

THERMOSTAT 0°C TO 100°C
CODE 934 **LEVEL 3**

This circuit is measurement of temperature. It has cut-off circuit when the lower or higher temperature varie 2°C from your setting. Used IC TEMP is the detector temperature.

Technical specifications:

- power supply : 12VDC. - consumption : 50mA max.
- can be set to detect the temperature from 0°C to 100°C.
- the temperature range can be adjusted by potentiometer.
- PCB dimensions : 3.68 x 1.99 inches.

How to works:

IC TEMP is the detector temperature. When the temperature is varying, causing the voltage change to the temperature (every 1°C=0.01V, @ 25°C=2.98V). This voltage of IC TEMP is fed to pin 9 of IC1/3 (a comparing DC voltage). If the voltage at pin 9 more than pin 10, causing the output of IC1/3 at pin 8 hasn't the voltage. But if the voltage at pin 9 less than pin 10, causing the output of IC1/3 at pin 8 has the voltage. This voltage is fed to SW1/2 COOL and pin 6 of IC1/2.

When you slide SW1 to "COOL" point, the voltage at pin 8 of IC1/3 is fed to pin 2 of IC1/1 for drive TR1, causing the relay is working and this voltage is fed to pin 12 of IC1/4. IC1/4 is configured as a decrease the temperature to 2°C automatic from your setting, such as: If you set the temperature at 10°C, when the temperature decrease to 8°C at the circuit will stop working.

But when you slide SW1 to "HOT" point, the voltage at pin 8 of IC1/3 is fed to pin 6 of IC1/2 (a inverting DC voltage). This voltage is fed to IC1/1 and IC1/2. The operation of circuit alternates with "COOL" function. IC1/4 is configured as a increase the temperature to 2°C automatic from your setting, such as: If you set the temperature at 30°C, when the temperature decrease to 32°C at the circuit will stop working.

VR1 is used for adjust a fine tune temperature (± 15°C from setting by VR2) and VR2 is used for adjust a normal turn of temperature (0°C to 100°C).

PCB assembly:

Shown in Figure 3 is the assembled PCB. Starting with the lowest height components first, taking care not to short any tracks or touch the edge connector with solder. Some tracks run under components, and care should be taken not to short out these tracks. If the pins will not enter the holes with ease, use a small drill to slightly enlarge the opening. All components with axial leads should be carefully bent to fit the position on the PCB and then soldered into place. Make sure that the electrolytic capacitors are inserted the correct way around. Some components are particularly sensitive to heat (ie: Transistors, IC's, diodes etc.) extra care must be taken to

only apply the iron for as little time as possible, using a pair of pliers to grip the leads will help conduct heat away. Trim components leads with wire cutters to prevent excess lengths causing a short circuit. Now check that you really did mount them all the right way round!

Connection of the single-core lapped screen between IC TEMP to PCB-board not more than 30 cm. and you must cheath the pin of IC TEMP with the heat shrinkable tube.

Tuning:

Connect the digital voltmeter at the "TP" point. Slide the switch SW1 to "HOT" position. Rotate VR1 to the middle and rotate VR2 until the voltage at "TP" point has the same your calculating of the value temperature below.

The equation for the "TP" voltage has had following format:

$$TP \text{ voltage} = 2.73 + (\text{temp}/100)$$

;temp = the temperature at your wanted (unit : °C)

EX: If you want to set the temperature at 50°C

$$\text{Solution TP voltage} = 2.73 + (50/100) = 3.23V \text{ at } 50^\circ C$$

Adjust VR2 until the voltage at "TP" point is 3.23 volts so VR1 can be adjusted the temperature ± 15°C (35°C to 65°C) form your setting.

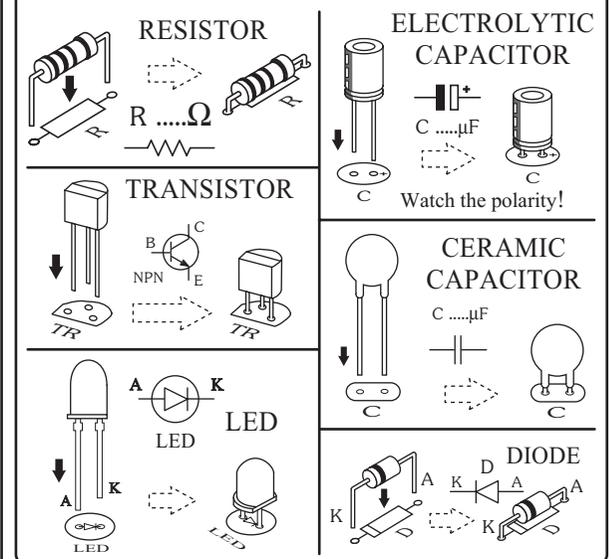
Switch and trimmer

SW1 is used for select the HOT and the COOL function.

VR1 is used for adjust the temperature at your wanted.

VR2 is used for adjust the temperature ± 15°C form your wanted.

Figure 1. Installing the componants



Troubleshooting:

The most problem like the fault soldering. Check all the soldering joint suspicious. If you discover the short track or the short soldering joint, re-solder at that point and check other the soldering joint. Check the position of all component on the PCB. See that there are no components missing or inserted in the wrong places. Make sure that all the polarised components have been soldered the right way round.

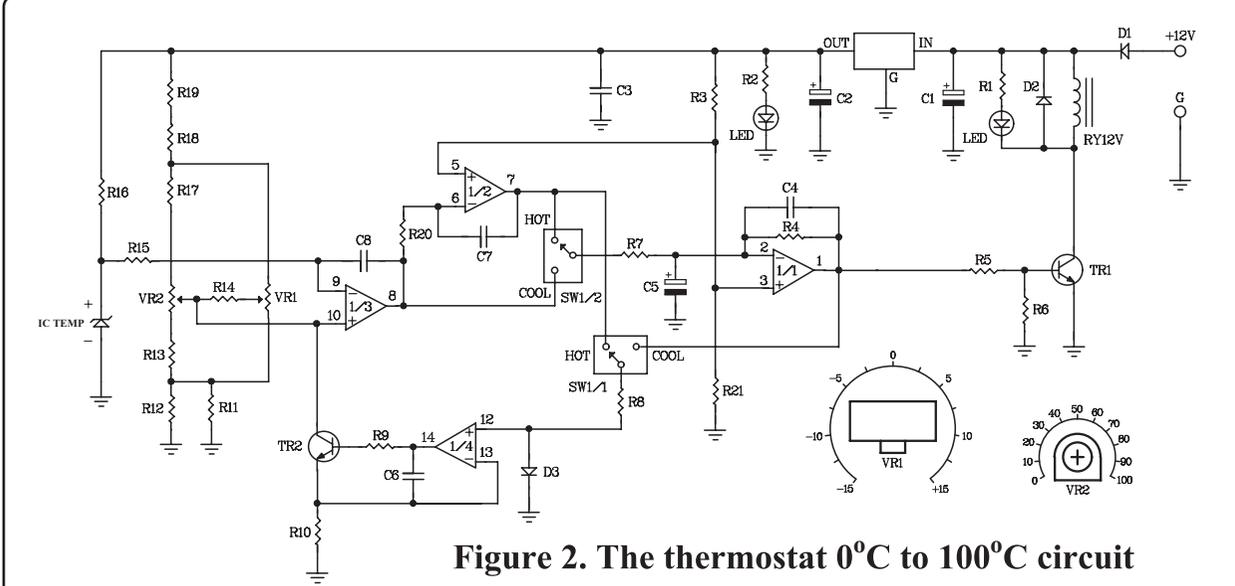


Figure 2. The thermostat 0°C to 100°C circuit

Figure 3. Connections

