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Continuous monitoring of carbon monoxide and nitrogen dioxide in large enclosed parking garages

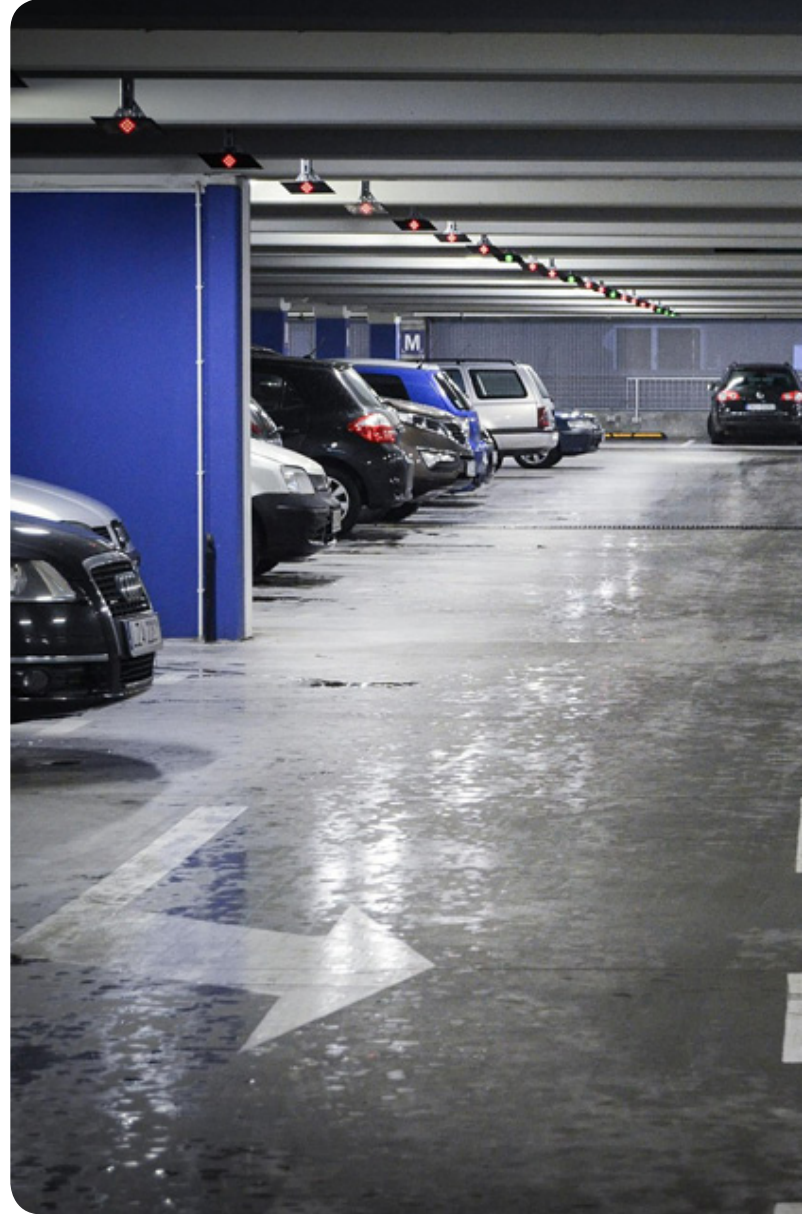
Enclosed parking facilities vary in size, design, location and the number and type of cars coming and going. If the facility is not ventilated properly, it can become a hazardous environment as vehicle exhaust from idling cars and slow moving cars trying to find a place to park collects in the enclosed area.

Carbon monoxide is the most abundant of the exhaust fumes, but there is also the possibility for nitrogen dioxide from diesel powered engines (and in more modern facilities, hydrogen buildup from electric car charging stations). To provide a safe, breathable parking facility and minimize energy costs associated with the operation of the ventilation system, a hazardous gas detection system is necessary.

For a large enclosed parking structure, Critical Environment Technologies' FCS Flexible Control System Controller connected to LPT-P digital transmitters with internal CO and NO₂ sensors provides monitoring hazardous gases to ensure a safe breathing environment.

To provide fresh air and move contaminated air out of the facility, fans are typically used. It is not economical or practical to run the fans continuously, as wear shortens motor life, higher maintenance services are required and the energy consumption is not only expensive, but not environmentally friendly. The FCS has internal and remote control interfaces to drive fans, heaters and louvers/dampers using relays, 4-20 mA output or Modbus® output.

The FCS offers up to 128 channels, 4 internal relays, data logging and an extensive menu structure with password protection, enhanced logic controls and priority/zoning capabilities. The FCS can operate as a standalone system or be connected to a BAS/DDC using Modbus® or BACnet® output.



Continuous Monitoring of Vehicle Exhaust in Large Enclosed Parking Facilities

The FCS is usually located in a central area or in a control room. It is connected to the LPT-P transmitters using Modbus® RTU RS-485 digital input. When determining where to install the LPT-P transmitters, you must consider the air flow patterns. Sensors should be placed in dead air zones, where there is little or no air movement and in areas of good air circulation but not in the path of rapidly moving air. Entrances to the parking facility, elevators, exhaust fans, makeup air fans and any other sources of active air currents will affect the ability of the sensor to accurately read the gas levels. Each LPT-P should be mounted in the "breathing zone", 4 to 6 feet from the floor,

the height at which most humans breathe. For most commercial vehicle exhaust applications, each sensor will monitor up to 5000 to 10,000 ft² (464 to 929 m²) or 40 to 56 foot (12 to 17 meter) radius. The layout of the area, where the walls are situated will impact how open or closed off the area is and will affect the sensing range of the sensor. In addition, mounting the sensor in a more central location, preferably not on back walls will also allow a wider sensing range. The LPT-P can be mounted on the back of a column, in a less obvious spot to reduce the likelihood of tampering.

The FCS has four 5 amp SPDT dry contact relays, which can be programmed to activate or delay the activation of equipment for a specified length of time after the low alarm is activated to allow the fans without VFD to

get up to speed and stay on before they get turned off if the alarm was activated by a nearby idling vehicle or a high number of cars entering/exiting all around the same time, such as when the majority of commuters start and end work. Using the relay's on and off delay functionality for activating the ventilation system keeps the equipment running properly and reduces energy costs by not having the fan on constantly. Other relays can be programmed to trigger remote alarm devices in areas that will alert the appropriate parking lot personnel. For VFD equipped fans, the FCS can be configured to constantly outputs a 4-20 mA (current) signal or a digital (Modbus®) signal that will tell the VFD to run the fan(s) at a certain speed depending on the gas reading levels received from the LPT-P.

The FCS offers up to 32 configurable priority levels for channels, groups of channels, relays, strobes and horns/audible. A priority can indicate a physical location (zoning) or a set of logic based on gas concentration, time of day and California's Title 24 requirements. Alarms and fans can be triggered to activate based on simple or complex priority structures meeting the individual requirements of the application. The FCS and LPT-P system comes configured from the factory, according to specifications at time of order. Configuration updates or changes to the settings can be done in the field using the easy to navigate, password protected menu structure or by uploading files using a USB stick that you generate from our FCS configuration software.

The LPT-P transmitters can be ordered with the optional, factory installed splash guard which makes the enclosure IP54 rated and protected in wash down or water spray applications. If regulations require the monitoring of a combustible gas (Methane, Hydrogen or Propane), the LPT-P is equipped with a third channel that can be connected to a remote sensor for the required target gas.

