FIDs are the Best Sensor Choice

Several different sensor technologies may be used to detect hydrocarbons, including: catalytic, photo-ionization, infra-red, gas chromatography, and flame ionization. Of these possibilities, flame ionization (FID) is considered the best choice for continuously monitoring the total concentration of VOCs in the parts per million (ppm) range. Why?

- Catalytic sensors are at first attractive because they are the least expensive to purchase and operate. Unfortunately they are inappropriate for ppm VOC monitoring. The physical/ chemical properties of a catalytic sensor make it well suited for monitoring flammable range (%LFL) concentrations of flammable gases - including hydrocarbons - but a catalytic sensor does not respond to low ppm range concentrations of hydrocarbons, and it is affected by interference from by-products of combustion (carbon monoxide and hydrogen).

- Gas Chromatographs (GCs) are the most expensive of the choices to purchase and operate. They are also the most accurate of the sensor choices. However, the level of specificity and detail offered in GC analysis is not really required in total hydrocarbon monitoring, and its complexity increases the maintenance burden. Another limitation: GCs are batch-type instruments: the sample must travel through a column, and this generally takes about twenty minutes or more for each sample. While there are regulations that specify GCs, they cannot be employed in continuous applications.

- Photo-ionization (PID) and infra-red (IR) sensors can be fairly accurate in low range monitoring of hydrocarbons. However, both of these sensor technologies also suffer from interference, they cannot detect all hydrocarbons, and they have significant calibration errors reading both higher concentrations as well as mixtures of hydrocarbons. Also, the optics used in these sensors can become fouled by condensation and particulate in the sample stream.

Of the four choices, then, Flame Ionization sensors (FID) are the most efficient, effective and economical for total hydrocarbon monitoring. The FID sensor response is appropriate for parts-per-million ranges of total hydrocarbon concentrations, and sampling is continuous. The FID sensor is capable of being packaged for industrial use, has better accuracy than catalytic, PID and IR, but requires less maintenance than a GC.

Not all FIDs are the Same

While flame ionization is the appropriate sensor technology for measuring total hydrocarbon levels in the parts-per-million (PPM) range, not all FIDs are the same. To be truly functional in industrial applications, select a total hydrocarbon analyzer that has all of the following characteristics:

Select an Industrial-Design Sensor

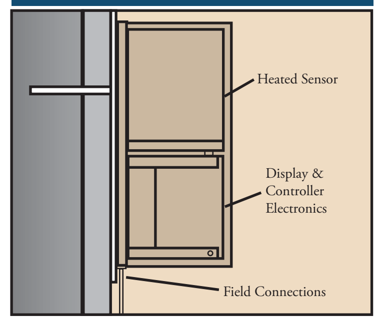
- Select an instrument that is capable of withstanding the rigors of industrial applications. Many FIDs offered to process industries are actually modified versions of fragile, rack-mounted, laboratory instruments. Many aspects of these products are features only if the instrument is used in a laboratory environment. When used in process applications, these same features become disadvantages.

- Only the Control Instruments Model 650 FID is a true workhorse industrial design. That's because Control Instruments has been manufacturing rugged, reliable instruments designed specifically for industrial processes since 1969. Over thirty-five years' worth of field-tested industrial process experience goes into the design of our FID.

Mount the Sensor at the Process

- Mounting at the sample point eliminates the long and expensive heated sample lines needed for rack mounted systems. One of the most obvious advantages of our Model 650 FID is how it mounts right on the process. Most FIDs are rack mounted in control rooms, but the NEMA 4-rated Model 650 sensor mounts directly at the sample point, indoors or outdoors. And mounting at the sample point also results in the fastest response time possible.

Duct Mounting Simplifies Operation



Avoid Sample Pumps: They Can Fail

- Pumps that must handle hydrocarbon sample streams are prone to failure and should be avoided. All Control Instruments FIDs employ an aspirator-driven sampling system that has no moving parts. This simple and extremely effective design requires very little maintenance, and its performance is unaffected by compounds in the sample stream. The aspirator, as well as the rest of the sample train, are composed entirely of corrosion-resistant stainless steel and hard-coated aluminum.

Fully Heat the Sensor Assembly

- A fully heated assembly prevents condensation and resulting maintenance and downtime problems caused by clogging. The entire sample train, from sample pickup point through to sensor exhaust, must be heated above the dew point of all vaporized materials in the process. Many FIDs only heat the flame cell (and require long, expensive heat traced sample lines), but the Model 650's aspirator-driven, duct mounted design allows the entire sensor to be fully heated, with no external sample lines.

- The entire sensor assembly is heated up to 200°C, sufficiently above the dew point to prevent sample condensation and clogging. Also, this duct-mount high temperature design is excellent when monitoring the high flash point solvent vapor compounds found in coating, graphic arts, and other industries.

The Sensor Must Have a Linear Response to Total Hydrocarbons

- Reliable, accurate response to total hydrocarbon levels is an essential requirement. The Model 650's high linearity assures precise readings over the entire monitoring range. The FID output may be displayed in one of three ways, as parts per million (PPM) of hydrocarbon, as PPM of Carbon by Volume (PPMCv), or as Milligrams of Carbon per Cubic Meter (mgC/m3).

Readings Must Accurately Convert to Weight Statements

- If the FID sensor's response is accurate and predicable, then readings can be reliably converted into weight statements and used to calculate emissions in pounds per hour (the actual lbs/hr statement is calculated using the FID output and the process' total flow measurement). Control Instruments' FID can output readings digitally so that meaningful VOC weight measurements can be calculated automatically.

The System Must Meet All Federal and State Requirements

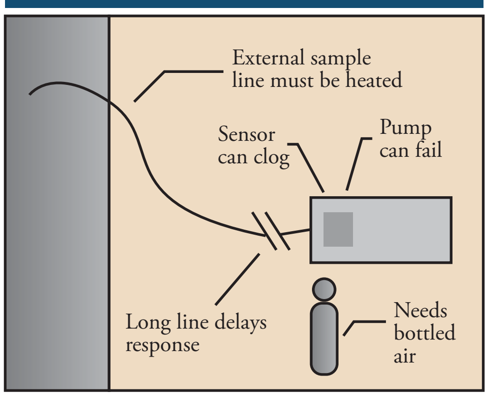
- The Control Instruments FID meets the performance criteria of CFR 40 Part 60, Method 25A. This sensor is an excellent choice for monitoring hydrocarbon destruction systems (such as catalytic or thermal incinerators), solvent recovery breakthrough, waste incinerators, and other applications.

The System Must Include Alarms as well as Integrated Relays

- The monitoring system should include alarm level and fault relays. These can be used to drive warning devices and to actuate dampers or other process operation settings. For example, an alarm relay can be used to initiate the steam-down cycle of a solvent recovery carbon bed when emission levels indicate that the bed is saturated.

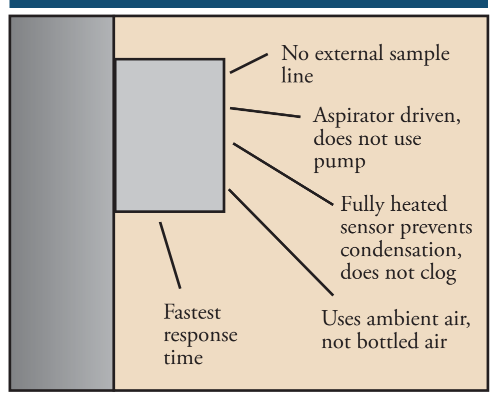
- The Model 650 has five built-in relays (SPDT 60 Watt contacts) for Warning, Danger, Fault, Horn and a fifth relay to indicate that the system is undergoing calibration.

Problems Found in a Typical FID



Most FIDs are bench or rack-mounted instruments, originally designed for laboratory use. Efforts to modify these laboratory instruments for industrial use have been based on incomplete knowledge of the industrial environment. These systems suffer from weaknesses in their design, including the use of heated external sample tubing, failure-prone pumps, partially-heated sensors, and reliance on bottled flame-support air.

Solutions in a Model 650 FID



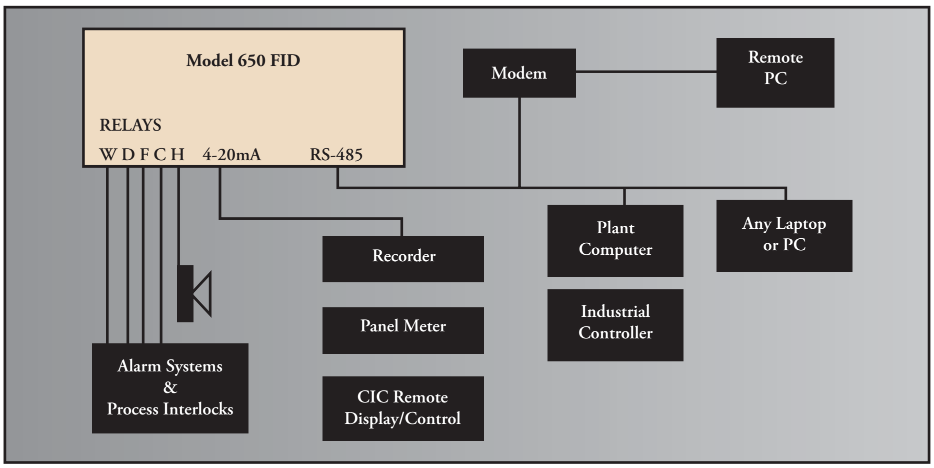
Control Instruments' Model 650 FID replaces each of the rack-mount's design weaknesses with a superior solution. For example, the Model 650's duct mount design eliminates heated external sample lines. The entire sensor section is heated to avoid condensation during sampling. Its air-aspirated sample draw system eliminated the use of failure-prone pumps. And the Model 650 uses ambient air - not bottled air - to support the flame.

The System Must be Accessible from a Remote Location

- Industrial emission monitoring calls for accurate record-keeping to prove compliance to the law. Any FID system used in environmental monitoring should include a digital output: this streamlines the collection and integration of readings for reporting to the government.

- The Control Instruments Model 650 FID system includes an RS-485 Modbus serial port and optional remote operator interface. This powerful feature allows operators and management to remotely request on-line, detailed information regarding the status of analyzer operation, including diagnostics and historical records.

Access & Control from Any Location



The System's Calibration & Maintenance Requirements Must be Low to Meet Down-Time Regulations

- Regulations state how much system down-time will be allowed for routine calibration and maintenance. Exceeding the down-time limits can result in penalties and headaches, so it is important that the system operate reliably with minimal maintenance. The Control Instruments' FID is designed to do just that.

- AutoCalibration is another advantage. The system can be programmed to run routine calibration checks and produce reports without any personnel involvement. This feature greatly reduces the manpower burden of running compliance monitoring systems.

For additional information about the Model 650 FID Total Hydrocarbon Analyzer, please call us today!

Control Instruments Corporation
25 Law Drive, Fairfield, NJ 07004
t: 973.575.9114 *f:* 973.575.0013
w: www.controlinstruments.com
e: sales@controlinstruments.com