

**PRODUCT DATASHEET**

# LAB NIR-O™ Benchtop Analyzer

Full Spectrum Near-Infrared Lab Spectrometer



## Real-time

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## Configurable

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## High sensitivity

- Polyols: OH (hydroxyl) and acid number
- Polymers: reaction endpoint, co-polymer ratio
- Films: thickness, %T, %R
- Measurement of moisture content
- Refinery products: RON, MON, RVP, Distillation Points, Olefins, % Oxygen
- Solvent compositions
- Process research and development

## Our NIR-O Analyzers: Process and Lab

The NIR-O™ analyzer uses near infrared radiation (NIR) to collect spectral data from liquids, gases, and polymer-based films. The spectral data are interpreted by the analyzer software to determine the composition or physical characteristics of the material, all in real-time, and in challenging process environments. Two full spectrum NIR analyzers are available, process online or a bench top for offline lab measurements. A comprehensive system includes the NIR-O analyzer, one or more NIR probes, fiber optic cables, and scanning data analysis software. The NIR-O provides excellent signal-to-noise ratio, wavelength stability, NIST traceable wavelength calibration, dual beam optics, and built-in diagnostics.

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## LAB NIR-O Complete Lab Analyzer System

The LAB NIR-O™ was engineered to enable calibrations developed in the lab to be moved directly to a NIR-O process analyzer in the field. This allows seamless and precise data transfer with high accuracy and reliability. The LAB NIR-O is a 6 channel near-infrared (1000-2100 nm) analyzer. It includes the Stability Monitoring System (SMS) filter and scripts for routine validation of hardware and optical performance.

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## Supporting the QC Lab

The Quality Control lab is often responsible for verifying the accuracy of process analyzers by reviewing grab samples. The built-in software of the LAB NIR-O allows engineers and technicians to combine reference values with sample spectra. This data can then be quickly loaded into a third-party chemometric tool for additional analysis and model maintenance. Often there is an advantage to chemometric model development or model validation if the spectrometer design used in the QC lab is identical with that used in the process. Additionally, using the same probes in the QC lab as the field allows for spare parts to be shared.

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## Pilot Plant Applications

Pilot plants often find themselves deciding between a traditional research-grade lab analyzer or a process analyzer developed for indoor field conditions. The development of the LAB NIR-O was based on our NIR-O process analyzer, however, components such as the air conditioners, not necessary in a lab environment, were removed. This results in a streamlined table-top analyzer that can also be used for pilot plant operations.

## Calibration Transfer Allows Flexible Uses

Process chemists, engineers, and researchers will appreciate the LAB NIR-O's flexibility to move from R&D testing, Pilot Plants, to full scale QC operations. In addition, the LAB NIR-O can be used for calibration development in support of a process NIR-O. A key aspect for NIR spectrometric method development involves the issue of calibration transfer between analyzers. This is important if you are developing a calibration on a laboratory unit for use on a process unit.

NIR multivariate calibrations are often a challenge to transfer between analyzers since they can be sensitive to very small changes in spectral data. In an ideal successful calibration transfer, the two analyzers must be as close to identical as possible. Designed to optically match the performance of our full spectrum process analyzer, calibrations developed on the LAB NIR-O in the laboratory can be quickly transferred to a process NIR-O and vice-versa. The ability to effortlessly transfer calibrations between instruments reduces the cost of ownership and the cost of calibration model maintenance.

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## Smart Choice

The LAB NIR-O is compatible with all our probes and flowcells which can be used in any combination required for your analytical needs. The LAB NIR-O's ability to monitor multiple reactions or samples with high accuracy and reliability in multiple environments makes it a cost-effective smart choice.

## SMS Provides Peace of Mind

An important consideration for successful implementation of spectroscopic analyzers is the ability to continually validate the performance of the analyzer system's hardware components.

The Stability Monitoring System (SMS) is internal to the LAB NIR-O and includes hardware and software to perform analyzer validation according to ASTM methodology. A fiber optic jumper cable must be installed on channel 6 of the LAB NIR-O for the SMS to operate.

### Analyzer Performance Tests

This topic is addressed in ASTM practice D-6122-191 under instrument performance tests. The ASTM practice provides a set of criteria for establishing baseline analyzer performance validation. Three levels of hardware testing are established:

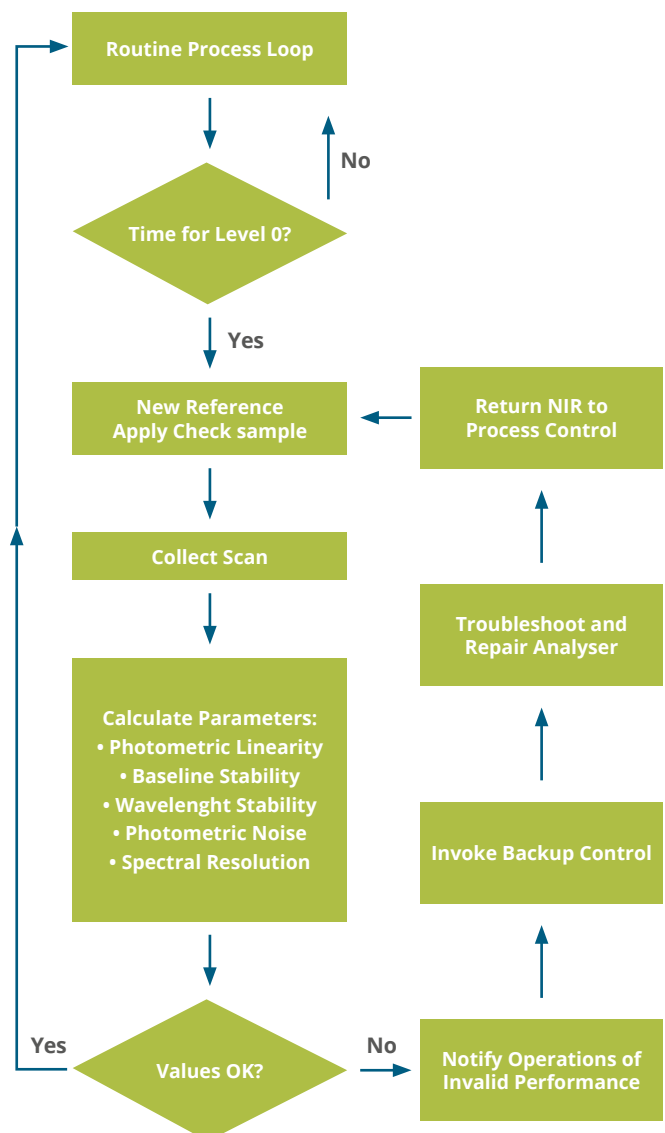
**Level 0** – Tests the analyzer hardware's capability to generate a consistent spectrum. This is accomplished by measuring photometric noise, baseline stability, spectral resolution, photometric linearity, and wavelength stability.

**Level A** – Tests compare key parts of the spectral data with historical data to identify deviations.

**Level B** – Tests and monitors the instrument performance for deviations that affect the system calibration models.

### Typical SMS Level 0 Validation Process

A flow chart depicting a typical SMS level 0 validation flow diagram is shown below. Our SMS operation is seamlessly integrated into the OmniLab control software. SMS provides assurance that all of the ASTM required measurements are conducted at the appropriate time and will send a signal or message to the control system if a validation issue is encountered.



## SMS Validation Detects Changes in Performance

The performance tests identified in the ASTM practice are diagnostics that can be used to detect changes in analyzer performance. This validation provides assurance that the measurement produced by the analyzer is a result of equipment that is operating properly. Since this is a hands-off procedure, it can be conducted in the background with no human intervention. The validation is done with an internal filter having a characteristic spectral signature. There are no liquids or other external sampling modes that are necessary.

### Tests Implemented in our SMS Package:

#### Level 0

1. Photometric noise level
2. Peak location (wavelength stability)
3. Baseline stability level
4. Bandwidth
5. Photometric linearity

#### Level A

This is a pass/fail performance test that is sensitive to all of the Level 0 parameters. Level A tests do not identify specific failure modes, but do indicate if the instrument performance is within historical bounds. In this test, the spectrum of a check sample (or an optical filter) is compared to a historical spectrum of the check sample.

#### Level B

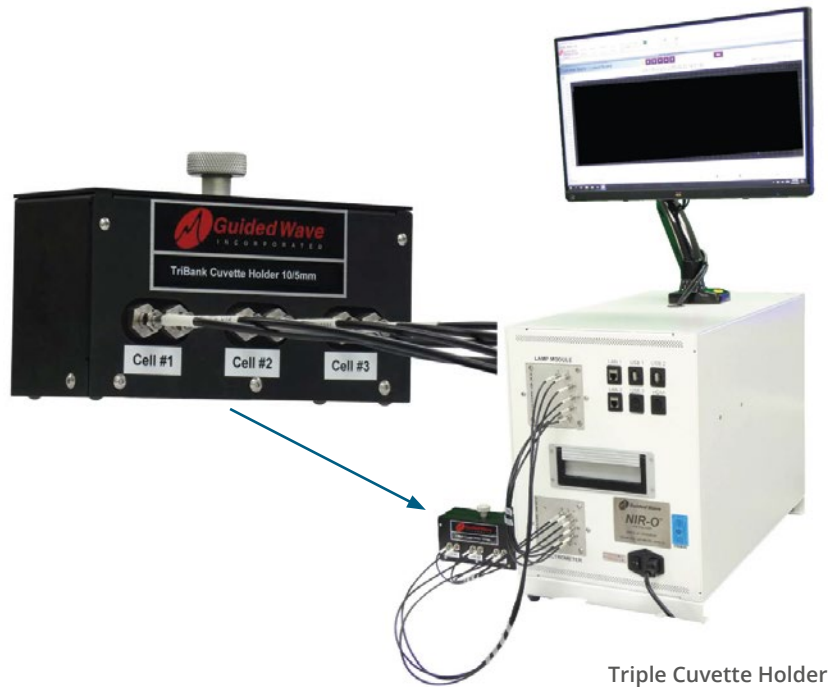
The level B tests analyze the spectrum of the SMS filter against the models in use on the analyzer system. This monitors for deviations to which the calibration model is sensitive. The results are compared to historical values to detect any change in the analyzer performance.

NOTE: The level B tests are not automatically part of the SMS because they require the customer's unique calibration models, which we may not have. We can assist customers in implementing Level B tests as part of their SMS installation.

<sup>1</sup> ASTM D6122-19 Standard Practice for Validation of the Performance of Multivariate Online, At-Line, and Laboratory Infrared Spectrophotometer Based Analyzer Systems, ASTM International, West Conshohocken, PA, 2019 [www.astm.org](http://www.astm.org)

## Cuvette Holder Types

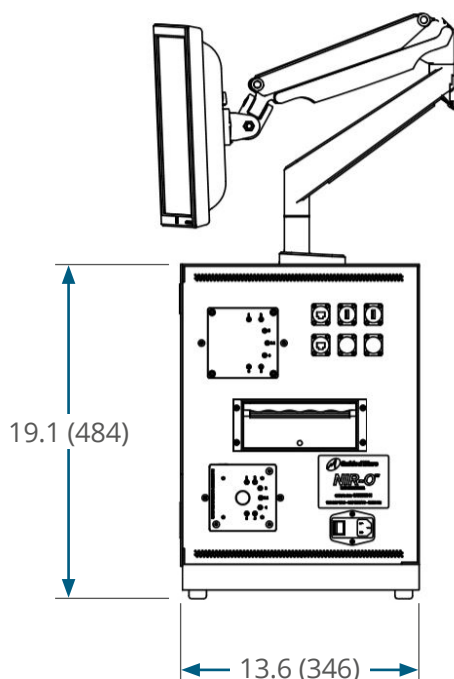
We offer two styles of cuvette holder. The first is a traditional single cuvette holder with an optional removable filter holder for easy system validation. The second style is the customizable triple cuvette. Designed as a single unit it can accept up to three cuvettes simultaneously, the triple cuvette holder is made to order. At the time of quotation, the required pathlengths for each of the slots is defined. This customizable design allows the holder to be compatible with standard NIR or UV cuvettes and disposal plastic cuvettes. If HPLC vials or other vial types are required contact us for alternative options.



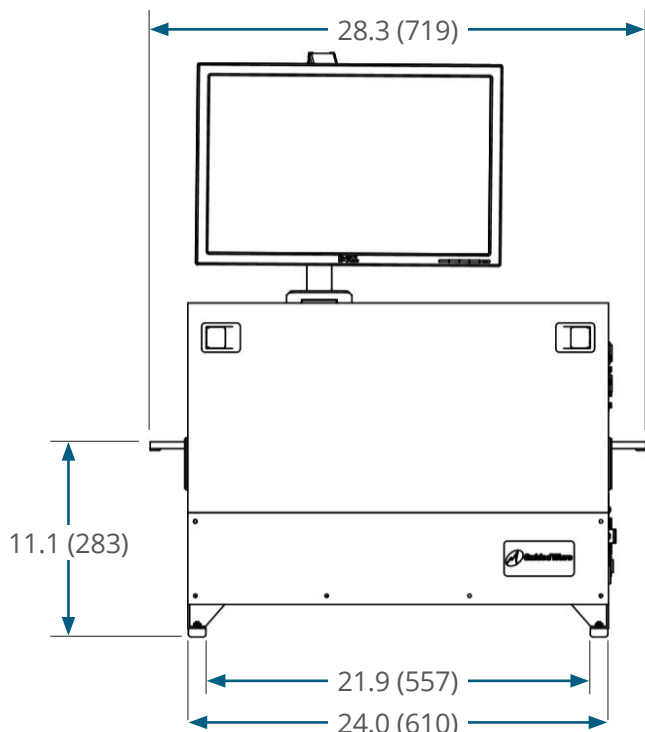
## Optional Accessories

Our Triple Cuvette Holder or traditional single cuvette holder are optional accessories for laboratory work, calibration development or feasibility studies. Either style of cuvette holder works alongside the LAB NIR-O for collecting high quality spectral data. By using two or more cuvette holders or probes, various applications or software configurations can be tested without any sample contamination.

## LAB NIR-O Dimensions – Side View



## LAB NIR-O Dimensions – Front View



## Specifications

<b>Design:</b>	DG-NIR Analyzer spectrometer, post-dispersed scanning grating
<b>Bandwidth:</b>	≤ 6.3 nm
<b>Certifications:</b>	Optional CSA 22.2
<b>Channels:</b>	6
<b>Controller/Display:</b>	Touch screen, keyboard and mouse
<b>Dimensions:</b>	Enclosure (w x d x h) 28.3 [719 mm] X 19.1 [484 mm] X 13.6 [346 mm]
<b>Dual Beam:</b>	1 reference channel for each 6 available sample channels
<b>Environmental:</b>	Typical lab environment, temperature 15 - 30 °C, humidity 10 - 90%, no condensation
<b>Fiber Optic Cable:</b>	500 μm diameter ultra-low OH
<b>Fiber Optic Cable Connectors:</b>	SMA 905
<b>Light Source / Life Tungsten Halogen:</b>	7.5 V, 15 W (5K hour recommended replacement, 10K hour MTBF) additional spare lamp included
<b>Minimum Step Size:</b>	0.5 nm
<b>Model Engine:</b>	Solo (PLS_Toolbox) or Piroutte®
<b>Multiplexer:</b>	Digital rotary switch
<b>Photometric Linearity:</b>	@ 1 AU >0.987; stray light <0.1%
<b>Photometric Noise:</b>	Single scan full range 50 μAU rms; 4 scan average full range 25 μAU rms
<b>Photometric Stability (Baseline):</b>	0.00075 AU/day rms
<b>Power Requirements:</b>	110/230 VAC, 50/60 Hz, 325 W
<b>RoHs Compliant:</b>	Yes
<b>Scan Time (Dual Beam):</b>	6 sec/channel (full range, no long pass filter, 1 scan to average)
<b>Software:</b>	OmniLab Process Analysis Software
<b>Warranty:</b>	Two (2) year limited warranty
<b>Wavelength Accuracy:</b>	±0.2 nm
<b>Wavelength Precision (Repeatability):</b>	±0.02 nm
<b>Wavelength Range:</b>	1000-2100 nm
<b>Wavelength Stability (Drift):</b>	±0.02 nm/day rms
<b>Weight:</b>	Approximately 75 lbs [34 kg]



## GAIN REAL-TIME INSIGHT INTO YOUR PROCESS

Process Insights manufactures and delivers premium sensors, monitors, detectors, analyzers, instrumentation, and software that are mission-critical to keep your operations, personnel, and the environment safe – every day across the globe.

Get the most reliable, precision analytical technologies available on the market today. We will work to match your needs and budget, and provide the optimal, and most stable process analysis solution for your application.

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## CENTERS OF EXCELLENCE | PROVIDING PROVEN SOLUTIONS

Process Insights is committed to solving our customers' most complex analytical, process, and measurement challenges everyday.

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For a complete range of products, applications, systems, and service options, please contact us at: [info@process-insights.com](mailto:info@process-insights.com)

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REVOLUTIONIZING MEASUREMENT

**EVERYWHERE**