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**detcon**

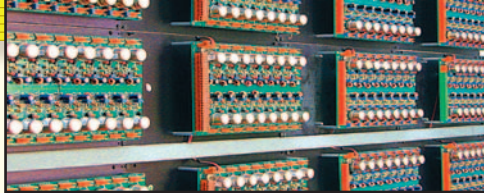
*Combustible* **LEL**  
**Gas Detection**  
Catalytic Bead Sensor Technology



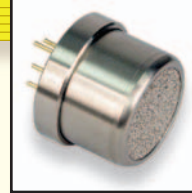
Catalog #LEL-1104

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ISO 9001:2000 • Certified



Combustible Sensor  
Burn-in Rack



Detcon Plug-In  
Combustible Sensor

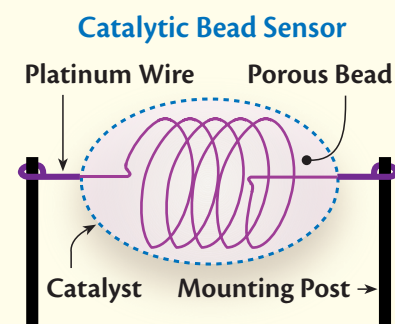
# Description

**Detcon catalytic bead** gas sensor assemblies are designed to monitor ambient air for concentrations of combustible gas in the range of 0-100% of the lower explosive limit (LEL). The sensor technology is of the catalytic pellistor type and consists of matched pair catalytic bead detectors located in a plug-in field-replaceable sensor package. Catalytic bead sensors show an excellent response to a long list of combustible gases. This

technique is non-selective and may be used for the detection and monitoring of several target combustible gases. The Detcon sensor is specifically designed to be poison resistant and is capable of providing reliable performance for periods of 5-10 years in most industrial environments. The technology is offered in three explosion-proof instrument packages with varying features as described in this brochure.

## Principle of Operation

**Method of detection** is by diffusion/adsorption. Air and gas diffuse through a sintered stainless steel filter and contact both the active and reference detector beads. The heated surface of the active detector promotes oxidation of the combustible gas molecule while the reference detector has been treated not to support this oxidation. The reference detector serves as a means to maintain zero stability over a wide range of environmental conditions. When combustible gas molecules are oxidized on the active detector, incremental heat is generated and its resistance changes. Change in resistance is accurately measured using a Wheatstone bridge circuit.



## Why Choose the Detcon Catalytic Bead Sensor?

**There are two primary technologies** for ambient measurement of combustible gases: Catalytic Bead and Infrared Optical. Both have advantages and disadvantages according to their design and operating characteristics. Detcon manufacturers sensors utilizing both technologies, and has a long history of field experience in their application.

Catalytic bead type detectors are the most commonly applied sensor technology for the detection of combustible gases, both organic and inorganic. The sensors are extremely versatile and are described as non-selective detectors which show a good response to both hydrocarbon and non-hydrocarbon combustible gases. Infrared devices are limited to the detection and monitoring of hydrocarbon gases only. Both sensor types are rapid to respond and recover in virtually any industrial environment. The catalytic bead is regarded as an industry

standard for combustible gas measurement, and as such has earned a strong reputation for reliability and field serviceability. It is often preferred because of its flexibility and low costs of installation and maintenance. Typical calibration intervals for the catalytic bead sensor range from 90-180 days. Infrared sensors generally require calibration semi-annually or, in some cases, annually.

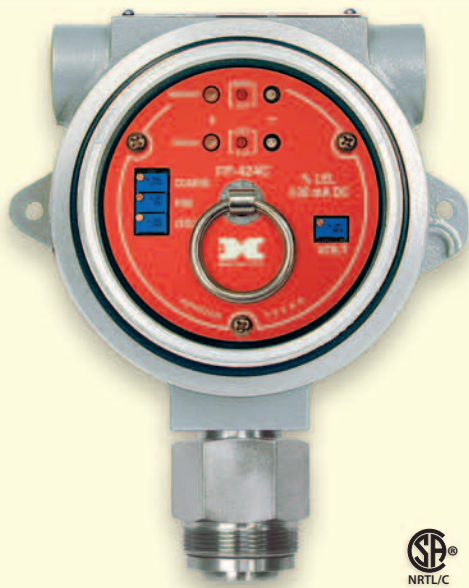
Choosing the best sensor for any application should involve close consideration of a variety of factors, from the end-users' accuracy and maintenance requirements to the prevailing environmental conditions. Detcon sales engineers are trained and ready to thoroughly review field applications and provide accurate and timely assistance in sensor selection. The following information summarizes the advantages of the catalytic bead sensor:

## Highlights

- ▶ Very rugged with strong resistance to damage from climate extremes and catalyst poisons
- ▶ Long service life
- ▶ Capable of measuring all hydrocarbon and non-hydrocarbon combustible gases
- ▶ Inexpensive to replace and maintain
- ▶ Minimal effects from temperature, wind, dust, and humidity

## Where can you benefit from the use of the Detcon Catalytic Bead Sensor?

- ▶ Rainy and high humidity environments
- ▶ Dirty and dusty operating areas
- ▶ Areas where several different combustible gases may be present
- ▶ Areas where non-hydrocarbon combustible gases must be detected



## Model FP-424C

**Standard**  
**4-20 mA Output**

**Detcon Model FP-424C** is a traditional explosion-proof sensor assembly with "blind" cover. Operator interface is via test points and zero and span potentiometers accessed through the transmitter face plate. Model FP-424 series sensors became commercially available in 1986. The most recent improvement was the addition of fail-safe circuitry designed to supervise the detector beads. Any detector fault triggers light emitting diodes and drops the 4-20 mA signal to zero. This very rugged and durable design includes a plug-in field replaceable transmitter. Even original installations are easily upgraded to current design improvements and features.

- ▶ Linear 4-20 mA output
- ▶ Integral sensor fault diagnostics
- ▶ Plug-in replaceable sensor
- ▶ One man remote calibration
- ▶ Field upgradable to MicroSafe™ Intelligent Sensor assembly



## Model FP-524C

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

**Detcon Model FP-524C** is an intelligent sensor assembly featuring Detcon's MicroSafe™ intuitive software. Operator interface is non-intrusive using a hand-held magnet and program switches accessed through a glass lens cover. Calibration instructions appear in simple interactive and sequential 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. FP-524 transmitters can also be used to upgrade existing FP-424 installations.

- ▶ 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 FP-624C

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

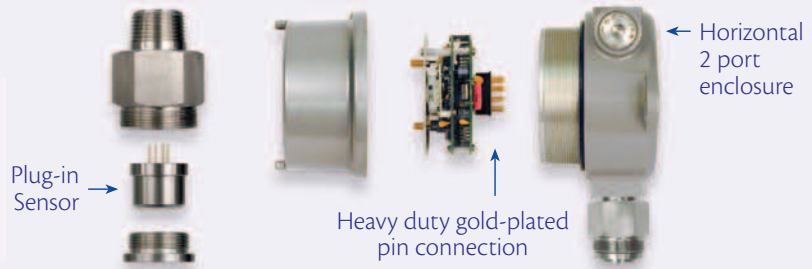
**Detcon Model FP-624C** is the most versatile of the combustible gas sensor designs. The intelligent sensor assembly features Detcon's MicroSafe™ intuitive software. Operator interface is non-intrusive. All maintenance and programming functions are menu driven and accessed through a glass lens cover using a hand-held magnet. Model FP-624 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

# Technology Features

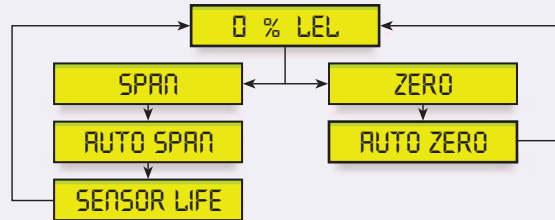
## Field Replaceable Plug-in Components

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



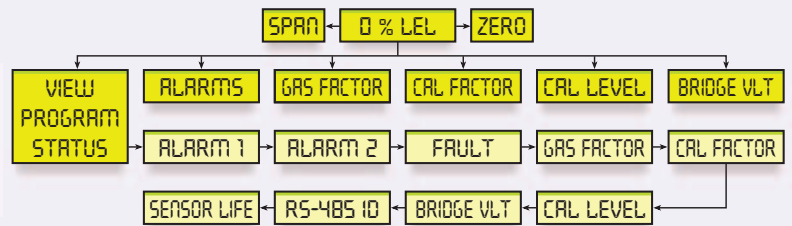
## Simple Calibration (FP-524C & FP-624C)

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.



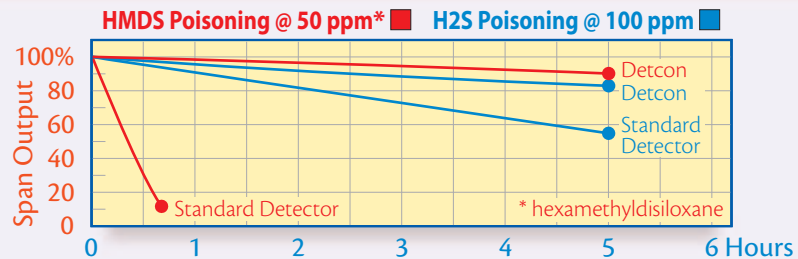
## Intuitive User Interface (FP-624C Shown)

The user interface allows for adjustment of sensor bridge voltage, 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.



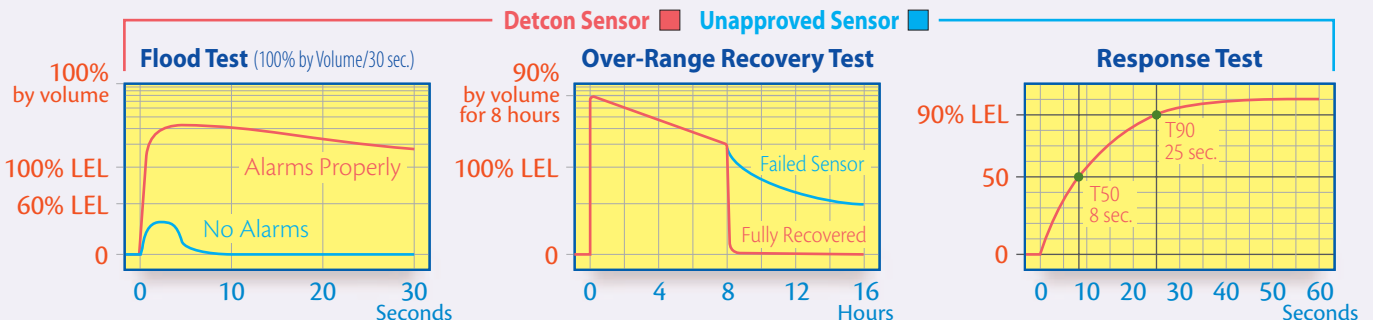
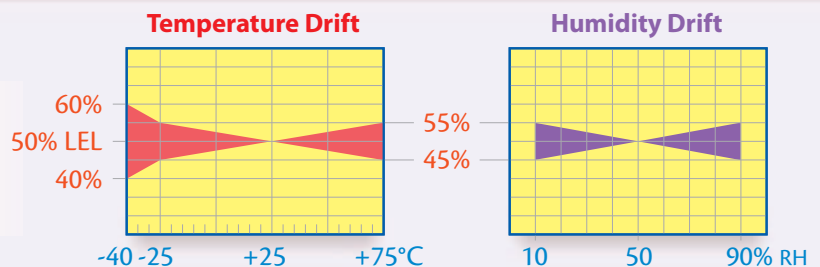
## Poison Resistant

The Detcon catalytic bead sensor is specifically designed to be poison resistant to sulfur compounds, silicones, halogen compounds and heavy metals. It is 100% field-proven in even the harsh environments of offshore drilling and production.



## 100% Performance Approved

The Detcon Series of 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.

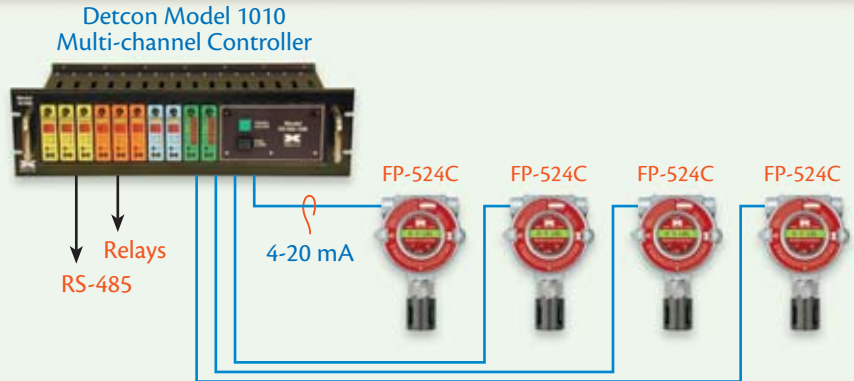


# Integration Options

The **FP Series** of combustible 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.

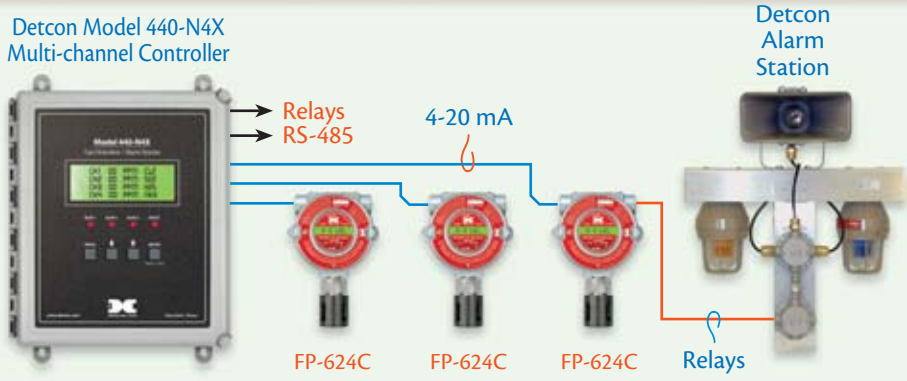
## ▶ 4-20 mA

**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.



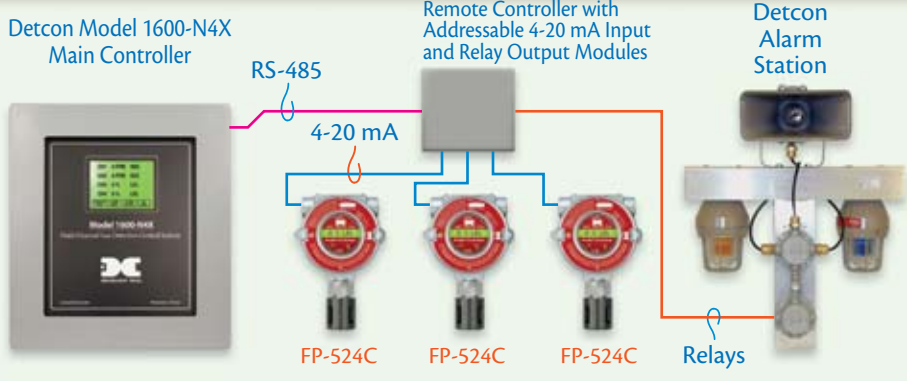
## ▶ 4-20 mA & Local Relays

**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 FP-624C) to activate field-mounted alarm stations or other responses. Controller provides additional output relays.



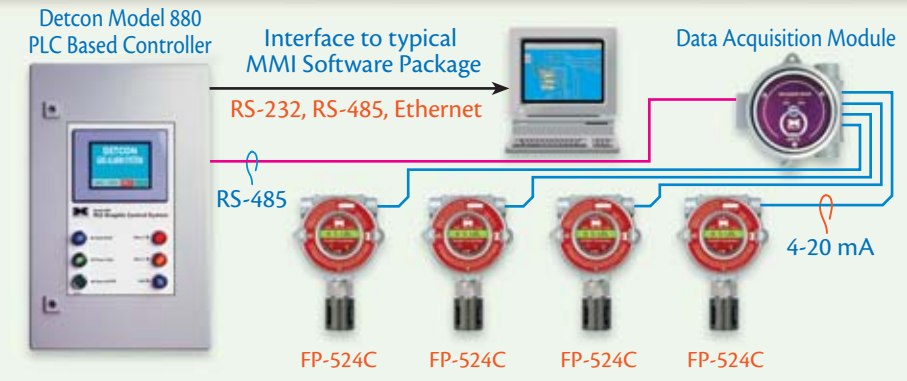
## ▶ 4-20 mA/RS-485 & Local Relays

**Individual sensors** (Model FP-524C) 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 package.



# Order Guide

## Model # Description

**FP-424C** Combustible gas sensor assembly with 4-20 mA output

**FP-524C** MicroSafe™ combustibile gas non-intrusive sensor assembly with 4-20 mA output

**FP-624C** MicroSafe™ combustibile gas non-intrusive sensor assembly with 4-20 mA, RS-485, & Relays

## Specifications

### Sensor Type

Matched pair catalytic bead

### Measurement Range

0-100% LEL (lower explosive limit)

### Accuracy/Repeatability

±3% 0-50% LEL  
±5% 51-100% LEL

### Response/Clearing Time

T50 <10 seconds  
T90 <30 seconds

### Operating Temperature Range

-40°F to +167°F; -40°C to +75°C

### Operating Humidity Range

0-100% RH (non-condensing)

### Outputs

Linear 4-20 mA DC  
RS-485 Modbus™ (FP-624C only)  
3 Relays (FP-624C only)  
Alarm 1, Alarm 2, & Fault  
Contacts rated 5 amps @ 250VAC,  
5 amps @ 30VDC

### Input Voltage

11.5-28 VDC (FP-424C & FP-524C)  
22.5-28 VDC (FP-624C)

### Power Consumption (maximum)

<2.1 watts @ 24 VDC (FP-424C)  
<2 watts @ 24 VDC (FP-524C)  
<3 watts @ 24 VDC (FP-624C)

### Electrical Classification

Explosion proof  
Class I, Division 1, Groups B, C, D  
CSA and UL Approved

### Safety Approvals

CSA/UL/NRTL  
Performance Approvals  
CSA 22.2 No. 152-M1984  
ISA 12.13-2000

### Warranty

Sensor: 2 year conditional  
Transmitter: 2 year

### Sensor Weight/Shipping Weight

4 lbs/5lbs

### Shipping Dimensions

12.5W" x 9.5D" x 8H"

## 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.

### ▶ LEL PLUG-IN SENSOR ELEMENT

#### 2 Year Conditional Warranty

Detcon Inc., as manufacturer, warrants each new LEL plug-in sensor element to be free from defects in material and workmanship under intended normal use for a period of 2 years under the following conditions: The warranty period begins on the date of shipment to the original purchaser and ends two years thereafter.

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## Detectable Gases

### (partial list)

Acetaldehyde	Ethyleneoxide
Acetic Acid	Diethyl Ether
Acetic Anhydride	Ethyl Formate
Acetone	Ethylmercaptan
Acetylene	n-Heptane
Alkyl Alcohol	n-Hexane
Ammonia	Hydrazine
n-Amyl Alcohol	Hydrogencyanide
Aniline	Hydrogen
Benzene	Hydrogen Sulphide
Biphenyl	Methane
1,3-Butadiene	Methyl Acetate
Butane	Methyl Alcohol
iso-Butane	Methylamine
Butene-1	Methylcyclohexane
cis-Butene-2	Dimethyl Ether
trans-Butene-2	Methylethylether
n-Butyl Alcohol	Methylethylketone
iso-Butyl Alcohol	Methyl Formate
tert-Butyl-alcohol	Methylmercaptan
n-Butyl Benzene	Methylpropionate
iso-Butyl Benzene	Methyl n-propylketone
n-Butyric Acid	Naphthalene
Carbon Disulphide	Nitromethane
Carbon Monoxide	n-Nonane
Carbon Oxysulphide	n-Octane
Cyanogen	n-Pentane
Cyclohexane	iso-Pentane
Cyclopropane	Propane
Decane	n-Propyl Alcohol
Diethylamine	n-Propylamine
Dimethylamine	Propylene
2,3-Dimethylpentane	Propyleneoxide
2,2-Dimethylpropane	iso-Propylether
Dimethylsulphide	Propyne
1,4-Dioxane	Toluene
Ethane	Triethylamine
Ethyl Acetate	Trimethylamine
Ethyl Alcohol	Vinyl Chloride
Ethylamine	Vinylethylether
Ethyl Benzene	o-Xylene
Ethylcyclopentane	m-Xylene
Ethylene	p-Xylene