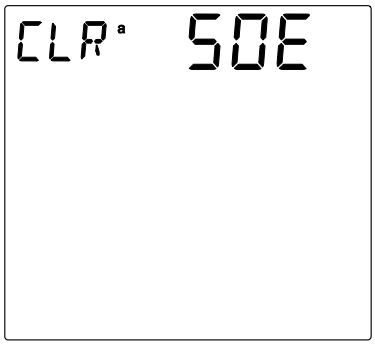


Fig 3-4-5 Clear SOE of switching value

Screen 3：Clear SOE of switching value

This page is used to clear SOE record of switching value. As shown in fig. 3-4-5, "CLR a" is shown in the upper left corner, and "SOE" is displayed at the top of the screen.

If you do not want to clear the ⏎, press the SOE button will skip this screen; if you want to clear, please press the ▭ button, the screen becomes as shown in fig. 3-4-6. Select the "Y" that is YES, to confirm the removal of SOE, select "N" that is NO, not clear SOE.

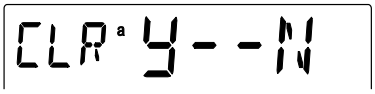


Fig 3-4-6 Confirm the removal of SOE

Screen 4：Clear SOE of the overlimit alarm

This page is used to clear SOE record of the overlimit alarm. The upper left corner of the screen displays "CLR b". The word "SOE" is displayed at the top of the screen, indicating that the overlimit alarm SOE is cleared. Operation method and display similar to the third screen

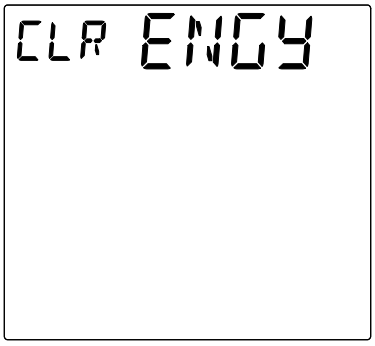


Fig 3-4-7 Clear the accumulated value of electricity measurement

Screen 5：Clear the accumulated value of electricity measurement

This page is used to clear the accumulated value of electricity measurement. As shown in fig. 3-4-7, the upper left corner of the screen displays "CLR" (CLEAR) means clear, the top of the screen displays "ENGY" (ENGERY) means clear the electric base, The operation to clear the accumulated value of electricity is the same as clearing the SOE.

Screen 6：Clear maximum demand

This page is used to clear the maximum demand. As shown in fig. 3-4-8, the upper left corner of the screen displays "CLR" (CLEAR) means clear ,the top of the screen displays the word "DMD" to clear maximum demand. The operation to clear the maximum demand is the same as clearing the SOE.

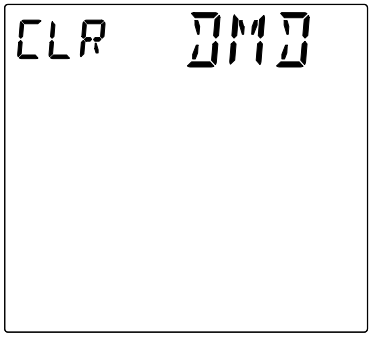


Fig 3-4-8 Clear maximum demand

Screen 7：Electric parameters Max Min reset

This page is used to reset the electrical parameters Maximum Minimum. As shown in fig. 3-4-9, the upper left corner of the screen to display "RST" (RESET) indicates reset, the top of the screen displays "MXMN" (MAXMIN) represents the word reset Max Min. The operation to reset the electrical parameters Maximum Minimum is the same as clearing the SOE

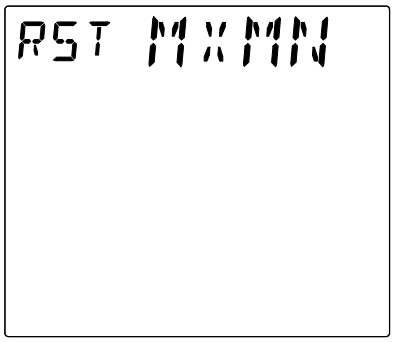


Fig 3-4-9 Reset the most value

After the electrical parameters of the reset maximum minimum, maximum and minimum values of various electrical parameters of the reset to the current measured value.

Screen 8：Alarm reset

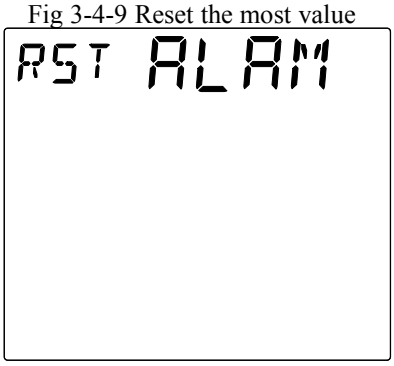


Fig. 3-4-10 Alarm reset

This page is used to reset the alarm. As shown in fig. 3-4-1 indicates reset, and "ALRM" (ALARM) at the top of the screen indicates reset overlimit alarm. The operation to reset the overlimit alarm is the same as clearing the SOE .

Screen 9：System Reset

This page is used to reset the system. As shown in fig. 3-4-11, upper left corner of the screen "RST" (RESET) indicates reset, the top of the screen to display "SYS" (SYSTEM) represents the system.

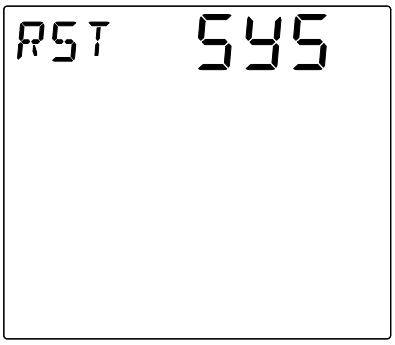


Fig 3-4-11 Reset

The operation to system reset is the same as clearing SOE.

3.5. SOE and statistic Inquiry

3.5.1. Features

In the single button mode, press ⏎ and △ button to enter into the event log query mode, the upper left corner of the screen displays the word "SOE [a]", indicates the switch event log. Press △ or ◁ button up and down to view content. Press "⏎" will turn screen directly, The limit alam SOE "SOE [b]", the maximum minimum value of the electrical parameter, and the maximum demand "DMD" in turn.

Note: The screen will go back to the single button mode automatically if there is no operation on buttons in ten minutes.

3.5.2. Inquiry switching value SOE

If there is no SOE records in RAM, after entering inquiry SOE mode, the upper display shows "NO", as shown in fig. 3-5-1. If there is SOE records in RAM,The "" sign is displayed in the lower left corner of the screen.After entering inquiry SOE mode, as shown in fig. 3-5-2:

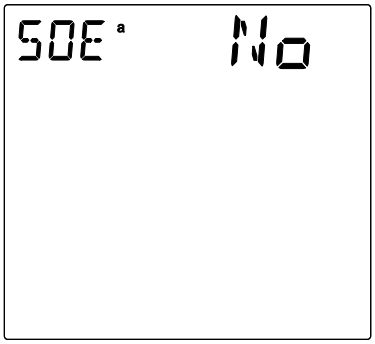


Fig 3-5-1 No SOE record

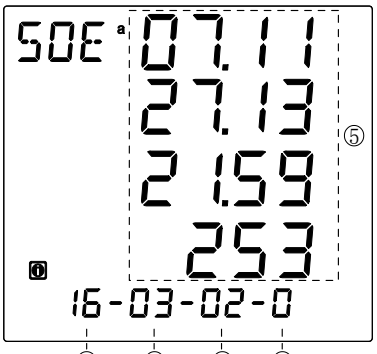


Fig 3-5-2 SOE record

① Total switch SOE event (up to 32). As shown there are currently a total of 16 events are recorded.

② Current event being viewed. As shown currently are visiting for the third events.

③ Types of events: in the following table.

Type Number	Type Description
1	Switching value input 1 shift event
2	Switching value input 2 shift event
3	Switching value input 3 shift event
4	Switching value input 4 shift event

④ Status of event. 0: “on” to “off” ; 1: “off” to “on”.

⑤ The time of the event occur.See in fig 3-5-2: the time of the event occurs is 2007-11-27 13:21:59 253ms

If you have multiple SOE events, press ▲ or ◀ buttons to page up and down buttons to view.

Note: If all SOE events have been uploaded via communication or all SOE events in memory have been cleared through local operations, the "0" mark in the lower left corner of the screen will disappear.

3.5.3. Inquiry the limit alarm SOE Operation

If there is no limit alarm SOE record in RAM, after entering the inquiry SOE mode, the "NO" is displayed on the top of the screen, as shown in fig. 3-5-3. If there is limit alarmSOE record in RAM, after entering the inquiry SOE mode, as shown in fig. 3-5-4.

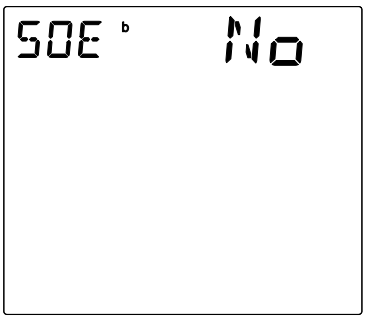


Fig 3-5-3 No SOE events

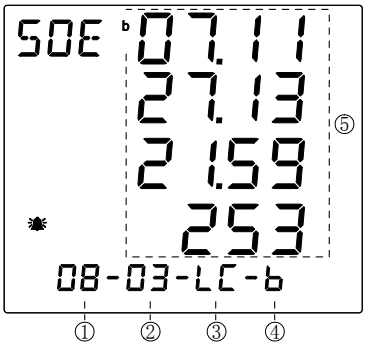


Fig 3-5-4 SOE events

① The total number of limit alarm SOE events (the maximum is 16).There are 8 recorded events in the picture.

② The sequence number of the current events.As pictured currently is the third event.

③ Type of the event:

Type NO.	Description
OC	Over-current alarm
LC	Zero-current alarm
ET	Over ground current alarm
OU	Over voltage alarm
LU	Low voltage alarm
OF	Over frequency alarm
LF	Low frequency alarm
PF	Low power factor alarm

④ Phase of event: “a” denotes phase A, “b” denotes phase B, “c” denotes phase C.

⑤ The time of the event occur.

See in fig 3.5.3.2: the time of the event occurs is 2007-11-27 13:21:59 253ms
You can view all the SOE events pressing “△” or “▽”.

3.5.4. Inquiry the electrical parameters of maximum and minimum operating presentation

After entering the electrical parameters of the maximum and minimum mode, press △ or ◁ button to page up and down to view; press ▭ button to view the value of a electrical parameter and the time of occurrence, minimum and maximum occurrence time are flashing several second. The time display mode is “year-month-day” and “hour: minute: second” alternating displayed. The current statistical data viewed are all from last statistical interval.

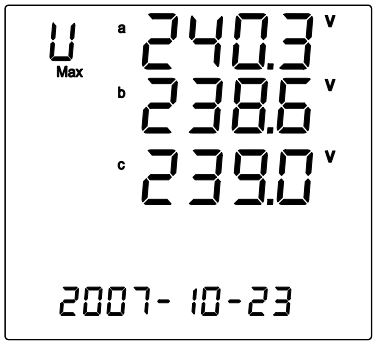


Fig 3-5-5 Maximum value of phase voltage

Screen 1：Maximum value of phase voltage

The screen shows a maximum value of 3-phase

voltage, as 3-5-5: the upper left corner of the screen displays "U_max", represents the maximum voltage, 'a', 'b', 'c', respectively, A-phase, B-phase, C-phase voltage, unit is V or kV. Occurrence time of the maximum value is displayed at the bottom of the screen.

Note: The only show in the 3-phase 4-wire page.

Screen 2：Minimum value of phase voltage

The screen displays the minimum value of the 3-phase voltage, as shown in fig. 3-5-6: the upper left corner of the screen displays "U_min", represents the minimum voltage, 'a', 'b', 'c', respectively, A-phase, B-phase, C-phase voltage,unit is V or kV. Occurrence time of the minimum value is displayed at the bottom of the screen.

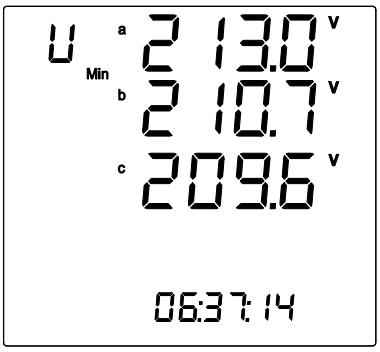


Fig 3-5-6 Minimum value of phase voltage

Note: The only show in the 3-phase 4-wire page.

Screen 3：Maximum value of line to line voltage

The screen displays the maximum value of line to line voltage, the upper left corner of the screen displays "U_max", represents the maximum value of line to line voltage, 'ab', 'bc', 'ca' denote the line voltage AB, BC, CA, with the first screen display similar .

Screen 4：Minimum value of line to line voltage

The screen displays the minimum value of line to line voltage, upper left corner of the screen displays "U_min", represents the minimum value of line to line voltage, 'ab', 'bc', 'ca' denote the line voltage AB, BC, CA, with a second similar screen display .

Screen 5：Maximum value of current

The screen shows the maximum value of current, the upper left corner of the screen displays "I_max", represents the maximum value of current, 'a', 'b', 'c', 'n' denote the A-phase, B-phase, C-phase, zero-sequence current ,unit is A. Similar to the first display screen.

Screen 6：Minimum value of current

The screen displays the minimum value of current,, the upper left corner of the screen displays "I_min", represents the minimum value of current, 'a', 'b', 'c', 'n' denote the A-phase, B-phase, C-phase, zero-sequence current,unit is A. Similar to the second display screen.

Screen 7：Maximum value of power factor

The screen displays the maximum value of power factor, upper left corner of the screen displays the word "PF_max", represents the maximum value of the power factor, 'a', 'b', 'c', ", respectively, A-phase, B-phase, C-phase, total power factor, showed similar with the first screen.

Note: Do not display the A-phase ,B-phase, C-phase maximum value of power factor in the 3-phase 3-wire system,it displays the maximum value of total power factor only in the first row.

Screen 8：Minimum value of power factor

The screen displays the minimum value of power factor, the upper left corner of the screen displays the word "PF_min", indicates the minimum value of power factor, 'a', 'b', 'c', ", respectively, A-phase, B-phase, C-phase, the total power factor, with a second similar display screen.

Note: Do not display the A-phase ,B-phase, C-phase maximum value of power factor in the 3-phase 3-wire system,it displays the minimum value of total power factor only in the first row.

Screen 9：Maximum value of total power and frequency

The screen displays the maximum value of total power and frequency, and the upper left corner of the screen displays the word "P_ max", representsmaximum value of total power and frequency, 'Σ' represents the total power, the first three rows are active power, reactive power, apparent power, units are kW, kvar, kVA. The fourth row is frequency, unit is Hz. Occurrence time of the maximum value is displayed at the bottom of the screen.

Screen 10：Minimum value of total power and frequency

The screen displays the minimum value of total power and frequency, top left corner of the screendisplay the word "P_ min", representsthe minimum value of total power and frequency, with a ninth screen display similar.

Screen 11：Maximum value of A-phase power

The screen displays the maximum value of A-phase power, the upper left corner of the screen displays the word "Pa_ max", represents the maximum value of the A-phase power, 'Σ' represents the total power, the first three rows are active power, reactive power, apparent power, unit is kW, kvar, kVA. Occurrence time of the maximum value is displayed at the bottom of the screen.

Note: This screen displayed in the 3-phase 4-wire system only.

Screen 12：Minimum value of A-phase power

The screen displays the minimum value of A-phase power,, top left corner of the screen displays the word "Pa_min", indicates the minimum value of A-phase power,, with an eleventh screen display similar.

Note: This screen displayed in the 3-phase 4-wire system only.

Screen 13：Maximum value of B-phase power

The screen displays the maximum value of B-phase power, the upper left corner of the screen displays the word "Pb_ max", represents the maximum value

of B-phase power, with an eleventh screen display similar.

Note: This screen displayed in the 3-phase 4-wire system only.

Screen 14：Minimum value of B-phase power

The screen displays the minimum value of B-phase power, the upper left corner of the screen displays the word "Pb_min", indicates the minimum value of B-phase power, with an eleventh screen display similar.

Note: This screen displayed in the 3-phase 4-wire system only.

Screen 15：Maximum value of C-phase power

The screen shows the maximum value of C-phase power, the upper left corner of the screen displays the word "Pc_ max", represents the maximum value of C-phase power, with an eleventh screen display similar.

Note: This screen displayed in the 3-phase 4-wire system only.

Screen 16：Minimum value of C-phase power

The screen displays the minimum value of C-phase power,, top left corner of the screen displays the word "Pc_min", C represents the minimum value of C-phase power,, with an eleventh screen display similar.

Note: This screen displayed in the 3-phase 4-wire system only.

3.5.5. Inquiry maximum demand operating presentation

Enter the maximum demand mode, press ◁ or △ buttons to page up and down to view; the occurrence time of the maximum are flashing several second. Display time of year - month - day and hours: minutes: seconds are displayed alternately. The current maximum demand are viewed on a demand period (15 minutes) statistics.

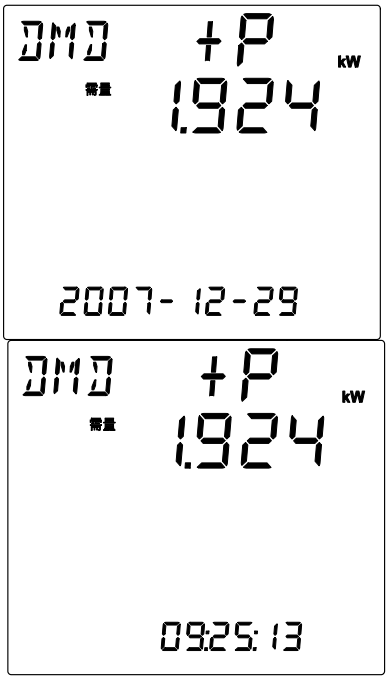


Fig.3-5-7 Maximum demand of forward active power

Screen 1： Maximum demand of forward active power

"DMD" at the left top corner denotes maximum demand, "+P" on the top denotes maximum demand of forward active power, unit is kW. See in Fig 3-5-7.
"1.924" denotes the maximum demand of forward active power is 1.924kW.
Occurrence time of the maximum demand is 2007-12-29 09:25:13.

Screen 2：Maximum demand of reverse active power

"DMD" at the left top corner denotes maximum demand, "-P" on the top denotes maximum demand of reverse active power, unit is kW. The screen display is similar to screen 1.

Screen 3：Maximum demand of forward reactive power

"DMD" at the left top corner denotes maximum demand, "+q" on the top denotes maximum demand of forward reactive power, unit is kvar.

Screen 4：Maximum demand of reverse reactive power

"DMD" at the left top corner denotes maximum demand, "-q" on the top denotes maximum demand of reverse reactive power, unit is kvar.

3.5.6. Other Inquiry

When single button mode measurement data display, press the button ▭ and ◁ button, you can view the three formats of the time and the current temperature of the device..

Screen 1：Time Format 1

At the bottom of this screen displays the system time and the format is "month-day hour: minute", see in Fig 3-6-1.

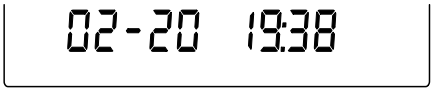


Fig 3-6-1 Time Format 1

The system time is: 02-20 19:38.

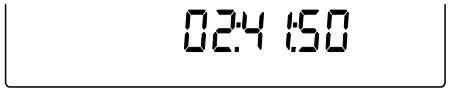


Fig 3-6-2 Time Format 2

Screen 2：Time Format 2

At the bottom of this screen displays the system time and the format is “hour: minute: second”, see in Fig 3-6-2.

The system time is: 02: 41: 50.

.

Screen 3：Temperature of device

At the bottom of this screen displays the temperature of device, see in Fig 3-6-3.

The temperature of device is: 25.8℃

Fig 3-6-3 Device temperature

Screen 4：Time Format 3

At the bottom of this screen displays the system time and the format is “year: month: day”, see in Fig 3-6-4.

The system time is: 2008-02-20.

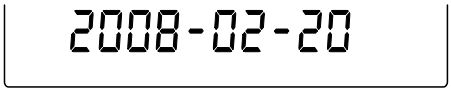


Fig 3-6-4 Time Format 3

Screen 5：No display

At the bottom of this screen displays nothing.

4. Communication

4.1. MODBUS protocol overview

MODBUS-RTU communication protocol is more commonly used as a communication protocol, the response from the main station and the slave station connection (half duplex). Themain station (for example PC) send a command to all the terminal devices (for example IM300), The addressed terminal device sends a response signal to the host.

4.1.1 The transmission format

Information is transmitted asynchronously and in bytes. The communication message passing between the main station and the slave station is the 11-bit word

format:

Odd-even check:

Start bit(1)	Data bits(8)								Parity check bit(1)	End bit(1)
0	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	1

No parity check:

Start bit(1)	Data bits(8)								End bit(1)	End bit(1)
0	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	1	1

4.1.2 The frame format

Data frame arrived at the terminal, The device removes the header of the data frame, read the data and perform the required tasks if it is detected correctly, Then put the generated data into the data frame and send it back to the requester. The returned data frames include: terminal address, executed command, data, check code.

Address	Function	Data	Check
8-Bits	8-Bits	N×8-Bits	16-Bits

Address code:

The address code is the first byte of each communication frame, ranging from 0 ~ 255 (00H ~ FFH). Each slave station must have a unique address code, and only the one that conforms to the address code can respond and send back the message. When the information is sent back from the slave station, the return data is started with their respective address codes. The address code that is sent indicates the address that will be sent from the slave station, and the address code returned from the slave station indicates the return from the slave station address. The corresponding address code indicates where the information came from. 00H is the broadcast address, all slave substations respond to the broadcast command, but no information is returned.

Function code:

The function code takes up a byte, range 1 ~ 127 (01H ~ 7FH), and tells the terminal device to perform what operation. The function code used in the device is shown in the following table:

01H: read the output status of the relay.

02H: read the input status of remote.

03H: read register data.

04H: read the input data of register.

05H: single relay output.

06H: write a single register.

10H: write multiple registers.

55H: read the switch amount SOE information.

56H: read the alarm of SOE information.

Data code:

Data length is uncertain, data domain is the main station and slave station to read and write register to carry on data exchange.

Error code:

The error codes supported by IM300 include the following:

Error code	Name	Explain
01	Illegal function code	Function code not supported by sub-station.
02	Illegal address	The register address not supported by the sub-station.
03	Illegal data	Master station data not supported by sub-station.

Check:

The data may be interfered with and changed during the transmission. The check can detect whether the data has changed during the transmission, and ensure that the host or the terminal does not respond to the erroneous data. The 16-bit cyclic redundancy check (CRC16) is used for verification. The procedure for calculating CRC-16 is described below.

The relevant byte in the frame is defined as a string of binary data (0,1). The 16th checksum is obtained as follows: The stream of data streams is multiplied by 216 and then divided by the generator polynomial (X16 + X15 + X2 + 1), which is expressed in binary as 1100000000000101, the quotient is ignored and the remainder of 16 bits is the CRC value . When calculating CRC-16 values, modulo two or XOR algorithms are used for all arithmetic operations. The CRC-16 checksum is generated as follows:

① Omit the most significant bits of the generator, and reverse the order of the

bits. Form a new polynomial, the result is 1010000000000001 or hexadecimal A001.

② Load all 1s or hexadecimal FFFFs into 16-bit registers.

③ 16-bit register with low-order byte of the first data byte XOR operation, the results stored in 16-bit register.

④ 16-bit register to the right one. If the overflow bit is 1, go to step 5, otherwise go to step 6.

⑤ MOR operation is performed on the 16-bit register with the new generator polynomial and the result is stored in the 16-bit register.

⑥ Repeat step 4 until it is shifted 8 times.

⑦ XOR operation of the next data byte with the low byte of the 16-bit register, the result is stored in a 16-bit register.

⑧ Repeat steps 4 to 7 until all bytes of data have been XORed with 16-bit registers.

⑨ 16-bit register is the content of CRC-16.

4.2. Communication protocol address table and description

Relay operation address table, supports read function of code 01 and remote control function of code 05

Address	Type	Name	Register
00010	RW	RL1	1
00011	RW	RL2	1

Digital address table, supports read function of code 02

Address	Type	Name	Register
10100	RO	DI1	1
10101	RO	DI2	1
10102	RO	DI3	1
10103	RO	DI4	1

System information address table, supports read function of code 03,04 and set the code 06,10

Address	Type	Name	Ranges	Remark	Register
40010	RO	ASCII code indicates the hardware version number			1
40011	RO	ASCII code indicates the software version number			1
40012	RO	ASCII code indicates year			1
40013 ～40015	RO	ASCII code indicates the product sequence number			3
40020	RW	System time××Year××Month		Only support all written and broadcast all written	1
40021	RW	System time××Day××Hour			1
40022	RW	System time××Minute××Second			1
40023	RW	System time××Millisecond			1
40030	RW	Communication address	1～254	Defaults ： 254	1
40032	RW	Communication baud rate	1～5	Defaults：4	1
40034	RW	Communication check mode	0～3	Defaults：0	1
40050	RO	Sub-station status			1
40055	WO	Sub-station setting			1
40060	RO	Freeze/Thaw state of energy			1

System parameter address table, supports read function of code 03,04 and set the code 06,10

Address	Type	Name	Ranges	Remark	Register
40062	RW	The selection of system frequency	5000/6000		1

40065	RW	Electrical parameters of the maximum and minimum range of statistics	1~1440min	Defaults：10	1
40067	RW	Direction of CT wiring		Defaults ：0x00000000	2(Write continuously)
40070	RW	Telemetry wiring mode	1~5	Defaults：1	1
40072	RW	PT primary voltage rating	100~35000V	Defaults：220/220	2(Write continuously)
40073	RW	PT secondary voltage rating	100～220V		
40075	RW	bit14-bit0 represents CT primary current rating bit15 = 0/1 indicates the secondary is 5A/1A	Primary current rating：1～9999A	Defaults：0x1388（5000：5）	1
40077	RW	bit 14-bit 0 indicates zero-sequence CT primary current rating bit15 = 0/1 indicates the secondary is 5A /1A	Primary current rating: 1～9999A	Defaults：0x1388（5000：5）	1
40081	RW	Relay output settings	1～2	Defaults：1	1
40085		AO related electrical parameter range			2（Write continuously）
40086		AO related electrical parameter types			
40088	RW	Pulse length of relay output	50～20000	Defaults ：2000，Unit：ms	1

40090	RW	back-light time	0~30 minutes	Defaults：5	1
40092～40097	RW	Time-sharing accounting settings(4 rates 48 periods)）	Stepper: 0.5 hours	Defaults：0xaa	6(Write continuously)

Basic electric parameter address table, supports read function of code 03, 04

Address	Type	Name	Register
40100	RO	Lin voltage Uab	1
40101	RO	Line voltage Ubc	1
40102	RO	Line voltage Uca	1
40103	RO	Average value of line voltage ULLAvg	1
40104	RO	Phase voltage Uan	1
40105	RO	Phase voltage Ubn	1
40106	RO	Phase voltage Ucn	1
40107	RO	Average value of phase voltage ULN Avg	1
40108	RO	Current Ia	1
40109	RO	Current Ib	1
40110	RO	Current Ic	1
40111	RO	Average of 3-phase current I Avg	1
40112	RO	Zero-sequence current In	1
40113	RO	Total frequency (F)	1
40115	RO	Total power factor (PF)	1
40116	RO	Total active power (W)	1
40117	RO	Total reactive power (Q)	1
40118	RO	Total apparent power (S)	1
40119	RO	Power factor of phase A（PFa）	1
40120	RO	Power factor of phase B（PFb）	1
40121	RO	Power factor of phase C（PFc）	1
40122	RO	Active power of phase A（Wa）	1

40123	RO	Active power of phase B（Wb）	1
40124	RO	Active power of phase C（Wc）	1
40125	RO	Reactive power of phase A（Qa）	1
40126	RO	Reactive power of phase B（Qb）	1
40127	RO	Reactive power of phase C（Qc）	1
40128	RO	Apparent power of Phase A（Sa）	1
40129	RO	Apparent power of phase B（Sb）	1
40130	RO	Apparent power of phase C（Sc）	1

Note 1: In the 3-phase 3-wire system, the data in 40104～40107 and 40119～40130 are invalid and value is 0.

Note 2: The correspondence between the above data (Ai) and the actual value is:

Voltage: U = (Ai / 10) × (PT1 / PT2), Ai is an unsigned integer, unitV.

Current: I = (Ai / 1000) × (CT1 / CT2), Ai is an unsigned integer, unit:A.

Zero-sequence current: In = (Ai / 1000) × (CT01 / CT02), Ai is an unsigned integer, unit:A.

Active power: P = Ai × (PT1 / PT2) × (CT1 / CT2), Ai signed integers, unit:W.

Reactive power: Q = Ai × (PT1 / PT2) × (CT1 / CT2), Ai signed integers, unit:var.

Apparent power: S = Ai × (PT1 / PT2) × (CT1 / CT2), Ai is an unsigned integer, unit:VA.

Power factor: PF = Ai / 1000, Ai denote signed integers, no unit.

Frequency: F = Ai / 100, Ai as an unsigned integer, unit:Hz.

energy address table, supports read function of codes 03, 04 and set function of code 10.Only support writes continuously

Address	Type	Data Definition	Register
40200	RW	The absolute value of total active energy	2

40202	RW	The absolute value of total reactive energy	2
40204	RW	The absolute value of phase A active energy	2
40206	RW	The absolute value of phase B active energy	2
40208	RW	The absolute value of phase C active energy	2
40210	RW	The absolute value of phase A reactive energy	2
40212	RW	The absolute value of phase B reactive energy	2
40214	RW	The absolute value of phase C reactive energy	2
40216	RW	The forward value of total active energy	2
40218	RW	The forward value of total active energy at sharp rate	2
40220	RW	The forward value of total active energy at peak rate	2
40222	RW	The forward value of total active energy at shoulder rate	2
40224	RW	The forward value of total active energy at off-peak rate	2
40226	RW	The reverse value of total active energy	2
40228	RW	The reverse value of total active energy at sharp rate	2
40230	RW	The reverse value of total active energy at peak rate	2
40232	RW	The reverse value of total active energy at shoulder rate	2
40234	RW	The reverse value of total active energy at off-peak rate	2
40236	RW	The forward value of total reactive energy	2
40238	RW	The forward value of total reactive energy at sharp rate	2
40240	RW	The forward value of total reactive energy at peak rate	2
40242	RW	The forward value of total reactive energy at shoulder rate	2
40244	RW	The forward value of total reactive energy at off-peak rate	2
40246	RW	The reverse value of total reactive energy	2
40248	RW	The reverse value of total reactive energy at sharp rate	2
40250	RW	The reverse value of total reactive energy at peak rate	2
40252	RW	The reverse value of total reactive energy at shoulder rate	2
40254	RW	The reverse value of total reactive energy at off-peak rate	2
40256	RW	The absolute value of the Ⅰ quadrant total reactive energy	2
40258	RW	The absolute value of the Ⅰ quadrant total reactive energy at sharp rate	2
40260	RW	The absolute value of the Ⅰ quadrant total reactive energy at	2

		peak rate	
40262	RW	The absolute value of the Ⅰ quadrant total reactive energy at shoulder rate	2
40264	RW	The absolute value of the Ⅰ quadrant total reactive energy at off-peak rate	2
40266	RW	The absolute value of the IV quadrant total reactive energy	2
40268	RW	The absolute value of the IV quadrant total reactive energy at sharp rate	2
40270	RW	The absolute value of the IV quadrant total reactive energy at peak rate	2
40272	RW	The absolute value of the IV quadrant total reactive energy at shoulder rate	2
40274	RW	The absolute value of the IV quadrant total reactive energy at off-peak rate	2
40276	RW	The absolute value of the II quadrant total reactive energy	2
40278	RW	The absolute value of the II quadrant total reactive energy at sharp rate	2
40280	RW	The absolute value of the II quadrant total reactive energy at peak rate	2
40282	RW	The absolute value of the II quadrant total reactive energy at shoulder rate	2
40284	RW	The absolute value of the II quadrant total reactive energy at off-peak rate	2
40286	RW	The absolute value of the III quadrant total reactive energy	2
40288	RW	The absolute value of the III quadrant total reactive energy at sharp rate	2
40290	RW	The absolute value of the III quadrant total reactive energy at peak rate	2
40292	RW	The absolute value of the III quadrant total reactive energy at shoulder rate	2
40294	RW	The absolute value of the III quadrant total reactive energy at off-peak rate	2

Note 1: In the 3-phase 3-wire system, the data in 40204～40215 are invalid and value is 0.

Note 2: The correspondence between the above data (Ai) and the actual value is:

Active energy:: Ep=Ai/10,Ai denote unsigned long integer(0 ～ 999,999,999),unit is KWh

Reactive energy:: Eq=Ai/10,Ai denote unsigned long integer(0 ～

999,999,999),unit is kvarh

Note 3: when set at the bottom, you need to set the total branch amount and the total amount of electricity.

Note 4: When there is no multi-rate function, if you want to set the base number of four-quadrant energy, you still need to write 10 registers at a time, and the settings of the sharp, peak, shouder, and off-peak energy values are invalid.

Harmonic statistics (Harmonic distortion ratio/2-15th harmonic occupancy) address table, supports read function of codes 03, 04

Address	Type	Data Definition	Register
40300	RO	Total harmonic distortion ratio（THD）of A-phase (Uab) voltage	1
40301	RO	Total harmonic distortion ratio（THD）of B-phase (Ubc) voltage	1
40302	RO	Total harmonic distortion ratio（THD）of C-phase (Uca) voltage	1
40303	RO	Total harmonic distortion ratio of current Ia	1
40304	RO	Total harmonic distortion ratio of current Ib	1
40305	RO	Total harmonic distortion ratio of current Ic	1
40306	RO	Total harmonic distortion ratio of zero-sequence current In	1
40308	RO	Odd harmonic distortion ratio of A-phase (Uab) voltage	1
40309	RO	Odd harmonic distortion ratio of B-phase (Ubc) voltage	1
40310	RO	Odd harmonic distortion ratio of C-phase (Uca) voltage	1
40311	RO	Odd harmonic distortion ratio of current Ia	1
40312	RO	Odd harmonic distortion ratio of current Ib	1
40313	RO	Odd harmonic distortion ratio of current Ic	1
40314	RO	Odd harmonic distortion ratio of zero-sequence current In	1
40315	RO	Even harmonic distortion ratio of A-phase (Uab) voltage	1
40316	RO	Even harmonic distortion ratio of B-phase (Ubc) voltage	1
40317	RO	Even harmonic distortion ratio of C-phase (Uca) voltage	1

40318	RO	Even harmonic distortion ratio of current Ia	1
40319	RO	Even harmonic distortion ratio of current Ib	1
40320	RO	Even harmonic distortion ratio of current Ic	1
40321	RO	Even harmonic distortion ratio of zero-sequence current In	1
40329	RO	The 2nd harmonic ratio of phase A (Uab)voltage	1
40330	RO	The 3rd harmonic ratio of phase A (Uab)voltage	1
40331	RO	The 4th harmonic ratio of phase A (Uab)voltage	1
40332	RO	The 5th harmonic ratio of phase A (Uab)voltage	1
40333	RO	The 6th harmonic ratio of phase A (Uab)voltage	1
40334	RO	The 7th harmonic ratio of phase A (Uab)voltage	1
40335	RO	The 8th harmonic ratio of phase A (Uab)voltage	1
40336	RO	The 9th harmonic ratio of phase A (Uab)voltage	1
40337	RO	The 10th harmonic ratio of phase A (Uab)voltage	1
40338	RO	The 11th harmonic ratio of phase A (Uab)voltage	1
40339	RO	The 12th harmonic ratio of phase A (Uab)voltage	1
40340	RO	The 13th harmonic ratio of phase A (Uab)voltage	1
40341	RO	The 14th harmonic ratio of phase A (Uab)voltage	1
40342	RO	The 15th harmonic ratio of phase A (Uab)voltage	1
40344	RO	The 2nd harmonic ratio of phase B (Ubc)voltage	1
40345	RO	The 3rd harmonic ratio of phase B (Ubc)voltage	1
40346	RO	The 4th harmonic ratio of phase B (Ubc)voltage	1
40347	RO	The 5th harmonic ratio of phase B (Ubc)voltage	1
40348	RO	The 6th harmonic ratio of phase B (Ubc)voltage	1
40349	RO	The 7th harmonic ratio of phase B (Ubc)voltage	1
40350	RO	The 8th harmonic ratio of phase B (Ubc)voltage	1
40351	RO	The 9th harmonic ratio of phase B (Ubc)voltage	1
40352	RO	The 10th harmonic ratio of phase B (Ubc)voltage	1
40353	RO	The 11th harmonic ratio of phase B (Ubc)voltage	1

40354	RO	The 12th harmonic ratio of phase B (Ubc)voltage	1
40355	RO	The 13th harmonic ratio of phase B (Ubc)voltage	1
40356	RO	The 14th harmonic ratio of phase B (Ubc)voltage	1
40357	RO	The 15th harmonic ratio of phase B (Ubc)voltage	1
40359	RO	The 2nd harmonic ratio of phase C(Uca) voltage	1
40360	RO	The 3rd harmonic ratio of phase C(Uca) voltage	1
40361	RO	The 4th harmonic ratio of phase C(Uca) voltage	1
40362	RO	The 5th harmonic ratio of phase C(Uca) voltage	1
40363	RO	The 6th harmonic ratio of phase C(Uca) voltage	1
40364	RO	The 7th harmonic ratio of phase C(Uca) voltage	1
40365	RO	The 8th harmonic ratio of phase C(Uca) voltage	1
40366	RO	The 9th harmonic ratio of phase C(Uca) voltage	1
40367	RO	The 10th harmonic ratio of phase C(Uca) voltage	1
40368	RO	The 11th harmonic ratio of phase C(Uca) voltage	1
40369	RO	The 12th harmonic ratio of phase C(Uca) voltage	1
40370	RO	The 13th harmonic ratio of phase C(Uca) voltage	1
40371	RO	The 14th harmonic ratio of phase C(Uca) voltage	1
40372	RO	The 15th harmonic ratio of phase C(Uca) voltage	1
40374	RO	The 2nd harmonic ratio of current Ia	1
40375	RO	The 3rd harmonic ratio of current Ia	1
40376	RO	The 4th harmonic ratio of current Ia	1
40377	RO	The 5th harmonic ratio of current Ia	1
40378	RO	The 6th harmonic ratio of current Ia	1
40379	RO	The 7th harmonic ratio of current Ia	1
40380	RO	The 8th harmonic ratio of current Ia	1
40381	RO	The 9th harmonic ratio of current Ia	1
40382	RO	The 10th harmonic ratio of current Ia	1
40383	RO	The 11th harmonic ratio of current Ia	1

40384	RO	The 12th harmonic ratio of current Ia	1
40385	RO	The 13th harmonic ratio of current Ia	1
40386	RO	The 14th harmonic ratio of current Ia	1
40387	RO	The 15th harmonic ratio of current Ia	1
40389	RO	The 2nd harmonic ratio of current Ib	1
40390	RO	The 3rd harmonic ratio of current Ib	1
40391	RO	The 4th harmonic ratio of current Ib	1
40392	RO	The 5th harmonic ratio of current Ib	1
40393	RO	The 6th harmonic ratio of current Ib	1
40394	RO	The 7th harmonic ratio of current Ib	1
40395	RO	The 8th harmonic ratio of current Ib	1
40396	RO	The 9th harmonic ratio of current Ib	1
40397	RO	The 10th harmonic ratio of current Ib	1
40398	RO	The 11th harmonic ratio of current Ib	1
40399	RO	The 12th harmonic ratio of current Ib	1
40400	RO	The 13th harmonic ratio of current Ib	1
40401	RO	The 14th harmonic ratio of current Ib	1
40402	RO	The 15th harmonic ratio of current Ib	1
40404	RO	The 2nd harmonic ratio of current Ic	1
40405	RO	The 3rd harmonic ratio of current Ic	1
40406	RO	The 4th harmonic ratio of current Ic	1
40407	RO	The 5th harmonic ratio of current Ic	1
40408	RO	The 6th harmonic ratio of current Ic	1
40409	RO	The 7th harmonic ratio of current Ic	1
40410	RO	The 8th harmonic ratio of current Ic	1
40411	RO	The 9th harmonic ratio of current Ic	1
40412	RO	The 10th harmonic ratio of current Ic	1
40413	RO	The 11th harmonic ratio of current Ic	1

40414	RO	The 12th harmonic ratio of current Ic	1
40415	RO	The 13th harmonic ratio of current Ic	1
40416	RO	The 14th harmonic ratio of current Ic	1
40417	RO	The 15th harmonic ratio of current Ic	1
40419	RO	The 2nd harmonic ratio of zero-sequence current In	1
40420	RO	The 3rd harmonic ratio of zero-sequence current In	1
40421	RO	The 4th harmonic ratio of zero-sequence current In	1
40422	RO	The 5th harmonic ratio of zero-sequence current In	1
40423	RO	The 6th harmonic ratio of zero-sequence current In	1
40424	RO	The 7th harmonic ratio of zero-sequence current In	1
40425	RO	The 8th harmonic ratio of zero-sequence current In	1
40426	RO	The 9th harmonic ratio of zero-sequence current In	1
40427	RO	The 10th harmonic ratio of zero-sequence current In	1
40428	RO	The 11th harmonic ratio of zero-sequence current In	1
40429	RO	The 12th harmonic ratio of zero-sequence current In	1
40430	RO	The 13th harmonic ratio of zero-sequence current In	1
40431	RO	The 14th harmonic ratio of zero-sequence current In	1
40432	RO	The 15th harmonic ratio of zero-sequence current In	1

Note: The above data (Ai) and the actual value of the correspondence between:

Percent harmonic distortion ratio: THD = Ai / 10, Ai is an unsigned integer, unit:%.

Harmonic occupancy: HP = Ai / 10, Ai is an unsigned integer, unit:%.

Remote signaling address table, supports read function of codes 03, 04

Address	Type	Data Definition	Register
40500	RO	Status of digital input	1
40501	RO	The remote signal of electricity limit alarm	2

System parameter address table, supports read function of code 03,04 and set function of code 06,10

Address	Type	Data Definition	Ranges	Defaults	Register	Remarks
40510	RW	The limit value of current	0~600000 meaning 0~6000A	6000A	2	Only supports writes continuously
40512	RW	The return value of current	0~600000 meaning 0~6000A	5000A	2	
40514	RW	Delay time	1~60000,Unit：ms	60000ms	1	
40515	RW	Allow	0x0000(prohibit)；0xCC33H(allow)	0x0000	1	
40516	RW	The limit value of zero current	0~600000 meaning 0~6000A	0A	2	Only supports writes continuously
40518	RW	The return value of zero current	0~600000 meaning 0~6000A	200A	2	
40520	RW	Delay time	1~60000,Unit：ms	60000ms	1	
40521	RW	Allow	0x0000(prohibit)；0xCC33H(allow)	0x0000	1	
40522	RW	The limit value of G	0~600000 meaning 0~6000A	6000A	2	Only supports writes continuously
40524	RW	The return value of G	0~600000 meaning 0~6000A	5000A	2	
40526	RW	G delay time	1~60000,Unit：ms	60000ms	1	
40527	RW	G allow	0x0000(prohibit)；0xCC33H(allow)	0x0000	1	
40528	RW	The limit value of low voltage	0~420000 meaning 0~42000V	0V	2	Only supports writes continuously
40530	RW	The return value of low voltage	0~420000 meaning 0~42000V	50V	2	
40532	RW	Delay time	1~18000 meaning 0.1~1800s	1800s	1	
40533	RW	Allow	0x0000(prohibit)；0xCC33H(allow)	0x0000	1	
40534	RW	The limit value of over voltage	0~420000 meaning 0~42000V	260V	2	Only supports writes continuously
40536	RW	The return value of over voltage	0~420000 meaning 0~42000V	220V	2	
40538	RW	Delay time	1~18000 meaning 0.1~1800s	1800s	1	
40539	RW	Allow	0x0000(prohibit)；0xCC33H(allow)	0x0000	1	
40540	RW	The limit value of low voltage low frequency	0~9999 meaning 0~99.99Hz	45.0Hz	2	Only supports

40542	RW	The return value of low voltage low frequency	0~9999 meaning 0~99.99Hz	46.0Hz	2	writes continuously
40544	RW	Delay time	1~18000 meaning 0.1~1800s	1800s	1	
40545	RW	Allow	0x0000(prohibit); 0xCC33H(allow)	0x0000	1	
40546	RW	The limit value of over voltage low frequency	0~9999 meaning 0~99.99Hz	55.0Hz	2	Only supports writes continuously
40548	RW	The return value of over voltage low frequency	0~9999 meaning 0~99.99Hz	54.0Hz	2	
40550	RW	Delay time	1~18000 meaning 0.1~1800s	1800s	1	
40551	RW	Allow	0x0000(prohibit); 0xCC33H(allow)	0x0000	1	
40552	RW	The limit value of low voltage low power factor	0~1000 meaning 0~1.0	0.5	2	Only supports writes continuously
40554	RW	The return value of low voltage low power factor	0~1000 meaning 0~1.0	0.6	2	
40556	RW	Delay time	1~18000 meaning 0.1~1800s	1800s	1	
40557	RW	Allow	0x0000(prohibit); 0xCC33H(allow)	0x0000	1	
40566	RW	Over current alarm associated	00（RL1）/01/（RL2）/FFFFH（Not associated）	FFFFH	1	Only supports writes continuously
40567	RW	Zero current alarm associated	00（RL1）/01/（RL2）/FFFFH（Not associated）	FFFFH	1	
40568	RW	Grounding alarm associated	00（RL1）/01/（RL2）/FFFFH（Not associated）	FFFFH	1	
40569	RW	Low voltage alarm associated	00（RL1）/01/（RL2）/FFFFH（Not associated）	FFFFH	1	
40570	RW	Over voltage alarm associated	00（RL1）/01/（RL2）/FFFFH（Not associated）	FFFFH	1	Only supports writes

40571	RW	Low frequency alarm association	00（RL1）/01/（RL2）/FFFFH（Not associated）	FFFFH	1	continuously
40572	RW	Over frequency alarm correlation	00（RL1）/01/（RL2）/FFFFH（Not associated）	FFFFH	1	
40573	RW	Low power factor alarm associated	00（RL1）/01/（RL2）/FFFFH（Not associated）	FFFFH	1	

Note 1: The limit value and the return value are primary side set value;

Note 2: Alarm parameter data content

- The limit value,return value and time of current, the limit and return value is 100 times, the time data is expressed as 1 times, the unit is A, A, millisecond respectively.
- The limit value,return value and time of voltage, the limit and return value is 10 times, the time data is expressed as 10 times,, the unit is V, V, second.
- The limit value,return value and time of frequency, the limit and return value is 100 times, the time data is expressed as 10 times, the unit is Hz, Hz, second.
- The limit value,return value of power factor is 1000 times, the time data is expressed as 10 times, unit is second.

Harmonic statistics（16～31thHarmonic occupancy）address table, supports read function of codes 03, 04

Address	Type	Data Definition	Register
40610	RO	The 16th harmonic ratio of phase A (Uab)voltage	1
40611	RO	The 17th harmonic ratio of phase A (Uab)voltage	1
40612	RO	The 18th harmonic ratio of phase A (Uab)voltage	1
40613	RO	The 19th harmonic ratio of phase A (Uab)voltage	1
40614	RO	The 20th harmonic ratio of phase A (Uab)voltage	1
40615	RO	The 21th harmonic ratio of phase A (Uab)voltage	1
40616	RO	The 22th harmonic ratio of phase A (Uab)voltage	1
40617	RO	The 23th harmonic ratio of phase A (Uab)voltage	1
40618	RO	The 24th harmonic ratio of phase A (Uab)voltage	1
40619	RO	The 25th harmonic ratio of phase A (Uab)voltage	1

40620	RO	The 26th harmonic ratio of phase A (Uab)voltage	1
40621	RO	The 27th harmonic ratio of phase A (Uab)voltage	1
40622	RO	The 28th harmonic ratio of phase A (Uab)voltage	1
40623	RO	The 29th harmonic ratio of phase A (Uab)voltage	1
40624	RO	The 20th harmonic ratio of phase A (Uab)voltage	1
40625	RO	The 31th harmonic ratio of phase A (Uab)voltage	1
40630	RO	The 16th harmonic ratio of phase B (Ubc)voltage	1
40631	RO	The 17th harmonic ratio of phase B (Ubc)voltage	1
40632	RO	The 18th harmonic ratio of phase B (Ubc)voltage	1
40633	RO	The 19th harmonic ratio of phase B (Ubc)voltage	1
40634	RO	The 20th harmonic ratio of phase B (Ubc)voltage	1
40635	RO	The 21th harmonic ratio of phase B (Ubc)voltage	1
40636	RO	The 22th harmonic ratio of phase B (Ubc)voltage	1
40637	RO	The 23th harmonic ratio of phase B (Ubc)voltage	1
40638	RO	The 24th harmonic ratio of phase B (Ubc)voltage	1
40639	RO	The 25th harmonic ratio of phase B (Ubc)voltage	1
40640	RO	The 26th harmonic ratio of phase B (Ubc)voltage	1
40641	RO	The 27th harmonic ratio of phase B (Ubc)voltage	1
40642	RO	The 28th harmonic ratio of phase B (Ubc)voltage	1
40643	RO	The 29th harmonic ratio of phase B (Ubc)voltage	1
40644	RO	The 30th harmonic ratio of phase B (Ubc)voltage	1
40645	RO	The 31th harmonic ratio of phase B (Ubc)voltage	1
40650	RO	The 16th harmonic ratio of phase C(Uca) voltage	1
40651	RO	The 17th harmonic ratio of phase C(Uca) voltage	1
40652	RO	The 18th harmonic ratio of phase C(Uca) voltage	1
40653	RO	The 19th harmonic ratio of phase C(Uca) voltage	1
40654	RO	The 20th harmonic ratio of phase C(Uca) voltage	1
40655	RO	The 21th harmonic ratio of phase C(Uca) voltage	1

40656	RO	The 22th harmonic ratio of phase C(Uca) voltage	1
40657	RO	The 23th harmonic ratio of phase C(Uca) voltage	1
40658	RO	The 24th harmonic ratio of phase C(Uca) voltage	1
40659	RO	The 25th harmonic ratio of phase C(Uca) voltage	1
40660	RO	The 26th harmonic ratio of phase C(Uca) voltage	1
40661	RO	The 27th harmonic ratio of phase C(Uca) voltage	1
40662	RO	The 28th harmonic ratio of phase C(Uca) voltage	1
40663	RO	The 29th harmonic ratio of phase C(Uca) voltage	1
40664	RO	The 30th harmonic ratio of phase C(Uca) voltage	1
40665	RO	The 31th harmonic ratio of phase C(Uca) voltage	1
40670	RO	The 16th harmonic ratio of current Ia	1
40671	RO	The 17th harmonic ratio of current Ia	1
40672	RO	The 18th harmonic ratio of current Ia	1
40673	RO	The 19th harmonic ratio of current Ia	1
40674	RO	The 20th harmonic ratio of current Ia	1
40675	RO	The 21th harmonic ratio of current Ia	1
40676	RO	The 22th harmonic ratio of current Ia	1
40677	RO	The 23th harmonic ratio of current Ia	1
40678	RO	The 24th harmonic ratio of current Ia	1
40679	RO	The 25th harmonic ratio of current Ia	1
40680	RO	The 26th harmonic ratio of current Ia	1
40681	RO	The 27th harmonic ratio of current Ia	1
40682	RO	The 28th harmonic ratio of current Ia	1
40683	RO	The 29th harmonic ratio of current Ia	1
40684	RO	The 30th harmonic ratio of current Ia	1
40685	RO	The 31th harmonic ratio of current Ia	1
40690	RO	The 16th harmonic ratio of current Ib	1
40691	RO	The 17th harmonic ratio of current Ib	1

40692	RO	The 18th harmonic ratio of current Ib	1
40693	RO	The 19th harmonic ratio of current Ib	1
40694	RO	The 20th harmonic ratio of current Ib	1
40695	RO	The 21th harmonic ratio of current Ib	1
40696	RO	The 22th harmonic ratio of current Ib	1
40697	RO	The 23th harmonic ratio of current Ib	1
40698	RO	The 24th harmonic ratio of current Ib	1
40699	RO	The 25th harmonic ratio of current Ib	1
40700	RO	The 26th harmonic ratio of current Ib	1
40701	RO	The 27th harmonic ratio of current Ib	1
40702	RO	The 28th harmonic ratio of current Ib	1
40703	RO	The 29th harmonic ratio of current Ib	1
40704	RO	The 30th harmonic ratio of current Ib	1
40705	RO	The 31th harmonic ratio of current Ib	1
40710	RO	The 16th harmonic ratio of current Ic	1
40711	RO	The 17th harmonic ratio of current Ic	1
40712	RO	The 18th harmonic ratio of current Ic	1
40713	RO	The 19th harmonic ratio of current Ic	1
40714	RO	The 20th harmonic ratio of current Ic	1
40715	RO	The 21th harmonic ratio of current Ic	1
40716	RO	The 22th harmonic ratio of current Ic	1
40717	RO	The 23th harmonic ratio of current Ic	1
40718	RO	The 24th harmonic ratio of current Ic	1
40719	RO	The 25th harmonic ratio of current Ic	1
40720	RO	The 26th harmonic ratio of current Ic	1
40721	RO	The 27th harmonic ratio of current Ic	1
40722	RO	The 28th harmonic ratio of current Ic	1
40723	RO	The 29th harmonic ratio of current Ic	1
40724	RO	The 30th harmonic ratio of current Ic	1

40725	RO	The 31th harmonic ratio of current Ic	1
40730	RO	The 16thharmonic ratio of zero-sequence current In	1
40731	RO	The 17th harmonic ratio of zero-sequence current In	1
40732	RO	The 18th harmonic ratio of zero-sequence current In	1
40733	RO	The 19th harmonic ratio of zero-sequence current In	1
40734	RO	The 20th harmonic ratio of zero-sequence current In	1
40735	RO	The 21th harmonic ratio of zero-sequence current In	1
40736	RO	The 22th harmonic ratio of zero-sequence current In	1
40737	RO	The 23th harmonic ratio of zero-sequence current In	1
40738	RO	The 24th harmonic ratio of zero-sequence current In	1
40739	RO	The 25th harmonic ratio of zero-sequence current In	1
40740	RO	The 26th harmonic ratio of zero-sequence current In	1
40741	RO	The 27th harmonic ratio of zero-sequence current In	1
40742	RO	The 28th harmonic ratio of zero-sequence current In	1
40743	RO	The 29th harmonic ratio of zero-sequence current In	1
40744	RO	The 30th harmonic ratio of zero-sequence current In	1
40745	RO	The 31th harmonic ratio of zero-sequence current In	1

Note: The above correspondence between the data (Ai) and the actual value is:

Harmonic occupancy: HP = Ai / 10, Ai is an unsigned integer, unit:%.

Voltage, current quality address table,support reads function of codes 03, 04

Address	Type	Data Definition	Register
40760	RO	Unbalanced degree of Voltage	1
40761	RO	Unbalanced degree of Current	1

Note: The above correspondence between the data (Ai) and the actual value is:

Unbalanced degree: Ai / 10, Ai = unsigned integer, unit:%.

Demand Statistics Address table, supports read function of codes 03, 04

Address	Type	Data definition	Register
40770	RO	The maximum demand of forward total active power	2
40772	RO	The maximum demand of reverse total active power	2
40774	RO	The maximum demand of forward total reactive power	2
40776	RO	The maximum demand of reverse total reactive power	2
40800	RO	Maximum demand occurrence time of the forward total active power	3
40803	RO	Maximum demand occurrence time of the reverse total active power	3
40806	RO	Maximum demand occurrence time of the forward total reactive power	3
40809	RO	Maximum demand occurrence time of the reverse total reactive power	3

Note: The above correspondence between the data (Ai) and the actual value is:

Active power maximum demand: P = Ai / 10, Ai as an unsigned integer, unit:W.

Reactive power maximum demand: Q = Ai / 10, Ai as an unsigned integer, unit:var.

Electric parameter statistics address table, supports read function of codes 03, 04

Address	Type	Data definition	Register
41000	RO	Maximum value of line voltage Uab	1
41001	RO	Maximum value of line voltage Ubc	1
41002	RO	Maximum value of line voltage Uca	1
41003	RO	Maximum value of phase voltage Uan	1
41004	RO	Maximum value of phase voltage Ubn	1
41005	RO	Maximum value of phase voltage Ucn	1
41006	RO	Maximum value of current Ia	1
41007	RO	Maximum value of current Ib	1
41008	RO	Maximum value of current Ic	1

41009	RO	Maximum value of current In	1
41010	RO	Maximum value of total frequency（F）	1
41011	RO	Maximum value of total power factor（PF）	1
41012	RO	Maximum value of A-phase power factor（PFa）	1
41013	RO	Maximum value of B-phase power factor（PFb）	1
41014	RO	Maximum value of C-phase power factor（PFc）	1
41015	RO	Maximum value of A-phase active power（Wa）	1
41016	RO	Maximum value of A-phase reactive power（Qa）	1
41017	RO	Maximum value of A-phase apparent power（Sa）	1
41018	RO	Maximum value of B-phase active power（Wb）	1
41019	RO	Maximum value of B-phase reactive power（Qb）	1
41020	RO	Maximum value of B-phase apparent power（Sb）	1
41021	RO	Maximum value of C-phase active power（Wc）	1
41022	RO	Maximum value of C-phase reactive power（Qc）	1
41023	RO	Maximum value of C-phase apparent power（Sc）	1
41024	RO	Maximum value of total active power（W）	1
41025	RO	Maximum value of total reactive power（Q）	1
41026	RO	Maximum value of total apparen power（S）	1
41030	RO	Minimum value of line voltage Uab	1
41031	RO	Minimum value of line voltage Ubc	1
41032	RO	Minimum value of line voltage Uca	1
41033	RO	Minimum value of phase voltage Uan	1
41034	RO	Minimum value of phase voltage Ubn	1
41035	RO	Minimum value of phase voltage Ucn	1
41036	RO	Minimum value of current Ia	1
41037	RO	Minimum value of current Ib	1
41038	RO	Minimum value of current Ic	1
41039	RO	Minimum value of current In	1
41040	RO	Minimum value of total frequency（F）	1

41041	RO	Minimum value of total power factor（PF）	1
41042	RO	Minimum value of A-phase power factor（PFa）	1
41043	RO	Minimum value of B-phase power factor（PFb）	1
41044	RO	Minimum value of C-phase power factor（PFc）	1
41045	RO	Minimum value of A-phase active power（Wa）	1
41046	RO	Minimum value of A-phase reactive power（Qa）	1
41047	RO	Minimum value of A-phase apparent power（Sa）	1
41048	RO	Minimum value of B-phase active power（Wb）	1
41049	RO	Minimum value of B-phase reactive power（Qb）	1
41050	RO	Minimum value of B-phase apparent power（Sb）	1
41051	RO	Minimum value of C-phase active power（Wc）	1
41052	RO	Minimum value of C-phase reactive power（Qc）	1
41053	RO	Minimum value of C-phase apparent power（Sc）	1
41054	RO	Minimum value of total active power（W）	1
41055	RO	Minimum value of total reactive power（Q）	1
41056	RO	Minimum value of total apparent power（S）	1
41060	RO	Maximum value occurrence time of line voltage （Uab）	3
41063	RO	Maximum value occurrence time of line voltage （Ubc）	3
41066	RO	Maximum value occurrence time of line voltage （Uca）	3
41069	RO	Maximum value occurrence time of phase voltage（Uan）	3
41072	RO	Maximum value occurrence time of phase voltage （Ubn）	3
41075	RO	Maximum value occurrence time of phase voltage （Ucn）	3
41078	RO	Maximum value occurrence time of current Ia	3
41081	RO	Maximum value occurrence time of current Ib	3
41084	RO	Maximum value occurrence time of current Ic	3
41087	RO	Maximum value occurrence time of current In	3
41090	RO	Maximum value occurrence time of total frequency（F）	3
41093	RO	Maximum value occurrence time of total power factor（PF）	3
41096	RO	Maximum value occurrence time of phase A power factor	3

		（PFa）	
41099	RO	Maximum value occurrence time of phase B power factor（PFa）	3
41102	RO	Maximum value occurrence time of phase C power factor（PFa）	3
41105	RO	Maximum value occurrence time of phase A active power（Wa）	3
41108	RO	Maximum value occurrence time of phase A reactive power（Qa）	3
41111	RO	Maximum value occurrence time of phase A apparent power（Sa）	3
41114	RO	Maximum value occurrence time of phase B active power（Wb）	3
41117	RO	Maximum value occurrence time of phase B reactive power（Qb）	3
41120	RO	Maximum value occurrence time of phase B apparent power（Sb）	3
41123	RO	Maximum value occurrence time of phase C active power（Wc）	3
41126	RO	Maximum value occurrence time of phase C reactive power（Qc）	3
41129	RO	Maximum value occurrence time of the phase C apparent power （Sc）	3
41132	RO	Maximum value occurrence time of total active power（W）	3
41135	RO	Maximum value occurrence time of total reactive power（Q）	3
41138	RO	Maximum value occurrence time of total apparent power（S）	3
41150	RO	Minimum value occurrence time of line voltage （Uab）	3
41153	RO	Minimum value occurrence time of line voltage （Ubc）	3
41156	RO	Minimum value occurrence time of line voltage （Uca）	3
41159	RO	Minimum value occurrence time of phase voltage（Uan）	3
41162	RO	Minimum value occurrence time of phase voltage （Ubn）	3
41165	RO	Minimum value occurrence time of phase voltage （Ucn）	3
41168	RO	Minimum value occurrence time of current Ia	3
41171	RO	Minimum value occurrence time of current Ib	3
41174	RO	Minimum value occurrence time of current Ic	3

41177	RO	Minimum value occurrence time of current In	3
41180	RO	Minimum value occurrence time of total frequency（F）	3
41183	RO	Minimum value occurrence time of total power factor（PF）	3
41186	RO	Minimum value occurrence time of phase A power factor（PFa）	3
41189	RO	Minimum value occurrence time of phase B power factor（PFa）	3
41192	RO	Minimum value occurrence time of phase C power factor（PFa）	3
41195	RO	Minimum value occurrence time of phase A active power（Wa）	3
41198	RO	Minimum value occurrence time of phase A reactive power（Qa）	3
41201	RO	Minimum value occurrence time of phase A apparent power（Sa）	3
41204	RO	Minimum value occurrence time of phase B active power（Wb）	3
41207	RO	Minimum value occurrence time of phase B reactive power（Qb）	3
41210	RO	Minimum value occurrence time of phase B apparent power（Sb）	3
41213	RO	Minimum value occurrence time of phase C active power（Wc）	3
41216	RO	Minimum value occurrence time of phase C reactive power（Qc）	3
41219	RO	Minimum value occurrence time of phase C apparent power（Sc）	3
41222	RO	Minimum value occurrence time of total active power（W）	3
41225	RO	Minimum value occurrence time of total reactive power（Q）	3
41228	RO	Minimum value occurrence time of total apparent power（S）	3

Note: The above correspondence between the data (Ai) and the actual value is:

Voltage: U = (Ai / 10) × (PT1 / PT2), Ai is an unsigned integer, unit:V.

Current: I = (Ai / 1000) × (CT1 / CT2), Ai is an unsigned integer, unit:A.

Zero-sequence current: In = (Ai / 1000) × (CT01 / CT02), Ai is an unsigned integer, unit:A.

Active power: P = Ai × (PT1 / PT2) × (CT1 / CT2), Ai signed integers, unit:W.

Reactive power: Q = Ai × (PT1 / PT2) × (CT1 / CT2), Ai signed integers, unit:var.

Apparent power: S = Ai × (PT1 / PT2) × (CT1 / CT2), Ai signed integers, unit:VA.

Power factor: PF = Ai / 1000, Ai signed integers, no unit.

Frequency: F = Ai / 100, Ai as an unsigned integer, unit:Hz.

Voltage and current fundamental value address table, supports read function of codes 03,04

Address	Type	Data definition	Register
41300	RO	Fundamental RMS of phase A voltage	1
41301	RO	Fundamental RMS of phase B voltage	1
41302	RO	Fundamental RMS of phase C voltage	1
41303	RO	Fundamental RMS of current Ia	1
41304	RO	Fundamental RMS of current Ib	1
41305	RO	Fundamental RMS of current Ic	1
41306	RO	Fundamental RMS of zero-sequence current In	1

Note: The above correspondence between the data (Ai) and the actual value is:

Voltage: U = (Ai / 10) × (PT1 / PT2), Ai is an unsigned integer, unit:V.

Current: I = (Ai / 1000) × (CT1 / CT2), Ai is an unsigned integer, unit:A.

Zero-sequence current: In = (Ai / 1000) × (CT01 / CT02), Ai is an unsigned integer, unit:A.

Important electrical parameters quick reading address table, supports reads function of codes 03,04

Address	Type	Data Definition	Register
42000	RO	DI 1	1

42001	RO	DI 2	1
42002	RO	Current Ia	1
42003	RO	Current Ib	1
42004	RO	Current Ic	1
42005	RO	Zero-sequence current In	1
42006	RO	Line voltage Uab	1
42007	RO	Line voltage Ubc	1
42008	RO	Line voltage Uca	1
42009	RO	Phase voltage Uan (valid in 3-phase,4-wire system)	1
42010	RO	Phase voltage Ubn (valid in 3-phase,4-wire system)	1
42011	RO	Phase voltage Ucn (valid in 3-phase,4-wire system)	1
42012	RO	Frequency（F）	1
42013	RO	Total active Power（W）	1
42014	RO	Total reactive power（Q）	1
42015	RO	Total apparent power（S）	1
42016	RO	Total power factor（PF）	1
42017	RO	Total active energy（Ep）	2
42019	RO	Total reactive energy（Eq）	2
42021	RO	Retention	2
42023	RO	Retention	2

Note 1: In the 3-phase 3-wire system, the data in 42009～40011 are invalid and value is 0.

Note 2: The correspondence between the above data (Ai) and the actual value is:

Voltage: U = (Ai / 10) × (PT1 / PT2), Ai is an unsigned integer, unit:V.

Current: I = (Ai / 1000) × (CT1 / CT2), Ai is an unsigned integer, unit:A.

Zero-sequence current: In = (Ai / 1000) × (CT01 / CT02), Ai is an unsigned integer, unit:A.

Active power: P = Ai × (PT1 / PT2) × (CT1 / CT2), Ai signed integers, unit:W.

Reactive power: Q = Ai × (PT1 / PT2) × (CT1 / CT2), Ai signed integers, unit:var.

Apparent power: S = Ai × (PT1 / PT2) × (CT1 / CT2), Ai is an unsigned integer, unit:VA.

Power factor: PF = Ai / 1000, Ai signed integers, no unit.

Frequency: F = Ai / 100, Ai as an unsigned integer, unit:Hz.

Active energy: Ep = Ai / 10, Ai unsigned long integer (0 ~ 999,999,999), unit:kWh.

Reactive energy: Eq = Ai / 10, Ai unsigned long integer (0 ~ 999,999,999), unit:kvarh.

Temperature address table, Suppors read function of codes 03, 04

Address	Type	Data Definition	Register
48000	RO	Temperature	1

Note: The above correspondence between the data (Ai) and the actual value is:

Temperature: T = (Ai / 10), Ai is an unsigned integer, unit: ℃.

4.3. Explanation of register address

- Hardware version register (40010): stored in the program memory.
- Software version register (40011): stored in the program memory.
- Year of production (40012): Specially download to E2p after production inspection.
- Serial number of production (40013 ~ 40015): pecially download to E2p after production inspection.
- System time - register for year and month (40020): high bytes denote year, from 00 to 99, low bytes denote month, from 1 to12.
- System time - register for day and hour (40021): high byte denotes day, from 1 to 31; low byte denotes hour, from 0 to 23.
- System time - register for minute and second (40022): high byte denotes minute, from 00 to 59; low byte denotes second, from 00 to 59.

- System time - millisecond register (40023): from 0 to 999.
- Communication address (40030): from 1 to 254, 0 and 255 are reserved as broadcast address. The default is 254.
- Communication baud rate (BAUD) (40032): 1 ~ 5 respectively baud rate, as follows:

Baud rate code	Explanation
1	1200 bps
2	2400 bps
3	4800 bps
4	9600 bps
5	19200 bps

- Check mode (PARITY) (40034): 0 to 3, representing the check mode, the following table:

Check mode Code	Explanation
0	No parity check, 2 end bits
1	Odd check, 1end bit
2	Even check, 1 end bit
3	No parity check, 1 end bit

- Sub-station status register (40050):

Address	Definitions	Default value	Remark
Bit0	DI change sign	0（None）	Cleared after DI inquiry
Bit1	Existence sign of hard-SOE	0（None）	Cleared after all communication SOE inquiry
Bit2	Protection action sign	0（None）	Cleared after communication inquiry or reset action
Bit3	Sign of checking time	1（Time was not ticked when power-on）	Cleared after remote time tick
Bit4	Existence sign of soft-SOE	0（None）	Cleared after all communication SOE inquiry
Bit5	Retention	0	
Bit6	Retention	0	

Bit7	Retention	0	
Bit8	Retention	0	
Bit9	Retention	0	
Bit10	Retention	0	
Bit11	Retention	0	
Bit12	Retention	0	
Bit13	Retention	0	
Bit14	Retention	0	
Bit15	Retention	0	

- Sub-station setting register (40055):

Address	Definitions	Default value
Bit0	Clear hard-SOE	0
Bit1	Limit alarm reset	0
Bit2	Clear all the energy	0
Bit3	Clear soft-SOE	0
Bit4	Retention	0
Bit5	Retention	0
Bit6	Retention	0
Bit7	Retention	0
Bit8	Freeze all the energy	0
Bit9	Unfreeze all the energy	0
Bit10	Retention	0
Bit11	Clear the demand	0
Bit12	Retention	0
Bit13	Retention	0
Bit14	MAX/MIN value reset	0
Bit15	Forced reset	0

Note: It needn't to return messages when broadcast freeze or unfreeze. After sending the freeze command by the upper computer, all of the reading energy values are equal to the electric accumulated value of the frozen

moment, but the internal measurement of energy value continues to accumulate. If you want to refresh the reading total value of energy, the upper computer must sending the unfreeze command.This facilitates the user's unified meter reading

- energy freeze and unfreeze status register (40060):

  The high byte is 00, BIT1 of low byte denote energy freeze and unfreeze status, other bits are inefficient.

  1 denotes freeze and 0 denotes unfreeze.

- System frequency selection (40062):

  5000 represents the system default frequency is 50Hz, 6000 represents the default frequency is 60Hz.

- Direction of CT wiring (40067,40068):

  High byte of 40067 is the direction of A-phase CT wiring; Low byte of 40067 is the direction of B-phase CT wiring. High byte of 40068 is the direction of C-phase CT wiring. 0x00 denotes forward direction, 0xFF denotes opposite direction.

- Telemetry wiring (40070): 1 to 5 show specific wiring in the following table:

Wiring Code	Explanation
1	3-phase 4-wire 3CT (3P4W / 3PT + 3CT)
2	3-phase 4-wire 1CT (3P4W / 3PT + 1CT)
3	3-phase 3-wire 3CT (3P3W / 3PT + 3CT)
4	3-phase 3-wire 2CT (3P3W / 3PT (or 2PT) + 2CT)
5	3-phase 3-wire 1CT (3P4W / 3PT + 1CT)

- Outputs function settings (40081): 1 ~ 2 respectively denote two relay outputs in the following table:

Relay outputs codes	Explanation
1	Pulse Output
2	Normally holding output

- The time of back-light (40090): 0 to 30 minutes, where 0 represents constant light.
- Association electricity parameter range of transmission output (40085):

used to set the range of corresponding related energy.

- Association transmission output type (40086):

BIT15 represents unidirectional/Bidirectional, 0 represents unidirectional, 1 represents bidirectional.

BIT14 ~ BIT0 represents the association type of transmission output, See the specific table below.

Only when the association type is active power, reactive power, power factor, or frequency, the direction can be set to Bidirectional. 4mA represents 0 and 20mA represents full scale when set to unidirectional. When set to Bidirectional, 4mA represents the reverse range, 20mA represents the forward range.

Example 1: When the range is set to 1.000kW, if set to unidirectional, the output of 4mA represents 0kW, the output of 20mA represents 1.000kW, the output of 12mA represents 0.500kW; if set to bidirectional, the output of 4mA represents -1.000kW, 20mA represents 1.000 kW, 12mA represents 0kW.

Example 2: If the frequency F is set to Bidirectional, real-scale range is 50Hz ± range, and 12mA represents 50Hz

Related type is used to select energy which is related to transmission output:

Association Type	Description	Remark	Association Type	Description	Remark
1	Related Uab	Unidirectional	16	Related P	Unidirectional / Bidirectional
2	Related Ubc	Unidirectional	17	Related Q	Unidirectional / Bidirectional
3	Related Uca	Unidirectional	18	Related S	Unidirectional
4	Related average of line voltage	Unidirectional	19	Related PFa	Unidirectional / Bidirectional
5	Related Uan	Unidirectional	20	Related PFb	Unidirectional / Bidirectional
6	Related Ubn	Unidirectional	21	Related PFc	Unidirectional / Bidirectional
7	Related Ucn	Unidirectional	22	Related Pa	Unidirectional / Bidirectional
8	Related average of phase voltage	Unidirectional	23	Related Pb	Unidirectional / Bidirectional

9	Related Ia	Unidirectional	24	Related Pc	Unidirectional / Bidirectional
10	Related Ib	Unidirectional	25	Related Qa	Unidirectional / Bidirectional
11	Related Ic	Unidirectional	26	Related Qb	Unidirectional / Bidirectional
12	Related average of current	Unidirectional	27	Related Qc	Unidirectional / Bidirectional
13	Related In	Unidirectional	28	Related Sa	Unidirectional
14	Related F	Unidirectional / Bidirectional，When the Bidirectional, indicates the range 50Hz ±	29	Related Sb	Unidirectional
15	Related PF	Unidirectional / Bidirectional	30	Related Sc	Unidirectional

- Time-partition accounting settings（40092～40097）: The registers are used to set 4 rates, 48 time-periods; stepper is 0.5 hours.

The time-Period (stepper) rate is represented by 2 bits:

Bit1/bit0	00	01	10	11
Rates	Sharp	Peak	Shoulder	Off-peak

Registers 40092 ~ 40097 denote 48 time-periods(stepper):

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
40092	time-period 4		time-period 3		time-period 2		time-period 1		time-period 8		time-period 7		time-period 6		time-period 5	
40093	time-period 12		time-period 11		time-period 10		time-period 9		time-period 16		time-period 15		time-period 14		time-period 13	
40094	time-period 20		time-period 19		time-period 18		time-period 17		time-period 24		time-period 23		time-period 22		time-period 21	
40095	time-period 28		time-period 27		time-period 26		time-period 25		time-period 32		time-period 31		time-period 30		time-period 29	
40096	time-period 36		time-period 35		time-period 34		time-period 33		time-period 40		time-period 39		time-period 38		time-period 37	
40097	time-period 44		time-period 43		time-period 42		time-period 41		time-period 48		time-period 47		time-period 46		time-period 45	

Note: Stepper is 0.5 hours, “1 time-period” denotes 00:00 ～ 00:30, “2 time-period” denotes 00:30～01:00, “47 time-period” denotes 23:00～23:30,

"48 time-period" denotes 23:30～00:00.

- 4 digital input（40500）: Status of digital input, bit0~bit3 of low byte denote 1~4 digital input respectively, the other bits are zero filled.

Bit site	7	6	5	4	3	2	1	0
High bits(zero–filled)	0	0	0	0	0	0	0	0
Low bits	0	0	0	0	DI4	DI3	DI2	DI1

- Remote Protection (40501 ~ 40502): Read the alarm status of the line. The data is explained as follows:

Bit site	7	6	5	4	3	2	1	0
40501 high byte	0	0	0	0	0	0	0	0
40501 low byte	Low power factor of phase A	Low frequency of phase A	Over frequency of phase A	low voltage of phase A	Over voltage of phase A	Over current of phase A	The zero current of phase A	Over ground current
40502 high byte	Low power factor of phase B	Retain	Retain	Low voltage of phase B	Over voltage of phase B	Over current of phase B	The zero current of phase B	Retain
40502 low byte	Low power factor of phase C	Retain	Retain	Low voltage of phase C	Over voltage of phase C	Over current of phase C	The zero current of phase C	Retain

- Register of demand occurrence time——Register 40800,40801 and 40802:

  The high bits of register 40800 denote year, range: 0～99;

  The low bits of register 40800 denote month，range: 1～12；

  The high bits of register 40801 denote day, range: 1～31；

  The low bits of register 40801 denote hour，range: 0～23；

  The high bits of register 40802 denote minute，range: 0～59；

The low bits of register 40802 denote second，range: 0～59.

- Register of electric parameters MAX/MIN value occurrence time——Register 41060,41061 and 41062:

The high bits of register 41060 denote year, range: 0～99;

The low bits of register 41060 denote month，range: 1～12；

The high bits of register 41061 denote day, range: 1～31；

The low bits of register 41061 denote hour，range: 0～23；

The high bits of register 41062 denote minute，range: 0～59；

The low bits of register 41062 denote second，range: 0～59.

- Register of quick remote signal inquiry - Register 42000:

Bit site	7	6	5	4	3	2	1	0
42000 high byte	0	0	0	0	DI4	DI3	DI2	DI1
42000 low byte	Low power factor of phase A	Low frequency of phase A	Over frequency of phase A	low voltage of phase A	Over voltage of phase A	Over current of phase A	The zero current of phase A	Over ground current alarm
42001high byte	Low power factor of phase B	Retain	Retain	Low voltage of phase B	Over voltage of phase B	Over current of phase B	The zero current of phase B	Retain
42001 low byte	Low power factor of phase C	Retain	Retain	Low voltage of phase C	Over voltage of phase C	Over current of phase C	The zero current of phase C	Retain

4.4. SOE Communication Format Description

The function code of SOE inquiry is 55H and alarm SOE inquiry is 56H which is the extension part of MODBUS RTU protocol. These function codes are used to ask SOE in the nominated address and do not support broadcasting command.

The communication format is as follows:

- **Master query:**

  For example:

Field Name	Example(HEX)
Slave Address	2A
Function	55（56）
CRC16Lo	DE（9E）
CRC16Hi	EF（EE）

- **Sub-station response:**

  The length of the data-structure is 8 bytes:

Information	Year	Month	Day	Time	Minute	Second and high byte of millisecond	Low byte of millisecond

Information byte:

The BIT7 and BIT6 bits denotes the status of remote signal, as shown in the following table:

BIT7	BIT6	Definition
0	0	Remote signal from OFF to ON（0-->1）
1	1	Remote signal from ON to OFF（1-->0）
1	0	The limit alarm (0-->1) caused by this device
0	1	Undefined

BIT0~BIT5 denote the number of remote signal: single 0-31

7	6	5	4	3	2	1	0
Retention	Retention	Retention	Retention	DI4	DI3	DI2	DI1
15	14	13	12	11	10	9	8
Low power factor of phase A	Low frequency of phase A	Over frequency of phase A	low voltage of phase A	Over voltage of phase A	Over current of phase A	The zero current of phase A	Over ground current
23	22	21	20	19	18	17	16
Low power	Retain	Retain	Low voltage of	Over voltage of	Over current of	The zero current of	Retain

factor of phase B			phase B	phase B	phase B	phase B	
31	30	29	28	27	26	25	24
Low power factor of phase C	Retain	Retain	Low voltage of phase C	Over voltage of phase C	Over current of phase C	The zero current of phase C	Retain

Year bytes： Range 00～99 represents（2000～2099year）；

Month bytes： Range 01～12 represents（01～12month）；

Day bytes： Range 01～31 represents（01～31day）；

Hour bytes： Range 00～23 represents（00～23hour）；

Minute bytes： Range 00～59 represents（00～59minute）；

Millisecond high byte & second bytes： BIT7 and BIT6 represent millisecond high, from0 to 3; BIT5~BIT0 represent second, from 0 to 59.

Millisecond low bytes： Range 0～255；(Milliseconds with **millisecond High byte**, Range 0 to 999).

Format for example: (the length of the SOE data structure is 8, Described time is 2002-3-25 10:32:24 300 millisecond. Status of the third remote signal change from ON to OFF.)

Field Name	Example(Hex)
Slave Address	2A
Function	55
Byte Count	09
SOE Status	00
SOE0-Information	C2
SOE0-Year	02
SOE0-Month	03
SOE0-Day	19
SOE0-hour	0A

SOE0-Minute	20
SOE0-Millisecond High byte & second	58
SOE0- Millisecond low byte	2C
CRC16 Lo	B6
CRC16 Hi	F0

The data length is decided by the SOE-number (M) and the SOE-data-structure, the range of M is from 0 to 4. when the number of sub-stations SOE provisions of not less than four, send four SOEs at a time， when the SOE number is less than four, send once. If there is no SOE records, fill 0 in byte-count field.When the sub station has a SOE record, the first byte after the byte count is the state byte of SOE (SOE status), and its lowest bit (BIT0) indicates whether there is a SOE record at the sub station, and when BIT0 is 0, the sub station has no SOE record; the BIT0 is 1, indicating that the sub station has a SOE record, waiting for the main station to query it. The other bits of this byte (BIT1 to BIT7) are reserved.

5. Transportation and storage

When being transported, the product should be packed. Violent vibration and strike must be avoided. The ambient temperature should be between -30℃ and +80℃ and the relative humidity should be less than 95%. There should be no corrosive gas and mildew in the air.

Appendix

A. The default value

No.	Description	Default	Remark
1	COMM: Communication parameter	254，9.6k，0	Communication address is 254；Baud rate is 9600bps；Transmission format: 1 start bit，8 data bits，no parity check，2 end bits
2	SYS:System wiring	1	3P4L 3PT 3CT
3	PT1 primary voltage	220	Unit: V
	PT2 secondary voltage	220	Unit: V
4	CT1 primary current	5000	Unit: A
	CT2 secondary current	5	Unit: A
5	CT0 primary current	5000	Unit: A
	CT0 secondary current	5	Unit: A
6	System Frequency	50	The default frequency is 50Hz
7	CT direction	000	3-phase CT wiring direction are forward
8	Relay output mode	1	Relay output is pulse type
9	The pulse length of relay output	2000	Unit：ms
10	Transmission output Association	9	Association of A phase current (Ia)
	Direction / Bidirectio	0	Direction
	The maximum value of the transmission output association	6.000	6.000 A
11	Time of back-light lighting	5	Unit:minute
12	Parameter statistical interval	10	Unit:minute
13	Is over current alarm allowed	0	Not allowed
	Over current limit value	6.0	Unit：kA
	Over current return value	5.0	Unit：kA
	Delay time of over current alarm	60000	Unit：ms
	Over current associated relay	OFF	Indicates no associated relay
14	Is zero-current alarm allowed	0	Not allowed
	Zero current limit value	0	Unit：A

	zero-current return	200	Unit：A
	Delay time of zero current alarm	60000	Unit：ms
	zero-current associated relay	OFF	Indicates no associated relay
15	Is grounding alarm allowed	0	Not allowed
	Over ground current value	6.0	Unit：kA
	Ground return value	5.0	Unit：kA
	Delay time of grounding alarm	60000	Unit：ms
	Ground associated relay	OFF	Indicates no associated relay
16	Is low voltage alarm allowed	0	Not allowed
	Low voltage limit value	0	Unit：V
	Low voltage return	50	Unit：V
	Delay time of low voltage alarm	1800	Unit：s
	Low-voltage associated relay	OFF	Indicates no associated relay
17	Is over-voltage alarm allowed	0	Not allowed
	Over-voltage limit	260	Unit：V
	Over-voltage return	220	Unit：V
	Delay time of over-voltage alarm	1800	Unit：s
	Over voltage associated relay	OFF	Indicates no associated relay
18	Is low-frequency alarm allowed	0	Not allowed
	Low frequency limit	45	Unit：Hz
	Low frequency return value	46	Unit：Hz
	Delay time of low-frequency alarm	1800	Unit：s
	Low frequency associated relay	OFF	Indicates no associated relay
19	Is over-frequency alarm allowed	0	Not allowed
	Over frequency limit	55	Unit：Hz
	Over frequency return value	54	Unit：Hz
	Delay time of over frequency alarm	1800	Unit：s

	Over frequency associated relay	OFF	Indicates no associated relay
20	Is low power factor alarm allowed	0	Not allowed
	Low power factor limit value	0.5	
	Low power factor return value	0.6	
	Delay time of low power factor alarm	1800	Unit：s
	Low power factor associated relays	OFF	Indicates no associated relay
21	Password	0000	
22	Time-period rate	Each time period is 3	shoulder rate

B. Technical Indicators

- **Standards**

Standard Code	Standard name	Level
GB/T 13729-2002	Remote terminal unit equipment	
GB/T17626.2-2006	Electrostatic discharge immunity test	Level 3
GB/T17626.4-2008	Electrical fast transients immunity test	Level 3
GB/T17626.5-2008	Surge immunity test	Level 3
GB/T 17626.8-2006	Frequency magnetic field immunity test	Level 3
GB/T 17626.12-1998	Oscillation wave immunity test	Level 3

- **Monitor Technical index**

Voltage	Precision: 0.2; Range: 0-42000V
Current	Precision: 0.2; Range: 0-6000A
Power factor	Precision: 0.5; Range: 0≤|COSΦ|≤1
Active power	Precision: 0.5; Range: 0-756000kW
Reactive power	Precision: 0.5; Range: 0-756000kvar
Apparent power	Precision: 0.5; Range: 0-756000kVA
Active energy	Precision：0.5； Range：0～99999999.9 kWh
Reactive energy	Precision：0.5； Range：0～99999999.9 kvar
Frequency	Precision: 0.01 Hz; Range: 45-65Hz
Harmonic precision	Precision: B
Digital input	Resolution ratio: 2ms; debounce time: 60ms
Transmission output	Precision: 0.5

- **Working parameters**

Working power supply:	Range: 85VAC～265VAC/85VDC～265VDC
Power consumption:	<5w
Working environment:	-25℃ ～ +70℃，95% non-condensing
Store temperature:	-30℃ ～ +80℃
Display:	Sectional form LCD, sight: 64mm×55mm
Weight:	400g，Only IM301：330g
Internal protection:	Panel:IP50, shell:IP20
Input characteristics:	Phase voltage rating: 220VAC ,range: 20VAC~264VAC Current rating:5A; range:0.05～6 A Current rating:1A; range:0.01～1.2 A Digital acquisition: passive node optically isolated input (isolation voltage 1500VDC)
Output characteristics:	Relay output: 5A/250VAC（Resistive）or 5A/30VDC（Resistive） Transmission output: 4 ~ 20mA, the load resistance less than 600 ohm, 500VDC isolation voltage
Communication:	Communication interface:RS485 Communication protocol:MODBUS-RTU Communication speed:1200/2400/4800/9600/19200bps
Display refresher rate:	<3s
Support wiring mode:	3-phase 4r-wire system 3CT, 1CT and 3-phase 3-wire 3CT, 2CT, 1CT

C. Order instructions

Product model description:

Features \ Model	IM300-U	IM300-I	IM301	IM302	IM303
Voltage	■		■	■	■
Current		■	■	■	■
System frequency	■		■	■	■
Power Factor			■	■	■
Active / reactive / apparent power			■	■	■
Basic energy			■	■	■
Zero-sequence current		■	■	■	■
Unbalance				■	■
Temperature of the equipment					■
Four-quadrant power				■	■
Maximum demand statistics				■	■
Time rate statistics					■
Limit alarm				■	■
Extremum statistical					■
Harmonic distortion ratio				■	■
Harmonic occupancy				2~15	2~31
Switch	2-ch	2-ch		2-ch	4-ch
2-ch relays				■	■
1-ch transmitter output 4 ~ 20mA DC					■
RS485 communication	■	■	■	■	■
LCD	■	■	■	■	■

According to the different selection of the specific type and function of the IM300 device (see Appendix C. order Instructions), Corresponding functions that do not have

the corresponding interface are not displayed.In the data uploaded by the communication, the corresponding value is invalid for functions that are not available.

Relevant standards (corresponding to nameplate content) to be marked when ordering

- The power supply standard configuration: AC or DC power supply 85VAC/DC ~ 265VAC/DC, 5W;
- The CT rated the standard input: 5AAC, continuous 2 times overload; Optional input: 1AAC, continuous 2 times overload.

CNABB/CNIIB/IM300/201903/REV C

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