Linear Actuator Controller with Limit Switch to prevent overextension and retraction

The project described here is a very useful device for use with linear actuators. This controller prevents the actuator from reaching the physical movement limits of the actuator, thus it prevents burnout of motor and physical/mechanical damage to the actuator itself to the mechanical machine associated with it. It also allows for a smoother stopping motion once the end of travel is reached. The project is capable to drive DC brushed motor up to 3A, it supports 12V DC or 24V DC motors with few changes. Two limit switches are used on both sides of the actuator. The limit switches are available with 2 contacts normally open and normally closed. It is advisable to use normally closed contacts. The project consists of 2 DPDT relays, two 1N5402 diodes, Power LED, Motor direction LEDs, 2 x tactile switches, DC supply capacitor, screw terminals, etc.

Operation

Make all the connections as per the diagram, and install the limit switches at the end of the actuator. It is important to provide little offset space for motor movement. Power the board. Press any of the tactile switches SW1 or Sw2, actuator starts moving in one direction, once it hit the end limit switch, the switch is open, and the diode which is connected across the switch stops the current flow in that direction, and the motor stops. Now press the other switch, in this case, the current flow is reversed and the associated diode allows the motor to run in reverse directions and continue till it hit the other side of the limit switch. It is important to check the motor direction as per diode polarity, and swap the motor connections if the system doesn't work properly or misbehaves.

The controller can drive 12V or 24V Motor (Maximum Current 3A)

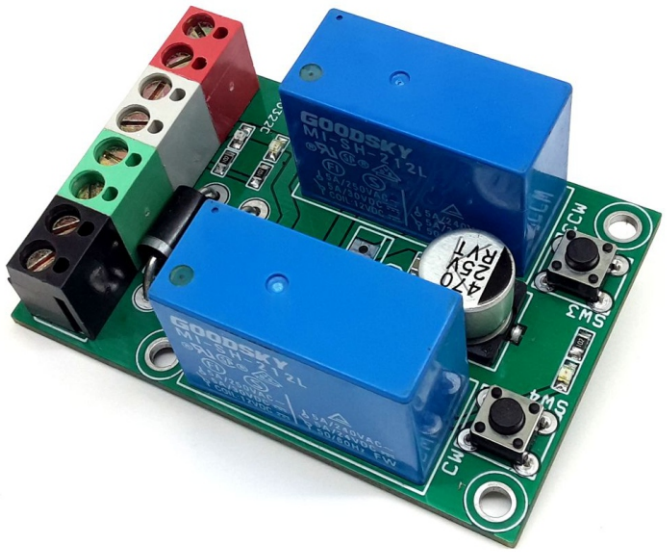
12V DC Motor

- Do Not Use Regulator U1, Jumper J1 closed, rest all components as per schematic.

24V DC Motor

- Open the Jumper J1
- Resistor Value R1, R2 and R3 = 2.2K Ohms
- Install U1 Regulator Lm7812
- In case of 24V Relay, don't install regulator, and use the jumper J1.

Note: It is advisable to use an appropriate high current limit switch, as it should be able to handle the high current of the DC Motor, considering the peak current of the motor.

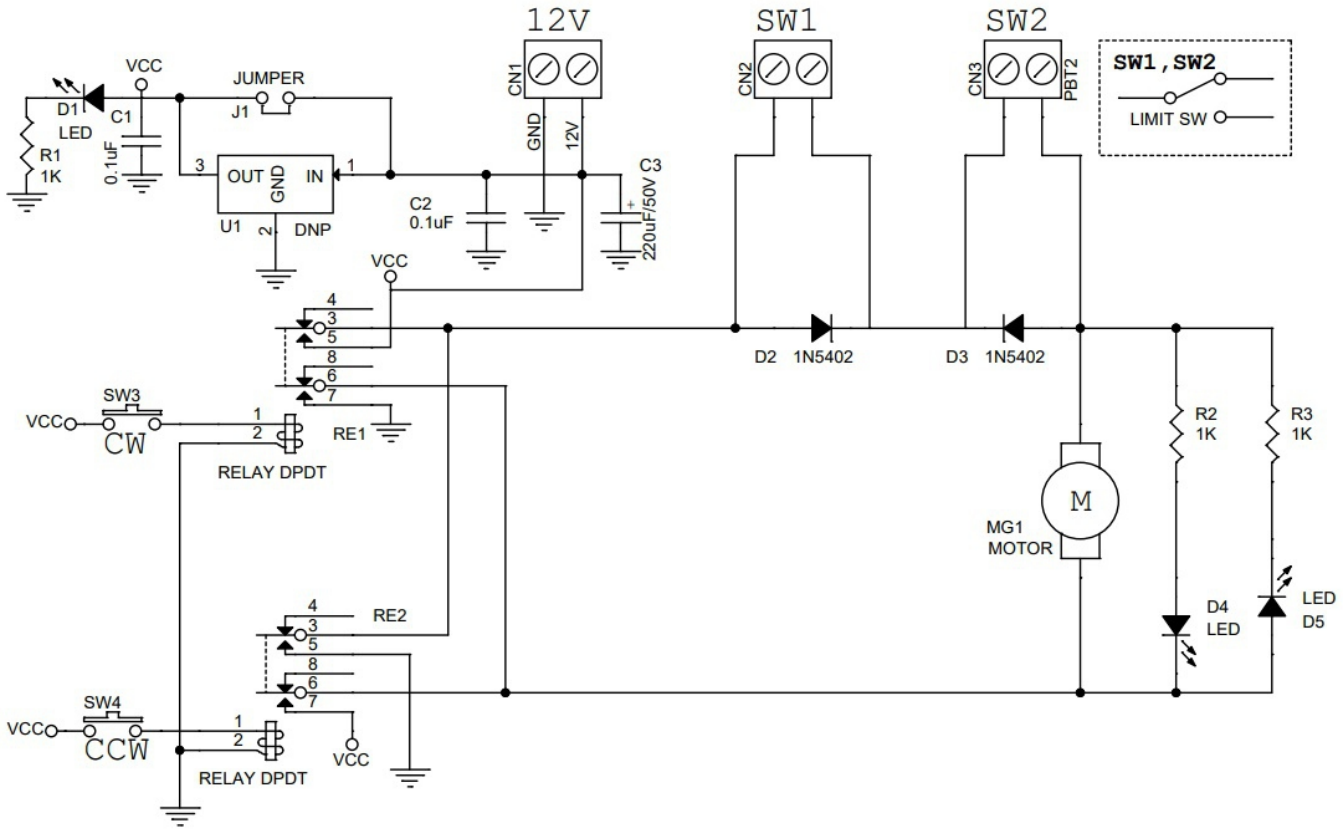


Features

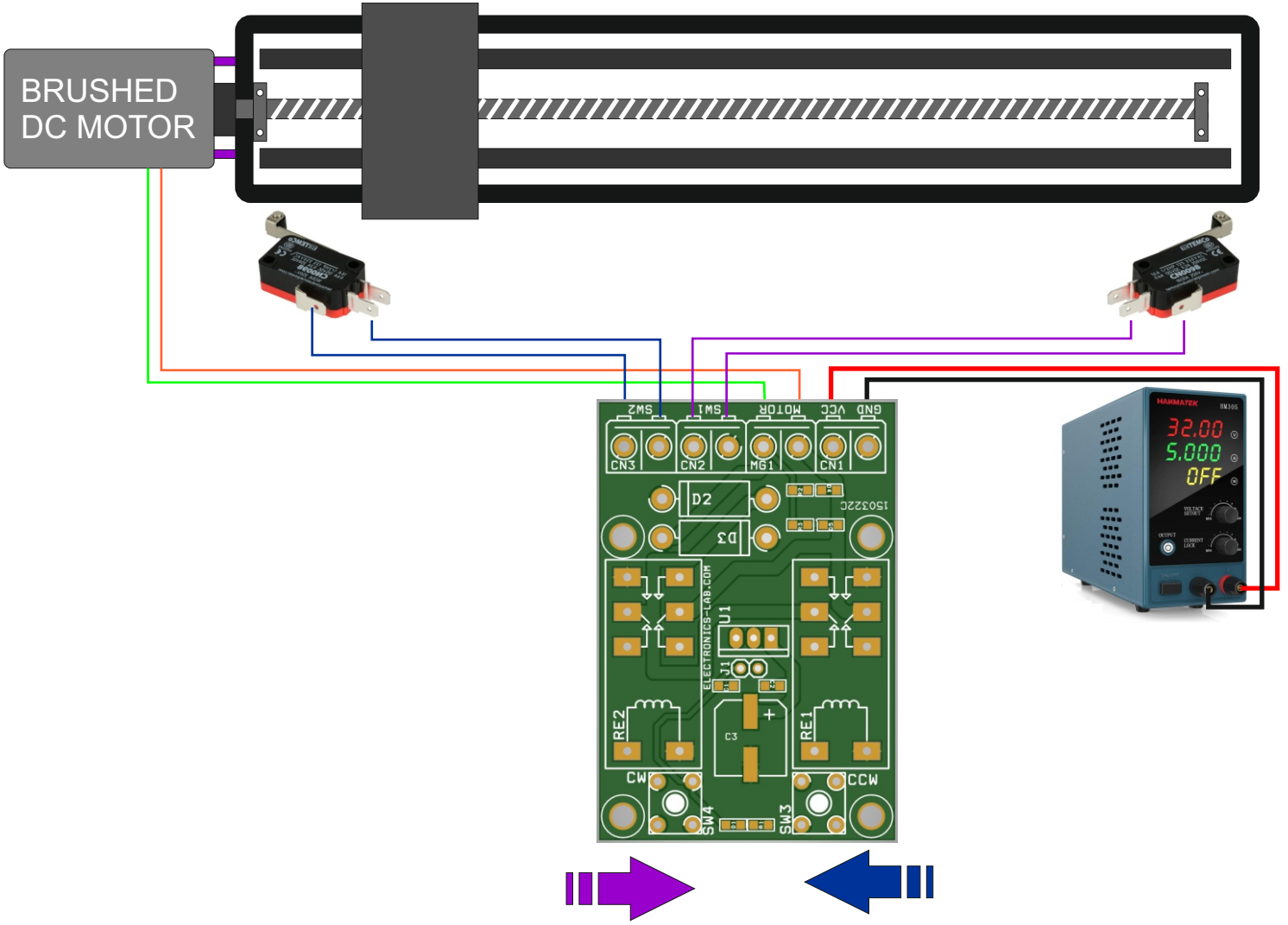
- Motor Supply 12V DC (for 24V Motor Read Note)
- Maximum Load Current 3Amps
- 2 x Tactile switch to drive Motor in CW/CCW
- 2 x LEDs for Motor Direction
- On Board Power LED
- Screw Terminals for Motor Connections, Limit Switch, Power Supply
- 4 x3MM Mounting Holes
- PCB Dimensions 63.98 x 43.18mm

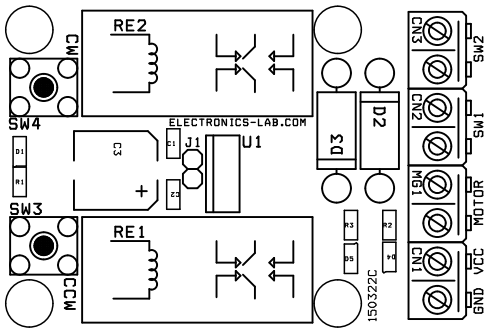
Applications

- Linear Actuators
- Rotary Actuators
- Machines
- Automation
- Furniture (Hospital Beds)

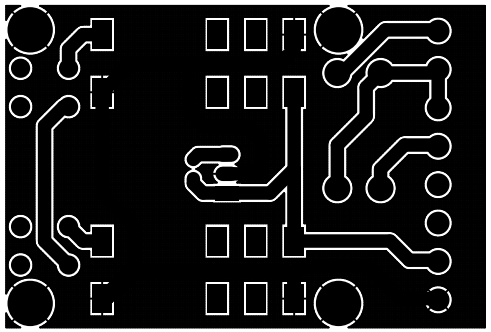


LINEAR ACTUATOR WITH NORMALLY CLOSED LIMIT SWITCH & BRUSHED DC MOTOR

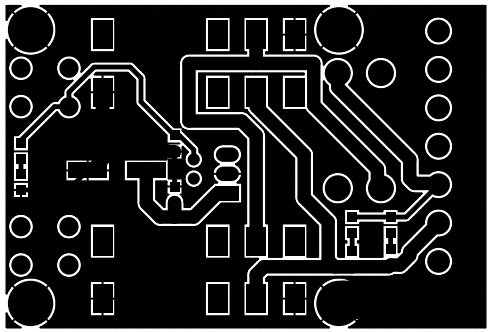




SILK SCREEN TOP



BOTTOM LAYER



TOP LAYER

PCB DIMENSIONS 63.98MM X 43.18MM

BOM						
NO	**QNTY.**	**REF.**	**DESC.**	**MANUFACTURER**	**SUPPLIER**	**SUPPLIER PART NO**
1	3	CN1,CN2,CN3	2 PIN SCREW TERMINAL PITCH 5.08MM	PHOENIX	DIGIKEY	277-1247-ND
2	2	C1,C2	0.1uF/50V SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
3	1	C3	220uF/50V OR 470uF/35V	WURTH	DIGIKEY	732-8463-1-ND
4	3	D1,D4,D5	LED SMD SIZE 0805	LITE ON INC	DIGIKEY	160-1427-1-ND
5	2	D2,D3	1N5402	SMC DIODE SOL.	DIGIKEY	1655-1N5402CT-ND
6	1	J1	2 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5315-ND
7	1	MG1	2 PIN SCREW TERMINAL PITCH 5.08MM	PHOENIX	DIGIKEY	277-1247-ND
8	2	RE1,RE2	RELAY DPDT	OMRON	DIGIKEY	G2RL-24 DC12
9	3	R1,R2,R3	1K 5% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
10	2	SW3,SW4	TACTILE SWITCH	NKK SWITCH	DIGIKEY	HP0215AFKP2-ND
11	1	J1	JUMPER SHUNT	SULLIN INC	DIGIKEY	S9001-ND
12	1	U1	LM7812	TI	DIGIKEY	DNP
RE1 & RE2 : General Purpose Relay DPDT (2 Form C) 12VDC Coil Through Hole						
RE1 & RE2 : OMRON Or Goodsky Part No **MI-SH-212L**						