ME337

Three phase multi-function smart meter

Manual-V1.1.230626

Contents

1. Product Features

- Fast installation
  - Product size is standard 96 panel type
  - Installation method is a snap on type, without screws
- Support multiple current transformer connections
  - The ME337N series supports a new type of current transformer – rogowski coil direct connection, without the need for an external integrator
  - The ME337N series supports voltage output type current transformer connection simultaneously
  - The ME337C series supports direct current connection, with a maximum connection current of 7A
- Support multiple power grid systems
  - Supports three-phase four wire, three-phase three wire, one phase three phase, and single-phase systems
- Multiple power supply options available
  - Available in 220VAC, 24VDC and 12VDC power supplies
- Support voltage and current harmonic measurement
  - Supports voltage, current, fractional harmonics, up to 50 measurements
  - Support voltage and current harmonic distortion and harmonic value measurement
  - Support voltage and current total harmonic distortion measurement
- More features
  - Support 6 rate tariff energy, support RTC switching or manual switching
  - Support demand measurement
  - Support alarm setting
  - Support current transformer orientation modification
  - Support current channel modification

2. Product operation process

1) Determine the type of grid system to be measured and wire it according to the corresponding wiring diagram, see6.2
2) Confirm the type and scope of power supply of the product, and power up the product
3) Modify the meter wiring method parameter to the type of grid system to be measured, see8.10.2.1
4) Modify the meter nominal frequency parameter to the nominal frequency of the grid to be measured, see8.10.2.2
5) Modify the PT ratio of the meter according to whether a voltage transformer is used, see8.10.2.4
6) Modify the meter current conversion coefficient, according to whether the current conversion coefficient needs to be configured, see8.10.2.5
7) Modify the meter current transformer type parameters, depending on the type of current sensor used, see8.10.3.1

8) Modify the current transformer ratio parameters corresponding to the meter, according to the current transformer ratio used, see8.10.3.2

9) Modify the nominal current parameters corresponding to the meter, according to the maximum current to be measured, see8.10.3.3

10) Modify the zero-drift suppression parameters according to the minimum voltage and current to be measured, see8.10.4

11) Verify whether the voltage, current, and power are correct (if not, there is a problem with the wiring or configuration)

3. Product Description

3. 1 Dimensions

figure 3-1 Meter dimension

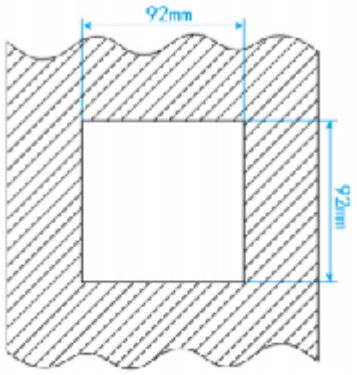


figure 3-2 Installation

3. 2 Model Naming Conventions

ME337 - N - D - 2

- Power supply
  - 2:220V AC auxiliary power supply (95-265VAC)
  - 3:24V DC auxiliary power supply (18-36VDC)
  - 4:12V DC auxiliary power supply (9-18VDC)
- Current transformer port
  - D:Terminal type
  - R:RJ45 (only for N series, not for C series)
- Current transformer type
  - C:Direct connection of 5A current
  - N:Rogowski coil and voltage output type CT

3. 3 Feature Overview

ME337 panel type three-phase multi-function power meter, external open Rogowski coil or voltage type CT, realize the test without removing the wire, simplify the test steps, and save construction costs. ME337 supports three-phase four-wire, three-phase three-wire, one-phase three-wire and single-phase

systems; It can measure multiple electrical parameters such as voltage, current, power factor, harmonics, power, and energy of A, B and C phases.

ME337 is equipped with RS485 communication interface, through the standard Modbus-RTU protocol, can be compatible with various configuration systems, the front-end collected electrical parameters real-time transmission to the system data center.

overview			
Type	Panel type		
Model	ME337		
Current sensor type	ME337N	ME337C	
	Rogowski coil, voltage output type CT	Current type transformer	
Characteristic	Support direct access to Rogowski coils	Direct current connection	
Advantage	Suitable for wide current range, without disassembling wires for measurement		
Wire system	3P4W 4CT,3P4W 3CT,3P3W 3CT,3P3W 2CT,1P3W,1P2W		
Application	Power analysis, energy measurement		
Display screen	LCD display		
Weight	259g		
Size	L*W*D:96*96 *45mm		
Color	White and black		
Current measurement			
Channel input range	ME337N		ME337C
	0-900mVAC peak,636mV RMS		0-7A AC
Measuring range	Rogowski coils	Voltage output type CT	0-7A AC
	50mV/kA@50Hz(0-12000A),@60Hz(0-10000A) 85mV/kA@50Hz(0-7000A),@60Hz(0-6000A) 100mV/kA@50Hz(0-6000A),@60Hz(0-5000A)...	Varies with instrument transformer parameters	
Voltage measurement			
Measuring range	0~600VAC Phase voltage		
Maximum measurement	720VAC Phase voltage		
Digital signal			
Relay output	1 electromagnetic relay output, contact capacity: 3A 30V DC, 3A 250V AC		
Digital input	2 dry contact inputs, optocoupler isolated (5kVrms)		
Communication			
RS485	One RS485 communication interface, interface type: two-wire half-duplex Communication rate: 2400bps~115200bps Specification: Modbus-RTU		
Power supply			
Power	ME337XX2	ME337XX3	ME337XX4
	95~265VAC/110~370VDC,45~60Hz	18-36VDC	9-18VDC
Maximum power consumption	3.5VA		

4. Data display

Instantaneous value	
Phase voltage	U1,U2,U3,AVG
Line voltage	U12,U23,U31,AVG
Current	I1,I2,I3,AVG,In
Grid frequency	F1,F2,F3,∑ (Total)
Power factor PF	PF1,PF2,PF3,∑(Total)
Displacement Power factor DPF	DPF1,DPF2,DPF3,∑(Total)
Active power	P1,P2,P3,∑(Total)
Reactive power	Q1,Q2,Q3,∑(Total)
Apparent power	S1,S2,S3,∑(Total)
Energy	
Active Energy Import	EP1,EP2,EP3,∑(Total) When the total Energy reaches 1.0 x 10^9 kWh, the energy of each phase will automatically clear to zero
Active Energy Export	EP1,EP2,EP3,∑(Total) When the total Energy reaches 1.0 x 10^9 kWh, the energy of each phase will automatically clear to zero
Reactive Energy Import	EQ1,EQ2,EQ3,∑(Total) When the total Energy reaches 1.0 x 10^9 kVARh, the energy of each phase will automatically clear to zero
Reactive Energy Export	EQ1,EQ2,EQ3,∑(Total) When the total Energy reaches 1.0 x 10^9 kVARh, the energy of each phase will automatically clear to zero
Apparent Energy	ES1,ES2,ES3,∑(Total) When the total Energy reaches 1.0 x 10^9 kVAh, the energy of each phase will automatically clear to zero
Tariff Energy	ET1,ET2, ET3,ET4, ET5,ET6 When Energy reaches 1.0 x 10^9 kWh, Energy automatically clears to zero
Harmonics	
Voltage harmonic percentage	Total harmonics (U1, U2, U3), odd total harmonics (U1, U2, U3), even total harmonics (U1, U2, U3) Fractional harmonics of order 1-50 (U1, U2, U3)
Current harmonic percentage	Total harmonics (I1, I2, I3), odd total harmonics (I1, I2, I3), even total harmonics (I1, I2, I3), K factor (I1, I2, I3) Fractional harmonics of order 1-50 (I1, I2, I3)
Voltage harmonic value	Total harmonics (U1, U2, U3) Fractional harmonics of order 1-50 (U1, U2, U3)
Current harmonic value	Total harmonics (U1, U2, U3) Fractional harmonics of order 1-50 (U1, U2, U3)
Phase diagram	
Phase sequence	Voltage, current
Voltage angle	U1,U2,U3

Current angle	I1,I2,I3
Voltage and current angle	UI1,UI2,UI3
Demand	
Demand	Total Active power, Total Reactive power, Total Apparent power
Total Active power demand max	Maximum demand and time
Total Reactive power demand max	Maximum demand and time
Total Apparent power demand max	Maximum demand and time
Unbalance	
Voltage unbalance	Negative order, zero order
Current unbalance	Negative order, zero order
Max.&Min.	
Phase voltage	Phases and averages
Line voltage	Phases and averages
Current	Phases and averages
Active power	Phases and averages
Reactive power	Phases and averages
Apparent power	Phases and averages

5. Accuracy and certification

Measuring accuracy	
current measurement accuracy	0.1%+Accuracy of current sensor
Voltage measurement accuracy	±0.2%(60V~600V AC)
Grid frequency	±0.01%(45~65Hz)
Power factor	±0.005
Active and apparent power	IEC62053-22 level 0.5S
Reactive power	IEC62053-21 level 1S
Active energy	IEC62053-22 level 0.5S
Reactive energy	IEC62053-21 level 1S
Environment condition	
Operating temperature	-20℃~+70℃
Storage temperature	-40℃~+85℃
Humidity range	5～95% RH, 50℃(non-condensing)
Class of pollution	2

Over voltage capability	CAT III 1000V, It is suitable for distribution system below 277 / 480VAC
Insulation strength	IEC61010-1
Altitude	3000m Max
Antipollution level	IP20(Meet the standard of IEC 60629)
Quality guarantee period	12 months
EMC (electromagnetic compatibility)	
Electrostatic discharge	Level IV(IEC61000-4-2)
Radiated immunity	Level III (IEC61000-4-3)
EFT Electrical fast burst immunity	Level IV (IEC61000-4-4)
Surge immunity	Level IV (IEC61000-4-5)
Conducted disturbance immunity	Level III (IEC61000-4-6)
Power frequency magnetic field immunity	0.5mT (IEC61000-4-8)
Conduction and radiation	Class B (EN55022)
Measurement standard	
EN 62052-11, EN61557-12, EN 62053-21, EN 62053-22, EN 62053-23, EN 50470-1, EN 50470-3, EN 61010-1, EN 61010-2, EN 61010-031	

6. Wiring

The meter is equipped with a wide range of interfaces to realize different functions.

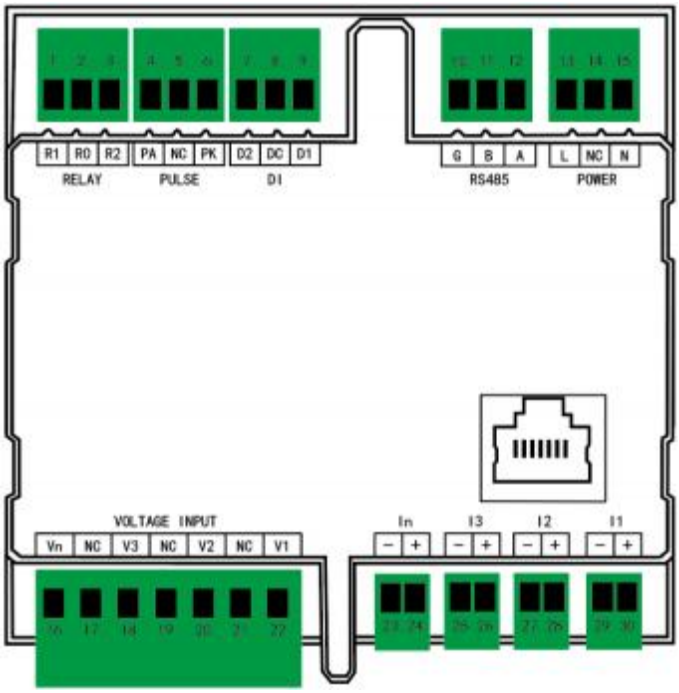


figure 6-1 Interface

No.	Name	Definition	Type	Remarks
1	R1	Relay normally open contacts	Relay output	It is a relay output with normally open and normally closed contacts
2	R0	Relay common contacts		
3	R2	Relay normally closed contacts		
4	PA	Pulse output positive terminal	Pulse output	Active Energy pulse output
5	NC	Empty terminal		
6	PK	Pulse output negative terminal		
7	D2	Digital input channel 2	Digital input	The two channels are dry contact inputs
8	DC	Digital channel common end		
9	D1	Digital input channel 1		
10	G	RS485 GND	RS485	RS485 Communication
11	B	RS485 B		
12	A	RS485 A		
13	L	Power supply (+)	Power supply	Power supply
14	NC	Empty terminal		
15	N	Power supply (-)		
16	Vn	N-phase voltage input	Voltage input	Voltage input channel
17	NC	Empty terminal		
18	V3	C-phase voltage input		
19	NC	Empty terminal		
20	V2	B-phase voltage input		
21	NC	Empty terminal		
22	V1	A-phase voltage input		
23	In-	N-phase current input negative	Current input	ME337XD series current channel
24	In+	N-phase current input positive		
25	I3-	C-phase current input negative		
26	I3+	C-phase current input positive		
27	I2-	B-phase current input negative		
28	I2+	B-phase current input positive		
29	I1-	A-phase current input negative		
30	I1+	A-phase current input		

		positive		
31	RJ45	ABC three-phase current input	Current input	ME337XR series current channel

6. 1 Power supply

The meter adopts external power supply mode, and there is no internal direct power supply.

- **Do not connect the meter while the cable is live**
- **Before connecting the power supply, it is necessary to confirm whether the power supply voltage is within the required range, otherwise the meter cannot work properly**

6. 2 Wiring type

Meter support wiring type, three-phase four-wire 4CT (3P4W_4CT), three-phase four-wire 3CT (3P4W_3CT), three-phase three-wire 3CT (3P3W_3CT), three-phase three-wire 2CT (3P3W_2CT), one-phase three-wire (1P3W), one-phase two-wire (1P2W)

- **The actual wiring type of the meter must be consistent with the wiring method of the internal configuration of the meter**
- **Three-phase four-wire 4CT (3P4W_4CT) requires 4 current sensors, and the N-phase current is measured through the sensor**
- **Three-phase four-wire 3CT (3P4W_3CT) requires 3 current sensors, and the N-phase current is calculated by calculation**
- **Three-phase three-wire 3CT (3P3W_3CT) requires 3 current sensors, and the B-phase current is measured through the sensor**
- **Three-phase three-wire 2CT (3P3W_2CT) requires 2 current sensors, and the B phase current is calculated by calculation**
- **The phase sequence of voltage and current must be in accordance with the phase sequence of ABC, otherwise the meter will show that the voltage and current phase sequence is wrong**
- **When using a current sensor, pay attention to the current arrow pointing on the sensor must be consistent with the actual current flow direction, that is, the sensor current arrow points to the load end**

The voltage and current wiring type is as follows:

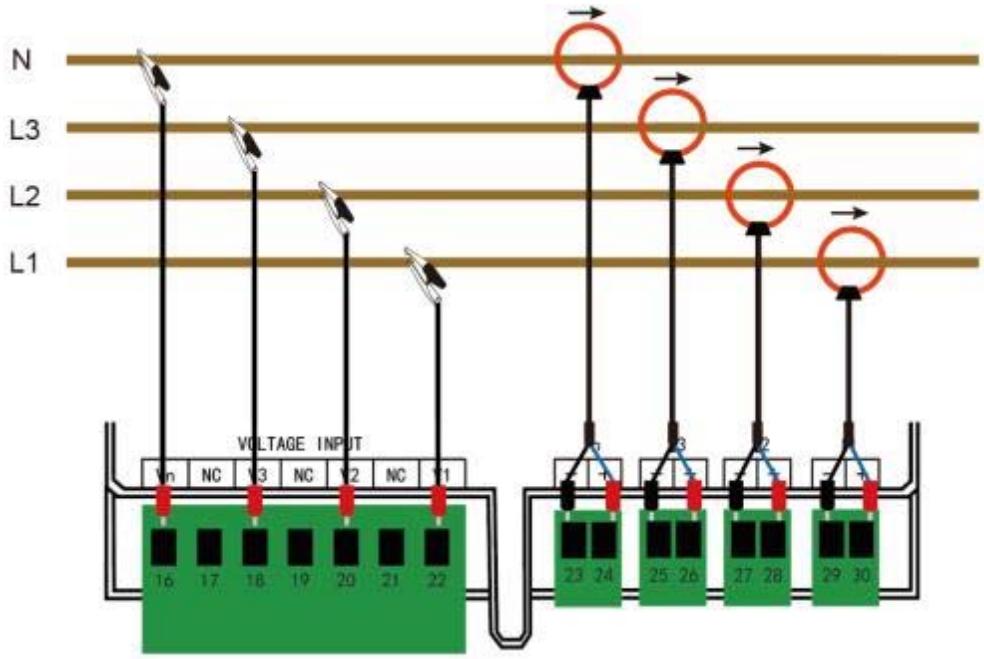


figure 6-2 Three-phase four-wire 4CT

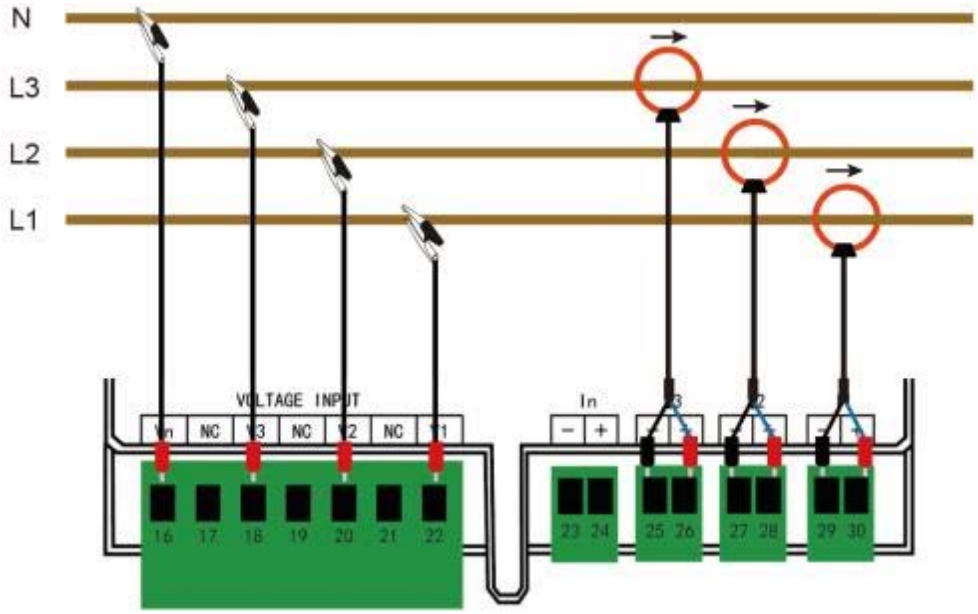


figure 6-3 Three-phase four-wire 3CT

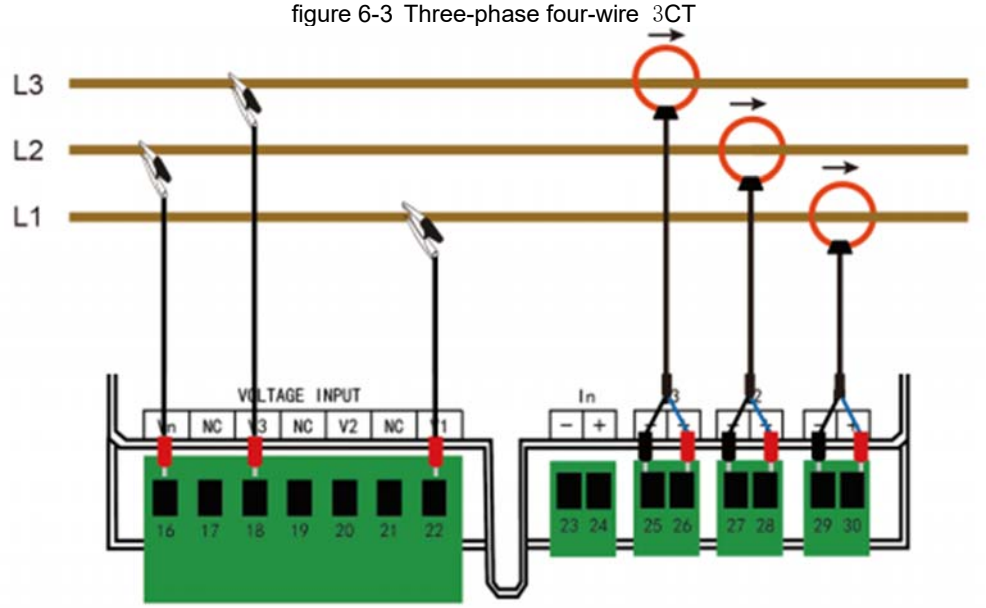


figure 6-4 Three-phase three-wire 3CT

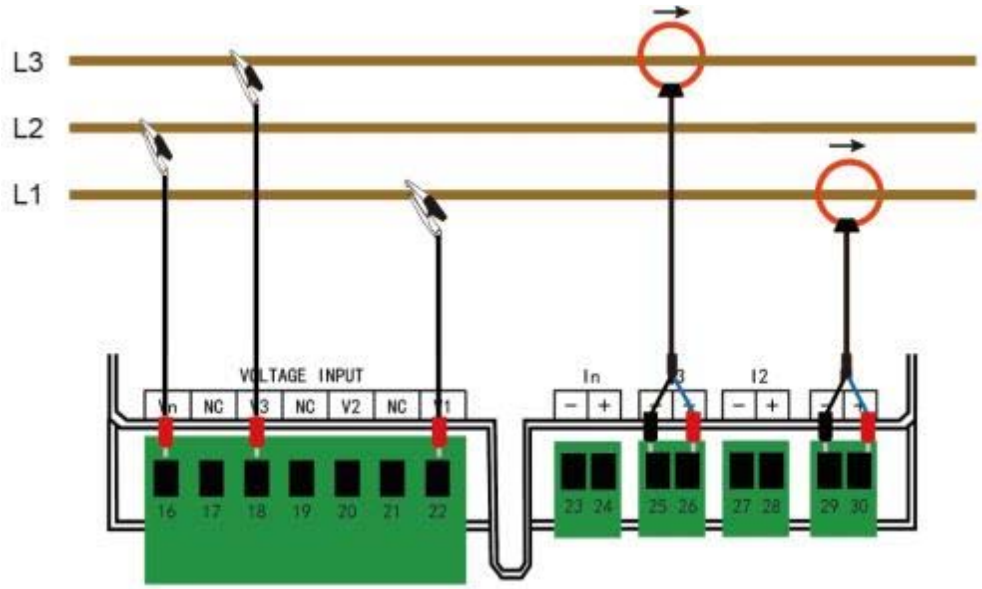


figure 6-5 Three-phase three-wire 2CT

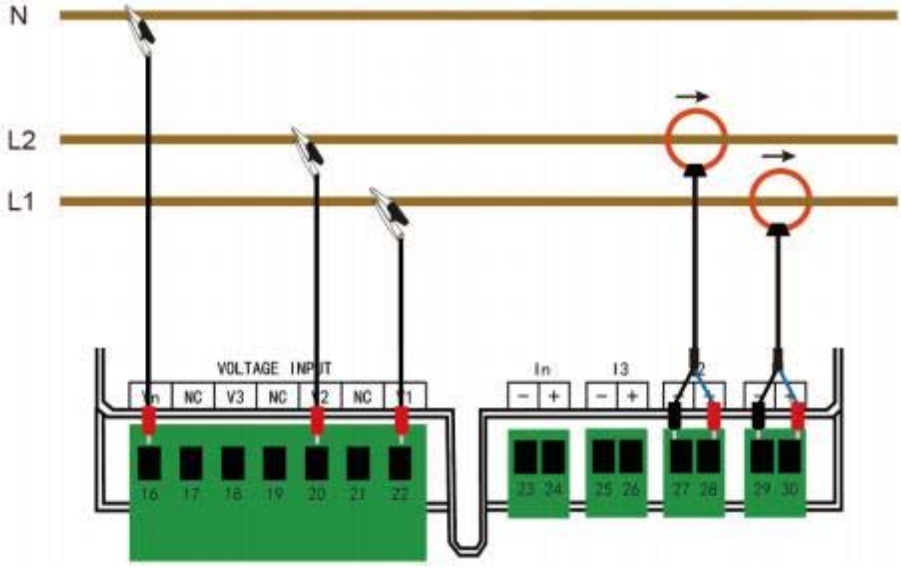


figure 6-6 Single-phase three-wire

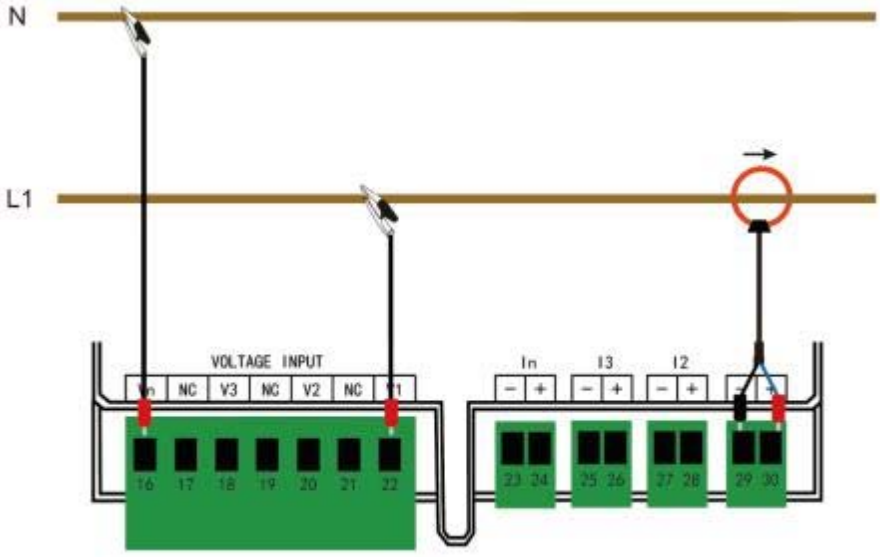
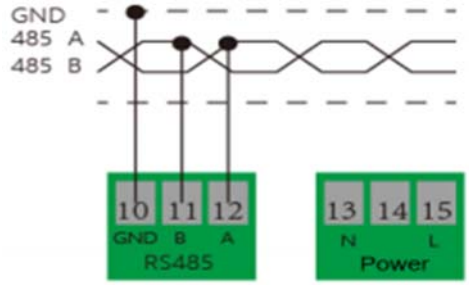


figure 6-7 Single-phase two-wire

6. 3 RS485

The electricity meter is equipped with an RS485 communication interface that supports the ModBus RTU protocol. The RS485 communication interface requires the use of shielded twisted pair connections, which are connected in the form of a daisy chain. In long-distance high-speed situations, a 120 Ω resistor needs to be connected in parallel at both ends of the daisy chain.



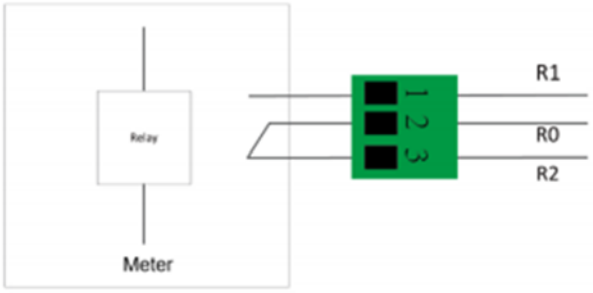
6. 4 Relay output

The meter is equipped with a relay output that is a normally open contact. The terminal markings are R1 and R0, where R0 is the common contact and R1 is the normally open contact. The maximum load capacity of the relay is 3A 30V DC and 3A 250V AC

The closed state of the normally open contact of the relay is displayed on the meter display interface

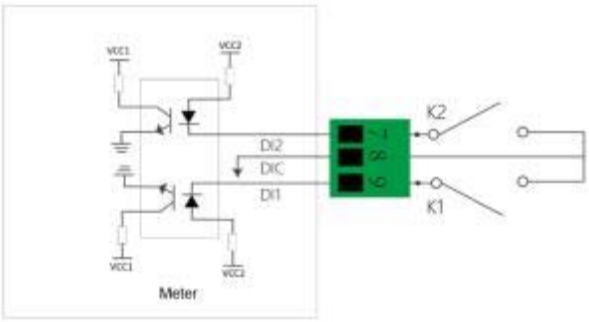
There are two types of relay output control modes, which can be modified through the meter operation interface or Modbus

Relay output control mode	Description
Manual	The relay output is controlled via the meter operator interface or Modbus
Alarm	The relay output is controlled by setting alarm parameters



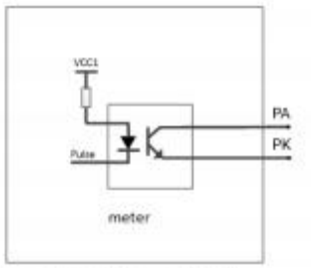
6. 5 Digital input

The meter is equipped with two digital switching inputs, which are connected by passive dry contact. The terminal blocks are identified as: DI1, DI2, DIC, where DIC is the common contact. The status of two digital switching inputs can be read through RS485/ModBus protocol, and the status of digital switching input is displayed on the meter display interface.



6. 6 Energy pulse output

The meter is equipped with an active power pulse output, and the electric energy pulse constant EC can be viewed through the meter information interface. The internal optocoupler of the meter is isolated, the maximum allowable passing current is 80mA DC, and the working voltage range is 5V ~ 80V DC



Energy pulse output connection diagram

7. Functionality

7. 1 Current transformer type support

ME337N series supports current transformer types including: Rogowski coil and voltage output CT
ME337C series supports traditional current transformers, and supports direct access of up to 7A.

7. 2 Current transformer orientation setting

ME337 supports current transformer direction configuration, in case of current transformer orientation error, the current transformer direction can be configured through the setting interface or Modbus.

7. 3 Current transformer channel settings

The ME337 supports current transformer channel configuration, which can be configured through the setup interface or Modbus in the event that the current transformer channel and voltage channel do not match.

7. 4 Multi-Tariff

ME337 provides a multi-tariff power accumulation function and supports up to 6 Tariffs.

There are two ariff switching control modes, which can be modified through the meter interface or Modbus

Tariff control mode	Description
Manual	Switch Tariff via the meter interface or Modbus
RTC	Trigger the Tariffswitch through the RTC time period

7.4.1 Manual Control Mode

- **Switch Tariff through the meter setting interface**
- **Switch Tariff through Modbus configuration command 1071**

7.4.2 RTC Control Mode

In RTC control mode, the Tariffswitch is triggered by the real-time clock.

The RTC control mode supports 6 time periods (Ta, Tb, Tc, Td, Te, Tf) and 6 Tariffs (T1, T2, T3, T4, T5, T6).

The time period and target tariff can be modified through Modbus.

The time period is set according to 24 hours, starting from the Ta start time, Tc start time cannot be located between Ta start time and Tb start time, Td start time cannot be between Ta start time and Tc start time, and so on.

7.5 Demand

The meter provides Active power, Reactive power, Apparent power demand and maximum demand.

The demand calculation method and demand calculation interval can be configured through the meter operation interface or Modbus.

7.5.1 Demand Calculation Method

The meter supports two demand calculation methods: fixed and sliding.

Demand Calculation Method	Description
fixed	The meter calculates and updates demand at the end of each interval
sliding	Demand is updated every 1 minute

The following figure introduces two methods of demand calculation, taking the demand interval of 15 minutes as an example:

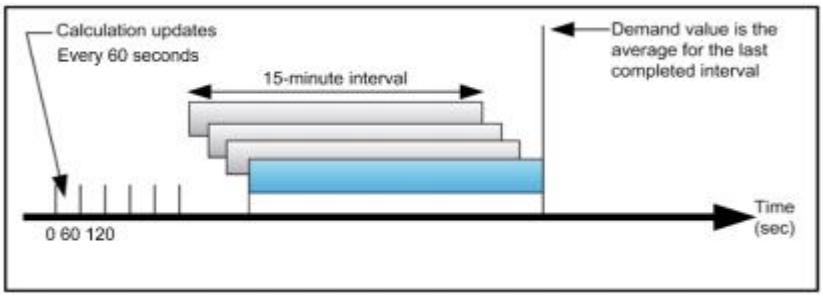


figure 7-1 Sliding

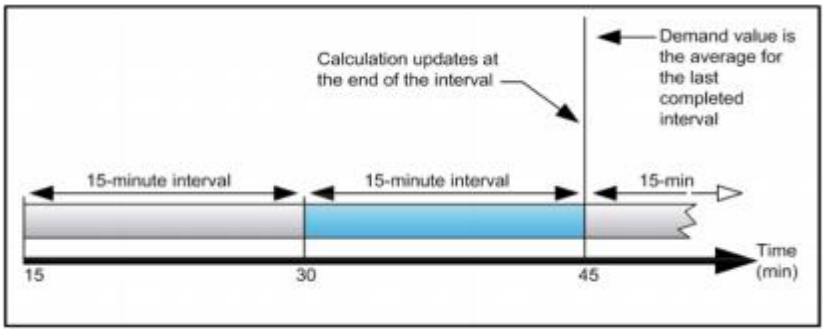


figure 7-2 fixed

7. 6 Alarm

The meter provides a variety of alarm parameter settings and alarm outputs, and the alarm parameters can be configured through Modbus.

Alarm type	Description
Over current, each phase	If a phase value exceeds the alarm threshold, an alarm is generated. When all phases are less than the release threshold, the alarm is released
Under current, each phase	If a phase value exceeds the alarm threshold, an alarm is generated. When all phases are greater than the release threshold, the alarm is released
Over phase voltage, each phase	If a phase value exceeds the alarm threshold, an alarm is generated. When all phases are less than the release threshold, the alarm is released
Under phase voltage, each phase	If a phase value exceeds the alarm threshold, an alarm is generated. When all phases are greater than the release threshold, the alarm is released
Over line voltage, each phase	If a phase value exceeds the alarm threshold, an alarm is generated. When all phases are less than the release threshold, the alarm is released
Under line voltage, each phase	If a phase value exceeds the alarm threshold, an alarm is generated. When all phases are greater than the release threshold, the alarm is released
Over power, Total Active Power (absolute)	
Over power, Total Reactive Power (absolute)	
Over power, Total Apparent Power	
Over demand, total Active power (absolute), current	
Over demand, total reactive power (absolute value), current	
Over demand, total apparent power, current	

Alarm type	Description
Over THD-U, each phase	If a phase value exceeds the alarm threshold, an alarm is generated. When all phases are less than the release threshold, the alarm is released
Over THD-I, each phase	If a phase value exceeds the alarm threshold, an alarm is generated. When all phases are less than the release threshold, the alarm is released

7.6.1 Alarm output

The alarm output can be associated with the buzzer and relay output (relay control mode needs to be configured as alarm mode), and the corresponding output will also be released when the alarm is released, see9.9.17

7. 7 Phase sequence detection

The meter supports three-phase voltage and current phase sequence detection, and the phase sequence can be viewed on the meter interface or the phase sequence status can be read through Modbus.

Phase sequence status marker	Description
 flashing	The voltage phase sequence is wrong
 flashing	The current phase sequence is wrong
 flashing	The voltage and current phase sequence is wrong
No display	The phase sequence is correct

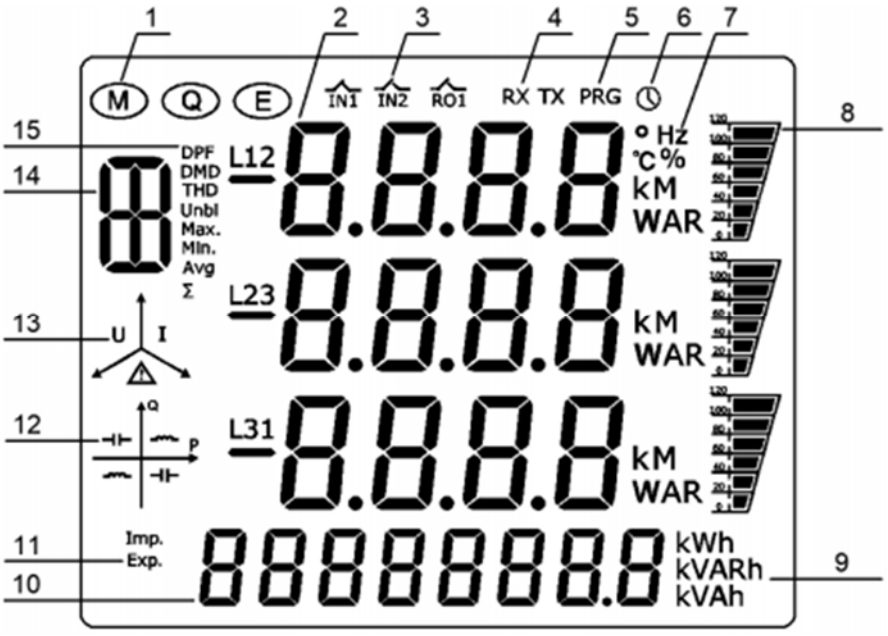
Note: The correct phase sequence of voltage and current can only ensure that the respective phase sequence is correct, and cannot guarantee the correspondence between voltage and current, so you need to pay attention to the wiring method

8. Interface display and operation

This section describes the display of the interface and the operation of key combinations, as well as the configuration of the device.

8. 1 Display interface and buttons

The meter adopts LCD display and 4 control buttons, and all the display segments of the screen are shown in the figure below:



Interface Symbol Description

No.	Symbol	Description
1	Ⓜ Ⓠ Ⓔ	Ⓜ: Indicates that the current interface is a real-time measurement data display Ⓠ: Indicates that the current interface is a power quality display Ⓔ: Indicates that the current interface is is a energy display
2	8	Used to display various data
3	IN1 IN2 RO1	众: Status display for digital input channel 1 IN2: Status display for digital input channel 2 RO1: Status display of relay output channel
4	RX TX	The communication status is displayed, when there is data sent and received, RX TX will be displayed, otherwise there will be no display
5	PRG	Device configuration mode displays, in which device parameters can be configured
6		Device information mode display, in which you can view device information
7	Measurement data units	Voltage:V,KV,MV Current:A,KA,MA Active power:W,KW,MW Reactive power:VAR,KVAR,MVAR Apparent power:VA,KVA,MVA Frequency:Hz Percentage:%
8		Voltage, current, power as a percentage of nominal value is displayed
9	kWh kVARh kVAh	Energy unit display Active Energy:kWh Reactive Energy:kVARh Apparent Energy:kVAh
10	8	Energy value display

No.	Symbol	Description
11	Imp. Exp.	Energy positive and negative displays positive Energy:Imp.; negative Energy:Exp.
12		Power quadrant and load capacitance display
13		Voltage and current phase sequence display When the voltage phase sequence is incorrect,  flashes When the current phase sequence is incorrect,  flashes
14		Used to display data types: Voltage:U Current:I Active power:P Reactive power:Q Apparent power:S Energy:E
15	DPF DMD THD Unbl Max. Min. Avg Σ	Types of power quality parameters: Power factor:PF Displacement power factor:DPF Demand:DMD Total harmonics Distortion:THD, Unbalance:Unbl Maximum:Max. Minimum:Min. Average:Avg Total:Σ

The four buttons of the meter are shown below:

Key function display description:

Key symbol	Description
	Back key: Used to exit the current operation interface
	Up key: Used to switch the interface display and change the value size during setting, long press to shift
	Down key: Used to switch the interface display and change the value size during setting, long press to shift
	Confirm key: Used to confirm the operation

8. 2 Meter start-up interface

After the meter is powered on, the following screen is displayed:

Meter Model　　Firmware Version　　Measurement Interface

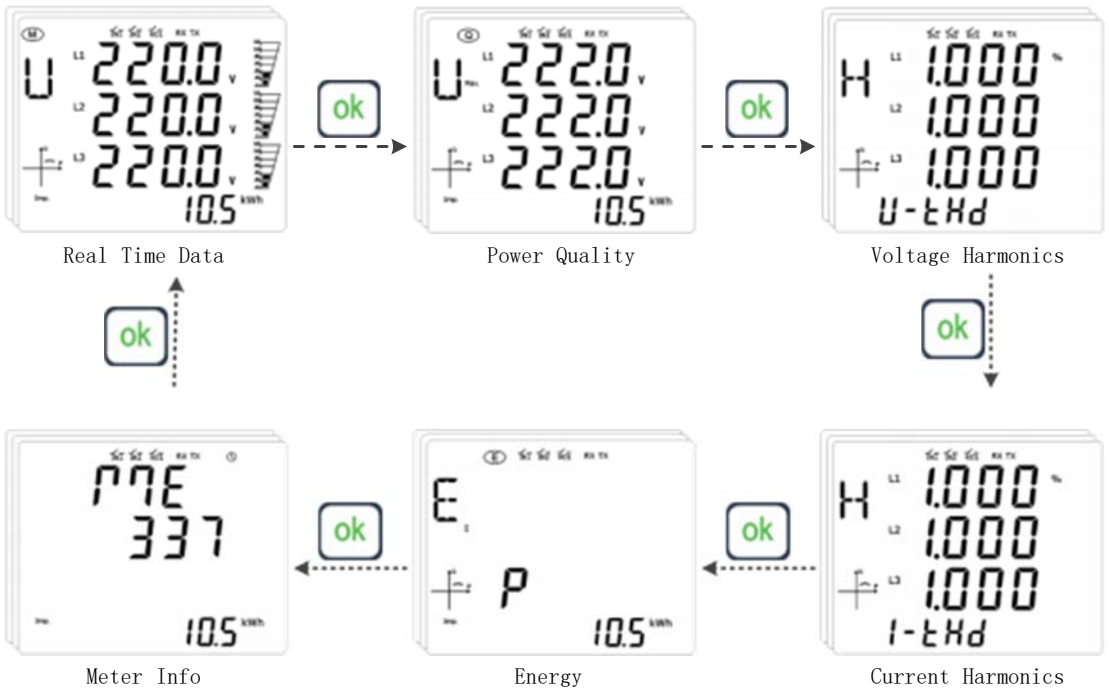
8. 3 Meter display mode switching

The meter display mode is divided into data display mode and device configuration mode.

The data display mode and device configuration mode are switched by ESC key

Data Display　　Configuration

There are a total of 6 display modes in the data display mode: real-time measurement data display mode(M), power quality display mode(Q), voltage harmonic display mode, current harmonic display mode, Energy display mode(E), device information display mode, and switch between each mode by key, as shown in the figure below:



Real Time Data　　Power Quality　　Voltage Harmonics

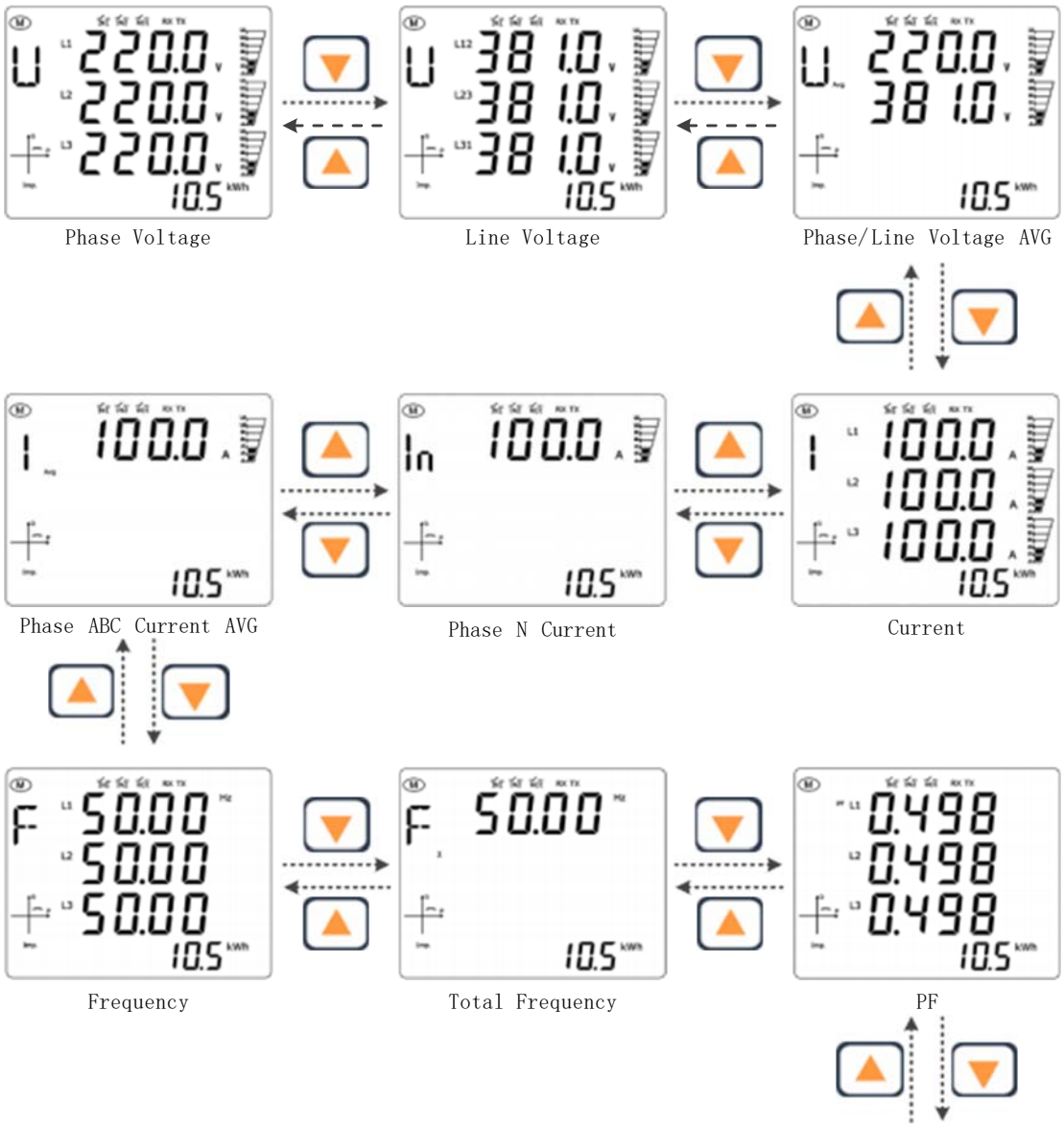
Meter Info　　Energy　　Current Harmonics

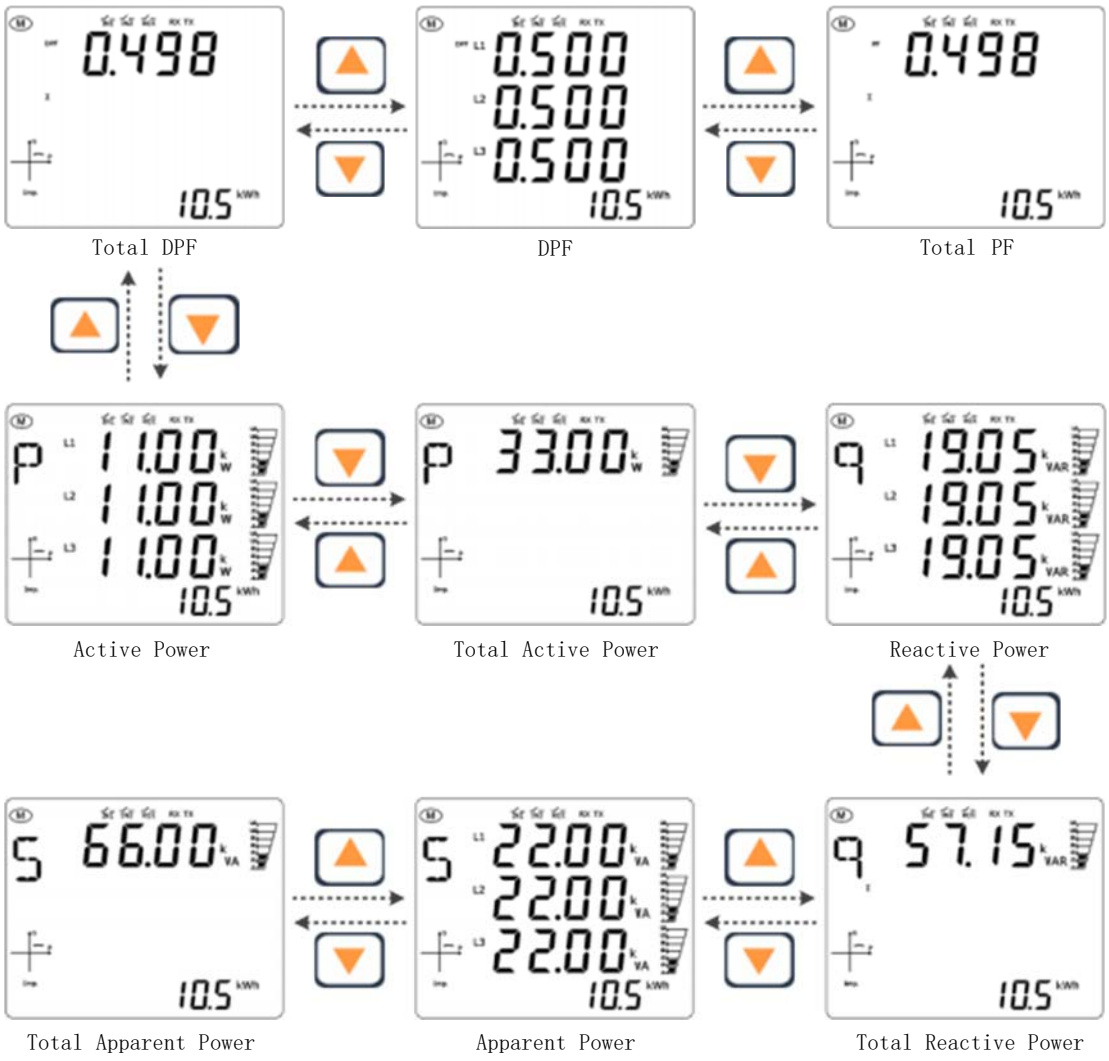
8. 4 Real-time measurement data interface

Figure (M) display, indicating that the current mode is real-time measurement data mode, real-time measurement data display interface is used to display: voltage, current, power, power factor, frequency and other data. Use the ▲ key or ▼ key to toggle the display of the interface.

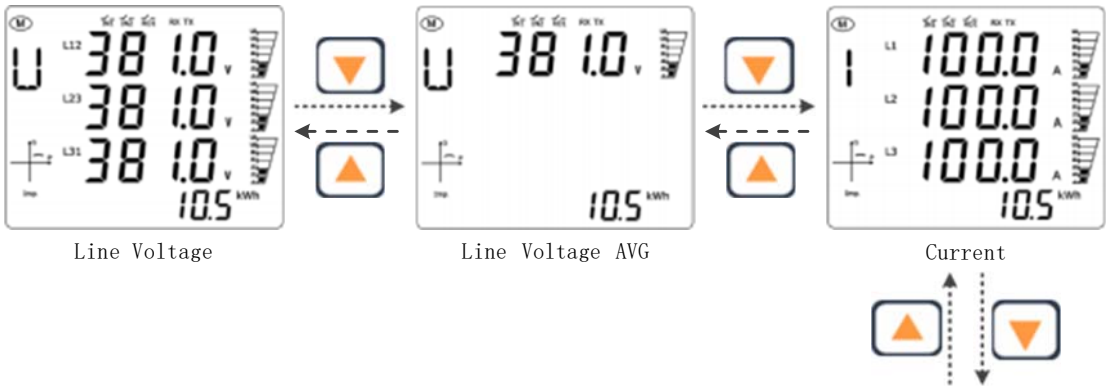
The meter will have different display interfaces under different wiring types:

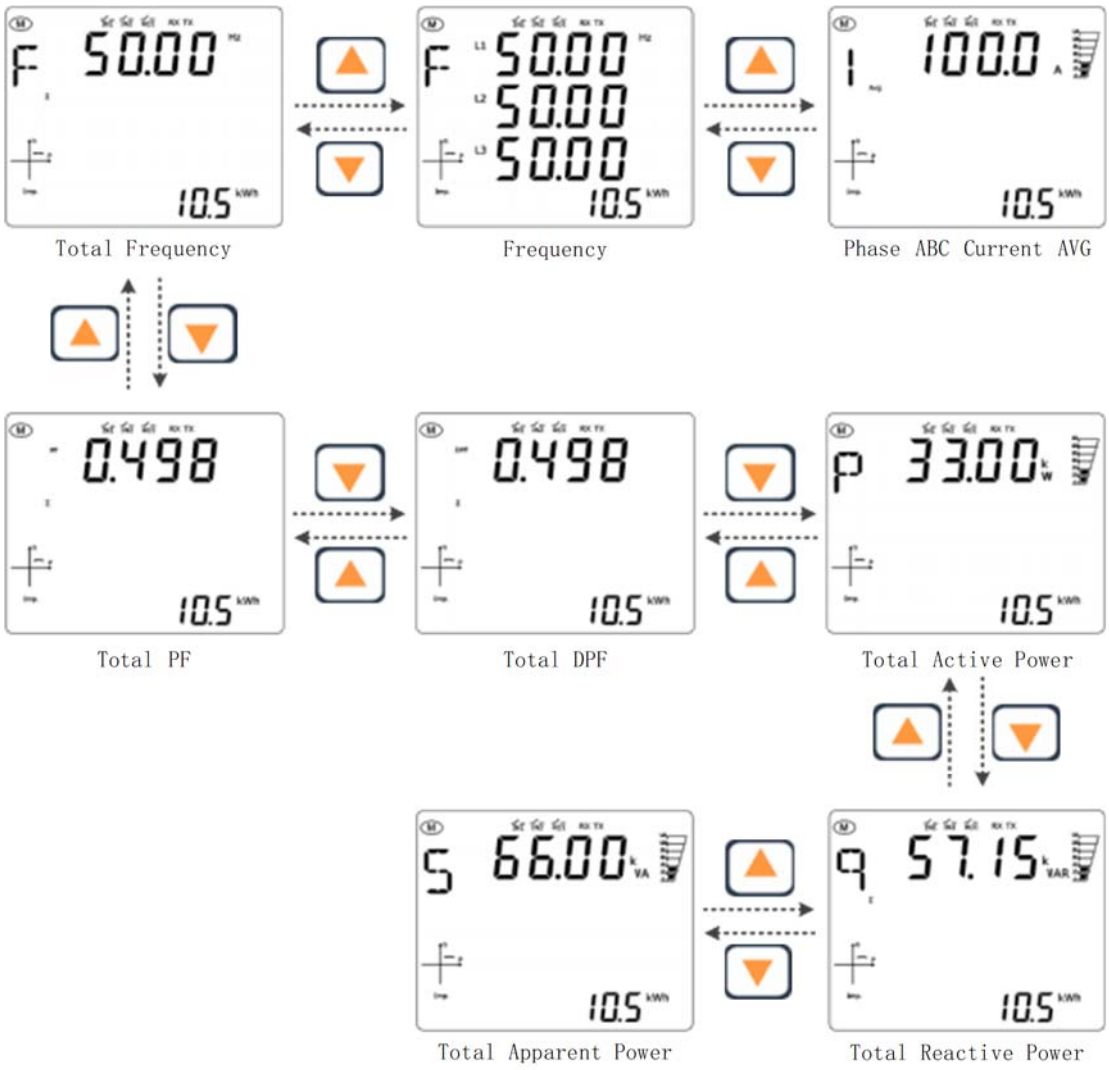
8.4.1 Real-time measurement data interface 3P4W



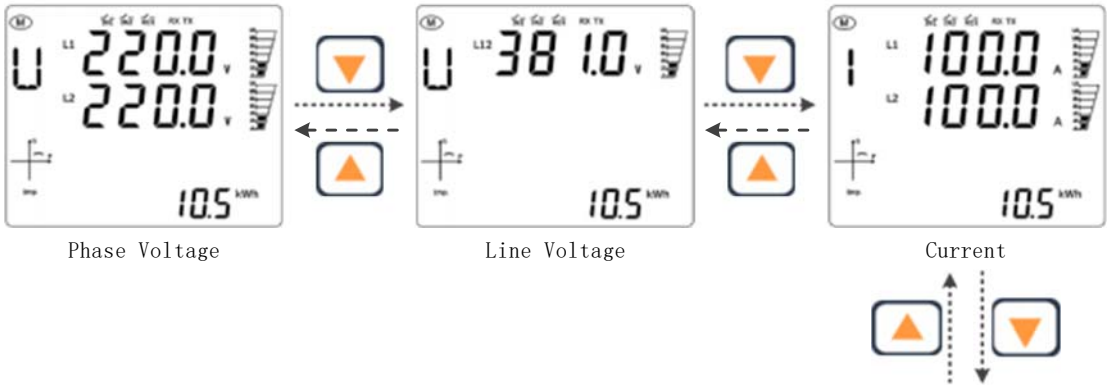


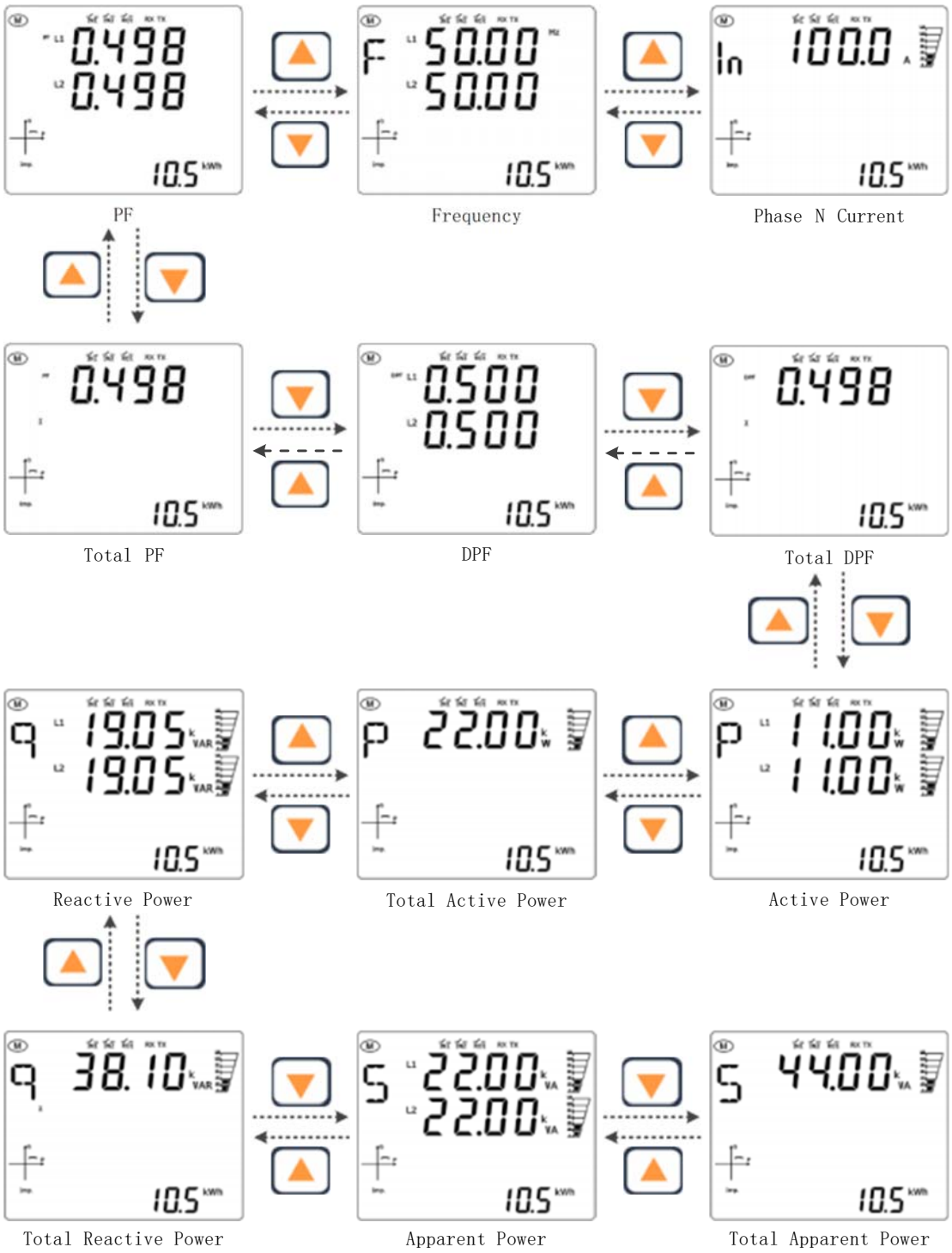
8.4.2 Real-time measurement data interface 3P3W



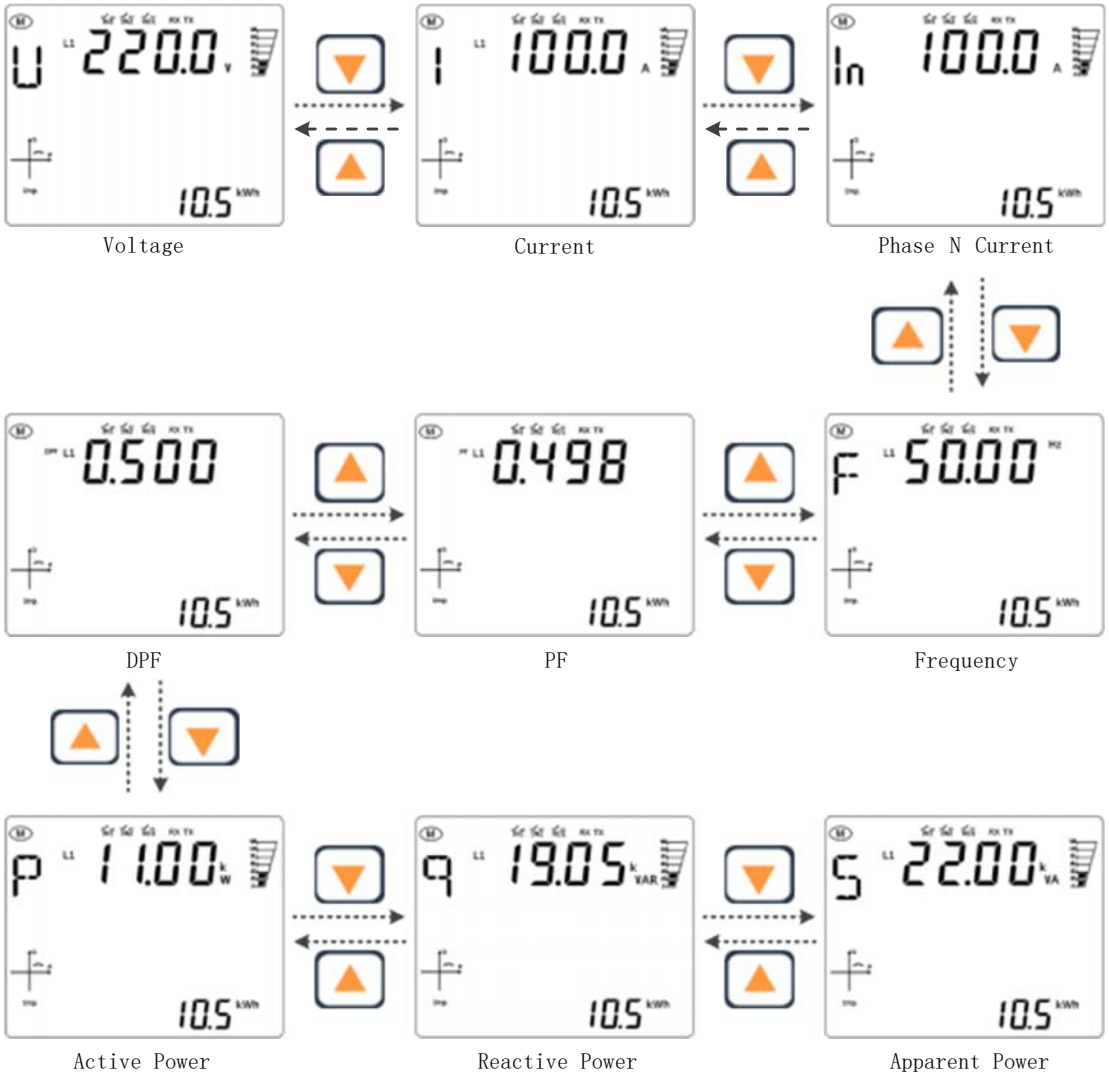


8.4.3 Real-time measurement data interface 1P3W




0.498
0.498
10.5
PF
F
50.00
50.00
10.5
Frequency
In
100.0
10.5
Phase N Current
0.498
10.5
Total PF
0.500
0.500
10.5
DPF
0.498
10.5
Total DPF
19.05
19.05
10.5
Reactive Power
P
22.00
10.5
Total Active Power
P
11.00
11.00
10.5
Active Power
38.10
10.5
Total Reactive Power
S
22.00
22.00
10.5
Apparent Power
S
44.00
10.5
Total Apparent Power

8.4.4 Real-time measurement data interface 1P2W

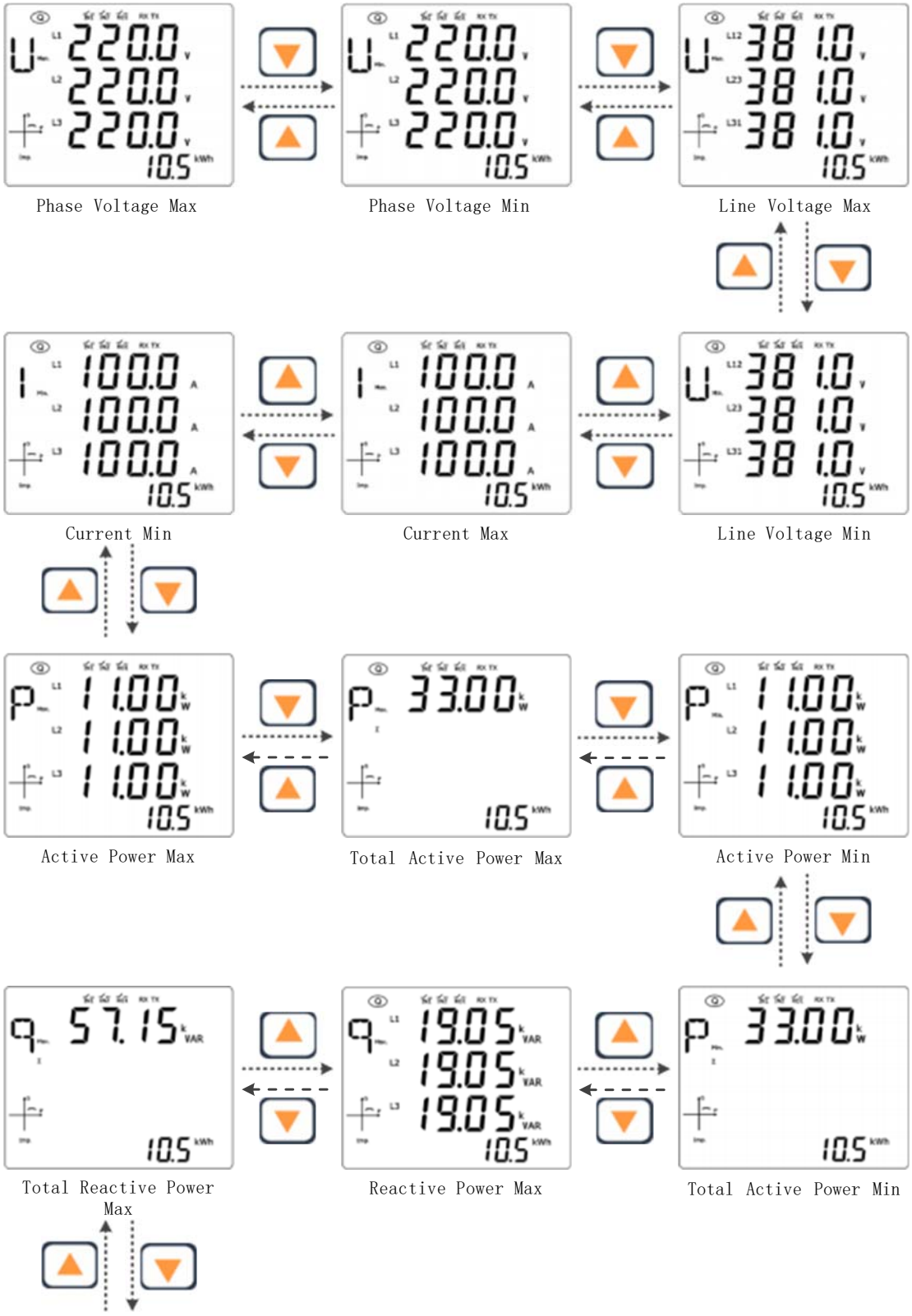


8. 5 Power quality interface

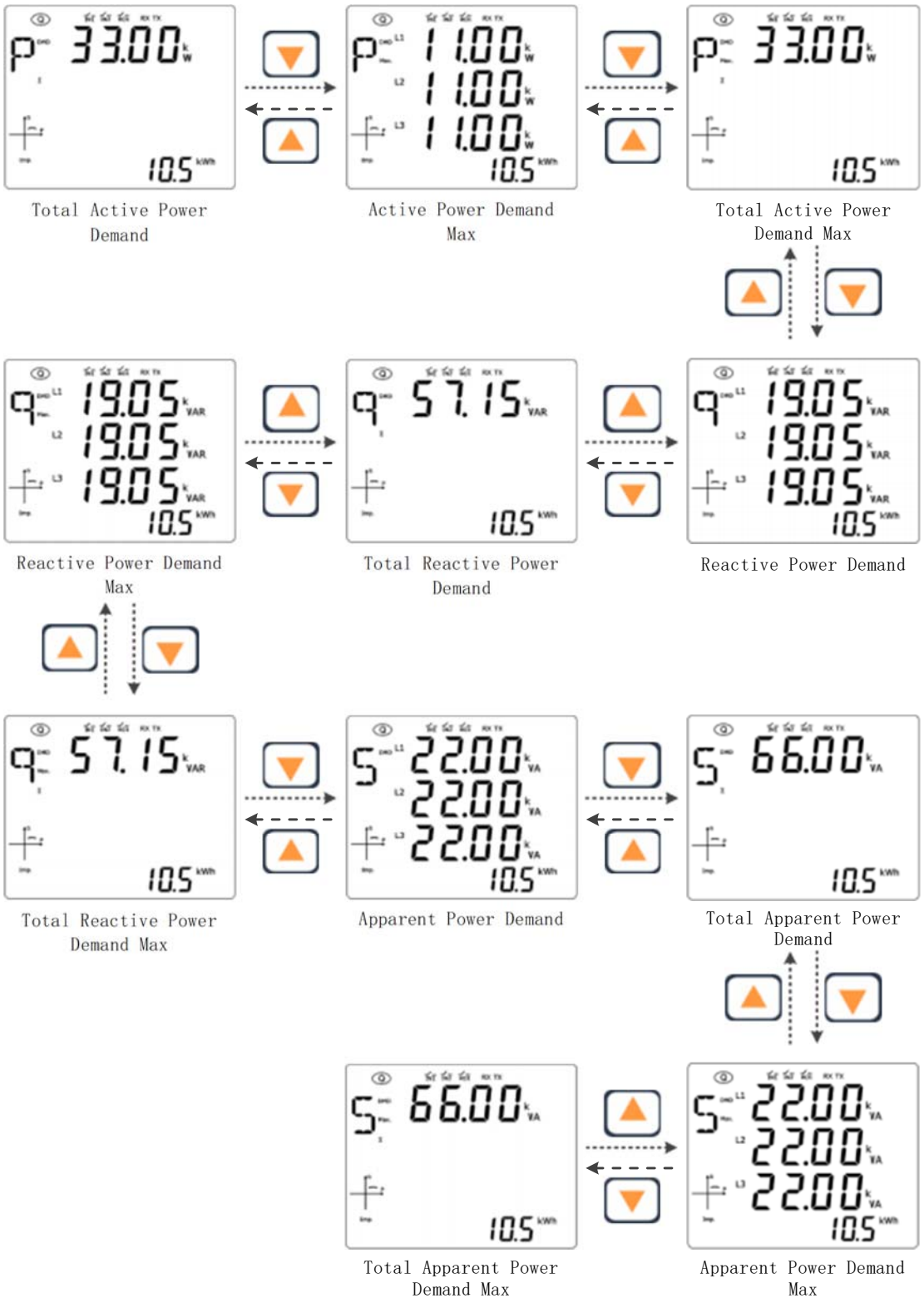
Figure Q indicator display, indicating that the current mode is power quality mode, power quality display interface is used to display: voltage and current power maximum and minimum value, voltage and current imbalance, current power demand and other data. Use the ▲ key or ▼ key to toggle the display of the interface.

The power quality display interface will have different display interfaces under different wiring methods.

8.5.1 Power quality interface 3P4W




Reactive Power Min
Total Reactive Power Min
Apparent Power Max
Total Apparent Power Min
Apparent Power Min
Total Apparent Power Max
Voltage Negative sequence/zero sequence imbalance
Current Negative sequence/zero sequence imbalance
Voltage Angle
Active Power Demand
Power Factor Angle
Current Angle


Total Active Power Demand
Active Power Demand Max
Total Active Power Demand Max
Reactive Power Demand Max
Total Reactive Power Demand
Reactive Power Demand
Total Reactive Power Demand Max
Apparent Power Demand
Total Apparent Power Demand
Total Apparent Power Demand Max
Apparent Power Demand Max

8.5.2 Power quality interface 3P3W

Line Voltage Max

Line Voltage Min

Total Active Power Min

Total Reactive Power Max

Current Negative sequence/zero sequence imbalance