OXIGRAF

On-Board Inert Gas Generation Validation System

Overview

An On-Board Inert Gas Generation (OBIGG) system is now mandatory for many civilian aircraft to prevent the buildup of explosive conditions in fuel tanks by generating Nitrogen Enriched Air (NEA) to lower the oxygen content in the fuel tank headspace or ullage. Oxigraf provides a complete system for validating the performance of your OBIGG system.

The Oxigraf O2N2 oxygen analyzer characterizes the performance of an OBIGG system over an entire flight profile from takeoff, climb, cruise, and descent by measuring the oxygen concentration at multiple sites in the fuel tanks every 16 seconds.

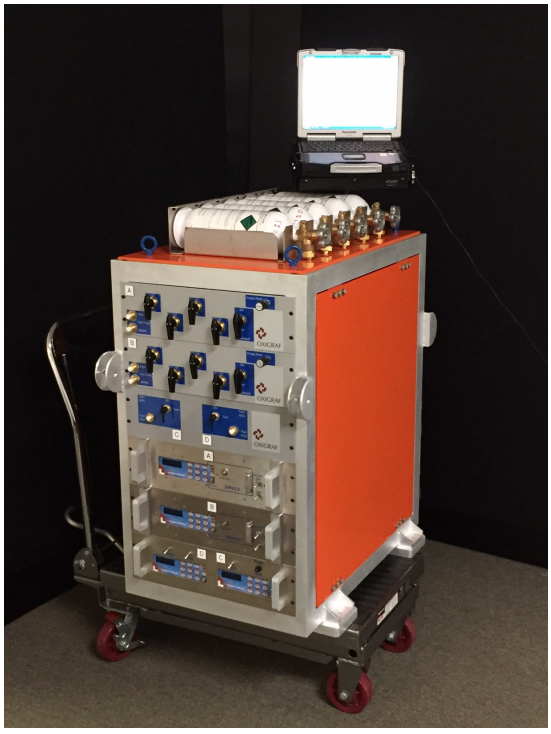
The O2N2 analyzer is a specialized instrument evolved from Oxigraf oxygen analyzers commonly used for medical, scientific, and industrial process and safety applications. The patented laser diode absorption spectroscopy technology employed by Oxigraf is a natural fit for analyzing oxygen concentrations in a Jet-A fuel-air mixture as only light comes in contact with the gas sample, and the gas sample is maintained at a low temperature. The sensor responds in milliseconds, has no cross sensitivity to other gases, corrects automatically for changes in temperature and pressure, measures quickly over a wide dynamic range, and is insensitive to vibration.

The aircraft OBIGG validation system is comprised of several rack mount Oxigraf O2N2 oxygen analyzers mounted in a rugged rack system along with manual cut-off valves, regulators, purge and calibration gas supplies, and a laptop computer with the OxiFTE system control and data logging software. Fuel tank sample kits with float valves and tubing to sample locations complete an installation.

Additionally, the system has features to mitigate risks of escape of the sample gas, such as monitored nitrogen purging of the electronics enclosure. The OBIGG test system also features float valves at the fuel sample point to prevent ingestion of fuel at the sample location. Manual shut-off valves and test ports allow total system validation and operator intervention if necessary to remove the analyzers from contact with the fuel system.

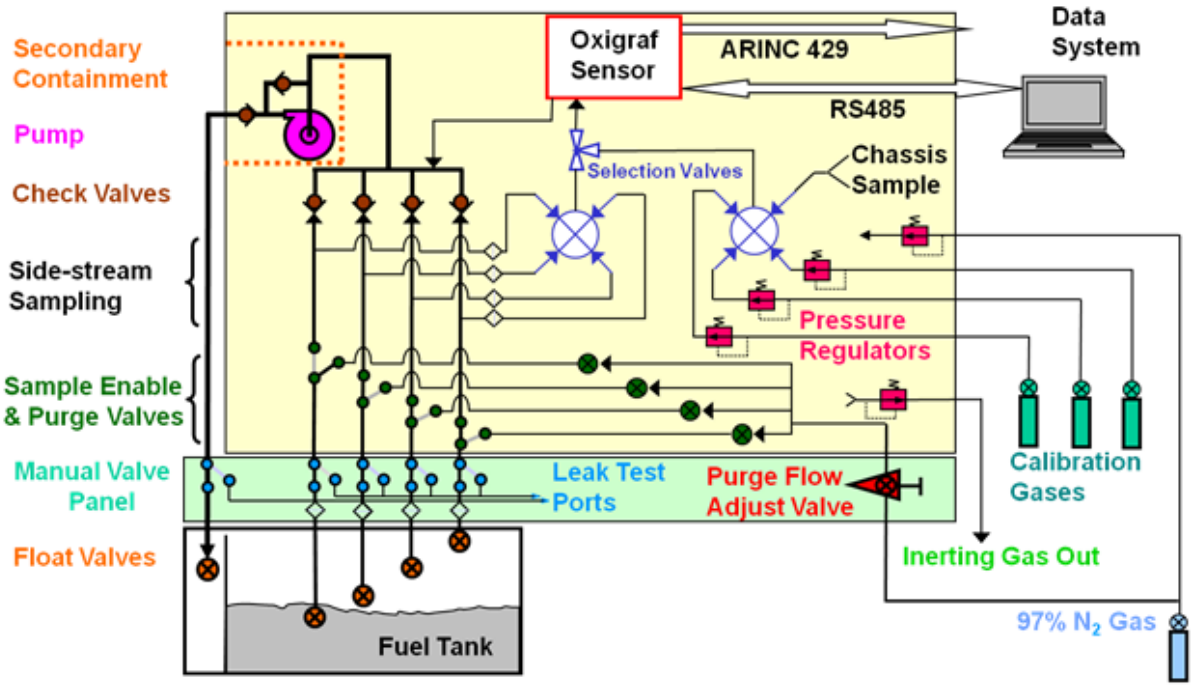
The number of O2N2 analyzers in a system depends on the number of sample points required in the fuel tank system to be monitored, with each O2N2 analyzer having four (4) sample channels. The example system shown below is comprised of eight (8) fuel tank channels and a optional two (2) channel, OEA/NEA analyzer. These are mounted in an 18U chassis with the other parts of the system. Oxigraf can provide standard 12U and 18U chassis along with custom racks as required for the application.

Customized Rackmount Validation System



- 18U Rack System with 3 Analyzers
- 10 Sample Systems
- OxiFTE Control and Monitoring System

O2N2 Process Schematic



The above system process schematic shows the O2N2 analyzer in relation to the float valves in the fuel tanks, the purge and calibration gasses and flows, and the control and data system. Communications to the control and data system are through RS-232/485 links and an ARINC-429 interface is provided to communicate with customer furnished data monitoring and recording systems.

O2N2 Performance Specifications:

Range	3 to 21% Oxygen
Resolution	0.1%
Stability (24 hours)	+- 0.5%
Linearity	+- 0.2%
Cross-Sensitivity	+- 0.2%, any gas mixture
Sensor Response Time	1s @ 350 ml/min flow and electronic filter setting 6
Multiplexer Cycle Time	16 seconds for four channels
Latency of Sample	10 to 60 seconds, depending on length of sampling line
Alarms (4)	Oxygen A, Oxygen B, Low Flow, System Check
Digital Output	ARINC-429, RS-232, RS-485

The performance specifications are valid under the following conditions:

Ambient Temperature	5 to 40° C (40 to 105° F) operating; -20-60° C (-2 to 140° F) storage
Cell Pressure	1.4 to 17.4 PSI (120 to 1200 mb) (100 to 900 mm Hg)
Warm-up for Full Accuracy	10 minutes
Fuel Tank Altitude	0 - 40,000 feet (Cabin altitude: 0 - 15,000 feet)
Humidity	0 to 95%, non-condensing (at 40° C or lower)

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