CM Series Intelligent Counter/Timer User Manual

Features:

◎ Single line of 4, 5 or 6 digits LED display.

◎ Different size for option: 48H*48W, 72H*72W, 48H*96W.

◎ Use thumb switch and key to set parameters value.

◎ Reversible counting function, 4 kinds of input mode: A, B, C, D.

◎ 2 output channels (relay or transistor): AL1, AL2. 12 kinds of output mode: F, N, R, C, K1, K2, P, Q, A, D, H, L.

◎ Power failure memory function.

◎ Key and thumb switch protection function.

◎ Reset function through key or wiring terminal.

◎ Timing pause function.

◎ 8 kins of timer mode, decimal and sexagesimal system for option.

◎ Timer double delay. Output delay unit can be set as h(hour), m(minute), s(second).

1. Model

```
CM □- P S □ □ B ── B: Thumb switch
                   1: 1 segment preset    2: 2 segment preset
                   Display digits: 4, 5, 6 digits
                   S: Rate setting
                   P: Preset
                   Dimension: 4: 48H*48W    7: 72H*72W    8 : 48H*96W
                   CM Series Counting / Timer
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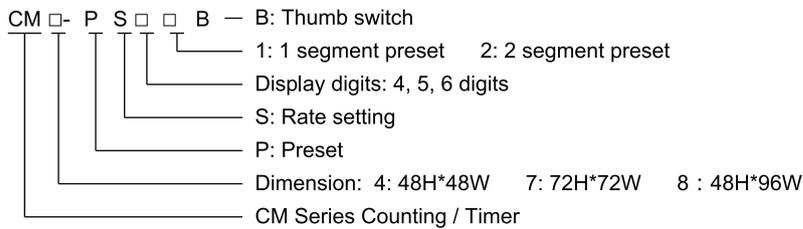
Model	Dimension (mm)	LED digit	Preset	Relay	24V power supply	Power supply
CM4-PS41B	48H*48W	4 digits	One	AL2	Can be ordered	AC/DC 100～240V
CM7-PS61B	72H*72W	6 digits	One	AL2	Can be ordered	AC/DC 100～240V
CM7-PS62B	72H*72W	6 digits	Two	AL1；AL2	Can be ordered	AC/DC 100～240V
CM8-PS51B	48H*96W	5 digits	One	AL2	Can be ordered	AC/DC 100～240V
CM8-PS52B	48H*96W	5 digits	Two	AL1；AL2	Can be ordered	AC/DC 100～240V

* Note: Please let us know your special demand in case the instrument still cannot meet your request.

2. Technical Parameters

Power supply	CM4, CM7, CM8: AC/DC 100~240V ±15%
Consumption	＜5W
Output type	Relay contact and transistor output simultaneously
Relay capacity	AC 250V/3A or DC 30V/3A
Transistor capacity	DC 30V/50mA
Output voltage	DC 24V±2V 50mA max
Iinsulation resistance	≥100MΩ
Anti-interference	Power: ±2kV Input: ±2kV
Anti vibration	10～55Hz 0.75mm
Prameters storage	10 years
Ambient temperature	0～50℃
Ambient humidity	35～85%RH

◆Counter parameters

| Input signal	Pulse signal: sin/square wave ; 5≤H≤30V 0≤L≤1V
Trigger edge	Rising edge.
Input impedance	≥10KΩ
Counting speed	5/30/100/1000/3000CPS
Counting Range	-1999～9999 (4 digits, max 3 decimal places can be reserved for display) -19999～99999 (5 digits, max 4 decimal places can be reserved for display) -199999～999999 (6 digits, max 6 decimal places can be reserved for display)
Output delay time	0.01s～99.99h (4 digits), 0.01s～999.99h (5 digits), 0.01s～9999.99h (6 digits)
Rate setting range	0.001～9999 (4 digits), 0.0001～999.99 (5 digits), 0.00001～9999.99 (6 digits)

◆Timer parameters

Accuracy	±0.1%F.S
Reset time	＜50ms
Power start time	＜300ms
Timing range	0.01s～999.9h (4 digits display), 0.01s～999.99h (5 digits display), 0.01s～9999.99h (6 digits display)
Delay range	0.01s～99.99h (4 digits display), 0.01s～999.99h (5 digits display), 0.01s～9999.99h (6 digits display)

3. Configuration and connection (Unit: mm)
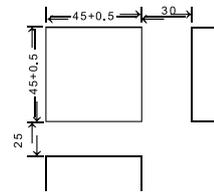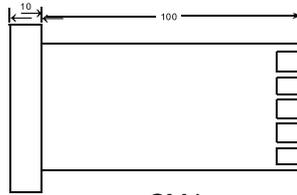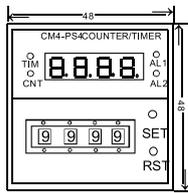
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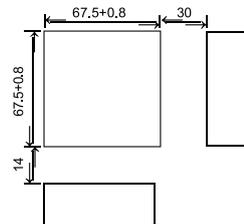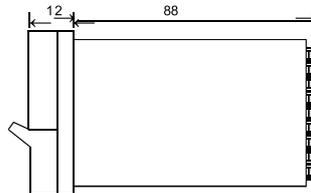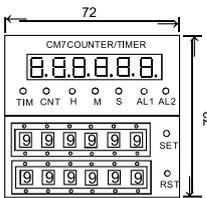
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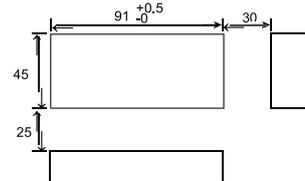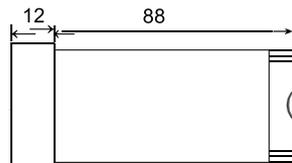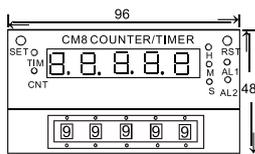
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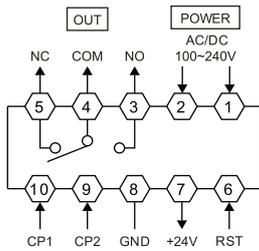
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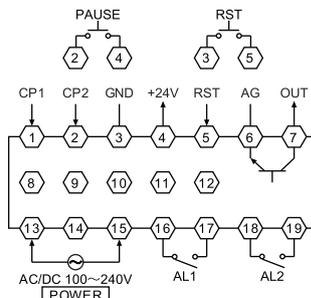
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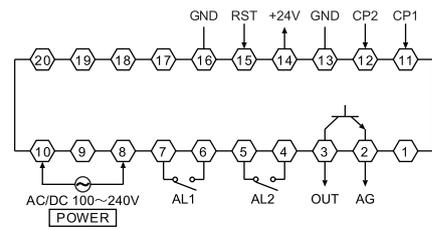
CM8

Note: if there is any change, please subject to the connection on the meter.

4. Usage and Operation

1. Before the instrument is powered on, please read the operation manual in detail, and check whether the wiring of the terminal is correct and whether the power supply meets the requirements of the instrument.
2. There are two operation keys. The instrument parameters can be modified with the combination of the keys and the up-line thrumb switch.

   SET: Set and confirm key. In measuring state, press it for 5 seconds to enter the parameters setting mode.

   RST: Reset and select key. In measuring state, press it to reset the measured value and output. In parameters setting state, press it to select the parameter that needs to be set.

3. Parameter setting operation

Press SET key for 5 seconds

| Measuring state |

↓ Press SET key for 5 seconds

FUn

↓ SET   Press RST key to select

cnT — Counter, CNT light on
↓ SET
SUdP — Measured value decimal point
↓ SET
0 — Measured value decimal place, press RST key to select
↓ SET
PdP — Ratio coefficient decimal point
↓ SET
5 — Ratio coefficient decimal place , press RST key to select
↓ SET
P — Ratio coefficient
↓ SET
1.00000 — Ratio coefficient value, press RST key to refresh (up line) thumb switch value as the new ratio value.
↓ SET
In — Input mode
↓ SET
A — Input mode value, press RST to select
↓ SET
CP — Highest counting speed
↓ SET
1000 — Highest counting speed, press RST to select
↓ SET
ouT — Output mode
↓ SET
r — Output mode, press RST to select
↓ SET
TiuE — Output delay time
↓ SET
0002.00 — Output delay time, press RST key to refresh (up line) thumb switch value as the new delay time value, meanwhile, modify the time unit h, m, s, and the relative indicator light is on.

TIM — Timer, TIM light on
↓ SET
rAn — Timer range
↓ SET
99.99.99 — Timer range, press RST key to select the corresponding timing unit, and the relative indicator light is on

| Return to measuring state |

↑ SET
0000 — Key protection mode, press RST key to select protect function.
↑ SET
LCY — Key protection
↑ SET
YES — Power failure memory function, press RST key to select whether this function is needed
↑ SET
HOL — Power failure memory function
↑ SET
nO2 — Relay 2 working mode, press RST key to select NO or NC
↑ SET
SS-2 — Relay 2 working mode
↑ SET
nO1 — Relay 1 working mode, press RST key to select NO or NC
↑ SET
SS-1 — Relay 1 working mode
↑ SET

Note: Please refer to Form 1 for detailed parameters explanation and setting method.

3

5. Additional notes

1. In the estate of measuring, control RST connection terminal or press RST key to reset the display value and output.

2. The width of reset signal (RST) and pause signal (PAUSE) must be more than 20ms. In case the instrument is used as timer, CP2 is used as PAUSE.

3. The transistor is of open collector output, it synchronous output with AL2 relay. CM4-PS41 is without transistor output function, if the user need this function, they need to indicate it when the order is made.

4. When the counter input mode is D, it is phase difference input mode, it can be used with encoder.

5. The input wire should not be too long, we suggest to user the shielded wire. The instrument should not be used under the circumstance of humidity>90RH% or strong acidity and alkalinity.

6. When the meter displays "Erro", please check the parameters value and see if they satisfy: SV2 (up row thumb switch value) ≥ SV1 (down row thumb switch value) ≥ P (ratio value) > 0, P≠0.

7. After the user set the parameters well and return back to the measuring estate, it's better press RST key to reset the meter.

8. When the meter is transistor open collector output, the output low potential terminal is AG, the high potential terminal is OUT. AG terminal shall not be short circuited with GND terminal to avoid burning the meter. Suggest to use the external power supply as the pull-up power for transistor, instead of the 24V power of the meter, so as to avoid interference with the input signal

9. When the meter output mode is C, automatic mode, if the output delay time ≥ the next counting / timing cycle, the output will not reset automatically.

6. Form 1: Parameter setting

Code	Parameter	Meaning	Specification	Range	Factory setting
1	FUn	Function selecting	Press RST key to select the measurement function CNT: counter, CNT light on. TIM: timer, TIM light on.	CNT、TIM	CNT
2	SUdP	SV value decimal point	Press RST key to select decimal point of SV value, timer without this menu. 0: None　　1: 1 decimal place 2: 2 decimal places　3: 3 decimal places 4: 4 decimal places　5: 5 decimal places	0、1、2、3、4、5	0
3	PdP	Ratio decimal point	Press RST key to select decimal point of ratio value, timer without this menu. 2: 2 decimal places　　3: 3 decimal places 4: 4 decimal places　　5: 5 decimal places	2、3、4、5	5
4	P	Ratio	Use the up row thumb switch to set the ratio value, and press RST key to confirm the setting, otherwise, it will remain the previous value. Timer withtou this menu.	0.00001～9999.99 (6 digits)	1.00000
5	In	Input mode	Press RST key to select input mode, please refer to Form 2 for input mode logic. Timer without this menu.	A、B、C、D	A
6	CP	Highest counting speed	Press RST key to select the highest counting speed. Timer without this menu.	5CPS、30CPS、200CPS、1KCPS、3KCPS	1KCPS
7	rАn	Timer range	Press RST key to select timer range, counter without this menu. 5(6) digits display: (9) 999.99+s light on, decimal 0.01s~9999.99s (9) 999.99+m light on, decimal 0.01m~9999.99m (9) 999.99+h light on, decimal 0.01h~9999.99h (9) 9999.9+m light on, decimal 0.1m~99999.9m (9) 9999.9+h light on, decimal 0.1m~99999.9h (9) 9.59.59+h、m、s light on, sexagesimal 1s~99h59m59s (9) 9.59.99+m、s light on, sexagesimal 0.01s~99m59s99ms (9) 999.59+h、m light on, sexagesimal 1m~9999h59m 4 digits display: 99.99+s light on, decimal 0.01s~99.99s 99.99+m light on, decimal 0.01m~99.99m 99.99+h light on, decimal 0.01h~99.99h 999.9+m light on, decimal 0.1m~999.9m 999.9+h light on, decimal 0.1m~999.9h 99.59+m、s light on, sexagesimal 1s~99m59s 999.9+s light on, decimal 0.1s~999.9s 99.59+h、m light on, sexagesimal 1m~99h59m	8 modes	99h59m59s h、m、s light on.

Code	Parameter	Meaning	Specification	Range	Factory setting
8	oUⁿ	Output mode	Press RST key to select output mode, please refer to Form 3 for output model logic.	F、N、R、C、K1、K2、P、Q、A、D、H、L	R
9	ⁿⁱⁿE	Output delay time	Use the up row thumb switch to set the output delay time, and press RST key to refresh the setting, meanwhile,the time unit will be changed accordingly.	00.01S ~ 99.99H	2.00S
10	SSⁿ-I	Relay 1(AL1) working mode	Press RST key to select AL1 working mode. NO1: AL1 relay NO; NC1: AL1 relay NC; The relay will act when switch between NO and NC. (Attention should be paid when adjusting this parameter under working condition)	NO1、NC1	NO1
11	SSⁿ-2	Relay 2(AL2) working mode	Press RST key to select AL1 working mode. NO2: AL2 relay NO; NC2: AL2 relay NC; The relay will act when switch between NO and NC. (Attention should be paid when adjusting this parameter under working condition)	NO2、NC2	NO2
12	HOL	Power failure memory	Press RST key to select power failure memory. YES: with power failure memory; NO: no power failure memory.	YES、NO	YES
13	LCⁿ	Key protection	Press RST to select protection for thumb switch and key: 0000: No protection; 1111: Protection for thumb switch, no protection for key. If need to use thumb switch to set the value, must press RST key to confirm the setting. 2222: Protection for thumb switch and RST key. In this mode, setting the thumb switch and pressing RST key will not work. (Generally, it is only applied to output mode C, R, P and Q. In automatic reset mode, the output is automatically controlled by the instrument, manual control is invalid.)	0000 1111 2222 3333	0000

7. Form 2: Relaytionship between input mode and the value

| Mode	up	Specifications
A		CP2 low voltage allows CP1 to count. CP2 high voltage does not allow CP1 to count.
B		CP2 low voltage, CP1 increase counter CP2 high voltage, CP1 decrease counter
C		CP1 increase CP2 decrease Display = CP1-CP2
D		CP2 later than CP1, CP2 increase counter. CP2 before CP1, CP2 decrease counter. Note: this is phase difference mode, can be usered with rotary encoder.

8. Form 3: The relationship between display value and output mode.

| Output Mode		Input mode		Action after preset value is reached
		Counting mode A and Timer	Counting mode B, C, D	
Output Mode	F	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Display value will continue decrease/ increase till reset input.
	N	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Display value and output will continue till reset input.
	R	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	When the display value and the output delay reaches the set value, it will return to initial state automatically. AL1 continues to output, and stops after AL2 delay output.
	C	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	The display value will return to initial state automatically. When the output delay reaches the set value, it wil return to initial state automatically. AL1 continues to output, and stops after AL2 delay output.
	K1	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	The display value continue. AL1 continues to output, and stops after AL2 delay output.
	K2	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	The display value continues until the input is reset, then it returns to the initial state. The output actions of AL1 and AL2 are independent, and the output time of AL1 and AL2 is equal.

		Input mode		Action after preset value is reached
		Counting mode A and Timer	Counting mode B, C, D	
Output Mode	P	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	After the display value continues delay output, it displays next cycle value (In the delay time, count and timing the next cycle from the initial value) AL1 continues to output, and stops after AL2 delay output.
	Q	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Display value continues to increase/decrease during delay output, and it returns to initial value after delay output. AL1 continues to output, and stops after AL2 delay output.
	A	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Display value and AL1 output continue till manual reset input. AL2 return back to initial state after delay output.
	D	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Output only when display value and set value are the same.
	L	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Display value continues till external reset input. AL1 output maintain, when display value ≤ set value 1. AL2 output maintain, when display value ≥ set value 2.
	H	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Reset / 99999 / Preset 2 / Preset 1 / 0 / -19999 / AL1 / AL2	Display value continues till external reset input. AL1 output maintain, when display value ≥ set value 1. AL2 output maintain, when display value ≥ set value 2.
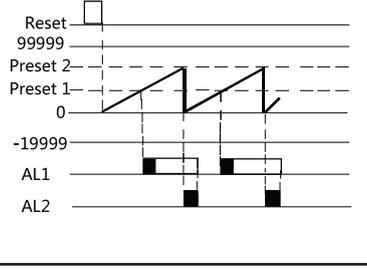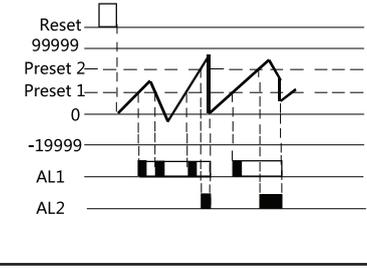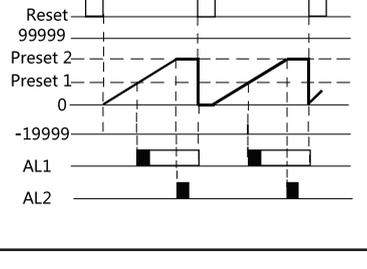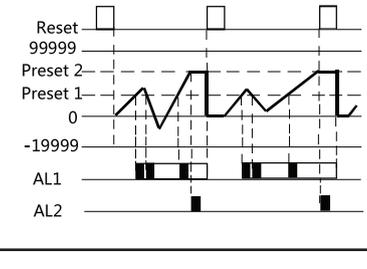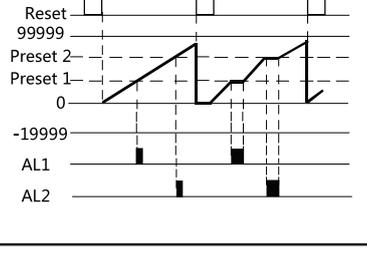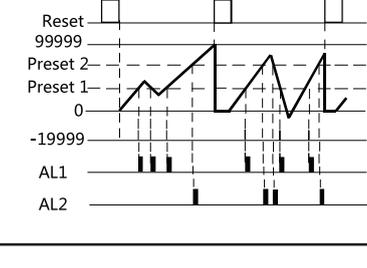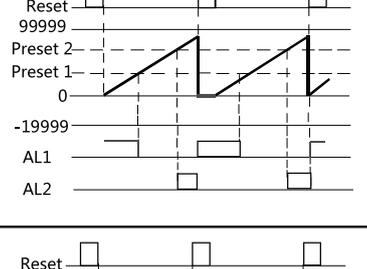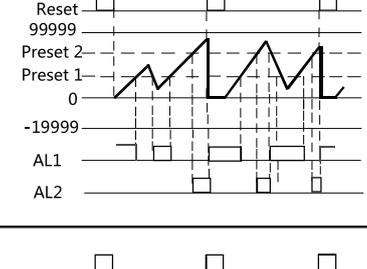
Normal output

Delay output

Self hold output
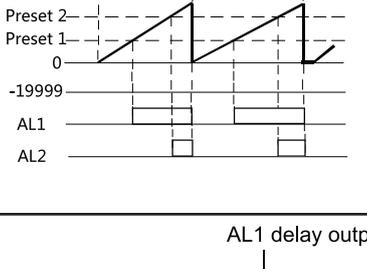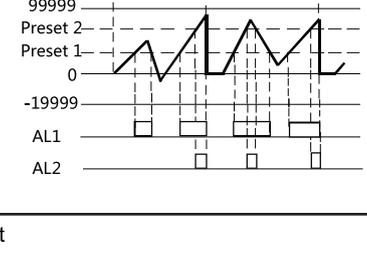
AL1 delay output

Self hold output
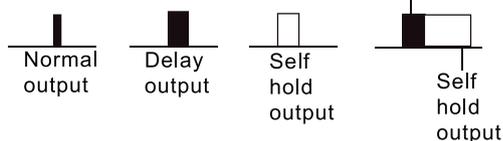
Delay output time: 0.01s-99.99h changeable (4 digits display)
0.01s-999.99h changeable (5 digits display)
0.01s-9999.99h changeable (6 digits display)

9. Wire Connection

3 wire proximity sensor		CM Counter
Red (Power)	+24V	
White (Out)	CP1(CP2)	
Black (GND)	GND	

2 wire proximity sensor		CM Counter
Red (Power)	+24V	
Blue (Out)	CP1(CP2)	
470Ω~3KΩ	GND	

10. Application Example

Control voltage input (Input Mode A, B)

Bulge
Proximity sensor
Wheel M

CP1
CP2
GND
+24V
CM Counter
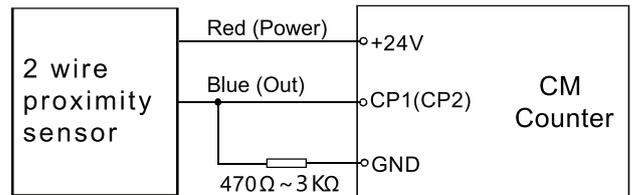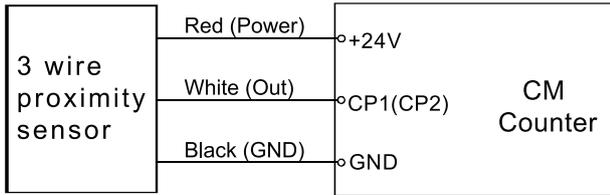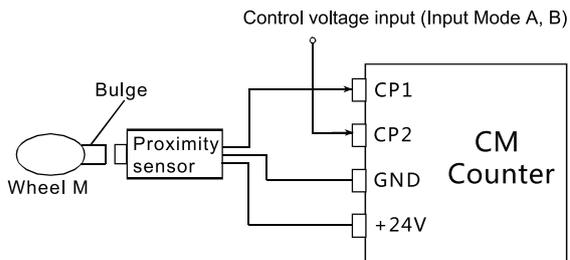
Input mode B (up counting or down counting)
When CP2 is low voltage, CP1 is add counting.
When CP2 is high voltage, CP1 is down counting.
(If there is no high voltage, please short circuit
CP2 and +24V terminal)

(Input Mode D)

Wheel
M
Rotary encoder

A phase
B phase

CP1
CP2
GND
+24V
CM Counter
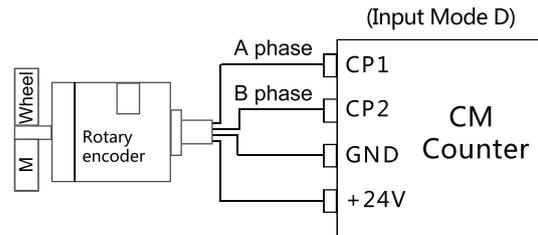
Note: If A phase and B phase of rotary encoder is open collector output,
pull resistance should be added at CP1 and CP2 input terminals. The
resistance value depends on the internal parameters of the encoder,
and the typical value is 5.1k

11. Common faults and solution

1. Meter does not count

★Check whether the wire connection is correct.

★Check whether the sensor input signal, voltage, frequency is correct.

★Check whether the input mode (IN) and counting speed (CPS) of the instrument meet the application requirements.

★Check iwhether the ratio (coefficient) P is set as a small value.

★Check whether the output signal is voltage signal. Note that the input impedance of the instrument is about 17k Ω.

If the input signal is switch signal, please add a pull-up resistor (5.1K) between input terminal and +24V terminal.

2. Cannot set the set value or press the key to reset

★Check the setting of LCK key protection menu, whether the RST key has been locked.

★Set LCK as 0000 to release operation authority for key and thumb switch.

3. With (without) power failure memeory function.

★ Check HOL parameter setting

★ YES: with power failure memory function

★ NO: without power failure memory function

4. After changing the parameter setting or setting value, the instrument does not work normally.

★ Exit the parameter setting menu or change the set value, press RST key in the measurement state to recharge the parameter
(LCK cannot be set as 2222, otherwise RST key operation will be invalid).

5. Excessive counting when relay or limit switch is used as input contact of the meter.

Because of mechanical vibration, there might be excessive counting when relay or limit switch is used as input contact of the meter.

An electrolytic capacitor of 33μF / 35V should be added at the input terminal and GND terminal.