

# MDX-8000

## MDX-8000

*High speed acquisition unit  
for Fiber Bragg Grating sensors*



# MDX-8000

## General presentation

- ▶ MDX-8000 is a data acquisition unit for Bragg grating sensors. Its optical channels are sampled in parallel at a 1 or 2 kHz frequency. Up to 16 sensors can be distributed on each optical line, for a total of 120 sensors measured simultaneously.
- ▶ The unit accepts many types of Bragg grating sensors and can measure stress, temperature, pressure, acceleration, force, displacement ... without buying expensive conditioning modules.
- ▶ The MDX-8000 embedded software integrates a web interface extremely intuitive and user-friendly that allows the setup of the entire system and sensors without having to install specific software on a PC.

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## Advanced connectivity

- ▶ Beyond the robustness, the MDX-400 features advanced connectivity
  - Embedded web server for system and sensors setup
  - Embedded FTP server for easy retrieval of data file recorded on the internal memory
  - Setup and data transfer via TCP/IP protocol

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## Main functionalities

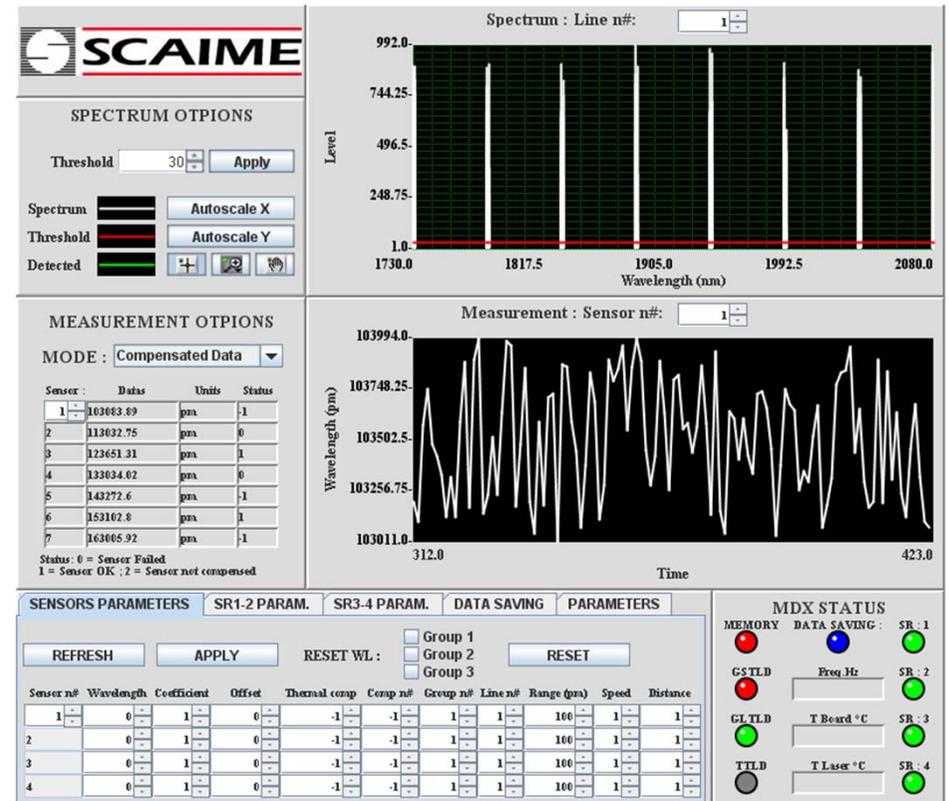
- ▶ Adjustment of acquisition gains
- ▶ Auto-detection of sensors defects.
- ▶ Sensors zero with sensors classification per group
- ▶ Digital inputs / outputs:
  - Digital input for acquisitions synchronisation
  - 4 static relays that can be configured by user
- ▶ Possibility to connect a GPS antenna for ultra-precise data dating.
- ▶ Data recording on internal memory or data transfer via TCP-IP or CANopen
- ▶ Measurements saving programming with automatic system standby

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## Web server

The embedded web interface is extremely intuitive and user-friendly and allows the setup of the entire system and sensors without having to install specific software on a PC.

- ▶ System Setup:
  - Adjustment of acquisition gains for each line independently in order to compensate for losses on optical lines
  - Selection of triggering mode: internal or external clock
  - Parameterization of the 4 static relays
  - Recording on the internal memory
- ▶ Set up and zero of sensors
- ▶ Diagnosis: monitoring of the main components of the system
- ▶ Visualization of the spectra of optical lines and of the measured values



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## Sensors setup

Sensors zeroing:  
Each group of sensors individually



**SENSORS PARAMETERS** | SR1-2 PARAM. | SR3-4 PARAM. | DATA SAVING | PARAMETERS | VCA GAIN CONTROL

REFRESH | APPLY | RESET WL:  Group 1  Group 2  Group 3 | ADD/SUPP SENSOR: ADD | SUPP

| Sensor n# | Wavelength  | Coefficient | Offset | Thermal coef | Comp n# | Group n# | Line n# | Range (mm) | Speed | Distance |
|-----------|-------------|-------------|--------|--------------|---------|----------|---------|------------|-------|----------|
| 1         | 1,530,217.4 | 1           | 0      | 0.041        | 0       | 1        | 1       | 2,000      | 0     | 1        |
| 2         | 1,539,759.2 | 1           | 0      | 0.041        | 0       | 1        | 1       | 2,000      | 0     | 1        |
| 3         | 1,500,000   | 0           | 0      | 0            | 0       | 0        | 1       | 0          | 0     | 0        |
| 4         | 1,500,000   | 0           | 0      | 0            | 0       | 0        | 1       | 0          | 0     | 0        |

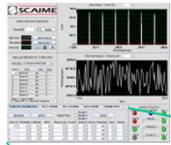
1line =  
1 sensor

- 'zero' wavelength
- Sensitivity
- Offset
- Thermal sensitivity
- Compensator number
- Group to which belongs the sensor
- Optical Line
- Sensor range
- Sensor Raw frequency/averaged
- Distance MDX-400/Sensor

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## 4 static relays

- ▶ Désactivated
- ▶ System fault
- ▶ Threshold: upon all sensors / specific sensor
- ▶ Mémoire full
- ▶ Sensor failure
- ▶ User define: static relay can be switched by the user



SENSORS PARAMETERS **SR1-2 PARAM.** SR3-4 PARAM. DATA SAVING PARAMETERS VCA GAIN CONTROL

SR1 General Threshold Threshold 10,000 Sensor 0 Save SR1 OFF

SR2 General Threshold Threshold 152.18 Sensor 0 Save SR2 OFF

- x > Threshold
- x > Threshold
- x < Threshold
- x outside  $\pm$  Threshold
- x inside  $\pm$  Threshold

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## Digital Input for Synchronisation



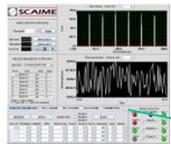
| SENSORS PARAMETERS   | SR1-2 PARAM.         | SR3-4 PARAM.                     | DATA SAVING          | PARAMETERS   | VCA GAIN CONTROL     |
|--|----------------------|----------------------------------|----------------------|--------------|----------------------|
| SYNCHRONISATION : <input checked="" type="radio"/> INT <input type="radio"/> EXT |                      |                                  |                      |              |                      |
| MOYENNAGE :  |                      | <input type="text" value="50"/>  | SAVE                 |              |                      |
| GPS ACTIVATE :   |                      | <input type="text" value="OFF"/> |                      |              |                      |
| LATITUDE :   | <input type="text"/> | LONGITUDE :                      | <input type="text"/> | DATE/HEURE : | <input type="text"/> |

- ▶ Acquisition is triggered by an internal clock by an external digital signal

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## Measurement averaging

- ▶ The system manages 2 kinds of sensors :
  - Sensors at raw frequency
  - Averaged sensors



SENSORS PARAMETERS   SR1-2 PARAM.   SR3-4 PARAM.   DATA SAVING   **PARAMETERS**   VCA GAIN CONTROL

SYNCHRONISATION :    INT    EXT  

**MOYENNAGE :**        

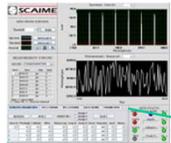
GPS ACTIVATE :  

LATITUDE :      LONGITUDE :      DATEHEURE :

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## GPS (option)

- ▶ GPS signal contains a very precise Universal Time Clock indication.
- ▶ Allows synchronisation of systems without physical connection with precise measure time stamping.



| SENSORS PARAMETERS   | SR1-2 PARAM. | SR3-4 PARAM. | DATA SAVING | PARAMETERS | VCA GAIN CONTROL |
|--|--------------|--------------|-------------|------------|------------------|
| SYNCHRONISATION : <input checked="" type="radio"/> INT <input type="radio"/> EXT                   |              |              |             |            |                  |
| MOYENNAGE : <input type="text" value="50"/> <input type="button" value="SAVE"/>                    |              |              |             |            |                  |
| GPS ACTIVATE : <input type="text" value="OFF"/>  |              |              |             |            |                  |
| LATITUDE : <input type="text"/> LONGITUDE : <input type="text"/> DATE/HEURE : <input type="text"/> |              |              |             |            |                  |

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## Setup of acquisition gains

- ▶ Sensors signal level adjustment
- ▶ Each line individually

| SENSORS PARAMETERS | SR1-2 PARAM.                   | SR3-4 PARAM. | DATA SAVING                    | PARAMETERS | VCA GAIN CONTROL |
|--------------------|--------------------------------|--------------|--------------------------------|------------|------------------|
| VCA Gain 0         | <input type="text" value="1"/> | VCA Gain 4   | <input type="text" value="5"/> |            |                  |
| VCA Gain 1         | <input type="text" value="2"/> | VCA Gain 5   | <input type="text" value="1"/> |            |                  |
| VCA Gain 2         | <input type="text" value="1"/> | VCA Gain 6   | <input type="text" value="1"/> |            |                  |
| VCA Gain 3         | <input type="text" value="1"/> | VCA Gain 7   | <input type="text" value="1"/> |            |                  |
| REFRESH GAIN       |                                | APPLY GAIN   |                                |            |                  |

