Songhe F24

Songhe F24 Capacitive Soil Moisture Sensor Module User Manual

Model: F24 | Brand: Songhe

1. Introduction

The Songhe F24 Capacitive Soil Moisture Sensor Module is designed for detecting soil moisture levels. Unlike resistive sensors, this module uses capacitive sensing, which contributes to its corrosion resistance and extended service life. It is suitable for various applications, including intelligent agriculture, garden watering systems, and DIY projects with microcontrollers like Arduino. The module operates within a voltage range of 3.3V to 5.5V and provides an analog output.

2. Product Features

- **Chip:** TL555 for reliable performance.
- **Operating Voltage:** 3.3V to 5.5V DC, compatible with common microcontrollers.
- **Output Voltage:** 0V to 3.0V DC analog output, proportional to soil moisture.
- **Interface:** 3-pin "Gravity" interface for easy connection.
- **Corrosion Resistant:** Designed with materials to resist corrosion, ensuring a long lifespan.
- **Dimensions:** Approximately 3.86 x 0.91 x 0.39 inches.

3. Setup Instructions

This section details how to connect and prepare your capacitive soil moisture sensor for use.

3.1 Components Overview

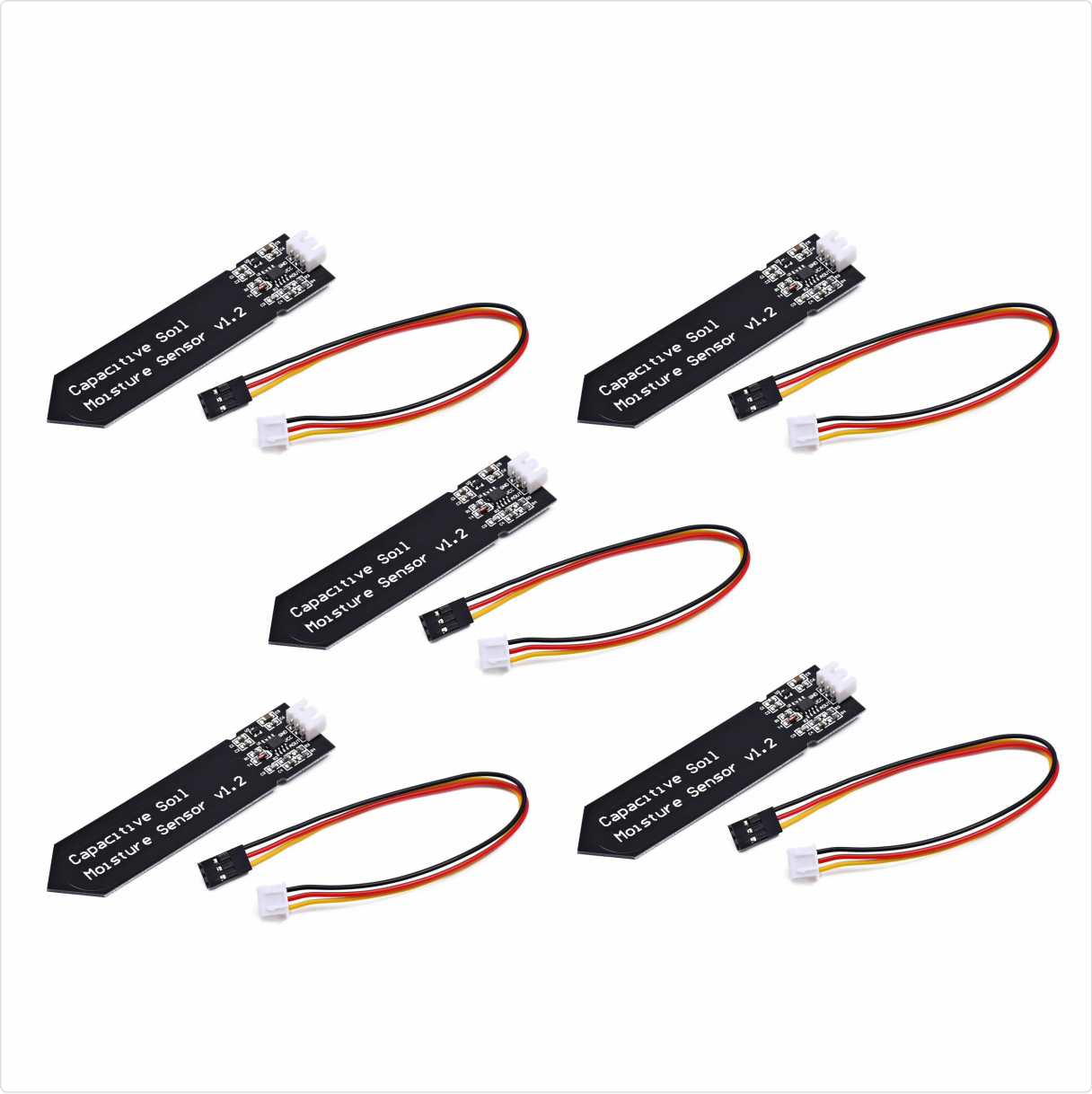

Figure 1: The Songhe F24 Capacitive Soil Moisture Sensor Module with its 3-pin connector cable. The sensor blade is designed for insertion into soil, and the module includes the necessary electronics for operation.

3.2 Wiring Connections

The sensor module features a 3-pin interface for connection to a microcontroller. The pins are typically labeled as follows:

- **VCC (Red Wire):** Connect to the 3.3V or 5V power supply of your microcontroller. Ensure the voltage is within the sensor's operating range (3.3V - 5.5V).
- **GND (Black Wire):** Connect to the ground (GND) pin of your microcontroller.
- **Analog Out (Yellow Wire):** Connect to an analog input pin on your microcontroller (e.g., A0 on Arduino). This pin provides the moisture level reading as an analog voltage.

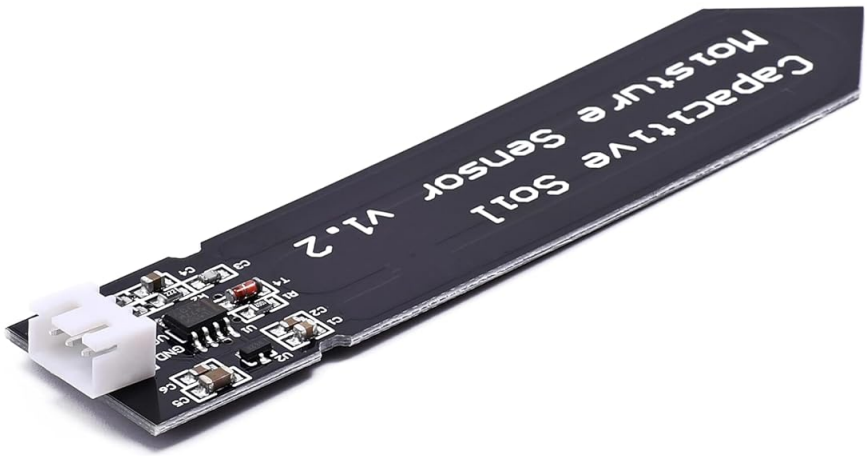

Figure 2: A detailed view of the sensor's 3-pin connector, showing the VCC, GND, and Analog Out pins for proper wiring.

Example Connection (Arduino):

- Sensor VCC → Arduino 5V (or 3.3V)
- Sensor GND → Arduino GND
- Sensor Analog Out → Arduino Analog Pin A0

4. Operating Instructions

Once connected, the sensor is ready to provide soil moisture data.

4.1 Sensor Placement

Carefully insert the sensor blade into the soil at the desired depth. Ensure that the electronic components (the top part with the connector) remain above the soil surface to prevent damage from moisture.

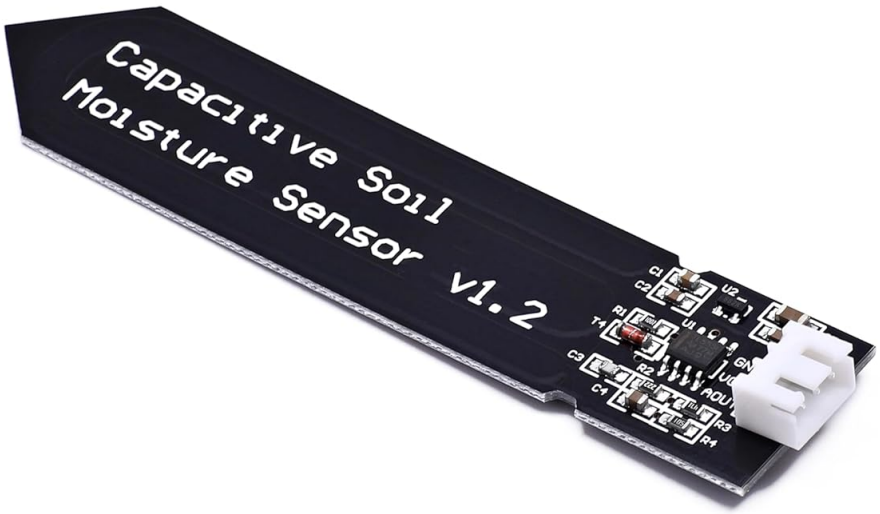

Figure 3: The sensor's blade, designed for direct insertion into soil to measure moisture levels.

4.2 Reading Data

The sensor outputs an analog voltage between 0V and 3.0V (when powered by 5V, the actual output range might vary slightly depending on the input voltage and internal regulator). This voltage is inversely proportional to the soil moisture level: a higher voltage typically indicates drier soil, and a lower voltage indicates wetter soil.
To read the data, use your microcontroller's analog-to-digital converter (ADC). For example, with Arduino, you would use the analogRead() function on the connected analog pin.

4.3 Calibration

For accurate readings, it is recommended to calibrate the sensor for your specific soil type. This involves:

1. **Dry Reading:** Take a reading when the sensor is completely dry (e.g., in air or very dry soil). This will give you the maximum analog value for dry conditions.
2. **Wet Reading:** Take a reading when the sensor is in fully saturated soil (e.g., in a cup of water or very wet soil). This will give you the minimum analog value for wet conditions.
3. **Mapping:** Use these two values to map the sensor's analog output to a percentage or a more intuitive moisture scale in your microcontroller's code.

5. Maintenance

Proper maintenance ensures the longevity and accuracy of your sensor.

- **Cleaning:** Periodically remove the sensor from the soil and gently wipe the blade clean of any accumulated soil or debris. Avoid using abrasive materials that could scratch the sensor surface.
- **Corrosion:** While designed to be corrosion-resistant, prolonged exposure to harsh chemicals or extreme conditions can still affect the sensor. Inspect the sensor blade and connections regularly for any signs of wear or corrosion.
- **Storage:** When not in use, store the sensor in a dry, clean environment away from direct sunlight and extreme temperatures.

6. Troubleshooting

If you encounter issues with your sensor, consider the following troubleshooting steps:

- **No Reading or Constant Reading:**
  - Verify all wiring connections (VCC, GND, Analog Out) are secure and correct.
  - Ensure the sensor is receiving the correct operating voltage (3.3V - 5.5V).
  - Check the microcontroller's code to ensure the analog input pin is correctly configured and read.
  - Test the sensor in both very dry and very wet conditions to see if the output changes. If it remains constant, the sensor might be faulty.
- **Inaccurate Readings:**
  - Perform a calibration as described in Section 4.3 for your specific soil type.
  - Ensure the sensor blade is fully inserted into the soil and not just touching the surface.
  - Check for any physical damage or excessive dirt/debris on the sensor blade that might interfere with readings.
  - Environmental factors like temperature fluctuations can slightly affect readings; consider environmental compensation if high precision is required.
- **Sensor Not Detected:**
  - Confirm the power supply to the sensor is active.
  - Inspect the sensor module for any visible damage to components or solder joints.

7. Specifications

Feature	Specification
Brand	Songhe
Model Number	F24
Chip	TL555
Operating Voltage	3.3V ~ 5.5V DC
Output Voltage	0V ~ 3.0V DC
Interface	3-pin "Gravity" (PH: 2.54MM)
Material	Ceramic Metal
Item Dimensions (L x W x H)	3.86 x 0.91 x 0.39 inches

Feature	Specification
Item Weight	Approximately 90 Grams (3.17 ounces)
Measurement Accuracy	±15%
Output Type	Analog
Sensing Distance	98 Millimeters
Upper Temperature Rating	55 Degrees Celsius

8. Warranty and Support

For warranty information, technical support, or further assistance with your Songhe F24 Capacitive Soil Moisture Sensor Module, please refer to the retailer where the product was purchased or visit the official Songhe brand website. Keep your purchase receipt as proof of purchase.