# 1 Way Digital Tube Delay Relay

The CE030 Multi-Function Relay Control Module is designed for users with many different needs. It uses a microcontroller as the main control unit, presets up to 18 functions, and can customize and add other specific functions according to user requirements.

The module adopts genuine high-quality power relay, high-power high-voltage triode, red signal indicator, military-grade double-sided PCB board, comprehensive layout, stable performance, and can be widely used in various power control applications.

Features:

1. New upgrade to version 3.0, change the high level trigger to low level trigger, adapt to a wider range of occasions;

2. Change the display circuit of the MCU+HC595 into a single-chip integrated control and display, which reduces the stability of the components.

2. Increase the anti-reverse function of the power supply, and the module will not be damaged due to the wrong power supply;

3. Using the top quality high-voltage power supply module to replace the previous discrete power supply, the system is more stable and reliable;

4. Increase the 0.1 second timing function, the timing accuracy is upgraded from the previous 0.1 seconds to 0.01 seconds;

5. Increase the automatic power saving function, the user can set it autonomously;

6. All setting options can be saved automatically, and the setting content will not be lost when power is off.
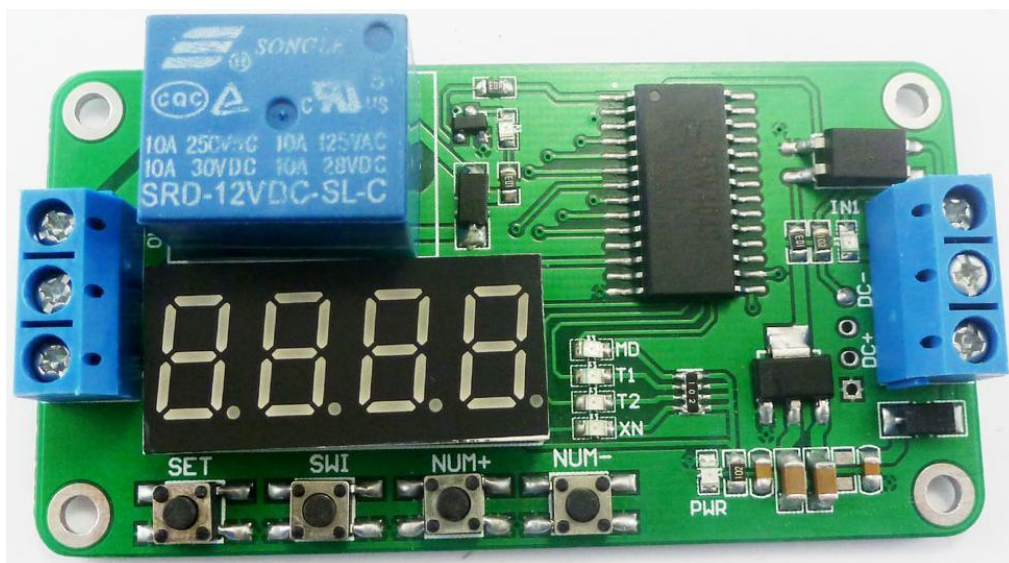
1. Module functions

The user can select one of the following 18 functions by pressing the button and display. You can set and save the function parameters, and also view the parameters of the current function. The time parameter setting can be adjusted by 0.1 second at minimum, and the precision is better than 0.01 seconds.

Tips: Function 1-8 is powered on automatically, function 9-18 requires low-level pulse signal to trigger start (low level duration is not shorter than 20ms, the same below), function 9 is self-lock mode, function 10 is Level control mode.

Function 1:
Timing pull-in: After power-on, the delay T1 time relay is closed, T1 is adjustable between 0.1 seconds and 270 hours, and a low-level pulse signal is sent to the IN1 interface, repeating the above functions;

Function 2:
Timing disconnection: the relay is closed when power is on, the delay time T1 time relay is disconnected, T1 is adjustable between 0.1 seconds and 270 hours, and a low level pulse signal is sent to the IN1 interface, and the above functions are repeated once;

Function 3:
Timing and re-opening: After power-on, the relay will not pick up first. After the delay time T1 arrives, the relay will pick up. When the pull-in time T2 arrives, the relay will be disconnected. The delay time T1 and T2 will be between 0.1 seconds and 270 hours. Adjustable between each other, give the IN1 interface a low-level pulse signal, repeat the above functions;

Function 4:
Timing disconnection and re-sucking: After power-on, the relay will immediately pull in. After the delay time T1 arrives, the relay will be disconnected; after the disconnection time T2 arrives, the relay will be closed. The delay time T1 and T2 will be between 0.1 seconds and 270 hours. Adjustable, give the IN1 interface a low-level pulse signal, repeat the above functions;

Function 5:
Infinite loop timing mode 1: After power-on, the relay does not pick up first. After the delay time T1 arrives, the relay pulls in; after the pull-in time T2 arrives, the relay turns off, and then repeats the above state. The delay time T1 and T2 are at 0.1. Adjustable from seconds to 270 hours, a low-level pulse signal is sent to the IN1 interface to restart the above functions;

Function 6:
Infinite loop timing mode 2: After power-on, the relay will immediately pull in. After the delay time T1 arrives, the relay will be disconnected. After the disconnection time T2 arrives, the relay will pick up and then repeat the above state. The delay time T1 and T2 are 0.1 seconds. Adjustable between -270 hours, give the IN1 interface a low-level pulse signal, you can restart the above functions;

Function 7:

Limited cycle timing mode 1: After power-on, the relay does not pick up first. After the delay time T1 arrives, the relay pulls in; after the pull-in time T2 arrives, the relay turns off, and then repeats the NX times or more. At this time, T1 and T2 are in Adjustable between 0.1 seconds and 9999 seconds, the number of cycles NX can be adjusted between 1-9999 times, and a low-level pulse signal is sent to the IN1 interface to restart the above functions;

Function 8:

Limited cycle timing mode 2: After power-on, the relay will immediately pull in. After the delay time T1 arrives, the relay will be disconnected. After the disconnection time T2 arrives, the relay will pick up and then repeat the NX times or more. At this time, T1 and T2 are at 0.1. Adjustable between seconds and 9999 seconds, the number of cycles NX can be adjusted between 1-9999 times, and a low-level pulse signal is sent to the IN1 interface to restart the above functions;

Function 9:

Self-locking relay mode: Give the relay IN1 interface a low-level pulse signal, the relay pulls in, and then a low-level pulse signal relay is disconnected.

Function 10:

Trigger relay mode: including delay open function, the relay does not operate after power-on, give IN1 interface a low level signal, the relay immediately picks up, after the IN1 signal disappears, the relay still pulls in, when the pull-in time T1 arrives, the relay Disconnected, T1 is adjustable between 0 seconds and 270 hours.

Note: In this function, if T1 is set to 0 seconds, it will become: IN1 has a low level signal relay to pull in, and if there is no signal, it will be disconnected immediately.

Function 11:

Trigger timing pull-in: The relay does not operate after power-on, give a low-level pulse signal to the IN1 interface, delay the T1 time relay to pull in, T1 can be adjusted between 0.1 seconds and 270 hours, repeating to the IN1 interface a low level Pulse signal, repeating more than one function;

Function 12:

Trigger timing disconnection: the relay does not operate after power-on, give a low-level pulse signal to the IN1 interface, the relay pulls in, the delay T1 time relay is disconnected, T1 is adjustable between 0.1 seconds and 270 hours, repeating to the IN1 interface A low-level pulse signal repeats the above functions;

Function 13:

Trigger timing pull-in and then disconnect: the relay does not operate after power-on, give a low-level pulse signal to the IN1 interface, the relay is closed after the delay time T1 arrives; the relay is disconnected after the pull-in time T2 arrives, the delay time T1 and T2 can be adjusted from 0.1 second to 270 hours, repeating a low-level pulse signal to the IN1 interface, repeating the above functions more than once;

Function 14:

The trigger timing is disconnected and re-supplied: the relay does not operate after power-on, a low-level pulse signal is sent to the IN1 interface, the relay is immediately pulled in, the relay is turned off after the delay time T1 arrives, and the relay is closed after the disconnection time T2 arrives. The delay time T1 and T2 can

be adjusted between 0.1 second and 270 hours. Repeat the low-level pulse signal to the IN1 interface and repeat the above functions.

Function 15:

Infinite loop timing mode 1: After the power is turned on, the relay does not operate, and a low-level pulse signal is sent to the IN1 interface. After the delay time T1 arrives, the relay is closed; after the pull-in time T2 arrives, the relay is disconnected, and then the above state is repeated. The time T1 and T2 can be adjusted between 0.1 second and 270 hours. Repeat the low-level pulse signal to the IN1 interface to restart the above functions;

Function 16:

Infinite loop timing mode 2: After the power is turned on, the relay does not operate, and a low-level pulse signal is sent to the IN1 interface. The relay is immediately pulled in. The relay is turned off after the delay time T1 arrives. After the disconnection time T2 arrives, the relay is closed, and then the relay is closed. Repeat the above state, the delay time T1 and T2 can be adjusted between 0.1 second and 270 hours, repeating a low level pulse signal to the IN1 interface, the above functions can be restarted;

Function 17:

Limited cycle timing mode 1: The relay does not operate after power-on, and a low-level pulse signal is sent to the IN1 interface. After the delay time T1 arrives, the relay is closed; after the pull-in time T2 arrives, the relay is disconnected, and then the NX times are repeated. At this time, T1 and T2 are adjustable between 0.1 seconds and 9999 seconds, and the number of cycles NX is adjustable between 1-9999 times. Repeating a low-level pulse signal to the IN1 interface can restart the above functions;

Function 18:

Limited cycle timing mode 2: After power-on, the relay does not operate, and a low-level pulse signal is sent to the IN1 interface. The relay is immediately closed. The relay is turned off after the delay time T1 arrives. After the disconnection time T2 arrives, the relay is closed, and then the relay is closed. Repeat NX times or more. At this time, T1 and T2 are adjustable between 0.1 seconds and 9999 seconds. The cycle number NX is adjustable between 1-9999 times. Repeat the low-level pulse signal to the IN1 interface to restart the above. Features;

2. Operation instructions

The user can select the function mode through the button and the display, or set the timing parameter. After all the parameters are set, it can be saved automatically, and the power is not lost! The following are some nouns related to parameter settings:

Buttons: There are 4 buttons, which are: [SET], [SWI], [NUM+] and [NUM-], short press: short button means that the button is pressed for less than 1 second, long press: long button refers to press button More than 1 second,

Working mode: There are 3 types: [Working mode], [View mode] and [Setting mode]

User parameters: There are 4 parameters that can be set (4 LEDs indicate 4 parameters respectively), respectively: [MD]: The MD indicator is on, the digital tube

displays the current program function, and the preset 01-18 has 18 functions. Select,

[T1]: The T1 indicator lights up, and the digital tube displays the timing time T1, which can be 0-9999.

[T2]: The T2 indicator is on, and the digital tube displays the timing time T2, which can be 0-9999.

[NX]: The NX indicator is on, and the contents displayed by the digital tube may have different meanings in different functions:

1: In function 1-6 and function 11-16, the contents of NX digital tube indicate the time base of T1 and T2 timing. The first two digits indicate T1, and the last two digits indicate T2, such as: NX is "01 01", indicating that the timing time unit of T1 and T2 is 1 second; for example, NX is "10 02", indicating that T1 timing unit is 10 seconds, T2 is 2 seconds, so the maximum timing time is 9999*99 seconds. That is about 270 hours.

2: In function 7, 8, 17, 18, when the NX indicator is on, the content of the 4-digit tube is expressed as the number of cycles. At this time, the time unit of T1 and T2 is fixed at 1 second, so the maximum timing of the limited cycle mode is 9999 seconds.
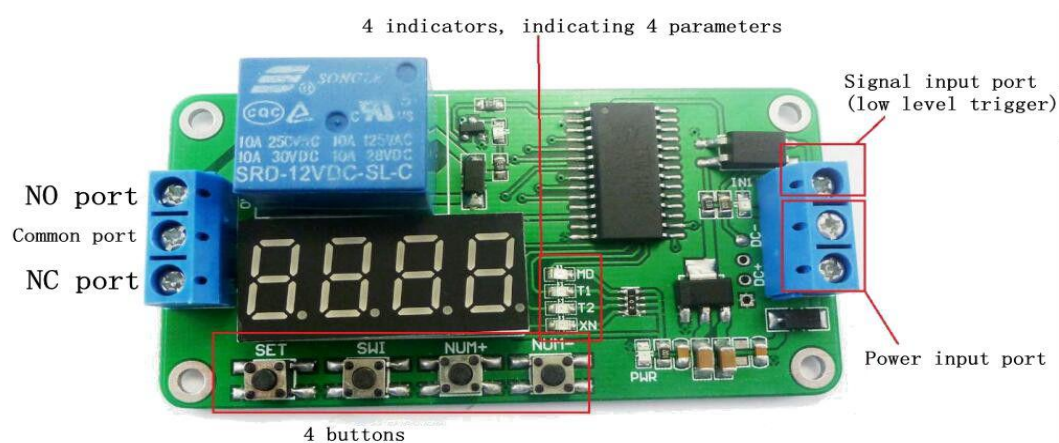
1. Working mode:

After power-on, it enters the working mode. At this time, the LED indicator flashes. The digital tube displays the countdown of the current timing time. When the timer returns to zero, the current function number is displayed. For example, "0 1" indicates that the current function is 1.

1.1 Short press [SET] to enter the power saving program, the display is off, but the program runs normally. Press again to resume display.

1.2 Press and hold [SET] to enter [Setting Mode].

1.3 Press and hold [SWI] to enter [View Mode].

1.4 Long press [NUM+] to enter the 10 seconds automatic power saving mode, the digital tube will flash twice as a whole, indicating that the setting is successful! After entering the power saving mode, if no button is operated within 10 seconds, the digital tube display will be turned off, but the program runs normally. You can temporarily resume the display by pressing [SET], or press [NUM+] again to exit the

automatic power saving. Mode, the digital tube will flash 3 times as a whole, indicating that the setting is successful!

1.5 Press and hold [NUM-] to reset the current function and stop running. Then press [NUM-] to resume operation; after entering the reset stop state, the LED indicator will no longer flash.

2. View mode: After booting, press and hold the [SWI] button to enter the view mode. In this mode, you can view the parameters of the currently executed function. View mode does not affect the continued operation of the current function,

2.1 Short press [SET], switch the parameter, select one of [MD], [T1], [T2] or [NX], the LED indicator of the selected parameter will be always on, and the digital tube will display the set parameters.

2.2 Press and hold [SWI] to exit [View Mode] and enter [Working Mode].

3. Setting mode: After power on, press and hold the [SET] button to enter the setting mode. In this mode, you can select the function and setting parameters.

Once in the setup mode, all functions stop running and enter the initial state; after exiting the setup mode, the module will immediately start running the selected work.

3.1 Short press [SET] to switch the parameters to be set. Select one of [MD], [T1], [T2] or [NX], and select the parameter.

The number of LED indicators will be on for a long time, and the digital tube will display the parameter settings.

3.2 Short press [SWI] to switch the selected digital tube, the selected digital tube will flash display.

3.3 Short press [NUM+], the selected digital tube value is increased by 1, and added to 9 to stop.

3.4 Short press [NUM-], the selected digital tube value is reduced by 1, reduced to 0 to stop.

3.5 Press and hold [SWI]. When setting [T1] or [T2] parameters, long press [SWI] to display the decimal point, and long press [SWI] to decrease the decimal point.

3.6 Press and hold [SET] to save the parameters and enter [Working Mode] at the same time.

Setup routine 1: Control a desk lamp, each button automatically runs for one hour, then goes out. This application can select function 10 or 12, the wiring method can refer to the wiring diagram, we take function 12 as an example:

The parameters are set such as: MOD= "- - 1 2", T1 = "3 6 0 0", T2 = "X X X X", NX = "0 1 X X" (X is an arbitrary value, not used) At the same time, the input detection interface IN1 is used as the user switch, and the following is the setting process:

1. Press and hold [SET] to enter [Setting Mode], you can see that the MOD light is on, and the last digital tube flashes, indicating that the current digital tube displays the value of the parameter MOD.

2. Press [NUM+] and [NUM-] to adjust the current flashing digital tube value. Press

[SWI] to switch the flashing digital tube. Press [NUM+] and [SWI] to set the value of MOD: "- - 1 2".

3. Press the [SET] button again, the parameter T1 indicator will be on, and the T1 will be set to "３６０ ０" by pressing the [NUM+] and [SWI] buttons.

4.T2 is not used, you can not set

5.NX needs to be set to "０１０ １" to indicate that both T1 and T2 have a timing base of 1 second.

6. Press and hold [SET] to save the settings and exit [Setting Mode]. The set function starts running immediately.

Setup routine 2: Each time the power is turned on, the machine runs for 1 hour and stops for 10 minutes, so that the cycle works 5 times and the machine is turned off. This application can select the function 8, the parameters are set like this:

MOD= "- - ０ ８" , T1 = "３６０ ０" , T2 = "０ ６ ０ ０" ,

NX = "０ ０ ０ ５" (where NX is the number of cycles).

3. Wiring instructions
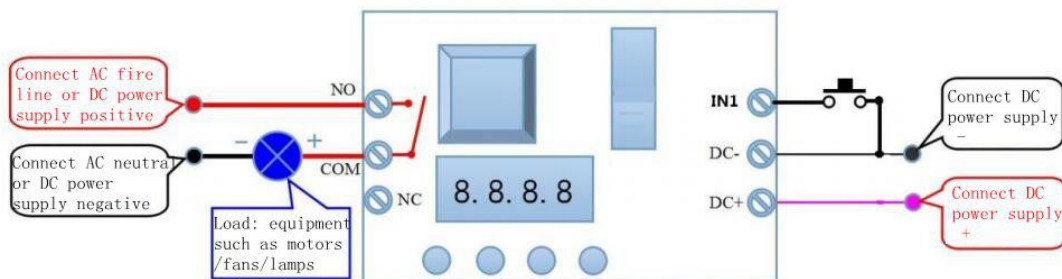
CE030 reference wiring diagram

Reminder: If the user load and the CE030 module use the same DC power supply, there may be cases where the power supply is insufficient, or the line connection is not proper, resulting in occasional unstable operation of the module. Please handle the following methods (even if there is no temporary If you find a problem, you should follow the recommendations below):

1. Separate wiring: Two wires should be taken from the positive pole of the DC power supply. One is connected to the DC+ interface of CE030 for the module, and one is connected to the NO port for the load. The negative pole of the power supply should be handled separately.

2. Replace the power supply with larger output current: If it is an inductive or capacitive load such as a motor, the capacity of the DC power supply should be larger. For example, if a 1A motor is used, it is reasonable to select the 3-5A power supply because the starting current of the motor is 3-7 times of rated current, if the power supply capacity is too small, it will cause the voltage to drop instantaneously, causing the CE030 module to reset.

3. Parallel capacitor: If the above two measures fail to achieve the desired effect,

please connect one between DC+ and DC-
Electrolytic capacitors with a capacity of 470uf/35V or more.

4. Electrical parameters

Working voltage: DC 12V

Operating current: less than 70mA at 12V (less than 40mA when the relay is not operating, less than 12mA when the shutdown is closed) Operating temperature: -20°C-60°C is recommended (limit range -30°C-70°C)

Load capacity: Relay normally open port Maximum load capacity: DC 0-30V/10A, AC 0-250V/10A Relay normally closed port Maximum load capacity: DC 0-28V/10A, AC 0-125V/10A Use limit: 1. The service life of the relay is 100,000 times for full load operation. Therefore, it is suitable for use in the case of low suction times and large current control. It is not suitable for use in fast repetitive motions.

2. Pay attention to the relay port load margin. The pure resistive load should have more than 1 time margin, and the general inductive or capacitive load must have at least 3 times the margin.

5. Module interface

Module voltage / signal input: There are 3 wire interfaces, all interfaces have terminal blocks, convenient for users to use 1, DC +: DC power supply positive

2, DC-: DC power supply negative

3. IN1: Input signal detection interface (active low, 3V-18V is effective high level voltage; 0.1.5V is invalid low level voltage; 1.5V-3V is unpredictable voltage, should be avoided This voltage range)

Relay load output: 3-wire interface, all terminals have terminal blocks

1, NO: relay normally open interface, the relay is suspended before the suction, after the suction and short circuit with COM

2, COM: relay common interface

3. NC: The relay normally closes the interface, and the relay is short-circuited with COM before the suction and closing.

6. Module size

Dimensions: 76mm * 40mm * 20mm (length * width * height). For specific mounting holes, please refer to the following figure:

CE030

3.5mm

3.5mm

3mm

69 mm

33mm

40mm

76 mm