

## Lab 412 Laboratory Spectrophotometer

The Guided Wave **Lab 412** Laboratory Fiber Optic Spectrophotometer offers *multi-channel* visible or near-infrared (NIR) scanning and analysis for at-line applications, QC method development, and routine laboratory analyses. This spectrophotometer contains the carefully engineered components used in the **412 Process Analyzer**, offering unprecedented stability and signal-to-noise ratio providing the basis for long-term, high-precision measurements. The **Lab 412** provides one or three channel dual-beam operation and Guided Wave's no moving optics or fiber multiplexing, plus built-in diagnostics. Process chemists, engineers, and researchers will appreciate the **Lab 412's** compact & transportable package and ability to monitor multiple reactions or samples with high accuracy and reliability.



### Complete Analyzer System

The **Lab 412** is the heart of a complete analyzer system that includes the spectrophotometer, one or more probes, fiber optic cables, intelligent scanning-and-analysis software, all carefully produced and integrated by Guided Wave engineers. The **Lab 412** uses optical fibers to collect spectral data from liquids, gases, slurries, and polymer-based melts or films. Spectral data are interpreted by the analyzer system's software, to determine the composition and/or physical characteristics of the material. Results from the **Lab 412** are easily transferred to a **412 Process Analyzer** for permanent process improvement programs through on-line analysis and control.

### Research-Grade Signal-to-Noise Ratio

The **Lab 412's** patented *dual-beam design*, coupled with its high output scanning grating, puts more light in the fiber; providing the highest available signal-to-noise ratio. Every **Lab 412** also provides excellent wavelength accuracy (NIST traceable) and superb wavelength repeatability. Here are a few of the many applications for which our customers rely:

- Moisture Content, Solvent Ratios, Reactor Charges
- Polymer Analysis, Reaction Endpoint, Copolymer Ratio
- Polymer Melt Monitoring Including Reaction Extrusion
- Distillation: Bottoms & Overheads, Production LC Makeup
- Process Research & Development: R&D Size To PDU Level
- Quality Control Method Development

### Real-Time Measurements

In fiber optic spectroscopy, the spectrophotometer transmits radiation to one or more probes installed directly in your research reactor, sample system, tubing or even a test tube in a fume hood. Readings are made at any time, providing *real-time information*. The Guided Wave **Lab 412** utilizes Guided Wave's single-strand fiber optic cable and GW's probes, flow cells, or

cuvet holders. GW's optical cable contains a high-efficiency glass fiber and a patented attenuation layer to eliminate internal and external stray light. GW's probes offer high optical efficiencies and rugged designs.

### Flexible Design for In-Situ Research or Pilot Plant Process Diagnostics Studies

The **Lab 412** is suitable for dip probes, static samples in a cell or in-situ dynamic analyses of processes in laboratory or pilot plant reactors, tanks, transfer tubing or even research extruders. Three versions of the **Lab 412** are available. The Visible version operates from 380 nm to 1070 nm and uses a silicon detector (Si). The NIR version uses an Indium-Gallium-Arsenide (InGaAs) detector and operates from 800 nm to 1700 nm. The extended, or xNIR, version uses an extended-range InGaAs detector and operates from 1000 nm to 2100 nm.

### Features

- Excellent Signal-to-Noise Ratio – detects small chemical differences.
- Cost effective Multi-channel Design – reduces costs per measurement point.
- Stable Dual Beam Optics – eliminates common sources of drift such as detector and lamp temperature drift and atmospheric water vapor; reduces the frequency of referencing.
- Excellent Wavelength Stability – accurate results over long time periods.
- Small footprint – requires less bench space.
- Single Strand Fiber – less expensive and more flexible.
- Remote measurements – fiber optic probes can be used in explosive areas.

## True Multiplexing

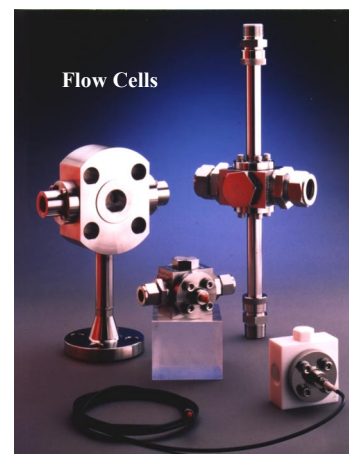
The **Lab 412** features Guided Wave's patented, integrated solid state multiplexer. No moving optical components or fibers are used. A bank of electromagnetic optical shutters is used to switch from one fiber channel to the next; thus ensuring reliable, accurate, noise free measurements over long time periods. This multiplexer permits the **Lab 412** to monitor up to three probes, allowing simultaneous data collection from parallel experiments, and *reducing the cost per measurement point*.



Cuvet Holder



SST Probe



Flow Cells

## Wide Range Of Probes and Cells

Guided Wave offers a wide range of transmission probes, flow cells and cuvet holders. These include probes suitable for most research reactors from laboratory bench top to pilot plant. Fixed pathlength flow cells are available in stainless steel or Teflon™. The Teflon™ Flow Cell is ideal for work in semiconductor solutions where metals contamination would be detrimental. Please send inquiries to [gwinfo@guided-wave.com](mailto:gwinfo@guided-wave.com) or visit our web site ([www.guided-wave.com](http://www.guided-wave.com)) to learn more about probes and flow cells for your application.

## Specifications

	Lab 412 VIS	Lab 412 NIR	Lab 412 xNIR
Wavelength Range (rated)	380 - 1070 nm	800 - 1700 nm	1000 - 2100 nm
Wavelength Range (optimal)	400 - 1000 nm	900 - 1600 nm	1050 - 2000 nm
Wavelength Accuracy	±0.28 nm	±0.20 nm	±0.20 nm
Wavelength Repeatability	±0.02 nm	±0.02 nm	±0.02 nm
Wavelength Stability (rms/24hrs)	±0.05 nm	±0.05 nm	±0.05 nm
Minimum Step Size	0.2 nm	0.2 nm	0.2 nm
Spectral Resolution	3.2 nm	6.8 nm	6.8 nm
Photometric rms Noise	< 20 µAU	< 13 µAU	< 26 µAU
Photometric (Baseline) Stability (rms/24hrs)	< 1 mAU	< 1 mAU	< 1 mAU
Dynamic Range (Mid Range)	4.0 decades	4.0 decades	4.0 decades
Optical Connections	SMA 905; 500 µm Diameter Single Strand Fiber Optic Cable		
Data Communications	RS-232 (DB9 Null Modem Cable)		
Dimensions	12" (w) x 16" (d) x 21" (h) [30 cm x 41 cm x 53 cm]		
Weight	53 lbs [24 kg]		
Power	300 W, 110/220 Vac, 50/60 Hz		
Climate (Temperature/Humidity)	Standard Laboratory 15 °C to 25 °C Regulated to ± 2 °C/0 - 95% Non-Condensing		

## Included as Standard Equipment

**Lab 412** Scanner Software with MacroTask command Language, hardware for connection to the Instrument Control Unit (PC), optical jumper cables, fiber optic fitting torque wrench, and **Method Maker** interface for use with **Unscrambler™**.

## Recommended Instrument Control Unit

The **Lab 412** must be used with an Instrument Control Unit (a PC-compatible computer) that meets or exceeds the following specification (when used with **CLASS-PA™** software): Pentium Processor; 200 MHz or faster; 128 MB

DRAM, SVGA graphics, hard drive (2 GB or greater), floppy disk drive (3.5"/1.44 MB), optional modem and CD-ROM, OS: Win2K or NT4.0 SP6.

## Options

- CAMO **Unscrambler™** chemometrics software
- **CLASS-PA™** operations software
- **Model Studio** - Method Maker for Unscrambler

*Specifications are subject to change without notice.*

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