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YDM201D Single-phase electronic electric energy meter instructions



Guangdong Yada Electronics Co., Ltd



Hazards and warnings

Before installing, operating or maintaining this device, read this manual carefully, get it and gradually become yourself with the equipment. This document is not an operating manual for untrainees, and the company is not responsible for problems arising outside of its normal use.



Danger of electric shock, combustion, or explosion

- **Part of the equipment is in power danger, please operate strictly in accordance with the specifications.**
- **The equipment must be powered off and grounded prior to maintenance and overhaul.**
- **All mechanical parts, doors, covers, etc. shall be restored in place before the equipment is powered on.**
- **Equipment maintenance and installation work can only be performed by qualified personnel.**

Not using these precautions may cause serious injury.

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Chapter 1Product Introduction

1.1 Overview

YDM201D Single-phase electronic electricity meter is mainly used to measure the single-phase active power of low-voltage network. At the same time, the voltage, current, power and other electrical parameters can be measured, and RS485 communication function can be selected for users to monitor, collect and manage electricity. It can be flexibly installed in the distribution box to realize the metering, statistics and analysis of electric energy for different areas and different loads. The meter has the advantages of small size, high accuracy, good electromagnetic compatibility and convenient installation, and meets the relevant technical requirements of the meter in EN62052-11 and EN50470-3 standards.

1.2 Function introduction

function	function declaration
real-time measurement	Voltage and current measurement
	Active power, reactive power, apparent power, power factor, frequency measurement
Electric energy measurement	Forward active energy metering, reverse active energy metering, total active energy metering (forward+reverse)
	Reactive total electrical energy metering
LCD show	8-bit segment LCD display, with automatic cycle and key display
	Display the electrical parameters such as energy, voltage, current, power and power factors
	The displayed numerical units adopt the national legal units of measurement, such as: V, A, kW, kvar, kVA, kWh, etc
Communication	RS485 interface ,supports Modbus-RTU communication protocol, where Modbus protocol can read real-time electrical parameters (voltage, current, power, power factor, electric energy, etc.)
pulse output	Active energy pulse output
Key programming	3 Key programmable communication address, port rate, check bit, backlight time and other parameters

1.3 Model description

model	function
YDM201D	Single-phase AC voltage, current, power, power factor, frequency real-time measurement and electric energy measurement, suitable for AC 220V, 230V, 240V and other power grid systems.

Chapter II Installation

2.1 Installation for prevention and preparation

Before installing and operating this device, read the following information carefully and follow the following safety precautions instructions.



Danger

Danger of electric shock, explosion, or arc flash

- All power connections shall be disconnected before installation, inspection, testing or maintenance.
- There are no parts available by maintenance, please arrange qualified personnel for maintenance.
- Do not work alone or work in dangerous conditions.
- High current passing through the conductive material can cause severe burns.
- This instrument is suitable for measurements made in building facilities. Such as measurement on distribution boards, circuit breakers, wiring, including cables, junction bars, junction boxes, switches, output sockets, industrial equipment, and other equipment, such as a standing motor permanently connected to fixing facilities.
- If the equipment is not used in the manner specified by the manufacturer, the protection provided by the equipment may be compromised.
- The voltage input circuit for this instrument must be connected to an appropriate safety device or circuit breaker.
- RS485 connecting line must be double-layer insulated cable;
- The strong and weak current circuit should not use the same cable, and the wire core should be arranged in bundles respectively. The current line of the transformer is weak current, which cannot be tied together with strong current.
- The instruments shall be installed dry, clean and away from heat and strong electromagnetic fields.

Otherwise, death or serious injury may result!

2.2 Installation information

2.2.1 Installation dimensions

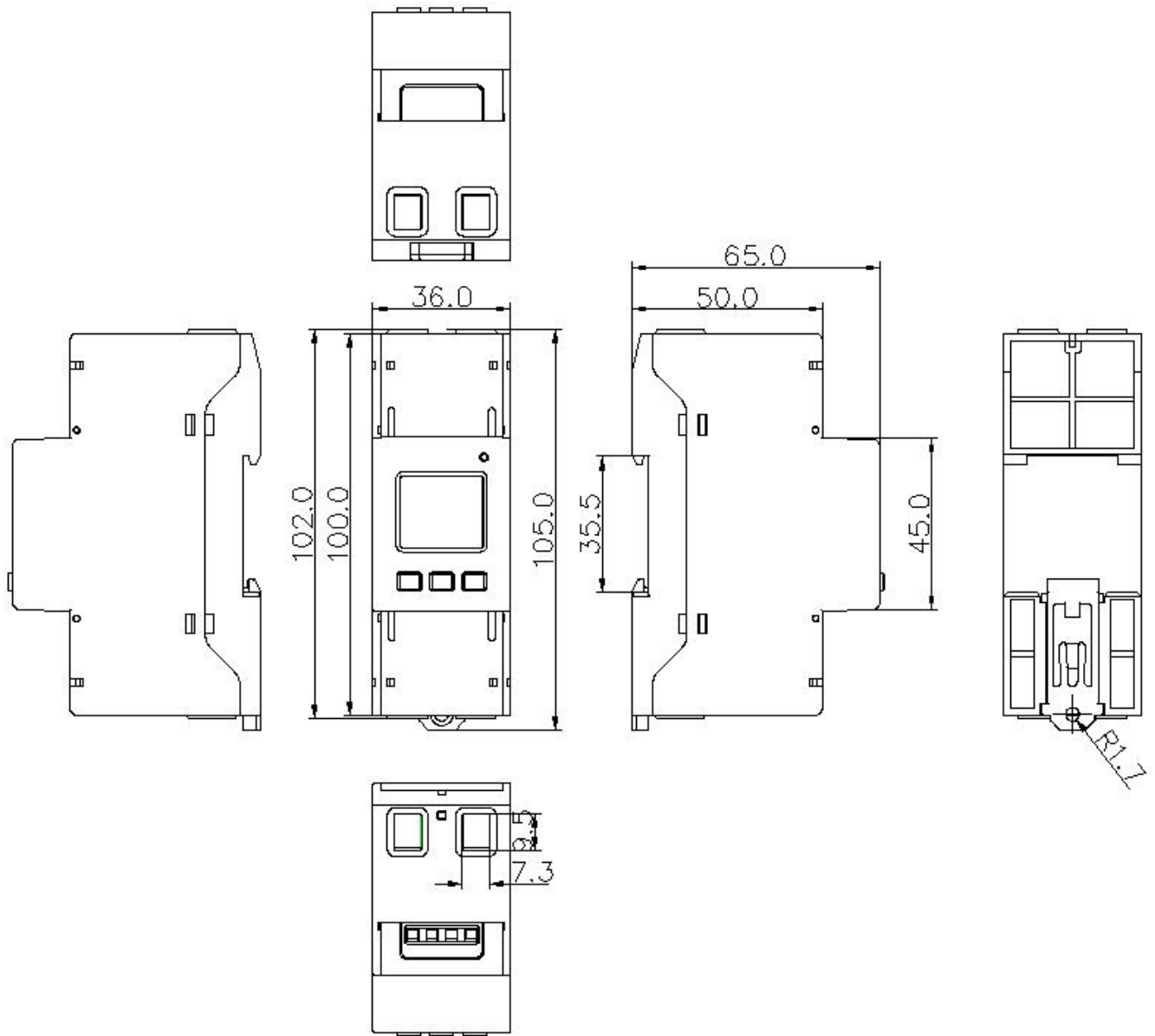
(1) Product host (unit: mm, tolerance: ± 0.5)

Overall dimensions: $36\pm 0.5\text{mm} \times 102\pm 0.5\text{mm} \times 65\pm 0.5\text{mm}$;

DIN rail installation size: 35mm;

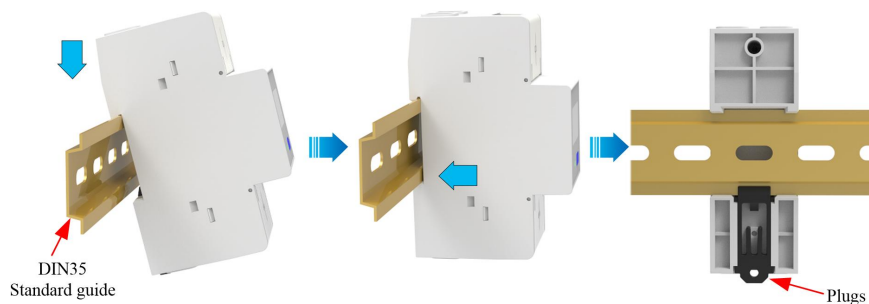
Weight: about 0.17kg;

Overall dimensions and installation dimensions are shown in the following figure:



2.2.2 Installation

- (1) Install the electricity meter on the DIN35mm standard guide rail.
- (2) Install the electricity meter on the standard guide rail from top to bottom, and then push the electricity meter into the guide rail from the bottom to the front.
- (3) When dismantling the machine, please use a screwdriver to forcibly hold the flexible insert tip ($\phi 3.4$), and then take out the electricity meter.



2.2.3 Cable requirements

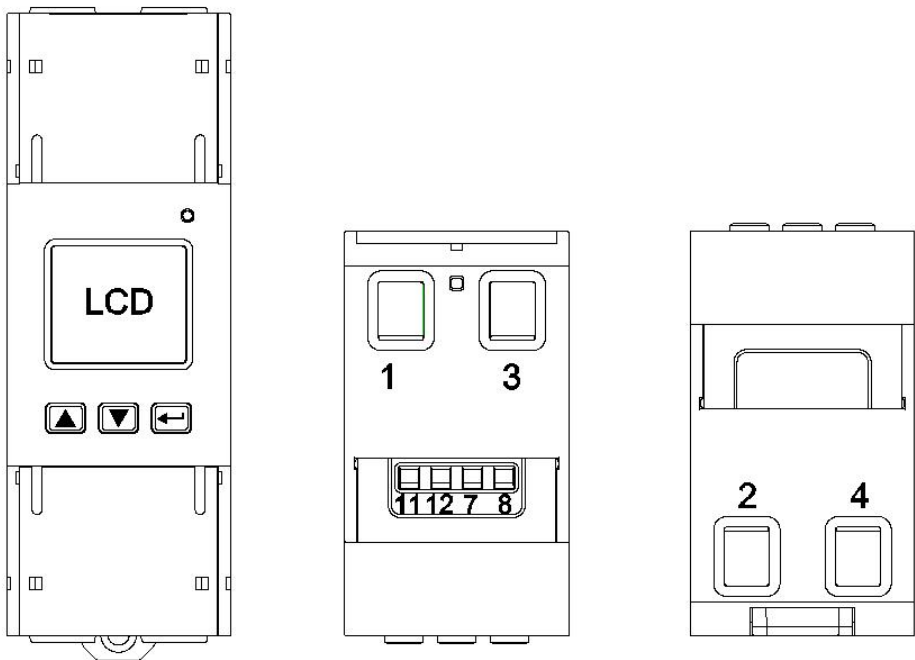
cable	port	type	Conductor section area	external diameter	behaviour of electricity	source
Voltage-current cable	L	Single core copper cable	4mm ² ~35mm ²	5~14mm	105℃、 600V	User preparation
	N					
Communication cable	RS485A	Two-core double twisted shielding wire	0.25mm ² ~1.5mm ²	4~11mm	80℃、 300V	User preparation
	RS485B					

pour:

- (1) The minimum cross-sectional area and diameter of the cable shall meet the local cable standards.
- (2) Factors affecting the cable selection include: rated current, cable type, laying method, ambient temperature and maximum expected line loss.

2.3 Interface definition

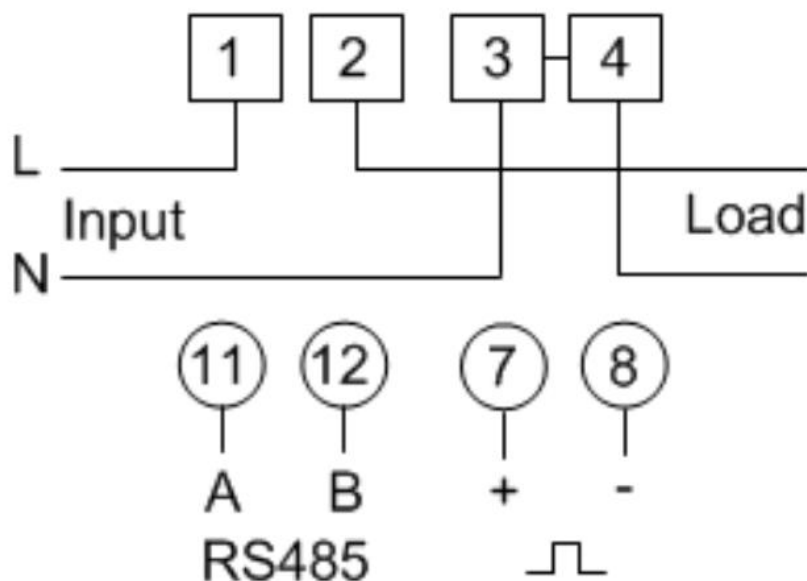
2.3.1 Panel description and interface definition



characteristic	function	description
	LCD show	Display the basic data, and the visual window size is: 21.4mm×18.4mm
	key	Turn the pages, shifting, add the values, and set
	Pulse indicator light	Electrical energy pulse indication function
1	AC voltage firewire input	Connect to the fire line on the grid side
3	The AC-voltage zero-line input	Connect to the zero line on the grid side
2	AC voltage firewire output	Load side
4	The AC-voltage zero-line output	Load side
11	RS485 Communications +	RS485 communication output positive electrode
12	RS485 Communications-	RS485 communication output negative electrode
7	Electricenergy pulse +	/
8	Electric energy pulse-	/

2.4 wiring diagram

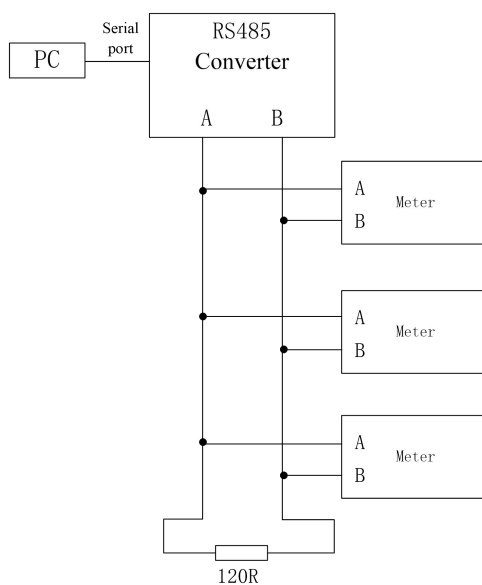
2.4.1 Terminal, wiring diagram



2.4.2 Communication

The RS-485 communication mode allows up to 32 meters are connected to a bus and is connected to the upper computer by an RS-485 converter. Communication cable can use ordinary shielded twisted pair, the total length should not exceed 1200 meters, the positive and negative polarity of RS-485 port of each equipment must be connected correctly.

If the shielding twisted pair is long, it is recommended to have a resistance of about 120Ω at its end to improve the reliability of the communication.



Chapter 3 Use and Operation

3.1 Key press definition

Key icon	Key name	Key function
	Up key	1、 When viewing the interface, turn up the screen to display; 2、 When programming, in the parameter interface, exit the menu; 3、 When programming, in the book editing interface, flashing digital right shift.
	Down key	1、 When viewing the interface, turn down the screen to display; 2、 When programming, in the parameter interface, turn over the screen display; 3、 When programming, in the editing interface, the flicker bit value decreases.
	Setting key	1、 When viewing the interface, enter the parameter screen; 2、 When programming, in the parameter interface, enter the editing interface; 3、 When programming, confirm the save settings in the editing interface;

3.2 Display instructions

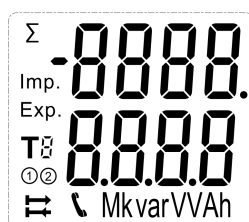
3.2.1 Display the functional description

(1) Using segment code liquid crystal display, display mode is divided into automatic cycle display and button switch display two kinds, display items can not be set.

(2) The display has backlight function, the backlight is white, and can be lit by the key. When there is no key operation, the delay is 60 seconds, and the backlight is closed; when the key is effectively operated, the backlight will light. In no operation, the backlight is closed after 60 seconds delay.

(3) Light Description: pulse indication (red): pulse constant 1000 imp / kWh.

(4) After the machine is powered on, the LCD enters the full display and holds for 5 seconds, and then automatically switch the measurement interface, can also pass, long press  the up key to enter the LCD full display, in the full display state, short press  the up key to exit the full display, the full display is as follows:



LCD display (full display)

3.2.2 Description of the data interface

(1) You can turn the page by pressing  up key or pressing  down key in serial number 1 to serial number 14. When there is no operation, the display will be automatically entered after 60 seconds, and the residence time of each page is fixed for 5 seconds:

order number	Display interface	explain	order number	Display interface	explain
1		Total active electric energy =1.200kWh	2		Positive active electric energy =1.000kWh
3		Reverse active power energy =0.200kWh	4		Total reactive power electric energy = 3.000 kvarh
5		Voltage =230.00V	6		Current =80.000A
7		Active power =9.200kW	8		Reactive power =9.200kW
9		Visual work power =18.4k VA	10		Power factor =1.000
11		Frequency =50.00Hz	12		Modbus-RTU Communication address=001
13		Production serial number is 6 bits high for a total of 12 bits	14		Production serial numbers were 6 bits lower for a total of 12 bits

Other symbol uses are said to be:

order number	Display interface	explain	order number	Display interface	explain
1		When the symbol is displayed on the liquid crystal, the machine is communicating	2		It means that the current is facing the user's power flow direction, that is, the positive (power) power trend
3		The current direction is opposite to the positive (electric energy) current direction	/	/	/

(2) Display the resolution and the display range

order number	Displays the project	unit	resolution ratio	indication range	remarks
1	Total electric energy	kWh	0.001	0.000~99999.999	/
			0.01	100000.00~999999.99	
			0.1	1000000.0~4294967.2	
2	Positive active power	kWh	0.001	0.000~99999.999	/
			0.01	100000.00~999999.99	/
			0.1	1000000.0~4294967.2	/
3	Reverse active power	kWh	0.001	0.000~99999.999	/
			0.01	100000.00~999999.99	/
			0.1	1000000.0~4294967.2	/
4	Total reactive power	kvarh	0.001	0.000~99999.999	/
			0.01	100000.00~999999.99	/
			0.1	1000000.0~4294967.2	/

5	voltage	V	0.001	/	/
6	current	A	0.001	/	/
7	active power	kW	0.0001	/	/
8	reactive power	kvar	0.0001	/	/
9	apparent output	kVA	0.0001	/	/
10	power factor	/	0.001	-1~0~1	/
11	frequency	Hz	0.01	45~65Hz	/

3.2.3 Parameter setting interface

In any display item in the measurement display interface, press  the Set key to enter the communication address "MAdr 001" in the parameter interface. Press  the down key to scroll through the screen to view the version number, baud rate/check bit, LCD backlight time, and software version. If you need to update a parameter, press  the button on the corresponding parameter screen, the password screen "Pd 0000" is displayed, and enter the password "Pd 2000". And press  to confirm. After the password is entered correctly, the preset parameter blinks. You can change the parameter. After entering the password on the parameter screen, you can also change the Settings for other items.

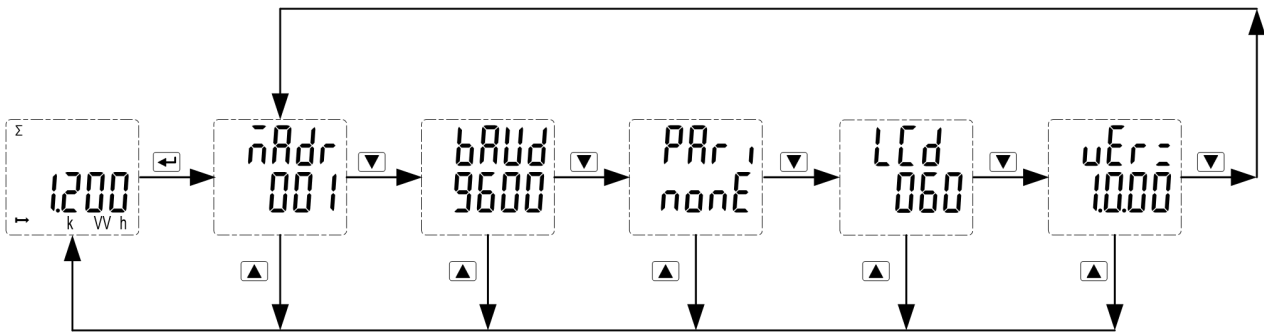
In the parameter or editing interface, if no key action within 60 seconds, will automatically return to the measurement interface.

Can set the parameter items:

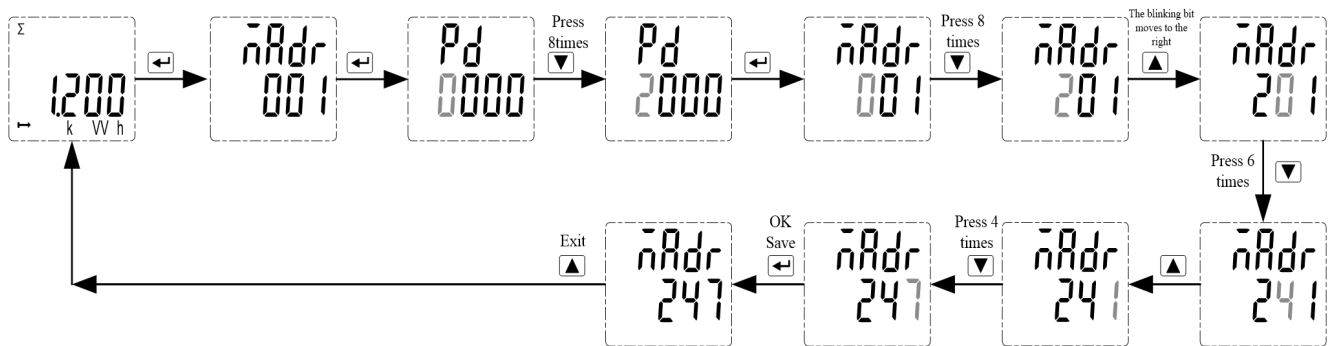
Order number	Parameter interface	Meaning	Setting range	Factory default
0		Password Settings	2000	Fixed 2000, not changeable
1		ModBus-RTU mailing address setting	1~247	001
2		Porter rate selection	1200:1200bps 2400:2400bps 4800:4800bps 9600:9600bps 19200:19200bps 38400:38400bps	9600
3		Check bit selection	None: no check; Odd: odd; Even: even check.	None without a check
4		Backlight time setting	In 0~300 seconds, 0 is always bright	60 Seconds
5		Version number Ver 1.0.00	Do not set	The final instrument display shall prevail

3.2.4 Key operation for example

(1) Parameter viewing:

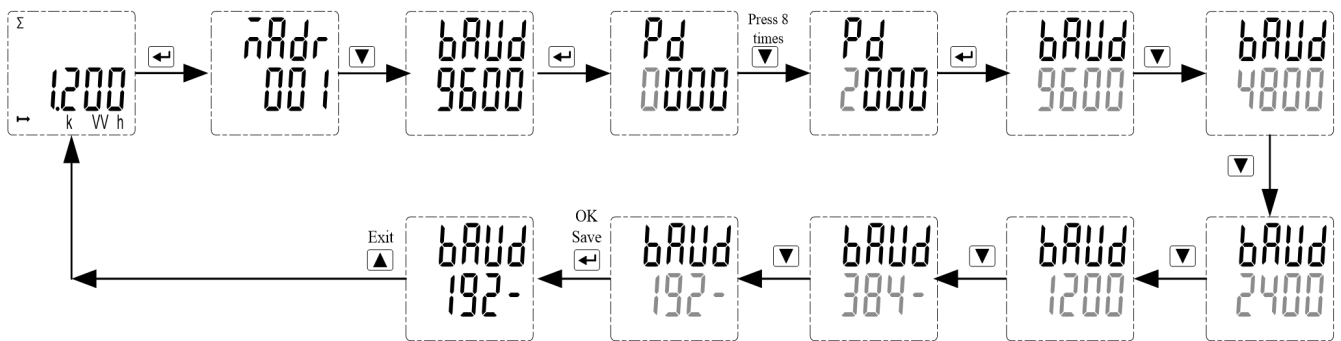


(2) The mailing address is set from 001 to 247. The specific operation are as follows:

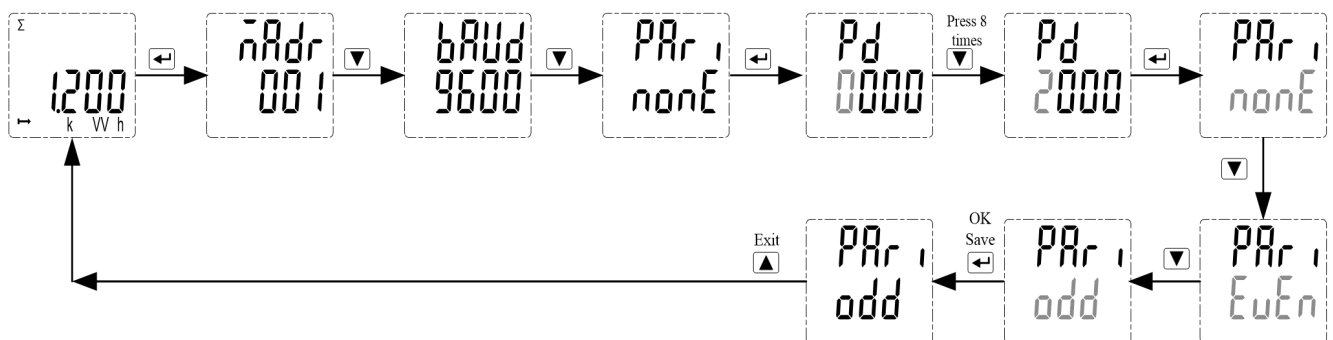


Note: The font in the above virtual box is gray means that this bit is flashing.

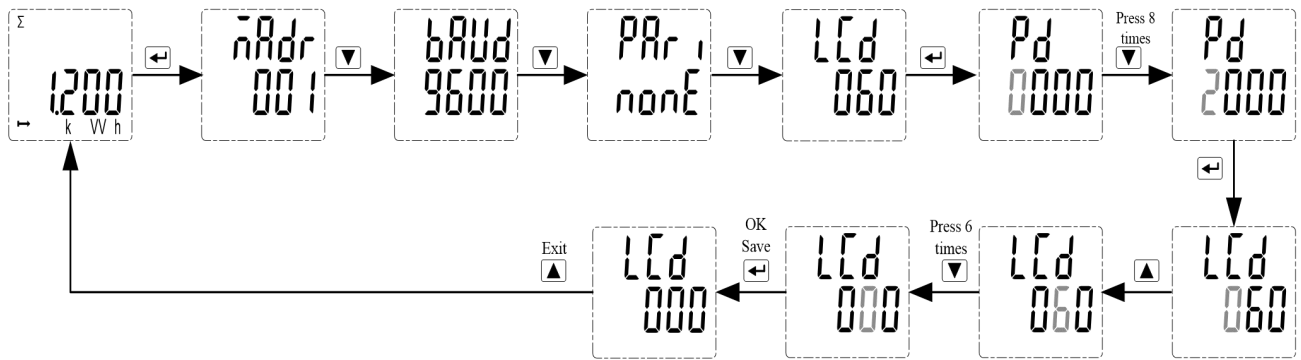
(3) The port rate is set from 9600 to 19200 as follows:



(4) The check bit is set by the odd check odd without check nonE as follows:



(5) The backlight delay is set from 60 seconds to 0 as follows:



Chapter IV Technical indicators

4.1 Specifications

project	Specifications1	Specification 2
nominal voltage U_n	AC230V	AC230V
minimum current I_{min} — nominal current I_n (maximum current I_{max})	0.25-5(80)A	0.25-5(80)A
Pulse constant constant	1000imp/kWh	1000imp/kWh
breakover current I_{tr}	0.5A	0.5A
nominal frequency f_n	50Hz/60Hz	50Hz /60Hz
Accuracy level (active power energy)	A level	B level
Note: The above parameters shall be marked on the nameplate.		

4.2 Test accuracy

project	Index (Specification I)	Index (Specification II)	measuring range
current	$\pm 0.5\%$	$\pm 0.5\%$	$I_{tr} \leq I \leq I_{max}$
	$\pm 1\%$	$\pm 1\%$	$I_{min} \leq I < I_{tr}$
voltage	$\pm 0.5\%$	$\pm 0.5\%$	$0.8U_n \sim 1.2U_n$
active power	$\pm 1\%$	$\pm 1\%$	When $I_{tr} \leq I \leq I_{max}$ range
reactive power	$\pm 2\%$	$\pm 2\%$	/
frequency	$\pm 0.02\text{Hz}$	$\pm 0.02\text{Hz}$	45Hz~65Hz
power factor	$\pm 2^\circ$	$\pm 2^\circ$	0.5L~1.0~0.5C
Active power	A Class	B Class	/
reactive power	A Class	AClass	/

(1) The maximum allowable error of electric energy is basic

When the percentage error caused by the change in the current and power factors within the range given in Table 1 shall not exceed the limit of the corresponding accuracy level given in Table 1.

If it is a bidirectional representation, the values in Table 1 apply to each direction.

Table 1 percentage error limits (single-phase instruments and multi-phase instruments with balanced or single-phase loads)

current	power factor	Percentage error limit /% of instrument level		
		A	B	C
$I_{min} \leq I < I_{tr}$	1	± 2.5	± 1.5	± 1.0
$I_{tr} \leq I \leq I_{max}$	From 0.5L to 1 to 0.8C	± 2.0	± 1.0	± 0.5
$I_{st} \leq I < I_{min}$	1	$\pm 2.5 \cdot \frac{I_{min}}{I}$	$\pm 1.5 \cdot \frac{I_{min}}{I}$	$\pm 1.0 \cdot \frac{I_{min}}{I}$
Note: $I_{st} \leq I < I_{min}$ Tested only under balanced load conditions.				

(2) Start

The meter shall start at the following specified voltage, power factor, frequency and starting current, and the electric energy shall be recorded continuously.

voltage	power factor	frequency	The meter level corresponds to the starting current I_{start}		
			A	B	C
176V	1.0	50Hz or 60Hz	$0.05I_{tr}$	$0.04I_{tr}$	$0.04I_{tr}$

(3) shunt running

When applying the 115%U_n When the current line has no current, the instrument should not produce more than one pulse in the shortest Δt time.

The shortest amount of Δt is:

$$\Delta t \geq \frac{240 \times 10^3}{k \cdot m \cdot U_{test} \cdot I_{start}} [min]$$

Where: k-pulse constant (imp / kWh), m-number of measurement elements, U_{test}-Maximum operating voltage (V),

I_{start}-Starting current (A)

4.3 Communication parameters

project	parameter	project	parameter
communication port	RS-485 (double line), isolated communication	check bit	No check/even check/odd check (factory default no check)
communication address	001~247 (factory default 001)	data bit	8bits
Baud rate	1200/4800/9600/19200/38400 (factory default 9600bps)	stop bit	1bits
Communication protocol	ModBus-RTU, protocol	Communication distance	The interval between sending two commands >40ms
Data upload	Data communication was performed by the standard ModBus protocol	response time	≤300ms

4.4 Use environment

4.4.1 Electrical parameters

project	metric	project	metric
Operating voltage range	176VAC~264VAC	Limit operating voltage range	154VAC~288VAC
Overvoltage classes	III	Measurement category	CAT-III-230
Operating frequency range	45Hz~65Hz	Power power consumption	≤1.5W

4.4.2 Operating environment conditions

project	metric	project	metric
operating temperature range	-25°C~55°C	Extreme operating temperature range	-40°C~70°C
Storage and transport temperature range	-40°C~85°C	Working relative humidity	5%~95% (no condensation exposure)
height	≤2000 meters	class of pollution	2
atmospheric pressure	86kPa~106kPa	Application place	Indoor meter (H1 and H2)
IP grade	Panel IP51, shell IP20	type of use	Single phase two lines

4.5 Electromagnetic compatibility

project	metric	satisfied
RE(radiation emission)	CLASS B (-3dB) @30MHz~6GHz	No limit value-3dB
RS (radiation immunity)	10V/m、80%AM(1k Hz)、80~6000MHz;	criterion A
	30V/m、80%AM(1k Hz)、80~6000MHz;	
CE(conducted emission)	CLASS B (-3dB) @150kHz~30MHz	No limit value-3dB
CS (conduction disturbance immunity)	10V、80%AM(1kHz)、0.15~80MHz;	criterion A
SURGE (surge disturbance immunity), shock current	RS485 communication port protection level: wave surge difference mode 4k V (internal resistance 42 Ω, 1.2 / 50us);	criterion B
	RS485:4k V surge to AC power supply; (485 signal line connected to AC input line and verified)	criterion B
	Power port: surge differential mode 4kV ;	criterion B
EFT (electric fast transient pulse group immunity)	Power and communication ports ± 4kV;	criterion A
Voltage-drop, short time interruption test	Voltage interruption test, Δ U voltage decreased by 100%, duration 5s, test times 10 times, interval between trials 10s;	criterion B
	Voltage drop test, Δ U voltage reduced by 60%, duration 1s, 10 times, interval between tests 10s;	criterion B
	Voltage temporary drop test, Δ U voltage reduced by 60%, duration 0.5s, test times 10 times, interval between tests 10s;	criterion B
	Voltage temporary drop test, Δ U voltage reduced by 60%, duration 0.5s, test times 10 times, interval between tests 10s;	criterion B
Harmonic (Power supply port current harmonics)	50-2000Hz, Class A product requirements	Class A
ESD (Electrostatic discharge immunity)	Contact discharge ± 8kV; air discharge ± 15kV;	criterion B
Power-frequency magnetic field immunity	The PMS index of the unit shell port meets the requirements of IEC61000-4-8 standard, and the specific requirements are the system index-steady state: 30 A/m, 1 minute test;	criterion A
General judgment: A: The temporary reduction or loss of basic function is not allowed; the power register content of the display should be read without ambiguity, but the degradation of display quality (such as color, brightness, contrast, clarity, clarity, geometry, etc.) is acceptable. At any time during the test, the error offset due to impact or interference shall not exceed the limit specified by the standard instrument for each accuracy level. B: Temporary reduction or loss of function or performance is allowed, including temporary decrease or loss of communication, temporary reduction or loss of display function, and self-reset of embedded software (firmware), but the power control switch and load switch shall not act unexpectedly, and the contents of the power register displayed by the display shall be read without ambiguity. No change in the value of the instrument power register at any time during and immediately after the test. Note: When the influence amount or interference is removed and restored to the reference test conditions, the instrument should not be damaged, and shall be operated correctly according to the relevant provisions of the standard, and its own measurement performance is not allowed to be reduced. All instrument functions shall be restored.		

4.6 Protection grade, rated pulse voltage, power frequency voltage resistance

project	metric
levels of protection	II
Rated pulse voltage	Voltage input to RS485 communication: voltage peak 6kV standard 1.2 / 50us pulse
Power frequency and pressure resistance	Voltage input to RS485 communication: 3.0kV · min · mA

Chapter VMaintenance and Troubleshooting

5.1 Troubleshooting

fault phenomenon	analysis of causes	processing method
The upper power is not shown	1. Wrong wiring mode.	1. If the wiring mode is incorrect, please follow the correct wiring mode (see the wiring diagram).
	2. Abnormal power supply voltage.	2. If the power supply voltage is abnormal, please provide the voltage according to the collector specification.
RS485Communication anomaly	1. RS485 communication line is not connected, short circuit or reversed.	1. If there is any problem with the communication cable, please replace the cable.
	2. The communication address, port rate, data bit and check bit are not consistent with the host.	2. Set the communication address, port rate, data bit and check bit consistent with the host. See the Parameter Settings for the key setting operation.
Improper electricity metering	1. Incorrect wiring, check whether the phase sequence corresponding to the voltage and the current is correct.	If the wiring mode is incorrect, follow the correct wiring mode (see the wiring diagram).
	2. Check whether the high end and low end of the current transformer inlet line are connected.	

Note: If there are some unsolved problems, please contact our after-sales service department in time.

Chapter VI Quality Assurance

6.1 Quality Assurance

All new instruments sold to users shall be guaranteed free quality for the design, materials and process within 12 months after power operation. If the products are determined to meet the above warranty conditions, our company shall be responsible for free maintenance.

6.2 Quality limitation

The following device issues are not free warranty:

- Damage caused by incorrect installation, use, and storage.
- Beyond the abnormal operation and application conditions specified by the product.
- Instruments repaired by agencies or persons not authorized by the Company.
- Instruments beyond the free warranty period.

Note: The above pictures are for reference only, and the product is subject to the physical object.



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