

High Performance Gas Sensors and Systems

Air Quality Applications



INTERLINK
ELECTRONICS®



SPEC
SENSORS

KWJ
ENGINEERING

eco
sensors

Calman
technology



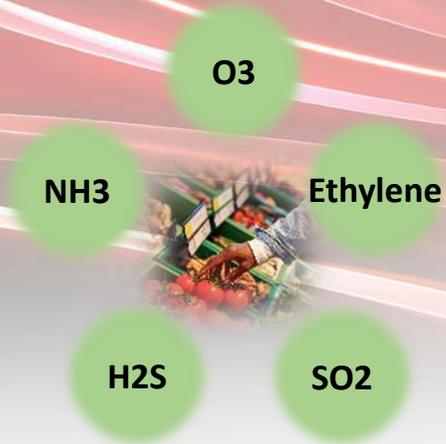
Gas Sensors Applications



Air Quality Monitoring

- Commercial buildings: *offices, hospitals, schools, warehouses, theatres*
- Residential: *living spaces, kitchens, yards (fixed or portable equipment)*
- HVAC control feedback
- Outdoor air quality: *smart cities, wildfire early warning & impact*

Sensor: HCHO = Formaldehyde



Food Supply Chain

- Food transportation asset tracking
- Freshness monitoring, ripening control
- Agricultural land and cultivation applications
- Livestock farms monitoring



Industrial and Automotive

- Automotive in-cabin AQM
- Industrial: *oil & gas, mining, warehouses*
- Hydrogen fuel cell monitoring
- First responder safety



Health and Wellness

- Condition warnings (non-clinical) *Diabetes, Asthma, SIBO, IBS-C*
- Breath analysis
- Sports training applications
- Alcohol monitoring
- Smoking cessation

Air Quality Monitoring Applications

1. **Healthy Work Environment and HVAC Lower Operating Costs**
2. **HVAC Ozone Air Treatment, Optimizing Makeup Air**
3. **HVAC Energy Efficiency and Increased Productivity**
4. **HVAC Detecting Vape Smoke at Schools and Businesses**
5. **Industrial Emissions Monitoring for Regulatory Compliance**
6. **Health and Safety at Home, Travel and Work**
7. **Enhancing Well-being in Parking Garages**
8. **Enhancing Well-being and Optimizing Makeup Air in Automobile Cabin**

1.

Healthy Work Environment and HVAC Lower Operating Costs

SPEC Sensors™ - Carbon Monoxide (CO)
Electrochemical Gas Sensor



Problem

- Adoption of UN Sustainability Development Goals
- Mitigate Sick Building Syndrome & reduce healthcare costs
- Monitor Carbon Monoxide (CO) as part of indoor air quality

Solution – monitor with Interlink’s SPEC Sensors™

- Indoor air quality assurance & energy management
- Superior air quality for safer & healthier work environment
- Design into a wired/wireless monitor for gases to control ventilation, to log data for analysis and for performance reporting

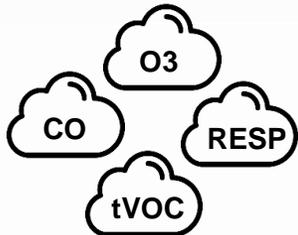


Advantage – CO Electrochemical Sensor

- Accurate ppb resolution readings using very low power
- Long life sensor element with fast response

HVAC Ozone Air Treatment, Optimizing Makeup Air

SPEC Sensors™ - Carbon Monoxide (CO), Indoor Air Quality (IAQ),
Respiratory Irritants (RESP), Ozone (O3)
Gas Sensors & Custom Engineering Services



Problem

- Improve air quality in large & busy public spaces and optimize use of makeup air
- Detect toxic gases to avoid emergency evacuations, business interruptions, liabilities

Application Note – Air treatment with Interlink's SPEC™ & Eco™ Products

- Fresh air with ozonated HVAC at airports (IOA-POG) and casinos
- Monitoring IAQ to activate makeup air & ozone generator may save energy costs

Advantage – O3, IAQ, CO, RESP Sensors & Custom Engineering Services

- Enable HVAC system automation: O3, IAQ (tVOC), CO, RESP
- Wired or wireless monitor to control ventilation and datalogging for reports
- Custom engineering services to automate solutions that meet building standards and guidelines

HVAC Energy Efficiency and Increased Productivity

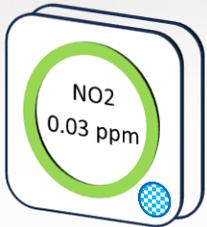


Problem – Reduce environmental impact via energy cost savings

- Reducing energy costs are important for regulatory compliance as well
- Monitor CO, NO₂, O₃, tVOC and Formaldehyde (HCHO) for quality of indoor air

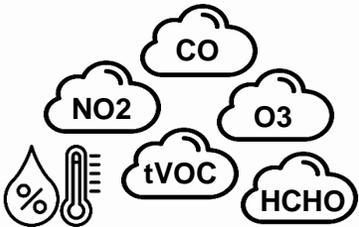
Application Note – Monitor with Interlink's SPEC Sensors™

- Real-time air quality monitoring to help optimize ventilation, heating, cooling
- Greater energy efficiency along with increased productivity for higher ROI



Advantage – CO, NO2, O3, IAQ (tVOC), HCHO Electrochemical Sensors

- Long life sensors with fast & accurate readings using very low power
- Custom engineering services for gas sensor elements
- Enable sustainable buildings that minimize environmental impact and enhance well-being



HVAC Detecting Vape Smoke at Schools and Businesses

SPEC Sensors™ - IAQ (tVOC)
Electrochemical Gas Sensor

Problem

- Monitor and deter vaping/smoking for a healthy environment

Solution – Affordable & effective in reducing vaping

- Vape detector uses an array of sensors including an Interlink SPEC™ electrochemical gas sensor, battery operated or wired
- Vape, tVOC are typically reported to dashboard, providing alerts to address issues

Advantage – IAQ (tVOC) Electrochemical Sensor

- Low power, continuously monitors chemical precursors
- With higher-powered sensor array, identifies Vape even in the presence of interferents (perfumes, hairsprays, deodorants)



Industrial Emissions Monitoring for Regulatory Compliance



Problem

- Regulations and voluntary adoption of standards for sustainability
- Energy companies have set targets to reduce greenhouse gas emissions, but traditional solutions with intermittent surveys are inaccurate and expensive
- Emissions: methane (CH₄), ethylene (C₂H₄), CO, H₂S, IAQ (tVOC), SO₂, and NO₂

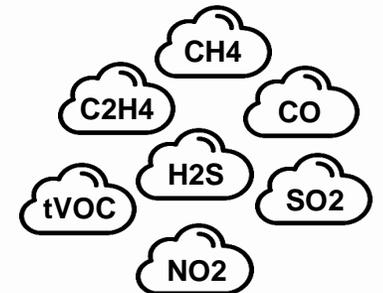


Solution – monitor with Interlink's SPEC Sensors™

- Continuous, real-time detection & measurement allows for reduction of gas emissions
- Suitable for wireless communication, solar/battery operation to enable quick deployment for alerts to repair gas leaks, data logging for analysis / company emissions performance

Advantage – SPEC™ Electrochemical Sensors

- Accurate ppb resolution readings using very low power
- When protected, deployable to rugged conditions



6. Health and Safety at Home, Travel and Work

Eco™ - Carbon Monoxide (CO), Air Quality
Portable Instrument with SPEC Sensors™
Electrochemical Gas Sensors

Problem

- CO & air pollution is harmful with CO poisoning claiming multiple lives per incident
- Sources of CO poisoning resulting in loss of life may not be obvious
- No regulations to use CO detectors at accommodations & existing buildings

Solution – Sparrow Protect+ with Interlink’s SPEC Sensors™

- Monitor CO and harmful VOCs in real-time with alerts to dangerous air quality
- Small size, rechargeable battery powered, and lightweight – ideal for travel
- iOS & Android Apps include data logging & alerts

Advantage – CO, IAQ (tVOC) Electrochemical Sensors

- Cost effective, small size, long life
- Accurate ppb resolution readings using very low power

Dec 31, 2023
“Carbon monoxide poisoning during church service sends 49 people to hospital in USA”



7. Enhancing Well-Being in Parking Garages

Problem

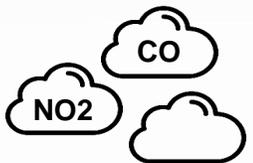
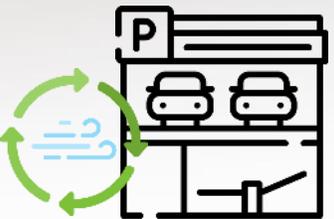
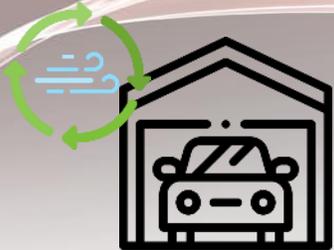
- Toxic gases like CO are known to pass through walls and poison occupants
- CO and/or NO2 monitoring & exhaust ventilation is not uniformly mandated

Application Note – Monitor & Ventilate with Interlink’s SPEC Sensors™

- Real-time air quality monitoring to support exhaust ventilation, remote alarms, or emergency opening of residential garage door to vent toxic levels of gases
- Enable sustainable buildings that enhance well-being

Advantage – CO, NO2 and other gas sensors

- Long life sensors with fast & accurate readings using very low power
- Custom engineering services to develop gas sensor elements, sensor arrays, modules & instruments

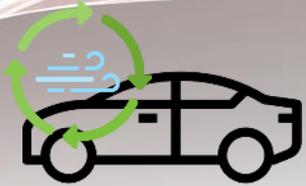


Enhancing Well-Being and Optimizing Makeup Air in Automobile Cabin

SPEC Sensors™
CO, NO2, O3, SO2, IAQ (tVOC), RESP
Electrochemical Gas Sensors

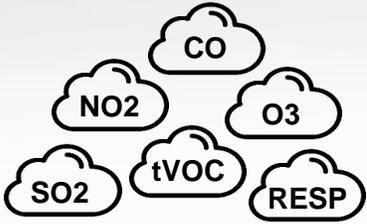
Problem

- CO, NO2, O3, SO2, tVOC are harmful gases which can enter passenger cabin
- Poor air quality can irritate eyes, aggravate respiratory & cardiovascular conditions



Application Note – Monitor & Ventilate with Interlink’s SPEC Sensors™

- Real-time air quality monitoring of both outside air and inside cabin air to activate makeup air may save energy, may enhance human alertness and well-being
- Continuous monitoring enables data logging for further analysis



Advantage – CO, NO2, O3, SO2, IAQ (tVOC), RESP Gas Sensors

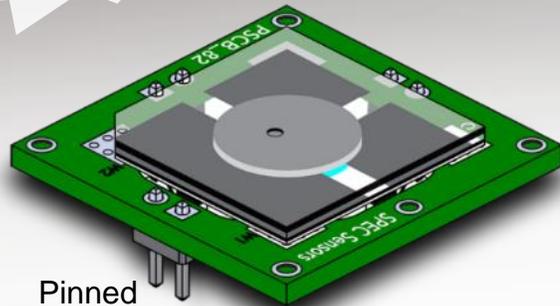
- Long life sensors with fast & accurate readings using very low power
- IAQ (tVOC) and RESP (respiratory irritants) sensors detect multiple gas compounds
- Custom engineering services to develop gas sensor elements, sensor arrays, modules & instruments

Product Catalog

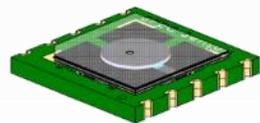


Gas Sensors & Modules

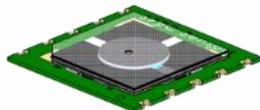
Available at
www.spec-sensors.com



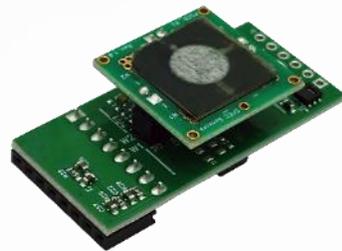
Pinned



Thick Castellation



Thin Castellation



Digital Gas Sensor Module &
Developer Kit

APPLICATIONS

- Indoor & Outdoor Air Quality
- Health & Wellness
- Agriculture & Food Processing
- Industrial Safety
- And more!

FEATURES

- Ultra-Low Power < 50 uW max
- Small Size & Low Profile (20 x 20 x 4 mm)
- Long Life (10+ years)
- Fast Response
- Accurate & Linear Response
- 100% Factory Tested
- RoHS Compliant
- UL & ETL Recognized CO Sensor

Product Catalog



Gas Sensors & Modules

AVAILABLE SENSORS

Gas Type		Part Number Family	Range (ppm)	Lower Detection Limit (ppm)	Sensitivity (nA/ppm)
Carbon Monoxide	CO	110-1xx	0 - 1000	1	4.75 ± 2.75
	CO	110-11x	0 - 100	0.1	35 ± 15
Ethanol	EtOH	110-20x	0 - 1000	1	20 ± 10
Hydrogen Sulfide	H2S	110-30x	0 - 50	0.1	200 ± 75
Ozone	O3	110-40x	0 - 10	0.02	-50 ± 25
Nitrogen Dioxide	NO2	110-50x	0 - 5	0.03	-30 ± 15
Sulfur Dioxide	SO2	110-61x	0 - 20	0.02	40 ± 15
Indoor Air Quality	IAQ	110-80x	0 - 100	0.2	20 ± 10
Respiratory Irritants	RESP	110-90x	0 - 20	0.02	-50 ± 25
Hydrogen	H2	110-00x	0 - 250	1	4 ± 2
Chlorine	Cl2	110-45x	0 - 20	0.02	-35 ± 15
Nitric Oxide	NO	110-70x	0 - 20	0.02	90 ± 50
Ethylene	C2H4	110-65x	0 - 100	0.02	50 ± 15
Formaldehyde	HCHO	110-85x	0 - 20	0.05	30 ± 15

Gas Detection – Featured Instruments

Full-function instruments for Ozone, Carbon Monoxide, VOC's and other gases!

Process Controllers | Area Safety Monitors | Handheld Safety Monitors | Calibrated Replaceable Sensor Modules | Alarm Panels



Analog Control Outputs | Digital Communication | Numeric & Bargraph Displays | Data Logging | Flexible Power Options

OEM3 - Ozone Process Control and Safety Instrument

- Simple setup and operation; flexible power supply options
- Multiple control outputs: Analog 0-2 V, 4-20 mA, signal relay
- User-replaceable sensor modules for easy calibration maintenance with no down-time



www.ecosensors.com

SPARROW Protect+ – Carbon Monoxide and VOC Air Quality Detector

- Small size & lightweight – ideal for travel
- LED alarm level indicator & buzzer alert you to dangerous air quality
- iOS & Android Apps include tons of additional features, including data logging & alerts



www.sparrowsense.com

Custom Engineering Services

CONSUMER DEVICES & INDUSTRIAL INSTRUMENTS

INDUSTRIAL DESIGN

MECHANICAL DESIGN

ELECTRONICS & FW

IOT & WIRELESS

UI & UX DESIGN

NOVEL MATERIALS

CUSTOM SENSORS

ALGORITHMS & AI

PRODUCT DESIGN

- Leverage our decades of experience implementing gas sensors and devices

PRODUCT TESTING

- Advanced capabilities for test and evaluation of gas detection devices
- High accuracy test chambers and reference monitors

CUSTOM GAS SENSOR DEVELOPMENT

- We customize gas sensors for specific gases and applications
- We support you through engineering, design, and manufacturing

If our spec sheets do not meet your needs, contact us to discuss how we can help!

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PRODUCT CATALOG