

KPM 37 Three-phase Rail Smart Power Meter user instructions V1.0



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 the device 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

Operating temperature: -25°C ~ +70°C Storage temperature: -30°C ~ +75°C
Relative humidity: 5% ~ 95% No condensation
Altitude :3000 meters below

1.2 Rated parameters

Device working power supply :85~265VAC , 80~300VDC
Rated AC data : Voltage:3* 57.7/100VAC , 3* 220/380VAC
AC current : Standard 5A

Frequency : 50Hz
Switching input: Internal 24VDC power supply Debounce time 40ms
Switching output: Small high-power relays
Contact capacity 250VAC/5A,30VDC/5A

Power consumption: AC voltage loop< 0.5VA / phase (rated)
AC current loop< 0.75VA / phase (5A)
< 0.25VA / phase (1A)

Device power supply circuit: <3VA

Overload capacity: AC voltage loop 1.2 times rated voltage, Continuous operation.
2 times the rated voltage , allow 10S.
AC current loop 1.2 times the rated current, Continuous operation.
20 times the rated voltage , Allow 1S.

Precision index

Parameter	Accuracy	Resolution	Parameter	Accuracy	Resolution
Voltage	±0.2%	0.01V	Power factor	±0.5%	0.01
Current	±0.2%	0.01A	Active energy	±0.5%	0.1kWh
Active power	±0.5%	0.1W	Reactive	±2%	0.1kvarh
Reactive power	±2%	0.1var	frequency	±0.02	0.01Hz
Apparent power	±0.5%	0.1VA			

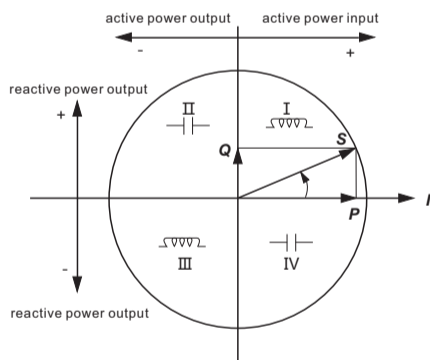
1.3 Electrical insulation performance

Power frequency withstand voltage: In line with GB /T13729-2002 provisions, Power frequency voltage 2KV,Insulation resistance 1 minute.
Insulation resistance: In line with GB / T13729-2002 provisions, Insulation resistance ≥50MQ
Impulse voltage: In line with GB / T13729-2002 provisions, can bear the impact of1.2 / 50US, 5KV peak standard lightning.

3. Function Description

3.1 Power symbol

KPM37 provides bidirectional power calculation, power and power factor polarity as shown in the figure.

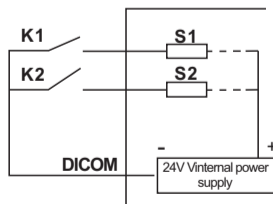


3.2 Power measurement

KPM37 records positive and negative bidirectional active and reactive energy also records the sum of positive and negative bidirectional energy, records positive and negative energy net value.

3.3 Switching Value input

KPM37 provides 2-channel switch input, used to detect the circuit breaker position signal, switch position signal and other status information. DC24V power supply is provided inside the equipment, when the scene requires a switch input function, external access passive contact signal, when the external contact closed, the corresponding switch input state is also turned on.



3.4 Delay output

KPM37 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 device 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.

Over limit alarm control:

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.

1.4 Mechanical properties

Vibration response: IEC255-21-1:1998, level 1
Vibration durability: IEC255-21-1:1998, level 1
Impact response: IEC 255-21-2, level 1
Impact durability: IEC 255-21-2, level 1
Collision: IEC 255-21-2, level 1

1.5 EMC performance

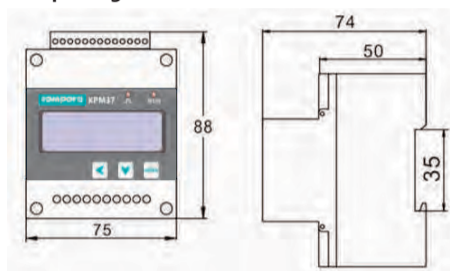
Electrostatic discharge immunity: IEC61000-4-4, level 4
Fast pulse group immunity: IEC61000-4-5, level 4
Surge immunity: IEC61000-4-2, level 4
Power frequency magnetic field immunity: IEC61000-4-8, level 4

2 Installation and wiring

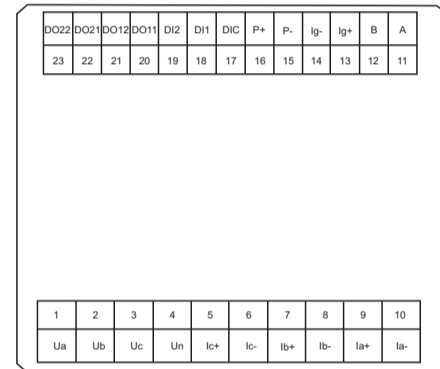
2.1 Selection criteria

Standard functions	Expandable functions	Model code
Three phase voltage, current, active power, reactive power, apparent power, active energy, reactive energy, power factor, frequency, demand value, max & min value, 2-31th harmonic analysis, time statistics, 1 way RS485 port, Modbus protocol, 4 tariff for 8 different periods, SOE record	-	KPM37
	2 relay output	KPM37R
	2 switch input	KPM37K
	2 relay output 2 switch input	KPM37RK

2.2 Shape and opening



2.3 Terminal

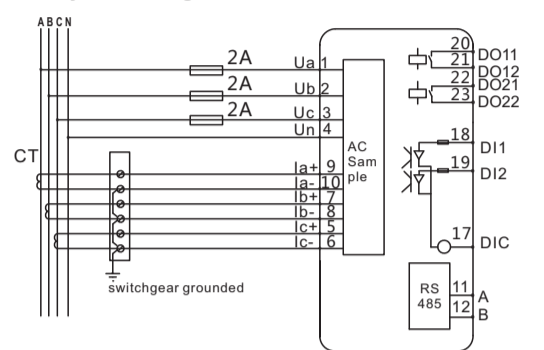


Index	Mark	Define	Index	Mark	Define
1	Ua	Phase A voltage	13	Ig+	Left current input
2	Ub	Phase B voltage	14	Ig-	Left current output
3	Uc	Phase C voltage	15	P-	
4	Un	Voltage neutral line	16	P+	
5	Ic+	C-phase current input	17	DIC	Common terminal of digital input
6	Ic-	C-phase current output	18	DI1	Switch input 1
7	Ib+	B-phase current input	19	DI2	Switch input 2
8	Ib-	B-phase current output	20	DO11	Relay output 1 forward
9	Ia+	A-phase current input	21	DO12	Relay output 1 backward
10	Ia-	A-phase current output	22	DO21	Relay output 2 forward
11	A	RS485 positive	23	DO22	Relay output 2 backward
12	B	RS485 negative			

2.4 Typical wiring

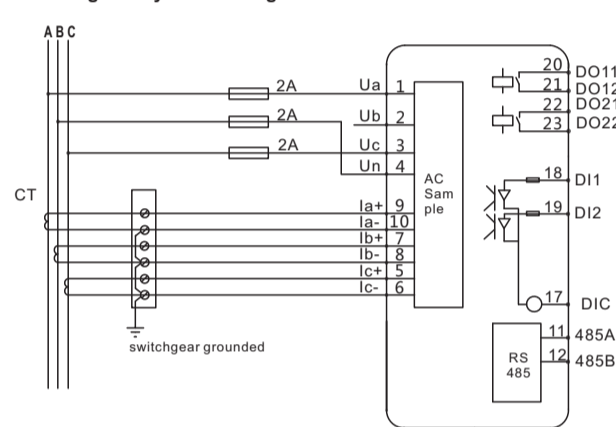
KPM37 provides star system and triangular system wiring mode, the common wiring mode is as follows:

2.4.1 Star system wiring



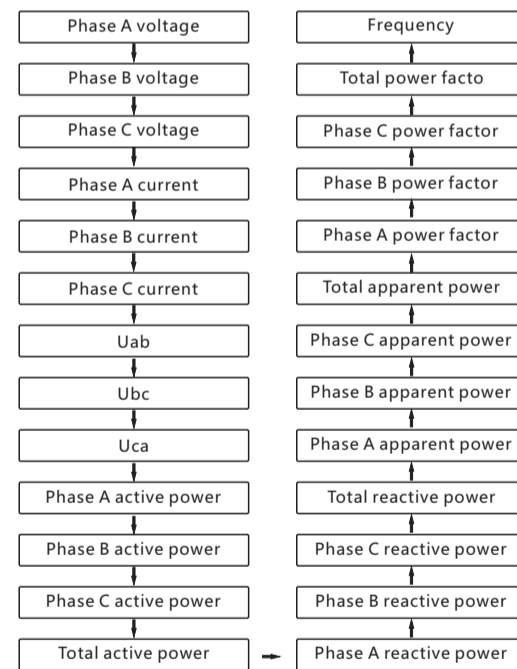
Four lines star system: Direct wiring without voltage transformer(PT) (The device is set to P4L)

2.4.2 Triangular system wiring



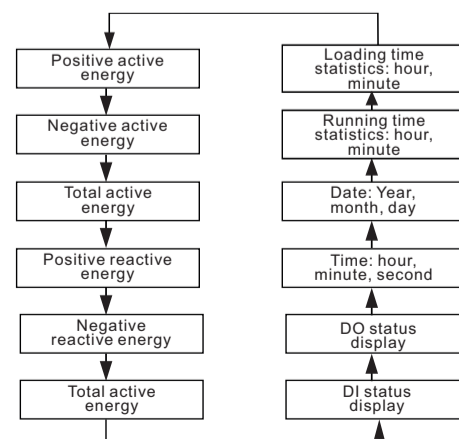
Triangle system: No voltage transformer(PT), 3 current transformers(CT) (device is set to P3L3)

In the electric parameter measuring state, press the [F] key to switch to display the content as shown below; in the 2LL2CT and 2LL3CT modes, the phase A voltage, separated phase active power, reactive power, apparent power and power factor are not displayed in the interface.



Electrical parameter query interface

Press the [F] key in the electric parameter measurement interface to enter the electric and time query interface. Press the [F] key continuously to display the data items as shown below.



4. Operating instructions

4.1 Interface display



Index	Display content	Detailed Description
1	Menu indication	Includes set, RT(running time), LT (Loading time)
2	Measurement data display area	Display main measurement data: voltage, current, power, power factor, energy, frequency, parameter settings, etc.
3	Communication indication	The two small computers all disappeared, indicating no communication; Two small computers all show that the communication is normally received and sent.
4	Time indication	Display time or time statistics
5	Electrical energy type	Display: Imp (import power) Exp (Export power) Tot (Total power)
6	Unit symbol	Voltage V, kV; Current: A, kA; Active power: W, kW; Reactive power var, kvar; apparent power:VA, kVA.

4.2 Operation display

There are three touch buttons on the front panel, These three buttons are labeled as [Left key], [Down key], and [Enter key] from left to right. The display of different measurement data and the setting of parameters can be realized by the operation of the three buttons.



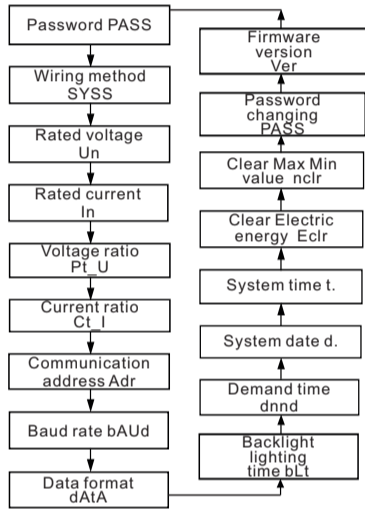
Name of key	Functional description
[Left key]	Switching the electric parameter items data display, and if it is in the parameter setting state, it is used to remove the bit to be modified
[Down key]	Switching power data item display interface, and if it is in the parameter setting state, it is used to increase the parameter values
[Enter key]	In the electric parameter measuring state, it is used to enter the parameter setting interface; And in the parameter setting state, it is used to enter the parameter setting state and confirm the parameter setting.
[Left key]+[Down key]	Exit parameter setting state

Query interface for energy data, switch vaule and time

Press the **[ENTR]** key in the parameter measurement interface to enter the password input interface. The default password is 6666. After the password is entered, press the **[ENTR]** key to confirm. If the input is correct, it will enter the parameter setting interface. If the input error, it will return to the measurement parameter display interface. In the parameter setting interface, Press **[ENTR]** button to switch the parameter item to be modified. Press **[ENTR]** button can enter the modification state of the parameter vaule, and it is accompanied by the flashing of the modified character. At this time, you can change the parameter size by pressing the **[ENTR]** button. After the modification, press the **[ENTR]** button to confirm, you can modify the next parameters. You can also press the **[ENTR]** and the **[ENTR]** key to exit the modification state of the parameter and return to the measurement interface. When the user does not have any operation within 60 seconds in the parameter modification state, it will automatically return to the electrical parameter measurement display interface.

Factory default value

Parameter	Display character	Defaults vaule	Meaning
Password	PASS	6666	Used to protect it from non-staff personnel to modify instrument parameters
Wiring method	SYSS	P4L	3 phase 4 wire, P3L2 & P3L3 are 3 phase 3
Rated voltage	Un	220	Could be set to 100V, 220V
Rated current	In	5	Could be set to 1A, 5A
Voltage ratio	Pt_U	1	Voltage transformer ratio (1-9999)
Current ratio	Ct_I	1	Current transformer ratio (1-9999)
Communication address	Adr	1	Meter address for network communication 1~247
Baud rate	bPS	9600	Communication baud rate 1200~19200
Data format	dAtA	81N	Data frames format: 8 data bits, a parity bit and one stop bit
Backlight lighting time	BlT	1	units : minute(0-120) ; If set to 0, the backlight will never go out
Demand time	dnnd	5	Unit: minute; the time window width in the calculation of the sliding window demand
System date	d.	Current	Such as: 2012.05.08
System time	t.	Current time	Such as: 09:35:20
Clear Electric energy	Eclr	Cleared	Used to clear the energy parameters.
Clear Max Min value	nclr	Cleared	Used to clear the maximum and minimum value
Password changing	PASS	6666	Default password is 6666
Firmware version	Ver	V1.00	The firmware program version



Setting interface

5. Communication

KPM37 multifunction meter provides MODBUS-RTU communication protocol, a start, 8-bit data bits, 1/0 parity, 1/2 stop bits. Each byte length is 11 bits. Supported baud rates: 1200, 2400, 4800, 9600, 19200.

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

RTU mode format for each byte: Address field + Command field + Data field + CRC check area

Supported function codes			
DEC	HEX	definition	Operation description
01	0x01	Read relay output	Read one or more relay outputs
02	0x02	Read switch input	Read one or more switch input
03	0x03	Read register data	Read the value of one or more registers
05	0x05	Write a single relay output	Control all the way to close or disconnect the relay
16	0x10	Write multiple registers	Write multiple register data at a time

5.1 Relay output control and status read

This area stores the relay status. The user can read the current status using the Modbus protocol 01H function code and use the function code 05H to control the output.

Address	Parameter	Numerical range	Data type	Read-write property
0000H	Relay1(DO1)	1=ON 0=OFF	Bit	R/W

5.1.1 Read relay output status (function code 01H)

Request data frame: Read the status of Relay1 .

Addr	Fun	Start Reg hi	Start Reg lo	Reg Num hi	Reg Num lo	CRC16 hi	CRC16 lo
01H	01H	00H	00H	00H	01H	xxH	xxH

Response Data Frame: The slave responds to the host's data frame. It contains slave address, function code, number of data bytes, relay status data and CRC check. Each relay in the data packet occupies one bit (1 = ON, 0 = OFF). The lowest bit of the first byte is the addressed relay state value, the rest are arranged in order of high, useless bits are filled with 0.

Examples of reading switch output status responses.

Addr	Fun	Byte count	Data	CRC16 hi	CRC16 lo
01H	01H	01H	01H	90H	48H

Data byte content (Relay1 is closed)

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
0	0	0	0	0	0	1

5.1.2 Relay control (function code 05H)

Note that the control relay 0x0000 is the relay divider, 0xFF00 relay sets the data frame

Addr	Fun	DO addr hi	DO addr lo	Value hi	Value lo	CRC16 hi	CRC16 lo
01H	05H	xx	xx	FFH	00H	xxH	xxH

Response data frame

Addr	Fun	DO addr hi	DO addr lo	Value hi	Value lo	CRC16 hi	CRC16 lo
01H	05H	xx	xx	FFH	00H	xxH	xxH

5.2 Read switch input status (function code 02H)

Query data frame: This function allows the user to obtain the status of the switch input DI ON / OFF (1 = ON, 0 = OFF). In addition to the slave address and the function field, The data frame also needs to include the initial address of the DI to be read and the number of DI to be read in the data field.

The address of DI in KPM37 starts at 0000H (DI1 = 0000H, DI2 = 0001H ... and so on). The switch input terminals DI1 to DI2 correspond to Bit0 to Bit3, respectively. The following example shows the state of the DI1 to DI2 read from the slave address 01

Addr	Fun	DI start reg hi	DI start reg lo	DI num hi	DI num lo	CRC16 hi	CRC16 lo
01H	02H	00H	00H	00H	04H	xx	xx

Response Number of Frames: The response contains the slave address, function code, number of data, packet and CRC check. Each bit in the packet occupies one bit (1 = ON, 0 = OFF). The lowest bit of the first byte is the addressed DI1 value. The rest of the bits are arranged in order of high order, and the unused bit is filled with 0.

The following table shows an example of reading the status of the switch input (DI1=ON, DI2=ON).

Addr	Fun	Byte count	Data	CRC16 hi	CRC16 lo
01H	02H	01H	03H	E1H	89H

The meaning of each bit in data

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	1	0	1	1

6. Common malfunction Analysis

- Nothing is displayed after the unit is powered on
 - Check if the supply voltage and other wiring are correct, also the supply voltage should be within the operating range
 - Turn off the device and the host computer, and then reboot
- 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 set correctly
 - 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 are 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 consistent
 - 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 ~200Ω matching resistors at the end of the communication line

Note: If there are any unsolved problems, please contact our company's after-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

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