

Controller Parts List.

Most parts are easily available from suppliers such as Rapid Electronics, Farnell, Mouser etc.

Resistors.

- 9 x 10k 1/4w resistor. R1-R4, R6, R7, R10, R11, R12
- 3 x 4k7 1/4w resistor. R5, R8, R9
- 1 x 82ohm 1/2w resistor. Backlight
- 1 x 39ohm 1/2w resistor. RS*
- 1 x 10k variable resistor. VR1

Capacitors.

- 3 x 100nF capacitor. C3, C4*, C6*
- 2 x 33pf capacitor (to suite crystal). C1, C2
- 1 x 220uF 16v electrolytic C5
- 1 x 22uF 35v electrolytic C7*

Semiconductors.

- 3 x BC337 transistors. Q1-Q3
- 2 x IN914 diodes. D1, D2
- 1 x IN4007 D3
- 1 x PIC18F4620 in 40 pin DIL packaging. IC1
- 1 x Traco power 2450E OR 7805 IC2*

*When using a Traco Power, C4 & C6 aren't fitted.

If a 7805 is used instead of the Traco then C7 isn't fitted and RS is replaced with a wire link.

Misc.

- PCB.
- 1 x HD44780, 20x4 LCD.
- 1 x passive sounder. LS1
- 1 x 10Mhz crystal.
- 1 x 40 pin DIL IC socket.
- 1 x 8 pin SIL header for keypad.
- 1 x 16 pin SIL header for LCD.
- 1 x 16 pin SIL socket to match above for LCD.
- 1 x 2 pin 3.81mm PCB mounted screw terminal.
- 3 x 5 pin 3.81mm PCB mounted screw terminals

Hardware (to mount LCD to PCB & module to case)

- 4 x 12mm M3 tapped standoffs (check height of 16 pin plug and socket).
- 4 x 6mm M3 dome headed screws.
- 4 x 16mm M3 countersunk screws.
- 8 x serrated washers.
- 8 x M3 nuts.

Notes:

The 'built and tested' unit I sell on my shop uses a Traco Power TSR 1-2450E buck converter.

Experimentation I've done with this unit suggests that “dirty switching” can cause the output to momentarily exceed the safe voltage limits of the PIC (and possibly LCD) causing failure of the PIC which usually manifests itself in thermal runaway of the device.

Where power switching is done at the mains side of the power supply the voltage rise/fall is slow enough to avoid any issues. The issue only occurs where the low voltage line is switched directly via a 'dirty' switch/connection.

With this in mind I make the following changes when the buck converter is used:

- The Traco module already contains smoothing capacitors so C4 & C6 aren't fitted and a 22uF @ 35v electrolytic (C7) is fitted instead (as per the data sheet recommendation).
- A 5v6 zener (D4) is fitted.
- A resistor of 39 ohms (RS) is placed in series with D3.
Note this change increases the minimum supply voltage to around 12v (24v is the 'nominal' supply voltage).
If alternative buck converters are used then it may be necessary to reduce the value of RS.

