

## Near-Infrared Analyzers

The **PIONIR™ Series** analyzers are designed for operation in on-line and process development environments utilizing patented and licensed BP technology. These on-line analyzers provide real-time, multi-point analysis of refinery and petrochemical processes. Features on the analyzer include:

- Diode array detector and fixed holographic grating, with no moving parts, results in maximum stability.
- Industrially hardened fiber optic cables.
- Dual-beam probe design with continual background correction eliminates fiber variation.
- Large database of calibration models for faster commissioning.
- Full chemometric modeling capability including SpectraQuant,™ Unscrambler®, MATLAB® and Pirouette®.
- Communications options including Modbus®, OPC®, Ethernet and analog protocols.

**AIT** | Worldwide  
**Leader in Process Analytics**



**PIONIR 1024**

### PIONIR APPLICATIONS

Gasoline Properties	Diesel Properties	Component Streams	Petrochemical Processes
RON, MON	Cetane Number	FCC	Xylene
Distillation Points	Cetane Index	Reformate	Para-Xylene
E200, E300	Density	Alkylate	Purified Teraphthalic Acid
RVP	Gravity	Isomerate	Toluene
Aromatics, Benzene	Polycyclic Aromatics	MTBE	Solvent Composition
Olefins	E360	Straight Run Naphtha	Alkylation Unit
Oxygenates	Aromatics	Pentanes	
Gravity	Kinematic Viscosity	Raffinate	
V/L Ratio*	Distillation Points	Pyrolysis Gasoline	
Drivability Index	Flash point	Heavy Aromatic	

\*Vapor to Liquid Ratio

For specific property performance, AIT requires submittal of a User Specification Form detailing process composition and conditions.

### AVI™ Absolute Virtual Instrument

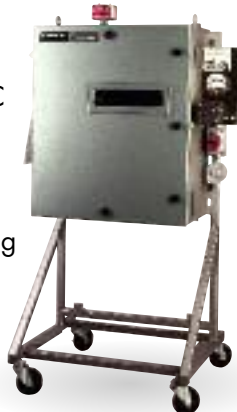
- Proprietary, patented instrument standardization protocol licensed from PerkinElmer
- Assures that any one PIONIR is optically identical to any other PIONIR
- Provides seamless calibration transferability between PIONIR systems
- Minimizes downtime during maintenance as PIONIR does not need calibration updates when components are changed

## PIONIR 1024 & MVP™

**The PIONIR™ analyzers have a record of reliable performance due to their rugged design. Proven stability allows you to continually improve product quality and meet production targets at reduced costs. PIONIR analyzers are recognized in the industry as the NIR system with the lowest total cost of ownership.**

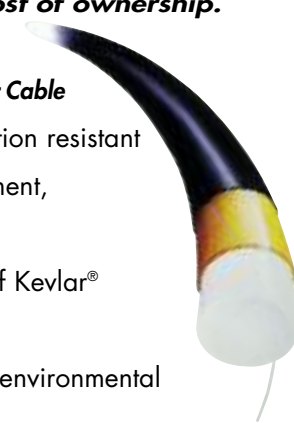
### HAZARDOUS ENVIRONMENT

- The **PIONIR 1024™** system can withstand temperatures from -40°C to +50°C and requires no shelter.
- Embedded processor offers a rugged solid-state computer running Windows®XP embedded real-time operating system. External RMS PC is not required.
- Available for use in general purpose and hazardous areas.
- An integrated display is offered as an option.



#### **Industrially Hardened Fiber Optic Cable**

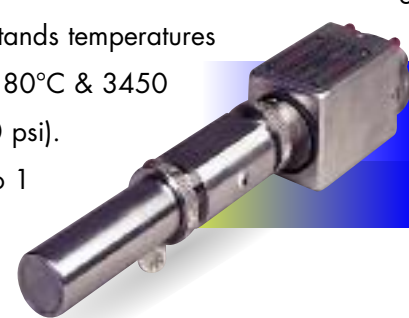
- Set in thixotropic gel - vibration resistant
- Helically wound, single-filament, low OH fiber
- Encased in durable layers of Kevlar® yarn for linear strength
- Black nylon outer jacket for environmental protection



#### **Dual Beam Slip-Stream Probe**

The innovative dual beam, self-referencing probe design eliminates instrument variations resulting from the source, fiber optics, or any other component by taking a new background scan with each sample scan.

- 10 cm pathlength minimizes variations from window fouling.
- Rugged design withstands temperatures and pressures up to 80°C & 3450 KPa (176°F and 500 psi).
- Can be located up to 1 kilometer from the analyzer placement.



### GENERAL PURPOSE

The **PIONIR MVP Rackmount** system is designed for on-line analysis from the control room. Utilizing fiber optics, probes can be located in general purpose or hazardous areas. This system is an economical way to implement NIR technology.



### LABORATORY

The **PIONIR MVP Benchtop** system is designed for the lab to support the on-line analyzers, or perform measurements for process development applications and routine samples.



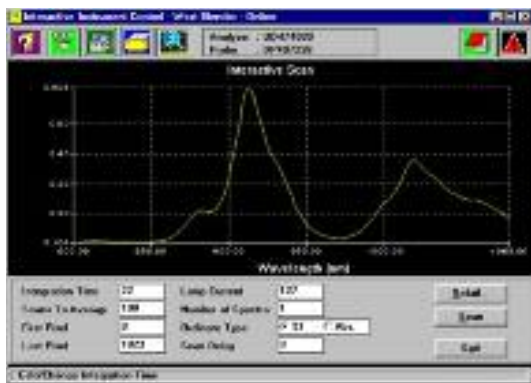
#### **Multiplexing**

One PIONIR 1024 or MVP Rackmount analyzers can be optically multiplexed for up to eight slip-stream probes to reduce the system cost per sample point.

#### **Grating & Diode Array Assembly**

The optical bench, heart of the **PIONIR** system, utilizes a fixed holographic grating and a 1024 element diode array assembly. Mounted in an Invar™ fixture, the entire assembly is designed to minimize the effects of thermal variation. This results in stable and reliable measurements day after day, and year after year.





**RMS™ Remote Management System**

Windows® based interface for set-up and control of analyzer, sample system, and DCS communications.

- Extensive system diagnostics.
- Open script platform to easily implement or change operational programs.
- Remote modem support.



**SpectraQuant™**

- Incorporates proven benefits of constrained principal component regression with the tools available in Eigenvector Research Incorporation's PLS Toolbox™ suite.
- Incorporates baseline constraints, pathlength constraint and spectral interference constraints.
- Featuring robust and intuitive user interface that includes a flow chart for step-by-step guidance through the model development



**Communications**

- Analyzer Gateway Ethernet Server, OPC version 2.0 compliant.
- Modbus RTU protocol, Modicon and floating point standards.
- Simultaneous Modbus and OPC capability provides seamless migration path.
- Bi-directional ASCII serial interface.
- Fully configurable analog and digital I/O, 4-20mA outputs, data multiplexing.

**Some of Our Satisfied Customers**

- Abu Dhabi Oil Refining**
- BP**
- Chevron**
- Citgo**
- ConocoPhillips**
- Flying J**
- Hindustan Petroleum (HPCL)**
- Indian Oil (IOCL)**
- Lyondell-Citgo**
- Paramount Petroleum**
- PDVSA**
- PEMEX**
- ROMPETROL**
- Shell**
- Sibneft**
- Statoil**
- Sunoco**

**Sample Conditioning Systems**

To achieve the optimum performance it is critical that a well-designed extractive sampling system is utilized

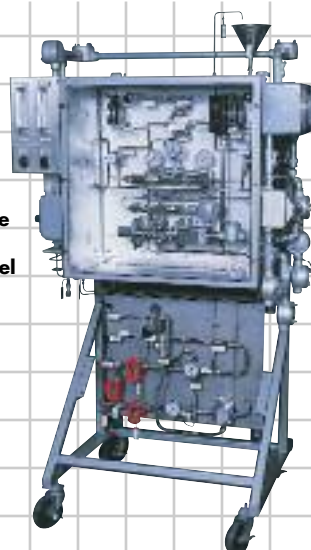
AIT can provide turnkey systems including:

- Fast loop conditioning panel.
- Analyzer loop thermal enclosure.
- Temperature conditioning system.
- Automated sample collection.
- Automated ASTM validation and wash system.

Additional customized systems that can be provided:

- Sample recovery system.
- Fast loop pumping system.

**Analyzer loop thermal enclosure with fast loop conditioning panel**



**Single Point Sample System**



**Automated sample collection system**

**Specifications**

- Spectrometer:**
  - Fixed holographic grating with photodiode array detector, features no moving parts
- Operating Range:**
  - 800–1080 nm (third overtone)
- Analysis Time:**
  - 30–60 seconds for multiple property predictions
- Optical Fiber:**
  - Proprietary design and manufacture. 200 micron fiber diameter; low OH silica core inside environmentally jacketed cable
- Spectral Performance:**
  - Spectral Resolution: 3.3 nm over full range, Absolute Virtual Instrument standard
  - Dynamic Range: 25,000:1 at 850 nm (15 second measurement)
  - Wavelength Repeatability: ± 0.004 nm scan to scan
  - Wavelength Accuracy: ± 0.01 nm long term (AVI Corrected)
- Sample Probe (Slip Stream):**
  - Fiber optically coupled to analyzer
  - Modular design for easy maintenance
  - Self-referencing design features dual sample and reference paths for background correction
  - 1/8 inch NPT (female) threaded ports—2 input, 2 output
  - Silica window material, 316 stainless steel sample cell body
  - Pressure rating to 3450 KPa (500 psi)
  - Sample flow: 200 to 800 mL per minute
  - Temperature rating to 80°C (176°F)
- Process Control Interface:**
  - Control: 4 digital AC inputs and 4 outputs standard, up to 16 total AC inputs or outputs (optional)
  - Optional 4–20 mA analog output to interface to process control computer with external accessory
  - Optional OPC or Modbus™ interface allows bi-directional information exchange between the PIONIR and the process control computer
  - Sensor input: Two 4–20 mA analog inputs standard
- Area Classification:**
  - PIONIR MVP: General Purpose - Non Hazardous
  - PIONIR 1024: General Purpose - Non Hazardous
  - PIONIR 1024: √Z-Purge – NEC Class I, Div 2
    - ATEX Zone 2
  - √X-Purge – NEC Class I, Div 2
    - ATEX/IECEX Zone 1

- Environmental Conditions:**
  - PIONIR MVP: Temperature: 10°C to 35°C (50°F to 95°F)  
Humidity: Non-Condensing
  - PIONIR 1024: -40°C to 50°C (-40°F to 122°F)  
Humidity: 0 to 100%
- Utility Requirements:**
  - Electrical Power:
    - PIONIR MVP: 110/120 Vac, 50/60 Hz  
220/240 Vac, 50/60 Hz
    - PIONIR 1024/P: 110/120 Vac, 50/60 Hz  
220/240 Vac, 50/60 Hz
  - Cooling Water:
    - PIONIR 1024/P: Water cooled systems only
    - Pressure: 2.5 kg cm<sup>2</sup> (155 psi) minimum differential across inlet outlet
    - Flow: Up to 1.9 Liters/minute (0.5 gal/min)
    - Temperature: 32°C (90°F) Maximum
    - Particulates: 500 micron Maximum
    - Connections: 3/8 inch NPT Male (Flow and Return)
  - Instrument Air:
    - PIONIR 1024P: Purged systems only
    - Pressure: 3.5 kg cm<sup>2</sup> (50 psi) at stated flow
    - Flow: 450 Liters/minute (16 cfm) Rapid Exchange  
150 Liters/minute (5.3 cfm) Running
    - Contaminants: Free from oils, mists and water
    - Connections: 1/2 inch Swagelok Tube connector
- Instrument Dimensions:**
  - PIONIR 1024:
    - 107x99x43 cm (42x39x17 inches)—Without shipping stand
    - 173x109x74 cm (68x43x29 inches)—With shipping stand
    - Weight: 204 kg (450 lb)—Uncrated
  - PIONIR MVP:
    - 61x48x34 cm (24x19x14 inches)
    - Weight: 27 kg (60 lb)—Uncrated

**Experience**

Our staff of applications experts provide you feasibility and calibration services that set the worldwide standard. We also provide system integration and post-installation support to ensure your success.

**Contact Us:**

AIT offers annual hardware maintenance and calibration modeling service support contracts.



**Contact our Marketing Dept. AIT Applied Instrument Technologies** 2121 Aviation Drive, Upland, CA 91786

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**International locations—see our website for your authorized representative** **Applied Instrument Technologies, Inc.**

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