

Rascal Handy Relay

Code: HRM250

This versatile relay module has two independent timers built into it so it can be set up to switch the relay contacts on and off in a variety of ways. With each timer being adjustable for 0.005s up to 270hrs (over 10 days!) it's a really versatile little rascal!! It has a total of 18 main functions which include the useful *delay on* and *delay off* functions, useful for sounders, gates, doors and lights. A built in LED display allows the user to set up the device to the function they require. The HRM250 has a non-volatile memory so once set up if the power is removed it will remember its settings.

18 Functions

The HRM250 really has 10 main functions but 8 of these 10 functions can be initiated in two different ways. You can either start the function by applying power to the HRM250 or start the function by applying a trigger voltage to it with power permanently applied to the HRM250. Therefore in total it has $10+8 = 18$ functions.

The first 1-8 functions are triggered when you actually power up the device, ie apply 12V to it. These are 8 different timing functions.

Functions 9 and 10 are "toggle" and "mimic" functions where the relay toggles or mimics a trigger input to it. For functions 9 & 10 (the HRM250 needs power permanently applied to it).

Functions 11-18 are really the same as the first 8 timer functions but these are initiated by a trigger input whilst the HRM250 has permanent power to it.

When using a trigger input it needs to be a "positive trigger" this means the trigger signal is between 8 and 12v usually it will be at the supply voltage of 12V.

1. *Power up* - Delay switch on
2. *Power up* - Delay switch off
3. *Power up* - Delay switch on followed by delay switch off
4. *Power up* - Delay switch off followed by delay switch on
5. *Power up* - Continuous loop starting with relay off then on
6. *Power up* - Continuous loop starting with relay on then off
7. *Power up* - Set number of "N" loops starting with relay off then on
8. *Power up* - Set number of "N" loops starting with relay on then off
9. Toggle mode – trigger input toggles output
10. Mimic mode – Relay energizes whenever input trigger present
11. *Positive trigger* - Delay switch on
12. *Positive trigger* - Delay switch off
13. *Positive trigger* - Delay switch on followed by delay switch off
14. *Positive trigger* - Delay switch off followed by delay switch on
15. *Positive trigger* - Continuous loop starting with relay off then on
16. *Positive trigger* - Continuous loop starting with relay on then off
17. *Positive trigger* - Set number of "N" loops starting with relay off then on
18. *Positive trigger* - Set number of "N" loops starting with relay on then off

All parameters are permanently saved once set. The functions and parameters can be reviewed or changed at a later time.

Useful Notes:

- Functions 01 to 08 start automatically when the power is turned on.
- On functions 09 to 18 a high start plus $\geq 20\text{ms}$ is required via the CH1 input
- Timer1 can be adjustable between 0.005 seconds and 270 hours
- Timer2 can be adjustable between 0.005 seconds and 270 hours
- CH1 = Pulse input 1
- N = Repeat count

Summary of Functions

Function	Relay at Power on	When T1=0	When T2=0	"N" Value	High Pulse on CH1 (Also restarts all functions)	Notes
01	OFF	ON				
02	ON	OFF				
03	OFF	ON	OFF			
04	ON	OFF	ON			
05	OFF	ON	OFF			Repeats when done
06	ON	OFF	ON			Repeats when done
07	OFF	ON	OFF	Loop #		
08	ON	OFF	ON	Loop #		
09	OFF				Toggles - ON / OFF Via pulse on CH1	
10	OFF	OFF			Mimics	
11	OFF	ON			Starts Timer1	
12	OFF	OFF			Relay On - Start Timer1	
13	OFF	ON	OFF		Starts Timer1	
14	OFF	OFF	ON		Relay On - Start Timer1	
15	OFF	ON	OFF		Starts Timer1	Repeats when done
16	OFF	OFF	ON		Relay On - Start Timer1	Repeats when done
17	OFF	OFF	ON	loop #	Starts Timer1	
18	OFF	OFF	ON	loop #	Relay On - Start Timer1	

Detailed Functions

Function 01 - Delay on after power up

- Power on starts Timer1 and relay will be off
- When Timer1 = 0s the relay will turn on
- Function then stops
- Timer1 can be adjustable between 0.005 seconds and 270 hours
- High pulse on CH1 will repeat the function

Function 02 - Delay off after power up

- Power on turns on the relay and starts Timer1
- When Timer1 = 0s the relay will turn off
- Function then stops
- Timer1 can be adjustable between 0.005 seconds and 270 hours
- High pulse on CH1 will repeat the function

Function 03 - Delay On - then switch off after second adjustable delay.

- Power on starts Timer1 and relay will be off
- When Timer1 = 0s the relay will turn on
- Timer2 Starts
- When Timer2 = 0s the relay will turn off
- Function then stops
- Both timers can be adjustable between 0.005 seconds and 270 hours
- High pulse on CH1 will repeat the function

Function 04 - Delay Off - then switch on after second adjustable delay.

- Power on turns on the relay and starts Timer1
- When Timer1 = 0s the relay will turn off
- Timer2 Starts
- When Timer2 = 0s the relay will turn on
- Function then stops
- Both timers can be adjustable between 0.005 seconds and 270 hours
- High pulse on CH1 will repeat the function

Function 05 – Power on Continuous Loop Timing - Mode A

- Power on starts Timer1 and relay will be off
- When Timer1 = 0s the relay will turn on
- Timer2 Starts
- When Timer2 = 0s the relay will turn off
- The function is then repeated
- Both timers can be adjustable between 0.005 seconds and 270 hours
- High pulse on CH1 will reset and restart the function

Function 06 – Power on Continuous Timing - Mode B

- Power on turns on the relay and starts Timer1
- When Timer1 = 0s the relay will be off
- Timer2 Starts
- When Timer2 = 0s the relay will turn on
- The function is then repeated
- Both timers can be adjustable between 0.005 seconds and 270 hours
- High pulse on CH1 will reset and restart the function

Function 07 – Power on - Set number of Loops Timing - Mode A

- Power on starts Timer1 and relay will be off
- When Timer1 = 0s the relay will turn on
- Timer2 Starts
- When Timer2 = 0s the relay will turn off
- Repeat the function "N" times
- Both timers can be adjustable between 0.005 seconds and 270 hours
- "N" can be set to between 1 and 9999 bops
- High pulse on CH1 will reset and restart the function

Function 08 – Power on - Set number of Loops Timing - Mode B

- Power on turns on the relay and starts Timer1
- When Timer1 = 0s the relay will be off
- Timer2 Starts
- When Timer2 = 0s the relay will turn on
- Repeat the function "N" times
- Both timers can be adjustable between 0.005 seconds and 270 hours
- "N" can be set to between 1 and 9999 bops
- High pulse on CH1 will reset and restart the function

Function 09 - Toggle Mode

- At power ON, relay will be off
- High pulse on CH1 will turn on the relay
- High pulse on CH1 will turn off the relay

Function 10 - Mimic Mode

- At power ON relay will be off
- High pulse on CH1 will turn on the relay
- Remove the High pulse on CH1, then when Timer1=0s the relay will turn off

Function 11 – Positive Trigger starts Delay On

- At power on relay will be off
- High pulse on CH1 will start Timer1 (High pulse is 3-12V)
- When Timer1 = 0s the relay will turn on
- High pulse on CH1 will restart function
- Timer1 can be adjustable between 0.005 seconds and 270 hours

Function 12 - Positive Trigger starts Delay OFF

- At power on relay will be off
- High pulse on CH1 will turn on the relay
- Timer1 will start
- When Timer1 = 0s the relay will turn off
- High pulse on CH1 will reset and restart the function
- Timer1 can be adjustable between 0.005 seconds and 270 hours

Function 13 - Positive Trigger starts delay On - then switch off after second adjustable delay.

- Power on starts Timer1 and relay will be off
- High pulse on CH1 will start Timer1
- When Timer1 = 0s the relay will turn on
- Timer2 now starts
- When Timer2 = 0s the relay will turn off
- High pulse on CH1 will reset and restart the function
- Both timers can be adjustable between 0.005 seconds and 270 hours

Function 14 – Positive Trigger starts delay Off - then switch on after second adjustable delay.

- At power on relay will be off
- High pulse on CH1 will turn on the relay
- Timer1 will start
- When Timer1 = 0s the relay will turn off
- Timer2 now Starts
- When Timer2 = 0s the relay will turn on
- High pulse on CH1 will reset and restart the function
- Both timers can be adjustable between 0.005 seconds and 270 hours

Function 15 – Positive Trigger starts Continuous Loop Timing - Mode A

- Power on relay will be off
- High pulse on CH1 will start Timer1
- When Timer1 = 0s the relay will turn on
- Timer2 now Starts
- When Timer2 = 0s the relay will turn off
- High pulse on CH1 will reset and restart the function
- The loop now repeats.
- Timer1 can be adjustable between 0.005 seconds and 270 hours

Function 16 - Positive Trigger starts Continuous Loop Timing - Mode B

- At power on relay will be off
- High pulse on CH1 will turn on the relay
- Timer1 will now start
- When Timer1 = 0s the relay will turn off
- Timer2 now Starts
- When Timer2 = 0s the relay will turn on
- High pulse on CH1 will reset and restart the function
- The loop now repeats
- Timer1 can be adjustable between 0.005 seconds and 270 hours

Function 17 - Positive Trigger starts Set number of Loops Timing - Mode A

- At power on relay will be off
- High pulse on CH1 will start Timer1
- When Timer1 = 0s the relay will turn on
- Timer2 now starts
- When Timer2 = 0s the relay will turn off
- The loop repeats "N" times
- T1 & T2 can be adjustable between 0.005 seconds and 270 hours
- N can be between 1 and 9999 bops
- High pulse on CH1 will reset and restart the function

Function 18 - Positive Trigger starts Set number of Loops Timing - Mode B

- At power on relay will be off
- High pulse on CH1 will turn on the relay
- Timer1 will start
- When Timer1 = 0s the relay will turn off
- Timer2 now Starts
- When Timer2 = 0s the relay will turn on
- The function repeats "N" times
- Both timers can be adjustable between 0.005 seconds and 270 hours
- N can be between 1 and 9999 bops
- High pulse on CH1 will reset and restart the function

Operating Instructions

The operating mode and timing parameters can be set with the four buttons and the LCD display. All parameters will be automatically saved when they are set.

Buttons

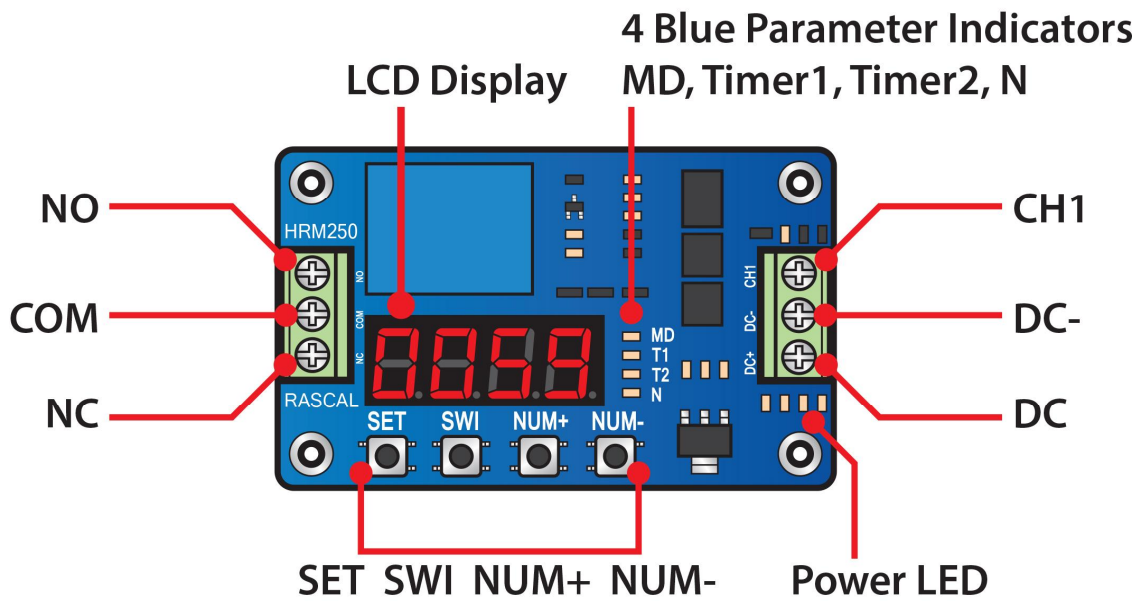
There are 4 buttons:

SET
SWI
NUM +
NUM-

They all have short and long presses:

Short presses are less than 1 second long

Long presses are more than 1 second long



Operating modes

- Normal Operation
- Parameter view
- Parameter setting

LED display

- Used to set or view the timing parameters

LED indicators

4 blue parameter indicators

MD:

Active program function (01 to 18)

On = Timing stopped

Flashing = Timing function has completed

Timer1:

Timer one - 1 to 9999 seconds

On = Displays current Timer1 value

Flashing = Timer1 is counting

Timer2:

Timer two - 1 to 9999 seconds

On = Displays current Timer2 value

Flashing = Timer2 is counting

N:

Varies for each function. See N Function below

On = Displays current N value

1 red power on indicator

1 blue relay active indicator

N Functions

Functions 01-06

LED display indicates the “time multiplier” for Timer1 and Timer2

Time base varies from 00 to 99

00 = .005 second time multiplier (for very fine timing)

01 = 1 second time multiplier

99 = 99 second time multiplier

First two LED digits indicate time multiplier for Timer1

Send two LED digits indicate time multiplier for Timer2

Example 1

N = 0101 Timer1=0015 Timer2=0060

Both Timers each have a 01 second time multiplier

Timer1 will count 15 seconds

01 * 15 = 15 seconds

Timer2 will count 60 seconds

01 * 60 = 60 seconds

Example 2

N = 0050 Timer1=0015 Timer2=0060

Timer1 has a .005 second time multiplier

Timer2 has a 50 second time multiplier

Timer1 will count 0.075 seconds

.005 * 15 = 0.075 seconds

Timer2 will count 3000 seconds

50*60=3000 seconds

Example 3

N = 9999 Timer1=9999 Timer2=9999

Both timers have 99 second time multipliers

Both will count:

989,901 seconds which is 275 hrs app

Functions 07, 08

LED display indicates “number of LOOPS”

In these functions the “time multiplier” is set to 01 or 1 second per Timer1 and Timer2 unit

The number of LOOPS can range from 1 to 9999

Operating Mode

When turned on

- The LED display shows the current function in operation
- When the function is complete, the LED display shows the current function number
- Such as: " - - 0 1 " for function 01

SET Button

- A short press on the SET button enters into the power saver mode
- The LED display goes blank
- The program continues to work normally
- Press SET again to turn the LED display back on
- Long press the SET button enters into Parameter Setting Mode

SWI Button

- Long press on the SWI button enters into Parameter View Mode

NUM+ Button

- Long press NUM+ button puts the unit into the 10 second automatic power saving mode
- The LED display will blink twice to signal that the mode has been enabled
- After entering the power saving mode, if no buttons are pressed within 10 seconds, the LED display and LEDs will turn off (Power and Relay LEDs are not turned off)
- The program will continue to run
- Short press SET to turn on the LED display temporarily
- Long press NUM+ again to exit the automatic power saving mode
- LED display must be on before you can disable automatic power saving mode
- Short press on Set to turn on LED display

- The LED display will blink three times to indicate the mode has been cancelled

NUM- Button

- Long press on NUM- causes a timing reset and stop
- MD light on solid = Stopped
- A short press on NUM- will start the timing from the beginning
- MD light flashing = Running

Parameter View Mode

- You can view the parameters of the current function
- Long press on SWI will enter into parameter view mode
- The MD LED indicator will be on
- Short presses on the SET button will rotate through the parameters. The MD, Timer1, Timer2 and N LEDs indicate what parameter is being displayed
- Long press the SWI button will enter back into Operating Mode

Parameter Setting Mode

- This mode allows you to set the active function and its timing parameters
- A long press on the SET button will enter into Parameter Setting mode
- A short press on the SET button will rotate through the four parameters as shown by the LEDs:
- MD – Function select
- Timer 1
- Timer 2
- N – Options
- The LED display will be flashing, showing the value of the current parameter
- Short press of the SWI button will rotate through the four parameter choices (MD, Timer1, Timer2 & N)
- Short press the NUM+ or NUM- button will increment or decrement the currently flashing digit
- Long press the SET button to save the parameters and enter back into Operating Mode

Example 1 - Controlling a lamp

Turn ON for one hour, then turn OFF

Setup:

- MOD="- - 02" Function 02 - Timing Disconnect
- Timer1="3600" 3600 seconds or 1 hour
- Timer2="xxxx" x can be any value as this setting is not needed
- N="01xx" 01 = Timer1 setting is in 1 second units. (xx= don't care)
- A long press on SET button to enter into Parameter Setting Mode
- MD LED should be on
- If not, short press on SET button several times until MD LED is on
- Press NUM+ or NUM- buttons to adjust the LED display to "- - 12"
- Use SWI button to switch between digits
- Short press SET button to turn on T1 LED
- Press NUM+ or NUM- buttons to adjust the LED display to "3 6 0 0"
- Use SWI button to switch between digits
- Short press SET button TWICE to turn on NX LED
- No need to set Timer2 as Function 02 does not use Timer 2
- Press NUM+ or NUM- buttons to adjust the LED display to "0 1 0 1";
- Use SWI button to switch between digits
- Long press SET button to save settings and exit Parameter Setting Mode
- The function starts running immediately

Example 2 – Powering a machine

When power on, the machine will run to the following:

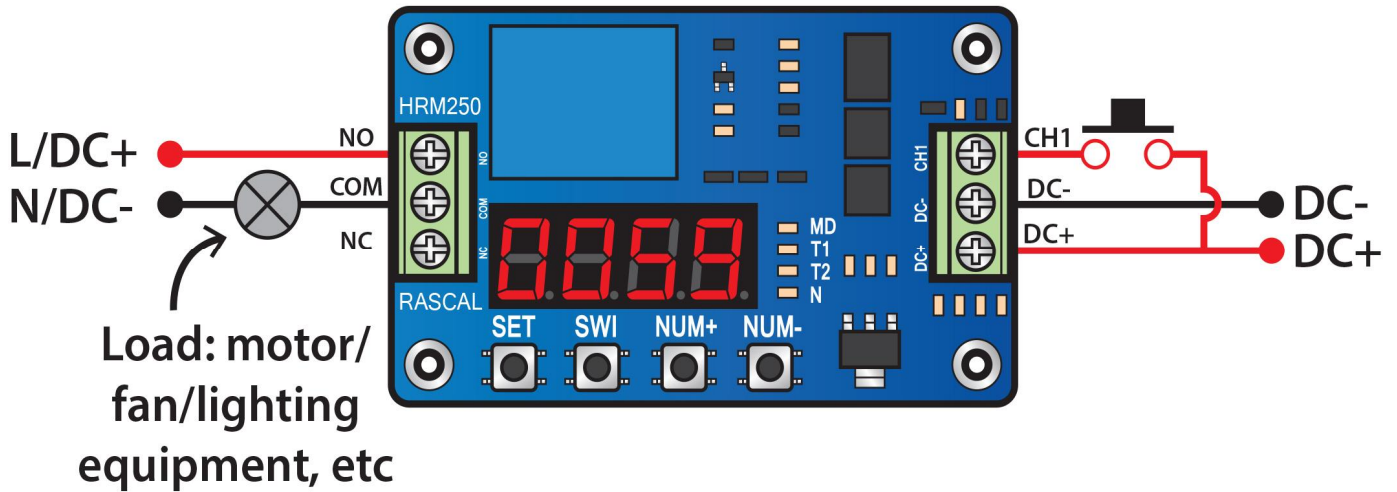
- Run for 1 hour
- Stop for 10 minutes
- Repeat the above 5 total times
- Turn off

Parameters:

- MD="- - 0 8" Function 08 - Limited Cycle Timing Mode B
- Timer1="3 6 0 0" Timer 1 = 3600 seconds or 1 hour
- Timer2="0 6 0 0" Timer 2 = 600 seconds or 10 minutes
- N="0 0 0 5" LOOP count = 5

Wiring Notes

Make sure your DC power supply has sufficient current capability to run the HRM250 and your load. If the DC power supply is too small and the HRM250 energizes the load it could cause the DC voltage going to the HRM250 to drop too low, causing it to reset.



Specification

If you are using one 12V power supply for both the HRM250 and your load make sure it has sufficient current capability to run the HRM250 and your load. If the DC power supply is too small and the HRM250 energizes the load it could cause the DC voltage going to the HRM250 to drop to low, causing it to reset.

If you are using the HRM250 to run drive a mains rated load you must wire it in accordance with any applicable wiring regulations. For inductive loads these can take far more power at start up and “weld” relay contacts together so for inductive loads you must use a contactor where appropriate.

Voltage & Current	12 V DC
Relay On	50ma
Relay Off	15ma
Relay & Display Off	3ma

- Trigger pulse - Positive Trigger input 8-12V D.C
- Size - 66mm * 40mm * 20mm (L * W * H)
- Relay 10A 240V N.O & N.C contacts

NB. For inductive loads use an appropriate contactor.

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