# ES925 Series 3 Phase Intelligent Energy Meter User Manual


This series meters are widely applied to control system, SCADA system and energy management system, transformer substation automation, distributing net automation, residence community electrical power monitor, industrial automation, intelligent construction, intelligent switchboard, switch cabinet, etc. It is easy to install and maintain, simple connection, programmable setting parameters on meters or computer.

## Features:

- ⊙Measure Items: 3 phase Voltage/Current/Active Power/Reactive Power/Frequency /Power Factor etc, totally 28 parameters
- ⊙Two switch input and two switch output (4 switch input can be ordered )
- ⊙True effective value measurement
- ⊙With RS485 interface，Modbus RTU communication protocol
- ⊙With forward and backward kwh record function. It can record the import and export kwh separatedly

## ⚠ Warning

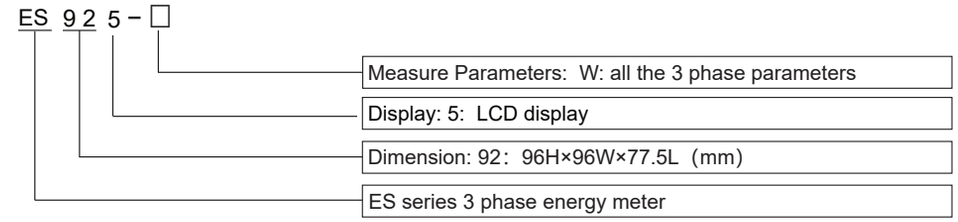
An accident may happen and product may be damaged if operation does not comply with the instruction.

SOMMY National High-tech Enterprise National Standard Draft Unit



KKES925-C01E-A/0-20210416

## I. Model Illustration




## II. Model Example

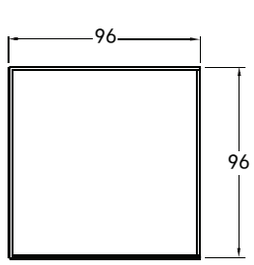
| Model | Alarm or remote control | Communication | Switch input or output |
|---|---|---|---|
| ES925-W | 2 | RS485 | 2 |

## III. Main Technical Parameters

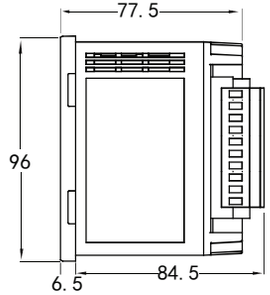
| | |
|---|---|
| Connection | 3 Phase 3 Wires, 3 Phase 4 Wires |
| Voltage range | AC 10-480V(L-L) |
| Voltage overload | Continuous: 1.2 times Instantaneous: 2 times/10S |
| Voltage consumption | <1VA (each phase) |
| Voltage impedance | ≥300KΩ |
| Voltage accuracy | RMS measurement, accuracy class 0.5 |
| Current range | AC 0.025~5A |
| Current overload | Continuous: 1.2 times Instantaneous: 2 times/2S |
| Current consumption | <0.4VA (each phase) |
| Current impedance | <20mΩ |
| Current accuracy | RMS measurement, accuracy class 0.5 |
| Freqency | 45~60Hz, accuracy 0.01Hz |

| | |
|---|---|
| Power | Active / Reactive / Apparent power, accuracy 0.5 class |
| Energy | Active Energy 1 class, Reactive Energy 2 class<br>Note: Kwh counting adopt 6 Integer + 2 decimal , when counting to 999999.99, it turns to 7 integer + 1 decimal counting mode .<br>And when counting to 9999999.9, it count from 0 again. Totally counting kwh can be 10, 000,000 kilowatt. |
| Display | LCD big screen display |
| Power supply | AC/DC 100~240V (85～265V) |
| Power supply consumption | ≤5VA |
| Output digital interface | RS-485, MODBUS-RTU Protocol |
| Switch Input | 2 switch input (Dry contact mode) |
| Alarm output | 2 switch output, 250VAC/3A or 30VDC/5A |
| Work environment | Temperature: -10~50℃, Humidity:<85% RH; Non-corrosive Gas; altitude ≤2500m |
| Storage environment | -40~70℃ |
| withstand voltage | Power supply , 485 interface , DI interface ≥DC 2000V |
| insulation | input, output, power supply VS meter cover＞ 5MΩ |
| Dimension | 96H×96W×61.5L (mm) |
| Weight | 0.5kg |

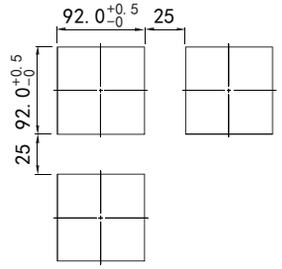
## IV.Dimension and Mounting Size (unit:mm)




Panel Size



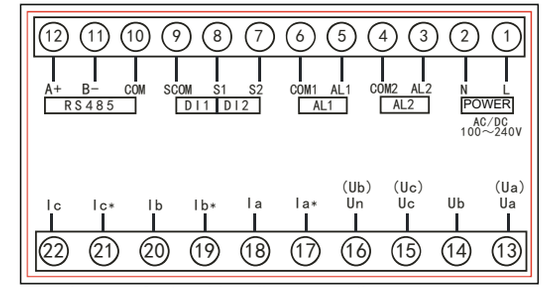

Side-face Size




Open hole size



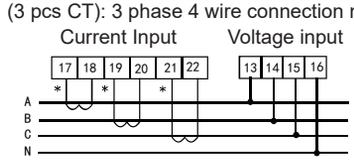
## V. Wire connection



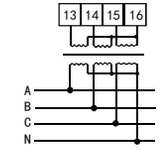

please refer to wiring diagram on the meter case

For voltage input terminals, the numbers in parentheses indicate 3 phase 3 wire connection method

Mode 1 (3 pcs CT): 3 phase 4 wire connection mode

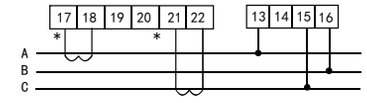



Current input via CT Voltage direct input

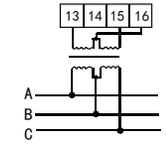



Voltage input via PT

Mode 2 (2 pcs CT): 3 phase 3 wire connection mode




Current input via CT Voltage direct input




Voltage input via PT

Explanation:

A. Voltage input: Input voltage should not be higher than the rated input voltage of meter, otherwise a PT should be used.

B. Current input: Standard rated input current is 5A. A CT should be used when the input current is bigger than 5A. If some other meters are connected with the same CT, the connection should be serial for all meters.

C. Please make sure that the input voltage is corresponding to the input current, they should have the same phase sequence and direction, otherwise the error may occur (power and energy).

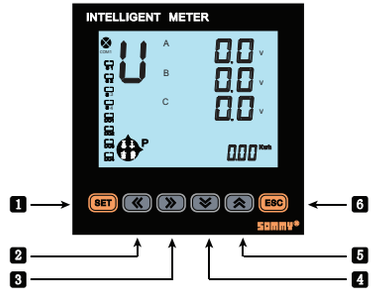
D.The connection mode of meter which is connected to power network should depend on CT quantity. For 2pcs of CT, it should be3 phase 3 wire connection. For 3 pcs of CT, it should be 3 phase 4 wire connection.The input network menu setting should accord to the connection mode of the measured load. Otherwise, the measured voltage or power is incorrect.

E. Please pay attention to the difference between 3 phase 3 wire and 3 phase 4 wire connection. Wrong connection may lead to incorrect calculation of power factor, power and energy.

Caution:

1.Power supply connection must be correct.
2.Pay attention on the phase sequence of voltage signal input.
3.Current signal input should be connected as per the connection drawing.
4.Connection mode should accord to the setting of user menu “LIN”.
5.Energy pulse output is open collector output.
6. Isolation between power supply and circuid board, in case of leakage switch wrong action

## VI.Panel Indication




| Item | Symbol | Name | Function | |
|---|---|---|---|---|
| 1 | SET | Set Key | △Press this key for 5s to enter the menu | △To confirm the modified menu value |
| 2 | « | Left Key | △Shift menu and move data postion in menu operation | △To shift measure interface outside of the menu |
| 3 | » | Right Key | △Shift menu and move data postion in menu operation | △To shift measure interface outside of the menu |
| 4 | ˅ | Decrease Key | △Enter data modification in menu operation | △To shift energy page outside of the menu |
| 5 | ˄ | Increase Key | △Enter data modification in menu operation | △To shift energy page outside of the menu |
| 6 | ESC | Return Key | △For backspace in menu operation | △Back to previous menu |

Measure and display interface illustration:

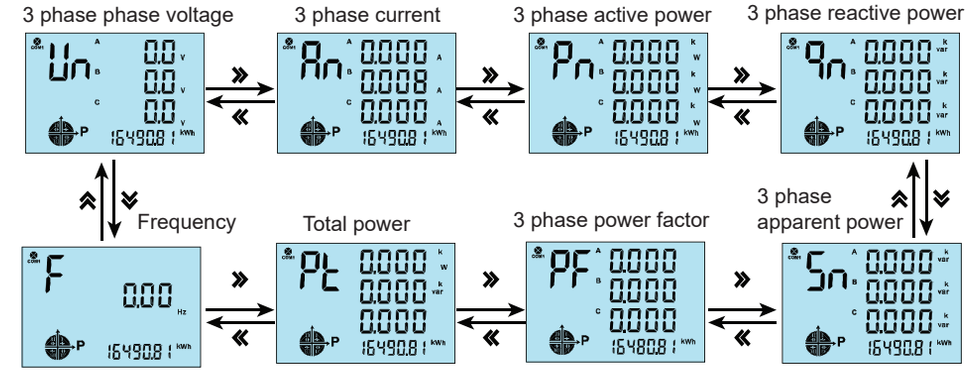
1. Under Measure Status, Press " « / » " key to switch display 3 phase phase voltage, line voltage, current, active power, reactive power, power factor, total power, frequency, etc.
2. Press " ˄ / ˅ " key to switch display total Kwh , forward Kwh, backward Kwh, total Kvarh , forward Kvarh, backward Kvarh.
3. DO1, DO2: In Alarm Mode: used as alarm output status indication. Under switch remote control mode, indicate switch output status .
4. S1, S2, S3, S4 as switch remote control input status indicate; 2 switch input as default
5. COM flashing means communicate is acting.
6. P(Kwh) means Total Active Energy (algebraic sum of forward active energy and backward active energy); Q(Kvarh) means Total Reactive Energy (algebraic sum of forward reactive energy and backward reactive energy).

Note:Representation method of 26 English letters

| English letter | A | B | C | D | E | F | G | H | I | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Display | A | b | C | d | E | F | G | H | I | J | K | L | M |
| English letter | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| Display | n | o | P | q | r | S | t | U | v | w | X | y | Z |

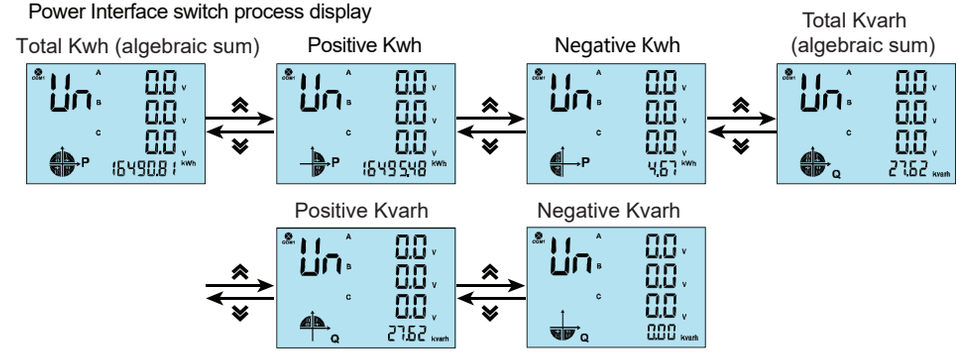


Meaurement Interface Switch Display Process




(note: in 3 phase 3 wire status only dislay 3 phase line voltage, current, total active power, reactive power, total power factor, frequency )

Power Interface switch process display




## VII. Menu Modification Instruction

Under measurement interface status :

1. Press SET Key more than 5 seconds, if setting password, it will pop up a dialog box, input the correct password to enter into user menu, to modify parameter.
2. If the present display is 1st level, press SET Key enter into next level display, press " « " " » " key to change menu subitems.
3. If the present display is 2nd or 3rd level, press ESC Key, return to previous display.
4. If present display is 3rd level, press " ˅ ", " ˄ " to flash the digit, press" « ", " » " to move position , press" ˅ ", " ˄ " Key to modify value; press SET Key to save setting value when flashing; if press ESC Key, set value will not be saved and return to the 2nd level display.
5. After modifying the parameters, press SET Key more than 5 seconds or press ESC Key to exit user menu and enter into measuring status.

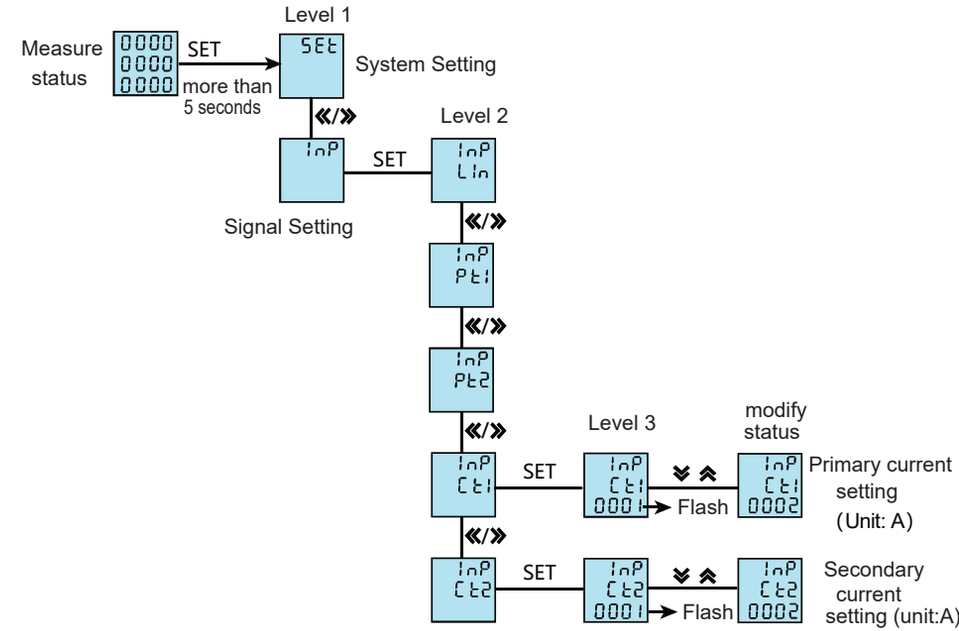
Menu Structure and Function Description

| 1st level | 2nd level | 3rd level | Description |
|---|---|---|---|
| SEt System setting | Clear Energy CLrE | 0000 | When input 1111, user can clear energy ; When input 1234, reset menu to default setting . |
| | User Password USEr | 0000 | modify password, factory default setting 0000, no password . |
| | Backlight time bLt | 0000 | backlight lighting delay time, unit “second”. When value is “0” , it keeps on lighting. |
| | primary secondary select PtCt | SECd/Pr i | SECD means display secondary energy. PRI means display primary energy. |
| | Page turing time PGCH | 0000 | measurent interface shift time, unit second. Set as 0 , no page shift. |
| | Software version VEr | 1.1 | Software version, read only |
| Signal setting InP | Link Lin | 3-3 / 3-4 | Set power net input mode, 3 phase 3 wire or 3 phase 4 wire |
| | Voltage transform Pt1 | 0.1-999.9 | Primary voltage, unit KV |
| | Voltage transform Pt2 | 10.0-999.9 | Secondary voltage, unit KV |
| | Current transform Ct1 | 1-9999 | Primary current, unit A |
| | Current transform Ct2 | 1.0-999.9 | Secondary current, unit A |
| communication setting CoM | Address Add | 1-247 | Meter address range |
| | Baud rate brd | 4K8/9K6/19K2 | Baud rate. 4K8 means 4800, 9K6 means 9600, 19K2 means 19200 |
| | Data sequence dtF | H-L / L-H | high register is in front or low register is in front |
| | Parity bit PrtY | no/EVEn/odd | No parity / even parity / odd parity |
| Alarm setting AL | Alarm mode Ad1 | 1-58 | When value is DO, it is remote control mode, otherwise it is alarm mode, please refer to alarm output parameters table. |
| | Alarm value unit Ut1 | 1/K/M | 1: means international standard unit, K: 1000 times of international standard unit, M: 1000000 times of international standard unit. |
| | Alarm value AL1 | 0-999.9 | 1st alarm value setting (unit:standard unit) |
| | Hysteresis HY1 | 0-999.9 | 1st alarm hysteresis value setting |
| | Alarm relay select out1 | rLY1/rLY2 | 1st alarm relay output select(when alarm mode is not DO) |
| | Alarm delay dLA1 | 0-99.9 | Alarm action delay time, unit: second |
| | Alarm reset time dLb1 | 0-99.9 | Alarm action reset time, unit: second |
| | second alarm setting refer to first alarm parameters setting | | |

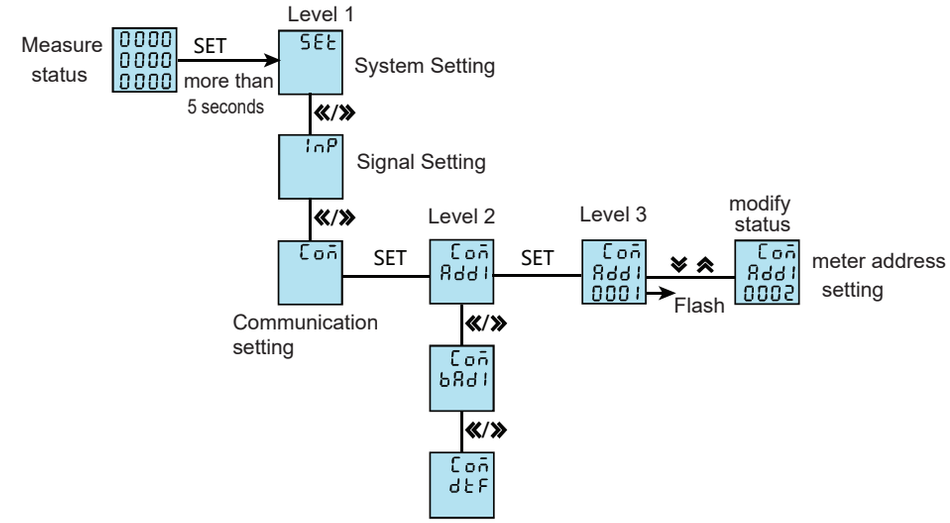


Note: Menus modification example

eg1. Set CT (current transformer) ratio method




eg2. Set communication address



Reference table : Reference table for alarm output electric parameters

1. DO1 , DO2 function can be used for remote control electric equipments. When using this function, set the alarm mode as 0(DO), otherwise DO1, DO2 used as AL1, AL2 output. DO1, DO2 function control can set set by RS485.
2. After the meter power on and running for 5seconds , alarm function begin to work normally.

Reference table for alarm output electric parameters

| No. | Item | Switch output low alarm code | Switch output high alarm code |
|---|---|---|---|
| 1 | Ua(A phase voltage) | 1 UaL (UabL) | 2 UaH (UabH) |
| 2 | Ub(B phase voltage) | 3 UbL (UcaL) | 4 UbH (UcaH) |
| 3 | Uc(C phase voltage) | 5 UcL (UbcL) | 6 UcH (UbcH) |
| 4 | U(A/ B/ C any phase voltage) | 7 UL (ULL) | 8 UH (ULH) |
| 5 | Ia(A line current) | 9 IaL | 10 IaH |
| 6 | Ib(B line current) | 11 IbL | 12 IbH |
| 7 | Ic(C line current) | 13 IcL | 14 IcH |
| 8 | I(A/ B/ C any line current) | 15 IL | 16 IH |
| 9 | P(total active power) | 17 PL | 18 PH |
| 10 | Pa(A phase active power) | 19 PaL | 20 PaH |
| 11 | Pb(B phase active power) | 21 PbL | 22 PbH |
| 12 | Pc(C phase active power) | 23 PcL | 24 PcH |
| 13 | Q(total reactive power) | 25 QL | 26 QH |
| 14 | Qa(A phase reactive power) | 27 QaL | 28 QaH |
| 15 | Qb(B phase reactive power) | 29 QbL | 30 QbH |
| 16 | Qc(C phase reactive power) | 31 QcL | 32 QcH |
| 17 | S(total apparent power) | 33 SL | 34 SH |
| 18 | Sa(A phase apparent power) | 35 SaL | 36 SaH |
| 19 | Sb(B phase apparent power) | 37 SbL | 38 SbH |
| 20 | Sc(C phase apparent power) | 39 ScL | 40 ScH |
| 21 | PF (Total power factor) | 41 PFLL | 42 PFLH |
| 22 | PFa(A phase power factor) | 43 PFaL | 44 PFaH |
| 23 | PFb(B phase power factor) | 45 PFbL | 46 PFbH |
| 24 | PFc(C phase power factor) | 47 PFcL | 48 PFcH |
| 25 | F frequency | 49 FL | 50 FH |
| 26 | EP (Total active energy) | 51 (EPL) | 52 (EPH) |
| 27 | EQ (Total reactive energy) | 53 (EQL) | 54 (EQH) |
| 28 | Unbalanced difference | 55 (UNNB) | 56 (ULNB) |
| 29 | Unbalanced difference | 57 (INNB) | 58 (PNNB) |

Note: The parameters in parentheses are 3 phase 3 wire corresponding alarm parameters . And each single phase power parameters are not alarmed.



## VIII. Modbus communication protocol&Modbus-RTU protocol introduction

1. The meter adpots Modbus RTU communication protocol,RS485 half duplex communication, adpots 16 digit CRC check,the meter does not return for error check.

1.1 All the RS485 communication should comply with host/slave method. Under this method, information and data transmit between one host and maximum 32 slaves (monitoring equipment);

1.2 Host will initialize and control all information transmitted in RS485 communication loop.

1.3 In any case, communication can never be started from a slave.

1.4 All the RS485 communication is sending by packet . One data packet is a communication frame. One packet include 128 byte at most.

1.5 Host sending is named request, slave sending is named response.

1.6 In any case, slave can only respond to one request of host.

2. Data frame format:

| Start bit | Data bit | Parity bit | Stop bit |
|---|---|---|---|
| 1 | 8 | Even Parity/odd Parity/no Parity (can be set) | 1 |

3. Data frame format:

| frame | byte | Illustration | |
|---|---|---|---|
| Slave address | 1 | Valid slave address range is 1-247 | |
| Function code | 1 | 0X03 | Read one or more register values |
| | | 0X06 | Write the specified value to an internal register |
| | | 0X10 | Write specified value to multiple internal registers |
| Data address | 2 | data area storage location when slave executes effective order. Different variable seizes differents numbers of register, some address variable seizes two register, 4 byte data, some variable seizes one register, 2 byte data, please use according to actual situation. | |
| Data length | 2 | Data length to be read or written | |
| Data | variable | The slave returns the response data or the master writing data | |
| CRC check code | 2 | MODBUS-RTU mode adopts 16 bit CRC check. Sending equipment should do CRC16 calculation for each data of packet, final result is stored in check area. Receiving equipment also make CRC16 calculation for each data of packet (except check area), and compare result area with check area; only the same packet can be accepted. | |

4. Abnormal communication processing

If host send a illegal data packet or host request a invalid data register, abnormal data response will happen. This abnormal data response is consisted of slave address, function code, error code and check area. When the high bit position of function code area is 1, it means the present data frame is abnormal response.

According to MODBUS communication requirement, abnormal response function code=request function code+0x80; when abnormal response, put 1 on the highest bit of function code.

For example: if host request function code is 0x04, slave response function code is 0x84.

Below table illustrates the meaning of abnormal function code:

| Error code | Name | Illustration |
|---|---|---|
| 0X01 | Function code error | Meter received the unsupported function code |
| 0X02 | Variable address error | Data location designated by host exceeds range of meter, or receive illegal register operation. |
| 0X03 | Variable value error | Data value sent from host exceeds the corresponding data range of meter, or data structure is incomplete |
| 0X04 | Frame length error | Function code and communication frame length are inconsistent |

5. Communication frame delay

There should be an appropriate delay between the two frame requests of the master station for the slave station to respond to the processing. When baud rate set as 9600, the recommended delay time between two host request is 300ms to ensure correct answer. If lower baud rate, more delay time.

## IX. Communication frame format illustration

1. Function code "03", read multi-channel register input

For example, host reads UA (A phase voltage), suppose measured A phase voltage is 220.0V. Address code of UA is 0x4000, because UA is fixed data (4 byte), seizes 2 data register, the hexadecimal data of 220.0V is 0x0000898 (2200).

Message format sent by the host: (default high bit in front)

| Host sending | bytes | send information | Note |
|---|---|---|---|
| slave address | 1 | 01 | Send to slave with address 01 |
| function code | 1 | 03 | Read register |
| start address | 2 | 0x4000 | start address |
| data length | 2 | 0x0002 | Read 2 registers (4 bytes in total) |
| CRC code | 2 | 0XD1CB | CRC code calculated by the host |

Message format returned by the slave response:

| Slave response | bytes | return information | Note |
|---|---|---|---|
| slave address | 1 | 01 | from slave with address 01 |
| function code | 1 | 03 | Read register |
| read word | 1 | 04 | 2 registers (4 bytes) |
| register data | 1 | 0x00 | High high bit of address 0x4000 memory content |
| | 1 | 0x00 | High bit of address 0x4000 memory content |
| | 1 | 0x08 | low bit of address 0x4000 memory content |
| | 1 | 0x98 | low low bit of address 0x4000 memory content |
| CRC code | 2 | 0xFC59 | CRC code calculated by the slave |

2. Function code "06": write single register

For example: Host writes fixed data, 1st alarm mode is AD1.

Suppose the address code of AD1 is 0x4900, because AD1 is fixed data, seizes 1 data register, decimalist code of 11 is 0X000B.



Message format sent by the host:

| Host sending | bytes | send information | Note |
|---|---|---|---|
| slave address | 1 | 01 | Send to slave with address 01 |
| function code | 1 | 06 | Write single register |
| start address | 1 | 0x49 | Register address high byte to write |
| | 1 | 0x00 | Low byte of register address to be written |
| Data to be written | 1 | 0x00 | Data high byte |
| | 1 | 0x0B | Data low byte |
| CRC code | 2 | 0xDE51 | CRC code calculated by the host |

Message format returned by the slave response correctly:

| Host sending | bytes | send information | Note |
|---|---|---|---|
| slave address | 1 | 01 | Send to slave with address 01 |
| function code | 1 | 06 | Write single register |
| start address | 1 | 0x49 | Register address high byte to write |
| | 1 | 0x00 | Low byte of register address to be written |
| Data to be written | 1 | 0x00 | Data high byte |
| | 1 | 0x0B | Data low byte |
| CRC code | 2 | 0xDE51 | CRC code calculated by the host |

3. Function code "10": write multiple registers

For example: Host writes fixed data, 1st alarm mode is AD1. Suppose the address code of AD1 is 0x4900, because AD1 is fixed data, seizes 1 data register, decimalist code of 11 is 0X000B.

Message format sent by the host:

| Host sending | bytes | send information | Note |
|---|---|---|---|
| slave address | 1 | 01 | Send to slave with address 01 |
| function code | 1 | 10 | Write multiple registers |
| start address | 1 | 0x49 | High byte of register start address of to be written |
| | 1 | 0x00 | low byte of register start address of to be written |
| Data word length to be written | 1 | 0x00 | High byte of word length of written data |
| | 1 | 0x01 | low byte of word length of written data |
| data length to be written | 1 | 0x02 | Data byte length (1 byte total) |
| Data to be written | 1 | 0x00 | Data high byte |
| | 1 | 0x0B | Data low byte |
| CRC code | 2 | 0x3F53 | CRC code calculated by the host |

Message format returned by the slave response correctly:

| Slave response | bytes | send information | Note |
|---|---|---|---|
| slave address | 1 | 01 | from slave with address 01 |
| function code | 1 | 10 | Write multiple registers |
| start address | 2 | 0x4900 | start address is 0000 |
| Save data word length | 2 | 0x0002 | Save 2 words length data |
| CRC code | 2 | 0X1795 | CRC code calculated by the slave |

4. The process of generating a CRC: (Can refer to program example as below)

4.1 Preset a 16 bit register as 0FFFFH(All 1), call it CRC register.

4.2 XOR the first 8-bit binary data (the first byte of the communication information frame) with the lower 8 bits of the 16-bit CRC register and put the result in the CRC register.

4.3 Shift the contents of the CRC register to the right by one bit (towards the lower bit) and fill the highest bit with 0, and check the shifted-out bit after the right shift;

4.4 If the shift-out bit is 0, repeat the third step( move to right by one bit again) . If the shift-out bit is 1, CRC register and polynomial A001 (1010 0000 0000 0001) XOR;

4.5 Repeat steps 3 and 4 until 8 times to the right, so that the entire 8-bit data has been processed;

4.6 Repeat steps 2 to 5 to process the next byte of the communication information frame;

4.7 After calculating all the bytes of the communication information frame according to the above steps, exchange the high and low bytes of the 16-bit obtained CRC register .

4.8 The final content of the CRC register is: CRC code.

Attached: CRC calculation C language source code

```
unsigned int GET_CRC(unsigned char * buf,unsigned charnum)
{
        unsigned  chari,j;
        unsigned int WCRC       =       0xffff;
        for(i=0;i<num;i++)
        {
                WCRC            ^=      (unsigned int)(buf[i]);   // Cyclic redundancy check
                for(j=0;j<8;j++)
                {
                        if(WCRC&1)
                        {
                                WCRC                    >>=     1;
                                WCRC                    ^=      0XA001;
                        }
                        else
                        WCRC                    >>=     1;
                  }
        }
        return(WCRC);                                   //      obtain CRC code
}
```



## X. ES925 parameter address reflection table

| Three-phase intelligent power meter address definition | | | | | | | |
|---|---|---|---|---|---|---|---|
| Read-only parameter communication list | | | | | | | |
| No. | reflection add. | Variable name | register | Data type | read/write | unit | note |
| 1 | 0x4000 | Phase voltage A | 2 | long | R | 0.1V | |
| 2 | 0x4002 | Phase voltage B | 2 | long | R | 0.1V | |
| 3 | 0x4004 | Phase voltage C | 2 | long | R | 0.1V | |
| 4 | 0x4006 | Line voltage AB | 2 | long | R | 0.1V | |
| 5 | 0x4008 | Line voltage BC | 2 | long | R | 0.1V | |
| 6 | 0x400a | Line voltage CA | 2 | long | R | 0.1V | |
| 7 | 0x400c | Phase current A | 2 | long | R | 0.001A | |
| 8 | 0x400e | Phase current B | 2 | long | R | 0.001A | |
| 9 | 0x4010 | Phase current C | 2 | long | R | 0.001A | |
| 10 | 0x4012 | Active power A | 2 | long | R | 0.1W | |
| 11 | 0x4014 | Active power B | 2 | long | R | 0.1W | |
| 12 | 0x4016 | Active power C | 2 | long | R | 0.1W | |
| 13 | 0x4018 | Total active power | 2 | long | R | 0.1W | |
| 14 | 0x401a | Reactive power A | 2 | long | R | 0.1var | |
| 15 | 0x401c | Reactive power B | 2 | long | R | 0.1var | |
| 16 | 0x401e | Reactive power C | 2 | long | R | 0.1var | |
| 17 | 0x4020 | Total reactive power | 2 | long | R | 0.1var | |
| 18 | 0x4022 | Apparent power A | 2 | long | R | 0.1VA | |
| 19 | 0x4024 | Apparent power B | 2 | long | R | 0.1VA | |
| 20 | 0x4026 | Apparent power C | 2 | long | R | 0.1VA | |
| 21 | 0x4028 | Total apparent power | 2 | long | R | 0.1VA | |
| 22 | 0x402a | Power factor A | 2 | long | R | 0.001 | |
| 23 | 0x402c | Power factor B | 2 | long | R | 0.001 | |
| 24 | 0x402e | Power factor C | 2 | long | R | 0.001 | |
| 25 | 0x4030 | Total power factor | 2 | long | R | 0.001 | |
| 26 | 0x4032 | Frequency | 2 | long | R | 0.01HZ | |
| 27 | 0x4034 | Total Kwh | 2 | long | R | 0.01kWh | LED display type power meter do not have this function |
| 28 | 0x4036 | Total Kvarh | 2 | long | R | 0.01kvarh | |
| 29 | 0x4038 | Forward Kwh | 2 | long | R | 0.01kWh | |
| 30 | 0x403a | Backward Kwh | 2 | long | R | 0.01kWh | |
| 31 | 0x403c | Forward Kvarh | 2 | long | R | 0.01kvarh | |
| 32 | 0x403e | Backward Kvarh | 2 | long | R | 0.01kvarh | |

| Reserve and extension | | | | | | | |
|---|---|---|---|---|---|---|---|
| system setting parameters list | | | | | | | |
| 1 | 0x4800 | Link mode | 1 | short | R | no decimal point | attached 1 |
| 2 | 0x4801 | Voltage transform PT1 | 1 | short | R/W | 0.1kV | Fixed decimal point |
| 3 | 0x4802 | Voltage transform PT2 | 1 | short | R/W | 0.1V | |
| 4 | 0x4803 | Current transform CT1 | 1 | short | R/W | 1A | fixed decimal point |
| 5 | 0x4804 | Current transform CT2 | 1 | short | R/W | 0.1A | |
| 6 | 0x4805 | communication address 1 | 1 | short | R/W | no decimal point | |
| 7 | 0x4806 | Baud rate 1 | 1 | short | R/W | | attached 2 |
| 8 | 0x4807 | Data format 1 | 1 | short | R/W | | |
| 9 | 0x4808 | communication address 2 | 1 | short | R/W | | reserved |
| 10 | 0x4809 | Baud rate 2 | 1 | short | R/W | | |
| 11 | 0x480a | Data format 2 | 1 | short | R/W | | |
| 12 | 0x480b | switch output | 1 | short | R | | attached 4 |
| 13 | 0x480c | switch input | 1 | short | R | | attached 5 |
| 14 | 0x480d | Remote control input | 1 | short | R/W | | attached 6 |
| Reserve and extension | | | | | | | |
| Alarm parameters list | | | | | | | |
| 1 | 0x4900 | 1st alarm mode | 1 | short | R/W | no decimal point | |
| 2 | 0x4901 | 1st alarm unit | 1 | short | R/W | | attach 3 |
| 3 | 0x4902 | 1st alarm unit value | 1 | short | R/W | 0.1 | fixed decimal point |
| 4 | 0x4903 | 1st hysteresis value | 1 | short | R/W | 0.1 | |
| 5 | 0x4904 | 1st alarm output mode | 1 | short | R | no decimal point | |
| 6 | 0x4905 | 1st alarm action delay | 1 | short | R/W | 0.1s | fixed decimal point |
| 7 | 0x4906 | 1st alarm reset delay | 1 | short | R/W | 0.1s | |
| The 2nd or more alarm communication addresses read from the end of 1st alarm address extension. | | | | | | | |
| Reserve and extension | | | | | | | |

Attached 1: Wire connection mode description:

| reflection address | value | Display characters | explanation |
|---|---|---|---|
| 0X4800 | 0 | 3-4 | 3 phase 4 wire connection |
| | 1 | 3-3 | 3 phase 3 wire connection |



Attached 2: Communication baud rate

| reflection address | value | Display characters | explanation |
|---|---|---|---|
| 0X4805 | 0 | 1.2K | baud rate 1200bps |
| | 1 | 2.4K | baud rate 2400bps |
| | 2 | 4.8K | baud rate 4800bps |
| | 3 | 9.6K | baud rate 9600bps |
| | 4 | 19.2K | baud rate 19200bps |

Attached 3: Alarm unit

| reflection address | value | Display characters | explanation |
|---|---|---|---|
| 0X4901、0X4908<br>0X4A01、0X4A05 | 0 | 1 | unit is 1 |
| | 1 | K | unit is K |
| | 2 | M | unit is M |

Attached 4: Alarm output status indication

| reflection address | Sequence No. | Alarm | explanation |
|---|---|---|---|
| 0X480B | BIT2-BIT15 | not used | not used |
| | BIT1 | alarm 2 | 0: no alarm action |
| | | | 1: alarm action |
| | BIT0 | alarm 1 | 0: no alarm action |
| | | | 1: alarm action |

Attached 5 : Switch input status indication

| reflection address | Sequence No. | Alarm | explanation |
|---|---|---|---|
| 0X480C | BIT4-BIT15 | not used | not used |
| | BIT3 | switch input 4 | 0: disconnect |
| | | | 1: connect |
| | BIT2 | switch input 3 | 0: disconnect |
| | | | 1: connect |
| | BIT1 | switch input 2 | 0: disconnect |
| | | | 1: connect |
| | BIT0 | switch input 1 | 0: disconnect |
| | | | 1: connect |

Attached 6 : Remote control output command explanation

| reflection address | Sequence No. | Alarm | explanation |
|---|---|---|---|
| 0X480D | BIT2-BIT15 | not used | not used |
| | BIT1 | remote control 2 | 0: disconnect |
| | | | 1: connect |
| | BIT0 | remote control 1 | 0: disconnect |
| | | | 1: connect |