

TROMINO®

Introducing a quantum leap in single station + synthetic array seismic and vibration analysis



Seems mite, it's dynamite!

TROMINO® is a high-resolution all-in-one system for passive and active seismic surveys and vibration monitoring.

TROMINO® is equipped with*:

- 3 velocimetric channels for seismic ambient microtremor recordings (up to ± 1.5 mm/s~)
- 3 velocimetric channels for strong motion recordings (up to ± 5 cm/s~)
- 3 accelerometric channels for strong vibration monitoring
- 1 analog channel (e.g., external trigger for MASW/refraction)
- built-in GPS receiver, internal and/or external antenna for positioning and absolute timing/synchronization among different units
- built-in radio transmitter/receiver module for indoor/outdoor synchronization among different units and alarm transmission (e.g., signal above threshold levels)

TROMINO® has applications in

ENGINEERING-GEOLOGY

- measurement of soil resonances
- site effects and seismic microzonation (H/V curves, Nakamura's method)
- passive seismic stratigraphy
- Vs30 estimation from constrained H/V curve fitting
- soil-structure double resonance detection
- active and passive synthetic arrays of any size through radio or GPS synchronization
- small/mid scale seismic refraction for P and S waves, MASW, FTAN method (TROMINO® + trigger)

ENGINEERING

- structural modes
- vibration monitoring, threshold-based alarm systems
- synchronized acquisition from different units via radio or GPS

Tromino Manager is the new software tool for the remote management of TROMINO®. *Tromino Manager* allows to continuously view and save data acquired on remote stations and to send threshold-based alarms on-line or via e-mail. *Tromino Manager* allows remote control of networks of TROMINOS® connected via radio to a master TROMINO®.

TROMINO® is an international patent

TROMINO® works in the frequency range 0.1 - 1024 Hz on all channels (up to 32 kHz on 2 channels*) with A/D conversion > 24 bit equivalent at 128 Hz. All this in a single **ultra-portable** package:

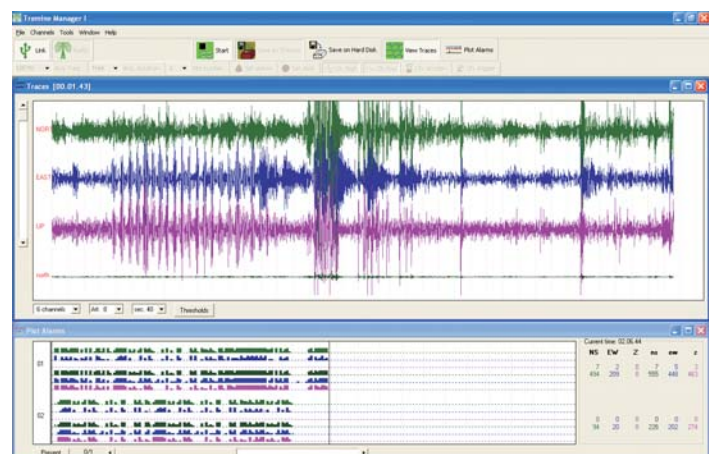
- no external cables
- very small size (10 x 14 x 8 cm)
- light weight (~1 kg)

very low consumption (75 mW*):

- 2 standard AA batteries (1.5 V) allow more than 100 h continuous recording
- works also on AC adapter for long monitoring

TROMINO® can record in continuous mode without time-limits or for predefined time intervals. Starting is manual or on threshold.

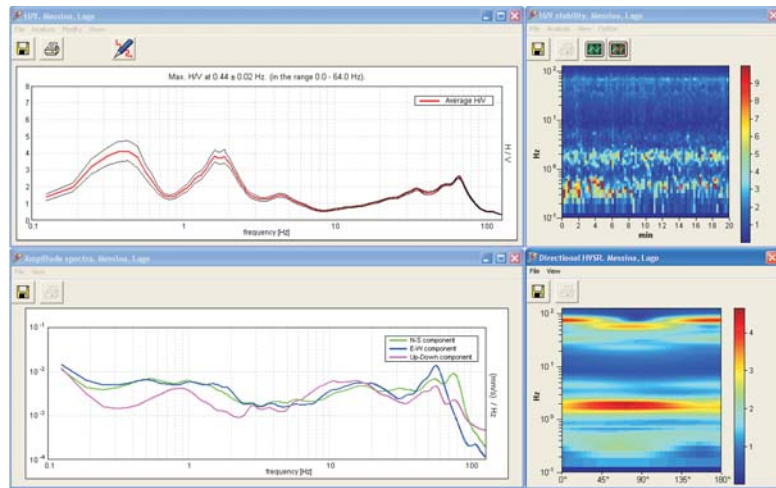
* specifications vary according to models



Grilla is the software to archive, organize, view and analyze the recordings of **TROMINO®**. **Grilla** is interactive, very user-friendly and produces automatic reports in Microsoft Word™ format.

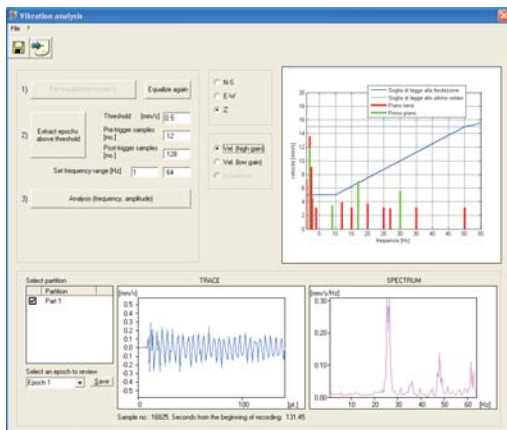
Some **Grilla** capabilities:

EXTENDED H/V ANALYSIS. Full spectral analysis, H/V curves to estimate soil resonances, trace cleaning in the time- and frequency-domains, statistical testing of significance of the results based on the European guidelines, 'reference site' method, estimate of the structure eigenfrequencies after soil effect removal, directional analysis, comparison among different analyses and recordings, several other mathematical analysis tools. Automatic editable reports including tables and figures.



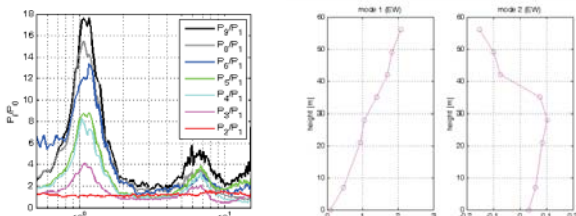
Module for spectral and H/V analysis

VIBRATION ANALYSIS. Sorting and spectral analysis of signal sections above thresholds, according to the European regulations on strong vibrations in structures. Automatic editable reports including tables and figures.



Module for vibration analysis

MODAL ANALYSIS OF STRUCTURES. Module for the calculation of the modal vibration frequencies of structures (Standard Spectral Ratio).

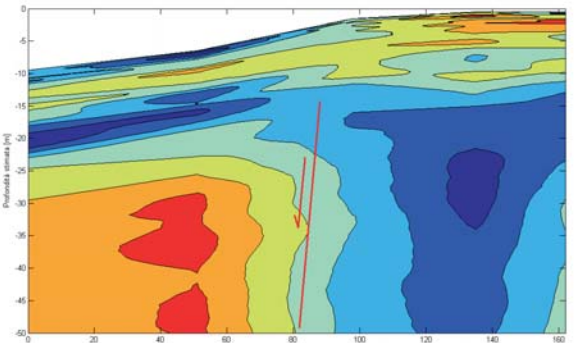
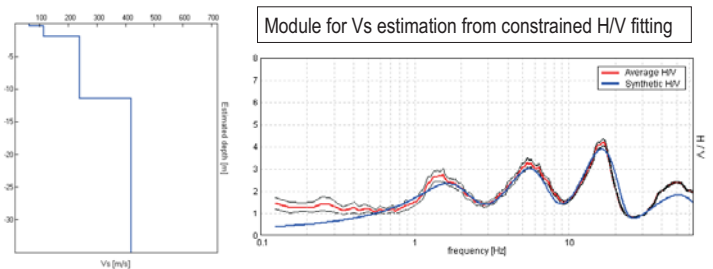


Site	Trace	Serial no.	Day	Start	End	Length	s. [Hz]	3FC	Doc.
1	Assoggenio	Grille 36	TRE-0004/00-06	30/04/07	19:55:30	20:15:31	20' 0"		128
2	Assoggenio	Grille 37	TRE-0004/00-06	30/04/07	20:20:07	20:40:08	20' 0"		128
3	Assoggenio	Orientalo a N	TRE-0004/00-06	30/04/07	16:41:55	17:41:56	60' 0"		128
4	Dushanbe	D17	TRS-0021/01-06	13/04/07	10:44:35	10:54:48	10' 0"		128
5	Dushanbe	D7	TRS-0021/01-06	13/04/07	11:10:46	11:21:23	10' 0"	TRC	128
6	El Cairo	Treccia 0001	TEN-0041/01-08	21/07/08	14:06:20	14:22:21	16' 0"		128
7	El Cairo	Treccia 0002	TEN-0041/01-08	21/07/08	14:58:50	15:14:51	16' 0"		128
8	Pisa	Corfosa 0001	TEN-0026/01-07	09/03/08	11:57:05	12:13:06	16' 0"		128
9	Pisa	Corfosa 2	TEN-0026/01-07	09/03/08	12:16:29	12:32:30	16' 0"		128
10	Tokyo	Pianterreno	TEN-0003/01-06	30/07/08	09:36:34	09:44:35	6' 0"	THC	512
11	Torre edice	Passo Resia	TRE-0004/00-06	06/09/00	12:37:05	12:57:06	20' 0"		128
12	Venezia	Rialto	TRE-0004/00-06	01/09/08	13:00:45	13:20:46	20' 0"		128
13	Venezia	San Marco	TRE-0004/00-06	28/08/08	15:43:15	16:03:16	20' 0"		128

Database for joint management of **TROMINO®** and **SoilSpy Rosina** recordings

CONSTRAINED H/V CURVE FITTING FOR Vs30 ESTIMATES. H/V forward modeling tool based on surface waves (Rayleigh and Love).

JOINT FITTING OF H/V AND DISPERSION CURVES. Subsoil velocity profile from joint fitting of H/V, active (MASW, etc.) and passive (ReMi™, ESAC, SPAC, passive MASW, etc.) array surveys. See also the Micromed **SoilSpy Rosina** brochure.



Example of passive seismic stratigraphy

And if you still don't have a **TROMINO®**? **Grilla Paws** is the downsized version of **Grilla** to store in a database, manage and analyze single station and multichannel recordings acquired with instruments other than **TROMINO®** and **SoilSpy Rosina**.

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