

# Coastal Urban Microclimate Observatory

## Complete Setup Instruction Manual

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### 1. Pre-Installation Planning

- Select open sky location (minimum 120° horizon clearance).
- Ensure natural soil/grass surface for temperature sensor placement.
- Verify legal permission for 10 m mast installation.
- Avoid proximity to AC exhausts, reflective walls, and concrete surfaces.
- Measure and record exact coordinates and elevation.

### 2. Equipment Checklist

- Ultrasonic anemometer (marine grade preferred).
- 10 m galvanized or stainless steel mast with guy wires.
- Aspirated radiation shield for temperature/humidity sensor.
- High-resolution tipping bucket rain gauge (0.1–0.2 mm).
- Barometric pressure sensor (0.1 hPa resolution).
- Optional: Pyranometer, soil temperature probe, soil moisture probe.
- Data logger with 1-minute logging capability.
- Surge protection and grounding system.
- UV-resistant outdoor cables and waterproof connectors.

### 3. Mast Installation Procedure

- Install mast vertically using concrete foundation or structural anchor.
- Attach 3–4 guy wires at equal angles for stability.
- Install lightning grounding rod and surge protector.
- Align wind sensor to True North using corrected compass bearing.
- Document final mast height and obstacle distances.

### 4. Sensor Installation Guidelines

- Wind sensor at 10 m above ground level.
- Temperature/humidity sensor at 1.5–2 m above natural soil.
- Rain gauge mounted level, 30 cm above ground, open sky exposure.
- Pressure sensor indoors in temperature-stable environment.
- Ensure all sensors are securely mounted and weatherproofed.

### 5. Data Logging Configuration

- Set logging interval to 1 minute.
- Configure timestamps in UTC only.
- Store data in CSV format with standardized units.
- Enable automatic local backup and weekly cloud backup.
- Test logging system for 48 hours before official data collection begins.

## 6. Calibration Protocol

- Cross-check temperature readings with nearest official station for 7 days.
- Calibrate rain gauge using measured water volume test.
- Compare pressure readings with official sea-level pressure data.
- Document calibration date and any adjustment factors.

## 7. Maintenance Schedule

- Daily visual inspection of rain gauge and mast.
- Monthly cable and corrosion inspection.
- Quarterly cleaning of radiation shield.
- Annual full recalibration and firmware updates.
- Immediate inspection after severe storm or cyclone.

## 8. Data Quality Control

- Flag unrealistic spikes or sensor dropouts.
- Annotate all data gaps clearly.
- Never delete anomalous data without documentation.
- Maintain a maintenance and anomaly logbook.

## 9. Data Publication & Archiving

- Maintain complete metadata (coordinates, elevation, sensor models).
- Archive yearly datasets in open repository (e.g., Zenodo, GitHub).
- Publish annual summary report of key findings.
- Maintain version-controlled dataset updates.

## Final Note

If maintained consistently for 3–5 years with proper calibration and documentation, this observatory will generate a high-quality coastal urban microclimate dataset suitable for scientific analysis, collaboration, and potential peer-reviewed publication.