DIGITAL THERMOMETER

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This digital thermometer can measure temperatures up to 150°C with an accuracy of ±1°C. The temperature is read on a 1V full scale-deflection (FSD) moving-coil voltmeter or digital voltmeter.

Operational amplifier IC 741 (IC3) provides a constant flow of current through the base-emitter junction of npn transistor BC108 (T1). The voltage across the base-emitter junction of the transistor is proportional to its temperature. The transistor used this way makes a low-cost sensor. You can use silicon diode instead of transistor. The small variation in voltage across the base-emitter junction is amplified by second operational amplifier (IC4), before the temperature is displayed on the meter. Preset VR1 is used to set the zero-reading on the meter and preset VR2 is used to set the range of temperature measurement.

Operational amplifiers IC3 and IC4 operate off regulated ±5V power supply, which is derived from 3-terminal positive voltage regulator IC 7805 (IC1) and negative low-dropout regulator IC 7660 (IC2). The entire circuit works off a 9V battery.

Assemble the circuit on a general-purpose PCB and enclose in a small plastic box. Calibrate the thermometer using presets VR1 and VR2. After calibration, keep the box in the vicinity of the object whose temperature is to be measured. ●