

Benefits

TerraAir is a solar powered cloud native IoT device producing continuous, reliable, outdoor air monitoring. With the ability to use a local WiFi connection or standalone LTE communication, TerraAir can be placed in any location providing cloud based Live Logging. Using particulate and VOC sensors, multiple units can be placed around a location to provide an accurate and Live Data assessment of current air quality. With fast and accurate readings any potential changes over background can be seen quickly and appropriate measures can be taken to remedy the issue.

Features

- Cloud Native IoT Device
- Solar Powered, Battery Backed
- LTE/WiFi Communication Protocols
- Instant Live Data Access via Secure Portal
 - Customizable Dashboard
 - Industry Standard API's
- Wind Speed & Wind Direction
- Fast. Reliable. Accurate

Base Model Specifications

- 10W Solar Panel
- 13Ah Ternary Lithium Battery
- Anemometer – 0 to 200 MPH
- Radios:
 - LTE
 - Bluetooth
 - WiFi
 - GPS
- 10 years onboard local storage, remote reset
- 1 second data sampling / variable value store
- PM (Particulate Matter) Sensor
 - 1.0µm, 2.5µm, 10.0µm
 - Range (PM 2.5) 1-500µg/m³
 - Resolution: 1µg/m³
- TVOC (Total Volatile Organic Compound)
 - Range: 0 ppb – 60,000 ppb
- Temperature and Humidity Sensor
 - Range: -40 to 85°C
- Humidity 0 - 90% RH
- Size: 18" x 8.5" x 15"
- Weight: 6.5lbs
- Optional additional sensors – see list



Summary Sensor Specifications

Sensor	Lower Range	Upper Range	Resolution
Total VOC (PID)	1 ppb	60,000 ppb	1 ppb
Methane (CH ₄)	0 ppm	50,000 ppm	5 ppm
Carbon Dioxide (CO ₂)	0 ppm	50,000 ppm	10 ppm
Carbon Monoxide (CO)	0 ppm	500 ppm	1 ppm
Hydrogen Sulfide (H ₂ S)	0 ppm	50 ppm	0.15 ppm
Nitrogen Dioxide (NO ₂)	0 ppm	20 ppm	0.1 ppm
Ethanol (C ₂ H ₅ OH)	0 ppm	200 ppm	0.2 ppm
Ozone (O ₃)	0 ppm	20 ppm	0.1 ppm
IAQ	0 ppm	100 ppm	0.15 ppm
RESP-IRR	0 ppm	20 ppm	0.15 ppm

Detailed spec sheets available upon request



TVOC Sensor Specifications

Parameter	Comments		Values Min.	Typ.	Max.	Units
Sensor Technology	MOx based gas sensor		0	-	60,000	ppb
Output signals	Digital processed value (VOX Index)		0	-	500	VOC Index Points
	Digital raw value (SRAW)		0	-	65,535	ticks
Measurement range	Ethanol in clean air		0	-	1,000	ppm
Specified range	Ethanol in clean air		0.3	-	30	ppm
Device-to-device variation	VOC Index		-	<±5 <±5	-	VOC Index points or % VOC Index m.v. (the larger)
Repeatability	VOC Index		-	<±5 <±5	-	VOC Index points or % VOC Index m.v. (the larger)
Limit of detection	Ethanol in specified range		-	-	<50 <10	ppb or % of concentration setpoint (the larger)
Response time	Changing concentration from 5 to 10 ppm of ethanol, at sample interval of 1s	τ_{63}	-	<10	-	s
		τ_{90}	-	<30	-	s
Switch-on behavior	Time until reliably detecting VOC events		-	<60	-	s
	Time until specifications in this table are met		-	<1	-	h
Sensitivity ⁷	SRAW, doubling VOC concentration	Ethanol in specified range	-	-870	-	ticks
		5 to 10 ppm of ethanol	710	870	1,030	ticks
Recommended sampling interval	VOC Index		-	1	-	s
	SRAW		10	1	0.5	s





PM Sensor Specifications

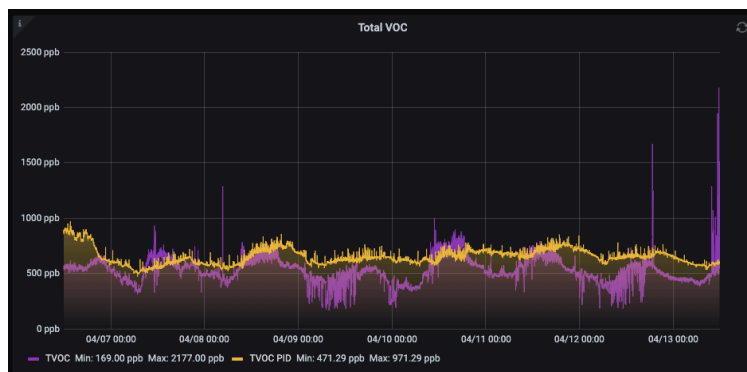
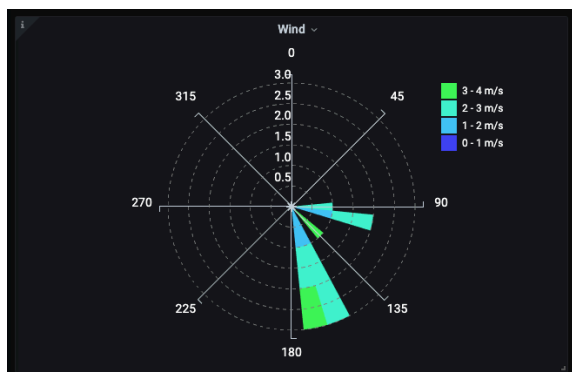
Item	Technical Parameters
Sensor Technology	Laser light scattering, electron cutting and particle counting
Range (PM2.5 standard value)	1~500 $\mu\text{g}/\text{m}^3$ (Effective range), 1000 $\mu\text{g}/\text{m}^3$ (Maximum range)
Particle size	Up to 6 channels: 0.3 μm 、0.5 μm 、1.0 μm 、2.5 μm 、5 μm 、10 μm
Output value	PM2.5, PM10, TSP Concentration ($\mu\text{g}/\text{m}^3$) , Number of particles (one / 0.1L)
Resolution	Concentration: 1 $\mu\text{g}/\text{m}^3$, Counting concentration: 1s/0.1L
Consistency	0~100 $\mu\text{g}/\text{m}^3$: $\pm 10\mu\text{g}/\text{m}^3@25^\circ$, 50%RH 100~500 $\mu\text{g}/\text{m}^3$: $\pm 10\%$ @25°, 50%RH
stability time	30 seconds after power-on
Sensitivity	Refresh data once every 1 second
Supply voltage	DC5V $\pm 3\%$
Operating current	Average operating current <75mA, Peak current <120mA
Communication Interface	UART, I ² C optional (depending on model)
Conditions of Use	-10~60°C, 10%~90%RH (non-condensing)



Example Time Series Data – sub sampled at 1 min with Grafana

Time	AM-0012	AM-0006	AM-0007	AM-0009
2021-03-09 15:18:00	969 ppb	830 ppb	248 ppb	1203 ppb
2021-03-09 15:19:00	949 ppb	801 ppb	336 ppb	1218 ppb
2021-03-09 15:20:00	872 ppb	812 ppb	296 ppb	1218 ppb
2021-03-09 15:21:00	895 ppb	796 ppb	280 ppb	1263 ppb
2021-03-09 15:22:00	862 ppb	836 ppb	274 ppb	1157 ppb
2021-03-09 15:23:00	826 ppb	805 ppb	256 ppb	1149 ppb
2021-03-09 15:24:00	876 ppb	798 ppb	283 ppb	1229 ppb

Example Total VOC MOx + PID + Wind – Charting provided by Grafana



Example Base Model AWS IoT decrypted MQTT JSON Packet

```
{ "pm1.0": { "value": 5, "unit": "ug/m^3" }, "temperature": { "value": 13.43,
"unit": "C" }, "h2s": { "value": 0, "unit": "ppm" }, "instant_charge": { "value":
0.53, "unit": "c" }, "timestamp": 1618336644, "tvoc": { "value": 66.17, "unit":
"ppb" }, "cpu_temp": { "value": 53.89, "unit": "C" }, "humidity": { "value": 16.66,
"unit": "%RH" }, "battery_charge": { "value": 13284.89, "unit": "c" }, "pressure":
{ "value": 85675.39, "unit": "Pa" }, "pm10.0": { "value": 9, "unit": "ug/m^3" },
"co2e": { "value": 409.87, "unit": "ppm" }, "battery_voltage": { "value": 3.73,
"unit": "V" }, "ir_c1": { "value": 501.25, "unit": "ppm" }, "pm2.5": { "value": 7,
"unit": "ug/m^3" }, "battery_gauge": { "value": 27.96, "unit": "%" }, "ir_co2": {
"value": 512.25, "unit": "ppm" }, "device_id": "AM-0017", "loopcounter": { "value":
12030 } }
```

