Sample Systems
For Gas and Moisture Analyzers

Save Money and Time with the Right Sample System from the Application Experts

Sample handling systems are essential for getting top performance from your gas and moisture analyzer systems. To get the right sample system for your unique application, turn to GE, the analyzer application expert with more than 40 years of design and construction experience. Couple GE moisture and gas analyzers with off-the-shelf or custom-designed GE sample handling and you've got a reliable, accurate, and low-maintenance measurement system.

Features and Benefits

GE sample systems enhance the performance of an analyzer by providing sample gas to the analyzer at optimal pressure, temperature, flow rate, and cleanliness. Designed specifically for hazardous environments and for use with GE analyzers, GE sample handling systems reduce your cost and downtime by:

- Providing better accuracy and reliability of measurement

- Extending analyzer life

- Limiting analyzer maintenance and associated parts and labor

- Facilitating field calibration

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Application Engineering is the Difference

Our application and service engineering teams possess the expertise to provide a comprehensive sample system designed and built for your specific situation. We know how our analyzers perform in various applications and how our sample handling systems can help deliver the best measurements. We offer a cost-effective source for complete analyzer packages.

- Standard systems for common applications

- Engineered systems for customer-specific requirements

- Design, construction, and inspection of all systems

- Installation guidance

- Start-up and commissioning

- Calibration

- Extended warranties and service plans for analyzer systems

Sample Handling Systems

Sample systems are used for isolation, filtration, and pressure/temperature/flow control of analyzer systems in petrochemical, natural gas, industrial gas, semiconductor, furnace gas and heat treating, power generation, air dryer, and pharmaceutical applications.

- Instrument, plant, utility or clean dry air

- Injection molding and extrusion

- High purity gas analysis

- Furnace or heat treating

- Natural gas—permanent and portable

- Hydrocarbon gases or liquids

- Hydrogen-cooled electric generators

- Inerting/blanketing gases

- Ambient air supply

A sample system typically consists of valves, filters, flow meters, and pressure gauges designed to enable proper long-term performance of an analyzer system.

- **Isolation of the sensors for calibration and service.** Sample panels are typically located at grade as close to the sample take-off point as possible while still allowing easy access. Sample take-off probes to pull a sample from the middle one-third of the pipe are used to obtain the best representative fluid. Needle or ball valves are used for isolation, and check valves are used on sample system outlets to prevent back-flow when tied to flare or vent lines.

- **Pressure regulation and pressure control to operate the sensors at the best pressure for their capability.** Moisture measurement is best done at the highest possible pressure for aluminum oxide sensor technology. An active pressure sensor on the multi-function moisture probes feeds data to the analyzer to calculate moisture content in PPMv or lbs/MMSCF based on the sample pressure. Some sensors have a maximum pressure based on their design and must be operated at or near atmospheric pressure.

- **Temperature control.** Sample systems may be exposed to outdoor ambient conditions. Some sensors, especially in low PPM ranges, benefit from heat tracing of sample lines and enclosure heaters. Constant temperatures prevent diurnal effects of water molecules adsorbing/desorbing to wetted sample system components, which may lead to reading swings day to night.

  In addition, oxygen sensor chemistry may be impacted with wide temperature swings to a minor degree, so a sample system enclosure heater prevents any sensor temperature dependency. In high moisture and condensable applications, a heater prevents condensation. In some applications, the sample system location may be too hot for the sensor(s). In this case, sample systems can be cooled by air handling systems or vortex coolers using compressed air as a resource.

  In areas with bright sunlight, sunshades are used to shelter the sample system from radiational heating.

- **Particulate filtration and/or liquid knock-out.** Some gas streams may contain particulates such as molecular sieve, catalyst fines, or even pipe scale. Stainless steel particulate filters in the 7 micron range provide a clean gas sample to all sensors. In some cases, coalescer filters with a bypass flow knock out any liquid condensates from the sample stream. These filters enable a proper bypass of collected condensate to ensure low maintenance.

  In cases with heavy condensate potential, sample taps off the process line are used with cooling coils to allow most of the condensate to drain back to the process. Liquid knock-out components are used to provide an additional level of safety.
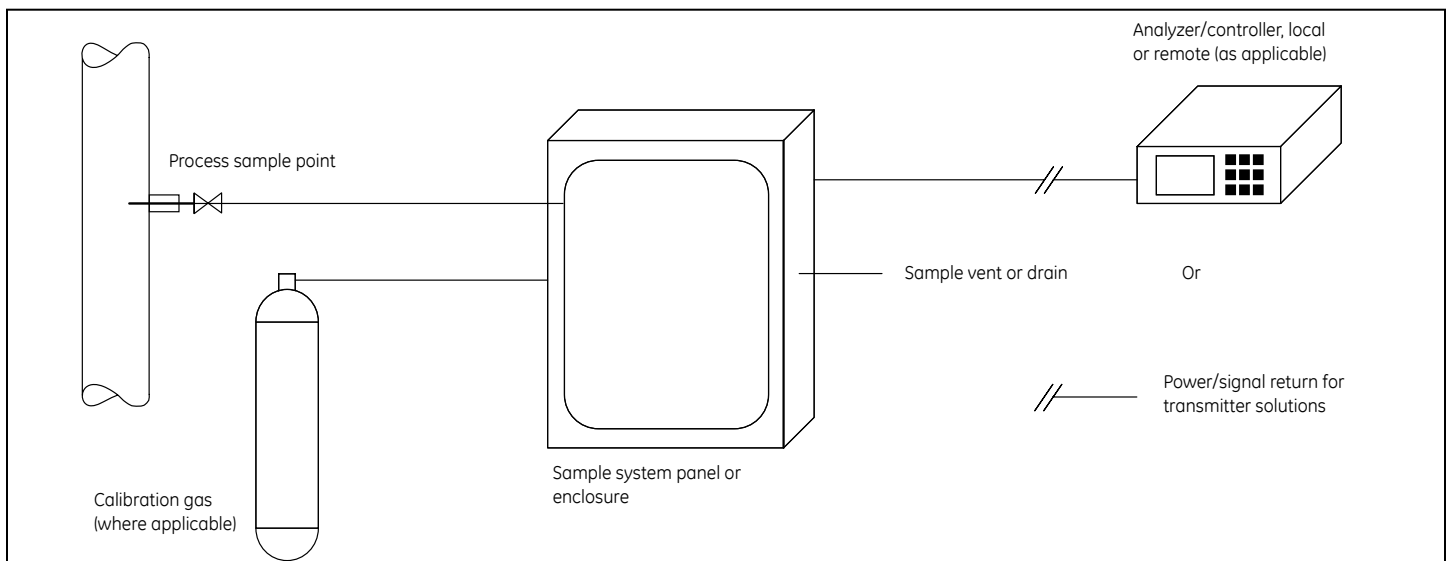
- **Flow control.** Sensors are operated at a flow appropriate for the condition under which the sensors were calibrated. Bypass loops are used to decrease transport time from the sample taps to the sample panel.

- **Automatic calibration.** For many gas analyzers, sample systems are designed with automated valves that are actuated by the analyzer controller at pre-set time intervals (daily, weekly, monthly) to automatically calibrate or verify the sensor. This provides a system that is always in calibration without the need for instrument engineer intervention.

- **Multiple streams.** A common approach to maximize analysis for multiple sample points is to provide multiple input streams to the analyzer panel. An automated approach can be provided by supplying inlet streams with solenoid valves or automated valves (electrically or pneumatically actuated).

- **Ultra high purity.** For PPB purity applications, users may consider sample systems with VCR® fittings and 316SS electro-polished tubing. These components are commonly used in semiconductor applications to improve leak integrity and reduce tubing effects on moisture and oxygen measurements.

Thermoparamagnetic process oxygen analysis of a low pressure application with remote selection of sample, purge, and calibration gases.

Moisture analysis in high pressure natural gas. Dual coalescing filters with bypass flow to remove TEG from sample gas. (TEG is conductive alcohol found in pipeline NG from TEG dryer carryover, which can bias Alux sensor readings.) It can be coalesced out of sample, providing reliable sensor performance.

Analyzer/controller, local or remote (as applicable)

Process sample point

Sample vent or drain

Or

Power/signal return for transmitter solutions

Calibration gas (where applicable)

Sample system panel or enclosure

Sample Systems Specifications

All systems are designed to meet specific customer needs. Specifications indicate typical recommendations for systems designed by GE.

Wetted Materials
Typically 304SS, 316SS, or 316LSS. Components may have glass, viton o-rings, or other wetted materials. Systems available in Monel and/or 316SS for NACE MR1075 EN3.1.B compliance for natural gas streams with high H2S content. Sample systems can also be manufactured with PFA tubing and components for acid gas applications.

Isolation
Via needle and/or ball valves

Pressure Regulation
Via pressure regulators and/or back-pressure regulators. Systems can be supplied with pumps or eductors to pull a gas sample from a low pressure source.

Temperature Control
Enclosed sample panel with insulation may be heated by enclosure heaters (typically explosion-proof) and/or cooled by air handling systems or vortex coolers, both with thermostat control. Systems in direct sunlight environments may use a sunshade to avoid radiational heating.

Heat tracing of sample lines from sample tap to sample system panel is within the customer or contractor scope.

Flow Control and Measurement
Via needle valves and/or fine metering valves. Displayed measurement via variable area (VA) flowmeters. Alarms via integral flow switches on VA flowmeters or via separate flow switch component.

Fittings
Typically compression type fittings, 1/4 in (6 mm). Custom systems available with VCR® installations for UHP applications requiring metal-to-metal face sealing components.

Filtration
Particulate filtration typical to 7 micron particulate level. Liquid knock-out via coalescing filters, membrane filters, and liquid dumps.

New Sampling/Sensor Initiative (NeSSI™)
Systems available designed to NeSSI (ISA SP76) for certain products.

Quality Assurance
GE sample systems are designed and manufactured in accordance with manufacturing site quality policies (typically ISO 9001) and using GE application engineering standard practices. All sample systems are visually inspected for workmanship and to conformance-to-order requirements.

Sample systems may also be inspected against standard drawings or customer-approved drawings, where applicable. All sample systems are pressure tested using dry compressed air and leak detection fluid.

Documentation
GE can provide sample system drawings as quoted/built. For complicated projects, an approval cycle is recommended and system sub-sourcing and construction is typically initiated after receipt of approved drawings.

Typical drawing packages include one CAD 2-D outline and dimension drawing with component layout/interconnections plus a BOM (Bill of Material) for each unique sample system design in a particular order.
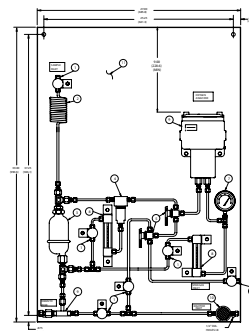
Standard sample system for measurement of oxygen in low pressure inerting (blanketing) gas applications
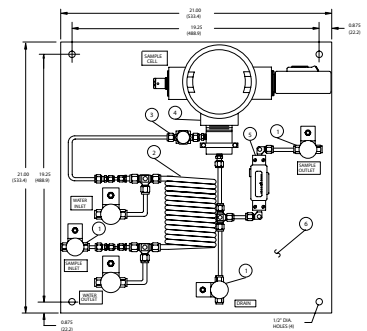
Standard sample system for measurement of moisture in high temperature hydrocarbon liquids

Factory Acceptance Test (FAT)
GE can perform FATs at our manufacturing sites to accommodate customer-specific inspection requirements such as visual inspection, pressure/leak testing, operational performance test, and documentation inspection. FAT requires GE review and acceptance of customer requirements, which usually is done at the inquiry and quotation stage.

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