ZN series digital counter manual

- Strong anti-jamming, high reliability, used widely in industrial control systems.
- Standard dimensions (48x48mm / 72x72mm), easy to install
- Fit to GB14048.5-2008 and many other national or industry standards, high-quality, high-performance
- Using high frequency crystal oscillator frequency division technology, timing accuracy, high precision
- With timing, counting, rotation speed, frequency, cumulative and other functions, cost-effective, variety relay work mode to meet the needs of the scene
- Can be connected to proximity sensors, photoelectric sensors, switch contacts, encoders and other sensors.
- Can set relay action mode, magnification a, magnification b, set value, cumulative value, count value, data will not lose when power off.
- Strictly produce according to standard, 9 working procedures and 5 times strict inspections.

❶ Main technical parameter

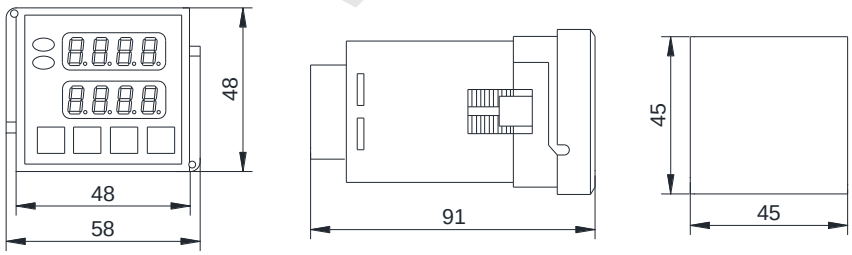
1. Function characteristic

Supply voltage	Refer to the label of case, the voltage fluctuation is 85%-110%Ue	Mechanical life	≥10^6 ops
Power consumption	≤3VA	Electrical life	≥10^5ops
Operating temperature	-5℃-45℃	Pause time	≥0.05s
Store temperature	-20℃-70℃	Reset time	≥0.05s
Auxiliary power	DC12V 30mA (max)	Power restart	≥1s
Operating humidity	35-85%RH	Mounting type	Panel
Contact rating	AC250V 5A C0SΦ= 1； DC24V 7A	Product weight	About 150g
Count type	1. Contact 2. NPN type sensor	Counting speed	2-10KHZ

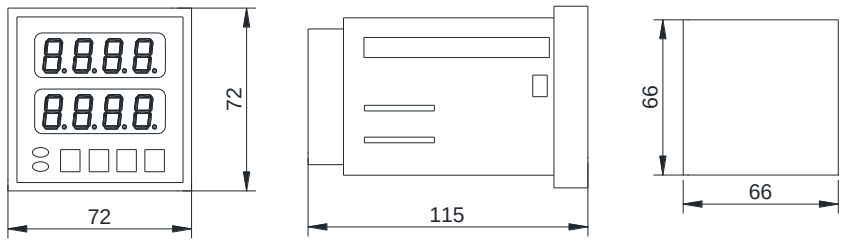
2. Electric characteristic

Insulation resistance	100MΩ min at 500Vdc	Dielectric strength	2000Vac, 50/60Hz for 1min
Anti-jamming	EFT execute GB/T17626-4 level	impact	Impact resistance: 30G X、Y、Z direction 3 times each
Anti-jamming	ESD execute GB/T17626-3 level	impact	Malfunction: 10G X、Y、Z direction 3 times each
vibration	Shock resistance: 10-50Hz(1min periods) 0.75mm swing, X、Y、Z direction 1h each		
vibration	Malfunction: 10-55Hz(1min periods) 0.5mm swing, X、Y、Z direction 1min each		

❷ External dimensions and Perforation dimensions (Unit: mm)

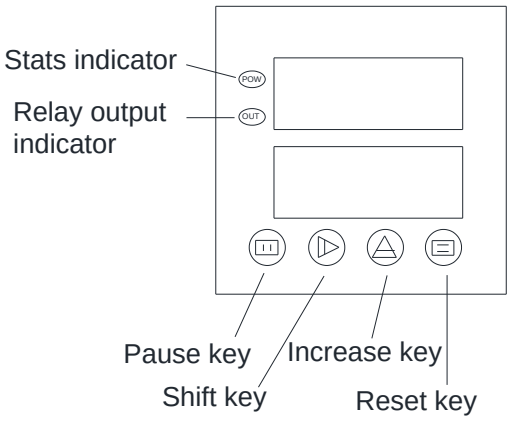


ZN48

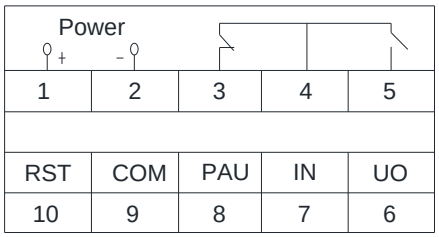


ZN72

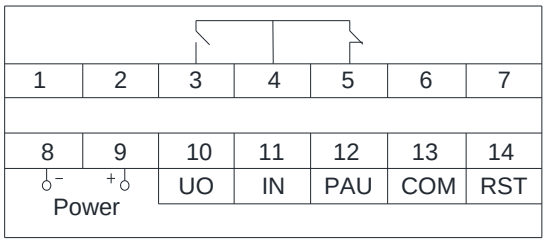
❸ Front panel description



❹ Wiring diagram



ZN48



ZN72

❺ Product function code, description, working range correspondence table

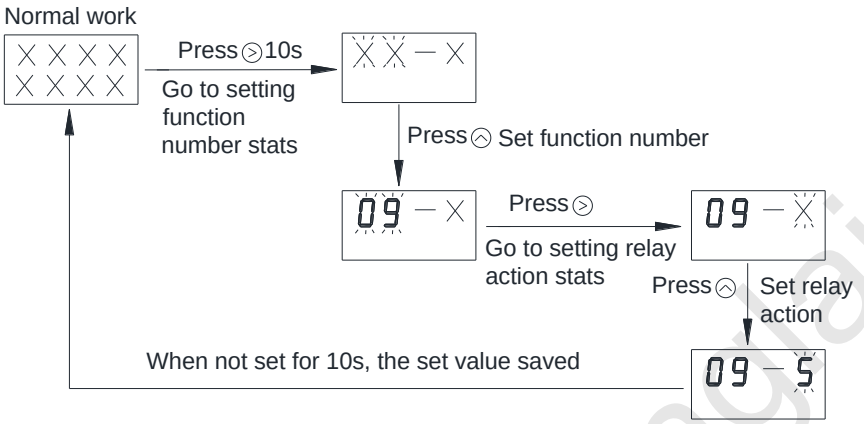
Function Code	Description	Range	Relay action code	Magnification
01	Single delay (Up)	0. 01S-99. 99S	1-6	
02	Single delay (Down)	0. 01S-99. 99S	1-6	
03	Single delay (Up)	1M-9999M	1-6	
04	Single delay (Down)	1M-9999M	1-6	
05	Single delay (Up)	1S-9999S	1-6	
06	Single delay (Down)	1S-9999S	1-6	
07	Single delay (Up)	1S-99M59S	1-6	
08	Single delay (Down)	1S-99M59S	1-6	
09	Single delay (Up)	1M-99H59M	1-6	
10	Single delay (Down)	1M-99H59M	1-6	
11	Double delay (Up)	1M-99H59M	1, 2	
12	Double delay (Down)	1M-99H59M	1, 2	
13	Double delay (Up)	1S-99M59S	1, 2	
14	Double delay (Down)	1S-99M59S	1, 2	
15	Double delay (Up)	1S-9999S	1, 2	
16	Double delay (Down)	1S 9999S	1, 2	
17	Double delay (Up)	1M 9999M	1, 2	
18	Double delay (Down)	1M 9999M	1, 2	
19	Accumulation (reset immediately)	0-99H59M59.99S	1-6	
20	Accumulation (reset after 8s)	0-99H59M59.99S	1-6	
21	Accumulation (reset immediately)	0-9999H59M59S	1-6	
22	Accumulation (reset after 8s)	0-9999H59M59S	1-6	
23	Accumulation (reset immediately)	0-9999D23H59M	1-6	
24	Accumulation (reset after 8s)	0-9999D23H59M	1-6	
25	Frequency	1Hz-9999Hz	1, 3	
26	Frequency	1.0Hz-999. 9Hz	1, 3	
27	Rotation	60-9999RPM	1, 3	
28	Frequency/Rotation	0-9999	1, 3	a、b
29	Reversible count	0-9999	1, 3, 5	
30	Reversible count	0-9999	1, 3, 5	a
31	Reversible count	0-99999999	1, 3, 5	
32	Reversible count	0-99999999	1, 3, 5	a

❻ Relay action mode

Code	Relay action content
1	When power on, the counter work, reach or exceed the set value, relay switch on.
2	When power on, the counter don't work (can make it work by reset button or reset terminals), reach or exceed the set value, relay switch on.
3	When power on, the counter work, reach or exceed the set value, relay switch off.
4	When power on, the counter don't work (can make it work by reset button or reset terminals), reach or exceed the set value, relay switch off.
5	When power on, the counter work, reach or exceed the set value, relay switch on, when reach to preset reset time, the counter reset automatically, begin work again.
6	When power on, the counter don't work (can make it work by reset button or reset terminals), reach or exceed the set value, relay switch on, when reach to preset reset time, the counter reset automatically, begin work again.

❼ Product function code and relay action code setting instructions

(1) e.g. the setting process of function code 09, relay action code 05, the setting process is as follow:



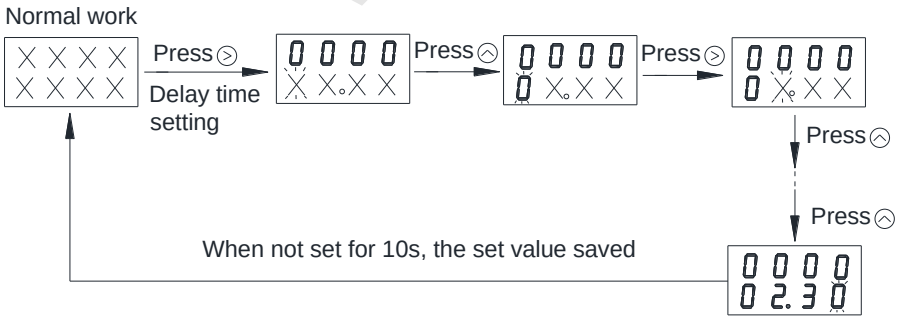
(2) When the relay action code is 5 or 6, it will appear with reset time setting, range is 0.1-999.9s.

(3) Factory setting is as follow: function code 08, relay action code 1, the digital display is 08-1, that is to say, the instrument function is single delay time relay, time range is 1S-99M59S, countdown, when power on, the counter work, reach or exceed the set value, relay switch on.

❽ Single delay time relay (function code 01-10)

(1) When single delay time relay, the upper digital tube show delay value, the lower digital tube show set value.

(2) e.g. function code is 07, set the single delay time delay's delay time to 2 minutes and 30 seconds, the setting process is as follow:



(3) Pause key (PAU): When the single delay time relay work, press down the pause key, delay paused, release the pause key, delay continues.

(4) Reset key (RST): When the single delay time delay work, press down the reset key, the time relay restores to initial state, release the reset key, time relay begins to delay work.

(5) PAU terminal: delay stopped when connect to COM terminal, delay continues when disconnect.

(6) reset (RST): restore to initial state when connect to COM terminal, renew delay when disconnect.

(7) IN terminal is invalid.

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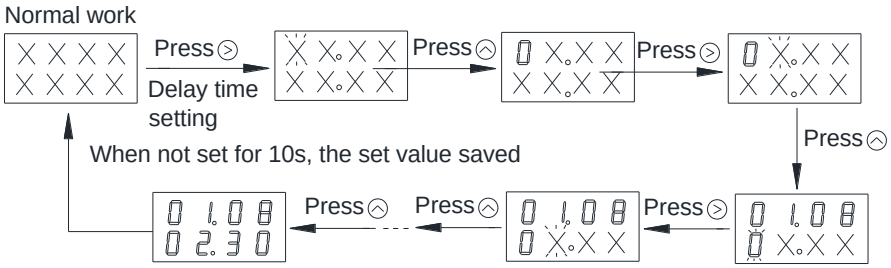
❾ Double delay time relay (function code 11-18)

(1) When double delay time relay work, the upper digital tube shows the relay release and pick up's current value in sequence, the lower digital tube shows the corresponding value.

(2) e.g. function code is 13, set the double delay time delay's release time to 1 minute and 8 seconds, pick up time to 2 minutes and 30 seconds, the setting process is as follow (When setting, the upper digital tube is release time, the lower digital is pick up time):



(3) Pause key (PAU): When the double delay time relay work, press down the pause key, delay paused, release the pause key, delay continues.

(4) Reset key (RST): When the double delay time delay work, press down the reset key, the time relay restores to initial state, release the reset key, time relay begins to delay work.

(5) PAU terminal: delay stopped when connect to COM terminal, delay continues when disconnect.

(6) Reset (RST): restore to initial state when connect to COM terminal, renew delay when disconnect.

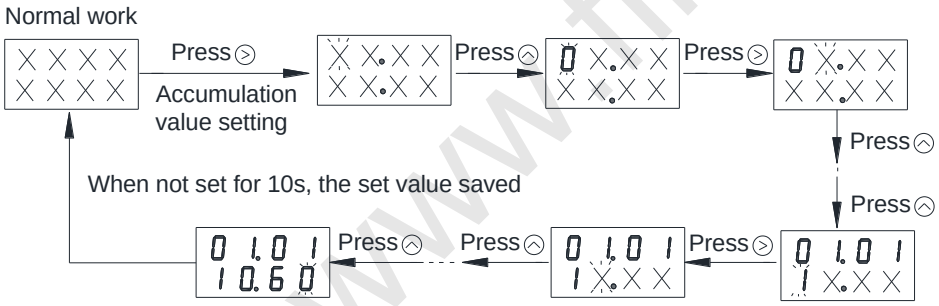
(7) IN terminal is invalid.

(8) When normal work, press the ⌔ key directly, the upper and lower digital tubes is flashing, the upper four digits display the relay release time action value, the lower four digits show relay pick up time action value.

❿ Eight-bit accumulation relay (function code 19-24)

(1) When accumulation relay work, the eight digital tubes show the current cumulative time.

(2) e.g. function code is 19, set the relay action time to 1 hour 1 minute 10.6 seconds, the setting process is as follow:



(3) Pause key (PAU): When the accumulation relay work, press down the pause key, cumulative time paused, release the pause key, cumulative time continues.

(4) Reset key (RST): When the accumulation relay work, press down the reset key, accumulation relay restores to initial state, release the reset key, accumulation relay begins to cumulative time. When the function code is 20, 22, 24, the reset will work after 8s.

(5) PAU terminal: cumulative time stopped when connect to COM terminal, cumulative time continues when disconnect.

(6) Reset (RST): restore to initial state when connect to COM terminal, renew cumulative time when disconnect. When the function code is 20, 22, 24, the reset will work after 8s.

(7) IN terminal is invalid.

(8) When normal work, press the ⌔ key directly, the upper and lower digital tubes is flashing, display time action value.

⓫ Frequency meter (function code 25-26)

(1) When frequency meter work, the upper digital tube display frequency measured value, the lower digital display frequency set value.

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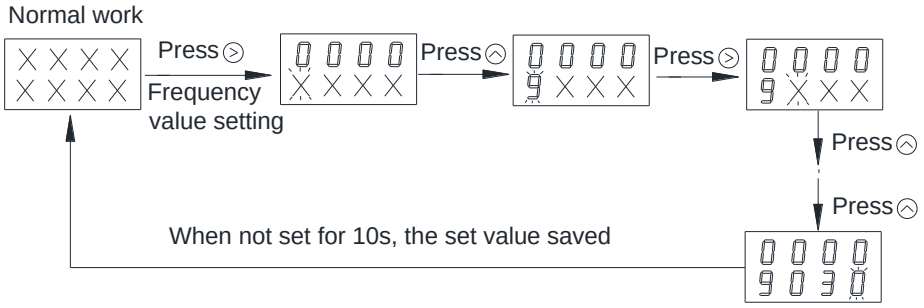
(2) e.g. function code is 25, set when the frequency exceeds 9030Hz, the relay picks up, the setting process is as follow:



(4) Pause key (PAU) / reset key (RST) is invalid, PAU terminal / reset terminal (RST) is invalid.

(5) IN is an external pulse input.

(6) If the measured rotational speed exceeds 9999, the meter displays "EEEE".

(7) Valid measured frequency upper limit and trigger selection:

When normal work, press down ⌔ key for 8s, enter the frequency measurement parameter setting interface,

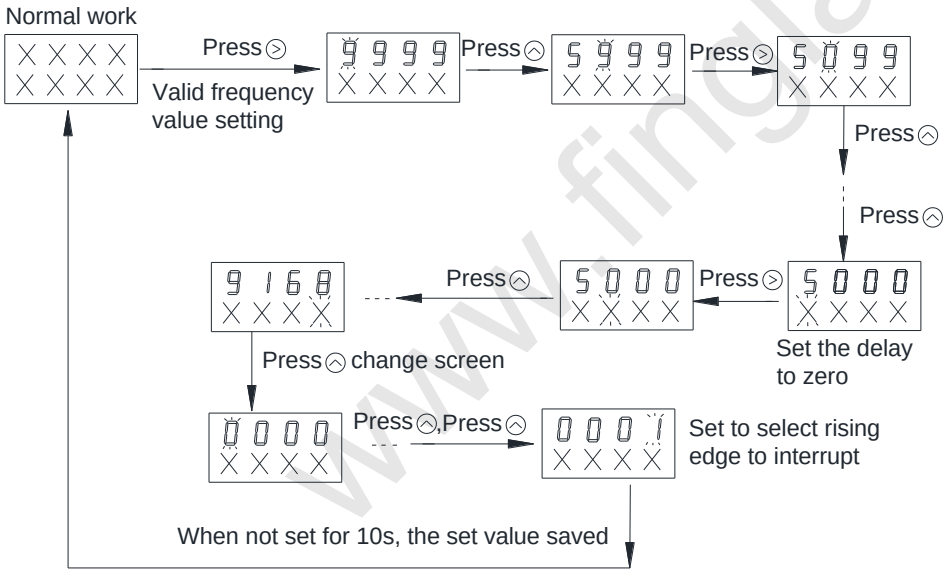
A, the upper digital tube is the maximum measured frequency.

B, the lower digital tube is the measured frequency's "display return to zero" time. As the lower measured limit is 0.1Hz, when the input pulse suddenly stops, the meter will be in the waiting state, the display cannot return to zero in time; modify this parameter so that the input pulse suddenly stops, according to the set time to return to zero.

C, after changing screen, the upper digital tube is the frequency measurement interrupt trigger mode selection. 0000: falling edge interrupt; 0001: rising edge interrupt.

When the input signal's frequency is more than the set upper measured limit, the frequency signal will can't be correctly identified.

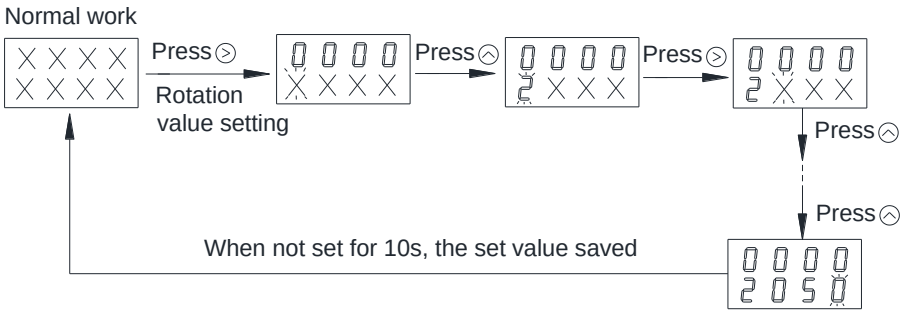
e.g. When input by lower frequency signal, set the upper measured frequency limit to 5000, the setting process is as follow:



⓬ Tachometer (function code 27)

(1) When tachometer work, the upper digital tube displays the rotational speed's measured value, the lower digital tube displays the rotational speed's set value.

(2) e.g. rotate a circle has a pulse, when the rotational speed exceeds 2050 r/min, the relay picks up, the setting process is as follow:



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(3) In the tachometer mode, when press down ⌔ 8s key for 8s, it also can enter to valid measured frequency upper limit and trigger selection. In this mode, usually don't need to change the upper valid frequency setting

(4) Pause key (PAU) / reset key (RST) is invalid, PAU terminal / reset terminal (RST) is invalid.

(5) IN is an external pulse input.

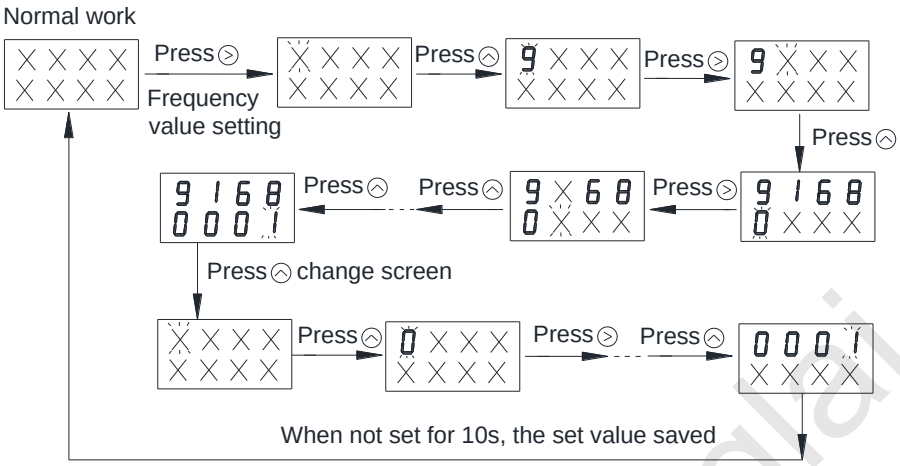
(6) return to zero delay and interrupt type setting is same as "⓫ frequency meter" setting.

(7) If the measured rotational speed exceeds 9999, the meter displays "EEEE".

⓭ Frequency meter with magnification (function code 28)

(1) When frequency meter work, the upper digital tube display frequency measured value, the lower digital display frequency set value.

(2) e.g. set relay action value to 9168Hz, magnification a=1, magnification b=1, when setting, the upper digital tube is frequency value, the lower digital tube is magnification a. When change screen, the upper digital tube is magnification b, the lower digital tube doesn't display:



(3) press down ⌔ 8s key for 8s, it also can enter to highest valid frequency setting and trigger mode setting.

(4) Magnification a's range is 0-9999, magnification b's range is 1-9999, the current display value = the measured frequency value ×a / b.

(5) When normal work, press ⌔ key in first time, the upper digits is flashing, displays relay action value, the lower digits display magnification a sparklingly; when press ⌔ key second time, the upper digits display magnification b sparklingly, the lower digits don't display

(6) Pause key (PAU) / reset key (RST) is invalid, PAU terminal / reset terminal (RST) is invalid.

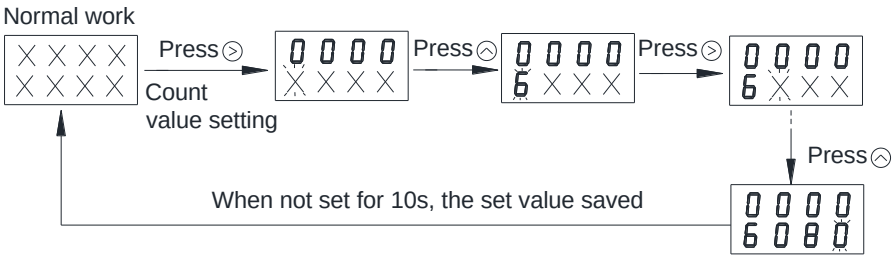
(7) IN is an external pulse input.

(8) max measured frequency, return to zero delay and interrupt type setting is same as frequency meter setting.

⓮ Reversible counter (Function code 29)

(1) When counter work, the upper digital tube displays count value, the lower digital tube displays count set value.

(2) e.g. set the count to 6080, the lower digital tube is set value, the setting process is as follow:



(3) filter out clutter, improve anti-jamming: In the industrial field, often because of wiring, power and other reasons, resulting in pulse signal doping a variety of irregular signals, cause the counter is not accurate counting. So set the counting pulse width and level mode selection in the strong interference scene, provide the right pulse to meter, let it distinguish, the set method is as follow:

Press ⌔ key for 8s, to enter count pulse width setting, the upper digital tube display valid min pulse width t1, the lower

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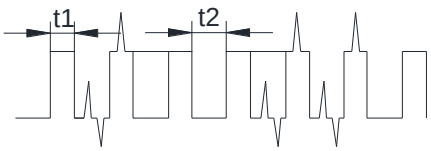
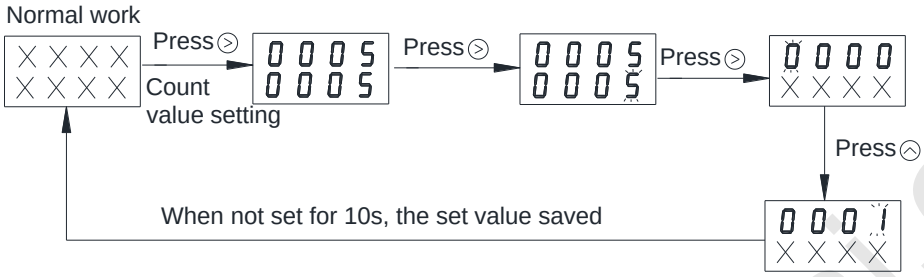
digital tube display min pulse Interval width t2. Their set range is all 0.1-999.9ms. The frequency is more high, the pulse width is more narrow, when user's frequency is more than 5KHz, can set t1=0, t2=0 directly, user can refer to the follow table, to calculate t1, t2 values, but please note, t1 and t2 usually is not symmetric, t1 is closed to real pulse width basically, if t1 is too small, will result in pulse lose, if too big, will reduce the filtering out clutter ability, result in count more.



Frequency(Hz)	Period (ms,t1+t2)
1	1000.0
10	100.0
100	10.0
1000	1.0
2000	0.5
10000	0.2

Press ⌔ key again, when screen change, the upper digital tube is count level selection, if set to 0, then the pulse's low level is valid (or valid when terminal IN connect to COM), if set to 1, then the pulse's high level is valid (or valid when terminal IN disconnect COM), the above setting is fit to NPN sensor.



When counting, if the pulse width is less then set value, will be eliminated as an interference.

(4) Pause terminal is reversible counter control terminal: count down when connect to COM, count up when disconnect.

(5) reset terminal (RST): restore to initial state when connect to COM terminal, renew count when disconnect.

(6) Reset key (RST): When the counter work, press down the reset key, the counter restores to initial state, release the reset key, time relay begins to count.

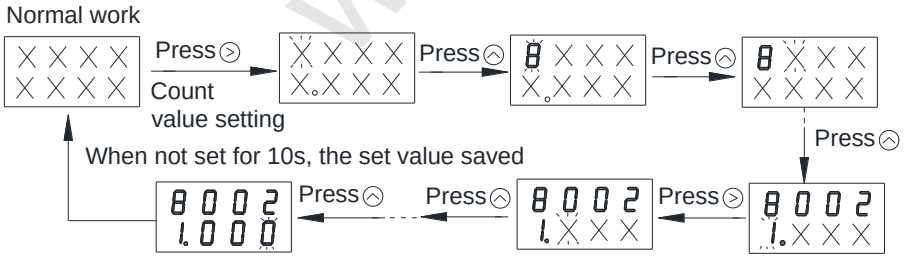
(7) IN is an external pulse input.

(8) Pause key (PAU): Invalid

⓯ Reversible counter with magnification (function code 30)

(1) When counter work, the upper digital tube displays count value, the lower digital tube displays count set value.

(2) e.g. set the count to 8002, magnification a=1.000, the upper digits are set value, the lower digits are magnification a, the setting process is as follow:



(3) Pulse width setting and level setting, refer to "⓮ Reversible counter (3)".

(4) PAU terminal is reversible counter control terminal: count down when connect to COM, count up when disconnect.

(5) reset terminal (RST): restore to initial state when connect to COM terminal, renew count when disconnect.

(6) Reset key (RST): When the counter work, press down the reset key, the counter restores to initial state, release the reset key, time relay begins to count.

(7) IN is an external pulse input.

(8) Pause key (PAU): Invalid.

(9) The current display value = the number of measured pulses × a, magnification a: 0.001-9.999.

(10) When normal work, press ⌔ key directly, the upper digits display relay action value sparklingly, the lower digits display

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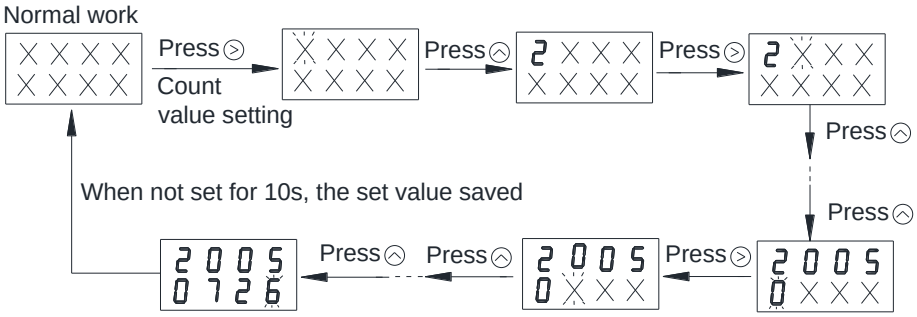
magnification a sparklingly.

⓰ Eight-bit reversible counter (function code 31)

(1) When counter work, the eight digits display the current count value.

(2) e.g. set the count to 20050726, the eight digits are set value, the setting process is as follow:



(3) Pulse width setting and level setting, refer to "⓮ Reversible counter (3)".

(4) PAU terminal is reversible counter control terminal: count down when connect to COM, count up when disconnect.

(5) reset terminal (RST): restore to initial state when connect to COM terminal, renew count when disconnect.

(6) Reset key (RST): When the counter work, press down the reset key, the counter restores to initial state, release the reset key, time relay begins to count.

(7) IN is an external pulse input.

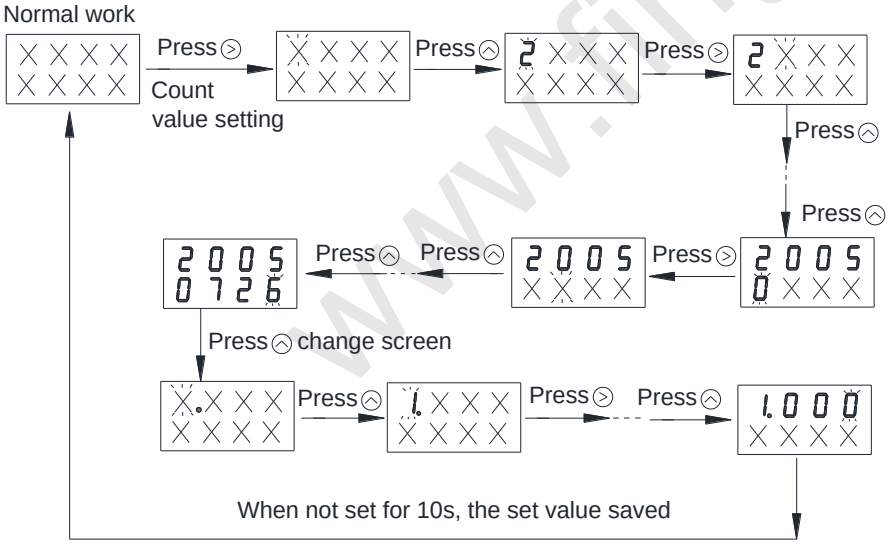
(8) Pause key (PAU): Invalid.

(9) When normal work, press ⌔ key directly, the eight digits display relay action value sparklingly.

⓱ Eight-bit reversible counter with magnification (function code 32)

(1) When counter work, the upper digital tube displays count value, the lower digital tube displays value set value.

(2) e.g. set the count to 20050726, magnification a=1, the eight digits are count value, when change screen, the upper digits are magnification, the lower digits don't display, the setting process is as follow:



(3) Pulse width setting and level setting, refer to "⓮ Reversible counter (3)".

(4) PAU terminal is reversible counter control terminal: count down when connect to COM, count up when disconnect.

(5) reset terminal (RST): restore to initial state when connect to COM terminal, renew count when disconnect.

(6) Reset key (RST): When the counter work, press down the reset key, the counter restores to initial state, release the reset key, time relay begins to count.

(7) IN is an external pulse input.

(8) Pause key (PAU): Invalid.

(9) The current display value = the number of measured pulses × a, magnification a: 0.001-9.999.

(10) When normal work, press ⌔ key directly in first time, the eight digits display relay action value sparklingly, when press ⌔ key second time, the upper digits display magnification sparklingly, the lower digits don't display.

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