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PZ Series Programmable Wireless Meter

Installation ManualV1.1

Acrel Co., Ltd.

DECLARATION

The company reserves the right to modify the product specifications described in the manual without notice. Before placing an order, please consult your local agent for the new specifications of this product.

Content

1 Overview

PZ series programmable wireless meters include PZ72L-E4/HZKC, PZ96L-E4/HZKC and other products. It is a comprehensive power monitoring instrument designed by our company in accordance with IEC standards and synchronized with international advanced technology. This series of products has a comprehensive three-phase AC power measurement, four-quadrant power measurement, harmonic analysis, remote signal input, remote control output and other functions, mainly used for comprehensive monitoring and diagnosis of power supply quality of the power grid and power management. The instrument has RS485 communication function, which is convenient for users to monitor, collect and manage electricity consumption. It adopts compatible Modbus-RTU protocol; can carry 470MHz wireless communication; can carry four-channel switch input/two-channel switch output; four-channel NTC temperature measurement. According to different requirements, set and control parameters such as transformation ratio, alarm and communication through the keys on the instrument panel.

2 Product Specifications And Features

2.1 Specification

Feature \ Model[Note1]		PZ72L-E4/HZKC	PZ96L-E4/HZKC
Display method			
		LCD（Field）	LCD（Field）
Real-time measurement			
Current/voltage/frequency/power factor		√	√
Active/reactive/apparent power		√	√
Four-quadrant electric energy measurement		√	√
Harmonic analysis			
Fractional harmonics		√(2-31)	√(2-31)
Total harmonic content（THD）		√	√
Data record			
Rocord		√	√
Warning		√	√
Communication			
RS485 interface	Modbus protocol	√	√
	DL/T-645protocol	√	√

2.2 Product Auxiliary Functions

Instrument model	Appearance	Optional function	Co-selectable functions
PZ72L-E4/HZKC	72 square	①2DI2DO(K)	K is a required function, ②③ are optional function
		②4-channel temperature measurement(T)	
		③LORA Communication(LR)	
PZ96L-E4/HZKC	96 Square	①2DI2DO(K)	K is a required function,Select in ①②, ③④ is optional function
		②4DI2DO(K)	
		③4-channel temperature measurement(T)	
		④LORA Communication(LR)	

3 Technical Parameters

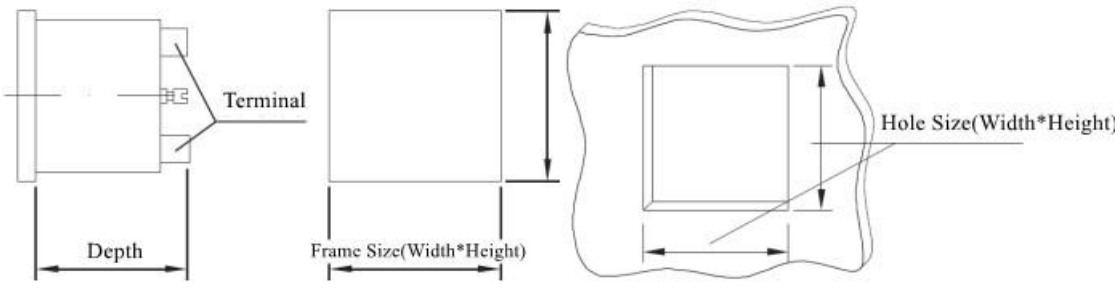
Technical Parameters			index
Input	Internet		Three-phase three-wire three-phase four-wire
	Frequency		45～65Hz
	Voltage		Rated value：AC 100V、400V
			Overload：1.2 times the rated value (continuous); 2 times the rated value/1s
			Power consumption: <0.2VA (each channel)
	Current		Rated value：AC 1A、5A
			Overload：1.2 times the rated value(continous；10 times the rated value/1s
			Power consumption: <0.2VA (each channel)
Output	Electric Energy Pulse		Output mode: open-collector optocoupler pulse (only 72 shape)
			Pulse constant: 4000imp/kWh (5A), 8000imp/kWh (1A)
	Communication		RS485 interface, Modbus-RTU protocol; DLT645 protocol
	Display		LCD
Function	Switch	Input	2 or 4 dry contact input
		Output	Output mode: 2 relay normally open contact output
			Contact capacity: AC 250V/3A, DC 30V/3
	Temperature measurement	Temperature measurement	4 channels NTC input, measuring range -20～100℃;
	LoRa	Frequency	470-510MHz

Instrument appearance	Face Frame Size		Shell Size			Cut-out Size	
	Width	Height	Width	Height	Depth	Width	Height
72 square	75	75	66	66	98	67	67
96 square	96	96	86	86	92	88	88

Measurement accuracy		Current and voltage: 0.2 level, power and active energy: 0.5 level, frequency 0.01 Hz, reactive energy: 1 level, temperature ±2°C
Power supply		AC85～265V or DC100～350V; power consumption≤4VA
safety	Power frequency withstand voltage	The power frequency withstand voltage between the shell and the auxiliary power supply, each input and output terminal group is AC 4kV/1min; The power frequency withstand voltage between the auxiliary power supply and each input terminal and each output terminal group is AC 2kV/1min; The power frequency withstand voltage between the voltage input and other input and output terminal groups is AC 2kV/1min; The power frequency withstand voltage between the current input and other input and output terminal groups is AC 2kV/1min; The power frequency withstand voltage between the relay output and other input and output terminal groups is AC 2kV/1min; The power frequency withstand voltage between each terminal group of switch input, communication, analog output, and pulse output is AC 1kV/1min;
	Insulation resistance	Input and output terminals to the chassis>100MΩ
Environment		Working temperature: -10℃～+55℃; Storage temperature: -25℃～+70℃; 5%～95% non-condensing; Altitude: ≤2500m;

4 Installation and wiring instructions

4.1 Shape and installation opening size (unit: mm)



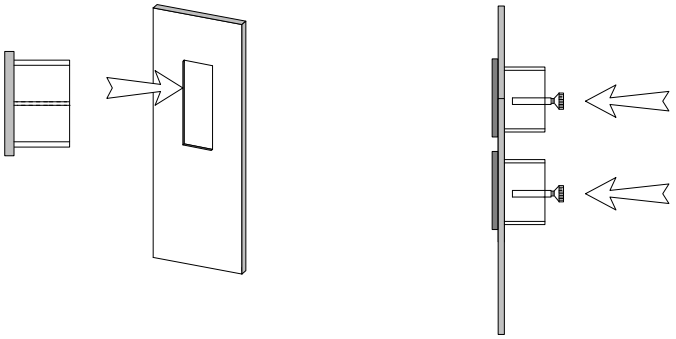
4.2 Installation method

The installation method is embedded, and the fixed method is extrusion. The specific operation is as follows:

a. On the switchboard, choose a suitable place to open an installation hole with the same size as the opening of the installed instrument;

b. Take out the meter, loosen the positioning screw (counterclockwise), and remove the mounting bracket;

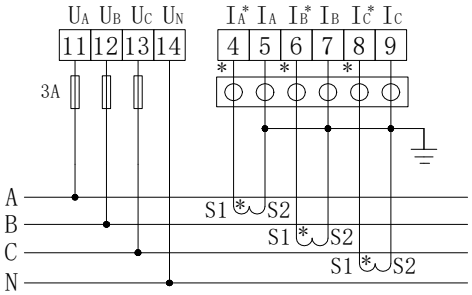
c. Insert the meter into the meter hole of the switchboard, insert the meter and install the mounting bracket and positioning screw (clockwise).



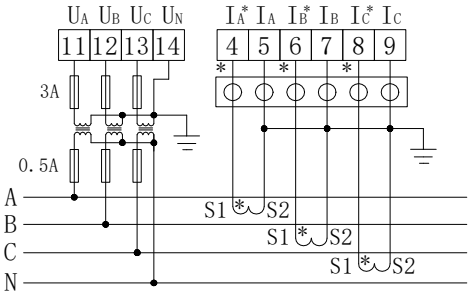
4.3 Terminals

4.3.1 Wiring method of instrument signal terminal

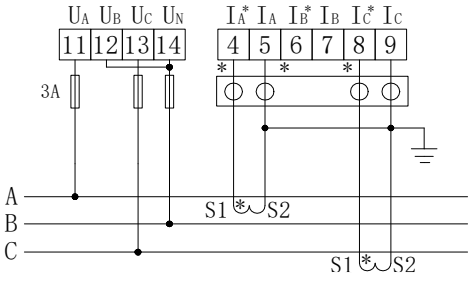
Signal terminal: "4, 5, 6, 7, 8, 9" is the terminal number of the input current signal; "11, 12, 13, 14" is the terminal number of the input voltage signal;



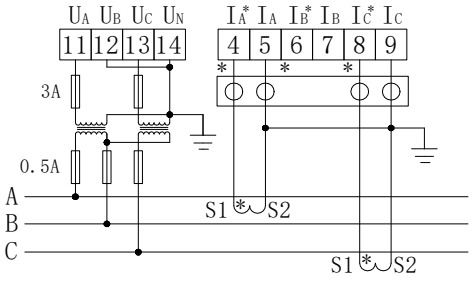
Three-phase four-wire (3CT)



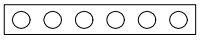
Three-phase four-wire (3PT 3CT)



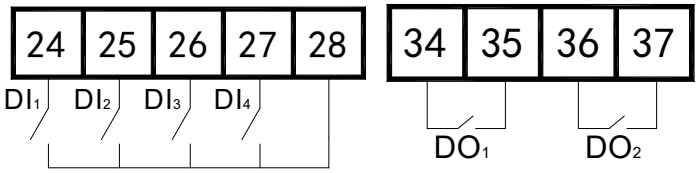
Three-phase three-wire (2CT)



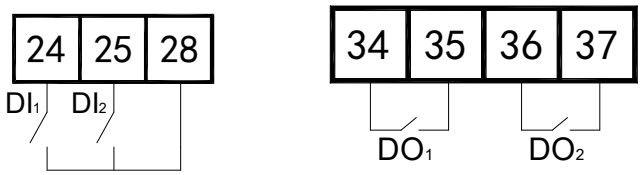
Three-phase three-wire (2PT 2CT)

注：  Is test terminal for short connection of CT secondary side

4.3.2 Wiring method of switch terminal

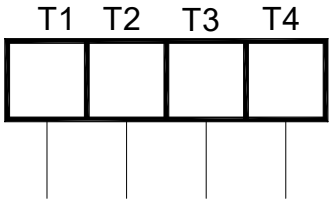


Switch Input(4DI) Switch Output(2DO)



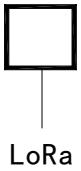
Switch Input(2DI) Switch Output(2DO)

4.3.3 Wiring of temperature measurement terminals



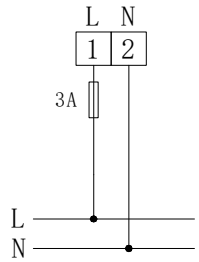
Test The Tempurature

4.3.4 Lora terminal wiring

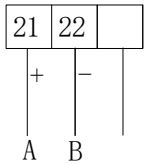


4.3.5 Wiring method of instrument auxiliary power supply and communication terminal

Instrument auxiliary power and communication terminals: "1, 2" is the auxiliary power terminal number, "21, 22" is the RS485 communication terminal number.



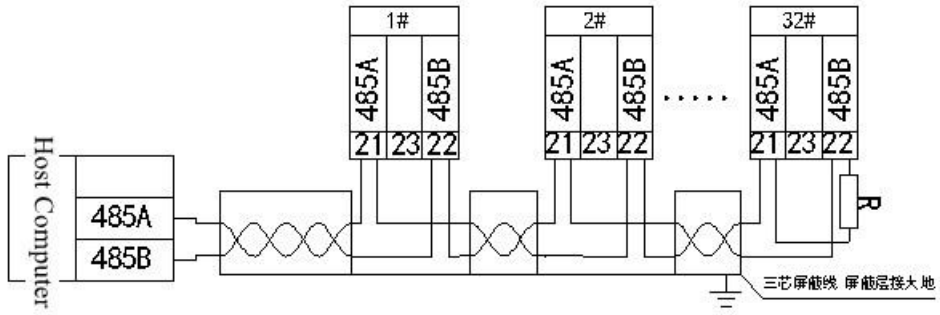
Auxiliary Power



RS485
Communication

The wiring example of the communication part is shown in the figure below:

Correct wiring method: connect the shielding layer of the communication cable to the ground

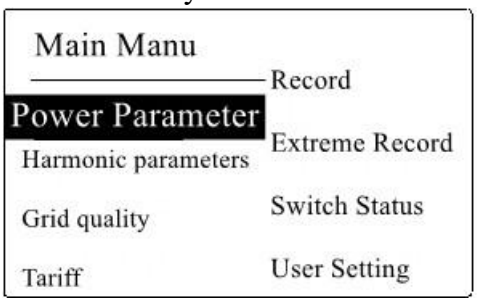


It is recommended to add a matching resistance between A and B of the last instrument, the resistance range is 120Ω~10 kΩ .

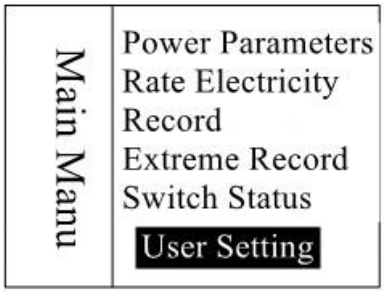
5 Programming and use

5.1 Main Menu

After the instrument is powered on, the interface will display the software version number instantly, and then the phase voltage interface will be displayed on the screen immediately. Press the SET key to enter the main menu interface. After entering the main menu, you can press the up or down key to select the item you want to view. When the item you want to view is in the highlighted state, press the enter key to enter the item.



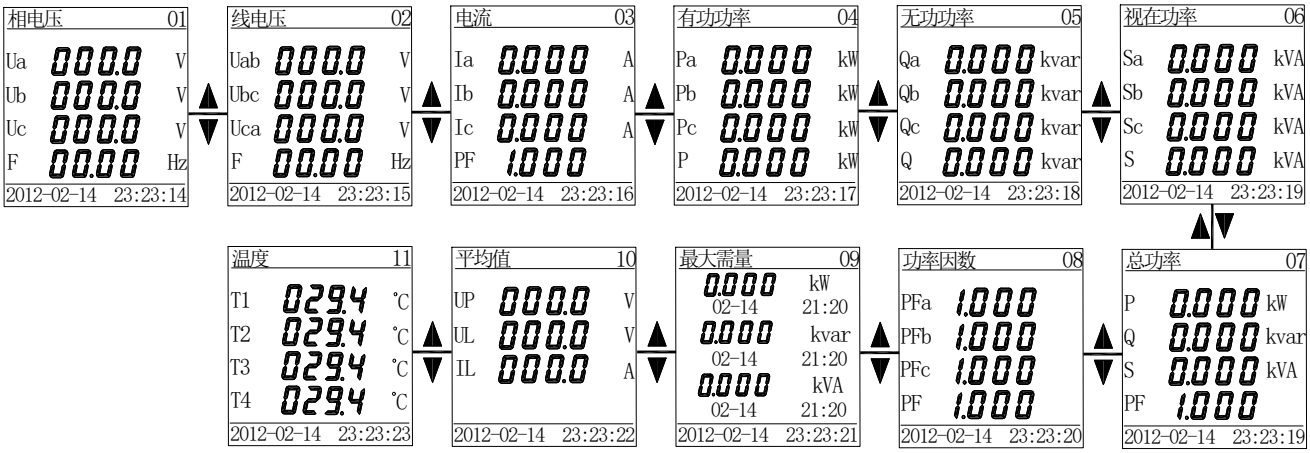
PZ96LW-E4/HT main menu interface



PZ72LW-E4/HT main menu interface

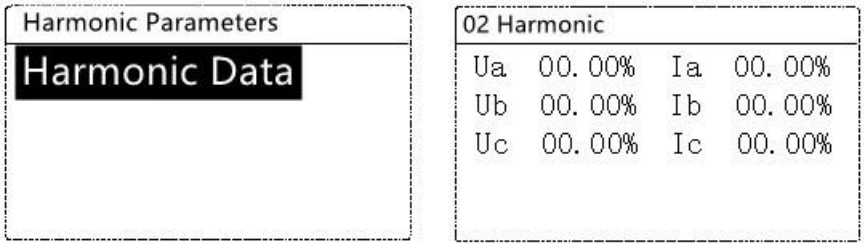
5.2 Flow chart for viewing power parameters

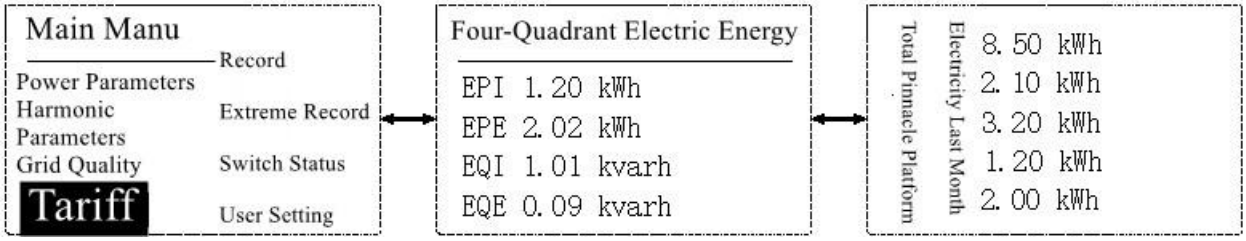
When the meter is powered on (or press the enter key after selecting the power parameter), the 01-11 interface as shown in the figure below will be displayed. Press the up and down keys to switch the display interface: phase voltage, line voltage, current, active power, reactive power, apparent power , Total power, power factor, maximum demand, average value, temperature. Note: Press the ENTER key on the phase voltage interface to enter the voltage angle interface, and press the ENTER key on the current interface to enter the current angle interface.



5.3 Harmonic parameter view flow chart

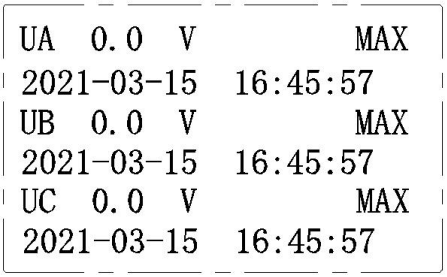
Select the harmonic parameter in the main menu and press Enter to enter the harmonic parameter interface, and then press Enter to enter the harmonic data interface. Press the left and right keys to view the harmonic data and total harmonics from the 02th to the 31st.





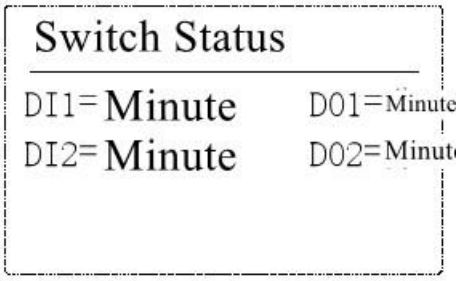
5.4 Flow chart for viewing extreme value records

After the instrument selects the extreme value record, press the Enter key to display the extreme valueinterface. The following figure shows the maximum value interface of the phase voltage; press the upand down keys to view the extreme values of other parameters (voltage U, current I, power P/Q/S, power factor PF, harmonic THD, frequency F, etc.).



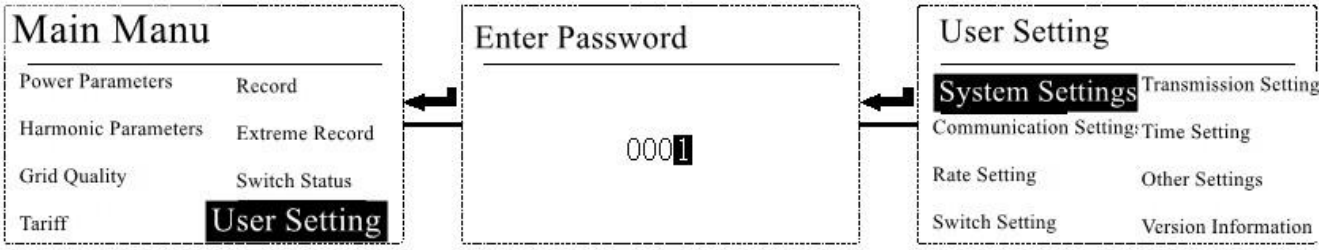
5.5 Flow chart for viewing switch status

After the instrument selects the switch status, press the enter key to display the switch status display interface. The switch status displays the real-time status of the current related switch input and relay output. When there is a switch input or output, the corresponding indicator position changes from off to on.

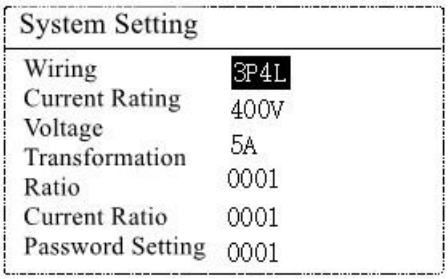


5.6 Flowchart of User Setting

After entering the main menu, press the left or right key to select the user setting item, and press the enter key to display the password input item. At this time, press the left and right keys to move the cursor on the one, ten, hundred, and thousand digits. When the digit is highlighted In the status, you can press the up and down keys to increase or decrease the digit. After the password (default is 0001) is entered correctly, press the enter key to enter the user setting interface.



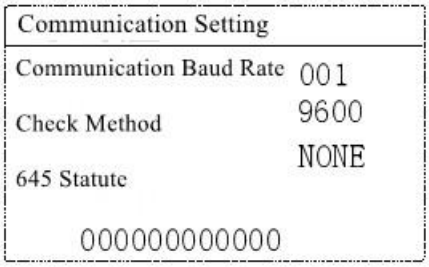
a) System settings After entering the user setting interface, the default system setting interface is in the reversed state, press Enter to enter the system setting interface. In the system setting interface, press the left and right keys to select the item that needs to be changed to make it in the reverse state; press the up and down keys to select the wiring mode (three-phase four-wire, three-phase three-wire), voltage level (100V, 400V, 600V), current Level (5A, 1A) voltage transformation ratio, current transformation ratio, password setting changes.

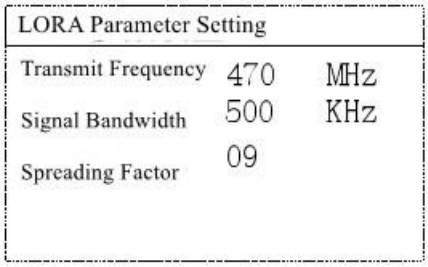


b) Communication settings

After entering the user setting interface, press the up and down keys to select the communication setting, and press the enter key to enter the communication setting interface. In the communication setting interface, press the up and down keys to switch between communication 1 and communication 2, and press the enter key to enter the communication setting and LORA parameter setting respectively.

In the communication sub-interface, press the left and right keys to select the item that needs to be changed and make it in the reversed state; Press the up and down keys to change the communication address (1～247), communication baud rate (1200 bps, 2400 bps, 4800bps, 9600bps, 19200bps, 38400bps), check method (NONE, EVEN, ODD, 2bits), 645 protocol address, Transmit frequency (460-510), signal bandwidth (7.8, 10.4, 15.6, 20.6, 31.2, 41.6, 62.5, 125, 250, 500), spreading factor (06-12).

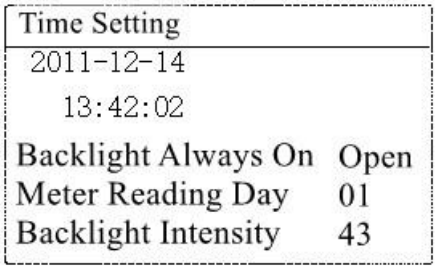




Communication 1 Communication2

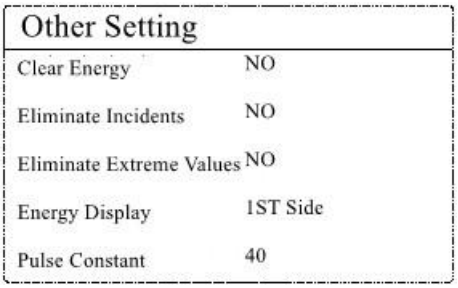
c) Time setting:

After entering the user setting interface, press the left and right keys to select the time setting, and then press the enter key to enter the time setting interface. After entering the time setting interface, press the up and down keys to select the item to be set, and press the left and right keys to modify the value of the setting item.



d) Other settings:

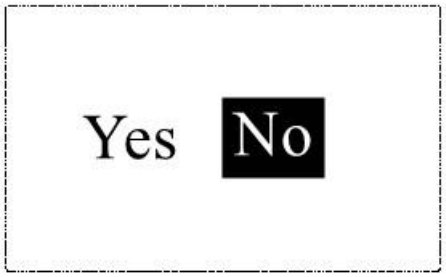
After entering the user settings interface, press the up, down, left, and right keys to select other settings, and then press the enter key to enter the other settings interface. Press the up and down keys to select the item to be set, and press the left and right keys to clear the setting item value. Note: If you need to clear the energy, select "Yes", and then press the Enter key, the energy will be cleared and cannot be recovered, and the maximum demand data will also be cleared. The actual value of the pulse constant is 100 times the displayed value. For example, when the pulse liquid crystal display is 100, the actual value is 10000.



e) Version information:

The version information will be displayed when the device is turned on, and the user can also view therelevant version information of the instrument in this interface.

f) Setting and saving: After the user has set the relevant parameters, press the Enter key to pop up the data saving interface, if you need to save, press the left button to select "Yes" and then press Enter; if you don't need to save, select "No" and then press Enter To exit the setting interface.



6 Packaging

The package contains the following items: host (including plug-in terminal block, 2M antenna (optional)), mounting bracket, certificate (anti-counterfeiting label), installation and operating instructions.

When opening the product package, please check carefully for damage. If there is any damage, please notify ACREL or its agent in time, and please keep the damaged outer package, and the company will replace it in time.

7 Matters needing attention in construction

7.1 Voltage Input

The input voltage should not be higher than 120% of the product's rated input voltage (100V or 400V), otherwise PT should be used; a 3A fuse must be installed at the voltage input terminal; the wiring method of the product should be set according to the PT wiring method of the product. as follows:

Wiring	Select
2 elements	3P3L
3 elements	3P4L

7.2 Current Input

The standard rated input current is 1A or 5A, and an external CT is required (it is recommended to use a wiring block, do not directly connect to the CT for easy disassembly); ensure that the input current corresponds to the voltage, the phase sequence is consistent, and the direction is the same; There are other instruments connected to the loop, and the wiring should be connected in series;

Before removing the product's current input connection, be sure to disconnect the CT primary circuit or short-circuit the secondary circuit!

7.3 Communication wiring

The instrument provides asynchronous half-duplex RS485 communication interface, adopts MODBUS-RTU protocol, all kinds of data information can be transmitted on the communication line. In theory, up to 128 network power meters can be connected to one line at the same time, and each network power meter can set its communication address (Addr). It is recommended to use shielded twisted-pair cable for communication connection, the wire diameter is not less than 0.5mm2. When wiring, keep the communication line away from the strong electric cable or other strong electric field

environment.

8 Communication description

8.1 Introduction

The communication of PZ72L-E4/HZC and PZ96L-E4/HZC adopts MODBUS-RTU communication protocol. The MODBUS protocol defines the check code and data sequence in detail, which are all necessary content for specific data exchange.

8.2 Overview of communication protocol

The PZ instrument uses the MODBUS-RTU communication protocol. The MODBUS protocol defines the check code, data sequence, etc., which are necessary for specific data exchange. The MODBUS protocol uses a master-slave response connection (half duplex) on a communication line. When the signal of the host computer is addressed to a unique terminal device (slave), the terminal device sends a response signal to the host.

The MODBUS protocol only allows communication between the host (PC, PLC, etc.) and terminal devices, and does not allow data exchange between independent terminal devices, so that each terminal device will not occupy the communication line when they are initialized, but is limited to response Inquiry signal arriving at the machine.

8.2.1 Transmission method

The information transmission is asynchronous, and the unit is byte. The communication information transmitted between the master and the slave is a 10-bit word format, including 1 start bit, 8 data bits (the least effective bit is sent first), There is no parity bit and 1 stop bit. If it is set to a parity bit or 2 stop bits, it is an 11-bit word format.

8.2.2 Information frame format

Address code	Function code	Data area	CRC verification code
1 byte	1byte	N byte	2 byte

Address code: The address code is at the beginning of the frame and consists of one byte (8-bit binary code). The decimal system is 0～255. Only 1～247 are used in the PZ instrument, and other addresses are reserved. These bits indicate the address of the terminal device designated by the user, which will receive data from the host connected to it. The address of each terminal device must be unique, and only the addressed terminal will respond to the query containing the address. When the terminal sends back a response, the slave address data in the response tells the host which terminal is communicating with it. Function code: The function code tells which function the addressed terminal performs. The following table lists the function codes used in this series of instruments, as well as their meanings and functions.

Function	definition	operating
03H/04H	Read the data register	obtain the current binary value of one or more registers
10H	Preset multiple registers	Set the binary value to a series of multiple registers

Data area: The data area contains the data required by the terminal to perform a specific function or the data collected when the terminal responds to a query. The content of these data may be

numerical values, reference addresses or setting values. For example: the function code tells the terminal to read a register, and the data area needs to specify which register to start and how many data to read. The embedded address and data vary according to the type and the content of the slave. CRC verification code: The error check (CRC) field occupies two bytes and contains a 16-bit binary value. The CRC value is calculated by the transmitting device and then appended to the data frame. The receiving device recalculates the CRC value when receiving the data, and then compares it with the value in the received CRC field. If the two values are not equal, it will happen. error.

The process of generating a CRC is:

a. Preset a 16-bit register as 0FFFFH (all 1s), which is called CRC register.

b. XOR the 8 bits of the first byte in the data frame with the low byte in the CRC register, and store the result back to the CRC register.

c. Move the CRC register one bit to the right, fill the highest bit with 0, and move the lowest bit out and check.

d. If the lowest bit is 0, repeat the third step (the next shift); if the lowest bit is 1, XOR the CRC register with a preset fixed value (0A001H).

e. repeat the third and fourth steps until 8 shifts. A complete eight bits have been processed in this way.

f. Repeat steps 2 to 5 to process the next eight bits until all bytes are processed.

g. the final CRC register value is the CRC value.

In addition, there is a method of calculating CRC using a preset table. Its main feature is fast calculation speed, but the table requires a larger storage space. This method will not be repeated here, please refer to related materials.

8.3 Introduction to Function Code

8.3.1 Function code

03H or 04H: read register This function allows users to obtain the data and system parameters collected and recorded by the device. The number of data requested by the host at one time is not limited, but it cannot exceed the defined address range. The following example is reading 3 basic data collected from slave 01 (each address in the data frame occupies 2 bytes) UAB, UBC, UCA, the address of UAB is 0028H, the address of UBC is 0029H, UCA The address is 002AH.

Host send		send Message
address code		01H
function code		03H
Start address	high byte	00H
	Low byte	28H
Number of registers	high byte	00H
	Low byte	03H
CRC check code	Low byte	85H
	high byte	C3H

Return from the machine		returned messages
address code		01H
function code		03H
Number of bytes		06H
Register data	high byte	Indefinite value
	Low byte	Indefinite value
Register data	high byte	Indefinite value
	Low byte	Indefinite value
Register data	high byte	Indefinite value
	Low byte	Indefinite value

CRC check code	Low byte	Indefinite value
	high byte	Indefinite value

8.3.2 Function code

10H: write register Function code 10H allows users to change the contents of multiple registers. The system parameters and switch output status of the instrument can be written with this function number. The host can write up to 16 (32 bytes) data at a time.

The following example is the meter output switch value Do 1 with the preset address 01. The address of the digital input/output status indication register is 0022H, the 9th-12th bits correspond to DI1-DI4, and the 13th-14th bits correspond to DO1-DO2 respectively.

Host send		Send message
address code		01H
function code		10H
Start address	high byte	00H
	Low byte	22H
Number of registers	high byte	00H
	Low byte	01H
Number of bytes		02H
0022H data to be written	high byte	10H
	Low byte	00H
CRC check code	Low byte	ADH
	high byte	12H

Return from the machine		returned messages
address code		01H
function code		10H
Start address	high byte	00H
	Low byte	22H
Number of registers	high byte	00H
	Low byte	01H
CRC check code	Low byte	A1H
	high byte	C3H

8.4 Correspondence address table

Adress	Name	Type	Remarks	word
0	Instrument address	R/W	The address of the instrument in the network node (001---127)	1
1	Communication rate	R/W	0--4800bps； 4--2400bps 1--9600bps; 5--1200bps 2--19200bps； 3--38400bps(Default communication rate).	1
2	Communication verification method	R/W	0--No check digit (default method); 1--odd parity bit; 2--even parity bit. 3--2 bits	1
3	Wiring	R/W	1--3 phase 3 wires; 2--3 phase 4-wire	1
4	Voltage level	R/W	0--100V； 1--400V； 2--600V.	1
5	Current rating	R/W	0--1A、 1--5A.	1
6	Voltage transformation ratio	R/W	Voltage transformation ratio (0001---9999).	1

7	Current ratio	R/W	Current ratio(0001---9999).	1
8	Backlight delay time	R/W	When set to 0, the backlight is always on; When set to 1-255, the backlight will turn off after 1-255 seconds.	1
9	Pulse constant	RO		1
53	The first switch input	RO	It is 1 when there is a switch input, and it is 0 when there is no switch input.	1
54	The second switch input	RO		1
55	The third switch input	RO		1
56	The fourth switch input	RO		1
57	The fifth switch input	RO		1
58	The sixth switch input	RO		1
59	The seventh switch input	RO		1
60	The eighth switch input	RO		1
61	The first switch output	R/W	When writing 1, the output relay contact is closed, When writing 0, the output relay contacts are separated.	1
62	The second switch output	R/W		1
63	The third switch output	R/W		1
64	The fourth switch output	R/W		1
65	Temperature 1 (T1)	RO		1
66	Temperature 1 (T2)	RO		1
67	Temperature 1 (T3)	RO		1
68	Temperature 1 (T4)	RO		1
75	Serial number 1, 2 bytes	R/W		1
76	Serial number 3, 4 bytes	R/W		1
77	Serial number 5, 6 bytes	R/W		1
78	Serial number 7, 8 bytes	R/W		1
79	Serial number 9, 10 bytes	R/W		1
80	Serial number 11,12 bytes	R/W		1
81	Serial number 13,14 bytes	R/W		1
84	LORA channel	R/W		1
85	LORA spreading factor	R/W		1
125	Current angle between Ia and Ib	RO		1
126	Current angle between Ib and Ic	RO		1
127	Current angle between Ic and Ia	RO		1
128	Year	R/W	Time; // BCD code format. When setting the time, you need to use the 10H command to set all the time	1
129	Month	R/W		1
130	Day	R/W		1
131	Time	R/W		1
132	Minute	R/W		1
133	Second	R/W		1
140	Voltage angle between Ua and Ub	RO	Number of decimal places for voltage angle: 1	1
141	Voltage angle between Ub and Uc			1
142	Voltage angle between Uc and			1

	Ua			
143-148	Event log 1	RO		6
149-154	Event log 2	RO		6
155-160	Event log 3	RO		6
161-166	Event log 4	RO		6
167-172	Event log 5	RO		6
173-178	Event log 6	RO		6
179-184	Event log 7	RO		6
185-190	Event log 8	RO		6
191-196	Event log 9	RO		6
197-202	Event log 10	RO		6
203-208	Event log 11	RO		6
209-214	Event log 12	RO		6
215-220	Event log 13	RO		6
221-226	Event log 14	RO		6
227-232	Event log 15	RO		6
233-238	Event log 16	RO		6
242	Neutral current	RO	The number of decimal places of the secondary current: 3	1
243	Phase voltage Uan	RO	The number of decimal places of the voltage on the secondary side: 1	1
244	Phase voltage Ubn	RO		1
245	Phase voltage Ucn	RO		1
246	Line Voltage Uab	RO		1
247	Line Voltage Ubc	RO		1
248	Line Voltage Uca	RO		1
249	Phase current Ia	RO	The number of decimal places of the secondary current: 3	1
250	Phase current Ib	RO		1
251	Phase current Ic	RO		1
252	Frequency F	RO	Number of decimal places of frequency: 2	1
253-254	A phase active power Pa	RO	Active power on the secondary side Decimal point: 2	2
255-256	B phase active power Pb	RO		2
257-258	C phase active power Pc	RO		2
259-260	Total reactive power Q total	RO		2
261-262	A phase apparent power Qa	RO	Reactive power on the secondary side Decimal point: 2	2
263-264	B phase apparent power Qb	RO		2
265-266	C phase apparent power Qc	RO		2
267-268	Total apparent power S total	RO		2
269-270	A phase apparent power Sa	RO	Apparent power on the secondary side Decimal point: 2	2
271-272	B phase apparent power Sb	RO		2
273-274	C phase apparent power Sc	RO		2
275-276	Total apparent power S total	RO		2
277	A phase power factor	RO	Power factor Number of decimal places: 3	1
278	B phase power factor	RO		1
279	C phase power factor	RO		1

280	Total power factor	RO		1
299	Voltage unbalance	RO	Voltage unbalance degree of decimal point: 1	1
300	Current unbalance	RO	Current unbalance degree of decimal point: 1	1
301-302	Maximum demand for active power	RO	Maximum demand number of decimal places: 2	2
303-306	Time when the maximum demand for active power occurs	RO	Time; // BCD code format.	4
307-308	Maximum demand of reactive power	RO	Maximum demand number of decimal places: 2	2
309-312	Time when the maximum demand of reactive power occurs	RO	Time; // BCD code format.	4
313-314	Apparent power maximum demand	RO	Maximum demand number of decimal places: 2	2
315-318	Apparent power maximum demand occurrence time	RO	Time; // BCD code format.	4
365-366	Positive active energy EPI	RO	Secondary power, 2 decimal places	2
367-368	Reverse active energy EPE	RO	Secondary power, 2 decimal places	2
369-370	Forward reactive energy EQL	RO	Secondary power, 2 decimal places	2
371-372	Reverse reactive energy EQC	RO	Secondary power, 2 decimal places	2
373-402	A phase voltage 2-31 each harmonic content rate	RO	Phase A voltage 2-31 harmonics; decimal places: 2	30
403-432	B phase voltage 2 — 31 each harmonic content rate	RO	Phase B voltage 2-31 harmonics; decimal places: 2	30
433-462	Cphase voltage2 — 31 each harmonic content rate	RO	Phase C voltage 2-31 harmonics; decimal places: 2	30
463-492	A phase current 2-31 harmonic content rate	RO	Phase A current 2-31 harmonics; decimal places: 2	30
493-522	B phase current 2-31 harmonic content rate	RO	Phase B voltage 2-31 harmonics; decimal places: 2	30
523-552	C phase current 2-31 harmonic content rate	RO	Phase C current 2-31 harmonics; decimal places: 2	30
553	A phase voltage total harmonic distortion rate	RO	Total harmonic content of phase A voltage; decimal places: 2	1
554	B phase voltage total harmonic distortion rate	RO	Total harmonic content of phase B voltage; decimal places: 2	1
555	C phase voltage total harmonic distortion rate	RO	Total harmonic content of phase C voltage; decimal places: 2	1
556	A phase current total harmonic distortion rate	RO	Total harmonic content of phase A current; decimal places: 2	1
557	B phase current total harmonic distortion rate	RO	Total harmonic content of phase B current; decimal places: 2	1
558	C phase current total harmonic distortion rate	RO	Total harmonic content of phase C current; decimal places: 2	1

1000	DIDO status	R/W	The high byte is DI (bit0 is DI1, bit1 is DI2, and so on, bit7 is DI8), and the low byte is DO (bit0 is DO1, bit1 is DO2, and so on, bit7 is DO8)	1
1001	No. 1 alarm selection	R/W	0-32, see the corresponding relationship in the 7.1.5 table for details. If the total active power alarms, this value is 16.	1
1002	1st alarm delay	R/W	0-9999 Unit: s; if the total active power alarms, this value is 16.	1
1003	No. 1 alarm dead zone	R/W	-9999 – 9999 See 7.1.5 for details, for example: the display value is 66.00Kw, the communication value is 6600	1
1004	No. 1 alarm high alarm	R/W		1
1005	No. 1 alarm low alarm	R/W		1
1006	1st alarm 0 alarm	R/W	0-1 (0: enable, 1: disable)	1
1007-1012	Road 2 (same as above)	R/W	There is one more combination alarm option than the first channel, the type selection is 0-33 (when the value is 33, the corresponding setting address is 1030-1037 effective), and the rest is the same as the first channel	6
1030	Combined alarm parameters Over frequency	R/W	-9999 – 9999 is valid only when the second alarm is a combined alarm, see 7.1.5 for details; for example: the display value is 66.00Kw, and the communication value is 6600	1
1031	Underfrequency	R/W		1
1032	Over power	R/W		1
1033	Underpower	R/W		1
1034	Overcurrent	R/W		1
1035	Under power factor	R/W		1
1036	Overvoltage unbalance	R/W	-1 – 9999 See 7.1.5 for details, for example: the display value is 55.00Kw, the communication value is 5500	1
1037	Overcurrent unbalance	R/W		1
1038	Combined alarm status	RO	The 0th bit represents the over-voltage alarm status, the first bit represents the under-voltage alarm status, and so on to the 9th bit	1
1100-1102	DLT/645 Adress	R/W		3
1370-1379	Total active energy	RO	Same as above	10
2000-2061	A phase voltage 2-63th harmonic content rate	RO	Phase A voltage 2-63 harmonics; 2 decimal places: 2	62
2062-2123	B phase voltage 2-63th harmonic content rate	RO	Phase B voltage 2-63 harmonics; 2 decimal places: 2	62
2124-2185	C phase voltage 2-63th harmonic	RO	Phase C voltage 2-63 harmonics; 2	62

	content rate		decimal places: 2	
2186-2247	A phase current 2-63th harmonic content rate	RO	Phase A current 2-63 harmonics; 2 decimal places: 2	62
2248-2309	B phase current 2-63th harmonic content rate	RO	Phase B current 2-63 harmonics; 2 decimal places: 2	62
2310-2371	C phase current 2-63th harmonic content rate	RO	Phase C current 2-63 harmonics; 2 decimal places: 2	62
2372	A phase voltage total harmonic distortion rate	RO	Total harmonic content of phase A voltage; decimal places: 2	1
2373	B phase voltage total harmonic distortion rate	RO	Total harmonic content of phase B voltage; decimal places: 2	1
2374	C phase voltage total harmonic distortion rate	RO	Total harmonic content of phase C voltage; decimal places: 2	1
2375	A phase current total harmonic distortion rate	RO	Total harmonic content of phase A current; decimal places: 2	1
2376	B phase current total harmonic distortion rate	RO	Total harmonic content of phase B current; decimal places: 2	1
2377	C phase current total harmonic distortion rate	RO	Total harmonic content of phase C current; decimal places: 2	1
2378	A phase voltage total harmonic distortion rate	RO	The effective value of the fundamental wave of phase A voltage; the number of decimal places: 1	1
2379	B phase voltage total harmonic distortion rate	RO	The effective value of the fundamental wave of phase B voltage; the number of decimal places: 1	1
2380	C phase voltage total harmonic distortion rate	RO	The effective value of the fundamental wave of phase C voltage; the number of decimal places: 1	1
2381	RMS value of A-phase current fundamental wave	RO	The effective value of the fundamental wave of phase A current; the number of decimal places: 3	1
2382	RMS value of B-phase current fundamental wave	RO	The effective value of the fundamental wave of phase B current; the number of decimal places: 3	1
2383	RMS value of C-phase current fundamental wave	RO	The effective value of the fundamental wave of phase C current; the number of decimal places: 3	1
2400-2461	Phase A voltage 2-63 harmonic content (secondary side)	RO	Phase A voltage 2-63th harmonic; decimal point: 1, unit: V	62

2462-2523	Phase B voltage 2-63 harmonic content	RO	Phase B voltage 2-63th harmonic; decimal point: 1, unit: V	62
2524-2585	Phase C voltage 2-63 harmonic content	RO	Phase C voltage 2-63th harmonic; decimal point: 1, unit: V	62
2586-2647	Phase A current 2-63 harmonic content	RO	Phase A current 2-63 harmonics; number of decimal places: 3 Unit: A	62
2648-2709	Phase B current 2-63 harmonic content	RO	Phase B current 2-63 harmonics; number of decimal places: 3 Unit: A	62
2710-2771	Phase C current 2-63 harmonic content	RO	Phase C current 2-63 harmonics; number of decimal places: 3 Unit: A	62
2772	A phase voltage total harmonic content	RO	Total harmonic content of phase A voltage; decimal places: 1	1
2773	B phase voltage total harmonic content	RO	Total harmonic content of phase B voltage; decimal places: 1	1
2774	C phase voltage total harmonic content	RO	Total harmonic content of phase C voltage; decimal places: 1	1
2775	A phase current total harmonic distortion rate	RO	Total harmonic content of phase A current; decimal places: 3	1
2776	B phase current total harmonic distortion rate	RO	Total harmonic content of phase B current; decimal places: 3	1
2777	C phase current total harmonic distortion rate	RO	Total harmonic content of phase C current; decimal places: 3	1
3002	Average value of phase voltage	RO		1
3003	Average line voltage	RO		1
3004	Average current	RO		1
3008-3009	System running time	RW		2
3010-3013	The maximum value of UA and the time of occurrence	RW		1
3014-3017	The maximum value of UB and the time of occurrence	RW		1
3018-3011	The maximum value of UC and the time of occurrence	RW		1
3012-3015	The maximum value of UAB and the time of occurrence	RW		1
3016-3019	The maximum value of UBC and the time of occurrence	RW		1
3020-3023	The maximum value of UCA and the time of occurrence	RW		1
3224-3141	The format is the same as above: IA (phase A current), IB, IC, PA (phase A active power), PB, PC, PT (total active power), QA	RW	Each amount is 2 bytes in length	

	(phase A reactive power), QB, QC, QT, SA (A-phase apparent power), SB, SC, ST, PFA (A-phase power factor), PFB, PFC, PF, F (frequency), In (N-line current), UH-THDa (phase A voltage harmonic content), UH-THDb, UH-THDc, IH-THDa (phase A current harmonic content), IH-THDb, IH-THDc			
3142-3273	The minimum record of the above 33 quantities (UA - IH-THDc), the format is the same as above	RW	Each amount is 2 bytes in length	

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