INSIGHT ANALYTICAL — MAKING MEASUREMENTS MATTER

Complete Product Overview

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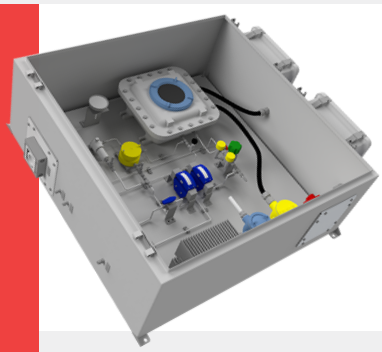
Insight-Analytical.com



Custom Engineered Solutions to Real World Problems

Insight Analytical Solutions partners with our clients to provide practical answers to all their measurement needs. From front end engineering to field service and support, Insight provides end-to-end solutions to difficult measurement applications in a wide range of industries. Our experienced team ensures an engineered product that meets customer requirements and provides exceptional performance, value and serviceability.

JP3 Critical Data. Real Time.

Process Insights — Premium Insights Into Process

ZEGAZ instruments

BARBEN ANALYTICAL

MICRO by Sensirion

Rigaku — Applied Rigaku Technologies, Inc.

RIKEN KEIKI

MARQMETRIX®

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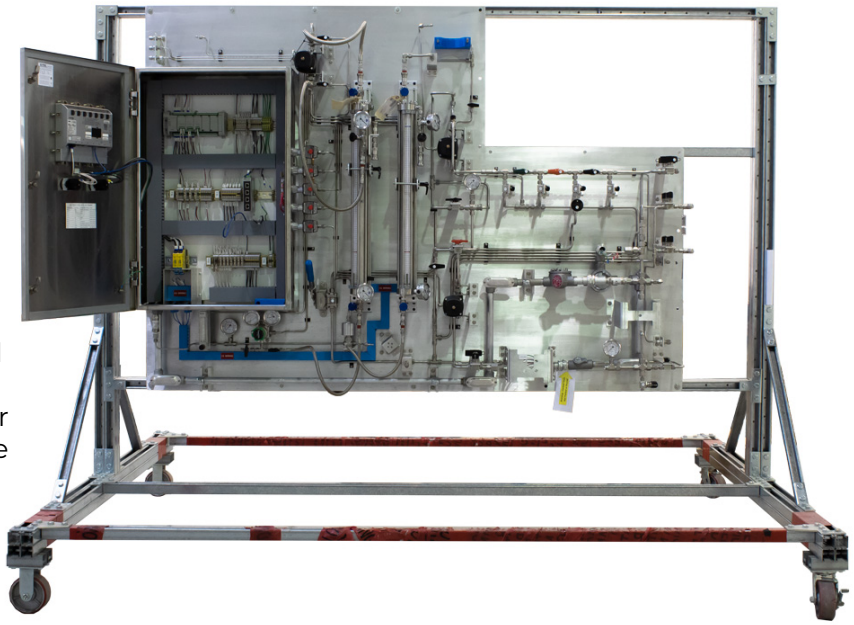
Applications

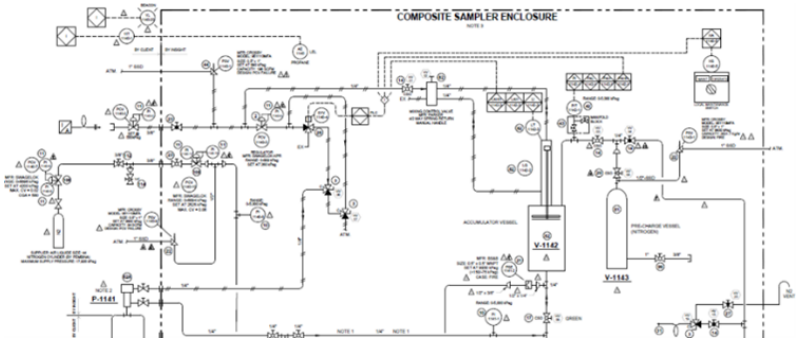
INSIGHT ANALYTICAL

Systems Integration



Insight's team of process analyzer engineering and technology experts have decades of experience in custom integration and sample system design. Our analyzer specialists provide support for every phase of your project, including:

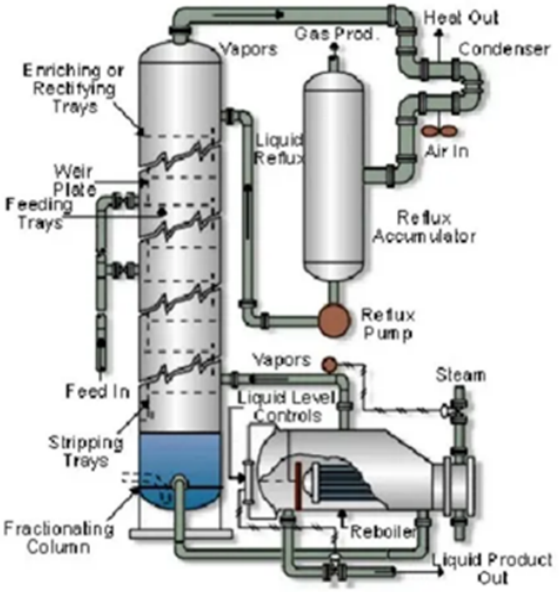
- Technical Project Definition. (Scope)
- Front End Engineering Design. (FEED)
- Detailed design.
- Manufacturing, integration and testing.
- Field commissioning and ongoing support.



Our integrated sample handling and fabrication capabilities have been applied on process analyzer systems around the world. Capabilities include:

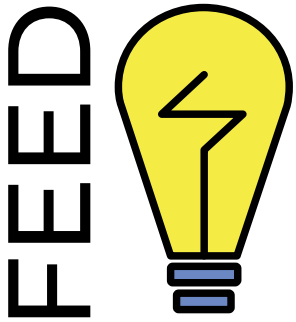
- Composite Sampler/Sample Collection System Design and Integration.
- Customized Grab Sampling Systems.
- Gas or Liquid Phase Analyzer Sample Handling/Transport Systems.
- Automated Grab Sampling Stations for Loading Applications.
- Winterization/Climate Control Analyzer System Packages.
- Analyzer System Integration and Shelter Fabrication.
- Sample System Design and Custom Engineering Packages.
- Analyzer Start-Up and Commissioning Services.
- Process Analyzer Training.
- Sample System Consulting.

Technical Project Definition (Scope)



No project should begin without a clear understanding of the needs and requirements of all parties involved. Often, this requires an evaluation of any necessary reporting standards, custody transfer agreements or an in-depth understanding of the process. Whether the analytical measurement is for a crude oil blending skid, a fractionation tower, emissions monitoring or wastewater treatment, application knowledge can be the key to a successful project. We interface with the customer as well as the engineering company to evaluate the application requirements, available technical solutions and provide a preliminary engineering estimate. We also identify key stakeholders throughout the operation, and their role-specific requirements of the analytical measurement. Where appropriate, our skilled field personnel will make on-site visits to evaluate requirements.

Front End Engineering Design



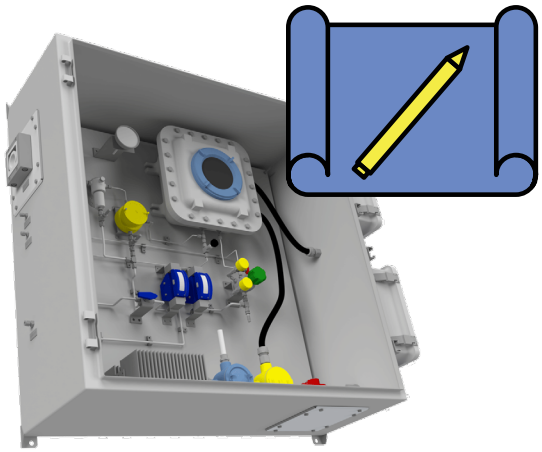
Measurement and analysis projects, whether through grab sampling, composite sampling or online process analytics; require specific expertise, knowledge and experiences. It is often estimated that 80 to 90% of the issues with process analyzer installations are sample system related. Insight Analytical has decades of experience in sample system design and specifications for process analyzer systems and fundamental knowledge of sampling techniques, spectroscopy and process gas chromatography as applied to analyzer systems. Our team trains companies all over the world to design proper sample systems and can facilitate the design process for your upgrade or new installation.

Front End Engineering Design (FEED) entails basic engineering to define the scope of work, the technical requirements as well as rough investment cost for the project. The FEED package may be used as the framework for a standardized bid package to integrators and suppliers.

Insight specializes in ensuring close communication between the end users, plant operations and other stakeholders to ensure that all the clients project specific requirements are met. This helps avoid significant changes during the project bid and execution phase. A thorough and well-defined bid package shall be one of the deliverables from FEED and ensures that a complete framework, and scope, and schedule is presented to all potential suppliers.

Brownfield projects add additional complexity to the FEED. The first step must include efforts to document what is currently installed and to confirm the information that will be used as the basis from which the project can start. Site surveys and evaluation of the operability and maintenance requirements of existing systems are essential.

Detail Design



“The devil is in the details” implies that the details of a plan, while seeming insignificant, may contain hidden problems that threaten its overall feasibility. This is certainly the case when designing analytical measurement installations such as grab sampling, composition sampling or process analytical systems. Careful attention to every nuance is important in laying out a sample system and many designs are rendered impractical because fundamental operating considerations are overlooked. At Insight Analytical, we provide years or experience in process analytical applications to design effective and maintainable systems which ensure that critical requirements such as hazardous area certifications and boiler safety documentation are met, as well as the operational requirements of delivering a timely and representative sample to an appropriately chosen analyzer.

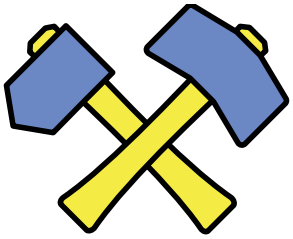
Process analyzer installations have multiple facets and these all must be considered carefully. Timely and appropriate interaction with all stakeholders, including process/chemical engineers, control system engineers, civil and piping and construction engineer, are all necessary to ensure that all the systems requirements are achieved.

An online analyzer integration project may consist of some or all of the following deliverables:

- Process Analyzers.
- Sample Extraction Probes.
- Sample Transport System .
- Sample conditioning system.
- Calibration / Carrier Gas Cylinders.
- Calibration System.
- Shelter Enclosure or Sample Panel.
- Sample Recovery system.
- System Documentation.

We develop three-dimensional models of every system we build prior to construction. 3D modeling for design allows the designer to see what they would not see when designing in 2D. 3D modeling help the designers and end users visualize space requirements, access to valves and controls and see how calibration and manual operations can be enacted. When shared with the end user, a consensus on layout and requirements can be assured before construction.

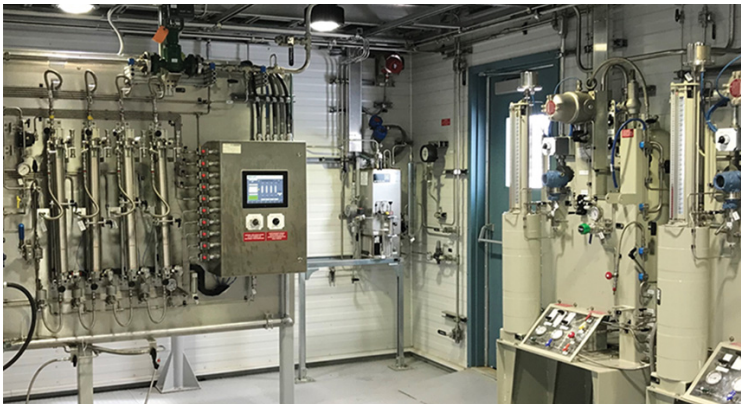
Manufacturing and Fabrication



Insight typically fabricates and tests its integrated systems in Calgary, but we have worked in collaboration with other local suppliers such as local Swagelok distributors across North America. Our team can provide design, engineering, testing and service whether the project is done locally or remotely. In both cases, we bring our extensive knowledge, proven practices and attention to detail to ensure the final product is built to meet the agreed upon specifications.

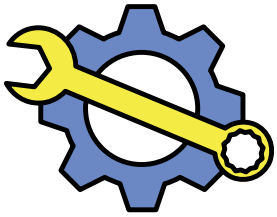
We view no job as too big or too small. From custom vaporization stations to grab sample systems to control panels to full analyzer shelters, all of our projects are fabricated in a 150,000 sq ft shop in Calgary northeast.

We have multiple loading facilities including drive in ramps, loading docks and a full overhead crane to take large projects such as full shelters in and out of the facility. It is during fabrication that our detail to design pays off, as our detailed bills of materials and full 3-D assembly models allow production and assembly to proceed in a timely and efficient manner. Journeymen electricians all the wiring and electrical, and our trained certified instrumentation technicians perform all internals.



Comfortably located between the airport and downtown, we are always happy to host a full factory inspection test. We provide detailed inspection test plans during our own internal inspection and will design a custom factory acceptance test plan to meet all your requirements. We pride ourselves on being full ready for acceptance tests and to have done everything possible to ensure that there are few punch list items to be addressed.

Service and Support



Insight has factored trained support out of three centers, Calgary, Edmonton and Grande Prairie. Our service support team has years of experience and a commitment to excellence. Our installation and start-up services get you up and online, while keeping you on schedule. With comprehensive expertise and dedication to meeting your schedule, our technicians will start up your products, ring out all wiring and ensure that data communications and control are implemented to your satisfaction.

Once your system is through dry commissioning, it is now ready undergo some performance testing. Our process is designed to systematically evaluate performance and readiness,and ensure all aspects of the system are performing as designed. As well, we will take laboratory samples for analysis, whether to prove system performance versus a third-party standard, or as part of building a chemometric model for an online analyzer.

INSIGHT ANALYTICAL

Composite Sampling
For Liquid Hydrocarbons

Composite samplers are designed to sample hydrocarbon liquids with densities of 350 – 900 kg/m3, including crude oil, condensate, and Natural Gas Liquids (NGLs).Composite samplers are capable of collecting thousands of individual samples that are all stored in the accumulator portion of the sampler. This collection of samples represents a composite sample of the process over time.

Insight Analytical's composite sampler includes a mixer and an integrated constant pressure (piston) cylinder for NGLs and high vapor pressure samples. This design allows for filling directly from the accumulator into the cylinder after mixing. This improves sample integrity by avoiding the need to connect cylinders to the accumulator with tube fittings and creating the potential for ambient air to contaminate the sample. This also simplifies the composite sampler and reduces sampling errors when piston cylinders are filled for off-site analysis. The composite sampler is designed to operate with Insight's own piston cylinders or third-party piston cylinders.

Specifications

Design Conditions (Process)

Maximum Operating Pressure:	1,440 psig (9930 kPa)
Density:	350 to 900kg/m³ (21.8 to 56.2 lbs/ft³)
Vapor Pressure:	8.7 to 21.7 psig (60 to 150 kPag)
Piping Specifications:	600# ANSI
Service:	Liquid Hydrocarbons (crude oil, condensate, or NGLs)
Actuation Gas Max Design:	67/100 psig (690 kPag) Instrument Air or N_2
Actuation Gas:	100 psig (690 kPag) Instrument Quality Gas or N_2

I/O:

- Level
- N_2 Pressure
- Operation/ Maintenance Switch
- 4-20 mA
- 4-20 mA
- Dry Contact

Power Supply Options

Pneumatic	120 VAC @ 1 Amp
Actuation Signal	24 VDC Option
Customer supplied	Pneumatic pressure

Area Classification:

- Optional Outdoor Enclosure
- Class I, Div/Zone 1 IIB T3, Enclosure rating NEMA 4X
- Class I Division 1 Groups C and D T3 and Class I Zone 1 IIB T3
- CRN / AB83 and or Provincial Equivalent

Process Connections

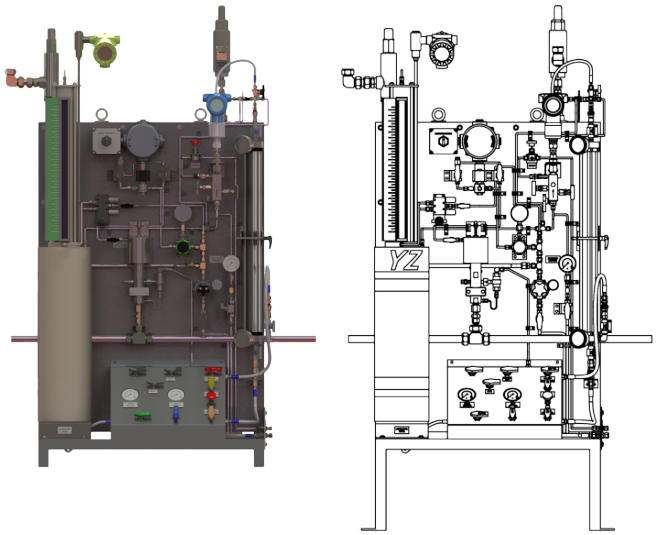
Sampling Pump:	3/8"NPT inlet / outlet connection
Pump Displacement per Stroke:	Adjustable from 0.5 to 1.8 cc/stroke
Accumulator Vessel:	Actuation gas max design 100 psig (690 kPag)
	Process design pressure 1800 psig (12411 kPag)

Tubing

- 1/8" x 0.028" 316LSS
- 1/4" X 0.035" 316LSS
- 3/8" X 0.049" 316LSS
- 1/2" X 0.049" 316LSS

Single Phase Sampling

One of the most important considerations when sampling is the need to maintain a single phase sample at all times. Sufficient pressure is required to keep lighter hydrocarbons in the liquid phase. The Insight composite sampler achieves single phase sampling by maintaining the “pre-charge” pressure for NGLs in both the accumulator and the piston cylinders. When actuated from a customer supplied source, the sample pump pushes against this pre-charge pressure to fill the accumulator under pressure. This pre-charge pressure ensures that lighter hydrocarbons (like ethane or propane) do not flash into the vapor phase when filling.



Sampling

The integrated sample pump is pneumatically actuated from a customer supplied signal. This sample is then collected in an accumulator until 80% full. A level transmitter and pressure transmitter are included to provide analog (4-20 mA) signals to a customer supplied PLC or flow computer/RTU. This allows for automated notification of when the accumulator is full or when pre-charge pressure is lost. A position switch provides status input to the customer supplied PLC/RTU to indicate when the sampler is in operation or maintenance mode. This ensures that safe maintenance can occur without sampling. Color coded valves and a schematic (P&ID) assist operations personnel with mixing, sampling and piston cylinder replacement. All equipment is mounted on a raised platform to allow for simplified operation and maintenance. The entire design follows API (American Petroleum Institute) Report 8.2 for composite sampling including tubing slope and diameter.

Features and Benefits

- Raised platform for easier operation and maintenance.
- Optional heated, insulated enclosure with gas detection and temperature control for outdoor mounting in cold climates.
- Positive displacement pump with adjustable sample injections per stroke.
- Sample accumulator with mixer to improve sample integrity and minimize stratification prior to filling piston cylinders. (ie: oil and water)
- Level transmitter and visual level indicator to indicate accumulator fill position locally or remotely with analog output for customer supplied PLC/RTU.
- Pressure transmitter to indicate pre-charge pressure in the accumulator and piston cylinders for improved sample integrity of NGLs and lighter hydrocarbon samples.
- Accumulator volumes of 1.5, 3 or 5 gallons. (5.7, 11.4 or 18.9 liters)
- Sample pump can be mounted locally.

INSIGHT ANALYTICAL

Automatic Sampling
For Liquid Hydrocarbons

Manual sampling of hydrocarbon liquids, crude oil, condensate and Natural Gas Liquids (NGLs) is usually left up to operations.

Sampling procedures may be inconsistent from one operator to another introducing sampling errors and time stamping issues. Automating the entire sampling process can reduce safety concerns associated with manual sampling, improve measurement quality, provide date & time stamped samples for fiscal accounting, along with freeing up operations or sampling at times when facilities are unmanned. Automated sampling provides a solution to ensuring quality standards are met, regardless of when trucks arrive.

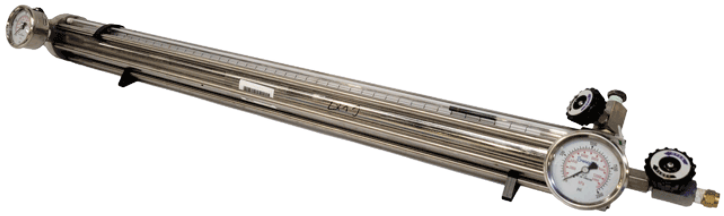
Why Automatic Sampling

- Minimized reliability and maintenance issues.
- Sampling terminates at the 80% level without operator intervention
- Automated quality measurement with a 24-hour solution.
- Single cylinder or multi-cylinder sample panel options .
- Multiple ways to initiate sampling both manually and automatically.
- Controlled cylinder fill rate consistent with best practices as described by API 8.1.
- Automatic recording of chain of custody information in the data historian.
- Consistent sampling for all types of liquid hydrocarbons at unmanned facilities.
- No required maintenance time from Instrument personnel or excessive time from operations.
- One system may have up to 20 sample cylinders mounted in a building, typically in groups of 4 per panel.

Single Phase Sampling

Glycol displacement cylinders are commonly used for crude oil, condensate and NGL samples. They can be filled under pressure, ensuring that volatile components like ethane, propane or butane are not lost from the sample or allowed to flash. Glycol filled sampling is not suitable when water or BS&W are required measurements.

Piston cylinders (also referred to as constant pressure cylinders) are more costly but suitable for all liquid hydro-carbons samples including water in oil or condensate. Nitrogen is allowed to bleed off from one end of the cylinder allowing sample to enter at the other. This maintains pressure while liquid sample enters the cylinder. A slow bleed of the nitrogen ensures the piston fills under constant pressure and no components are allowed to flash.



Glycol Filled Cylinders

- Internal neck formed for easy cleaning.
- Heavy wall neck to prevent splitting and flaring.
- Body made of seamless stainless steel tubing.
- Aircraft quality NPT threads.
- Working pressures to 1,800 psig.
- 316L stainless steel.

Floating Piston Cylinders

- ANSI 600# Max working pressures up to 1440psig.
- Slow n2 bleed ensuring the piston fills under constant pressure.
- Suitable for all hydrocarbon composition & physical property analysis.
- Suitable for determination of moisture in oil or condensate

Specifications

Pneumatic Sample Actuation:

Electrical Power:	120 VAC, 60Hz, 24 VDC
Sample Inlet:	Pneumatically Operated
Utility Gas Requirement:	100 PSIG Air on N2
Pressure Rating:	Max 1440 PSIG (600# ANSI)
Temperature Rating:	90°C (194°F)
Area Class:	Class 1 Div 1 / Zone 1

Cylinder Sizes:

Piston Cylinder Sizes:	300cc, 500cc, 1000cc
Glycol Cylinder Sizes:	500cc, 1000cc

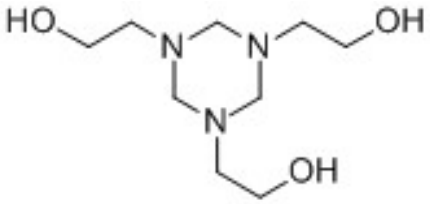
Sample Panel Control PLC:

Power:	120 VAC, 60Hz, 24VDC
Area Class:	Class 1 Div 2 / Zone 2

INSIGHT ANALYTICAL

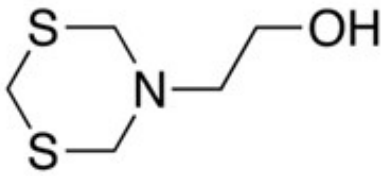
Dithiazine Testing in Natural Gas Pipelines

Natural gas pipelines have stringent specifications on the amount of hydrogen sulfide or H2S which can be present in the gas. One of the common methods for reducing hydrogen sulfide is using a scavenger such as one of the many variations of triazine. The most commonly employed triazine for scavenging H2S is 1,3,5 Tris (2hydroxyethyl) Hexahydro-s-Triazine, or what is commonly referred to as MEA triazine.



1,3,5 Tris (2-Hydroxyethyl) HexaHydro -s -Triazine	
CAS NO	4719-04-04
Molecular Formula	$C_9H_{22}N_3O_3$
Molecular Weight	219.28
Boiling Point	360°C

The MEA Triazine molecule reacts with hydrogen sulfide to form 2-(1,3,5-Dithiazinan-5-yl)ethanol, or what is commonly referred to as dithiazine.



2-(1,3,5-Dithiazinan-5-yl) ethanol	
CAS NO	88891-55-8
Molecular Formula	$C_5H_{11}NOS_2$
Molecular Weight	165.28
Melting Point	40-44°C

The dithiazine molecule exhibits unusual phase behavior and can potentially precipitate out in relief valves, regulators and in the pipeline itself. As such, there is a desire to measure dithiazine concentrations, which are typically less than 1 part per billion or ppb.

Insight Analytical has developed and commercialized a unique method to measure parts per trillion to parts per billion levels of dithiazine in pipelines. A sample panel is installed at site. The sample panel allows a controlled flow of natural gas at line pressure to run over an absorber column, which captures any dithiazine in the gas. The system may be allowed to run for days or even a week, allowing the dithiazine to build up in the trap. The trap can then be returned to Insight Analytical, where the dithiazine is extracted and measured. Since the natural gas flow rate through the panel is measured, the mass of dithiazine on the column and the total volumetric flow allows us to determine the concentration of dithiazine in the pipeline. With detection limits as low as 100 parts per trillion, Insight Analytical can provide reliable and precise determination of dithiazine in pipeline and natural gas processing applications.

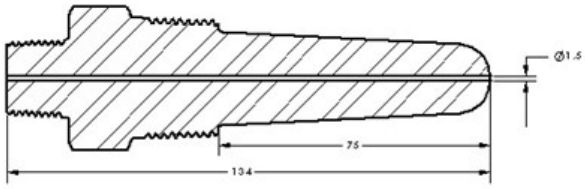
INSIGHT ANALYTICAL

1" NPT Probe

This probe is the product of an effort to design a standard sample probe that will work in most gas phase analytical applications with a 1" NPT threadolet process connection. In addition to the 1" male NPT thread for the process connection, another male ½" NPT connection is included for an isolation valve. It has an insertion length of 75 mm from the base of the NPT thread, or about 63 mm (2.5 inches) as measured from the inside wall of typical process pipes. This length is sufficient to obtain a representative sample in most applications.

The quill section of the probe has a 1.5 mm bore for fast response time, a hemispherical tip to reject particulates and liquid aerosols, and follows the Insight Analytical philosophy of eliminating excessive probe insertion length. Electropolishing the 316L stainless steel smooths and passivates the surface, which results in improved corrosion resistance, higher fatigue strength, and reduces the tendency for thread galling.

For most gas phase applications, the common practice of specifying probe length to locate the tip in the center third of the pipe typically results in a probe that is much longer than required to obtain a representative sample. The elimination of excess sample probe length lowers cost, improves response time, makes plugging less likely, reduces pressure drop and flow disturbances in the process pipe, and makes it possible to design the probe to withstand high process gas velocity without failure caused by vortex shedding induced vibration. This probe has been designed to meet the vortex shedding safety calculations in the ASME PTC 19.3 TW-2010 thermowell design standard for fluid velocities up to 100 m/s and fluid densities up to 0.4 kg/m3.



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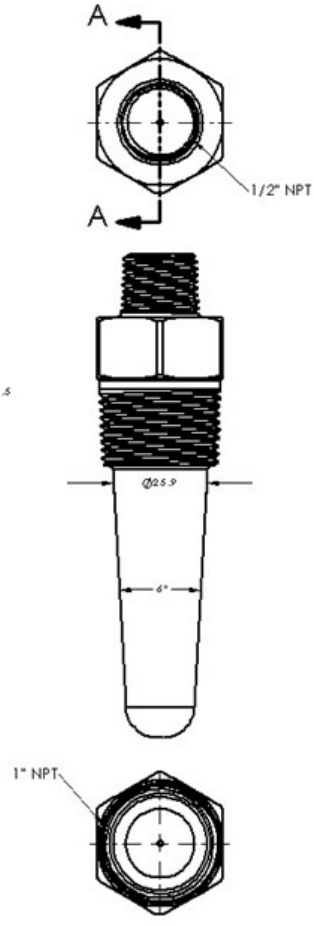


Technical Specifications

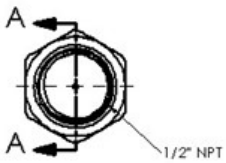
Maximum Pressure Rating	20700 kPag (3000 psig)
Temperature Range -	45°C to 149°C (-49°F to 300°F)
Internal Volume	0.25 cm^3 (0.015 in^3)
Outlet Port Size ½	" NPT male thread
Process Connection Size 1	" NPT male thread
Threadolet Process Connection Required 1	" NPT Female thread. Minimum opening ID of 26 mm (1.02").
Wetted Materials E	lectropolished 316L Stainless Steel
NACE compliance	NACE MR0175/ISO 15156 and MR0103 Compliant.
Compliance with ASME PTC 19.3 TW-2010	Passes calculations for process velocities up to 100 m/s and maximum density of 400 kg/m^3

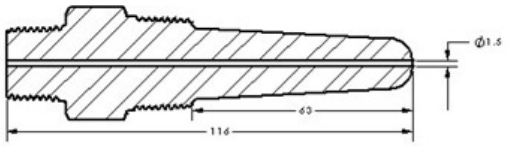
¾" NPT Probe

This probe is the product of an effort to design a standard sample probe that will work in most gas phase analytical applications with a 3/4" NPT threadolet process connection. In addition to the 3/4" male NPT thread for the process connection, another male ½" NPT connection is included for an isolation valve. It has an insertion length of 63 mm from the base of the NPT thread, or about 50 mm (2 inches) as measured from the inside wall of typical process pipes. This length is sufficient to obtain a representative sample in most applications.

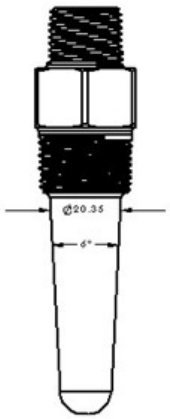
The quill section of the probe has a 1.5 mm bore for fast response time, a hemispherical tip to reject particulates and liquid aerosols, and follows the Insight Analytical philosophy of eliminating excessive probe insertion length. Electropolishing the 316L stainless steel smooths and passivates the surface, which results in improved corrosion resistance, higher fatigue strength, and reduces the tendency for thread galling.

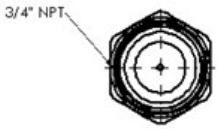
For most gas phase applications, the common practice of specifying probe length to locate the tip in the center third of the pipe typically results in a probe that is much longer than required to obtain a representative sample. The elimination of excess sample probe length lowers cost, improves response time, makes plugging less likely, reduces pressure drop and flow disturbances in the process pipe, and makes it possible to design the probe to withstand high process gas velocity without failure caused by vortex shedding induced vibration. This probe has been designed to meet the vortex shedding safety calculations in the ASME PTC 19.3 TW-2010 thermowell design standard for fluid velocities up to 100 m/s and fluid densities up to 0.4 kg/m3.





SECTION A-A





Technical Specifications

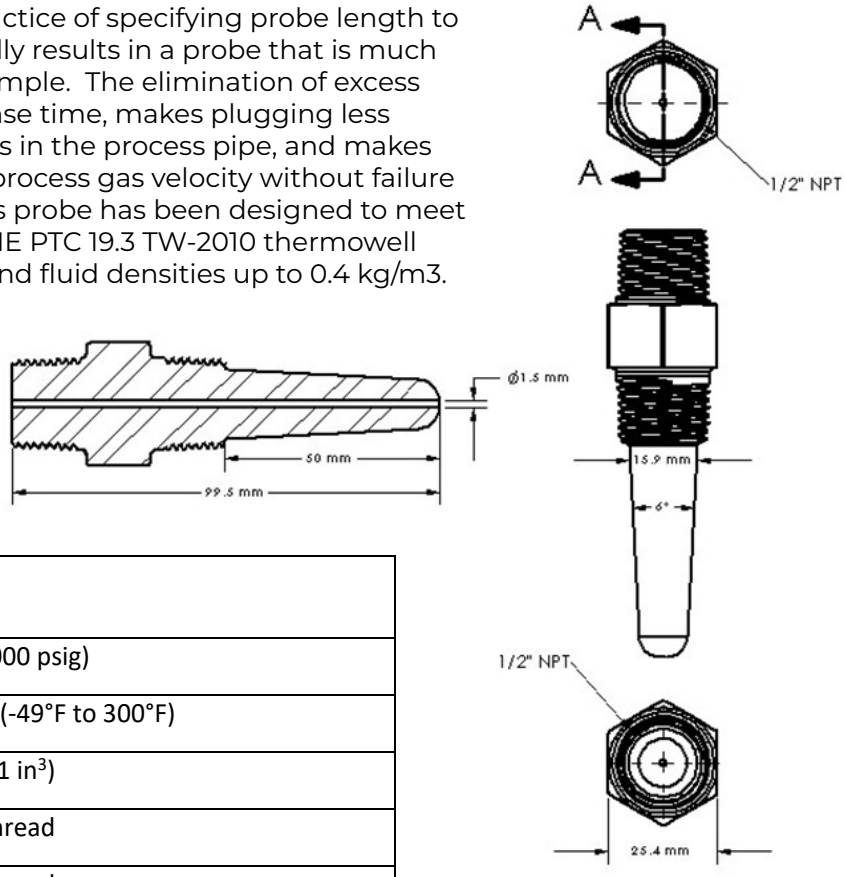
Maximum Pressure Rating 2	0700 kPag (3000 psig)
Temperature Range -	45°C to 149°C (-49°F to 300°F)
Internal Volume	0.21 cm^3 (0.013 in^3)
Outlet Port Size ½	" NPT male thread
Process Connection Size 3	/4" NPT male thread
Threadolet Process Connection Required 3	/4" NPT Female thread. Minimum opening ID of 21 mm (0.83").
Wetted Materials E	lectropolished 316L Stainless Steel
NACE compliance	NACE MR0175/ISO 15156 and MR0103 Compliant.
Compliance with ASME PTC 19.3 TW-2010	Passes calculations for process velocities up to 100 m/s and maximum density of 400 kg/m^3

½" NPT Probe

The Insight Analytical ½" NPT sample quill probe has a ½" NPT process connection and another male ½" NPT connection for an isolation valve. It is designed for applications with ½" NPT threadolet process connections and has an insertion length of 50 mm from the base of the NPT thread, or about 25 to 38 mm (1 to 1.5 inches) as measured from the inside wall of typical process pipes. This length is sufficient to obtain a representative sample in most applications.

The quill section of the probe has a 1.5 mm bore for fast response time, a hemispherical tip to reject particulates and liquid aerosols, and follows the Insight Analytical philosophy of eliminating excessive probe insertion length. Electropolishing the 316L stainless steel smooths and passivates the surface, which results in improved corrosion resistance, higher fatigue strength, and reduces the tendency for thread galling.

For most gas phase applications, the common practice of specifying probe length to locate the tip in the center third of the pipe typically results in a probe that is much longer than required to obtain a representative sample. The elimination of excess sample probe length lowers cost, improves response time, makes plugging less likely, reduces pressure drop and flow disturbances in the process pipe, and makes it possible to design the probe to withstand high process gas velocity without failure caused by vortex shedding induced vibration. This probe has been designed to meet the vortex shedding safety calculations in the ASME PTC 19.3 TW-2010 thermowell design standard for fluid velocities up to 100 m/s and fluid densities up to 0.4 kg/m3.



Technical Specifications

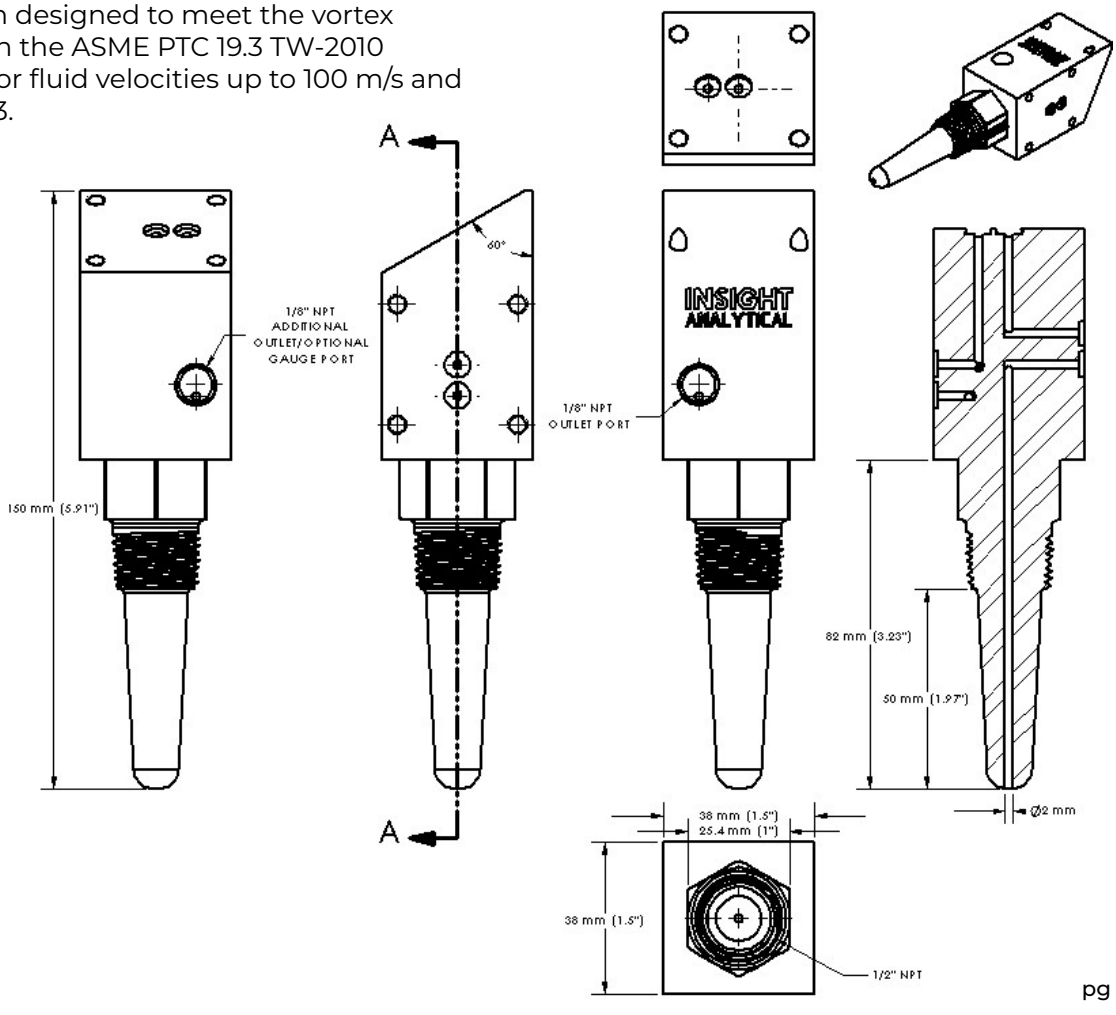
Maximum Pressure Rating	20700 kPag (3000 psig)
Temperature Range -	45°C to 149°C (-49°F to 300°F)
Internal Volume 0	.18 cm^3 (0.011 in^3)
Outlet Port Size ½	" NPT male thread
Process Connection Size ½	" NPT male thread
Threadolet Process Connection Required ½	" NPT Female thread. Minimum opening ID of 16.5 mm (0.65").
Wetted Materials E	lectropolished 316L Stainless Steel
NACE compliance	NACE MR0175/ISO 15156 and MR0103 Compliant.
Compliance with ASME PTC 19.3 TW-2010	Passes calculations for process velocities up to 100 m/s and maximum density of 0.4 kg/m^3

½" NESSI Probe

The Insight Analytical ½” NPT NESSI Sample probe is an enhanced version of the standard ½” NPT quill probe, where an upper section has been added to allow up to three NESSI/SP76 compliant sample system components to be mounted and connected in series.

The quill section of the probe has a 2 mm bore for fast response time, a hemispherical tip to reject particulates and liquid aerosols, and follows the Insight Analytical philosophy of eliminating excessive probe insertion length.
Minimizing the sample probe insertion length allows a standard probe length to be used for most gas phase application with a ½” NPT threadolet connection. This probe has an insertion length of 50 mm from the base of the NPT thread, or about 25 to 38 mm (1 to 1.5 inches) as measured from the inside wall of the process pipe, which is sufficient to obtain a representative sample in most applications.

The elimination of excess sample probe length lowers cost, improves response time, makes plugging less likely, reduces pressure drop and flow disturbances in the process pipe, and makes it possible to design the probe to withstand high process gas velocity without failure caused by vortex shedding induced vibration. This probe has been designed to meet the vortex shedding safety calculations in the ASME PTC 19.3 TW-2010 thermowell design standard for fluid velocities up to 100 m/s and fluid densities up to 400kg/m3.

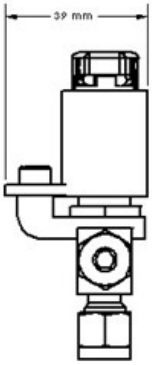


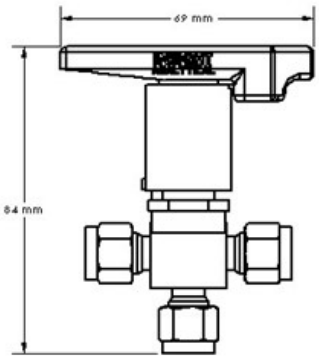
2 & 3-Way Spring Return Valve

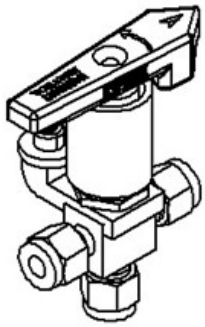
The Insight Analytical 2 & 3-Way Auto Return Valves are manual ball valves equipped with a spring that ensures that it will remain in the normally closed position unless the valve handle is manually rotated and held in the open position. This auto return feature is ideal for applications where serious issues may occur if the valve is accidentally left open, such as in manual grab sample stations.

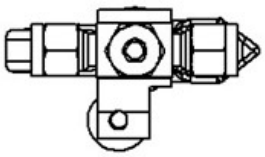
This valve is based on a Swagelok SS-42GS4 2-way valve, with ¼" Swagelok Tube connections, 0.125" (3.18 mm) orifice, 316 Stainless Steel wetted parts, modified PTFE packing, and retains the basic ratings for the base valve including CRN registration and 2500 psig (172 barg) pressure rating.

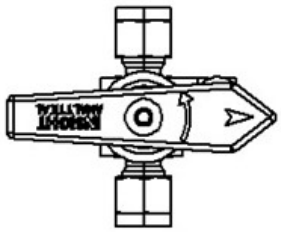
The handle is made from nylon and is available in several colors (black, red, yellow and blue) and is rated for a maximum temperature of 70°C (158°F). An optional aluminum handle is also available which allows the valve to be used over a temperature range of -40°C (-40°F) to 149°C (300°F).

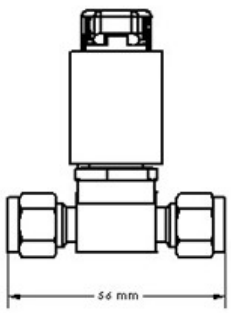


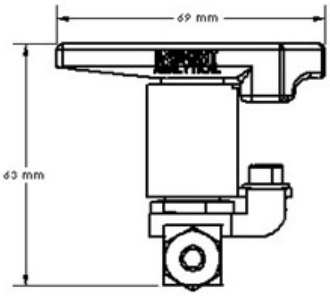


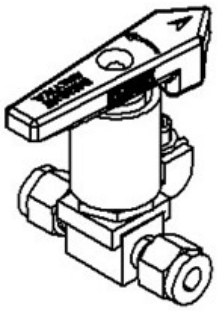










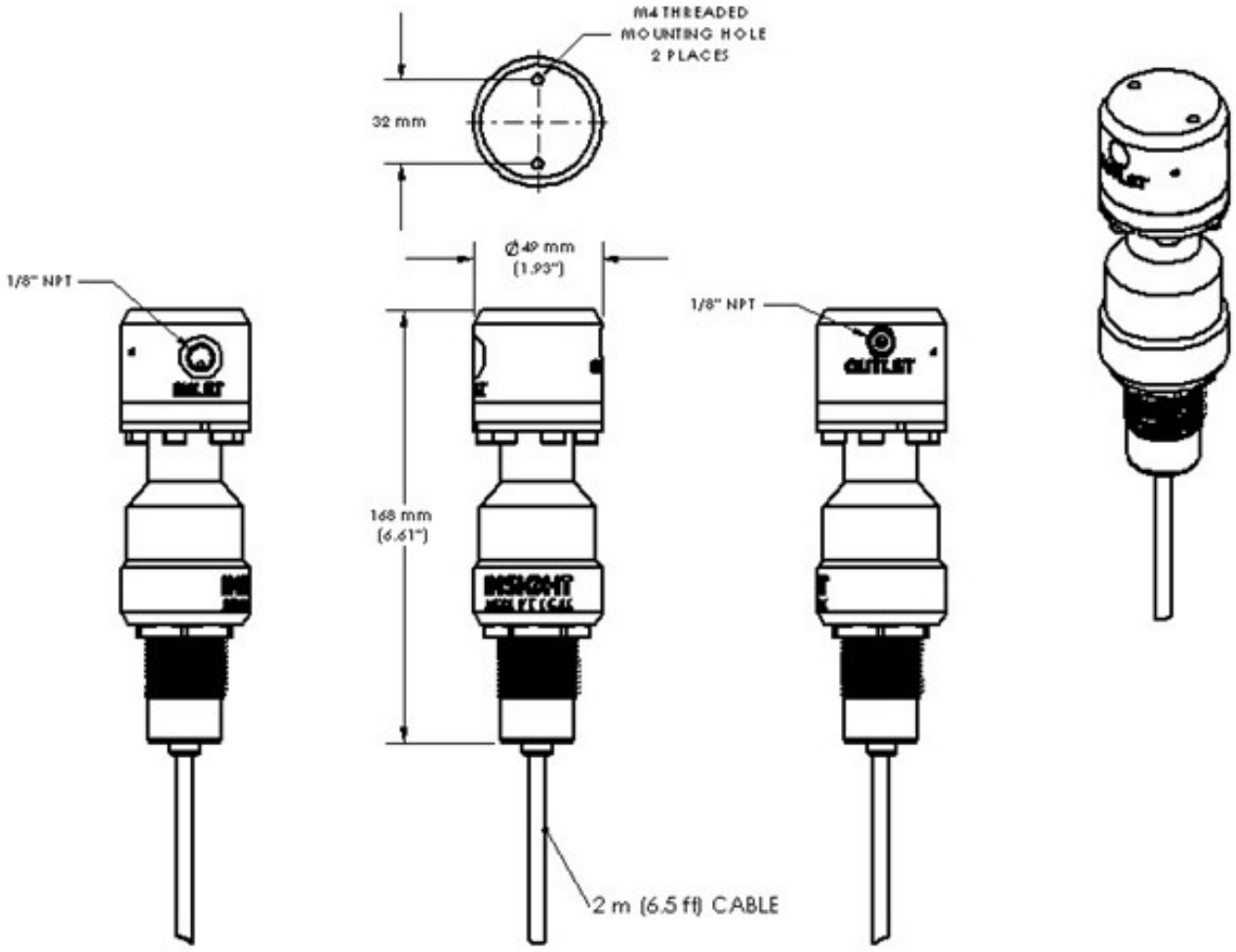


ATEX Zone 1 Carryover Sensor

This carryover sensor is designed to detect the presence of liquids such as water, glycol and alcohols in gas phase analyzer sample systems at pressure up to 3450 kPag (500 psig). It functions as a combination of cyclone separator, knock out pot and liquid carryover sensor.

The sample housing has an upper section made from electroless nickel plated aluminum with 1/8" NPT inlet and output ports, with the inlet gas going through a 2 mm diameter orifice and flowing tangentially into a small diameter bore. This inlet geometry results in large centrifugal forces on the gas sample which tends to move denser components such as liquid aerosols and particulates radially outward towards the walls of the housing where they can coalesce. Any liquids or particulates that are separated from the gas collect at the inside bottom of the lower housing, which is made from glass filled PEEK.

A capacitive sensor with hazardous area certification for ATEX/IECEx 2G Ex mb IIC T4 Gb is threaded into the bottom of the lower housing and will detect liquids or particulates that collect in the bottom of the housing. The capacitive sensor is isolated from the sample gas by the bottom wall of the housing and can detect accumulated liquid through the wall of the housing because the PEEK has a low dielectric constant, only slightly higher than air.



The capacitive sensor has five wires for connection, including power supply of 10 to 30 VDC and PNP normally open output. Sensitivity can be adjusted via a potentiometer on the bottom of the sensor. The sensor output is normally open with minimum and maximum load currents of 5 mA and 200 mA. An external miniature fuse with 2A or less rating should be provided to prevent short circuit situations.

The quantity of liquid required to trip the sensor depends on the dielectric constant, with it generally being very sensitive to water and somewhat less sensitive to glycol, alcohols, and saturated hydrocarbons such as compressor oil. Particulates with high dielectric constants can also be detected, such as metals or metallic compounds.

When mounting the carryover sensor, the sensor and lower part of the housing must be kept at least 75 mm (3") away from conductive materials such as metal fittings, tubing and panels. An optional bracket is available to mount the sensor on a panel. It is also important to keep in mind when working around the sensor that hands or tools will trip the sensor if they get too close.

The housing is NACE MR0175 compliant and can be used in sour gas applications, but should not be used where there are components in the sample that can attack the nickel plated aluminum and PEEK housings such as strong acids including HCl and nitric acid, halogens, carbon disulfide, and phenol.

After a liquid carryover event, the liquid needs to be removed from the lower sensor housing before returning to service. The liquid can be removed by disassembling the housing and cleaning, or alternatively inverting the housing and purging with instrument air. Isopropyl Alcohol or soap and water work well for cleaning the inside of the housings if this is required. Do not use any chemicals for cleaning that may attack PEEK or aluminum, such as strong acids. The inside of the housings should be dry before reassembly. It is recommended that a new o-ring be installed after disassembling the housings for cleaning.

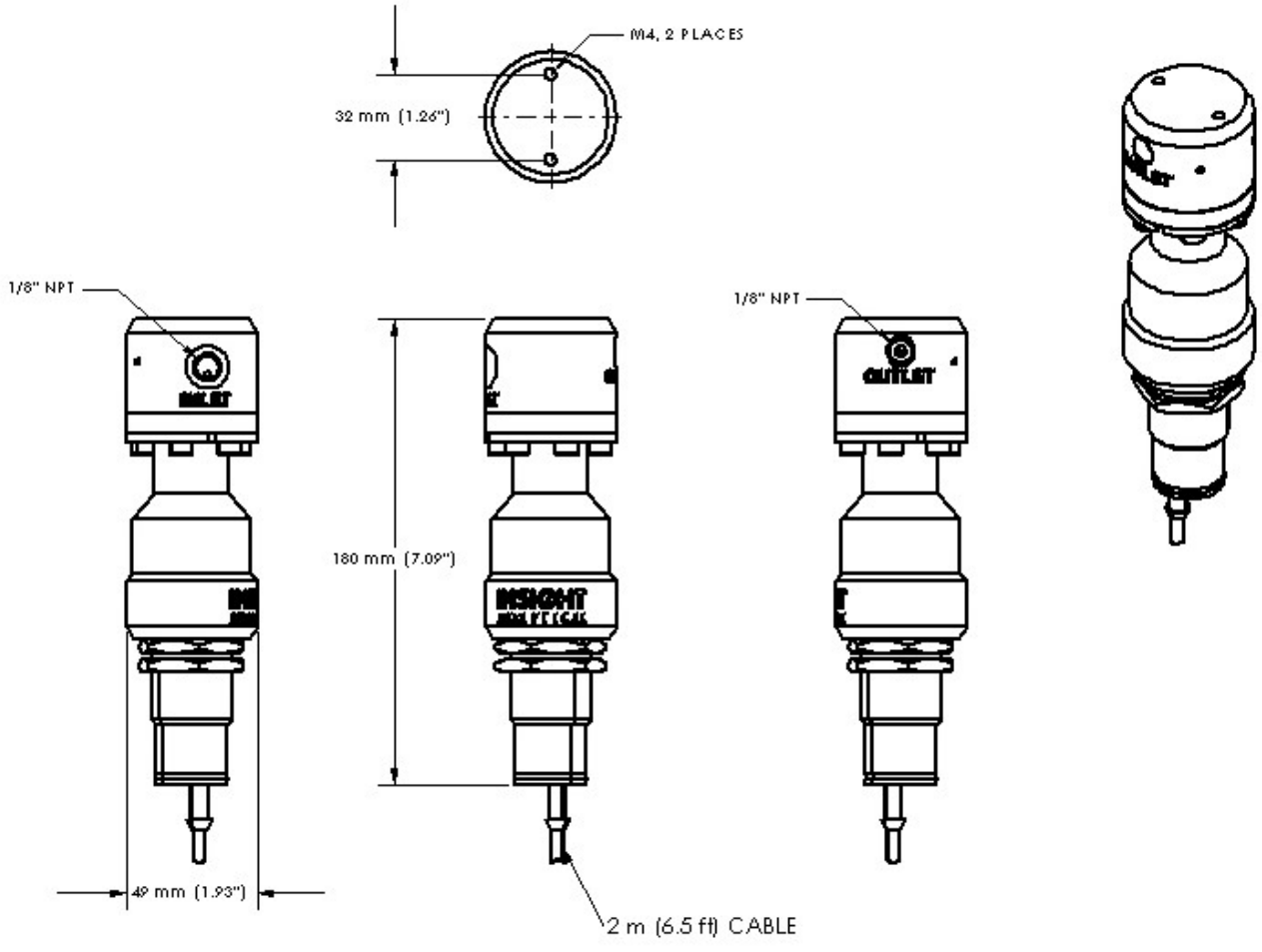
Technical Specifications	
Maximum Pressure Rating	3450 kPag (500 psig) at 40°C maximum 1380 kPag (250 psig) at 60°C maximum 690 kPag (100 psig) at 80°C maximum
Temperature Range	-20°C to 80°C (-4°F to 158°F)
Internal Volume 1	6 cm^3 (1 in^3)
Inlet and Outlet Port Size	1/8" NPT female thread
Power supply 2	0 to 250 V AC/DC, with 2A fuse
Hazardous area certifications A	TEX/IECEx 2G Ex mb IIC T4 Gb T ambient -20°C to □0°C Ingress Protection IP67
RoHS Compliance	Yes
Wetted Materials E	lectroless nickel plated 6061 T6 aluminum, glass filled PEEK, nylon, perfluoroelastomer (FFKM) o-ring.
NACE compliance	NACE MR0175/ISO 15156 and MR0103 Compliant.
Output type	Normally Open, with minimum load current of 5 mA and maximum switching output of 200 mA.
Electrical Connection	2 m PVC cable, 5 wires

Division 2 Carryover Sensor

This carryover sensor is designed to detect the presence of liquids such as water, glycol and alcohols in gas phase analyzer sample systems at pressure up to 3450 kPag (500 psig). It functions as a combination of cyclone separator, knock out pot and liquid carryover sensor.

The sample housing has an upper section made from electroless nickel plated aluminum with 1/8" NPT inlet and output ports, with the inlet gas going through a 2 mm diameter orifice and flowing tangentially into a small diameter bore. This inlet geometry results in large centrifugal forces on the gas sample which tends to move denser components such as liquid aerosols and particulates radially outward towards the walls of the housing where they can coalesce. Any liquids or particulates that are separated from the gas collect at the inside bottom of the lower housing, which is made from glass filled PEEK.

A capacitive sensor with non-incentive hazardous area certification for Class I Division 2 is threaded into the bottom of the lower housing and will detect liquids or particulates that collect in the bottom of the housing. The capacitive sensor is isolated from the sample gas by the bottom wall of the housing and can detect accumulated liquid through the wall of the housing because the PEEK has a low dielectric constant, only slightly higher than air.



The capacitive sensor only requires a two-wire connection with power supply of 20 to 250 V AC/DC and has a normally open output function. Sensitivity can be adjusted via a potentiometer on the bottom of the sensor. The sensor output is normally open with minimum and maximum load currents of 5 mA and 200 mA. An external miniature fuse with 2A or less rating should be provided to prevent short circuit situations.

The quantity of liquid required to trip the sensor depends on the dielectric constant, with it generally being very sensitive to water, somewhat less sensitive to glycol and alcohols, and not being able to detect saturated hydrocarbons such as compressor oil. Particulates with high dielectric constants can also be detected, such as metals or metallic compounds.

When mounting the carryover sensor, the sensor and lower part of the housing must be kept at least 75 mm (3") away from conductive materials such as metal fittings, tubing and panels. An optional bracket is available to mount the sensor on a panel. It is also important to keep in mind when working around the sensor that hands or tools will trip the sensor if they get too close.

The housing is NACE MR0175 compliant and can be used in sour gas applications, but should not be used where there are components in the sample that can attack the nickel plated aluminum and PEEK housings such as strong acids including HCl and nitric acid, halogens, carbon disulfide, and phenol.

After a liquid carryover event, the liquid needs to be removed from the lower sensor housing before returning to service. The liquid can be removed by disassembling the housing and cleaning, or alternatively inverting the housing and purging with instrument air. Isopropyl Alcohol or soap and water work well for cleaning the inside of the housings if this is required. Do not use any chemicals for cleaning that may attack PEEK or aluminum, such as strong acids. The inside of the housings should be dry before reassembly. It is recommended that a new o-ring be installed after disassembling the housings for cleaning.

Technical Specifications

Maximum Pressure Rating	3450 kPag (500 psig) at 40°C maximum 1380 kPag (250 psig) at 60°C maximum 690 kPag (100 psig) at 70°C maximum
Temperature Range -	20°C to 70°C (-4°F to 158°F)
Internal Volume	16 cm^3 (1 in^3)
Inlet and Outlet Port Size	1/8" NPT female thread
Power supply	20 to 250 V AC/DC, with 2A fuse
Hazardous area certifications C	SA Class I, Division 2, Groups A, B, C and D; Class II, Division 2, Groups E, F, and G T4, ambient temperature range -25°C to 70°C. Ingress Protection IP65/Type 4/4X
Wetted Materials E	lectroless nickel plated 6061 T6 aluminum, glass filled PEEK, nylon, perfluoroelastomer (FFKM) o-ring.
NACE compliance	NACE MR0175/ISO 15156 and MR0103 Compliant.
Output type	Normally Open, with minimum load current of 5 mA and maximum switching output of 200 mA.
Electrical Connection	2 m PVC cable, 2 x 0.5 mm^2 wires

INSIGHT ANALYTICAL

Manual Vapor Pressure Testing Kit

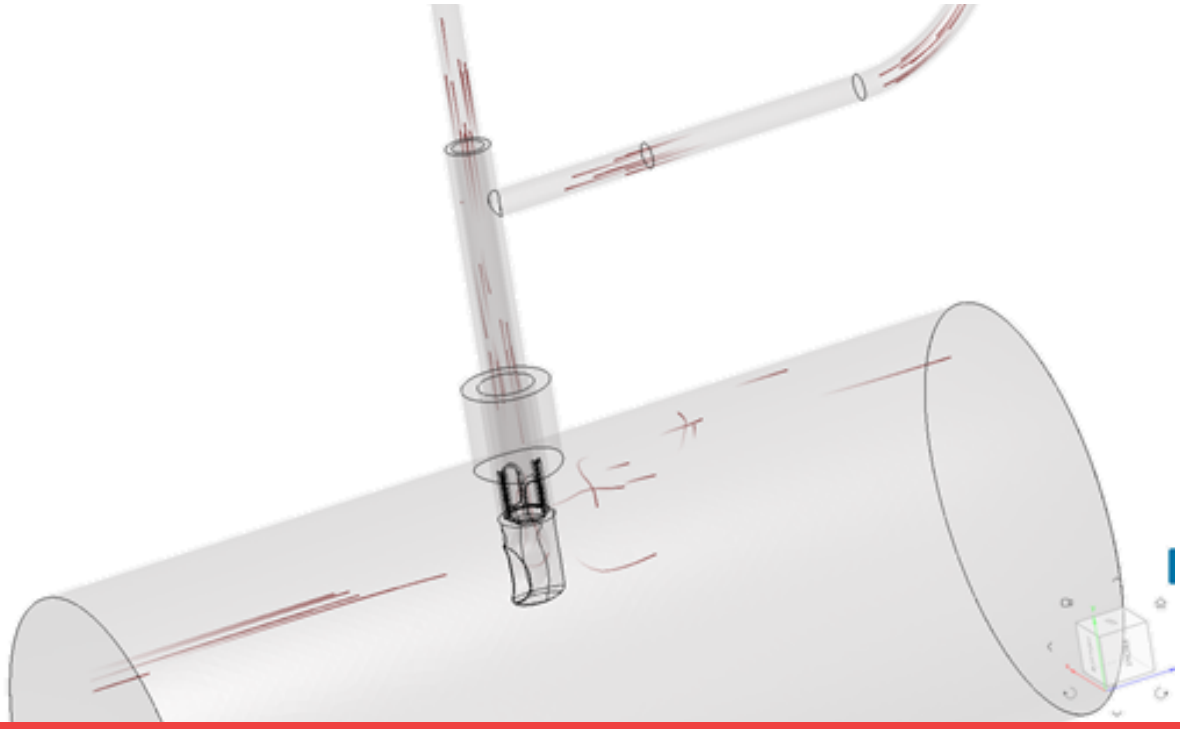
This unit from Parkes Scientific is designed for the determination of vapour pressure using a manual apparatus according to ASTM D7975 specifications. It is used to accurately determine the vapour pressure of crude oils exerted in a manually created vacuum. Suitable for testing samples that exert a vapour pressure between 25 kPa and 180 kPa at 37.8oC and between vapour to liquid ratios of 4:1 to 0.25:1. Sample pressure ranges up to 500kPa, however precision and bias statements have not been determined up to 500kPa.

Note: this unit is not intended for custody transfer measurements as per ASTM D6377.

Scoop Probe

The Insight Analytical Liquid Fast Loop probe design exploits modern technologies including CFD (Computational Fluid Dynamics) and metal 3D printing to produce an optimized solution for creating closed loop flow in analytical fast loops, without the need of addition pumps or venting the process fluid after analysis. This probe is an ideal solution for applications requiring fast analysis response time and sample return to the process, including composite samplers, moisture measurement, densitometers, and GC, NIR or Raman compositional measurements.

Flowing process fluid has kinetic energy proportional to the density and the square of the velocity. When the moving process fluid encounters the scooplike opening at the front of the probe tip, it is forced to slow down, converting its kinetic energy to an increase in pressure. Process fluid above the front opening is forced to flow around the probe, which increases the velocity and lowers the pressure around the vent slots. The resulting pressure differential between the front opening and the vent slots on the side of the probe can be used to generate sample flow in an external fast loop.



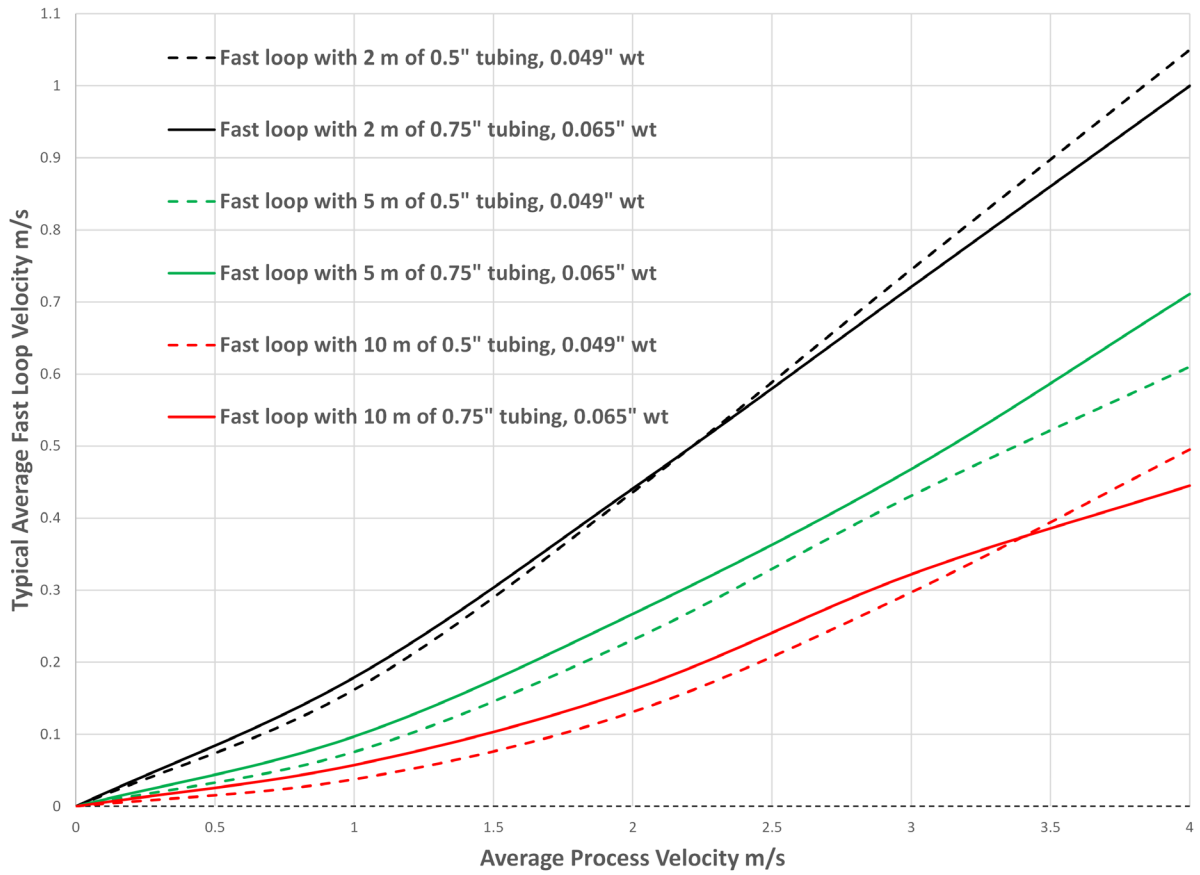


Figure 1 - Typical Fast Loop Velocities for a 5 cP/8330 kg/m3 Light Crude Oil

Figure 1 shows the typical fast loop velocities for a light crude oil with a viscosity of 5 cP and density of 830 kg/m3, over a range of 1 to 4 m/s (3.3 to 13.1 ft/s) process velocity, for both 3/4" diameter 0.065" wall thickness tubing and 1/2" diameter 0.049" wall thickness tubing for 2, 5, and 10 m long fast loop lengths. The average fast loop velocity values shown in this graph are with no added flow restriction in the fast loops, which would lower the velocity, if present. These results show that using larger diameter tubing for the fast loop will typically give higher average velocity and flowrate, except for very short loop lengths.

Technical Specifications	
Maximum Pressure Rating C	lass 150, 300 or 600.
Temperature Range	-29°C to 149°C (-20°F to 300°F)
Process Pipe Size Range N	PS 4 and larger (DN100 and larger)
Mounting Location Recommendations	Horizontal mounting recommended and/or minimizing height changes between probe and loop.
Process Connection Size 1	-1/2" or larger flange size
Return Port Size 1	" FNPT typically supplied with Swagelok SS-1210-1-16BT fitting for ¾" tubing connection, but ½" tubing optional.
Wetted Materials	316/316L Stainless Steel
NACE compliance	NACE MR0175/ISO 15156 and MR0103 Compliant.
Compliance with ASME PTC 19.3 TW-2010	Passes calculations for process velocities up to 10 m/s and maximum density of 1500 kg/m^3 for 8" (200 mm) length.

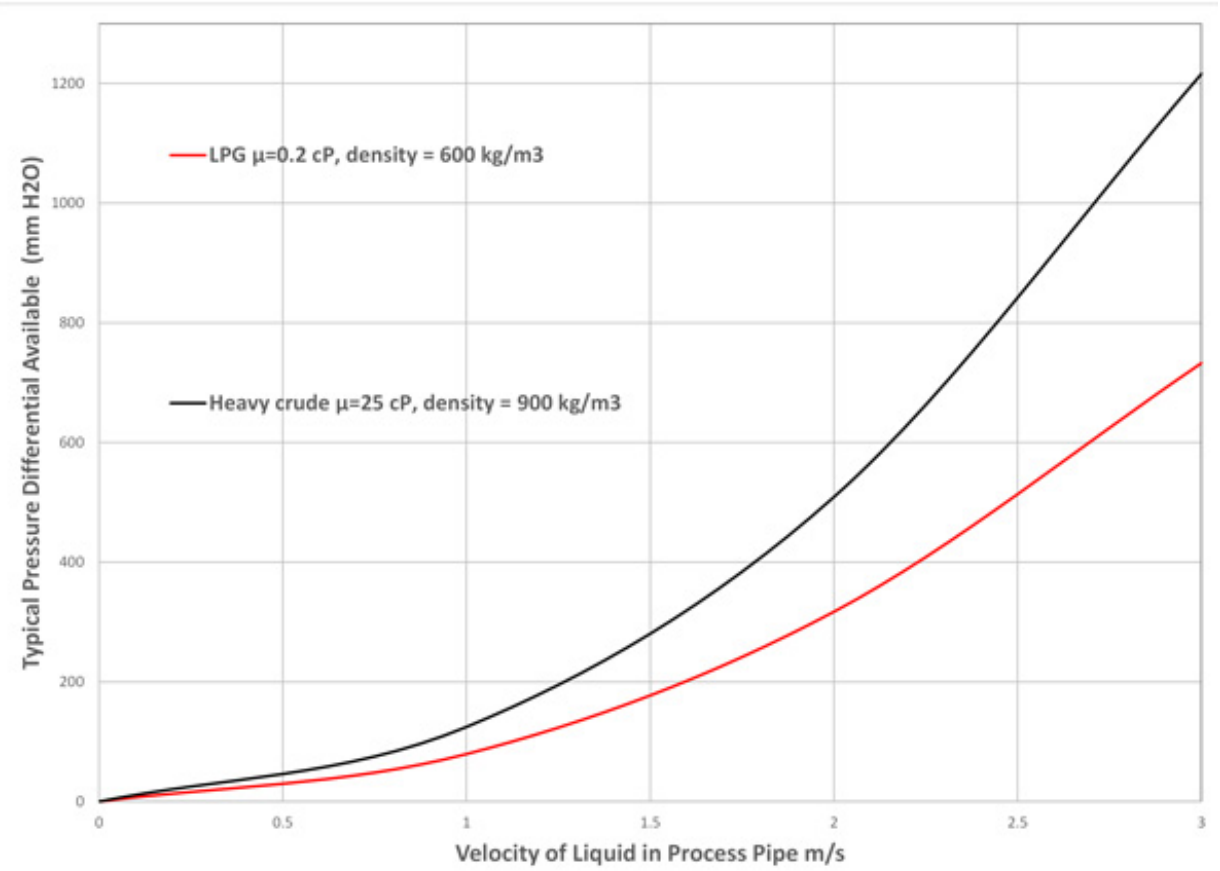
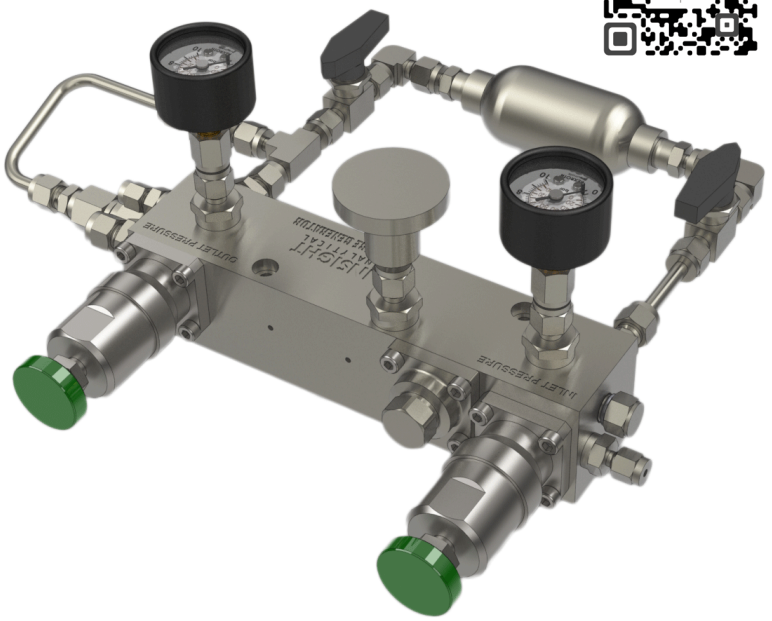


Figure 2 – Differential Pressure Generated at Different Process Velocities

Figure 2 shows the pressure differential created in the probe by liquids with densities of 650 kg/m3 and 900 kg/m3, over a range of 1 to 4 m/s (3.3 to 13.1 ft/s) process velocity, shown in units of mmH2O. The pressure differentials that are generated are fairly small, so it is important to minimize height changes in the fast loop for it to be self-priming. Horizontal probe mounting is recommended where possible. For applications with low process velocities or significant height changes in the fast loop, it may be necessary to manually prime the fast loop using a 3-way valve located at the probe sample return connection.

INSIGHT ANALYTICAL

Moisture Generator Block



The Insight Analytical Moisture Generator (Patent Pending) is a compact, portable, rugged device for adding a known amount of moisture to a gas sample for field validation of analyzers measuring water vapor concentration and requires no utilities except for a high-pressure gas supply. It has an adjustable water vapor concentration range from close to zero up to 190 ppm (8.7 lbs/mmscf or 140 mg/m3) over a range of delivery pressure and flow rate that makes it compatible with checking the calibration on a wide variety of analyzers measuring water content or water dew point temperature, for example in natural gas applications where the natural gas can be used as the high-pressure gas supply.

Field of Application:

Process moisture analyzers such as those using Tunable Diode Laser (TDLAS), Chilled Mirror, and Quartz Crystal Microbalance (QCM) technologies installed in the field on processes such as natural gas pipelines normally operate for long periods of time reading very low water vapor concentrations with little or no changes in their outputs. It is sometimes difficult to determine if these analyzers are working properly and that they will respond to a process upset when it occurs. It is desirable to “bump test” these analyzers periodically to validate their operation and verify that they will respond properly to an upset, but this is often not commonly done because it requires using moisture calibration cylinders that are expensive, large, and heavy along with additional equipment such as heated pressure regulators and heated cylinder blankets.

Technical Specifications	
Maximum Pressure Rating 1	500 psig (10342 kPag)
Temperature Range	-6°C to 65°C
Delivery Pressure Range 0	to 250 psig (0 to 1724 kPag)
Flow Rate Range	3 scfh at 100 psig to 26 scfh at 1000 psig Saturation Pressure With Methane Based Gas Supply (1.4 LPM at 690 kPag to 12.3 LPM at 6895 kPag)
Outlet Water Content Range at 21°C Ambient Temperature	0 to 8.7 lbs/mmscf / 0 to 140 mg/m^3 / 0 to 190 ppmv At 21°C Block Temperature and Saturation Pressures from 100 psig to 1000 psig (690 kPag to 6895 kPag). See Figures 3, 4 and 5 for more details
Inlet and Outlet Connection Size	1/8” Tube Swagelok Compression Fitting
Vent Connection Size ¼	” Tube Swagelok Compression Fitting
Wetted Materials E	lectroless Nickel Plated Aluminum and 316 Stainless Steel
NACE compliance	NACE MR0175/ISO 15156 and MR0103 Compliant.

Advantages

- It can be used as a portable moisture generator to “bump test” field moisture analyzers or permanently mounted in an analyzer sample system.
- It has no electrical components, so it is suitable to be used in explosive gas atmospheres, such as natural gas plants or metering stations without additional certifications.
- The dry and wet gas stream are combined at a constant mixing ratio which is stable over time and is unaffected by gas composition.
- Adjusts the moisture content by changing the saturation pressure rather than the saturation temperature, so it responds quickly to adjustments because pressure changes stabilize much faster than temperature changes.
- Can use any high-pressure gas supply including gas from cylinders or high-pressure natural gas as the validation gas media.
- Accuracy is not affected by the analyzer operating pressure regardless of whether it is high, low, or unsteady.
- Does not use expensive or high maintenance components like mass flow controllers, heaters, or coolers.
- It can use high pressure sample gas such as natural gas to create the moisture validation gas mixture so that the analyzers can be validated with the same gas composition that they are measuring – this helps to determine if the sample gas composition is affecting analyzer accuracy.
- Small ruggedly built package that is light, portable, and resistant to damage and vibration.
- Does not require external equipment such as pressure regulators, gas cylinders etc.

Principle of Operation:

This device generates a known water vapor concentration for validating moisture or water dew point analyzers. An inlet pressure regulator on the gas supply is used to adjust the outlet water vapor content with the resulting water vapor concentration being roughly inversely proportional to this pressure setting (high-pressure settings give low water vapor concentrations and lower pressures result in higher water contents). After this pressure adjustment, the gas flow is split into two streams with one flowing into a saturation chamber where the gas becomes water-saturated at the supply pressure and block temperature, and the other flowing through a dryer containing mole sieve to remove most of the water vapor.

The flow of these two streams is controlled such that the mixing ratio of the dry and wet gas streams is always constant regardless of the inlet pressure regulator setting or supply gas composition. The dry gas and wet gas streams are mixed in a T-fitting and internal passages in the block before flowing though the outlet connection fitting.

The water vapor concentration in the outlet gas is calculated using a spreadsheet which uses the inlet pressure regulator setting and the temperature of the block to calculate water content. A back pressure regulator (BPR) at the block outlet is used to adjust the outlet pressure to match the inlet pressure requirements of the analyzer being validated and vents any excess gas flow that exceeds the analyzer flow requirements.

The general layout of the moisture generator is shown in Figure 1 and the range of water vapor concentration generated for a range of block temperatures and pressure settings is shown in Figures 2, 3 and 4 for concentration units of ppmv, lbs/mmscf, and mg/m3 respectively.

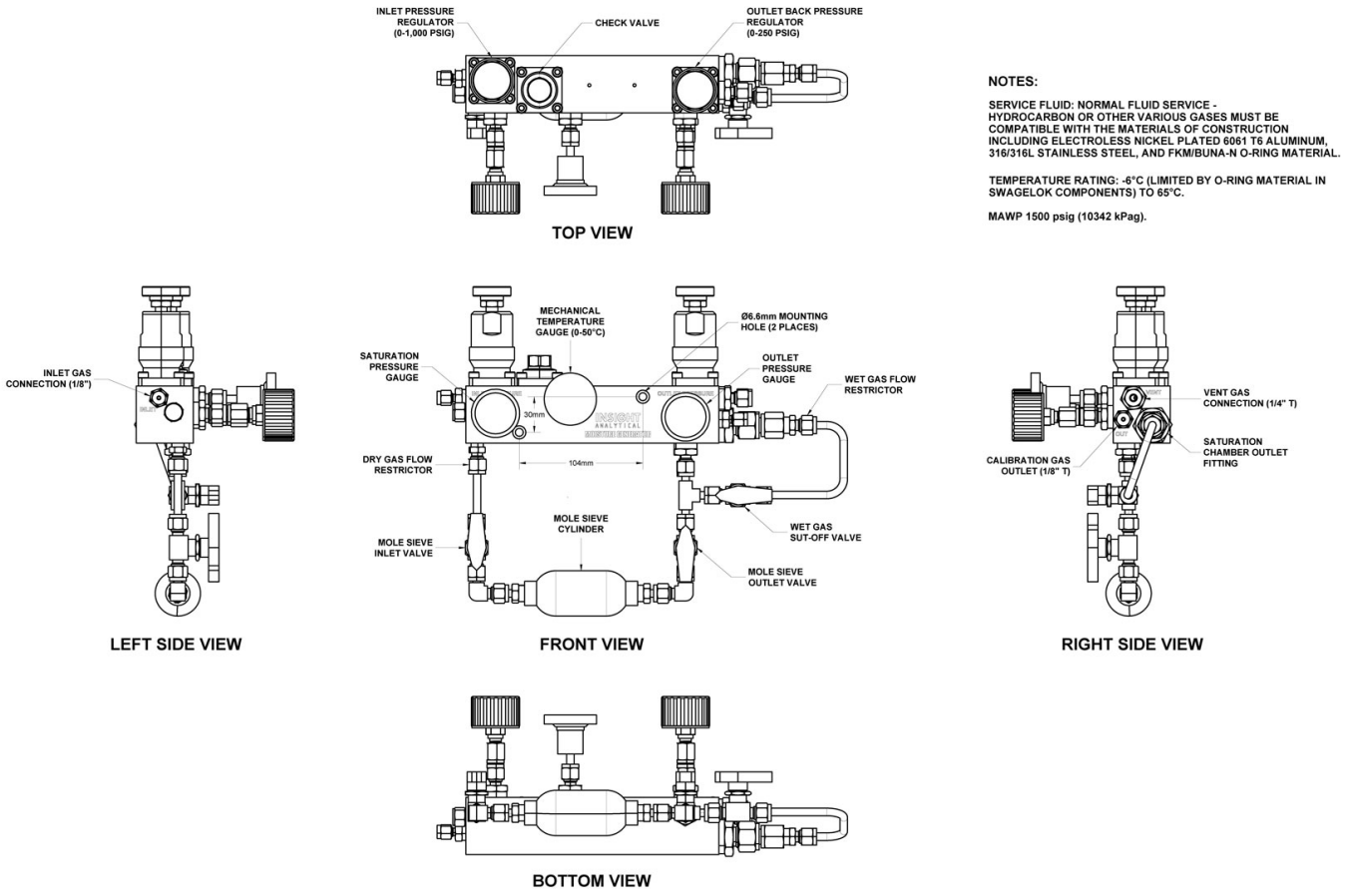


Figure 1 – Moisture Generation Block General Arrangement Drawing

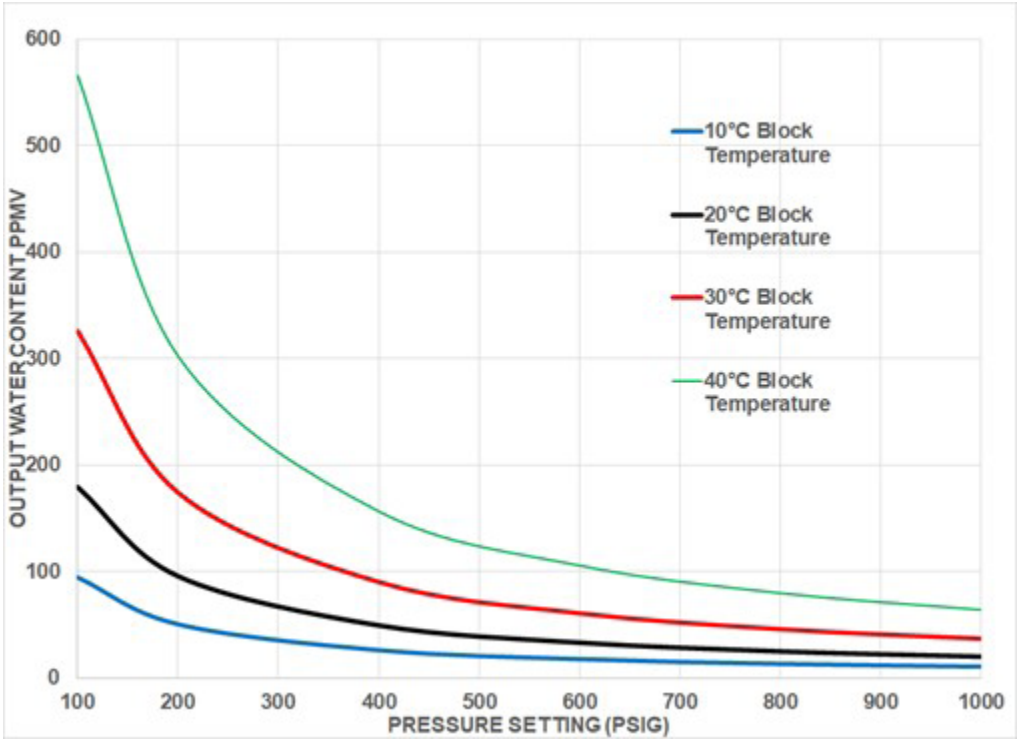


Figure 2 – Water Vapor Concentrations in ppmv Generated Over a Range of Block Temperatures and Pressure Settings

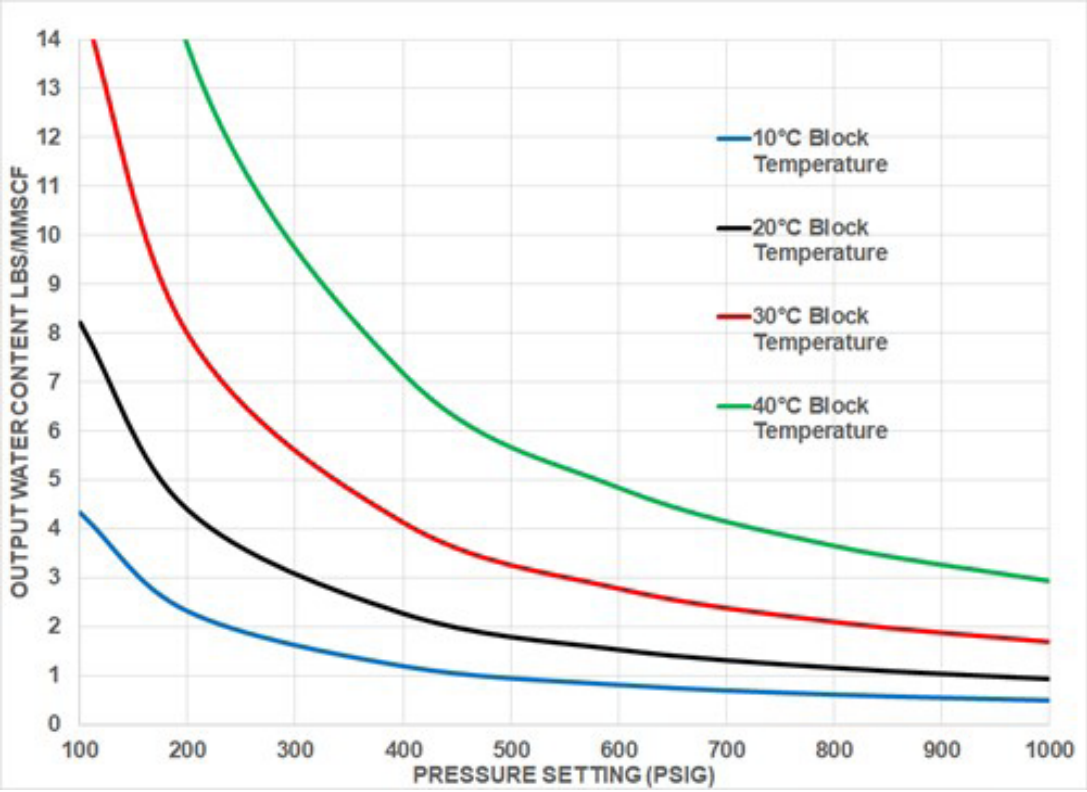


Figure 3 – Water Vapor Concentrations in lbs/mmscf Generated Over a Range of Block Temperatures and Pressure Settings

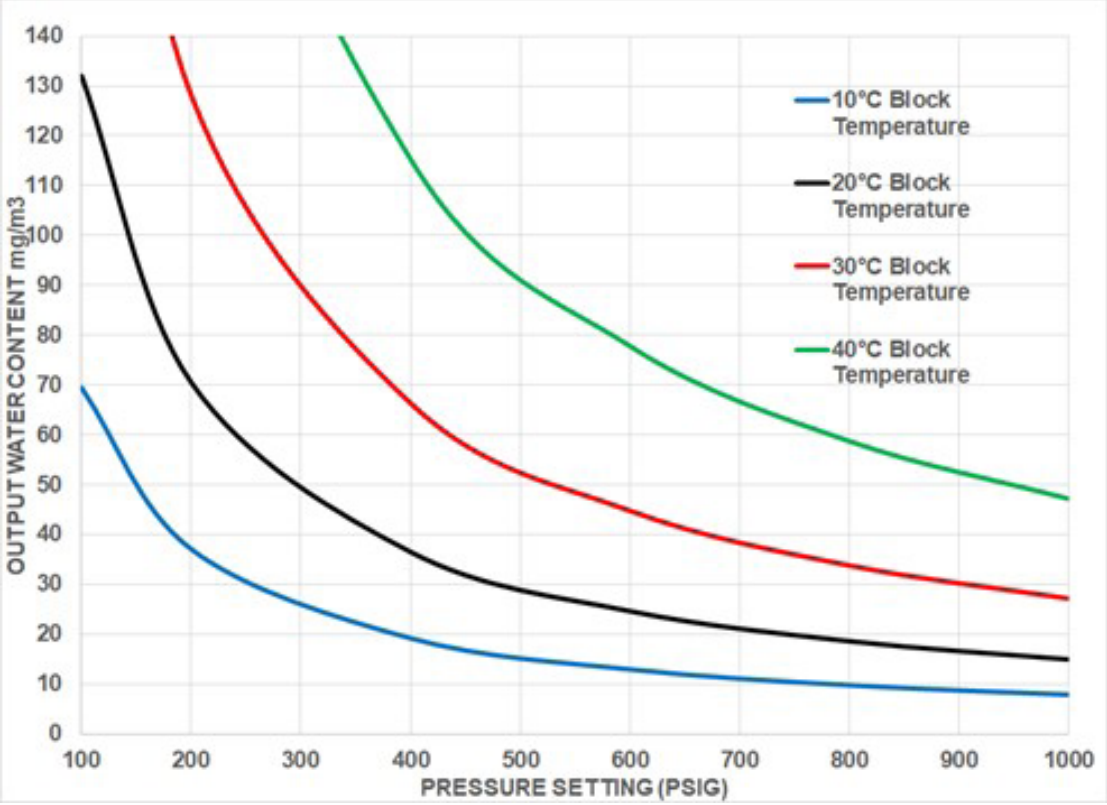
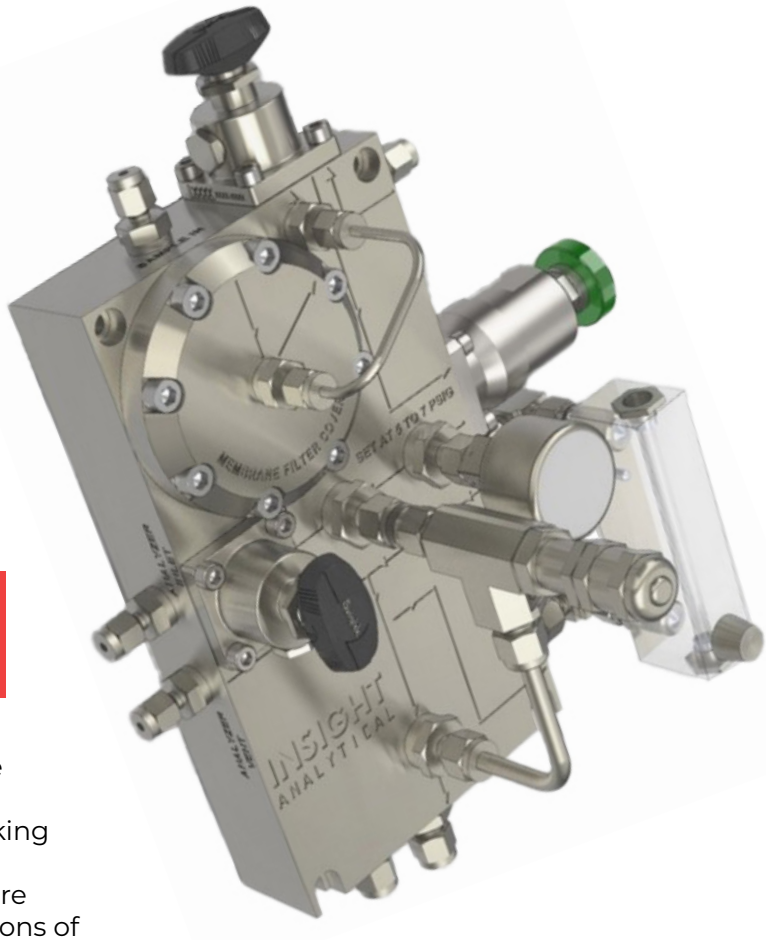


Figure 4 – Water Vapor Concentrations in mg/m3 Generated Over a Range of Block Temperatures and Pressure Settings

INSIGHT ANALYTICAL

Fast Sample System FSS-1



The Insight Analytical Type 1 Sample System Block (Patent Pending) is a self-contained sample conditioning system for gas analyzers built into a compact machined block that can be used with either portable or fixed gas analyzers.

Field of Application:

Most gas analyzers will only work reliably and provide accurate measurements with clean, dry, non-corrosive samples delivered within their design conditions for temperature, pressure, and flow rate, so analyzers making measurements of chemical composition or physical properties on samples extracted from processes require some form of sample conditioning system. The functions of basic sample systems typically include at least the following: filtration, pressure regulation, a method of introducing calibration gases, and maintaining the safety of the system which may require limiting the maximum pressure in the event of a pressure regulator failure for applications with analyzers with low pressure ratings. Some sample systems may also require some form of flow control when being used with a gas analyzer that does not have internal flow control and possibly more sophisticated processing such as condensing liquids.

A well-designed sample system will accomplish these functions while meeting the requirements for timeliness (required speed of response time), accuracy, and other requirements of the analysis system, and optimizing the balance between meeting the above performance factors with the cost of the equipment, installation, operation, and maintenance which are inherent in any analyzer system installation.

The Type 1 Sample System Block is intended for use in gas phase applications where condensing of liquids is not required and includes the best features of both conventional sample systems built from discrete sample conditioning components and SP76/NeSSI substrate style systems. Most of the fittings in this system are made with o-ring type Swagelok fittings rather than NPT threads to reduce the possibility of leaks – the only NPT threads in the system are on the pressure gauge and rotameter connections.

A 2”/50mm diameter membrane filter built into the machined block with proprietary geometry to both reduce the internal volume and increase the mixing compared to other commercially available designs, with the result being significantly faster response time without compromising the effectiveness of the filtering.

The standard version is configured for use with analyzers such as gas chromatographs or other analyzers that require clean, dry sample gas delivered at pressure just above atmospheric and that have their own internal flow control. Alternate versions of this system are available with the 2-way shut off valve replaced with a metering valve for flow control and an additional rotameter added to the vent for applications with analyzers requiring external flow control.

Advantages

- More economical than SP76/NeSSI style sample systems but with better performance.
- More compact than sample systems using conventional discrete components connected with tubing.
- It has no electrical components, so it is suitable to be used in explosive gas atmospheres, such as natural gas plants or metering stations without additional certifications.
- Easier to work on and understand than SP76/NeSSI style sample systems.
- Incorporates a larger diameter membrane filter than SP76/NeSSI style systems can accommodate and the novel geometry inside of the membrane filter results in faster response time than conventional membrane filter housings.
- Reduces the likelihood of gas leaks because of reduced connections and replacing NPT/sealant type connections with o-ring seals.
- Reduced issues with contamination from liquid thread sealant.
- Reduced issues with thread galling which is common with NPT threads – increased life for fittings, components, and other connections because of the reduction in the use of NPT threads.
- Low internal volume of passages in machined block and seamless connections between components results in faster response time than either conventional or SP76 based systems.
- Area and mass of the machined aluminum block increases heat transfer to the SP76 type pressure regulator which helps to counter the cooling created by the Joule-Thomson effect, thereby keeping the pressure reduction closer to isothermal conditions compared to conventional or SP76 based systems without actively heated pressure regulators.
- Faster response time for a given sample flow rate means that lower sample flow rates can be used for a given sample response time resulting in lower fugitive/engineered emissions.
- Modular nature of system means it is possible to replace the entire system with a spare and perform repair/maintenance in the shop rather than in the field, resulting in less downtime.
- Use of electroless nickel plating on the machined aluminum block provides a hard, corrosion resistant and inert surface while still providing the advantages of aluminum including high thermal conductivity, light weight and reasonable cost.

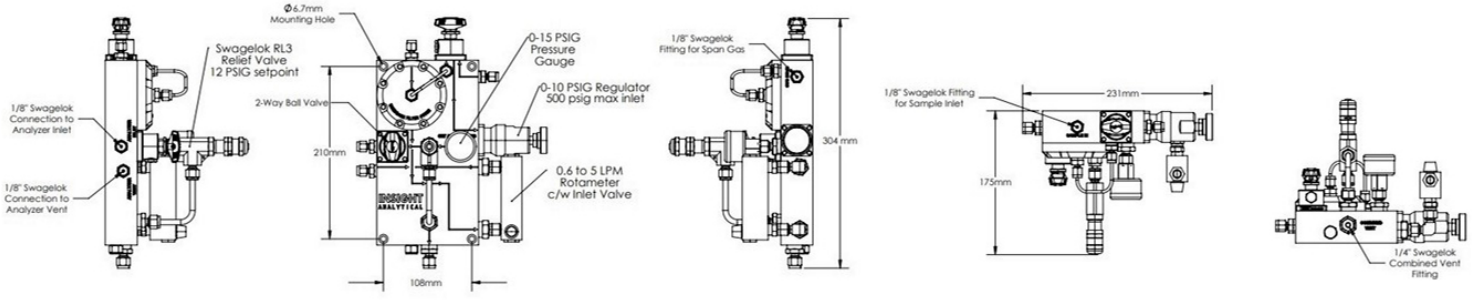


Figure 1 – Fast Sample System FSS-1 General Arrangement Drawing

Technical Specifications	
Maximum Inlet Pressure Rating	100 psig (690 kPag) for standard system, up to 1000 psig (6895 kPag) rating upon request
Temperature Range	-6°C to 65°C
Delivery Pressure Range	0 to 10 psig (0 to 69 kPag) for standard system, higher delivery pressure ranges available upon request
Flow Rate Range	See Figure 3
Filter Drain Rotameter Material and Range	Acrylic rotameter body, 0 to 2 NLPM Air Calibration, other ranges available
Inlet and Outlet Connection Size	1/8” Tube Swagelok Compression Fitting for inlet and analyzer connections, ¼” Tube Vent Fitting
Pressure Relief Valve	Swagelok SS-RL3S4 Relief Valve set at 12 psig (83 kPag)
Wetted Materials E	lectroless Nickel Plated Aluminum and 316 Stainless Steel, FKM o-rings. Other o-ring material options available
NACE compliance	NACE MR0175/ISO 15156 and MR0103 Compliant.

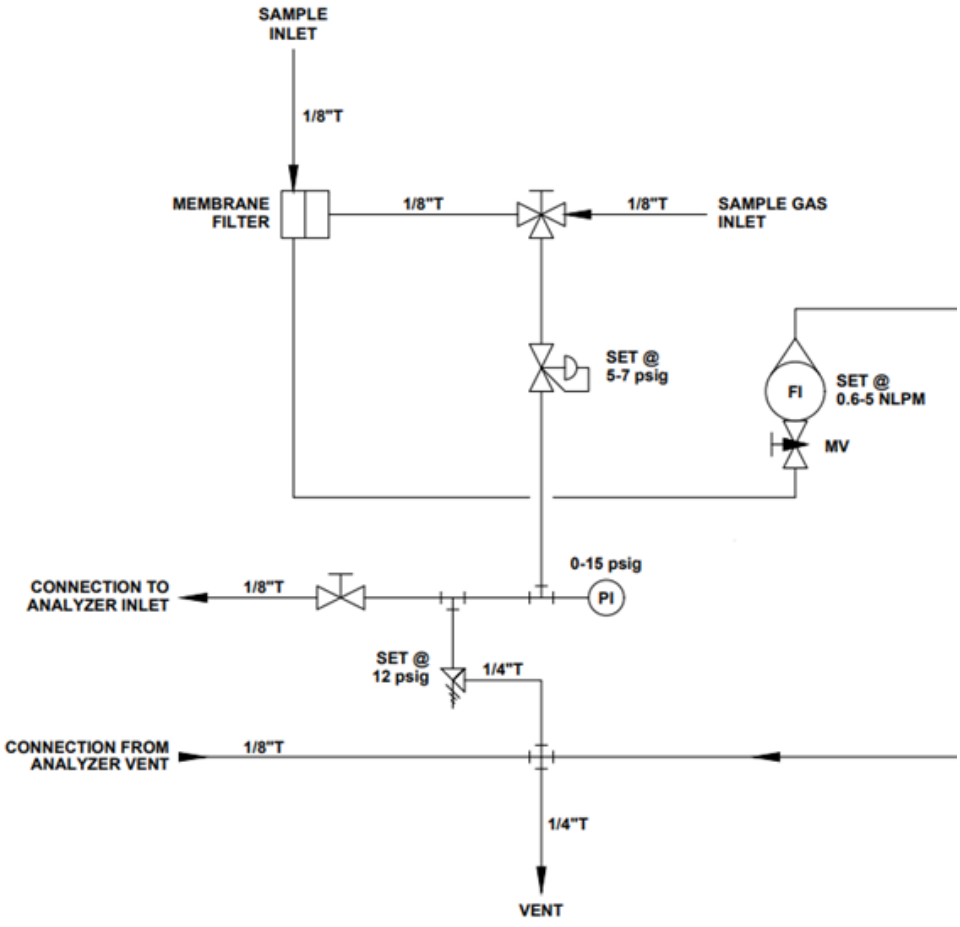


Figure 2 – Flow Schematic for Fast Sample System FSS-1 Standard Version

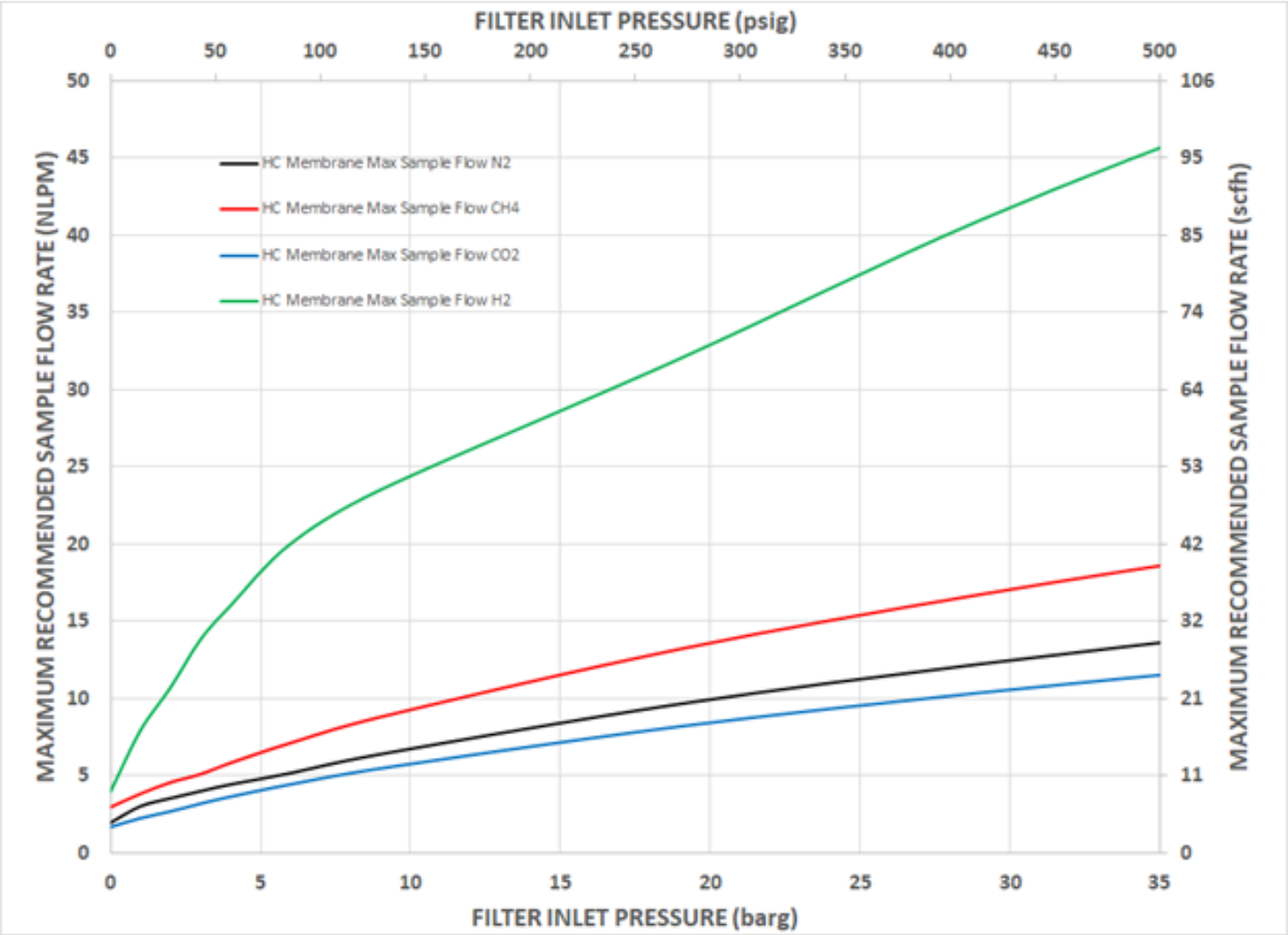
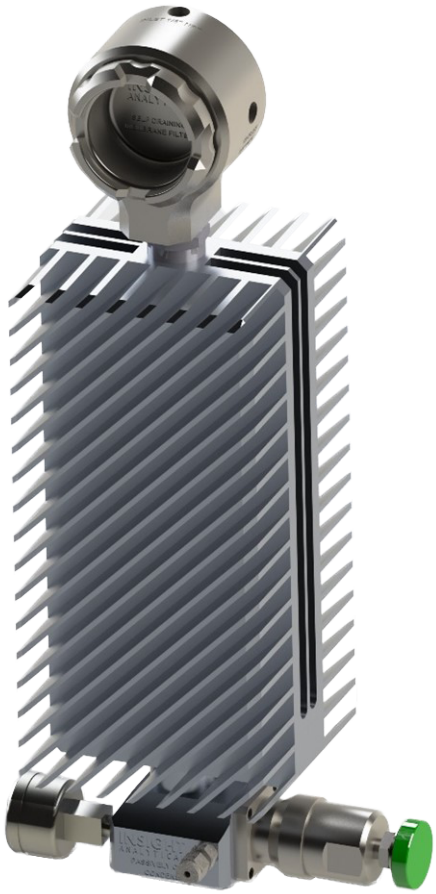


Figure 3 – Maximum Recommended Sample Flowrates Thru Membrane Filter

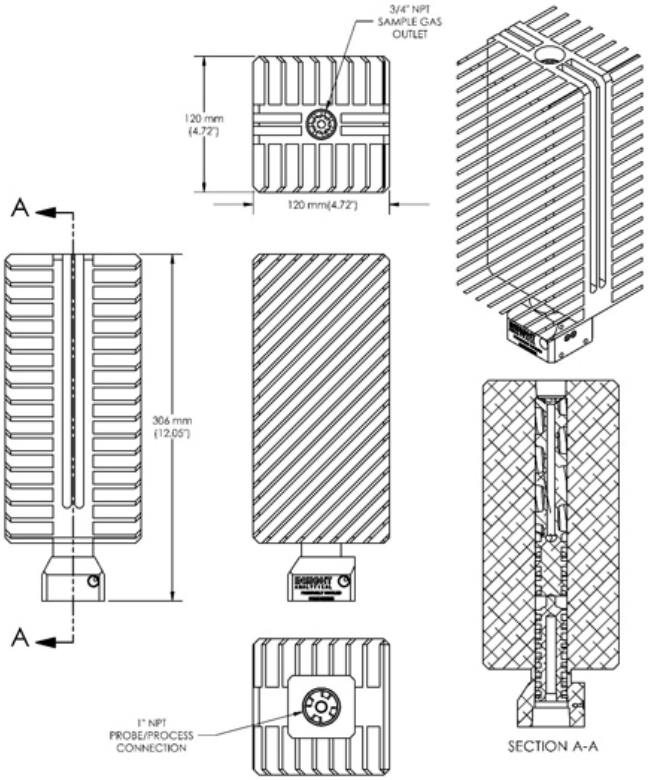
INSIGHT ANALYTICAL

Passive Probe Condenser



The Insight Analytical Passive Probe Condenser is designed to limit the dew point temperature of sample gas in analytical sample systems when mounted on the outlet of quill type sample probes. The operation of this condenser is similar to distillation/reflux type sample probes, tube-in-tube heater exchangers, and shell and tube heat exchangers, except it has passive cooling fins to dissipate heat to the surroundings, so does not require cooling air or liquid flow. If the dew point temperature of the sample gas is higher than the condenser body temperature, liquids are condensed and will drain back down through the sample probe and into the process.

The condenser is mounted vertically at the process sample point above the sample probe with an isolation valve between the probe and condenser. Mounting of the condenser on the isolation valve is via a 1" NPT female thread on the bottom of the aluminum condenser inner core. Process gas flowing up through the probe is cooled as it contacts the aluminum insert inside of the condenser body. The lowest half of the insert is a reflux section and includes sixteen staggered rows of saddle shaped fins which function as both reflux/ distillation saddles and cooling fins. The upper half of the insert is a condenser section with the gas flowing through seven parallel helical grooves. The grooves are inclined at a 70° angle to the horizontal to provide the best compromise between maximizing condensed liquid quantity, drainage, and contact surface area, while minimizing response time and vertical velocity. The insert is coated with SilcoTek Dursan® hydrophobic and oleophobic coating to improve drainage and provide abrasion and corrosion resistance. After coating, the insert is permanently installed in the electroless nickel plated aluminum condenser body via a shrink fit, which maximizes the heat transfer between the two parts.



Passive Probe Condenser Insert.

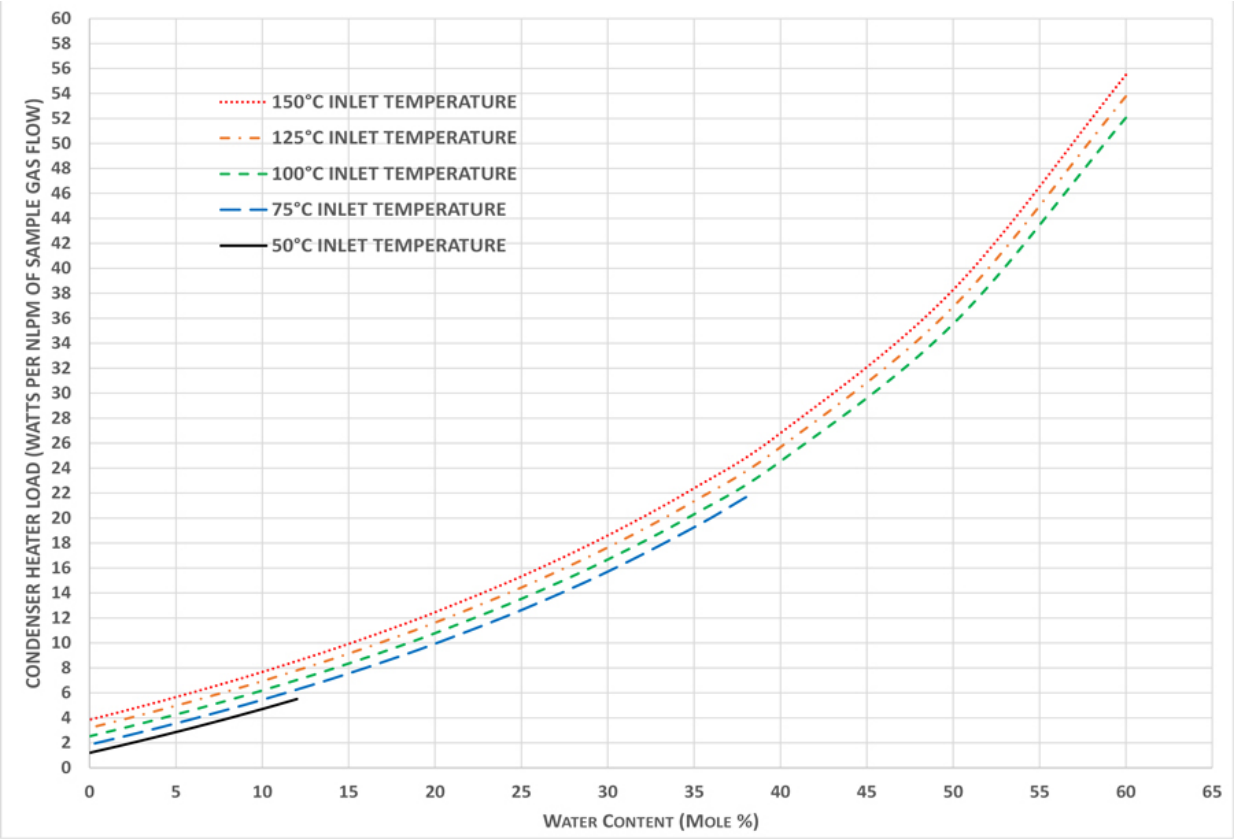


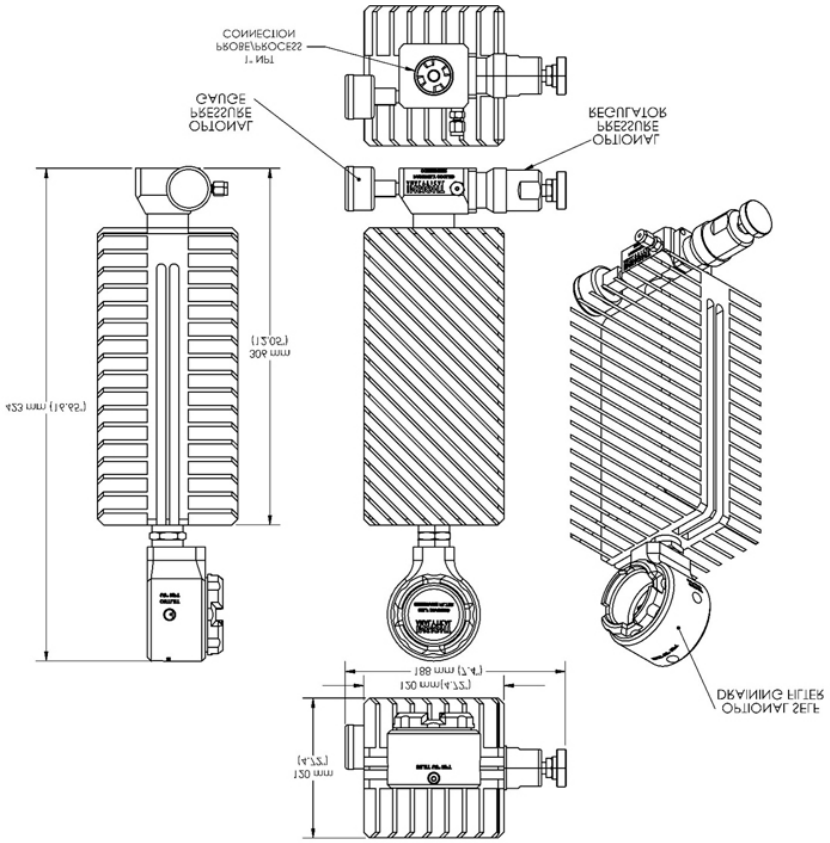
Figure 1 – Condenser Heat Load Estimates for 1 NLPM of Dry Condenser Outlet Flow as a Function of Inlet Temperature and Water Vapor Content

The design of the diagonal fins machined on the outside of the condenser body was optimized using CFD (computational fluid dynamics) software to achieve the highest heat dissipation and lowest sample gas outlet temperature within a compact size footprint. The thermal resistance of the condenser is about 0.43 °C/W in a 20°C (68°F) ambient temperature. For example, if the cooling load is estimated to be 20 W, then the condenser outlet temperature would be about 8.6°C above ambient temperature. Figure 1 can be used to estimate the cooling load for 1 NLPM of dry condenser outlet gas at various inlet temperatures and water contents for applications where water is the primary liquid being condensed.

There are a lot of variables in installation details that can affect the condenser performance including radiation from the sun and hot process pipes, air circulation/wind, and ambient temperature range. The Electroless Nickel Plating finish on the condenser minimizes the heating of the condenser by external radiation but insulating the process pipe in the area around where the probe is installed and minimizing sun exposure can improve performance.

This condenser is ideal for applications where a sample chiller or distillation/reflux probe might be used, but a more compact and cost-effective solution is required, and an outlet dew point temperature slightly higher than ambient temperature is still acceptable. This product should only be used in applications where the sample gas, any entrained liquids, and the cooling fluid are compatible with the electroless nickel plated aluminum material of construction. It is also important to ensure that the maximum temperature is not exceeded and that the minimum ambient temperature is safely above the freezing point of any liquids that are being condensed from the gas sample.

An optional self draining membrane filter can be mounted on the outlet of the condenser to remove any mist or aerosols present in the condenser outlet gas. If required the outlet of the membrane filter can be connected to a SP76 compliant pressure regulator mounted on the base of the condenser. The temperature of the base of the condenser normally significantly higher than the outlet, and this provides passive heating of the pressure regulator.



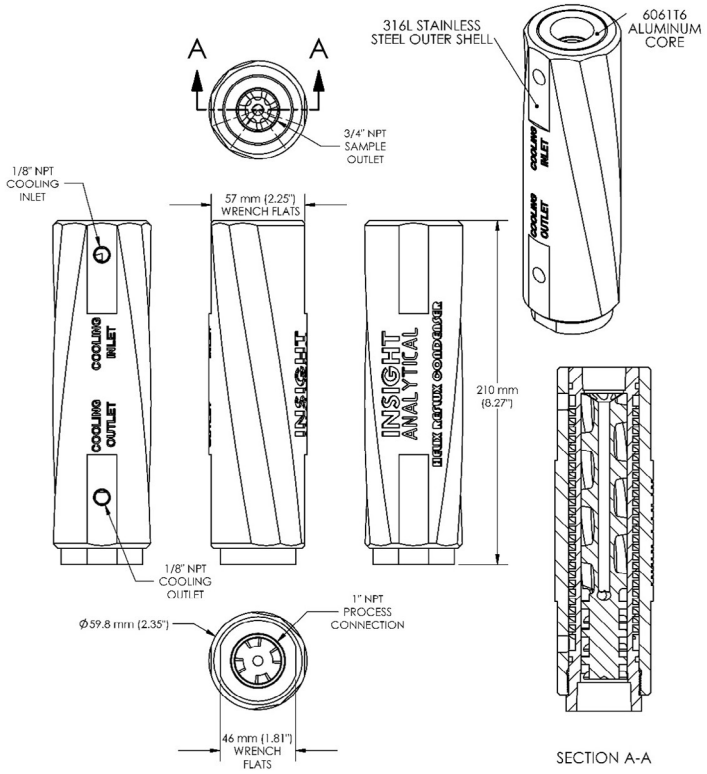
Technical Specifications	
Maximum Pressure Rating	10340 kPag (1500 psig)
Temperature Range	-30°C to 149°C (-22°F to 300°F)
Internal Sample Volume	88 cm^3 (5.4 in^3)
Recommended Sample Flow	0.5 to 10 NLPM (1 to 20 scfh)
Effective Thermal Resistance 0	.43 °C/W at 20°C Ambient Temperature
Dimensions and Weight	306 mm L x 120 mm D x 120 mm W (12.05” L x 7.4” W x 7.4” D), 3.8 kg (8.4 lbs)
Sample Inlet Port Size 1	” NPT female thread
Sample Outlet Port Size ¾	” NPT female thread
Sample Wetted Materials E	lectroless nickel plated 6061 T6 aluminum and Dursan™ coated 6061 T6 aluminum
Condenser External Surface E	lectroless nickel plated 6061 T6 aluminum
NACE compliance	NACE MR0175/ISO 15156 and MR0103 Compliant.
RoHS Compliance	Yes

INSIGHT ANALYTICAL

Active Probe Condenser

The Insight Analytical Active Probe Condenser is designed to limit the dew point temperature of sample gas in analytical sample systems when mounted on the outlet of quill type sample probes. The function of this condenser is similar to distillation/reflux type sample probes, tube-in-tube heater exchangers, and shell and tube heat exchangers, where cooling air or liquid flowing though the stainless steel outer shell cools the inner aluminum core along with the sample gas flowing through it. If the dew point temperature of the sample gas is higher than the inlet temperature of the cooling fluid, liquids are condensed and will drain back down through the sample probe and into the process.

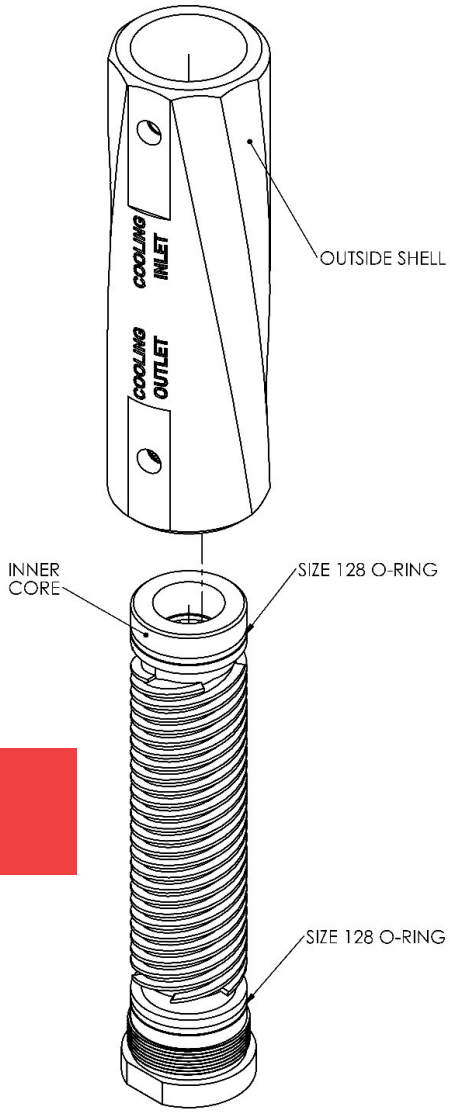
The condenser is typically mounted vertically at the process sample point above the sample probe with an isolation valve between the probe and condenser. Mounting of the condenser on the isolation valve is via a 1" NPT female thread on the bottom of the aluminum condenser inner core. Process gas flowing up through the condenser is cooled as it contacts the aluminum insert inside of the inner core. The lowest one third of the insert is a reflux section and includes six staggered rows of saddle shaped fins which function as both reflux/distillation saddles and cooling fins. The upper two thirds of the insert is a condenser section with the gas flowing through seven parallel helical grooves. The grooves are inclined at a 70° angle to the horizontal to provide the best compromise between maximizing condensed liquid quantity, drainage, and contact surface area, while minimizing response time and vertical velocity. The insert is coated with SilcoTek Dursan® hydrophobic and oleophobic coating to improve drainage and provide abrasion and corrosion resistance. After coating, the insert is permanently installed in the electroless nickel plated aluminum inner core via a shrink fit, which maximizes the heat transfer between the two parts.



Multi-start helical fins machined on the outer diameter of the inner core provide a large surface area for efficient heat transfer to the cooling fluid flowing between the inner core and outside shell and have a very low pressure drop. Low pressure drop is an important performance consideration if air from the cold side of a vortex type cooler is being used as the cooling fluid. While the condenser layout is similar to other countercurrent heat exchangers, where the hot sample gas and cooling fluid enter at opposite ends of the exchanger, this design is compatible with large temperature differentials between the hot and cold sides which are problematic for most shell and tube type heat exchangers. The outer shell and inner core are assembled with an M45 thread on the probe side of the condenser with sealing maintained by two size 128 O-rings. Although the outer shell and inner core are made from different materials, this design minimizes thermal stresses because the two parts are only rigidly connected at one end, which allows the two parts to expand and contract independently along their length.

Control of the sample gas outlet temperature is typically accomplished either by using a cooling liquid with at an appropriate temperature or using cooling air from a vortex cooler along with either manual or automatic flow control. An optional insulation cover is available for applications where the desired sample gas exit temperature is significantly different from ambient temperature.

This condenser is ideal for applications where a sample chiller or distillation/ reflux probe might be used, but a more compact and cost effective solution is required. This product should only be used in applications where the sample gas, any entrained liquids, and the cooling fluid are compatible with the 316L stainless steel and nickel plated aluminum materials of construction. It is also important to ensure that the maximum temperature is not exceeded and that the minimum ambient temperature is safely above the freezing point if liquid is being used as the cooling fluid.



Technical Specifications

Maximum Pressure Rating	10340 kPag (1500 psig) for process gas 1380 kPag (200 psig) for cooling fluid
Temperature Range	-30°C to 149°C (-22°F to 300°F) for air cooling 1°C to 100°C (34°F to 212°F) for liquid cooling
Internal Sample Volume 4	9 cm^3 (3 in^3)
Recommended Sample Flow	0.5 to 10 NLPM (1 to 20 scfh)
Cooling Fluid Pressure Drop	60 NLPM (2.1 cfm) Air: 1.7 kPa (0.25 psi) pressure drop 3.8 LPM (1 US GPM) Water: 1.7 kPa (0.25 psi)
Dimensions and Weight	210 mm L x 60 mm Dia. (8.27" L x 2.35" Dia.), 2.5 kg (5.5 lbs)
Inlet and Outlet Cooling Port Size	1/8" NPT female thread
Sample Inlet Port Size 1	" NPT female thread
Sample Outlet Port Size	¾" NPT female thread
Sample Wetted Materials E	lectroless nickel plated 6061 T6 aluminum and Dursan® coated 6061 T6 aluminum
Coolant Wetted Materials E	lectroless nickel plated 6061 T6 aluminum, 316L stainless steel, Aflas O-ring
Condenser External Surface	316L Stainless steel and electroless nickel plated aluminum
NACE compliance	NACE MR0175/ISO 15156 and MR0103 Compliant.
RoHS Compliance	Yes

Critical Data. Real Time.

Verax CTX/CTXe

The Verax CTX represents JP3's latest generation Near-Infrared analyzer designed specifically for oil and gas applications. With faster measurement times, four independent spectrometer detectors enhanced optical components, and a new flow cell, the Verax CTX provides significant improvements in measurement speed, quality, repeatability, stability, and reliability in even the harshest environments. Natural gas or liquids can be accurately analyzed to obtain hydrocarbon composition, Vapor Pressure, BTU, API gravity, and other physical properties. Verax CTX is now certified for Natural Gas Custody Transfer applications as well.

Certifications

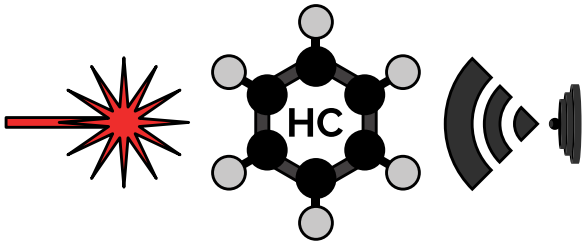
NEMA 4x IP66

Cl 1 Div 2 A,B,C,D,T4

Cl 1 Zone 2

CSA C22.2 61010-1 & 213

Flow Cell: IS Cl 1 Div 1



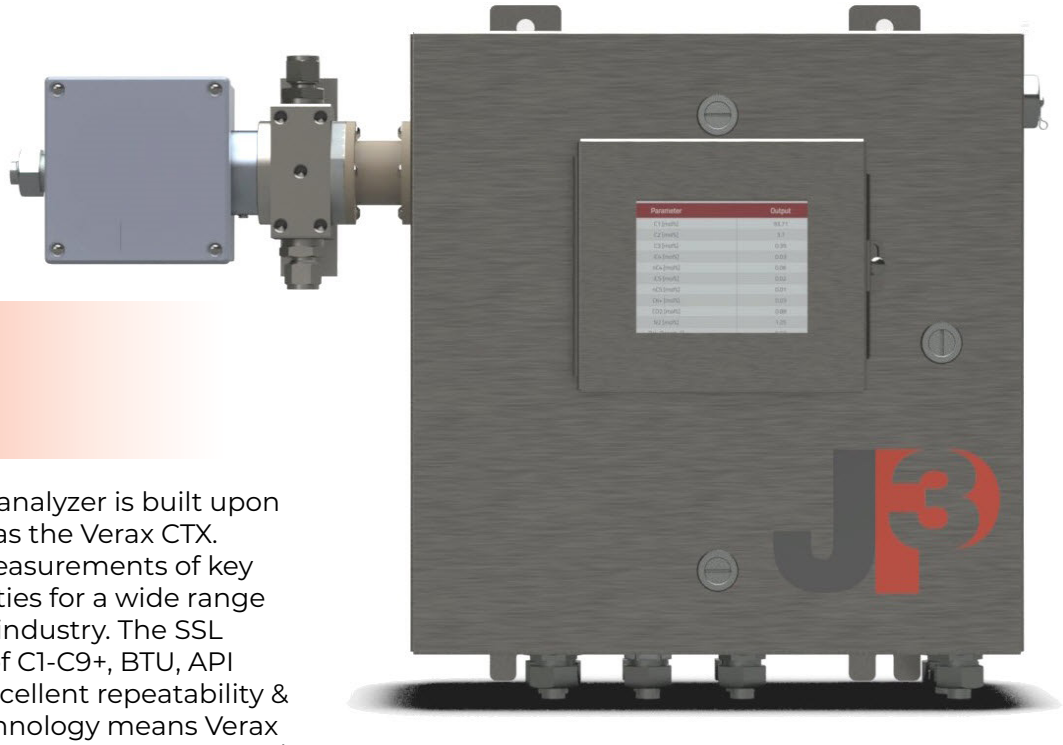
Features

- Rapid measurement time enabling real-time monitoring & control.
- No sampling system or shelter required - zero waste, zero emissions.
- Multi-Cell flow option for multiple stream analysis.
- Custom Flow Cell in-line at process temperature and pressure to prevent fouling and minimize maintenance requirements.

Applications

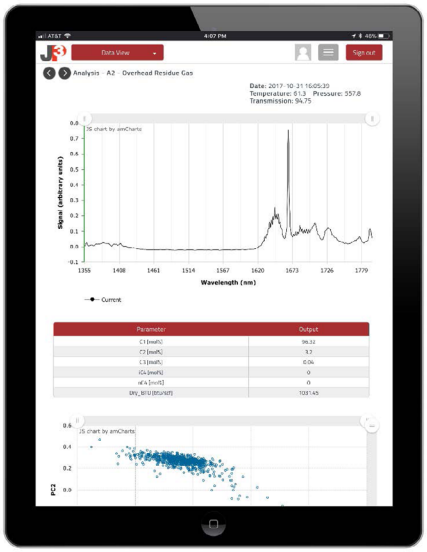
- Gas Plant Fractionation.
- Fuel Gas Monitoring.
- Truck/Tank/Rail On-load and Off-load Control.
- Stabilizer Optimization.
- Real-time Vapor Pressure Control for Liquids/ Crude.
- On-line Crude Tower Control.

Critical Data. Real Time.



Verax SSL/SSG

The Verax SSL single stream liquid analyzer is built upon the same field-proven technology as the Verax CTX. The SSL produces rapid, reliable measurements of key compositional and physical properties for a wide range of applications across the oil & gas industry. The SSL provides fast stream composition of C1-C9+, BTU, API gravity, Vapor Pressure, etc. with excellent repeatability & reproducibility. JP3's advanced technology means Verax analyzers produce zero emissions and require no carrier/ calibration gases.



Certifications

NEMA 4x IP66

Cl 1 Div 2 A,B,C,D,T4

Cl 1 Zone 2

CSA C22.2 61010-1 & 213

Flow Cell: IS Cl 1 Div 1

Features

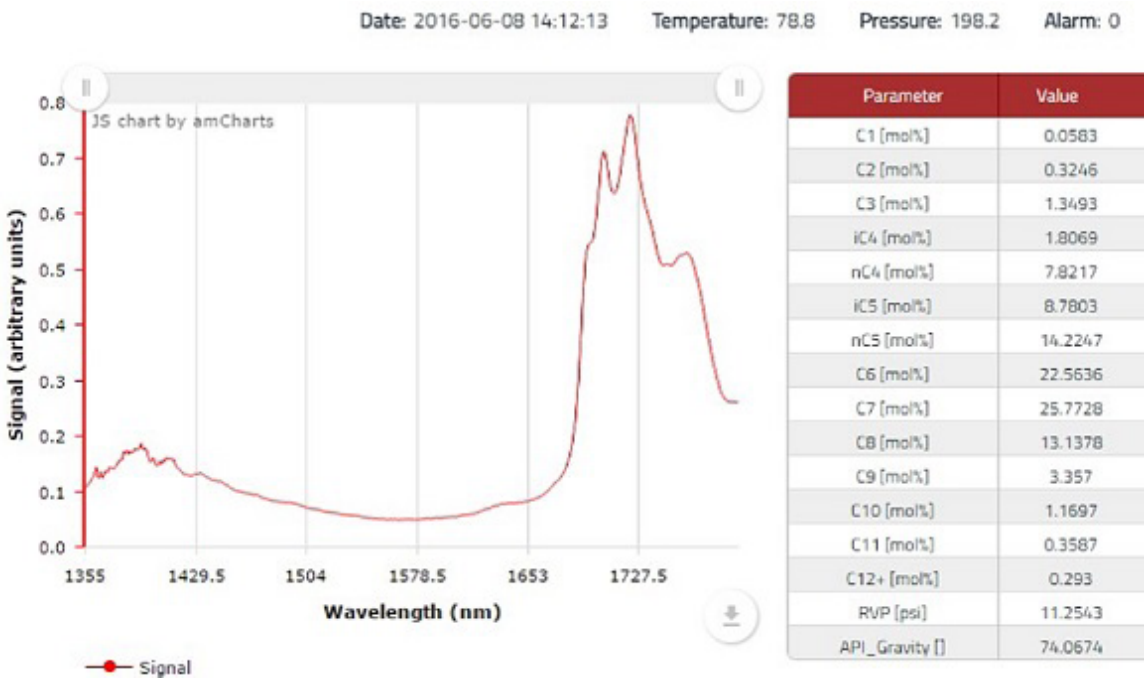
- Zero consumables, zero waste, no calibration gas required.
- NIR laser absorption spectroscopy with proprietary chemometric modeling.
- Rapid analysis time enabling real-time monitoring and control.
- Flow Cell in line at process temperatures and pressures - specially designed to prevent fouling.

Applications

- Natural Gas Composition & BTU.
- Crude Oil - API Gravity and Vapor Pressure.
- Turbine/Compressor Fuel Gas Monitoring.
- Transmix Interface & Transition.
- Gas Blending - Ethane/Propane.

Critical Data. Real Time.

Data Subscription Services



Parameter	Value
C1 [mol%]	0.0583
C2 [mol%]	0.3246
C3 [mol%]	1.3493
iC4 [mol%]	1.8069
nC4 [mol%]	7.8217
iC5 [mol%]	8.7803
nC5 [mol%]	14.2247
C6 [mol%]	22.5636
C7 [mol%]	25.7728
C8 [mol%]	13.1378
C9 [mol%]	3.357
C10 [mol%]	1.1697
C11 [mol%]	0.3587
C12+ [mol%]	0.293
RVP [psi]	11.2543
API_Gravity []	74.0674

JP3 is an innovative leader in the “Data as a Service” business model for oil and gas. JP3 data services are grounded on unique and proprietary data produced via the JP3 Verax NIR measurement system. This technology has been widely proven for reliability and performance across the US and Canada. JP3 is providing a broad array of composition and physical property measurements of crude oil, condensate, NGLs, natural gases, purity NGL products, and refined fuel products across the upstream, midstream, and downstream markets. JP3 continues to rapidly expand its installed base and scope of measurement applications and advanced software and visualizations that use those measurements to allow operators and decisions makers to better preform their roles.

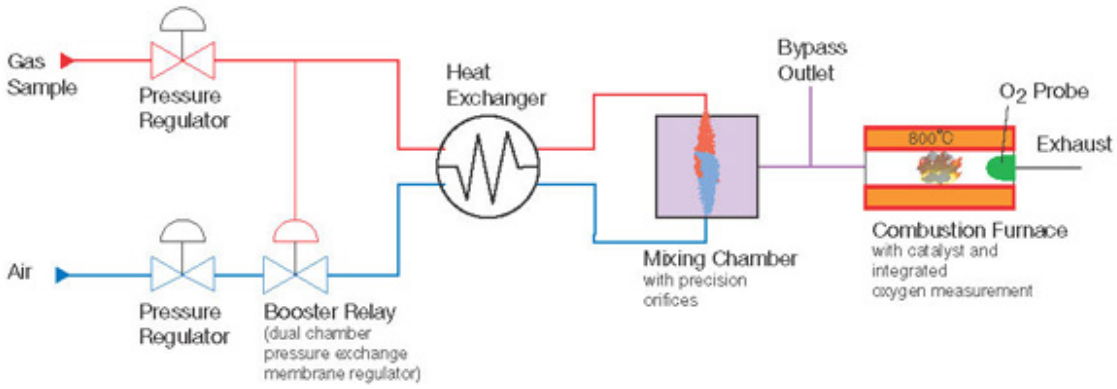
JP3 Data Service Plan Overview

- JP3 provides all necessary equipment, software, and services to commission and maintain measurement packages and data service.
- Available measurement packages include: Vapor Pressure; C1-C6+ Gas Composition; C1-C6+ Liquid Composition; Extended Gas and Liquid Composition; BTU; and Natural Gas Custody Transfer.
- Monthly data services fee is based on the number and choice of measurement package(s).
- JP3 Viper Software is a secure, web-based utility for viewing real-time process data which can be utilized to make key decisions toward your profitability.
- No capital expenditure or long-term contract is required.

COSA XENTAUR
a Process Insights Brand

9610 BTU Calorimeter

One of the latest instruments from COSA+Xentaur for measuring Wobbe Index, BTU, and CARI (Combustion Air Requirement Index). The COSA 9610 Wobbe Index Meter's measuring principle is based on the analysis of the oxygen content after combustion of the sample. A continuous gas sample is mixed with dry air at a precisely maintained ratio, dependent on the BTU range of the gas to be measured. Key advantages to using this measuring principle, based on the Residual Oxygen Measurement Method, are its insensitivity to changes in ambient temperature, very fast response times with the ability to measure BTU values down to zero.



Features

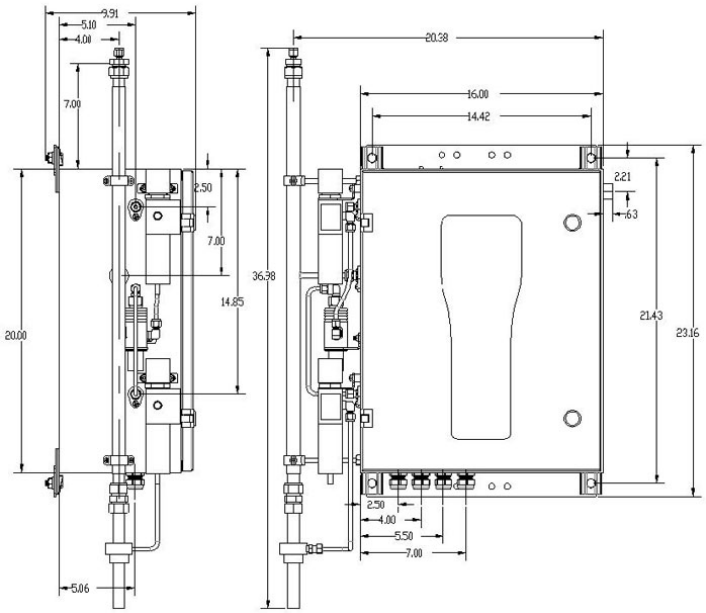
- High Accuracy.
- Fast Response.
- Large Measurement Range.
- Measures Low BTU Gases.
- Low Maintenance.
- Flameless / No Flameouts.

Applications

- Turbine Control.
- Flare Stack Control.
- Fuel Optimization.
- Measures Low BTU Gases.
- Custody Transfer.
- Hyco Plant Control.

XTDL Optical Moisture Analyzer

The XTDL is designed with a new proprietary optical sampling system for moisture dew point in your high CO2 gas applications. From beverage & food to plastics applications, the COSA Xentaur XTDL-HR was designed to accurately measure the moisture dew point in a carbon dioxide background gas without the worry of cleaning the optics or frequently replacing sensing elements due to frequent drift or failure. Once calibrated at the factory, no further recalibrations are required.



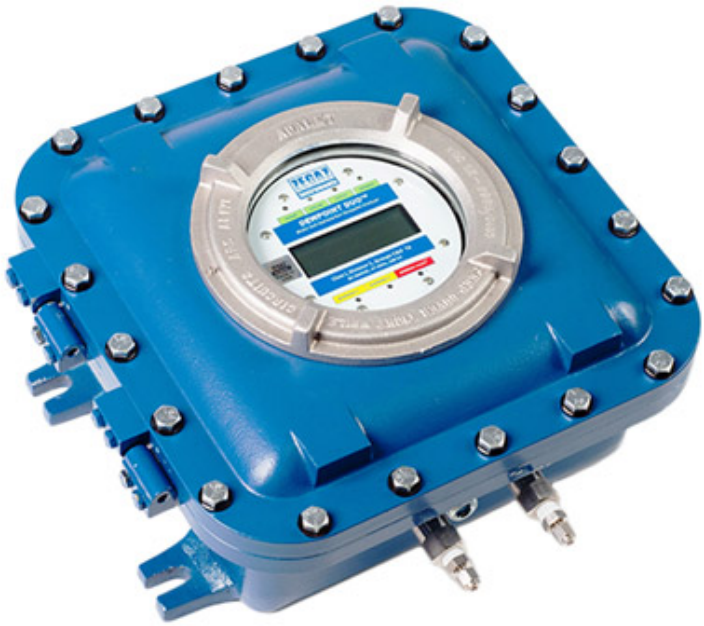
Features

- High contrast display.
- Selectable graphical output.
- Fast response.
- Field calibration.
- 6 different engineering units.
- Real-time pressure and temperature correction.

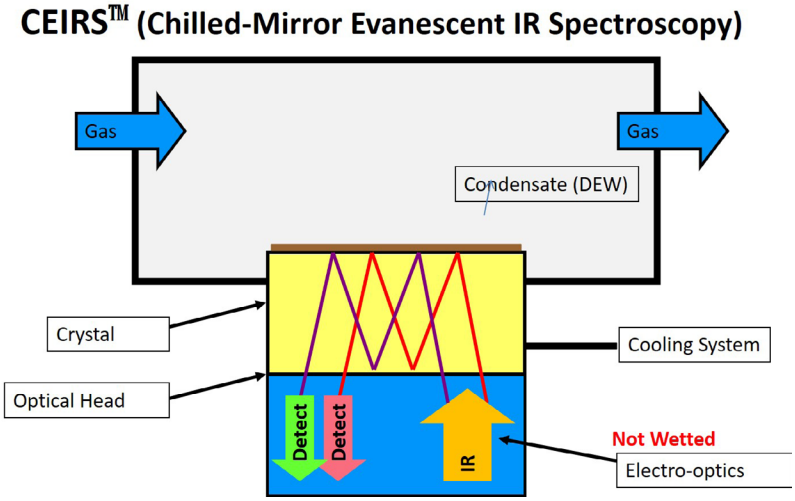
Applications

- High and Low Moisture Content in CO2.
- Cold Blast Furnace Gas.
- Annealing.
- Carbonitriding.
- Carburizing.
- Brazing.

Dewpoint Duo



ZEGAZ Instruments products use the patented CEIRS™ (Chilled-mirror Evanescent IR Spectroscopy) that combines the first-principle chilled-mirror method with advanced IR spectroscopy to accurately and unambiguously determine the dew point of water and hydrocarbons in natural gas streams for pressures of up to 2000 psig. These analyzers are rated for Hazardous Location operation.



Features

- No calibration.
- No consumables.
- Self-cleaning.
- Immune to contaminants.
- Robust and highly reliable.

Applications

- Natural gas pipeline quality control for water and hydrocarbon dewpoint.
- Boiler and gas turbine protection through measurement of hydrocarbon dewpoint.
- Monitoring chemical plant inlet of hydrocarbon streams for dewpoint protection.

DewPort™

DewPort™ is a portable hydrocarbon and water dew point analyzer. It is analogous to the manual chilled mirror, except that the human eye is replaced by a state-of-the-art infra-Red sensing mechanism to detect the onset of the condensation and analyze the nature of the condensate. The cooling system in a manual system needs compressed gas, but it has been replaced with electronic cooling in DewPort™.

DewPort™ provides a first-principle chilled mirror measurement that is the standard for such measurement and complies with ASTM D1142, ISO 6327, and ISO/TR 11150.

Features

- Advanced CEIRS™ Technology.
- First-Principle Chilled-Mirror Method.
- Measures Both Water and Hydrocarbon Dew Points Using the Same Sensor.
- Industry-Leading 70°C Cooling Range.
- State-of-the-Art Cooling System.
- Mirror Immune to Degradation and Contamination.

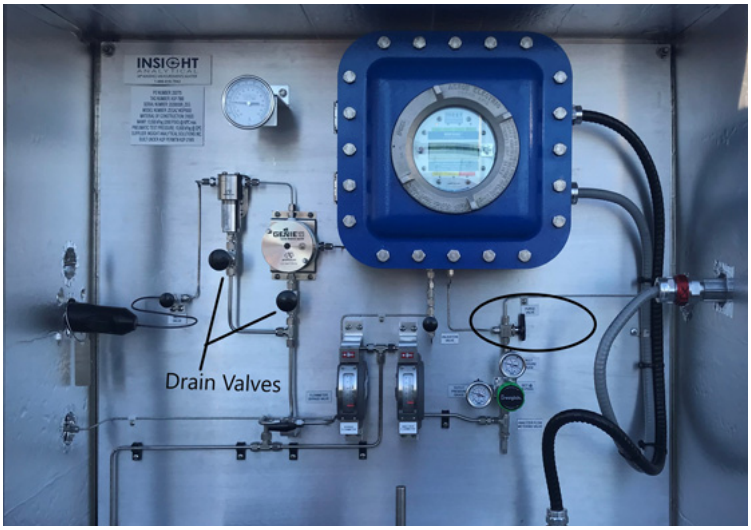
Applications

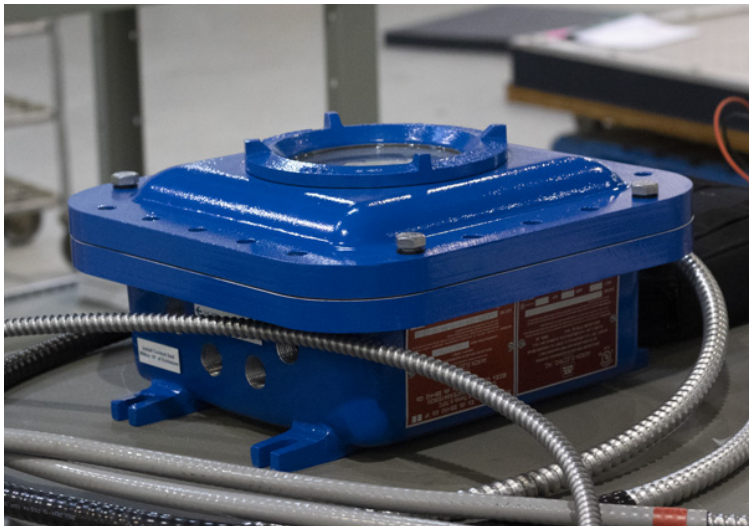
- Natural gas pipeline quality control for water and hydrocarbon dewpoint.
- Boiler and gas turbine protection through measurement of hydrocarbon dewpoint.
- Monitoring chemical plant inlet of hydrocarbon streams for dewpoint protection.

ZEGAZ instruments

Hydrocarbon Dewpoint Analyzer

HCD5000™ is designed for the measurement of hydrocarbon dewpoint of a natural gas stream at pressures up to 2000 psi. It is based on the groundbreaking CEIRS™(Chilled-Mirror Evanescent IR Spectroscopy). HCD5000™ is by far the most advanced analyzer of its kind offering unambiguous and reliable measurements. HCD5000™ carries CSA (Class I, Div.1) and ATEX/IECEX (II 2 G Ex db IIB+H2 T6 Gb) hazardous location certifications.





Features

- Direct, first principle measurement.
- Highly reliable.
- Self-cleaning.
- Immune to most contaminants.
- Accurate and unambiguous.
- No calculation or model errors.

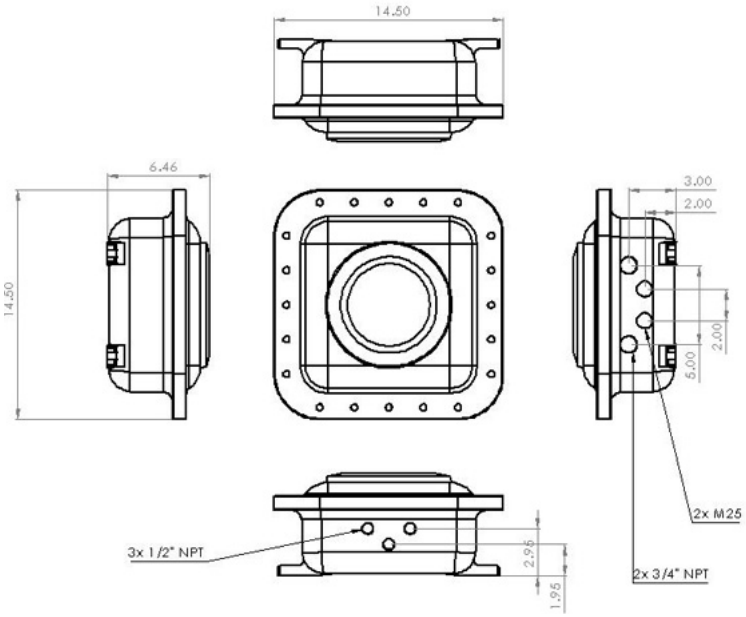
Applications

- Natural gas pipeline quality control for and hydrocarbon dewpoint.
- Boiler and gas turbine protection through measurement of hydrocarbon dewpoint.
- Monitoring chemical plant inlet of hydrocarbon streams for dewpoint protection.

ZEGAZ instruments

Water Dewpoint Analyzer

WDP5000™ is the only analyzer designed for the first-principle detection of moisture dewpoint in natural gas. Most other analyzers measure moisture content at low pressure and then estimate water dewpoint at a higher pressure. WDP5000™ uses a novel implementation of chilled-mirror technology to accurately and unambiguously detect the water dewpoint at the supplied pressure. It can handle pressures up to 2000 psig (137 barg) eliminating the need to reduce the pressure, thus avoiding errors associated with pressure regulation.



Features

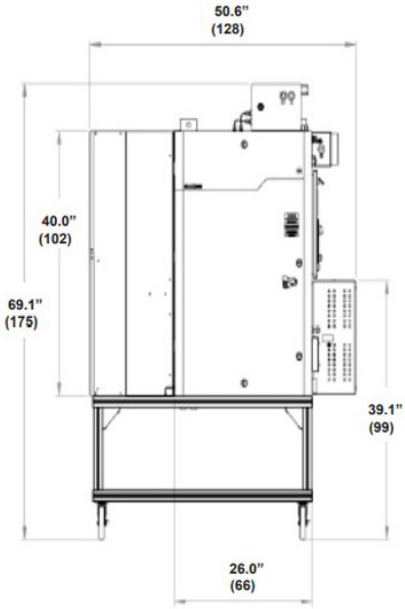
- True dewpoint measurement.
- Works at line pressure.
- Accurate and unambiguous.
- No carrier gas or replacement parts required.
- Sensor is not damaged by contaminants, slugs, or aerosols

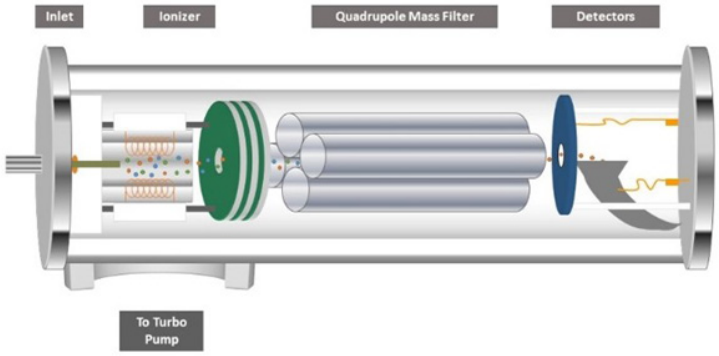
Applications

- Natural gas pipeline quality control for and hydrocarbon dewpoint.
- Boiler and gas turbine protection through measurement of hydrocarbon dewpoint.
- Monitoring chemical plant inlet of hydrocarbon streams for dewpoint protection.

MAX-300 RTG

The MAX300-RTG uses cutting-edge quadrupole mass spectrometer technology to deliver continuous online composition monitoring of industrial gas streams. Rapid, accurate gas analysis enables high-precision reactor control and increased production efficiency. It has the speed necessary to analyze the total composition of a sample in seconds and can be fully automated to measure several points in a process or multiple production lines with a single analyzer.





Features

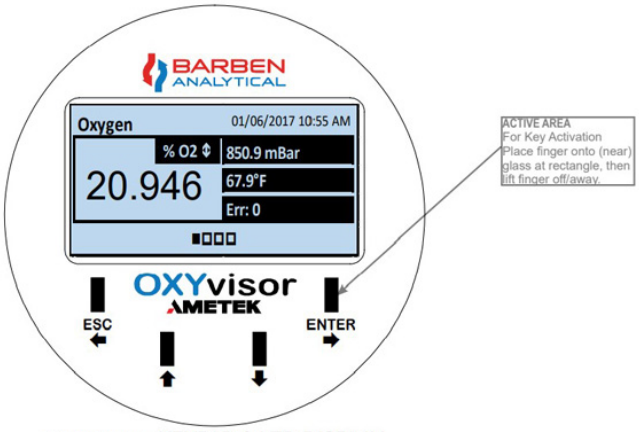
- Full, speciated analysis in Real-time (0.1 second per component)
- Measure all components with one analyzer (From 100% down to ppb levels)
- Monitor multiple applications with one analyzer.
- Process Sample Points: 16, 31, 46.
- Flexible (New components can be added for future projects)
- Industrial enclosure (Also available in stainless steel)

Applications

- Flare Gas.
- Fuel Gas.
- Product Quality.
- End Point Detection.
- Pure Gas/Controlled ATM Analysis

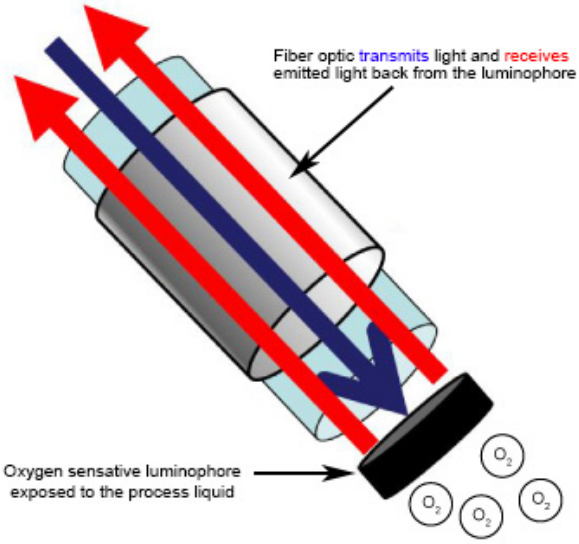
OXYvisor

Barben Oxygen Analyzer Technology operates in a variety of industrial process applications to measure trace and percent level O2. Barben probes use a special O2 sensitive fluorescent coating which is mated with fiber optic cable and built into high-grade stainless steel fittings to measure the partial pressure of both dissolved and gaseous oxygen. The O2 probes show excellent long-term stability even withstanding rough process conditions. The OXYvisor is an oxygen analyzer best utilized to measure O2 concentration in continuous, online monitoring and control applications. The OXYvisor can measure O2 concentration by volume in any phase stream.



OXYvisor KEYPAD & LED DISPLAY

Figure 29 - OXYvisor HMI Keypad and LED Display



Features

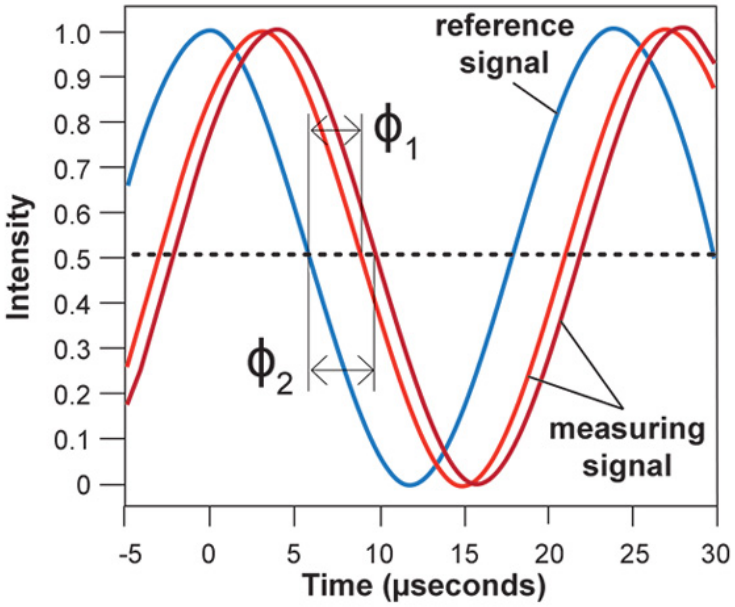
- Measures O2 concentration in both gas & liquid phase applications.
- Temperature & pressure compensated.
- Measurement unaffected by %H2S, CO2, SO2, H2.
- Auto-Calibration & Remote Validation capabilities.
- USB Data trend storage.
- Local display HMI for setup & configuration.

Applications

- O2 in hydrocarbon streams.
- Vapor recovery units.
- Custody transfer/metering stations
- Trace level O2 in flare gas.
- Dissolved O2 in liquid/product streams.
- O2 in methanol/ethanol/oils.

4401-OXY

Barben O2 Analyzer Technology operates in a variety of industrial process applications to measure trace and percent level O2. Barben probes use a special O2 sensitive fluorescent coating which is mated with fiber optic cable and built into high-grade stainless steel fittings to measure the partial pressure of both dissolved and gaseous oxygen. The O2 probes show excellent long-term stability even withstanding rough process conditions.



Features

- Excellent long term stability & drift.
- Retractable 'hot-tap' sensor design with no membranes or electrolytes to foul.
- Impervious to usual O2 poisons & interferences (%H2S, CO2, SO2, H2, etc.)
- Auto-Calibration & Remote Validation capabilities.
- Local display HMI & USB data historian.
- Measurement independent of flow velocity.

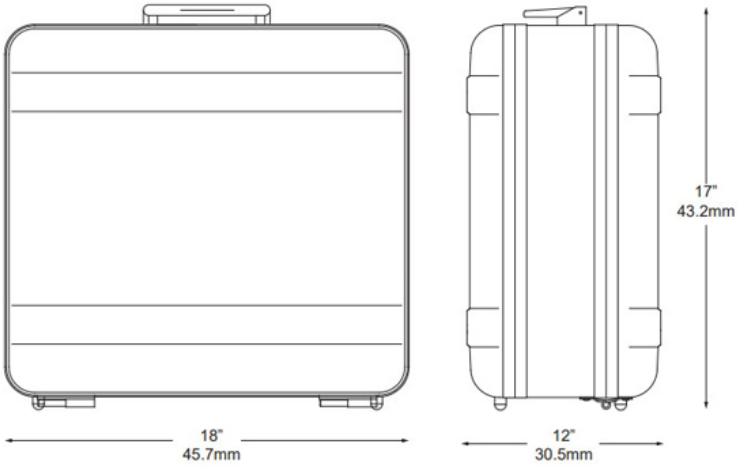
Applications

- O2 in hydrocarbon streams/process streams.
- Natural gas production and sweetening.
- Trace level O2 in flare gas.
- Dissolved O2 in liquid/product streams.
- ppb dissolved O2 for waterflood injection.
- O2 detection in nitrogen headers & tank blanketing.

PSC3-OXY Portable

The PSC3-OXY is a portable carrying case option for the 4401OXY Oxygen Analyzer. With all the benefits of the 4401OXY, the PSC3-OXY can measure trace level oxygen in the field in a self-contained, ruggedized, and weather-resistant case. Includes sample conditioning system for wet, dirty natural gasses and quick connect fittings for sample inlet & sample outlet. The PSC3-OXY seamlessly integrates with the 4401OXY, BOS FIBERSENSE Oxygen Sensor, and PT1000 RTD, all of which are included in an application-specific package.

PSC3-OXY Dimensions (with cover)



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- Natural gas production and sweetening.
- Trace level O2 in flare gas.
- Dissolved O2 in liquid/product streams.
- ppb dissolved O2 for waterflood injection.
- O2 detection in nitrogen headers & tank blanketing.

ATOM INSTRUMENT
a Process Insights Brand

SLA-1000

The ATOM SLA-1000 has the fastest analysis time of any commercially available analyzer allowing user-defined , multiple cycle averaging to improve analyzer performance. The analyzer operating software is both intuitive and user-friendly. In addition, the ATOM SLA requires only bottled air (no other gases needed for carrier or combustion) during normal operation and does not require installation in a shelter.

Features

- Designed for high-speed analysis and fast response time.
- It allows stable and accurate analysis at both high and low sulfur concentrations using the standard 100 seconds analysis cycle time.
- Up to 10 sequential results can be averaged to provide more consistent and reliable concentrations, allowing optimization of low-range detection performance.
- Analyzer response time for specific application requirements.

Applications

- Diesel (including ULSD)
- Gasoline (including Tier-III)
- Reforming and isomerization.
- Other Refinery Grade Fuel.
- Blending Operations.
- Catalyst Protection.

ATOM INSTRUMENT
a Process Insights Brand

SGA-1000

The ATOM SGA-1000 has the fastest analysis time of any commercially available analyzer allowing user-defined, multiple cycle averaging to improve analyzer performance. The analyzer operating software is both intuitive and user-friendly. In addition, the ATOM SGA -1000 only requires bottled Air for normal operation and does not require installation in a shelter.

Features

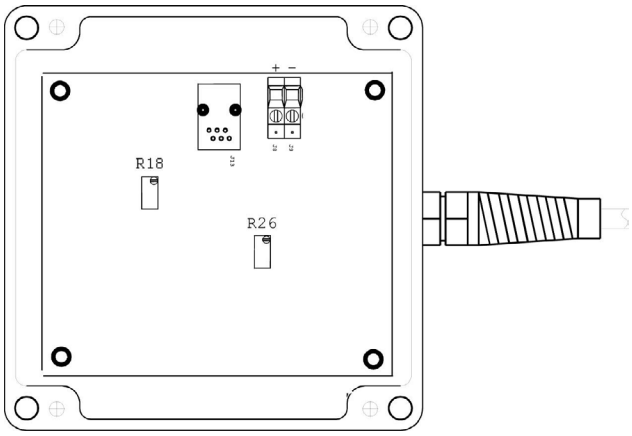
- Designed for high-speed analysis and fast response times.
- Cycle time is user-selectable – with the standard cycle time being 100 seconds.
- Easily reconfigured for a cycle time of 60seconds.
- Allows for stable and accurate analysis for both high and low sulfur concentrations below 1ppm.

Applications

- LPG.
- Natural Gas.
- Reforming and isomerization.
- Catalyst Protection.
- Blending Operations.
- Flare and Stack Gas.

Series 3000 O2 Analyzer

A compact stand-alone one-channel meter with a built-in data logger and LCD display. The sensor probe is inserted into the process stream and connected to the controller via fiber optics. Full SCS's are available for use with the OXY5500 along with software for PC interfacing. The OXY5500 is accurate and reliable for measurements in natural gas and gas processing applications. The sensor is unaffected by higher levels of H2S or any sulfur species, and there is no cross-sensitivity to contaminants or other gases.



Features

- Measurement options 0-10; 0-50; 0-100; 0-500; 0-1,000; 0-5,000; 0-10,000; or 0-20,000 ppm.
- ±1% of full-scale accuracy.
- 90% of full scale in less than 10 seconds response time.
- 40 to 104°F (5 to 40°C) operating temperature range.
- 14-32 VDC input power.
- 4-20 mADC analog output.

ALPHA OMEGA INSTRUMENTS

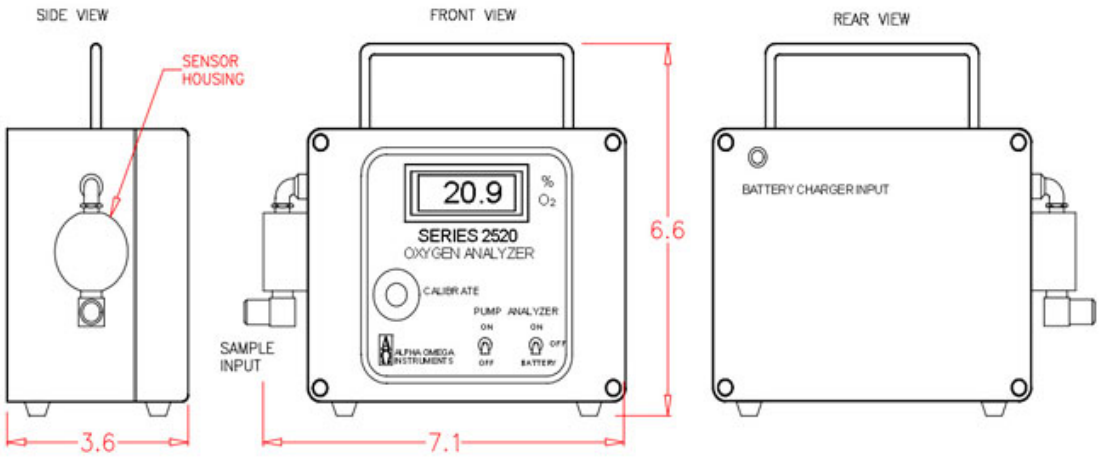
Series 2520 O2 Analyzer

The Series 2520 Portable Percent Oxygen Analyzer is a lightweight, easy-to-use analyzer that provides accurate and repeatable percent oxygen measurements in a variety of gases. The rugged and compact design of the Series 2520 makes it ideal for industrial applications where spot oxygen measurements need to be made. The Series 2520 can be configured with one of several measuring ranges from 0-1% to 0-100% oxygen. The standard Series 2520 Portable Percent Oxygen Analyzer is equipped with a 3-1/2 digit liquid crystal display, built-in NICAD batteries, and a universal AC adapter that provides the ability to recharge the NICAD batteries even while powering the analyzer from the adapter.

Features

- State-of-the-Art Sensor Technology - High Precision Measurements.
- Light Weight/Compact Design - Easy to Carry and Transport.
- Rapid Speed of Response - Senses Oxygen Changes in Seconds.
- Built-in NICAD Batteries - Provides Hours of Continuous Operation.
- Uses Standard NICAD's - Replacement Batteries Found World-Wide.
- Minimum Maintenance - Low Cost of Ownership.

SERIES 2520 PORTABLE PERCENT OXYGEN ANALYZER
SHOWN WITHOUT ACCESSORIES
AND WITH QUICK-CONNECT GAS FITTING

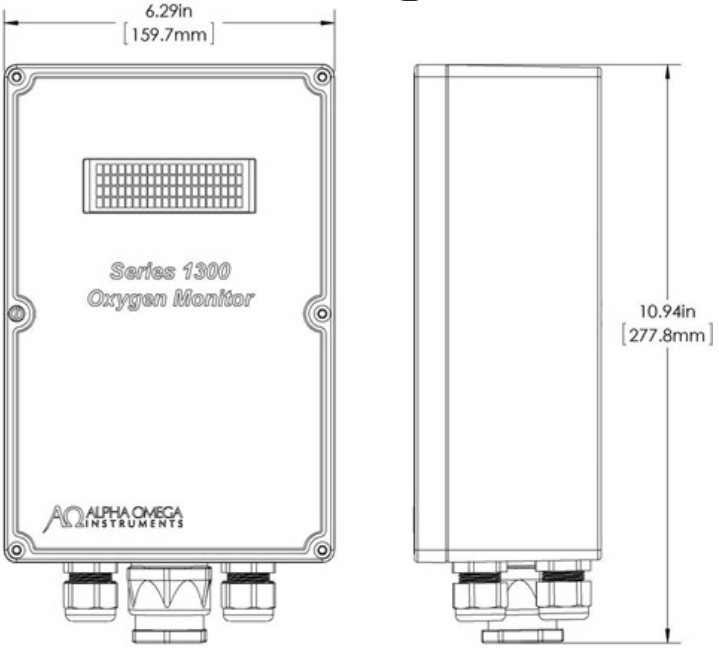


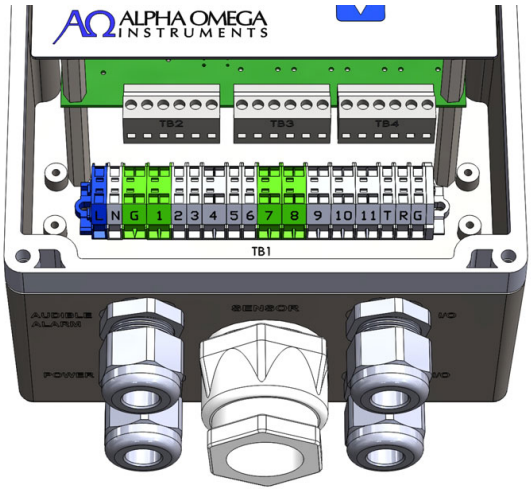
Series 1300 O2 Monitor

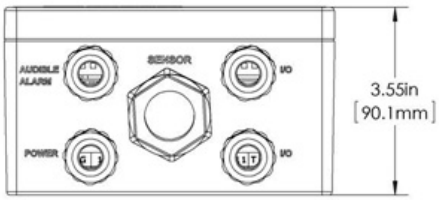
The cornerstone feature of the Series 1300 Oxygen Deficiency Monitor is its extended life electrochemical sensor with optimized Enhanced Electrolyte System (EES). As a result of EES, Alpha Omega Instruments is able to offer an unparalleled three (3) year sensor warranty. The standard measuring range of the monitor is 0-30% with a readout resolution to the nearest tenth of a percent. Alpha Omega Instruments' exclusive Advanced Digital Interface (ADI) offers the capability to expand the Series 1300 with up to three oxygen sensors. Adding oxygen sensors and/or optional horn and strobe alarms in the field takes just a few minutes. The Series 1300 also features a powerful built-in data logger so time-stamped oxygen values can be captured and stored for subsequent use with a variety of spreadsheet programs.

Features

- Multiple Sensor Operation.
- Four Alarm Relays Standard - Users can select multiple alarming functions.
- Insensitive to Air Currents - No erroneous oxygen readings from air movement.
- Protects from Frequent False Alarms.
- No sensor failures from high-temperature fatigue.
- Built-in Data Logger Standard - Easy method of downloading & displaying O2 values.







Point Level

RF Nivo

RFnivo Level Switches are designed for use with bulk solids, granulates, powders and pastes, as well as liquids and highly viscous oils. The unit can be used as full, demand, or empty detectors, and as overfill protection in silos, tanks, hoppers, pipelines, etc.
The RFnivo point level switch can come designed to withstand extreme process conditions. “Active Shield” technology ensures reliability of the unit within applications containing foam, bridging, material deposits or material with strong caking properties.

Features

- Quick easy set-up & installation.
- Auto-calibration to uncovered state on first power-up, full manual calibration.
- Re/self-calibration options.
- Active shield technology - allows the unit to measure while ignoring probe build-up.
- Pre-selected sensitivity to work in most applications - can be changed where required.

Applications

- Certified for all bulk solid applications -flour, grain, sugar, cement, granulate, carbon black.
- Building materials industry - lime, moulding sand, etc.
- Food industry - sugar, flour, salt, etc.
- Chemical industry - pigments.

Mononivo

Single-rod limit switch designed for use in various applications within the bulk material handling industry. The Mononivo can be used as a full, demand, or empty detector for use in storage and process containers. Using the same operating principle as the Vibranivo, a piezo-electrically stimulated oscillating rod vibrates at its mechanical resonance frequency. When the rod is covered in material, the damping generated is electronically registered and actuated as an output signal.

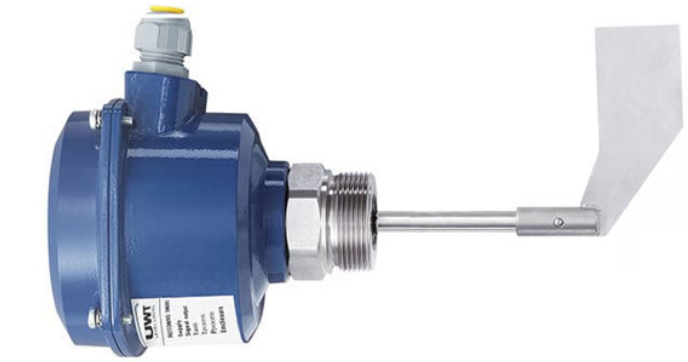
Features

- Wide range of applications with no maintenance requirements.
- Die-casted aluminum housing.
- Easy installation & commissioning.
- Adjustable sensitivity for light bulk solids (from 20g/l)
- Rod oscillation ensures a certain amount of self-cleaning.

Applications

- Timber & Wood industry.
- Building materials industry - lime, moulding sand, etc.
- Food industry - milk powder, flour, salt, etc.
- Chemical industry & mechanical engineering.

Rotonivo



The Rotonivo is a trusted, multifunctional electromechanical level limit switch that is used to monitor the level of virtually all bulk goods. Based on a simple, reliable measuring principle, the Rotonivo paddle switches can be used as full, demand, or empty detectors in bulk good silos. The Rotonivo can come equipped for process overpressure and low pressures, as well as very high/low process temperatures. Overfill and no-load protection are guaranteed for the long term.

Features

- Micro-switch to prevent motor burnout - protected clutchless motor.
- Extendable probe lengths up to 10m.
- Robust reinforced shafts.
- Fast easy installation.
- Insensitive to dust, electrical change, adhesion, temperature & pressure.
- Integrated, adjustable delay for output signal.

Applications

- Building materials - lime, styrofoam, moulding sand, etc.
- Food industry – milk powder, flour, salt, etc.
- Timber industry – wood pellets.
- Plastic granules and chemical industry.

Vibranivo

The UWT Vibranivo series use a piezo-electrically stimulated vibrating fork for reliable level monitoring as full, demand, or empty detectors in bulk good silos. The versatility of the Vibranivo series makes it suitable for applications with high mechanical loading/ measurement of bulk good in liquids, and for use in all solids which are conveyed/stored under extreme conditions.

Features

- Modular & simple design.
- Maintenance-free sensor.
- Working pressures up to 16bar.
- Process temperatures from -40°C to 150°C.
- Fork made entirely of stainless steel - multiple fork lengths/extension options.

Applications

- All fine grain & powdered solids.
- Building industry – cement/quarries.
- Food & beverage.
- Chemical industry & water/wastewater industry.

UWT Liquids

Capanivo

The Capanivo series level detector can be used as a full/demand or empty detector, as well as for leakage detection in any kind of liquid. It is a versatile capacitance switch, applicable for level detection of solids, liquids, slurries, foams, and for simple pump control. Due to the resistant materials of construction, even aggressive media with strong adhering properties is reliably detected. Non-contact measurement options along with different device versions to suit all installation situations.

Features

- Potted construction for resistance to shock/vibration/ humidity/condensation.
- Highly chemical resistant probe.
- Very high sensitivity - dielectric from 1.5 DK.
- Integrated local display options available.
- Freely programmable set-up covers wide range of applications & materials.

Applications

- Liquids, solids, slurries, interface, foam detection.
- Back-pressure detection.
- Dry run protection.
- Chemical & Petrochemical.

NivoCapa

Continuous level measurement for all liquids with the NivoCapa 8000. This capacitance level sensor is a simple and cost-effective solution for level measurement of liquids, oils, pastes, slurries, or foam, both conductive and non-conductive materials. Reliable results even with viscous and adhesive product due to “Active Shield” technology. This easy-to-use sensor is suitable for level monitoring in a wide range of applications due to numerous configuration options. Interface measurement options available.

Features

- Rope or Rod options available.
- Dielectric sensitivity >= 1.5
- User-friendly LCD display with control/diagnostic functions.
- “Active Shield” technology provides protection from build-up.
- “Inverse Frequency Shift” technology ensures precision.

Applications

- Oil & Gas. Power. Mining & Cement.
- Food & beverage.
- Food industry - milk powder, flour, salt, etc.
- Water and Chemical.

RF Nivo

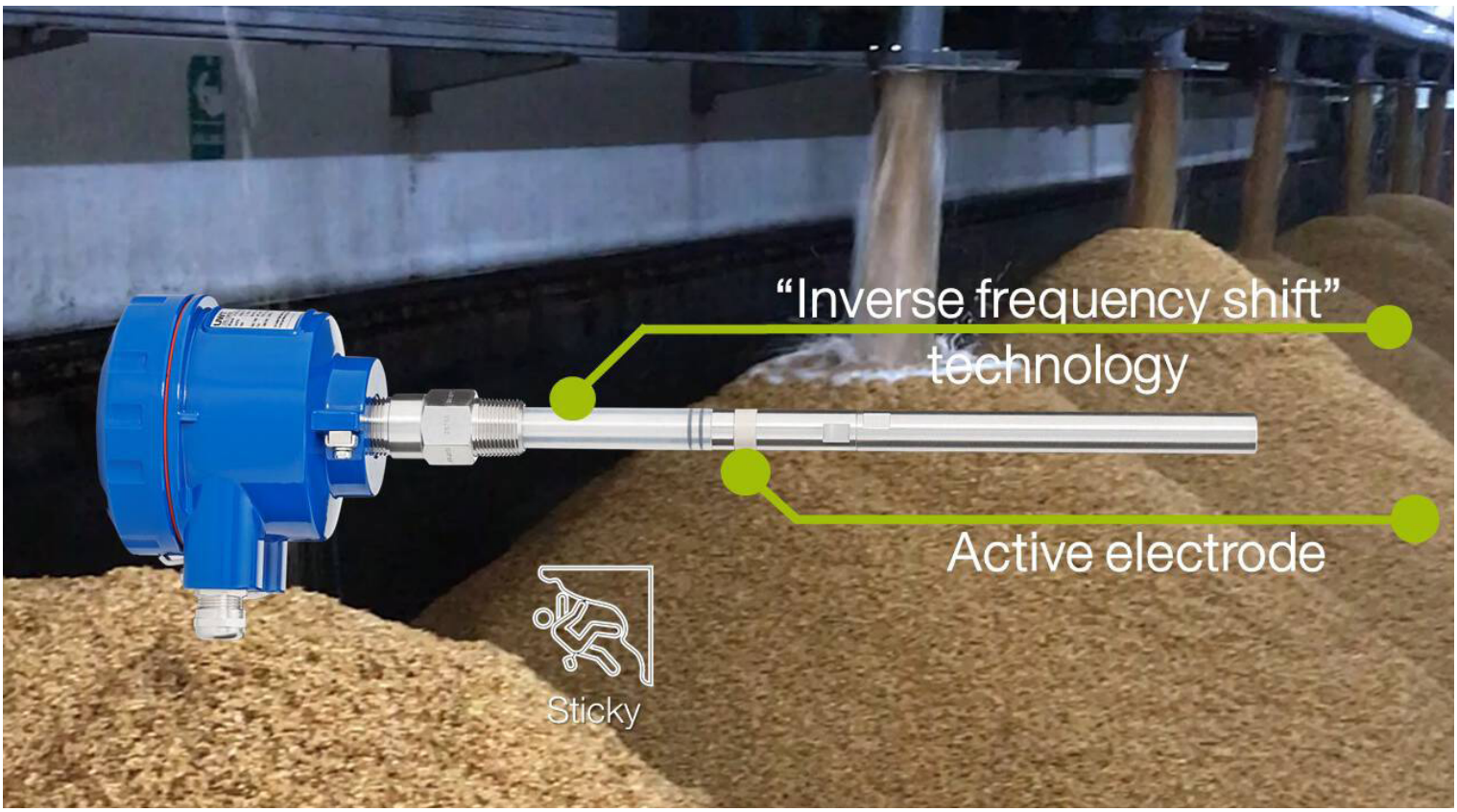
RFnivo Level Switches are designed for use with bulk solids, granulates, powders and pastes, as well as liquids and highly viscous oils. The unit can be used as full, demand, or empty detectors, and as overfill protection in silos, tanks, hoppers, pipelines, etc.
The RFnivo point level switch can come designed to withstand extreme process conditions. “Active Shield” technology ensures reliability of the unit within applications containing foam, bridging, material deposits or material with strong caking properties.

Features

- Quick easy set-up & installation.
- Auto-calibration to uncovered state on first power-up, full manual calibration.
- Re/self-calibration options.
- Active shield technology - allows the unit to measure while ignoring probe build-up.
- Pre-selected sensitivity to work in most applications - can be changed where required.

Applications

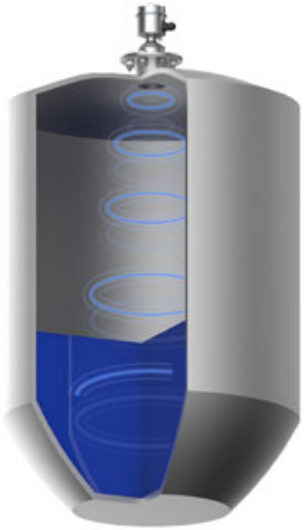
- Certified for all bulk solid applications -flour, grain, sugar, cement, granulate, carbon black.
- Building materials industry - lime, moulding sand, etc.
- Food industry - sugar, flour, salt, etc.
- Chemical industry - pigments.



UWT Continuous

NivoRadar

Continuous, non-contact level measurement of solids and liquids with the NivoRadar 3100. Though largely used in storage silos for level measurement of bulk solids, the robust stainless steel construction makes the NivoRadar suitable for all kinds of industrial applications. Operating at a frequency of 78GHz, the NR 3000 achieves a very small beam angle, eliminating any signal interference at the flange and allowing optimum reflection of the material level.



Features

- High precision 4° beam angle.
- Up to 100m measurement ranges.
- Antenna is highly resistant to material deposits - self-clean function, air-flush connection.
- Adjustable aiming flange options.
- Easy installation, setup & commissioning - plug & play system, removable display.
- Integrated lens cleaner.

Applications

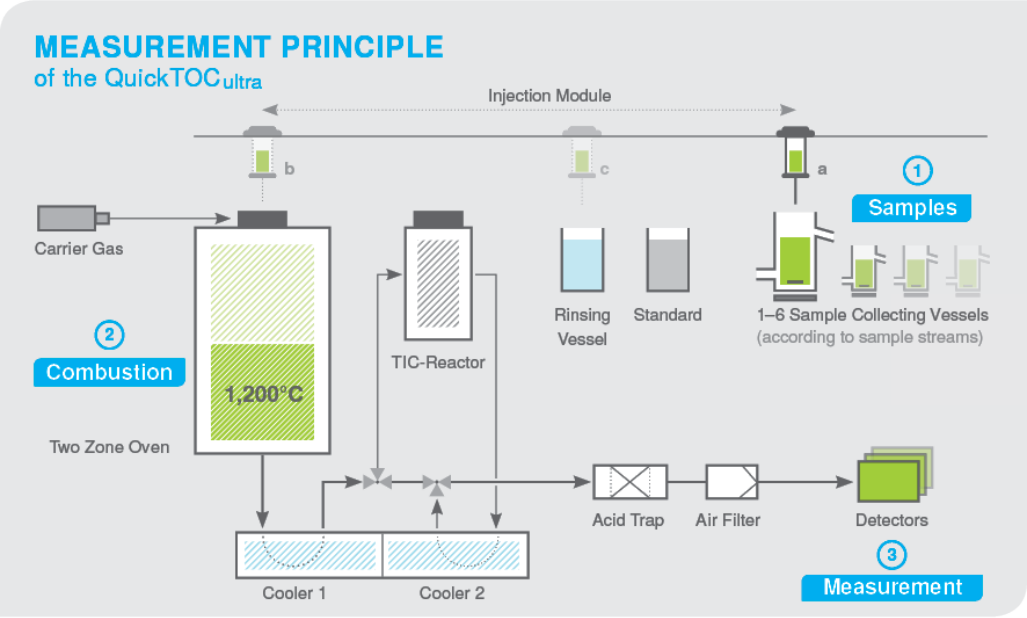
- Food & Beverage.
- Building, Cement & Quarry industries.
- Animal feed.
- Grain.
- Plastics.
- Power industry.

THE TOC COMPANY
a Process Insights company

QuickTOCultra

LAR's TOC analyzer QuickTOCultra is the most reliable measurement system for the roughest wastewater applications. Due to an unrivaled injection and oxidation technique, the QuickTOCultra easily handles sticky, fatty, salty, and high-particle samples unlike other TOC analyzers.

The combustion leader in TOC analysis provides maximum reliability and availability, hence also profitability for its operators.



Features

- Exact determination of TC, TRUE TOC and TIC
- Proven thermal oxidation principle.
- Highest combustion temperature available (1,200°C)
- Catalyst-free.
- No filtration necessary.
- Very low maintenance and operational costs.

Applications

- Water influent & effluent.
- Discharge Control
- Industrial Wastewater.
- Oil-in-Water
- High salt concentrations.
- Process water.

THE TOC COMPANY

a Process Insights company

QuickTOCtrace

LAR's TOC analyzer QuickTOCtrace is a reliable analyzer for the lowest measuring ranges, which uses uv oxidation and differential conductivity measurement to determine organic contamination, making it ideal for TOC measurement of (ultra-)pure water. It is a compact and intuitive analyzer with a short reaction time – first results are available within 30 seconds.

Its comparatively low initial cost and, due to its robustness, low operating costs increase the profitability of your manufacturing processes.

Features

- Exact determination of TC, TRUE TOC and TIC
- Proven thermal oxidation principle.
- Highest combustion temperature available (1,200°C)
- Catalyst-free.
- No filtration necessary.
- Very low maintenance and operational costs.

Applications

- Water influent & effluent.
- Discharge Control
- Industrial Wastewater.
- Oil-in-Water
- High salt concentrations.
- Process water.

THE TOC COMPANY

a Process Insights company

QuickTOCpurity

The QuickTOCpurity from LAR Process Analysers AG is the online TOC measurement system for the determination of total carbon (TC), total organic carbon (TOC), total inorganic carbon (TIC) and dissolved organic carbon (DOC) in pure water. LAR's total organic carbon analyzer is suitable for a variety of applications and types of water.

Features

- Continuous TC, TOC, TIC monitoring.
- Easy calibration and validation (QuickCalibration)
- Catalyst-free technique
- Closed system to prevent contaminations
- Low operational and maintenance costs
- Response time TC: 1 min.

Applications

- Pure water
- Process water
- Boiler feed water
- Condensate Return

MARQMETRIX®

Raman All-In-One

The MarqMetrix Raman All-In-One is everything needed to take high-quality and non-destructive Raman measurements without sample preparation. Combined into a single unit, the AIO includes a spectrometer, laser, TouchRaman® BallProbe®, and built-in acquisition computer. Portable, high performance, and priced to be installed at all points of compositional need, the AIO eliminates the need for expensive, complex, and bulky Raman equipment.

Features

- Sized to be placed anywhere.
- Spectral range: 100-3250 cm-1.
- Factory-calibration stability (greater than 1.5 years).
- Wireless remote operation.
- Multiple instrument control.

Applications

- Chemicals and hazardous materials manufacturing.
- Refining, natural gas, and other petrochemicals.
- Polymers and plastic manufacturing.
- Biopharmaceutical manufacturing.
- Polymers and plastic manufacturing.
- Biopharmaceutical manufacturing.

Rigaku

Applied Rigaku Technologies, Inc.

NEX OL

Featuring advanced 3rd generation energy dispersive X-ray fluorescence (EDXRF) technology, the Rigaku NEX OL represents the next evolution of process elemental analysis for liquid stream and fixed position web or coil applications. Designed to span from heavy industrial through to food grade process gauging solutions, the NEX OL is configurable for use in both classified and non-classified areas. In addition to analyzing liquid streams, the Rigaku NEX OL is designed to service web and coil applications, with the ability to perform multi-element composition and/or coating thickness. Typically a head is mounted in a fixed position over a roller so that the head to surface distance is constant.

Features

- Real-time process control by elemental analysis.
- Measure elements aluminum ($_{13}$Al) to uranium ($_{92}$U)
- From ppm levels to weight percent (wt%) concentrations.
- Robust Rigaku NEX QC+ optical kernel with SDD detector.
- Industrial touch screen user interface.
- Easy empirical calibration and routine operation.

Applications

- Chemicals: blending additives and resins.
- Petroleum: lubricating oil additives and blending.
- Mining: solvent extractions.
- Industrial: wastewater.
- Metal finishing: plating, pickling, and pre-treatment baths.
- Polyethylene / PET manufacturing: TPA and PTA catalysts.

Applied Rigaku Technologies, Inc.

NEX XT

Rigaku's NEX XT is the next generation process gauge for high-level total sulfur measurement (0.02% to 6% S) of crude, bunker fuel, fuel oils, and other highly viscous hydrocarbons, including residuum. This versatile, compact, and robust X-ray Transmission / Absorption (XRT / XRA) process gauge is specifically optimized for the total sulfur analysis needs of refineries, pipelines, blending operations, bunkering terminals, and other storage facilities. Applications for the NEX XT include bunker fuel blending to meet MARPOL Annex VI sulfur restrictions, interface detection of different grade fuels delivered via pipelines, refinery feedstock blending and monitoring, and the quality monitoring of crude at remote collection and storage facilities.

Features

- Compact design with no routine maintenance.
- Up to 1450 psig and 200°C.
- ($_{92}$U)
- User-adjustable data update frequency.
- Reduced standards requirements.
- No sample condition or recovery system.
- No radioisotopes.

Applications

- Pipelines.
- Upgrading Facilities.
- Refineries.

Applied Rigaku Technologies, Inc.

NEX LS

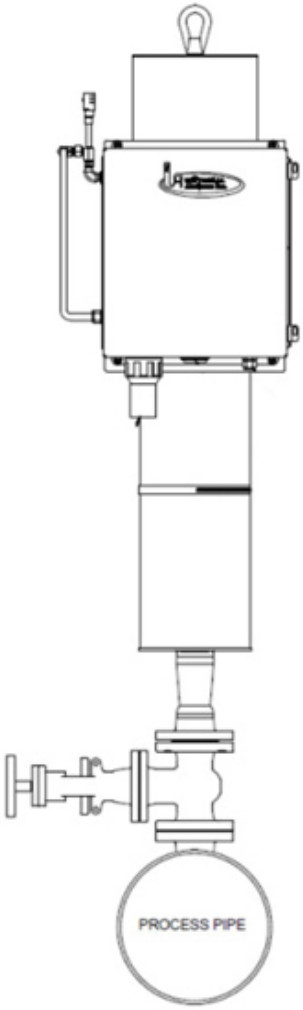
Rigaku NEX LS is specifically designed to service web and coil applications, with the ability to perform multi-element composition, coat weight or coating thickness. The measuring head is mounted on a rigid beam and is equipped with a linear traversing mechanism positioned over a roller so that the head-to-surface distance is constant. Where needed, elemental composition of a coating is measured directly. In contrast, coat weight (or coating thickness) may be measured directly (where counting rate for an element is proportional to thickness) or indirectly by measuring attenuation of some substrate element (where counting rate is negatively correlated to thickness).

Features

- Silicone release coaters.
- Vacuum formed plastics.
- Specialty plastics.
- RoHS compliance.
- Conversion coatings.
- Top coatings on metal coil.

Model 1221

Rigaku's NEX XT is the next generation process gauge for high-level total sulfur measurement (0.02% to 6% S) of crude, bunker fuel, fuel oils, and other highly viscous hydrocarbons, including residuum. This versatile, compact, and robust X-ray Transmission / Absorption (XRT / XRA) process gauge is specifically optimized for the total sulfur analysis needs of refineries, pipelines, blending operations, bunkering terminals, and other storage facilities. Applications for the NEX XT include bunker fuel blending to meet MARPOL Annex VI sulfur restrictions, interface detection of different grade fuels delivered via pipelines, refinery feedstock blending and monitoring, and the quality monitoring of crude at remote collection and storage facilities.



Features

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- User-adjustable data update frequency.
- Reduced standards requirements.
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- No radioisotopes.

Applications

- Pipelines.
- Upgrading Facilities.
- Refineries.

DynamiQ-X NG2210

The DynamiQ-X NG2210 provides fast and accurate on-line monitoring of natural gas, and delivers calorific values for composition control and custody transfer purposes. The analyzer is extremely compact while its capabilities are massive. The applied microGC chips enable analysis times of less than a minute.

This gas analyzer accommodates two or three gas chromatograph (GC) units working in parallel, each performing a different GC analysis under individually optimized conditions. Each GC unit contains a state-of-the-art microchip-based injector and a thermal conductivity detector (TCD) combined with a proven microbore GC column, and is set with optimal chromatography conditions.

Features

- Very short analysis times.
- Hydrogen, oxygen and nitrogen detection.
- Continuous monitoring
- Compact and robust device.
- Built-in stream selector.
- Low carrier gas consumption.
- Back-flush-to- detector technology.
- Tubeless analyzer.

Applications

- Transportation and distribution networks for natural gas.
- Natural gas storage.
- Natural gas city gate stations.
- Blending stations.
- Natural gas conditioning stations.
- Mobile analysis and measurement systems.
- Offshore.
- Power-to-gas systems.

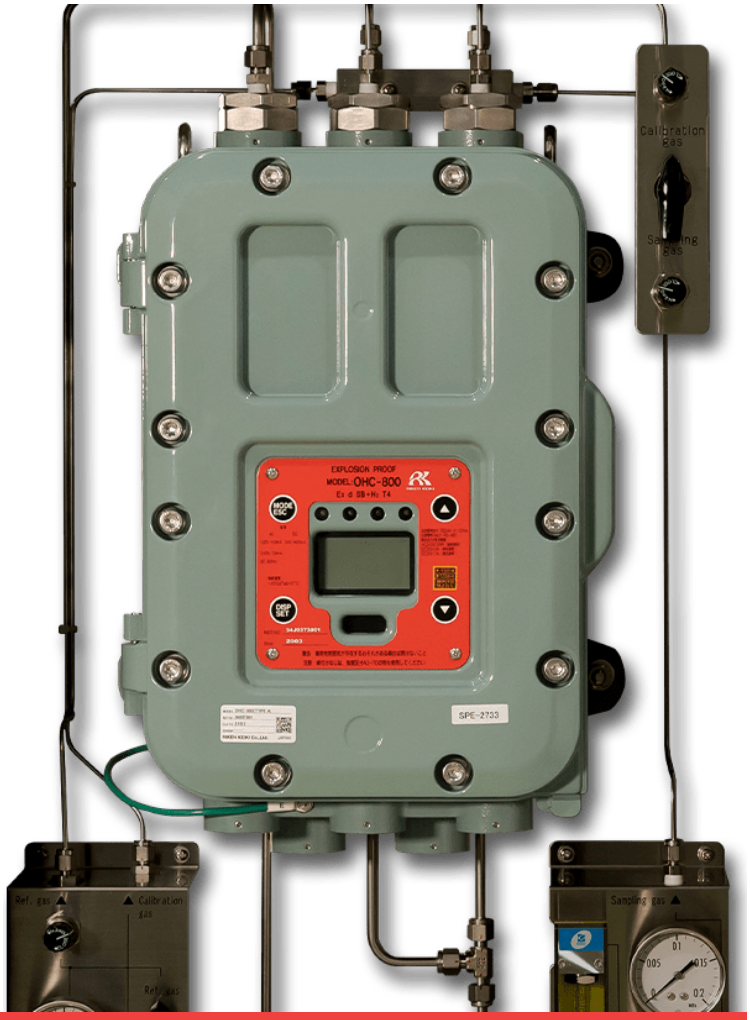
RIKEN KEIKI

OHC-800

The OHC-800 Opt-Sonic gas calorimeter uses two sensors, an optical sensor, and a sonic sensor.

Each of these sensors independently measures calorific value. When measuring fuel gases, interference gases such as N2, CO2, O2, and CO will affect the sensor response in different ways.

By combining an optical sensor and a sound velocity sensor to perform unique calculations, the system is not affected by interference from gases that do not have heat content, such as N2, CO2, and O2.



Features

- Unique measure principle “Opt-Sonic calculation” is applied.
- Minimize the interference effect caused by interferencegases.
- Fast response time T90 reaction within 5 seconds.
- High repeatability +/-0.02MJ/m^3
- Wide operation temperature -20~+60 degree C
- Explosion-Proof structure even for Hydrogen II2G Ex db IIB+H_2 T4 GB <ATEX/IECEx>
- High ingress protection level IP66/IP67
- Easy to switch the display along “Calorific value”, “Density” and ‘WOBBE index”.

Applications

- Electric power energy, power generation plant, calorific value adjustment, gas turbine control.
- Refineries and petro chemical plants.
- Density monitorning of OFF gas generated while in petroleum processing.
- Monitoring of CO_2 and CO containined coke-oven gas.
- Calorific value measurement of biogas after removing CO_2 contained in gas.