smart GasDetection Technologies

Gas Safety Solutions for the Cannabis Industry

Goodforgas.com

Atmospheric hazards at commercial cannabis grower and processor facilities

Grower Hazards

Carbon dioxide (CO_2) is necessary for photosynthesis and without it, plants can't grow. Cannabis "grow" areas (greenhouses) are controlled environments where light, temperature, humidity, and CO_2 concentration are tightly controlled to optimize growth and the production of cannabinoids and other active chemicals. Cannabis greenhouses are typically tightly sealed and enriched by adding CO_2. The optimal CO_2 concentration for growth is between 1,200 and 1,500 ppm.

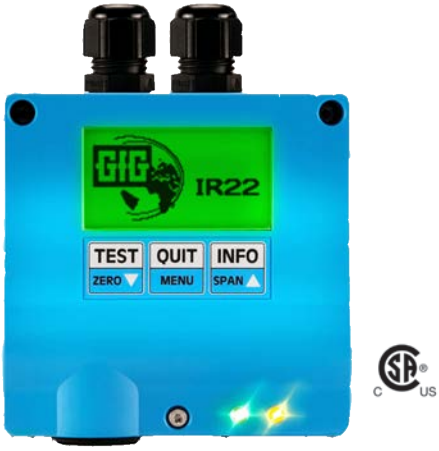
Carbon dioxide is a byproduct of living organisms, and is naturally present in the earth's atmosphere. The average concentration in fresh air is about 400 ppm. At this concentration it's harmless, but at higher concentrations CO_2 is toxic. The OSHA exposure limit for unprotected workers is 5,000 ppm measured as an 8 hour time weighted average (TWA). The IDLH (Immediately Dangerous to Life and Health) concentration is 40,000 ppm. Even 30 minutes of exposure at this concentration can lead to irreversible harm. At very high concentrations even a breath or two can be lethal.

CO_2 is colorless, odorless, and about 1.5 times heavier than air. It can easily displace the oxygen in fresh air if it is released in an enclosed space. But because CO_2 is also a toxic gas, it's not enough just to measure the oxygen concentration. In fact, it takes about 67,000 ppm CO_2 to displace enough oxygen for the concentration to reach 19.5% oxygen, the concentration below which the atmosphere is oxygen deficient. This is the reason cannabis "grow op" regulations require direct measurement of CO_2 levels in the greenhhouse, with readings and alarms visible from the outside. You need to know if a hazardous condition exists before you enter, not after!

In commmercial grow ops, CO_2 is typically introduced using CO_2 generators or a compressed gas delivery system. CO_2 gas delivery systems are often quite sophisticated, using sensors in the greenhouse to control the release of the gas. In non-commercial operations controls are less rigorous, and CO_2 may be generated by open flame burners, fermentation, dry ice, vinegar + baking soda, or even composting. But whatever means are used, regulations still require a fixed detection system to directly measure CO_2 with an alarm set at the toxic exposure limit of 5,000 ppm.

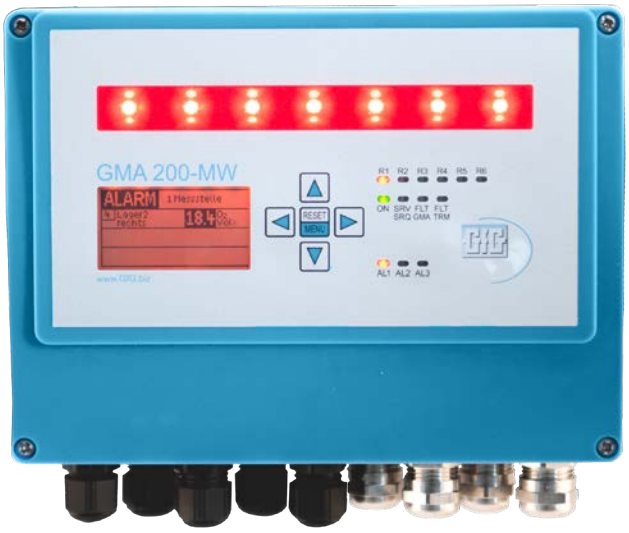
Processor Hazards

Cannabis can be sold in the form of leaf or buds, but the most valuable products are essential oils and extracts. Extraction is the process of separating the active chemicals from the raw material, and turning it into a usable form. Medical extracts are mostly based on cannabidiol (CBD) while recreational extracts are based on tetrahydrocannabinol (THC). The most common extraction techniques involve the use of flammable gas or solvents to separate the chemicals from the plant material. Extraction rooms are hazardous locations where explosive concentrations of gas or vapor can easily develop.



IR 22 CO_2 Gas Measurement Transmitter

- *CO_2 transmitter for non-hazardous locations*
- *Connect via MODBUS (RS 485) or 4-20mA*
- *Backlit graphic LCD canges color to indicate alarm*
- *Built-in push-button interface*
- *Non-intrusive calibration*



GMA 200-MW/4 Controller

- *Advanced controller for LEL, O_2, CO_2 and toxic gas*
- *IP-65 wall housing with built-in horn and strobe*
- *Up to four points of gas measurement in any combination*
- *Backlit graphic LCD canges color to indicate alarm*
- Connect via MODBUS (RS-485) or 4-20mA

Biochemical techniques and high-tech equipment have led to new forms of cannabis extracts such as vape oils, oral tinctures, crumbles, and wax concentrates. Common extraction techniques utilize propane, butane, alcohols like ethanol or methanol, organic solvents like hexane or heptane, CO_2, or water. Each method has its particular benefits, and different methods may be used in sequence. The most common recreational extract is BHO. "Butane Hash Oil" (sometimes referred to as "Butane Honey Oil") is extracted with butane. Butane extraction is relativelly easy, and lends itself to smaller operations. However, it's also easy for a mistake or leak to lead to an explosion.

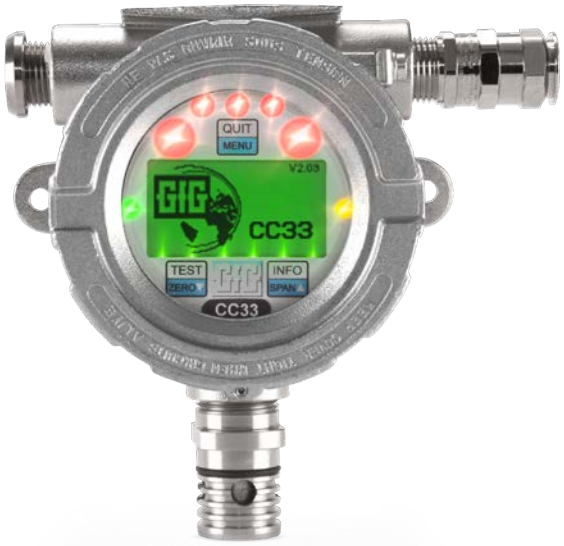
The extraction rooms where gas and solvents are used are Class I Division 1 Hazardous Locations which are required to be continuously monitored for combustible gases. Rooms that are immediately adjacent to extraction rooms are Class I Division 2 areas which must also be continuously monitored for the presence of combustible gas.

Extraction techniques need to separate the active molecules from the plant material without causing them to "deactivate" or lose their bioactive potency. Supercritical CO_2 extraction is the most expensive extraction method, but also the safest as it avoids the use or creation of explosive gases or vapors. It is highly efficient, and allows for selective purification of the rough extract into multiple products.

In certain pressure and temperature conditions, CO_2 behaves as both a gas and a liquid at the same time. This "critical" point is reached at around 1,071 psi (the critical pressure) and 90º F (the critical temperature). The temperature is well below the deactivation temperature for the cannabinoids and terpenes that are targeted for extraction. The supercritical CO_2 is forced through the macerated plant material. The liquid passes through separators where CO_2 is removed and the various fractions of the extract are collected.

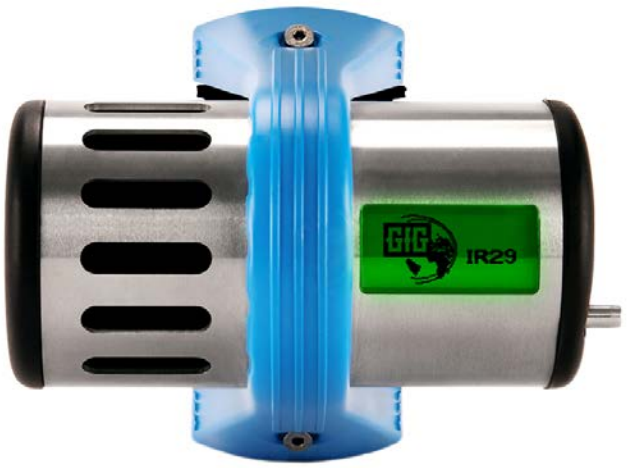
Subcritical CO_2 extraction, known as winterizing, requires less pressure and uses a lower temperature, non-supercritical liquid form of CO_2. Winterizing takes longer, is less efficient and produces lower yields, but is easier on the fragile molecules being extracted, which can produce higher quality (and higher priced) extracts.

The winterization process usually uses ethanol to further separate the pure cannabinoids and terpenes from other byproducts. Constituents that are not soluable in alcohol or water can be extracted using a range of other solvents such ether, naphtha, benzene, butane, methanol, isopropyl alcohol, and even olive oil.



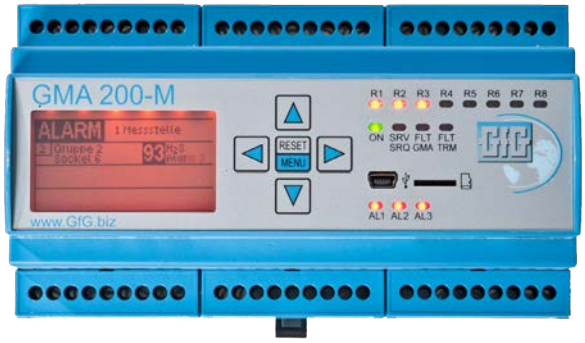
CC 33 Combustible Gas Measurement Transmitter

- *Configurable for wide range of flammable gases*
- *Explosion proof stainless steel or cast aluminum housing*
- *ATEX and IECEx Certified for Zone 1 hazardous locations*
- *Backlit graphic LCD changes color to indicate alarm*
- *Non-intrusive calibration*



IR 29 Infrared Gas Measurement Transmitter

- *ATEX Certified as Intrinsically Safe for Zone 0 Ex locations*
- *Available for LEL or CO_2 measurement*
- *Built-in temperature, pressure and humidity compensation*
- *Multi-wavelength IR measurement*
- *Available for alcohols and other hard to measure VOCs*



GMA 200-MT Controller

- *Advanced controller for LEL, O_2, CO_2 and toxic gas*
- *Compact DIN rail mounted design*
- *Up to 16 points of gas measurement in any combination*
- *Comprehensive outputs with 8 fully programmable relays*
- *Connect via MODBUS (RS-485) or 4-20mA*

The CO_2 extraction room must be monitored for the level of carbon dioxide as well as for the presence of combustible gas if extraction techniques additionally include use of flammable gas or solvents. For highly toxic organic chemicals like benzene, it may also be necessary to use a fixed photoionization detector (PID) to monitor for ppm exposure to toxic volatile organic chemical (VOC) vapors.

GfG Solutions for Grow Operations

The most common hazards in cannabis greenhouses are CO_2 and oxygen deficiency. Greenhouses are not typically hazardous because of the presence of flammable gas. Cannabis industry regulations require a remote display or controller at each point of entrance to the greenhouse. It must be possible to check the readings and alarm status without having to enter the potentially hazardous environment.

Typically GfG transmitters for CO_2 detection are located within the greenhouse while the GMA 200 controller is located outside. Small greenhouses may require only a single measurement point, while large facilities might need a multipoint system with remote displays and multiple points of detection. GfG controllers have multiple relays and outputs used to control fans, actuate CO_2 delivery systems, activate alarms, or communicate with other EHS systems on site.

GfG Solutions for Processor Operations

Gas measurement transmitters installed in extraction rooms require a Class I Division 1 Certification, while adjacent rooms require Class I Division 2 Certification. Combustible gases and CO_2 are the most common hazards in these hazardous locations. GfG transmitters can be connected to a single or multi-point controller which is located outside the hazardous area. Gas detection and monitoring systems are not only required, but critical to the safety of people and assets. Explosions and fires as well as exposure to CO_2 and other toxic gases are clear and present dangers.

GfG Fixed Systems - A Leader in Gas Safety for Cannabis

GfG systems are flexible, scalable, and support the widest range of sensor technologies in the industry. GfG fixed systems offer substantially lower cost of ownership through intrinsically safe and increased safety designs that do not require the cabling to be run in explosion proof conduit.

GfG Instrumentation has been a world leader in the gas detection industry for almost 60 years. We have the complete gas detection solution for cannabis industry growers and processors.

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