HEXING

User Manual

Single Phase Electronic Meter

HXE12-DL

Focus on creating value for clients

Revision history

Index	Date	Name	Remarks

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. User can consult this document for the use and maintenance of the meter. The manual includes:

- Introduction of meter's work mechanism, performance and functions.
- Malfunction that may happens during its lifetime and the corresponding precaution.
- Detail 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 dedicated for personnel from the electricity company such as the meter lectotype engineers as well as for the technicians responsible for the meter installation, operation and maintenance from the electricity company.

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Content

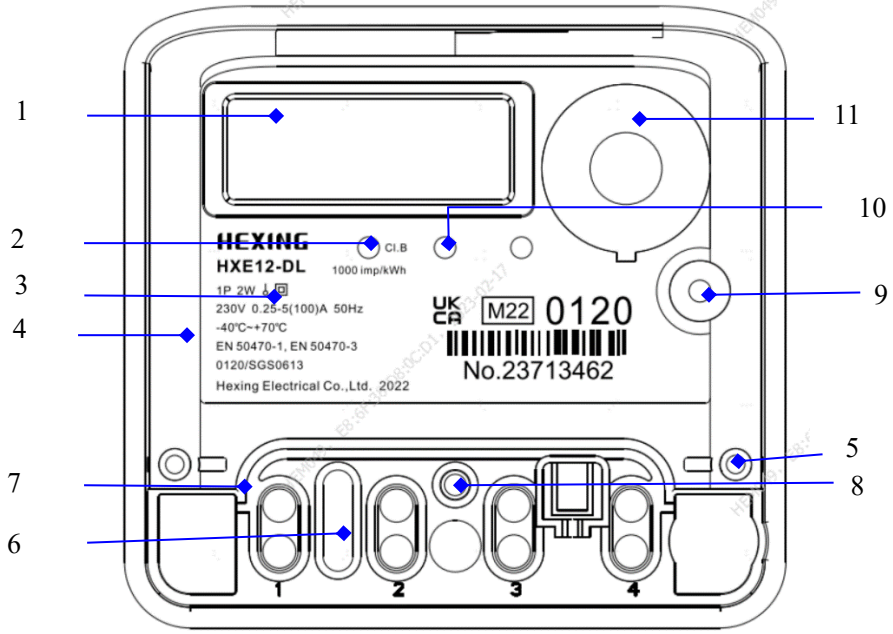
1 Overview

This manual is for single phase energy meter with active energy measurement. HXE12-DL electronic meter is developed and manufactured by Hexing. It features in high accuracy, low power consumption and reliable stability and superior anti-tampering functions.

Main Features

- Support 1P2W.
- LCD display with large 8 digits.
- Display button allow to check the LCD display items and change the LCD display mode.
- Support firmware upgrade.
- Communication protocol: IEC 62056-21C
- Seal between base and main cover can support Ultrasonic Sealing.
- Support Degree Protection IP54
- Real-time clock(optional)
- current reverse, terminal cover open(optional), meter cover open(optional) etc. detection for tampering-proof

2 Appearance



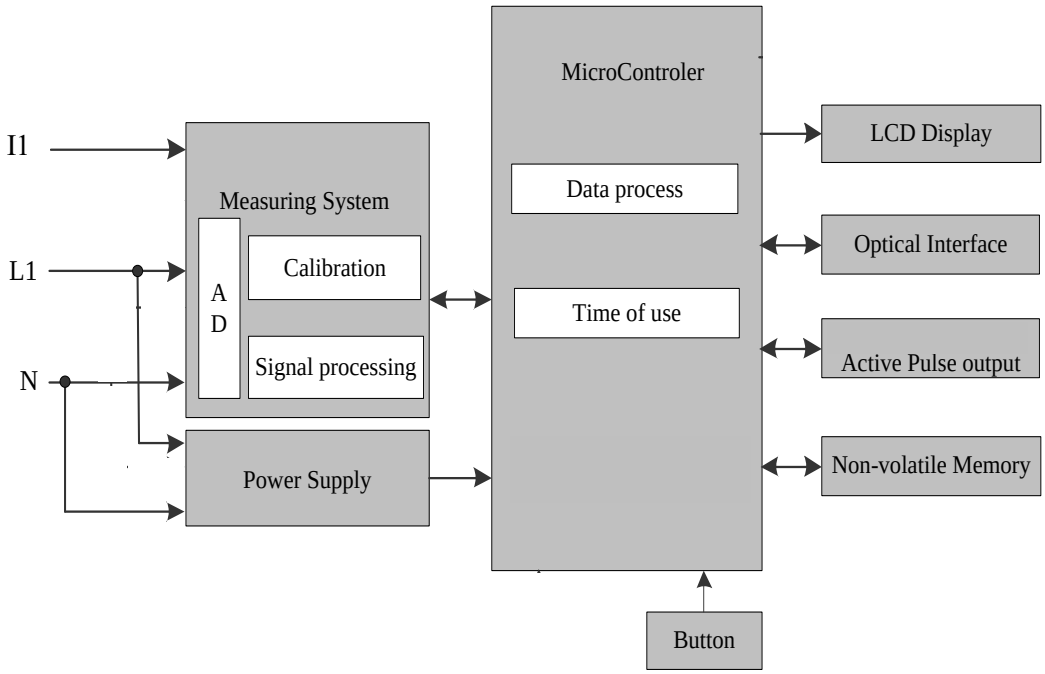
No.	Description
1	LCD display
2	Pulse LED(active energy)
3	Nameplate
4	Meter Cover
5	Meter Cover Seal
6	Active Pulse output
7	Terminal block
8	Terminal cover Seal
9	Display button
10	Alarm LED
11	Optical port

3 Standard

Standard	Description
IEC 62052-11	Electricity metering equipment (a.c.) – General requirements, tests and test conditions – Part 11: Metering equipment
IEC 62053-21	Electricity metering equipment (a.c.) –Particular requirements –Part 21:Static meters for active energy(classes 1 and 2)

IEC 62053-23	Electricity metering equipment (AC) - Particular requirements - Part 23: Static meters for reactive energy (classes 2 and 3)
IEC 62054-21	Electricity metering (a.c.) – Tariff and load control – Part 21: Particular requirements for time switches
IEC 62056-21	Electricity metering - Data exchange for meter reading, tariff and load control - Part 21: Direct local data exchange
IEC 62056-53	Electricity Metering Data exchange - The DLMS/COSEM suite - Part 53: DLMS/COSEM Application Layer
IEC 62056-61	Electricity metering - Data exchange for meter reading, tariff and load control - Part 61: Object identification system (OBIS)
IEC 62056-62	Electricity metering - Data exchange for meter reading, tariff and load control - Part 62: COSEM Interface classes
EN50470-1	Electricity metering equipment (a.c.) – Part 1: General requirements, tests and test conditions – Metering equipment(class indexes A, B and C)
EN50470-3	Electricity metering equipment (a.c.) – Part 3: Particular requirements – Static meters for active energy (class indexes A, B and C)

4 Working Principle



5 Measurement

5.1 Active energy Measurement

- Total Active energy(|+A|+|-A|)
- Import Active energy(|+A|)
- Export Active energy(|-A|)
- Measurement range is 00000000-99999999 kWh

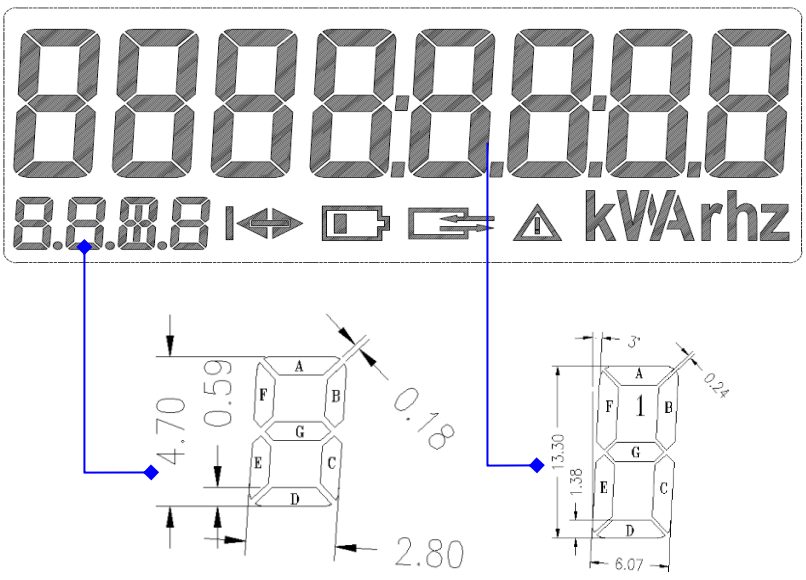
5.2 Instantaneous Measurement

- Voltage
- Current
- Active power
- Power factor
- Frequency

6 LCD display

6.1 LCD with full segments

Below is LCD with full-segment display.

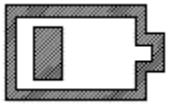


- LCD material is HTN type

- LCD operation temperature range is -30℃~＋80℃
- LCD shall be high contrast ratio
- LCD shall be wide viewing angle
- LCD polarizer shall be anti-ultraviolet function

6.2 Display segments

Segments	Description
	Digit display
	OBIS code and Current tariff
	Value Unit
	Communication indicator
	Alarm indicator, The alarm can be configured as historical or real-time. The alarm event as below: Reverse Terminal cover open Meter cover open Historical alarm: The alarm always be on, and turn off after the event is cleared by software. Real-time alarm: The alarm always be on, and turn off after the event is cleared.

	Current direction indicator |-> Forward <- Reverse |- No current(No load indicator)
	Low battery indicator

6.3 Display mode

This meter is designed with three display modes:

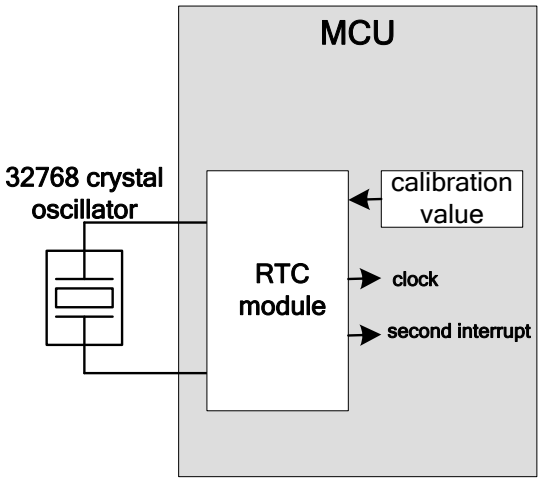
- Auto mode display

Meter default display mode is auto-scrolling display, after meter runs for a certain time (for auto-scrolling display circle, default as 6 seconds), it will switch to the next screen display automatically. Auto-scrolling display table is configurable, and 32 items can be configured at maximum, detailed display information please see display list.

- Manual mode display: Button display

When customer presses the button, meter will enter button-press display mode. In this mode, after customer press display button once, it will switch to the next screen display. When button-press operation is stopped, meter will return to auto-scrolling display mode automatically in a certain time (default as 30 seconds) when power is on, or enter power-off display mode when power is off. Button-press display table is configurable, and 32 items can be configured at maximum, detailed display information please see display list.

7 RTC



Inner clock diagram

- Supports calendar, time and leap year automatic switch function.
- The meter is equipped with a clock module, which calculates the time by a 32768Hz crystal oscillator.
- If utility request higher precision of clock, the crystal oscillator will be calibrated in factory and the accuracy can be less than 0.5s/day at 23℃.
- 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 suggested not to synchronize clock around 0:00 o'clock to prevent the repetition or missing of frozen data.

8 LED Indication

8.1 Active LED indication

When LED flash, it means active energy consumption. When meter power on, the

LED support configurable into always on or off, default is always off.

8.2 Alarm LED indication

When tamper events occur, alarm LED will light on all the time. When tamper events cleared, alarm LED will light off.

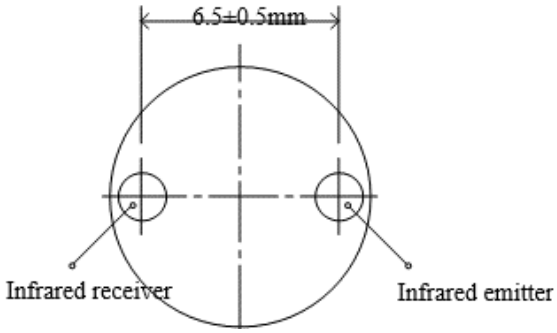
The alarm event can be configured as below: Reverse, Terminal cover open, Meter cover open.

9 Communication interface

The meter can be equipped with an optical port interface.

9.1 Optical communication

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 bayonet in order to well fix the optical head, to ensure the communication accuracy and to avoid the drop of optical head by force.

Optical port

Communication standards: IEC62056-21C

300bps for standby, 4800 bps for communication(2400～9600bps configurable)

10 Overall dimensions and installation

10.1 Meter Connection

Please follow the instruction to arrange the wire connection:

a) Use copper cable as the lead-in wire to terminal block.

b) Screw out the wire-fasten screw so that the connection wires can be inserted into.

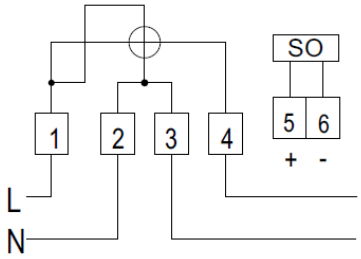
c) Remove the plastic cover of the connection wire long enough so that the wire-fasten screws can contact each connected wire.

d) Screw the wire-fasten screws to fix the connection wires.

e) Pull the connected wires to check whether they are connected tightly.

NOTE The screws in the terminal block should be screwed down tightly to avoid burnt because of bad contact or thin lead-in wire.

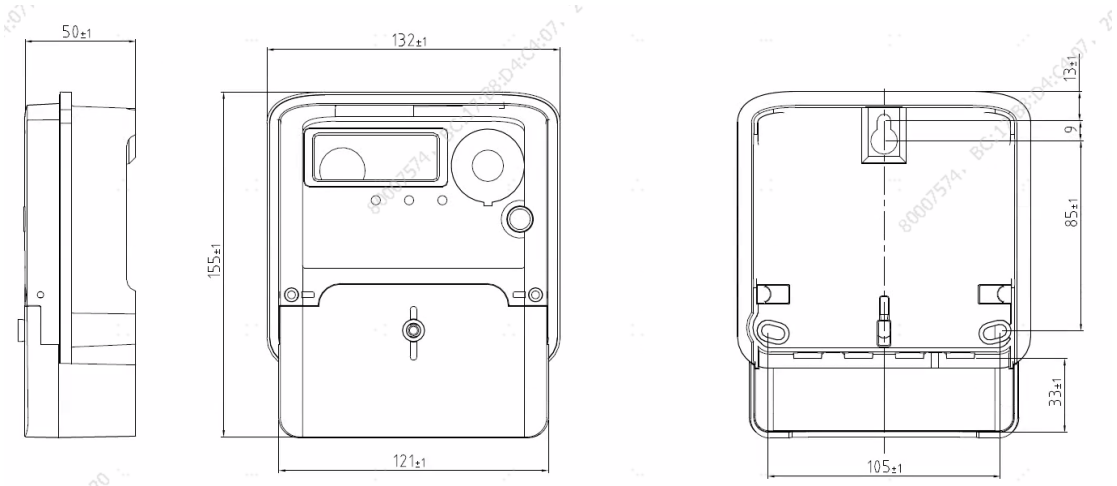
- **Connection Diagram:**



1P2W LNNL

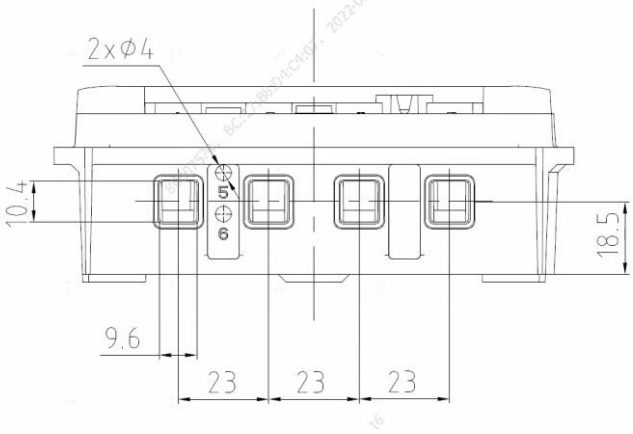
- **Auxiliary terminal wiring diagram**
  - 5-6 : Active Pulse output

10.2 Meter Dimension

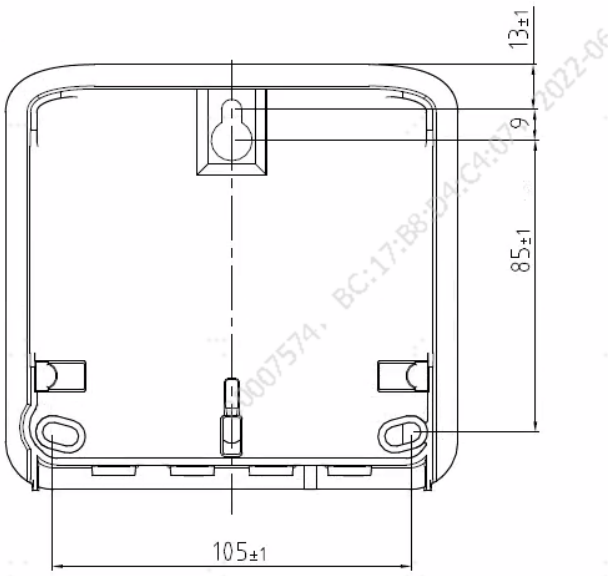


Long terminal cover

- **Terminal drawing**



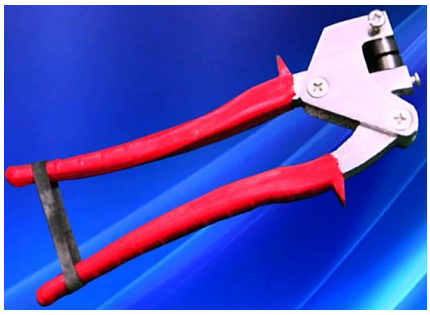
10.3 Installation Dimension



11 Installation and un-installation

11.1 Installation tools

Cross screwdriver	
Electric drill	

Wire stripper	
Lead sealing pliers	
Hairsprings	
Screw	

11.2 Preparation before installation

- The meter should be installed in ventilated and dry place to ensure the meter's safety and reliability. In the 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.

11.3 Installation procedure

The meter is intended to be installed in a Mechanical Environment 'M1', with Shock and Vibrations of low significance, as per 2014/32/EU Directive.
The meter is intended to be installed in Electromagnetic Environment 'E2', as per 2014/32/EU Directive.

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.

NOTE The hanger is adjusted to low position by default when it leaves the factory, in order to match the packing box and prevent damage during transportation.

4. Using the vertical installation method, the meter is hanging on the hanger screw, and fixed on the bottom by two M4 screws. Need to ensure that the 3 screws are completely banned, and the meter is installed firmly, without shaking.

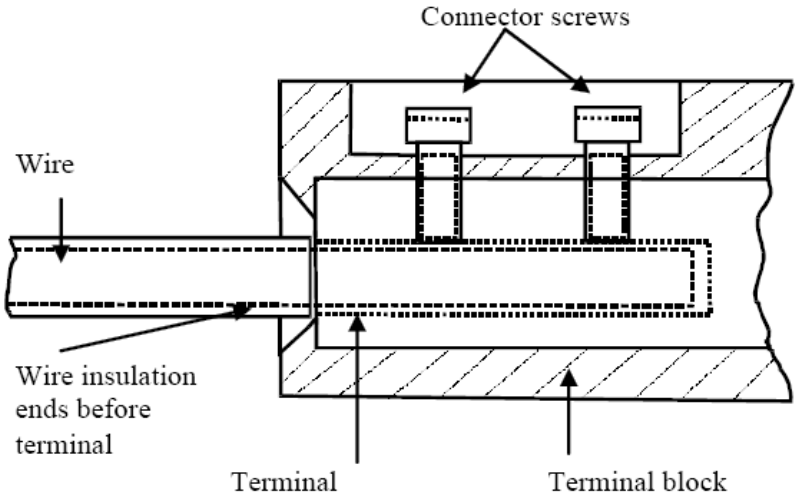
NOTE To ensure the installation stability, the diameter of hanger screw must be greater than 11mm, and the diameter of bottom fixed screws must be greater than 7mm.

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 22mm for this series

of products.

WARNING We insist on the recommended length of the stripped wire to ensure 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. 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.

9. Close the terminal cover, and sealed it.

11.4 Testing after installation

Power on the meter, the LCD display properly.

11.5 Un-installation

1. Remove the fuse 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 current connection screws and remove the connecting wires.
5. Using the appropriate screwdriver to unscrew the meter fixing screws.
6. Take off the meter.

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

7. If necessary, please replace a new meter.

WARNING If a new meter cannot be installed for 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.

12 Service

12.1 Fault Operation

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

1. Whether the environment temperature is beyond 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 other ways of pollution)

If not the above reasons lead to failure, meters should be unloaded and sent to Hexing service center (according to section 17.2 "METER repair").

12.2 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 (see section 16.5 "Un-installation"), and reinstall an alternative METER.
2. Describe the fault phenomenon as much as possible (if you can, please provide with METER fault code), offer 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

13 Maintenance

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

13.1 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.

13.2 Error and function check

The following process can be performed to realize error and function check

1. Insert the METER to the corresponding terminal of error test bench. (Electric METER wiring hole number detailed in chapter 15.1 "Connection diagram"), tighten the connection screws (maximum torque is 3Nm)

NOTE	Attention: If the error test bench can't support the independent current inductor of the direct METER, the voltage connection tick need to be disconnected. User can choose internal connection tick (protected by the METER cover, only can reach after open the cover) and external tick (can reach under the start button). After the error test, reconnect the tick. Ensure the correct and stable connection.

2. Put the pulse testing part of the error testing bench align to the LED on the METER.

3. Start the error test bench. Put on rate voltage but no current. Confirm no current indictor display on LED. Check whether the electric METER is displayed correctly (trouble-free code instructions).

4. Start the error testing bench

5. Take off the METER from the error test bench after test complete.

13.3 Reinstall

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

The installation process detailed in chapter 16 "Installation and un-installation".

14 Scarp Processing

This chapter describes the right method of meter scarp processing.

Compliant ISO 14001 environmental certification specification, the components of the meter is maximum extent separable, thus to provide corresponding abandoned and recycling station after disassembled.

NOTE Attention: meter scarp processing reference to local waste and environmental protection laws and regulations.

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

Parts	Recommend scarp processing method
PCB board	Electronic waste, scarp 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

15 Transportation and Storage

During the transportation and packing process, the products shall not be dramatically shocked, and shall be transported and stored according to the regulations. Inventory and storage should be made in a shelf with original package. The piling height should be not more than eight layers. The storage place shall be clean, in which the ambient temperature shall be - 40℃ ~ 70 ℃ and relative humidity not more than 95%. And

there are no harmful substances in the air that might cause corrosion.

16 Parameters

Electrical	
Voltage	230V
Basic current	5A
Maximum current	100A
Starting current	≤0.4%Ib(Active)
Frequency	50Hz
Burden in current circuit	<1VA
Burden in voltage circuit	<2W/10VA
Meter life	10 years
Impulse constant	1000imp/kWh

External influence	
Protection	IP54(Indoor)
Operating temperature	-40℃~70℃
Storage temperature	-40℃~70℃
Relative humidity	0~95%(Non Condensing humidity)

Electromagnetic compliance	
Fast transient burst	4kV
Surge voltage	4kV

Electrical insulation	
impulse voltage	6kV
AC voltage	4kV

Accuracy	
Standard Compliance	IEC62052-11 or EN50470-1 IEC62053-21 or EN50470-3 IEC62053-23

Mechanical parameters	
Connection type	Direct connection
Network type	1P2W
Terminal configuration	LNNL
Weight of Meter	Approx.0.5kg

Dimension(H x W x D)	155mmx132mmx50mm(with long terminal cover)
Mounting	Front projection mounting
Sealing	Sealing provisions for terminal with sealing screw
Terminal hole diameter	10mm x 9mm (DC)
Terminal cover	Long terminal cover or
Meter Cover material	Recycled Opaque PC+ glass fiber with a transparent window
Meter Base material	Recycled Opaque PC+ glass fiber
Terminal Cover material	Recycled PC transparent
Terminal Box material	Recycled Opaque PC+ glass fiber

Technical parameters	
Measuring range	0—99999999 kWh
Display mode	LCD

Annex A Display OBIS

Items	ID	OBIS
Voltage A	C400	32.7.0
Current A	C410	31.7.0
Total active power	C420	1.7.0
Active power A	C421	21.7.0
Total reactive power	C430	3.7.0
Reactive power A	C431	23.7.0
Total power factor	C450	13.7.0
Power factor A	C451	33.7.0
Frequency	C470	14.7.0
Meter serial-low part	C03C	C.1.0.2
Meter serial-high part	C03D	C.1.0.1
Date	C195	0.9.2
Time	C180	0.9.1
Test display	FFFF	8.8.8.8
Import active energy [total]	9010	1.8.0
Import active energy [T1]	9011	1.8.1
Export active energy [total]	9020	2.8.0

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