### compere

**Multifunction Power Quality Analysis Meter** User InstructionsV1.0

### **Danger and Warning**

■ The device may only be installed by professionals. Caused any malfunction due to not follow the instructions in this manual, Manufacturers will not bear any responsibility

### **Electric shock burning and explosion**

- Devices can only be installed and maintained by qualified staff.
- Before any operation, the device should be isolated from the voltage input and power supply, and short circuit the secondary winding of all current transformers.
- Verify that the device is live before operation.
- All mechanical parts and covers should be restored in place before thedevice is energized.
- Device in use should provide the correct voltage. Not paying attention to these precautions may cause serious injury.

# 1.Technical Parameters

# 1.1 Environmental conditions

Working temperature: -25°C  $\sim$  +70°C Storage temperature:  $-30^{\circ}$ C  $\sim +75^{\circ}$ C

Relative Humidity: 5% ~ 95%

### Non-condensing Altitude: 3000 meters or less

1.2 Rated parameters

Device operating power: AC 85~265V, DC 100~310V Rated AC data: Phase voltage 57.7V/220V/400V

AC current 5A or 1A (ordering instructions) Frequency 50Hz

Digital input: Internal supply of DC 24V power Debounce time 40ms

Relay output: Small high-power relay Contact capacity 250VAC/5A, 30VDC/5A

Power consumption: AC voltage loop less than 0.5VA/phase (rated) less than 0.75VA/phase (at 5A) AC current loop

Less than 0.25VA/Phase (at 1A) **Unit Power Circuit** Less than 3VA

Overload capability: AC voltage loop

1.2 times rated voltage, continuous operation

2 times rated voltage, 10s allowed AC current loop: 1.2 times rated current, continuous operation

20 times rated current, allow 1s

Precision index

C1

CT

ABC

CT

set to 2LL3Ct)

Parameter	Accuracy	Resolution	Parameter	Accuracy	Resolution
Voltage	±0.2%	0.01V	Power factor	±1%	0.001
Current	±0.2%	0.01A	Active power	±0.5%	0.1kWh
Active energy	±0.5%	0.1W	Reactive power	±2.0%	0.1kvarh
Reactive	±2.0%	0.1var	Frequency	±0.02	0.01Hz
Apparent power	±0.5%	0.1VA	Temperature	±1°C	0.1°C

### 1.3 Electrical insulation performance

Power frequency withstand voltage: Conforms to the provisions of GB/T13729-2002 power frequency voltage 2KV, time 1 minute

Insulation resistance: Conforms to the provisions of GB/T13729-2002, the insulation resistance is not less than  $50M\Omega$ 

РΤ

Impulse voltage: Conforms to the provisions of GB/T13729-2002, bear the shock of 1.2k/50US peak for 5kV standard lightning

Ub

Uc

la+ la-

lc+

PE

Ua 16

Ub 18

Uc 20

Un<sub>2</sub>

la+ 14

<u>Ub</u> 18

Uc 20

la+ 14

Quad-line star system: Uses 3 voltage transformers (PTs) (device set to 3Ln3Ct)

2A

2A

Angle system: no voltage transformer (PT), 3 current transformers (CT) (Device is set to 2LL3Ct)

Angle system: use 2 voltage transformers (PT), 3 current transformers (CT) (Device is

2.32 Angle System Wiring Mode

Three hase C

D042

DI2

DI3

DI4

COM

485A

485B

485G

J<sub>D</sub>042

DI2

31 DI1

33 <sub>DI3</sub>

34 DI4

35 coм

7 485A

6 485B

5 485G

37 D011 38 B812 39 B821

+ 40 B031

+ 42 D032 + 43 D032 + 44 D042

31 DĬ1

32 DI2

33 DI3

34 DI4 ХДО354 СОМ 485A 6 485B 5 485G

### 1.4 Mechanical properties

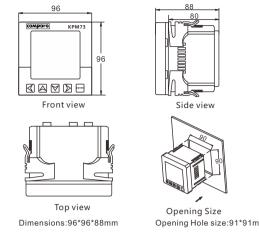
Vibration response: GB / T11287-2000 provisions, Harsh grade level 1 Vibration durability: GB/T11287-2000 provisions, Harsh grade level 1 Impact response: GB/T14537-1993 provisions, Harsh grade level 1 Impact durability: GB/T14537-1993 provisions, Harsh grade level 1 Collision: GB/T14537-1993 provisions, Harsh grade level 1

1.5 Electromagnetic compatibility
Electrostatic discharge immunity: GB / T17626.2-2006 level 4
Fast pulse group immunity: GB / T17626.4-2008 level Surge immunity: GB / T17626.5-2008 level 4

Power frequency magnetic field immunity: GB / T17626.8-2008 level 4

### 2. Selection, Installation and Wiring

### 2.1. Shape and opening size



### 2.2 Terminal wiring

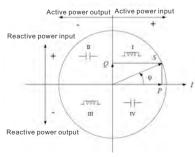
### РΤ 中 40 D022 D031 Ub 18 + 42 B032 + 43 B031 + 44 D042 <u>Uc</u> 20 Un 22 CT 31 DĬ1 32 <sub>DI2</sub> \_33 <sub>DI3</sub> <u>34</u> DI4 35 COM 7 485A 88 6 485B RS 485 5 485G

Angle system: use 2 voltage transformers (PT), 2 current transformers (CT) (Device is set to 2LL2Ct)

# 3. Function Description

# 3.1 Power symbols

KPM73 provides bidirectional power calculations with power and power factor polarities such as following fig showed:

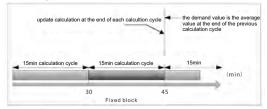


# 3.2 Energy measurement

KPM73 records bidirectional active and reactive energy, the sum of positive and negative bidirectional energy, and positive and negative net energy, active and reactive energy and value of this month, last month and last month. PUMG730 also provides multiple rates of electricity, peak four rates, can be set up to 8 hours in 24 hours a day, the time setting step is half an hour, you can record the peak Pinggu four rates total active/reactive energy, records The four rates are active/reactive energy this month, last month, and the month before last month.

# 3.3 Demand

Power systems often charge fees based on the user's power consumption (in the form of active energy) and the peak power level (in the form of active power). Demand is the average power over a certain time interval. KPM73 uses common slip demand algorithm to calculate demand.



Slip time: Recursively measure the time interval of maximum demand, which can be selected in 1. 2. 3. 5.10. 15. 30mi

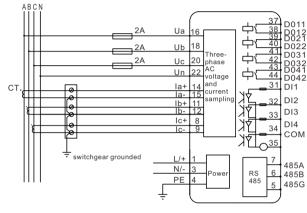
Demand cycle: Setting range 1~15 slip times. Maximum Demand: Maximum Demand since Operation

Ind ex	Mark	Define	Inde x	Mark	Define	Index	Mark	Define
1	L/+	positive	16	Ua	Phase A voltage	31	DI1	Switch input 1
2			17			32	DI2	Switch input 2
3	N/-	negative	18	Ub	Phase B voltage	33	DI3	Switch input 3
4	PE	ground	19			34	DI4	Switch input 4
5	485G	Communi-catio n shielded ground	20	Uc	Phase C voltage			A commo n terminal
6	485B	RS485 negative	21			35	COM AO-	of switch Negativ e analog
								output
7	485A	RS485 positive	22	Un	Voltage neutral line	36	AO+	analog
8	lc+	C-phase current into the line	23			37	DO1 1	Relay output 1 positive
9	Ic-	C-phase current outlet	24	PTC A	Tempera-ture Input positive	38	DO1 2	Relay output 1 negativ e
10			25	PTC B	Tempera-ture input negative	39	DO2 1	Relay output 2 positive
11	lb+	B-phase current into the line	26	P+	Pulse output positive	40	DO2 2	Relay output 2 negativ e
12	lb-	B-phase current outlet	27	P-	Pulse output negative	41	DO3 1	Relay output 3 positive
13			28	485G	Communicati on shielded ground	42	DO3 2	Relay output 3 negativ e
14	la+	A - phase current into the line	29	B/Q-	RS485 negative	43	DO4 1	Relay output 4 positive
15	la-	A - phase current outlet	30	A/Q+	RS485 positive	44	DO4 2	Relay output 4 negativ e

Note: 5,6,7 terminal configured as a standard RS485, terminals 28, 29, 30 are backup RS485.

2.3 Typical wiring
KPM73 provides two connection modes of star system and angle system. The common connection mode is as follows

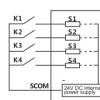
### 2.31 Star system wiring mode (for 400V/690V and above systems)



Quad-line star system: direct wiring without voltage transformer (PT) (device set

### 3.4 Switch input

S.4 Switch input KPM73 provides 4 digital input channels for detecting status information such as circuit breaker position signal and contact-breaker position signal. DC24V power supply is provided inside the equipment. When switching input function is required, passive contact signal is externally connected. When the external contact is closed, the corresponding digital input status is also turned on.



# 3.5 Relay output

KPM73 provides two kinds of relay action modes. The user should identify whether the relay is in remote control or over-limit alarm control. In different control modes, the relays operate in different ways.

# Remote control:

The relay is controlled by commands from the PC or PLC via communication. Over limit alarm control:

The relay is controlled by an electrical parameter inside the meter as a response to a set point control alarm condition.

The two relays operate as follows: Remote control:

The relay closes by accepting a PC or PLC command. The relay status will remain until the PC or PLC issues a release command or the meter loses power.

When the trigger relay's alarm signal is generated, the relay operates. The relay is not released until all the alarm conditions for the trigger relay have disappeared or the meter has lost power. If the meter resumes power and the alarm condition still exists, the relay will act again.

# 3.6 Pulse

KPM73 provides active / reactive energy metering, 1 active energy pulse output, and adopts the optocoupler electrode open circuit output. The method of energy accuracy method of standard table.

Electrical characteristics: Open collector voltage VCC≤48V, current Iz ≤50mA: Pulse constant: 3200imp/kWh. It means when the meter accumulated 1kWh, the pulse

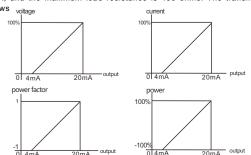
output number is 3200. It is emphasized that 1kWh is the secondary side of the electric energy data. In the case of PT and CT, the relative N pulse data corresponds to the primary side energy is N÷3200 imes voltage transformation ratio imes current transformation ratio (kWh)

# Application examples:

The external pulse counting device, assumes that the number of pulses collected during a period of length T is N, and the instrument input is: 10kV/100V, 400A/5A, then the instrument energy accumulation during this time period is  $N \div 3200 \times 100 \times 80$ 

# 3.7 Analog output

Analog output 4mA corresponds to the lower limit of the range, 20mA corresponds to the upper range. When the range is exceeded, the transmission current increases linearly. The maximum effective output is 120% of the range, the maximum output current is 24mA, and the maximum load resistance is 400 ohms. The transmission curve is as follows



Explanation:  $P=(Px-12) \times Pe \times CT \times PT/8$ , Px is the actual analog measured value, the unit is mA;

Pe is the corresponding rated power, unit W, PE value varies under different voltage levels, as follows

220V/5A:Pe=3300W 220V/1A:Pe=660W

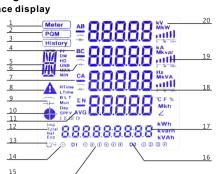
100V/5A: Pe=1500W 100V/1A: Pe=600W

Display content

Note: When transmitting single-phase power, Pe = rated voltage  $\times$  rated current.

### 4. Operating instructions

### 4.1.Interface display



Detailed Description

1	Real-time data	contain basic electrical parameters, total power data, time, etc.,
2	Power Quality	contain demand, harmonics, voltage and current imbalance and so on.
3	Historical data	Contains Multi-rate electric energy freeze data, daily freeze data, maximum and minimum value, etc
4	Phase sequence indication	Indicated A, B, C-phase value, AB, BC, CA three-line value and $\Sigma$ three-phase sum, such as three-phase total active power, total reactive power, total apparent power and so on, N represents zero line
5	Measurement data type	Identifies the parameter name displayed in the current measurement data display area in alphabetical form:  Voltage 'U' Current is 'I' Active power 'P' Reactive power 'Q' Apparent power' S' Power factor 'PF' Frequency 'F' Demand 'DM' Harmonic 'HD'  Unbalance 'UNB' Maximum 'Max' Minimum'Min', Temperature 'T'Meter operation time 'RTime' Load time "LTime" Two months ago "B Mon' Last month "L Mon' This month "T Mon'Yesterday "LDay/Today is "T Day'  The day before yesterday "B Day' Peak Pinggu "FPSV"
6	Each phase of the load nature indication	Inductance symbol light: Indicates that it is an inductive load at this time, now, Q>0;  Capacitance symbol light: Indicates that it is a capacitance load at this time, now, Q<0;
7	Negative sign	Display when the measured data is negative
8	Alarm	Display when there is alarm signal
9	Total load property indicindication	Inductance symbol light: Indicates inductive load at this time, ΣQ>0; Capacitance symbol light: Indicates capacitive load at this time, ΣQ<0;
10	Load quadrant indication	The quadrant of the system power is displayed in quadrant diagrams. The first quadrant $\Sigma P>0$ and $\Sigma Q>0$ , the second quadrant $\Sigma P<0$ and $\Sigma Q>0$ , the fourth quadrant $\Sigma P<0$ and $\Sigma Q<0$ , the fourth quadrant $\Sigma P>0$ and $\Sigma Q<0$ .
11	average value	Data show average
12	Electrical type indication	Imp: Forward electrical metric; Exp: reverse electric metric; Total: Absolute value, the sum of the absolute values of the forward electrical and reverse electrical metric; Net: net electrical degrees, The absolute value of the difference between Forward electrical metric and reverse electric metric.
13	Communication indication	If two small computers sign are all faded, it means there is no communication message; two small computers sign all show means the communication transceiver is proper functioning.
14	Clock indication	When this sign light, it indicates area 17 displays time data.
15	Switch input status	When there is a digital display, it indicates that the corresponding loop switch is closed.
16	Relay output status	When there is a digital display, it indicates that the corresponding loop relay is closed.
17	Power and time area	Display a variety of electrical measurement data, real-time clock, parameter settings, etc.
18	Measurement data display area	Display the main measurement data: voltage, current, power, power factor, frequency, temperature, harmonic data, demand, maximum, minimum, parameter setting data, etc.
19	Each phase load histogram	Load : Load size display ;  Directly indicate the percentage of the load current relative to the rated current in the form of a histogram,
20	Electrical parameter unit symbol	voltage: V , kV. Current: A , kA. Activepower: W , kW , MW. Reactive power:var, kvar, Mvar. Apparent power: VA , kVA , MVA. Frequency: Hz. Active electricity :kWh.Peactive electricitykvarh;

# ırrent imbalance rate 0.0000

In the harmonic display interface, when "HD" is on, you can use the down key or up key to see the three-phase voltage and current harmonic total distortion rate and 2  $\sim$  31 harmonic content, The 32~51 harmonic content are read by the background. The upper left corner shows "U", for this parameter indicates a three-phase harmonic voltage, when display "I", for this parameter indicates a three-phase harmonic current, the first three lines show the total harmonic distortion and fractional harmonic content, the fourth line represents the current harmonic data type, the total harmonic distortion is displayed when "THd" is displayed, when "HR" is displayed, the data indicates the fractional harmonic content, 2 ~ 31 corresponds number of harmonics.

In "History" interface, press > to enter daily freezing data display interface, then continuously press 🔻 down or 🔺 up turn to display the electrical parameter freezing data for today, yesterday and the previous day every 2 hours. The "T" "Day" light indicates today's data, "L" "Day" light indicates yesterday's data, and "B" "Day" light indicates the previous day's data.

In the maximum and minimum value query display interface, press the 🔻 down button or use the Å button to rotate diplay the screen as shown below. At the same time, when the data is the maximum value, the character "MAX" is displayed on the left side, and when the data is the minimum value, the character "MIN" is displayed on the left side.

# 5.3 Parameter setting

SEEDI

In parameter measurement interface, press ENTER key to enter the password input interface, the default password is 6666. Press the ENTER key again for confirmation after the password input. If input action is correct, the system will enter the parameter setting interface. If the input is wrong, it will return to the parameter measurement

In parameter measurement interface, Press ▲ UP key or ▼ DOWN key to switch the modifying parameters. Press the 'ENTER' key to enter the parameter value modify state, and accompanied with flashing for modification of the characters. After the setting is completed, press the 'ENTER' key to confirm the parameters changing. Then you can modify the next parameter, or you can also press ◀ button to exit the parameters modifying state, return to the measurement interface. When the user has no operation in 60 seconds in the parameters modifying state, the system will automatically return to the electrical parameter measurement display interface.

SEE 03

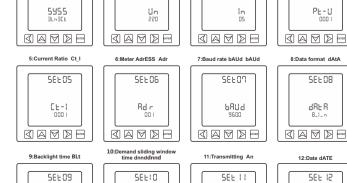
An us

56504

48FE

2:Rated voltage Un

SEE 02



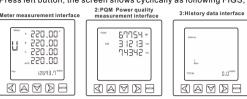
5.2 Operation display

There are five touch buttons on the front panel, the five keys are marked as key left ,key up , ,key down , , right key ,key enter Through the operation of five keys can be achieved in different measurement data display and parameter settings.

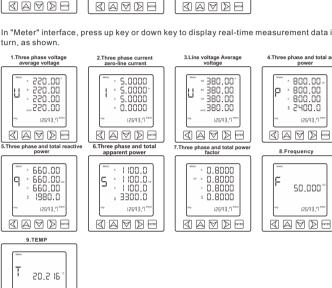


Buttonname	Functional description			
Left key	Switch the three major functions display interface: "Meter", "PQM", "History"; in the parameter setting state as "return" key.			
Up key Down key	In different function display interface, press the up or down key to cycle through al the parameters of present function. In the parameter setting mode, press "up" to increase the value of the modified bit in the parameter setting state. Press "down" to decrease the value of the modified bit.			
Right key	During "Meter" display, press this key to cycle the energy data; In the "POM" power quality display, pressing this button cycles display demand, the harmonics, voltage and current imbalance. Under "History" display, press this button to show the Multi-rate electric energy freeze data, daily freeze data, maximum minimum value. In parameter setting state, it is used to move the bits to be modified.			
ENTER	Confirm to enter the programming state; in the parameter setting state, it is used to enter the menu, programming parameters and confirmation.			

Measurement display menu structure as follows Press left button, the screen shows cyclically as following FIGS,



In "Meter" interface, press up key or down key to display real-time measurement data in



In the "Meter" interface, right-click to enter the electric energy and time query interface, press the right button continuously to display the interface as the following FIG shown. When the time and date are displayed, the clock pattern is displayed in the lower left corner of the screen. When the energy accumulated more than 999999999, the hexadecimal representation of the floating point number of the energy accumulated value is displayed, F indicates that the maximum display value is exceeded

C 220.00°

AVG 220.00 12693.KW

AVG 220.00

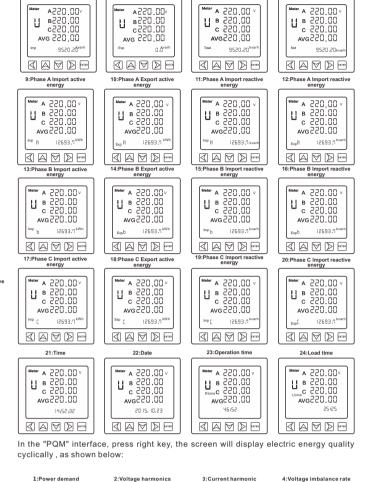
Meter A 220.00 v

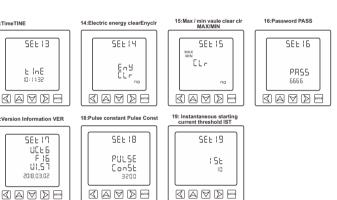
12693.HW

AVG 220.00 C 220.00 C 220.00

#220.00 B220.00 c220.00

12693.<sup>AW</sup>





Note: The display serial number is different accord to different the setting

# Factory default value:

Parameter	Display	Default	Implication		
Password protection	PASS	6666	Used to protect non-staff to modify instrument		
Wiring method	SYSS	3Ln3CT	Three-phase four-wire system , 2LL2CT and 2LL3CT : Three-phase three-wire system		
Rated voltage	Un	220	Could be set as 100、220、400		
Rated current	In	5	Could be set as 1、5、10		
Voltage ratio	Pt_U	1	Voltage transformer ratio: 1~9999		
Current ratio	Ct_I	1	Current transformer ratio: 1~9999		
Communicati on address	Adr	1	The address of the meter when the network is communication, 1~247		
Baud rate	baud	9600	Communication Baud rate address 1200~38400		
Data format	dAtA	81N	Data frame format: 8 data bits, a parity bit and one stop bi		
Backlight lighting time	BLt	1	units: minute; If set to 0, the backlight will never go out; se to other values, the light will go off after the setting time delay after the last key		
Transmitting	An	Ua	3Ln3CT can be transmitted to the project Ua, Ub, Ucla,lb, lc, Uab, Uca, Pa, Pb, Pc, P, Qa, Qb, Qc, Q, Sa, Sb, Sc, S, PFa, PFb, PFc, PF, F; 2LL CT and 2LL3CT can be transmitted to the project: la,lb, lc, Uab, Ubc, Uca, PQ, S, PF, F;		
System date	dAtE	Current date	Such as: 2012.05.08		
System time	tinE	Current time	Such as: 09:35:20		
Clear Electric energy	cLr Eny	Cleared	Used to clear the energy parameters.		
Clear Max Min value	cLr MaxMin		Used to clear the maximum and minimum value,		
Firmware version	VEr		The firmware program version and date of the device		
Pulse constant	Pulse Const	3200	Setting range 400~9999		
Instantaneou s starting current	IST	10	Setting range 1~9999mA		

# 6. Communication

KPM73 multifunction meter provides MODBUS-RTU communication protocol, 1 start bit, 8 data bits, 1/0 parity, 1/2 stop bits. Each byte length is 11 bits. Supported baud rates: 1200, 2400, 4800, 9600, 19200, 38400.

Factory default communication parameters: 9600, no parity, 1 stop bit.

Address field + Command field + Data field + CRC check area

RTU mode format for each byte: 1 start bit + 8 data bits + 1 parity bit + 1 stop bit

The format of the data frame is as follows:

Supported function codes definition Operation description Read relay output Read switch input re relay outputs Read one or more switch input Read the value of one or more registers Read register data 05 0x05 Write a single relay output Control all the way to close or disconnect the relay
Write multiple register data at a time Write multiple registers 16 0x10

# 6. Common malfunction Analysis

60054

> Nothing is displayed after the unit is powered on

Lie

· Check if the supply voltage and other wiring are correct, also the supply voltage should be within the operating range

2.3576 2.8489 1.9483 EHO

UNB

0.0000

• Turn off the device and the host computer, and then reboot

3.3678

FHO

- > The device is not working properly after power on
- Turn off the device and the host computer, and then reboot
- ➤ Voltage or current readings incorrect

• Check if the wiring mode setting matches the actual wiring mode

- Check whether the voltage transformer (PT) and current transformer (CT) ratio are
- · Check if GND is grounded properly.
- · Check if the shield is grounded
- Check if the voltage transformer (PT) and current transformer (CT) are intact
- > The power or power factor reading is incorrect, but the voltage and current readings ar correct
- . Compare the voltage and current input of the actual wiring and wiring diagram, and check if the phase relationship is correct.
- RS-485 communication is not working properly
- Check whether the communication baud rate. ID and communication protocol settings of the host computer are consistent with the meter
- Please check the data bits, stop bits, parity settings and the host computer is
- Check if the RS-232 / RS-485 converter is working properly
- Check if there are the problems in the entire communications network lines (Such as
- short circuit, open circuit, grounding, if the shield is properly grounded at one end, etc.) • Turn off the device and the host computer, and then reboot
- If the communication line is longer, it is recommended to parallel connect a 100
- ~200 $\Omega$  matching resistors at the end of the communication line.

# sales service department.

### 8 Contact Details

Henan Compere Smart Technology CO., LTD. Telephone:+86-371-86181681

Fax:+86-371-67890037

Web:http://www.compere-power.com/en/home/

Address: No.41, Dongming Road, Zhengzhou, Henan Province, China

The final interpretation of this manual is owned by Henan Compere Smart Technology Co.,Ltd.