



Three-phase multifunction energy meter PEC-EM3-CT Series

User Guide V1.0



PECTECH SRL

Safety Information- Important Information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol shall not be used with this signal word.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Nova for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

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Chapter 1. Overview

1.1. Introduction

PEC-EM3-CT Series series products are three phase DIN rail installation multi-function energy meter. This series of products can support measurement and analysis of variety of power parameters, such as voltage, current, the four quadrant power parameters, power factor, harmonic content etc. ; Meanwhile they also can provide the measurement of multiple electric energy parameters , such as two way active energy, reactive energy, monthly and daily electricity consumption statistics. This series of products also can support the analysis of electric power parameter measurement in 1P2W, 3P4W, 3P3W grid environment, is suitable for power monitoring for photovoltaic inverter , new energy electricity consumption statistic analysis, real time power monitoring and a variety of other environments, has the multi-function, high stability and long life characteristics. This series of products with RS485 communication interface, baud rate maximum support 38400bps. It can easily realize the function of remote data read, and adopt the design of large-screen LCD and touch-sensitive key, which can easily carry out the local view and set operation of variety parameters. The product has the function of password protection, which ensures the data security of the product.

PEC-EM3-CT Series series products are multi-functional electric energy meters designed for electric energy monitoring of photovoltaic inverter, statistical analysis of new energy electricity consumption, power monitoring needs of power system utilities and intelligent buildings. Its complete communication function is very suitable for various control systems, SCADA systems and energy management systems.

1.2. Characteristics

- **External current transformers of output types such as 1/5A, 333mV are supported, and direct access of Rogowski coil is also supported.** With the current transformer reverse connection correction function.
- Support external voltage transformer access, input voltage minimum support 30V.
- DIN Rail mounting, standard 4 modulus width.
- Touch button design improves button operability and reduces button failure rate
- Multi-function parameter measurement, providing voltage, current, active power, reactive power, apparent power, power factor, phase Angle, etc.
- To provide the analytical data of the total harmonic contents of voltages and currents
- Provide a variety of statistical data and local storage functions, such as two-way power, demand and other statistical data. Provide monthly electricity consumption statistics for the last 12 months and daily electricity consumption statistics for the last 31 days
- supports the dual-timing function of the meter startup running time and load running time.
- supports the access of a 2-tariff switching signal for metering at 2-tariff energy.
- Support RS485 communication function, baud rate up to 38400bps, Modbus RTU.
- Supports one optocoupler pulse output interface, and output parameters can be set.
- LCD refresh time is 1 second, support manual or automatic scroll display (configurable)

1.3. Parameters

| 1. The Unit can measure and display | |
|---|---|
| Instantaneous RMS Values | |
| Current | Per phase, neutral |
| Voltage | L-L, L-N |
| Frequency | 45 to 65Hz |
| Active power | Total and per phase |
| Reactive power | Total and per phase |
| Apparent power | Total and per phase |
| Power factor | Total and per phase |
| Energy Values (include: import, export, import + export) | |
| Active energy | 0 to 99999999.999 kWh |
| Reactive energy | 0 to 99999999.999 kvarh |
| Multi-Tariff active energy (T1 - T4) | 0 to 99999999.999 kWh |
| Maximum Demand Values | |
| Max.Demand of current | Per phase |
| Max.Demand of active power | Total |
| Max.Demand of reactive power | Total |
| Max.Demand of apparent power | Total |
| 2. The Unit can measure and communication read | |
| Energy Values | |
| Apparent Energy (total) | 0 to 99999999.999 kVAh |
| Per phase energy | Active energy and reactive energy, include: import, export, import+export Range: 0 to 999999.999 kWh/kvarh |
| Multi-Tariff reactive energy (T1 - T4) | 0 to 99999999.999 kvarh, include: import, export, import+export |
| Monthly electricity consumption for the last 12 months | Total active energy Range: 0 to 99999999.999 kWh |
| Daily energy consumption for the last 31 days | Total active energy Range: 0 to 99999999.999 kWh |
| 3. The Unit can settable | |
| Communication class | Modbus address, baud rate, parity bit, stop bit |
| Current transformer (CT) class | CT1 (Primary), range from 1 to 9999 CT2 (Secondary), range is 1/ 5A or 333mV or Rogowski 50-85-100mV/kA |
| Voltage transformer (PT) class | PT1 (Primary), range from 30 to 500000 PT2 (Secondary), range is 30 to 500 |
| System configuration class | User password (HMI), Power system type |
| Demand class | Demand interval period, Slide time |
| Pulse output class | Pulse output type, Pulse output width, Pulse output rate |
| Time class | Automatic scroll display time, Backlit time, System time (RTC), Tariff time |

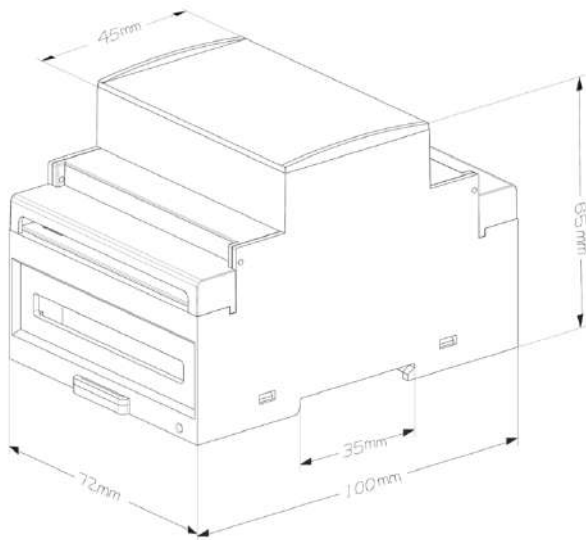
Chapter 2. Technical parameters specification

2.1. Specification

| Electrical Characteristics | | |
|-------------------------------------|------------------------------------|--|
| Type of measurement | | RMS including harmonics on AC system, support 1P2W, 3P3W, 3P4W |
| Measurement accuracy | Voltage, Current | Class 0.5, according IEC 61557-12 |
| | Active power | Class 0.5, according IEC 61557-12 |
| | Reactive power | Class 2, according IEC 61557-12 |
| | Apparent power | Class 1, according IEC 61557-12 |
| | Active energy | Class 0.5S, according IEC 62053-22, IEC 61557-12 |
| | Reactive energy | Class 2, according IEC 62053-23, IEC 61557-12 |
| | Power factor | Class 1, according IEC 61557-12 |
| | Frequency | Class 0.2, according IEC 61557-12 |
| | Harmonic distortion | Class 2, according IEC 61557-12 |
| Data update rate | | 1 second. Optional 100 ms |
| Input-Voltage | Rate voltage (Un) | 230 Vac (L-N) / 400 Vac (L-L) |
| | Measured range (Direct connection) | 30 to 300 Vac (L-N), 30 to 500 Vac (L-L) |
| | PT primary | 30 to 500000 |
| | Impedance | 1MΩ |
| | Frequency range | 45 to 65 Hz |
| | Overload capacity | 2*Un for 1 second |
| Input-Current | CT2 (Secondary) | 1A or 5A for PEC-EM3-5A 333mV for PEC-EM3-333 50, 85, 100mV/kA for PEC-EM3-RC |
| | CT1 (Primary) | 1 to 9999 A |
| | Measured range | 0.003 to 6 A, basic current (Ib) is 5A for PEC-EM3-5A 5 to 5000 A for PEC-EM3-RC (100mV/kA reference – 500mV) |
| | Impedance | <0.01 ohm for PEC-EM3-5A >1 MOhm for PEC-EM3-333 and PEC-EM3-RC |
| | Overload capacity | 120A for 0.5 second for PEC-EM3-5A |
| Auxiliary power supply | Operating range | 80 ~ 300 Vac / 100 ~ 420 Vdc |
| | Frequency | 45 ~ 65 Hz |
| | Power consumption | < 4VA/0.5W |
| Pulse output | Interface type | Open collector optocoupler |
| | Pulse constant | Per pulse equal 0.001/0.01/0.1/1/10/100 kWh/kvarh (Configurable) |
| | Pulse width | 60/100/200 milliseconds (Configurable), default is 100milliseconds |
| | Pulse output type | Import/export/total active energy, Import/export/total reactive energy (Configurable) |
| | Class | Class A, according IEC 62053-31 |
| | Input voltage | 5 ~ 27 Vdc |
| Pulse indicator light on the panel | | Pulse constant is 5000imp/kWh, Represents the total active energy of the secondary side |
| Real-time clock accuracy | | 0.5 s/d |
| Mechanical Characteristics | | |
| IP Degree of Protection (IEC 60529) | | Designed to IP51 front display, IP30 meter body |
| Dimensions (W x H x D) | | 72 x 100 x 66 mm |
| Mounting Position | | DIN Rail mounting |

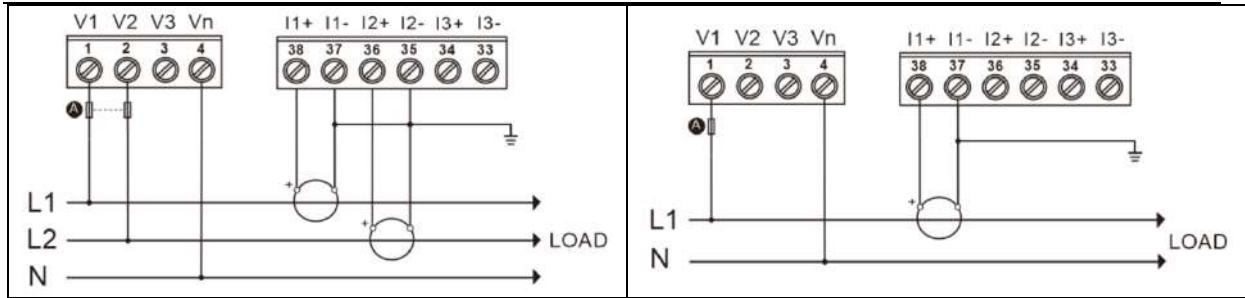
| | |
|--|---|
| Material of meter case | UL 94 V-0 |
| Environmental Characteristics | |
| Operating Temperature | -25 to +55°C |
| Storage Temperature | -40 to +80°C |
| Humidity | < 90%, non-condensing |
| Pollution Degree | 2 |
| Altitude | Up to 2000m |
| Vibration | 10 Hz to 150Hz, IEC 60068-2-6 |
| Electromagnetic Characteristics | |
| Electrostatic Discharge | Level 4, according IEC 61000-4-2 ⁽¹⁾ |
| Immunity to Radiated Fields | Level 3, according IEC 61000-4-3 ⁽¹⁾ |
| Immunity to Electrical Fast Transients | Level 4, according IEC 61000-4-4 ⁽¹⁾ |
| Immunity to Surges | Level 4, according IEC 61000-4-5 ⁽¹⁾ |
| Immunity to Conducted Disturbances | Level 3, according IEC 61000-4-6 ⁽¹⁾ |
| Immunity to Magnetic Fields | IEC 61000-4-8 ⁽¹⁾ |
| Immunity to Voltage Dips | IEC 61000-4-11 ⁽¹⁾ |
| Radiated Emissions | Class B, according EN55011 |
| Conducted Emissions | Class B, according EN55011 |
| Harmonics | IEC 61000-3-2 ⁽¹⁾ |
| (1): The experimental test is carried out according to the grade requirements of industrial grade products in IEC61326-1 | |
| Safety | |
| Measurement Category | CAT III, according IEC 61010-1 |
| Overvoltage Category | CAT III, according IEC 61010-1 |
| Insulation | AC Voltage Test: 4kV for 1 minute |
| | Impulse Voltage Test: 6kV - 1.2/50µS waveform |
| Protective Class | II, according IEC61010-1 |
| Communications | |
| Interfaces standard and protocols | 2-wire RS485, Modbus RTU |
| Baud rate | 1200 to 38400 bps, default is 9600 bps |
| Parity bit | None, Even, Odd, default is None |
| Stop bit | 1 or 2, default is 1 |
| Response time | <100ms |
| Transmission mode | half-duplex |
| Transmission distance | Up to 1000m |
| Max. Bus loading | 64 pcs |

2.2. Installation dimensions



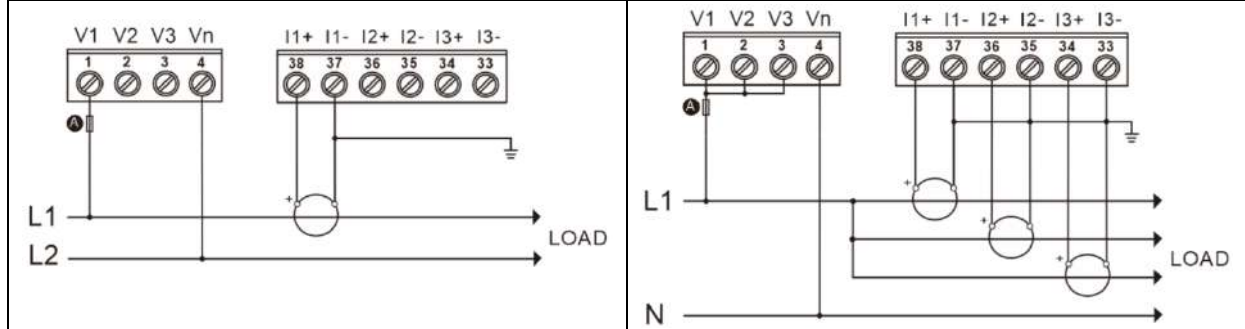
2.3. Wiring Diagrams

| Measurement input wiring | |
|--------------------------|-----------------|
| 3P4W (3CT) | 3P4W (3PT+3CT) |
| | |
| 3P3W (2CT) | 3P3W (2PT+2CT) |
| | |
| 2P3W (L+L+N, 2CT) | 1P2W (L+N, 1CT) |



1P2W (L+L, 1CT)

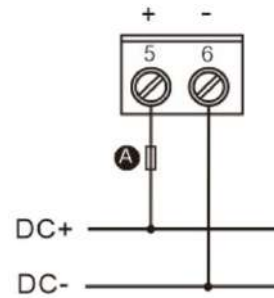
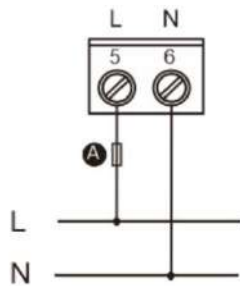
1P2W (L+N, 3CT)



Auxiliary power wiring

AC Power

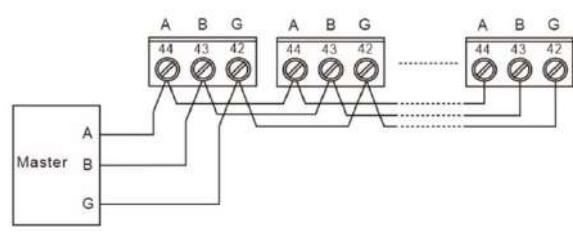
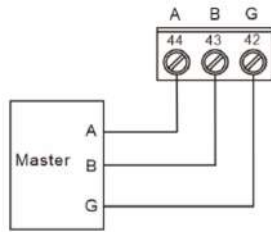
DC Power



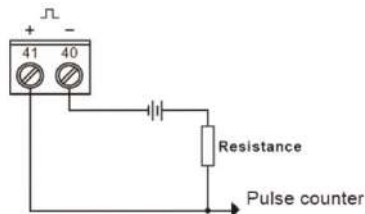
Communication terminal wiring

Single meter wiring

Multiple meters wiring



Pulse output terminal wiring



A : 500 mA fast fuse.

Terminal specification parameters

| | |
|------------------------------------|---|
| Voltage measurement input terminal | Wire size: 0.82 ~ 3.31 mm ² (18 ~ 12 AWG) Torque: 0.5 ~ 0.6 N.m |
|------------------------------------|---|

| | |
|------------------------------------|--|
| Current measurement input terminal | Wire size: 1.318 ~ 3.31 mm ² (16 ~ 12 AWG) Torque: 0.5 ~ 0.6 N.m |
| Auxiliary power terminal | Wire size: 0.82 ~ 3.31 mm ² (18 ~ 12 AWG) Torque: 0.5 ~ 0.6 N.m |
| Communication terminal | Wire size: 0.82 ~ 3.31 mm ² (18 ~ 12 AWG) Torque: 0.5 ~ 0.6 N.m |
| Pulse output terminal | Wire size: 0.82 ~ 3.31 mm ² (18 ~ 12 AWG) Torque: 0.5 ~ 0.6 N.m |
| Digital inout and ouput terminal | Wire size: 0.82 ~ 3.31 mm ² (18 ~ 12 AWG) Torque: 0.5 ~ 0.6 N.m |

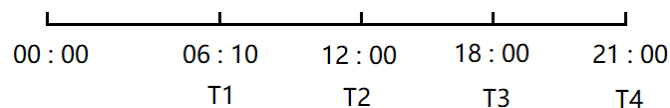
Chapter 3. General function description

3.1. Multi-tariff function

The multi-tariff function refers to the function that the meter realizes time-sharing measurement of electric quantity. The power meter divides the 24 hours of a day into several time periods, and then specifies the rate number for each time period. Then the power meter accumulates the amount of electricity in time division according to the pre-divided time period, and stores it to the position of the rate number corresponding to each time period, so as to realize the function of time-division measurement of electricity.

The meter used the method of the tariff number correlation to the starting time point to realize the tariff segment division. The power meter support up to 8 starting time points and up to 4 tariff segments (T1, T2, T3 and T4).

Figure 3-1: The starting time points of the tariff segment



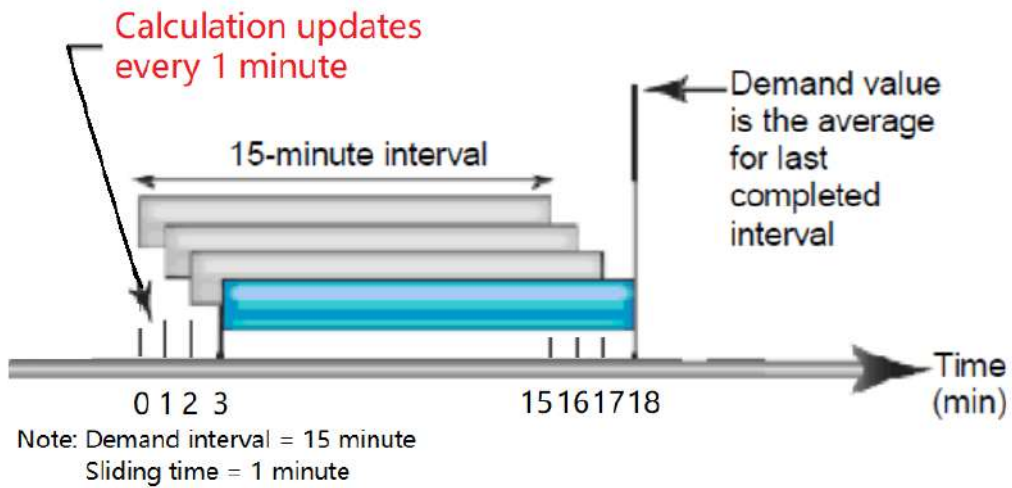
As shown in Figure 3-1, 06:10 designated as the start time of tariff 1 (T1), 12:00 designated as the start time of tariff 2 (T2), 18:00 designated as the start time of tariff 3 (T3), 21:00 designated as the start time of tariff 4 (T4), so tariff 1 time range is 06:10 to 12:00, tariff 2 time range is 12:00 to 18:00, tariff 3 time range is 18:00 to 21:00, tariff 4 time range is 21:00 to tomorrow 06:10.

Note: The tariff parameters can be set by communication commands (Please refer to the relevant communication protocol document for the register address).

3.2. Demand calculation method

The block intervals are sliding, the power meter calculates and update the demand at the sliding speed.

Figure 3-2: Diagram of sliding block interval calculation method




As shown in Figure 3-2, the first demand calculation is made at the 15th minute, and the demand calculation data is between the 0th and the 15th minute. At the 16th minute, do the second demand calculation, and the demand calculation data is between the 1th and the 16th minute. At the 17th minute, do the third demand calculation, and the demand calculation data is between the 2th and the 17th minute.

Chapter 4. Operation

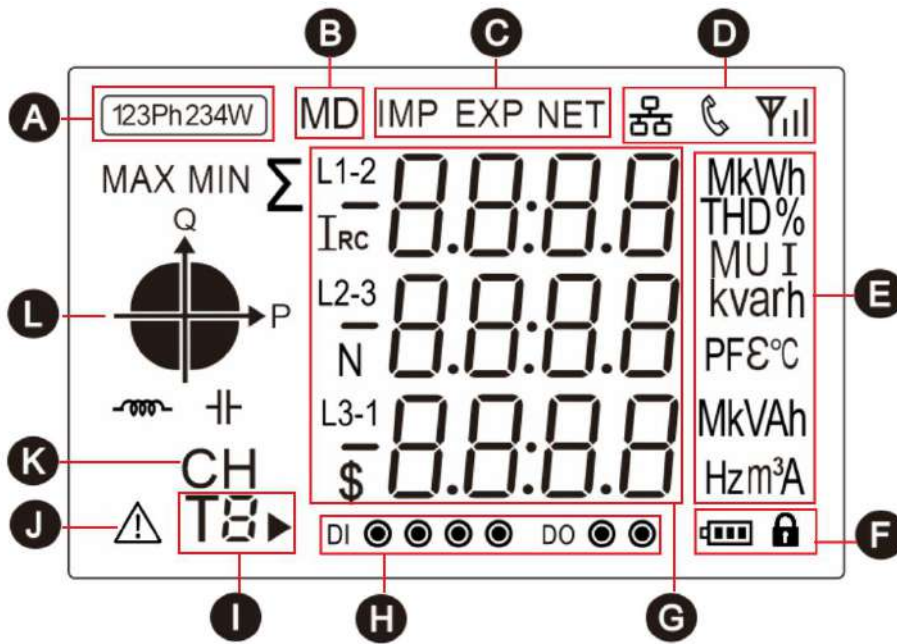
4.1. Meter startup instructions

After the PEC-EM3-CT Series series products are properly wired and connected to the power supply, the products will first enter the self-test process, under which the LCD screen display sequence is shown as follows:

| | | |
|------------------------------|--|--|
| <p>First screen display</p> | <p>Display full screen characters</p> | |
| <p>Second screen display</p> | <p>Displays the software version number of the power meter</p> | |

| | | |
|-----------------------------|---|--|
| <p>Three screen display</p> | <p>Display the results of the self-test</p> |  |
|-----------------------------|---|--|

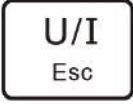

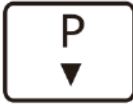

4.2. LCD display area description



- A: The power grid type icon represents the current measurement type of the meter.
- B: Maximum demand icon.
- C: Direction icon for import and export energy.
- D: A status indicator icon for the meter.
- E: An icon of a unit of measurement data.
- F: Battery status icon and lock icon, displays the battery status and dicates that the device is locked.
- G: Measured values.
- H: An icon of digital I/O status for the meter.
- I: Multi tariff icon indicating the tariff segment to which the current energy. ► represents the tariff number displayed as the running tariff segment. For example: T2 ► The figure on the left represents that the tariff 2 (T2) segment is running, and the accumulated energy will be counted into the corresponding energy area of tariff 2 (T2).
- J: Warning Status icon.
- K: Channel indicator icon for multiple measurement channels.
- L: Quadrant indicator icon indicating the quadrant of the current load.

4.3. Button definition description

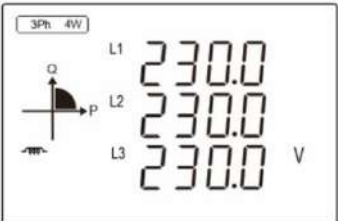
| Button | Definition | Click | Press 3 second |
|--------|------------|-------|----------------|
|--------|------------|-------|----------------|

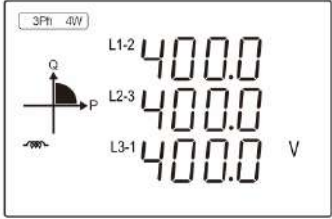
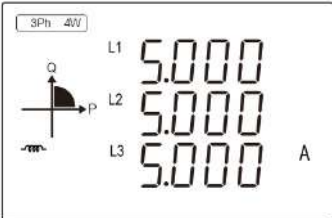
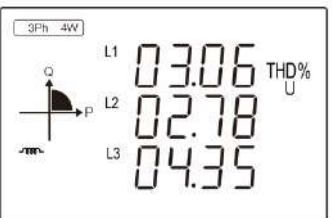
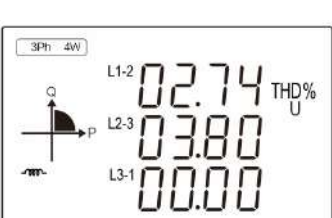
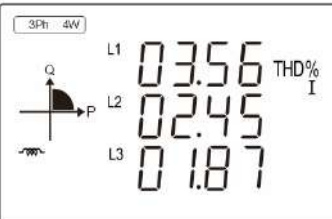
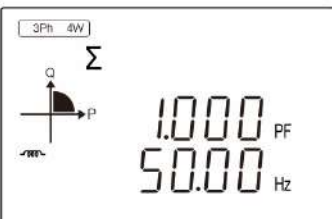
| | | | |
|--|---------------------------------------|--|--|
|  | <p>Button 1: Escape key (Esc)</p> | <ol style="list-style-type: none"> 1. In the setting screen or auxiliary screen: exit or return to the previous screen. 2. In the main display screen: page scroll for parameters such as voltage and current. | <p>Under the main display screen: enter the auxiliary display screen.</p> |
|  | <p>Button 2: Up key (Up)</p> | <ol style="list-style-type: none"> 1. In the main display screen: view the power factor, maximum demand. 2. In the setting screen or auxiliary screen: scroll up to display the page or the increasing number. | <p>Null</p> |
|  | <p>Button 3: Down key (Dn)</p> | <ol style="list-style-type: none"> 1. In the main display screen: view the power information. 2. In the setting screen or auxiliary screen: scroll down to display the page or the decreasing number. | <p>Null</p> |
|  | <p>Button 4: Enter key (Et)</p> | <ol style="list-style-type: none"> 1. In the main display screen: view energy data and system time. 2. In the setting screen: right move the setting cursor. | <ol style="list-style-type: none"> 1. In the main display screen: enter the setting mode. 2. In the setting screen: enter the setting state or carry out confirmation operation. |

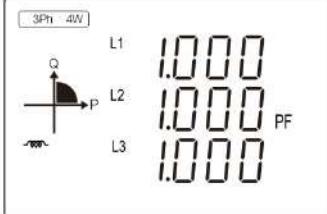
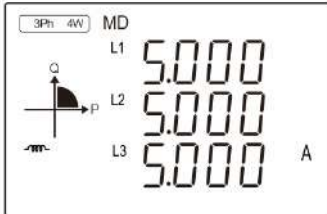
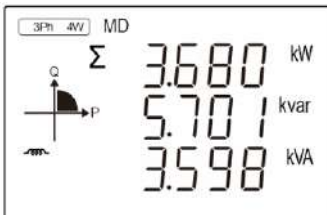
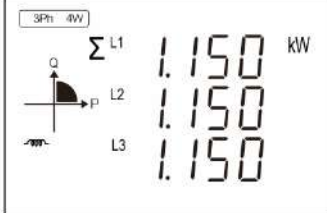
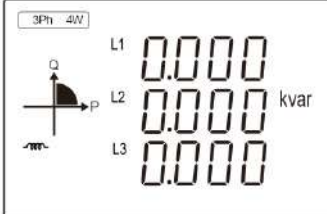
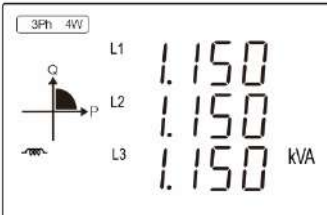
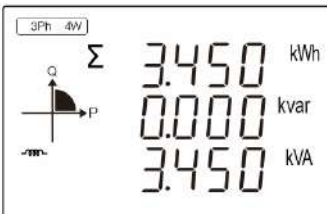
4.4. Description of display screen

4.4.1. Main display screen

After the meter is powered on and passes the self-test process, the interface entered is defined as the main display interface, which is used to display the main measurement parameters, electric quantity data, instrument information and other data of the product. Users can scroll the display page by pressing the button 1 to button 4.

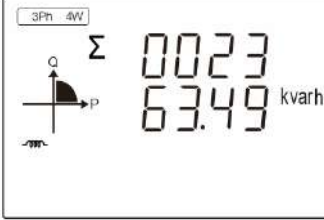
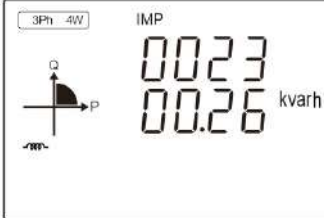
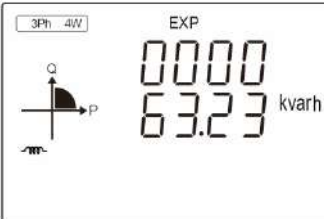
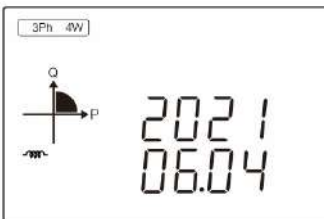



| LCD display | Description |
|---|---|
| Display screen under button 1 | |
|  | <p>A display screen for three-phase L-N voltage.</p> <p>Example: L1-N voltage = 230.0V L2-N voltage = 230.0V L3-N voltage = 230.0V</p> <p>Note: In 3P3W mode, this screen is not displayed</p> |

| | |
|---|---|
|  | <p>A display screen for three-phase L-L voltage.</p> <p>Example: L1-2 voltage = 400.0V L2-3 voltage = 400.0V L3-1 voltage = 400.0V</p> <p>Note: In 1P2W mode, this screen is not displayed</p> |
|  | <p>A display screen for three-phase current.</p> <p>Example: L1 current = 5.001A L2 current = 5.002A L3 current = 5.000A</p> |
|  | <p>A display screen for three-phase L-N voltage THD.</p> <p>Example: L1 voltage THD = 3.06% L2 voltage THD = 2.78% L3 voltage THD = 4.35%</p> |
|  | <p>A display screen for three-phase L-L voltage THD.</p> <p>Example: L1-2 voltage THD = 2.74% L2-3 voltage THD = 3.80% L3-1 voltage THD = 0.00%</p> <p>Note: This screen is displayed only in 3P3W mode.</p> |
|  | <p>A display screen for three-phase current THD.</p> <p>Example: L1 current THD = 3.56% L2 current THD = 2.45% L3 current THD = 1.87%</p> |
| <p>Display screen under button 2</p> | |
|  | <p>Total power factor and frequency display screen</p> <p>Example: Total power factor = 1.000 Frequency = 50.00Hz</p> |

| | |
|---|--|
|  | <p>Three - phase power factor display screen</p> <p>Example: L1 power factor = 1.000 L2 power factor = 1.000 L3 power factor = 1.000</p> |
|  | <p>Max.demand of three-phase display screen</p> <p>Example: Max.Demand of L1 current = 5.000A Max.Demand of L2 current = 5.000A Max.Demand of L3 current = 5.000A</p> |
|  | <p>Max.demand of total active/reactive/apparent power display screen</p> <p>Example: Max.Demand of total active power = 3.680 kW Max.Demand of total reactive power = 5.701 kvar Max.Demand of total apparent power = 3.598 kVA</p> |
| <p>Display screen under button 3</p> | |
|  | <p>Per phase active power display screen</p> <p>Example: L1 active power = 1.150 kW L2 active power = 1.150 kW L3 active power = 1.150 kW</p> |
|  | <p>Per phase reactive power display screen</p> <p>Example: L1 reactive power = 0 kvar L2 reactive power = 0 kvar L3 reactive power = 0 kvar</p> |
|  | <p>Per phase apparent power display screen</p> <p>Example: L1 apparent power = 1.150 kVA L2 apparent power = 1.150 kVA L3 apparent power = 1.150 kVA</p> |
|  | <p>Total active/reactive/apparent power display screen</p> <p>Example: Total active power = 3.450 kWh Total reactive power = 0 kvar Total apparent power = 3.450 kVA</p> |
| | |




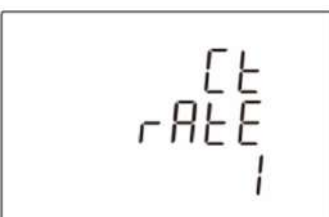
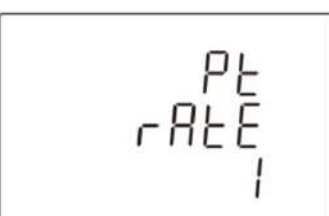
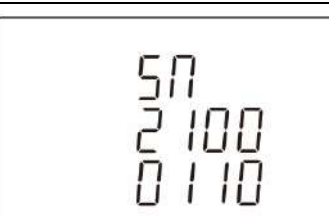

Display screen under button 4

| | |
|--|--|
| | <p>Total active energy</p> <p>Example: Total active energy = 30.10 kWh</p> |
| | <p>Import active energy</p> <p>Example: Import active energy = 15.05 kWh</p> |
| | <p>Export active energy</p> <p>Example: Export active energy = 15.05 kWh</p> |
| | <p>Tariff 1 active energy</p> <p>Example: Tariff 1 active energy = 63.42kWh</p> |
| | <p>Tariff 2 active energy</p> <p>Example: Tariff 2 active energy = 28.63kWh</p> |
| | <p>Tariff 3 active energy</p> <p>Example: Tariff 3 active energy = 83.55kWh</p> |
| | <p>Tariff 4 active energy</p> <p>Example: Tariff 4 active energy = 93.26kWh</p> |

| | |
|--|--|
|  | <p>Total reactive energy</p> <p>Example: Total reactive energy = 2363.49kvarh</p> |
|  | <p>Import reactive energy</p> <p>Example: Import reactive energy = 2300.26kvarh</p> |
|  | <p>Export reactive energy</p> <p>Example: Export reactive energy = 63.23kvarh</p> |
|  | <p>Displaying the current date of the system real-time clock.</p> <p>Example: The current date is June 4, 2021</p> |
|  | <p>Displaying the current time of the system real-time clock.</p> <p>Example: The current time is 14:32.38</p> |
| <p>Icon description of the load nature:</p> <p> is mean: The load is an inductive load,  is mean: The load is a capacitive load.</p> | |

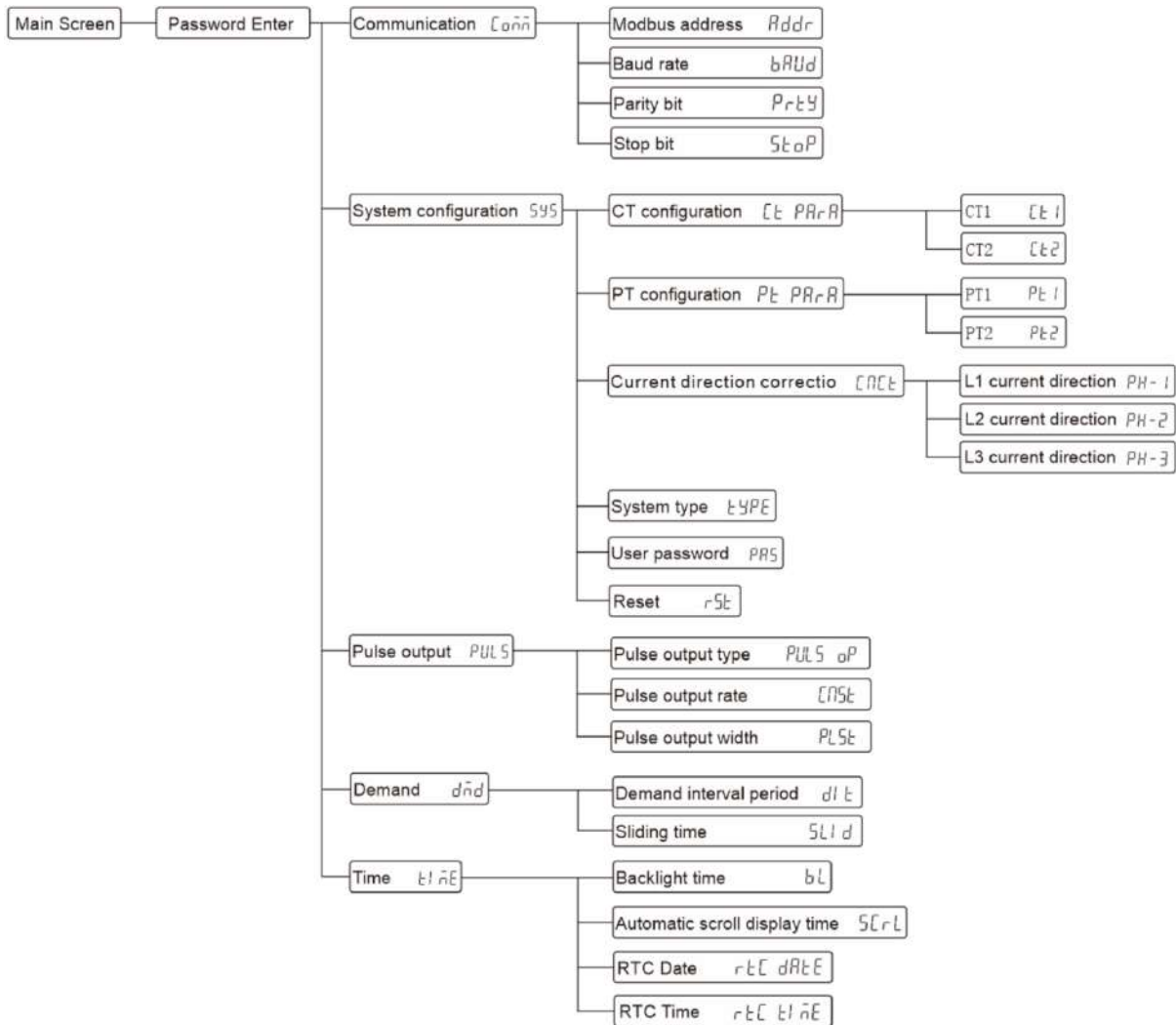
4.4.2. Auxiliary display screen

Under the main display screen, press button 1 for 3 second to enter the screen of auxiliary display. At this point, click button 2 or button 3 can be scroll the page needs to be viewed. Under the screen of auxiliary display, can click button 1 to return to the main display screen. If there is no button operation in more than 1 minute under the screen of auxiliary display, the meter will automatically return to the main display screen.

| LCD display | Description |
|---|--|
|  | <p>Modbus address</p> <p>Example: The modbus address is 1.</p> |
|  | <p>Baud rate</p> <p>Example: The baud rate is 9600bps.</p> |
|  | <p>Parity bit</p> <p>Example: The Parity bit is None.</p> |
|  | <p>Ratio of current transformer (CT)</p> |
|  | <p>Ratio of voltage transformer (PT)</p> |
|  | <p>The serial number of meter</p> <p>Example: The serial number is 21000110.</p> |
|  | <p>Software version number</p> |

4.5. Setting-up

The logical diagram of the parameter setting menu is as follows:



How to enter the "Parameter setting Menu" screen:

Step 1: In the main display screen, press button 4 for 3 second to enter the user password input mode.



Note: The user password input screen is shown in the figure on the right.

Step 2: Enter the correct user password and press button 4 for 3 second to confirm.

How to enter a password:






- A: Click button 2 and button 3 to increase or decrease the number of flashing bits.
- B: Click button 4 to move the flashing position to the right.
- C: After entering the correct password, press button 4 for 3 second for confirmation. If the password is verified correctly, the power meter will enter the screen of "Parameter Setting menu".

Note: Under the user password input screen, can click button 1 to return to the main display screen. If there is no button operation in more than 1 minute under this screen, the power meter will automatically return to the main display screen.

4.5.1. Set communication class parameters

Communication parameters include: Modbus address, baud rate, parity bit, stop bit.

| | |
|---|--|
| <p>1. After entering the "Parameter Setting Menu" screen, select the setting screen (as shown in the figure below), and then press button 4 for 3 second to enter the communication parameter setting screen.</p> | |
| | |
| <p>2. Setting the modbus communication address</p> | |
| | <p>Modbus address setting range: 001 to 247, default is 001.</p> <p>Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state.</p> <p>Click button 2 or button 3 to scroll the page and select the next setting interface.</p> <p>Click button 1 to exit the setting menu and return to the previous setting screen.</p> |
| | <p>Click button 2 or button 3 to increase or decrease the number of set bits.</p> <p>Click button 4 can be moved the set bits to the right.</p> <p>Press button 4 for 3 second to confirm the setting. The meter will save the setting value and exit the setting state.</p> <p>Click button 1 to exit the setting state without saving the setting parameters.</p> |
| <p>3. Setting the baud rate</p> | |
| | <p>Baud rate can be setting: 1200, 2400, 4800, 9600, 19200, 38400 bps, default is 9600bps.</p> <p>Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state.</p> <p>Click button 2 or button 3 to scroll the page and select the next setting interface.</p> <p>Click button 1 to exit the setting menu and return to the previous setting screen.</p> |

| | |
|---|--|
|  | <p>Click button 2 or button 3 to select the baud rate. Press button 4 for 3 second to confirm the setting. The meter will save the setting value and exit the setting state. Click button 1 to exit the setting state without saving the setting parameters.</p> |
| <p>4. Setting the parity bit</p> | |
|  | <p>Parity bit can be setting: None, Even, Odd, default is None. Press button 4 for 3 second to enter the setting state, and the character of the setting becomes the flashing state. Click button 2 or button 3 to scroll the page and select the next setting interface. Click button 1 to exit the setting menu and return to the previous setting screen.</p> |
|  | <p>Click button 2 or button 3 to select the parity bit. Press button 4 for 3 second to confirm the setting. The meter will save the setting value and exit the setting state. Click button 1 to exit the setting state without saving the setting parameters.</p> |
| <p>5. Setting the stop bit</p> | |
|  | <p>Stop bit can be setting: 1 or 2, default is 1. Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state. Click button 2 or button 3 to scroll the page and select the next setting interface. Click button 1 to exit the setting menu and return to the previous setting screen. Note: The stop bit can only be set to 2 if the check bit is equal to None.</p> |
|  | <p>Click button 2 or button 3 to select the stop bit. Press button 4 for 3 second to confirm the setting. The meter will save the setting value and exit the setting state. Click button 1 to exit the setting state without saving the setting parameters.</p> |

4.5.2. Set CT class parameters

CT parameters include: primary side value (CT1) and secondary side value (CT2) of the current transformer.

1. After entering the "Parameter Setting Menu" screen, select the setting screen (as shown in the figure below), and then press button 4 for 3 second to enter the system parameter setting screen.



2. Select the setting screen (as shown in the figure below), and then press button 4 for 3 second to enter the CT class parameters setting screen.



2.1. Setting CT1 for PEC-EM3-5A



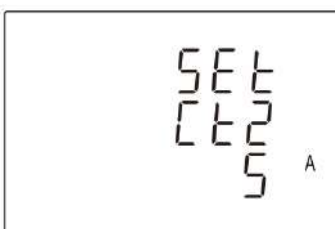
CT1 setting range: 1 to 9999A, default is 5A.

Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state.
Click button 1 to return to the previous level setup menu.



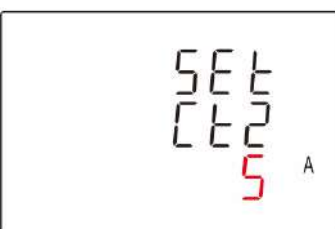
Click button 2 or 3 to increase or decrease the number of set bits.
Click button 4 can be moved the set bits to the right.
Press button 4 for 3 second to confirm the setting. The power meter will save the setting value and exit the setting state.
Click button 1 to exit the setting state without saving the setting parameters.

2.2.1 Setting CT2 for **PEC-EM3-5A**



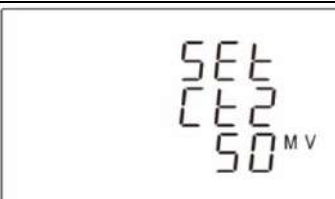
CT2 can be set: 1A or 5A, default is 5A.

Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state.
Click button 1 to return to the previous level setup menu.




Click button 2 or 3 to select the CT2.
Press button 4 for 3 second to confirm the setting. The power meter will save the setting value and exit the setting state.
Click button 1 to exit the setting state without saving the setting parameters.

2.2.2 Setting CT2 for **PEC-EM3-RC**




CT2 can be set: 50mV,85mV or 100mV, default is 100mV.

Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state .
Click button 1 to return to the previous level setup menu .

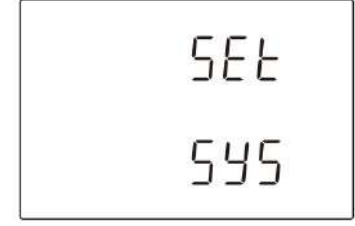

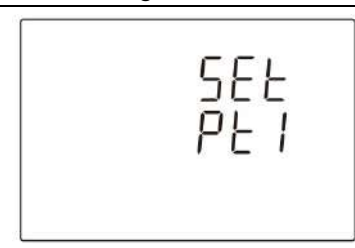
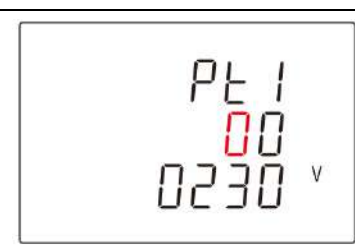
| | |
|---|--|
|  | <p>Click button 2 or 3 to select the CT2.</p> <p>Press button 4 for 3 second to confirm the setting. The power meter will save the setting value and exit the setting state. Click button 1 to exit the setting state without saving the setting parameters.</p> |
|---|--|

2.2.3 below display only for model **PEC-EM3-333**, (CT2 only can view and not be set)

| | |
|---|---|
|  | <p>CT2 is 333mV (not configurable).</p> <p>Click button 1 to return to the previous level setup menu.</p> |
|---|---|

4.5.3. Set PT class parameters

PT parameters include: primary side value (PT1) and secondary side value (PT2) of the voltage transformer.







| | |
|--|--|
| <p>1. After entering the "Parameter Setting Menu" screen, select the setting screen (as shown in the figure below), and then press button 4 for 3 second to enter the system parameter setting screen.</p> | |
|  | |
| <p>2. Select the setting screen (as shown in the figure below), and then press button 4 for 3 second to enter the PT class parameters setting screen.</p> | |
|  | |
| <p>2.1. Setting PT1</p> | |
|  | <p>PT1 setting range: 30 to 500000V, default is 230V.</p> <p>Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state.</p> <p>Click button 1 to return to the previous level setup menu.</p> |
|  | <p>Click button 2 or 3 to increase or decrease the number of set bits.</p> <p>Click button 4 can be moved the set bits to the right.</p> <p>Press button 4 for 3 second to confirm the setting. The power meter will save the setting value and exit the setting state.</p> <p>Click button 1 to exit the setting state without saving the setting parameters.</p> |




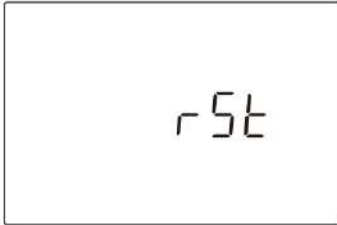

| | |
|------------------|--|
| 2.2. Setting PT2 | |
| | <p>PT2 setting range: 30 to 500V, default is 230V.</p> <p>Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state.</p> <p>Click button 1 to return to the previous level setup menu.</p> |
| | <p>Click button 2 or 3 to increase or decrease the number of set bits.</p> <p>Click button 4 can be moved the set bits to the right.</p> <p>Press button 4 for 3 second to confirm the setting. The power meter will save the setting value and exit the setting state.</p> <p>Click button 1 to exit the setting state without saving the setting parameters.</p> |

4.5.4. Set system class parameters

System class parameters include: system current direction correction, system type, user password, reset max. demand or historical electricity consumption log.

| | |
|---|--|
| 1. After entering the "Parameter Setting Menu" screen, select the setting screen (as shown in the figure below), and then press button 4 for 3 second to enter the system class parameter setting screen. | |
| | |
| 2. Setting system current direction correction | |
| | <p>Press button 4 for 3 second to enter the next level setting menu.</p> <p>Click button 2 or button 3 to scroll the page and select the next setting interface.</p> <p>Click button 1 to return to the previous level setup menu.</p> |
| 2.1. Set L1 current direction correction | |
| | <p>L1 current direction correction can be set: forward or reverse, default is forward.</p> <p>Click button 3 to scroll down to the Settings screen of L2 current direction correction.</p> <p>Press button 4 for 3 second to enter the setting state, and the character of the setting becomes the flashing state.</p> <p>Click button 1 to return to the previous level setup menu.</p> |

| | |
|---|--|
|  | <p>Click button 2 or 3 to select the current direction. Press button 4 for 3 second to confirm the setting. The power meter will save the setting value and exit the setting state. Click button 1 to exit the setting state without saving the setting parameters.</p> <p>Note: <i>Frd</i> represents forward, <i>rE!!</i> represents reverse.</p> |
| <p>2.2. Set L2 current direction correction</p> | |
|  | <p>L2 current direction correction can be set: forward or reverse, default is forward.</p> <p>Click button 3 to scroll down to the Settings screen of L3 current direction correction. Press button 4 for 3 second to enter the setting state, and the character of the setting becomes the flashing state. Click button 1 to return to the previous level setup menu.</p> |
|  | <p>Click button 2 or 3 to select the current direction. Press button 4 for 3 second to confirm the setting. The power meter will save the setting value and exit the setting state. Click button 1 to exit the setting state without saving the setting parameters.</p> <p>Note: <i>Frd</i> represents forward, <i>rE!!</i> represents reverse.</p> |
| <p>2.3. Set L3 current direction correction</p> | |
|  | <p>L3 current direction correction can be set: forward or reverse, default is forward.</p> <p>Click button 2 to scroll down to the Settings screen of L2 current direction correction. Press button 4 for 3 second to enter the setting state, and the character of the setting becomes the flashing state. Click button 1 to return to the previous level setup menu.</p> |
|  | <p>Click button 2 or 3 to select the current direction. Press button 4 for 3 second to confirm the setting. The power meter will save the setting value and exit the setting state. Click button 1 to exit the setting state without saving the setting parameters.</p> <p>Note: <i>Frd</i> represents forward, <i>rE!!</i> represents reverse.</p> |
| <p>3. Set system type</p> | |
|  | <p>The system type supported by the power meter includes the five types: 1P2W, 2P3W, 3P3W, 3P4W, default is 3P4W.</p> <p>Press button 4 for 3 second to enter the setting state, and the character of the setting becomes the flashing state. Click button 2 or button 3 to scroll the page and select the next setting interface.</p> |

| | |
|--|---|
| | <p>Click button 1 to exit the setting menu and return to the previous setting screen.</p> |
|  | <p>Click button 2 or button 3 to select the system type. Press button 4 for 3 second to confirm the setting. The meter will save the setting value and exit the setting state. Click button 1 to exit the setting state without saving the setting parameters.</p> |
| <p>4. Setting user password</p> | |
|  | <p>User password setting range:0000 to 9999, default is 0000. Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state. Click button 2 or button 3 to scroll the page and select the next setting interface. Click button 1 to exit the setting menu and return to the previous setting screen.</p> |
|  | <p>Click button 2 or button 3 to increase or decrease the number of set bits. Click button 4 can be moved the set bits to the right. Press button 4 for 3 second to confirm the setting. The meter will save the setting value and exit the setting state. Click button 1 to exit the setting state without saving the setting parameters.</p> |
| <p>5. Reset Max. demand or historical electricity consumption log</p> | |
|  | <p>Press button 4 for 3 second to enter the reset state. Click button 2 or button 3 to scroll the page and select the next setting interface. Click button 1 to exit the setting menu and return to the previous setting screen.</p> |
|  | <p>Click button 2 or button 3 to select the reset options. Press button 4 for 3 second to confirm the reset. The meter will reset the selected option and exit the reset state. Click button 1 to exit the reset state without reset the selected option.</p> |
| <p>Note: <i>LEG</i> is mean: Historical monthly and historical daily consumption of energy. (this option is supported only for the Multit-tariff meter) <i>dnd</i> is mean: Max. demand.</p> | |

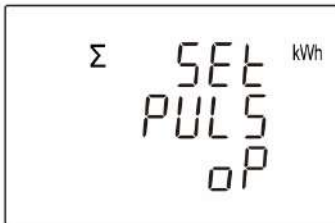
4.5.5. Set pulse output class parameters

Pulse output class parameters include: pulse output type, pulse output rate and pulse output width.

1. After entering the "Parameter Setting Menu" screen, select the setting screen (as shown in the figure below), and then press button 4 for 3 second to enter the pulse output class parameter setting screen.



2. Setting pulse output type

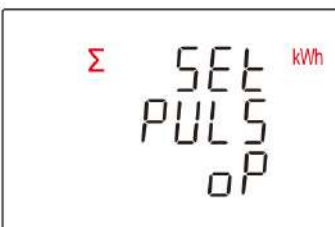


The type of energy represented by the pulse output.
Options that can be set: total active energy, import active energy, export active energy, total reactive energy, import reactive energy, export reactive energy, default is total active energy.

Press button 4 for 3 second to enter the setting state, and the character of the setting becomes the flashing state.

Click button 2 or button 3 to scroll the page and select the next setting interface.

Click button 1 to return to the previous level setup menu.



Click button 2 or button 3 to select the pulse output type.
Press button 4 for 3 second to confirm the setting. The meter will save the setting value and exit the setting state.

Click button 1 to exit the setting state without saving the setting parameters.

3. Setting pulse output rate



Pulse output rate can be set: 0.001, 0.01, 0.1, 1, 10, 100, default is 0.01.

Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state.

Click button 2 or button 3 to scroll the page and select the next setting interface.

Click button 1 to return to the previous level setup menu.

Note: Digital representation of pulse output rate: how much kWh/kvarh is each pulse. Example: Setting the pulse output rate to 0.1 means that each output pulse is equal to 0.1kwh /kvarh.




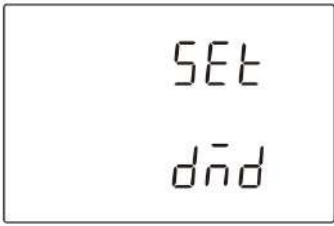
| | |
|--|---|
|  | <p>Click button 2 or button 3 to select the pulse output rate. Press button 4 for 3 second to confirm the setting. The power meter will save the setting value and exit the setting state. Click button 1 to exit the setting state without saving the setting parameters.</p> |
| <p>4. Setting pulse output width</p> | |
|  | <p>The pulse output width represents the effective duration of the pulse output. Options that can be set: 60, 100, 200, unit is ms, default is 100ms. Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state. Click button 2 or button 3 to scroll the page and select the next setting interface. Click button 1 to return to the previous level setup menu.</p> |
|  | <p>Click button 2 or button 3 to select the pulse output width. Press button 4 for 3 second to confirm the setting. The power meter will save the setting value and exit the setting state. Click button 1 to exit the setting state without saving the setting parameters.</p> |





Table 4-1: List of pulse output type

| Character | Pulse output type | Character | Pulse output type | Character | Pulse output type |
|----------------|-----------------------|-----------|------------------------|-----------|------------------------|
| Σ kWh | Total active energy | IMP kWh | Import active energy | EXP kWh | Export active energy |
| Σ kvarh | Total reactive energy | IMP kvarh | Import reactive energy | EXP kvarh | Export reactive energy |

4.5.6. Set demand class parameters

Demand class parameters include: demand interval period and sliding time.

| |
|--|
| <p>1. After entering the "Parameter Setting Menu" screen, select the setting screen (as shown in the figure below), and then press button 4 for 3 second to enter the demand class parameter setting screen.</p>  |
| <p>2. Setting demand interval period</p> |



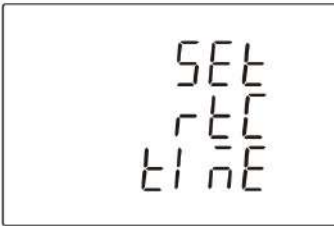

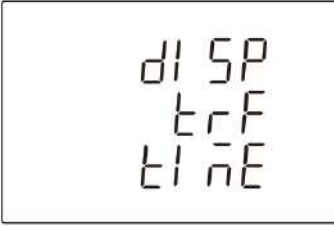

| | |
|---|--|
|  | <p>Demand interval period can be set: 0 to 60, unit is minute, default is 60 minutes.</p> <p>Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state.</p> <p>Click button 2 or button 3 to scroll the page and select the next setting interface.</p> <p>Click button 1 to return to the previous level setup menu.</p> <p>Note: If the demand interval period is set to 0 minutes, then the demand is updated every second.</p> |
|  | <p>Click button 2 or button 3 to increase or decrease the number of set bits.</p> <p>Click button 4 can be moved the set bits to the right.</p> <p>Press button 4 for 3 second to confirm the setting. The meter will save the setting value and exit the setting state.</p> <p>Click button 1 to exit the setting state without saving the setting parameters.</p> |
| <p>3. Setting sliding time</p> | |
|  | <p>Sliding time setting range: 1 to (demand interval period), unit is minutes, default is 1 minute.</p> <p>Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state.</p> <p>Click button 2 or button 3 to scroll the page and select the next setting interface.</p> <p>Click button 1 to return to the previous level setup menu.</p> <p>Note: The slip time has no effect when the demand interval period is set to 0.</p> |
|  | <p>Click button 2 or button 3 to increase or decrease the number of set bits.</p> <p>Click button 4 can be moved the set bits to the right.</p> <p>Press button 4 for 3 second to confirm the setting. The meter will save the setting value and exit the setting state.</p> <p>Click button 1 to exit the setting state without saving the setting parameters.</p> |

4.5.7. Set time class parameters

Time class parameters include: backlight time, automatic scroll display time, System time (RTC) and Tariff time.

1. After entering the "Parameter Setting Menu" screen, select the setting screen (as shown in the figure below), and then press button 4 for 3 second to enter the time class parameter setting screen.

| | |
|---|---|
| | |
| <p>2. Setting backlight time</p> | |
| | <p>Backlight time can be set: on, off, 5, 10, 30, 60, 120, unit is minute, default is 60 minutes.</p> <p>Press button 4 for 3 second to enter the setting state, and the character of the setting becomes the flashing state.</p> <p>Click button 2 or button 3 to scroll the page and select the next setting interface.</p> <p>Click button 1 to return to the previous level setup menu.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. The character “on” means the backlight is always on, and “off” means the backlight is always off. 2. If you need to setting other values within 120 minutes, use the communication command to do so. |
| | <p>Click button 2 or button 3 to select the backlight time.</p> <p>Press button 4 for 3 second to confirm the setting. The power meter will save the setting value and exit the setting state.</p> <p>Click button 1 to exit the setting state without saving the setting parameters.</p> <p>Note: <i>on</i> That means is on. <i>off</i> That means is off.</p> |
| <p>3. Setting automatic scroll display time</p> | |
| | <p>Automatic scroll display time set range: 0 to 60, unit is second, default is 0 second.</p> <p>Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state.</p> <p>Click button 2 or button 3 to scroll the page and select the next setting interface.</p> <p>Click button 1 to return to the previous level setup menu.</p> <p>Note: Automatic scroll display time is 0, means no automatic wheel display</p> |
| | <p>Click button 2 or button 3 to increase or decrease the number of set bits.</p> <p>Click button 4 can be moved the set bits to the right.</p> <p>Press button 4 for 3 second to confirm the setting. The power meter will save the setting value and exit the setting state.</p> <p>Click button 1 to exit the setting state without saving the setting parameters.</p> |
| <p>4. Setting date of RTC</p> | |

| | |
|---|---|
|  | <p>Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state.</p> <p>Click button 2 or button 3 to scroll the page and select the next setting interface.</p> <p>Click button 1 to return to the previous level setup menu.</p> |
|  | <p>Click button 2 or button 3 to increase or decrease the number of set bits.</p> <p>Click button 4 can be moved the set bits to the right.</p> <p>Press button 4 for 3 second to confirm the setting. The meter will save the setting value and exit the setting state.</p> <p>Click button 1 to exit the setting state without saving the setting parameters.</p> |
| <p>5. Setting system time (RTC)</p> | |
|  | <p>Press button 4 for 3 second to enter the setting state, and the digit of the setting becomes the flashing state.</p> <p>Click button 2 or button 3 to scroll the page and select the next setting interface.</p> <p>Click button 1 to return to the previous level setup menu.</p> |
|  | <p>Click button 2 or button 3 to increase or decrease the number of set bits.</p> <p>Click button 4 can be moved the set bits to the right.</p> <p>Press button 4 for 3 second to confirm the setting. The meter will save the setting value and exit the setting state.</p> <p>Click button 1 to exit the setting state without saving the setting parameters.</p> |
| <p>6. View tariff time</p> | |
|  | <p>View menu for tariff information.</p> <p>Press button 4 for 3 second to enter the screen for veiw tariff information.</p> <p>Click button 2 or button 3 to scroll the page and select the next setting interface.</p> <p>Click button 1 to return to the previous level setup menu.</p> <p>Note: The menu cannot be setting and can only be viewed.</p> |
|  | <p>The screen for displaying the tariff information.</p> <ol style="list-style-type: none"> 1. The number displayed in the first line of the screen represents the sequence number of the selected starting time point. The meter supports 8 starting time points and 4 tariff segments. 2. The character displayed in the second line of the screen represents the current tariff is T1. The meter supports 4 tariff segments. (T1 to T4) 3. The character displayed in the third line of the screen represents the starting time of the tariff segment (format is hours: minutes). |

| | |
|--|---|
| | <p><i>FEE1</i> That means tariff segment is tariff 1 (T1). <i>FEE2</i> That means tariff segment is tariff 2 (T2). <i>FEE3</i> That means tariff segment is tariff 3 (T3). <i>FEE4</i> That means tariff segment is tariff 4 (T4).</p> <p>Click button 1 scroll the page and select the next screen. Press button 1 for 3 second to exit the setting state without saving the setting parameters.</p> <p>Note: If FEE0 is displayed, the time segment is invalid and does not belong to any tariff.</p> |
|--|---|

Appendix

Appendix A – LCD character definition table

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | | |
| A | B | C | D | E | F | G | H | I | J |
| | | | | | | | | | |
| K | L | M | N | O | P | Q | R | S | T |
| | | | | | | | | | |
| U | V | W | X | Y | Z | | | | |

Appendix B – Failure code reference table

| No. | LCD display | Fault description |
|-----|-------------|---------------------------------|
| 1 | Err-01 | The battery voltage is too low. |

Appendix C – Alarm prompt comparison table

| No. | The action of the meter | Alarm definition |
|-----|-------------------------|--|
| 1 | LCD display alarm icon | Occurs over voltage, over current or power exceeds the limit |