

DIGITAL TEMPERATURE CONTROLLER
CODE 945 **LEVEL 3**

This digital circuit is used to control temperature. The circuit will be cut-off when the actual temperature is higher or lower than the set temperature. It can be used for real application such as with the hatching machine and automatic on-off electric fan.

Technical Specifications:

- Power supply : 12VDC./max. 70mA.
- Can be set to detect the temperature from 0°C to 99°C.
- Cut-off circuit when the actual temperature is lower or higher than the set temperature.
- Loading : max. 1A/220VAC.
- PCB dimensions : 2.21 x 3.43 in.

Circuit Assembling:

External connecting and fitting of components are shown in Figure 2. It is recommended to assemble the circuit starting with a lower component i.e. diodes, resistor, electrolyte capacitors and transistors etc. Be careful while assembling and check for the matching of PCB poles and components before soldering as shown in Figure 3. Use a max. 40W. solder and soldering lead with a tin and lead ratio of 60/40 together with a joint solution inside. Recheck the assembled circuit for your own assurance. Better using a lead sucker or a lead wire absorber in case of misplacing component to protect PCB from damage.

How to Work:

The circuit is shown in Figure 1, the microcontroller IC2 is used to control the circuit operation. And IC1 is the temperature

sensor. Follow these steps to setting the operation mode.

1. Press and hold SW1 until display indicates "P-t" and release. Then display will indicate the delay timer (maximum setting 9.59 minutes) (SW1 is used for show the delay timer in the current temperature).

2. Press SW2 or SW3 for increase and decrease the delay time (if you want to change the minute digit only, press and hold SW3 and press SW1) (SW2 is used for show the lower temperature setting and SW3 is used for show the higher temperature setting in the current temperature).

3. When setting completely, press SW1, display will indicate "P-H" (setting the higher temperature).

4. Press SW2 or SW3 for increase and decrease the higher temperature (if you want to change the 10th digit only, press and hold SW3 and press SW1).

5. When setting completely, press SW1, display will indicate "P-L" (setting the lower temperature).

6. Press SW2 or SW3 for increase and decrease the lower temperature (if you want to change the 10th digit only, press and hold SW3 and press SW1).

7. When setting completely, press SW1, display will indicate "P--" (exit the setting operation mode).

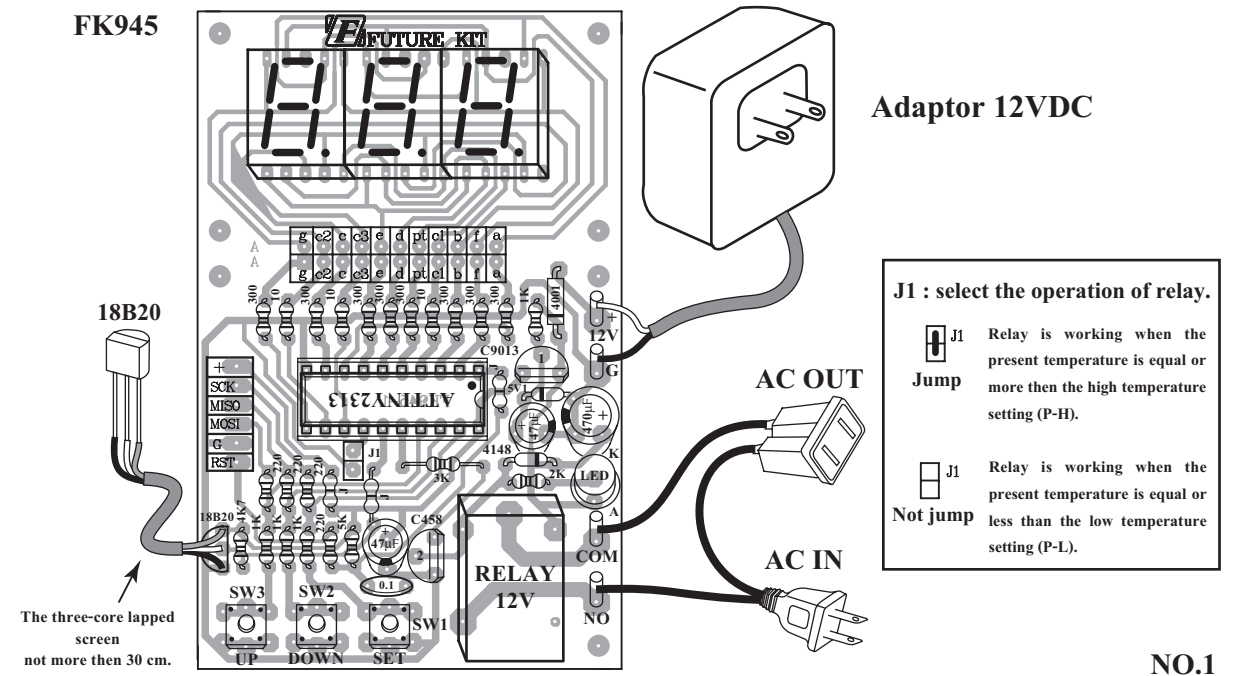
Testing:

Supply 12VDC to the circuit. Display will indicate "00.0" and indicate the current temperature. Then jumping J1 and set the program following "Setting the operation mode". By the delay timer = 0.05, the higher temperature (P-H) = 35.0 and the lower temperature (P-L) = 25.0.

Heat at IC1 18B20, when the temperature is higher more than 35 degree, relay and LED are working. But if there is no heat at IC1, the temperature will be cool slowly, when the temperature less than 25 degree, the circuit will work about 5 second and stop working.

If not jumping J1, relay will be working at the lower temperature and stop working at the higher temperature.

Figure 2. Circuit Assembling



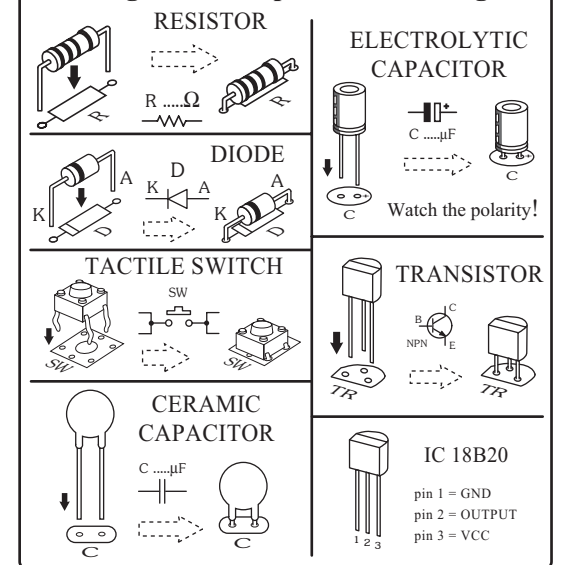
See the value setting:

- SW1 is used for seeing the delay operation of relay.
- SW2 is used for seeing the low temperature setting.
- SW3 is used for seeing the high temperature setting.

Troubleshooting:

As the circuit has only a few components, the main cause of troubles will come from component misplacing and defaulted soldering. When found out that the circuit does not work, check for the proper component placings and various soldering points.

Figure 3. Components Installing



NOTE:

FUTURE BOX FB03 is suitable for this kit.

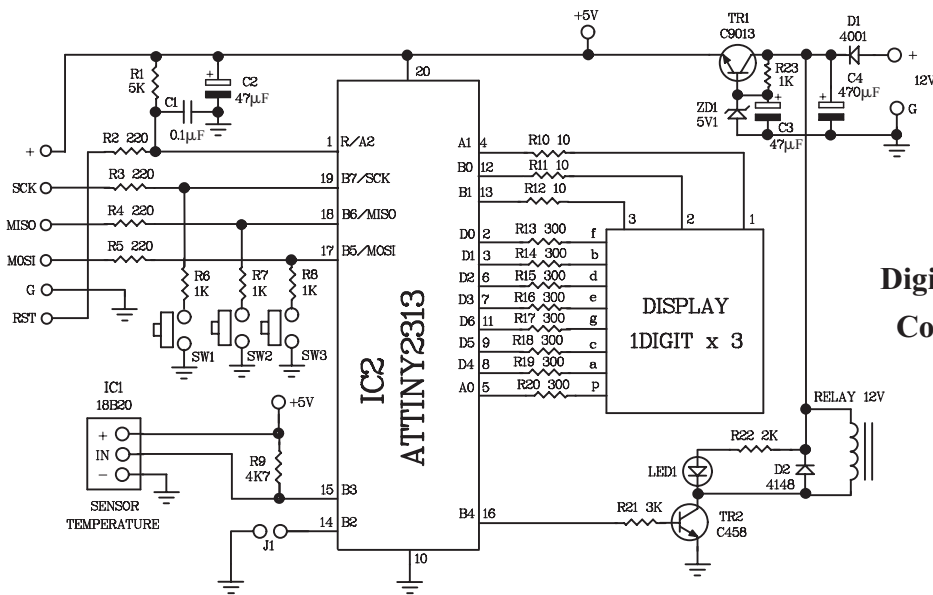


Figure 1.
Digital Temperature Controller Circuit

RESISTORS

- R1 = 5kΩ - green-black-red-gold
- R2-R5 = 220Ω - red-red-brown-gold
- R6-R8, R23 = 1kΩ - brown-black-red-gold
- R9 = 4k7Ω - yellow-purple-red-gold
- R10-R12 = 10Ω - brown-black-black-gold
- R13-R20 = 300Ω - orange-black-brown-gold
- R21 = 3kΩ - orange-black-red-gold
- R22 = 2kΩ - red-black-red-gold

CERAMIC CAPACITORS

- C1 = 0.1μF or 104

ELECTROLYTIC CAPACITORS

- C2, C3 = 47μF
- C4 = 470μF

TRANSISTORS

- TR1 = C9013
- TR2 = C458, C828, C945, C1815