

PO Box 8067
The Woodlands, TX 77387
888-367-4286 (toll free)
281-367-4100
281-292-2860 (fax)
sales@detcon.com

detcon

**COMBUSTIBLE
HYDROCARBON**

Gas Detection

Infrared Sensor Technology



DC
detcon inc.

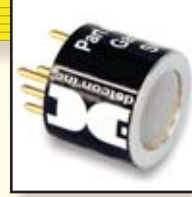
Catalog #IR-CH-0604

www.detcon.com

ISO 9001:2000 • Certified



Factory Testing in Accordance with
ISO 9001:2000 Certified Quality Program



Detcon Plug-In
Infrared Sensor

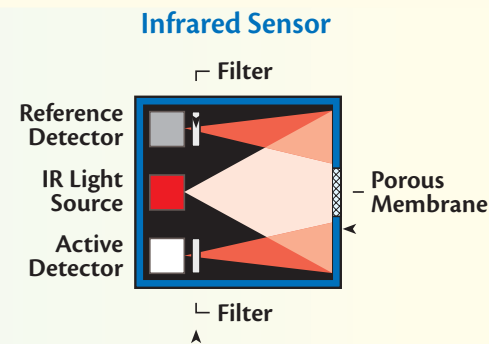
Description

Detcon CH infrared sensors are designed to detect and monitor combustible hydrocarbon gases in the lower explosive limit range (%LEL). The sensors utilize a non-dispersive, sub-miniature detector assembly that contains an IR light source, an active wideband pyroelectric detector and a reference pyroelectric detector. The IR light source and both detectors are packaged as a plug-in field replaceable optical sensor module. Two models are available, Detcon Model IR-522 and

Detcon Model IR-622. Both models feature Detcon's unique and intuitive MicroSafe™ software. Operator interface is non-intrusive via a small handheld magnet. Embedded intuitive software guides the operator through configuration programming and simple calibration procedures. Both sensor assemblies are certified by CSA and UL for installation in Class I, Division 1, Group B C D areas. Both sensor assemblies are certified to a very demanding performance standard.

Principle of Operation

IR sensors operate on the principle of infrared light absorption as a means to detect the presence of combustible hydrocarbon gases. The Detcon IR sensor uses a miniature plug-in optical detector in a stainless steel housing. The target gas diffuses through a sintered stainless steel flame arrestor and into an optical cavity. A lamp provides a cyclical IR radiation source that contacts two pyroelectric detectors. These "active" and "reference" detectors each give an output that measures the intensity of the radiation contacting their surface. The active detector is covered with a filter specific to the IR spectrum where hydrocarbons absorb and the reference detector has a filter specific to the non-absorbing part of the IR spectrum. Hydrocarbon gases absorb a fraction of the IR radiation and the active detector signal decreases. The reference detector signal remains unchanged in the presence of the target gas. The ratio of the active and reference detector signals is used to compute the gas concentration. By using the ratio, drift caused by changes in the lamp intensity or optical reflectivity is eliminated.



Why Choose the Detcon Infrared Sensor?

There are two primary methods of monitoring for combustible gas leaks in industrial environments, catalytic beads and infrared optical. Both sensor technologies offer certain advantages and, of course, each technology has certain limitations. Detcon manufactures both types of combustible gas detection sensors and boasts a long history of using both technologies to solve some of industry's most demanding gas monitoring applications. Catalytic sensor technology is non-selective and shows a good response to virtually any type of combustible gas, while infrared technology is limited to the detection and monitoring of only combustible hydrocarbon gases. Both Detcon combustible gas detection sensors are independently certified for use in hazardous areas and are independently tested and certified to a rigid performance standard.

Fail-safe Operation and Reduced Maintenance

Detcon IR sensors provide a continuous self-diagnostic checking of the optics. This provides a higher degree of fail-safe operation than catalytic sensors and thus allows for less frequent

calibration. In many applications, annual maintenance and calibration is all that is required to maintain a high level of sensor performance and reliability.

Heated Optics and Low Power Design

Most IR cell designs incorporate secondary heaters to elevate optical component surface temperatures and eliminate losses due to condensation. The Detcon optical detector is a miniature assembly and the IR lamp's internal heat is sufficient to prevent condensation problems. With no secondary heater, the Detcon IR sensor has very low power consumption, and allows smaller and lower cost power supplies to be specified.

Poison Resistant and Immune, No Oxygen Required

Unlike catalytic bead sensors, IR sensors are not subject to poisoning by routine chemicals such as silicons, oils/lubricants, chlorides and heavy metals. Also, gases such as Halogen and Freon have no temporary inhibiting effect on the IR sensor. Finally, Detcon IR sensors do not require background O₂ and they are not damaged as a result of over-range exposure.

Highlights

- ▶ Fail-safe Operation and Less Frequent Calibration than Catalytic Detectors
- ▶ Rugged Packaging with Field Replaceable Plug-in Optical Detector
- ▶ Long Service Life and 5 year Warranty
- ▶ Independently Certified to a Rigid Performance Standard
- ▶ Simple Operator Interface with Intuitive Software

Where can you benefit from the use of the Detcon Infrared Sensor?

- ▶ Frequent Catalyst Poisoning Gas Exposures
- ▶ Frequent High Combustible Gas Releases
- ▶ Oxygen Deficient Environments
- ▶ Poor Detector Accessibility



Model IR-522W

MicroSafe™ Intelligent Sensor
4-20 mA Output
Non-intrusive Interface

Detcon Model IR-522W combustible hydrocarbon gas detectors are non-intrusive intelligent sensors featuring Detcon's MicroSafe™ intuitive software. Operator interface is via a hand-held magnet and program switches accessed through a glass lens cover. Calibration instructions appear in simple script on a 16-character display. The transmitter design incorporates extensive fault diagnostics with each condition conveniently identified on the transmitter display. The sensor transmitter module is plug-in field replaceable which allows for easy field level maintenance and repair.

- ▶ Linear 4-20 mA output
- ▶ Integral sensor fault diagnostics
- ▶ Plug-in replaceable sensor
- ▶ One-man remote calibration
- ▶ Self adjusting zero and span with sensor life indication
- ▶ LED indicators for Fault and Calibration status
- ▶ Non-intrusive, magnetic programming interface (via hand-held magnet)
- ▶ Simple menu-driven programming and calibration
- ▶ 16 character backlit alphanumeric display



Model IR-622W

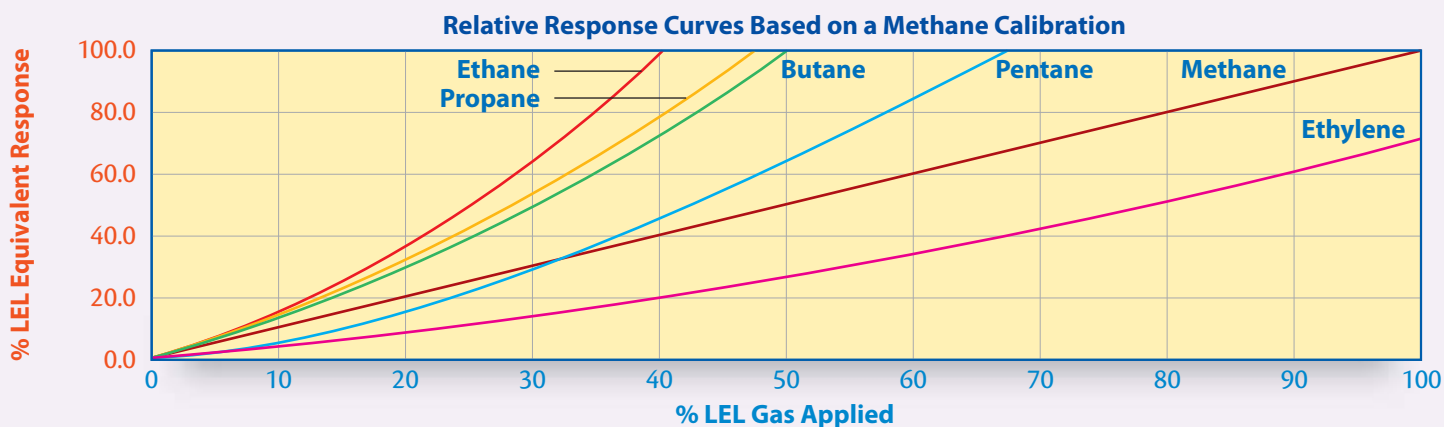
MicroSafe™ Intelligent Sensor
4-20 mA, RS-485, Relays
Non-intrusive Interface

Detcon Model IR-622W is the most versatile of the combustible hydrocarbon gas sensor designs. The intelligent sensor assembly features Detcon's MicroSafe™ intuitive software. Operator interface is non-intrusive. All maintenance and programming functions are menu driven and accessed through a glass lens cover using a hand-held magnet. Model IR-622W series sensors provide complete flexibility and redundancy in system integration options. Standard outputs include a linear 4-20 mA signal, three alarm relays, and an RS-485 serial communication port. The transmitter is a plug-in module which supports easy field level maintenance and repair.

- ▶ Linear 4-20 mA output, 3 relays, and RS-485 Serial Communications
- ▶ Integral sensor fault diagnostics
- ▶ Plug-in replaceable sensor
- ▶ One-man remote calibration
- ▶ Self adjusting zero and span with sensor life indication
- ▶ LED indicators for Fault and Calibration status
- ▶ Non-intrusive, magnetic programming interface (via hand-held magnet)
- ▶ Simple menu-driven programming and calibration
- ▶ 16 character backlit alphanumeric display

Wide Band IR Sensor Technology

The **Detcon IR Sensor** employs a "Wide Band" optical filter. This feature allows for an extensive list of combustible hydrocarbon compounds to be measured. The wide band sensor also provides more uniform signal sensitivities between commonly measured hydrocarbon gases, so that better overall accuracy is achieved with a single calibration.



Technology Features

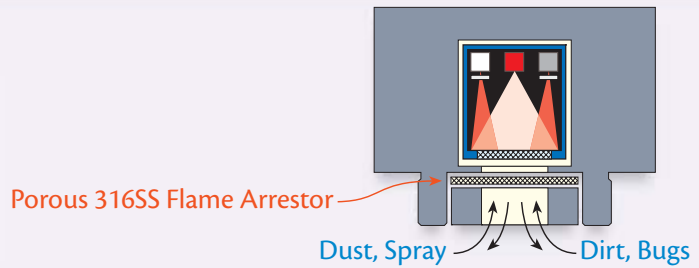
Field Replaceable Plug-in Components

The transmitter electronics for each of the IR series sensors are equipped with a gold-plated mating plug for rapid replacement or upgrade in the field. The IR sensor body is constructed with stainless steel components and is plug-in replaceable within minutes.



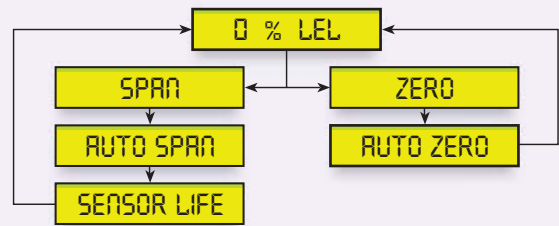
Protected Optics Design

The enclosed optical chamber operates at 7-10°C hotter than ambient temperature so condensation is eliminated entirely. The optical chamber is protected from the environment by a porous metal flame arrestor. This prevents optical failures due to dust, dirt, spray and insects.



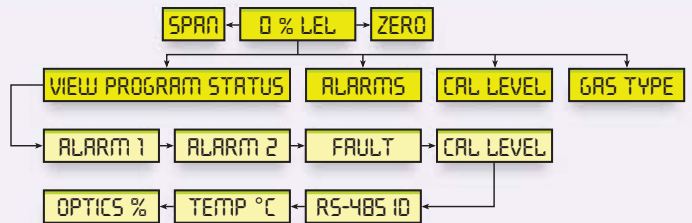
Simple Calibration (IR-522W & IR-622W)

Span and zero calibration are automatic and require only 2 touches from a calibration magnet and 3 minutes. As found reading and remaining sensor life are displayed during every calibration.



Intuitive User Interface (IR-622W Shown)

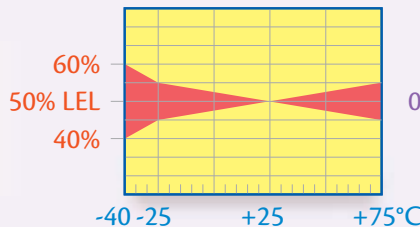
The user interface allows for adjustment of gas type, calibration gas value, alarm level set-points, and gas correction factors. The "View Program Status" function displays all current set-point parameters for quick review.



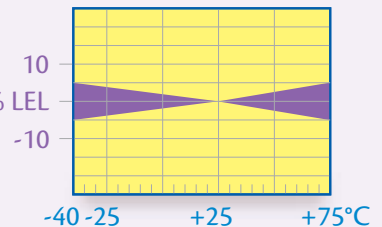
100% Performance Approved

The Detcon Series of IR combustible gas sensors are 3rd party approved for compliance to strict industrial performance specifications. These tests include accuracy, response time, long-term stability, temperature/humidity drift, flood testing, etc.

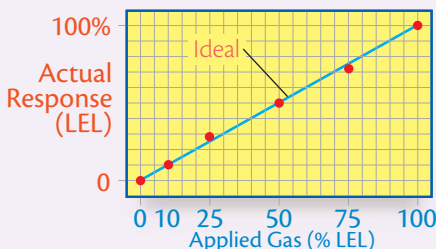
Span Temperature Drift



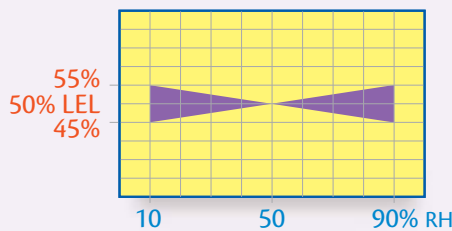
Zero Temperature Drift



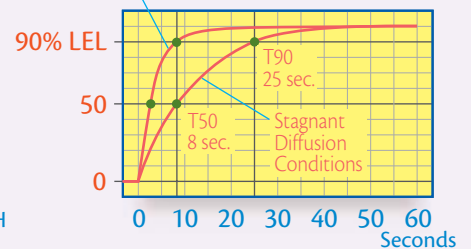
Accuracy



Humidity Drift



High Velocity Impinging on Flame Arrestor Response Test

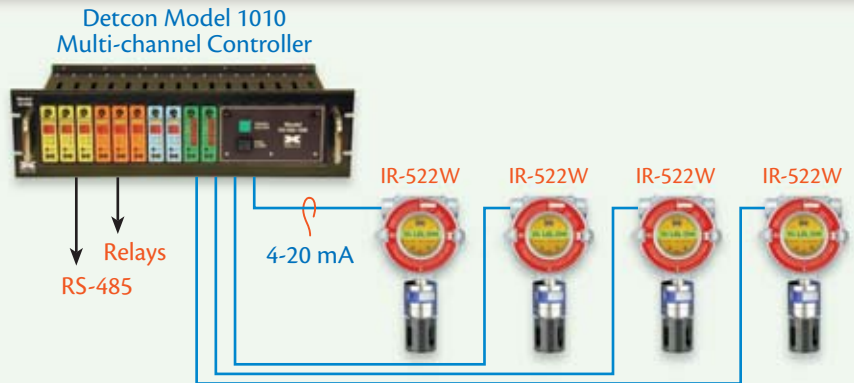


Integration Options

The **IR Series** of combustible hydrocarbon gas detectors provide the end-user with a wide variety of output options including 4-20 mA, RS-485 Modbus RTU, and relay contacts. As stand-alone devices, they are compatible with virtually any industry standard data acquisition system. Additionally, Detcon provides a complete range of pre-engineered gas detection systems. Shown below are a series of typical system integration approaches.

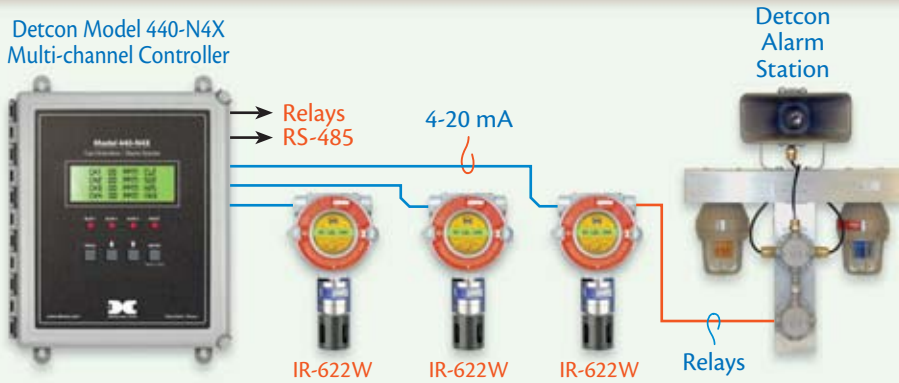
▶ 4-20 mA

Direct feed of individual sensor 4-20 mA outputs to dedicated Detcon multi-channel controller. The controller repeats outputs, and provides relay and RS-485 output options.



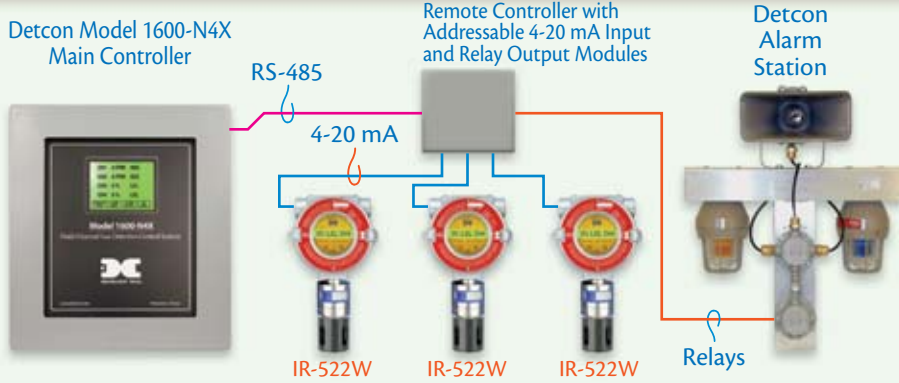
▶ 4-20 mA & Local Relays

Direct feed of 4-20 mA outputs to dedicated Detcon multi-channel controller is combined with direct wiring of built-in relay outputs (from Model IR-622W) to activate field-mounted alarm stations or other responses. Controller provides additional output relays.



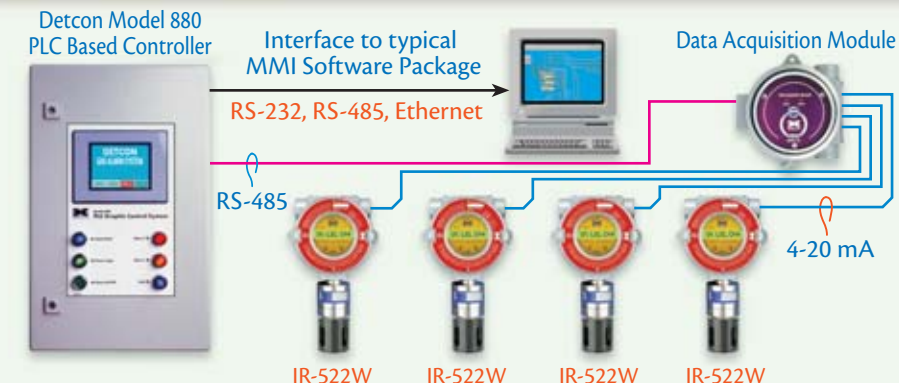
▶ 4-20 mA/RS-485 & Local Relays

Individual sensors (Model IR-522W) provide 4-20 mA inputs to a remote-mount addressable 4-20 mA Input Module. The addressable 4-20 mA Input Module communicates via RS-485 to Model 1600 Controller. The remote-mounted addressable Relay Output Module provides signal for local alarm station. Detcon Model 1600 controller provides all data handling, display and historical logging.



▶ 4-20 mA & RS-485 Combination

Individual sensor 4-20 mA outputs are routed to Detcon DA-1 Data Acquisition Modules for conversion to RS-485. DA-1s are looped and fed to Model 880 PLC providing all data handling, display, and historical logging. The Model 880 then can be interfaced to a PC-based MMI using Citect, Wonderware or other software packages.



Order Guide

Model # Description

IR-522W MicroSafe™ combustible hydrocarbon non-intrusive sensor assembly with 4-20 mA output

IR-622W MicroSafe™ combustible hydrocarbon non-intrusive sensor assembly with 4-20 mA, RS-485, & Relays

*Specify target gas when placing order (i.e. methane, ethane, propane, butane, etc.)

Specifications

Sensor Type

Non Dispersive Infrared (NDIR) Optical

Measurement Range

0-100% LEL (lower explosive limit)

Target Gases

Methane (standard)

Other gases: see Target Gas List

Accuracy*

±3% full scale 0-50% LEL

±5% full scale 51-100% LEL

Response Time**

T50 <10 seconds

T90 <30 seconds

Zero Drift*

< 5% LEL per year

Operating Temperature Range

-40°F to +167°F; -40°C to +75°C

Operating Humidity Range

0-99% RH (non-condensing)

Outputs

Linear 4-20 mA DC

RS-485 Modbus™ (IR-622W only)

3 Relays (IR-622W only)

Alarm 1, Alarm 2, & Fault

Contacts rated 5 amps @ 250VAC,

5 amps @ 30VDC

Input Voltage

11.5-28 VDC (IR-522W)

22.5-28 VDC (IR-622W)

Power Consumption (maximum)

<2.5 watts @ 24 VDC (IR-522W)

<3 watts @ 24 VDC (IR-622W)

Electrical Classification

Explosion proof

Class I, Division 1, Groups B, C, D

CSA and UL Approved

Safety Approvals

CSA/NRTL (US OSHA Certified)

Performance Approvals

CSA 22.2 No. 152-M1984

ISA 12.13-2000

Warranty

Sensor: 5 year pro-rated

Transmitter: 2 year

Sensor Weight/Shipping Weight

4 lbs/5lbs

Shipping Dimensions

12.5W" x 9.5D" x 8H"

*Tested on Methane

**Tested under stagnant release conditions.

Warranty

▶ ELECTRONICS

5 Year Fixed Fee Service Policy

Detcon Inc. warrants each new control transmitter circuit to be free from defects in material and workmanship under intended normal use for a period of two years from the date of shipment to the original purchaser. Detcon, further provides for a five year fixed-fee service policy covering the control transmitter circuit. The fixed fee service policy shall affect any necessary factory repair for the period following the two-year warranty period and shall end five years after expiration of the warranty. All warranties are FOB the Detcon factory located in The Woodlands, Texas, USA.

▶ IR PLUG-IN OPTICAL SENSOR

5 Year Conditional Warranty

Detcon Inc., as manufacturer, warrants each new IR plug-in optical sensor to be free from defects in material and workmanship under intended normal use for a period of 5 years under the following conditions: The warranty period begins on the date of shipment to the original purchaser and ends 5 years thereafter.

Warranty Schedule

First 2 years: no charge

3rd year: 25% of replacement charge

4th year: 50% of replacement charge

5th year: 75% of replacement charge

Non-warranty: 100% of replacement charge

888-367-4286

281-367-4100



detcon inc.



www.detcon.com

Detectable Gases

▶ TARGET GAS LIST

The IR-622W & IR-522W gas sensors are factory calibrated and software configured for the detection of methane gas as standard. Calibration and configuration for several other target gases are available and should be specified at time of order. Reference the listing below for available gases. In the future, if the application of the gas sensor changes to a new target gas, a simple firmware exchange is required.

Methane
Ethane
Propane
Butane
Pentane
Hexane
Heptane
Octane
Ethylene
Propylene
Butene
Pentene
Hexene
Octene
Cyclopropane
Cyclohexane
Cyclohexene
Pinene
Benzene
Toluene
Xylene
Methanol
Ethanol
Propanol
Isobutanol
Dimethyl Amine
Trimethyl Amine
Butanamine
Pyridines
Dimethyl Ether
Ethyl Ether
Vinyl Ether
Ethylene Oxide
Tetrahydrofuran
1, 4 Dioxane
Acetone
Methyl Ethyl Ketone
Pentanone
Heptanone
Methyl Isobutyl Ketone

Contact the factory for other target gases.