

## KPM31 Single phase DIN rail energy Meter user instructions V2.0

### 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 qualified by the staff to install and maintain.
- Before any operation on the Devices, should be isolated from the voltage input and power supply, and the secondary windings of all current transformers are Short circuit.
- Verify that the device is live before operation.
- All mechanical parts and covers should be restored in

*Not pay attention to these precautions may cause serious injury.*

### 1. Overview

#### 1.1 Function introduction

KPM31A is designed with advanced microprocessor and digital signal processing technology. It integrates comprehensive single-phase power measurement, display, energy accumulation, and network communication. It has strong anti-interference ability and can still work stably in situations with severe electromagnetic interference.

#### 1.2 Applications

- Measure and monitor electric energy parameters in the distribution system
- Energy efficiency management system
- Statistical analysis of internal power consumption and basis for charging statistics
- Automatic meter reading system for electric energy measurement
- Intelligent power distribution management system

#### 1.3 Features

- Measure single-phase voltage, current, active power, reactive power, apparent power, power factor, frequency, active power, and reactive power
- Multi-rate electricity metering, up to 8 time periods can be set a day, 4 rates can be selected.
- 12-month historical electricity statistics function
- Standard configuration 1 RS485 communication interface, Modbus protocol, expandable DLT645-2007 protocol
- Rated current 5(60)A
- 1 pulse passive optocoupler collector output
- Front-end integrated DSP measurement chip, high measurement accuracy
- Built-in clock and maintenance-free battery, data is permanently saved after power failure
- The internal expandable large-capacity magnetic latching relay realizes load on-off control
- 35mm standard guide rail installation, beautiful appearance, easy installation

#### 1.4 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 of 1.2 / 50US, 5KV peak standard lightning.

#### 1.5 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

#### 1.6 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 Technical Parameters

#### 2.1 Environmental Conditions

Working temperature: -10°C~+55°C  
Relative humidity: 5%~95% non-condensing  
Storage temperature: -20°C~+75°C  
Altitude: Below 3000 meters

#### 2.2 Rated Parameters

Input voltage: Rated 220V  
Input current: 5-60A  
Power consumption: Whole set power consumption < 0.5VA  
Overload capacity:  
AC voltage loop: 1.2 times rated voltage, continuous work 2 times rated voltage, allow 10s  
AC current loop: 1.2 times rated current, continuous work 20 times rated current, allow 1s

#### 2.3 Measurement Accuracy Index

Parameters	Accuracy	Parameters	Accuracy
U	0.2%	PF	±0.5%
I	0.2%	kWh	0.5s
P	0.5%	kVar	Class 2
Q	0.5%	F	±0.02

#### 2.4 Electrical insulation Performance

- Medium strength:  
Comply with GB/T13729-2002 regulations, Power frequency voltage 2KV, time 1 minute
- Insulation resistance:  
Comply with GB/T13729-2002 regulations, 500V megger test, insulation resistance not less than 50MQ
- Impulse voltage:  
Comply with GB/T13729-2002 regulations, Withstand the impact of 1.2/50US peak 5KV standard lightning wave

#### 2.5 Mechanical properties

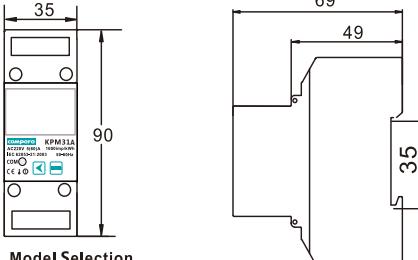
- Vibration: Vibration response: GB/T11287-2000, level 1  
Vibration durability: GB/T11287-2000, level 1
- Impact: Impact response: GB/T14537-1993, level 1  
Impact durability: GB/T14537-1993, level 1
- Collision: GB/T14537-1993, level 1

#### 2.6 Electromagnetic compatibility

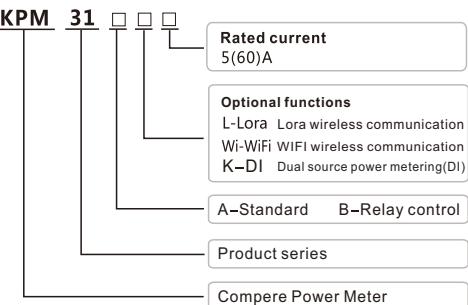
- Electrostatic discharge immunity : IEC61000-4-2, level 4
- Fast pulse group immunity : IEC61000-4-4, level 4
- Surge immunity : IEC61000-4-5, level 4
- Power frequency magnetic field immunity : IEC61000-4-8, level 4

### 3 Selection And Installation

#### 3.1 Product Size



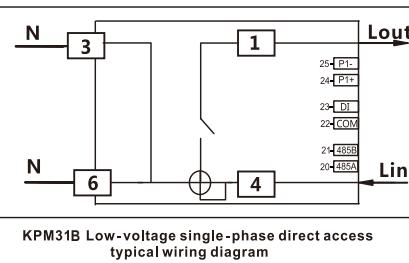
#### 3.2 Model Selection



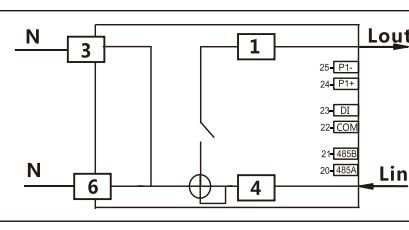
For example, KPM31-A-5(60): Rated 220V, 5(60)A, Standard model, multi-rate energy statistics, historical electric energy statistics, single-phase rail smart energy meter.

#### 3.3 Installation Wiring

##### KPM31A Low-voltage single-phase direct access typical wiring diagram



##### KPM31B Low-voltage single-phase direct access typical wiring diagram



#### 4 Function description

##### 4.1 Electric energy measurement

KPM31A records the historical total active power, total reactive power, forward and reverse power of active and reactive power, and freezes of active and reactive power in the historical 12 settlement days (restore power at 0 o'clock on the 1st of each month). KPM31A also provides Multi-rate electric energy, providing four rates of peak, flat and valley, up to 8 periods can be set 24 hours a day, can record total active/reactive energy at four rates of peak, flat and valley, and record four rates of active/reactive power for 12 months. And four-rate historical power. For example, the daily electricity measurement is divided into 5 time periods:

##### 5.3 Parameter Setting Menu

Please make settings before starting measurement. When entering the setting screen, you need to press and hold for 3 seconds to enter the password input interface. The default password is 6666. The password correctly. Long press to enter the parameter setting interface, and then press to select the item to be set, after long press key, the first number from left of the set value will start to flash, short press key to select the digit to be modified, short press key to increase modified bit value. After finish the modification, long press key to confirm. In the setting interface, if there is no operation for 30s, it will return to the measurement display screen, or short press the and keys at the same time to return directly to the

##### 1. Password input interface

Before entering the setting screen, enter the password, the initial password is 6666, after entering the setting screen, you can set your own password.

Note: When setting the password, please save the password in advance and set it carefully.

: Select digit to be modified

: Short press this key to modify the value, long press it, if the password is correct, enter the parameter setting, otherwise return to the password input interface.

##### 2.Password modification

: Initial password: 6666, which can be set by users.

Note: When setting a password, please save the password in advance and set it carefully.

: Select digit to be modified

: long press this key to save and no longer flash means operation success

##### 3.Address setting

The address of the meter is the standard Modbus-RTU address. On the same RS485 communication cable, the addresses of all KPM31 meters can't be the same. The address of the meter must be set uniformly before putting it into operation.

Note: Setting range: 001~247; default value: 001

: Select digit to be modified

: Short press this key to modify, long press it to save and no longer flash means operation success

##### 4.Baud rate setting

The baud rate of the RS485 interface can be set according to your own system, but it must be consistent with the parity of each byte of the communication data in the RS485 link.

Settable range: 1200、2400、4800、9600, Default 9600

: Change Baud

: Short press this key to modify, long press it to save and no longer flash means operation success

##### 5.Parity bit setting

: Switch between NONE, EVEN and ODD

: Short press this key to modify, long press it to save and no longer flash means operation success

##### 6.Energy clear

1# segment start time is 6 o'clock, end time 10 o'clock, billing segment is 1; 2# segment start time is 10 o'clock, end time 12 o'clock, billing segment is 2; and so on, 5# period start time is 24 o'clock and ends at 6 o'clock the next day, and the billing segment is 4. The electricity kWh of the same rate is calculated in combination. city measurement is divided into 5

Time slot	Time Slot Start time	Rate
1#	6	1
2#	10	2
3#	12	1
4#	15	3
5#	23	4

#### 4.2 Input Signal

- The input voltage should not be higher than 120% of the rated input voltage. It is recommended to install a fuse (typically 1A 250Vac) in the voltage input signal circuit.
- Current input: In actual engineering applications, it can be directly connected within 0-60A.

#### 4.3 Output Signal

- Pulse output: KPM31A&B provides active/reactive energy measurement, active energy pulse output function, adopts the output of the optocoupler open collector, the method of energy accuracy inspection refers to the national measurement regulation: the pulse error comparison method of the standard meter.

- Electrical characteristics: open collector voltage VCC≤48V, Current Iz≤50mA;

- Pulse constant: 1600 imp/kWh

#### 4.4 RS485 communication

The meter provides RS485 communication, adopts the standard MODBUS-RUT protocol, and can query various power parameters.

#### 4.5 Magnetic latching Relay Control

KPM31B provides relay action mode, users can communicate remotely to control the close or trip of the relay.

#### 4.6 Dual source power metering

KPM31BK is equipped with one DI input, which is connected to the dry contact of the switch device. When the dry contact is open, measure the electric energy data of the basic circuit; when the dry contact is closed, measure the electric energy data of the extended circuit.

#### 5. Operating Instructions

##### 5.1 Interface display

##### Real-1

U:	220.3V
V:	000.0A
F:	50 Hz

##### 5.2 Key Operation And Display

##### 7.Reset WIFI module

- RSTW:NO : Switch between YES and NO
- : Short press this key to modify, long press it to save and no longer flash means operation success

##### 5.4 Parameter setting

The parameter setting menu structure menu is as follows: Default value list

Item	Symbol	Default value	Description
Password	PASS	6666	Used to protect non-workers to modify instrument parameters
Communication address	Adr	1	Meter address 1~247 during network communication
Baud rate	baud	9600	Baud rate 1200~9600
Parity bit			

The example of read digital output status response.

Addr	Fun	Bytecount	Data	CRC16hi	CRC16lo
01H	01H	01H	01H	xxH	xxH

Data byte content (Relay 1 closed)

Addr	Fun	StartReg_hi	StartReg_lo	RegNum_hi	Reg Num_lo	CRC16_hi	CRC16_lo
01H	01H	00H	01H	00H	01H	xxH	xxH

### 6.1.2 Relay control (Function code 05H)

Note that the control relay 0xFF00 is the relay closed, and the 0x0000 relay is open

Request data frame:

Addr	Fun	DOaddr_hi	DOaddr_lo	Value_hi	Value_lo	CRC16_hi	CRC16_lo
01H	05H	xx	xx	FFH	00H	xxH	xxH

### Response data frame:

Addr	Fun	DOaddr_hi	DOaddr_lo	Value_hi	Value_lo	CRC16_hi	CRC16_lo
01H	05H	xx	xx	FFH	00H	xxH	xxH

### 6.2 System Parameter Reading And Writing

This area stores system parameters related to equipment work, including communication, password and other parameters, which can be read using Modbus protocol 03H function code, or set using 10H function code.

Addr	Parameter	Data range	Format
0000H	Protection password	0~9999	Word
0001H	Communication address	Modbus communication address: 1~247	Word
0002H	Baud rate	1 : 1200 , 2 : 2400 , 3 : 4800 , 4 : 9600 ,	Word
000CH	Clear energy	Command word 0x55AA, immediately clear the electric energy data	Word

### 6.3 Basic Measuring Parameters

Basic measurement area, mainly measuring basic voltage, current, power, power factor, etc.; The parameters in this area are all real-time measurement parameters, which are read using Modbus-RTU protocol 03H function code and are read-only data. The data format is floating point data. The data in this area is real-time data for primary side.

Addr	Parameter	Data format	Unit
0030H	U	Floating point	V
0032H	I	Floating point	A
0034H	P	Floating point	W
0036H	Q	Floating point	var
0038H	S	Floating point	VA
003AH	PF	Floating point	
003CH	F	Floating point	Hz
0070H	Apparent demand	Floating point	VA

### 6.4 Multi-rate Parameter area

The parameters in this area are all real-time measurement parameters, which are read using Modbus protocol 03H function code and are read-only data.

0080H	Total active energy	Floating point	kWh
0082H	Import active energy	Floating point	kWh
0084H	Export active energy	Floating point	kWh
0086H	Total reactive energy	Floating point	kvarh
0088H	Import reactive energy	Floating point	kvarh
008AH	Export reactive energy	Floating point	kvarh
008CH	Total sharp active energy	Floating point	kWh
008EH	Total peak active energy	Floating point	kWh
0090H	Total flat active energy	Floating point	kWh
0092H	Total valley active energy	Floating point	kWh
0094H	Total sharp reactive energy	Floating point	kvarh
0096H	Total peak reactive energy	Floating point	kvarh
0098H	Total flat reactive energy	Floating point	kvarh
009AH	Total valley reactive energy	Floating point	kvarh
009CH	Total combined active energy for this month	Floating point	kWh
009EH	Total combined active energy of the previous 1 settlement day	Floating point	kWh
00A0H	Total combined active energy of the previous 2 settlement day	Floating point	kWh
00A2H	Total combined active energy of the previous 3 settlement day	Floating point	kWh
00A4H	Total combined active energy of the previous 4 settlement day	Floating point	kWh
00A6H	Total combined active energy of the previous 5 settlement day	Floating point	kWh
00A8H	Total combined active energy of the previous 6 settlement day	Floating point	kWh
00AAH	Total combined active energy of the previous 7 settlement day	Floating point	kWh
00ACB	Total combined active energy of the previous 8 settlement day	Floating point	kWh
00AEH	Total combined active energy of the previous 9 settlement day	Floating point	kWh
00B0H	Total combined active energy of the previous 10 settlement day	Floating point	kWh
00B2H	Total combined active energy of the previous 11 settlement day	Floating point	kWh
00B4H	Total combined active energy of the previous 12 settlement day	Floating point	kWh
00B6H	Total combined active energy for this month	Floating point	kvarh
00B8H	Total combined active energy of the previous 1 settlement day	Floating point	kvarh
00BAH	Total combined active energy of the previous 2 settlement day	Floating point	kvarh
00BCH	Total combined active energy of the previous 3 settlement day	Floating point	kvarh
00BEH	Total combined active energy of the previous 4 settlement day	Floating point	kvarh
00C0H	Total combined active energy of the previous 5 settlement day	Floating point	kvarh
00C2H	Total combined active energy of the previous 6 settlement day	Floating point	kvarh
00C4H	Total combined active energy of the previous 7 settlement day	Floating point	kvarh
00C6H	Total combined active energy of the previous 8 settlement day	Floating point	kvarh
00C8H	Total combined active energy of the previous 9 settlement day	Floating point	kvarh
00CAH	Total combined active energy of the previous 10 settlement day	Floating point	kvarh
00CCH	Total combined active energy of the previous 11 settlement day	Floating point	kvarh
00CEH	Total combined active energy of the previous 12 settlement day	Floating point	kvarh
00D0H	Sharp active energy for this month	Floating point	kWh
00D2H	Sharp active energy of the previous 1 settlement day	Floating point	kWh
00D4H	Sharp active energy of the previous 2 settlement day	Floating point	kWh
00D6H	Sharp active energy of the previous 3 settlement day	Floating point	kWh
00D8H	Sharp active energy of the previous 4 settlement day	Floating point	kWh
00DAH	Sharp active energy of the previous 5 settlement day	Floating point	kWh
00DCB	Sharp active energy of the previous 6 settlement day	Floating point	kWh
00DEH	Sharp active energy of the previous 7 settlement day	Floating point	kWh
00E0H	Sharp active energy of the previous 8 settlement day	Floating point	kWh
00E2H	Sharp active energy of the previous 9 settlement day	Floating point	kWh
00E4H	Sharp active energy of the previous 10 settlement day	Floating point	kWh
00E6H	Sharp active energy of the previous 11 settlement day	Floating point	kWh
00E8H	Sharp active energy of the previous 12 settlement day	Floating point	kWh

00EAH	Sharp reactive energy for this month	Floating point	kvarh
00ECH	Sharp reactive energy of the previous 1 settlement day	Floating point	kvarh
00EEH	Sharp reactive energy of the previous 2 settlement day	Floating point	kvarh
00F0H	Sharp reactive energy of the previous 3 settlement day	Floating point	kvarh
00F2H	Sharp reactive energy of the previous 4 settlement day	Floating point	kvarh
00F4H	Sharp reactive energy of the previous 5 settlement day	Floating point	kvarh
00F6H	Sharp reactive energy of the previous 6 settlement day	Floating point	kvarh
00F8H	Sharp reactive energy of the previous 7 settlement day	Floating point	kvarh
00FAH	Sharp reactive energy of the previous 8 settlement day	Floating point	kvarh
00FCH	Sharp reactive energy of the previous 9 settlement day	Floating point	kvarh
00FEH	Sharp reactive energy of the previous 10 settlement day	Floating point	kvarh
0100H	Sharp reactive energy of the previous 11 settlement day	Floating point	kvarh
0102H	Sharp reactive energy of the previous 12 settlement day	Floating point	kvarh
0104H	Peak active energy for this month	Floating point	kWh
0106H	Peak active energy of the previous 1 settlement day	Floating point	kWh
0108H	Peak active energy of the previous 2 settlement day	Floating point	kWh
010AH	Peak active energy of the previous 3 settlement day	Floating point	kWh
010CH	Peak active energy of the previous 4 settlement day	Floating point	kWh
010EH	Peak active energy of the previous 5 settlement day	Floating point	kWh
0110H	Peak active energy of the previous 6 settlement day	Floating point	kWh
0112H	Peak active energy of the previous 7 settlement day	Floating point	kWh
0114H	Peak active energy of the previous 8 settlement day	Floating point	kWh
0116H	Peak active energy of the previous 9 settlement day	Floating point	kWh
0118H	Peak active energy of the previous 10 settlement day	Floating point	kWh
011AH	Peak active energy of the previous 11 settlement day	Floating point	kWh
011CH	Peak active energy of the previous 12 settlement day	Floating point	kWh
011EH	Peak reactive energy of this month	Floating point	kvarh
0120H	Peak reactive energy of the previous 1 settlement day	Floating point	kvarh
0122H	Peak reactive energy of the previous 2 settlement day	Floating point	kvarh
0124H	Peak reactive energy of the previous 3 settlement day	Floating point	kvarh
0126H	Peak reactive energy of the previous 4 settlement day	Floating point	kvarh
0128H	Peak reactive energy of the previous 5 settlement day	Floating point	kvarh
012AH	Peak reactive energy of the previous 6 settlement day	Floating point	kvarh
012CH	Peak reactive energy of the previous 7 settlement day	Floating point	kvarh
012EH	Peak reactive energy of the previous 8 settlement day	Floating point	kvarh
0130H	Peak reactive energy of the previous 9 settlement day	Floating point	kvarh
0132H	Peak reactive energy of the previous 10 settlement day	Floating point	kvarh
0134H	Peak reactive energy of the previous 11 settlement day	Floating point	kvarh
0136H	Peak reactive energy of the previous 12 settlement day	Floating point	kvarh
0138H	Flat active energy for this month	Floating point	kWh
013AH	Flat active energy of the previous 1 settlement day	Floating point	kWh
013CH	Flat active energy of the previous 2 settlement day	Floating point	kWh
013EH	Flat active energy of the previous 3 settlement day	Floating point	kWh
0140H	Flat active energy of the previous 4 settlement day	Floating point	kWh
0142H	Flat active energy of the previous 5 settlement day	Floating point	kWh
0144H	Flat active energy of the previous 6 settlement day	Floating point	kWh
0146H	Flat active energy of the previous 7 settlement day	Floating point	kWh
0148H	Flat active energy of the previous 8 settlement day	Floating point	kWh
014AH	Flat active energy of the previous 9 settlement day	Floating point	kWh
014CH	Flat active energy of the previous 10 settlement day	Floating point	kWh
014EH	Flat active energy of the previous 11 settlement day	Floating point	kWh
0150H	Flat active energy of the previous 12 settlement day	Floating point	kWh

0152H	Flat reactive energy for this month	Floating