

DC motor overcurrent circuit breaker





The system shuts off power to the DC motor when the current consumption increases above the monitored value. Thus, the device can act as a limit switch.

Characteristics

- 3-15 V DC motor power supply
- load current < 1A
- stepless adjustment of the tripping current in the range of 0.1-1 A
- control button
- dual-mode operation
- · option to expand the system
- 5 V DC power supply

Circuit description

The circuit, the schematic of which is shown in Figure 1, shuts off power to the DC motor if the current draw increases above the monitored value. This allows the system to act as a limit switch for a DC motor drive. Pressing the button starts the engine in the conventional "first" direction, for example, to the right. At this time, the value of the current drawn by the motor is compared with the set value using potentiometer PR1. When the motor axis is braked or stopped, the current drawn by the motor will increase significantly. Such an event will immediately cause the system to react - the power supply to the motor will be disconnected. Another press of the button will restart the entire cycle, but the difference will be that the polarity of the power supply to the motor will be changed, that is, the motor will operate

rotating in the opposite direction, for example, to the left. If the motor axis is not stopped, the motor will automatically shut down after about 20 s. Pressing and holding the button will start the cycle in force mode. It relies on the fact that when the power supply to the motor is automatically disconnected, but the button is still pressed, restart attempts will be made at intervals of about 0.5 s until the button is released. Such a feature will eliminate a possible jamming of the mechanism.

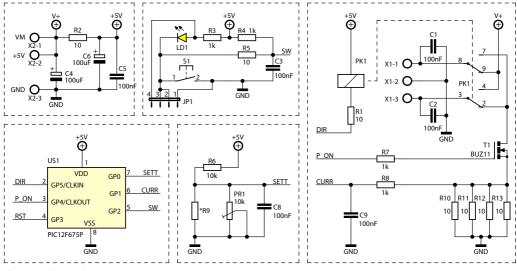


Figure 1. Schematic diagram

Assembly and start-up

An assembly diagram of the system is provided in Figure 2. The X2 connector is used to connect the power supply to the circuit and the motor, X1 is the motor connector, JP1 allows you to attach an additional button and an optional LED. The R2, C5...C7 elements filter the power supply to the circuit, while R6, R9, R10 and C8 allow us to set the overcurrent cutoff threshold. The R8, R11...14, C9 elements are used to measure the current consumed by the motor, the T1 transistor controls the operation of the motor and the PK1 relay is used to change the polarity, that is, the direction of rotation of the motor.

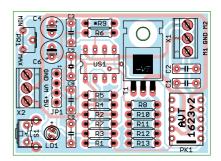


Figure 2. Assembly diagram

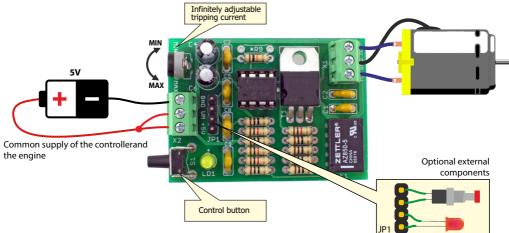


Figure 3. Example of connection to a common 4-6 V power supply

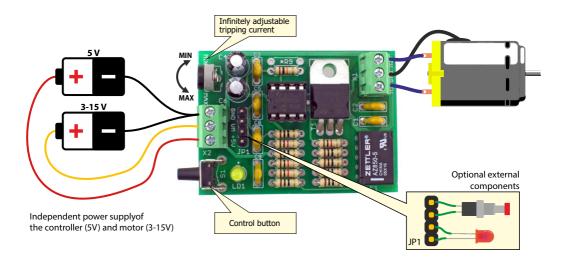


Figure 4. An example of connection to an independent power supply

List of elements

Resistors:

R1, R2, R5, R10-R13:	10 Ω (brown-black-gold)
R3, R4, R7, R8:	1 kΩ (brown-black-red-gold)
R6:	10 kΩ (brown-black-orange-gold)
R9:	do not solder
PR1:	10 kΩ potentiometer, vertical
Capacitors:	
C1-C3, C5, C8, C9:	100 nF (may be labeled 104)
C4, C6:	100 µF!
Semiconductors:	
T1:	BUZ11 or similar!
US1:	PIC12F675!
LD1	LED!
Other:	
PK1:	AZ850-5 or similar
X1, X2:	DG381-3.5/3
JP1:	goldpin 1×4
S1:	button

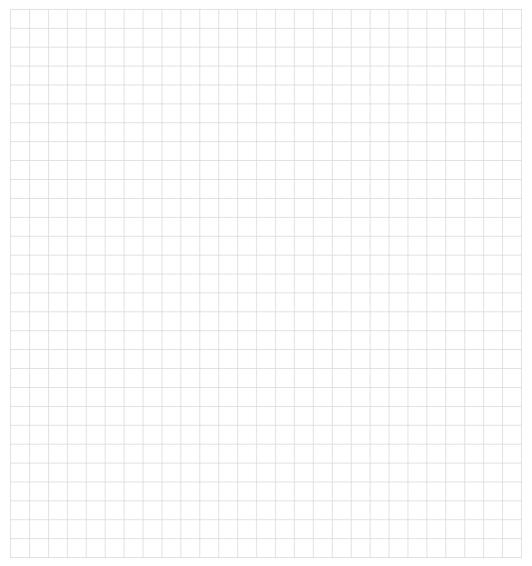




We begin the assembly by soldering the components onto the board in order of size, from the smallest to the largest. When installing components marked with an exclamation mark, pay attention to their polarity. Frames with pinout drawings and symbols of these components on the circuit board, as well as photographs of the assembled kit, can be helpful. To access high-resolution images as links, download the PDF.



Notes





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This symbol means do not dispose of your product with your other household waste. Instead, you should protect human health and the environment by handing over your waste equipment to a designated collection point for the recycling of waste electrical and electronic equipment.

AVT SPV reserves the right to make changes without prior notice. Assembly and connection of the device not in accordance with the indications within the instructions, arbitrary change of components and any structural modifications may cause damage to the device and expose users to harm. In such a case, the manufacturer and its authorized representatives shall not be liable for any damages arising directly or indirectly from the use or malfunction of the product. DIY kits are intended for educational and demonstration purposes only. They are not intended for use in commercial applications. If they are used in such applications, the buyer assumes all responsibility for ensuring compliance with all regulations.