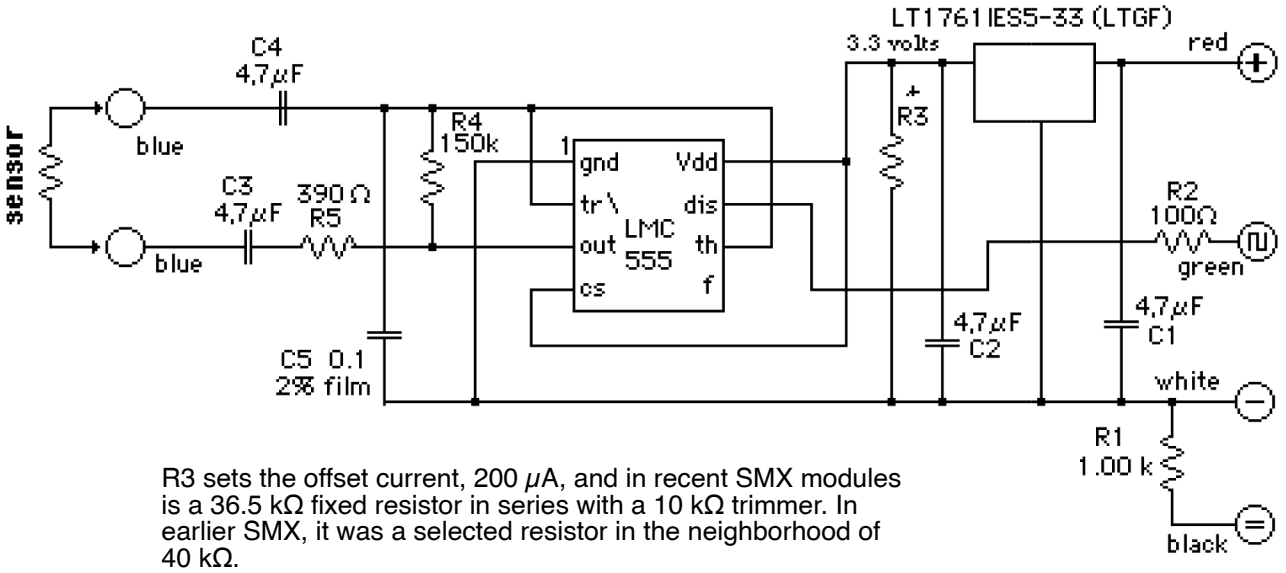
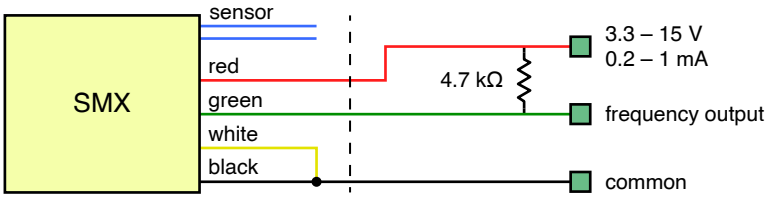


R3 sets the offset current, 200 μA, and in recent SMX modules is a 36.5 kΩ fixed resistor in series with a 10 kΩ trimmer. In earlier SMX, it was a selected resistor in the neighborhood of 40 kΩ.

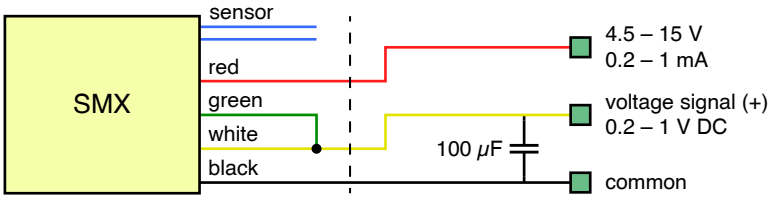
The power supply voltage is regulated at 3.3 volts DC by the micropower regulator. The power supply + input can be as low as 4 volts and as high as 15 volts. Filter capacitors are provided for stability and averaging of the supply current. The LMC555 timer operates in its direct feedback mode, with a square wave on the totem pole output from pin 3 charging or discharging the 0.1 μF polyester film timing capacitor through the network of fixed resistors in series/parallel with the moisture sensor. When the sensor is dry, the 150 kΩ resistor sets a minimum oscillator frequency of 50 hertz. When the sensor is wet, or a short circuit, the 390 Ω in series with the grid limits the upper frequency to about 13 kHz. The current through the sensing grid is AC. Nonpolar ceramic capacitors isolate the circuit from the sensor, to assure that the average current is AC and to forestall galvanic interactions in the soil environment. The output frequency is transmitted to the logger from the open collector DIS output pin, protected from miswiring by the 100 Ω resistor. Normally a pullup resistor will be provided to give voltage transitions at the logger. The current drawn by the circuit varies linearly with the frequency due to the charge and discharge cycles of the 0.1 μF capacitor. The supply current is proportional to wetness, a voltage signal can be taken from across the 1kΩ resistor. The offset current is set to 200 μA by R3, 36.5 kΩ in series with 10 kΩ trimmer.

There will be a small AC component on the DC output signal, that can be averaged in software. A 10 μF capacitor in parallel with the output resistor will reduce the AC component to <5 millivolts.

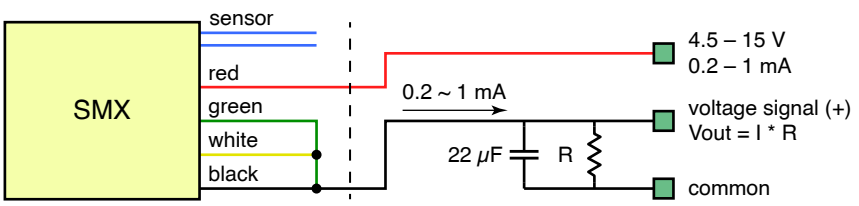
I. Digital frequency output: 50 – 10,000 Hz.



II. Voltage output: 0.2 – 1 V.



III. Two wire current output: 0.2 – 1 mA.



The current on the two wire circuit may be converted to a voltage at the input of the data logger. A 1 kΩ resistor will convert the 0.2 – 1 mA current into a 0.2 – 1 V signal.