

# Electronic Von Frey

*Higher throughput and improved accuracy*



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# Electronic Von Frey

*Semi-automated handheld device with flexible force range options, for performing many types of experiments from severe allodynia to hyperalgesia.*



## Background

**Touch sensitivity** in unrestrained animals is traditionally tested with Von Frey filaments, which is a tedious and experimenter-dependent assay.

For this reason Ugo Basile developed a **handheld Electronic Von Frey test with automated paw withdrawal detector**.

It is important that the application of the force is always perpendicular, with a preset amount of grams and at a predefined rate, which can be controlled with the provided tools (rate-meter on the control unit and

slope on the software).

The Electronic Von Frey is based on a **force sensor** and a **peak detection algorithm** to automatically score paw withdrawal (a foot pedal for manual score is also included).

One key feature of this device is the possibility to **visually control the rate of application of the force** by keeping the signal on the slope via software or using the rate-meter on the electronic unit.

## Typical device applications

The Electronic Von Frey has been used in a **variety of neuropathy applications** in nerve injury, from partial sciatic nerve ligation (PNL, to chronic constriction injury (CCI) and spinal nerve ligation (SNL) to screen phenotypes and drugs to treat allodynia and hyperalgesia.

The classic instrument for test of touch sensitivity is the Von Frey hair or, more specifically, the Semmes-Weinstein set of Von Frey Hairs, i.e., 20 monofilaments in a linear scale of physical force.

The hair is pressed against the skin, the force applied increases with increasing hand pressure, until the hair bends; once the hair is bent, increasing hand approach

causes further bend, but negligible additional force on the skin. In this way, a given filament always applies the same force, not subject to variation by the energy of the operator.

Compared to the classic Von Frey Hairs, the Electronic Von Frey device (e-VF) has the advantage of ensuring a **continuous force application** along the whole force capacity of the sensor, by using a rigid metal tip, and the capability to record the animal response automatically.

Altogether this brings about a **high reproducibility, sensitivity and accuracy**.

## Product Description

The Electronic Von Frey system solves the multiple measurement (i.e. multiple filaments) issue and the experimenter bias by using a handheld force sensor with a rigid metal. The scientist gradually increases the force applied to the animal paw, until the peak detector scores the animal paw withdrawal (or the user scores it manually with the included pedal).

**Force ranges** are selectable in the 0-50, 0-200 and 0-1500 grams with a 0.1 grams sensitivity and software tools are included to aid a linear application of the force (rate-meter and slope).

The system is battery or mains powered and comes with software included and data export in CSV. One model for Mice or Rats in modular enclosures (up to 6 rats or 12 mice; optional with Modular Animal Enclosures and Grid Platform, available in 2 heights, 40 or 80 cm).

### The Electronic Von Frey Ugo Basile system comes complete with:

- An electronic unit battery powered via USB or the provided charger
- A rigid stimulator filament in nitinol (metal)
- A prism to aid paw targeting
- A pedal for manual scoring
- A software for saving force curves, peaks and export data into CSV for Excel
- Optional large testing grid surface with 5x5mm holes
- Optional modular animal enclosures to hold up to 6 rats and 12 mice

### Features include:

- 0-50, 0-200, 0-1500 grams ranges to maximize device dynamic range 0.1 gram sensitivity and time resolution of 0.1 seconds
- Automatic peak detector and foot pedal



Included rigid metal filament tip and plastic Eppendorf tips. Both with magnetic fixing.

Optional Large Perforated Metal Sheet Platform. From left to right: 37450-278 Base assembly with animal enclosure included (37000-007); 37450-045 Base assembly 40cm height (animal enclosure not included); 37450-085 Base assembly 80cm height (animal enclosure not included).

## Features

## Benefits

Embedded force sensor	No need for multiple filament measurements but just one application of the force
Force Peak detector for automated scoring of paw withdrawal	Higher throughput and improved accuracy, thanks to decrease in experimenter bias
Force Rate Control aids via electronic unit or PC-software	Allows to apply the force at a desired and adjustable rate
Large force range (0-1500 grams) and high time resolution (0.1 seconds)	Flexibility for performing many types of experiments from severe allodynia to hyperalgesia
Battery powered, small electronic unit with display for settings and results	The system can be easily positioned even away from the mains and can be used with or without software
Grid platform and animal enclosures (optional)	Can be provided as a complete, "ready to go system". Works with rats and mice in high throughput (6 rats and 12 mice at the time) and it is easy to clean
Optional manual scoring of paw withdrawal	Allows for scoring animals which present an unusual position of the paw, and do require the experimenter to visually score.

## Main references

- K. Kim et al., 2024, "[Insular cortex stimulation alleviates neuropathic pain through changes in the expression of collapsin response mediator protein 2 involved in synaptic plasticity](#)", Neurobiology of Disease
- M. Cha, et al., 2024, "[Alleviation of peripheral sensitization by quadriceps insertion of cog polydioxanone filaments in knee osteoarthritis rats](#)", Biochemical and Biophysical Research Communications
- Y. Alvarez-Bagnarol et al., 2023, "[Inhibition of dorsal raphe GABAergic neurons blocks hyperalgesia during heroin withdrawal](#)", Nature.com
- C. Gu et al., 2023, "[MAGL regulates synovial macrophage polarization via inhibition of mitophagy in osteoarthritic pain](#)", Molecular Medicine Reports
- N. M. Sharfman et al., "[Melanocortin-4 receptor signaling in the central amygdala mediates chronic inflammatory pain effects on nociception](#)", Neuropharmacology
- Q. Xu et al., 2021, "[A novel visceral pain model of uterine cervix inflammation in rat](#)", European Journal of Pharmacology
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## Specifications - Operation

Commands	Via soft buttons and pedal
Read-out	LCD Screen, via the DCA3 Software on the PC
Start	Automatic start at pressure adjustable threshold
Stop	Automatic at end of pressure, Automatic after a time limit (adjustable from 5 to 25 seconds), Manual by pedal
Force Ranges	0.50, 0-200, 0-1500gf
Force Increasing Rate	Monitored via e-VF Electronic Unit or via the DCA3 Software on the PC
Force Response	In 0.1gf steps
Latency Time	In 0.1s steps
Connection to PC	via USB cable (A to mini-B) and e-VF Software (DCA3)
Power Requirement	Either battery operated, via USB cable connected to PC, included power supply (100-240 VAC, 50-60Hz)
Operating Temperature	10°C to 40°C; 5% to 95% RH (non-condensing)
Sound Level	Negligible

## Ordering Informations

38450 Electronic Von Frey. Comes complete with: Electronic Unit (SKU 38450-001), Von Frey Applicator, with Transducer, Glass Prism, Rigid metal Filaments with magnetic fixing, Eppendorf plastic tip with magnetic fixing (SKU 38450-004), Pedal Switch (SKU 37215-323), USB Lead (SKU 52010-325)

## Optional Items

37450-278 Base assembly for plantar stimulation, including support with columns, perforated metal sheet and multiple-configuration animal-enclosure, from 3 to 12 spaces

37450-005 Large Perforated Metal Sheet

37450-045 Large Perforated Metal Sheet, with 4 legs, 40cm height (animal enclosure 37000-007 is not included and should be ordered separately)

37450-085 Large Perforated Metal Sheet, with 4 legs, 80cm height (animal enclosure 37000-007 is not included and should be ordered separately)

**Extra warranty (standard 12 months + 12 months with product registration) available**

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