Specifications

**MR304LN Series**

**Configuration**

The system consists of a spectroradiometer with two input and two output ports. The system features simultaneous data acquisition from the two output ports (configured with a MCT and an InSb detector).

One input port is used to fix a reference cancellation source. The other input port is designed to receive an input telescope and a viewing device.

The MR304LN is equipped with liquid nitrogen cooled detectors.

The spectroradiometer includes:

- Complete Fourier Transform Interferometer, with two detectors
- Electronic controls built into the FTIR module
- External power supply module
- Acquisition and data processing radiometric software
- Input collimator
- FTIR Internal temperature control system
- FTIR base with handles and fixation points for tripods
- Room temperature cancellation reference source
- Aluminum transport case

**Data acquisition and radiometric software**

**Communication link to PC**

100 Mb Ethernet communication with shielded CAT 5 cable

**Recording time (continuous mode)**

Up to 30 minutes (equivalent to 5 GB)

**Transfer to hard disk**

Data saved in real time to hard disk

**Data time stamping**

On-board, at ZPD from embedded processor

**FTSW500 radiometric software (features)**

- Control of the instrument (configuration, status, commands, etc.)
- Real time data acquisition on both channels (MCT and InSb det.)
- Functionalities to perform instrument diagnostics
- Data analysis and post processing
- Built-in radiometric calibration function (Radiance, Irradiance and Apparent Intensity)
- Built-in data export function to GRAMS spectroscopy software
- Library of java functions compatible with MATLAB and IDL for further data processing
- Windows XP compatible

**Options**

**Telescopes**

- Wide-angle telescope (maximum field of view = 75 mrad) focusing range: 2 m to infinity
- Medium-angle telescope (maximum field of view = 28 mrad) focusing range: 10 m to infinity
- Narrow-angle telescope (maximum field of view = 4.9 mrad) focusing range: 30 m to infinity

**Viewing devices**

- Ocular
- CCD camera with controller and monitor

**Others**

- Tripod
- Computer

![Image of MR304LN spectroradiometer](image.png)
Spectrometric characteristics

Spectral technique
Fourier Transform Interferometer

Spectral range
667 - 5,000 cm⁻¹ (2-15 μm) capability
Optional extension to 10,000 cm⁻¹ (1 μm) available

FOV uniformity
± 7.5% on 85% of measured FOV

Spectral resolution
6 computer selectable unapodized resolutions (1, 2, 4, 8, 16, and 32 cm⁻¹) at all wavelengths

Spectral stability
Better than 0.01 cm⁻¹

Scan speed
23.5 cm/s, fixed

Scan rate
<table>
<thead>
<tr>
<th>Resolution</th>
<th>Scan/Sec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cm⁻¹</td>
<td>10</td>
</tr>
<tr>
<td>2 cm⁻¹</td>
<td>17</td>
</tr>
<tr>
<td>4 cm⁻¹</td>
<td>34</td>
</tr>
<tr>
<td>8 cm⁻¹</td>
<td>54</td>
</tr>
<tr>
<td>16 cm⁻¹</td>
<td>82</td>
</tr>
<tr>
<td>32 cm⁻¹</td>
<td>107</td>
</tr>
</tbody>
</table>

FOV of interferometer
45 mrad (without input collimator or telescope)

Maximum optical throughput
8.1 x 10⁻³ cm² sr

Detectors
InSb: 1,800-5,000 cm⁻¹ (2-5.5 μm)
Optional extension to 10,000 cm⁻¹ (1 μm) available
MCT: 667-2,500 cm⁻¹ (4-15 μm)
Optional PV MCT available 740-2500 cm⁻¹

Detector cooling
Liquid nitrogen

Noise equivalent spectral radiance
(at 16 cm⁻¹ resolution, 1 s. observation time, calibration and measurement near ambient temperature, measured at peak response)
MCT: NESR (RMS) < 2.5 x 10⁻⁹ W/(cm².sr.cm⁻¹)
InSb: NESR (RMS) < 2.5 x 10⁻¹⁰ W/(cm².sr.cm⁻¹)

Dynamic range InSb detector
1-64 gain and 16-bit ADC

Dynamic range MCT detector
1-256 gain and 16-bit ADC

Gain control
Computer controlled (manual and automatic mode) in steps of 1, 2, 4, 8, 16, 32, 64 (128, 256 MCT only)

FOV selection
Manually-controlled field stop

Physical and electrical characteristics

Weight
Sensor head: 35 kg
Power supply module: 3.5 kg

Dimensions (L x W x H)
Spectroradiometer: 390 mm x 375 mm x 460 mm
Input collimator: 190 mm x 102 mm x 115 mm
Power supply module: 390 mm x 255 mm x 110 mm

Modulation frequency
15.7 kHz to 117.5 kHz

Temperature operation range
0°C to 45°C operating, -30°C to 55°C survival

Humidity
< 90% relative humidity non condensing

Operational random vibration
Acceleration spectral density 0.015 g²/Hz from 5 to 40 Hz. Monotonic slope down to 0.00015 g²/Hz at 500 Hz. (Along typical mounting direction)
Acceleration magnitude 1 g RMS along typical mounting direction (0.63 g RMS for the other 2 directions)
Reference to MIL-STD 810 F method 514.5

Shock
Optical head 6 g during 10 ms
Acceleration amplitude 6 g (half sine)
Shock duration 10 ms
Number of shocks 15 (5 each direction)
Reference to MIL-STD 810 method 516.5