👩‍🌾 User Manual:

Smart Environment Monitor with Automatic Pump Control

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1. Introduction

Thank you for choosing the Smart Environment Monitor. This simple device helps you monitor soil moisture, temperature, and humidity, and it automatically turns ON a water pump when the soil becomes too dry.

The device uses a relay to control a 230V water pump, which helps automate watering based on real-time soil conditions. Information is shown on the LCD screen, and you can switch between different sensor readings using a button.

What's in the Box?

Your kit should include:

- ✅ Smart Environment Monitor device (Figure 1)
- ✅ 230V connection cable. (Figure 2)
- ✅ Soil Moisture sensor and cable. (Figu3)

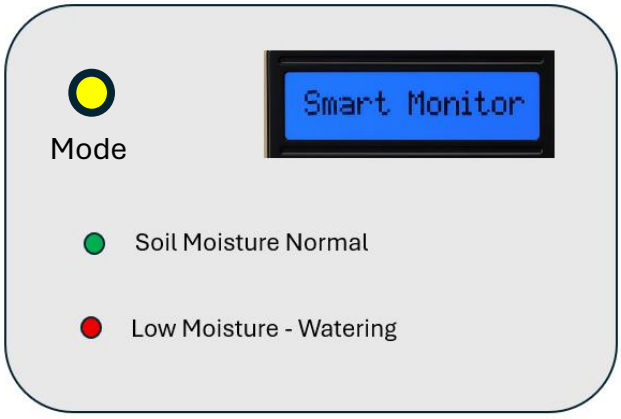

Figure 1. Smart



Figure 2. Power cable



Figure3. Soil Moisture sensor and cable

2. System Overview

This embedded system monitors environmental conditions using three sensors: DHT11 (air temperature and humidity), a soil moisture sensor, and an LM35 temperature sensor. The readings are displayed on an LCD screen, and a push button is used to cycle through the data. A relay is used to control a 230V water pump based on soil moisture levels. Green and red LEDs indicate the system status.

3. Hardware Requirements

- Smart Environment Monitor Device (Arduino-based)
- Soil Moisture Sensor
- DHT11 Sensor
- LM35 Temperature Sensor
- 16x2 LCD Display
- Relay Module
- Power Cable
- 230V water pump (not included)
- Sensor connector cable
- Push Button, Red and Blue LEDs

4. Software Requirements

- Compiled C code written for ATmega328P
- Microchip Studio (for uploading the code)
- AVR ISP Programmer or Arduino as ISP (for flashing code to the microcontroller)

5. Installation

5.1 ⚠ Safety First!

If you're not confident working with 230V, ask an electrician to connect the water pump safely!

A. Plug In the Device

- Connect Power cable to device and plug to 230ACV supply. (Figure 4)

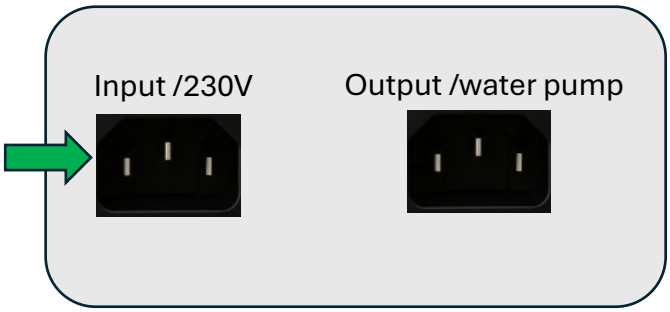

Figure 4. Connecting input 230V power cable

- Connect sensor cable to device (Figure 5)

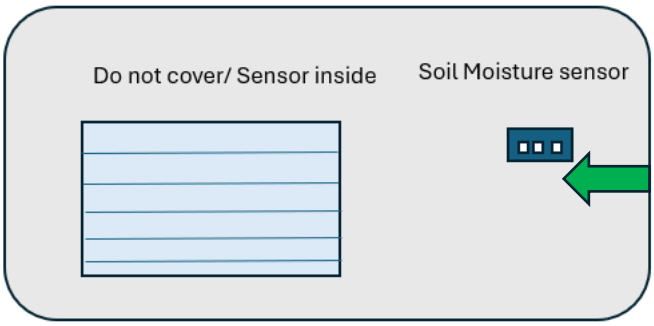

Figure5. Connecting soil moisture sensor cable

B. Connect the Water Pump. (Figure 6)

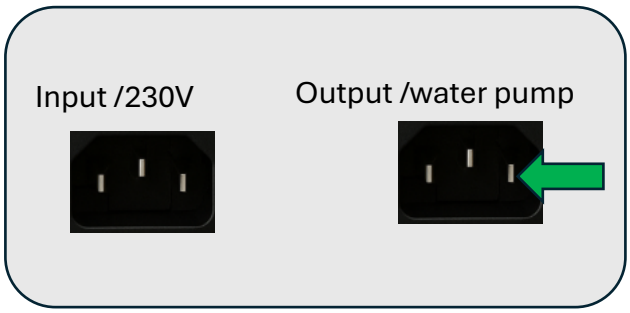

Figure 6. Connecting water pump

6. Usage

- The device shows **different sensor data** on the LCD screen.
- Press the **button** to switch between:
  - 🌡️ **Temperature & Humidity** (from air)
  - 🌱 **Soil Moisture** (%)
  - 🔥 **Room Temperature** (from LM35 sensor)

6.1 Automatic Watering Function

- If **soil moisture drops below 40%**, the **pump turns ON automatically**.
- When moisture rises above 45%, the **pump turns OFF**.
- This helps **avoid overwatering** and **saves water**.

6.2 LED Indicators

- 🟢 **Blue LED ON** → Device is working normally./ Pump stopped
- 🔴 **Red LED ON** → Low Moisture level / Pump started

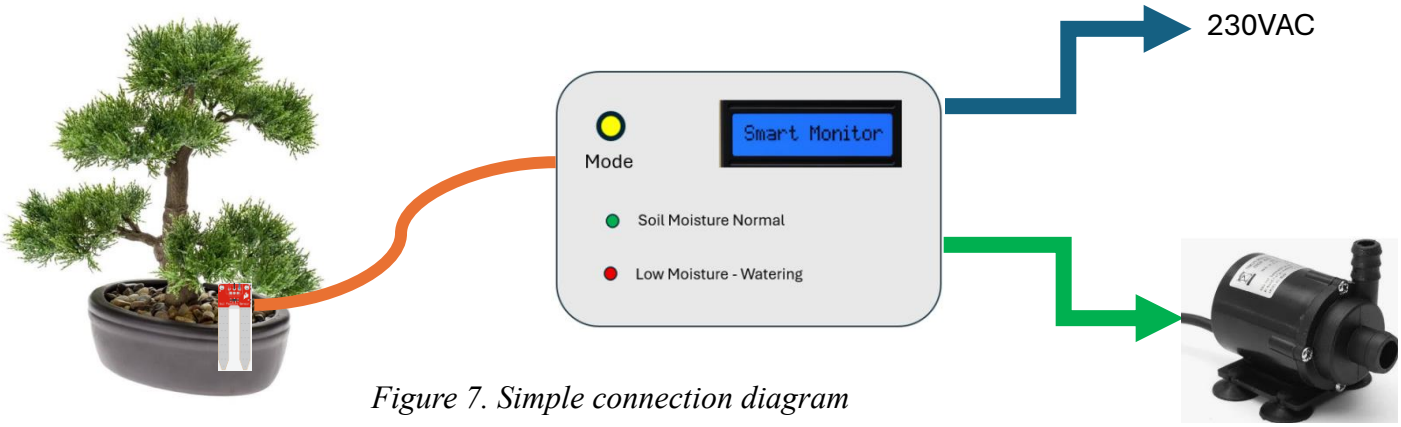

Figure 7. Simple connection diagram

7. Troubleshooting

Problem	What to Do
LCD is blank	Adjust small knob on the back (contrast control)
Red LED is ON	Check that all sensors are securely plugged in
Pump not turning on	Make sure moisture is low enough and pump is wired correctly
Button doesn't switch display	Try pressing a bit slower; press and release once to change

8. Safety Notes

⚠️ **Do NOT touch the relay or pump wiring while the device is connected to 230V.**
⚠️ Ensure all AC wiring is safely insulated and placed away from water or damp areas.
⚠️ Only use pumps up to 10A at 230V.
⚠️ Keep the device dry and indoors.
⚠️ Keep away from the children

9. Maintenance

- Keep the soil moisture sensor clean and free of corrosion.
- Ensure all connectors are secure and not exposed to water.
- Check the LCD and buttons occasionally for responsiveness.
- Do not block or cover sensor area in the
- This device has inbuild AC 230v to DC 5v converter.

10. Contact

For help or questions, please contact:

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