Process Insights™
Premium Insights Into Process

DASTEC
30 años de soluciones para la industria

PRODUCT DATASHEET

NIR-O™ PROCESS ANALYZER

Full Spectrum Near-Infrared Spectrometer

Process Insights™
Premium Insights Into Process

NIR-O™ SPECTROMETER

Real-time

Configurable

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

NIR Process Analyzer

Our NIR-O™ process analyzer offers remote multi-channel extended range near-infrared (NIR 1000-2100 nm) spectroscopic analysis. NIR-O provides excellent signal-to-noise ratio, wavelength stability, NIST traceable wavelength calibration, dual beam optics and built-in diagnostics. Process engineers, operators, and researchers will appreciate NIR-O's ability to monitor up to12 process streams or points within a stream with accuracy, repeatability, and reliability. Additionally, the optional Stability Monitor System can provide confidence in hardware performance in the field. However a fiber optic jumper cable must still be installed on channel 6 or 12.

Complete Analyzer System

NIR-O is the core of a comprehensive process analyzer system that includes the spectrometer, one or more NIR probes, fiber optic cables, and OmniView™ scanning and analysis software. Like our previous spectrometers, NIR-O uses near infrared radiation to collect spectral data from liquids, gases, glass, and polymer-based films. The spectral data are interpreted by the OmniView software to determine the composition or physical characteristics of the material.

Real-Time Measurements

Using intrinsically safe fiber optic cables to transmit light from the spectrometer to your process and back, allows real time measurements at any time, providing you with up-to-date process information. NIR-O is designed to be used with our 500 µm core jacketed fiber optic cables. These unique cables contain a high purity fused silica core fiber, surrounded by specialized jacketing to protect both the signal transmitted and the fiber itself, allowing the analyzer to be located up to two hundred meters away.

True Multiplexing

NIR-O can be configured for up to 12 channels (i.e., independent sample points). This allows you to incorporate the number of sampling points you need now, while being able to easily and more economically add sampling points as your process or facility needs change. NIR-O can measure multiple parameters at up to 12 independent sampling locations in rapid succession by employing digital optical switching technology. Multiplexing greatly reduces the cost-per-measurement point, making cost-per-result more economical.

Research-Grade Signal-to-Noise Ratio

NIR-O's dual beam design, coupled with its high output near-zero aberration scanning grating, puts more light into the fiber. This provides an excellent signal-to-noise ratio, which means better sensitivity in your measurements. Each NIR-O provides excellent wavelength accuracy (NIST traceable) and superb wavelength repeatability.

Options:

- Touch screen computer for local process visualization and control (only on general purpose and Z-purge package)

- Z-Purge package: Class 1 Zone 2 Groups IIB+ H2 ATEX, IECEx certification

- X-Purge package: Class 1 Zone 1 Groups IIB+ H2 ATEX, IECEx certification

- Solo (PLS_Toolbox) or Piroutte® model prediction engines

- Remote desktop computer

- External 4-20mA analog I/O box, custom configured for your needs

- Starter Library models for Refinery Applications

- Chemometric modeling support available

- FAT/SAT support available

- Chemometric and/or instrument maintenance training

- NIR-O General Purpose (GP) enclosure shown. Dimensions will vary depending upon purge packages.
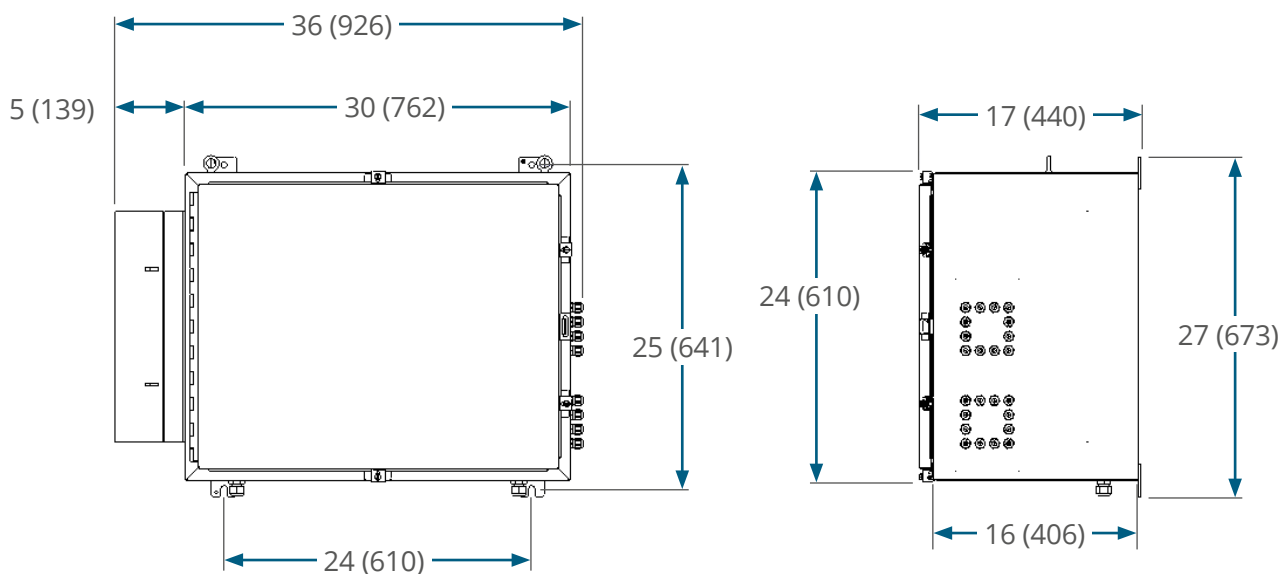
Dimensions shown in inches [mm]

SMS Option Provides Peace of Mind

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

The optional Stability Monitoring System (SMS) is a built-in package for NIR-O, which includes hardware and software to perform analyzer validation accoring to ASTM methodology. If the SMS option is selected, then one NIR-O channel must be dedicated to its use.

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 OmniView 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.
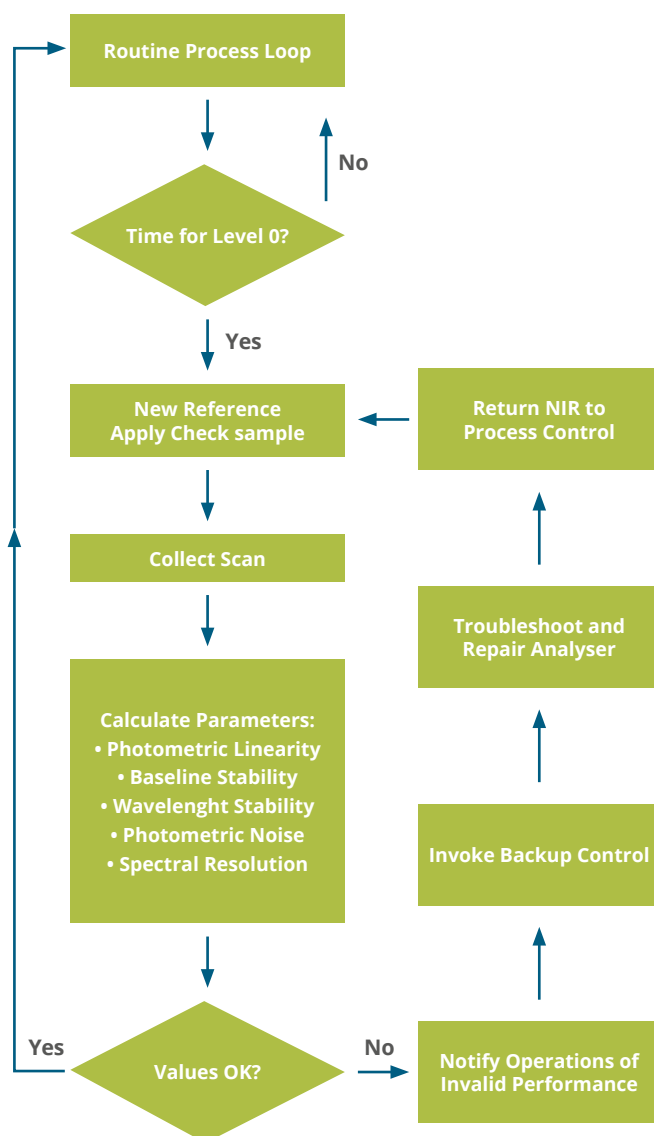
SMS Validation Detects Changes in Performance

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. Everything is contained inside the NIR-O analyzer enclosure and all SMS related materials are completely non-hazardous.

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.

[1] 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

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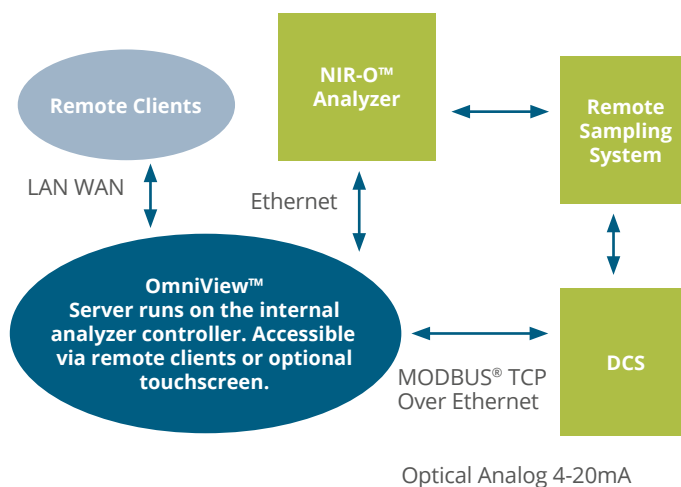Bolivia www.tecdas.com.bo

OmniView Process Analysis Software

OmniView is a standalone software package controlling all aspects of a NIR-O anlyzer. It provides full control of analyzer operations; diagnostics, data manipulation, event logging, trend graphs and alarms, calibration model security, and control of inputs and outputs. Communications via MODBUS TCP are included as standard. 4-20 mA analog signals are also supported with optional hardware. OmniView can be customized with "add-on scripts" to meet the needs of any process installation.

A Comprehensive Package

Support for third-party model chemometric tools are available. Pre-and post-processing of spectral data is done by way of the Python™ scripting language. OmniView supports the multiple probes available on the NIR-O analyzer, each with multiple analyses. Models, probes, or the analyzer can be taken on and offline with the click of a button.

Remote Access without Interrupting Continuous Analyzer Operations

OmniView allows remote access over LAN/WAN via a web based Java application. With proper security settings you can fully operate and configure the OmniView software and your NIR-O analyzer from the plant or from any remote location. Simultaneous users can view the operations, function and "health" of your NIR-O analyzer. This is extremely useful as the process engineer, laboratory technician, maintenance technician, and process supervisor can all access the analyzer remotely to accomplish their tasks. Furthermore, at your option are Service Engineers and/or Applications Specialists can review and support your system, on demand, from our service centers.

Remote Clients

NIR-O™ Analyzer

Remote Sampling System

LAN WAN

Ethernet

OmniView™
Server runs on the internal analyzer controller. Accessible via remote clients or optional touchscreen.

MODBUS® TCP Over Ethernet

DCS

Optical Analog 4-20mA

Features

- User configurable windows to allow customized views
  – Multi-tasking
  – Pre-Configured for Easy Set-up
  – Real-time Trend Charts
  – Current Value Display
  – Powerful Python™ Script Language
  – Multiple Access Levels (Security)
- Built-in Reporting of Analyzer Diagnostics
  Network Accessibility, Local and Global Remote, Real-time Access
- Component and System Level Event Logging
- Event Logging with Manual Entry Option
- I/O – MODBUS® TCP or MODBUS RS232/485 is standard. (4-20mA/discreet signals are optional and require additional hardware)
- Solo (PLS_Toolbox) or Piroutte® Model Predictions (optional)

Remote Clients

Minimum Computer Requirements

- Intel® Dual Core processor
- 4 GB RAM minimum, or as required for OS
- Recommended 19 inch (minimum) monitor with 1080x1024 screen resolution
- 100 MB Ethernet for network access
- Microsoft Windows® OS – Win 7/10

Specifications

Design:	DG NIR Analyzer spectrometer, post-dispersed scanning grating
Bandwidth:	≤ 6.3 nm
Warranty:	Two (2) year limited warranty
Channels:	Up to 12
Dual Beam:	1 reference channel for each 6 available sample channels
Light Source / Life Tungsten Halogen:	7.5 V, 15 W (5K hour recommended replace 10K hour life MTBF), additional spare lamp included
Fiber Optic Cables:	500 µm diameter ultra-low OH
Fiber Optic Cable Connectors:	SMA 905
Detector Type:	Extended range InGaAs with 2-stage TE cooler
Multiplexer:	Digital rotary switch
Model Engine:	Solo (PLS_Toolbox) or Piroutte®
Communications:	Modbus TCP over ethernet or external OPTO 22 analog and digital I/O
Software Required:	OmniView™ Process Analysis Software
Wavelength Range:	1000-2100 nm
Wavelength Accuracy:	±0.2 nm
Wavelength Precision (Repeatability):	±0.02 nm
Wavelength Stability (Drift):	±0.02 nm/day rms
Minimum Step Size:	0.5 nm
Photometric Noise:	Single scan full range ≤50 µAU rms, 4 scan average full range ≤25 µAU rms
Photometric Stability (Baseline):	≤0.00075 AU/day rms
Photometric Linearity:	@ 1 AU stray >0.987, stray light <0.1 %
Scan Time (Dual Beam):	6 sec/channel (full range, no long pass filter, 1 scan to average)
RoHS Compliant:	Yes
Dimensions (General Purpose):	Overall: 36" (w) x 17" (d) x 27" (h) [93 cm x44 cm x 68 cm]
Enclosure Options:	Temperature controlled NEMA 12, NEMA 4, IP 54, IEC 60529
Protection Options:	General purpose, Z-Purge, X-Purge
Certifications:	ATEX, CE, IECEx (C1Z1, C1Z2, C1D1, C1D2) CSA, PACE, CNEX
Environmental:	0-45°C, 0-100% Non-condensing, sun shaded and rain protected
Weight:	Approximately 180 lbs [82 kg]
Power Requirements:	110/230 VAC, 50/60 Hz (325 W instrument only) (1500 W maximum with air conditioner)

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.

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 list of sales & manufacturing sites, please visit:
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REVOLUTIONIZING MEASUREMENT

EVERYWHERE