

## MS-FROG

MS-FROG stands for Multi-Shot Frequency Resolved Optical Gating. The MS-FROG is based on second harmonic generation, making it reliable and compact. It has been specially developed for laser sources with sub-nJ pulse energy. It allows the measurement of pulses from 4 fs to 80 ps. The high scan speed allows real-time operations for measurement and optimization. The MS-FROG-SP allows the measurement of both ultrashort and long pulses thanks to its resolution of 50 attoseconds in fine scan mode. Our MS-FROG integrates in-house built spectrometers specially developed for FROG measurements. They guarantee high spectral resolution and the best performances for the application of pulse characterization. Also they are fully configurable according to your laser specifications. On top of that, our proprietary algorithm allows to extract information from each recorded spectra instantaneously, leading to real time reconstruction of your pulses! Like every Femto Easy product, the MS-FROG is easy to install and use.



### Key features

- ◆ User-friendly: no calibration and no tweaking necessary
- ◆ Versatile: *instant-swap* of spectrometer for different wavelength ranges
- ◆ Large pulse duration measurement range (from 4 fs to 80 ps)
- ◆ User-friendly and powerful software
- ◆ High sensitivity (sub-nJ pulse)
- ◆ Resolution of 50 as in fine scan mode

### Options

- ◆ Additional MISS spectrometer
- ◆ Low energy
- ◆ Phase matching
- ◆ Few cycle pulse extension
- ◆ Fiber input connector
- ◆ Low repetition rate
- ◆ Additional crystals

# Specifications

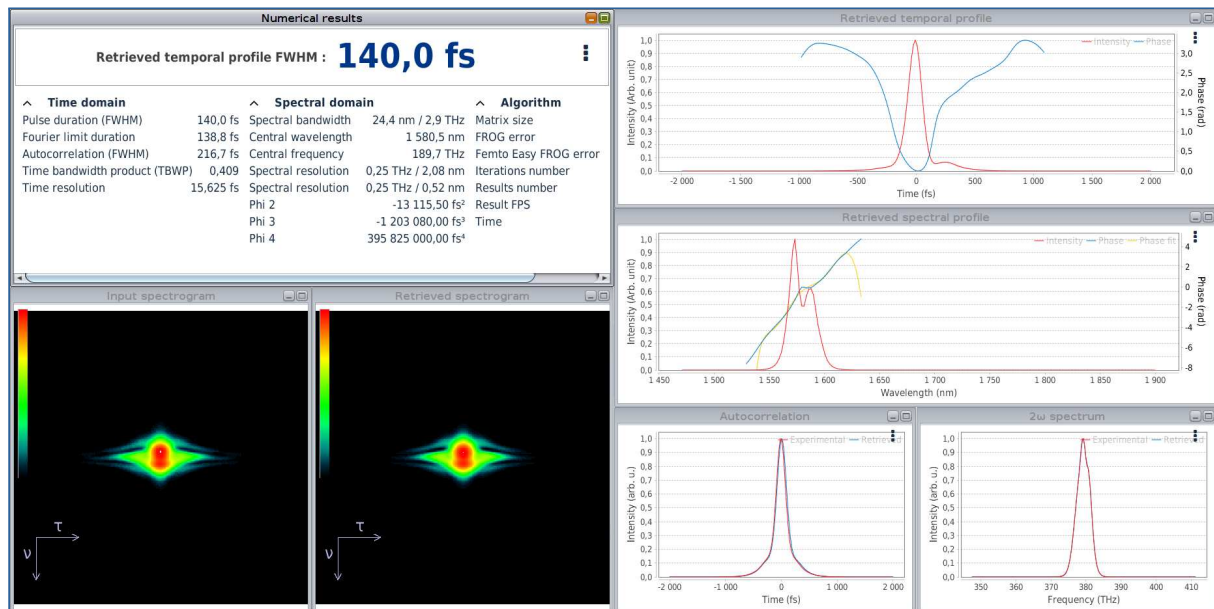
Models		MS-FROG	MS-FROG-SP	MS-FROG-LP	MS-FROG-SLP
Pulse duration range	min	10 fs <sup>1</sup> - 50 fs	4 fs <sup>1</sup> - 20 fs	20 fs	4 fs <sup>1</sup> - 20 fs
	max	40 ps	40 ps	80 ps	80 ps
Fine scan mode range		not applicable	4 – 100 fs	not applicable	4 – 100 fs
Accessible spectral range (nm)		500 - 2100 <sup>2</sup>			
Spectral Window $\Delta\lambda$ (nm)		From 200 to 700 <sup>2</sup>			
Minimum temporal resolution		1 fs	standard : 1 fs fine scan : 50 as	2 fs	standard : 2 fs fine scan : 50 as
Scan speed		> 65 ps/s	standard : > 65 ps/s fine scan : > 400 fs/s	> 130 ps/s	standard : > 130 ps/s fine scan : > 400 fs/s
Input pulse repetition rate		100 Hz to GHz <sup>3</sup>			
Min input pulse energy <sup>4</sup>	1 MHz	50 pJ	10 nJ	50 pJ	10 nJ
	100 MHz	5 pJ	1 nJ	5 pJ	1 nJ
Polarization		linear vertical			
Detection		CMOS 12 Bits – 3 Mpx – 72 dB			
PC Interface		USB 3.1			
Beam height (mm)		69 - 148			
Dimensions (mm)		326 x 194 x 129			

<sup>1</sup> With few cycle pulse extension option

<sup>2</sup> Effective spectral bandwidth to be defined within the accessible spectral range according to customer's requirements. Additional spectrometers can be provided to address different spectral windows.

<sup>3</sup> Low repetition rate available as an option

<sup>4</sup> Those values give an order of magnitude. The exact sensitivity depends on many parameters (pulse duration, beam profile, wavelength...)



- ◆ Live extraction of shot to shot pulse properties: temporal profile intensity and phase, fundamental spectrum and phase, Chirp, Third-order dispersion...
- ◆ Several algorithms (including the Ptychographic Iterative Engine) are combined to enhance the reconstruction speed and quality
- ◆ Enhanced background & hot pixels treatment, for optimum dynamic and signal to noise ratio
- ◆ Client / Server interface, allowing remote control through network
- ◆ All data exportable into most common formats