



EXPERIENCE IN THE MOTOR VEHICLE INDUSTRY

Infrared Industries, Inc. (IRI) was founded in the late 1950s and initially produced infrared detecting elements, instruments, and control systems for the military and aerospace industries. When the company went public in 1959, the initial public offering was a huge success because they were considered a successful “space age” company. Infrared Industries continued to deliver solutions to these markets for many years, but also began to capitalize on that experience in the development of commercial products for the medical, automotive, industrial, analytic, research, petroleum, utilities, and environmental industries.

LEGACY PRODUCTS FOR THE MOTOR VEHICLE INDUSTRY

The first product that Infrared Industries developed that targeted the automotive market was an automotive bench, which was introduced to the market in 1971. Infrared Industries was the initial supplier of benches to some of the largest automotive manufacturers in the 1970s. Sun Automotive built an analyzer around the initial bench and Bear Automotive and Allen Test followed suit. Infrared Industries was a sole provider for the automotive market until around 1988 when new specifications were mandated.

In 1974, Infrared Industries introduced the **IR-702 Dual-Gas Analyzer into the market**. The IR-702 was used in the industrial, scientific, automotive, research, and other markets throughout the 1970s, 1980s, and 1990s. It was the first dual-gas analyzer of its kind—powerful, reliable, and extremely capable.

Infrared Industries also developed these products, which were variations on the IR-702:

- **IR-703 Single-Gas Analyzer**
- **IR-705 Single-Gas Dual-Range Sealed Analyzer**
- **IR-702 and IR-703A Mobile Analyzer**
 - Each analyzer was enclosed in a mobile cart and included a self-contained sample conditioning system.



IR-702 Dual-Gas Analyzer

IRI developed the **IR-7100 Infrared Bench**, **IR-7200 Infrared Bench**, and **IR-7500 Infrared Bench**, which were available in single-gas, dual-gas, and sealed gas configurations.

The **IR-700** series products were the predecessors to the **IR-2003**, which came out in 2003. To stay out in front of the competition, Infrared Industries put all its knowledge and experience to work to produce the most powerful analyzer to date: the **IR-208**, which was released in 2008.

CURRENT PRODUCTS FOR THE MOTOR VEHICLE INDUSTRY

Current Infrared Industries products for the motor vehicle industry include the following:

- **Gas Analyzers**
 - FGA4000XDS Gas Analyzer
 - FGA4500 Gas Analyzer
 - HM5000 Gas Analyzer
 - IR-208 Gas Analyzer
- **Optical Shelf**
- **NDIR Optical Benches**
 - IR-510 NDIR Optical Bench
 - IR-410 NDIR Optical Bench
- **High-Performance Pumps**
 - HM Pumps
 - XD Pumps
 - CEP-1 Pump
 - IR-1050 Centurion Explosion-Proof Pump
- **Filters**
- **Software**
 - IRI Display Software
 - InfraView Software

Infrared Industries Gas Analyzers

Infrared Industries is a leading developer and producer of state-of-the-art gas analyzer instrumentation. The company is widely respected and recognized in the automotive, oil and gas, industrial, environmental, analytic research, and utility industries for its rugged, reliable, accurate, and affordable gas analyzers.

FGA4000XDS Gas Analyzer

The **FGA400** was introduced in 1994, became the **FGA4000** in 1996, and now—through years of refinement and evolution—is the **FGA4000XDS**. The **FGA4000XDS** is a portable and dynamic gas analyzer that can speed up emissions testing, tune-ups, and real-time diagnostics testing. Accurate and quick—it offers immediate results in only two seconds and is the fastest analyzer on the market—it is the must-have solution for every performance tuning center and automotive or motorcycle service facility.



The **FGA4000XDS** measures up to five gases—hydrocarbons (HC), carbon monoxide (CO),

FGA4000XDS Gas Analyzer

carbon dioxide (CO₂), oxygen (O₂), and oxides of nitrogen (NO_x)—and displays the results on six super-bright, oversized, easy-to-read (even from 25 feet) LED displays. It also measures RPM on both two- or four-stroke engines all the way up to 30,000 RPM and calculates Air to Fuel Ratio (AFR), Lambda, and Grams per Mile (GPM) or Grams per Kilometer (GPK) in real time.

The **FGA4000XDS** features a heavy-duty dual filter with a water separator and constant water purge system. This unique and easy-to-service system allows the analyzer to operate trouble-free in the harshest environments.

The FGA4000XDS Gas Analyzer meets or exceeds the following standards:

- State of California Bureau of Automotive Repair (BAR) BAR-90 certified
- State of California Bureau of Automotive Repair BAR-97 compliant
- International Organization of Legal Metrology (OIML) Class 1&0 Gas Standards
- Canada's AirCare Vehicle Emissions Testing Program approved

What sets the FGA4000 apart from competitive products?

- **Fastest response time (along with the FGA4500) of any gas analyzer on the market: under 2 seconds** (versus 16 – 20 seconds for competitive products)
- **Has a 2%** (versus 5% for competitive products) **full-scale accuracy and actual gas measurement** (versus guesstimating certain gases based on formulated calculations, which many competing products do)
- **Integral water separator and purge pump continuously remove water from the exhaust during testing** (versus competitive products, which use water traps that require constant service)
- **Easy to clean** (versus having to return competitive analyzers to the factor for services and weeks of downtime)
- The **FGA4000XDS** is **smaller than other gas analyzers** of its kind on the market, **which increases its portability.**
- The **FGA4000XDS** has more enhanced **features** than competitive products. **The FGA4000XDS feature set includes all the following:**
 - Tachometer to measure engine speeds of up to 30,000 RPM
 - Instantaneous calculations of Grams per Mile (GPM) or Grams per Kilometer (GPK)
 - Instantaneous calculations of Air to Fuel Ratio (AFR) and Lambda (λ)
 - Simulated IM120 and IM240 tests
 - Eight analog outputs for easy connection to a dynamometer, chart recorder, or data acquisition console to conveniently display all essential information
 - Internal data record feature, which allows the store of all parameters and downloading the information to a computer or replay to the analyzer screen
 - Printer, which makes it possible to print a shop name, address, and other text on a printed document for the customer's records
 - Digital bi-directional RS-232 communication, allowing remote operation of the analyzer and data storage and graphical interpretation through a PC
 - Software tools such as Infrared Industries' **IRI Display**, which makes possible the control and display of the FGA4000XDS Gas Analyzer from a Windows-based software console

FGA4500 Gas Analyzer

The **FGA4500 Gas Analyzer** is the sister of the FGA4000XDS and provides an LCD screen with multi-language capability. Currently it comes with English, Spanish, and Arabic; it can be customized to include other languages. The **FGA4500** is a portable and dynamic gas analyzer that can speed up emissions testing, tune-ups, and real-time diagnostics testing. Accurate and quick—it offers immediate results in only two seconds and is the fastest analyzer on the market—it is the must-have solution for every performance tuning center and automotive or motorcycle service facility.



FGA4500XDS Gas Analyzer

The **FGA4500** measures up to five gases—hydrocarbons (HC), carbon monoxide (CO), carbon dioxide (CO₂), oxygen (O₂), and oxides of nitrogen (NO_x). It also measures RPM on both two- or four-stroke engines all the way up to 30,000 RPM and calculates Air to Fuel Ratio (AFR), Lambda, and Grams per Mile (GPM) or Grams per Kilometer (GPK) in real time.

The **FGA4500** features a heavy-duty dual filter with a water separator and constant water purge system. This unique and easy-to-service system allows the analyzer to operate trouble-free in the harshest environments.

The FGA4500 Gas Analyzer meets or exceeds the following standards:

- State of California Bureau of Automotive Repair (BAR) BAR-90 certified
- State of California Bureau of Automotive Repair BAR-97 compliant
- International Organization of Legal Metrology (OIML) Class 1&0 Gas Standards
- Canada's AirCare Vehicle Emissions Testing Program approved

What sets the FGA4500 apart from competitive products?

- **Fastest response time of any gas analyzer (along with the FGA4000XDS) on the market: under 2 seconds** (versus 16 – 20 seconds for competitive products)
- **Has a 2%** (versus 5% for competitive products) **full-scale accuracy and actual gas measurement** (versus guesstimating certain gases based on formulated calculations, which many competing products do)
- **Integral water separator and purge pump continuously remove water from the exhaust during testing** (versus competitive products, which use water traps that require constant service)
- **Easy to clean** (versus having to return competitive analyzers to the factor for services and weeks of downtime)
- The **FGA4500** is **smaller than other gas analyzers** of its kind on the market, **which increases its portability.**
- The **FGA4500** has more enhanced **features** than competitive products. **The FGA4500 feature set includes all the following:**
 - Tachometer to measure engine speeds of up to 30,000 RPM
 - Instantaneous calculations of Grams per Mile (GPM) or Grams per Kilometer (GPK)
 - Instantaneous calculations of Air to Fuel Ratio (AFR) and Lambda (λ)
 - Simulated IM120 and IM240 tests
 - Eight analog outputs for easy connection to a dynamometer, chart recorder, or data acquisition console to conveniently display all essential information

- Internal data record feature, which allows the store of all parameters and downloading the information to a computer or replay to the analyzer screen
- Printer, which makes it possible to print a shop name, address, and other text on a printed document for the customer's records
- Digital bi-directional RS-232 communication, allowing remote operation of the analyzer and data storage and graphical interpretation through a PC
- Software tools such as Infrared Industries' **IRI Display**, which makes possible the control and display of the FGA4500 Gas Analyzer from a Windows-based software console

HM5000 Gas Analyzer

Infrared Industries started development on the **HM5000** in 1998 and it was produced in 2002. This analyzer not only tests for emissions, but also includes onboard diagnostics. The HM5000 can be connected to a vehicle's exhaust while it is being driven and in less than a second the composition of the exhaust gas can be seen, including exactly how much Hydrocarbons (HC), Carbon Monoxide (CO), Carbon Dioxide (CO₂), Oxygen (O₂), and Oxides of Nitrogen (NO_x) the vehicle is emitting.



HM5000 Gas Analyzer

The HM5000 measures and records a vehicle's engine speed and gives instantaneous readings of up to 5 gases, Air to Fuel (AFR) Ratio, Grams Per Mile (GPM), and Lambda which help in tuning a carburetor or injection system. The HM5000 interfaces to a PC or a PDA for complete control, display, and graphing capability. With its analog outputs, the HM5000 can be connected to a data acquisition system or run analog gauges. The data in the HM5000 can also be recorded while on a road test or taking laps around the track. Upon returning, the HM5000 can be connected to a PC and a history of the test drive can be downloaded for analysis. The HM5000 has multi-language capability. Currently it comes with English, Spanish, and Arabic; it can be customized to include other languages.

The HM5000 Gas Analyzer meets the following standard:

- State of California Bureau of Automotive Repair (BAR) BAR-97 compliant

What sets the HM5000 apart from competitive products?

- **Fastest response time of any handheld gas analyzer on the market: under 2 seconds** (versus 16 – 20 seconds for competitive products)
- **Completely self-contained with long life Li-Ion battery** (versus being tethered to an accessory box that can be cumbersome)
- **Has a 2%** (versus 5% for competitive products) **full-scale accuracy and actual gas measurement** (versus guesstimating certain gases based on formulated calculations, which many competing products do)
- **Internal water separator and purge pump that continuously remove water from the analyzer during exhaust testing** (versus competitive products, which use water traps that require constant service)
- **Easy-to-clean and service sample cell** (versus having to return competitive analyzers to the factor for services and weeks of downtime)
- The **HM5000** has a **richer feature set** than competitive products and **includes all the following:**
 - Tachometer to measure engine speeds of up to 15,000 RPM

- Instantaneous calculations of Grams per Mile (GPM) or Grams per Kilometer (GPK)
- Instantaneous calculations of Air to Fuel Ratio (AFR) and Lambda (λ)
- Simulated IM120 and IM240 tests
- Graphical display
- Internal data record feature, which allows the store of all exhaust readings for downloading the information to a computer or replaying to the analyzers display
- Printer, which makes it possible to print a shop name, address, and other text on a printed document for the customer's records
- Software tools such as Infrared Industries' **IRI Display**, which makes possible the control and display of the HM500 Gas Analyzer from a Windows-based software console

IR-208 Gas Analyzer

The **IR-208 Gas Analyzer** is the latest evolution of Infrared Industries' industrial/analytic analyzer. Introduced in 2008, it eclipses all of its predecessors. Infrared Industries designed the **IR-208** to be a platform analyzer, allowing it to be specifically tailored to a customer's needs. The customer stipulates which gases they want to measure and over what ranges. The **IR-208** features enhanced capabilities, enabling it to utilize infrared and additional sensor technologies. This enables the **IR-208** to offer the customer a choice of over 250 gases.



IR-208 Gas Analyzer

The IR-208 Gas Analyzer meets the following hazardous area definitions and standards:

- Dust-protected enclosure
- RS-232 bi-directional digital communication
- 4-20 mA, 0-100 mV, and analog DC outputs in the range the customer specifies

What sets the IR-208 apart from competitive products?

- It provides a choice of more than 250 gases that can be measured.
- Infrared Industries can completely customize the analyzer to the exact gases and ranges the customer needs.
- Up to six gases can be measured by one analyzer.
- Up to 16 analyzers can be viewed, managed, and logged from one PC console with the addition of **InfraView** software.

Infrared Industries Optical Shelf

The **Optical Shelf** is a complete analyzer without a display and cover and is built by Infrared Industries to be used as a sub-system by an OEM or a company that wants to install a complete gas analyzer sub-system into their system. The analyzer can also be linked to a computer and communications with the analyzer can be done through a computer keyboard and monitor. A full digital library (DLL) is available to facilitate software integration into a host system.

Infrared Industries NDIR Optical Benches

Infrared Industries makes NDIR optical benches for integration into OEM gas analyzer systems. Infrared Industries benches offer a wide range of abilities and features including custom detectors, optical filters, custom samples cells, sources, specialized materials, and mechanical designs.

Infrared Industries was the initial supplier of benches to some of the largest automotive manufacturers in the world during 1970s, 1980s, and 1990s—including North American Draeger, Sun Automotive, Bear Automotive, Allen Test—and has built upon that technology to offer benches today that fit a wide range of needs. Today, Infrared Industries builds OEM benches for Nova Analytical and many other well-recognized and respected companies.

IR-510 NDIR Optical Bench

The **IR-510 NDIR Optical Bench** offers greater design flexibility to OEMs due to its small overall size and low power consumption, combined with the ability for Infrared Industries to customize subsystem designs to OEM specifications. It measures up to three gases simultaneously through NDIR. Two auxiliary sensor inputs are available for use with electrochemical, paramagnetic, or other gas sensor technologies.

The IR-510 NDIR Optical Bench features the following:

- RS-232 bi-directional digital communication
- 1V, 5V, or 10V DC analog outputs
- 4-20 mA output (* optional feature)
- Onboard data logging

What sets the IR-510 apart from competitive products?

- It provides a choice of more than 250 gases that can be measured.
- It offers enhanced optics for low-level gas sensing.
- Up to 16 analyzers can be viewed, managed, and logged from one PC console with the addition of **InfraView** software.



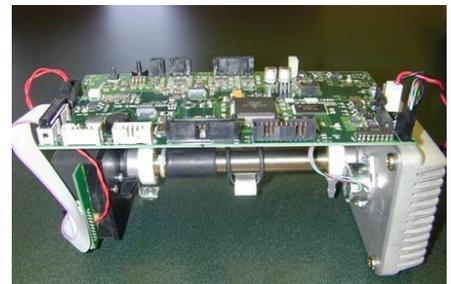
IR-510 NDIR Optical Bench

IR-410 NDIR Optical Bench

Introduced in 2009, the **IR-410 NDIR Optical Bench** is a state-of-the-art NDIR optical sensor designed to meet worldwide gas measurement standards. Up to three gases can be measured under infrared from a choice of over 250 under infrared technology. The **IR-410** also features two additional optional ports for additional gas sensor inputs.

The IR-410 NDIR Optical features the following:

- RS-232 bi-directional digital communication



IR-410 NDIR Optical Bench

- 4-20 mA and 0-100 mV analog outputs (* optional feature)
- 1V, 5V, or 10V DC analog outputs
- Onboard data logging

What sets the IR-410 apart from competitive products?

- It provides a choice of more than 250 gases that can be measured.
- It offers enhanced optics for ultralow-level gas sensing.
- Up to 16 analyzers can be viewed, managed, and logged from one PC console with the addition of **InfraView** software.

Infrared Industries High-Performance Pumps

Infrared Industries has designed compact, high-performance diaphragm pumps, available at a competitive price. All of IRI's pumps are balanced to cut down on vibration, reduce noise, and extend the life of the pump.

HM Pumps

There are two versions of the **HM Pump**: the single-headed **HMS Pump** and the dual-headed **HMD Pump**. These are offered in various configurations to meet your needs.

The **HMS Pump** is a brushless DC motor-driven, single-head micro pump that handles liquids or gases. Its compact size allows it to be used in systems where size and weight are a factor. It can be used for vacuum, pressure, or alternating vacuum/pressure operations and in low flow applications. It handles a pressure range of 0-24+ PSIG, vacuum range of 0-20 In Hg, and has a maximum unrestricted flow range of 2.5 LPM.



HMS Pump



HMD Pump

The **HMD Pump** is a brushless DC motor-driven, dual-head micro pump for handling gases and liquids. One head can be used for low flow and one for high flow. Also, one head can be used for air and one for liquid. Each head can be configured for vacuum operation, pressure operation, or alternating vacuum and pressure operation. It handles a pressure range of 0-24 PSIG, vacuum range of 0-20 In Hg, and has a maximum unrestricted flow range of 5 LPM.

XD Pumps

There are two versions of the **XD Pumps**: the single-headed **XDS Pump** and the dual-headed **XD Pump**. These are offered in various configurations to meet your needs.



XDS Pump

The **XDS Pump** is a DC motor-driven, single-head miniature pump that handles liquids or gases. It can be used for vacuum, pressure, or alternating vacuum/pressure operations and in low flow applications. It handles a pressure range of 0-25 PSIG, vacuum range of 0-25 In Hg, and has a maximum unrestricted flow range of 6.0 LPM.



XDS Pump

The **XDT Pump** is a DC motor-driven, dual-head miniature pump that handles both gases and liquids. Each head can be configured for vacuum operation, pressure operation, or alternating vacuum and pressure operation. It handles a pressure range of 0-28 PSIG, vacuum range of 0-25 In Hg, and has a maximum unrestricted flow range of 11 LPM.

CEP-1 Pump

The **CEP-1 Pump** is a heavy-duty industrial pump designed for applications where extend or continuous operation is required. This pump is of all metal and ball bearing construction featuring a brushless AC motor for long life and a Teflon diaphragm to assure exception chemical compatibility.

This pump handles a maximum pressure range of 23.4 PSIG, a maximum vacuum In HG of 21.4, a maximum flow of 6.8 LPM, a maximum flow of 0.24 CPM, and a maximum BAR of 1.61.



CEP-1 Pump

IR-1050 Centurion Explosion-Proof Pump

The **IR-1050 Centurion Explosion-Proof Pump** is UL and CSA listed Class I, Division 1, Group C and D and Class II, Group F and G certified. It includes explosion-proof motors on your choice of a single-head, double-head, or quad-head pump.

The single-head handles a pressure range of 6.1-71 PSIG, the dual-head handles a pressure range of 55-75 PSIG, and the quad-head handles a pressure range of 70-75 PSIG, all depending on how they are configured. The single-head has a vacuum range of 8.4-25.2 In Hg, the dual-head has a vacuum range of 24-28.4 In Hg, and the quad-head has a vacuum range of 24.8-29.3 In Hg, depending on configuration. The single-head has a maximum flow range of 9.4-30.2 LPM, the dual-head has a maximum flow range of 51.1-73, and the quad-head has a maximum flow range of 100-142.2, depending on configuration.



*IR-1050 Centurion
Explosion-Proof Pump*

Infrared Industries Filters

Infrared Industries makes filters that remove particle sizes down to one micron and coalescing filters for removing water vapor and other contaminants in the sample stream.



Infrared Industries Filters

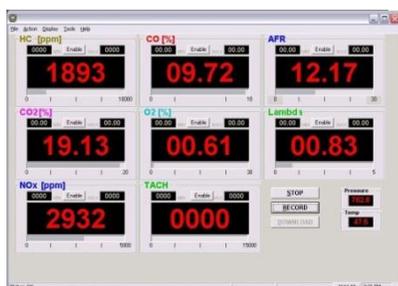
IRI offers a filtration system specifically designed for automotive gas analyzers. The first stage is a water separator for the filter system and is designed to separate out the water and moisture from the sample stream and expel it from the system on a continuous basis. The second stage is a specialized tri-laminate coalescing filter for fine particle and residual moisture removal.

Why buy these filters from Infrared Industries? Infrared Industries has spent years perfecting the system for optimal performance and reliability. IRI also makes them in-house so they can offer them at a low cost and the customer gets the convenience and assurance of buying them from a trusted source.

Infrared Industries Software

Infrared Industries has two software programs that allow the user to remotely control and display their gas analyzer.

IRI Display



IRI Display Software Console

IRI Display Software from Infrared Industries is a Windows-based software program that allows remote control and display of the Infrared Industries FGA4000XDS, FGA4500, and HM5000 Gas Analyzers. **IRI Display** allows the user to view, store, plot, and print data in addition to controlling the analyzer.

If a PC is not near when an emissions test is run, up to 30 minutes of data can be recorded and saved to the analyzer. Later, the data can be downloaded to a computer and played back through **IRI Display**.

InfraView Software



***InfraView Software
Manages Several Analyzers***

InfraView from Infrared Industries is an easy-to-use yet powerful software program for control and display of its industry-leading portfolio of gas analyzers. Up to 16 analyzers can be managed and viewed from one PC console, which makes efficient operation possible.

InfraView includes datalogging, which allows unlimited recording of test data to be stored on a PC hard drive. **InfraView** is available for all Infrared Industries gas analyzer models.

Reasons to Choose Infrared Industries

Infrared Industries has many years of experience working with companies who need the very best emissions monitoring instruments. IRI reinvests the knowledge gained from that experience back into the products and has honed and refined the technology and end products they deliver to customers.

What are the reasons to choose Infrared Industries?

- Fifty years' experience and industry-leading innovation, which enable Infrared Industries to stay forefront and relevant in meeting customers'—and the market's—needs
- Many years of experience working with the top automotive companies in the world
- Customization of products to specific features and options and other customer requirements
- Maintaining quality through manufacturing its own pumps, filters, optics, optical benches, enclosures, and pneumatics
- Passing on cost savings to the customer
- Software developed by Infrared Industries, which is integrated between the bench and analyzer and can be tailored for the customer
- Exceptional and responsive customer support—one call fixes it all
- Outstanding product life and continuity of service, giving you the assurance that your investments with Infrared Industries will be well supported long into the future
- A wide range of products with capabilities not found in competitive products and from one source
- Infrared Industries' extensive and well-regarded background in the aerospace and military industries and conversion of that expertise into civilian products

Applications for Infrared Industries Products

Applications where Infrared Industries analyzers are being used in the motor vehicle market are:

- Perform real-time road testing
- Detect fuel or emission related problems
- Verify carburetor mixture
- Measure air pump performance
- Measure catalytic converter performance
- Find vacuum and exhaust leaks
- Pre-check for smog test
- Measure engine RPM for two- and four-stroke or rotary engines
- Adjust fuel injection or carburetor mixture
- Tune for vehicle's optimum performance
- Do performance tuning and emissions testing for motorcycles

Future Plans

Infrared Industries is developing the next generation of environmental monitors, which will have the ability to measure more gases over a wider diversity of ranges within a single analyzer. The future of the market is multi-gas digital analyzers with software integration, which will be a real boon to the customer in cost savings and flexible functionality. Infrared Industries will continue to be on the leading edge of this new wave of environmental monitoring instruments for the automotive/motor vehicle market.

Bringing You Tomorrow's Technology...Today

Infrared Industries combines over 50 years of experience and innovation with cutting-edge technology, comprehensive manufacturing capabilities, and personalized service to optimize your organization's competitive edge.

We help you verify that you meet federal compliance standards for emissions, improve processes, cut operating costs, and capitalize on untapped opportunities for profit.

Improving processes, cutting costs, realizing new profit streams...it all starts with measuring the things you can't see. And that all starts with Infrared Industries—bringing you tomorrow's technology...today.