

## Model 412 Process Analyzer

The Guided Wave Model 412 process Analyzer offers remote *multi-channel* near-infrared (NIR) or visible (Vis) spectroscopic scanning and analysis. Essentially a *smart chemical sensor*, the Model 412 provides exceptional signal-to-noise, excellent wavelength stability, NIST traceable wavelength calibration, dual-beam optics and built-in diagnostics. Process operators, engineers, and researchers will appreciate the Model 412's ability to monitor up to 12 process streams (or points within a stream) with accuracy, repeatability, and reliability.

### Complete Analyzer System

The Model 412 is the core of a comprehensive process analyzer system that includes the spectrophotometer; one or more NIR probes, fiber optic cables, and intelligent scanning-and-analysis software. Like other Guided Wave spectrophotometers, the Model 412 uses near-infrared radiation to collect spectral data from liquids, gases, slurries, glass, and polymer-based films. The spectral data are interpreted by the analyzer system's software, to determine the composition and/or physical characteristics of the material.

### Real-Time Measurements

In remote spectroscopy the analyzer transmits radiation to one or more probes installed directly in your process reactors or pipes. Readings can be made at any time, providing *real-time process information*. The Guided Wave Model 412 is designed to be used with Guided Wave's single-strand fiber optic cable. This patented cable contains a high-efficiency glass fiber, permitting transmission distances of up to several hundred meters.

### True Multiplexing

The Model 412 also features Guided Wave's patented, integrated multiplexer. This multiplexer, together with appropriate light input modules, permits the Model 412 to monitor up to twelve probes simultaneously greatly *reducing the cost per measurement point*. You can also purchase the Model 412 as a three-channel instrument, then upgrade it later to 6, 9, or 12 channels.

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

The Model 412's *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 Model 412 also



provides excellent wavelength accuracy (NIST traceable) and superb wavelength repeatability.

### Designed For On-Line Processes

The Guided Wave Model 412 is suitable for on-line analyses of most processes and process streams. Three versions of the Model 412 are available. The Vis version operates at 380 - 1070 nm and uses a silicon detector (Si). The NIR version uses an Indium-Gallium-Arsenide (InGaAs) detector and operates at 800-1700 nm. The extended, or xNIR, version uses an extended-range InGaAs detector and operates at 1000-2100 nm.

Here are just a few of the many applications for which our customers rely on the Model 412 every day:

- On-line analyses of polyols: OH and acid number
- On-line analyses of polymers: reaction endpoint, co-polymer ratio
- On-line analyses of films: color; thickness, %T, %R
- On-line measurement of moisture content
- On-line analyses of refinery products
- On-line analyses of vinyls: solvent composition
- Process research and development

## Specifications

Model	412 Vis	412 NIR	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	RS422, RS-232 (DB9 Null Modem Cable), or optical fiber modem		
Dimensions	30" (w) x 17.3" (d) x 41.3" (h) [76 cm x 44 cm x 105 cm]		
Weight	200 lbs [91 kg]		
Power	1500 W, 110/220 Vac, 50/60 Hz		
Climate (Temperature/Humidity)	0 °C to 40 °C Shaded/0 - 100% Condensing		

### Included as Standard Equipment

- Model 412 Scanner software with MacroTask command language
- Drivers for Opto-22 4-20 mA I/O and discrete (0-5V) I/O
- Modbus communication protocol, embedded
- Optical jumper cables and tool kit with torque wrench
- Method Maker interface for use with (Unscrambler™)
- Temperature controlled NEMA 4 Enclosure

### Options

- Camo Unscramble™r chemometrics software for Windows™
- Model Studio interface to Unscramble™
- CLASS-PA™ or SpectrOn™ process analysis software.

### Enclosure Options

The Guided Wave Model 412 comes installed with an air-cooled internal climate control system for General Purpose Environments. This instrument can also be packaged for

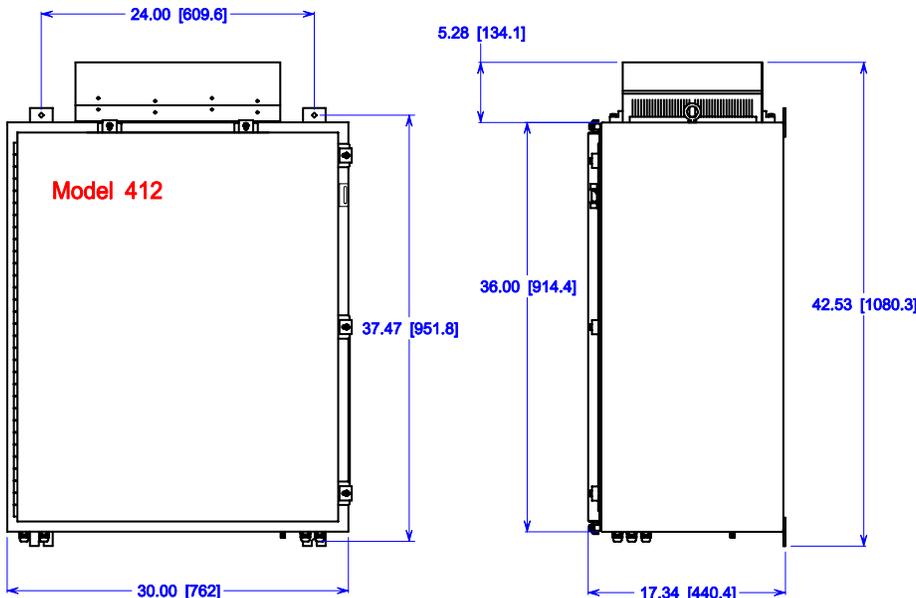
hazardous environments. These options include Class I Division 2 groups C & D and CENELEC EEx pdem [ib] II C T4.

### Instrument Control Unit (Host Computer)

The Model 412 must be used with an Instrument Control Unit (a PC/AT-compatible computer) that meets or exceeds the following specification: 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) and CD-ROM, Windows NT 4.0 SP6 or Windows 2000.

### Operating Environment

- Internal operating temperature settable between 30 and 40 °C controlled to ± 1 °C of set point
- External (ambient) temperature 0-40 °C, shaded location
- Temperature limits for constant operation ± 10 °C
- External humidity (condensing) 0-100%



For more information on Guided Wave analyzers and probes, contact:

[gwinfo@guided-wave.com](mailto:gwinfo@guided-wave.com)

or visit our web site at:

<http://www.guided-wave.com>.

Specifications are subject to change without notice.

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## Guided Wave Incorporated

3033 Gold Canal Drive  
Rancho Cordova, CA 95670  
USA  
Tel: 916.638.4944; Fax: 916.635.8458  
[gwinfo@guided-wave.com](mailto:gwinfo@guided-wave.com)

[www.guided-wave.com](http://www.guided-wave.com)

## Guided Wave BV

PO Box 427  
7550 AK Hengelo (o)  
The Netherlands  
Tel: +31.74.2595390; Fax: +31.74.2595752  
[info@guided-wave-europe.com](mailto:info@guided-wave-europe.com)