ASCENT
Communication Technology

# APM530 Multifunction Power Meter

## User Manual

Revision A

# ACT APM530 Multifunction Power Meter
# User Manual

ACT Document Number: ACT APM530 Multifunction Power Meter User Manual Revision A


This document is produced to assist professional and properly trained personnel with installation and maintenance issues for the product. The capabilities, system requirements and/or compatibility with third-party products described herein are subject to change without notice.

For more information, contact ACT: support@ascentcomtec.com

Revision History

| Revision | Date | Reason for Change |
|---|---|---|
| A | 9/11/2016 | Initial Release |

## Table of Contents

# Chapter 1. Brief Introduction

## 1.1 Adopted Standard

**Adopted National Standard**

GB/T 17883-1999 Class 0.2S and 0.5S Alternating Current Static Active Watt-Hour Meter

GB/T 17882-1999 Class 2 and 3 Alternating Current Static Reactive Watt-Hour Meter

GB/T 15284-2002 Special Requirements of Multi-Rate Watt-Hour Meter

DL/T 614-1997 Multi-Function Watt-Hour Meter

GB/T 13850-1998 Electrical Quantity Transducer of Transforming AC Electric Quantity to Analog Quantity or Digital Signal

**Corresponding International Standard**

IEC 62053-22: 2003 Electricity Metering equipment (AC)-Special Requirements - Part 22: Static Watt-Hour Meter (Class 0.2S and 0.5S)

IEC 62053-23: 2003 Electricity Metering equipment (AC)-Special Requirements - Part 23: Static Reactive Watt-Hour Meter (Class 2S and 3S)

IEC 61010-1: 2001 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements

IEC 61000-2-11 EMC - Part 2 -11

IEC 60068-2-30 Testing Environment - Part 2-30

## 1.2 Product Overview

APM530 Series LCD multi-functional electric instruments are designed for intelligent electricity monitoring and energy measurement of power system, industrial and mining enterprises, public facilities, intelligent buildings and etc. They can accurately measure all frequently-used electric power parameters of three-phase power grid, including three-phase voltage, three-phase current, active power, reactive power, apparent power, frequency, power factor, four-quadrant electric energy, UIPQ demand, analog input monitoring and switch input monitoring. They also have communication interface and have the functions of analog output, relay output control and electric energy pulse output.

APM530 Series LCD multi-functional electric instruments have output modes of extended functions: 2 communication interfaces, 4 analog outputs, 4 relay outputs, local or remote switch signal monitoring and controlling output function (telecommand and telecontrol), 12 switch monitoring, 2 analog output measuring, 2 electric energy pulse output and event logging.

APM530 Series LCD multi-functional electric instruments, with very high cost performance, can directly replace power transmitters, measuring and indicating instruments, energy metering instruments and relevant auxiliary units. As an advanced intellectualized and digitized gathering component of front-end of power network, they are widely used in diversified control systems, such as SCADA system, energy management system, substation automation, power distribution automation, power monitoring in residential districts, industrial automation, intelligent buildings, intelligent switchboards and switch cabinets. They have the characteristics of expedient installation, simple connection, convenient maintenance, small work amount. What's more, the instruments are field programmable and parameters can be input. Thus, the instruments can complete networking of different PLC in this industry and communication software of industrial control computer.

# Chapter 2. User Selection

In the same series, models with "+ "are the enhancement models and without the default.

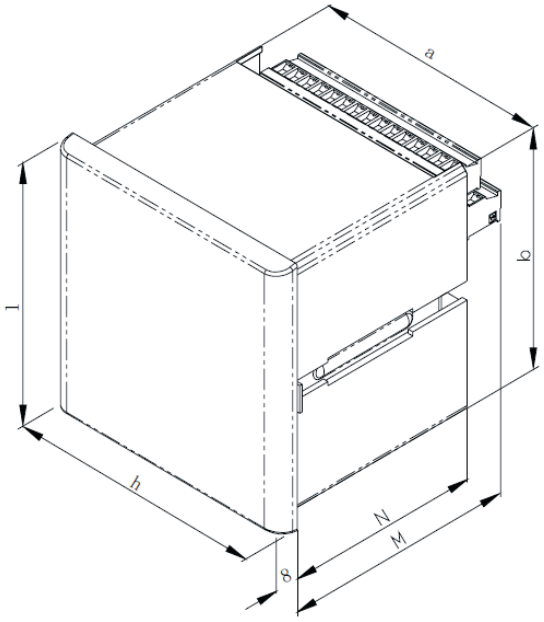
| Model | | APM530 | APM530+ |
|---|---|---|---|
| **Real-Time Measurement** | Three-phase voltage | ✓ | ✓ |
| | Three-phase current | ✓ | ✓ |
| | Power frequency | ✓ | ✓ |
| **Electric Energy** | Active electric energy | ✓ | ✓ |
| **Measurement** | Reactive electric energy | ✓ | ✓ |
| | Two-way measurement | ✓ | ✓ |
| **Maximum Demand** | UIPQ slip | - | ✓ |
| **RS485 Communication** | RS485 interface ports (MODBUS-RTU agreement) | ✓ | ✓ |
| **Display** | LCD screen | ✓ | ✓ |
| **Electric Energy Pulse** | Passive dry contact | 2 | 2 |
| **Transmitting Output** | 4 mA to 20 mA / 0 V to 5 V | 4 | 4 |
| **Switch Output** | Passive dry contact | 12 | 12 |
| **Relay Output** | AC 250 V / 5 A remote control / alarming | 4 | 4 |
| **DC Measurement** | 0 mA to 20 mA | - | ✓ |

# Chapter 3. Technical Specifications

| Item | Description |
|---|---|
| **Signal Input** | |
| Connection | Three-Phase Four Wire Y34 / Three-Phase Three Wire V33 |
| Voltage | Range: 400 V / 100 V |
| | Overload: Sustained: 1.2 times; momentary: Twice |
| | Power Consumption: <1 W |
| Current | Range: 5 A / 1 A |
| | Sustained : 1.2 times; momentary: Twice |
| | Power Consumption: <1 W |
| Frequency | 40 Hz to 65 Hz |
| **Power Supply** | AC/DC 80 V to 270 V |
| | <5 W |
| **Electric Energy Pulse** | Passive optocoupler collector output |
| | Fixed pulse width 80 ms ±20 % |
| | RS485 communication interface physical isolation |
| **Communication** | Conforms to MODBUS-RTU international standards |
| | Communication speed 4800 bps to 38400 bps |
| | Verification method N81, E81, O81 |
| **Transmitting Output** | 0/4 mA to 20 mA or 0 V to 5/10 V transmitting output |
| | Transmitting items and corresponding values are programmable |
| **Analog Output** | Programmable remote control / alarming relay output |
| | Capacity 5 A / 250 V AC; 5 A / 30 V DC |
| | Alarming electric quantity, switching input, analog input and controlling method are programmable |
| **Relay Output** | Telemetering switch input measurement, passive dry contact |
| | Associated alarming output is programmable |
| **Telemetering Switching** | 0/4 mA to 20 mA analog input measurement |
| | Alarming output is programmable |
| **Analog Input** | Electric quantity: 05; frequency: ±0.1 Hz |
| **Measuring Class** | Active electric energy: 0.1 |
| | Reactive electric energy: 0.5 |
| | Analog input: 0.5 |
| **Display** | LCD |
| **Operating Temperature** | -10 °C to +55 °C |
| **Storage Temperature** | -20 °C to +75 °C |
| **Safety** | Insulation: Signal, power supply, resistance of output terminal against shell >5 MΩ |
| | Pressure-tolerant, output between signal input and power supply > AC 2 kV |
| **Outline** | Dimensions: 96 mm × 96 mm × 95 mm |
| | Weight: 0.5 kg |

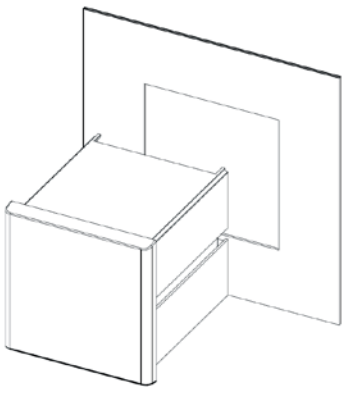
# Chapter 4. Installation and Wiring

## 4.1 Dimensions

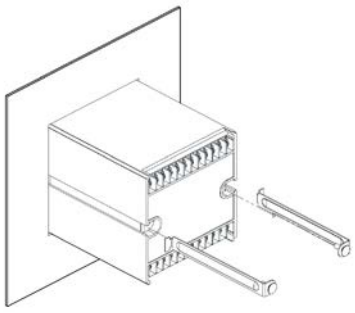



| Model | APM530 |
|---|---|
| Outline Dimensions (L × H) | 96 mm × 96 mm |
| Screen Coordinating Dimensions (a × b) | 90 mm × 90 mm |
| Cut-out (s × y) | 91 mm × 91 mm |
| Min. Horizontal Installation Distance | 96 mm |
| Min. Vertical Installation Distance | 96 mm |
| Overall Length (N) | 96 mm |
| | |
| Installation Dimensions | a × b |
| Cut-Out | s × y |
| Panel Dimensions | l × h (mm) |

## 4.2 Installation Method



Front View



Back View

1) Make a hole of s x y (mm) on the fixed power distribution cabinet

2) Take out the instrument, loosen the screws, and take down the fixed support

3) Install the instrument into the mounting hole from the front

4) Insert the fixed support and tighten the screws to fasten the instrument

## 4.3 Instructions of Functions of Terminals

1) Signal and Terminal Number

Terminals of APM530 series adopt universal numbers which apply to all the products of this series, details as follows:

| | | |
|---|---|---|
| **Power Supply** | 1, 2 | AC/DC 80-270V |
| **Current Signal** | 4, 5, 6, 7, 8, 9 | 4, 6, 8 as the coming lines of three phase current |
| **Voltage Signal** | 11, 12, 13, 14 | as three phase voltage input UA, UB, UC, UN separately |
| **Relay Output** | 15-22 | 4 relay outputs |
| **Transmitting Output** | 30-34 | 4 4-20mA transmitting output, 30 as the common terminal |
| **Electric Energy Pulse** | 47, 48, 49, 50 | 47 and 49 as the pulse end of passive output and pulse end connected with the power source |
| **The Second RS485** | 55, 56, 57 | as A+, B-, G separately |
| **The First RS485** | 58, 59, 60 | as A+, B-, G separately |
| **DC 20mA Input** | 61, 62, 63, 64 | 61 and 63 as directions of DC input, 62 and 74 as the common terminal |
| **Switch Input** | 70-78 | 8 switch inputs, 70 as the common terminal |

Instructions:

a) 1, 2 are auxiliary power supplies of the instruments; the range of power supply voltage is AC/DC 80-270V. To prevent the products from being damaged, please make sure that power supply provided is applicable to products of this series

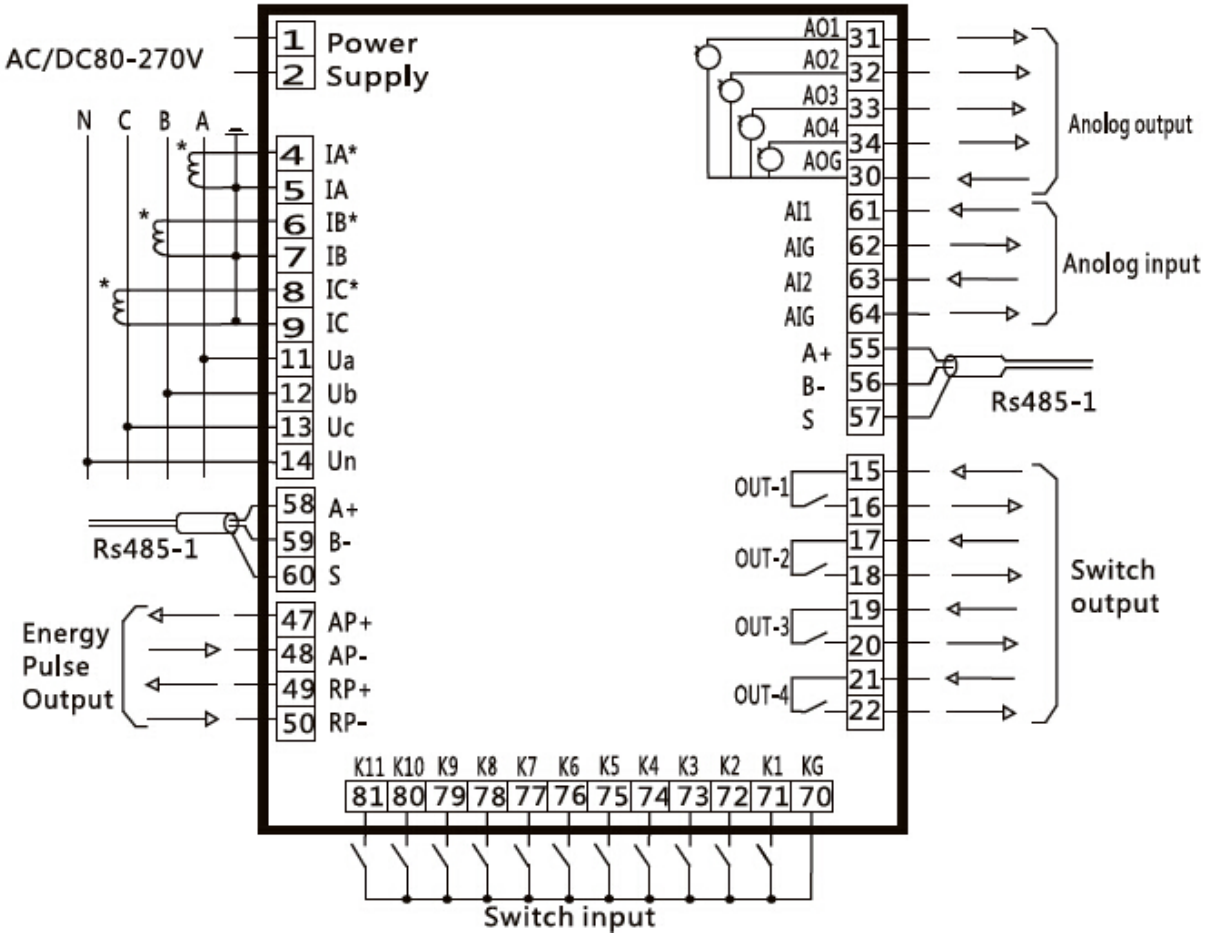
b) 4, 6, 8 are input terminals of current transformer, terminals with “* “are incoming terminals of current.

c) Three-Phase Three-Wire Connections: In the three-phase three-wire network, B phase current is connectionless; UB is connected to terminal No.14

d) As for detailed use of terminals, please refer to the wiring diagram on the product shell.

## 4.4 Wiring

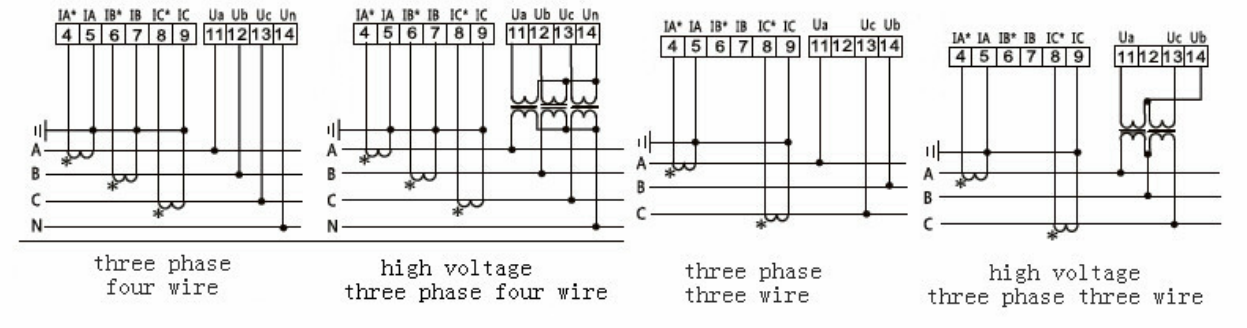
1) Typical Wiring Diagram for Low Voltage Network




This wiring diagram above is an example of APM530 unit, and other models in the APM530 series are similar to it except that there are fewer terminals and functional modules.

Attention: Please connect in accordance with the wiring diagram on the product shell since terminal orders of each product are slightly different.

2) Connection Method of Input Signal




Connection Instructions:

a) Voltage input: Input Voltage should not be higher than rated input voltage of the product (100V or 400V), otherwise PT should be used. Wiring banks are recommended for easy maintenance.

b) Current Input: Rate Input Current is 5A, when current is above 5A, external CT should be used. If there are other instruments connecting with the CT, concatenation should be adopted. Disconnect the primary circuit or short the secondary circuit before removing the connection of current input of the instrument. Wiring banks are recommended for easy maintenance.

c) Make sure that input voltage and current are corresponding to each other, with the same phase and the same direction; otherwise there will be numerical errors or sign errors (power and electric energy).

d) The instruments can work in the mode of three-phase four-wire system or three-phase three-wire system, and users should choose corresponding mode in accordance with the actual situation. Generally, three-phase three-wire mode is adopted when there is no centre line; when there is centre line, three-phase four-wire mode is adopted. Only 2 CTs (A and C phase) should be installed in three-phase three-wire mode, but 3 CTs are needed in three-phase four-wire mode( when only 2 CTs are available, another phase current can be combined)

**Note**

2 wiring modes can be set in the instrument; the actual wiring mode must be in accordance with the setting mode, otherwise the measured data will be inaccurate.

**Note**

The actual wiring mode, pulse constant and other technical parameters are subject to wiring diagram of the product.

# Chapter 5. Program Operation

## 5.1 Entry and Exit of Programming State

Under the state of displaying, press the “MENU” button to enter the page of password authentication, enter password with“ ▶ ”or “ ◀ ” (the default password 0001), then press “↵” button to enter the page of programming.

**Note**

No action of the page after entering password and pressing “”button shows that the password is incorrect.

After exiting to the first layer menu of programmatic interfaces, press “MENU” button, the instrument will display “SAVE-YES”, and there are two choices:

a) Save and exit. Choose “↵” to save and exit

b) Keep programming. Choose “MENU” button to directly withdraw from programming state without saving, by this time, all pervious changes are invalid.

## 5.2 Use of Buttons in Programming

**Common functions of four buttons:**

“ ▶ ” button and “ ◀ ” button are used for switch between menus of same layer or add and subtraction of numerical values; “MENU” button is used for exit or entry into the programming interface; “↵” button is used for entry into the next menu or confirmation of modified values

How to add and subtract number of ones, tens, hundreds and thousands:

Add and subtraction of ones: “ ▶ ” button (or “ ◀ ” button)

Add and subtraction of tens: press “ ◀ ” button longer than two seconds to do a shifting, and then press “ ▶ ” button or “ ◀ ” button for addition or subtraction

Add and subtraction of hundreds: press “ ◀ ” button longer than two seconds to do a shifting, and then press “ ▶ ” button or “ ◀ ” button for addition or subtraction

Add and subtraction of thousands: press “ ◀ ” button longer than two seconds to do a shifting, and then press “ ▶ ” button or “ ◀ ” button for addition or subtraction.

For example, on the menu item of INPUT- ⌜.U-0001, if press " ▶ ", it will change into INPUT- ⌜.U-0002;

If press " ◀ " longer than 2 seconds, tens can be added or subtracted, and if press " ▶ " again, it will change into INPUT- ⌜U-0011;

If press " ◀ " longer than 2 second once again, hundreds can be added or subtracted, and if press " ▶ " again, it will change into INPUT- ⌜.U-0111;

If press " ◀ " longer than 2 second once again, thousands can be added or subtracted, and if press " ▶ " again, it will change into INPUT- ⌜.U-1111.

## 5.3 Program Operation

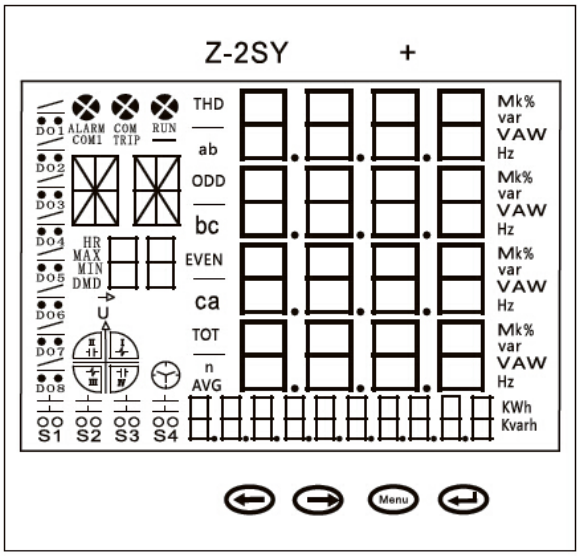
### 5.3.1 Menu Structure

Under the state of programming, the LCD interface adopts the hierarchical structure and provides three-line LED display.

The First Line: The First Layer Menu

The Second Line: The Second Layer Menu

The Third Line: The Third Layer Menu




As the picture shown on the right:

The First Layer: INPT Signal Input

The Second Layer: I.SCL Current Range

The Third Layer: 5A Current Range Value, namely current range of input signal is 5A

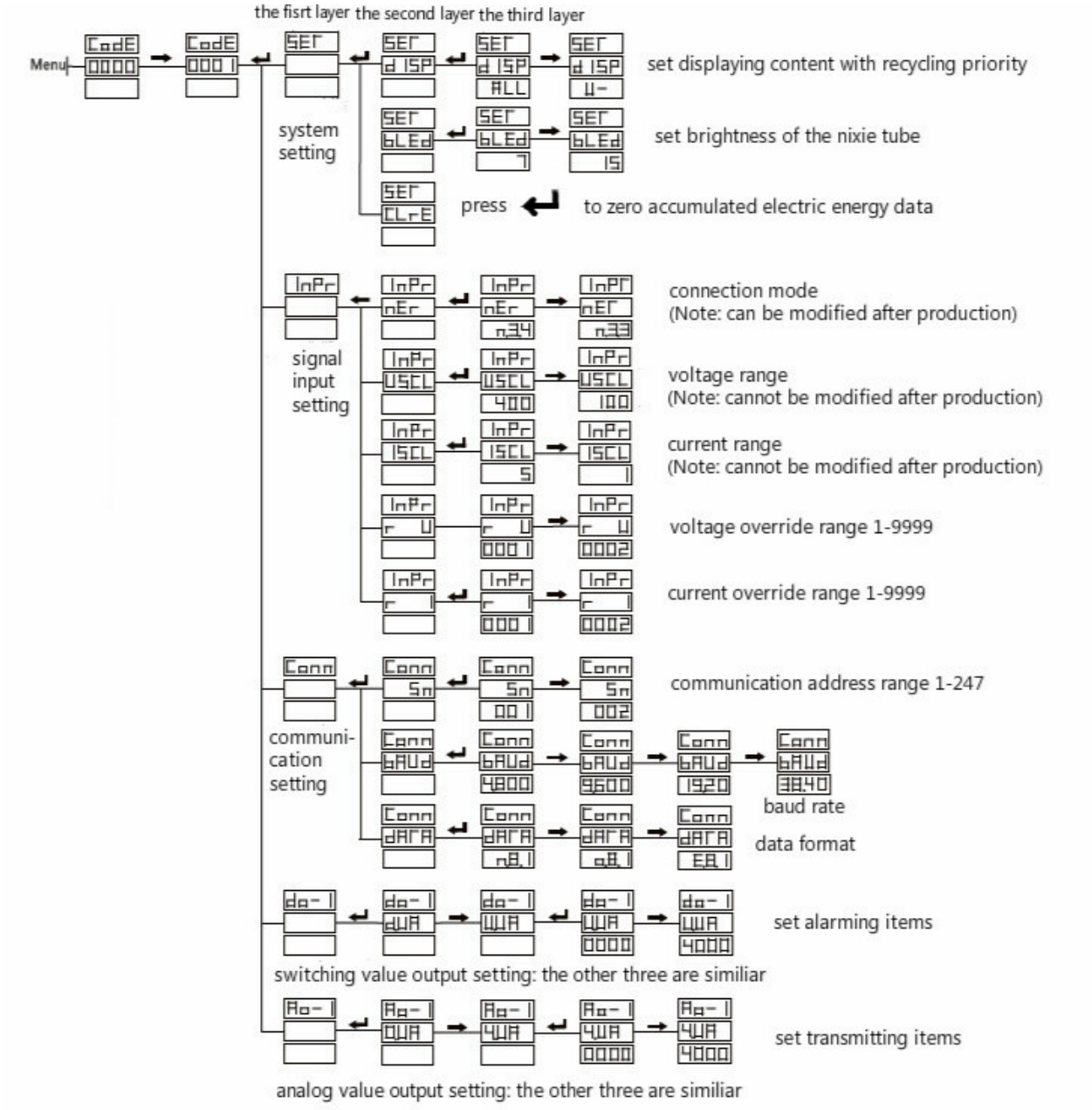
Organizational structure on the LCD interface as follows, user can set the proper parameters based on the actual situation.

| The First Layer | The Second Layer | The Third Layer | Descriptions |
|---|---|---|---|
| System Setting | Code | 0-999 | Set Users' Password |

| | | | |
|---|---|---|---|
| | Display | All or Other Statistics | Set Display Items with Recycling Priority ( for example, U is set, then voltage is first displayed; if ALL is set, recycling display is closed, and it is necessary to press left and right button to view the data. |
| | Clear Electric Energy<br>Clear Demand<br>CLr. | "↵" or "MENU" | Press "↵" to zero accumulated data<br>Press "MENU" to exit without zeroing |
| Signal Input | Connection Mode NET | N.3.4 or N.3.3 | Choose connection code of input signal ( N.3.4 three phase four wire, N.3.3 three phase three wire) |
| | Voltage Range U.SCL | 400V or 100V | Choose range of input voltage (cannot be modified after production) |
| | Current Range I.SCL | 5A or 1A | Choose range of input current (cannot be modified after production) |
| | Voltage Ratio 「.U | 1 to 9999 | Set Voltage Ratio as primary scale/secondary scale |
| | Current Ratio 「.I | 1 to 9999 | Set Current Ratio as primary scale/secondary scale |
| | Address SN | 1 to 247 | Address range of instrument 1 to 247 |
| Communication Setting | Communication Rate BAUD | 4800 to 38400 | Baud rate 4800, 9600, 19200, 38400 |
| | Data Format DATA | N, E, O Data Format | Data format N81, E81, O81 |
| Relay Output Setting DO~i (i 1 to 4) | Choose Alarming Items or Closing Alarming( See 7.4 Relay Output) | Set Specific Threshold Value of Alarming Items | Choose alarming items and set corresponding threshold values, once alarming conditions are met, alarming output is conducted. For example, "do-1", "U.UA", "3800" represents breakover of the first relay output when A phase voltage is above 380V |
| Transmitting Output Setting AO~i (i 1 to 4) | Choose Transmitting Items or Closing Transmitting Output ( See 7.4 Relay Output) | Set Full-Scale Value of Transmitting Items | Choose transmitting items and set corresponding threshold values (namely 0 to 20mA, 4 to 20mA, 4 to 12 to 20mA). For example, "Ao-1", "IA H", "5000" represents the first 4 to 20mA transmitting output signal when A phase current is within 0 to 5A |

**Note** The above menu items are the menu items when all functions are available. When some menu items are missing or not functioning well in use, it shows that this model doesn't support this function.

Structure diagram as follows:




Operating Instructions:

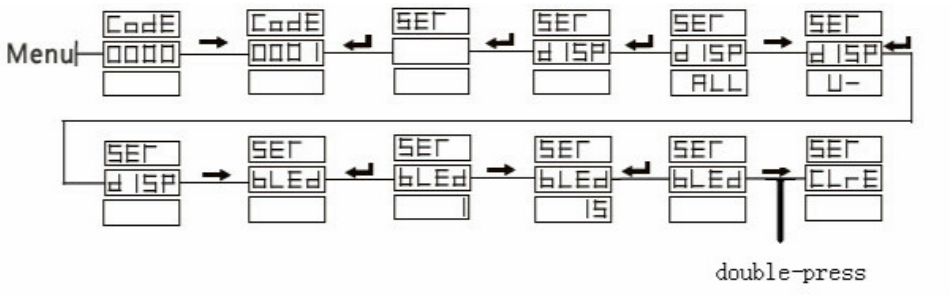
a) Press "↵" button to exit to the second layer menu after data or options of the third layer are modified; if press "MENU" button to exit to the second layer, the modifications are invalid.

b) Voltage and current of factory setting cannot be modified; connection mode can be modified in accordance with the actual situation.

c) As a general rule, models, parameters and factory settings are marked on the back label; the user can also reset the instruments based on actual demand, see 5.3.2

### 5.3.2 Typical example of programming operation

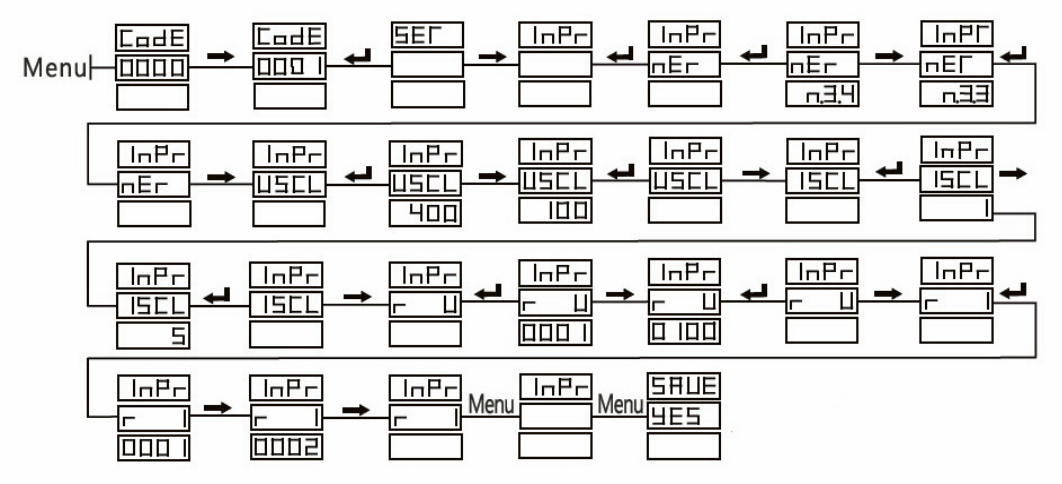
1) System setting: the user should set recycling display mode as voltage-first, modify brightness of LCD (supposing that the original brightness is 1, and now change it to 15; the darkest as 1 and the brightest as 15) and clean electric energy data.




Press " ◀ " button longer than two seconds to do a shifting, and then press " ▶ "for addition or subtraction. See use of buttons on LCD panel in the instructions. (Press "↵" to zero accumulated electric energy data

If only zero electric energy data, modification of LCD brightness and display mode of measured information can be skipped.

2) Input signal setting (including modification of connection mode): generally, the user programs the instrument before modifying connection mode or signal input range. For example, if user wants instrument of three-phase three-wire and signal of 10KV/100V and 1000A/5A (supposing that the original one is of three-phase four-wire and signal of 400V/400V and 1A/1A), operations as follows: change connection mode of three-phase four-wire to three-phase three-wire, signal input range as 100V voltage and 5A current, voltage ratio as 100 and current ration as 200

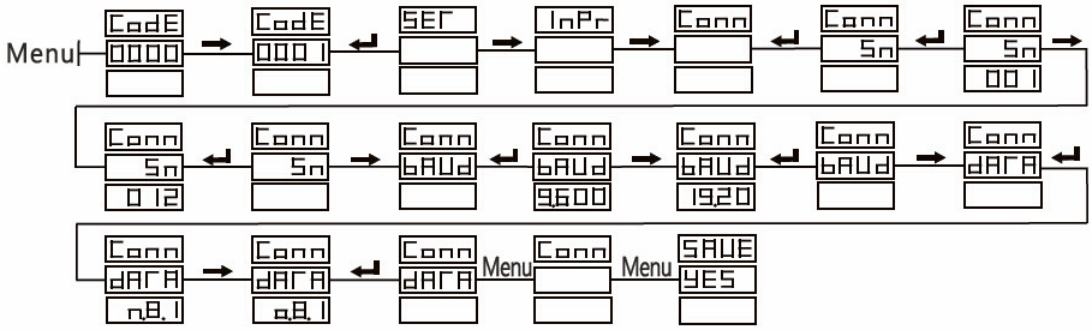



Explanation: when "YES" shows up, press "↵" button to save the changes, if press "MENU", they will not be saved.

**Note**

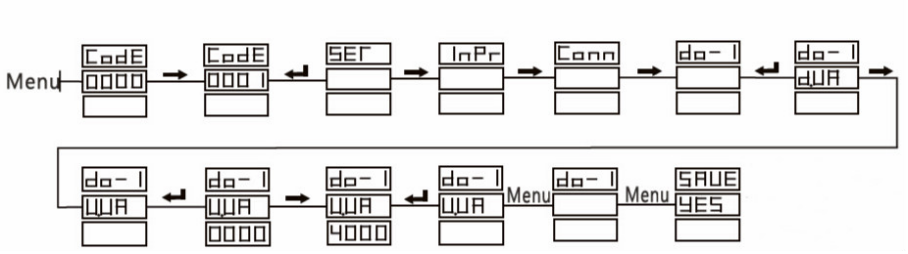
Factory settings of input voltage and current range cannot be modified, and connection mode can be modified in accordance with the actual situation.

3) Examples of communication setting: if users are going to use the communication function of the instrument, he should check the communication parameters or make corresponding modification. For example, the user wants to modify the parameters to communication address of 12, baud rate of 19200, data format of o.8.1, and odd parity check (supposing the original parameters are: address of 1, baud rate of 9600, data format of n.8.1, and no check)




Explanation: when "YES" shows up, press "↵" button to save the changes, if press "MENU", they will not be saved.

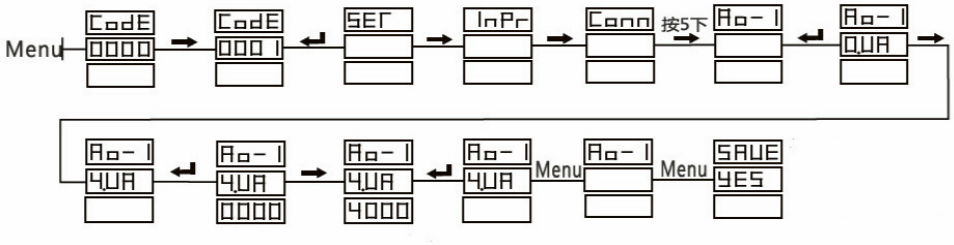
4) Example of relay alarming output setting: set A phase alarming output, when A-phase voltage is above 400V, the first circle switching value alarming output will be realized, that is the first switching value breakover( supposing that the instrument is under the state of closing alarming output before being programmed)




Press " ▶ " button longer than two seconds to do a shift, and then press it again.

Explanation: when "YES" shows up, press "↵" button to save the changes, if press "MENU", they will not be saved.

5) Example of analog alarming output setting: set A phase voltage of 0 V to 400 V and corresponding 4 A to 20 A current signal of transmitting output (supposing that the instrument is under the state of closed transmitting and A phase voltage signal input range of 400 V).




Press " ▶ " button longer than two seconds to do a shifting, and then press it again

**Note** Full-scale value of transmitting items must be set accurately; otherwise transmitting may be inaccurate (See 7.3 Transmitting Output).

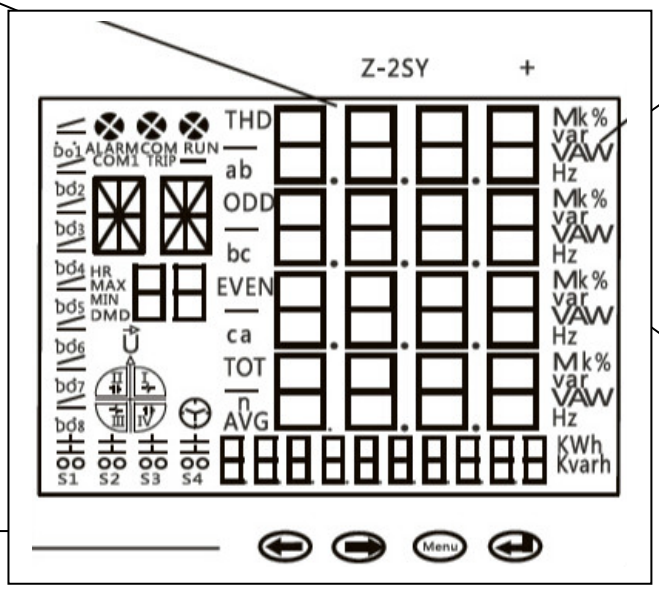
# Chapter 6. Panel Instructions and Display of Metrical Information

## 6.1 Panel and Display Information

(1) Panel

5 lines LCD displaying metrical information in 8 pages: phase voltage of three phases; circuit voltage of three phases; current of three phases; active power; reactive power; power factor; frequency; two-way active electric energy; two-way reactive electric energy

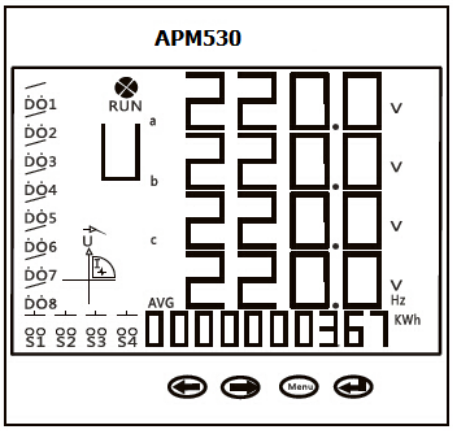
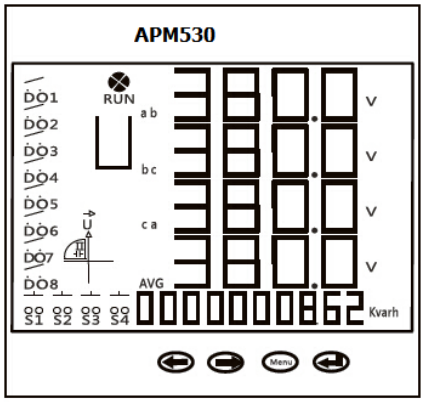
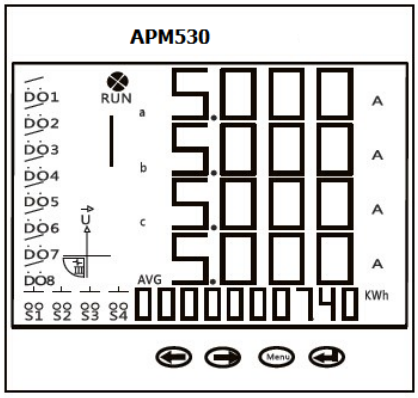
K-thousand, M-million are orders of magnitudes of measured data. For example, when the first line displays 10.23, if character K and character V are lightened, it shows that Ua=10.23KV; if character K and character M are not lightened, it shows that Ua=10.23V.




4 buttons used for displaying switch or programming: “ ◀ ”and are “ ▶ ” for pages switching or add and subtraction of numerical value; “MENU” is the button for entering program state or exit; “↵” is the button for confirmation or information switch within the same page

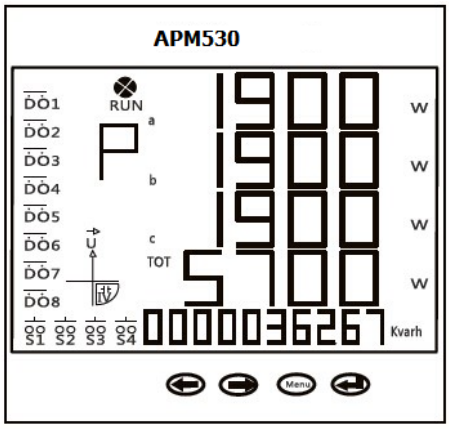
Unit or identification of measured items: voltage of three phases V; current of three phases A; active power W; reactive power Var; power factor; frequency Hz, switch-out, switch-in

**Display Information**

| Page | Content | Instructions |
|---|---|---|
| XS1=1<br>Phase voltage of three phases |  | Displaying phase voltage of each phase separately<br>The first three lines display numerical value of Ua, Ub, Uc, the forth line displays their average value. In the picture on the left, Ua=220V, Ub=220V, Uc=220V, AVG(the average voltage)=220V, electric energy is two-way active electric energy 3.67KWh, no input and output in 8 switch-in DO1 to DO8 and 4 alarming S1 to S4. |
| XS1=2<br>Circuit voltage of three phases |  | Displaying circuit voltage of each phase separately<br>The first three lines display numerical number of Uab, Ubc, Uca, the forth line displays their average value. In the picture on the left, Uab=380V, Ubc=380V, Uca=380V, AVG(the average voltage)=380V, electric energy is positive active electric energy 8.62KWh, no input and output in 8 switch-in DO1 to DO8 and 4 alarming S1 to S4. |
| XS1=3<br>Current of three phases |  | Displaying current of each phase separately, the unit as A, when K is lightened, it is kV<br>The first three lines display numerical value of Ia, Ib, Ic, the forth line displays their average value.In the picture on the left, Ia=5A, Ib=5A, Ic=5A, AVG( the average current )=380V, electric energy is negative active electric energy 7.40KWh, 8 switch-in DO1 to DO8 are cut off and 4 alarming S1 to S4 are separated, no output. |

XS1=4

Active power of three phases

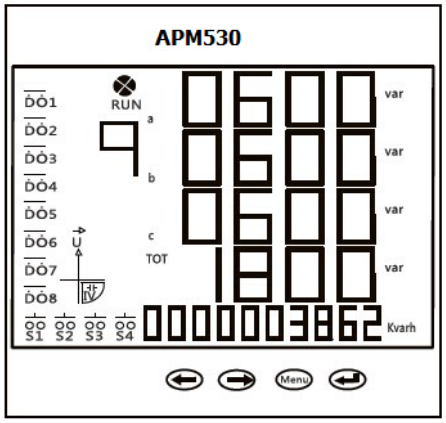



Displaying active power of each phase separately/

In the picture on the left, active power of A phase is 1900W, active power of B phase is 1900W, active power of C phase is 1900W, the total active power is 5700W, TOT is the symbol of total active power, AVG is the symbol of average active power, electric energy is negative reactive electric energy 362.67Kvarh, 8 switch-in DO1 to DO8 are all switched in and 4 alarming S1 to S4 are all pulled in, full output.

XS1=1

Three-phase reactive power

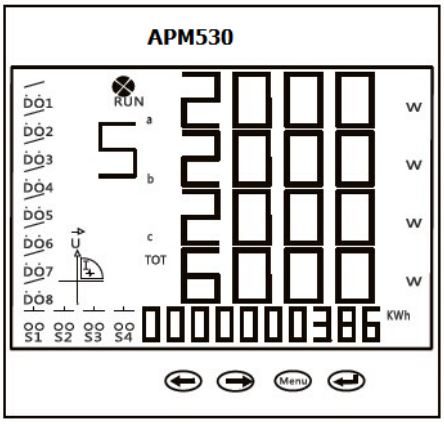



Displaying reactive power of each phase separately,

In the picture on the left, reactive power of A phase is 600W, reactive power of B phase is 600W, reactive power of C phase is 600W, the total active power is 1800W, TOT is the symbol of total active power, AVG is the symbol of average active power, electric energy is negative reactive electric energy 38.62Kvarh, 8 switch-in DO1 to DO8 are all switched in and 4 alarming S1 to S4 are all pulled in, full output.

XS1=2

Three-phase apparent power

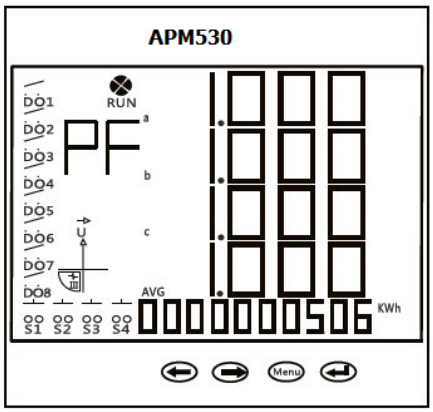



Displaying apparent power of each phase separately,

In the picture on the left, apparent power of A phase is 2000W, apparent power of B phase is 2000W, apparent power of C phase is 2000W, the total apparent power is 6000W, TOT is the symbol of total active power, electric energy is positive active electric energy 3.86Kwh, no input and output in 8 switch-in DO1 to DO8 and 4 alarming S1 to S4.

XS1=3

Three-phase power factor

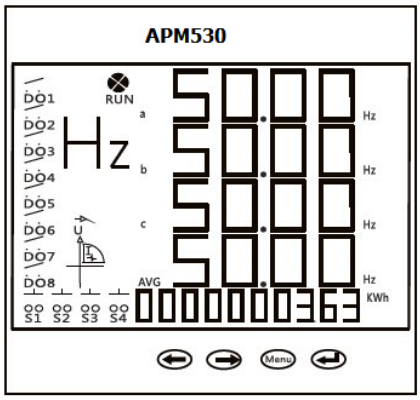



Displaying power factor of each phase separately, COS as the unit

In the picture on the left, power factor of A phase is 1.000cos, power factor of B phase is 1.000cos, power factor of C phase is 1.000cos, the average power factor (AVG) is 1.000cos, electric energy is negative active electric energy 5.06Kwh, 8 switch-in DO1 to DO8 are all cut off and 4 alarming S1 to S4 are all reparated, no output.

XS1=4

Three-phase frequency




Displaying frequency of each phase separately,

In the picture on the left, frequency of A phase is 50Hz, frequency of B phase is 50Hz, frequency of C phase is 50Hz, the average frequency (AVG) is 50Hz, electric energy is negative active electric energy 3.63 kWh, 8 switch-in DO1 to DO8 are all cut off and 4 alarming S1 to S4 are all separated, no output.

# Chapter 7. Function Module

## 7.1 Communication

### 7.1.1 Physical Layer

1) RS485 communication interface, asynchronous half-duplex mode

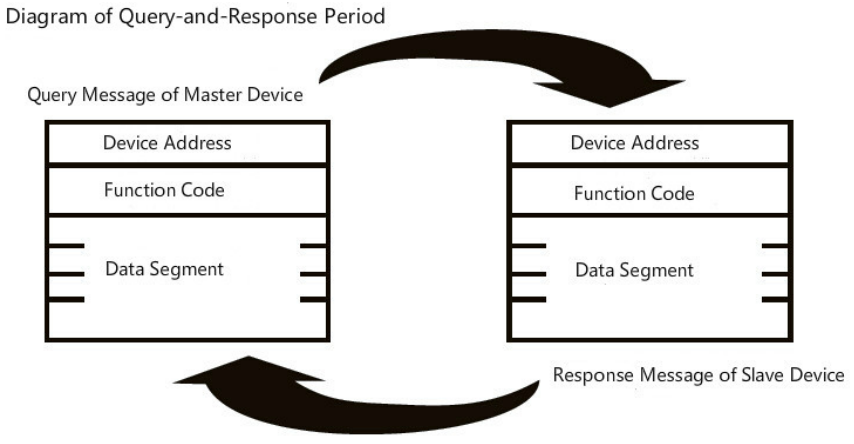
2) Communication rate can be set within 4800 to 38400 bps, the default as 9600bps;

3) Format of byte transmitting, 1 start bit, 8 data bits, 1 check bit and 2 or 3 stop bits (N81 E81 O81)

### 7.1.2 Communication Agreement MODBUS-RTU

MODBUS agreement is a master-slave communication connection method. Signal of the hose computer addresses to the salve computer with unique address. Answering signal from the slave computer sends it back to the host computer in the reverse direction, that is: within a separate communication line, signal transmits all the communication data flow in two reverse directions (asynchronous half-duplex mode)

MODBUS agreement only allows communication between the host computer (PC, PLC and so on) and terminal units and does not allow data exchange between independent terminal units, thus terminal units will not occupy communications circuits during initialization and only responds to query signal reaching this computer.




Structure of data frame, namely message format

| Address Code | Function Code | Data Code | Check Code |
|---|---|---|---|
| 1 Byte | 1 Byte | N Byte(s) | 2 Bytes |

Address Code: composed of one byte (8 binary codes), 0 to 255 decimalism, only 1 to 147 in our system and other addresses are reserved. Address of each terminal unit must be unique; terminal units only addressed will influence relevant polling:

Function Code: tells what kind of function addressed terminal units will execute. The following table lists out all function codes that the instruments of E/Z series support and their meanings

| Code | Meaning |
|---|---|
| 01 | Read output state of relay |
| 02 | Telemeter input state of switch |
| 03 | Read value of data register |
| 05 | Telecontrol output action of single relay |
| 0F | Telecontrol output action of multiple relays |

Data Code: includes all data that terminal units need to execute specific functions and that terminal units collect when responding to polling. The content of these data may be value, reference address or set value.

Check Code: error checking (CRC) domain occupies two bytes, including 16-bit binary value. CRC value is figured out by transmission equipment and attached to data frame. Receiving equipment recalculates CRC value when receiving the data and compares it with received value in CRC domain. If the two values are unequal, that's an error.

**Progress for generating a CRC:**

1) Preset a 16-bit register as 0FFFFH(hexadecimal number system, all ones), name it as CRC register

2) XOR 8 bits of the first byte and low byte of CRC register, and store the result in the CRC register

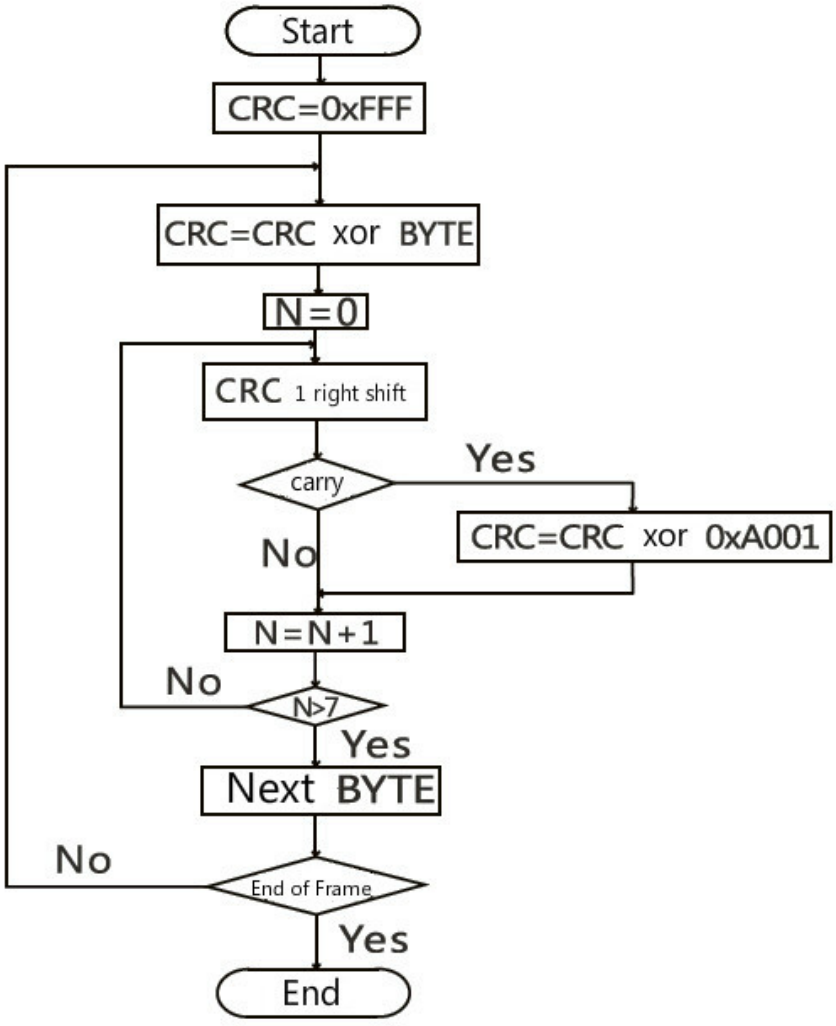
3) Move CRC register one step to the right, the most significant as 0, remove the highest bit and detect

4) If the one being removed is 0; repeat the third step(the next shift); if it is 1, xor the CRC register and a preset value(0A001H)

5) Repeat the third and forth step until the eighth shift, processing 8 bits of a byte

6) Repeat the second and fifth step to deal with 8 bits of next byte until all bytes are progressed.

7) The final value of CRC register is CRC value.




Example of communication message: 1. Read data (function code: 03/04): users can get data and system parameters collected and recorded from terminal units. There are no limits to how many data the host request collecting for one time, but the number should be within defined address range.

Data frame of query (the host)

| Address | Command | Beginning Register Address (high) | Beginning Register Address(low) | Number of Registers (high) | Number of Registers (low) | CRC16 low | CRC16 high |
|---|---|---|---|---|---|---|---|
| 0CH | 03H | 00H | 2BH | 00H | 03H | 74H | DEH |

Data frame of response (the slave), showing Ia=1380H(4.992), Ib=1390(5.008), Ic=1370H(4.976)

| Address | Command | Data byte length | Data 123456 | CRC16 low | CRC16 high |
|---|---|---|---|---|---|
| 0CH | 03H | 06H | 13H 80H 13H 90H 13H 70H | 72H | E5H |

Preset data( function code: 16) this function allows users to change content of multiple register, power measurement can be written with this function, what needs to be stressed is that the written data is writable attribute parameter, the number should never exceed address range. The following is an example of communication mode of written current of 400A/5A=80

Data frame of query (the host)

| Address | Command | Beginning Register Address (high) | Beginning Register Address (low) | Number of Registers (high) | Number of Registers (low) | Number of written byte | Written data | CRC16 low | CRC16 high |
|---|---|---|---|---|---|---|---|---|---|
| 0CH | 10H | 00H | 04H | 00H | 01H | 02H | 00H50H | FFH | 78H |

Data frame of response (the slave), showing that data have been written in.

| Address | Command | Beginning Register Address(high) | Beginning Register Address(low) | Number of Registers (high) | Number of Registers (low) | CRC16 low | CRC16 high |
|---|---|---|---|---|---|---|---|
| 0CH | 10H | 00H | 04H | 00H | 01H | 41H | 15H |

**MODBUS Address Information Table**

| Address | Item | Description | Byte Address | Explanation |
|---|---|---|---|---|
| **Setting Information** | | | | |
| 0 | MM | Program setting password | 0, 1 | 2 bytes, 1 to 9999 |
| 1 | DZ | Instrument Address | 2 | 1 byte, 1 to 247 |
| | TXK | Communication control word | 3 | See bit address instruction |
| 2 | XS1 | Electric quantity display | 4 | Display mode of electric quantity 0 to 6 |
| 3 | SRS | Output control word | 5 | See bit address instruction |
| | PT | Voltage rate | 6, 7 | PT = Voltage Primary Side/Secondary Side (1 to 9999) |

| | | | | |
|---|---|---|---|---|
| 4 | CT | Current rate | 8, 9 | CT = Current 1 Primary Side/Secondary Side (1 to 9999) |
| 5 | DOS1 | On-off output 1 setting | 10, 11, 12 | |
| 6 | DOS2 | On-off output 2 setting | 13, 14, 15 | |
| 7 | DOS3 | On-off output 3 setting | 16, 17, 18 | See descriptions in switching value |
| 8 | DOS4 | On-off output 4 setting | 19, 20, 21 | module |
| 9 | | | | |
| 10 | | | | |
| 11 | MNS1 | Analog output 1 setting | 22, 23, 24 | See descriptions in analog value |
| 12 | MNS2 | Analog output 2 setting | 25, 26, 27 | module |
| 13 | MNS3 | Analog output 3 setting | 28, 29, 30 | |
| 14 | MNS4 | Analog output 4 setting | 31, 32, 33 | |
| 15 | | | | |
| 16 | | | | |
| | LIGHT | LED brightness | 34 | The darkest: 1 the brightest: 15 |
| 17 | AUTO | Date of automatic meter reading | 35 | Day of automatic meter reading |
| 18 | SDS1 | Period setting 1 | 36, 37, 38 | |
| 19 | SDS2 | Period setting 2 | 39, 40, 41 | |
| 20 | SDS3 | Period setting 3 | 42, 43, 44 | |
| 21 | SDS4 | Period setting 4 | 45, 46, 47 | |
| 22 | SDS5 | Period setting 5 | 48, 49, 50 | |
| 23 | SDS6 | Period setting 6 | 51, 52, 53 | See descriptions in multi-rate |
| 24 | SDS7 | Period setting 7 | 54, 55, 56 | module |
| 25 | SDS8 | Period setting 8 | 57, 58, 59 | |
| 26 | | | | |
| 27 | | | | |
| 28 | | | | |
| 29 | | | | |

**Operation Information**

| | | | | |
|---|---|---|---|---|
| 30 | DATE | Date | 60, 61, 62 | YY-MM-DD |
| 31 | TIME | Time | 63, 64, 65 | HH-MM-SS |
| 32 | | | | |
| | DIO | Switching value | 66 | See descriptions in switching value |
| 33 | | information | | module |
| | INFO | Operation information | 67 | Reserved |
| 34 | AI | Analog input | 68, 69 | Reserved |
| 35 | DPC | Decimal point of voltage | 70 | |
| | DCT | Decimal point of current | 71 | See descriptions of data format |
| 36 | DPQ | Decimal point of power | 72 | |
| | SIGN | Sign bit of power | 73 | |

**Information on Electric Quantity**

| Address | Item | Description | Byte Address | Explanation |
|---|---|---|---|---|
| **Electric Energy Information** | | | | |
| 37 | Ua | A phase voltage | 74, 75 | Descriptions of data format: |
| 38 | Ub | B phase voltage | 76, 77 | Adopting 2-byte electric quantity |
| 39 | Uc | C phase voltage | 78, 79 | register (0 to 9999) and 1-byte |
| 40 | Uab | AB circuit voltage | 80, 81 | decimal point register (0-15) to |
| 41 | Ubc | BC circuit voltage | 82, 83 | describe data of electric quantity. |
| 42 | Uca | CA circuit voltage | 84, 85 | Electric quantity register shows BCD |
| 43 | Ia | A phase current | 86, 87 | part of electric quantity, while |
| 44 | Ib | B phase current | 88, 89 | decimal point register shows |
| 45 | Ic | C phase current | 90, 91 | exponential part of electric |
| 46 | Pa | A phase active power | 92, 93 | quantity. For example: Voltage Ua is |
| 47 | Pb | B phase active power | 94, 95 | shown by register DPT and register |
| 48 | Pc | C phase active power | 96, 97 | Ua, when register Ua=0DACH(3500); |
| 49 | Ps | Total active power | 98, 99 | Ua=0.3500 x 10^5= 35.00KV, |
| 50 | Qa | A phase reactive power | 100, 101 | current Ia is shown by register DCT |
| 51 | Qb | B phase reactive power | 102, 130 | and register Ia, when register |
| 52 | Qc | C phase reactive power | 104, 105 | Ia=0FA0H(4000);register DCT=3; |
| 53 | Qs | Total reactive power | 106, 107 | Ia=0.4000 x 10^3=400.0A, decimal |
| 54 | PFa | A phase power factor | 108, 109 | point of power factor is DPQ, and |
| 55 | PFb | B phase power factor | 110, 111 | there are fixed display mode for |
| 56 | PFc | C phase power factor | 112, 113 | frequency and power factor to |
| 57 | PFs | Total power factor | 114, 115 | make calculations, |
| 58 | Sa | A phase apparent power | 116, 117 | XX.XXHz(DHZ=2);0.XXX(DPF=0).For |
| 59 | Sb | B phase apparent power | 118, 119 | example, PFs=03A4(932) shows that |
| 60 | Sc | C phase apparent power | 120, 121 | power factor PF is 0.932 |
| 61 | Ss | Total apparent power | 122, 123 | |
| 62 | FR | Frequency | 124, 125 | Calculation formula:<br>Actual electric quantity + electric quantity register / 10000 X 10^ corresponding decimal point register<br>Bit 0 to 7 of SIGN represents the sign of Pa, Pb, Pc, Ps, Qa, QB, Qc, Qs respectively, 1 as negative and o as positive |
| | **Information on Electric Power** | | | |
| 63 | WPP | Positive active electric | 126, 127, 128, | Secondary side electric power |
| 64 | | energy | 129 | parameters: high byte is behind low |
| 65 | WPN | Negative active electric | 130, 131, 132, | byte, 4-byte integer, unit as Wh, |
| 66 | | energy | 133 | accumulated value under the action |
| 67 | WQP | | | of input signal, such as AC100V |

| | | | | |
|---|---|---|---|---|
| 68 | | Positive reactive electric energy | 134, 135, 136, 137 | 5A=0.866Kw, 0.866Kw for one hour. Besides, data of this register can be written into the computer, and electric power parameters can be preset |
| 69<br>70 | WQN | Negative reactive electric energy | 138, 139, 40, 141 | |
| 71<br>72 | EPP | Positive active electric energy | 142, 143, 144, 145 | Primary side electric power parameters: adopting data of IEE754 floating number to describe the result, unit as Wh. As for input signal of AC100V5A=0.866Kw, when ratio of instrument PT=10Kv/100V=100, CT=200A/5A=40, working for one hour 0.866KWh x 100 x 40=3464KWh, LED display of instrument is primary side of electric power, and electric power data can be read directly without transformation. |
| 73<br>74 | EPN | Negative active electric energy | 146, 147, 148, 149 | |
| 75<br>76 | EQP | Positive reactive electric energy | 150, 151, 152, 153 | |
| 77<br>78 | EQN | Negative reactive electric energy | 154, 155, 156, 157 | |

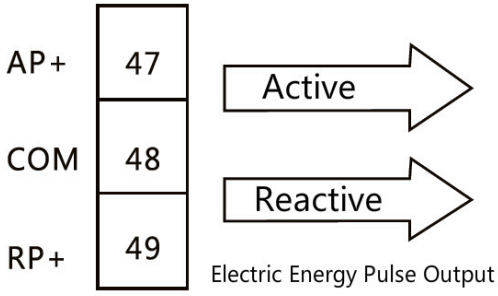
**About Control Word**

| **Parameter** | **Meaning** | |
|---|---|---|
| Communication control word TXK | Data format | 00--N.8.1 |
| BIT7634;3210 | BIT5 BIT4 | 01--O.8.1 |
| function; baud rate and data format | | 10--E.8.1 |
| | Communication rate | 00--38.4K |
| | BIT1 BIT0 | 01--19.2K |
| | | 10--9.6K |
| | | 11--4.8K |
| Input control word TXK | Input network BIT7 | 0--three phase four wire 1—three phase three wire |
| BIT7634;3210 | Voltage range BIT6 | 0—400V 1—100V |
| function; input network and range | Current range BIT1 | 0—5A 1—1A |

## 7.2 Electric Energy Measurement and Electric Energy Pulse Output

APM530 Series LCD multi-functional electric instruments, with two-way measurement of active and reactive electric energy, 2 electric energy pulse output and RS485 interface, can display and remotely transfer the electric energy data. The instruments can realize primary side data of active and reactive electric energy. Electric energy of optocoupler relay of open collector can realize the remote transfer of active electric energy and reactive electric energy, remote computer terminals and PLC, DI switch collection module can be used to collect total number of pulses of the instrument to realize accumulative metering of electric energy.

Adopted output mode is mode of accuracy test of electric energy (National measurement regulations: comparative method of pulse error of standard meter).



Electric Energy Pulse Output

a) Electrical characteristics : in circuit diagram of pulse collection interface, VCC≤ 48V, Iz≤ 50mA.

b) Pulse constant: 5000 imp/kWh (AC 380V 5A range), 20000 imp/kWh (AC 100V 5A or 380V 1A range); 8000 imp/kWh (AC 100V 1A range), the meaning is: when the instrument accumulates 1kWh, the number of pulse output is N(5000, 20000, 80000), what needs to be stressed is that 1kWh is the secondary side data of electric energy. If with PT and CT, corresponding N = the primary side electric energy 1kWh x voltage ratio PT x current ratio CT

c) Example: pulse counting device is used in PLC terminal. Supposing that N pulses are collected in a period of T, instrument input is: 10kV/100V400A/5A, then electric energy of N/20000 x 100 x 80 kWh is accumulated in this period.

## 7.3 Transmitting Output

APM530 Series LCD multi-functional electric instruments have the function of analog transmitting, transmitting items of each one and range can be set flexibly, for example, 4.UA 3800 (UA 0 to 380V corresponding transmitting output 4 to 20mA), 0.1A 5000 (IA 0 to 5A corresponding transmitting output 0 to 20mA), 4.PH 5700(PA 0 to 5700W corresponding transmitting output 4 to 20mA), 4.P5700 (PS -5700W to 0 to +5700W corresponding transmitting output 4 to 12 to 20mA), and etc. Detailed transmitting items may refer to Transmitting Item Setting Table

Electric parameters: output 0/4 to 20mA, 0/1 to 5 V, 0/2 to 10V

Accuracy class: 0.5S

Overload: 120% of effective output, maximum current 24mA, maximum voltage 12V

Load: Rmax = 400 Ω

Transmitting items: phase voltage, phase circuit voltage, phase active power, total active power, phase reactive power, total reactive power, three phase power, total apparent power, power factor, frequency, two-way active power and two-way reactive power and so on. Customers may also give a clear indication of transmitting items and range at the time of

ordering and instruments will be set in accordance with requirements. Users can also, according to actual needs, modify transmitting items and range after production, but electric parameters (0/4 to 20mA, 0/1 to 5 V, 0/2 to 10V) cannot be modified.

## 7.4 Relay output and switching value

Capacity of relay: 5A 250VAC/5A 30VDC

If customers need capacity of special specifications, it can be customized, please contact the marking department of our company.

Two operation modes of relay output module available: electric quantity alarming and communication remote control. Operation mode, alarming items and alarming range of each relay can be set flexibly in programming, for example, alarming item “U.UA” and alarming range “4000” represents that relay switch is conducted when UA > 400.0V; alarming item “d.UA” and alarming range “1000” represents that relay switch is conducted when UA <100.0V.

As for detailed settings, please see Alarming Item Setting Table

Relay alarming and switch measurement are displayed in binary form on the nixie tube, 1 represents connecting or alarming, 0 represents disconnecting or no alarming. When viewing the status of switch-in and switch-out with communication agreement, read register value first, and it is decimal at this time, judge whether this value is negative or not. If it is negative, flip the value and plus on when transforming it into binary format; if not, convert it directly. Data of switch-in and switch-off is 16 bits, the 8 high bits represent switch value input and 8 low bits represent alarming output, namely the highest bit is the eighth switch-in, the last bit is the first alarming output.

# Chapter 8. Common Problems and Solutions

## 8.1 Communications

1) No returned data

Answer: First, make sure that communication setting information of the instrument is in accordance with requirements of the upper computer, including slave address, baud rate, and check mode and so on. If many instruments have not received any data, check the connection of the communication bus and RS485 converter. If only one or several instruments are abnormal, relevant communication lines should also be checked. Slave address of abnormal instruments and normal instruments can be changed to test, eliminate or identify software problems of the upper computer.

2) Inaccurate returned data

Answer: Data of communication of APM530 series LCD multi-functional instruments available to user are of primary grid float and secondary grid int/long. Please read descriptions about data storing address and format in Communication Address Table carefully, and make sure that date is being transformed into the right format.

## 8.2 Inaccurate Measurements of U, I, P, etc.

Answer: First, make sure that correct voltage and current signal have been connected to the instruments. Multimeters can be used to measure voltage signal. Use clamp meters to measure current voltage when necessary. Then check whether signal wire is connected correctly, for example, whether there is something wrong with dotted terminal of current signal and phase sequence. As for instruments of APM530 series, observe their power interfaces, active power is negative only when the instrument is powered reversely. As a general rule, the sign of active power is positive. If it is negative, incoming and outgoing lines of current may be connected wrongly. Certainly, wrong phase sequence may also lead to abnormal display of power. The other thing to notice is that electric quantity that the instrument shows is primary grid value. If override of voltage and current transformer set in the instrument is not in accordance with the actual one, the electric quantity display may also be inaccurate. Range of voltage and current of the instruments cannot be modified after being produced. Connection network can be modified in accordance with the actual situation, but connection mode setting in programming menu should be in accordance with the actual connection mode, otherwise displayed information may be wrong,

## 8.3 Inaccurate Counter of Electric Energy

Answer: Accumulation of electric energy of the instrument is based on measurement of power. First, observe whether magnitude of power is in accordance with the actual load. Meters of APM530 series support two-way energy measurement. If connected wrongly, total active power is negative, electric energy accumulates to negative active electric energy and positive electric energy is not accumulated. Reversed connection of incoming and outgoing

line of current transformer is the most common problem. For instruments of 2S4/9S4/3S4, all active power with signs can be observed. Negative power may be due to wrong connection. Besides, wrong phase sequence can also lead to abnormal counter of electric energy.

## 8.4 No Lights On the Instrument

Answer: Make sure that appropriate auxiliary power supply has been connected to the auxiliary power terminal of the instruments. Auxiliary power voltage beyond limits may cause unrecoverable damage to the instruments. Multimeters can be used to measure voltage value of auxiliary power supply. If the voltage id normal and There is no indication on instruments, cut off electricity and power it up once again. If the instruments still fail to display the information, please contact technical services department of our company.

## 8.5 No Response to Any Operation

Answer: when the instrument has no response when pressing “ ▶ ”, “ ◀ ” , “MENU” , “↵” , cut off electricity and power it up once again. If the instrument fails to get right, please contact technical services department of our company.

## 8.6 Other Abnormal Situations

Answer: please contact technical services department of our company in time. Users are supposed to describe the scene, and technicians of our company will analyze the possible reasons according to the feedback. If the problems cannot be solved with communication, the company will send technicians to the scene as soon as possible.

**Transmitting Item Setting Table**

| Transmitting item | Transmitting Type Setting | Transmitting Range Setting | Explanation |
|---|---|---|---|
| A phase voltage | | | 0-20mA transmitting output for A phase voltage 0-400V |
| | | | 4-20mA transmitting output for A phase voltage 0-400V |
| B phase voltage | | | 0-20mA transmitting output for B phase voltage 0-400V |
| | | | 4-20mA transmitting output for B phase voltage 0-400V |
| C phase voltage | | | 0-20mA transmitting output for C phase voltage 0-400V |
| | | | 4-20mA transmitting output for C phase voltage 0-400V |
| AB circuit voltage | | | 0-20mA transmitting output for AB phase voltage 0-400V |
| | | | 4-20mA transmitting output for AB phase voltage 0-400V |
| BC circuit voltage | | | 0-20mA transmitting output for BC phase voltage 0-400V |
| | | | 4-20mA transmitting output for BC phase voltage 0-400V |
| CA circuit voltage | | | 0-20mA transmitting output for CA phase voltage 0-400V |
| | | | 4-20mA transmitting output for CA phase voltage 0-400V |

| | | |
|---|---|---|
| A phase current | | 0-20mA transmitting output for A phase current 0-5A |
| | | 4-20mA transmitting output for A phase current 0-5A |
| B phase current | | 0-20mA transmitting output for B phase current 0-5A |
| | | 4-20mA transmitting output for B phase current 0-5A |
| C phase current | | 0-20mA transmitting output for C phase current 0-5A |
| | | 4-20mA transmitting output for C phase current 0-5A |
| A phase active power | | 0-20mA transmitting output for A phase active power 0-6000W |
| | | 4-20mA transmitting output for A phase active power 0-6000W |
| B phase active power | | 0-20mA transmitting output for B phase active power 0-6000W |
| | | 4-20mA transmitting output for B phase active power 0-6000W |
| C phase active power | | 0-20mA transmitting output for C phase active power 0-6000W |
| | | 4-20mA transmitting output for C phase active power 0-6000W |
| Total active power | | 0-20mA transmitting output for total active power 0-6000W |
| | | 4-20mA transmitting output for total active power 0-6000W |
| A phase reactive power | | 0-20mA transmitting output for A phase reactive power 0-9000W |
| | | 4-20mA transmitting output for A phase reactive power 0-9000W |
| B phase reactive power | | 0-20mA transmitting output for B phase reactive power 0-9000W |
| | | 4-20mA transmitting output for B phase reactive power 0-9000W |
| C phase reactive power | | 0-20mA transmitting output for C phase reactive power 0-9000W |
| | | 4-20mA transmitting output for C phase reactive power 0-9000W |
| Total reactive power | | 0-20mA transmitting output for total reactive power 0-9000W |
| | | 4-20mA transmitting output for total reactive power 0-9000W |
| A phase power factor | | 0-20mA transmitting output for A phase power factor 0-1.000 COS |
| | | 4-20mA transmitting output for A phase power factor 0-1.000 COS |
| B phase power factor | | 0-20mA transmitting output for B phase power factor 0-1.000 COS |
| | | 4-20mA transmitting output for B phase power factor 0-1.000 COS |
| C phase power factor | | 0-20mA transmitting output for C phase power factor 0-1.000 COS |
| | | 4-20mA transmitting output for C phase power factor 0-1.000 COS |
| Total power factor | | 0-20mA transmitting output for total power factor 0-1.000 COS |
| | | 4-20mA transmitting output for total power factor 0-1.000 COS |
| A phase apparent power | | 0-20mA transmitting output for A phase apparent power 0-8000W |
| | | 4-20mA transmitting output for A phase apparent power 0-8000W |
| B phase apparent power | | 0-20mA transmitting output for B phase apparent power 0-8000W |
| | | 4-20mA transmitting output for B phase apparent power 0-8000W |
| C phase apparent power | | 0-20mA transmitting output for C phase apparent power 0-8000W |
| | | 4-20mA transmitting output for C phase apparent power 0-8000W |
| Total apparent power | | 0-20mA transmitting output for total apparent power 0-8000W |
| | | 4-20mA transmitting output for total apparent power 0-8000W |
| Frequency | | 0-20mA transmitting output for three phase frequency 0-50Hz |
| | | 4-20mA transmitting output for three phase frequency 0-50Hz |
| OFF | OFF as Closing transmitting output | |

**Alarming Item Setting Table**

| Alarming Item | Alarming Type Setting | Alarming Range Setting | Explanation |
|---|---|---|---|
| A phase voltage | | | Alarming output for A phase voltage lower than 400V |
| | | | Alarming output for A phase voltage higher than 400V |
| B phase voltage | | | Alarming output for B phase voltage lower than 400V |
| | | | Alarming output for B phase voltage higher than 400V |
| C phase voltage | | | Alarming output for C phase voltage lower than 400V |
| | | | Alarming output for C phase voltage higher than 400V |
| AB circuit voltage | | | Alarming output for AB phase voltage lower than 400V |
| | | | Alarming output for AB phase voltage higher than 400V |
| BC circuit voltage | | | Alarming output for BC phase voltage lower than 400V |
| | | | Alarming output for BC phase voltage higher than 400V |
| CA circuit voltage | | | Alarming output for CA phase voltage lower than 400V |
| | | | Alarming output for CA phase voltage higher than 400V |
| A phase current | | | Alarming output for A phase current lower than 5A |
| | | | Alarming output for A phase current higher than 5A |
| B phase current | | | Alarming output for B phase current lower than 5A |
| | | | Alarming output for B phase current higher than 5A |
| C phase current | | | Alarming output for C phase current lower than 5A |
| | | | Alarming output for C phase current higher than 5A |
| A phase active power | | | Alarming output for A phase active power lower than 6000W |
| | | | Alarming output for A phase active power higher than 6000W |
| B phase active power | | | Alarming output for B phase active power lower than 6000W |
| | | | Alarming output for B phase active power higher than 6000W |
| C phase active power | | | Alarming output for C phase active power lower than 6000W |
| | | | Alarming output for C phase active power higher than 6000W |
| Total active power | | | Alarming output for total active power lower than 6000W |
| | | | Alarming output for total active power higher than 6000W |
| A phase reactive power | | | Alarming output for A phase reactive power lower than 9000W |
| | | | Alarming output for A phase reactive power higher than 9000W |
| B phase reactive power | | | Alarming output for B phase reactive power lower than 9000W |
| | | | Alarming output for B phase reactive power higher than 9000W |
| C phase reactive power | | | Alarming output for C phase reactive power lower than 9000W |
| | | | Alarming output for C phase reactive power higher than 9000W |
| Total reactive power | | | Alarming output for total reactive power lower than 9000W |
| | | | Alarming output for total reactive power higher than 9000W |
| A phase power factor | | | Alarming output for A phase power factor lower than 1.000cos |
| | | | Alarming output for A phase power factor higher than 1.000cos |
| B phase power factor | | | Alarming output for B phase power factor lower than 1.000cos |
| | | | Alarming output for B phase power factor r higher than 1.000cos |
| C phase power factor | | | Alarming output for C phase power factor lower than 1.000cos |
| | | | Alarming output for C phase power factor higher than 1.000cos |

| | | |
|---|---|---|
| Total power factor | | Alarming output for total power factor lower than 1.000cos |
| | | Alarming output for total power factor higher than 1.000cos |
| A phase apparent power | | Alarming output for A phase apparent power lower than 8000W |
| | | Alarming output for A phase apparent power higher than 8000W |
| B phase apparent power | | Alarming output for B phase apparent power lower than 8000W |
| | | Alarming output for B phase apparent power higher than 8000W |
| C phase apparent power | | Alarming output for C phase apparent power lower than 8000W |
| | | Alarming output for C phase apparent power higher than 8000W |
| Total apparent power | | Alarming output for total apparent power lower than 8000W |
| | | Alarming output for total apparent power higher than 8000W |
| Frequency | | Alarming output for three phase frequency lower than 50Hz |
| | | Alarming output for three phase frequency higher than 50Hz |
| OFF | OFF as Closing transmitting output | |

**Ascent Communication Technology Ltd**

**AUSTRALIA**
961 Mountain Highway, Boronia
Victoria 3155, AUSTRALIA
Phone: +61-488 293 682

**CHINA**
Unit 1907, 600 Luban Road
200023, Shanghai CHINA
Phone: +86-21-60232616

**EUROPE**
Pfarrer-Bensheimer-Strasse 7a
55129 Mainz, GERMANY
Phone: +49 (0) 6136 926 3246

**HONG KONG SAR**
Unit 9, 12th Floor, Wing Tuck Commercial Centre
177 Wing Lok Street, Sheung Wan, HONG KONG
Phone: +852-2851 4722

**USA**
2710 Thomes Ave, Cheyenne
WY 82001, USA
Phone: +1-203 816 5188

**VIETNAM**
15 /F TTC Building, Duy Tan Street, Cau Giay Dist.
Hanoi, VIETNAM
Phone: +84 168 481 8348

**WEB:** www.ascentcomtec.com **EMAIL:** sales@ascentcomtec.com


Ver. ACT_APM530_P_Meter_Manual_V1c_Sep_2016