

EEDTP

THREE PHASE KEYPAD PREPAID ENERGY METER



1. General

EEDTP meter is Three phase four wire keypad prepaid electronic energy meter, It is designed, manufactured, test under the requirements of IEC62055-41, IEC62053-21, IEC62056-21 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 consumption (kWh) 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
- ☆ Infrared Communicate with hand hold unit (HHU) according to IEC62056-21 standard
- ☆ Measure each phase voltage, current, power, frequency and phase angle
- ☆ Relay open when prepaid deposit used up
- ☆ 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
- ☆ Strong magnetic detection and open meter cover detection

2. Technical Specification

Item	Parameters
Rated voltage	3x220/380V, 3x230V/400V, 3x240/415V
Rated current	3x5(80)A, 3x10(100)A, or CT type
Pulse constant	Active energy: 800imp/kWh or 12800imp/kWh
Starting current	4‰Ib
Accuracy class	Active: 1.0 / Reactive : 2.0
Reference frequency	50Hz or 60Hz
Power consumption	≤2W, 4VA

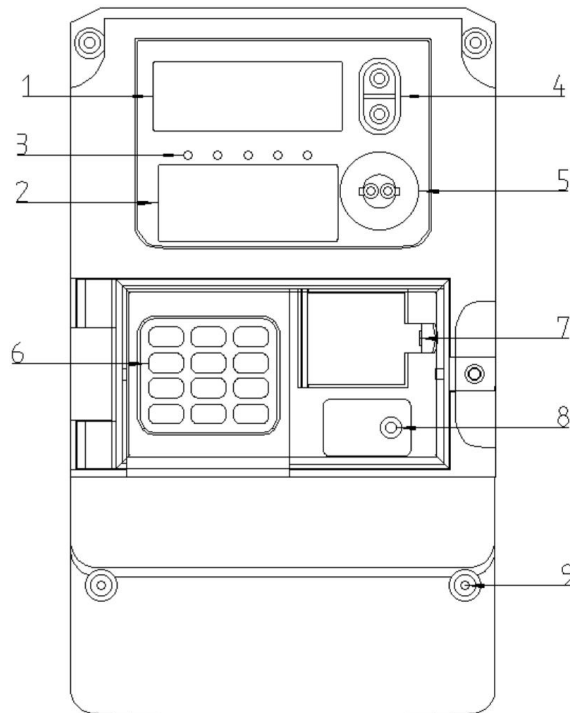
Temperature	-10℃～+65℃
Temperature limit	-20℃～+75℃
Humidity	<95%(Free of condensation)
MTBF	≥6×10 ⁴ h
Design lifetime	≥15years
Pulse parameters	Pulse width:(80±5)ms, Current≤15mA, Voltage: DC(5～24)V(External power source)

Other reference parameters:

Outline dimension	L×W×H=290mm×170mm×95mm
Weight	About 2.5kg

3. Operation principal

3.1 Meter appearance:



1.1.1 LCD display

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

1.1.3 Nameplate. Contain meter basic parameters and specification

1.1.4 Up and Down button with display

1.1.5 Optical communication port, for local data reading and parameter setting

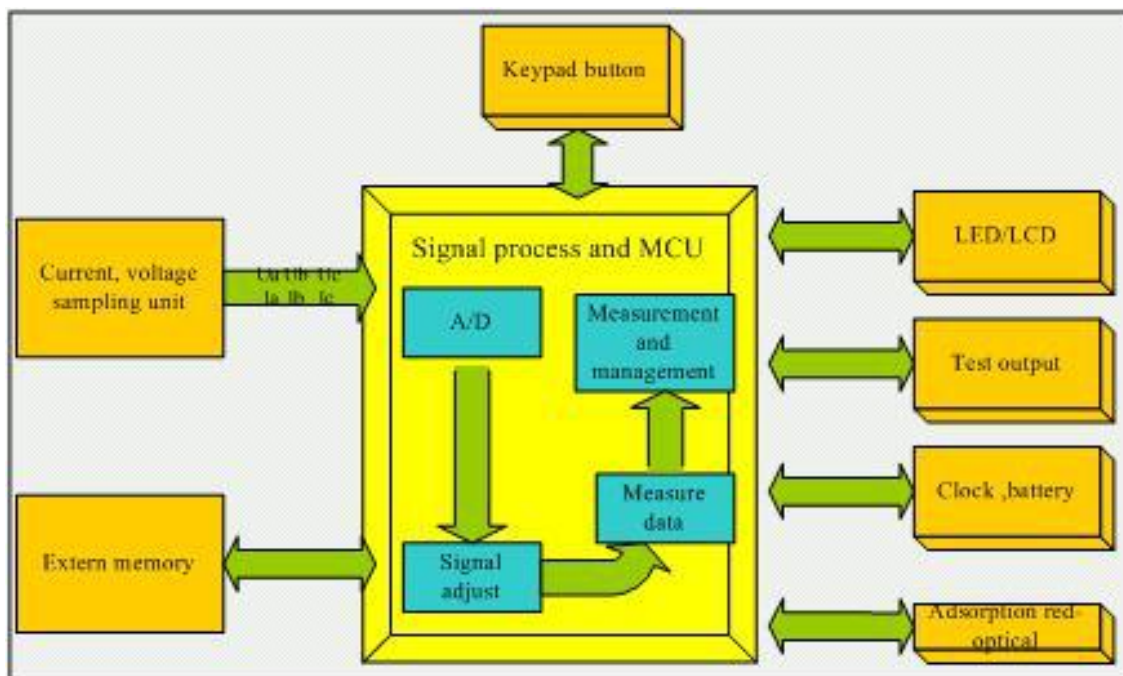
1.1.6 Keypad, contain 0~9 numeric buttons, "←" button and "↵" button, for TOKEN enter and data query

1.1.7 Programming enable Key

1.1.8 Assistance terminal. Pulse ports (active and reactive energy), 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 energy

Measure active 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 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 remain energy alarm

This meter have 3 levels of remaining energy alarm limit to remind user purchase energy:

When remaining energy is more than alarm limit1, LED alarm indicator will be green and long lighted.

When remaining energy is less or equal to alarm limit 1, and more than alarm limit 2, LED alarm indicator will be green and glitter.

When remaining energy is less or equal to alarm limit 2, and more than alarm limit 3, LED alarm indicator will be red and long lighted

When remaining energy is less or equal to alarm limit 3, LED alarm indicator will be red and glitter.

When remaining energy 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 MPPUL alarm

Meter measure each phase average power. If the maximum phase deducts the minimum one exceeded the power unbalance limit, LCD alarm symbol will be flashed. According to the binary code on LCD, we can track out the alarm reason. Alarm will disappear when phase power unbalance value within the limit. Phase power unbalance limit is programmable.

4.9 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.

4.10 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 tamp. 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.

4.10.1 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.

4.10.2 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

4.11 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)
2. Cumulative total purchased energy
3. Active max demand
4. Monthly energy consumption (energy consumption in one month)

4.12 Payment cumulative function

4.12.1 When meter at prepaid model, it will deduct the remaining energy during running, relay open when remaining energy run out. Meter will calculate the total consumption energy and prepaid total consumption energy.

4.12.2 When meter at the postpaid model, it don't deduct the remaining energy, and relay don't open when remaining energy is 0. Meter will calculate total consumption energy and postpaid total consumption energy.

Noted: Prepaid model and postpaid model is optional

4.13 Power off display

4.13.1 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 a SIGN, later relay will open.

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

4.14 Max demand

This meter can calculate and store the forward active maximum demand by each billing intervals, as well as the max demand occurrence time.

The default demand period is 15 minutes, slide interval is 1 minute.

Demand period and slide interval is programmable via local communication port, both of them should be set smaller than 60 minutes, and the demand period should be the integral multiple of slide interval.

4.15 Installation model and running model

4.15.1 Meter after inspection and testing, out-factory to be installation model. Customer can enter a series code (TOKEN) "1268213655081111930" 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

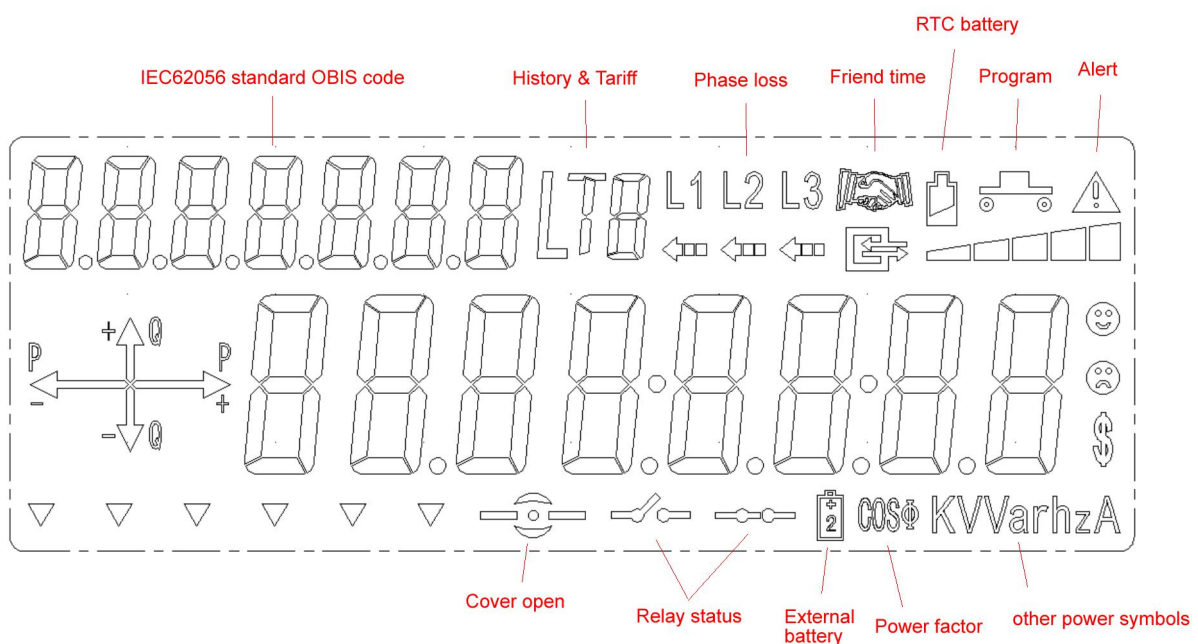
running model.

4.15.2 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

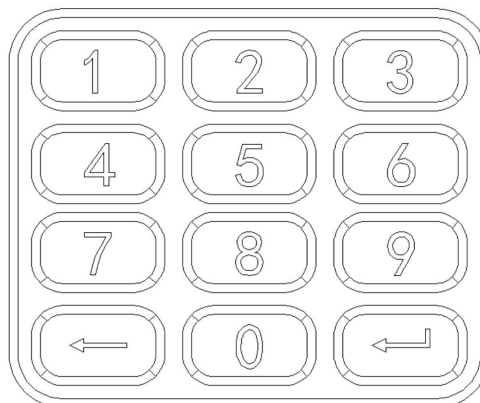
4.15.3 Running model: Meter can detect terminal cover and meter box open.

5. LCD display and LED indicator

5.1 Full-screen display



6. Keypad operation



Keypad has 12 buttons to enter TOKEN and query information. "←" is delete key, "↵" is confirm key.

User get a 20 digits TOKEN from vending station, enter 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. Prepayment

When purchase energy, vending station will issue an encrypted 20 digits TOKEN to user. After finished this 20 digits TOKEN into meter, you can press the "↵" key to confirm. If this is a valid TOKEN, the meter will execute the command, show information of "good" and 😊 on the LCD, and beep "di" "di" twice, prompt the operation successfully. If the TOKEN is invalid, the meter will not accept this TOKEN, some information like as "USEd" or "oLd" or "rEjEct" and 😞 will come out on the LCD main display area. Meanwhile, the corresponding error code will show on the lower-left of LCD, and beep "di" "di" "di" three times, prompts the operation fail.

Keypad lock-out function: have 2 kinds of keypad lock-out, one is local keypad lock-out, the other is remote keypad lock-out. If entered an invalid TOKEN, keypad lock-out period will be double of TOKEN entering times ($2*N$). If continue entering an invalid TOKEN more than 5 times, the keypad lock-out period will be extended to 20 multiples of TOKEN entering times ($20*(N-5)$), the maximum keypad lock out period is 120S. During the keypad lock-out period, test TOKEN is available, but not accept the credit TOKEN and clear TOKEN, user can use the keypad to do manual query operation.

Error code display:

- 02** CRC error, please check the input TOKEN is correct
- 03** TOKEN is illegal: time information is 0
- 04** the input TOKEN is repeated: the TOKEN has been used. Show "USEd" on the LCD main display area.
- 05** TOKEN is illegal: the time information in the TOKEN is before the meter saved; Show "oLd" on the LCD main display area.
- 06** TOKEN is expired: the high 8 bit of TID is large than KEN. Show "EXPIRED" on the LCD main display area.
- 07** kWh in TOKEN is exceed 10000000 or other stock limit
- 08** Invalid TOKEN: except CLASS 0~2.
- 09** Manufacturer No. error: when CLASS 1
- 10** Data error, power setup is exceeded the limit
- 11** Setting item is no use: when CLASS 2
- 13** Don't accept the credit TOKEN when meter at DDTK state

- 17 Invalid TOKEN: the date of TOKEN earlier than the date of meter
- 18 Operation problem: Meter has incorrect configuration or state when entering the TOKEN.
- 19 Special using purpose TOKEN: 00(H):01(M)
- 20 Operation problem: Stay time between TOKEN 1 and TOKEN 2 exceed the period limit when enter KT change TOKEN
- 21 Operation problem: Meter had already at the running model
- 22 Operation problem: Meter still at the installation model
- 23 Operation problem: Meter had already at the pre-paid state when enter the fixed payment states switching TOKEN
- 24 Operation problem: Meter had already at the post-paid state when enter the fixed payment states switching TOKEN
- 25 Operation problem: Meter at the keypad lock-out state due to continue TOKEN reject.
- 26 data value error: TI error when setting secret key
- 27 Operation problem: No short FAC when user define the sub-style 15 in class 2
- 28 Test Item can't use when Class 1
- 29 Register error when in class2/class1
- 30 KRN set error
- 31 TOKEN is not for electricity meter. Class 1 sub-style error
- 32 TOKEN is not for electricity meter. Class 0 sub-style error
- 40 Illegal Key change operation: DDTK→DCTK
- 41 Illegal Key change operation: DDTK→DITK
- 42 Illegal Key change operation: DUTK→DITK
- 43 Illegal Key change operation: DCTK→DITK
- 44 Illegal Key change operation: DUTK→DCTK
- 48 Illegal Key change operation: DDTK→DCTK

Support TOKEN TYPES:

☆ Transfer credit TOKEN (Class 0:Transfer Credit)

Purchased energy will increment into the remaining energy register. Remain energy stock limit is 10,000,000 kWh. If new purchased energy plus the remain energy exceed the energy stock limit, meter will not accept this transfer credit TOKEN, but this TOKEN is still valid, can be used at next time as long as the meter remain energy within the stock limit.

☆ Test TOKEN (Class 1: Initiate Meter Test / Display)

Testing TOKEN is used to test some basic functions, test item include Relay, LCD, total KWh, Key type, tariff No., keypad check, MPL, tampering status, power, firmware version, MPPUL.

Testing TOKEN do not need be encrypted.

☆ Set Maximum Power Limit TOKEN (Class 2: Set Maximum Power Limit)

Set MPL through 20 digits TOKEN

☆ Register resetting TOKEN (Class 2: Clear Credit)

When Register = 0 or Register = 0xFFFF, clear the remaining credit

☆ Secret key change TOKEN (Class 2: Set 1st Section Decoder Key/ Set 2nd Section Decoder Key)

Use 'Set1stSectionDecoderKey' TOKEN and 'Set2ndSectionDecoderKey' TOKEN to change secret key. TOKEN input via keypad, two group of TOKEN enter meter, the first TOKEN input correctly, LCD display 'HALF= = =', the second TOKEN input correctly, LCD display "good" and "😊", now the key changed successfully.

Initialization key is DITK, transport and installation use DDTK, customer use DUTK

☆ Clear tamper status TOKEN (Class 2: Clear Tamper Condition)

Clear the tamper record: Occurrence times and time

Noted to well-place the terminal cover before input this TOKEN, otherwise the meter will display an error-43.

☆ Set MPPULTOKEN

(Class 2: Set Maximum Phase Power Unbalance Limit)

Set MPPUL via 20 digits TOKEN

8. Communication

8.1 Optical communication for local data reading and writing

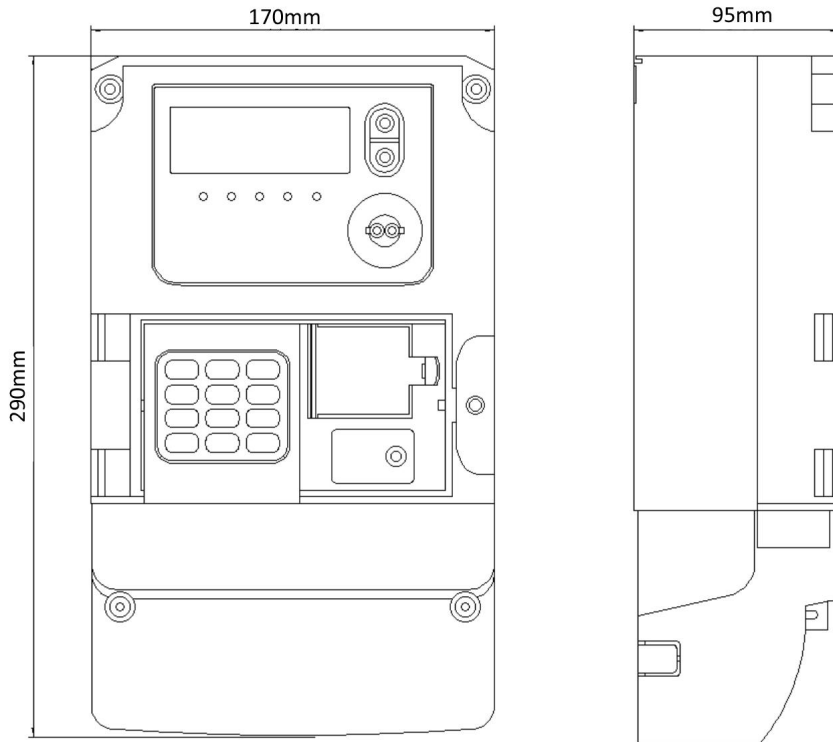
8.2 **Optional:** Support RS485 communication

9. Installation and connection

9.1 Meter installation

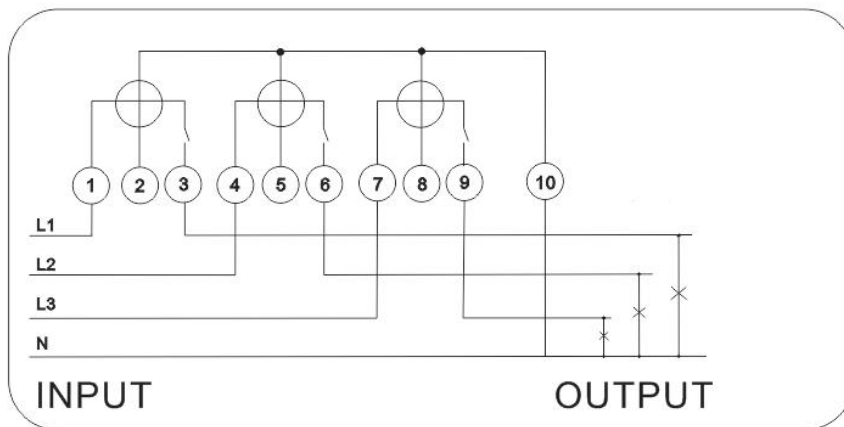
(1) Meter install dimension as below, there is a hook at the upper of meter back, using M6 hook screw for

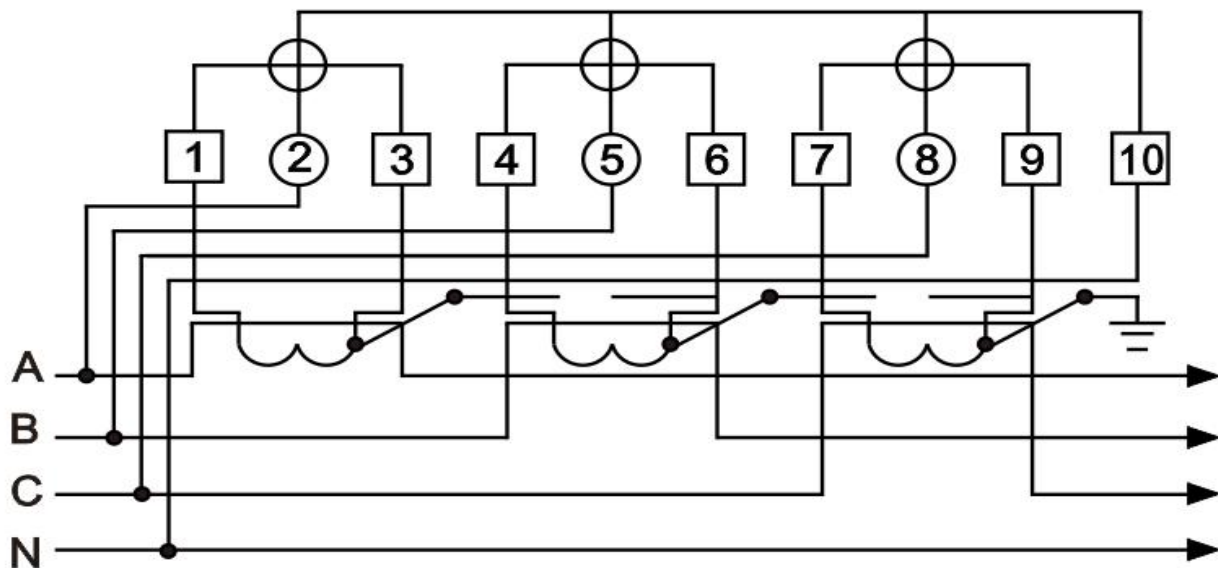
fixing. And there are 2 mounting holes at the lower of meter, using M4 screw or ST4.2 x12 self-trap screws.



OUTLINE DIMENSION DRAWING

(2) Wire connection diagram as following





CT connection diagram

10. Transport and storage

- ★ Meter transport should be without severe vibration and shock. Its storage should be consistent with transport packaging
- ★ Product should be in the original packaging box, the environment should be kept clean and the ambient temperature does not exceed $-20\text{ }^{\circ}\text{C} \sim +75\text{ }^{\circ}\text{C}$, 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.

11. 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.