PRODUCT CATALOGUE
Prevent-iON™

Preventing battery fires & failures through off-gas & anomaly (abuse) detection
using our modular and open sensor platform

Prevent-iON ™

Prevent-iON: Preventing battery fires & failures through off-gas & anomaly (abuse) detection

Prevent-iON is dedicated to enhancing safety by preventing battery fires and failures through advanced off-gas and anomaly detection. This versatile solution is designed for a variety of critical applications. Prevent-iON operates in two essential phases: first, it continuously monitors the environmental conditions in which these systems operate; second, it identifies specific risks, such as off-gas emissions from batteries and other potential anomalies. By providing early warnings and intervention capabilities, Prevent-iON helps to minimize downtime and enhance the overall safety of energy systems.

Prevent-iON contributes to the stability and efficiency of renewable energy systems by ensuring the safety and reliability of the critical components involved in energy storage and distribution. By preventing potential failures, such as battery fires or system malfunctions, Prevent-iON helps maintain operational continuity, indirectly supporting grid stability and the effective integration of renewable energy into the energy mix. This approach ensures that renewable energy systems function safely and efficiently, helping to balance supply and demand without directly managing energy storage.
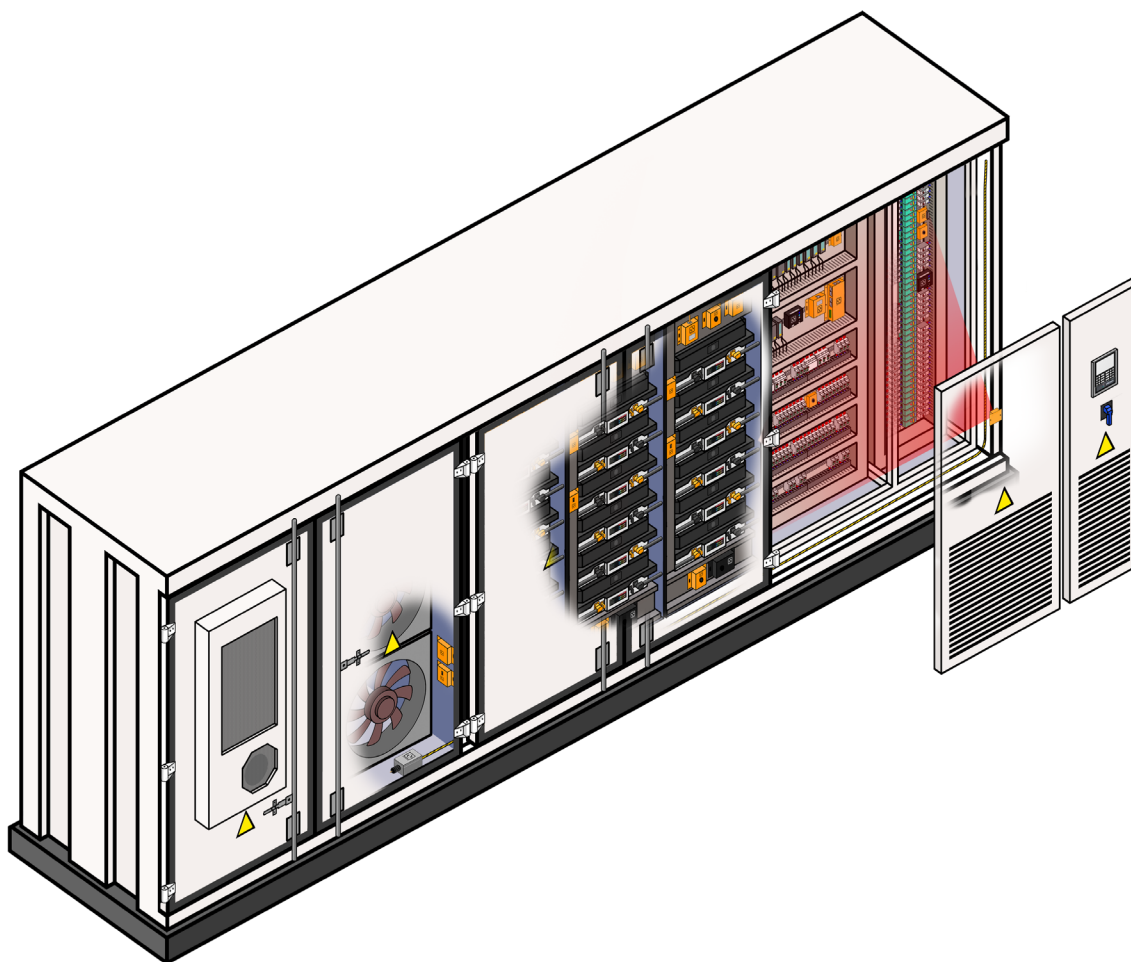
The four stages of Li-ion battery fires, as shown in the image, highlight the progression of thermal runaway, and Prevent-iON plays a vital role in addressing these stages.
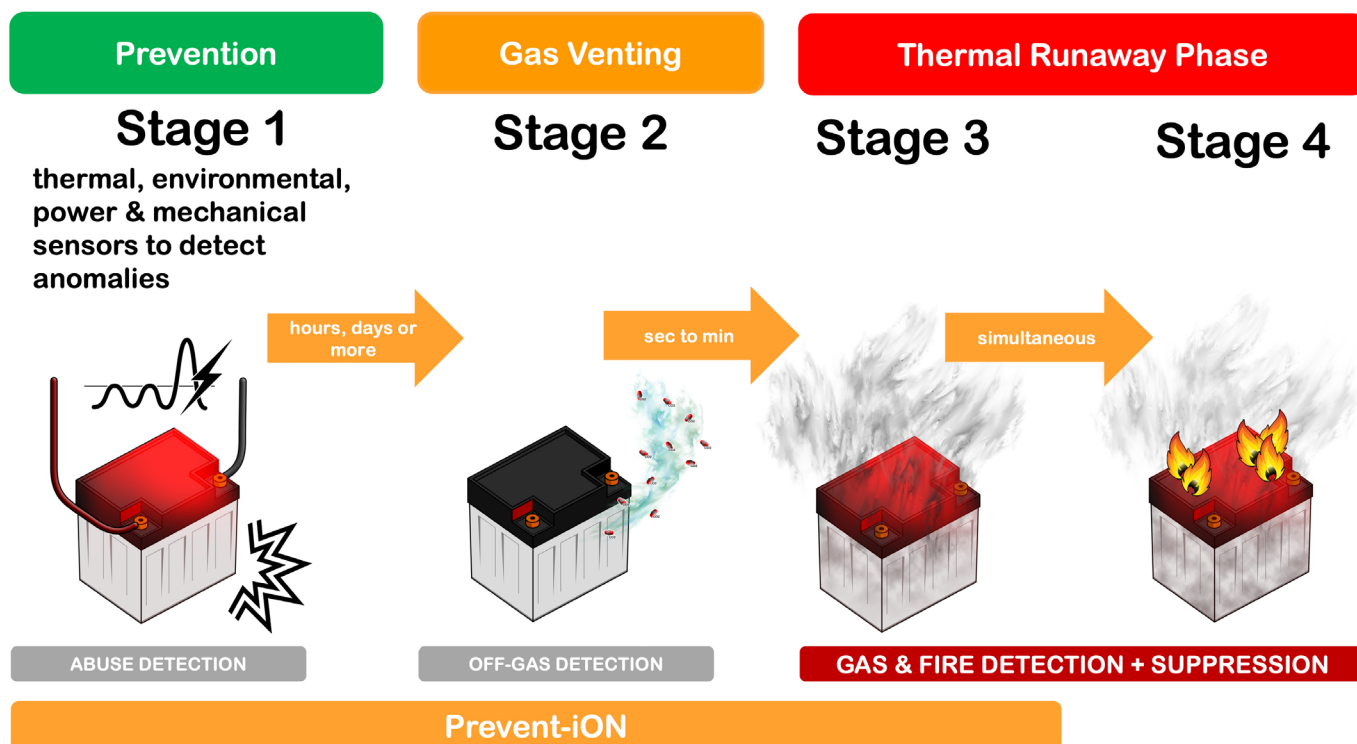
In **Stage 1 (Abuse phase)**, various sensors—including thermal, environmental, power, and mechanical—monitor the system to detect early anomalies or signs of abuse, which can take hours or even days to manifest.

In **Stage 2 (Off-gas phase)**, off-gas detection sensors identify the release of gases, providing an alert within seconds to minutes as the battery deteriorates.

In **Stage 3 (Gas and smoke phase)**, occurs when the battery enters a critical state, leading to the simultaneous release of flammable gases and fire, necessitating immediate detection and suppression.

Finally, in **Stage 4 (Fire phase)**, is the continuation of the thermal runaway, where rapid gas and fire detection systems, alongside suppression mechanisms, are crucial to managing the escalation and preventing further damage.

Prevent-iON plays a role across these stages, aiming to detect, alert, and mitigate the risk of catastrophic failure.

For ordering or more information, please visit our website at https://prevent-ion.com/solutions/ or contact us at hello@infrasensing.com.

Prevent-iON Architecture

The architecture overview provides a high-level description of a system's structure and the interaction of its components to deliver functionality. This serves as a blueprint, ensuring seamless integration and alignment with the system's objectives. It guides the development, implementation, and maintenance processes to meet performance, scalability, and reliability requirements.

Prevent-iON is engineered to prevent failures across various energy applications, incorporating advanced monitoring technologies and a multi-layered approach to ensure safety and reliability. The system utilizes sensors for early risk detection, such as identifying signs of thermal runaway, while employing algorithms to assess the likelihood of failures. This proactive approach allows Prevent-iON to trigger automated systems that manage and mitigate risks effectively, ensuring a swift and robust response. The architecture is available in three configurations, each tailored to address diverse operational requirements.

Traditionally, all sensors required a base unit for operation. However, with the introduction of the innovative C- and R-series in 2024, this dependency has changed. These new sensor series are engineered to function independently of a base unit, further enhancing flexibility and streamlining deployment in diverse configurations.

The Prevent-iON architecture is offered in three configurations, each tailored to address specific operational requirements, ensuring the system is adaptable and effective across a range of applications.
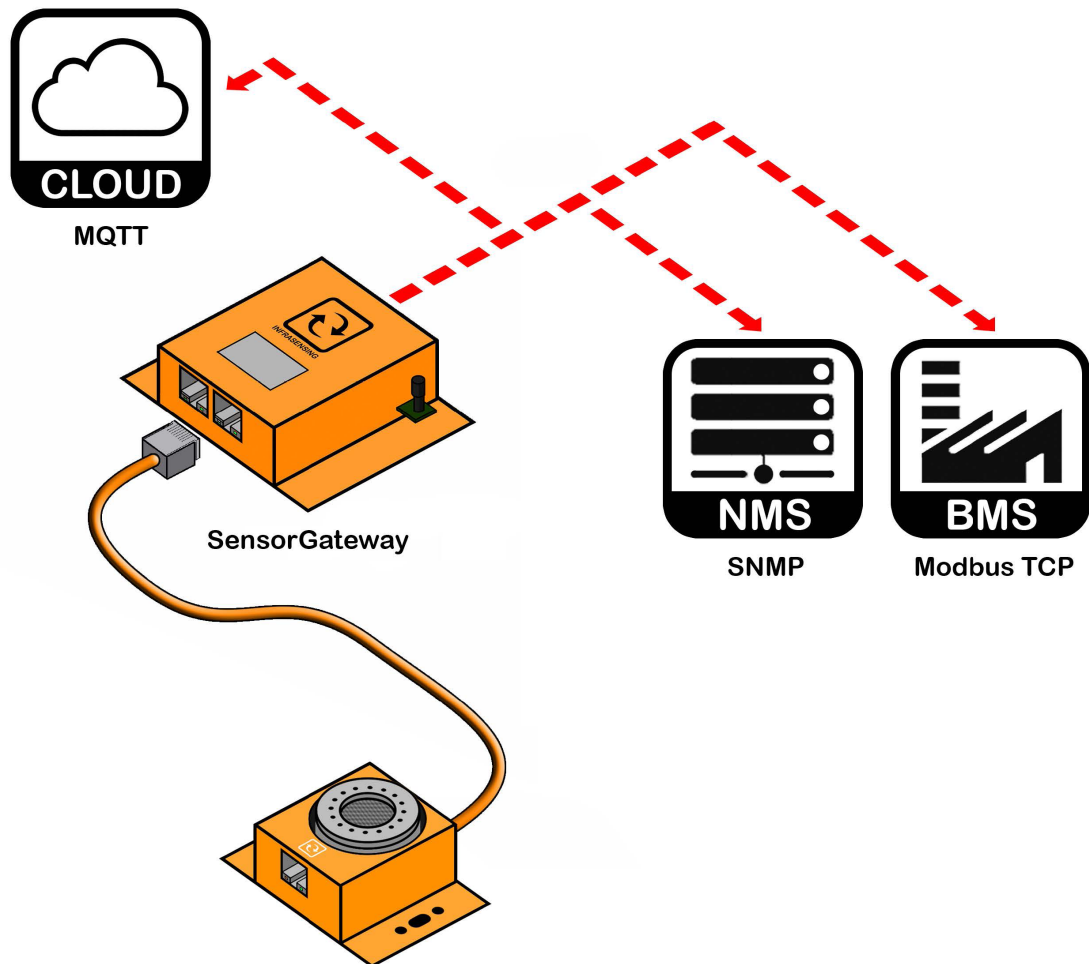
Standard Configuration

Standard IP-based Version (Base Unit + Hub + Sensors):

In the standard configuration, Prevent-iON employs an IP-based architecture centered around a base unit. This base unit can connect directly to up to two sensors or to a hub, which in turn supports additional sensors. This flexibility allows for efficient deployment in large or distributed systems, including data centers, industrial facilities, utility-scale ESS, renewable energy farms, and commercial applications.

The base unit collects real-time data from connected sensors and hubs, processes it using advanced analytics, and makes the data accessible through industrial IP protocols such as Modbus TCP, SNMP, or MQTT. This architecture supports scalability, centralized monitoring, and seamless integration with existing IT infrastructure, including building management systems, IT networks, cloud platforms, and other IP-based systems.


CLOUD
MQTT

SensorGateway

NMS
SNMP

BMS
Modbus TCP

RS-485 Configuration

RS-485 Version:

For systems requiring direct and robust communication, the RS485 version offers a standalone architecture where sensors connect using the RS485 communication protocol with Modbus RTU. This configuration is designed for local systems or smaller installations, where real-time monitoring and control occur at the site level.

The RS485 protocol provides reliable data transmission over long distances with minimal interference, making it ideal for environments with industrial noise or where IP-based networks are impractical. Sensors in this configuration are individually addressable, supporting up to 256 unique addresses for seamless integration into customer control systems.

Our RS-485 native sensors, identifiable by their "R-" prefix, are powered via a 12-24V DC input, ensuring compatibility with standard industrial power supplies. This setup allows customers to leverage the full potential of our sensors for direct and native integration into their existing control systems, providing a streamlined solution for real-time data acquisition and monitoring.


DC POWER IN

12-24v DC

RS485 (Modbus)

ICS

Industrial Controller / 3rd Party Gateway
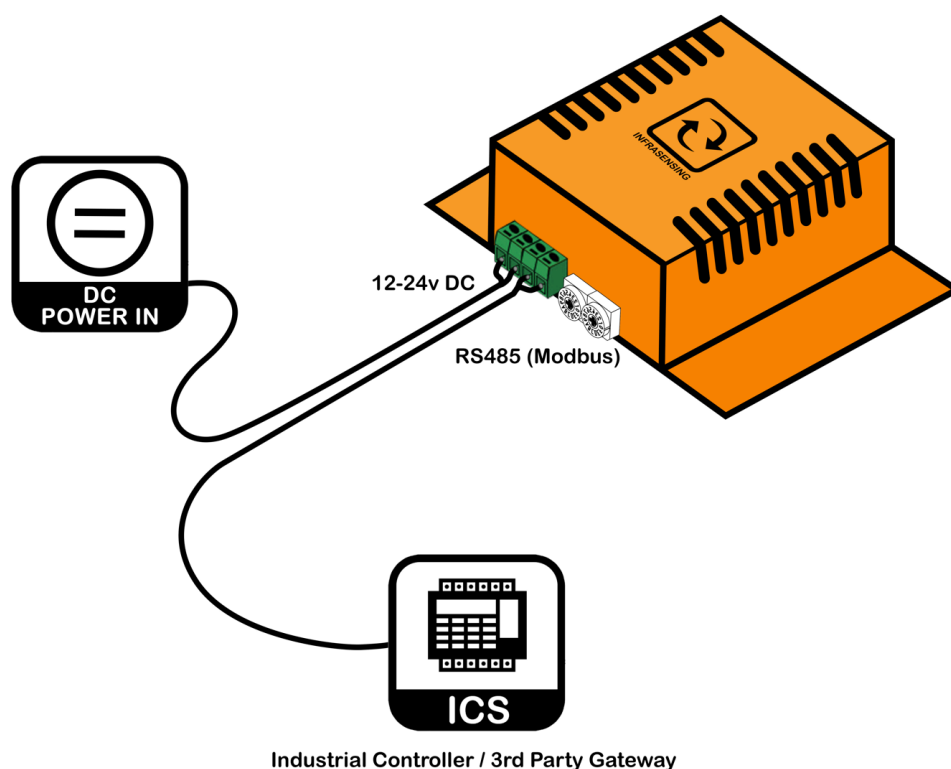
Cylindrical Configuration

Cylindrical Version:

The cylindrical design enhances flexibility by allowing for easy installation in hard-to-reach areas while maintaining optimal performance. The modular nature of the architecture supports scalability, enabling the addition of more sensors as needed to expand monitoring capabilities.

Cylindrical sensors, identifiable by their "C-" prefix, always connect to the cylindrical hub (EXP-CHUB). The EXP-CHUB can operate in standalone mode, similar to an RS-485 sensor, or be connected to a base unit. Up to four cylindrical sensors can be connected to a single EXP-CHUB, with a limitation of two cylindrical thermography sensors per hub.

This architecture makes the RS485 cylindrical sensor setup an excellent choice for modern industrial and utility systems, where space efficiency, reliability, and data accuracy are critical. It is ideal for environments that require compact, robust solutions without compromising on performance.

RS-485	MODBUS	SNMP	MQTT
Modbus RTU	Modbus TCP	SNMP	MQTT

EXP-CHUB

SensorGateway v5
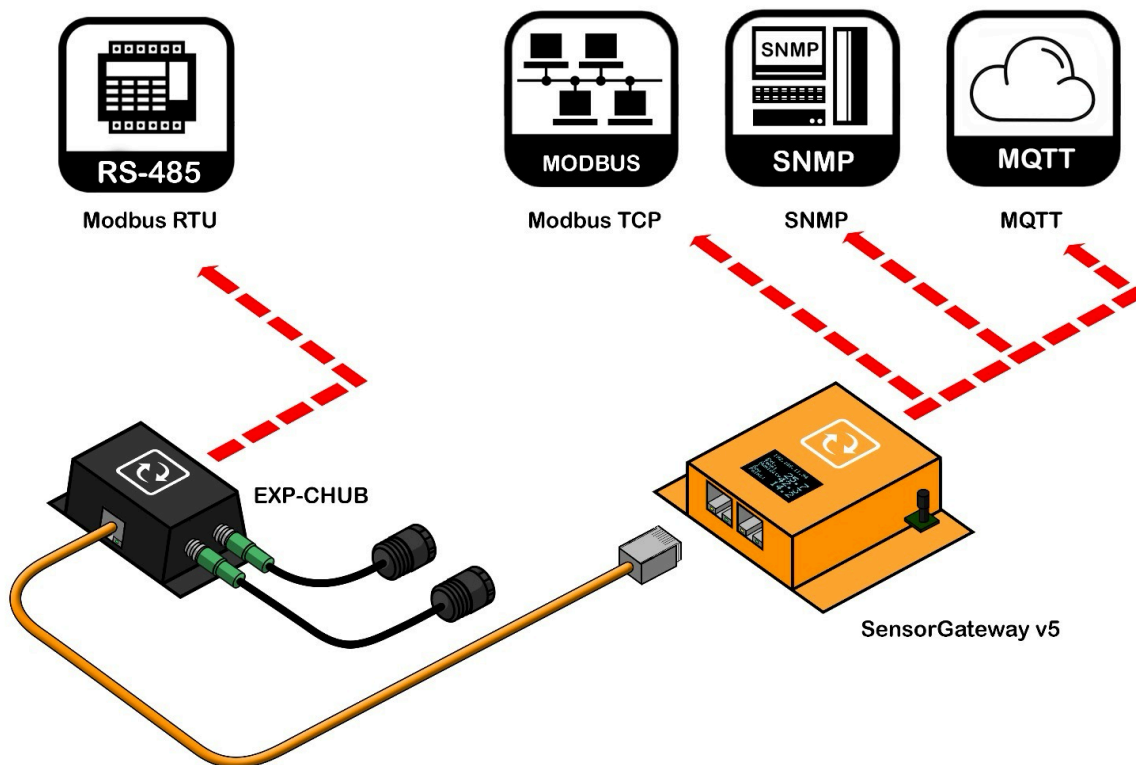
Flammable Gas Sensor

R-GAS-FLAMMABLE

Certifications: **ETL Listed to UL 2075**
CSFM-5275
CE and EMC certified
EN61010 certified
IEC60068-2-30, IEC 60068-2-6, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6

listed to UL2075

Internal temperature measurement range:	-40°C to +125°C (-40°F to 257°F)
Internal temperature accuracy:	±0.48°C (0.86 °F)
Internal relative humidity measurement range:	0 to 100% RH
Internal relative humidity accuracy:	2% RH
VOC measurement output range:	0-500 VOC Index
VOC repeatability:	<±5 VOC index points or % mass volume (m.v.)
Butane (C4H10) accuracy:	±5 %LEL
Ethane (C2H6) accuracy:	±5 %LEL
Hydrogen (H2)accuracy:	±5 %LEL
Isobutane (CH3) accuracy:	±5 %LEL
Methane (CH4) accuracy:	±3 %LEL
Octane (C8H18) accuracy:	±12 %LEL
Pentane (C5H12) accuracy:	±5 %LEL
Propane (C3H8) accuracy:	±6 %LEL
Propylene (C3H6) accuracy:	±5 %LEL
Toluene (C7H8) accuracy:	±12 %LEL
Xylene (C8H10) accuracy:	±12 %LEL
Response time (T90):	<30s
Detection range:	0-100 %LEL
Detection method:	Spectrometer
Relay output:	3 (Normally Open)
Relay switching current:	up to 0.5A
Input Voltage:	12-24v ±10%
Power usage:	672mW
Protocol:	Modbus RTU over RS485
	Integration with Base Unit over RJ45 (serial data)
Life span:	up to +10 yrs

Environmental Specifications:
Hydrogen (H2):

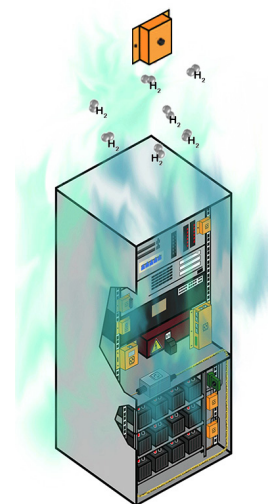|	
Operating tempearture range:	-40°C to 75°C (-40°F to 167°F)
Humidity (operating and storage):	0 to 100% RH (non-condensating)
Life span:	Up to +10 yrs

Methane (CH4)

Operating temperature range:	-40°C to +70°C (-40°F to +158°F)
Humidity (operating and storage):	0 to 100% RH (non-condensating)
Life span:	Up to 5yrs

|	
Sensor enclosure:	Steel enclosure, industrial grade
Mounting option:	0U rack, DIN rail, magnetic, or wall mountable sensor
Dimensions:	71mm (2.79") x 70.5mm (2.77") x 30 mm (1.18")
Weight:	193g (0.43lbs)

VOC Gas Sensor

GAS-VOC

VOC measurement range:	0-500 VOC index
VOC repeatability:	<±5 VOC index points or % mass volume
Temperature measurement range:	-40°C to 125°C
Temperature accuracy:	0.48 °C (0.86 °F)
Relative humidity measurement range:	0 to 100% RH
Relative humidity accuracy:	2% RH
Operating temperature range:	-10°C to +50°C (14°F to +122°F)
Humidity (operating and storage):	0-90% RH (non-condensating)

Sensor housing: Steel enclosure, industrial grade
Mounting option: 0U rack, DIN rail, magnetic, or wall mountable sensor
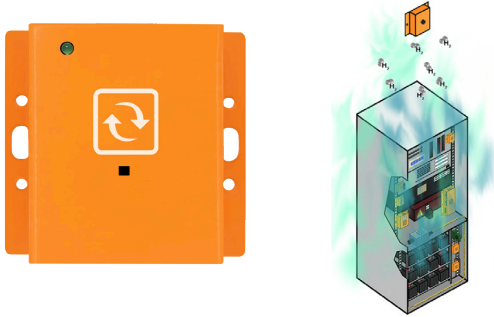
VOC Gas Sensor
(Cylindrical version)

C-GAS-VOC

|	
VOC measurement range:	0-500 VOC index
VOC repeatability:	<±5 VOC index points or % mass volume
Temperature measurement range:	-40°C to 125°C
Temperature accuracy:	0.48 °C (0.86 °F)
Relative humidity measurement range:	0 to 100% RH
Relative humidity accuracy:	2% RH
Operating temperature range:	-10°C to +50°C (14°F to +122°F)
Humidity (operating and storage):	0-90% RH (non-condensating)

Sensor housing: Industrial plastic enclosure
Mounting option: Can be secured by M24 nut/s

Temperature & Humidity Sensor
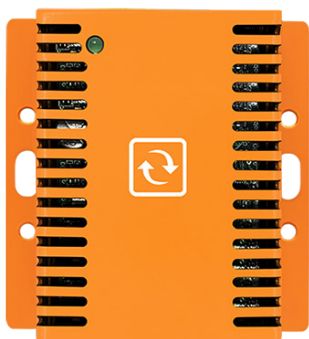
ENV-THUM-L

Certifications: UR61010 - UL Recognized

Temperature Resolution: 0.01°C (0.018°F)
Temperature Accuracy: ±0.2°C (±0.36°F) from 0°C to 90°C (32°F to 194°F)
Humidity Resolution: 0.01 % RH
Humidity Accuracy: ±2% RH between 0% RH to 100% RH
Humidity Range: 0 to 100% RH

Operating temperature range: 0°C to +75°C (32°F to +167°F)
Humidity (operating and storage: < 90% RH (non-condensating)

Optical Dust Particle Sensor

### ENV-DUST-L

Certifications: Listing to UR61010 - pending

Range: 0 – 600 µg/m^3
Particle Size: PM2.5 and PM10
Sensitivity: 100 µg/m^3

Operating temperature range:
-10°C to +65°C (14°F to +149°F) in PoE mode
Humidity (operating and storage:
< 90% RH (non-condensating)

Sensor enclosure: Steel enclosure, industrial grade
Mounting option: 0U rack, DIN rail, magnetic, or wall mountable sensor
Dimensions:
76 mm (3") x 68 mm (2.7") x 23 mm (0.9")
Weight: 140g (0.31lbs)

ENV-DUST

BASE-WIRED
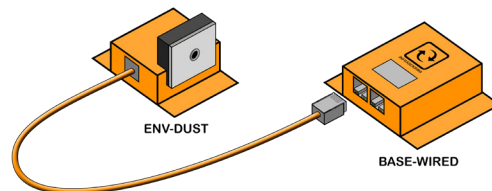
Atmospheric Corrosion (ACM) Sensor

ENV-CORROSION-L

Certifications: Listing to UR61010 - pending

Silver corrosion: Angstrom (Å)
Copper corrosion: Angstrom (Å)

Design standard: ANSI/ISA 71.04-2013

Operating temperature range: 0°C to +75°C (+167°F)
Humidity (operating and storage: < 90% RH (non-condensating)

Sensor housing: Plastic industrial grade enclosure
Mounting option: 0U rack, DIN rail, or wall mountable

Water Leak Sensing

ENV-WLEAK-COMBO-5M-L

Certifications: Listing to UR61010 - pending

Water detection trigger: 1-2 seconds
Drying time: Cable dries and resets within 15 seconds of removal from standing water
Standard cleaning method: Wipe with clean damp cloth
Cable breaking strength (including connectors): 70lbs/32kg
Data output: Provides a WET/DRY indication in Base Unit

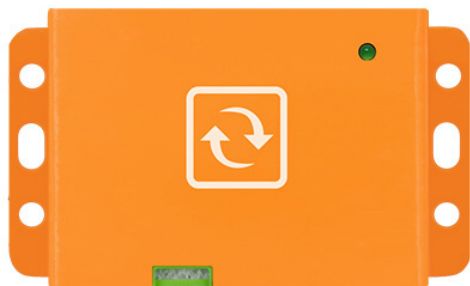Operating temperature range: 0°C to + 75°C (32°F to +167°F)

Particle Matter Sensor

ENV-PARTICLE-L

Certifications: Listing to UR61010 - pending

Mass concentration range:	0 – 1000 µg/m³
Particle detection size range:	Mass concentration: PM1.0, PM2.5, PM4 and PM10
	Number concentration: PM0.5, PM1.0, PM2.5, PM4 and PM10
Mass concentration resolution:	1 µg/m³
Mass concentration precision:	PM1 and PM2.5: ±10 µg/m³ @ 0 to 100 µg/m³ ±10 % @ 100 to 1000 µg/m³
	PM4 and PM10: ±25 µg/m³ @ 0 to 100 µg/m³ ±25 % @ 100 to 1000 µg/m³

Maximum long-term mass concentration precision limit drift:
±1.25 µg/m3 @ 0 to 100 µg/m³
±1.25 % @ 100 to 1000 µg/m³

Lower limit detection:	0.3 µm
Lifespan:	10 years operating continuously 24hrs/day
Acoustic emission level:	25dB(A) @ 0.2m
Long term acoustic emission level drift:	+0.5dB(A)/year @ 0.2m
Sampling interval:	1 ± 0.04s

Operating temperature range:	-10°C to +65°C (14°F to +149°F) in PoE mode
Storage temperature range:	-40°C to 70°C (-40°F to 158°F)
Humidity (operating and storage):	< 90% RH (non-condensating)
Recommended temperature and humidity range:	10°C to 40°C and 20% to 80% RH

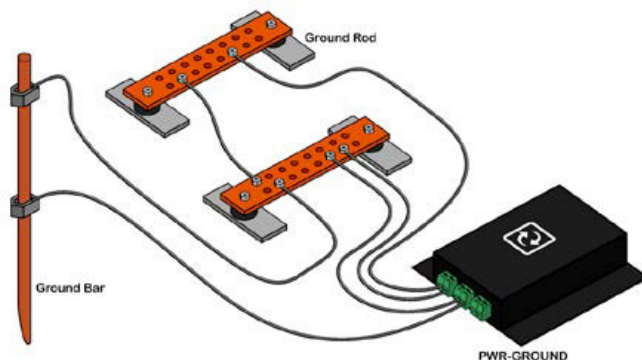|	
Sensor enclosure:	Steel enclosure, industrial grade
Mounting option:	0U rack, DIN rail, magnetic, or wall mountable sensor
Dimensions:	91.6 mm (3.6") x 71.7mm (2.8") x 33.6mm (1.32")
Weight:	170g (0.38 lbs.)

Ground Monitoring

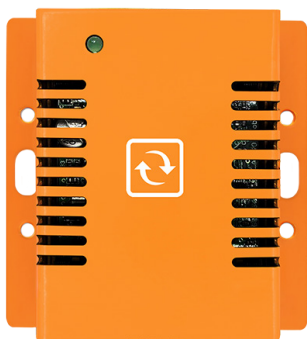### PWR-GROUND-L

Certifications: Listing to UR61010 - pending

Range:	0 to 5000 Ohms
Injected current:	0.7 mA
Ground metering points:	3 different ground terminals
IO isolation:	1000 V AC
Used voltage:	3.0 V

Operating temperature range:	0°C to +75°C (32°F to +167°F)
Humidity (operating and storage:	< 90% RH (non-condensating)

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Digital Shock / Vibration Sensor

SEC-SHOCK-L

**Certifications: Listing to UR61010 - pending**

Vibration unit: ±2g
Sensor sensitivity: 0.18g

Operating temperature range: 0°C to +75°C (32°F to +167°F)
Humidity (operating and storage): < 90% RH (non-condensating)

BASE-PI-5-24V

Compared to the regular base unit, the BASE-PI-5-24V is equipped with a terminal block for power connections, offering a more secure and industrial-grade alternative to the traditional barrel jack. This design enhances its suitability for industrial environments where reliability and robustness are essential. This Base Unit seamlessly supports all sensors, enabling real-time environmental and infrastructure monitoring for comprehensive facility management.
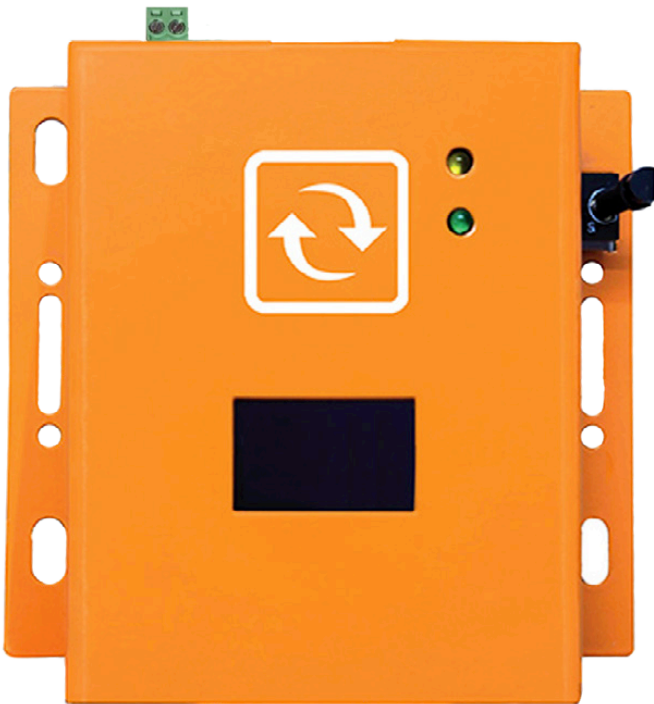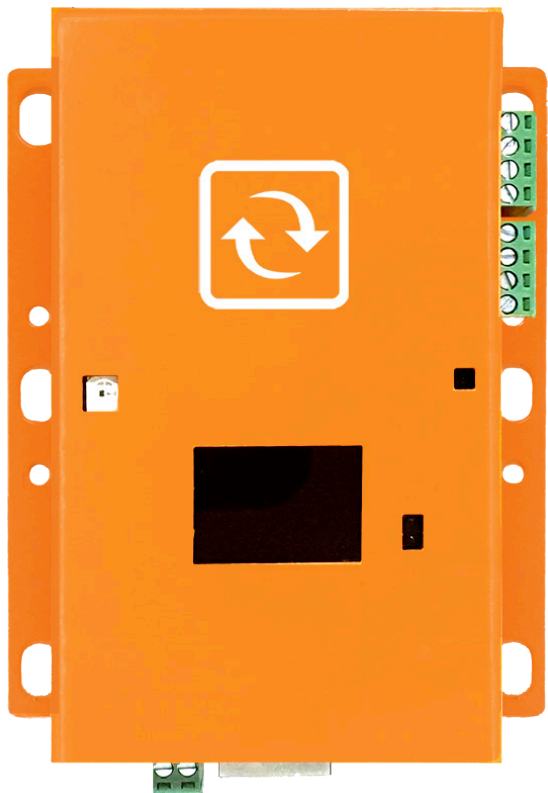

BASE-PI-5-24V 🔗

TCP/IP:	IPv4 at 10/100 Mbps
Network data transfer:	SNMP GET (50 - 130 bytes) , SNMP Trap (143 - 280 bytes)
Built-in:	Web server, SNMP v2 & v3 (MD5/AES), Modbus TCP
Built-in alerting options:	Email, voice call or SMS
Network protocols:	DHCP or status IP
Powered by:	It is powered via PoE or 12v DC to 24v DC input via the terminal block
Connectivity:	RJ45 cable transmitting data & power from Base Unit to Sensor
Cable specification:	RJ45 CAT 6/7 recommended, Up to 100m (330ft) subject to cable quality & interference
Power usage:	684 mW (without sensors attached)
Industrial IP protocols:	SNMP and Modbus TCP; Modbus RTU with ADDON
Operating temperature range:	0°C to +75°C (32°F to +167°F)
Humidity (operating & storage:	< 90% RH (non-condensating)
Sensor enclosure:	Steel enclosure, industrial grade
Mounting option:	0U rack, DIN rail, magnetic or wall mountable

BASE-PI-6

The BASE-PI-6 is an updated version of the Base Unit that includes new built-in features, such as RS485 on a terminal block with 3 relay output. It boasts a data memory of QSPI 256Mbit and allows for the insertion of an SD Card. Additionally, it has two status LEDs on the PCB.

BASE-PI-6

Relay:	3
TCP/IP:	IPv4 at 10/100 Mbps & IPv6
Network data transfer:	SNMP GET (50 - 130 bytes) , SNMP Trap (143 - 280 bytes)
Built-in:	Web server, SNMP v2 & v3 (MD5/AES), Modbus TCP
Built-in alerting options:	Email, Slack, voice call or SMS
Network protocols:	DHCP or status IPv4
Storage:	2GB of on-board data (sensor) logging
Dry contact outputs:	1
Powered by:	It is powered via PoE or 12v DC to 24v DC input via the terminal block
Connectivity:	RJ45 cable transmitting data & power from Base Unit to Sensor
Cable specification:	RJ45 CAT 6/7 recommended, Up to 100m (330ft) subject to cable quality & interference
Power usage:	684 mW (without sensors attached)
Industrial IP protocols:	SNMP, Modbus TCP, TLS, (HTTPS), MQTT
Industrial RS-485 protocols:	Modbus RTU
Operating temperature range:	-25°C to +70°C (13°F to +158°F)
Humidity (operating & storage:	< 90% RH (non-condensating)
Sensor enclosure:	Steel enclosure, industrial grade
Mounting option:	0U rack, DIN rail, magnetic or wall mountable

Relay Add-On
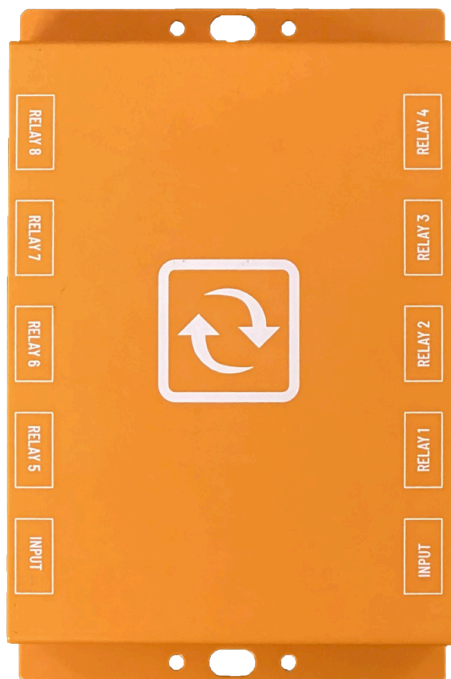
ADDON-8RELAY

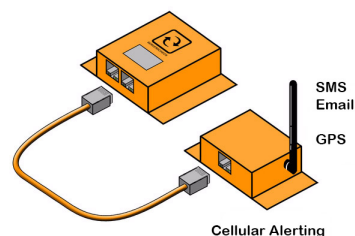|	
Relay outputs:	8
Dry contact input:	4 triggering options: Relay / NPN or N-channel mosfet / Open Drain / Open Collector
Relay contact rating:	125V AC 0.5A; 30V DC 1A
Powered by and communicates with:	Base Unit (BASE-XX) required
Operating temperature range:	-40°C to +85°C (-40°F to +185F)
Humidity (operating and storage):	< 90% RH (non-condensating)
Sensor enclosure:	Steel enclosure, industrial grade
Mounting option:	0U rack, DIN rail, magnetic or wall mountable
Dimensions:	152.2mm (5.99") x 96.2mm (3.79") x 30.17mm (1.19")
Weight:	365.2g (0.81lb)

LTE/3G/2G Cellular Add-On

ADDON-LTE

LTE FDD:	FDD/B2/B4/B12
Optional positioning:	GPS
Wireless module:	Quectel wireless module embedded
Carrier approvals:	Deutsche Telekom(Europe), AT&T/Sprint/U.S. Cellular/Telus/Rogers(Canada)
Regulatory approvals:	

GCF (Global), CE (Europe) , FCC (North America), IC (Canada), Anatel (Brazil), IFETEL (Mexico), SRRC/CCC/NAL (China), KC (South Korea), NCC (Taiwan, China), JATE/TELEC (Japan), RCM (Australia & New Zealand), FAC (Russia), NBTC (Thailand), IMDA (Singapore), ICASA (South Africa)

Operating temperature range:	-40°C to +85°C (-40°F to +185F)
Humidity (operating and storage):	< 90% RH (non-condensating)
Sensor enclosure:	Steel enclosure, industrial grade
Mounting option:	0U rack, DIN rail, magnetic or wall mountable

SMS
Email

GPS

Cellular Alerting

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Sensorhub for Base Unit
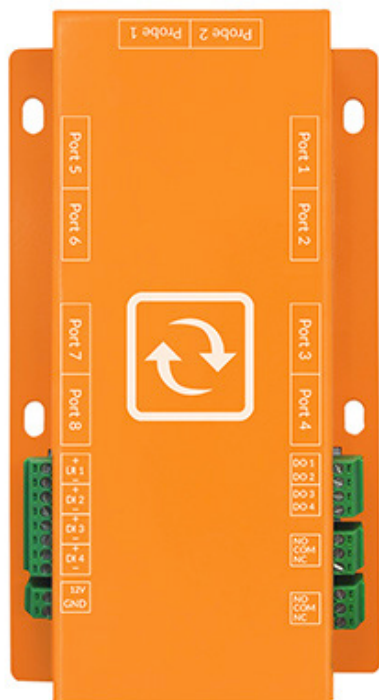
EXP-8HUB-L

Certification: **cULus 62368-1 Listed**

Expansion ports for external sensor probes:	8
Dry contact input:	4
Digital output:	4 (digital sink 100mA)
Relay contact rating:	250VAC / 24VDC, 8A
Powered by and communicates with:	Base Unit (BASE-XX) required; max 1 hub per Base Unit

Operating temperature range:	0°C to +75°C (32°F to +167°F)
Humidity (operating and storage):	< 90% RH (non-condensating)

|	
Sensor enclosure:	Steel enclosure, industrial grade
Mounting option:	0U rack, DIN rail, magnetic or wall mountable
Dimensions:	152.2mm (5.99") x 96.2mm (3.79") x 30.17mm (1.19")
Weight:	365.2g (0.81lb)

Sensorhub for Base Unit

EXP-12HUB

Certifications: **Listing to UR61010 - pending**

Expansion ports for external sensor probes:	12
Auxillary power input:	+12V to +24V power input
Auxillary power output:	+12V
Connectivity:	RJ45 cable transamitting data & power from Base Unit to sensor
Power usage:	235mW
Operating temperature range:	0°C to +75°C (32°F to +167°F)
Operating humidity range:	< 90% RH (non-condensating)
Sensor enclosure:	Steel enclosure, industrial grade
Mounting option:	0U rack, DIN rail, magnetic or wall mountable
Dimensions:	152mm (5.98") x 96mm (3.78") x 36mm (1.42")
Weight:	558.8g (1.23lb)

Introducing our versatile sensor platform, meticulously tailored to cater to the distinct needs of three critical industries:
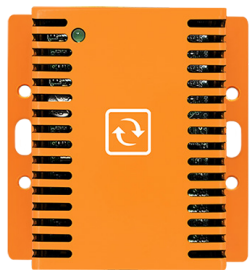
ServersCheck ®:

Our journey commenced with ServersCheck—a comprehensive software and hardware solution dedicated to monitoring data & IT infrastructure. Encompassing all products, including refrigerant gas sensors, ServersCheck stands as a holistic offering, ensuring the seamless functionality of IT components.

SwitchMon ™:

Expanding our product line, SwitchMon is designed to prevent failures in switchgear, transformers, and critical power systems through continuous thermal and environmental monitoring. In the first phase, SwitchMon focuses on monitoring the environment in which these critical power systems operate. The Second phase involves continuous thermal monitoring of the switchgear, ensuring optimal conditions and preventing potential failures in essential power infrastructure.

Prevent-iON ™:

Elevating our commitment to safety, the Prevent-iON is dedicated to preventing battery fires and failures through off-gas and anomaly detection. Prevent-iON operates in two essential phases: first, it continuously monitors the environmental conditions in which these systems operate; second, it identifies specific risks, such as off-gas emissions from batteries and other potential anomalies.

CRASense ™:

In data centers and server rooms, maintaining optimal environmental conditions is crucial to ensuring the reliable performance and longevity of IT equipment. CRASense, part of the Infrasensing product line, offers a specialized solution for monitoring key environmental factors within Computer Room Air Conditioning (CRAC) and HVAC systems. By continuously tracking temperature, humidity, and airflow, CRASense helps safeguard critical infrastructure against potential risks such as overheating, moisture damage, and airflow disruptions.

In essence, our sensor platform not only optimizes monitoring for specific industries but also provides nuanced product differentiations to address the unique requirements of each sector.

For ordering or more information, please visit our website at https://prevent-ion.com/solutions/ or contact us at hello@infrasensing.com.