

Counter, meter counter, raster meter manual

■ Summary

- (1) Include three count modes, such as addition and subtraction count, reversible count, identifiable phase count (raster meter);
- (2) Input signal: contact, level pulse (low level: -30V to +0.8V, high level: +4V to +30V);
- (3) External sensors: proximity sensors, Hall sensors, photoelectric sensors, encoders, etc.;
- (4) The meter offers DC12V/50mA DC power to the sensor;
- (5) Can set magnification, ensure the proportional relationship between counting and display. Range is 0.0001-9999;
- (6) Can preset the count value, it can be reset by reset button or reset terminal;
- (7) The current count value, function parameter value and count control value will save when power off;
- (8) Can select low-speed count and high-speed count, it has software filter function in the low-speed count mode.
- (9) Built-in three-way relay alarm output, up to 12 kinds of relay alarm control output mode, to fit to a variety of control requirements;
- (10) RS485 communication, Modbus-RTU protocol, can be directly connected with PLC, HMI, industrial configuration software;
- (11) 6-bit 0.56-inch highlighted red digital tube display;

■ Main technical parameters

Name	Content
Count frequency	< 10KHz
Count range	-199999~999999
Display value	Pulse input value * magnification value
Feed output	DC12V/50mA
Power supply	AC/DC85~265V; DC9~36V
Power consumption	< 3VA
Communication Interface	RS485 interface, Standard Modbus RTU protocol
Contact rating	3A@250Vac, 3A@24Vdc
Operating temperature	-10 to 55 °C
Storage temperature	-20 to 80 °C
External dimensions	96x48x90mm
Perforation dimensions	92x44mm

■ Nomenclature

FCT01-①-②③

Input signal type : N: Input sensor is NPN type; P: Input sensor is PNP type

RS485 interface: R: have; N: not have

Relay alarm output: A1: one relay; A2: two relays; A3: three relays; N: no relay

E.g.: Input sensor is NPN, with RS485 communication interface, two relays alarms, the model will be FCT01-N-RA2.

■ Panel description

Count value display

② J1 relay action indicator

J2 relay action indicator

Function key, for set parameter and clear the count value



Count mode

This meter has three count modes

(1) Mode 1, addition mode, this mode is a default mode when the product was made (See figure 3-1).

IN1, IN2 is the input terminal, when IN1 receive signal, it mean addition count mode, when IN2 receive signal, it mean subtraction count mode

(2) Mode 2, reversible count mode (See figure 3-2):

IN1 is count signal input terminal IN2 is control signal input terminal

① controlled addition count: IN2 switch off or input high level, when IN1 receive signal, it mean addition count

② Controlled subtraction count: IN2 and GND are short circuit or input by low level, when IN1 receive signal, it is subtraction count

(3) Mode 3, identifiable phase count (see figure 3-3):

IN1 and IN2 are input terminals, When IN1, IN2 receive the phase difference of 90 degrees A and B signals in sequence, the counter is automatically recognized as a count up. When IN1, IN2 receive the phase difference of 90 degrees B and A signals in sequence, the counter is automatically recognized as a count down.

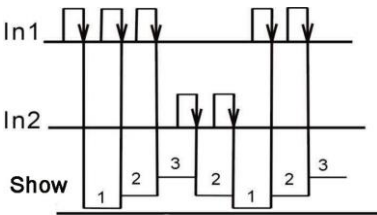


Figure 3-1

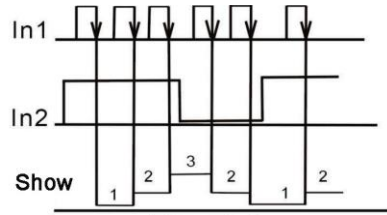


Figure 3-2

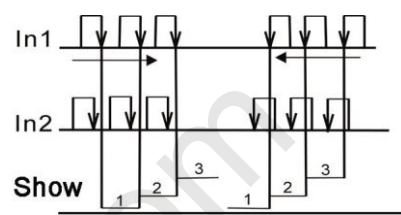


Figure 3-3

Key operation instructions

1. Key definition:

"SET": Function key, used to enter menu, select parameters. Press down the "SET" for about 1 second, then enter the menu.

"◀": Shift key, select the digits, the selected digit will blink.

"▲/Clr": Increase/clear key, add the value of the flashing digit (the number is cycled between 0 and 9), or use it to clear the count in the working state.

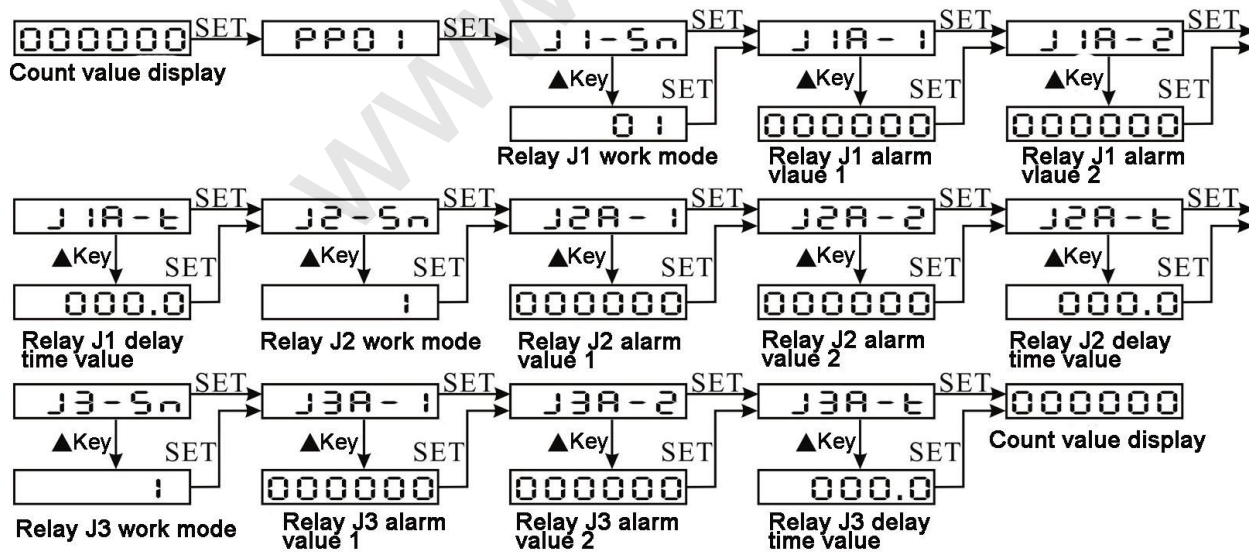
2. Operation method:

Use the "SET" key to select the parameter setting page, press "▲" to enter the parameter value modification, and use "◀" and "▲" to modify parameter. Use the "SET" key to confirm and enter the next parameter setting.

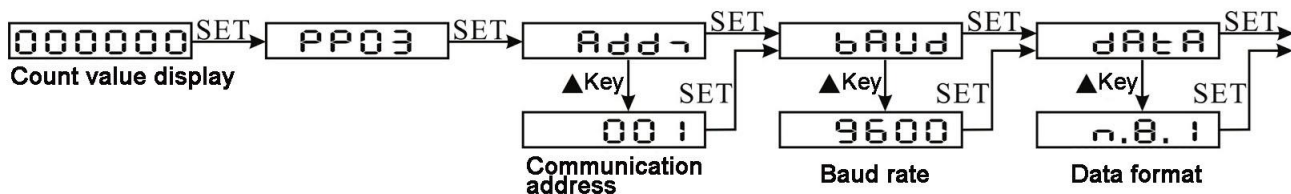
Parameter settings

1. Parameters setting flow chart :

(1) PP01 menu setting, setting relay action:

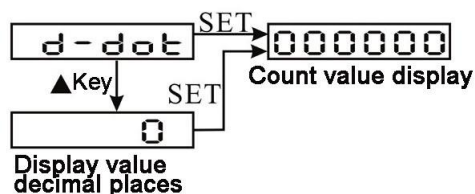
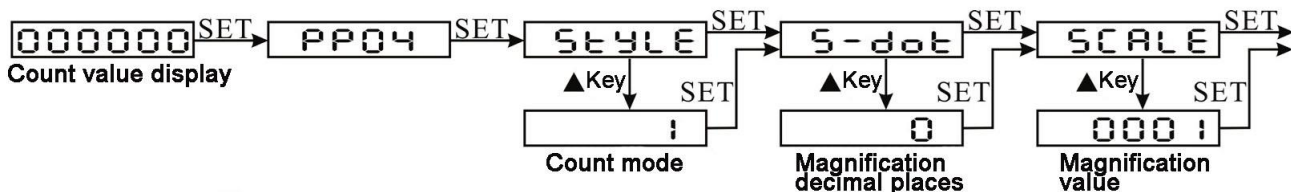


(2) PP03 menu setting, set RS485 Communication parameters:

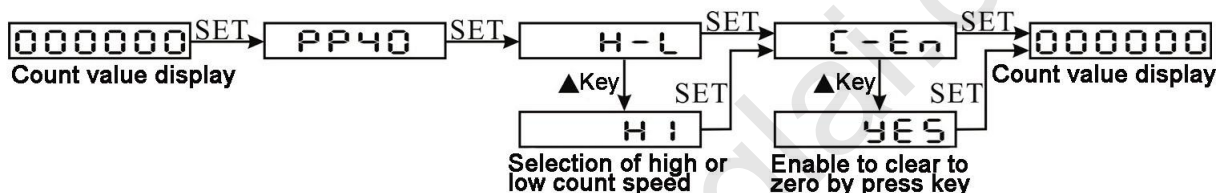


000000
Count value display

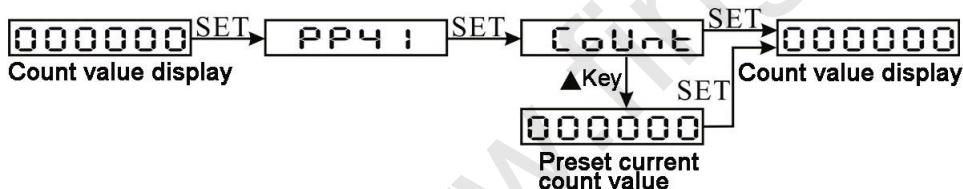
(3) PP04 menu setting, set count mode magnification:



(4) PP40 menu setting, set high low count mode, enable to clear to zero by press key:



(5) PP41 menu setting, set current count value:



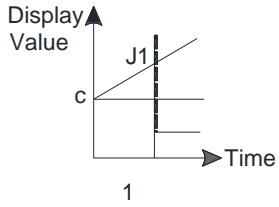
2. Parameters description:

No	Display	Description	Range
PP01 relay work type set	J1-Sn	Relay J1 work mode	0~12
		Description: refer to relay control type, when set to 0, it is in remote control status	
	J1A-1	Relay J1 alarm value 1	-199999~999999
		Description: refer to relay control type	
	J1A-2	Relay J1 alarm value 2	-199999~999999
		Description: refer to relay control type	
	J1A-t	Relay J1 delay time value	0.0~999.9
		Description: refer to relay control type	
	J2-Sn	Relay J2 work mode	0~5
		Description: refer to relay control type, when set to 0, it is in remote control	
	J2A-1	Relay J2 alarm value 1	-199999~999999
		Description: refer to relay control type	
	J2A-2	Relay J2 alarm value 2	-199999~999999
		Description: refer to relay control type	

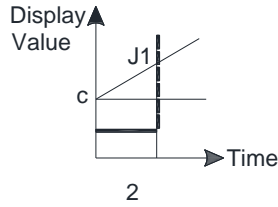
	J2A-t	Relay J2 delay time value	0.0~999.9
	Description: refer to relay control type, time unit is second		
	J3-Sn	Relay J3 work mode	0~5
	Description: refer to relay control type, when set to 0, it is in remote control		
	J3A-1	Relay J3 alarm value 1	-199999~999999
	Description: refer to relay control type		
	J3A-2	Relay J1 alarm value 2	-199999~999999
	Description: refer to relay control type		
	J3A-t	Relay J3 delay time value	0.0~999.9
	Description: refer to relay control type, time unit is second		
PP03 Communication parameters set	Addr	RS485 Communication address	1~247
	Description: RS485 Communication address		
	bAUd	RS485 Communication baud rate	2400、4800、9600、19200
	Description: RS485 Communication baud rate		
	data	RS485 Communication data format	n.8.1、o.8.1、e.8.1、n.8.2
	Description: n.8.1 No check bit 8 data bits 1 stop bit o.8.1 Odd check 8 data bits 1 stop bit e.8.1 Even check 8 data bits 1 stop bit n.8.2 No check bit 8 data bits 2 stop bits		
PP04 count mode magnification set	StylE	Count mode	1~3
	Description: refer to counter count mode		
	S-dot	Magnification decimal places	0~4
	Description: Magnification value's decimal point position		
	SCALE	Magnification value	0.9999~9999
	Description: Magnification		
PP40	H-L	High/low speed count selection	Hi、NNi、Lo
	Description: Lo: Low speed count mode, count frequency≤5Hz NNi: Middle speed count mode, count frequency≤30Hz Hi: High speed count, count frequency≤10KHz		
	C-En	enable to clear to zero by press	yEs、no
	Description: yEs: Can clear the current count to zero by pressing key no: Can't clear the current count to zero by pressing key		
PP41	CoUnt	Preset current count value	-199999~999999
	Description: Preset current count value		

Relay control type

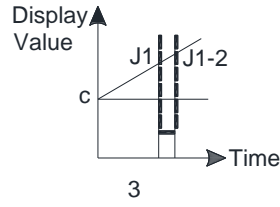
(1) Relay J1 has 12 control output type(J1-Sn) :



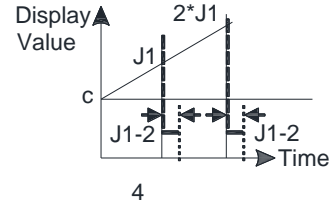
When count reach to J1, relay switch on, and count continue



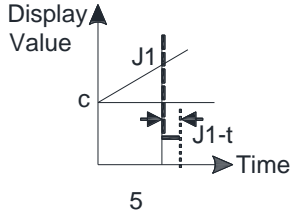
When count reach to J1, relay switch off, and count continue



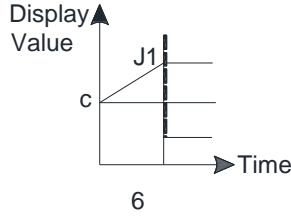
When count reach to J1, relay switch on, count continue, when reach to J1-2, relay switch off. (J1-2>J1)



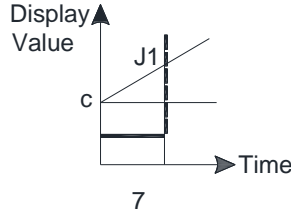
When count reach to J1, relay switch on, and count continue, when reach to J1+J1-2, then switch off, and count continue by J1 multiple repeatedly



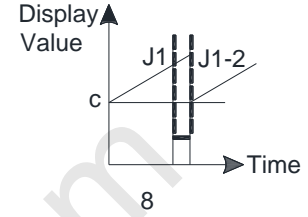
When count reach to J1, relay switch on, count continue, when reach to J1-t, relay switch off.



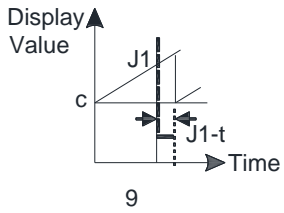
When count reach to J1, relay switch on, and count stop



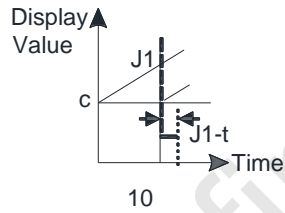
When count reach to J1, relay switch off, and count stop



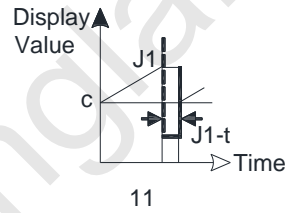
When count reach to J1, relay switch on, count continue, when reach to J1-2, relay switch off, and count reset (J1-2>J1)



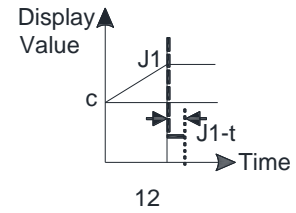
When count reach to J1, relay switch on, count continue, when reach to J1-t, relay switch off, and count reset



When count reach to J1, relay switch on, count reset, when reach to J1-t, relay switch off.

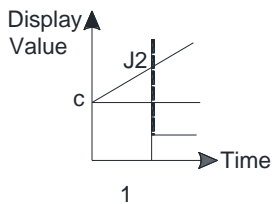


When count reach to J1, relay switch on, count stop, when reach to J1-t, relay switch off, and count reset

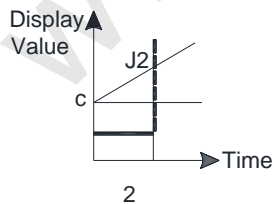


When count reach to J1, relay switch on, count stop, when reach to J1-t, relay switch off

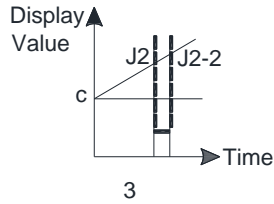
(2) Relay J2 has 5 control output types (J2-Sn) :



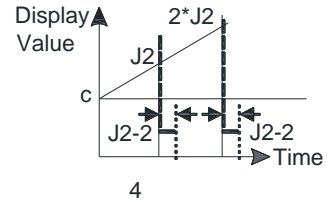
When count reach to J2, relay switch on, and count continue



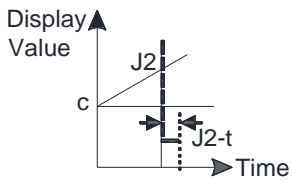
When count reach to J2, relay switch off, and count continue



When count reach to J2, relay switch on, count continue, when reach to J2-2, relay switch off. (J2-2>J2)



When count reach to J2, relay switch on, and count continue, when reach to J2+J2-2, then switch off, and count continue by J2 multiple repeatedly



When count reach to J2,
relay switch on,
count continue, when
reach to J2-t, relay
switch off.

5

(3) Relay J3 has 5 control output types (J3-Sn) :

Relay J3's control output types are same as J2's, please refer to J2's control output figure

■ RS485 communication

1. Communication protocol and features:

RS485 interface;

Electrical connection: three-wire connection, i.e. A(+), B(-), ground;

Connection type: asynchronous, semiduplex;

International standard Modbus-RTU protocol, instrument address: 1~247;

Baud rate: 2400 , 4800, 9600, 19200;

Data Format: N81 No parity, 8 data bits, 1 stop bit;

N81 No check bit 8 data bits 1 stop bit

O81 Odd check 8 data bits 1 stop bit

E81 Even check 8 data bits 1 stop bit

N82 No check bit 8 data bits 2 stop bits

The controller is currently open 01H, 02H, 03H, 04H read command, 05H, 10H write command, 03H, 04H read command has the same function, If the controller receives a wrong command, the meter will not respond.

Message format description:

Command 01H: Read relay output status command (total J1, J2, J3 three-way relay, address: 0~2)

Host request: address + command + start relay address + relay quantity + CRC check code
 1 byte + 1 byte + 2 byte + 2 byte + 2 byte

Address: It is the instrument address of inquiry, can be set from 1 to 247, occupies 1 byte

Command: 01H, length is 1 byte

Start relay address: The start address of the relay, occupies 2 bytes

Relays quantity: Number of relays

CRC check code: low 8 bits in front, high 8 bits behind, occupied 2 bytes

Slave response: address + command + register byte quantity + register value + CRC check code
 1 byte + 1 byte + 1 byte + n byte + 2 byte

Address: the instrument address number, length is 1 byte

Command: 01H, length is 1 byte.

Register byte quantity: returned register value byte quantity

Register Value: Relay status value

CRC check code: occupies 2 bytes, low 8 bits in front, high 8 bits behind

Command 02H: Read input status command (total IN1, IN2, reset three inputs, address is 0~2)

Host request: address + command + start input port address + number of input ports + CRC check code
 1 byte + 1 byte + 2 byte + 2 byte + 2 byte

Address: The address number of the instrument to be queried. It can be set from 1 to 247. It occupies 1 byte

Command: 02H, length is 1 byte

Start input port address: The start address of the input port, which occupies 2 byte

Input port number: the number of input ports

CRC check code: low 8 bits in front, high 8 bits behind, occupied 2 bytes

Slave response: address + command + register byte quantity + register value + CRC check code
 1 byte + 1 byte + 1 byte + n byte + 2 byte

Address: the instrument address number, a length of 1 byte

Command: 02H, length is 1 byte

Register byte quantity: returned register value byte quantity

Register value: State of the input port

CRC check code: occupy 2 bytes, low 8 bits in front, high 8 bits behind

Command 04H (or 03H): Read command

Host request: address + command + data address + data length + CRC check code
 1 byte + 1 byte + 2 byte + 2 byte + 2 byte

Address: It is the instrument address of inquiry, can be set from 1 to 247, occupies 1 byte
 The address number of the instrument to be queried. It can be set from 1 to 247. It occupies 1 byte
 Command: 04H or 03H Read command, length is 1 byte
 Data Address: The start address of Register, occupied 2 bytes
 Data length: register length
 CRC check code: low 8 bits in front, high 8 bits behind, occupies 2 bytes
 Slave response: address + command + data length + data information + CRC check code
 1 byte + 1 byte + 1 byte + n byte + 2byte
 Address: Instrument address number, length is 1 byte.
 Command: 04H or 03H, length is 1 byte
 Data length: Length of data byte to be sent
 Data information: Read data, refer to the instrument parameter address table
 CRC check code: occupy 2 bytes, low 8 bits in front, high 8 bits behind

Command 05H: Set the relay output (total J1, J2, J3 three relays, address: 0~2)
 Host request: address + command + relay address + relay action value + CRC check code
 1 byte + 1 byte + 2 byte + 2 byte + 2 byte
 Address: It is the instrument address of inquiry, can be set from 1 to 247, occupies 1 byte
 Command: 05H Write command, length is 1 byte
 Relay address: Controlled relay address, occupy 2 bytes (0000H relay release, FF00H relay pick-up)
 Relay action value: controlled relay action value, set the relay work mode to 0, this command works
 CRC check code: low 8 bits in front, high 8 bits behind, occupies 2 bytes
 Slave response: address + command + relay address + relay action value + CRC check code
 1 byte + 1 byte + 2 byte + 2 byte + 2 byte
 Address: It is the instrument address of inquiry, can be set from 1 to 247, occupies 1 byte
 Command: 05H Write command, length is 1 byte
 Relay Address: controlled relay address, occupy 2 bytes
 Relay action value: controlled relay action value
 CRC check code: occupy 2 bytes, low 8 bits in front, high 8 bits behind

Command 10H: Write command
 Host request: address + command + start address + number of registers + number of bytes + write register
 data + CRC check code
 1 byte + 1 byte + 2 byte + 2 byte + 1 byte + n byte + 2 byte
 Address: It is the instrument address of inquiry, can be set from 1 to 247, occupies 1 byte
 Command: 10H Write command, length is 1 byte
 Start address: The start address of Register, occupy 2 bytes
 Register number: number of registers
 Number of bytes: Number of bytes to be written
 Write register data: Data written to register
 CRC check code: low 8 bits in front, high 8 bits behind, occupies 2 bytes
 Slave response: address + command + start address + number of registers + CRC check code
 1 byte + 1 byte + 2 byte + 2 byte + 2 byte
 Address: It is the instrument address number, length is 1 byte
 Command: 10H write command, length is 1 byte
 Start Address: The start address of the register, occupies 2 bytes
 Number of Registers: Number of registers
 CRC check code: low 8 bits in front, high 8 bits behind, occupies 2 bytes

2. The instrument parameter address table (03H, 04H, 10H command to use):

Address	Description	Data type	Attributes	Instruction
0	Count value	Long	R/W	Constituted by address 0 and 1, signed integer, two's complement
1				
2	Display decimal places	Short	R/W	Display decimal places
3	Magnification decimal places	Short	R/W	Magnification decimal places
4	Magnification value	Short	R/W	Two-byte unsigned integer
5	Relay J1 work type	Short	R/W	
6	Relay J1 alarm value 1	Long	R/W	Address 6,7 forms a 4-byte signed integer, two's complement
7				
8	Relay J1 alarm value 2	Long	R/W	Address 8,9 forms a 4-byte signed integer, two's complement
9				
10	Relay J1 delay time value	Short	R/W	

11	Relay J2 work type	Short	R/W	
12	Relay J2 alarm value 1	Long	R/W	Address 12,13 forms a 4-byte signed integer, two's complement
13				
14	Relay J2 alarm value 2	Long	R/W	Address 14,15 forms a 4-byte signed integer, two's complement
15				
16	Relay J2 delay time value	Short	R/W	
17	Relay J3 work type	Short	R/W	
18	Relay J3 alarm value 1	Long	R/W	Addresses 18, 19 form a 4-byte signed integer, two's complement
19				
20	Relay J3 alarm value 2	Long	R/W	Addresses 20, 21 form a 4-byte signed integer, two's complement
21				
22	Relay J3 delay time value	Short	R/W	

3. communication example :

(1) Read data register (function code 03H/04H): read the current count value 45000, instrument address is 1.
Host read data frame:

Address	Command	Start address (High bit in front)	Number of registers (High bit in front)	Check code (Low bit in front)
01H	04H	00H,00H	00H,02H	71H,CBH

Instrument response data frame:

Address	Command	Data length	Data segment (4 bytes)	Check code
01H	04H	04H	00H,00H,AFH,C8H	87H,E2H

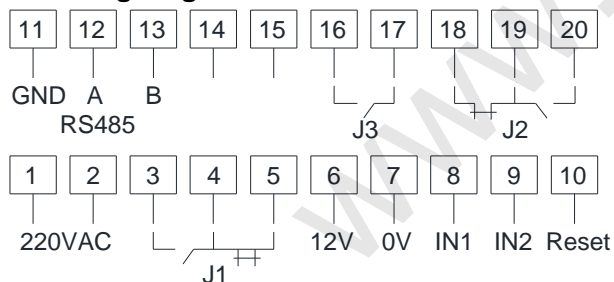
(2) Write data register (function code 10H): Set the current count value to 0 and the instrument address to 1.
Host write data frame:

Address	Command	initial address	Number of registers	Bytes	Data segment	Check code
01H	10H	00H,00H	00H,02H	04H	00H,00H,00H,00H	F3H,AFH

Instrument response data frame:

Address	Command	initial address	Number of registers	Check code
01H	10H	00H,00H	00H,02H	41H,C8H

■ wiring diagram and notes



Note: If there is a contact bounce causing false counts, please set the counter to low speed input mode.

■ Instrument application

1. The counter is used to measure the length

For rotating object measurements, the display value of the instrument is equal to the number of rotating object multiplied by the perimeter of each revolution, set the Magnification to perimeter, then the instrument display value is the length value of the measurement.

2. The usage of recognizable phase count (raster meter) and encoder

Select the appropriate encoder, calculate the length of the encoder unit pulse, set the magnification equal to the length of the encoder unit pulse, then the instrument display value is the required value of the measurement

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