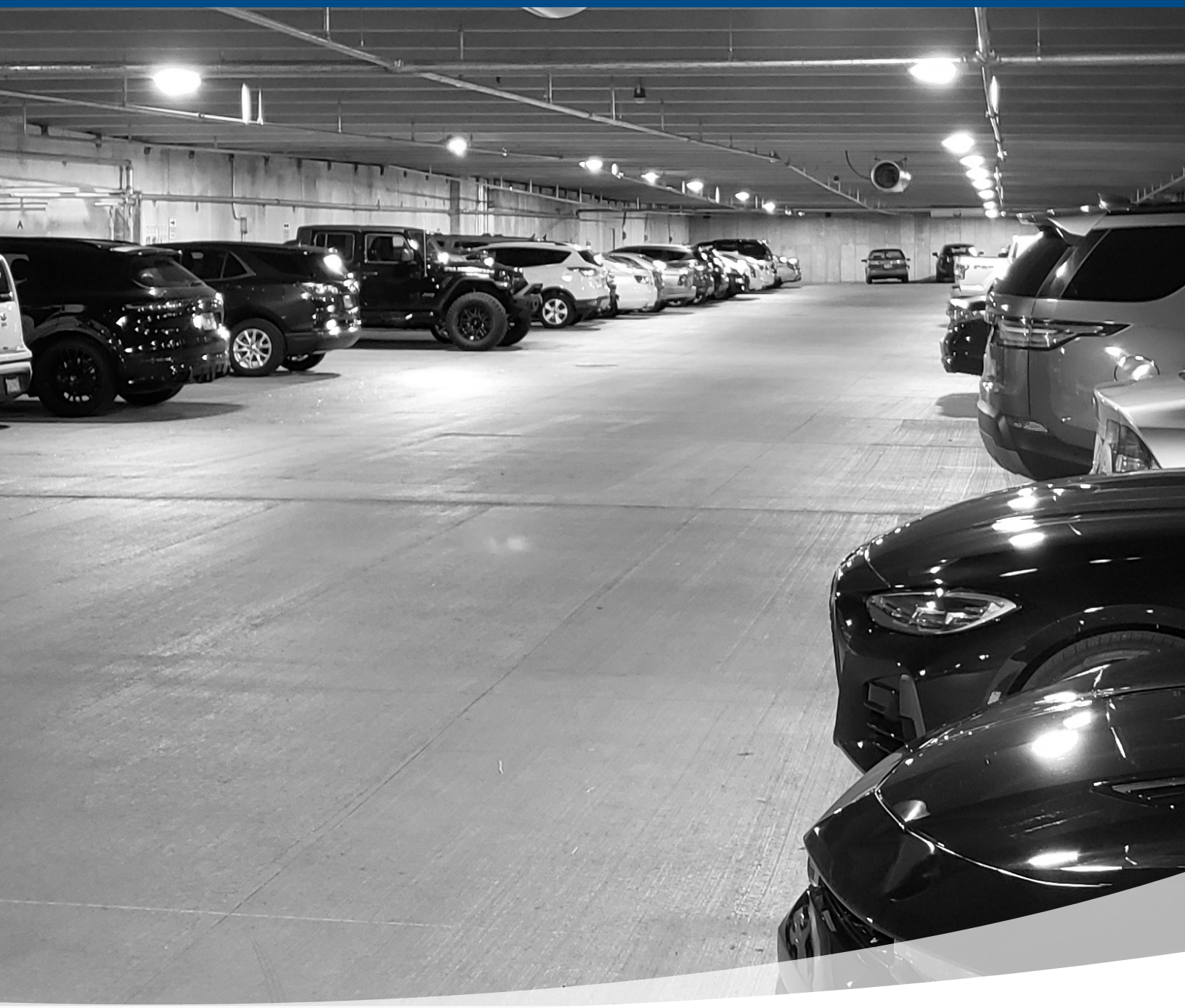
Gas Detection Systems

Smart, Coordinated Solutions for Car Park Ventilation



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Introduction

Managing ventilation in car parks presents unique challenges that demand careful consideration and effective solutions. One of the primary challenges is the buildup of harmful gases such as carbon monoxide (CO) and nitrogen dioxide (NO2) due to vehicle emissions.

These gases, if left unchecked, create poor air quality and dangerous conditions posing serious health risks to occupants and workers within the space.

Traditional ventilation & control systems often fall short in addressing these challenges effectively. They may not be equipped to handle the fluctuating levels of gas emissions in real-time, resulting in delayed responses to hazardous conditions. Furthermore, inefficient ventilation systems can lead to energy waste, driving up operational costs and environmental impact.

Integrated solutions that combine intelligent gas detection systems with optimized ventilation design are essential for overcoming these challenges effectively. By seamlessly integrating gas detection with Car Park ventilation systems, Engineers can achieve a holistic approach to safety and efficiency.

The Basics of Gas Detection

High concentrations of toxic gases or prolonged exposure to low levels pose serious health and safety risks. Carbon monoxide (CO) and nitrogen dioxide (NO2), commonly found in gasoline and diesel exhaust, can cause severe illness or even death. Enclosed or partially enclosed areas with vehicles, like parking garages benefit from real time monitoring of contaminants that gas detection provides. Demand control ventilation systems comply with building codes, ensuring occupant safety and minimizing HVAC energy costs.

Gas detection systems range from simple configurations, like a single zone Control Hub with gas detection linked to a fan, to complex multi-zone networks of detectors spread throughout a facility, communicating with each other to efficiently manage the broader HVAC system. Despite differences in size and complexity, all gas detection systems share four essential components: control hubs, detectors, relays, and zones.

Control Hubs

Gas detection systems encompass any setup designed to monitor an area for the presence of toxic gases and trigger ventilation or warning devices to either clear the air of the threat or alert occupants to evacuate when determined thresholds are exceeded.

Detectors

Detectors serve as the cornerstone of every gas detection system. They gauge the gas concentration in the surroundings and relay this critical data to the system.

Relays

Relays extend the communication range between detectors by repeating signals, ensuring reliable data transmission over long distances.

Zones

Zones are a way to organize the physical components of a system into logical groups for a control hub to manage. Zones break down the entire system layout into smaller areas like rooms, bays, or floors. This allows information to be presented in a user-readable format for understanding the status of the system, as well as, providing a more precise control of the equipment within the spaces.

Gas Detection Product Range

Systemair Car Park Gas Detection solutions stand as your dependable shield, safeguarding against the dangers of carbon monoxide (CO), nitrogen dioxide (NO2) and hydrogen (H2). With a focus on safety, efficiency, and user-friendly operation, our systems ensure compliance with regulations while exceeding expectations.

Experience peace of mind knowing that your occupants and property are protected by our advanced ventilation solutions.

CH-S Series

Single Zone Control Hub

Monitor vehicle emissions and control Car Park Ventilation Systems, creating an advanced single zone fixed gas detection system.

CH-M Series

Multi-Zone Control Hub

Monitors multiple areas for vehicle emissions and controls Car Park Ventilation Systems, offering an advanced fixed gas detection system.

RD Series

Single & Multi-Zone Remote Detectors

Industrial gas detectors monitor H2, CO and/or NO2 and control Car Park Ventilation Systems alongside CH-S or CH-M Control Hubs, covering up to 7,500 sq. ft. per detector.

REP-M Series

Multi-Zone Relay Expansion Pack

Expands Car Park Ventilation System control with 4 relays, 1 analog output, and up to 4 zones. Extends communication range by repeating signals up to 4,000 ft.

CH-S Series Control Hub

Single Zone Control Hub

Designed to monitor vehicle emissions and control Car Park Ventilation Systems to provide the ultimate single zone fixed gas detection system.

- **Comprehensive Monitoring:** Detects hazardous carbon monoxide (CO) and/or nitrogen dioxide (NO_2) for safety assurance.
- **Greater Coverage:** Monitors up to 4 Sensors and 30,000 sq. ft., ensuring comprehensive surveillance and early detection.
- **Simplified Installation:** Preconfigured wiring, factory calibration, and customized programming streamline setup.
- **Effortless Upgrade:** Integrates seamlessly with new and existing building control systems, facilitating smooth upgrades up to 4 sensors.
- **More Control:** Customize setpoints, delays, outputs, and relays for tailored responses, offering flexibility.
- **Enhanced Durability:** Withstands harsh weather conditions and is easy to service, ensuring reliability.

	CH-S Control Hub
Input power	120 VAC, 50/60 Hz. 0.2A 24 VAC, 50/60 Hz. 1.0A
Power consumption	24 VA
Control relays	6 relays, 5A @ 125 VAC / 250 VA
Analog outputs	User-selectable 4-20 mA, 0.2-1 VDC, 1-5 VDC, or 2-10 VDC
Storage temperature	-58°F to 248°F (-50°C to 120°C)
Operating temperature	-4°F to 122°F (-20°C to 50°C)
Humidity	10% to 90% (non-condensing)
Display	4-digit numeric, red
Front panel indicators	10 LEDs, Power (green), Sensors 1-4 (yellow), Zones 1-2 (yellow), Alert 1-2 (red), Alarm (red)
Alarm	106 dB @ 10 m, 3.8 kHz piezoelectric element
Sensor lifespan	Up to 10 years, end-of-life notification
Sensor calibration	Recommended recalibration every 2 years
Sensor capacity	Up to 4 sensors, maximum of 2 internally mounted sensors
Dimensions	8.15" W x 9.93" H x 2.70" D (21 cm W x 25 cm H x 7 cm D)
Weight	5.5 lbs (2.49 kg)
Housing	Gray, NEMA 3R, polycarbonate plastic
Performance & Environmental	ANSI/ISA 92.00.01-2010 (R2015) & RoHS
Electromagnetic intereference	EN 50270, FCC Part 15 Subpart B

CH-M Series Control Hub

Multi-Zone Control Hub

Designed to monitor any size area for vehicle emissions and control Car Park Ventilation Systems to ensure unparalleled fixed gas detection capabilities.

- **Limitless Flexibility:** Customizable zones, relays, setpoints, delays, and outputs offer full adaptability. Expansion packs facilitate easy scalability.
- **Enhanced Control:** Advanced features include on-demand ventilation, timers, and user input via a 7" full-color LCD touch screen, providing maximum control.
- **Intelligent Integration:** Seamlessly integrates with Building Management Systems (BMS) via BACnet IP and Modbus RTU protocols, enabling centralized control.
- **Streamlined Installation:** Custom factory programming minimizes setup time, ensuring optimal performance from the start.
- **Comprehensive Monitoring:** Supports up to 128 CO and/or NO2 sensors, ensuring thorough coverage and detection of potential hazards.
- **Durable Design:** NEMA 4X water and dust resistance rating ensure durability in challenging environments, ensuring long-term reliability.

	CH-M Control Hub
Input power	24 VAC, 50/60 Hz, 0.75 A Optional: 120 VAC, 50/60 Hz, 0.3 A via PP-M Power Pack
Power consumption	18 VA
Control relays	4 relays, 5A @ 125 VAC / 250 VA Optional: Up to 32 relays via REP-M Relay Expansion Packs
Analog outputs	User-selectable 4-20 mA, 0.2-1 VDC, 1-5 VDC, or 2-10 VDC
Digital outputs	BACnet IP, Modbus RTU
Storage temperature	-58°F to 248°F (-50°C to 120°C)
Operating temperature	-4°F to 122°F (-20°C to 50°C)
Humidity	10% to 90% (non-condensing)
Display	7.0" LCD, 1024 x 600, 5-point capacitive touch
Alarm	70 dB @ 10 m, 2.9 kHz piezoelectric element
Sensor capacity	Up to 30 remote sensors Optional: Up to 128 remote sensors via REP-M Relay Expansion Packs
Dimensions	8.72" W x 10.50" H x 2.90" D (22 cm W x 27 cm H x 7 cm D)
Weight	5.0 lbs (2.27 kg)
Housing	Gray, NEMA 4X, polycarbonate plastic
Performance & Environmental	ANSI/ISA 92.00.01-2010 (R2015) & RoHS
Electromagnetic intereference	EN 50270, FCC Part 15 Subpart B

RD Series Remote Detectors

Fixed commercial gas detectors monitoring hydrogen (H2), carbon monoxide (CO) and/or nitrogen dioxide (NO2) for controlling Car Park Ventilation Systems in conjunction with the CH-S or CH-M Control Hubs. With coverage spanning up to 7,500 sq. ft. per detector, these devices diligently detect hazardous gases, ensuring a secure environment.

- **UL 2075 Certified:** CO and NO2 sensors are UL 2075 certified, ensuring that gas and vapor detectors are reliable, accurate, and can detect the presence of harmful gases in a timely manner.
- **Single or Dual Sensor Configurations:** Capable of housing one or two sensors offering flexibility, allowing precise monitoring of a specific gas with one sensor or simultaneous detection of two gases with enhanced safety and efficiency.
- **Excellent Coverage:** Monitors a sizable area, up to 7,500 sq. ft., providing extensive coverage for enhanced safety and early detection of hazardous gases.
- **Seamless Expansion:** Offers the flexibility to connect up to 4 sensors per CH-S Control Hub and 30 sensors per CH-M Control Hub. Add sensors at any time, allowing for easy scalability as monitoring needs evolve.
- **Simplified Installation:** Streamlines the installation process with daisy chain power and communication, along with factory calibration and customized programming, reducing setup time and complexity.
- **Enhanced Durability:** Provides resilience against weather elements with rainproof water resistance and offers straightforward service and maintenance procedures, ensuring long-term reliability.

	RD Series Remote Detectors
Input power (Single sensor)	24 VAC, 50/60 Hz. 0.2A to 0.35A
Power consumption (Single sensor)	4.8 VA
Power consumption (Dual sensor)	8.5 VA
Analog output	User-selectable 4-20 mA, 0.2-1 VDC, 1-5 VDC, or 2-10 VDC with zero offset enable/disable
Digital communication	Modbus RTU
Storage temperature	-58°F to 248°F (-50°C to 120°C)
Operating temperature	-4°F to 122°F (-20°C to 50°C)
Humidity	15% to 90% (non-condensing)
Front panel indicators	2 LEDs, Power (green), Fault (yellow)
Dimensions	4.98" W x 4.98" H x 2.18" D (12.6 cm W x 12.6 cm H x 5.5 cm D)
Weight	1 lb (0.5 kg)
Housing	Gray, NEMA 3R, polycarbonate plastic
Performance (CO/NO2 only)	ANSI/ISA 92.00.01-2010 (R2015)
Electromagnetic intereference	EN 50270, FCC Part 15 Subpart B
Environmental	RoHS

Accessories

REP-M

Relay Expansion Pack

Enhances control of the Car Park Ventilation System with 4 relays, 1 analog output, and supports up to 4 additional zones. It extends communication range by 4,000 ft.

- Seamless Expansion
- Enhance Durability
- Extended Range
- Simplified Installation

PP Series

PP-96 & PP-150 Power Packs

An external 120 to 24 Vac step-down transformer to power the CH-M 24, CH-S 24, CH-S Dual 24, REP-M, and up to 30 remote sensors. Transformer 96 VA/150 VA, 120 to 24 Vac, Circuit Breaker, Foot and Dual Threaded Hub Mount.

PP-300 Power Pack

An external 480/240/208/120 to 24 Vac step-down transformer to power the CH-M 24, CH-S 24, CH-S Dual 24, REP-M, and up to 30 remote sensors. Transformer 300 VA, Circuit Breaker, Foot and Dual Threaded Hub Mount.

Alarm

Alarm-24 / Alarm-120

Multifunctional LED audible/visual combination developed with a multiple input technology that allows three separate levels of alarm, controllable via wiring selection. This alarm offers multiple combinations including independent visual signal, independent audible tone, or a combined audible tone and visual signal. Compatible with 12-24VAC/DC or 120-240VAC.

Featured Product: IV Smart EC

Other Considerations

Alarms
If attempts to ventilate toxic gas fail, the alarm activates. Horns and/or strobes alert occupants to evacuate, and in certain situations, the fire protection system may also call emergency personnel.

Delays
Besides using gas concentration setpoints, alert and alarm levels can incorporate time delays to determine how long equipment should wait before activation or deactivation. These delays are beneficial for preventing equipment from running unnecessarily due to transient gas levels or avoiding rapid cycling when gas levels hover around the setpoint.

Additional Outputs
In addition to linking equipment to relays for operation at defined levels, supplementary outputs can be utilized to adjust a VFD or communicate with a BMS. These enhancements expand the system's capabilities, enabling finer control and smarter operation.

Warm-Up Procedure
Whenever a detector is activated, it is imperative to allow the sensors sufficient time to stabilize before accurate readings can be obtained. To accommodate this necessary stabilization period, Systemair Gas Detectors implement a brief warm-up phase before entering regular operation mode. Upon completion of the warm-up phase, the sensors have stabilized adequately to provide reliable protection against hazardous gas concentrations. For optimal performance, it is recommended to allow the detectors to run for a minimum of two hours.

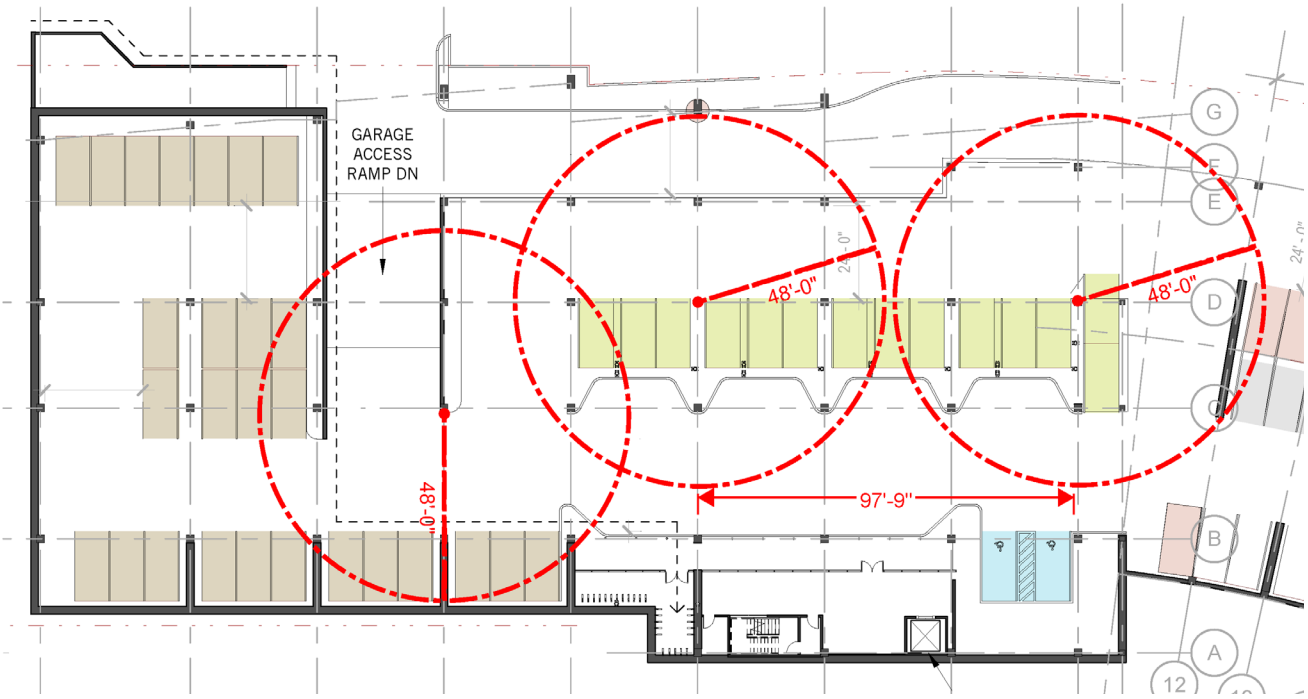
Override Functionality
In some cases, it's better to manually activate ventilation instead of waiting for gas levels to rise. Systemair Gas Detectors have a manual override, and Systemair Control Hubs offer automatic scheduling for equipment operation. These features are useful for predicting high gas levels, detecting smoke, or dealing with uncomfortable temperatures

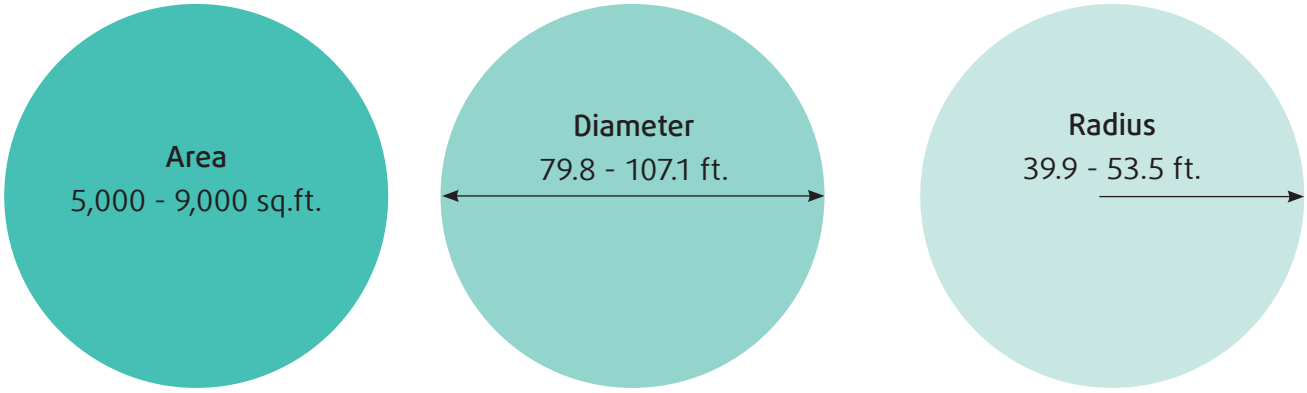
Fail-Safe Mechanism
Systemair Gas Detectors are designed for fail-safe operation, regardless of circuit breaker trips, wiring malfunctions, or power surges. If power is lost, low alert and alarm relays activate to engage connected ventilation and warning systems, preventing gas accumulation in situations where the detector can't monitor hazardous gas levels due to unexpected events.

Maintenance Protocols
Regular maintenance is vital for gas detectors. It involves inspecting components and wiring regularly to comply with regulations and prevent corrosion. Sensors need annual bump testing and should be recalibrated or replaced if they're not responsive enough. Proper training for personnel on operation, adjustment, troubleshooting, and maintenance is crucial. Comprehensive documentation helps address potential issues throughout the detector's lifespan.

Estimated Coverage

Systemair Gas Detectors can effectively cover areas of up to 7,500 ft^2 (697 m^2) per sensor. However, as ceiling height rises and air circulation diminishes, the coverage area decreases accordingly. It's important to note that mounting detectors on walls or in corners will reduce the effective coverage area, regardless of ceiling height or air circulation. For optimal coverage, position sensors at a distance of one diameter apart and one radius away from walls or obstacles. Refer to the table below to determine coverage in your particular setting.





Detector Mounting Locations

The ability of the unit to efficiently sense the target gas depends greatly upon proper selection of the mounting location. The unit monitors the area around it by sampling the air that passes by the sensor. Therefore, the unit should be positioned where it can sample air that contains a target gas concentration representative of the average value in that area.

When determining the mounting location, give special consideration to the following guidelines:

Use one sensor per target gas for each coverage area.

Prioritize locations with the highest occupation density.

Keep remote detectors within 4000 feet of the control hub.

Mount the CO and/or NO2 detector at average breathing height (5-7 feet) for maximum safety.

Mount the H2 detector near the ceiling.

Avoid locations near doorways, fans, ventilation inlets/outlets, and areas with high airflow.

Prevent direct water contact and exposure to outside garage door rain.

Avoid placement in heater or air conditioner outlet vents.

Maintain temperatures between -4°F (-20°C) and 122°F (50°C).

Prevent engine exhaust exposure; use shielding in high-traffic areas.

Ensure unrestricted airflow to the unit.

Avoid corner and chemical container proximity to prevent false readings from high-level concentrations.

Regulations

In the United States, the three main agencies with regulations on hazardous gases are OSHA, NIOSH, and ACGIH – each with its own limits on exposure.

- **Permissible Exposure Limit (PEL)** is set by OSHA as the legal limit of chemical substance or physical agent that an employee can be exposed to.
- **Threshold Limit Value (TLV)** is set by ACGIH as the daily level to which a worker may be exposed for his/her working lifetime without adverse health effects.
- **Recommended Exposure Limit (REL)** is set by NIOSH as a recommendation for OSHA to adopt as the new PEL.

Each of these limits can be broken down into three subcategories:

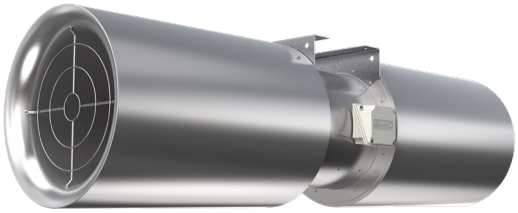
- **Short-Term Exposure Limit (STEL)** to a particular substance expressed as a TWA concentration over a 15-minute period instead of 8-hours.
- **Time-Weighted Average (TWA)** concentration of gas in a worker's breathing zone for an 8-hour period during a 40-hour work week.
- **Ceiling (C)** or maximum instantaneous concentration a worker can be exposed to without respiratory aid.

OSHA®	ACGIH® GLOBALLY PROTECTING WORKER HEALTH	NIOSH
CARBON MONOXIDE	**CARBON MONOXIDE**	**CARBON MONOXIDE**
PEL-TWA: 50 PPM	TLV-TWA: 25 PPM TLV-STEL: 400 PPM	REL-TWA: 35 PPM
NITROGEN DIOXIDE	**NITROGEN DIOXIDE**	**NITROGEN DIOXIDE**
PEL-STEL: 1 PPM PEL-C: 5 PPM	TLV-TWA: 3 PPM TLV-STEL: 5 PPM	REL-STEL: 1 PPM

All Systemair Gas Detectors have adjustable limits to allow for flexible use in a variety of environments and applications. Limits can be lowered below the legally required level for added safety factor or raised to the limit to avoid excessive operation of ventilation equipment.

AJR-Q

Quiet Axial Impulse Jet Fan



Product Overview

Our AJR-Q Series of Axial Impulse Jet Fans are designed to optimize Sweep Ventilation Systems and reduce costly exhaust ducting in enclosed and underground parking garages. Using the combined performance factors of Airflow, Thrust, Throw and Induction the AJR fully implements an Extraction Ventilation Strategy to more effectively reduce CO levels compared to traditional garage ventilation designs.

AMCA Certified Performance Data

Industry's first Axial Impulse Jet Fan certified and tested in accordance with the ANSI/AMCA 250 Laboratory Methods of Testing Jet Tunnel Fans for Performance and the ANSI/AMCA 300 Reverberant Room Methods for Sound Testing of Fans.

Low Sound Levels

The innovative new AJR-Q addresses the most common challenge of Axial Jet Fans by reducing objectionable fan and airflow noise while improving performance.

High Performance Models

An advancement over traditional garage transfer and circulation fans, the AJR-Q Jet Fans performance is specifically designed and quantified to address the design challenges inherent to enclosed and underground parking application.

AJR-Q 355 Performance – 44.3 N Thrust, Induction Factor of 8.4, Throw distance 117' (35.7m)

AJR-Q 400 Performance – 74.0 N Thrust, Induction Factor of 7.6, Throw distance 121' (36.9m)

Precision Placement

Unlike large and bulky ducting, AJR-Q Jet Fans are only installed where specifically required to eliminate dead-air zones and potential CO hot-spots, reducing installation costs and releasing valuable ceiling space to accommodate other trades.

Easy Installation & Speed Control

Includes large, easy access electrical box with wire leads. Inverter rated motor for speed controllability.

Warranty

The AJR-Q Series is backed by a 3 year limited warranty.

Systemair Mfg. Inc. certifies that the AJR series shown herein is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.

IV Smart EC

High Induction Compact Centrifugal Jet Fan

Product Overview

The lowest profile induction jet fan on the market. The IV Smart EC combines the performance factors including airflow, induction, thrust and throw to more effectively reduce CO levels and achieve a Dilution Ventilation Strategy in the most energy efficient manner.

AMCA Certified

Certified and tested in accordance with the ANSI/AMCA 250 Laboratory Methods of Testing Jet Tunnel Fans for Performance and the ANSI/AMCA 300 Reverberant Room Methods for Sound Testing of Fans.

Standard Control Options or Modbus/BACnet Ready

Standard speed control options include PWM, 0-10V, and speed feedback reference. Optional Modbus communication capability provides seamless integration with the Building Automation System. Modbus communication allows for complete control and monitoring of the fan. BACnet communication is available when paired with the Protonode Gateway Accessory (Item# 498173).

High Performance in a Small Package

Produces 11N Thrust, Induction Factor of 28 and Throw distance of 129' (39.5m) at Terminal Velocity 196 fpm (1m/s).

EC Driven

EC motor enables Demand Control Ventilation and reduces energy consumption on average 30%. Allows for soft start and eliminates need for a motor starter & VFD.

Low Profile Design

Height of less than 5.9" and a footprint of 31.5" x 22.4" makes it the industry's most compact Centrifugal High Induction Jet Fan.

Easy Installation

Includes large, easy access electrical box with quick-connect lever terminals and weighing only 45 lbs, makes installation quick, easy and safe.

Warranty

The IV Smart EC is backed by a 3 year limited warranty.

Protonode Accessory (Item# 498173)

Available on the IV Smart EC – Modbus Jet Fan (#95922). Seamlessly connect up to 32 devices into BMS networks, including BACnet.

Systemair Mfg. Inc. certifies that the IV Smart EC series shown herein is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.

IV-50 EC

High Induction Centrifugal Jet Fan

Product Overview

The low profile IV-50 EC utilizes the combined performance factors including airflow, induction, thrust and throw to more effectively reduce CO levels and achieve a Dilution Ventilation Strategy in the most energy efficient manner.

AMCA Certified

Industry's first Jet Fan certified and tested in accordance with the ANSI/AMCA 250 Laboratory Methods of Testing Jet Tunnel Fans for Performance and the ANSI/AMCA 300 Reverberant Room Methods for Sound Testing of Fans.

High Performance

Produces 51N Thrust, Induction Factor of 22.9 and Throw distance of 154' (47m) to Terminal Velocity 196 fpm (1m/s).

EC Driven

EC motor enables Demand Control Ventilation and reduces energy consumption nearly 30%. Allows for soft start and eliminates need for a motor starter & VFD.

Low Profile

Height of less than 10.25" and footprint of 32.8" x 50.5" makes it the industry's most powerful compact Centrifugal High Induction Jet Fan.

Easy Installation

Includes large, easy access electrical box with quick-connect lever terminals.

Control Options

Speed control options include PWM, 0-10V, 4-20mA, or simple on/off to any set speed, and speed feedback reference.

Warranty

The IV-50 EC is backed by a 3 year limited warranty.

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Notes

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