



# User Manual

## Single Phase Smart AMI Meter

**HXE110**

*Focus on creating value for clients*

## Revision history

<b>Index</b>	<b>Date</b>	<b>Name</b>	<b>Remarks</b>
1.0	Nov. 20th. 2020	HEXING	First Release
1.1	Apr. 21th. 2021	HEXING	Update
1.2	Jun. 28th. 2021	HEXING	Update
1.3	Nov. 26th. 2021	HEXING	Update
1.4	Dec. 9th. 2021	HEXING	Update
1.5	Oct. 16th. 2023	HEXING	Update

## Document description

### Effective coverage:

This user manual only applies to Hexing meter type as mentioned in the document title.

### Objective:

This user manual includes the relevant technical information of meter. It's available for the use and maintenance of the meter. The manual includes:

- Introduction of meter's work mechanism, performance and functions.
- Malfunction that may happen during its lifetime and the corresponding precaution.
- Detailed description of the meter functioning during its whole lifetime.

### User Object:

- This user manual aims at guiding the personnel responsible for the meter design, testing, operation etc.
- This user manual is also helpful for personnel from the electricity company such as the meter engineers, and the technicians responsible for the meter installation, operation and maintenance from the electricity company as well.

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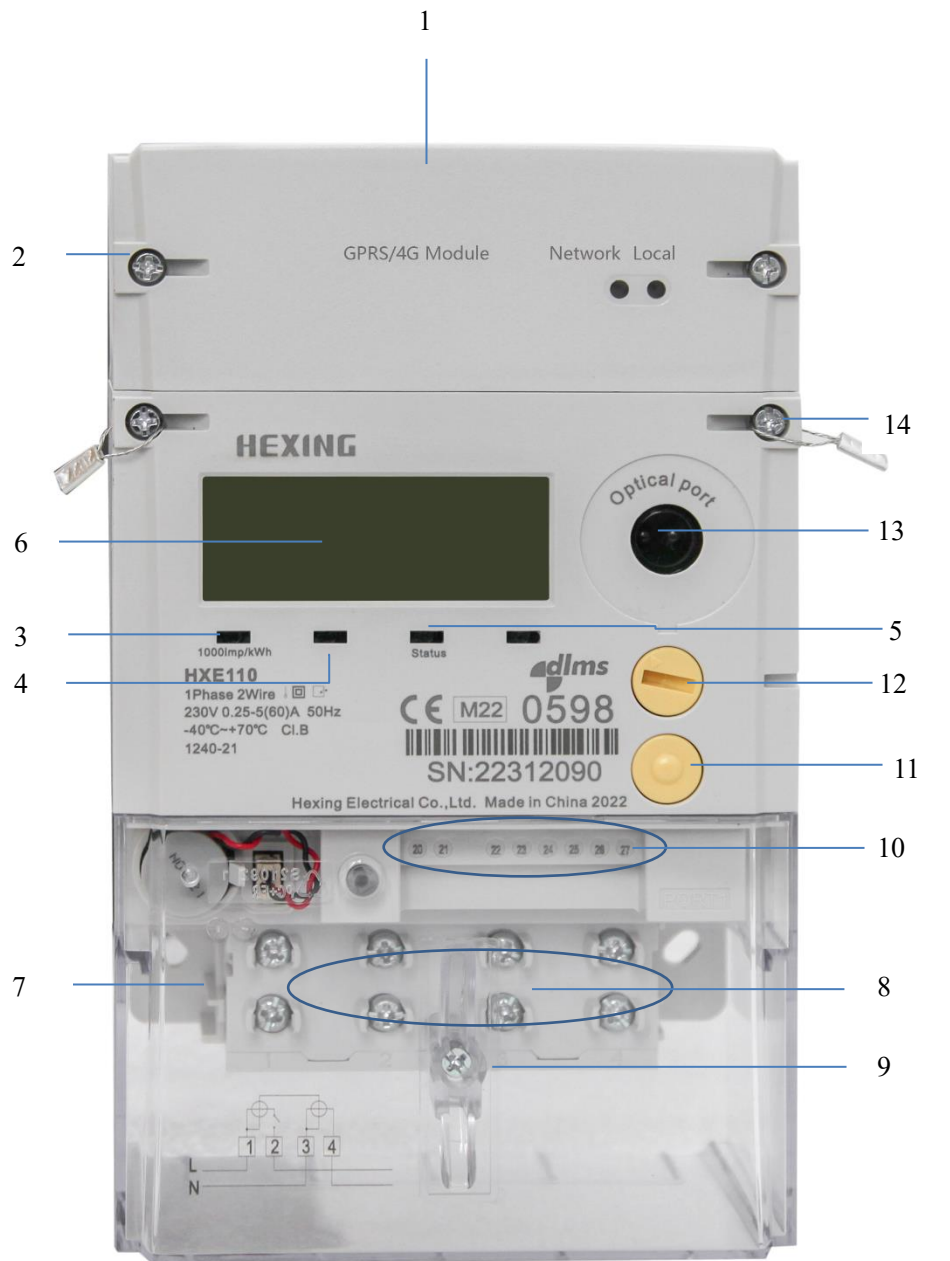
# 1 Overview

The HXE110 single-phase smart meter is design for measuring the import and export active energy, import and export reactive energy, maximum demand and instantaneous parameters. It supports contract management, multi-tariff, monthly billing, daily billing, load profile, event detection, neutral measurement (optional) and supply control etc. A modular-designed communication module can be GPRS/4G module, or NB-IoT module, which supports plug and play while doesn't need to power off the meter.

## Main Features

- Support wide scope of operate voltage
- LCD display with large 8 digits.
- Lithium battery or/and super-capacitor used as back-up power supply, so can support display available in case of power failure.
- Display button allows checking the LCD display items and changing the LCD display mode.
- Support multiple input/output interface and hot plug in/out interface.
- Communication protocol: DLMS/COSEM.
- Communication encryption ensures data transmission safety.
- Support local and remote firmware upgrade.
- Support relay on/off remotely.
- Support Degree Protection IP54.
- Real-time clock.
- Various events detection and record including under voltage, over voltage, programming, password setting and time setting.
- Magnetic, phase reverse, etc. detection for tampering-proof.

## 2 Appearance



- |                              |                         |                       |
|------------------------------|-------------------------|-----------------------|
| 1. Communication module      | 6. LCD window           | 11. Display button    |
| 2. Communication module seal | 7. Terminal cover       | 12. Sealable button   |
| 3. Active pulse LED          | 8. Terminal Block       | 13. Optical port      |
| 4. Reactive pulse LED        | 9. Terminal cover seal  | 14. Meter cover seals |
| 5. Alarm LED (optional)      | 10. Auxiliary interface |                       |

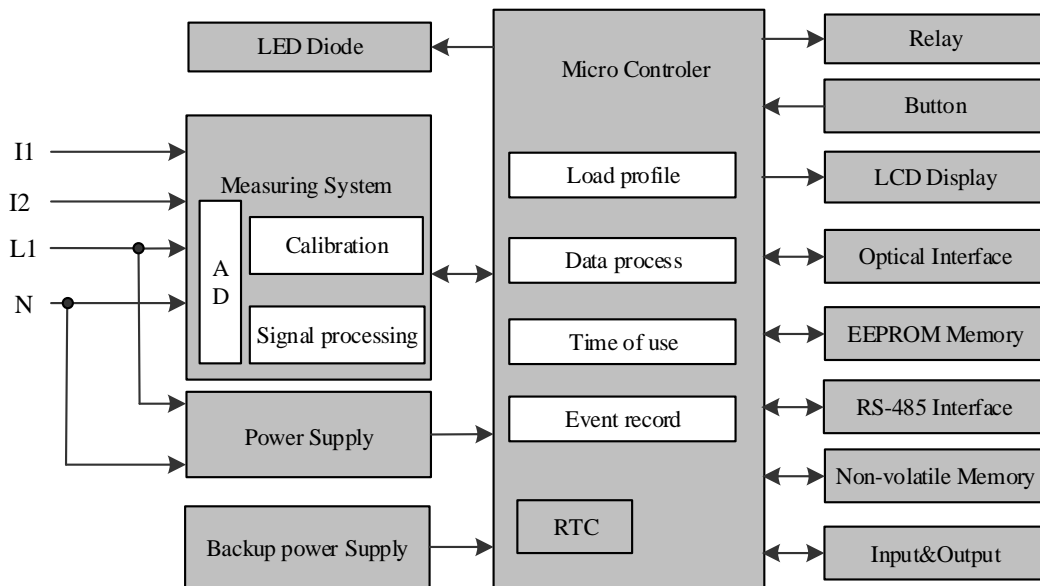


### 3 Standards Compliance

Standard	Description
<b>IEC 62052-11</b>	Electricity metering equipment (AC.) – General requirements, tests and test conditions – Part 11: Metering equipment
<b>IEC 62053-21</b>	Electricity metering equipment (AC.) –Particular requirements –Part 21:Static meters for active energy(classes 1 and 2)
<b>IEC 62053-23</b>	Electricity metering equipment (AC) – Particular requirements – Part 23: Static meters for reactive energy (classes 2 and 3)
<b>EN50470-1</b>	Electricity metering equipment (AC.) – Part 1: General requirements, tests and test conditions – Metering equipment(class indexes A, B and C)
<b>EN50470-3</b>	Electricity metering equipment (AC.) – Part 3: Particular requirements – Static meters for active energy (class indexes A, B and C)
<b>IEC 62052-21</b>	Electricity metering equipment (AC) – General requirements, tests and test conditions – Part 21: Tariff and load control equipment
<b>IEC 62056-21</b>	Electricity metering - Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange
<b>IEC62056-42</b>	Electricity metering – Data exchange for meter reading, tariff and load control – Part 42:Physical layer services and procedures for connection-oriented asynchronous data exchange
<b>IEC62056-46</b>	Electricity metering – Data exchange for meter reading, tariff and load control – Part 46: Data link layer using HDLC protocol
<b>IEC62056-47</b>	Electricity metering – Data exchange for meter reading, tariff and load control – Part 47:COSEM transport layer for IP networks
<b>IEC62056-53</b>	Electricity metering – Data exchange for meter reading, tariff and load control – Part 53:COSEM Application layer
<b>IEC62056-61</b>	Electricity metering – Data exchange for meter reading, tariff and load control – Part 61:OBIS Object identification system

<b>IEC62056-62</b>	<p>Electricity metering</p> <ul style="list-style-type: none"><li>– Data exchange for meter reading, tariff and load control</li><li>– Part 62:Interface classes</li></ul>
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## 4 Working Principle



## 5 Measurement

### 5.1 Active energy Measurement

- Total Import active energy per tariff
- Total Export active energy per tariff
- Total Sum active energy per tariff

### 5.2 Reactive energy Measurement

$$+R=R_I+R_{II}; -R=R_{III}+R_{IV}$$

- Total Import reactive energy per tariff
- Total Export reactive energy per tariff
- Total Reactive energy per tariff in QI
- Total Reactive energy per tariff in QII
- Total Reactive energy per tariff in QIII
- Total Reactive energy per tariff in QIV

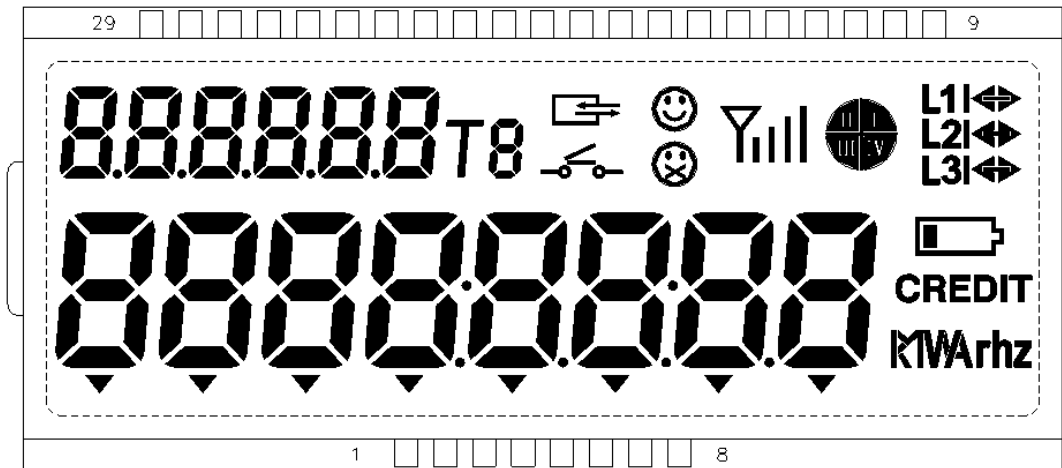
### 5.3 Instantaneous Measurement

- Voltage
- Current
- Active power
- Reactive power
- Apparent power
- V&I Phase Angles
- Power factor
- Frequency

## 6 LCD display




### 6.1 LCD with full segments










LCD with full-segment display is as following:



- LCD material is HTN type, and its working temperature range is  $-40^{\circ}\text{C}\sim+70^{\circ}\text{C}$ .
- LCD shall be high contrast ratio.
- LCD shall be wide viewing angle.
- LCD polarizer shall be anti-ultraviolet function.

### 6.2 Display segments

LCD display information	Description
	Data display
	OBIS display
	Indicates current voltage: 1) On: The voltage is normal 2) Off: Power failure 2) Flashing: Under voltage, Overvoltage, Loss voltage

	Unit
	The meter is in communication
	Four-quadrant indicator
	Indicate the direction of the power 1) Right arrow: Import 2) Left arrow: Export 3) Not displayed or displayed as input power: grid power on but no import 4) No display: when voltage indicator has no display
	Battery status
	Relay connection/disconnection
	Strength of signal status
	Tariff indicator
	S1~S8 Event status indicator

## 6.3 Display mode

This meter is design with three display modes:

- Auto mode display

Meter default display mode is auto-scrolling display, the default auto scrolling time cycle is 10 seconds. The time in each cycle is configurable between (1s-60s) time interval; it will switch to the next screen display automatically. Auto-scrolling display item list is also configurable with 32 items, detailed display information please check the display list.

- Manual mode display

Manual display mode can be activated by pressing and holding display button, a

short and repeated press of display button will change the screen display. Meter will return to auto-scrolling display mode automatically in a certain time without operating (default time is 120s). The display item list under manual mode display I display list is configurable, and 60 items can be configured at minimum, detailed display information please check the display list.

- Power off display

The LCD will be off as default status. The meter will show power off display by pressing the button, the item list of power off is the same as that under auto mode, No push button is pressed for 30~60s, the meter will turn off the LCD.

- Test mode display

Meter can enter or exit test mode by receiving command. The meter can display energy in 3 decimals in test mode. When power off happens, the meter will exit test mode automatically.

## 7 Demand

### 7.1 Calculation method of MD

Support two types of MD calculation methods: sliding window time and block. MD sliding time can be set from 1 to 60 minutes, and MD sliding number can be set between 1~15, and the sliding time and number should not be more than 60 by multiplication.

### 7.2 MD recorded content

- Import active demand
- Import reactive demand
- Export active demand
- Export reactive demand
- Reactive demand in QI
- Reactive demand in QII
- Reactive demand in QIII
- Reactive demand in QIV
- Total import active MD with time stamp total tariff
- Total export active MD with time stamp total per tariff
- Total import reactive MD with time stamp total per tariff
- Total export reactive MD with time stamp total per tariff
- Total reactive MD with time stamp total per tariff in QI
- Total reactive MD with time stamp total per tariff in QII
- Total reactive MD with time stamp total per tariff in QIII
- Total reactive MD with time stamp total per tariff in QIV

### 7.3 MD reset

There are two kinds of reset:

Auto reset: reset according to the time preset, usually the same with billing time.

Manual reset:

1. Push the seal button and hold for preset time.
2. Send command for MD reset.



## 8 Load profile

### 8.1 load profile capacity

Load Profile	Default application	Max. capture items
Load Profile 1	Hourly Data(energy)	60
Load Profile 2	Hourly Data(Instantaneous)	60
Load Profile 9	Daily Billing Data	60

- The period can be setting from 0, 60, 300, 600, 900, 1800, 3600, 86400s, when you choose 0, means no need for this profile.
- Each profile capacity can be set in factory.
- When you change the objects or period in profile, the data will be erase.
- The average, minimum and maximum value of the instantaneous data can only be configuring in only one load profile (Load profile 1 or Load profile 2).

### 8.2 Capture object list

Object	Number of bytes
Clock	14
Load profile status word	2
Import active energy	5
Export active energy	5
Reactive energy in QI	5
Reactive energy in QII	5
Reactive energy in QIII	5
Reactive energy in QIV	5
Import reactive energy	5
Export reactive energy	5
Last average active demand import	5
Last average active demand export	5
Last reactive demand (Q1)	5
Last reactive demand (Q2)	5

Last reactive demand (Q3)	5
Last reactive demand (Q4)	5
Last average value of voltage L1	5
Last average value of current L1	5
Last average value of power factor L1	5

## 9 Billing

### 9.1 Daily freezing

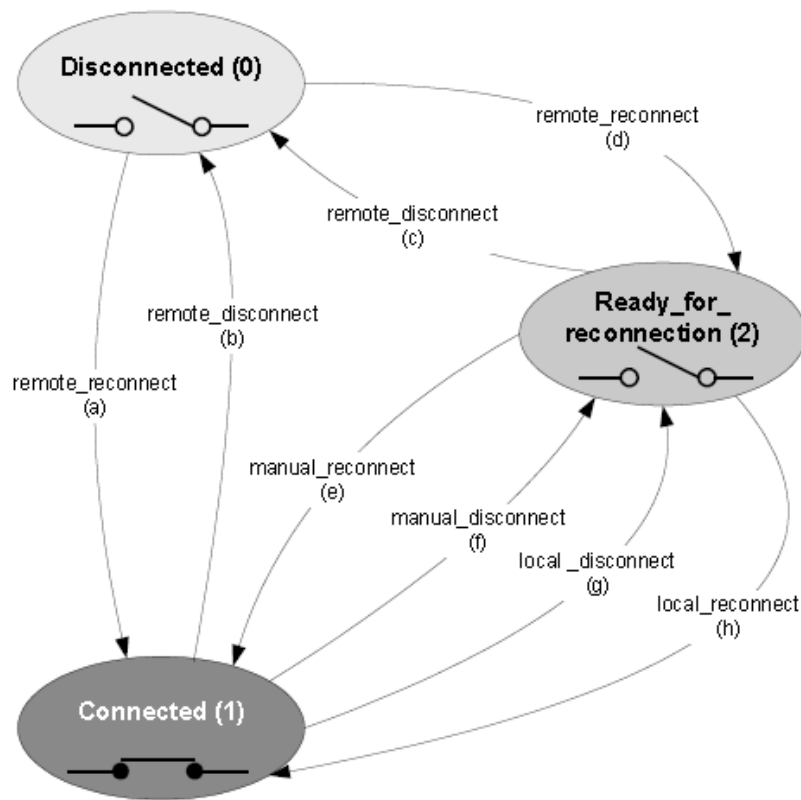
- At least keep 62 days data
- Freezing time: 00:00 at midnight everyday
- Freezing content: Can be configurable, same as load profile list(item 8.2)
- Daily freezing profile is the load profile whose period is set as 1440min(one day).

### 9.2 Monthly billing

- Capacity: At least keep 13 items of monthly billing data
- Automatic billing: When meter passes the set billing time, the meter will freeze the monthly billing data automatically. The format is XX day XX hour, and the default is 00 clock on the first day of each month.
- Manual billing: Support sending command or press-button billing. When meter under scroll button display mode, press the seal button for 10 seconds, and then -PrESS-bL shows on display, then press any button and the LCD will display donE, which means press-button billing has finished. This function support configuring as enable mode or disable mode. There are delay times between manual billing to reduce illegal repeat operation in short time.
- Support supplement latest one billing data when meter power off or clock adjust.
- Support configuring maximum 60 objects one time, the list is as follows:
  - Clock
  - Meter serial number
  - Import active energy
  - Export active energy
  - Reactive energy in QI
  - Reactive energy in QII
  - Reactive energy in QIII
  - Reactive energy in QIV
  - Import reactive energy
  - Export reactive energy
  - Import active energy tariff [x]
  - Export active energy tariff [x]
  - Import reactive energy tariff [x]
  - Export reactive energy tariff [x]
  - Reactive energy tariff [x] in QI

- Reactive energy tariff [x] in QII
- Reactive energy tariff [x] in QIII
- Reactive energy tariff [x] in QIV
- Import active MD with time stamp
- Import active MD with time stamp tariff[X]
- Export active MD with time stamp
- Export active MD with time stamp tariff[X]
- Import reactive MD with time stamp
- Import reactive MD with time stamp tariff[X]
- Export reactive MD with time stamp
- Export reactive MD with time stamp tariff[X]
- Reactive MD with time stamp in QI
- Reactive MD with time stamp tariff[X] in QI
- Reactive MD with time stamp in QII
- Reactive MD with time stamp tariff[X] in QII
- Reactive MD with time stamp in QIII
- Reactive MD with time stamp tariff[X] in QIII
- Reactive MD with time stamp in QIV
- Reactive MD with time stamp tariff[X] in QIV

## 10 Relay control



Relay control logic figure

Remote control: means send command to disconnect/connect.

Manual control: means press button to disconnect/connect. When relay status is "ready for connection", the mark of relay on LCD will flash. When support relay on by pressing button, the LCD will show "-PrESS-", now press the upper and down button together for 1 second, relay will be switched on. If want to switch relay off, just press upper or down button for preset time.

Local control: means use the meter own function:to realize power/current control, etc.

### 10.1 Relay status

No.	Status	Description
-----	--------	-------------

0	Disconnected(0)	In this status, relay is off, Any other operation is not allowed except that system or PC software send the cancel relay off command
1	Connected(1)	In this status, relay is on
2	Ready for connected(2)	In this status, relay is off

## 10.2 Relay control command

Transform No.	Transfer Name	Transform explain
a	Remote_reconnect	Remote reconnect, From Disconnected(0) to Connected(1), donneed manual control
b	Remote_disconnect	Remote disconnect, From Connected(1) to Disconnected(0)
c	Remote_disconnect	Remote disconnect, From Ready for connected(2) to Disconnected(0)
d	Remote_reconnect	Remote reconnect, From Disconnected(0)to Ready for connected(2) From Ready for connected(2) to Connected(1) need local or manual command
e	Manual_reconnect	Manual reconnect, From Ready for connected(2) to connected(1)
f	Manual_disconnect	Manual disconnect, From Connected(1) to Ready for connected(2) From Ready for connected(2) to Connected(1) need local or manual command
g	Local_disconnect	Local disconnect, From Connected(1) to Ready for connected(2) From Ready for connected(2) to Connected(1) need local or manual command
h	Local_reconnect	Local reconnect, From Ready for connected(2) to Connected(1)

## 10.3 Relay control mode

Control mode	Disconnection				Reconnection			
	Remote		Manual	Local	Remote		Manual	Local
	b	c	f	g	a	d	e	h
0	×	×	×	×	×	×	×	×
1	√	√	×	√	×	√	√	×
2	√	√	×	√	√	×	√	×
3	√	√	×	√	×	√	√	×
4	√	√	×	√	√	×	√	×
5	√	√	×	√	×	√	√	√
6	√	√	×	√	×	√	√	√

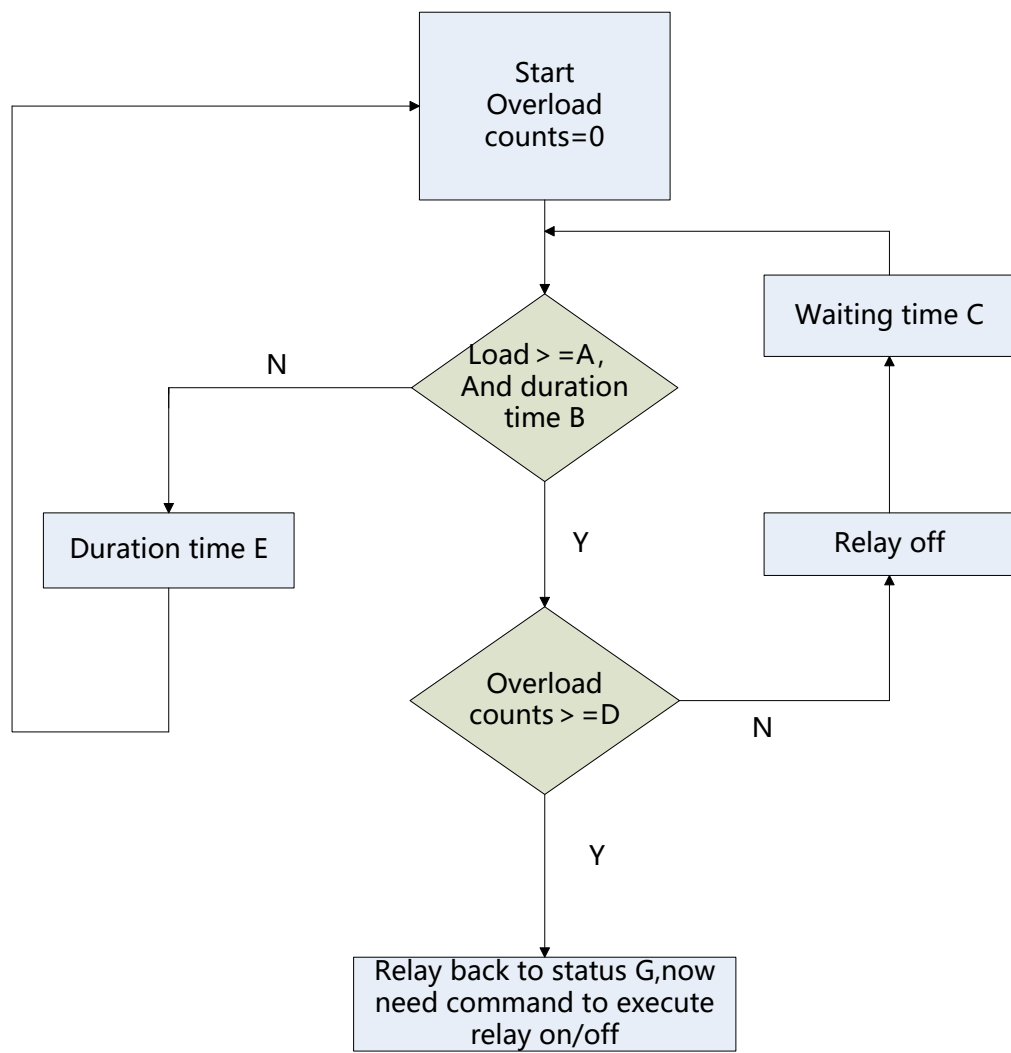
## 11 Load control

Load control monitor object can be total instantaneous active power(import + export), total instantaneous import active power, total instantaneous export active power, Maximum current in three phase, Maximum active power in three phase.

Overload disconnect logic:

- When load is higher than the preset threshold A and duration the preset delay time B, relay will disconnect, relay status turns from connected to ready for reconnection
- After relay is disconnected, it will keep this status for a preset time C, relay will turn connected and detect the load again
- If overload counts more than D times, relay will not execute off/on again, relay will keep the initial status(consumer can decide to turn off or on by himself), this initial status called G.
- If overload does not happen in E minutes, the meter will restart the overload counts.





## 12 Firmware Upgrade

Meter and communication module firmware can be upgraded remotely and/or locally. Firmware upgrade will not work in meter and module until the new version of firmware is uploaded into the meter completely. The meter records the event log as the firmware update.

The meter is fully compliant with the upgrade process defined in the DLMS standard:

- Step 1: Get Image Block Size.
- Step 2: Client initiates Image transfer.
- Step 3: Client transfers Image Blocks.
- Step 4: Client checks completeness of the Image.
- Step 5: Server verifies the Image (Initiated by the client or on its own).
- Step 6: Client checks the information on the images to activate.
- Step 7: Server activates the Image(s) (Initiated by the client or on its own).

After writing the firmware into meter, meter should check all steps right or not, if the CRC of the firmware is correct, then can update new firmware.

If result of checking authenticity is negative, the meter will reject to upgrade.

## 13 Event record

### 13.1 Event classification

- Standard event
- Tamper event
- Relay control event
- Power quality event
- Communication event

### 13.2 Event list

Standard Event
Switch to summer
Clock adjusted(old date/time)
Clock adjusted(new date/time)
RTC error
Low Battery Voltage
Error register cleared
Alarm register cleared
Program flash failure
Watchdog error/Exception Reset
Measuring unit fault
Firmware ready for activation
Firmware activated
Firmware failure
Parameter Program
Manual demand reset
TOU activated
TOU modified
Password Program
Reset all
Load Profile Reset
Calibration
Checksum of energy data error
EEPROM hardware error start
Tamper Event

<b>Tamper Event</b>
Terminal Cover Open
Terminal cover close
Magnetic Influence Detection start
Magnetic Influence Detection end
Meter Cover Open
Meter Cover close
Association authentication failure (n time failed authentication)
Module Cover Open
Module cover close
Current reversal(any phase current reversal happen )

<b>Relay Control Event</b>
Manual disconnection
Manual connection
Remote disconnection
Remote connection
Local disconnection
Limiter threshold exceeded
Limiter threshold ok
Limiter threshold changed
Local reconnection
Disconnect/Reconnect failure

<b>Power Quality Event</b>
Power down (short power failure)
Power up (short power failure)
Low power factor start
Low power factor end
Frequency abnormal start
Frequency abnormal end
Power down(long power failure)
Power up(long power failure)
Under voltage L1 start
Under voltage L1 end
Over voltage L1 start
Over voltage L1 end
Reverse Energy L1 start
Reverse Energy L1 end

Communication Event
Modem initialization failure
SIM card failure
SIM card Ok
GPRS registration failure
Modem SW reset
Modem HW reset
Diagnostic failure
User initialization failure
Signal quality low
Auto answer number of calls exceeded
Local communication attempt

## 14 Back-up power

### 14.1 Battery

The meter has a 1200mA external changeable lithium battery (optional). When the meter is power off, the battery supplies for RTC, LCD display and tamper events will be recorded.

#### 14.1.1 Low battery detection

When the meter is power on, the voltage will be measured by AD sampling per second.

The accuracy of voltage measuring is  $\pm 0.1V$ .

When the battery has been detected under low voltage (less than 3.0V) for 10 continual seconds, a low battery sign can be displayed on LCD, to remind customer to change the battery.

#### 14.1.2 Battery working lifetime

- Working lifetime
  - The battery can be used at least 10 years.
  - When the meter powers off, the lifetime of battery can be at least 2 years.

#### 14.1.3 External battery replacement

1) Power off the meter.

Customer should replace battery after powering off the meter. If it is inevitable to replace battery when powering on, please be even more careful for replacement operation to avoid electrical shock accidentally!



**WARNING**

Before battery replacement, must power off the meter first, otherwise it

may threat life. Make sure in replacement process, power grid will not be powered on by misoperation.

- 2) Open terminal cover.
- 3) Remove the battery to be replaced.



- 4) Plug in the new battery.



- 5) If the display of meter works, it means currently new battery installation is correct.
- 6) Close terminal cover.
- 7) Power on the meter.



**NOTE**

To ensure battery replacement will not make any influence to RTC of the meter, please try to finish battery replacement in a short period (within 20s is recommended), or after battery replacement, use PC software or HHU to write RTC of the meter.

## 15 RTC

- Supports calendar, time and leap year automatic when switching function.
- The accuracy is less than 0.5s/day at 23 °C, totally comply with IEC 62054-21
- Content of clock and range
  - year (2000~2099)
  - month (01~12)
  - day (01~31)
  - week (01~07) from Monday to Sunday
  - hour (00~23)
  - minute (00~59)
  - second (00~59)

It is not suggested to synchronize clock around 0:00 o'clock to avoid the repetition or missing of frozen data.

### 15.1 DST

DST (Daylight Saving Time): DST is a system which regulates the local time for energy conservation. the unified time is called “DST”. Generally, During summertime, people will set the time one hour ahead, in order to make people get up and go to bed earlier, reduce the amount of lighting, and make full use of light resources and save lighting electricity.

#### 15.1.1 DST configurable

Once set DST and activated, it keeps working until reset the program. Available to set start time in any month any week any day and end time can be set in the same way. For example, start on Monday in the last week of March and end on Friday in second week of September. Or set to start on 10<sup>th</sup> March, end on 8<sup>th</sup> September directly.



After entering DST, meter's time will be adjusted in 1 hour ahead. When exiting DST, meter time shall be adjusted in 1 hour later.

When set the DST parameters or change the meter's clock, the meter starts to work hourly under DST setted..

### **15.1.2 Restrictive conditions**

DST time span cannot exceed 10 months for a single DST.

DST time span cannot be less than 1 day for a single DST.

## **15.2 TOU**

Support 4 tariffs.

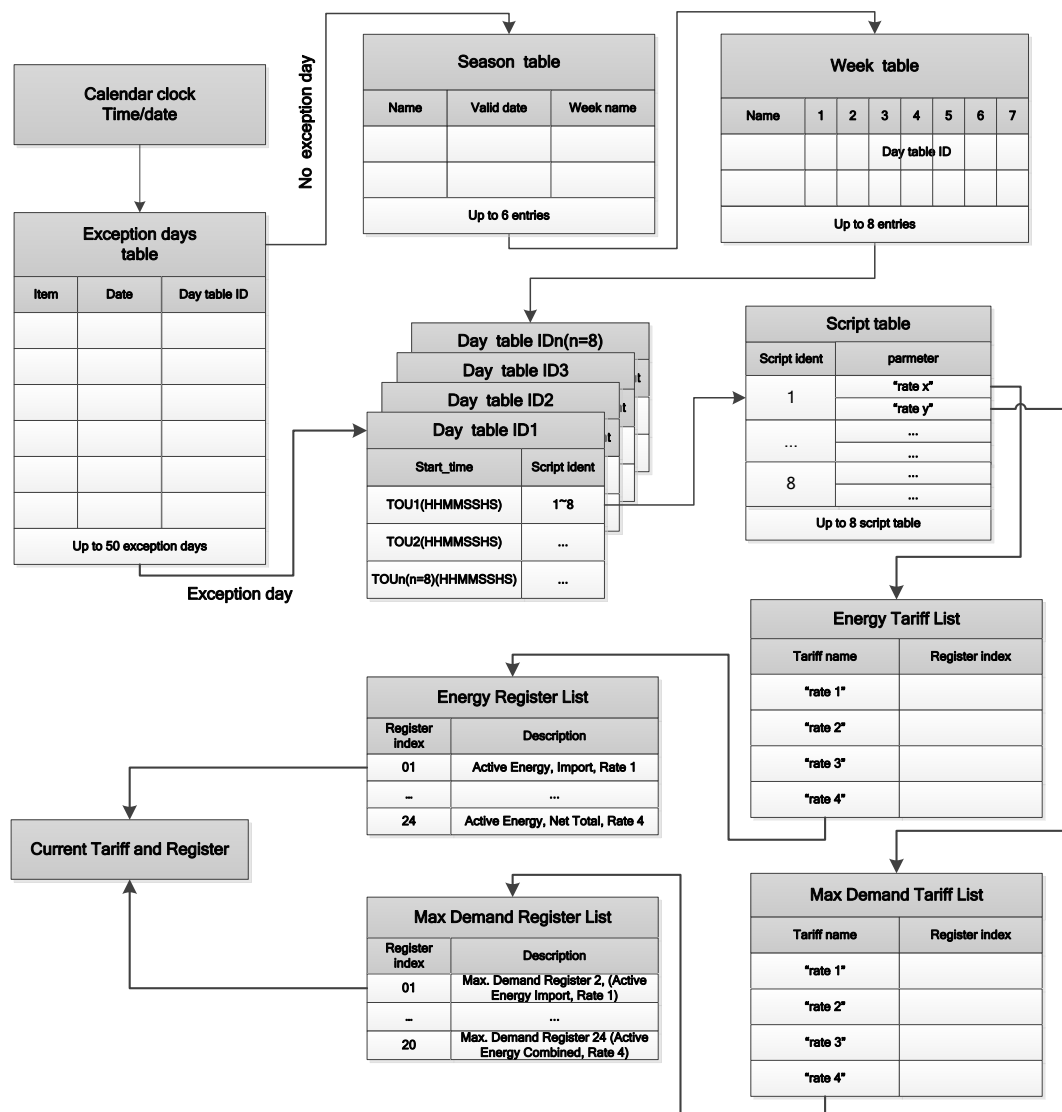
Support maximum 50 holidays.

Holidays can be divided into two types: special yearly holiday and public yearly holiday. Special yearly holidays only work only in specific years, while public yearly holidays work through the current and future years.

It's available to set maximum 6 season tables which can be configured for one year, and under each season table can set corresponding week table.。

Maximum of 8 weekly timetables can be configured, and each weekly time table supports separate configuration of daily timetable from Monday to Sunday.

Maximally 8 daily timetables can be configured, and each daily timetable supports configuration up to 8 time periods. Configuration crossing zero is also available.



Flow chart of TOU tariff table judgment process

### 15.2.1 Active and passive tariff

- Support active and passive tariff
- The way to activate Passive tariff:
  - Set passive tariff active time and when meter clock goes across the set time, the passive tariff will be activated and overwrite the old active tariff
  - Set clock into past time(earlier than meter now time), the passive tariff will activate immediately.

## **16 LED Indication**

### **16.1 Active LED indication**

When LED flashes, it means active energy consumption. When meter powers on, the LED is available to configure in the status always on or off, default is always off.

### **16.2 Reactive LED indication**

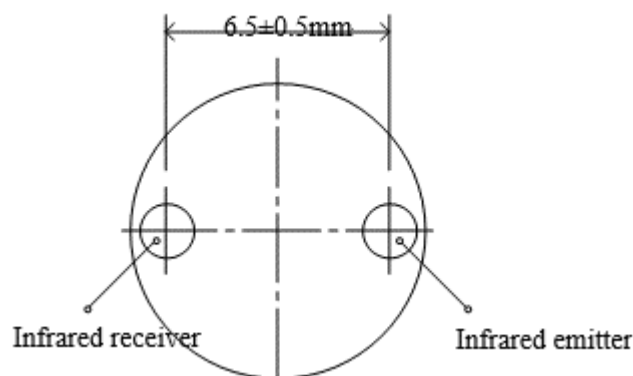
When LED flashes, it means reactive energy consumption. When meter powers on, the LED is available to configure in the status always on or off, default is always off.

## 17 Communication interface

The meter can be equipped with an optical port, IR LED, RS485 or RF interface.  
The customer can choose one or more.

### 17.1 Optical communication (Optional)

Comply with IEC62056-21 optical communication physical interface standard.



**Front view of optical port**

Signal wavelengths: 900nm~1000nm(infrared).

The optical port of the meter has an iron absorbing plate in order to get the optical port(with magnetic) fixed better, to ensure the communication accuracy and to avoid the drop of optical port by force.



**Optical port**

Communication standards: IEC62056-21 E mode or DLMS HDLC, default is E mode. 300bps standby, 9600 bps for communication(4800~19200bps configurable)

## **17.2 RS485 interface(optional)**

Communication protocol: DLMS HDLC or IEC62056-21 E mode, default is DLMS HDLC.

Baud rate: 300~9600 bps (configurable), default is 9600bps. Data bits is 8, none parity.

## **17.3 P1 PORT interface(optional)**

Communication standards: DSMR P1 5.0.2

## **17.4 GPRS communication**

Communication standards: DLMS/COSEM, TCP/IP

GPRS module online mode:

- Always online mode: module will be online all time
- Time period online mode: module will be online at preset period
- Passive activation online mode: module will be online just under SMS or call active message
- On demand online mode: module supports both time period online and passive activation mode

GPRS module supports client mode and server mode.

## 18 Client management

The meter shall fully support DLMS Security as described in the 8<sup>th</sup> version DLMS/COSEM Green Book, And it can transmit the data with/without encryption and authentication.

Several authentication mechanisms are used to authenticate communication entities during AA establishment. Data transportation security is based on a role-based security. Each role has its own access privileges. And all these authentication and encryption algorithms are limited to security policy. Here as following is the list with all the roles, their privileges and authentication mechanism:

Role	Client ID	Privileges	Description
Public client	16	Read limited meter information, like the meter serial number, clock, etc.	Accessible via remote communication and local interface without any security
Reading client	2	Read meter data and parameters	Established with authentication HLS (LLS backup) Data transmission with none security, or authentication and encryption
Management client	1	Read meter data, configure meter parameters and control meter	Established with authentication HLS (LLS backup) Data transmission with none security, or authentication and encryption
Pre-established client	102	Receive broadcast commands, and push data	Accessible only via remote communication Always Established Data transmission with none security, or authentication and encryption

## 19 Overall dimensions and installation

### 19.1 Meter Connection

Please follow the instruction to arrange the wire connection:

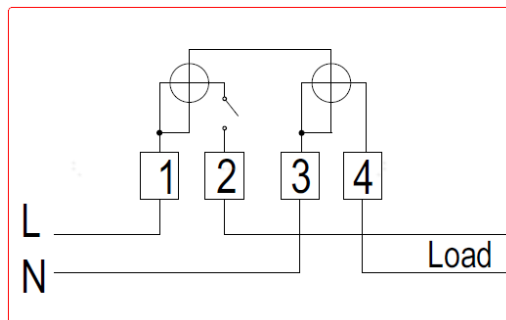
- a) Use copper cable to connect terminal block.
- b) Screw out the wire-fasten screw so that the connection wires can be inserted into.
- c) Remove the plastic cover of the connection wire and make sure that the exposed wire is long enough, the recommended length is no less than 22 cm...
- d) Tighten the screws to fix the connection wires..
- e) Check whether the connection is tight or not...



#### NOTE

The screws in the terminal block should be screwed down tightly to avoid burnt ..

#### ● Connection Diagram:



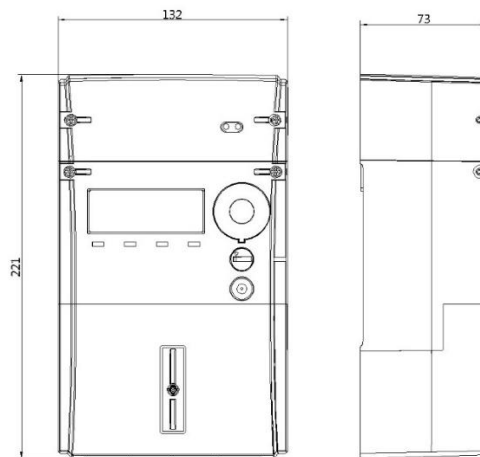
1P2W LLNN Connection

#### ● Auxiliary terminal wiring diagram

- 20-21 : Auxiliary relay / null
- 22-23 : Active Energy pulse output/Reactive Energy pulse output /RTC/ null
- 24-25: MBUS/ null
- 26-27 : RS485/ SI/ null
- PORT1: P1/ RS485/ null



## 19.2 Meter Dimension

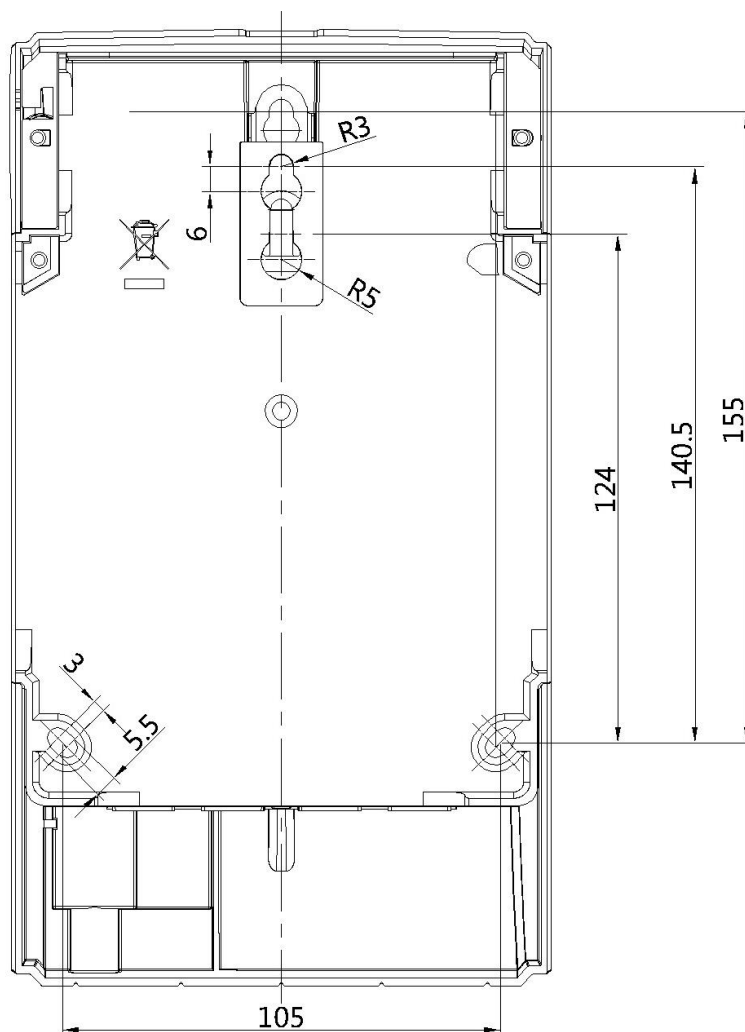


**Dimension of smart meter**

- Length——221mm(30mm terminal cover) or 201mm(10mm terminal cover)
- Width——132mm
- Height——73mm
- Terminal space——30mm or 10mm

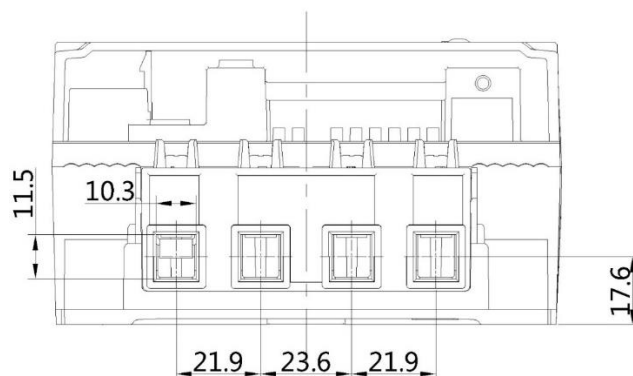


● **Installation dimension drawing**



**Installation Dimension**







● **Terminal drawing**



**Dimension of Terminal Block**

## 20 Installation and un-installation

### 20.1 Installation tools

Cross screwdriver	
Electric drill	
Wire stripper	
Lead sealing pliers	
Hair springs	
Screw	

## 20.2 Preparation before installation

- ◆ The meter should be installed in ventilated and dry place to ensure the meter's safety and reliability. In dirty or risky area, the meter should be installed in a protection box.
- ◆ Meter should be fixed on a firm, fire-resistant and stable support.
- ◆ Before installation, please check if the meter has been damaged during the transportation(damage of meter cover, hanger, seal, and LCD display, etc)
- ◆ As the internal part of the electrical meter is composed by the delicate electronic components, the meter should be carefully protected during the installation in order to avoid any damage.

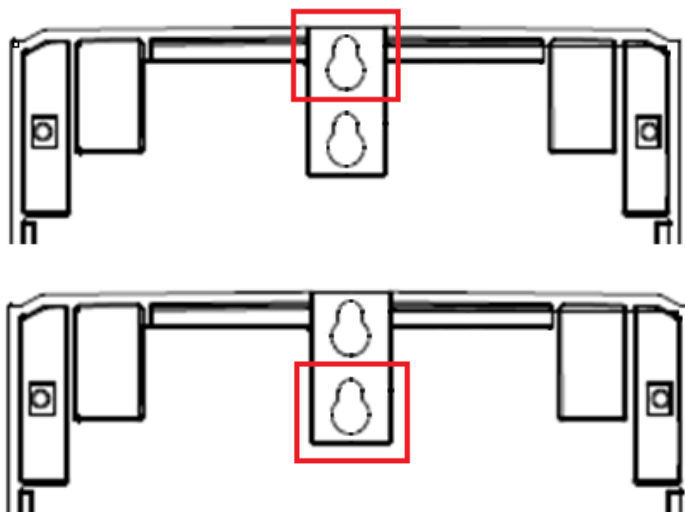


### WARNING

Make sure that the power is cut off before the meter installation, otherwise it will cause a threat to life. The fuse should be disconnected and put it in a safe place to avoid the accidental power-on.

## 20.3 Installation procedure

- 1、 Select the proper position according to the meter dimensions, and indicate fixing points of the meter on the installation panel.
- 2、 Drill down holes on previously marked positions. (make sure that there's no cable behind before punching, avoid ruining the cable and threatening personal safety)



- 3、 Open the meter terminal cover, and adjust the height of hanger.
- 4、 Using the vertical installation method, the meter hangs on the hanger screw, and

fixed on the bottom by two screws. Need make sure that the 3 screws are completely banned, and the meter is installed firmly, without shaking.

**NOTE**

To ensure the installation stability, the diameter of hanger screw must be longer than 11mm, and the diameter of bottom fixed screws must be wider than 7mm.

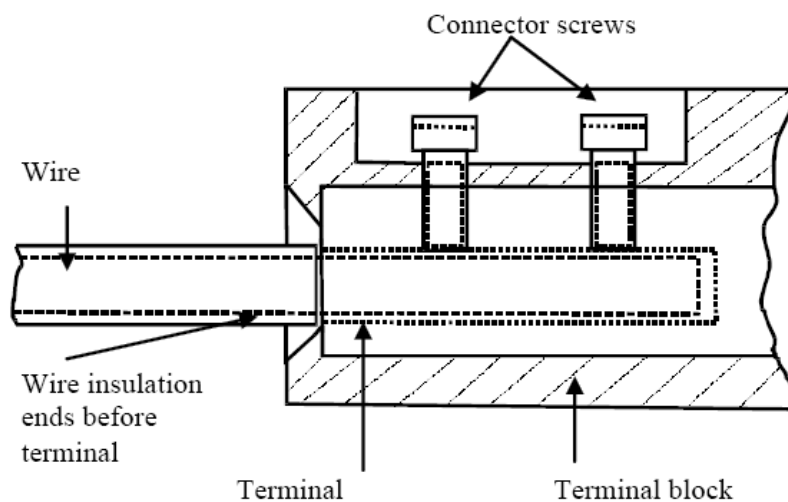
5、Cut the cable to the required length and use the wire stripper to uncover the cable.

The recommended bare metal length after stripping is at least 20mm for this series of products.

**WARNING**

We insist on the recommended length of the stripped wire to make sure that the bare metal part is long enough and can be fixed by two connection screws at the same time. However the bare part should not exceed the terminal box wiring holes, ensure the safety and insulation effect.

6、When using a small sectional cable, such as 4mm squared, the cable must be placed in the medium to ensure that the screw is well tightened without deviation.



7、The cables should be connected correctly according to the wiring diagram and the terminals should be tightened during the installation in order to avoid any damage caused by bad connection.

**NOTE**

The bad fixing of connection screws will lead to the raise of resistance, which can lead to electrical energy loss and heating of terminals. The heating of component is risky. Besides, 1mΩ contact resistance in a circuit of 80A will result in 6.4 W power losses.

- 8、 The cables should be connected correctly according to the definition of the auxiliary terminal (such as pulse output, signal input or RS485 communication).

**WARNING**

Please be careful and don't connected the auxiliary terminal to the voltage or current line by mistake, to avoid damage to meter.

- 9、 Check connecting wire carefully and avoid any error (such as the reverse wiring for the incoming and outgoing lines, the wrong connection of live and neutral, the bad fixing of screws).

**NOTE**


To ensure the correct wiring, it is recommended to use the appropriate testing tools (such as multi-meters) for input/output test.

- 10、 Close the terminal cover, and sealed it.

**NOTE**

Please make sure that the terminal cover is closed tightly, otherwise it will cause the meter relay cut off due to terminal cover open.

## 20.4 Test after installation

- Switch on the breaker
- Check the meter display, if there is any malfunction indication, phase inverse, cover open, or strong magnetic field, no current indicator.
- Press button to display voltage value, check the voltage twice.
- Check the relay is on the right position (if the symbol '  ' is shown on the LCD).

## 20.5 Remove

- 1、 Switch off the breaker and power off the meter.



**WARNING**

Make sure that the power is cut off before the meter un-installation, otherwise it will cause a threat to life. The fuse should be disconnected and put it in a safe place to avoid the accidental power-on.

---

- 2、 Cut off the terminal cover seal, and remove the terminal cover.
- 3、 Use the voltage test equipment (such as multi-meter) to test meter connecting wire and confirm power-off before go to the next operation.
- 4、 Use the appropriate screwdriver to unscrew the meter auxiliary terminal screws and remove the connecting wires.
- 5、 Use the appropriate screwdriver to unscrew the current connection screws and remove the connecting wires.
- 6、 Use the appropriate screwdriver to unscrew the meter fixing screws.
- 7、 Take off the meter.



**CAUTION**

The meter un-installation should be done according to the above mentioned step. Be attention to prevent meter from dropping down, which will cause injuries and damage to the meter itself.

---

- 8、 If necessary, please replace a new meter.



**WARNING**

If a new meter cannot be installed at the moment, please envelop the voltage and current connection cables in insulating material and avoid exposing any bare metal part, otherwise it will pose a threat to life.

---

## 21 Service

### 21.1 Fault Operation

If the LCD cannot display correctly, or data communication does not work, please check as follows:

1. Whether the environment temperature is over the limit working temperature range of the meter
2. Whether the optical communication interface or LCD display window is clean (no scratches, no paint, no fog, or any other kinds of pollution)

If it's not the above-mentioned reasons which leads to failure, meters should be unloaded and sent to Hexing service center.

### 21.2 Meter Repair

If the METER repair is necessary, please operate in accordance with the following process:

1. If the METER has been installed, then uninstall the METER (refer to section 19.5 "uninstall"), and reinstall another METER.
2. Describe the fault phenomenon as much as possible (if you can, please provide with METER fault code), the name, phone number of the responsible person for the follow-up maintenance. Please indicate the serial number and complete METER model (METER model can be obtained from the METER nameplate)
3. Package the METER, ensure the METER will not be damaged during the transport. Try to use the original package. Don't put in a METER with missing part
4. Send the electric METER to a certified Hexing service center

## 22 Maintenance

There is no need to change the METER within the life cycle. METER maintenance can be executed based on local regulations. Recommended every 5~10 years.

### 22.1 Clean

Use dry cloth to clean the surface of the METER and wipe the stains and insects.

**WARNING**

Warning: Flowing water and high-pressure water equipment is not allowed to clean the METER, which may lead to short circuit.

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### 22.2 Error and function check

The following process can be performed to recognize error and check function.

1. Insert the METER to the corresponding terminal of error test bench. (electric METER wiring hole number detailed in chapter 19.1 "Meter Connection"), tighten the connection screws(maximum torque is 3Nm)
2. Put the pulse testing part of the error testing bench align to the LED on the METER.(Actual auxiliary terminal definition can be found on installation manual or on the wiring diagram on the nameplate.)
3. Start the error test bench. Put on rate voltage but no current. Confirm no current indicator display on LED. Check whether the electric METER is displayed correctly (trouble-free code instructions).
4. After the METER is power on, set the METER to test mode through communication. The test mode is with the highest level of security. Both communication key and administrator password are needed to enter the test mode.

**NOTE**

Attention: In order to not affect the actual accumulated power when doing the test, each time METER is off from the electricity, the METER need to set into the test mode again.

---

5. Start the error testing bench
6. Execute relay control operation through PC software(if the relay is applied),



check whether the relay is working properly.

7. Take away the METER from the test bench after test finished

## **22.3 Reinstall**

In order to avoid the change of asset management, it's recommended to reinstall the METER in the former position.

The installation process detailed refer to chapter 20 "install and uninstall".

## 23 Scrap Processing

This chapter describes the right method of meter scrap processing.

According to ISO 14001 environmental certification specification, the components of the meter is separable, therefore you can send the corresponding abandoned and recycling station after disassembled.

**NOTE**

Attention: meter scrap processing should comply to local waste and environmental protection laws and regulations.

Meter can be disassemble into different parts, the recommended waste treatment methods are as follows:

Parts	Recommend scrap processing method
PCB board	Electronic waste, scrap according to local regulations
Metal parts, including iron part of optical communication, terminal connection copper bar, internal current cables etc	Provided to the metal material recycling
Plastic	Recycle bin for plastic materials, otherwise can burn

## **24 Transportation and Storage**

The meters should be placed on pallet and the height should not exceed 5 layers. The storage condition should be clean, with an environmental temperature of between  $-40^{\circ}\text{C}$  and  $+70^{\circ}\text{C}$ , relative humidity of less than 98% and with an absence of rusty matter in the air.

## 25 Parameters

Electrical	
Reference Voltage	1P2W: 220V, 230V, 240V
Basic current	5A/10A
Maximum current	60A, 80A, 100A
Starting current	$\leq 0.4\%I_b(\text{active})$ $\leq 0.5\%I_b(\text{reactive})$
Frequency	(50 $\pm$ 2%)Hz
Consumption in current circuit	$\leq 2\text{VA}$
Consumption in voltage circuit	$\leq 2\text{W}/10\text{VA}$ without communication $\leq 5\text{W}/25\text{VA}$ with communication
Battery life	15years
Data retention	>15years
Meter life	15years
Impulse constant	1000imp/kWh 1000imp/kvarh

External influence	
Protection	IP54(indoor)
Material for meter case compliance	ISO 75
Operating temperature	-40℃~+70℃
Storage temperature	-40℃~+70℃
Relative humidity	$\leq 95\%$
Atmospheric pressure	63kPa-106kPa

Electromagnetic compliance	
Fast transient burst	4kV
Surge voltage	4kV

Electrical insulation	
impulse voltage	6kV
AC voltage	4kV

Accuracy	
Class (IEC) active	1
Class (EN) active	B
Class (IEC) reactive	2
Standard Compliance	IEC62052-11 IEC62053-21,

	IEC62053-23, EN50470-1, EN50470-3,
--	--

Mechanical parameters	
<b>Connection type</b>	Direct connection
<b>Network type</b>	1P2W
<b>Terminal configuration</b>	LLNN (1P2W)
<b>Weight of Meter</b>	1.08 kg
<b>Dimension(H x W x D)</b>	Long terminal cover: 221/201mm×132mm×73mm
<b>Mounting</b>	Front projection mounting
<b>Sealing</b>	Sealing provisions for terminal with sealing screw Cover
<b>Terminal hole diameter</b>	9.5mm
<b>Terminal cover</b>	Long terminal cover
<b>Meter Cover material</b>	PC+10%GF
<b>Meter Base material</b>	PC+10%GF
<b>Terminal Cover material</b>	PC

Display parameters	
<b>Default display range</b>	0~999999.99 kWh
<b>Display mode</b>	LCD

## Annex A Communication and Display OBIS

Display items	Display OBIS code	Display format
Energy		
Active energy import (+A)	1.8.0	xxxxxx.xx kWh
Active energy import (+A) rate X	1.8.X	xxxxxx.xx kWh
Active energy export (-A)	2.8.0	xxxxxx.xx kWh
Active energy export (-A) rate X	2.8.X	xxxxxx.xx kWh
Reactive energy import (+R)	3.8.0	xxxxxx.xx kWh
Reactive energy import (+R) rate X	3.8.X	xxxxxx.xx kWh
Reactive energy export (-R)	4.8.0	xxxxxx.xx kvarh
Reactive energy export (-R) rate X	4.8.X	xxxxxx.xx kvarh
Reactive energy of QI	5.8.0	xxxxxx.xx kvarh
Reactive energy of QI rate X	5.8.X	xxxxxx.xx kvarh
Reactive energy of QII	6.8.0	xxxxxx.xx kvarh
Reactive energy of QII rate X	6.8.X	xxxxxx.xx kvarh
Reactive energy of QIII	7.8.0	xxxxxx.xx kvarh
Reactive energy of QIII rate X	7.8.X	xxxxxx.xx kvarh
Reactive energy of QIV	8.8.0	xxxxxx.xx kvarh
Reactive energy of QIV rate X	8.8.X	xxxxxx.xx kvarh
Apparent energy import	9.8.0	xxxxxx.xx kVAh
Combined active energy	15.8.0	xxxxxx.xx kWh
Combined active energy rate X	15.8.X	xxxxxx.xx kWh
Instantaneous		
Instantaneous voltage on phase A	32.7.0	xxx.xx V
Instantaneous current on phase A	31.7.0	xxx.xx A
Instantaneous net frequency	14.7.0	xx.xx Hz
Instantaneous active import power (+A)	1.7.0	xx.xx kW
Instantaneous active export power (-A)	2.7.0	xx.xx kW
Instantaneous reactive import power (+R)	3.7.0	xx.xx kvar
Instantaneous reactive export power (-R)	4.7.0	xx.xx kvar
Instantaneous power factor (PF)	13.7.0	x.xxx
Demand		
Import active MD	1.6.0	xxxxx.xxx kW
Import active MD occurrence date	1.6.0	yy-mm-dd

Display items	Display OBIS code	Display format
Import active MD occurrence time	1.6.0	hh:mm:ss
Import active MD rate X	1.6.X	xxxxx.xxx kW
Import active MD rate X occurrence date	1.6.X	yy-mm-dd
Import active MD rate X occurrence time	1.6.X	hh:mm:ss
Export active M.D	2.6.0	xxxxx.xxx kW
Export active MD occurrence date	2.6.0	yy-mm-dd
Export active MD occurrence time	2.6.0	hh:mm:ss
Export active MD rate X	2.6.X	xxxxx.xxx kW
Export active MD rate X occurrence date	2.6.X	yy-mm-dd
Export active MD rate X occurrence date	2.6.X	hh:mm:ss
Import reactive MD	3.6.0	xxxxx.xxx kvar
Import reactive MD occurrence date	3.6.0	yy-mm-dd
Import reactive MD occurrence time	3.6.0	hh:mm:ss
Import reactive MD	3.6.X	xxxxx.xxx kvar
Import reactive MD rate X occurrence date	3.6.X	yy-mm-dd
Import reactive MD rate X occurrence time	3.6.X	hh:mm:ss
Export reactive MD	4.6.0	xxxxx.xxx kvar
Export reactive MD occurrence date	4.6.0	yy-mm-dd
Export reactive MD occurrence time	4.6.0	hh:mm:ss
Export reactive MD	4.6.X	xxxxx.xxx kvar
Export reactive MD rate X occurrence date	4.6.X	yy-mm-dd
Export reactive MD rate X occurrence time	4.6.X	hh:mm:ss
Import apparent MD	3.6.0	xxxxx.xxx kvar
Export apparent MD rate X occurrence date	4.6.X	yy-mm-dd
Export apparent MD rate X occurrence time	4.6.X	hh:mm:ss
Combined active MD	15.6.0	xxxxx.xxx kW
Combined active MD occurrence date	15.6.0	yy-mm-dd
Combined active MD occurrence time	15.6.0	hh:mm:ss
Others		
Local time	0.9.1	hh:mm:ss
Local date	0.9.2	mm-dd-yy
Error register	F.F.0	xxxxxxxx
Meter serial number	C.1.0	xxxxxxxx
Number of power failures on all phase	C.7.0	xxxxxxxx
Number of long power failures on all phase	C.7.5	xxxxxxxx

Display items	Display OBIS code	Display format
Calendar name	13.0.0	xxxxxxxxx
Limiter 1 threshold	17.0.0	xxxxxx.xxx kW
Battery voltage	C.6.3	



## Annex B Demand content OBIS list

Description	OBIS
Active import demand	1.0.1.4.0.255
Reactive import demand	1.0.2.4.0.255
Active export demand	1.0.3.4.0.255
Reactive export demand	1.0.4.4.0.255
Reactive demand in QI	1.0.5.4.0.255
Reactive demand in QII	1.0.6.4.0.255
Reactive demand in QIII	1.0.7.4.0.255
Reactive demand in QIV	1.0.8.4.0.255
Import apparent demand	1.0.9.4.0.255
Export apparent demand	1.0.10.4.0.255
Active demand ( $ QI+QIV + QII+QIII $ )	1.0.15.4.0.255
Active import MD total and per tariff	1.0.1.6.x.255 (x=0~4)
Active export MD total and per tariff	1.0.2.6.x.255 (x=0~4)
Reactive import MD total and per tariff	1.0.3.6.x.255 (x=0~4)
Reactive export MD total and per tariff	1.0.4.6.x.255 (x=0~4)
Reactive MD total and per tariff in QI	1.0.5.6.x.255 (x=0~4)
Reactive MD total and per tariff in QII	1.0.6.6.x.255 (x=0~4)
Reactive MD total and per tariff in QIII	1.0.7.6.x.255 (x=0~4)
Reactive MD total and per tariff in QIV	1.0.8.6.x.255 (x=0~4)



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