产品合格证

符合标准: GB/T 22264

检 验 员: 检 01

出厂日期: 见产品或盒贴出厂编号

本产品经检验合格,准予出厂。

欣灵电气股份有限公司 XINLING ELECTRIC CO.,LTD.

产品合格证

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RECYCLABLE

National High-Tech Enterprise(Zhejiang Province)Business Name

欣灵

使用说明书
Products Instructions

HCD194E-□SY Series
LCD Network Multifunctional Power Meter

Thank you very much for choosing Xinling Brand meter.
Please read the user manual before using the product.

09A070Q0

User Manual for Multifunctional Power Meter

Thank you for choosing the power meter developed by our company. To facilitate your selection, purchase, and safe, correct, and efficient use of this meter, please read this manual carefully and be sure to pay attention to the following points when using it:

◆ This device must be installed and maintained by professional personnel.
◆ Before performing wiring operations on this device, the input signal and power supply must be cut off.
◆ Always use a suitable voltage detection device to confirm that there is no voltage in all parts of the meter.
◆ The electrical parameters supplied to this device must be within the rated range.

The following situations will cause damage to the device or abnormal operation:
◆ Auxiliary power supply, voltage, or frequency exceeding the specified range
◆ Frequency of the power distribution system exceeding the specified range
◆ Incorrect polarity of current or voltage input
◆ Unplugging/plugging in the communication connector while the device is energized
◆ Failure to connect terminal wires as required

Do not touch the terminals while the meter is in operation.

The recommended power frequency working power supply for the meter: AC 220V

Contents

I.Product Overview

Reference Standards

GB/T 17883-1999 0.5S Class Static AC Active Watt-hour Meter
GB/T 17882-1999 2 Class and 3 Class Static AC Reactive Watt-hour Meter
DL/T 614-1997 Multifunctional Electric Energy Meter
GB/T 13850-1998 Electrical Measuring Transmitter for Converting AC Electrical Quantity to Analog or Digital Signal

Corresponding International Standards

IEC 62053-22: 2003 Electrical Measuring Equipment (AC) - Part 22: Special Requirements for Static Watt-hour Meters (0.5S Class)
IEC 62053-23: 2003 Electrical Measuring Equipment (AC) - Part 23: Special Requirements for Static Reactive Meters (2S and 3S Classes)
IEC 61010-1: 2001 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements
IEC 61000-2-11 Electromagnetic Compatibility (EMC) - Part 2-11
IEC 60068-2-30 Environmental Testing - Part 2-30

Performance			Parameters
Signal Input	Wiring		Three-phase Four-wire / Three-phase Three-wire
	Voltage	Range	Continuous: 1.2x; Instantaneous: 2x
		Overload	<1 VA
		Power Consumption	Power Consumption
	Current	Range	5 A/ 1 A
		Overload	Continuous: 1.2x; Instantaneous: 2x
		Power Consumption	< 1 VA
	Frequency		40 ~ 65 Hz
Power Supply			AC/ DC 85 ~ 265 V; AC 220 V;< 5 VA
Energy Pulse			Passive Optocoupler Collector Output
Communication			RS 485 communication interface (with physical isolation), compliant with international standard MODBUS-RTU protocol; Communication speed: 1200 ~ 19200; Check modes: N81, E81, O81
Analog Output			4 ~ 20 mA transmitter output; Transmitter items and corresponding values can be set programmably
Relay Output			Programmable remote control/alarm relay output; Capacity: 3 A / 250 VAC, 5 A / 30 VDC
Digital Input			Switch input measurement (passive dry contact input); Input/output association can be set programmably
Measurement Class			Electric quantity: 0.5S; Frequency: ±0.1 Hz; Active energy: 0.5S; Reactive energy: 1S

Display Mode	Digital display: LCD display
Environment	Operating temperature: -10 ~ 55℃; Relative humidity: 20 ~ 75%
Safety	Insulation: Resistance between signal/power/output terminals and enclosure > 5 MΩ Withstand voltage: AC 2 kV between signal input/power/output

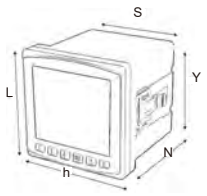
3.Product Overview

The digital-display multifunctional meter is designed to meet the needs of intelligent power monitoring and electric energy metering in power systems, industrial and mining enterprises, public facilities, intelligent buildings, etc. It can measure all common electrical parameters in three-phase power grids with high precision, including three-phase voltage, three-phase current, active power, reactive power, apparent power, frequency, power factor, four-quadrant electric energy, and switch input monitoring. It also integrates functions like communication interface, analog output, relay output control, and electric energy pulse output.

The meter provides multiple expandable I/O options for selection:
1 communication interface (2 optional)
4 analog outputs
4 relay outputs
Local/remote switch signal monitoring & control output (i.e., "remote signaling" and "remote control" functions)
8-channel switch monitoring
2-channel electric energy pulse output

The digital-display multifunctional network power meter features an excellent cost-performance ratio — it can directly replace conventional power transmitters, measurement indicating meters, electric energy metering instruments, and related auxiliary units. As an advanced intelligent, digital grid front-end acquisition component, it has been widely applied in various control systems, SCADA systems, energy management systems, substation automation, distribution network automation, residential power monitoring, industrial automation, intelligent buildings, intelligent distribution panels, and switchgear cabinets. It offers advantages such as easy installation, simple wiring, convenient maintenance, low engineering workload, field-programmable input parameters, and compatibility with networking via different PLC and industrial control computer communication software in the industry.

II.Installation and Dimensions



Model Code	External Dimensions (L×h)(mm)	Mounting Hole Dimensions (s×y) (mm)	Minimum Installation Distance		Total Length (N) (mm)
			Horizontal (mm)	Vertical (mm)	
42	120×120×70	111×111	120	120	80
96	96×96×70	91×91	96	96	80
80	80×80×70	76×76	80	80	80
72	72×72×70	67×67	72	72	80

III.Terminals and Wiring

1	2	3	4	5	6	7	8	9	10
L	N	P+	P-	Q+	Q-	A2	B2	A1	B1
Power Supply		Pulse Output				Rs485		Rs485	

31	32	33	34	35
COM	AO1	AO2	AO3	AO4
4-Channel Analog Output				

22	23	24	25	26	27	28	29
DO1		DO2		DO3		DO4	
4-Channel Digital Output							

39	38	37	36	40
DI1	DI2	DI3	DI4	COM
4-Channel Digital Input				

11	12	13	14	15	16	17	18	19	20
IA*	IA	IB*	IB	IC*	IC	UN	UA	UB	UC

2.Terminal Function Description

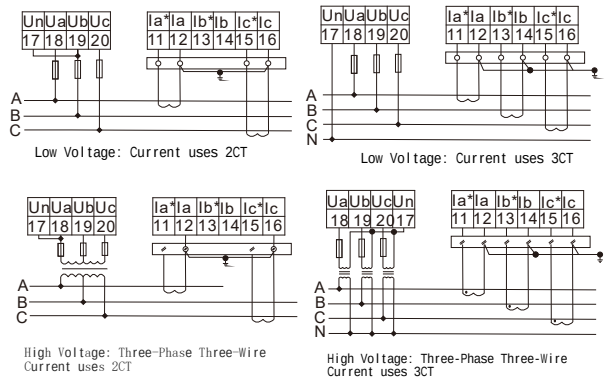
1) Signal and Function Terminal Numbering

The meter's wiring terminals adopt a unified numbering system, which is applicable to all products in this series. The details are shown in the table below:

Power Supply	1, 2	AC220V or AC/DC85-265V
Current Signal	11, 12, 13, 14, 15, 16	11, 13, 15 are three-phase current incoming terminals
Voltage Signal	17, 18, 19, 20	Respectively three-phase voltage inputs (UA, UB, UC)
Relay Output	22——29	4-channel relay output
Transmitter Output	31——35	4-channel 4-20mA transmitter output; 31 is the common terminal
Energy Pulse	3, 4, 5, 6	3, 5 are positive terminals of passive output; connect to the positive terminal of the external power supply
Rs485	7&8, 9&10	7&8 for the second channel; 9&10 for the first channel
Switch Input	36——40	4-channel switch input; 40 is the common terminal

Operating Instructions

(a) Terminals 1 and 2 are the auxiliary power supply for the meter. The maximum power supply voltage is AC/DC 85-265 V. Please ensure the supplied power matches this product series to avoid damage.(b) Terminals 11, 13, and 15 are incoming terminals for the current transformer; terminals marked with * indicate current incoming terminals.
(c) Three-phase three-wire connection: In a three-phase three-wire network, phase B current does not need to be connected; connect UB to terminal 17.
(d) For detailed terminal wiring, follow the wiring diagram on the specific product's enclosure.
It is recommended to use a power frequency power supply for the meter's auxiliary power supply: AC 220 V applies if no specific instructions are provided.
The figure below takes the 96 multifunctional model as an example. Wiring diagrams for other products are similar, differing only in fewer wiring terminals and function modules.



Low Voltage: Current uses 2CT

Low Voltage: Current uses 3CT

High Voltage: Three-Phase Three-Wire Current uses 2CT

High Voltage: Three-Phase Three-Wire Current uses 3CT

Wiring Instructions

(a) Voltage Input: The input voltage must not exceed the product's rated input voltage (100 V or 400 V). Otherwise, a PT (Potential Transformer) should be used. For convenient maintenance, terminal blocks are recommended.
(b) Current Input: The standard rated input current is 5 A. For currents exceeding 5 A, an external CT (Current Transformer) is required. If other meters are connected to the CT, the wiring must use series connection. Before disconnecting the product's current input wiring, always disconnect the CT primary circuit or short-circuit the CT secondary circuit first. For convenient maintenance, terminal blocks are recommended.
(c) Ensure that the input voltage and current correspond to each other, with consistent phase sequence and direction; otherwise, numerical and sign errors (for power and energy) will occur!

(d) Wiring Mode Selection

The meter can operate in three-phase four-wire mode or three-phase three-wire mode. Users should select the corresponding wiring mode based on on-site application conditions:The meter can operate in three-phase four-wire mode or three-phase three-wire mode. Users should select the corresponding wiring mode based on on-site application conditions:The meter can operate in three-phase four-wire mode or three-phase three-wire mode. Users should select the corresponding wiring mode based on on-site application conditions:Use the three-phase three-wire mode when there is no neutral line; only 2 CTs (for phases A and C) need to be installed.Use the three-phase four-wire mode when a neutral line is present; three CTs are required.Note: The meter supports settings for both modes. The actual wiring mode must match the mode set in the meter — otherwise, the meter's measurement data will be inaccurate. For specific wiring modes, pulse constants, and other technical parameters, refer to the wiring diagram included with the product.Note: The meter supports settings for both modes. The actual wiring mode must match the mode set in the meter — otherwise, the meter's measurement data will be inaccurate. For specific wiring modes, pulse constants, and other technical parameters, refer to the wiring diagram included with the product.

IV.Programming Operations

1.Entering and Exiting the Programming StateEntering the programming state:When in the display state, press the "↵" key for 7 seconds to enter the password authentication page. Use the "◄", "►", "▲", and "▼" keys to input the password (the default user password is 8888), then press the "↵" key to enter the programming state page.Note: After inputting the password and pressing the "↵" key, the third row of characters will blink if the password is correct; no blinking indicates an incorrect password.Exiting the programming state:When you have exited the first-level menu of the programming interface, press the "↵" key once to exit and save the programming settings.

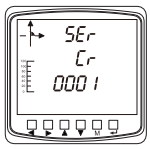
2.Key Functions in Programming

The common functions of the keys are as follows:
The "◄" and "►" keys: Used for switching between menu interfaces or shifting digits.
The "▲" and "▼" keys: Used for adjusting values up or down.
The "M" key: Used to enter the next-level menu.
The "↵" key: Used to return to the previous-level menu; when setting parameters, pressing it will return to the previous menu and save the settings.

3.Programming Operations

1.Menu Structure

During the programming state, the digital display interface adopts a hierarchical menu structure:The 1st row shows 1st-level menu information;
The 2nd row shows 2nd-level menu information;The 3rd row shows 3rd-level menu information.
For example (as shown in the figure below):1st level: SET (System Settings);2nd level: CT (Current Ratio);3rd level: Current Transformer ratio parameter value. That is, set the ratio (CT) of the input current signal to 1 (5 A / 5 A).

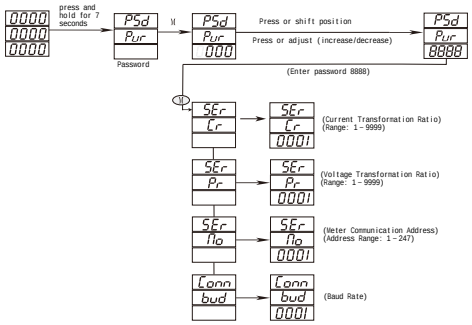


The organizational structure of the digital display interface menu is as follows; users can select appropriate setting parameters based on actual conditions:

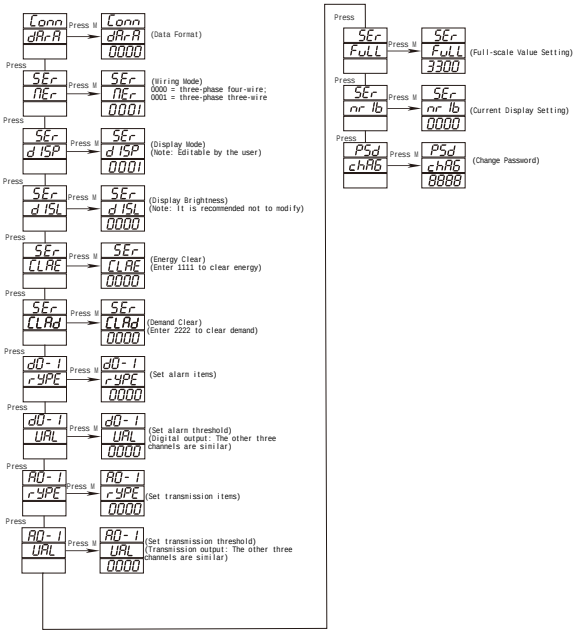
First Layer	Second Layer	Third Layer	Description
Password (PSD)	Enter Password (PUT)	0 ~ 9999	Enter the current password of the meter; the default is 8888
	Change Password (CHAG)	0 ~ 9999	Change the password
System Settings (SET)	Display (DISP)	0 ~ 11	0: Automatic cycle display mode
	Energy Clear	CLR. E	0000: Three-phase four-wire
	Wiring Mode (NET)	0000 or 0001	0001: Three-phase three-wire
	Voltage Transformation Ratio (PT)	1 ~ 9999	Set voltage transformation ratio = 1st scale / 2nd scale
	Current Transformation Ratio (CT)	1 ~ 9999	Set current transformation ratio = 1st scale / 2nd scale

Communication Settings	Address No.	1 ~ 247	Meter address range: 1 ~ 247
	Communication Baud Rate (BAUD)	1200 ~ 9600	0001=1200, 0002=2400, 0003=4800, 0004=9600; default: 9600
	Data Format (DATA)		0001=N,8,1; 0002=O,8,1; 0003=E,8,1; default: N,8,1
Digital Output Setting DO-X (X=1~4)			Refer to the digital output alarm transmission output settings for details
Transmission Output Setting AO-X (X=1~4)			

Note: The above menu items apply to the product with full functions. If you find some menu items are missing or non-functional during use, it means the product you selected does not support those functions.
Its structure diagram is as follows.



Programming Menu Structure Diagram

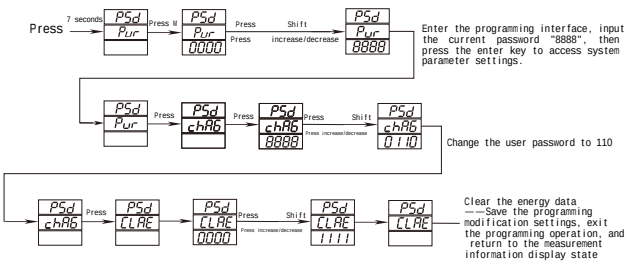


Digital Display Character Meaning Table

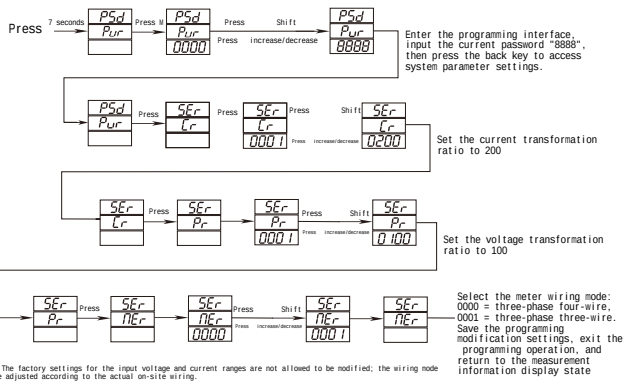
HZ	H2	Frequency	CT	Ct	Current Transformation Ratio	DO- 2	dO-2	Digital Output 2
DI	d I	Digital Input	PT	Pr	Voltage Transformation Ratio	DO- 3	dO 3	Digital Output 3
DO	do	Digital Output 1	DISP	d ISP	Display Selection	DO- 4	dO-4	Digital Output 4
Wh-0	uh-0	Forward Active Energy	DISL	d ISL	Brightness Adjustment	TYPE	rYPE	Type Selection
Wh-1	uh- I	Reverse Active Energy	NO.	no	Meter Address	UAL	UAL	Calibration Value Setting
VARh 0	uRh0	Forward Reactive Energy	CLR. E	CLRE	Energy Clear	AO- 1	AO- 1	Transducer Output 1
VARh 1	uRh I	Reverse Reactive Energy	NET	nEr	Wiring Mode	AO- 2	AO-2	Transducer Output 2
PSD	PSd	Password	CONN	Conn	Communication	AO- 3	AO-3	Transducer Output 3
Put	Pur	Enter Password	BUD	bud	Baud Rate	AO- 4	AO-4	Transducer Output 4
CHAG	chAG	Change Password	DARA	dAr-A	Data Format			
SET	SEr	Settings	DO- 1	dO- I	Digital Output 1			

2.Programming Operation Example for a Typical Model

(1) System Settings: The user needs to change the password to 110; clear the energy data.



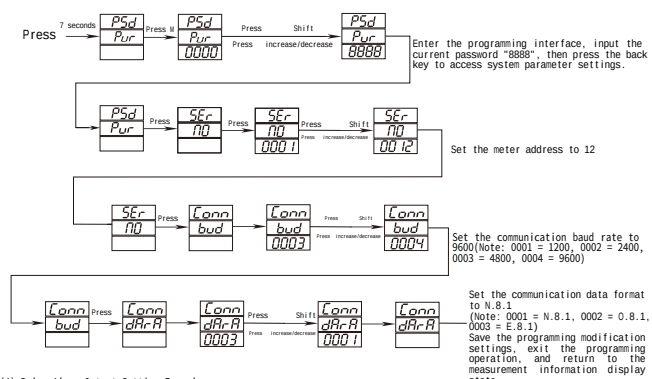
(2) Input Signal Settings (including wiring mode modification): Generally, users need to perform programming operations on the meter before changing the wiring mode or the range of signal input. For example: A user intends to reconfigure the meter to three-phase three-wire mode (with the signal specification: 10kV/100V, 1000A/5A) — the original configuration is three-phase four-wire mode (signal specification: 380V/380V, 5A/5A). The operations are as follows:Change the wiring mode from three-phase four-wire to three-phase three-wire;Adjust the signal input range: set the voltage transformation ratio to 100, and the current transformation ratio to 200.



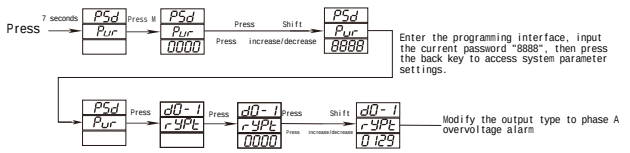
Note: The factory settings for the input voltage and current ranges are not allowed to be modified; the wiring mode can be adjusted according to the actual on-site wiring.

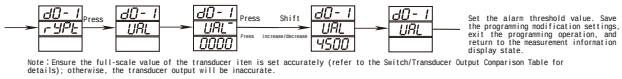
(3) Example of Communication Settings: When users need to use the meter's communication function, they usually need to check or modify the meter's communication parameters.

In this example, the user intends to modify the meter's communication address to 12, baud rate to 9600, and data format to N.8.1 (odd parity). (Original parameters before programming: address = 1, baud rate = 4800, data format = E.8.1 (no parity)).



(4) Relay Alarm Output Setting Example
Set the phase A overvoltage alarm output: when the phase A voltage exceeds 450V, trigger the first digital alarm output (i.e., turn on the first digital output). (Assume the meter is in the alarm output disabled state before programming.)

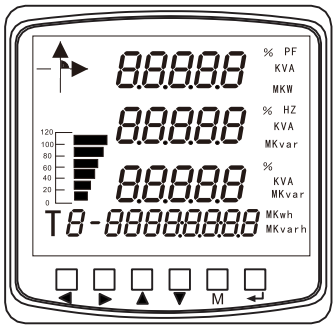


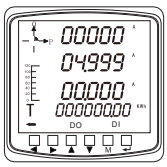


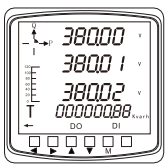
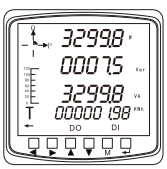
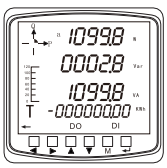
Note：Ensure the full-scale value of the transducer item is set accurately (refer to the Switch/Transducer Output Comparison Table for details); otherwise, the transducer output will be inaccurate.

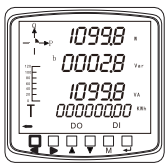
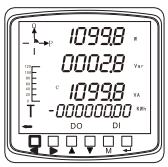
The measurement information includes 12 pages. Use the "◀" and "▶" keys to switch between pages. The page switching details are shown in the table below.

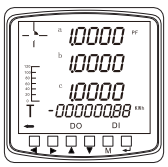
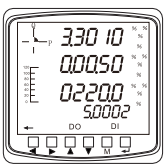
2.LCD Display Page Description for Multifunctional Power Meter



Page	Content	Description
DISP= 1		Displays three-phase currents IA, IB, IC (unit: A). In the diagram: IA=5.0001 A, IB=5.0002 A, IC=5.0001 A; forward active energy: 0.08 kWh, reverse active energy: 0.0 kWh.
DISP= 2		a. Displays three-phase current unbalance rate: 0%; average current: 4.999 A; A-phase zero-sequence current: 0.000 A; reverse active energy: 0.00 kWh.
DISP=3		Displays three-phase phase voltages Ua, Ub, Uc respectively: Ua=219.99 V, Ub=219.99 V, Uc=219.99 V; forward reactive energy: 0.09 kvarh.

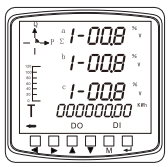
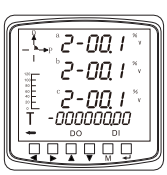
Page	Content	Description
DISP= 4		Displays three-phase line voltages Uab, Ubc, Uca respectively: Uab=380.00 V, Ubc=380.01 V, Uca=380.02 V; reverse reactive energy: 0.88 kvarh.
DISP= 5		Displays total active power (W), total reactive power (var), and total apparent power (VA): P=329.8 W, Q=7.5 var, S=329.8 VA; forward active energy: 1.98 kWh.
DISP= 6		Displays phase A active power (W), reactive power (var), and apparent power (VA): P=1099.8 W, Q=2.8 var, S=1099.8 VA Reverse active energy: 0.00 kWh

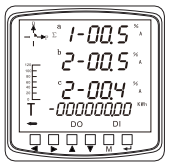
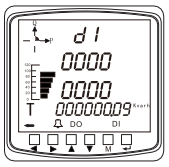
Page	Content	Description
DISP= 7		Displays phase B active power (W), reactive power (var), and apparent power (VA): P=1099.8 W, Q=2.8 var, S=1099.8 VA; forward reactive energy: 0.00 kvarh.
DISP= 8		Displays phase C active power (W), reactive power (var), and apparent power (VA): P=1099.8 W, Q=2.8 var, S=1099.8 VA; reverse reactive energy: 0.00 kvarh.
DISP= 9		Displays total power factor, frequency, zero-sequence voltage, and forward active energy: PF=0.9999, F=50Hz, Un=0.0008V Forward active energy: 2.84 kWh

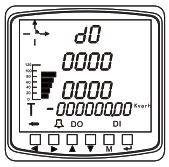
Page	Content	Description
DISP= 10		Displays the total power factor of phases A, B, and C, and negative active energy: PF =1.0000; negative active energy: 0.88 kWh.
DISP= 11		Display of demand data: Total active power demand: 3.3010kW Total reactive power demand: 0.0085kvar Phase A voltage demand: 220.5V Phase A current demand: 5.0003A Note: When a standard clock is added, the demand will be reset to zero at the end of the month.
DISP= 12		Display of current demand: Total active power demand: 3.3000kW Total reactive power demand: 0.0050kvar Phase A voltage demand: 220.0V Phase A current demand: 5.0002A

3 Multifunctional Harmonic Meter

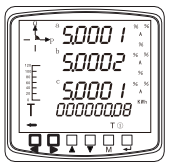
This is an instrument with functions including measurement, display, digital communication, input and output. It can measure and display multiple electrical parameters in the power grid: current, voltage, power, electrical energy, frequency, power factor, zero-sequence voltage & current, and the 31st harmonic of voltage & current. It is equipped with electrical energy pulse output and 485 communication, plus a large-screen LCD display. Multiple expansion functions are optional: 4-channel digital input; 4-channel digital output; 4-channel transmitter output

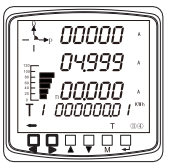
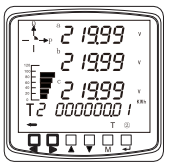
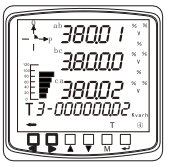
Page	Content	Description
DISP= 11		Displays total harmonics of three-phase voltages: THD(Ua)=0.8%, THD(Ub)=0.8%, THD(Uc)=0.8%; Forward active electrical energy: 000.00k Wh
DISP= 12 - 41		Displays the 2nd to 31st harmonics of three-phase voltages: THD(Ua)=2-0.1%, THD(Ub)=2-0.1%, THD(Uc)=2-0.1%; and electrical energy

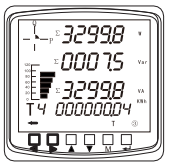
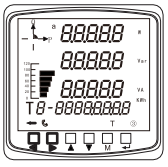
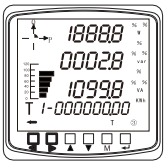
Page	Content	Description
DISP= 42		Displays total harmonics of three-phase currents THDIa=0.5% THDIb=0.5% THDIc=0.4% and electrical energy
DISP= 43 – 72		Displays the 2nd to 31st harmonics of three-phase currents THDIa-31=0.1% THDIb-31=0.0% THDIc-31=0.0% and electrical energy
DISP= 73		Displays the digital input status of 8 channels "0" indicates open, "1" indicates closed Current status of all 8 channels: open Forward active electrical energy: 0.09kvarh

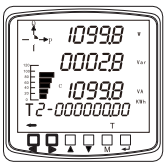
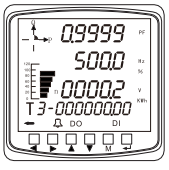
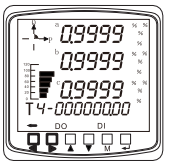
Page	Content	Description
DISP= 74		Displays the digital output status of 8 channels: "0" = open, "1" = closed; Current status of all 8 channels: open; Reverse reactive electrical energy: 0.00kvarh

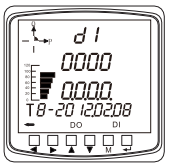
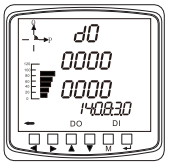
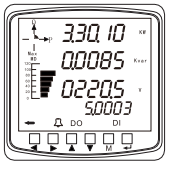
4 Multifunctional Time-of-Use MeterThis multifunctional time-of-use meter is an instrument with functions including measurement, display, digital communication, input and output. It can measure and display multiple electrical parameters in the power grid (such as current, voltage, power, electrical energy, frequency, power factor, zero-sequence voltage & current). It is equipped with a standard clock, plus an 8-time-period 4-tariff time-of-use billing function. It features electrical energy pulse output and 485 communication, as well as a large-screen LCD display. Multiple expansion functions are available: 1–4 channels of digital input; 1–4 channels of digital output; 1–4 channels of transmitter output

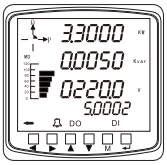
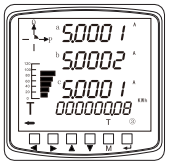
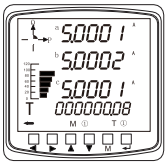
Page	Content	Description
DISP= 1		Displays three-phase currents IA, IB, IC (unit: A). In the interface: Ia=5.0001A, Ib=5.0002A, Ic=5.0001A; Forward active electrical energy: 0.08kWh; T: ① indicates operation in the peak period (the same applies below)

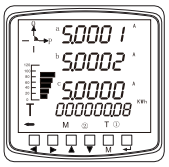
Page	Content	Description
DISP=2		Displays three-phase current unbalance rate: 0% Average current: 4.999A Zero-sequence current: 0.00A Forward flat-period electrical energy: 0.01kWh T: ③ indicates operation in the flat period (the same applies below)
DISP=3		Displays three-phase phase voltages Ua, Ub, Uc respectively: Ua=219.99V Ub=219.99V Uc=219.99V Forward peak-period active electrical energy: 0.01kWh T: ② indicates operation in the peak period (the same applies below)
DISP=4		Displays three-phase line voltages Uab, Ubc, Uca respectively: Uab=380.00V Ubc=380.01V Uca=380.02V Forward valley-period active electrical energy: 0.02kWh T: ④ indicates operation in the valley period (the same applies below)

Page	Content	Description
DISP=5		Displays total active power (W), total reactive power (var), and total apparent power: P=3299.8W Q=7.5var S=3299.8VA Forward valley-period active electrical energy: 0.04kWh
DISP=6		Displays phase A active power (W), reactive power (VAR), and apparent power:P=1099.8WQ=2.8varS=1099.8VAReverse active electrical energy: 0.00kWh indicates the meter is in communication state (the same applies below)
DISP=7		Displays phase C active power (W), reactive power (var), and apparent power:P=1099.8WQ=2.8varS=1099.8VA Reverse peak-period active electrical energy: 0.00kWh

Page	Content	Description
DISP=8		Displays phase B active power (W), reactive power (var), and apparent power: P=1099.8W Q=2.8var S=1099.8VA Reverse peak-period active electrical energy: 0.00kWh
DISP=9		Displays total active power factor, frequency, zero-sequence voltage, and reverse flat-period active electrical energy: PF=0.9999 F=50Hz Un=0.02V Reverse flat-period active electrical energy: 0.00kWh
DISP=10		Displays three-phase power factors: PFA=0.9999 PFB=0.9999 PFC=0.9999 Reverse flat-period active electrical energy: 0.00kWh

Page	Content	Description
DISP=11		Displays the digital input status of 8 channels "0" indicates open, "1" indicates closed Current status of all 8 channels: open Date: February 8, 2012
DISP=12		Displays the digital output status of 8 channels "0" indicates open, "1" indicates closed Current status of all 8 channels: open Time: 14:08:30
DISP=13		Displays demand data Total active power demand: 3.3010kW Total reactive power demand: 0.0085kvar Phase A voltage demand: 220.5V Phase A current demand: 5.0003A

Page	Content	Description
DISP=14		Displays current demand Total active power demand: 3.3000kW Total reactive power demand: 0.0050kvar Phase A voltage demand: 220.0V Phase A current demand: 5.0002A
DISP=15-29		Displays three-phase current parameters and forward/ reverse reactive electrical energy respectively
DISP=30-58		Displays three-phase current parameters and last month's time-of-use electrical energy respectively M: ① indicates last month's electrical energy

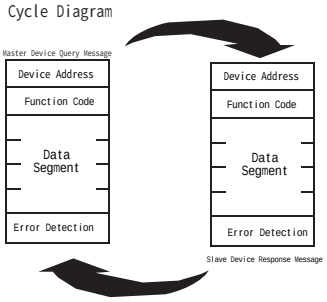
Page	Content	Description
DISP= 59 - 84		Displays three-phase current parameters and last month's time-of-use electrical energy respectively

VI.Function Modules

Communication
1 Physical Layer
1) RS 485 communication interface, asynchronous half-duplex mode;
2) Communication speed: 1200 ~ 9600 bps (configurable), default 4800 bps at factory;
3) Byte transmission format: 1 start bit, 8 data bits, 1 parity bit, 2-3 stop bits (N 8 1, E 8 1, O 8 1 optional);
2 Communication Protocol: MODBUS-RTU

The MODBUS protocol adopts a master-slave response communication connection method over a single communication line: The master device addresses a slave device with a unique address; the response signal from the slave device is transmitted back to the master device. That is: All communication data streams are transmitted in two opposite directions over a single communication line (half-duplex working mode).The MODBUS protocol only allows communication between master devices (PC, PLC, etc.) and terminal devices, and does not permit data exchange between independent terminal devices. This way, each terminal device will not occupy the communication line during initialization, and only responds to query signals addressed to itself.

Query-Response Cycle Diagram



Structure of Data Frame: Message Format

Address Code	Function Code	Data Code	Check Code
1 BYTE	1 BYTE	N BYTES	2 BYTES

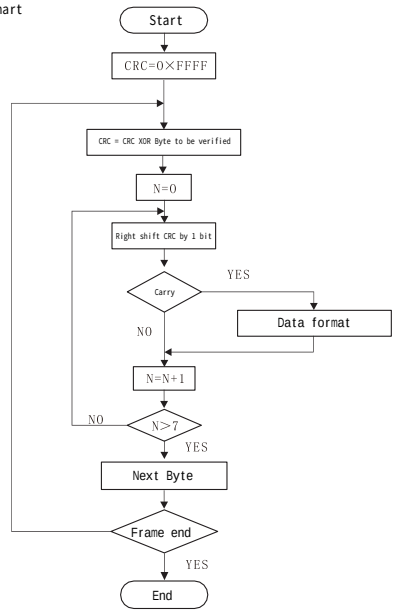
Address Code: Consists of one byte (8-bit binary code), with a decimal range of 0 ~ 255. In our system, only addresses 1 ~ 247 are used, and other addresses are reserved. Each terminal device must have a unique address—only the addressed terminal will respond to the corresponding query.
Function Code: Instructs the addressed terminal on which function to execute. The table below lists the function codes supported by the meter, along with their meanings and functions.
Data Code: Contains the data required for the terminal to execute a specific function, or the data collected by the terminal when responding to a query. This data may include values, reference addresses, or setting values.
Check Code: The error check (CRC) field occupies two bytes and contains a 16-bit binary value. The CRC value is calculated by the transmission device and then appended to the data.

(1) Initialize a 16-bit register to OFFFFH (hexadecimal, all 1s), referred to as the CRC register.
(2) Perform an XOR operation between the 8 bits of the first byte in the data frame and the low byte in the CRC register, then store the result back in the CRC register.
(3) Shift the CRC register right by one bit: fill the most significant bit with 0, shift out the least significant bit, and check the shifted-out bit.
(4) If the bit shifted out in the previous step is 0: repeat step 3 (next shift); if it is 1: perform an XOR operation between the CRC register and a preset fixed value (A001H).
(5) Repeat steps 3 and 4 until 8 shifts are completed. This finishes processing the 8 bits of one byte.
(6) Repeat steps 2 to 5 to process the 8 bits of the next byte until all bytes have been processed.
(7) Finally, the value in the CRC register is the CRC value.

Function Codes

Code	Meaning
01	Read relay output status
02	Telemeter digital input status
03	Read data register value
05	Remotely control single relay output action
0F	Remotely control multiple relay output actions

Checksum Calculation Flowchart



6.1.3 Message Command Format

Command 01 for Reading Relay Output Status

Host Request Command			Slave Response		
Slave Address	1Byte	1~247	Slave Address	1Byte	
Function Code	1Byte	01	Function Code	1Byte	
Starting Relay Address	2Bytes	0000 (fixed)	Register Byte Count	1Byte	
Number of Relays	2Bytes	0004 (maximum)	Register Value	Nbytes	
CRC Check Code	2Bytes		CRC Check Code	2Bytes	

Telemetry Switch Input Status Command 02

Host Request Command			Slave Response		
Slave Address	1Byte	1~247	Slave Address	1Byte	
Function Code	1Byte	02	Function Code	1Byte	
Starting Switch Address	2Bytes	0000 (fixed)	Register Byte Count	1Byte	
Number of Telemetry Switches	2Bytes	0004 (maximum)	Register Value	Nbytes	
CRC Check Code	2Bytes		CRC Check Code	2Bytes	

Command 03 / 04 for Reading Data Registers

Host Request Command			Slave Response		
Slave Address	1Byte	1~247	Slave Address	1Byte	
Function Code	1Byte	03/04	Function Code	1Byte	
Starting Register Address	2Bytes		Register Byte Count	1Byte	
Number of Registers	2Bytes		Register Value	Nbytes	
CRC Check Code	2Bytes		CRC Check Code	2Bytes	

Single-Channel Relay Output Control Command 05

Host Request Command			Slave Response		
Slave Address	1Byte	1~247	Slave Address	1Byte	
Function Code	1Byte	05	Function Code	1Byte	
Starting Register Address	2Bytes	0000 ~0003	Starting Relay Address	1Byte	
Number of Registers	2Bytes	FF00/0000	Relay Action Value	Nbytes	
CRC Check Code	2Bytes		CRC Check Code	2Bytes	

Multi-Channel Relay Output Control Command 0F

Host Request Command			Slave Response		
Slave Address	1Byte	1~247	Slave Address	1Byte	
Function Code	1Byte	0F	Function Code	1Byte	
Starting Register Address	2Bytes	0000 ( )	Starting Relay Address	2Bytes	
Number of Relays	2Bytes	0004 ( )	Number of Relays	2Bytes	
Data Byte Count	1Byte	01			
Multi-Relay Action Value	1Byte				
CRC Check Code	2Bytes		CRC Check Code	2Bytes	

4 Message Example

(1) Read Remote Control/Alarm Relay Output Status (Function Code 001)

Host Request: 01 01 00 00 00 04 3D C9

- 01: Slave Address
- 01: Function Code for Reading Relay Status
- 00 00: Starting Relay (this meter is fixed to start reading from 0)
- 00 04: Number of Relays (maximum 4 channels)
- 3D C9: CRC Check Code

Slave Response: 01 01 01 01 90 48

- 01: Slave Address
- 01: Function Code
- 01: Number of Registers (in bytes)
- 01: Relay Status Value (001 indicates the 1st relay is closed)
- 90 48: CRC Check Code

Note: According to the Modbus protocol, the relay status value corresponds to each relay output status starting from the least significant bit (LSB) of each byte. "1" indicates the ON state, and "0" indicates the OFF state. For example, the binary value "0000 0011" of "03" (in a relevant example) means the 1st and 2nd relays are closed.

(2) Telemetry Switch Input Status (Function Code 02)

Host Request: 01 02 00 00 00 08 79 CC

- 01: Slave Address
- 02: Function Code for Reading Telemetry Switch Status
- 00 00: Starting Address (fixed at 0 for this meter)
- 00 08: Number of Switches
- 79 CC: CRC

Slave Response: 01 02 01 01 60 48

- 01: Slave Address
- 02: Function Code for Reading Telemetry Switch Status
- 01: Number of Registers (in bytes)
- 01: Switch Input Status Value (the 1st switch is valid)
- 60 48: CRC

Note: According to the Modbus protocol, the switch input status value corresponds to each switch input status starting from the least significant bit (LSB) of each byte. "1" indicates the ON state, and "0" indicates the OFF state.

(2) Read Data Registers (Function Code 03)

Read floating-point data of three-phase phase voltages of the power grid once

Host Request: 01 03 00 4F 00 06 F4 1F

- 01: Slave Address
- 03: Function Code 03 for Reading Data
- 00 4F: Starting address of floating-point data for three-phase phase voltages (004F)
- 00 06: Data length (3 floating-point numbers correspond to 6 word data)
- F4 1F: CRC

Slave Response: 01 03 0C…… (12-byte data)

12-byte data (in byte format)

(1) Remote Control Single Relay Output (Function Code 05)

Host Request: 01 05 00 00 FF 00 8C 3A

- 01: Slave Address
- 05: Function Code 05 for Remote Control Single Relay Output
- 00 00: Remote control relay address (0000~0003)
- FF 00: Relay action value (FF00: Closed; 0000: Opened)
- 8C 3A: CRC

Slave Response: 01 05 00 00 FF 00 8C 3A

NOTE: This meter has a maximum of 4 relay outputs. When using the remote control command, the relays must be configured to operate in remote mode.

(5) Remote Control Multi-Channel Relay Output (Function Code 0F)

Host Request: 01 0F 00 00 00 04 01 0F 7E 92

- 01: Slave Address
- 0F: Function Code 0F for Remote Control Multi-Channel Relays
- 00 00: Starting Address of Remote Control Relays (fixed at 0000 for this meter)
- 00 04: Number of Remote Control Relays (fixed at 0004 for this meter)
- 01: Data Byte Count
- 0F: Action Value (0F means 4 channels are closed)
- 7E 92: CRC

Slave Response: 01 0F 00 00 00 04 54 08

- 01: Slave Address
- 0F: Function Code 0F for Remote Control Multi-Channel Relays
- 00 00: Starting Address of Remote Control Relays (fixed at 0000 for this meter)
- 00 04: Number of Remote Control Relays (fixed at 0004 for this meter)
- 54 08: CRC

NOTE: The communication protocol of this meter complies with the standard MODBUS-RTU protocol. The communication address table contains both primary power grid data in floating-point type and fixed-point integer data of the secondary power grid. Customers can select and read the corresponding data according to their system requirements. Please refer to Appendix 1 for the MODBUS communication address information table.

2 Electric Energy Measurement and Electric Energy Pulse Output

The multi-function network power meter supports bidirectional active and reactive energy metering, features a 2-channel electric energy pulse output function, and comes with an RS 485 digital interface to realize the display and remote transmission of electric energy data. It can obtain primary measurement data of active and reactive energy: the electric energy pulse of the open-collector optocoupler relay enables the remote transmission of active and reactive energy. Remote computer terminals, PLCs, or DI switch acquisition modules can collect the total number of pulses from the meter to achieve cumulative electric energy metering. The output method adopted is the accuracy verification method for electric energy (national metrology regulation: pulse error comparison method of standard meters).

(a)Electrical Characteristics

In the pulse acquisition interface circuit diagram: VCC ≤ 48 V, IZ ≤ 50 mA.

(b)Pulse Constant

8000 imp/kWh. Its meaning is: when the meter accumulates 1 kWh, the number of pulse outputs is 8000. It should be emphasized that 1 kWh refers to the secondary measurement electric energy data. In scenarios with PT (voltage transformer) and CT (current transformer), N pulse data corresponds to the primary measurement electric energy of 1 kWh × voltage transformation ratio (PT) × current transformation ratio (CT).

(c)Application Example

The PLC terminal uses a pulse counting device. Assume that N pulses are collected within a time period t, and the meter input parameters are: 10kV/100V and 400A/5A. Then the cumulative electric energy of the meter in this period is: N/8000 × 100 × 80 kWh.

3 Transmitter Output

The series of digital-display multi-function network power meters have an analog quantity transmitter function; each channel can flexibly set the transmission item and transmission range, and the transmitter outputs 4~20mA. For detailed transmission items, please refer to the transmitter output comparison table.

Electrical Parameters: Output: 4~20mA; Accuracy Class: 0.5 S

Overload: 120% of the effective output, maximum current 24 mA, voltage 12 V

Load: Rmax = 400ΩTransmission Items: Phase voltage, line voltage, phase current, phase active power, total active power, phase reactive power, total reactive power, three-phase apparent power, total apparent power, power factor, frequency, etc.

Customers can also specify the transmission items and transmission range in detail when placing an order, and the meter will be configured according to the user's requirements before leaving the factory; users can also modify the transmission items and transmission output range after the product leaves the factory based on actual needs.

4 Switch Quantity Simulation Function Comparison Table (TYPE Value)

Item	Switch Quantity Output			Transmission Output
	Corresponding Parameter (Low Alarm)	Corresponding Parameter (High Alarm)		Corresponding Parameter (4-20mA)
Ua (Phase A Voltage)	1	129		129
Ub (Phase B Voltage)	2	130		130
Uc (Phase C Voltage)	3	131		131
Uab (AB Line Voltage)	4	132		132
Ubc (BC Line Voltage)	5	133		133
Uca (CA Line Voltage)	6	134		134
Ia (Phase A Current)	7	135		135
Ib (Phase B Current)	8	136		136
Ic (Phase C Current)	9	137		137
Pa (Phase A Active Power)	10	138		138
Pb (Phase B Active Power)	11	139		139
Pc (Phase C Active Power)	12	140		140
Ps (Total Active Power)	13	141		141
Qa (Phase A Reactive Power)	14	142		142
Qb (Phase B Reactive Power)	15	143		143
Qc (Phase C Reactive Power)	16	144		144
Qs (Total Reactive Power)	17	145		145
PFa (Phase A Power Factor)	18	146		146
PFb (Phase B Power Factor)	09	147		147
PFc (Phase C Power Factor)	20	148		148
PFs (Total Power Factor)	21	149		149
Sa (Phase A Apparent Power)	22	150		150
Sb (Phase B Apparent Power)	23	151		151
Sc (Phase C Apparent Power)	24	152		152
Ss (Total Apparent Power)	25	153		153
F (Frequency)	26	154		154
YU (Voltage Unbalance Degree)	27	155		155
YI (Current Unbalance Degree)	28	156		156

Note: The transmitted alarm value is the integer data of the secondary power grid. For the scale value unit in the UAL value comparison table, you can also refer to the secondary power grid data format in Appendix 1. MODBUS-RTU Communication Address Information Table.

Voltage	0.1V	Current	0.001A	Active Power	W	Reactive Power	Var
Apparent Power	VA	Power Factor		Unbalance Degree	0.001	Frequency	0.01HZ

5 Relay Outputs, Relay Capacity: 3 A 250 VAC / 5 A 30 DCIf customers need relay capacities of special specifications, they can contact the Marketing Department of our company for custom-made solutions.5 Relay Outputs, Relay Capacity: 3 A 250 VAC / 5 A 30 DCIf customers need relay capacities of special specifications, they can contact the Marketing Department of our company for custom-made solutions.

The relay output module has three optional working modes: electric quantity upper/lower limit alarm mode, communication remote control mode, and linkage mode. Each relay can flexibly set the working mode, alarm item, and alarm range during programming operations. For example:When the alarm item "TYPE" is set to 1-28, it is the low alarm;When set to 129-156, it is the high alarm;When set to 000, it is the remote control mode;When set to 0220-0249, it is the linkage mode.

Notes:(a) High-Low Alarm

A low alarm indicates that the relay output channel conducts when the value is below the alarm threshold of the alarm item; a high alarm indicates that the relay output channel conducts when the value is above the alarm threshold of the item.

(b)Discrete Quantity Monitoring AlarmIf the switch input state is selected as the alarm output, no alarm threshold needs to be set.(b) Discrete Quantity Monitoring AlarmIf the switch input state is selected as the alarm output, no alarm threshold needs to be set.When the type value (TYPE) of the alarm item (DO-X) is set to **0220**: The first switch input closes, and the corresponding relay triggers an alarm output.When set to **0221**: The second switch input closes, and the corresponding relay triggers an alarm output.When set to **0222**: The third switch input closes, and the corresponding relay triggers an alarm output.When set to **0223**: The fourth switch input closes, and the corresponding relay triggers an alarm output.Note: "X" refers to the X-th alarm. For example, if the type value (TYPE) of DO-1 is set to 0221, it means the first relay triggers an alarm output when the second switch input is turned on.

(C) Remote Control Relay
When the remote control relay is outputting, the alarm function must be disabled — this is achieved by setting the type value (TYPE) of the alarm for this channel to 0000 during programming operation.

6.6 Remote Control Discrete Input
The discrete input module adopts the dry contact resistance switch signal input method. The instrument is equipped with an internal +12V working power supply, so no external power supply is required. It can be used to monitor statuses such as fault alarm nodes, switch opening/closing states, handcart positions, and capacitor activation status in capacitor compensation cabinets.
Status information can be transmitted to systems (e.g., intelligent monitoring systems) via the communication interface. When paired with fast/signal relays, automatic switch opening/closing can be easily implemented through communication. Additionally, the status monitored by the discrete input can be set as the trigger condition for relay output actions, enabling functions like latching and interlocking.

Address (HEX)	Data Content	Data Format	Data Length (BYTE)	Description
00	MM		2	Instrument Information (0 - 9999)
01	DZ		1	Instrument Address (1 - 254)
	TXK		1	Reserved
02	XSL		1	Reserved
	SRS		1	Reserved
03	PT		2	Voltage Ratio (Primary Side / Secondary Side)
04			2	Current Ratio (Primary Side / Secondary Side)
05-20				Reserved
21	DIO/INFO		2	Switch Information (0 = Open, 1 = Closed)
22				Reserved
23	DPT		1	Voltage Decimal Point Position
	DCT		1	Current Decimal Point Position
24	DPQ		1	Power Decimal Point Position
	SING		1	Power Sign Position

25	Ua	Int16	2	Phase A Voltage	Data Calculation: Voltage U Formula: U=(RX/10000)*(10~DPT) Current Formula: Current=(RX/10000)*(10~DCT) Power P Formula: P=(RX/10000)*(10~DPQ) Power Factor PF: PF=RX/1000 Frequency F: F=RX/100 Rx is the data stored in the corresponding register. Bits 0-7 of SIGN represent the signs of Pa, Pb, Pc, Ps, Qa, Qb, Qs respectively: 1 indicates a negative value, and 0 indicates a positive value.
26	Ub	Int16	2	Phase B Voltage	
27	Uc	Int16	2	Phase C Voltage	
28	Uab	Int16	2	Phase AB Voltage	
29	Ubc	Int16	2	Phase BC Voltage	
2A	Uac	Int16	2	Phase Ca Voltage	
2B	Ia	Int16	2	Phase A Current	
2C	Ib	Int16	2	Phase B Current	
2D	Ic	Int16	2	Phase C Current	
2E	Pa	Int16	2	Phase A Active Power	
2F	Pb	Int16	2	Phase B active Power	
30	Pc	Int16	2	Phase C active Power	
31	PΣ	Int16	2	Total active Power	
32	Qa	Int16	2	Phase A Reactive Power	
33	Qb	Int16	2	Phase B Reactive Power	
34	Qc	Int16	2	Phase C Reactive Power	
35	QΣ	Int16	2	Total Reactive Power	
36	Pfa	Int16	2	Phase A Power Factor	
37	Pfb	Int16	2	Phase B Power Factor	
38	Pfc	Int16	2	Phase C Power Factor	
39	Pfs	Int16	2	Total Power Factor	
3A	Sa	Int16	2	Phase A Apparent Power	
3B	Sb	Int16	2	Phase B Apparent Power	
3C	Sc	Int16	2	Phase C Apparent Power	
3D	SΣ	Int16	2	Total Apparent Power	

3E	F	Int16	2	Frequency	
3F-40	WPP	long	4	Forward Active Energy	Regarding 3F:It is the high byte; other parameters follow the same rule as secondary-side energy parameters (high bytes come first, low bytes follow). It is a 4-byte integer, with the unit of Wh (or varh).
41-42	WPN	long	4	Reverse Active Energy	
43-44	WQP	long	4	Forward Reactive Energy	
45-46	WQN	long	4	Reverse Reactive Energy	
47-48	EPP	Float	4	Forward Active Energy	Primary-side energy parameters:Adopt the IEEE 754 floating-point data format, with a 4-byte length. The unit is Wh (or varh).
49-4A	EPN	Float	4	Reverse Active Energy	
4B-4C	EPQ	Float	4	Forward Reactive Energy	
4D-4E	EQN	Float	4	Reverse Reactive Energy	
4F-50	Ua	Float	4	Phase A Voltage	Primary-side voltage parameters:Adopt the IEEE 754 floating-point data format, with a 4-byte length. The unit is V. For example, when the returned data is 45 09 81 9A, the primary-side voltage is 2200.1 V.
51-52	Ub	Float	4	Phase B Voltage	
53-54	Uc	Float	4	Phase C Voltage	
55-56	Uab	Float	4	Phase Ab Voltage	
57-58	Ubc	Float	4	Phase Bc Voltage	
59-5A	Uca	Float	4	Phase Ca Voltage	
5B-5C	Ia	Float	4	Phase A Current	Primary-side current parameters: Adopt the IEEE 754 floating-point data format, with a 4-byte length. The unit is A.
5D-5E	Ib	Float	4	Phase B Current	
5F-60	Ic	Float	4	Phase C Current	
61-62	Pa	Float	4	Phase A Active Power	Primary-side active power parameters:Adopt the IEEE 754 floating-point data format, with a 4-byte length. The unit is W.
63-64	Pb	Float	4	Phase B Active Power	
65-66	Pc	Float	4	Phase C Active Power	
67-68	PΣ	Float	4	Total Active Power	
69-6A	Qa	Float	4	Phase A Reactive Power	Primary-side reactive power parameters:Adopt the IEEE 754 floating-point data format, with a 4-byte length. The unit is var.
6B-6C	Qb	Float	4	Phase B Reactive Power	
6D-6E	Qc	Float	4	Phase C Reactive Power	

6F-70	QΣ			4	Total Reactive Power
71-72	Pfa	Float		4	Phase A Power Factor
73-74	Pfb	Float		4	Phase B Power Factor
75-76	Pfc	Float		4	Phase C Power Factor
77-78	Pfs	Float		4	Total Power Factor
79-7A	Sa	Float		4	Phase A Apparent Power
7B-7C	Sb	Float		4	Phase B Apparent Power
7D-7E	Sc	Float		4	Phase C Apparent Power
7F-80	SΣ	Float		4	Total Apparent Power
81-008F		Float	Reserved	30	
0090		Maximum Demand of Active Power	uInt16	2	0.1W
0091		Maximum Demand of Reactive Power	uInt16	2	0.1var
0092		Maximum Demand of Voltage	uInt16	2	0.1V
0093		Maximum Demand of Current	uInt16	2	0.001A
0094-97			Reserved	8	
0098		Current Demand of Active Power		2	0.1W
0099		Current Demand of Reactive Power		2	0.1var
009A		Current Demand of Voltage		2	0.1V
009B		Current Demand of Current		2	0.001A
009C-00FF			Reserved	200	
0100		Time of Period 1 in Period 1 Table	hh:mm	2	Period 1 Table
0101		Tariff of Period 1 in Period 1 Table	uInt16	2	
0102		Time of Period 2 in Period 1 Table	hh:mm	2	
0103		Tariff of Period 2 in Period 1 Table	uInt16	2	
0104		Time of Period 3 in Period 1 Table	hh:mm	2	

0105		Tariff of Period 3 in Period 1 Table	uInt16	2	Period 1 Table
0106		Time of Period 4 in Period 1 Table	hh:mm	2	
0107		Tariff of Period 4 in Period 1 Table	uInt16	2	
0108		Time of Period 5 in Period 1 Table	hh:mm	2	
0109		Tariff of Period 5 in Period 1 Table	uInt16	2	
010A		Time of Period 6 in Period 1 Table	hh:mm	2	
010B		Tariff of Period 6 in Period 1 Table	uInt16	2	
010C		Time of Period 7 in Period 1 Table	hh:mm	2	
010D		Tariff of Period 7 in Period 1 Table	uInt16	2	
010E		Time of Period 8 in Period 1 Table	hh:mm	2	
010F		Tariff of Period 8 in Period 1 Table	uInt16	2	
0110-11F		Period 2 Table		32	The format of Period 2, 3, and 4 Tables is the same as that of Period 1 Table
0120-12F		Period 3 Table		32	
0130-13F		Period 4 Table		32	
0140-14F		1st-15th Public Holidays		30	
014F		Reserved		2	
0150-155		Time Zone		12	
0156-165		Reserved		32	
0166		Current Date (Month-Year)	yy:MM	2	Date and time are in BCD code
0167		Current Date (Day-Year-Week)	dd:mm	2	
0168			00	1	
		Current Time (Hour)	hh	1	
0169		Current Time (Minute-Second)	mm:ss	2	
016A		Automatic Meter Reading Day	dd:hh	2	
016B-017F		Reserved		42	
0180		A-Phase Voltage Harmonic DC Component	uInt16	2	Harmonic Content % = Rx / 100

0181		A-Phase Voltage Total Harmonics	uInt16	2	Harmonic Content % = Rx / 100
0182		A-Phase Voltage 2nd Harmonic	uInt16	2	
0183-19F		A-Phase Voltage 3rd-31st Harmonics	uInt16	58	
01A0		A-Phase Current Harmonic DC Component	uInt16	2	Harmonic Content % = Rx / 100
01A1		A-Phase Current Total Harmonics	uInt16	2	
01A2		A-Phase Current 2nd Harmonic	uInt16	2	
01A3-1BF		A-Phase Current 3rd-31st Harmonics	uInt16	58	
01C0		B-Phase Voltage Harmonic DC Component	uInt16	2	
01C1		B-Phase Voltage Total Harmonics	uInt16	2	
01C2		B-Phase Voltage 2nd Harmonic	uInt16	2	
01C3		B-Phase Voltage 3rd Harmonic	uInt16	2	
01E0		B-Phase Current Harmonic DC Component	uInt16	2	
01E1		B-Phase Current Total Harmonics	uInt16	2	
01E2		B-Phase Current 2nd Harmonic	uInt16	2	
01E3-1FF		B-Phase Current 3rd-31st Harmonics	uInt16	58	
0200		C-Phase Voltage Harmonic DC Component	uInt16	2	
0201		C-Phase Voltage Total Harmonics	uInt16	2	
0202		C-Phase Voltage 2nd Harmonic	uInt16	2	
0203-21F		C-Phase Voltage 3rd-31st Harmonics	uInt16	58	
0220		C-Phase Current Harmonic DC Component	uInt16	2	
0221		C-Phase Current Total Harmonics	uInt16	2	Harmonic Content % = Rx / 100
0222		C-Phase Current 2nd Harmonic	uInt16	2	
0223-23F		C-Phase Current 3rd-31st Harmonics	uInt16	2	
0240-0241		Forward Total Active Energy	ulong	4	Secondary-side energy parameters, ulong data format, 4-byte length, unit: Wh (varh), high byte first
0242-0243		Forward Active Energy (Tariff 1)	ulong	4	

0244-0245		Forward Active Energy (Tariff 2)	ulong	4	Secondary-side energy parameters, ulong data format, 4-byte length, unit: Wh (varh), high byte first
0246-0247		Forward Active Energy (Tariff 3)	ulong	4	
0248-0249		Forward Active Energy (Tariff 4)	ulong	4	
024A-024B		Reverse Total Active Energy	ulong	4	
024C-024D		Reverse Active Energy (Tariff 1)	ulong	4	
024E-024F		Reverse Active Energy (Tariff 2)	ulong	4	
0250-0251		Reverse Active Energy (Tariff 3)	ulong	4	
0252-0253		Reverse Active Energy (Tariff 4)	ulong	4	
0254-0255		Forward Total Reactive Energy	ulong	4	
0256-0257		Forward Reactive Energy (Tariff 1)	ulong	4	
0258-0259		Forward Reactive Energy (Tariff 2)	ulong	4	
025A-025B		Forward Reactive Energy (Tariff 3)	ulong	4	
025C-025D		Forward Reactive Energy (Tariff 4)	ulong	4	
025E-025F		Reverse Total Reactive Energy	ulong	4	Secondary-side energy parameters, ulong data format, 4-byte length, unit: Wh (varh), high byte first
0260-0261		Reverse Reactive Energy (Tariff 1)	ulong	4	
0262-0263		Reverse Reactive Energy (Tariff 2)	ulong	4	
0264-0265		Reverse Reactive Energy (Tariff 3)	ulong	4	
0266-0267		Reverse Reactive Energy (Tariff 4)	ulong	4	
0268-0269		Total Reactive Energy (Quadrant 1)	ulong	4	
026A-026B		Reactive Energy (Tariff 1, Quadrant 1)	ulong	4	
026C-026D		Reactive Energy (Tariff 2, Quadrant 1)	ulong	4	
026E-026F		Reactive Energy (Tariff 3, Quadrant 1)	ulong	4	
0270-0271		Reactive Energy (Tariff 4, Quadrant 1)	ulong	4	
0272-0273		Total Reactive Energy (Quadrant 4)	ulong	4	
0274-0275		Reactive Energy (Tariff 1, Quadrant 4)	ulong	4	

0276-0277		Reactive Energy (Tariff 2, Quadrant 4)			Secondary-side energy parameters, ulong data format, 4-byte length, unit: Wh (varh), high byte first
0278-0279		Reactive Energy (Tariff 3, Quadrant 4)	ulong	4	
027A-027B		Reactive Energy (Tariff 4, Quadrant 4)	ulong	4	
027C-027D		Total Reactive Energy (Quadrant 2)	ulong	4	
027E-027F		Reactive Energy (Tariff 1, Quadrant 2)	ulong	4	
0280-0281		Reactive Energy (Tariff 2, Quadrant 2)	ulong	4	Secondary-side energy parameters, ulong data format, 4-byte length, unit: Wh (varh), high byte first
0282-0283		Reactive Energy (Tariff 3, Quadrant 2)	ulong	4	
0284-0285		Reactive Energy (Tariff 4, Quadrant 2)	ulong	4	
0286-0287		Total Reactive Energy (Quadrant 3)	ulong	4	
0288-0289		Reactive Energy (Tariff 1, Quadrant 3)	ulong	4	
028A-028B		Reactive Energy (Tariff 2, Quadrant 3)	ulong	4	
028C-028D		Reactive Energy (Tariff 3, Quadrant 3)	ulong	4	
028E-028F		Reactive Energy (Tariff 4, Quadrant 3)	ulong	4	
0290-02DF		Previous Month's Energy	ulong	4	
02E0-032F		Month Before Last's Energy	ulong	4	
0330-043F		Reserved		544	Primary-side energy parameters, using IEEE754 standard
0440-048F		Current Month's Energy	float	160	Floating-point data format, 4-byte length, unit: Wh (varh), high byte first
0490-04DF		Previous Month's Energy	float	160	
04E0-052F		Month Before Last's Energy	float	160	