351

# AMC 系列可编程智能电测仪表

AMC Series programmable intelligent meters

## 安装使用说明书 V2.1

Installation and Operation Instruction V2.1

安科瑞电气股份有限公司

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# 申　　明



## DECLARATION

# 目　　录

## Contents

## 1.概述 General

AMC 系列可编程智能电测仪表采用交流采样技术，可直接或间接测量单相电网或三相电网中某一相的电压和电流。既可用于本地显示，又能与工控设备连接，组成测控系统。

仪表可具有 RS-485 通讯接口，采用 Modbus-RTU 协议；可带模拟量输出、继电器报警输出、开关量输入/输出。根据不同要求，通过仪表面板按键，对变比、报警、通讯等参数进行设置和控制。

AMC series programmable intelligent meters, adopting AC sampling technology, can directly or indirectly measure electric voltage and current of single phase or three phase grid. It can be used for local display, and connecting industrial control device to form measuring control system。

This series of meters have RS-485 port, adopt Modbus-RTU protocol. Analog output, alarm output, switching input/ output can be selected. Based on different request, by pressing the keys, parameters of ratio, alarm, communication etc. can be modified.

## 2.产品型号规格 Type Description

表 1

Table 1

| 仪表型号<br>Type | 基本功能<br>Basic function | 外形<br>Shape | 可选功能<br>Optional function |
|---|---|---|---|
| AMC48-AI<br>AMC48-AV | 电流、电压测量；<br>Current, voltage measurement<br>LED 数码管显示<br>LED | 48<br>方形<br>48<br>Square | 1、一路 RS485 通讯（/C）<br>RS485 communication (/C )<br>2、一路变送输出(/M）<br>Analog output (/M ) |
| AMC48-AI3<br>AMC48-AV3 | | | 无 None |
| AMC48L-AI<br>AMC48L-AV | 电流、电压测量；<br>Current, voltage measurement<br>LCD 液晶显示<br>LCD | | 1、一路 RS485 通讯（/C）<br>RS485 communication (/C )<br>2、一路变送输出(/M）<br>Analog output (/M ) |
| AMC48L-AI3<br>AMC48L-AV3 | | | 无 None |
| AMC72-AI<br>AMC72-AV<br>AMC72-AI3<br>AMC72-AV3 | 电流、电压测量；<br>Current, voltage measurement<br>LED 数码管显示<br>LED | 72<br>方形<br>72<br>Square | 1、一路 RS485 通讯（/C）<br>RS485 communication (/C )<br>2、一路变送输出 (/M）<br>Analog output (/M )<br>3、一路报警（/J）<br>Alarm output (/J)<br>4、变送输出+RS485 通讯（/MC）<br>Analog output + RS485 communication (/ MC )<br>5、RS485 通讯+开关量 2DI2DO（/KC）<br>RS485 communication + switching output 2DI2DO (/KC )<br>6、一路报警+一路变送输出+RS485 通讯（/JMC）<br>Alarm output + analog output + RS485 communication (/JMC ) |
| AMC72-DI<br>AMC72-DV | 直流电流、电压测量；<br>DC voltage, current measurement<br>LED 数码管显示<br>LED | | |
| AMC72L-AI<br>AMC72L-AV<br>AMC72L-AI3<br>AMC72L-AV3 | 电流、电压测量；<br>Current, voltage measurement<br>LCD 液晶显示<br>LCD | | |
| AMC72L-DI<br>AMC72L-DV | 直流电流、电压测量；<br>DC voltage, current measurement<br>LCD 液晶显示<br>LCD | | |

| | | | |
|---|---|---|---|
| AMC96-AI<br>AMC96-AV<br>AMC96-AI3<br>AMC96-AV3 | 电流、电压测量；<br>Current, voltage measurement<br>LED 数码管显示<br>LED | 96<br>方形<br>96<br>Square | 1、一路 RS485 通讯（/C）<br>RS485 communication (/C )<br>2、变送输出(/M 或/3M）<br>Analog output (/M or /3M )<br>3、一路报警（/J）<br>Alarm output (/J)<br>4、变送输出+RS485 通讯 （/MC 或/M3C）<br>Analog output + RS485 communication (/ MC or /M3C )<br>5、RS485 通讯+开关量 4DI2DO（/KC）<br>RS485 communication + switching 4DI2DO (/KC )<br>6、一路报警+一路变送输出+RS485 通讯（/JMC）<br>Alarm output+ analog output + RS485 communication (/JMC ) |
| AMC96L-AI<br>AMC96L-AV<br>AMC96L-AI3<br>AMC96L-AV3 | 电流、电压测量；<br>Current, voltage measurement<br>LCD 液晶显示<br>LCD | | |

**注：1.AI/AV 表示单相电流/电压，AI3/AV3 表示三相电流/电压；**

**1. AI/AV means single-phase current/voltage, AI3/AV3 means three-phase current/voltage;**

**2. /J 默认为一路继电器输出（与第二路开关量输出复用）。**

**2. /J means 1 channel relay output (multiplexing with second channel switching output)**

## 3 技术参数 Technical parameter

表 2

Table 2

| 技术参数<br>Technical parameter | | 指 标<br>Value |
|---|---|---|
| 输入<br>Input | 标称值<br>Rated value | 交流电压：单相 AC 100V、400V<br>三相 AC 100V、400V、660V（仅 72/96，三相时特指线电压）<br>AC voltage：Single phase AC 100V ,400V<br>Three phase AC 100V ,400V , 660V（$U_{L-L}$, Only 72/ 96）<br>交流电流：AC 1A、5A；<br>AC current：AC 1A,5A<br>直流电压：1000V、300V、75mV、10V；<br>DC voltage：1000V ,300V ,75mV ,10V<br>直流电流：0-20mA、4-20mA、5A；<br>DC current： 0-20mA ,4-20mA ,5A； |
| | 过载<br>Overload | 电压：1.2 倍持续，2 倍额定值/1 秒；<br>Voltage: 1.2 times rated value(continuous); 2 times rated value /1 second<br>电流：1.2 倍持续，10 倍额定值/1 秒；<br>Current: 1.2 times rated value(continuous); 10 times rated value /1 second |
| | 频率<br>Frequency | 45Hz～65Hz |
| | 功耗<br>Power consumption | 各电压、电流输入回路功耗均小于 0.5VA<br>Power consumption of each voltage, current input circuit is less than 0.5VA |

| | | | |
|---|---|---|---|
| 精度等级<br>Accuracy | | | 0.5 级<br>0.5 class |
| 功能<br>Function | 显示<br>Display | | LED 或 LCD 显示；<br>LED or LCD |
| | 通讯<br>Communication | | RS485，Modbus-RTU 协议；（1 个起始位，8 个数据位，1 个停止位，无奇偶校验位）<br>波特率 2400/4800/9600/19200 bps 等<br>RS485, Modbus-RTU protocol；（1 start bit, 8 data bit, 1 stop bit, no parity）<br>Baud Rate 2400/4800/9600/19200 bps etc. |
| | 报警<br>Alarm | | 默认 1 路无源继电器，触点容量 3A/30VDC，3A/250VAC，<br>1 channel passive relay，contact capacity 3A/30VDC，3A/250VAC，<br>高、低、不平衡报警等<br>Used for high,low, unbalance alarm etc. |
| | 模拟量<br>Analog | | DC4～20mA（负载 ＜ 500Ω）<br>（备注：上述信号输入输出特需选用屏蔽线）<br>DC4~20mA, ( load < 500Ω)<br>(note：Shielded wire is specially selected for the above signal input and output) |
| | 开关量<br>switching | 输入<br>Input | 四路或两路干接点输入，内置电源,光耦隔离<br>4 channel or 2 channel dry contact Input, built in power supply |
| | | 输出<br>Output | 两路开关量输出，常开继电器触点，容量：3A/30VDC，3A/250VAC<br>2 channel switching output, NO relay contact, capacity: 3A/30VDC，3A/250VAC |
| 电源<br>Auxiliary supply | 电压范围<br>Voltage range | | AC/DC 85-265V |
| | 功耗<br>Power consumption | | ＜ 5VA |
| 绝缘电阻<br>Insulation resistance | | | ≥ 100MΩ |
| 工频耐压<br>Power frequency withstand voltage | | | 电源端子组与信号输入、输出端子组之间2kV/1min（RMS）<br>Between power supply set of terminals and signal input, output set of terminals 2kV/1min (RMS)<br>外壳与各端子组（除参比电压≤40V的端子）之间的工频耐压为AC 4kv<br>Between the shell and all set of terminals（except the set of terminals reference voltage less than 40V）<br>AC 4kV |
| 环境<br>Environment | 温度<br>Temperature | | 工作： -10℃～+55℃ 贮存：-25℃～+70℃<br>Operation： -10℃～+55℃ Storage: -25° C～+70° C |
| | 湿度<br>Humidity | | ≤ 95%RH，不结露，不含腐蚀性气体<br>≤95%RH, no condensation, without corrosive gas |
| | 海拔<br>Altitude | | ≤ 2500m |

## 4 安装接线说明 Installing and wiring

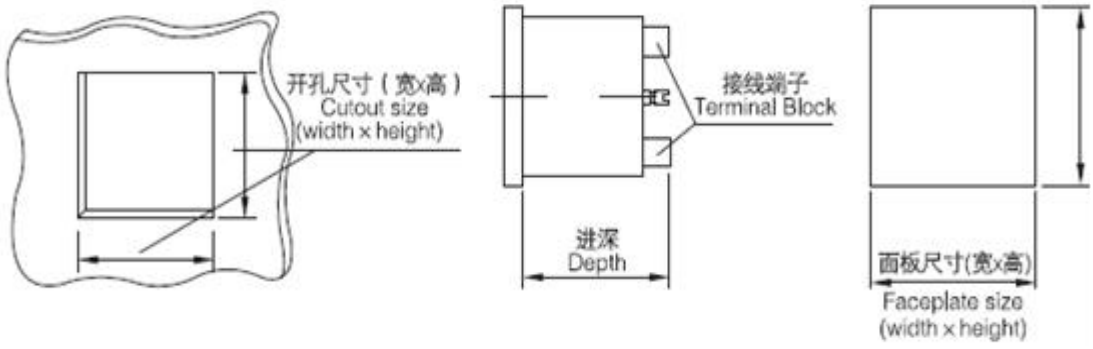
### 4.1 外形及安装开孔尺寸(单位：mm) Outline and mounting cut out size (Unit: mm)

表 3

Table 3

| 仪表外形 Shape | 面框尺寸 Panel | | 壳体尺寸 Housing | | | 开孔尺寸 Cut out | |
|---|---|---|---|---|---|---|---|
| 单位：mm Unit： mm | 宽 Width | 高 Height | 宽 Width | 高 Height | 深 Depth | 宽 Width | 高 Height |
| 48 方形 48 Square | 49 | 49 | 44 | 44 | 93 | 45 | 45 |
| 72 方形 72 Square | 75 | 75 | 66.5 | 66.5 | 94.3 | 67 | 67 |
| 96 方形 96 Square | 96 | 96 | 90 | 90 | 77.8 | 92 | 92 |

### 4.2 仪表及开孔示意图 Diagram of meter and its cut out




### 4.3 安装方法 Installing

1）在固定配电柜开孔；

1) Make holes on distribution cabinets;

2）取出仪表，取出卡扣；

2) Take out the meter and the buckle;

3）仪表由前装入安装孔，如图 4 所示；

3) The meter is loaded into the mounting hole from the front, as shown in Figure 4;

4）插入仪表卡扣，将仪表固定，如图 5 所示。

4) Insert the buckle and fix the meter, as shown in Figure 5.

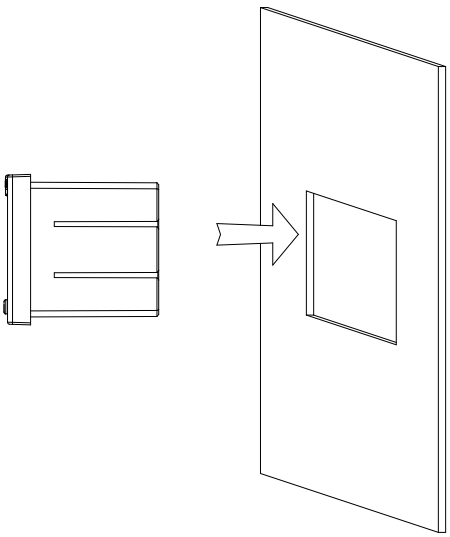


图 4

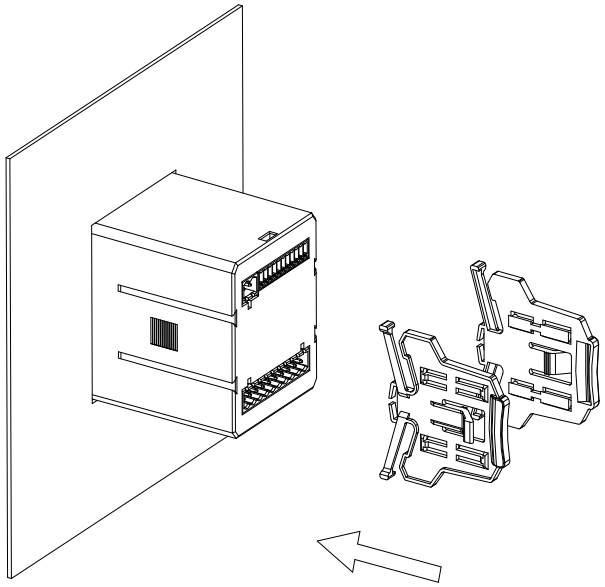


图 5

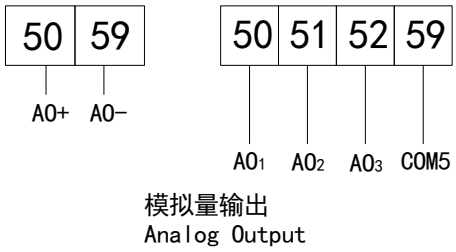
## 4.4 端子及接线方法 Terminals and wiring

根据不同的设计要求，推荐在电源、电压输入端子增加保险丝（BS88 1A gG）以满足相关电气规范的安全性要求。

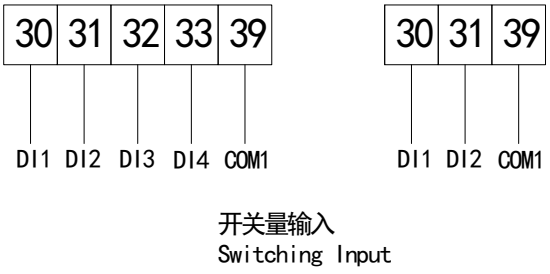
According to different design requirements, it is recommended to add a fuse (BS88 1A gG) to the power supply and voltage input terminals to meet the safety requirements of relevant electrical codes.

4.4.1 仪表端子及接线 Terminals and wiring

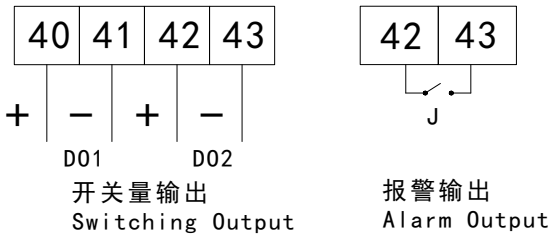
变送接线 Analog wiring:



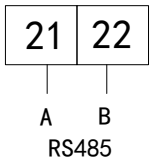

开关量输入接线 Switching input wiring:



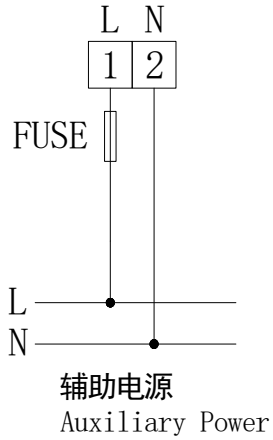
开关量输出或报警接线 Switching output or alarm wiring:




通讯接线 RS-485 wiring；

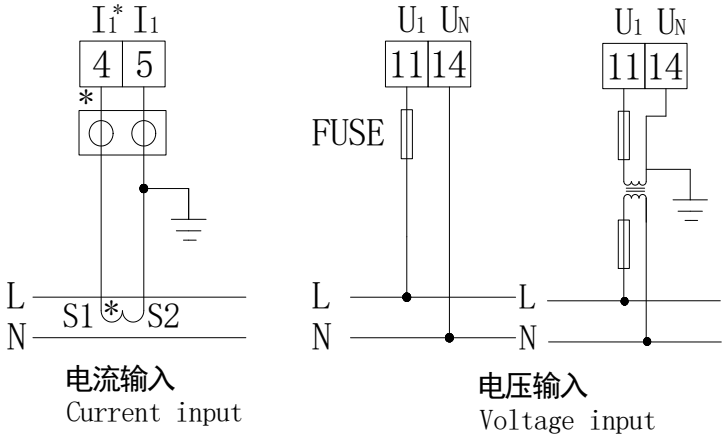



电源接线 Power wiring：



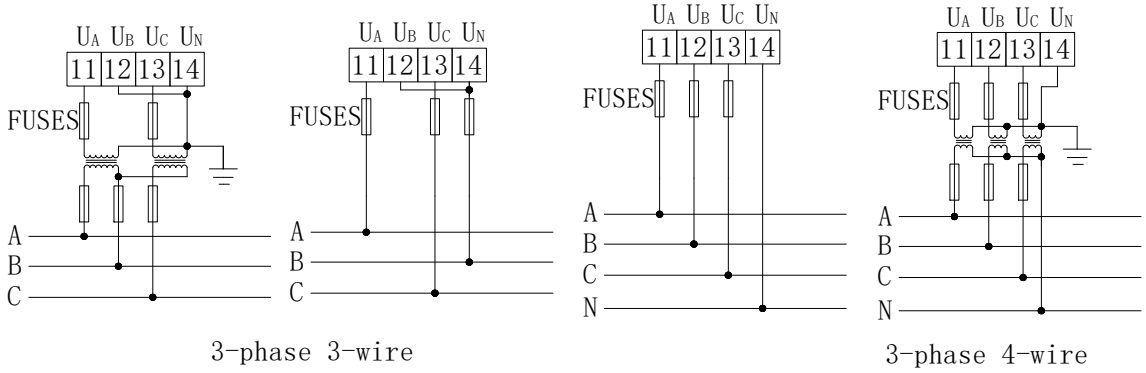

输入信号接线 Voltage or current wiring:

单相 single phase:

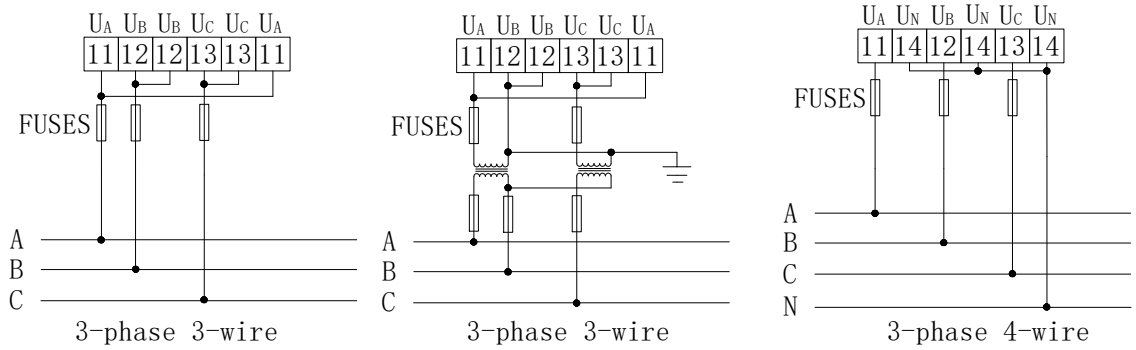


三相 Three phase:

三相电压 Three phase voltage：

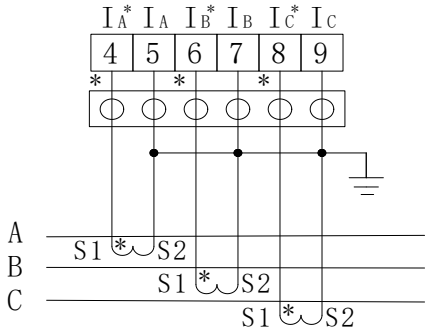



AMC72/96 Voltage

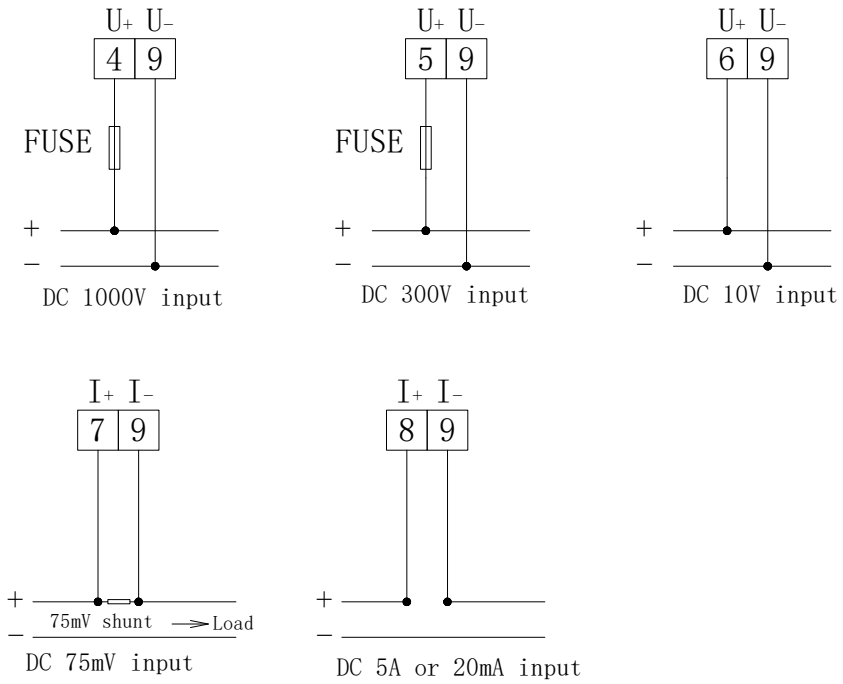



AMC48 Voltage

三相电流 Three phase current：



直流 DC series:




**注：1. 符号“*”表示电流进线端，该接线仅供参考，具体以仪表上接线图为准；**

**2. 报警输出继电器与第二路开关量输出 DO2 复用。**

**Note: 1. The symbol “*” indicates current input terminal, this wiring is for reference only , the specific wiring diagram on the meter prevail;**

**2. Alarm output relay duplex with the second switching output (DO2).**

4.5 注意事项 Notice

4.5.1 电压输入 Voltage Input

输入电压不得高于产品额定输入电压的 120%，否则应考虑使用 PT；

The input voltage must not be higher than the rated input voltage of the product ,otherwise PT should be considered

在电压输入端须安装 1A 保险丝。

A 1A fuse must be installed on the voltage input.

4.5.2 电流输入 Current Input

交流电流输入应使用外部 CT；

Current input shall use external CT;

如果使用的 CT 上连有其它仪表，接线应采用串接方式；

If the used CT connected with other meters, the connection should be used in series;

建议使用接线排，不要直接接 CT，以便拆装；

It is recommended to use wiring board ,do not connected with CT directly, in order to remove conveniently;

去除产品的电流输入连线之前，一定要先断开 CT 一次回路或短接二次回路；

Before removing product ‘s current input connection, be sure to disconnect the CT primary circuit or short the secondary circuit.

4.5.3 附加功能接线 Additional function wiring

模拟量输出与开关量输入的 COM 表示各自公共端，并不是实际接地；

COM of analog output and switching input represent their own common end, it is not earthing actually.

通讯连接建议使用两芯屏蔽线，每芯截面不小于 0.5㎜$^2$，分别接 A、B，屏蔽层接大地，布线时应使通讯线远离强电电缆或其他强电场环境。

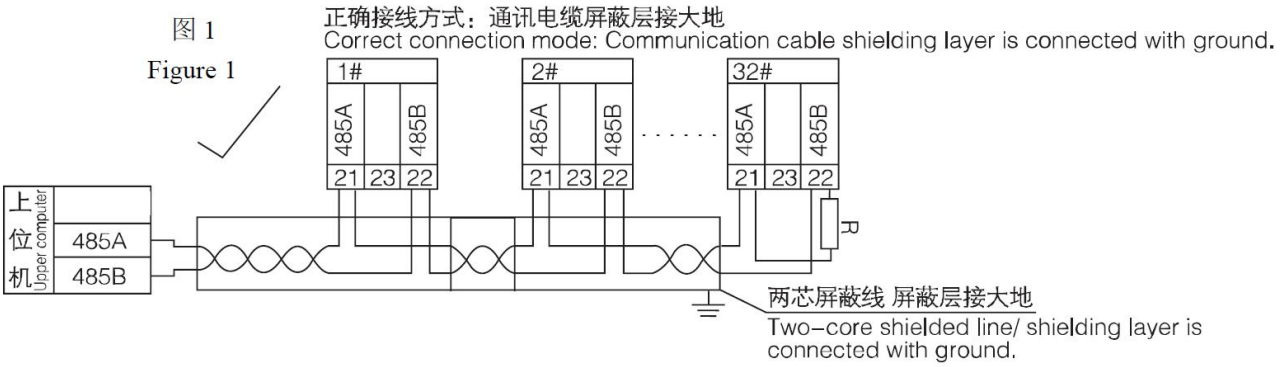
Two-core shield cable is recommended for communication connection. Its wire diameter is not less than 0.5mm2 , connecting A B respectively , shielded layer single point to connect the earth or dangling .When wiring, the communication line shall be far away from strong current cable and other strong electric field environment.

关于通讯部分的接线实例如下图所示：

For connection mode in communication section are shown as following:

图 1

Figure 1




建议最末端仪表的 A、B 之间加匹配电阻，阻值范围为 120Ω～10kΩ。

Recommendation of adding matched resistance between A , B of the last meter, the rated resistance range is 120Ω~10kΩ.

## 5 操作说明 Operating description

### 5.1 按键功能说明 Key function description

表 4 按键功能说明

Table 4 Key function description

| 面板按键类别<br>Key symbol | 按键功能<br>Function |
|---|---|
| SET 键(SET )<br>SET ( SET) | 功能切换或返回上一级菜单<br>Return to previous menu or Function switching |
| 左键( ◀ )<br>Left ( ◀ ) | 子菜单左移或减小数据。<br>Same level menu shifting left or reducing data |
| 右键( ▶ )<br>Right ( ▶ ) | 子菜单右移或增大数据。<br>Same level menu shifting right or increasing data. |
| 回车键( ↵ )<br>Enter （↵） | 进入下一级菜单或确认。<br>Enter Next level menu or Confirm. |
| 左键+回车键(◀ + ↵ )<br>Left+ enter （◀ + ↵ ) | 编程模式下，该组合键用于百位数的减小<br>In programming mode, this key combination is used for the reduction of hundreds of digits. |
| 右键+回车键(▶ + ↵ )<br>Right + enter ( ▶ + ↵ ) | 编程模式下，该组合键用于百位数的增加<br>In programming mode, this key combination is used to increase the hundred digits. |

注：组合键使用时，可以先按住左右键，然后按回车键。

**Note: When using the combination key, you can firstly press the left or right key and then press the Enter key.**

## 5.2 编程菜单 Programming menu

### 5.2.1 菜单符号及意义 Menu symbol and its meaning

表 5

table 5

| 第一级菜单<br>First menu | 第二级菜单<br>Second menu | 第三级菜单<br>Third menu | 说明<br>Description |
|---|---|---|---|
| SYS | CodE | 0～9999 | 密码设置（初始密码 0001）<br>Password setting (initial password 0001) |
| | bLCd | 0～255 | LCD 背光控制，设置为 0 时，背光常亮，设为 0-255 时，背光在亮 0-255 秒后熄灭<br>LCD backlight control, when set to 0, the backlight is always on, when set to 0-255, the backlight is off after 0-255 seconds |
| | AL-F | ON/OFF | 选择报警时屏幕是否闪烁<br>Whether the screen flashes when alarming |
| In | LinE | 3P3L、3P4L | 接线方式(三相三线、三相四线)<br>注：仅三相电压<br>Electrical network (3-phase 3-wire, 3-phase 4-wire)<br>Note: just for 3 phase voltage |
| | In. I<br>（In.U） | 1A、5A<br>（100V、400V、660V） | 输入电流范围<br>(输入电压范围)<br>Current rated value<br>(Voltage rated value) |
| | In.Ct<br>（In.Pt） | 0～9999 | 电流变比<br>（电压变比）<br>Current ratio<br>(Voltage ratio) |
| | H | -9999～9999 | 满度显示<br>Full scale display |
| | L | -9999～9999 | 零点显示<br>Zero display |
| | U.P（A.P） | 0～3 | 显示值小数点<br>Decimal point<br>of current (voltage) display |
| | 2 | -9999～9999 | 零点屏蔽值<br>Shielding value<br>of zero display |
| bUS | Addr | 1～247 | 通讯地址<br>Communication address |

| | | | |
|---|---|---|---|
| | bAUd | 1.2、2.4、4.8、<br>9.6、19.2、38.4 | 通讯波特率<br>（例 9.6 表示 9600bps）<br>Baud rate<br>(Example 9.6 means 9600bps) |
| | nodE | None/2bit/odd/even | 通信模式<br>（无校验、2 位停止位、奇校验、偶校验）<br>Communication mode<br>(No parity check、2-bit stop bit、odd parity check、even parity check) |
| tr.1-tr.3 | SEL | 1，2，3 | 模拟量输出项目选择<br>Analog output selection |
| | tYPE | 4～20mA 或 0～20mA<br>4～20mA or 0～20mA | 输出范围<br>Output type |
| | Ro.H i | 0～9999 | 高变送数值设置<br>High analog value setting |
| | Ro.Lo | 0～9999 | 低变送数值设置<br>Low analog value setting |
| do.1-do.2 | SEL | 0. do/1. AL | 报警项目选择<br>Alarm selection |
| | dLY | 0～20 | 报警延时或远程控制延迟时（s）<br>Alarm delay or remote control delay (s) |
| | bAnd | 0～9999 | 不动作带设置<br>No action band setting |
| | AL.Hi | 0～9999 | 高报警数值设置<br>High alarm value setting |
| | AL.Lo | 0～9999 | 低报警数值设置<br>Low alarm value setting |
| | AL.-b | 0～100 | 不平衡报警设定（%）<br>Unbalance alarm setting (%) |
| | In.=0 | Lo. on/Lo. of | 信号为 0 时是否允许低报警<br>Whether alarm is allowed when the signal is 0 |
| UEr | | | 仪表版本号及编号<br>Version |

## 5.3 功能设置与使用 Setting and use

编程示例以流程图的形式介绍改变编程菜单中的某些选项，如电流倍数、模拟量输出设置、开关量输出设置等。

The programming example introduces some of the options in the programming menu, such as current ratio, analog output setting, and switching output setting etc.

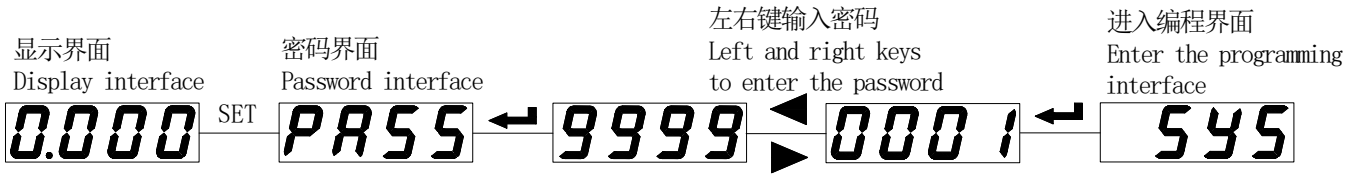
**注：在设置或选择完成后，需按回车键进行确认，确认完成后连续点按 SET 键直到出现 SAVE/YES 页面，此时必须按回车键确认，否则设置无效。**

**Note: After the setting or selection is completed, press the Enter key to confirm. After confirming the completion, press the SET key until the SAVE/YES page appears. At this time, you must press the Enter key to confirm, otherwise the setting is invalid.**

5.3.1 如何进入编程界面 How to enter the programming menu

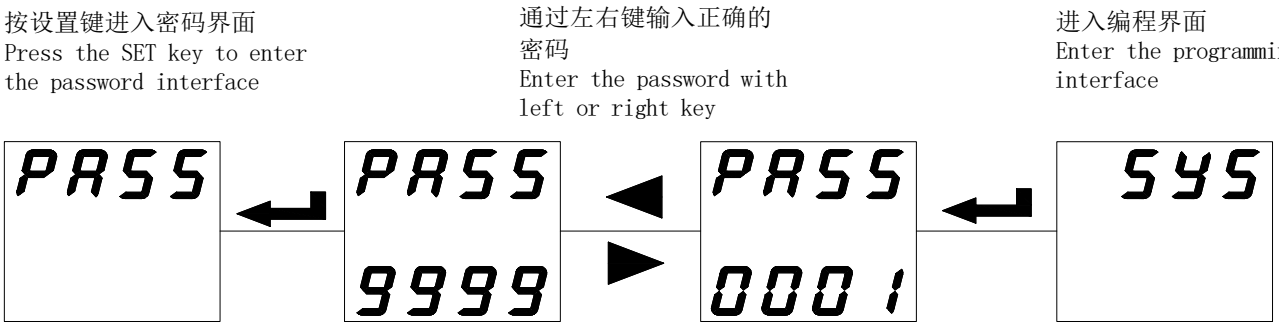
**单相：**

Single phase:




**三相：**

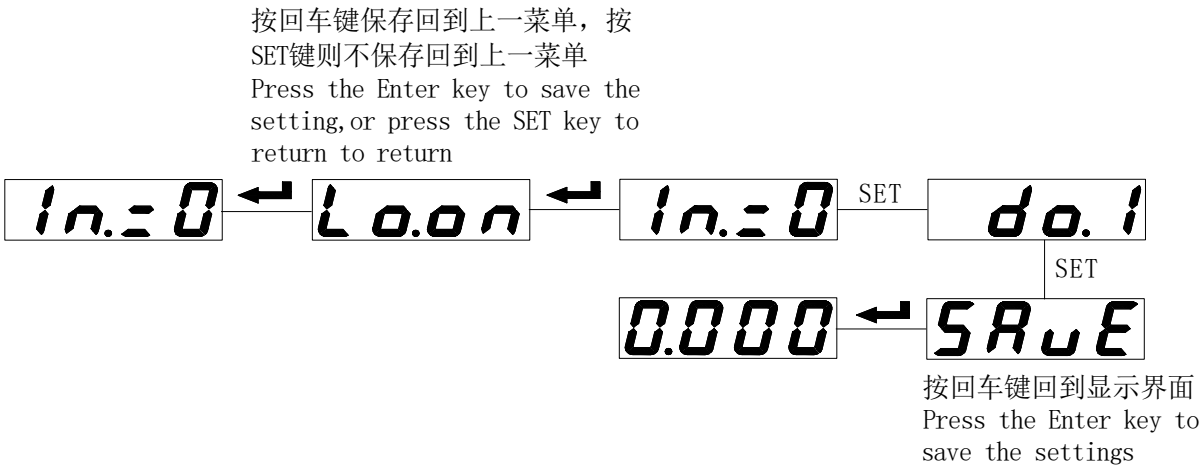
Three phase:




5.3.2 如何保存修改后的参数 How to save the modified parameters

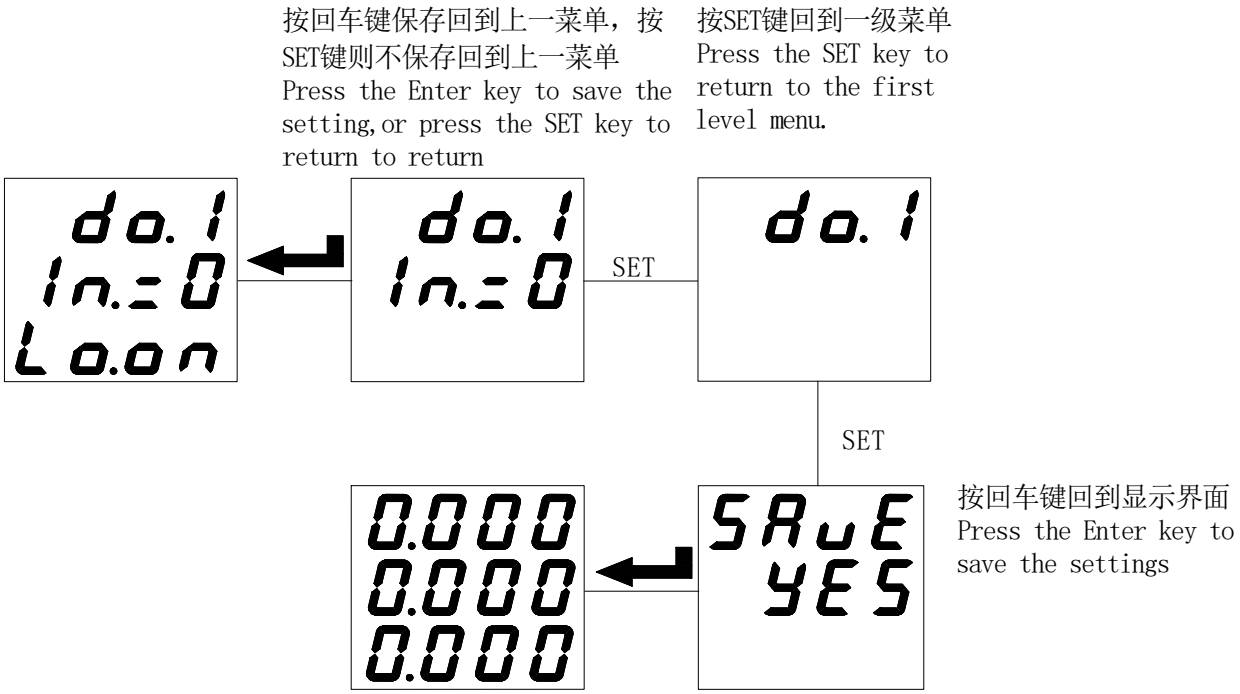
单相：

Single phase:



三相：

Three phase:



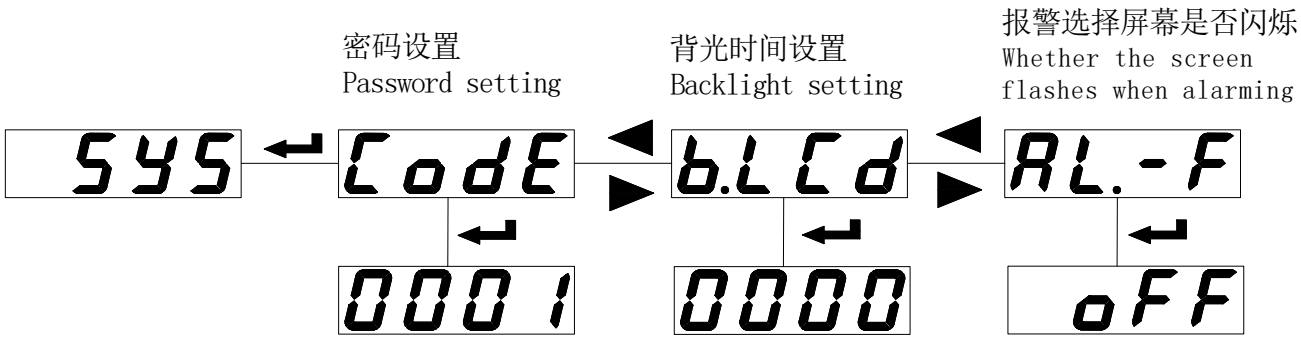

**注：不需要设置一个参数保存一个，可以把所有的参数设置完成之后按上述步骤进行保存。**

**Note: You do not need to save the parameter after modifying one. You can save all the parameters after modifying them as described above.**

5.3.3 如何修改密码，背光时间等 How to modify the password, backlight time etc.

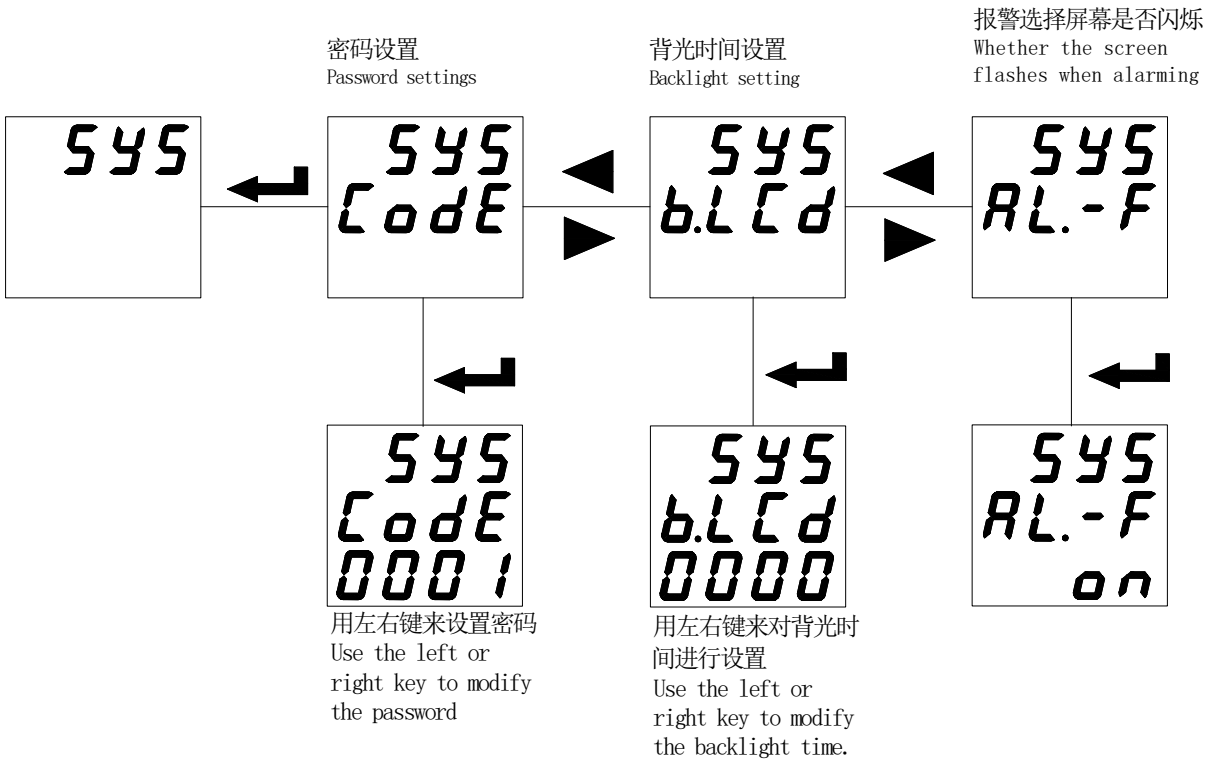
单相：

Single phase:



三相：

Three phase:




进入编程菜单，左右键选择 LCd 页面，按回车键进入修改状态；左右键进行液晶背光时间修改 000～255s，此项对 LED 显示仪表无效。

000：表示液晶背光常亮；

250：表示液晶背光在按键 250 秒内无操作后，背光关闭，以延长背光使用寿命。

Enter the programming menu, press left or right key to select the LCd page, press Enter key to enter revising condition, left or right key to modify the time to 000 ~ 255s.To LED display meter, this item is invalid.

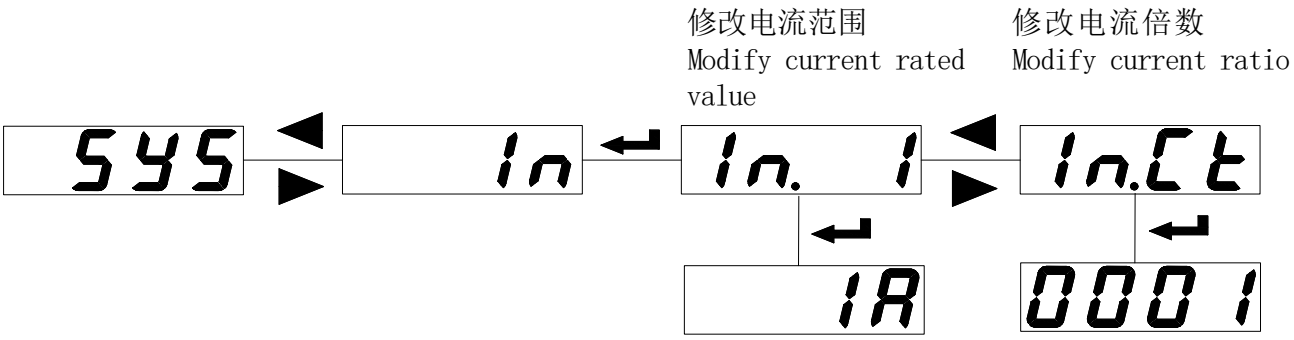
000: the LCD backlight is always on;

250: the LCD backlight has no backlight after 250 seconds, and the backlight is turned off to extend the life of the backlight.

5.3.4 如何修改电流范围和电流倍数 How to modify the current rated value and current ratio

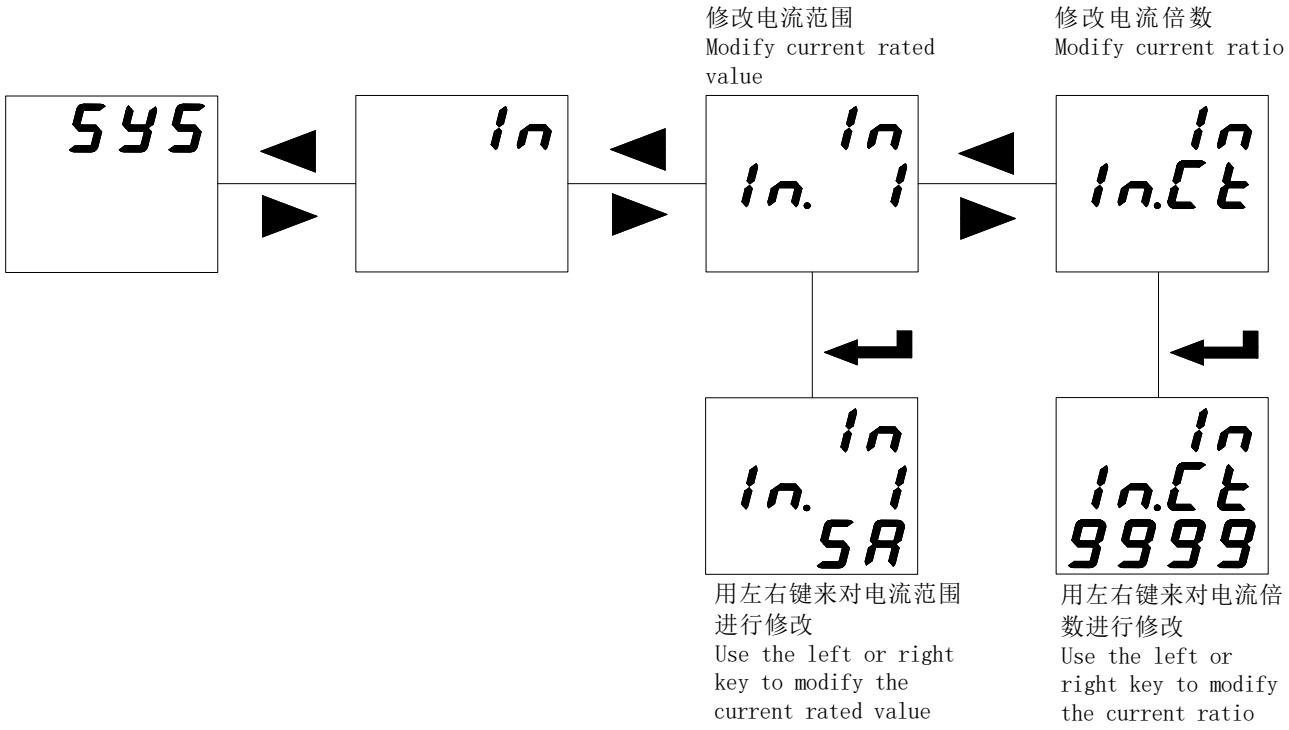
单相：

Single phase:




三相：

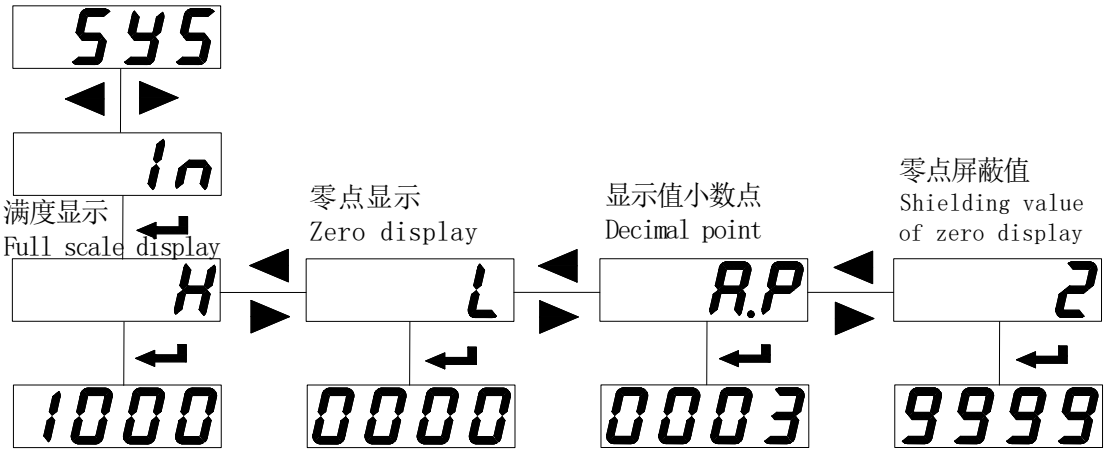
Three phase:




**注：IN.I 为输入电流范围，IN.U 为输入电压范围；IN.CT 为电流变比设置，IN.PT 为电压变比设置。**

**Note: IN.I is the current rated value , IN.U is the input voltage rated value; IN.CT is the current ratio, and IN.PT is the voltage ratio.**

5.3.5 如何修改直流显示值 How to modify the DC display value




**直流电压表菜单与此类似，只有一处不同：U.P 替代 A.P；**

The DC voltage meter is the same, only one difference: U.P replaces A.P;

当零点屏蔽值设定为正时，表示显示值在设定范围内都显示为 0，即：|显示值|≤设定值，显示都为 0（图 6）；当设定值为负时，表示显示值≤设定值时，显示都为设定值（图 7）。

When the zero shielding value is set to positive, it means that if | display value | ≤ set value, the display value is 0(Fig. 6); When the set value is negative, then the display value is set value when the display value ≤ set value (Fig. 7).

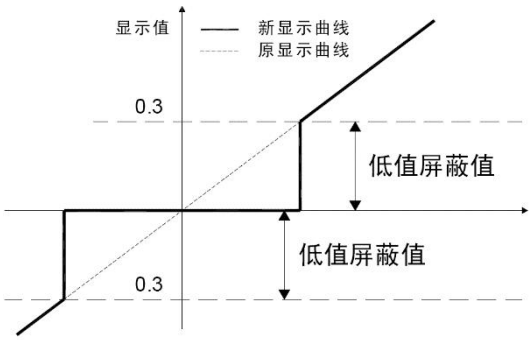



图 6

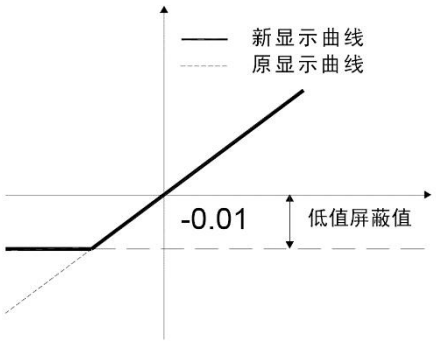



图 7

**直流表设置 DC meter setting**

H：直流高点显示值；L：直流零点显示值，A.P(U.P):显示小数点

H: DC high point display value; L: DC zero point display value, A.P (U.P): Display decimal point

**输入信号低点为 0 时：**

When the low point of the input is 0:

例：输入 0-75mV，对应显示为 0-1000A,设定：H：1000，L：0，A.P:0;则当实际输入为 37.5mV 时，显示为（1000-0）*（37.5/(75-0)）= 500.

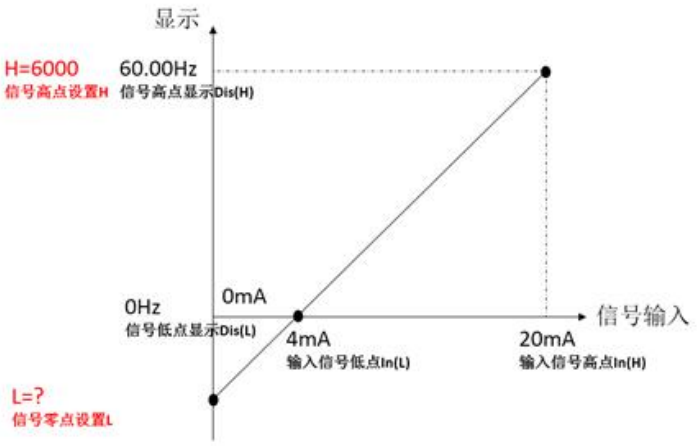
For example：The input signal is 0-75mV, and the relative display needs to be 0-1000A, then the setting will be: H: 1000, L: 0, A.P: 0. So when the input is 37.5mV, the display will be 500 ((1000-0)*(37.5/(75-0))).

**输入信号低点不为 0 时：**

When the low point of the input is not 0:

例：输入 4-20mA，对应显示为 0-60.00Hz,对应关系图如下：

For example: The input signal is 4-20mA, and the display needs to be 0-60.00Hz, then the chart of the relationship will be as follows:




设定：H：6000，根据上图关系求 L，(In(H)-In(L))/In(L) = (Dis(H)-Dis(L))/(DisL-L)，L = 0-（6000-0）*4/(20-4) = -1500。A.P:2；则当实际输入为 4mA 时，显示为（6000-0）*（4/20）+（-1500）= 0Hz.

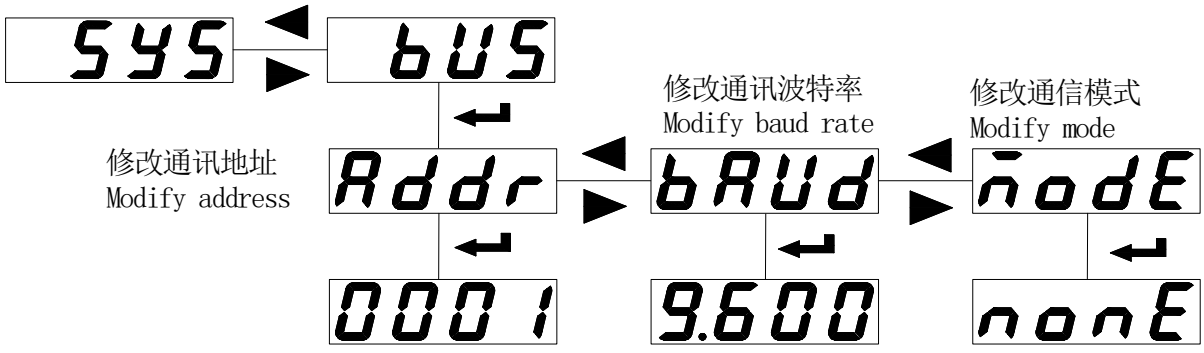
Setting: H: 6000, fi We can get L according to the chart: (In (H)-In (L))/In (L) = (Dis (H)-Dis (L))/ (Dis (L)-L). So L= 0 – (6000-0) * 4 / (20 – 4) = -1500

A.P:2; so when the input is 4 mA, the display will be (6000-0) * (4/20) + (-1500) = 0Hz

5.3.6 **如何修改通讯地址、通讯波特率以及通信模式** How to modify the communication address, communication baud rate and communication mode

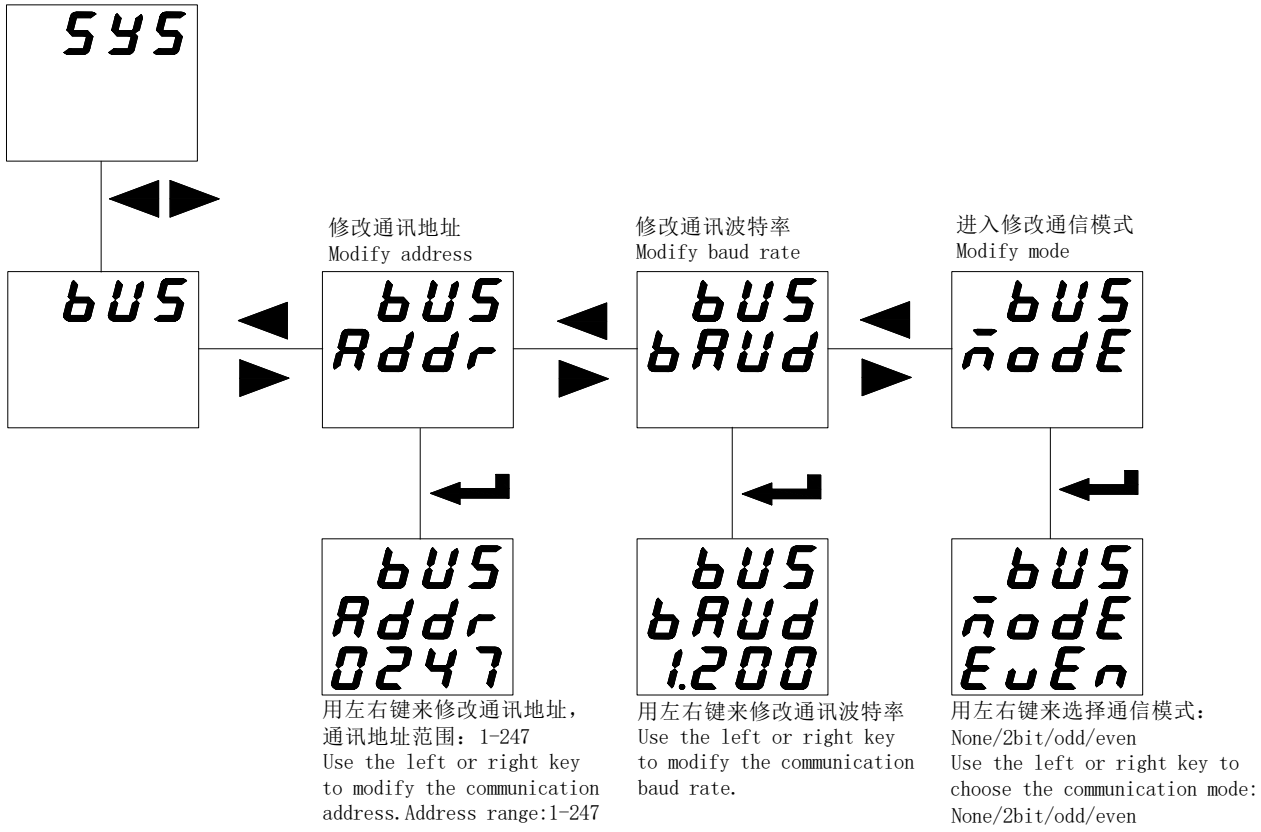
单相：

Single phase:




三相：

Three phase:




5.3.7 如何修改模拟量输出项目，输出范围以及高低变送数值

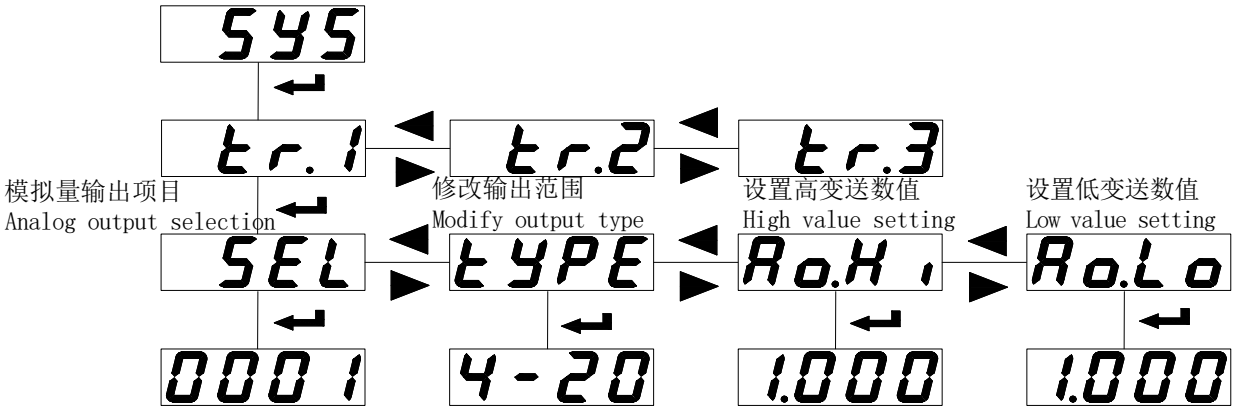
How to modify the analog output parameter, the output range and the high and low values

表 6

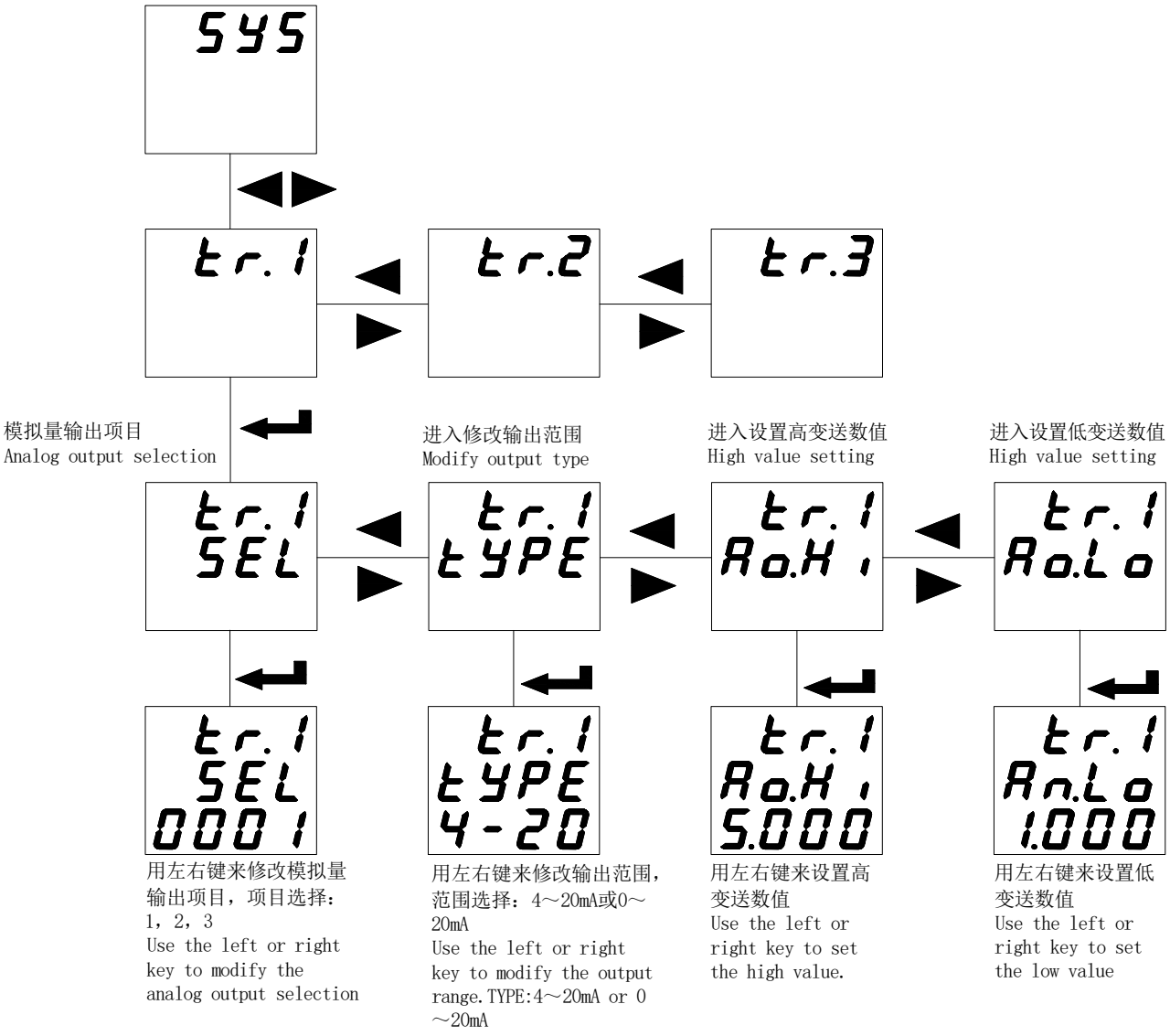
Table 6

<table>
<tr><td>tr.1</td><td>第一路变送<br>First analog output</td></tr>
<tr><td>SEL</td><td>模拟量输出项目选择<br>Analog output selection<br><table><tr><td>0001</td><td>0002</td><td>0003</td></tr><tr><td>U1/I1</td><td>U2/I2</td><td>U3/I3</td></tr></table></td></tr>
<tr><td>tYPE</td><td>4～20mA 或 0～20mA<br>4～20mA or 0～20mA</td></tr>
<tr><td>Ao.Hi</td><td>模拟量输出 20mA 时对应的电参量，取最高四位整数（小数点忽略）不足末位补 0。<br>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.</td></tr>
<tr><td>Ao.Lo</td><td>类似 Ao.Hi<br>Same as Ao.Hi</td></tr>
</table>

单相：Single phase:




三相 Three phase:




5.3.8 如何修改报警项目，设置报警延时，设置高低报警数值以及不平衡报警设定（1 路报警与 2 路报警相同）
How to modify the alarm item, set the alarm delay, set the high and low alarm value and the unbalance alarm setting (1 way alarm is the same as 2 way alarm)

表 7

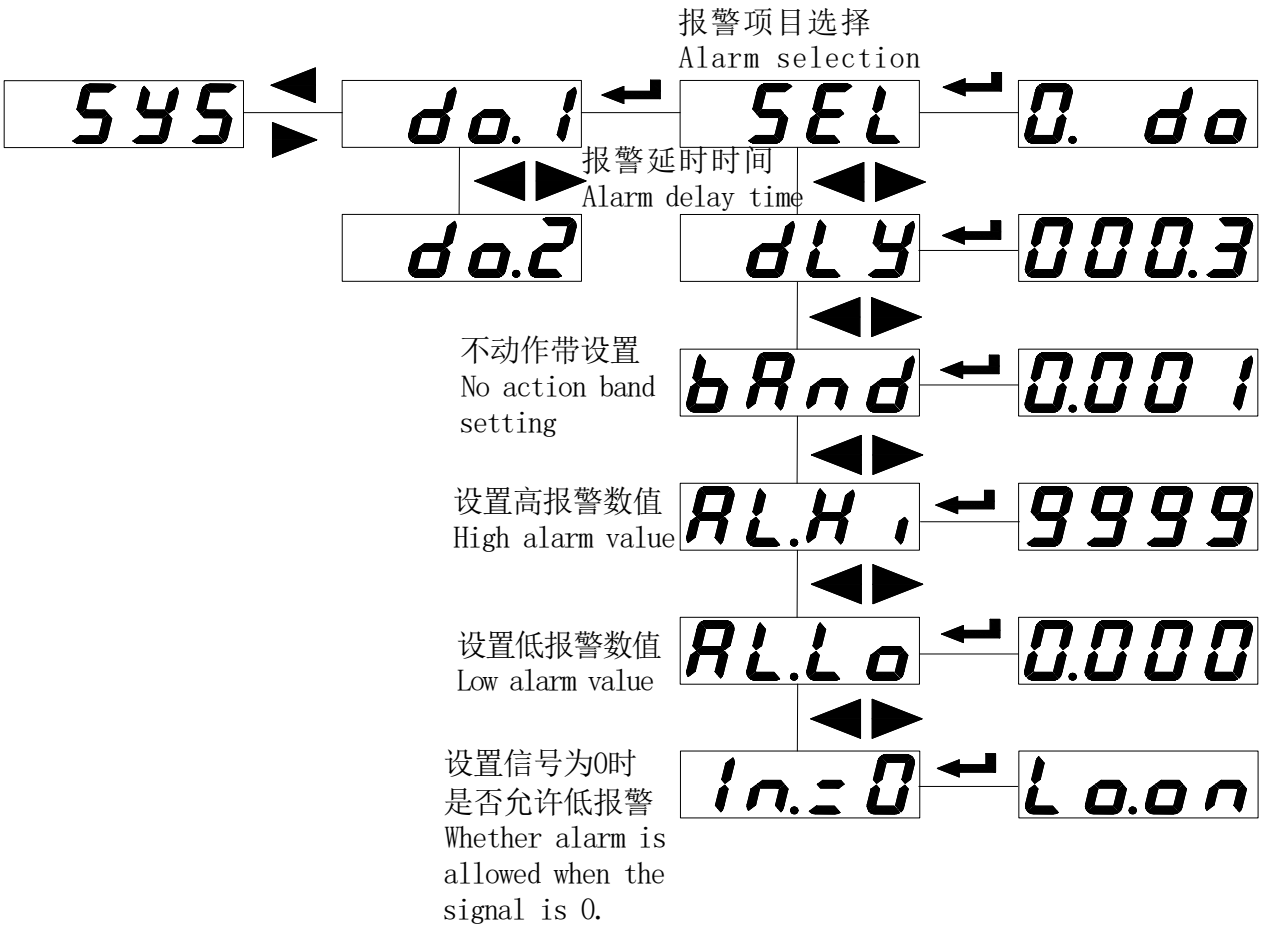
Table 7

<table>
<tr><td>do.1</td><td>第一路开关量<br>First switching output</td></tr>
<tr><td>SEL</td><td>报警项目设置<br>Alarm setting<table><tr><td>0. do</td><td>1. AL</td></tr><tr><td>遥控<br>remote<br>control</td><td>报警<br>alarm</td></tr></table></td></tr>
<tr><td>dLY</td><td>当报警项目 SEL 为 00 时（遥控），DLY 表示开关量动作后持续时间，<br>当报警项目 SEL 不为 00 时（报警），DLY 表示开关量动作前延时时间。<br>When the SEL is 00 (remote control), DLY indicates the duration after the switching amount is</td></tr>
</table>

| | |
|---|---|
| | activated.<br>When the alarm item SEL is not 00 (alarm), DLY indicates the delay time before the switching action. |
| bAnd | 不动作带设置<br>No action band setting |
| AL.Hi | 高报警数值设置（不用设置最大 9999）<br>High alarm value setting (do not set the maximum 9999) |
| AL.Lo | 低报警数值设置（不用设置最小 0）<br>Low alarm value setting (do not set minimum 0) |
| In.=0 | 信号为 0 时是否允许低报警，Lo.on 使能，Lo.of 禁止<br>Whether low alarm is allowed when the signal is 0, Lo.on is enabled, Lo.of is forbidden |

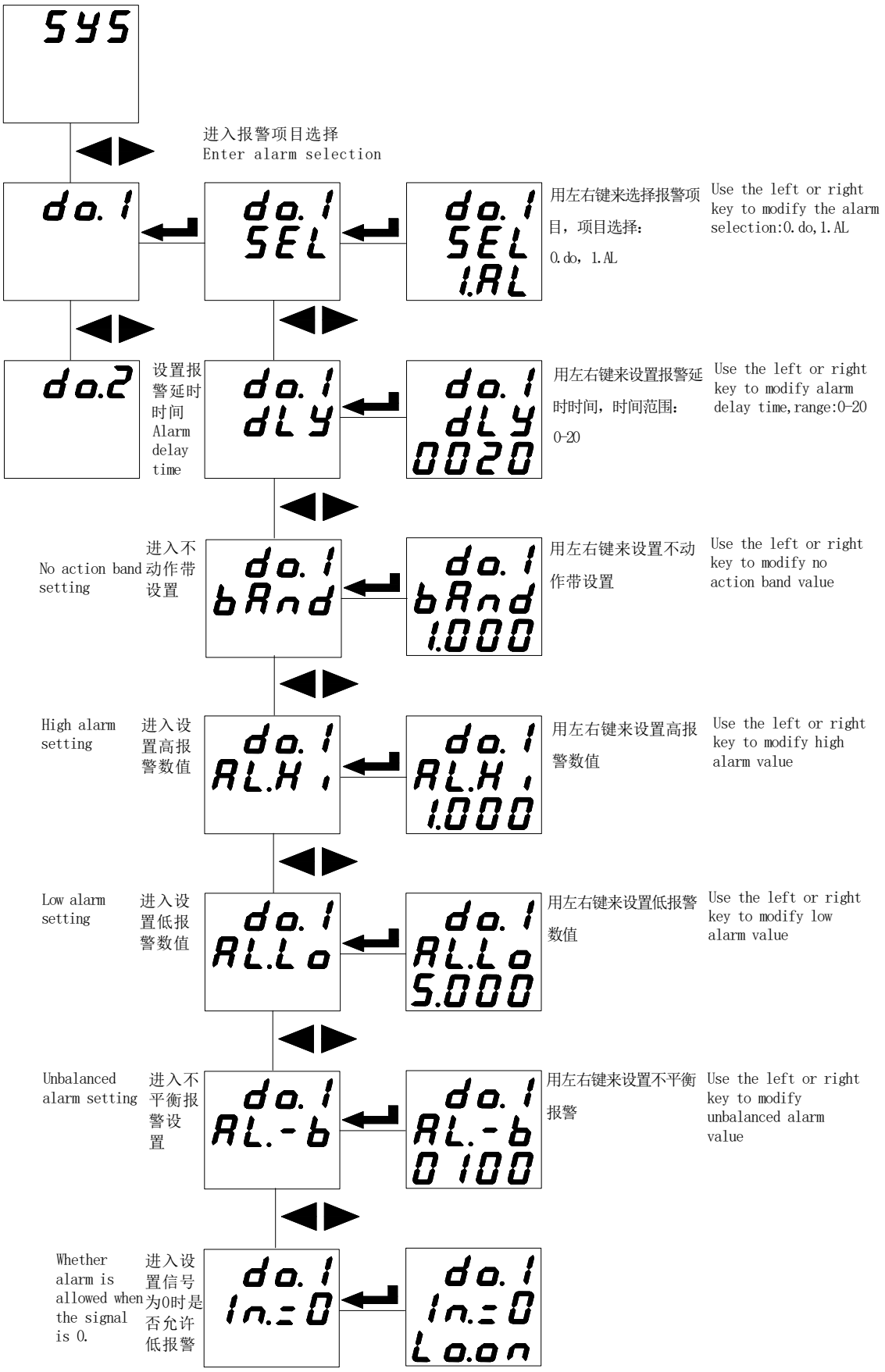
单相：

Single phase:




三相：

Three phase




**注：1.不动作带设置、高报警数值设置和低报警数值设置与电量的显示值对应，显示中含小数点。例：输入**

100A/5A，100%电流时高报警，95%返回；20%电流时低报警，25%返回，“AL.Hi”可设 100.0，“AL.Lo”可设 020.0，“bAnd”设 005.0；

2.不平衡计算

（最大值-最小值）/额定值（平均值小于额定值）

（最大值-最小值）/平均值（平均值大于等于额定值）

**Note: 1. No action band setting, high alarm value setting and low alarm value setting correspond to the display value of the meter, and the value contains a decimal point. Example: Input 100A/5A, 100% current high alarm, 95% return; 20% current low alarm, 25% return, "AL.Hi" taken as 100.0, "AL.Lo" taken as 020.0, "bAnd" taken as 005.0;**

**2.Unbalance calculation**

**( maximum value –minimum value)/rated value (average value is less than rated value)**

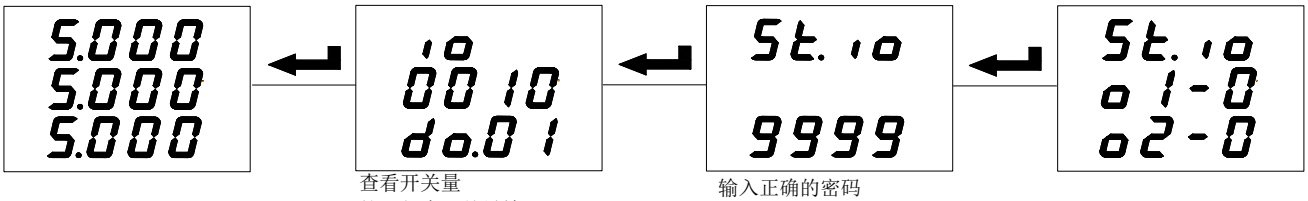
**( maximum value –minimum value)/ average value (average value is greater than or equal to the rated value)**

## 5.4 查看开关量显示以及报警状态 View switching display and alarm status

### 5.4.1 查看开关量 View switching

查看 AMC96(L)三相电流（同三相电压）的开关量流程：

View the switching status of AMC96 (L) three-phase current meter (same three-phase voltagemeter):

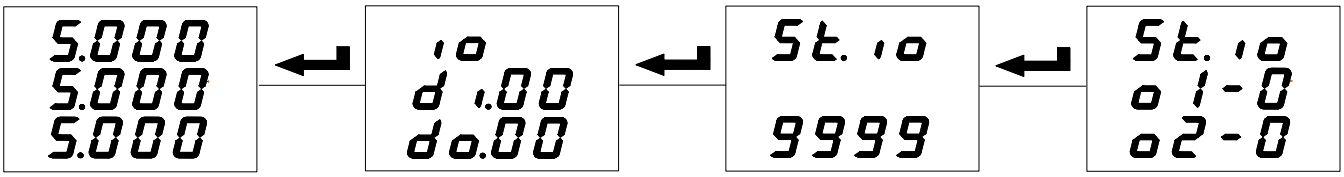



查看开关量
第二行为开关量输入
第三行为开关量输出
View switching input/output
The 2nd line is switching input
The 3rd line is switching output

输入正确的密码
Enter the password

查看 AMC72(L)三相电流（同三相电压）的开关量流程：

View the switching status of AMC72 (L) three-phase current meter (same three-phase voltage meter):

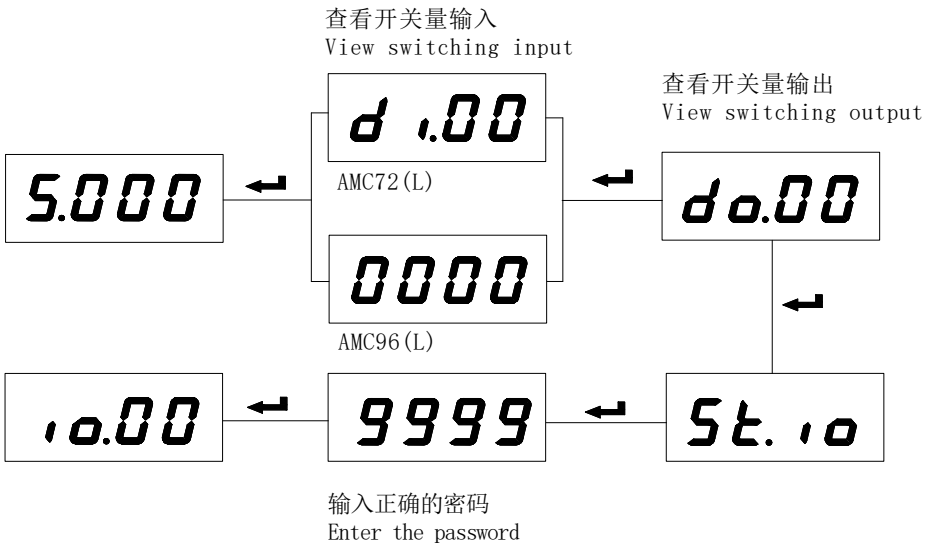



查看开关量
第二行为开关量输入
第三行为开关量输出
View switching input/output
The 2nd line is switching input
The 3rd line is switching output

输入正确的密码
Enter the password

查看 AMC72/96(L)单相电流（同单相电压）的开关量流程：

View the switching status of AMC72/96(L) single-phase current meter(same single-phase voltage meter):




液晶(LCD)显示方式仪表，在正常测量状态下就有开关量输入/输出指示，无需按快捷键查看。

The liquid crystal (LCD) display meter has a switching input/output indication under normal measuring condition, without pressing the shortcut key to look over.

在查看开关量状态页面，按一下回车键，进入本地开关量输出(继电器)控制页面(St.io)，左右键输入保护密码（出厂设置：0000），回车确认进入；数字闪烁表示可修改，按左键选择需修改项，按右键进行修改，按回车键确认修改；如果需要同时控制两路继电器，应先全部修改后，再按回车键确认。

When look over switching condition page, press down ENTER, Enter local switching output (relay) control page (St. io), press left/right key to enter protective password (Default Value; 0000), press ENTER to confirm enter; the data flashes indicate revisability, press left key to select revising item, press right key to do revising, press ENTER to confirm revising; If Control two channel relay is needed, firstly, finishing all the revising, then press ENTER to confirm.

5.4.2 **查看报警状态** View alarm status

报警状态（正常测量时，按住右移键，可查看报警信息）

Alarm status (for normal measurement, press and hold the right shift key to view the alarm information)

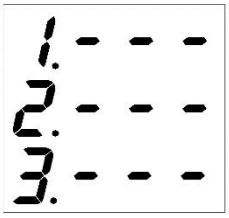
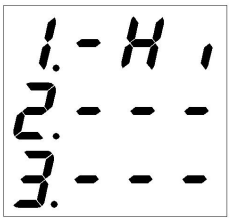
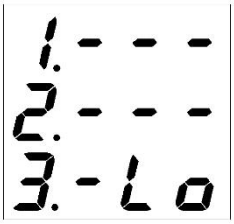
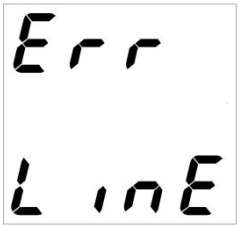
AMC72/96 系列单相仪表报警状态：

AMC72/96 series single-phase meter alarm status:

| | | | |
|---|---|---|---|
| ---- | A-H i | A-Lo | 测量值为 0 时不报警<br>No alarm when the value is 0 |
| 正常<br>normal | I 过高<br>I too high | I 过低<br>I too low | |

AMC72/96 系列三相仪表报警状态：

AMC72/96 series three-phase meter alarm status:

| | | | | |
|---|---|---|---|---|
|  |  |  |  | 三相数据全为 0 时不报警<br>No alarm when three-phase data is 0 |
| 正常<br>normal | U1(I1)过高<br>U1(I1) is too high | U3(I3)过低<br>U3(I3) is too low | 不平衡或缺相<br>Unbalanced or none-full phase | |

# 6 通讯 Communication

## 6.1 概述 General

AMC 系列仪表采用与 Modbus-RTU 的协议：“9600，8，n，1”，其中 9600 为默认波特率，如果需要可通过编程修改为 2400、4800、19200 等， 8 表示有 8 个数据位；n 表示无奇偶校验位；1 表示有 1 个停止位。

错误检测：CRC16（循环冗余校验）

AMC Series meter adopt Modbus-RTU protocol: "9600, 8，n, 1", in it 9600 is default baud rate, based on request, it can be revised as 2400，4800 , 19200 etc., 8 indicate have 8 data bit; n indicate no parity bit; 1 indicate have one stop bit.

Error detecting: CRC16 (cyclic redundancy check)

## 6.2 协议 Protocol

当数据帧到达终端设备时，它通过一个简单的“端口”进入被寻址到的设备，该设备去掉数据帧的“信封”（数据头），读取数据，如果没有错误，就执行数据所请求的任务，然后，它将自己生成的数据加入到取得的“信封”中，把数据帧返回给发送者。返回的响应数据中包含了以下内容：终端从机地址（Address）、被执行了的命令（Function）、执行命令生成的被请求数据（Data）和一个 CRC 校验码（Check）。发生任何错误都不会有成功的响应，或者返回一个错误指示帧。

When Data frame reach terminal device, it enter addressed device by a simple "port", this device remove Data frame "envelope"(data head), read data, if there is no error, executing task requested by data, then, add the new produced data in the obtained "envelope", return the data frame to the transmitter. Returned responding data include following content: slave terminal address (Address), executed command (Function), requested data produced by executing command (Data) and one CRC check code (Check). If any error occur, no successful responding or returning one error indication frame.

### 6.2.1 数据帧格式 Data frame format

| 地址<br>**Address** | 功能<br>**Function** | 数据<br>**Data** | 校验<br>**Check** |
|---|---|---|---|
| 8-Bits | 8-Bits | N×8-Bits | 16-Bits |

### 6.2.2 地址域 Address domain

地址域在帧首，由一个字节（8-Bits，8 位二进制码）组成，十进制为 0～255，在本仪表中只使用 1～247，其它地址保留。这些位(Adress)标明了用户指定的终端设备的地址，该设备将接收来自与之相连的主机数据。同一总线上每个终端设备的地址必须是唯一的，只有被寻址到的终端才会响应包含了该地址的查询。当终端

发送回一个响应，响应中的从机地址数据便告诉主机是哪台终端正与之通信。

Address domain: address domain is located at beginning of frame, composed of one byte (8 bit binary system domain), decimal system is 0-255, in our system, just 1-247 is used, other address is Reserved, these bits indicate terminal device address specified by users, this device will receive the connecting host computer data. Every terminal device has its only one address, only the addressing terminal is responding enquiry including this address. When terminal is Transmitting one responding, the responding slave address data tell host computer that which terminal is communicating with it.

### 6.2.3 功能域 Function domain

功能域代码告诉了被寻址到的终端执行何种功能。下表列出了该系列仪表用到的功能码，以及它们的意义和功能。

Function domain: function domain tell the addressed teminal to excute what function， Below table list: function domain used in this Series meters, and their meaning and function。

| 代码（十六进制）<br>Code(hex) | 意义<br>Meaning | 行　为<br>Operation |
|---|---|---|
| 03H | 读取保持寄存器<br>Read holding register | 在一个或多个保持寄存器中取得当前的二进制值<br>Obtain current binary system value of one or multiple holding register |
| 10H | 预置多寄存器<br>Present multiple register | 把具体的二进制值装入一串连续的保持寄存器<br>Set actual binary system value into a series of continuous holding register |

### 6.2.4 数据域 Data fields

数据域包含了终端执行特定功能所需的数据或终端响应查询时采集到的数据。这些数据可能是数值、参量地址或者设置值。

例如：功能域告诉终端读取一个寄存器，数据域则需要指明从哪个寄存器开始及读取多少个数据，内嵌的地址和数据依照类型和从机之间的不同而内容有所不同。

Data field： data field is including the data needed by terminal for executing specific function, or the collected data when terminal is responding enquiry . Content of these data may be value, reference address or setting value.

For example: The function domain tell terminal to Read one register, the data field need to specify the starting register and Read how many data, the built-in address and data have different content depending on type and slave computer.

### 6.2.5 错误校验域 Error check domain

该域采用 CRC16 循环冗余校验，允许主机和终端检查传输过程中的错误。有时由于电噪声和其它干扰，一组数据从一个设备传输到另一个设备时，在线路上可能会发生一些改变，错误校验能够保证主机或从机不去响应那些发生改变的数据，这就提高了系统的安全性、可靠性和效率。

This domain adopt CRC16 cyclic redundancy check, for host computer and terminal, the error in checking and transmitting is allowable. Due to electric noise and other interfere, when one group of data is transmitting from one device to another device, on the transmitting line, some change may be produced. The error check can enable the host computer or slave computer not responding those changed data, so, safety, reliability and efficiency of system are upgraded.

## 6.3 错误校验码的生成方法 Method to create error check code (CRC)

错误校验（CRC）域占用两个字节，包含了一个 16 位的二进制值。CRC 值由传输设备计算出来，然后附加

到数据帧上，接收设备在接受数据时重新计算 CRC 值，然后与接收到的 CRC 域中的值进行比较，如果这两个值不相等，就发生了错误。

CRC 运算时，首先将一个 16 位的寄存器预置为全 1，然后连续把数据帧中的每个字节中的 8 位与该寄存器的当前值进行运算，仅仅每个字节的 8 个数据位参与生成 CRC，起始位和停止位以及可能使用的奇偶位都不影响 CRC。在生成 CRC 时，每个字节的 8 位与寄存器中的内容进行异或，然后将结果向低位移位，高位则用“0”补充，最低位（LSB）移出并检测，如果是 1，该寄存器就与一个预设的固定值（0A001H）进行一次异或运算，如果最低位为 0，不作任何处理。

Error check (CRC) domain occupy 2 byte, including one 16 bit binary system value. CRC value is calculated by transmission device, then attached to the data frame, the receiving device, while receiving, it calculates the CRC value again, then comparing it with the receiving CRC domain value, if these two values is not equal, it shows a error occurs.

When operating, firstly, preset one 16-bit register as All-1, then continuously operating each byte 8 bit of Data frame and current value of this register, only every 8 data bit of each byte to participate in forming CRC the start bit and stop bit and usable parity bit have no affect on the CRC. When forming CRC, every 8 data bit of each byte and content of register carry out exclusive or operation, then shift the result to the low bit the high bit is filled with 0, shift out the least significant bit (LSB) is shifted out and tested, if it is 1， this register and one preset fixed value (0A001H) carry out one exclusive or operation, if the least significant bit is 0，no treating is needed.

CRC 生成流程：

1 预置一个 16 位寄存器为 0FFFFH（全 1），称之为 CRC 寄存器。

2 把数据帧中的第一个字节的 8 位与 CRC 寄存器中的低字节进行异或运算，结果存回 CRC 寄存器。

3 将 CRC 寄存器向右移一位，最高位填 0，最低位移出并检测。

4 如果最低位移出为 0：重复第 3 步（下一次移位）；如果最低位移出为 1：将 CRC 寄存器与一个预设固定值（0A001H）进行异或运算。

5 重复第 3 步和第 4 步直到 8 次移位。这样就处理完了一个完整的 8 位。

6 重复第 2 步到第 5 步来处理下一个 8 位，直到所有的字节处理结束。

7 最终 CRC 寄存器的值就是 CRC 的值。

此外还有一种利用查表计算 CRC 的方法，它的主要特点是计算速度快，但是表格需要较大的存储空间，该方法此处不再赘述，请查阅相关资料。

Flow for forming one CRC:

1、Preset one 16 bit register as OFFFFH (All-1), called as CRC register.

2、8 bit of data frame first byte and low byte of CRC register carry out exclusive or operation, then save its result back to CRC register.

3、Right shift CRC register for one bit, the most significant bit is filled with O, the least significant bit is shifted out and tested.

4、If the least significant bit is 0, Repeat the third step (next shift); If the least significant bit is 1, CRC register and preset fixed value specified (0A001H) carry out exclusive or operation.

5、Repeat the third step and the fourth step until shift for 8 times, the complete 8 bit is done.

6、Repeat the second step to the fifth step to treat next 8 bit until all the byte is treated.

7、The CRC register final value is CRC value.

Besides, there is another CRC calculation method by preset table, its main feature is fast calculating speed, but large saving space is needed, please refer to related data

## 6.4 通讯参量地址表（Word）

### 6.4.1 通讯参量地址表（Word）Communication parameter address meter (word)

表 8

Table 8

| 地址<br>Address | 内容<br>Content | | 简要说明<br>Brief Explanation | 简要说明<br>Brief Explanation |
|---|---|---|---|---|
| | 单相<br>Single phase | 三相<br>Three phase | | |
| 0000H | Ua 有效值<br>Ua effective value | Ua 有效值<br>Ua effective value | | 读写属性：R — 读；W — 写除 002aH 为部分可写外，均为只读。<br>Read/Write：R-read;W-write<br>The 002aH is partial writable,the rest is read-only. |
| 0001H | Ua 指数位<br>Ua exponent bit | Ua 指数位<br>Ua exponential | | |
| 0002H | Ia 有效值<br>Ia effective value | Ub 有效值<br>Ub effective value | | |
| 0003H | Ia 指数位<br>Ia exponent bit | Ub 指数位<br>Ub exponential | | |
| 0004H | | Uc 有效值<br>Uc effective value | | |
| 0005H | | Uc 指数位<br>Uc exponential | | |
| 0006H | | Ia 有效值<br>Ia effective value | | 说明：<br>① “—” 表示保留字或保留位。<br>② 电压、电流等数据数值计算方法：<br>读数 = 有效值×10E(指数位-3)<br>Explanation:<br>①“—”indicate Reserved word or Reserved bit.<br>② voltage, current etc. data numerical value **Computing Method: Reading = Effective value ×10E ( Exponential-3)** |
| 0007H | | Ia 指数位<br>Ia exponential | | |
| 0008H | | Ib 有效值<br>Ib effective value | | |
| 0009H | | Ib 指数位<br>Ib exponential | | |
| 000aH | | Ic 有效值<br>Ic effective value | | |
| 000bH | | Ic 指数位<br>Ic exponential | | |
| .... | — 保留字 Reserved word | | | |
| 0010H | PT | | 电压变比<br>Voltage ratio | |
| 0011H | CT | | 电流变比<br>Current ratio | |
| 0012H | 报警及 I/O<br>Alarm and I/O | | | |
| … | — 保留字 Reserved word | | | |
| 002aH | | 报警及 I/O<br>Alarm and I/O | | |
| 002bH | | PT | 电压变比<br>Voltage ratio | |
| 002cH | | CT | 电流变比<br>Current ratio | |
| … | — 保留字 Reserved word | | | |

| | | | |
|---|---|---|---|
| 0060H<br>0061H | UA 电压<br>UA voltage | 三相三线时为线电压<br>$U_{L-N}$ when three-phase three-wire<br>三相四线时为相电压<br>$U_{L-L}$ when three-phase three-wire<br>单相电压表：仅 UA<br>Single phase voltage meter:only UA | 数据类型：float<br>Type of data: float<br>单位：V<br>Unit：V |
| 0062H<br>0063H | UB 电压<br>UB voltage | | |
| 0064H<br>0065H | UC 电压<br>UC voltage | | |
| 0066H<br>0067H | IA 电流<br>IA current | 三相表：Three phase meter<br>三相电流 Three phase current<br>单相电流表：仅 IA<br>Single phase current meter :only IA | 数据类型：float<br>Type of data: float<br>单位：A<br>Unit：A |
| 0068H<br>0069H | IB 电流<br>IB current | | |
| 006AH<br>006BH | IC 电流<br>IC current | | |

说明：

电压、电流、功率等数据数值计算方法：（例见：6.5.1 读数据）

读数 = 有效值×10E（指数位-3）

Description:

Voltage and current calculating method: (example see 6.5.1 Reading data)

Reading = virtual value╳10E(exponent bit-3)

报警及开关量输入/输出状态字：

Alarm switching input / output status Character:

| 15 | … | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| — | | | AL.L | AL.H | DI1 | DI2 | — | | — | | DO1 | DO2 |
| (R) 高、低报警指示<br>(R) H、L alarm indication | | | | | (R) 1 闭合，0 断开<br>(R) 1 closing, 0 opening | | | | (R/W) 1 闭合，0 断开<br>(R/W) 1 closing, 0 opening | | | |

| 15 | … | 13 | 12 | 11 | 10 | 9 | 8 | 7 | … | 0 |
|---|---|---|---|---|---|---|---|---|---|---|
| — | | | H.L | A.-H | A.-L | U.-H | U.-L | 开关量输入/输出状态<br>Switching input/output status | | |
| | | | 功率因数低报警<br>Low power factor alarm | 电流高、低报警<br>High, Low alarm of current | | 电压高、低报警<br>High, Low alarm of voltage | | 与上表同<br>Same as above | | |

## 6.5 通讯应用 Communication application

本节所举实例尽可能采用下表格式（数据为 16 进制）

Actual example, the whole way adopt format of below table (data as Hex)

| Addr | Fun | Data start | | Data #of | | CRC16 | |
|---|---|---|---|---|---|---|---|
| | | reg Hi | reg Lo | reg Hi | reg Lo | Lo | Hi |
| 01H | 03H | 00H | 00H | 00H | 06H | C5H | C8H |
| 地址<br>Address | 功能码<br>Function code | 数据起始地址<br>Data start address | | 数据读取个数<br>Data read number | | 循环冗余校验码<br>CRC code | |

6.5.1 读数据 Read data

例 1：读三相电压表数据

Example 1: Read Three phase voltage meter data

| | |
|---|---|
| 查询数据帧<br>Inquiry Data frame | 01 03 00 00 00 06 c5 c8 |
| 返回数据帧<br>Return Data frame | 01 03 0c 08 ab 00 02 08 ac 00 02 08 ac 00 02 1b 05 |

说明：

01：从机地址

03：功能码

0c：十六进制，十进制为 12，表示后面有 12 个字节的数据

1b 05：循环冗余校验码

数据处理方法见 6.4 通讯参量地址表。

处理如下：08 ab(16 进制)=2219(10 进制)

08 ac(16 进制)=2220(10 进制)

00 02(16 进制)=2 (10 进制)

计算：$2219\times10^{2-3}$ = 221.9；$2220\times10^{2-3}$ = 222.0

单位：伏特（V）

Explanation:

01: Slave address

03:Function code

0c: Hex, Decimal as 12, indicate: 12 byte data rearwards

1b 05: cyclic redundancy check code Data processing method see: 6.4 communication parameter address meter

Processing as follows: 08 ab(hex)=2219(decimal)

08ac ( hex)=2220 ( decimal)

0002 ( hex)=2 (decimal)

Calculation: $2219\times10^{2-3}$ = 221.9；$2220\times10^{2-3}$ = 222.0

Unit: Volt (V)

则仪表显示：

Meter display:

| | |
|---|---|
| U1 | 221.9 |
| U2 | 222.0 |
| U3 | 222.0 |

读电流表数据与读电压表类似，但起始地址为 06H，查询帧：01 03 00 06 00 06 25 c9

读其它信息的查询帧与此格式相同，各信息地址见 6.4 通讯参量地址表。

Reading voltage meter data is similar with that of reading current meter, but starting address is 06H, Query frame: 01 03 00 06 00 06 25 c9

Reading inquiry frames of other information is same as this format, each information address see: 6.4 communication parameter address meter.

例 2：读单相电流数据

Example2: Read single-phase current data

| | |
|---|---|
| 查询数据帧<br>Inquiry Data frame | 01 03 00 02 00 02 65 cb |
| 返回数据帧<br>Return Data frame | 01 03 04 03 b2 00 00 5a 50 |

说明：

01：从机地址

03：功能码

04：十六进制，十进制为 4，表示后面有 4 个字节的数据

5a 50：循环冗余校验码

数据处理方法见：6.4 通讯参量地址表

处理如下：03 b2(16 进制) = 946 (10 进制)

00 00(16 进制) = 0 (10 进制)

计算：$946\times10^{0-3}$ = 0.946；

单位：安培（A）

Description:

01: Slave address

03: Function code

04: Hex, decimal system is 4, means there are 4 byte data

5a 50; Cyclic redundancy check code Data processing method see: 6.4 communication parameter address table

Data processing：03b2 (Hex) = 946 ( decimal system) 00 00( Hex) = 0 (decimal system)

Calculation: $946\times10^{0-3}$ = 0.946;

Unit: A

则仪表显示：

Display:

| | |
|---|---|
| I | 0.946 |

6.5.2 写数据 Write data

例 3：单相开关量输出远程控制（控制字：0012H）

Example3: Single phase switching output remote control (control character: 0012H)

| | |
|---|---|
| 写入数据帧<br>Read in data frames | 01 10 00 12 00 01 02 00 02 24 e3 （DO1 闭合）<br>01 10 00 12 00 01 02 00 02 24 e3 (DO1 closing)<br>01 10 00 12 00 01 02 00 01 64 e2 （DO2 闭合）<br>01 10 00 12 00 01 02 00 01 64 e2 (DO2 closing)<br>01 10 00 12 00 01 02 00 03 e5 23 （DO1、DO2 闭合）<br>01 10 00 12 00 01 02 00 03 e5 23 (DO1、DO2 closing) |
| 返回数据帧<br>Return Data frame | 01 10 00 12 00 01 A1 CC（不成功，无返回）<br>01 10 00 12 00 01 A1 CC（If no data returning indicate setting is unsuccessful） |

说明：

向开关量输出状态位远程写入 1，则闭合；写入 0，则断开。

当继电器闭合持续时间为非 0 时，表示继电器工作在脉冲方式，继电器闭合持续时间为所设值；若持续时间设置为 0，则表示继电器工作在保持方式。

Description:

To switching output status bit, remote write in 1, then closing; read in 0，then opening.

When relay closing duration is Nonzero, indicate: relay adopt pulse mode, relay closing duration as setting value; if duration setting as 0, then indicate: relay adopt holding mode。

例 2：三相开关量输出远程控制（控制字：002aH）

Example 2: Three phase switching output remote control (control word: 002aH)

| | |
|---|---|
| 设置数据帧<br>Setting Data frame | 01 10 00 2a 00 01 02 00 02 20 5b （DO1 输出）<br>01 10 00 2a 00 01 02 00 02 20 5b (DO1 closing)<br>01 10 00 2a 00 01 02 00 01 60 5a （DO2 输出）<br>01 10 00 2a 00 01 02 00 01 60 5a (DO2 closing)<br>01 10 00 2a 00 01 02 00 03 e1 9b （DO1、DO2 输出）<br>01 10 00 2a 00 01 02 00 01 60 5a (DO1、DO2 closing) |
| 返回数据帧<br>Return Data frame | 01 10 00 2a 00 01 20 01（若无数据返回表示设置不成功）<br>01 10 00 2a 00 01 20 01 (If no data returning indicate setting is unsuccessful) |

## 7 常见故障分析 Common fault analysis

表 9 常见故障分析排除

Table 9 Common Fault Analysis

| 故障内容<br>Fault content | 分析<br>Analysis | 备注<br>Remarks |
|---|---|---|
| 上电无显示<br>No display after power on | 检查电源电压是否在工作电压范围内<br>Check Aux power voltage is within the range | |
| 电压电流电能等读数不正确<br>Voltage or current is incorrect | 检查电压电流变比设置是否正确<br>检查电压互感器，电流互感器是否完好<br>Check the voltage/current ratio<br>Check voltage transformer/current transformer is intact | |
| 通讯不正常<br>Communication failure | 检查通讯设置中地址，波特率，校验位等是否与上位机一致<br>检查 RS485 转换器是否正常<br>通讯末端并联 120 欧姆以上电阻<br>检查接线是否正确<br>Check whether the address, baud rate, check digit, etc. in the communication settings are consistent with the host computer.<br>Check RS485 converter is working<br>Add resistance at the end of communication<br>Check wiring is correct | |

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