



Innova 1314i Multi-Gas Monitor



The INNOVA 1314i Photoacoustic Gas Monitor is a highly accurate, reliable, and stable quantitative gas monitoring system. Its measurement system, based on the photoacoustic infrared detection method, is capable of measuring almost any gas that absorbs infrared light.

Gas selectivity is achieved through the use of optical filters. By installing up to five filters, the 1314i can measure the concentration of up to five component gases and water vapour in any air sample. The detection limit is gas-dependent, but is typically in the ppb region.

Accuracy of these measurements is ensured by the 1314i's ability to compensate for temperature and pressure fluctuations, water vapour interference, and interference from other gases known to be present. Reliability of measurement results can be ensured by regular self tests.

This measurement system requires no consumables and very little regular maintenance. For most applications, recalibration is only necessary one to two times a year.

The monitor is equipped with standard interfaces: USB, Ethernet, and RS232. These enable the monitor to be integrated into automated process systems.

To ensure easy placement of the 1314i, it is housed in a rugged box that fits in a standard 19 inch rack and has a built-in pump system that allows samples to be drawn from up to 50 meters away.

“Highly Accurate,
Reliable, Stable,
Quantitative,
and Remotely
Controllable Gas
Monitoring System”

KEY BENEFITS

- Selectively measures a wide range of gases/vapours
- Linear response over a wide dynamic range
- Stable and Reliable: ensuring a maximum of only two calibrations a year
- User-friendly: easy calibration, configuration, and viewing/analysing of data via PC
- Accurate: compensates for temperature and pressure fluctuations, water vapour interference, and interference from other known gases
- Operates immediately: virtually no warm-up time necessary
- Remote control capability via TCP/IP network interface protocol
- Expandable up to 24 locations with 1409 Multipoint Sampler: the Gas Monitor can operate as the system controller for full standalone operation

Selectivity

The gas selectivity of the 1314i is determined by the optical filters installed in its filter wheel. Because water is nearly always present in ambient air and absorbs infrared light at most wavelengths, it contributes to the total acoustic signal in the analysis cell. Therefore, the monitor is permanently fitted with a special filter that measures water vapor and enables the 1314i to compensate for water vapor interference. By selecting different filters, this technique can also be used to cross-compensate for known interferent gases.

Calibration

After the relevant optical filters are installed, the monitor must be calibrated. This is achieved through easy-to-use menu driven instructions. Thanks to its high stability, calibration of the 1314i is seldom necessary more than once a year. Calibration is performed using either the Calibration Software BZ7002 or directly from the 1314i front panel.

Operation

The 1314i monitoring system is easy to operate using either the application software LumaSoft™ Gas 7810 or 7870 or by using the front panel push-keys (which can be locked and accessed at three levels using passwords). The monitor can be operated as both an online and offline instrument (i.e. standalone operation). Using these user-interfaces with their logical division of information, everything that needs to be defined is achieved prior to starting the monitoring task.

Starting Measurements

Once the set-up parameters have been defined, measurements can be started immediately or later using a delayed start time. Once started, the monitoring task continues until it is stopped either manually or by using a defined stop time.

Alarms

Two Alarm trigger levels, which provide high alarm limits for each measured gas, can be defined. These can also be linked to audible alarms using the relay outputs. In addition, the application software LumaSoft™ Gas 7810 or 7870 allows four alarm levels to be displayed.

Measurement Cycle

1. The pump draws air from the sampling point through the air filter to flush out the “old” air in the measurement system and replace it with a “new” air sample. The pressure sensor is used to check that the pump sequence is elapsed successfully and to measure the actual air pressure.
2. The “new” air sample is hermetically sealed in the analysis cell by closing the inlet and outlet valves.
3. Light from an infrared light source is reflected off a mirror, passed through a mechanical chopper, which pulsates it, and then through one of the optical filters in the filter wheel.
4. The gas being monitored selectively absorbs the light transmitted by the optical filter. Because the light is pulsating, the gas temperature increases and decreases, causing an equivalent increase and decrease in the pressure of the gas (an acoustic signal) in the closed cell.
5. Two microphones mounted in the cell wall measure this acoustic signal, which is directly proportional to the concentration of the monitored gas present in the cell.
6. The filter wheel turns so that light is transmitted through the next optical filter, and the new signal is measured. The number of times this step is repeated is dependent on the number of gases being measured.
7. The response time is approximately 13 seconds for one gas or water vapor, or approximately 26 seconds if five gases and water vapor are measured.

Online Measurement Results

Using one or more of the monitor's standard interfaces, measurement results are transferred directly to a PC. Here they can be displayed on screen as real-time values in tables and graphs (see Fig. 1) or integrated into the process system.

In the 7870 software, the graphs can be configured to display only the desired gases, defined concentration ranges, and results from statistical analyses. Also, when using the 7870 software, all measurement data is stored in user-defined SQL Server 2005 database.

Offline Measurement Results

Gas measurement result data is displayed on the 1314i's screen (display memory) as soon as it is available, and is constantly updated. During a task, the 1314i performs running statistical analyses of the measured gas concentrations, calculating a variety of values for each monitored gas.

This data (in Display Memory) can be copied to the Background Memory, which is a non-volatile storage area. The internal memory stores the measurement readings on a gas per gas basis, but also across the sampling channels when applicable.

Data stored in Background Memory can be recalled to Display Memory. From this memory, data can be uploaded to the Offline Software in either excel or text file format or alternatively printed out on a standard printer.

Reliability

Reliability can be ensured by a series of self tests performed by the monitor. The self tests check software, data integrity, and the 1314i's components to ensure that they function properly. If a fault is found, it is reported in the measurement results, so that the integrity of the results can be ensured.

If the power supply fails, the 1314i will automatically start up again when power is restored. Measurement data stored in the monitor's memory is not affected by power loss.

Maintenance

The only maintenance tasks necessary are calibration and replacement of the air filter. Both tasks are easily performed. The frequency for changing the air filter depends on the individual applications.

Multiple Point Monitoring

The INNOVA 1314i can be integrated with the INNOVA 1409 Multipoint Sampler to form a monitoring system expandable to up to 24 channels sampled sequentially. The user can decide upon a full standalone operation (the gas monitor is the system controller) or a remote controlled operation from a PC with the LumaSoft 7870 for online monitoring.

Remote Control Option

LumaSense Technologies offers remote control capability through the user's local area network using the LumaSoft™ Gas Single Point 7810 or Multi Point 7870 software. Online access to the measurement data is available via a built in OPC server (alternatively via Microsoft Excel).

Optional Modules

The functions of the 1314i can be expanded through three additional modules.

Purge Module

The 1314i can be fitted with a "sealed box" which ensures that the measurement system inside the 1314i can be purged using an inert gas.



Technical Specification

Analogue/Relay Interface Module

For each gas, barometric pressure and chamber temperature, the following outputs are available:

- 0-20mA, 4-20 mA
- 0-10Volts (0-5 V with loss of dynamic range)

Accuracy:	Zero Drift: $\pm 0.25\%$
Voltage Output:	$\pm 1.5\%$ of full scale
Current Output:	$\pm 0.5\%$ of full scale
Resolution:	16 bit (0-20 mA and 0-10 V)
Measurement Range:	Range and zero-point are scalable in the software. Maximum load resistance on current output is 800 Ω . Minimum load resistance for the voltage output is 1000 Ω .

The analogue outputs are galvanically isolated from the rest of the analyser, but NOT from each other. With the Analogue/Relay Interface Module, 12 alarm relays can be configured: either as two alarm levels for each gas (plus water) on any active sampling channel, or as alarm relays for selective channels on any monitored gas. Furthermore, two alarm relays are available for warning/error messages and for system watchdog function. Max 25 VDC, Max 100 mA.

Ordering Information

Photoacoustic Gas Monitor - Innova 1314i

Optical filters necessary for the user's monitoring task can be ordered together with the 1314i, and installed by LumaSense Technologies. The 1314i is then delivered zero-point and humidity interference calibrated.

Includes the Following Accessories

AT 2177	4m PTFE tubing
DS 0759B	Particle filter
VF 0102A	Fuse
BR6011	Set-up tree
Mains Cable	
AS0001A	USB cable
BZ7002	Calibration Software
BZ7003	Offline Software
7810	LumaSoft Gas Single Point monitoring software

Instruction Manual (USB flash drive)

Optional Accessories

The 1314i can be span-calibrated for certain gases – contact your local LumaSense Technologies representative for details of the gases for which this can be done.

27 Optical Filters

UA 0968 – UA 0989 and

UA 0936

UA 6008

UA 6009

UA 6010

UA 6016

Calibrations

UA 0181 Automated Calibration

UA 0182 Complex Calibration

UA 0183 Advanced Calibration

Multiple Point Monitoring

7870 LumaSoft Gas Multi Point

1409 Multiple Point Sampler

Cables, Adapters, and Tubings

WL 0950-003	RS232 Interface cable (9pin–9pin) null modem
JP 0600	6-pin DIN plug (male) with locking collar for alarm relay
AF 0614	PTFE tubing
UA 1357A	Genie Membrane separator
UA 1365	Genie Membrane separator (inline)
UA 1373	Analogue/Relay Interface Module
JZ 0102A	37-pin Sub-d to 37-pin screw terminal
AO 1431A	I/O cable one meter (for analog relay)
AO 1432A	I/O cable three meters (for analog relay)
UA 1361A	Purge Module

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a1-cbiss Ltd, 5 Valiant Way, Lairdside
Technology Park, Tranmere, Wirral, CH41 9HS
T: +44(0)151 666 8300
F: +44(0)151 666 8329
E: sales@a1-cbiss.com
W: www.a1-cbiss.com

