

# SmartCity IoT Sensor Network

## Installation and Configuration Manual

Municipal Infrastructure Documentation - Sample

### ⚠ SAFETY FIRST - READ BEFORE INSTALLATION

**Electrical Hazard:** All installations must be performed by certified electricians. Verify power is OFF before beginning work. Use proper PPE including insulated gloves and safety glasses.

## 🔧 Installation Overview

The SmartCity IoT sensor network provides real-time environmental monitoring, traffic analysis, and infrastructure health assessment for municipal operations. This manual covers sensor installation, network configuration, and system integration procedures.

### System Components

- Environmental Sensors:** Air quality, noise level, temperature, humidity
- Traffic Sensors:** Vehicle count, speed detection, pedestrian flow
- Infrastructure Sensors:** Vibration monitoring, structural health
- Gateway Units:** Data aggregation and cellular/WiFi transmission
- Power Management:** Solar panels with battery backup systems

## 📦 Pre-Installation Requirements

### Hardware Specifications

Component	Model	Power Requirement	Operating Temperature
Air Quality Sensor	AQ-500X	12V DC, 2A	-20°C to +60°C
Traffic Counter	TC-200M	24V DC, 1.5A	-30°C to +70°C
IoT Gateway	GW-1000	12V DC, 5A	-20°C to +55°C
Solar Panel	SP-100W	N/A (Power Source)	-40°C to +85°C

### Pre-Installation Checklist

- ☐ Obtain all necessary municipal permits and approvals
- ☐ Verify utility clearances (electrical, gas, water, fiber)
- ☐ Confirm cellular coverage and signal strength at installation site
- ☐ Schedule traffic control measures if street work required
- ☐ Verify equipment delivery and inspect for shipping damage
- ☐ Coordinate with IT department for network configuration

## Installation Procedures

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### Site Preparation and Mounting

**Time Required:** 2-4 hours per location

**Personnel:** 2 certified technicians + 1 traffic control officer

#### Site Survey:

1. Confirm GPS coordinates match work order specifications
2. Verify 10-foot clearance from power lines and telecommunications
3. Check for underground utilities using 811 location markings
4. Assess pedestrian and vehicle traffic patterns
5. Document site conditions with photos for record-keeping

#### [INSTALLATION DIAGRAM]

*Pole-mounted sensor configuration showing:*

- Solar panel positioning (south-facing, 30° tilt)
- Sensor height requirements (air quality: 3m, traffic: 5m)
- Gateway placement and antenna orientation
- Cable routing and weatherproofing details

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### Power System Installation

**Safety Note:** Only qualified electricians may perform electrical connections

#### Solar Panel Configuration:

1. Mount solar panel at optimal angle (latitude + 15°)

2. Install charge controller in weatherproof enclosure
3. Connect battery bank with appropriate fusing
4. Verify system voltage and charging parameters
5. Test backup power functionality

#### ⚠ Electrical Safety Requirements

All electrical work must comply with National Electrical Code (NEC) and local electrical codes. Use only UL-listed components rated for outdoor use. Install appropriate overcurrent protection and grounding systems.

## Network Configuration

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### Gateway Setup and Connectivity

**Network Protocol:** LTE-M with WiFi backup

#### Configuration Steps:

1. Insert activated SIM card into gateway device
2. Configure APN settings for carrier network
3. Set up WiFi credentials for backup connectivity
4. Configure sensor polling intervals and data transmission schedule
5. Test connectivity and data transmission to cloud platform

```
# Gateway Configuration Commands
configure terminal
interface cellular 0
apn municipal.smartcity.net
username smartcity_device
password [provided_by_carrier]
ip dhcp exit
interface wifi 0
ssid SmartCity_Backup
security wpa2 psk [wifi_password]
dhcp client exit
sensor-config poll-interval 300
transmission-interval 900
data-retention 72hours
exit
```

## 📊 Sensor Calibration and Testing

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### Air Quality Sensor Calibration

**Equipment Required:** Certified reference gases, flow meter, laptop with calibration software

#### Calibration Procedure:

1. Connect sensor to calibration gas supply (CO, NO2, PM2.5)
2. Allow 30-minute warm-up period for sensor stabilization
3. Perform zero-point calibration using filtered ambient air
4. Apply span gas at known concentrations (50%, 80% of full scale)

5. Verify linearity and adjust calibration coefficients if needed
6. Document calibration results and affix certification label

📈 Acceptance Testing

**Duration:** 48-hour monitoring period

**Test Criteria:**

- **Data Transmission:** 99% successful transmission rate
- **Power System:** Maintain operation through 48-hour cloudy period
- **Sensor Accuracy:** ±5% of reference measurements
- **Network Connectivity:** Automatic failover to backup connection

Maintenance and Troubleshooting

Maintenance Schedule

Component	Frequency	Maintenance Activity	Duration
Air Quality Sensors	Quarterly	Cleaning, calibration verification	2 hours
Solar Panels	Semi-annual	Cleaning, connection inspection	1 hour
Gateway Unit	Monthly	Firmware updates, log review	30 minutes
Battery System	Annual	Capacity test, replacement if needed	3 hours

Support and Emergency Contacts

🆘 Emergency Response

**System Failure:** Municipal IT Helpdesk (555) 123-4567

**Electrical Issues:** City Electrician (555) 123-4568

**Traffic Safety:** Traffic Control (555) 123-4569

**Environmental Concerns:** Environmental Services (555) 123-4570

Vendor Technical Support

**SmartCity Solutions:** support@smartcitysolutions.com | (800) 555-CITY

**Hours:** 24/7 for critical issues | Business hours for routine support

**Remote Monitoring:** Available via secure VPN connection

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