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Manual of AMC Series intelligent power collection and monitoring device

Installation and Operation Instruction V3.0

ACREL Co., Ltd.

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1.General

AMC series intelligent power collection and monitoring device is a smart meter designed for power monitoring needs of power systems, industrial and mining enterprises, utilities, and intelligent buildings. It integrates measurement of power parameters (such as single-phase or three-phase current, voltage, and active power). Power, reactive power, apparent power, frequency, power factor) and power monitoring and assessment management. At the same time, it has a variety of peripheral interface functions for users to choose: with RS485 communication interface, MODBUS-RTU protocol can meet the needs of communication network management; 4-20mA analog output can correspond to measured electrical parameters, meet DCS Such interface requirements; with switch input and relay output can realize the function of "remote signal" and "remote control" of circuit breaker switch. High-brightness LED/LCD display interface, parameter setting and control through buttons, ideal for real-time power monitoring systems. Can directly replace conventional power transmitters and measuring instruments. As an intelligent, digital front-end acquisition component, the instrument has been widely used in various control systems, SCADA systems and energy management systems.

2.Type and specification of products

Picture 1

<table>
<tr><th>Meter type</th><th>Basic function</th><th>Optional function</th><th>Co-selection function</th></tr>
<tr><td>AMC72-E4/KC
AMC72L-E4/KC</td><td rowspan="3">Three phase voltage, Zero sequence voltage
Three phase current, Zero sequence current
Three phase active power, Total active power
Three phase reactive power, Total reactive power
Three phase apparent power, Total apparent power
Three phase Power factor, Total power factor
Frequency, Voltage phase angle, Voltage and current imbalance,Forward and reverse power
Four quadrant energy metering,System time display
1 channel RS485 interface / Modbus-RTU protocol and the statute DLT645.</td><td>①2DI+2DO+1Ep(K)
②4DI+2DO(K)
③Event record (SOE)
④T2-31 th and total harmonics measurement (H)
⑤2DI+2DO+1M(KM)</td><td>①③④
②③④
③④⑤</td></tr>
<tr><td>AMC96-E3/KC
AMC96L-E3/KC</td><td rowspan="2">①4DI+2DO+1Ep(K)
②2DI+2DO+1Ep(K)
③Event record (SOE)
④2-31th harmonic measurement (H)
⑤2-channel analog output (M)</td><td rowspan="2">①③④
②③④⑤</td></tr>
<tr><td>AMC96-E4/KC
AMC96L-E4/KC</td></tr>
<tr><td>AMC72-E/KC
AMC72L-E/KC</td><td>single-phase voltage，single-phase current
active power, reactive power, apparent power
Power factor
Frequency
Four quadrant energy metering,System time display
1 channel RS485 interface / Modbus-RTU protocol and the statute DLT645.</td><td>①2DI+2DO+1Ep(K)
②4DI+2DO(K)
③Event record (SOE)
④Total harmonic measurement (H)
⑤2DI+2DO+1M(KM)</td><td>①③④
②③④
③④⑤</td></tr>
</table>

Note:1.DI--Switching input, DO--Switching output, M--Analog output, SOE--Event recording, H--Harmonic measurement, Ep--Electric energy pulse

2.When the digital tube is displayed, the harmonic data is not displayed, and the data is read only by communication.

3.K is a required function，Choose from ①②

4.When Event record (SOE) is selected,Extreme value and maximum demand（D）are available at the same time.

5. The II on the instrument nameplate, representing the second generation product, applies to this specification.

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3. Technical parameters

Picture 2

Technical parameters			Value
Input	Connection		Single phase-2-wire, 3-phase-3-wire, 3-phase-4-wire
	Frequency		45-65Hz
	Voltage		Rating: single-phase :AC 100V、400V Three-phase: AC 3×57.7V/100V(100V)、3×220V/380V(400V)、 3×380V/660V(660V)(96 size only) Note：72 profile not suitable for high voltage applications
			Overload:1.2 fold rating {continuous) : 2 fold rating for 1 second
			Power consumption:< 0.5VA
	Current		Rating: AC IA、5A
			Overload:1.2 fold rating(continuous);10fold rating for 1 second
			Power consumption:< 0.5VA
Output	Electric energy		Output mode:open-collector photo-coupler pulse
			Pulse constant: 10000imp/kWh(settable)，see wiring diagram for details；
	Communication		RS485port, Modbus -RTU protocol,DLT645 protocol(versions 07 and 97)， baud rate 1200 ~ 38400
Function	Switching input		Dry contact input, built-in power supply;
	Switching output		Output mode: Relay normally open contact output
			Contact capacity: AC 250V/3A、 DC 30V/3A
	Analog output		1-5V,4 - 20mA
Accuracy class			Frequency:0.05Hz,Current、Voltage:0.2 class,Reactive power:l .0class,Reactive Electric energy:l .0class, active power:0.5class,active electric energy: 0.5class,2-31th harmonic measurement:±1%
Power supply			AC/DC 85-265V or DC24V（±20%）or DC48V(±20%) power consumption≤10VA
Security	Power frequency withstand voltage		Between Power supply//Switching Output// Current Input//voltage Input and Transmitting// Communication //Pulse Output//switching input AC 2 kV 1min; Between Power supply、switching output、Current Input、voltage Input AC 2 kV 1min; Between Transmitting、Communication、Pulse Output、switching input AC 1kV 1 min;
	Insulation resistance		Input、Output end to machine enclosure >100MΩ
Environment		Temperature	work: -25°C~+65°C storage: -40°C ~+80°C
		Humidity	≤93%RH Non-condensing
		Altitude	≤2500m

Note: The instrument Modbus RTU is compatible with dlt645 and only needs to set the corresponding address. See Chapter 6.3 for details.

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3.Installation wiring instructions

4.1 Outline and mounting cutout size

Picture 3

Outline	faceplate size		housing size			cutout size	
	width	height	width	height	depth	width	height
72 square	75	75	66.5	66.5	94.3	67	67
96 square	96	96	86.5	86.5	77.8	88	88

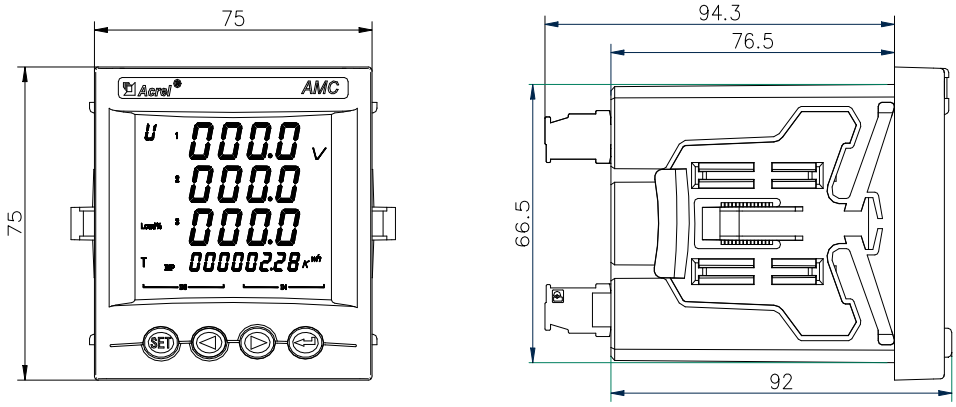


Figure 1 AMC72 appearance size

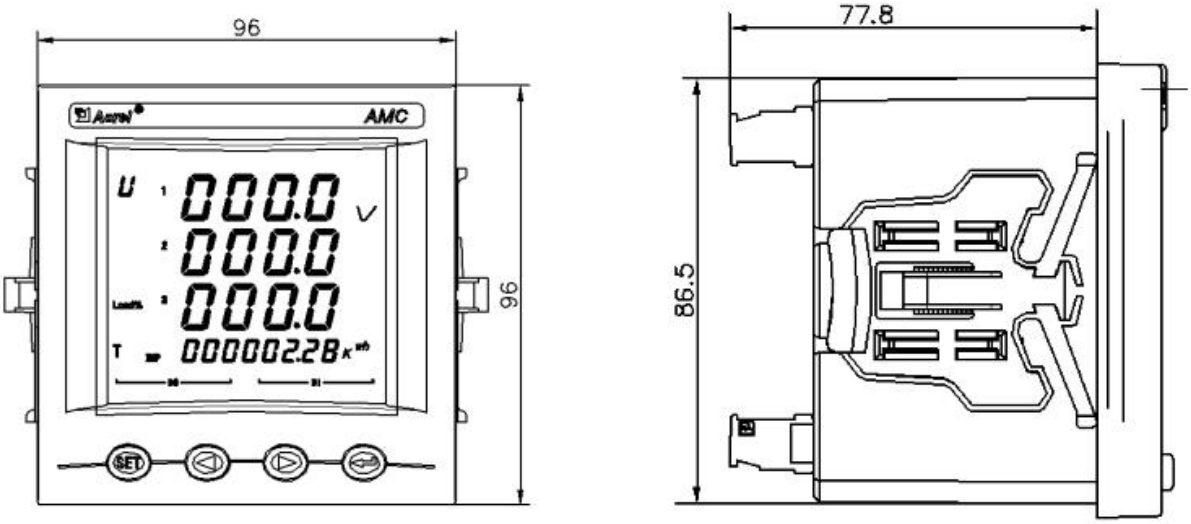


Figure 2 AMC96 appearance size

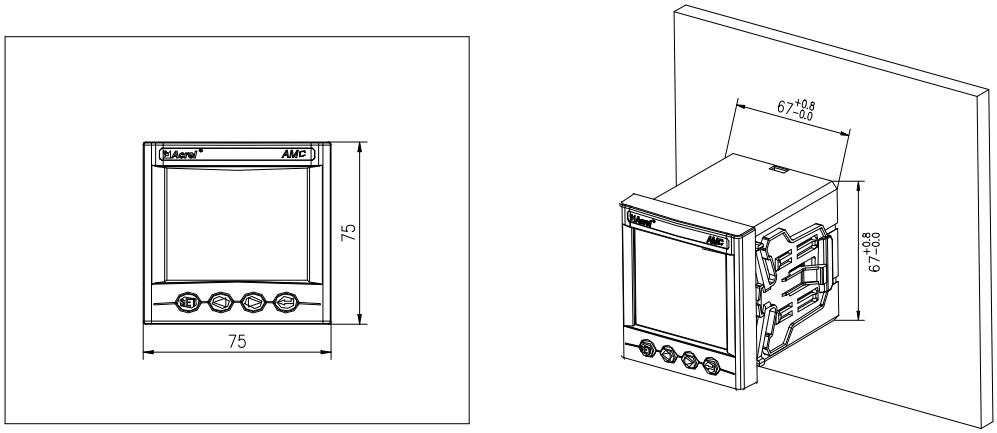


Figure 3 AMC72 installation dimensions

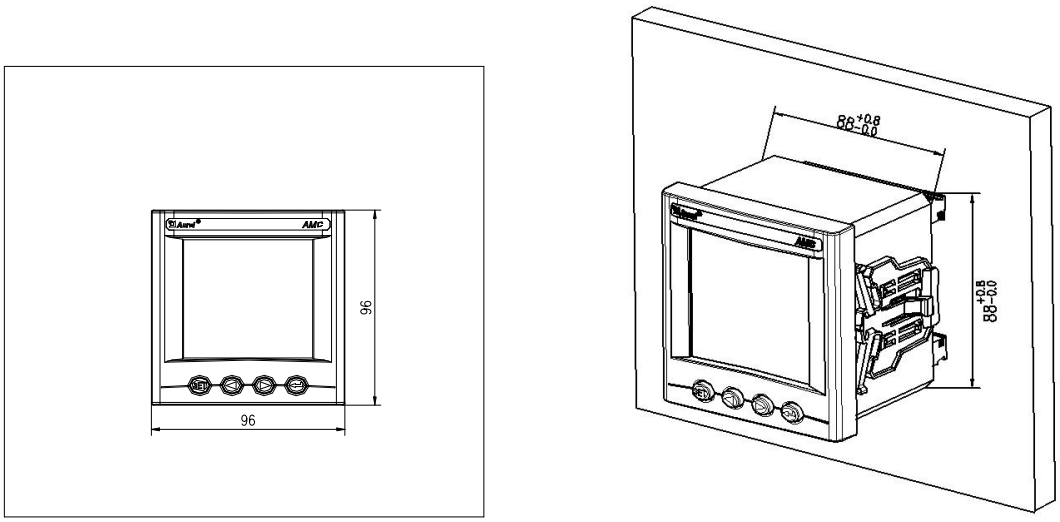


Figure 4 AMC96 installation dimensions

4.2 Installation method

1)Opening in fixed distribution cabinet

2)Take out the instrument and take out the clip

3) The instrument is mounted from the Front to the mounting hole, as shown in figure 5

4) Insert the instrument clasp to secure the instrument, as shown in figure 6

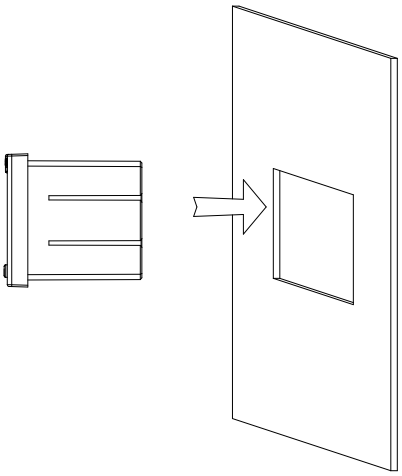


Figure 5

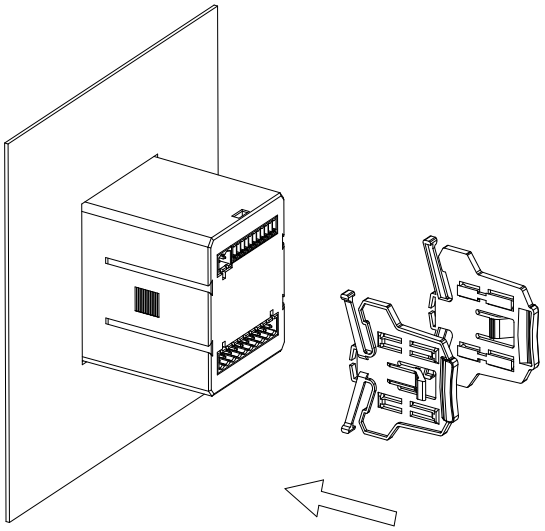


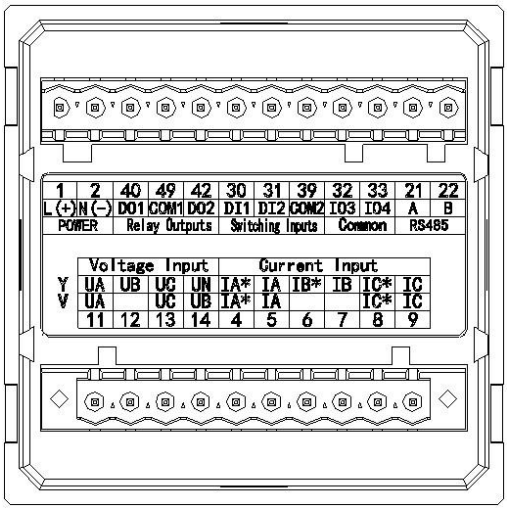
Figure 6

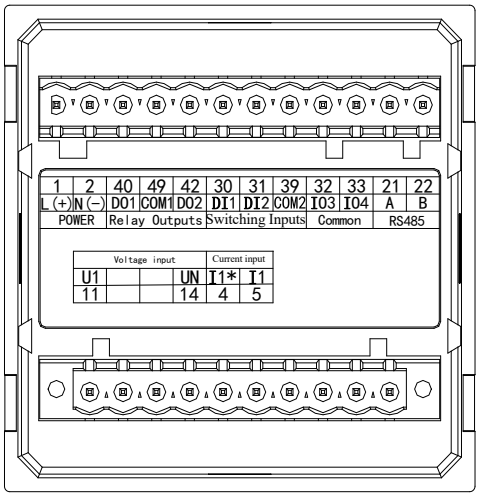
4.3 Wiring method

According to varied design requirements, power and voltage input terminals are recommended with fuse(BS88 1A gG) to meet with the safety performance requirements of prevailing electric codes.

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4.3.1 Instrument terminal block and wiring method





three-phase single-phase

Figure 7 AMC72 series terminal block diagram

Note: Switching input: 32 - DI3, 33 - DI4;

pulse output: 32 - E +, 33 - E-.

Analog output：32-AO，33-COM3.

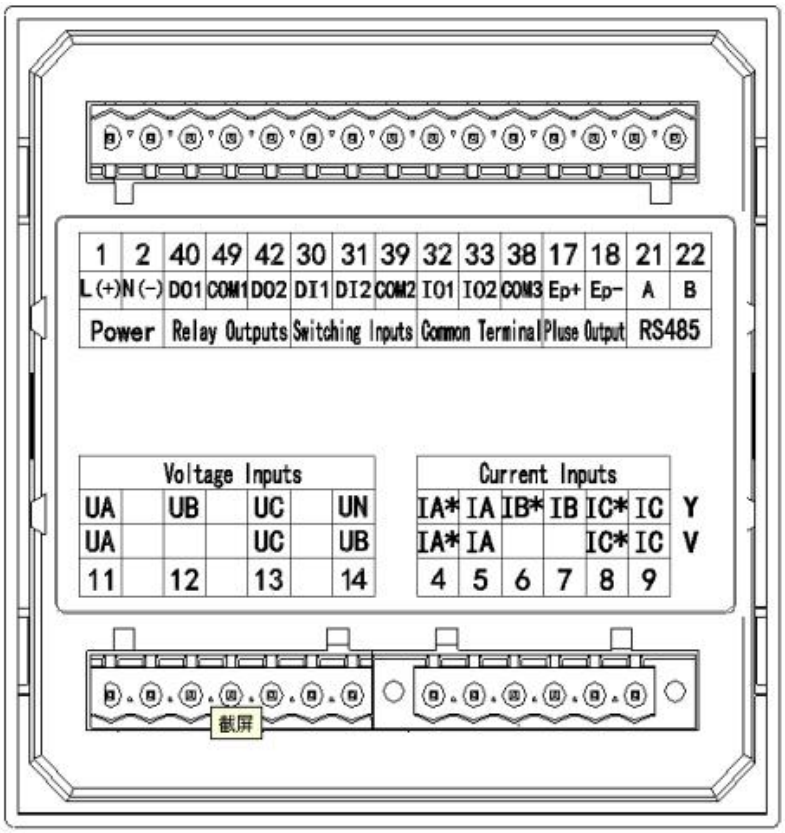


Figure 8 AMC96 series terminal block diagram

Note:

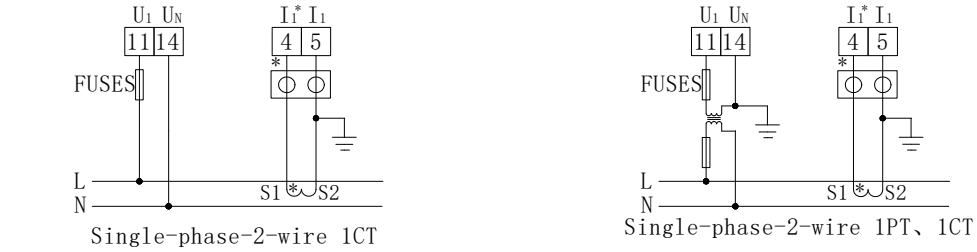
Switching input: 32——DI3, 33——DI4, 38——COM3;

pulse output: 32——AO1,33——AO2,38——COM3.

4.2.2 Instrument signal terminal wiring method

Signal terminal: "4,5,6,7,8,9" is the terminal number of the current input; "11,12,13,14" is the terminal number of the voltage input.

Single-phase:



Three-phase

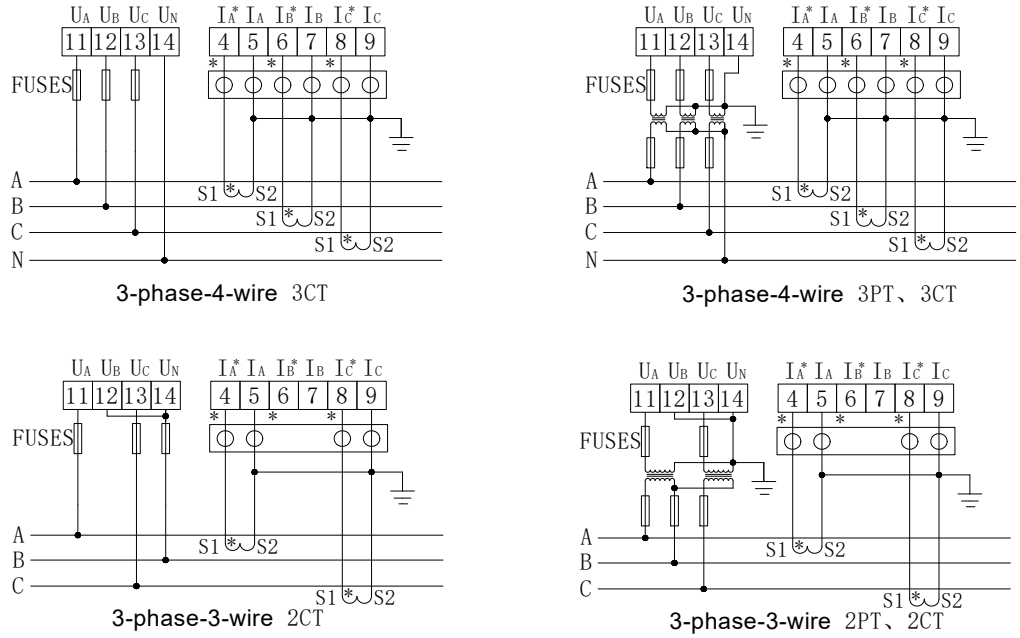


Figure 9 Schematic diagram of instrument signal wiring

Note: ○○○○○○ is the test terminal for short circuit of CT secondary side.

An example of wiring for the communication part is shown below:

Correct wiring method: the communication cable shield is connected to the earth.

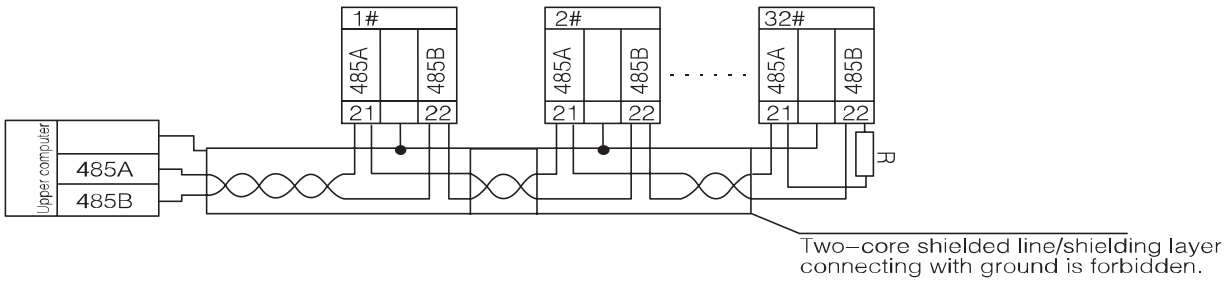


Figure 10 RS485 communication wiring diagram

It is recommended to add a matching resistor between A and B of the end meter, and the resistance range is 120Ω~10 kΩ.

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5. Operating instructions

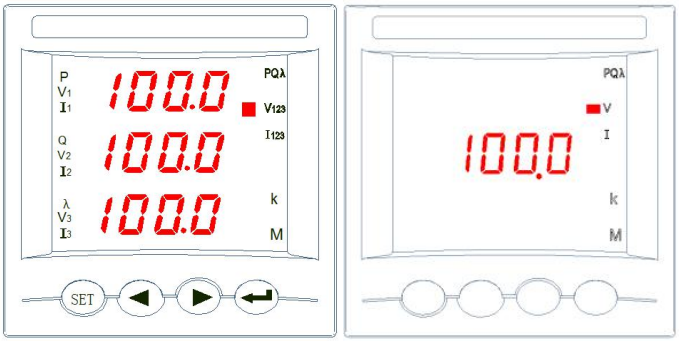


Figure 11 LED front panel

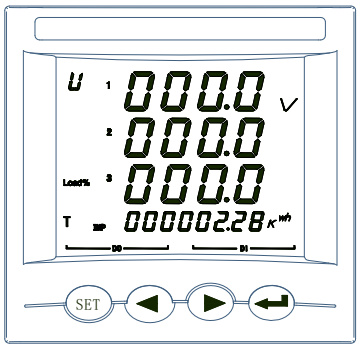


Figure 12 LCD front pane

5.1 Explanation for keypad functionality

Four keys of AMC series intelligent power collection and monitoring device separately indicate SET key, LEFT key, RIGHT key, ENTER key from left to right.

Table 4 key function description

Panel key category	Key Function
SET key (SET)	Under measurement mode, Press This key enter programming mode, meters hint Input password PASS, after Input correct password, set up meters programming; Under programming mode, used for Return to previous menu。
Left key(◀)	Under measurement mode, used for switching Display item; Under programming mode, used for switching same class menu or ones place reduced。
Right key(▶)	Under measurement mode, used for switching Display item; Under programming mode, used for switching same class menu or ones place increase。
ENTER key(↵)	Under measurement mode, when Displaying Electric energy data, press This key can look over time sharing multi-rate Electric energy(if any); Programming mode, used for menu item selection confirm and parameter revision confirm。
Left key+ENTER key(◀+ ↵)	Programming mode, this key combination is used for the reduction of hundreds of digits.
Right key+ENTER key(▶+ ↵)	Programming mode, this key combination is used to increase the hundred digits.

Note: When using the combination key, you can hold down the Left and Right key and then press the Enter key.

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5.2 **Display Example**

5.2.1 The operation steps of checking the current, voltage, power, electric energy and frequency of amc72 / 96 are shown in FIG. 13 and FIG. 14.

AMC72 / 96 three phase watt hour meter:

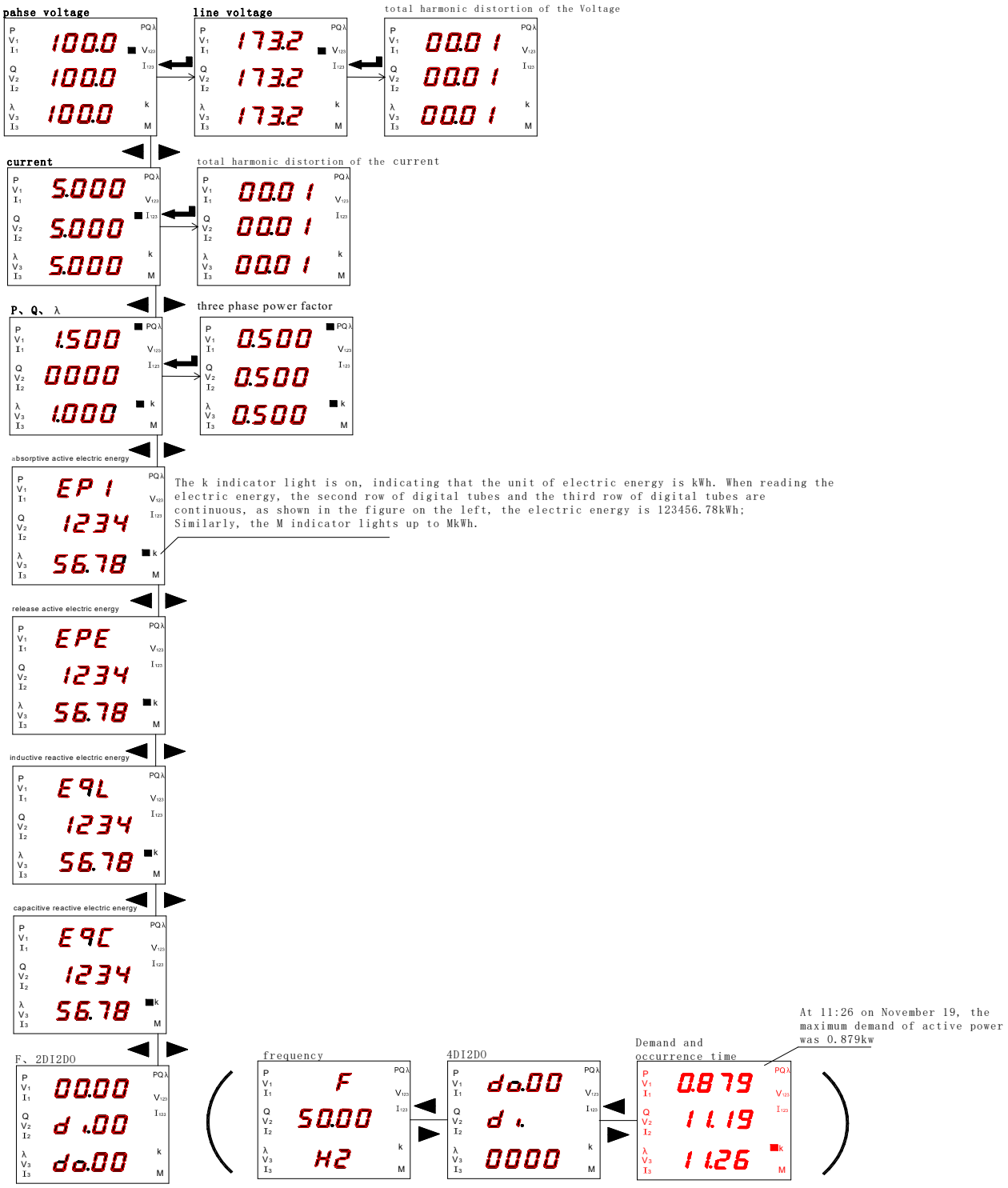


Figure 13

AMC72 single phase watt hour meter:

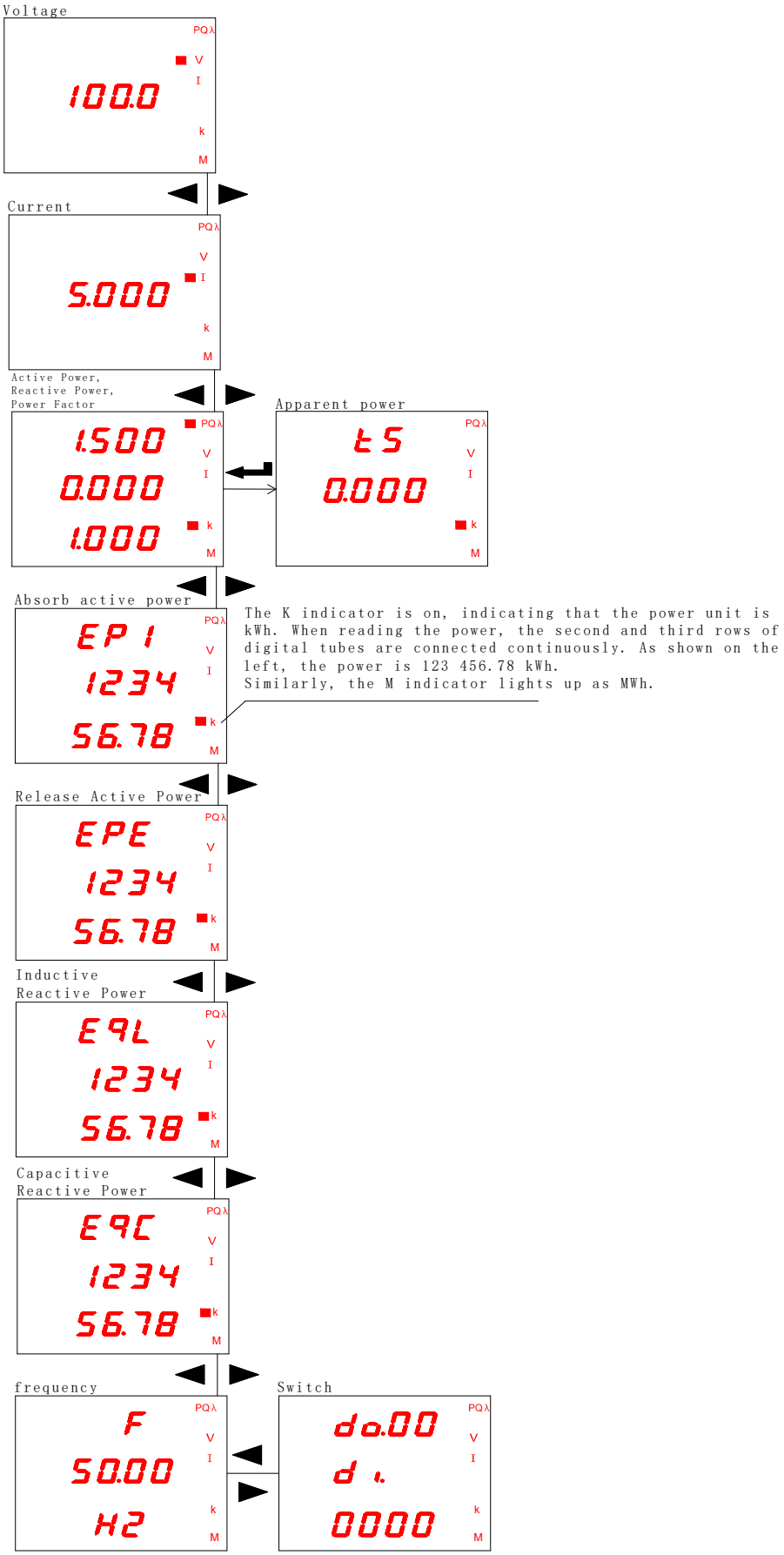


Figure 14

5.2.2 The steps to view the event record of AMC72/96 are shown in Figure 15.

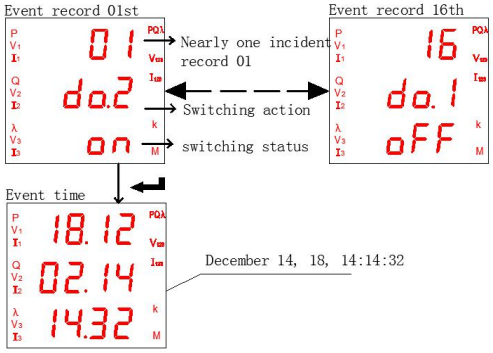


Figure 15

Note: The event record (SOE) can be viewed by pressing the SET key on any interface.

5.2.3 The steps for viewing various types of power parameters of the AMC72L/96L are shown in Figure 16,17.
AMC72L/96L three-phase power meter:

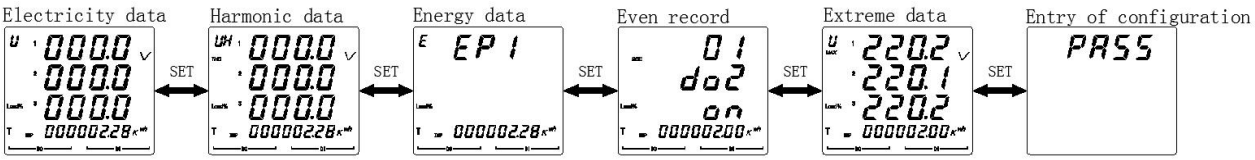


Figure 16

. AMC72L single-phase power:

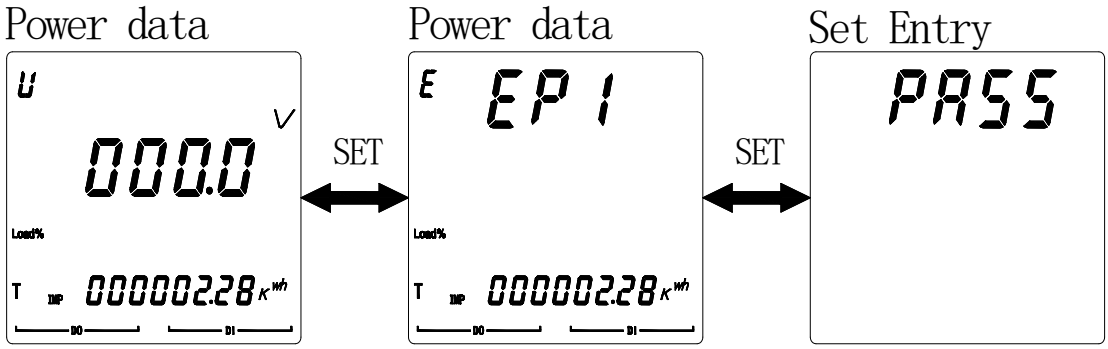


Figure 17

Note: The SET key can be used to switch various types of data,event record (SOE) and extreme value data exist only when SOE function is selected.

5.2.4 View the power parameters of the AMC72L/96L as shown in Figure 18,19.

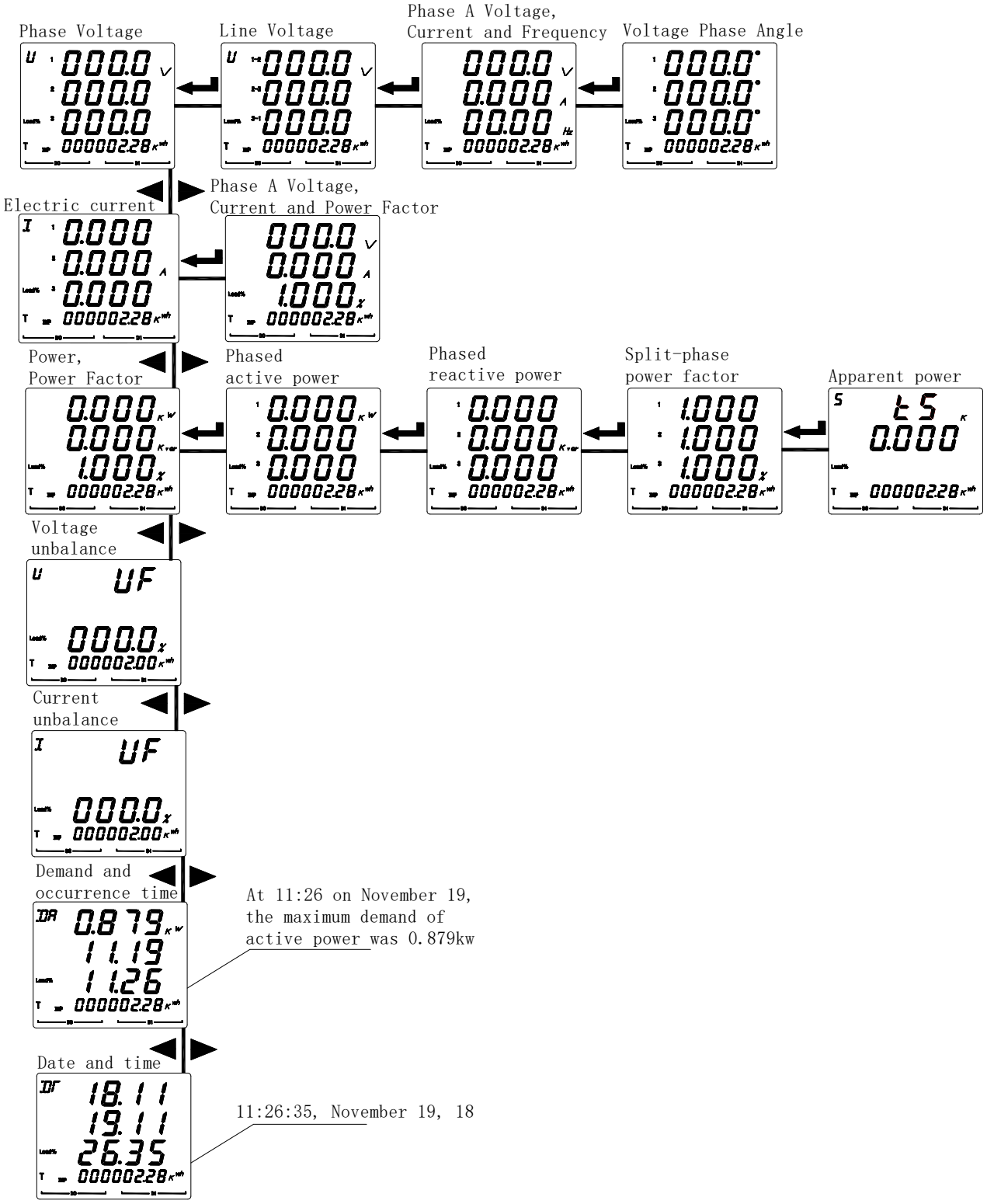


Figure 18

Note: If the meter has an event record (SOE) function, the date and time interface is displayed.

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AMC72l single phase electric energy:

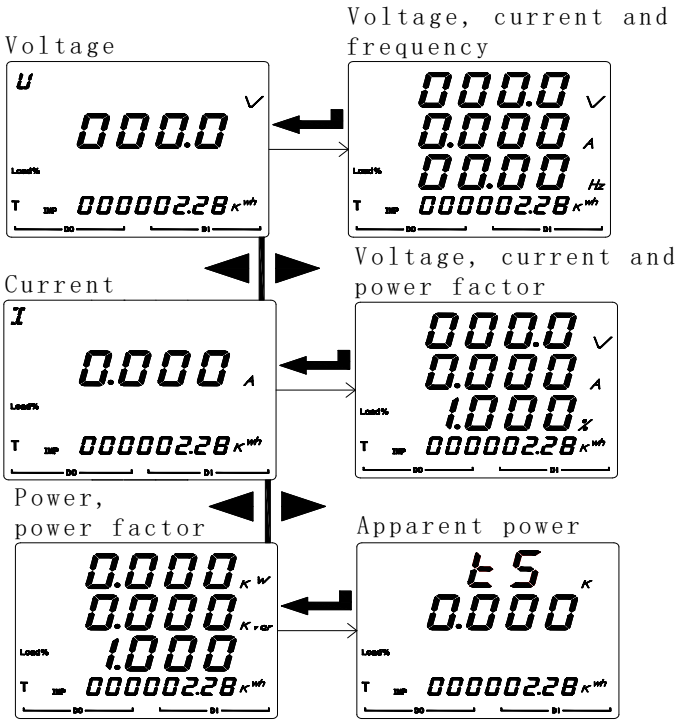


Figure 19

5.2.5 View the harmonic parameters of the AMC72L/96L meter as shown in Figure 20.

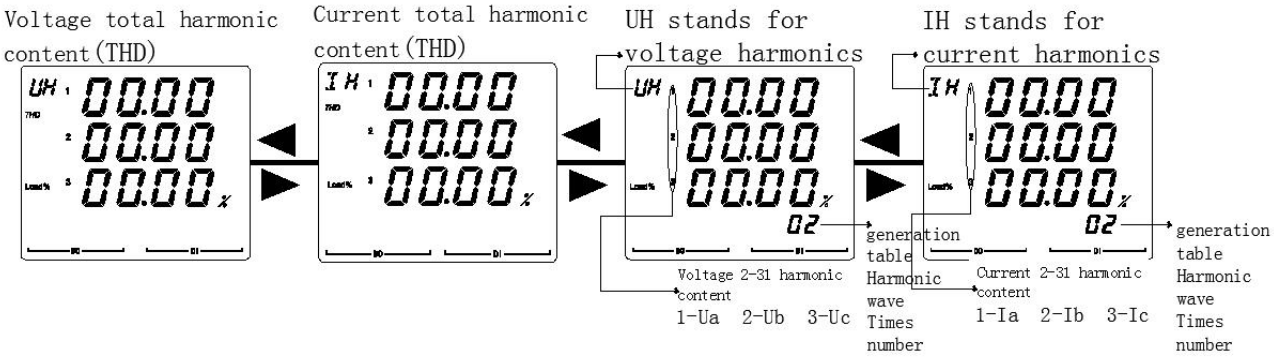


Figure 20.

Note: Only the 96 shape has the function of fractional harmonics; press the left and right buttons to switch the harmonic content of 2-31 times.

5.2.6 View the power parameters of the AMC72L/96L as shown in Figure 21.

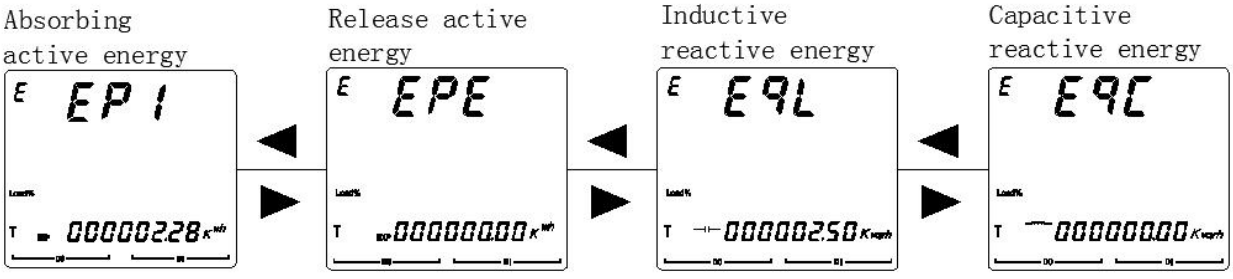


Figure 21

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5.2.7 View the AMC72L/96L event record parameters as shown in Figure 22.

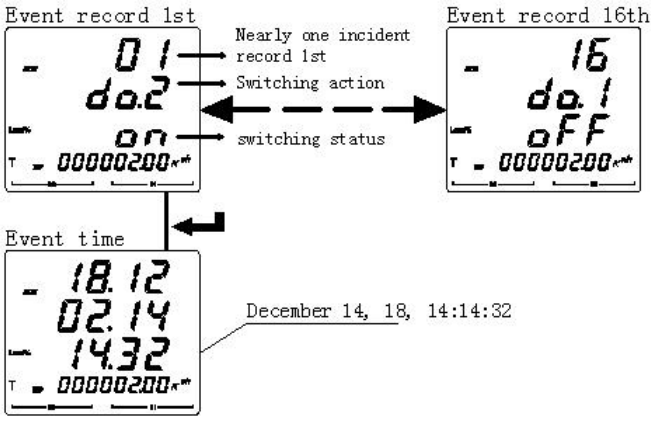


Figure 22

5.2.8 View the extreme value parameters of the AMC72L/96L as shown in Figure 23.

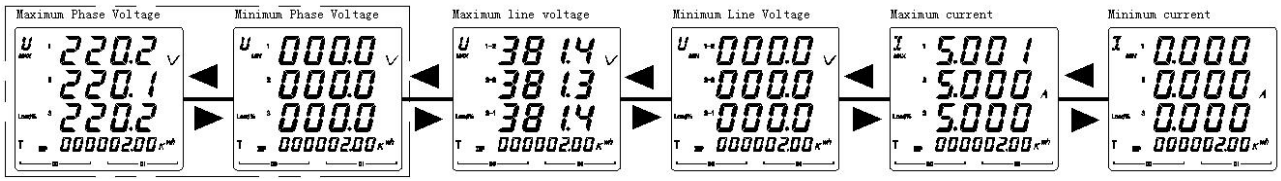


Figure 23

Note: There are no interface voltage maximum value and phase voltage minimum value interface for three-phase three-wire.

5.3 Programming menu

5.3.1 Meter general programming menu

Table 5

First menu	Second menu	Tertiary menu	Description
SYS	dISP		Start-up display selection: 0-automatic page turning; other page numbers correspond to the current meter model power parameter interface.
	CodE	0～9999	Password setting (Initial password 0001)
	CLr.E		Press ENTER key Electric energy clear
	CLr.d		Press Enter key, clear demand record
	CLr.A		Press Enter key, clear demand record
	EP.E9	E1/E2	Primary(EI) or secondary(E2) energy display option,The default is E1.
	PLUS	1.6-160.0	Constant of Energy plus(e.g:10.0-10000imp/kWh)

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	CF	EP/EQ	Active pulse (EP), reactive pulse (EQ) switching, default active pulse
In	LinE	3P3L、3P4L	Connection mode(Three-phase-three-wire Three-phase-four-wire)
	In.U	100V、400V、660V	Input voltage range
	In.I	1A、5A	Input current range
	In.Pt	0～9999	Voltage ratio
	In.Ct	0～9999	Current ratio
bUS	Addr	1～247	Communication address
	bAUd	1200、2400、4800、9600、19200、38400	Communication baud rate
	nodE	None/2bit/odd/even	Communication data mode
	645 Addr	000000000001～999999999999	645 Protocol Communication Address
tr.1-tr.2	SEL	See 5.4.2 for details.	Analog output item selection
	tYPE	4～20mA Or 0～20mA	Output range
	Ao.Hi	-9999～9999	High change value setting
	Ao.Lo	-9999～9999	Low change value setting
do.1-do.2	SEL	See 5.4.3for details.	Alarm item selection
	dLY	0000～9999	Alarm delay or remote control delay
	bAnd	0000～9999	Hysteresis setting
	AL.Hi	-9999～9999	High alarm value setting
	AL.Lo	-9999～9999	Low alarm value setting
	In.=0		Whether low alarm is allowed when the signal is 0

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dAtE	Year	Month,day	Set current time
t InE	Time	Minutes, seconds	
uEr			Meter version number and number

5.3.2 LCD display instrument backlight control menu

Table 6

First menu	Second menu	Tertiary menu	Description
SYS	b.LCd	0-9999	When set to 0, the backlight is always on. When set to 1-9999, the backlight is off after 1-9999 seconds.

5.4 **Programming example**

The programming example use flow chart to introduce how to change some options of programming menu such as current times, transducer setting etc.

Note: After completing setting or selecting, press ENTER button to confirm, after confirming, pressing SET key until SAVE/YES page appear, now, the ENTER button must be pressed to confirm, otherwise, the setting is invalid.

5.4.1 How to modify the current ratio

For example: the signal is 1000A/5A meter, the ratio setting is shown in Figure 24.

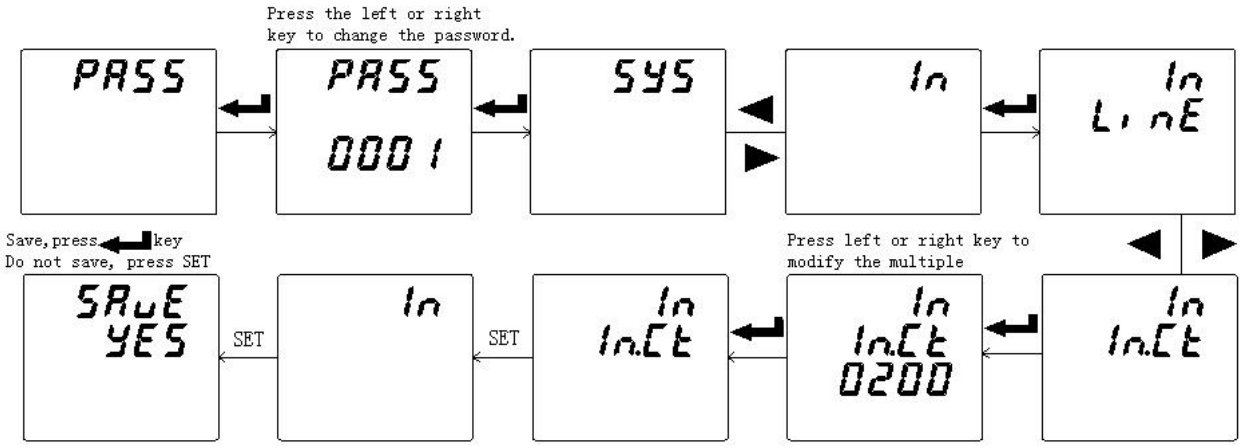


Figure 24

5.4.2 How to modify the analog output settings(Only AMC96 instrument supports analog output function)

For example: set the line voltage Uab to correspond to the first analog 0-20mA output at 19-381V， The settings are shown in Figure 25.

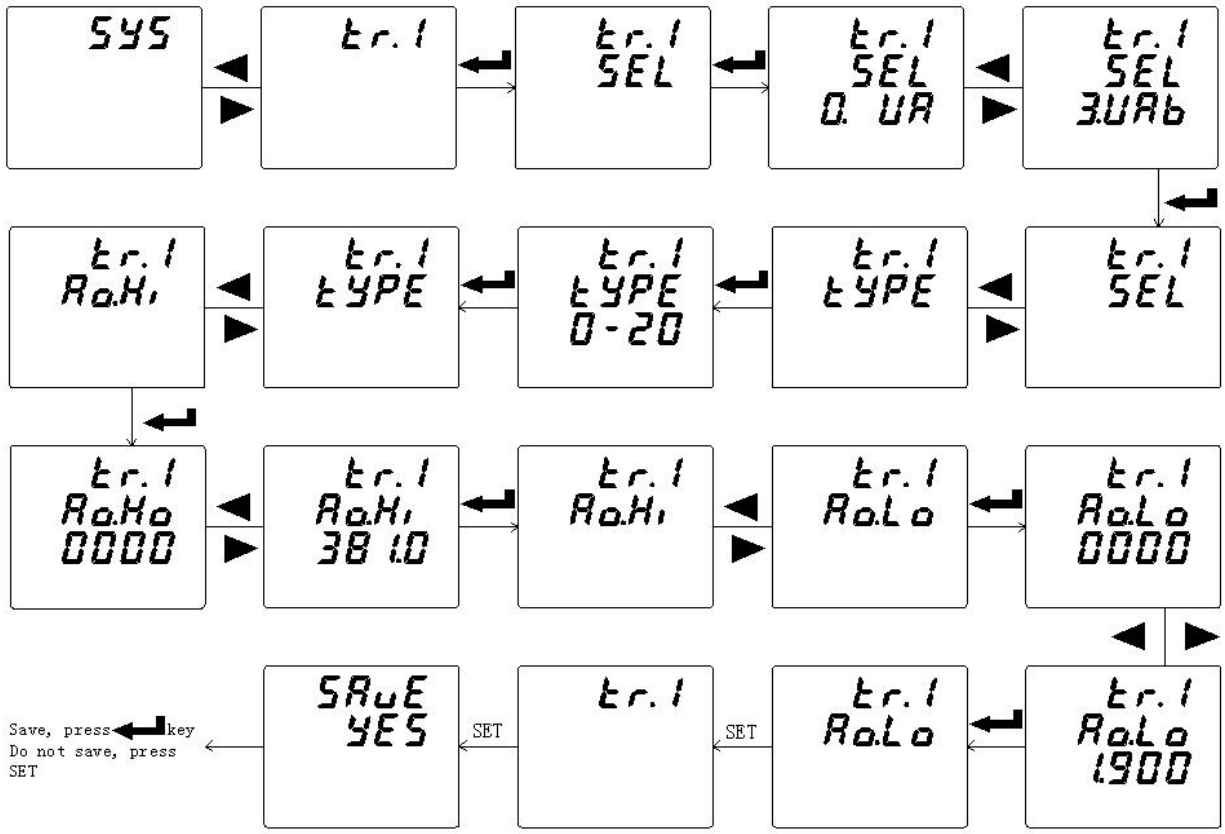


Figure 25

Table 7

tr.1	First channel **analog output**
SEL	Analog output item selection 00 UA; 01 UB; 02 UC; 03 UB; 04 UBC; 05 UCA; 06 IA; 07 IB 08 IC; 09 PA; 10 PB; 11 PC; 12 Psum; 13 QA; 14 QB; 15 QC 16 Qsum; 17 SA; 18 SB; 19 SC; 20 Ssum; 21 PFA; 22 PFB; 23 PFC 24 PF; 25 F
tYPE	4～20mA Or 0～20mA
Ao.Hi	When the analog output is 20mA, the corresponding electrical parameter is taken as the highest four-digit integer (the decimal point is ignored) and the last bit is zero.
Ao.Lo	Similar to Ao.Hi

Note: The analog output setting includes the analog output selection, the analog output full scale corresponding

value and the analog output zero corresponding value.

The analog output selects different values for different signals, and refers to the analog output item selection. The analog output full scale corresponds to the signal primary side value, that is, the 20 mA output corresponds to the displayed value of the power, and the highest four-digit integer (the decimal point is ignored) is less than 0. If the input is 220V, 100A/5A, three-phase three-wire, the total power is 220kV×100A× $\sqrt{3}$ =38.10kW, the output type is 4-20mA; if 100% total power, the first analog output is 20mA, 0% total power The first analog output 4mA, the first analog output selection (register address 0005H) is set to 12, the first output fullness corresponding value (register address 0006H) can be set to 38.10; the first output zero corresponding value (Register address 0007H) can be set to 0.

5.4.3 Switching/Relay alarm output setting

For example: when the total active power is lower than 3.3kW or higher than 66kW, the first alarm will act after 10 seconds,and Hysteresis setting is 1kW. When the power is 0, the alarm is allowed. The setting is shown in Figure 26.

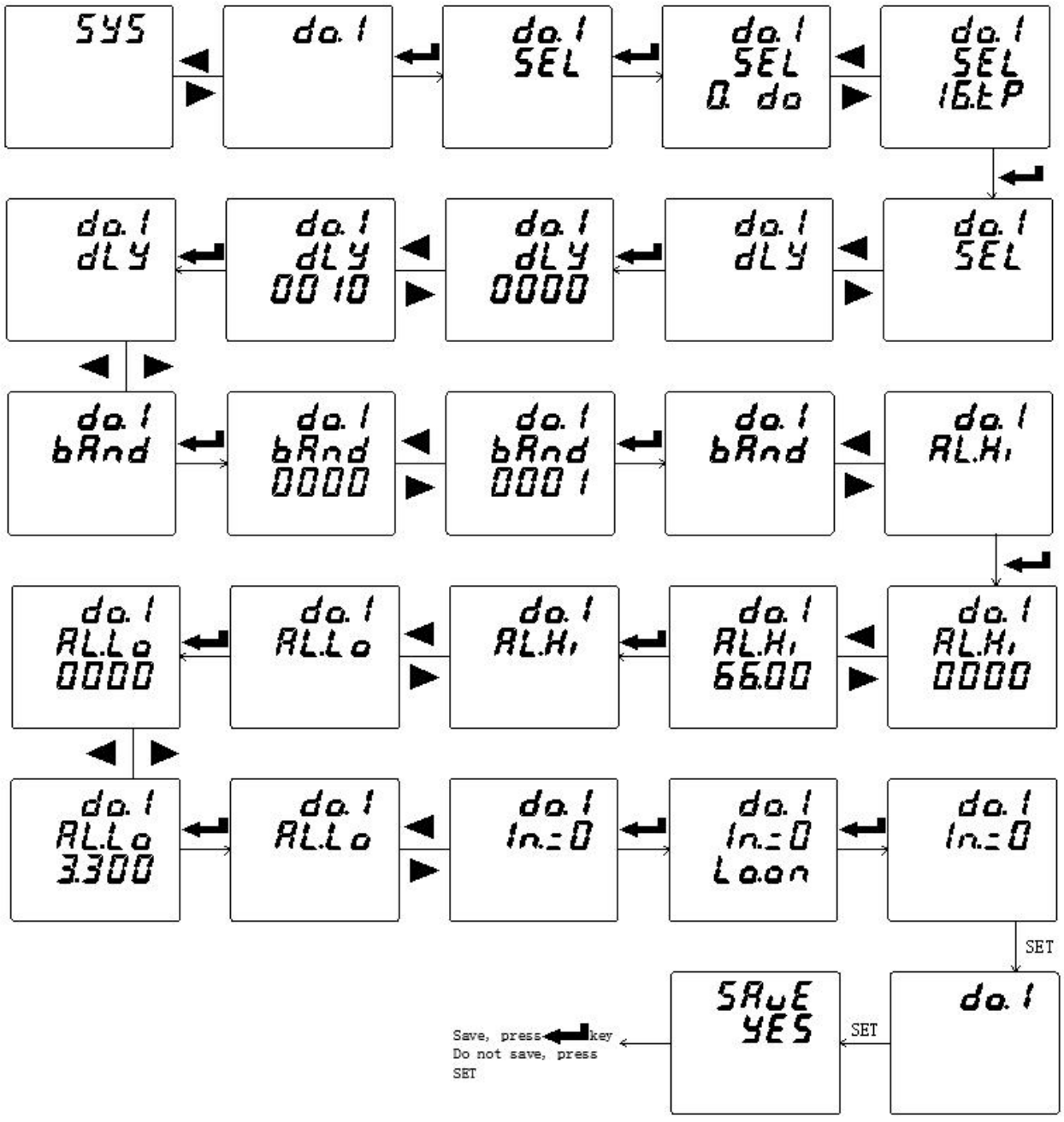


Figure 26

Table 8

<table>
<tr><td>do.1</td><td>The first switching/relay alarm output</td></tr>
<tr><td>SEL</td><td>Alarm item setting
<table>
<tr><td>00</td><td>01</td><td>02</td><td>03</td><td>04</td><td>05</td><td>06</td><td>07</td></tr>
<tr><td>Remote control</td><td>UA</td><td>UB</td><td>UC</td><td>Three-phase phase voltage maximum value</td><td>UAB</td><td>UBC</td><td>UCA</td></tr>
<tr><td colspan="2">08</td><td>09</td><td>10</td><td>11</td><td colspan="2">12</td><td>13</td><td>14</td></tr>
<tr><td colspan="2">hree-phase line voltage maximum value</td><td>IA</td><td>IB</td><td>IC</td><td colspan="2">Three-phase current maximum value</td><td>PA</td><td>PB</td></tr>
<tr><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td></tr>
<tr><td>PC</td><td>Psum</td><td>QA</td><td>QB</td><td>QC</td><td>Qsum</td><td>SA</td><td>SB</td><td>SC</td></tr>
<tr><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td colspan="2">30</td><td>31</td></tr>
<tr><td>Ssum</td><td>PFA</td><td>PFB</td><td>PFC</td><td>PF</td><td>F</td><td colspan="2">Voltage imbalance</td><td>Current imbalance</td></tr>
<tr><td colspan="3">32</td><td colspan="3">33</td><td colspan="3">34</td></tr>
<tr><td colspan="3">DI1(Linkage)</td><td colspan="3">DI2(Linkage)</td><td colspan="3">FL（Combined alarm）</td></tr>
<tr><td colspan="6">The corresponding channel "In.=0" needs to be set to "Lo.on"</td><td colspan="3">The second way DO can be set</td></tr>
</table></td></tr>
<tr><td>dLY</td><td>When the alarm item SEL is 00 (remote control), DLY indicates the duration after the switching amount is activated.
When the alarm item SEL is not 00 (alarm), DLY indicates the delay time before the switching action.</td></tr>
<tr><td>bAnd</td><td>Hysteresis setting</td></tr>
<tr><td>AL.Hi</td><td>High alarm value setting (do not set the maximum 9999)</td></tr>
<tr><td>AL.Lo</td><td>Low alarm value setting (do not set minimum -9999)</td></tr>
<tr><td>In.=0</td><td>Whether low alarm is allowed when the signal is 0, Lo.on is enabled, Lo.of is forbidden</td></tr>
</table>

Note:

1. Hysteresis setting, high alarm value setting and low alarm value setting correspond to the display value of the battery, and the display contains a decimal point.e.g. input 220V 100A/5A, three phase four wire, 100% P total as 220*100*3=66kW, e.g. 100% power high alarm, "AL.Hi" taken as 66.00; 100% voltage high alarm, "AL.Hi" taken as 220.0; 100% current high alarm, "AL.Hi" taken as 100.0

2.Indication of three phase XX maximum/minimum value: high alarm represents maximum value of three phase; low alarm represents minimum value of three phase

3.Secondary DO to be set as "34.FL" combination alarm function; after setting, level II menu changed as "SEL" (function selection), "dLy" (delay), "H-U" (high voltage), "L-U" (low voltage), "H-F" (high frequency), "L-F" (low frequency), "H-P" (high frequency), "L-P" (low frequency), "H-I" (high current), "L-PF" (low power factor), " H-b.U " (over voltage unbalance, set as -1 phase miss, judgment condition at least one phase>0.5Ue, at least one phase<0.1Ue), " H-b.I " (over current unbalance, set as -1 phase miss, judgment condition at least one phase>0.2Ie, at least one phase<0.01Ie).

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4.Unbalance calculation

(Difference between maximum deviation from the mean value and mean value)/mean value *100%,if the mean value of denominator is less than the rated value, the denominator is rated value; voltage rated value Ue; 3 phase 4 wire Ue as the phase voltage, menu setting 400V instrument as 220V*PT, 100V instrument as 57V*PT.Current rated value Ie: 5A instrument as 5A*CT, 1A instrument as 1A*CT.

Unbalance set parameter in percentage, e.g. 20 means 20%.

6 **Communication**

6.1 **Register listing(MODBUS-RTU)**

Table 9

Address	Parameter	Read or write	Value range	Data type
0000H	Password saved	R/W	0001-9999	Uint16
0001H high byte	Communication address	R/W	0001-0247	Uint16
0001H low byte	Communication baud rate	R/W	0-3：38400、19200、 9600、4800bps	
0002H	Control character	R/W	8th bit-connection mode (0-3-phase-4-we, 1-3-phase-3-wire) 7th bit-input voltage range (0-400V, 1-100V) second bit-input current range (0-5A, 0-1 A)	Uint16
0003H	PT transformation ratio	R/W	1-9999	Uint16
0004H	CT transformation ratio	R/W	1-9999	Uint16
0005H	First analog output parameter setting Analog output selection	R/W	The low byte is valid, and the corresponding parameter refers to the SEL correspondence in 5.4.2.	Uint16
0006H	First analog output parameter setting Analog output full scale corresponding value	R/W	-9999～9999(Same as analog output setting menu 5.4.2 in Ao.Hi)	Int16
0007H	First analog output parameter setting Analog output zero point corresponding value	R/W	-9999～9999(Same as analog output setting menu 5.4.2 in Ao.Lo)	Int16
0008H-000AH	Second analog output parameter setting	R/W	Same as the first analog output parameter setting	Uint16
000BH-000DH	Third analog output parameter setting	R/W	Same as the first analog output parameter setting	Uint16
000EH-0010H	Fourth analog output parameter setting	R/W	Same as the first analog output parameter setting	Uint16
0011H high	Backlight control	R/W	Only applied to LCD Display meters 0= lights	Uint16

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byte				
0012H	rt-1 hour，rt-1 minute	R/W	high byte:rt-1 hour，low byte:rt-1 minute	Uint16
0013H	rt-1 multiple rate，rt-2 hour	R/W	high byte:rt8-rt1 multiple rate(1 sharp, 2 peak, 3 flat, 4 valley)，low byte:rt-2 hour	Uint16
0014H	rt-2 minute，rt-2 multiple rate	R/W	high byte:rt-2 minute，low byte:rt1-rt2 multiple rate(1 sharp, 2 peak, 3 flat, 4 valley)	Uint16
0015H-0017H	Rt-3, rt4 setting	R/W	Same as rt-1, rt-2 setting	Uint16
0018H-001AH	rt-5，rt6 setting	R/W	Same as rt-1, rt-2 setting	Uint16
001BH-001DH	rt-7，rt8 setting	R/W	Same as rt-1, rt-2 setting	Uint16
001EH～0020H	Date time setting	R/W	Year, Month, Day, Hour, Minute, Second	Uint16
0021H high byte	Automatic meter reading day	R/W	Month, day	Uint16
0021H low byte	Current time rate	R/W	1 sharp, 2 peak, 3 flat, 4 valley	
0022H	Switching input and output status	R/W	See 6.2.1	Uint16
0023H high byte	Decimal point U (DPT)	R	3～7	Uint16
0023H low byte	Decimal point I (DCT)	R	1～5	
0024H high byte	Decimal point PQ (DPQ)	R	4～10	Uint16
0024H low byte	Symbol PQ	R	High byte-low byte:Q、Qc、Qb、Qa、P、Pc、Pb、Pa; 0 is positive and 1 is negative	
The following is the primary side power parameter				
0025H	UAN	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
0026H	UBN	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
0027H	UCN	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
0028H	UAB	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
0029H	UBC	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
002AH	UCA	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
002BH	IA	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
002CH	IB	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
002DH	IC	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
002EH	PA	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
002FH	PB	R	0-9999 (see 6.2.2 for conversion formula)	Uint16

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0030H	PC	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
0031H	Psum	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
0032H	QA	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
0033H	QB	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
0034H	QC	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
0035H	Qsum	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
0036H	PFA	R	0-1000 (see 6.2.2 for conversion formula)	Uint16
0037H	PFB	R	0-1000 (see 6.2.2 for conversion formula)	Uint16
0038H	PFC	R	0-1000 (see 6.2.2 for conversion formula)	Uint16
0039H	PFsum	R	0-1000 (see 6.2.2 for conversion formula)	Uint16
003AH	SA	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
003BH	SB	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
003CH	SC	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
003DH	Ssum	R	0-9999 (see 6.2.2 for conversion formula)	Uint16
003EH	F	R	4500-6500(see 6.2.2 for conversion formula)	Uint16
The following is the energy address table				
003FH～0040H	Absorptive active electric energy secondary side	R	0-999999999(see 6.2.2 for conversion formula)	Uint32
0041H～0042H	Release active electric energy secondary side	R	0-999999999(see 6.2.2 for conversion formula)	Uint32
0043H～0044H	Inductive reactive electric energy secondary side	R	0-999999999(see 6.2.2 for conversion formula)	Uint32
0045H～0046H	Capacitive reactive electric energy secondary side	R	0-999999999(see 6.2.2 for conversion formula)	Uint32
0047H～0048H	absorptive active electric energy primary side	R	(see 6.2.2 for conversion formula)	Float
0049H～004AH	Release active electric energy primary side	R	(see 6.2.2 for conversion formula)	Float
004BH～004CH	Inductive reactive electric energy primary side	R	(see 6.2.2 for conversion formula)	Float
004DH～004EH	Capacitive reactive electric energy primary side	R	(see 6.2.2 for conversion formula)	Float
The following is the primary side zero sequence voltage and current address table				
0074H	Zero sequence voltage	R	0-9999(see 6.2.2 for conversion formula)	Uint16
0075H	Zero sequence current	R	0-9999(see 6.2.2 for conversion formula)	Uint16
0076H	Current percentage	R	Unit 0.01%	Uint16
0077H	Voltage current phase sequence state	R	高位：电流，低位：电压 0：正常 1：错误	Uint16
0078H-0079H	Running time	R	Unit 1min	Uint32
007AH～007DH	Data time	R	Year、mouth、day、hour、min、second、millisecond	Uint16

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The following is the voltage phase parameter address table				
008CH	Voltage UA phase angle	R	0-9999（1 decimal place, example 1200 means 120.0）	Uint16
008DH	Voltage UB phase angle	R	0-9999（1 decimal place, example 1200 means 120.0）	Uint16
008EH	Voltage UC phase angle	R	0-9999（1 decimal place, example 1200 means 120.0）	Uint16
The following is the event record address table.				
008FH～0094H	Event record 1st	R	See 6.2.3 event record table 10 for details	Uint16
0095H～009AH	Event record 2nd	R	See 6.2.3 event record table 10 for details	Uint16
009BH～00A0H	Event record 3rd	R	See 6.2.3 event record table 10 for details	Uint16
00A1H～00A6H	Event record 4th	R	See 6.2.3 event record table 10 for details	Uint16
00A7H～00ACH	Event record 5th	R	See 6.2.3 event record table 10 for details	Uint16
00ADH～00B2H	Event record 6th	R	See 6.2.3 event record table 10 for details	Uint16
00B3H～00B8H	Event record 7th	R	See 6.2.3 event record table 10 for details	Uint16
00B9H～00BEH	Event record 8th	R	See 6.2.3 event record table 10 for details	Uint16
00BFH～00C4H	Event record 9th	R	See 6.2.3 event record table 10 for details	Uint16
00C5H～00CAH	Event record 10th	R	See 6.2.3 event record table 10 for details	Uint16
00CBH～00D0H	Event record 11th	R	See 6.2.3 event record table 10 for details	Uint16
00D1H～00D6H	Event record 12th	R	See 6.2.3 event record table 10 for details	Uint16
00D7H～00DCH	Event record 13th	R	See 6.2.3 event record table 10 for details	Uint16
00DDH～00E2H	Event record 14th	R	See 6.2.3 event record table 10 for details	Uint16
00E3H～00E8H	Event record 15th	R	See 6.2.3 event record table 10 for details	Uint16

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00E9H～00EEH	Event record 16th	R	See 6.2.3 event record table 10 for details	Uint16
0130H～0137H	Event record 1st	R	See 6.2.3 event record table 11 for details	Uint16
0138H～013EH	Event record 2nd	R	See 6.2.3 event record table 11 for details	Uint16
013FH～0145H	Event record 3rd	R	See 6.2.3 event record table 11 for details	Uint16
0146H～014CH	Event record 4th	R	See 6.2.3 event record table 11 for details	Uint16
014DH～0153H	Event record 5th	R	See 6.2.3 event record table 11 for details	Uint16
0154H～015AH	Event record 6th	R	See 6.2.3 event record table 11 for details	Uint16
015BH～0161H	Event record 7th	R	See 6.2.3 event record table 11 for details	Uint16
0162H～0168H	Event record 8th	R	See 6.2.3 event record table 11 for details	Uint16
0169H～016FH	Event record 9th	R	See 6.2.3 event record table 11 for details	Uint16
0170H～0176H	Event record 10th	R	See 6.2.3 event record table 11 for details	Uint16
0177H～017DH	Event record 11th	R	See 6.2.3 event record table 11 for details	Uint16
017EH～0184H	Event record 12th	R	See 6.2.3 event record table 11 for details	Uint16
0185H～018BH	Event record 13th	R	See 6.2.3 event record table 11 for details	Uint16
018CH～0192H	Event record 14th	R	See 6.2.3 event record table 11 for details	Uint16
0193H～018FH	Event record 15th	R	See 6.2.3 event record table 11 for details	Uint16
019AH～0190H	Event record 16th	R	See 6.2.3 event record table 11 for details	Uint16
The following is the secondary side power parameters				
0100H	UAN	R	0-9999 (1 decimal place, unit V)	Uint16
0101H	UBN	R	0-9999 (1 decimal place, unit V)	Uint16
0102H	UCN	R	0-9999 (1 decimal place, unit V)	Uint16
0103H	UAB	R	0-9999 (1 decimal place, unit V)	Uint16

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0104H	UBC	R	0-9999 (1 decimal place, unit V)	Uint16
0105H	UCA	R	0-9999 (1 decimal place, unit V)	Uint16
0106H	IA	R	0-9999 (3 decimal places, unit I)	Uint16
0107H	IB	R	0-9999 (3 decimal places, unit I)	Uint16
0108H	IC	R	0-9999 (3 decimal places, unit I)	Uint16
0109H	PA	R	0-9999 (3 decimal places, unit kw)	Int16
010AH	PB	R	0-9999 (3 decimal places, unit kw)	Int16
010BH	PC	R	0-9999 (3 decimal places, unit kw)	Int16
010CH	Psum	R	0-9999 (3 decimal places, unit kw)	Int16
010DH	QA	R	0-9999 (3 decimal places, unit kvar)	Int16
010EH	QB	R	0-9999 (3 decimal places, unit kvar)	Int16
010FH	QC	R	0-9999 (3 decimal places, unit kvar)	Int16
0110H	Qsum	R	0-9999 (3 decimal places, unit kvar)	Int16
0111H	PFA	R	-1000 to 1000 (3 decimal places)	Int16
0112H	PFB	R	-1000 to 1000 (3 decimal places)	Int16
0113H	PFC	R	-1000 to 1000 (3 decimal places)	Int16
0114H	PFsum	R	-1000 to 1000 (3 decimal places)	Int16
0115H	SA	R	0-9999 (3 decimal places, unit VA)	Uint16
0116H	SB	R	0-9999 (3 decimal places, unit VA)	Uint16
0117H	SC	R	0-9999 (3 decimal places, unit VA)	Uint16
0118H	Ssum	R	0-9999 (3 decimal places, unit VA)	Uint16
0119H	F	R	4500-6500 (2 decimal places)	Uint16
011AH	Zero sequence voltage	R	0-9999 (1 decimal place, unit V)	Uint16
011BH	Zero sequence current	R	0-9999 (3 decimal places, unit I)	Uint16
DO setting and status read address				
025DH	Communication mode	R/W	0: None 1: 2 Stop 2: Odd 3: Even	Uint16
025EH	Pulse constant setting	R/W	16-1600 100 stands for 10000imp/kWh	Uint16
025FH	DIDO status	R		Uint16
0260H	DO1 alarm selection	R/W	0000-9999 (same as DO setting menu 5.3.3 in SEL)	Uint16
0261H	DO1 alarm delay	R/W	0000-9999 (same as DO setting menu 5.3.3 DLY)	Uint16
0262H	DO1 hysteresis setting	R/W	0000-9999 (same as DO setting menu 5.4.3 bAnd)	Uint16
0263H	DO1 high alarm value	R/W	-9999～9999 (with the DO setting menu 5.3.3 AL.Hi)	Int16
0264H	DO1 low alarm value	R/W	-9999～9999 (along with DO setting menu 5.3.3 AL.Lo)	Int16

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0265H	DO1 low alarm enable	R/W	Enable at 0 (same as DO setting menu 5.4.3 in In.=0)	Uint16
0266H-026BH	DO2 alarm settings	R/W	Same as DO1 alarm setting, high and low voltage value and voltage value in DO2 combination alarm	Uint16
026CH-0271H	DO3 alarm settings	R/W	Same as DO1 alarm setting	Uint16
0272H-0277H	DO4 alarm settings	R/W	Same as DO1 alarm setting	Uint16
0278H	DLT645 address setting	R/W	High four-bit address, hex form	Uint16
0279H	DLT645 address setting	R/W	Medium four-bit address, hex form	Uint16
027AH	DLT645 address setting	R/W	Low four-bit address, hex form	Uint16
027BH	DO2 combination alarm over frequency value	R/W	0000-9999 (same as DO2 setting menu 5.4.3 H-F)	Uint16
027CH	DO2 combination alarm underfrequency value	R/W	0000-9999 (same as DO2 setting menu 5.5.3 L-F)	Uint16
027DH	DO2 combination alarm over power value	R/W	-9999～9999 (the same as the DO2 setting menu 5.4.3 H-P)	Int16
027EH	DO2 combination alarm underpower value	R/W	-9999～9999 (L-P in the same DO2 setting menu 5.4.3)	Int16
027FH	DO2 combination alarm over current value	R/W	0000-9999 (the same as the DO2 setting menu 5.4.3 H-I)	Uint16
0280H	DO2 combination alarm underpower factor value	R/W	-1000 to 1000 (L-PF in the same setting as the DO2 setting menu 5.4.3)	Int16
0281H	DO2 combination alarm overvoltage imbalance value	R/W	-1 to 999 (H-b.U in the same setting as the DO2 setting menu 5.4.3)	Int16
0282H	DO2 combination alarm overcurrent imbalance value	R/W	-1 to 999 (H-b.I in the same setting as the DO2 setting menu 5.4.3)	Int16
03E8H	Alarm status of DO2 combined alarm	R	bit0="H- U"（high voltage） bit1="L- U"（low voltage） bit2="H- F"（high frequency） bit3="L- F"（low frequency） bit4="H- P"（high power） bit5="L- P"（low power） bit6="H- I"（high current） bit7="L- PF"（low power factor） bit8="H- b.U"（over voltage unbalance, set as -1 phase miss） bit9="H- b.I"（Current imbalance）	Uint16

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03E9H	DO1 current alarm value	R	0000-9999	Uint16
03EAH	DO2 current alarm value	R	0000-9999	Uint16
03EBH	DO3 current alarm value	R	0000-9999	Uint16
03ECH	DO4 current alarm value	R	0000-9999	Uint16
03EDH	DO2 combination alarm current overvoltage value	R	0000-9999	Uint16
03EEH	DO2 combination alarm current undervoltage value	R	0000-9999	Uint16
03EFH	DO2 combination alarm current over frequency value	R	0000-9999	Uint16
03F0H	DO2 combination alarm current underfrequency value	R	0000-9999	Uint16
03F1H	DO2 combination alarm current overpower value	R	0000-9999	Uint16
03F2H	DO2 combination alarm current underpower value	R	0000-9999	Uint16
03F3H	DO2 combination alarm current overcurrent value	R	0000-9999	Uint16
03F4H	DO2 combination alarm underpower factor value	R	0000-9999	Uint16
03F5H	DO2 combination alarm overvoltage imbalance value	R	0000-9999	Uint16
03F6H	DO2 combination alarm overcurrent imbalance value	R	0000-9999	Uint16
The following is an address table with H function				
0400H	A Phase voltage total harmonic distortion rate	R	0-9999（2 decimal places, example 200 means 2%）	Uint16
0401H	B Phase voltage total harmonic distortion rate	R	0-9999（2 decimal places, example 200 means 2%）	Uint16
0402H	C Phase voltage total harmonic distortion rate	R	0-9999（2 decimal places, example 200 means 2%）	Uint16
0403H	A Phase current total harmonic distortion rate	R	0-9999（2 decimal places, example 200 means 2%）	Uint16
0404H	B Phase current total harmonic distortion rate	R	0-9999（2 decimal places, example 200 means 2%）	Uint16

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0405H	C Phase current total harmonic distortion rate	R	0-9999（2 decimal places, example 200 means 2%）	Uint16
0406H	A Phase voltage harmonic value	R	0-9999 (secondary side value, decimal point 1 bit, unit V)	Uint16
0407H	B Phase voltage harmonic value	R	0-9999 (secondary side value, decimal point 1 bit, unit V)	Uint16
0408H	C Phase voltage harmonic value	R	0-9999 (secondary side value, decimal point 1 bit, unit V)	Uint16
0409H	A Phase current harmonic value	R	0-9999 (secondary side value, decimal point 3 bits, unit A)	Uint16
040AH	B Phase current harmonic value	R	0-9999 (secondary side value, decimal point 3 bits, unit A)	Uint16
040BH	C Phase current harmonic value	R	0-9999 (secondary side value, decimal point 3 bits, unit A)	Uint16
040CH-0429H	A Phase voltage 2-31 harmonic distortion rate	R	0-9999（2 decimal places, example 200 means 2%）	Uint16
042AH-0447H	B Phase voltage 2-31 harmonic distortion rate	R	0-9999（2 decimal places, example 200 means 2%）	Uint16
0448H-0465H	C Phase voltage 2-31 harmonic distortion rate	R	0-9999（2 decimal places, example 200 means 2%）	Uint16
0466H-0483H	A Phase current 2-31 harmonic distortion rate	R	0-9999（2 decimal places, example 200 means 2%）	Uint16
0484H-04A1H	B Phase current 2-31 harmonic distortion rate	R	0-9999（2 decimal places, example 200 means 2%）	Uint16
04A2H-04BFH	C Phase current 2-31 harmonic distortion rate	R	0-9999（2 decimal places, example 200 means 2%）	Uint16
04C0H-04DDH	A Phase voltage 2-31 harmonic value	R	0-9999 (secondary side value, decimal point 1 bit, unit V)	Uint16
04DEH-04FBH	B Phase voltage 2-31 harmonic value	R	0-9999 (secondary side value, decimal point 1 bit, unit V)	Uint16
04FCH-0519H	C Phase voltage 2-31 harmonic value	R	0-9999 (secondary side value, decimal point 1 bit, unit V)	Uint16
051AH-0537H	A Phase current 2-31 harmonic value	R	0-9999 (secondary side value, decimal point 3 bits, unit A)	Uint16
0538H-0555H	B Phase current 2-31 harmonic value	R	0-9999 (secondary side value, decimal point 3 bits, unit A)	Uint16
0556H-0573H	C Phase current 2-31 harmonic value	R	0-9999 (secondary side value, decimal point 3 bits, unit A)	Uint16
The following is the extreme value address table				

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0600H	A Phase voltage maximum	R	0-9999 (secondary side value)	Uint16
0601H	A phase voltage maximum value occurs year, month	R	High bit:year, low bit:month	Uint16
0602H	A phase voltage maximum value occurs day, hour	R	High bit:day, low bit:hour	Uint16
0603H	A maximum value of the phase voltage occurs minutes, seconds	R	High bit:minute, low bit:second	Uint16
0604H-0607H	B phase voltage maximum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
0608H-060BH	C phase voltage maximum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
060CH-060FH	A line voltage maximum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
0610H-0613H	B line voltage maximum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
0614H-0617H	C line voltage maximum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
0618H-061BH	A phase current maximum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
061CH-061FH	B phase current maximum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
0620H-0623H	C phase current maximum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
0680H-0683H	A phase voltage minimum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
0684H-0687H	B phase voltage minimum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
0688H-068BH	C phase voltage minimum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
068CH-068FH	A line voltage minimum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
0690H-0693H	B line voltage minimum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
0694H-0697H	C line voltage minimum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
0698H-069BH	A phase current minimum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16

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069CH-069FH	B phase current minimum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
06A0H-06A3H	C phase current minimum value and occurrence time	R	(The same as the A phase voltage extreme value)	Uint16
0700H	**Voltage imbalance**	R	0-9999 (1 decimal place, example 20 means 2%)	Uint16
0701H	Current imbalance	R	0-9999 (1 decimal place, example 20 means 2%)	Uint16

6.2 **Communication application**

The AMC series intelligent power collection and monitoring device has unified planning of the communication address table during design. The user can conveniently realize the functions of telemetry, remote signaling and remote control according to the following description.

6.2.1 Switching input and output

The switching input of AMC series intelligent power collection and monitoring device adopts dry contact switch signal input mode. The instrument is equipped with working power supply, no external power supply is required. When the external contact is closed or disconnected, the meter displays the switch status locally, and the remote transmission function can be realized through the communication port of the meter, that is, the “remote message” function.

The switching output of AMC series intelligent power collection and monitoring device is relay output, which can be remotely controlled by the host computer (the remote control has two modes: 1, level trigger; 2. pulse trigger) to realize the "remote control" function, or according to customer requirements. Implement the corresponding alarm function (such as over current, under voltage).

The communication address of the AMC series intelligent power collection monitoring device and the digital switching input and switching output is 0022H, and its correspondence with the digital input and output is as follows:

	16	15	14	13	12	11	10	9	8～1
0022H			DO2	DO1	DI4	DI3	DI2	DI1	Reserved

6.2.2 Power parameters and electrical energy

The series of measured values are read by the command No. 03 of the Modbus-RTU communication protocol. The correspondence between the communication value and the actual value is as follows: (Agreed Val_t is the communication read value, Val_s is the actual value).

1. Phase voltage UA, UB, UC, line voltage UAB, UBC, UCA, zero sequence voltage:

Val_s=Val_t×10＾（DPT-4），Unit volt V, DPT is read from the high byte of 0023H .

2. Current IA, IB, IC, zero sequence current:

Val_s=Val_t×10＾（DCT-4），Unit Ampere A, DCT is read from the low byte of 0023H.

3.Power PA, PB, PC, Psum, QA, QB, QC, Qsum:

Val_s=Val_t×10＾（DPQ-4），Active power unit watt W, reactive power unit var, DPQ read from 0024H high byte, active power and reactive power symbols from 0024H low byte (from high to low, Q, Qc, Qb, Qa,

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P, Pc, Pb, Pa) read.

4.Power factor values PFA, PFB, PFC, PFsum:

Val_s=Val_t/1000，No unit

5.Frequency:

Val_s=Val_t/100，Unit Hertz Hz

6.Electrical energy:

For the AMC series intelligent power collection and monitoring device, the following a and b methods can be used to read the electric energy, and the user can select according to the actual situation.

a) Read address 003FH～0040H (absorbed active energy), 0041H～0042H (release active energy), 0043H～0044H (inductive reactive energy), 0045H～0046H (capacitive reactive energy) secondary energy, read again PT, CT, calculated according to the following formula:

Electrical energy communication readout value Val_t=first word × 65536 + second word

The primary value of electric energy is Val_s=Val_t/1000×PT×CT, the unit of active energy: kilowatt hour (kWh), and the unit of reactive energy: kilowatt hour (kvarh). The PT is read from the address 0003H, and the CT is read from the address 0004H.

Note: In general, the user reads the absorbed active energy.

b) Read the primary side energy in 0047H~004EH. This value uses the floating point variable data type. It uses the sign bit to represent the sign of the number, and the exponent and mantissa to represent the size of the number. The data format adopted by the meter is IEEE754 data format, with 24-bit precision. The high order of the mantissa is always "1", so it is not saved. The bit distribution is as follows:

1-bit sign bit, 8-bit exponent bit, 23-bit mantissa, the sign bit is the highest bit, and the mantissa is the lowest 23 bits.

Specific examples are as follows:

Read number (such as 047H 048H, 2word, from high to low, total 4byte, 32bit):

0 10001110 100 1011 1010 1100 0000 0000b

Sign bit S Index position E mantissa M

The sign bit S=0, “1” is negative and “0” is positive;

Calculate the index E=10001110, and convert it to a decimal number 142;

Calculate the mantissa M=100 1011 1010 1100 0000 0000, and convert it to decimal number 4959232.

Calculation formula: primary side charge

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$$=(-1)^{S} \times 2^{(E-127)} \times \left(1+\frac{M}{2^{23}}\right)$$

The calculation result in the above example is:

$$(-1)^{0} \times 2^{(142-127)} \times \left(1+\frac{4959232}{2^{23}}\right)=52140Wh=52.14kWh$$

6.2.3 Event Record

Event record 1st - Event record 16th, recorded in order of time, that is, event record 1st records the data of the event that occurred recently, and event record 16th records the data of the early event. The data format of each event record is shown in Table 10:

Table 10 Event record data format 1

	High 8 bits	Low 8 bits
Address 1	Bit 0 (lowest bit): 0 is DO, 1 is DI 7th bit (highest bit): 0 is open and 1 is closed	Switching serial number: 0 is the first road, 1 is the second road, and so on.
Address 2	Alarm type: see 5.4.3	Combined alarm type [note]
Address 3	Year	Month
Address 4	Day	Hour
Address 5	Minute	Second
Address 6	The value at the time of the alarm (the minimum value of the three phases is recorded when the phase is broken)	

Note: 0-high voltage, 1-low voltage, 2-high frequency, 3-low frequency, 4-high power, 5-low power, 6-high current, 7-low power factor,8-high voltage Balanced, 9-high current imbalance

Table 10 Event record data format 2

	High 8 bits	Low 8 bits
Address 1	Bit 0 (lowest bit): 0 is DO, 1 is DI 7th bit (highest bit): 0 is open and 1 is closed	Switching serial number: 0 is the first road, 1 is the second road, and so on.
Address 2	Alarm type: see 5.4.3	Combined alarm type
Address 3	Year	Month
Address 4	Day	Hour
Address 5	Minute	Second
Millisecond		
Address 6	The value at the time of the alarm (the minimum value of the three phases is recorded when the phase is broken)	

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Example: DO1 is the A-phase voltage alarm. When the under-voltage alarm occurs at 14:56:32 on January 22, 15th, the alarm value is 172.2V, the corresponding register value is shown in Table.

	High 8 bits	Low 8 bits
Address 1	128	0
Address 2	1	0
Address 3	15	1
Address 4	22	14
Address 5	56	32
Address 6	1722	

7 **Common fault analysis**

Common fault analysis and elimination

Fault content	Analysis	Remarks
No display after power on	Check if the power supply voltage is within the operating voltage range	
Voltage, current, power, etc. readings are incorrect	Check if the voltage-to-current ratio setting is correct Check if the wiring mode setting is consistent with the actual Check if voltage transformer, current transformer is intact	
Power or power factor is incorrect	Check if the wiring mode setting is consistent with the actual Check if the voltage and current phase sequence is correct Check if the wiring is correct	
Communication is not normal	Check whether the address, baud rate, check digit, etc. in the communication settings are consistent with the host computer. Check if the RS485 converter is normal Parallel connection of 120 ohms or more at the end of communication Check if the wiring is correct	

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