

VIAVI

MicroNIR PAT-L

Immersion Spectrometer: A robust near infrared (NIR) process spectrometer for liquid analysis

Rugged, fast, and maintenance-free, the MicroNIR™ PAT-L transmission spectrometer is designed for real-time process monitoring in industrial and pharmaceutical process analytical technology (PAT) applications.

The PAT-L is the newest member of the VIAVI PAT family of miniature process spectrometers. Its compact design and high performance make it ideal for use in industrial processes that require continuous monitoring. The NIR transmission design permits analysis of aqueous and nonaqueous liquids. The PAT-L is available in multiple configurations, specified on order, with a choice of probe material, optical path length, immersion depth, and process flange. As a member of the MicroNIR product family, it enables moving directly to production chemometric models and processes developed elsewhere. The PAT-L integrates readily with process equipment of all types and sizes, with the performance and stability to support truly efficient—and scalable—manufacturing.



Figure 1. MicroNIR PAT-L Immersion Spectrometer

Features

- All-in-one optical design for ease of installation and cleaning
- Continuous liquid process monitoring in vessels, tanks and pipelines
- Rapid acquisition time for real-time reaction monitoring and high flow liquid streams
- Wide range of transmission path lengths for organic solvents and aqueous solutions
- Full integration of light source and light pipe eliminates fiber optics
- Broadly configurable to meet the needs of most processes
- Optional cooling jacket for high temperature environments
- USB-powered via hardwired cable
- Includes MicroNIR Pro software, a complete data acquisition and chemometric modeling package

Applications

- Pharmaceutical Manufacturing
 - API synthesis
 - Solvent moisture content
 - Biofermentation nutrition monitoring
- Polymerization Process Monitoring
 - Polyol hydroxyl number
 - Polyurethane and polyisocyanate condensation
- Oil and Gas
 - Octane number
 - Lubricant properties
 - Fuel identification
- Industrial Applications
 - Semiconductor cleaning fluids
 - Reaction monitoring
 - Detergents, paints and coatings

Product Description

The MicroNIR PAT-L immersion spectrometer is based on the MicroNIR PAT-U process spectrometer, with design adaptations that include:

- Full integration into a fixed gap immersion probe
- High-efficiency light pipe design
- Inert gas backfill eliminates water vapor interference and condensation
- Hardwired USB cable for reliability
- Optional removable cooling jacket

The PAT-L is a fully integrated spectrometer-probe. The spectrometer section is rated IP65/IP67 and the immersion probe section is rated at up to 250 bar. Optical specifications are identical to the MicroNIR PAT-U and may be found on the PAT-U Data Sheet. The cooling jacket, with hose barb connections, allows coolant to circulate and maintain the spectrometer within its operating temperature range while the probe is in contact with hot fluids or in high ambient temperatures. Maximum working temperatures depend on the probe length and material and the coolant used. The MicroNIR internal temperature operating range is 0 to 50°C.

The PAT-L immersion probe section is based on the Hellma Excalibur HD FPT 26, a well-proven, heavy-duty industrial probe.



Figure 2. PAT-L showing transmission measurement gap

Mounting and Process Integration

The MicroNIR PAT-L has been designed for maximum flexibility to meet the diverse requirements of process integration. A variety of flange mounts and probe lengths are available. Probe body materials include 316L stainless steel and Hastelloy C22. Transmission gaps range from 2 mm (for aqueous liquids) to 3, 4, 5 and 10 mm (for polymers and petrochemicals).

Available Configurations

The standard configuration is: 2 mm optical path, 316L stainless steel body, EN 1092-1/05/A/DN 25/PN 40 process connection, 40 bar (Class 300) pressure rating and 200 mm maximum immersion depth (with flange). Other configurations are available as described in the table below.

MicroNIR PAT-L Probe Specifications and Configurations

Feature	Value
Optical path lengths	2, 3, 4, 5, 10 mm
Probe body materials	316L stainless steel, Hastelloy C22
Process connections	No flange EN 1092-1/05/A (5 options): DN40/PN40, DN50/PN16 or /PN40, DN80/PN16 or /PN40 ASME B16.5 (4 options): NPS 1.5 Class 150 or 300 RF, NPS 2 Class 150 or 300 RF
Max pressure rating	10, 16, 40, 160, 250 bar
Max immersion depths	240, 440, 640, 940 mm (no flange)
Outer diameter	26 mm
Optical window	Sapphire
Seals	Gold-coated, high nickel alloy C-ring
Gas backfill	N ₂ , 4 bar
Probe temperature range	-30°C to 400°C.



Figure 3. Detail of PAT-L with optional cooling jacket, showing hardwired USB connection.