

THREE PHASE FOUR WIRE SPLIT PREPAYMENT METER USER MANUAL

Model: KAYZ-QPM16-3

Version: 2V002



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1. General

QPM16-3 is a new type three phase four wire split prepayment meter, which developed and produced by KAYZ Meter. It is designed, manufactured, test under the requirements of IEC62055-41, IEC62053-21, IEC62056-21(IEC61107) and other relevant international standards.

Main features :

- ☆ 20 digits TOKEN for energy transferring, high security and reliability.
- ☆ Prepaid state and postpaid state switching.
- ☆ Active energy, reactive energy (optional) and apparent energy (optional) measurement.
- ☆ Energy prepaid, relay open when credit run out Prepaid module >
- ☆ Low remain energy alarm, alarm limit is programmable
- ☆ Over power limit alarm and trip. Power limit is programmable
- ☆ Over phase power unbalance limit alarm, the phase power unbalance limit is programmable.
- ☆ Open terminal cover or meter box alarm and trip. This function is available at both power on and power off status.
- ☆ Low and high voltage protection, the low and high voltage limit is programmable.
- ☆ Optical communication port for local data reading and writing.
- ☆ Communicate with customer interface unit (CIU), hand hold unit (HHU) and data concentrator unit (DCU) via wireless (LORA) and 485 (optional).
- ☆ Measure each phase voltage, current, power, frequency and phase angle.
- ☆ Large LCD display, distinct visible with backlight.
- ☆ Relay open when power failure (optional).
- ☆ Installation model and running model switching. When meter at installation model, open terminal cover will not trigger alarm and relay open, it is an user-friendly designing when do meter installation and testing. When meter at running model, open terminal cover will generate an event record and relay open immediately. The actual operation according to customer requirements
- ☆ open meter cover detection, and Strong magnetic detection (optional).

2. Specifications and technical parameters

Item	Technical Specs
Rated voltage	230/400V
Range of operation voltage	144V~312V
Rated current	3×10(100)A
Pulse constant	Active:400imp/kWh, Reactive:400imp/kvarh
Starting current	2%Ib
Accuracy class	Active: 1.0, Reactive: 2.0
Reference frequency	50Hz
Power consumption	≤2W, 4VA
Temperature	-25°C~+55°C
Temperature limit	-35°C~+75°C
Humidity	<95%(Free of condensation)
MTBF	≥6×10 ⁴ h
Design lifetime	≥15years
Battery life	≥10 years
Pulse parameters	Pulse width:(80±5)ms , Current≤15mA , Voltage: DC(5~24)V(External power source)

Other reference parameters:

Outline Dimension	L×W×H = 287.5mm×170.5mm×87mm
Weight	About 2.1kg

3. Operation principal 3.1

Meter appearance:

3.1.1 LCD display.

3.1.2 LED indicators. From left to right are: kWh, kvarh, status credit, alarm, comm..

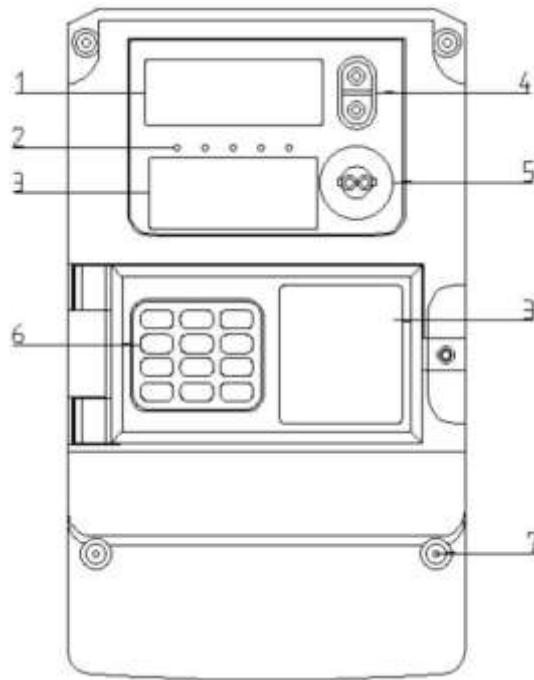
3.1.3 Nameplate. Contain meter basic parameters and specification.

3.1.4 Up and Down button with display.

3.1.5 Optical communication port, for local data reading and parameter setting.

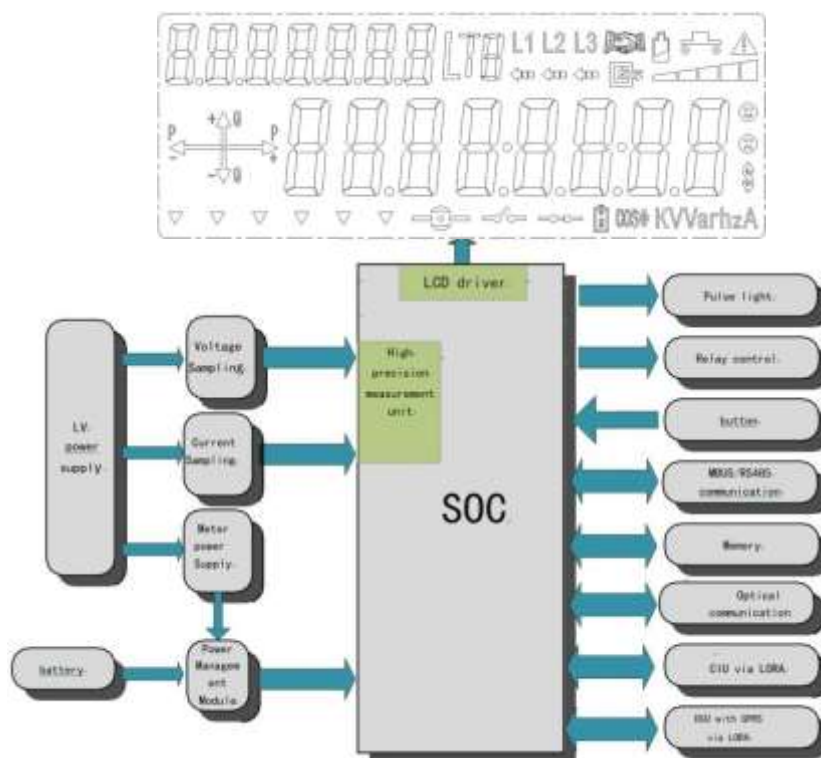
3.1.6 Keypad, contain 0~9 numeric buttons, “←”button and “→”button, for TOKEN entering and data query.

3.1.7 Assistance terminal cover. Pulse ports (active and reactive energy), RS485 communication port, open meter box detection port.



3.2 Operation principal

Sampling current and voltage signal by shunt resistor and divider resistor net, it uses single Chip microcomputer to complete measurement, management, communication, data saving, driving liquid crystal display etc. Measurement chips work with MCU to convert the sampled analog signal into digital signal. Then take an integral operation to acquire the accurate measurements. Per processing, can provide or exchange information with external interface at any time.



The diagram of operation principal

4. Main functions

4.1 Measure active and reactive energy, reactive is optional.

Measure active (reactive) energy: Total= import + export

4.2 Measure total active energy

Total active energy is the sum of 3 phases active energy, $W^+ = |W_A| + |W_B| + |W_C|$

4.3 Measure average power

Measure each phase and total phase average power. The average power is the mean of each minute instantaneous power, can be used for load controlling. The minimum unit for active power is

0.0001kW.

4.4 Build-in relay for load controlling

Relay open when remaining energy to be 0, user should purchase the energy to resume the power supply.
(When remaining energy is bigger than 0, relay close automatically)

4.5 Credit increment function

Upon acceptance of a valid TOKEN, meter shall credit the exact amount contained on the TOKEN to the appropriate register in the meter and will increment the register by this amount

4.6 Low balance credit alarm

This meter have three levels of balance credit alarm limit to remind user purchase energy: When balance credit is more than alarm limit 1st, LED alarm indicator will be green and long lighted.

When balance credit is less or equal to alarm limit 1st, and more than alarm limit 2nd, LED alarm indicator will be yellow and long lighted.

When balance credit is less or equal to alarm limit 2nd, and more than alarm limit 3rd, LED alarm indicator will be red and long lighted.

When balance credit is less or equal to alarm limit 3rd, LED alarm indicator will be red and glitter.

When balance credit run out, relay open. User should purchase the energy (remaining energy is bigger than 0) to close the relay.

4.7 Over power limit alarm and trip

Relay open automatically when any phase exceeded the power limit, at the same time, LCD alarm symbol will be flashed. According to the binary code on LCD, we can track out the alarm reason. Overload relay open delay time and relay close delay time is programmable.

If power limit is not defined or bigger than 69kW, or set as 0, for devices or equipment safety purpose, we regard the power limit is “3 times* I_{MAX} * rate voltage”, this is a format of default power limit.

4.8 Relay error alarm

Meter monitor relay work status continuously, to confirm if the relay worked as per MCU order. If find some problem on relay, LCD alarm symbol will be flashed. According to the binary code on LCD, we can track out the alarm reason. If no problem, no alarm symbol flash.

4.9 Terminal cover or meter box open alarm and trip

Unauthorized terminal cover or meter box open will trigger an event log be recorded in non-volatile memory with date and time stamp. At the same time, meter trip and LCD alarm symbol flash. According to the binary code on LCD, we can track out the alarm reason.

4.9.1 Unauthorized terminal cover or meter box open will trigger an event log, no matter of meter at power on state or at the power off state.

4.9.2 When meter at installation model, open terminal cover or meter box will not trigger an event log.

Remark: Event logs generation and relay open action are related to KT, but alarm is not related to KT

4.10 Billing function

Bill date can be set at any date between 1st and 28th. Default billing time is on each month 1st day at 0 o'clock, can store last 12 months data, details as below:

1. Cumulative total consumption energy(import/export, active/reactive/apparent)
2. Cumulative total purchased energy
3. Active max demand
4. Monthly energy consumption (energy consumption in one month)

4.11 Low and high voltage protection (optional)

4.12.1 Any phase over the high voltage limit, relay open

4.12.2 All 3 phases below the low voltage limit, relay open

LCD alarm symbol will be flashed as well. According to the binary code on LCD, we can track out the alarm reason.

Relay close when voltage goes normal in the last 1 minute. Relay close delay time is programmable.

Low and high voltage limit can be programmable, if you set 0, that means the low and high voltage relay open function is closed.

4.12 Power off display

4.14.1 Open terminal cover and meter box detection. If the terminal cover or meter box is well placed previously, open terminal cover or meter box will trigger an event log with date and time stamp. Meanwhile, LCD will show "OPEN" character, later LCD display shut off.

4.14.2 Press the "⏻" key, LCD will show software revision, remaining energy, prepaid total consumption, postpaid total consumption by sequence. Later LCD display shut off.

4.13 Remaining usage days alarm (Optional)

According to current balance credit and last month average daily consumption, we can get the remaining usage days. If the remaining usage days are less than the limit, alarm triggered. Remaining usage days limit is programmable.

If last month average daily consumption is 0, 5kWh be default as last month average daily consumption for remaining usage days calculation

4.14 Installation model and running model

4.14.1 Meter after inspection and testing, out-factory to be installation model. Customer can enter a series code (TOKEN) "12682136550811111930" to transfer the meter from installation model to running model. Or meter continue using more than 168 hours, meter will auto-switching from installation model to running model.

4.14.2 Installation model: Open terminal cover or meter box, will not trigger alarm and relay open. It is more human-friendly when do meter installation and testing

4.14.3 Running model: Meter can detect terminal cover and meter box open.

4.15 CIU Operation

Users can enter the 20-digit TOKEN or 3-digits short code and then press the ENTER Key to inquire relevant data.
See the following for instruction for display:

✂ After inputting Token or short code under successful communication conditions, the meter would display
the following parameter:



✂ The LCD will display the corresponding data in case of successful communication.

E.g. Enter "1705 1221 8600 5260 0665" and press the Enter key, the following parameter will be displayed
in case correct Token is input:



✂ The following parameter will be displayed in case incorrect Token is input:



✂ The following parameter will be displayed in case the Token has been used before:



✂ Communication failure



✂ Special function

- Successful cancellation of the audible alarm



- No need to cancel the audible alarm



- Switch to normal operation mode

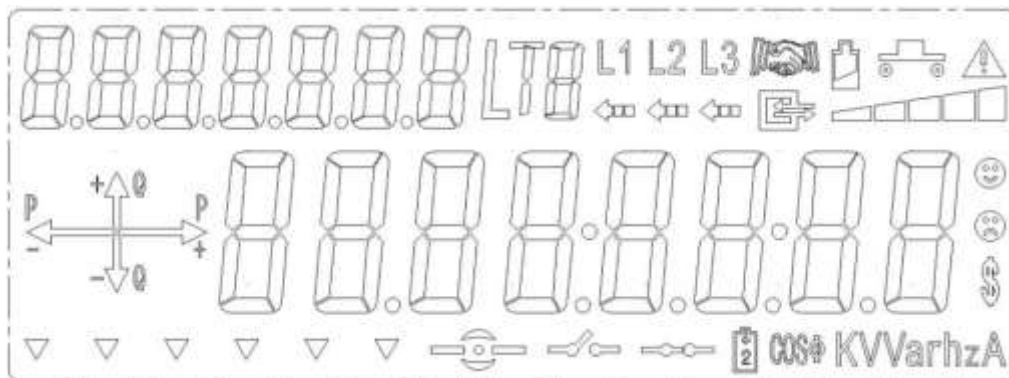


- Normal operation mode



5. LCD display and LED indicator

5.1 Full-screen display



5.2 LCD displays instruction

KVVarhzA : Measurement unit

kW/kWh: it is a unit of active power/ energy.

kVA/kVAh: it is a unit of apparent power/ energy.

kVar/kVarh: it is a unit of reactive power/ energy.

V: it is a unit of voltage.

A: it is a unit of current.

Hz: it is a unit of frequency.

88888888: Display Data

88888888: Symbol of display item No., is Called OBIS Code.

: Credit Status Indicator

L1 L2 L3

: Symbol of 3 phase voltage,  means the reverse current. : Symbol of relay close

: Symbol of relay open



: Symbol of TOKEN success



: Symbol of TOKEN reject



: Symbol of friendly date



: Symbol of communication status



: Symbol of programmable status



: Battery low voltage



: Alarm symbol on LCD (Flashed)

Meter power on, LCD show full-screen display, software's latest buyoff date, then enter into scrolling display (cycle display) model. The default scrolling (cycle) display items are 001/003/005/014/015/016. Scrolling (cycle) display items and each display stay time is programmable, can set max 30 items per scrolling cycle.

If need to inquire another data, you can press “←” or “→” key to enter into the manual query model. One time “←” key press, one display backward. One time “→” key press, one display forward. If no manual operation within 30 seconds, the meter will auto-return to scrolling (cycle) display model.

If need to quick query some data, you can enter a “3 digits code+↵” key, for quick query purpose.

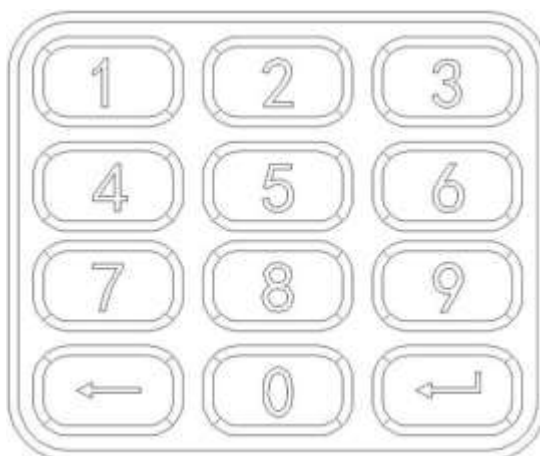
Short Code	Function	Short Code	Function
000	All Function Test	001	Relay Test
002	Display All ON	004	Total Used Active kWh
005	KRN Version	006	TI Information
007	The Maximum Power Limit	008	Meter Tampering Status

009	Balance Credit	030	SGC Information
031	MFC Information	032	DSN Information
033	KT Information	034	EA Information
035	Relay Operation Reason	036	Power Down Times
039	kWh Consumption of previous Month	040	Total Purchase Credit Amount
041	Overdraft Credit	042	Hoarding Credit
046	Cancel alarm	047	Entry Running Mode
048	Emergency Credit	050	Instantaneous Power
070	Current date	071	Current time
072	Phase A Current	073	Phase B Current
074	Phase C Current	076	Phase A Voltage
077	Phase B Voltage	078	Phase C Voltage
079	Total Active Power	080	Phase A Active Power
081	Phase B Active Power	082	Phase C Active Power
083	Total Reactive Power	084	Phase A Reactive Power
085	Phase B Reactive Power	086	Phase C Reactive Power
087	Total Apparent Power	088	Phase A Apparent Power
089	Phase B Apparent Power	090	Phase C Apparent Power
091	Total Power Factor	092	Phase A Power Factor
093	Phase B Power Factor	094	Phase C Power Factor
095	Frequency	100	Meter Number

101	The Software Version	200	Previous Charged Credit
201	Previous Charged Token	202	Previous Charged Date
203	Previous Charged Time	204	The Last 2 nd Charged Credit
205	The Last 2 nd Charged Token	206	The Last 2 nd Charged Date
207	The Last 2 nd Charged Time	208	The Last 3 rd Charged Credit
209	The Last 3 rd Charged Token	210	The Last 3 rd Charged Date
211	The Last 3 rd Charged Time	212	The Last 4 th Charged Credit
213	The Last 4 th Charged Token	214	The Last 4 th Charged Date
215	The Last 4 th Charged Time	216	The Last 5 th Charged Credit
217	The Last 5 th Charged Token	218	The Last 5 th Charged Date
219	The Last 5 th Charged Time	220	The Last 6 th Charged Credit
221	The Last 6 th Charged Token	222	The Last 6 th Charged Date
223	The Last 6 th Charged Time	401	Total kWh of Last 1 st Day
402	Total kWh of Last 2 nd Day	403	Total kWh of Last 3 rd Day
432	Total kWh of Last 1 st Month	433	Total kWh of Last 2 nd Month
434	Total kWh of Last 3 rd Month	435	Total kWh of Last 4 th Month
436	Total kWh of Last 5 th Month	437	Total kWh of Last 6 th Month
445	Only kWh of Last 1 st Month	446	Only kWh of Last 2 nd Month
447	Only kWh of Last 3 rd Month	450	Reverse Active kWh

6. Keypad operation :

Keypad drawing as below: (Just for Reference)



Keypad has 12 buttons to enter TOKEN and query information. “←” is delete key, “→” is confirm key.

User gets a 20 digits TOKEN from vending station, enters the TOKEN into meter, meter will decrypt this TOKEN and finish energy transferring. During keypad operation, the backlight will be lighted and the digits will show on the LCD. Maximum 8 digits per each screen, so total need 3 screens to display the full TOKEN. If entered incorrect digit, press the “←” key can be deleted. When finish TOKEN entering, press “→” key to confirm to complete energy transferring. If no operation within 30 seconds, the meter will return to cycle display model automatically, turn off the backlight.

7. Communication

7.1 Optical communication

Optical communication for local data reading and writing.

7.2 AMI remote communication

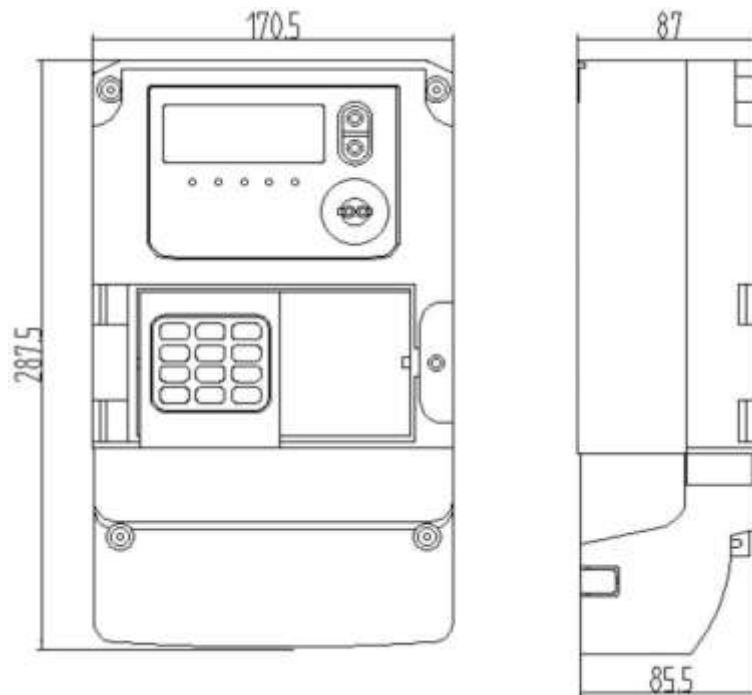
Support wireless Lora communication With CIU To DCU.

8. Installation and connection

8.1 Meter installation

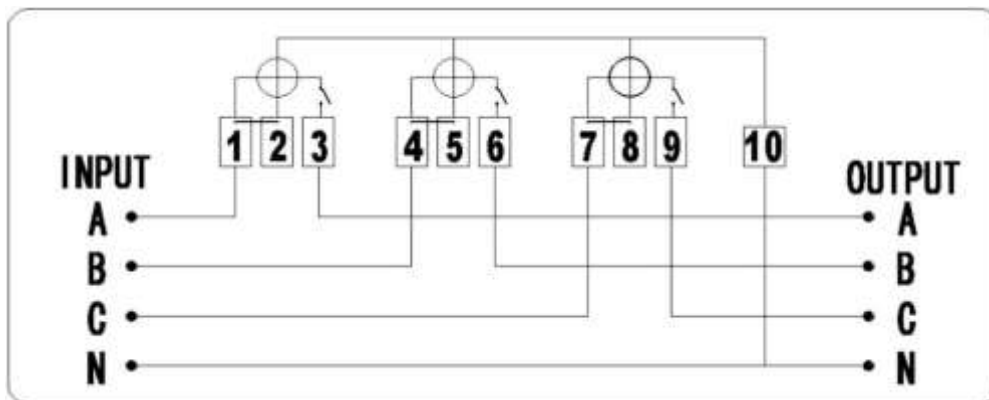
(1) Meter install dimension as below, there is a hook at the upper of meter back, using M6 hook screw for fixing.

And there are 2 mounting holes at the lower of meter, using M4 screw or ST4.2 x12 self-tap screws.

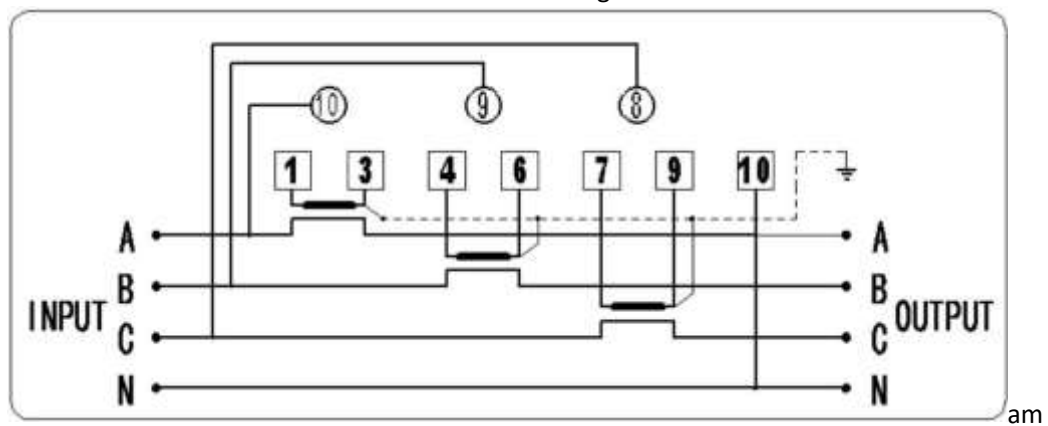


OUTLINE DIMENSION DRAWING

(2) Wire connection diagram as follong direct connection diagram



CT connection diagram



8.2 Assistant terminal

POUT	COM	QOUT
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POUT:

Active pulse output port

COM: Pulse output common port

QOUT: Reactive pulse output port

9. Transport and storage

- ★ Meter transport should be without severe vibration and shock. Its storage should be consistent with transport packaging JB/T9329-1999 and GB/T15464-1995.
- ★ Product should be in the original packaging box, the environment should be kept clean and the ambient temperature does not exceed $-20^{\circ}\text{C} \sim +65^{\circ}\text{C}$, relative humidity less than 85%, non-corrosive gases in the air and the mold.
- ★ If product stored in the warehouse, it should be placed on shelves with original packing, the stacking height should be not exceeding 5 layers.
- ★ Product should not be stored after open packing.

10. Notes

There is no adjustable internal component for user inside the meter.

The meter should be checked to "Qualified" before delivery. And can be installed with lead-seal. Access energy meter cross-sectional area of the wire should meet the requirements of the load current to avoid too small to heat and damage the meter.

Installation must be vertical and firmly. The input and output of power line cannot be reverse. The meter should be installed in the ventilation dry. The installation of energy meter should be fixed at the bottom solid wall of fire-resistant hard vibration. Watt-hour meter should be mounted vertically, it is recommended to install appropriate height to 1.8 meters.

There should be lightning protection measures in the working environment.