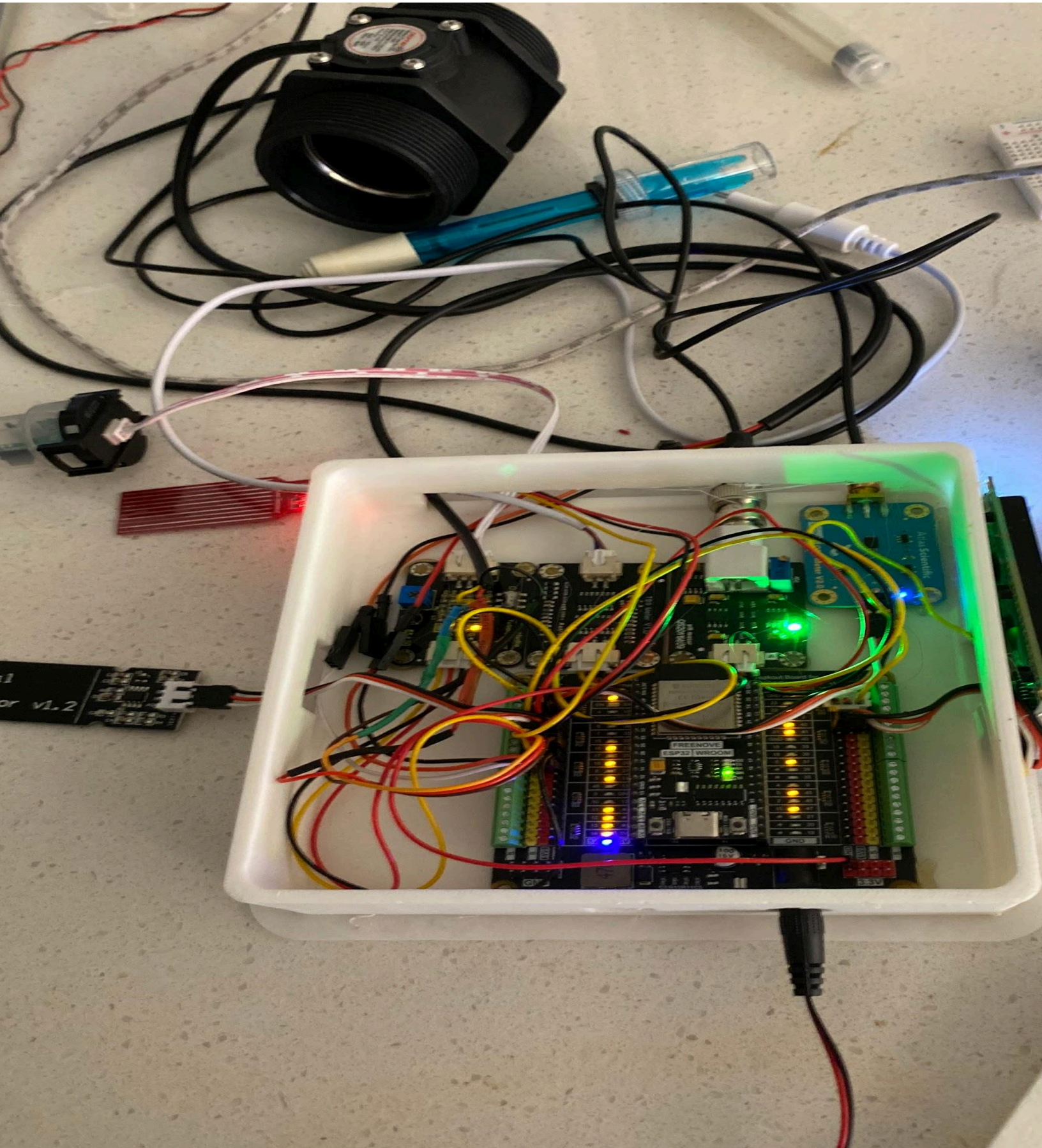
Octopus Water Monitoring Station Owners Manual



Introduction

Welcome to the **Octopus Water Monitoring Station**! This device is designed for environmental enthusiasts, researchers, and hobbyists to monitor water quality and related parameters with ease. Its octopus-inspired design features **eight modular, removable sensors** for versatile and precise measurements. Whether you're conducting research or simply curious about water quality, this manual will guide you through assembly, operation, maintenance, and troubleshooting.

Package Contents

1. **Main Unit:** 3D-printed frame and Lid housing the ESP32 and
2. **Sensors (8 total):**
    - Total Dissolved Solids (TDS)
    - Oxidation-Reduction Potential (ORP)
    - pH
    - Soil Moisture
    - Temperature
    - Flow Rate
    - Turbidity
    - Water Level
3. **Power Supply:** 12V 1A cable and adapter (or battery connection).
4. **Logic:** ESP32 and Breakout Board
5. **Tool Kit:** Includes screwdriver and calibration tools.

6. **Quick Start Guide:** Reference sheet for setup and calibration.

Features

- **Modular Design:** Easily removable and replaceable sensors.
- **Wireless Connectivity:** Built-in ESP32 web server for real-time data monitoring.
- **Cost-Effective:** Self-assembly with a 3D-printed frame.
- **Multi-Parameter Measurement:** Simultaneously monitor eight water quality metrics.
- **User-Friendly:** No soldering required.
- **Visual Data:** LCD Screen shows data on-site

Assembly Instructions

Step 1: Preparing the Frame

1. Unbox the main unit and verify all components are intact.
2. Place the frame on a flat, stable surface.

Step 2: Attaching Sensors

1. Identify the labeled ports for each sensor on the frame.
2. Insert each sensor into its corresponding port.
3. Ensure all sensors are securely connected.

Step 3: Connecting the Power Supply

- **If using a power adapter:**
    1. Plug the 12V 1A cable into the power port on the main unit.
    2. Connect the other end to the adapter and plug it into a power outlet.
- **If using a battery:**
    1. Attach the battery connector to the main unit's power port.
    2. Ensure the battery is charged and connected properly.

Step 4: Initial Calibration

- Use the provided tool kit to calibrate each sensor according to its instructions:

Sensor	Calibration Steps
TDS	Refer to this guide for calibration details.
pH	Immerse in a buffer solution of known pH. Adjust the red-marked screw with a flathead screwdriver.
ORP	Place the probe in a 225 mV solution. Adjust the offset until the reading is correct.

Water Level	Submerge the sensor in water and ensure it responds accurately.
Soil Moisture	Insert into moist soil and check for response.
Turbidity	Use a solution with a known turbidity. Adjust as needed with the red-marked screw.
Flow Rate	Run a known amount of liquid through the sensor. Adjust the offset to match actual flow.
Temperature	Compare with a known temperature source and adjust until readings align.

Operation

Powering On

1. Connect the power cable to your power source.
2. Once powered, the LCD screen and LEDs on the case will illuminate.

Accessing the Web Server

1. Connect your device to the same Wi-Fi network as the ESP32.
2. Open a web browser and navigate to the ESP32's default IP address (e.g., 192.168.1.236).

Monitoring Data

- View real-time sensor readings on the dashboard or LCD screen.
- **Tip:** Record data in a spreadsheet or journal for long-term tracking.

Maintenance

Cleaning Sensors

- Rinse sensors with distilled water after each use.
- Avoid harsh chemicals unless specified in the sensor's manual.

Replacing Sensors

- Detach the faulty sensor and replace it with a new one.

Firmware Updates

1. Download the latest firmware from the official website.
2. Follow the included instructions to upload updates via USB.

Troubleshooting

Issue	Possible Cause	Solution
No power	Loose connection	Check power cable and power supply.
Sensor not responding	Poor connection	Reattach or replace the sensor.
Data not displaying	Network issue	Reconnect to the ESP32's Wi-Fi.
Inaccurate readings	Sensor needs calibration	Recalibrate the sensor.

Safety Guidelines

- Do not immerse the main unit in water.
- Handle sensors with care to avoid damage.
- Disconnect power before performing maintenance.
- Store sensors in appropriate conditions as specified.
- **DO NOT LICK ANY SENSORS!**

Technical Specifications

- **Power Supply:** 12V 1A (DC adapter or battery connection).
- **Connectivity:** Wi-Fi (ESP32) with real-time web hosting capabilities.
- **Material:** 3D-printed PLA frame (biodegradable).
- **Sensor Compatibility:** 8 modular ports.

How It Works

Sensor	Function	How It Works	Significance
TDS	Measures dissolved solids	Uses electrical conductivity to determine solid concentration (Hancock).	High TDS may indicate harmful contaminants.
pH	Measures hydrogen ion potential	Voltage difference between the test solution and a reference electrode ("How Does a pH Probe Work?").	pH affects water chemistry and aquatic life.

Temperature	Monitors water temperature	Thermistor measures resistance changes with heat ("Temperature and Water").	Influences biological activity and chemical reactions.
ORP	Measures electron transfer	Voltage difference between the solution and a reference solution (Atlas Scientific).	Indicates water's ability to cleanse itself ("Oxidation-Reduction Potential").
Turbidity	Measures water clarity	Detects light scattering caused by suspended solids (Atlas Scientific).	High turbidity signals poor water quality ("Turbidity Measurement and Monitoring").
Flow Rate	Measures water flow	Turbine wheel with Hall Effect sensor calculates flow via pulse rate (Wikiseeed).	Critical for monitoring runoff and pollutant transport.

Soil Moisture	Measures water content in soil	Capacitive sensor measures charging rate affected by surrounding moisture (Hackaday).	Essential for water and heat energy transfer in ecosystems.
Water Level	Monitors water surface height	Conductive plates measure changes in conductivity caused by water contact.	Low levels indicate droughts or poor water management.

Contact Us

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