

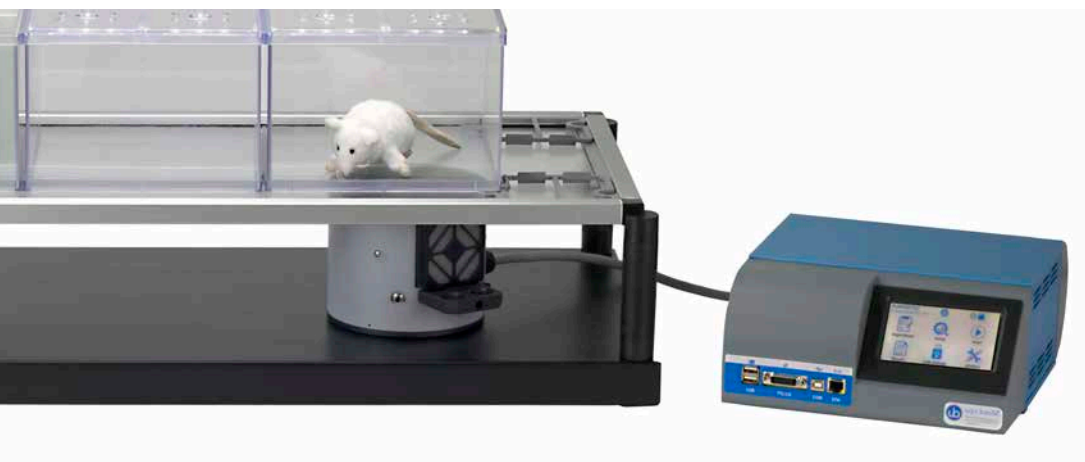
Instruction manual

# Plantar Test (Hargreaves method)

Revision 1.2



Pain  
Inflammation



SKU: 37570



ugo basile®

TRANSFORMING IDEAS  
INTO INSTRUMENTS

## ***SAFETY CONSIDERATIONS***

Although this instrument has been designed with international safety standards, it contains information, cautions and warnings which must be followed to ensure safe operation and to retain the instrument in safe conditions.

Service and adjustments should be carried out by qualified personnel, authorized by Ugo Basile organization.

Any adjustment, maintenance and repair of the powered instrument should be avoided as much as possible and, when inevitable, should be carried out by a skilled person who is aware of the hazard involved.

Capacitors inside the instrument may still be charged even if the instrument has been disconnected from its source of supply.



**Your science, our devices**

**More than 35.000 citations**



## CE CONFORMITY STATEMENT

Manufacturer **UGO BASILE srl**  
Address Via G. di Vittorio, 2 – 21036 Gemonio, VA, ITALY  
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Fax n. +39 0332 745488

***We hereby declare that***

Instrument. **PLANTAR TEST**  
Catalog number **37570**

***is manufactured in compliance with the following European Union Directives  
and relevant harmonized standards***

- ***2014/35/UE relating to electrical equipment designed for use within certain voltage limits***
- ***2014/30/UE relating to electromagnetic compatibility***
- ***2011/65/UE and 2015/863/UE on the restriction of the use of certain hazardous substances in electrical and electronic equipment***

Account Manager

Mauro Uboldi

Nome / Name

October 2020

Date

A handwritten signature in black ink, consisting of several overlapping loops and a long horizontal stroke at the end, positioned above a horizontal line.

Firma / Signature

# Product features and general information

The 37570 NEW Plantar Test (Hargreaves' Method) brings together tradition and innovation.

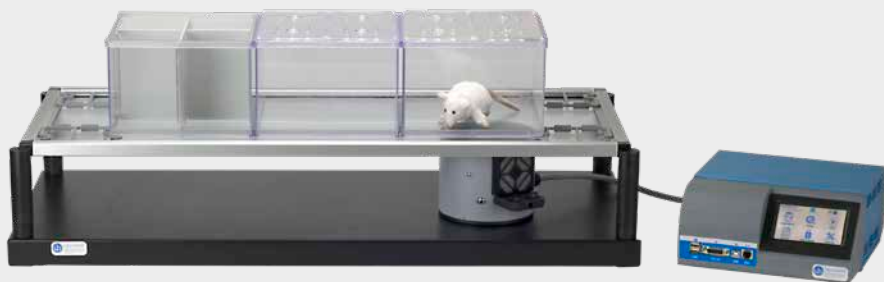
The highly cited and world-wide recognized thermal stimulator with automatic paw withdrawal latency measure, has now some key new features and benefits, helping the user to perform the experiment in a more efficient and accurate way.

## Main features:

- Automatic detection of the animal response
- Data export via USB pen-drive
- Adjustable I.R. Intensity

## New features:

- Selectable automatic or manual detection mode
- Large touch screen display for calibration, set-up, testing and result review
- TTL input and output signals for synchronisation with other devices
- Firmware update via USB key



# What's in the box

**SKU: 37570**

1 Control unit  
1 IR emitter/detector  
1 Metal base with 4 columns  
1 Glass pane (to be positioned above the base)  
3 Sets of animal modular enclosures (up to 12 mice or 6 rats)  
1 Power cord according to your country  
1 USB pen containing:  
This instruction manual  
The quality control and warranty certificate

**OPTIONAL ITEMS ORDERING INFORMATION:****SKU:37300**

Heat-Flux I.R. Radiometer

**AVAILABLE SPARE PARTS****SKU: E-HR 002**

I.R. Bulb (Halogen "Bellaphot", Mod. 64607 OSRAM, 8V-50W)

**SKU: E-BT 008**

Battery type CR2032

**SKU: E-FT010-1**

2 X fuse T1.25A - 6X32 mm

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# 1 General

The device has been designed to perform screening of analgesic drugs and rodent phenotyping via heat stimulation on the rat/mouse paw, according to the method designed by Prof K. Hargreaves.

It basically consists of an I.R. source, whose radiant energy of adjustable intensity is focused on the rat/mouse paw, while it is freely moving on a glass pane, over which animal enclosures are positioned to limit its movements and eventually deliver the energy to the paws from underneath, when the animal is standing still.

The instrument measures the time latency of the paw withdrawal response when pain elicits it, given the radiant heat applied to the animal's paw.

## 1.1 Principle of Operation

The rat/mouse is normally placed into the animal enclosures from 15 minutes to 1-2 hours before the test starts (habituation) and the operator waits for the end of any sign of exploration or discomfort before starting the test itself. The amount of time varies with animal models and species.

At this point, using the cross centred around the IR emitter, the operator targets the animal paw and starts the stimulus by pressing the detect on the emitter or on the display. The reaction time of the animal is scored and automatically recorded.

## 2 Instrument Description

The Plantar Test Unit consists of an I.R. source, whose radiant energy of adjustable intensity is focused by a parabolic mirror on the animal paw.

The instrument components are:

The I.R. source, the sensor, the microcontroller and the electronic circuit.

On the instrument front panel are located a touch screen display and several connection ports. On the back of the device are located the power socket, the power fuse and switch, the emitter cable connector and the serial number label.

At the bottom of the IR emitter, is located a sticker with the factory calibration data.

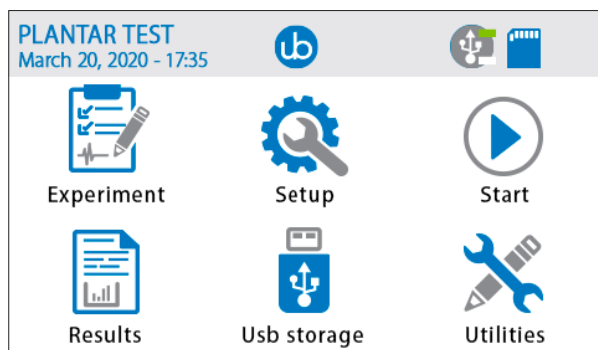


## 2.1 Animal Welfare

In any analgesia test, great care must be taken to prevent the animal from inadvertent harm. When an investigator initially begins using the Plantar Test unit, and when first assessing a new strain of animals, care must be taken to identify the appropriate amount of stimulus that will produce the desired response and no/minimum harm. An adjustable cut-off time (maximum stimulus time) can be set from 5" to 30" to prevent animal injury.

## 2.2 Touch-screen command/display

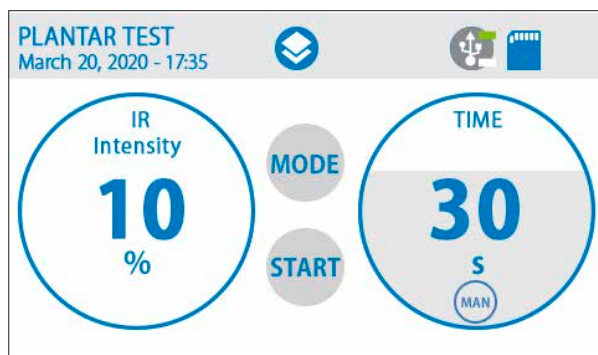
The Plantar Test incorporates a 4.3" touch-screen display, for basic settings and monitoring, via an intuitive Home menu.



Home menu

During the test (below figure), the touch-screen display, shows the numeric values of the set IR intensity (in %) and the elapsed time (in seconds).

In addition, at the bottom of the Time counter, the function mode is indicated (auto or manual detection).



Test page



## 2.3 Notes on Resistive Touch-Screens

The Ugo Basile Plantar Test touch screen uses resistive technology and can be used with fingers, gloves or (recommended) a display pencil.

Resistive touch-screens (differently from commercial *capacitive* screens) are a better choice for laboratory applications because of:

- High resistance to dust and water
- Better use with gloved hand or stylus

## 3 Installation

### 3.1 Unpacking & preliminary check

Check the content of the shipment for completeness and visually inspect the instrument as soon as you take it out of the packaging.

If the box looks damaged, inform the carrier and provide a conditional signature (not a full signature).

Once unpacking, if the instrument is damaged, notify our company, writing an email to [support@ugobasile.com](mailto:support@ugobasile.com)

If after a test, the instrument fails to meet the expected behaviour and performance, please contact our after sales service at [sales@ugobasile.com](mailto:sales@ugobasile.com).

Protect the environment: Dispose of packaging properly, according to existing and applicable waste management rules and regulation.

### 3.2 Notes on the Instruction Manual

This instruction manual included in the box (in the USB pen drive in PDF format) is necessary for a correct installation and operation of the instrument.

Please save the manual, keep it ready to be consulted by the qualified personnel using the instrument, and print it only if necessary.

Our Instruction Manuals are available as free download on our web site, [www.ugobasile.com](http://www.ugobasile.com)  
For any additional information and/or assistance, you are welcome to contact our Service Department, first of all by specifying the serial number of your instrument ([service@ugobasile.com](mailto:service@ugobasile.com))

## 3.3 Safety Instruction

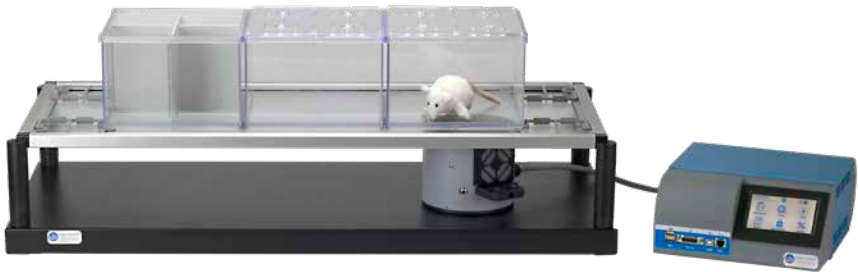
The following guide lines must be followed to ensure safe operation.

- DO NOT attempt to open or perform any service work before having contacted Ugo Basile support team
- DO NOT use the device on human subjects

## 3.4 Assembling the instrument

Place the electronic unit on a stable and flat surface and do not block the lateral ventilation grids. To guarantee the rated performance, a free area should be left around the instrument of at least 20 cm left, right and rear.

Then screw the 4 columns onto the metal base and position the glass frame pane onto the column themselves. At this point you are ready to assemble the modular animal enclosures (see specific manual)



*The Plantar test full system*

## 3.5 Before Applying Power

The Power Module (see figure below ) is positioned on the left of the back panel and incorporates, from left to right, the fuse holder, the ON/OFF switch, the inlet connection of the power cord.



*Power module*

The fuse compartment holds two fuses. Use (T1,25A 6X32mm) fuses for operation at both 100 or 240V, for fuse replacement, please refer to paragraph 7.1-Electrical at page 24 of this manual. The power cord inlet fits a standard C13 cable, Cat. # E-WP008. Make sure your power out-take is provided with a reliable ground connection.

## 3.6 Intended Use

The Plantar Test is intended for **investigation use on laboratory animal only**.

## 3.7 Additional Safety Consideration

1. Use original accessories and spare parts only
2. Immediately disconnect and replace damaged main cord
3. Do not obstruct access to the power module
4. Do not obstruct the ventilation grids on booth sides of the cabinet
5. Do not operate in hazardous environment or outside prescribed environmental limitations
6. Do not spray any liquid on the connectors, display, or other parts

**Ugo Basile cannot in any way and form be held responsible for damage caused to things and people and warranty will be void, due to:**

- Incorrect electrical supply
- Incorrect installation procedure
- Incorrect or improper use or, in any case, not in accordance with the purpose for which the instrument has been designed and the warnings stated in the instruction manual supplied with the instrument
- Replacement of original component, accessories or parts with others not approved by the manufacturer
- Servicing carried out by unauthorized personnel

## 3.8 Connections

Connect the mains cord between the power socket of the Plantar Test and the power outlet with a reliable earth connection.

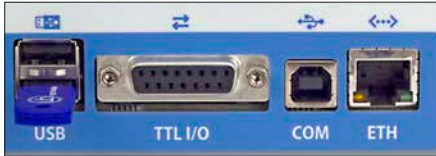
Connect the emitter cable to the electronic unit and then the power cord.  
At this point you can turn the Plantar test on.



*Rear view Plantar Test control unit*

The connection module on the front panel (Figure below) encompasses the following connectors, from left to right:

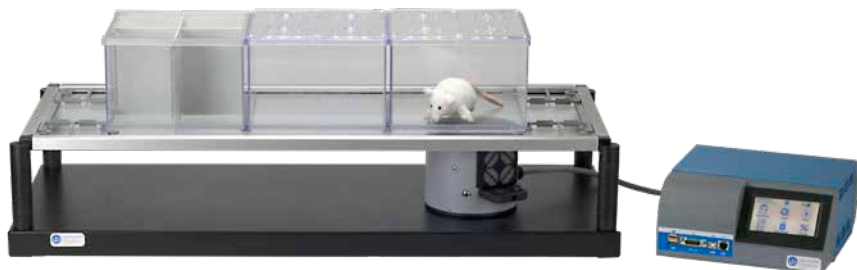
1. Upper and lower USB ports: enable data export to a PC (via a USB pen drive), and allows firmware upgrades
2. TTL I/O: 15pins D-SUB connector, provides TTL input and output for start/stop command and mode settings
3. COM: Reserved for maintenance and service purpose
4. Ethernet connector: only for support reason at the factory, not to be used



*Connection panel*

## 4 Operation

Position the Plantar Test electronic unit and base with the glass pane and the animal enclosures in a quiet and flat environment.



*The Plantar test device*

Avoid direct illumination, e.g., from a table lamp.

This will definitely upset the animals, as rodents dislike bright light, not to speak of the risk to raise their body temperature.

Moreover, intense light may cause the sensor to sometimes deliver inaccurate results, as a light source from above tends to mask the I.R. energy reflected back by the paw.

### 4.1 Main Menu

Getting familiar with the Plantar Test home page menu is very easy (see figure below).



*Main Menu*

From the home page, press the "UB logo" button for software and memory information. Press again the "UB logo" to roll back into main menu page.

## 4.2 Quick setup for first test

### Animal handling and habituation:

It is advisable to gather some experience in handling rats/mice and in developing the best habituation protocol before the test is started, so that the pointing and the delivery of energy to the paw will be more accurate.

You are now ready to configure and run your first experiment. The following steps will guide you to quickly configure the Plantar Test device and get the first results:

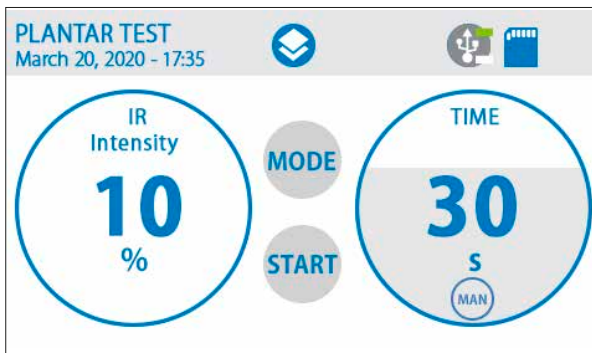
### Carrying out the test

Put the animal(s) in the cage(s) and wait until they are quiet, with little or no exploration, but not sleeping.

A trial is initiated by pressing start from the emitter buttons or from the touch screen.

When the animal feels pain and withdraws its paw, the I.R. source switches off and the reaction time counter stops. The withdrawal latency to the nearest 0.1 s is automatically detected and stored.

A MANUAL MODE can also be used in this new Plantar Test generation for those cases where the paw withdrawal is tricky to measure automatically. To measure latency manually, simply press the button once to start the test and press again to stop it, and the instrument will measure the latency time.



*The start page*

Initiating a test is very simple:

1. Press SETUP to adjust the IR intensity and the cut-off time
2. Press START to initiate the test through the touch screen or through one of the two buttons located in the emitter (according to your preference)


### Looking at the results

The Plantar Test will save the IR intensity and time latency results, in addition to the descriptive data, if they have been input in the Experiment field (Treatment, Protocol, ID, Stage, Trial).

PLANTAR TEST  
March 20, 2020 - 17:35






DATE - TIME:	ID:	S#:
TREATMENT:	STAGE:	TRIAL:
PROTOCOL:	LIGHT:	mW/cm <sup>2</sup> :
LATENCY:		
MODE:		



Result page

PLANTAR TEST  
March 20, 2020 - 17:35



TREATMENT	<input type="text"/>
PROTOCOL	<input type="text"/>
STAGE	<input type="text"/>
TRIAL	<input type="text"/>
ID	<input type="text"/>




Experiment screen, where the descriptive data shown in the Results screen are input



### Exporting the results

Once data have been saved into the Plantar Test internal memory, they can be transferred into a USB pen drive by simply plugging it into the front USB port and pressing,

- USB STORAGE, followed by
- SAVE DATA

PLANTAR TEST  
March 20, 2020 - 17:35





SAVE Data

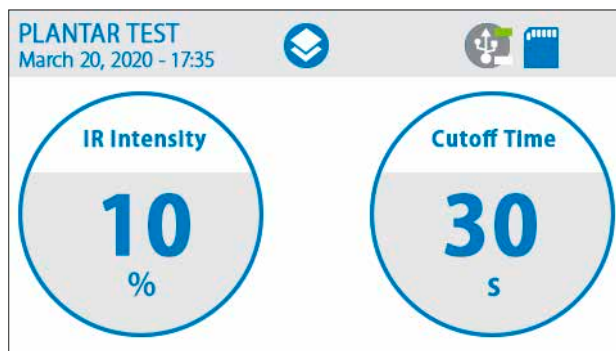
LOAD Protocol

The export window

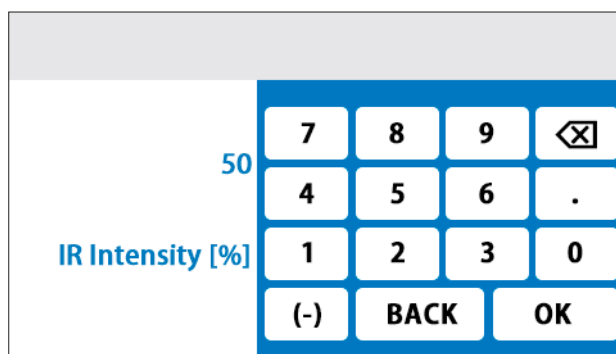


## 4.3 Set up and Utilities Icons

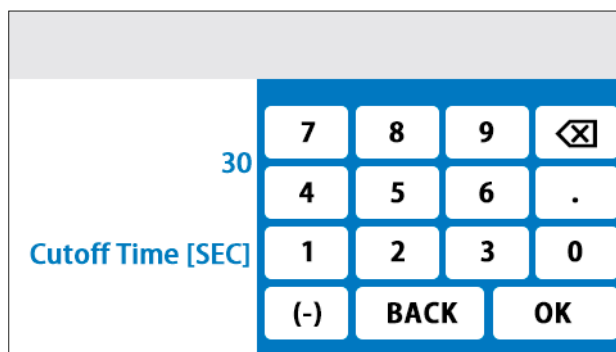
The “set up” icon from the home screen is intended to define the experiment parameters, i.e. IR intensity (level of energy delivered to the paw) and “cut off time”, i.e. the time after which the energy source will turn off even if there is no paw withdrawal (intended to avoid tissue damage).



The set-up page



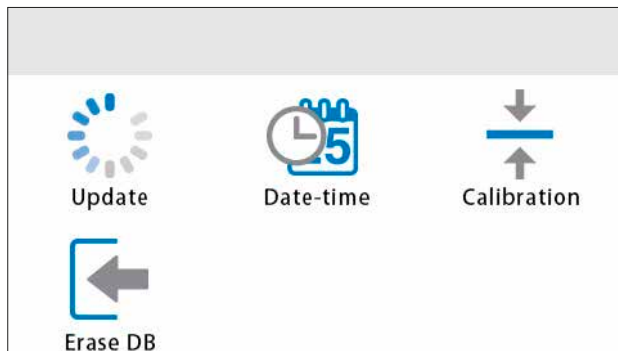
The keyboard screen to input the IR intensity in percentage values



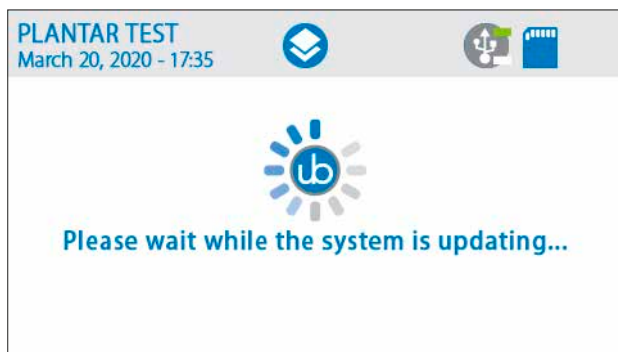
The keyboard screen to input the cut-off value in second

The **UTILITIES** icon, accessible from the MAIN menu, gives access to:

- Update
- Date-Time
- Calibration
- Erase DB



The UPDATE menu requires to insert the USB pen drive and is necessary to updated the device firmware. Contact the Ugo Basile Support team before updating the firmware.



*The update page*

The DATE-TIME menu allows to adjust the date and time of the device, as shown in the screen shot below

PLANTAR TEST

March 20, 2020 - 17:35



Date:

Time:

▲

▲

▲

▲

▲

9 SEPT 2020 10 45

▼

▼

▼

▼

▼

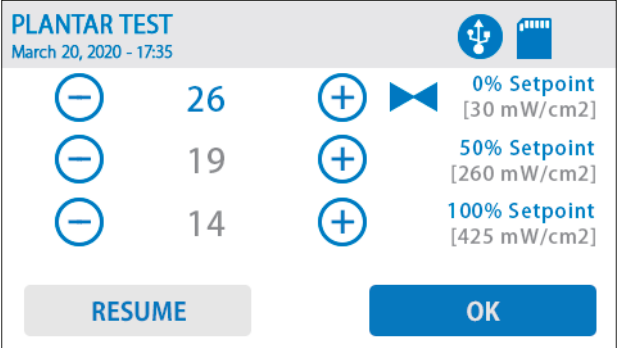
CANCEL

OK

*The date & time page*

The **CALIBRATION** menu is dedicated to the conversion of the arbitrary % units of the Plantar Test into absolute energy values (SKU 37300). In addition to this, when a 37300 radiometer (optional, which can be purchased from Ugo Basile) is available, the emission power of the heat source can be measured and adjusted.

Factory calibration values can be input in the menu below, by simply reading the values from the sticker attached to the bottom of the unit.



*The calibration screen*

From the UTILIES screen also the full memory can be erased, by tapping onto the ERASE DB button

## 4.4 Radiometer Calibration

The calibration consists in the measurement of the I.R. output power of the Plantar Test with the Ugo Basile I.R. Radiometer (SKU:37300) which in turn has been calibrated with a standard I.R. source in order to provide an absolute energy source.

A periodical calibration with the Ugo Basile Radiometer is recommended with a frequency depending on the use frequency of the Plantar Test device; for a 2 days a week use we recommend a 3 month frequency re-calibration.

## 5 Bibliography

### METHOD PAPER

K.M. Hargreaves, R. Dubner, F. Brown, C. Flores and J. Joris: "A New and Sensitive Method for Measuring Thermal Nociception in Cutaneous Hypersensitivity" *Pain* 32: 77-88, 1988

### OTHER UGO BASILE PLANTAR TEST PAPERS

D.C. Yeomans & H.K. Proudfoot: "Characterization of the Foot Withdrawal Response to Noxious Radiant Heat in the Rat" *Pain* 59: 85-97, 1994

SOME OF THE PAPERS MENTIONING THE UGO BASILE PLANTAR TEST

L. Mannelli et al: "Effects of the Neutrophil Elastase Inhibitor EL-17 in Rat Adjuvant-Induced Arthritis" *Rheumatology* 10.1093, 2016

S. Castany et al: "The Antinociceptive Effects of a  $\delta$ -Opioid Receptor Agonist In mice with Painful Diabetic Neuropathy: Involvement of Heme Oxygenase 1" *Neuroscience Letters* 614: 49-54, 2016

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A. Finley et al: "Sphingosine 1-Phosphate Mediates Hypersensitivity via a Neutrophil-Dependent Mechanism" *PLoS ONE* 8(1): e55255, 2013

J. Donnerer et al: "The Pain Pathway in the Rat following Noxious Thermal Stimulation: Effect of Morphine on pERK1/2 and TRPV1 at the Dorsal Horn Level, and on Hypersensitivity" *Pharmacology* 92: 32-38, 2013

M. Arai et al: "The miRNA and mRNA Changes in Rat Hippocampus after Chronic Constriction Injury" *Pain Medicine* 14 (5): 720-729, 2013

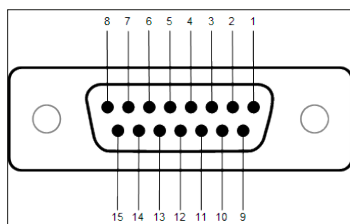
P.J. Austin et al: "G. Chronic Constriction of the Sciatic Nerve and Pain Hypersensitivity Testing in Rats" *JoVE* 61, e3393, doi:10.3791/3393, 2012 <http://www.jove.com/video/3393/chronic-constriction-sciatic-nerve-pain-hypersensitivity-testing> Nociception in Pitx3416insG Mice" *Mamm Genome* 21: 12-27, 2010

## 6 Connections

### 6.1 Communication port connection

The Plantar Test device is provided with a D-sub (DA-15 Female) TTL I/O port. This port could be used to synchronize some events with external instruments or acquisition systems. TTL Output signal are electrical isolated in order to guarantee an electrical barrier between Librae Incapacitance Tester and any other external device.

TTL signals are refereed to Power Ground (pin 14 and pin 15)



*D-sub connector pins*

DB-15 Pin#	Signal Name	Signal Type	Description
1	Start/Stop	TTL OUT	Start -> TTL High Level Stop -> TTL Low Level
2	Detection Manual/Automatic	TTL OUT	Manual -> TTL High Level Automatic -> TTL Low Level
3	Reserved	TTL OUT	Reserved
4	Reserved	TTL OUT	Reserved
5	Reserved	TTL OUT	Reserved
6	Reserved	TTL OUT	Reserved
7	Reserved	TTL OUT	Reserved
8	IR value	ANALOG OUT	Analog IR value
9	External start	TTL IN	Start -> TTL High Level Stop -> TTL Low Level
10	Reserved	TTL IN	Reserved
11	Reserved	TTL IN	Reserved
12	Reserved	TTL OUT	Reserved
13	Detection	TTL OUT	Detection -> TTL High Level No detection -> TTL Low Level
14	GND	POWER	Power Ground
15	GND	POWER	Power Ground

*D-sub connector pin-out table*

NOTE: TTL OUT is designed for connection with scientific instruments! DO NOT CONNECT ANY POWER DEVICE!

NOTE: DO NOT SINK a current more than 10mA from each TTL pin! DAMAGE WILL OCCURS.

## 7 Maintenance

While any service of the instrument ought to be carried out by Ugo Basile personnel or by qualified personnel authorized by UGO BASILE organization, this manual section describes normal maintenance procedures which can be carried out at your facility.

**UNPLUG THE MAIN CORD BEFORE CARRYING OUT ANY MAINTENANCE JOB**

### 7.1 Electrical

To inspect and/or replace the fuses, disconnect the mains cable first! Insert a miniature screwdriver in the slot indentation and snap out the slide which houses the fuses. Snap in the fuse slide: the mechanical “click” ensures that it is locked.

### 7.2 Cleaning/disinfection

The Plantar Test does not require any maintenance apart from normal cleaning.

Do not use organic solutions. Cotton wool and water can be used for cleaning purposes. For disinfection, use a non-alcoholic disinfectant, or  $H_2O_2$ .

### 7.3 Long Inactivity

The instrument does not require any particular maintenance after long inactivity, except cleaning

### 7.4 Customer Support

For any further information you may desire concerning the use and/or maintenance of the Plantar Test, please do not hesitate to contact our service department (or our local distributor) either directly or via our support page <http://www.ugobasile.com/support.html>:

Before sending any instrument to our factory for repair, please contact our logistics department to obtain a return authorization number (RMA) and shipping/packing instructions. We may not be held responsible for damages during transport due to poor packing; whenever possible, please use the original packing.



## 8 Specification

<b>General</b>	
Command Input	4.3" TFT touch-screen
Read-out	4.3" TFT touch-screen
Power Requirements	Universal input 100-240 VAC, 50-60Hz, 50W
Sound Level	< 54dB
Operating environment	10°C to 40°C; 5% to 95% RH (non-condensing)
<b>Operation</b>	
I.R. Intensity	Adjustable from 1 to 100 (in one digit steps)
Latency time	0.1s steps
Cut-off function	From 5 to 30 sec
Measurement Mode	Manual and automatic
Start Experiment	By Start button, push buttons or TTL input
Stop Experiment	By Stop button, push buttons, cut-off or TTL input
Data export	.csv format, from USB key (provided)
TTL I/O	Input and output TTL signal
<b>Physical weights</b>	
Total Weight	11.0 kg
Shipping Weight	14.0 kg
<b>Physical dimensions</b>	
Platform-base dimension (with cages)	90cm(w) x 38.5cm(d) x 37cm(h)
Electronic unit dimension	25cm(w) x 29cm(d) x 12cm(h)
Required space on table (all parts)	135cm(w) x 40cm(d) x 50cm(h)
Packaging dimensions	98(w) x 49(d) x 47(h)cm
<b>Warranty</b>	
<p>This device is covered by 12-month on-factory manufacturer warranty.</p> <p>An additional 12 month on-factory warranty period (total 2 years) is available for free after device registration.</p>	



For other Ugo Basile products related to this device  
visit **[ugobasile.com](http://ugobasile.com)** web site for details



TGR - Thermal Gradient Ring (Zimmermann's method)



The original Plantar Test for thermal stimulation  
(Hargreaves Apparatus)



Dynamic Plantar Aesthesiometer (DPA) for  
mechanical stimulation



Thermal Place Preference (TPP Test) for Mice &  
Rats



Plethysmometer, the 1st and original device for  
measuring paw volume & oedema



Analgesy-Meter the 1st and original Randall-Selitto  
paw-pressure test

**Ugo Basile SRL**

Via Giuseppe Di Vittorio 2, 21036 Gemonio (VA) ITALY - Tel. +39 0332 744574 - [sales@ugobasile.com](mailto:sales@ugobasile.com)



For other Ugo Basile products related to this device visit **[ugobasile.com](http://ugobasile.com)** web site for details



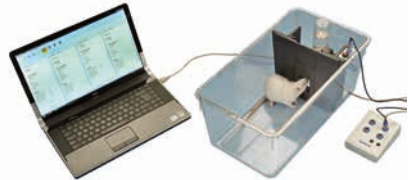
Hot/Cold Plate NG for screening of thermal hyperalgesia/allodynia



e-VF Handheld Electronic Von Frey of original design



PAM Pressure Application Measurement (for joint pain)



Orofacial Stimulation Test (Fehrenbacher, Henry, Hargreaves method)



Tail-Flip Unit, thermal stimulation of the tail, according to D'Amour & Smith method



I.R. Heat-Flux Radiometer for Tail Flick and Plantar Test

**Ugo Basile SRL**

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8 Specification



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The 1st, original Mouse RotaRod for motory coordination studies



OPERON (Papaleo-Scheggia's method) for Attentional Set-Shifting Task



Fear Conditioning System - ANYmaze



Rodent Treadmill NG with interchangeable lane assembly for rats or mice



GSM Grip-Strength Meter for mice and rats



The Rota-Rod Family

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