TSE
Technical & Scientific
Equipment GmbH

TSE Analgesiameter

Tail-Flick Measuring System / 1-Place

For Mice & Rats

TSE Analgesiameter

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1. The system

The **TSE Analgesiameter "Tail-Flick"** is a fully automatic measuring system for the rapid screening of rats or mice for analgesic drug effects. The measuring parameter is the so-called "tail-flick" reaction which is an indicator of the sensitivity of the animal to pain.

The heart of the system is a special lamp, which directs a focused light beam with a high proportion of infrared radiation, i.e. heat, onto the animal's tail. The animal is held in a special animal restrainer mounted on a benchtop base. The light intensity of the radiation lamp and therefore the achievable temperature as well as the maximum permitted irradiation time can be set by the operator before the start of the experiment.

The time which elapses between switching the lamp on and the animal's first clear pain reaction (visible tail movement = "tail-flick“) is measured. The application of analgesically effective substances leads to an increase in this reaction time, i.e. an increase in the pain threshold when compared with untreated control animals.

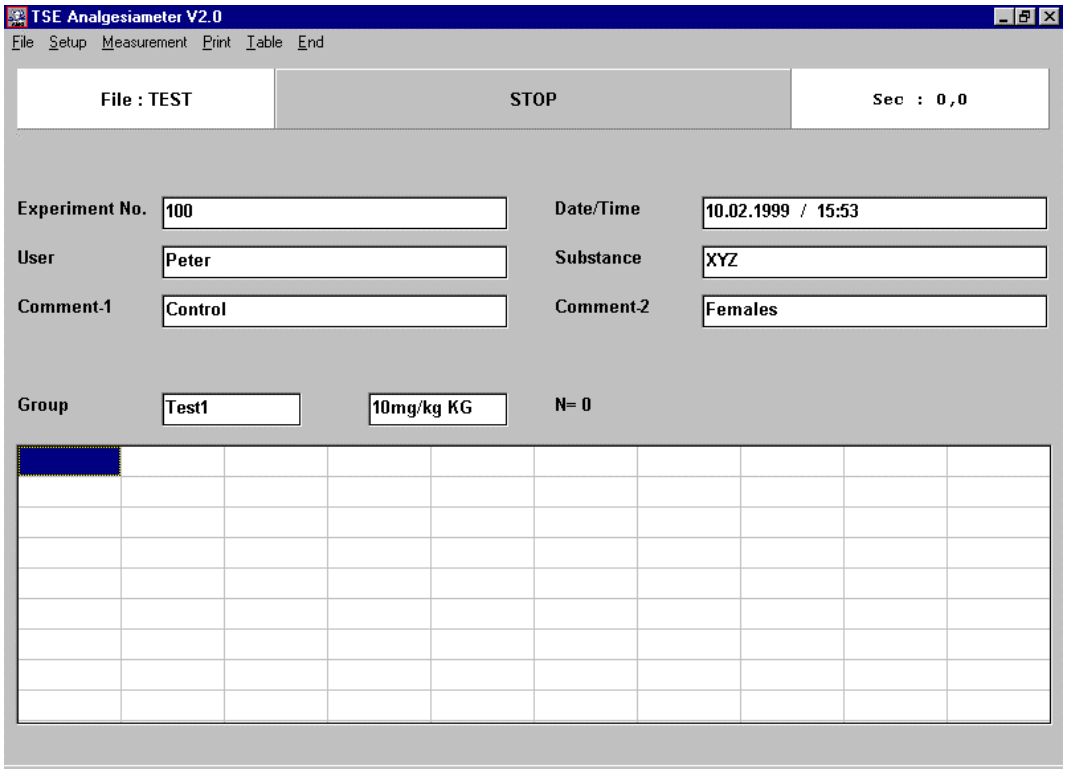
During the measurement the measuring data are transferred to the PC via the ANG interface, stored on the hard disk and shown on the monitor. The measuring data can be shown on the monitor in the form of a protocol when the measurements have been completed and also printed out. Export as an ASCII-compatible file for further processing with statistics programs is also possible.

2. System components

The system consists of:

1. the analgesiameter with radiation lamp,
2. a foot switch for the Start/Stop function,
3. restrainer cages for mice and rats
4. tail rests made of Teflon,
5. a control unit,
6. an IBM-compatible computer with built-in ANG interface,
7. ANG software for Windows
8. all necessary connection cables.

3. Program start – the main screen



The following menu commands are available:

File	Create new file or open existing file
Setup	Set hardware parameters
Measurement	Start measurement, stop and reject measured values
Print	Print table and set printer font
Table	Display and export table
End	Exit program

Status line
File name
Status Stop - Run
Sec Time lamp is switched on in seconds (switched on with the foot switch)

Date/Time
Automatically provided by the system

Below there are several **Input fields**, in which the descriptive parameters can be entered before the start of the experiment. All the entries from the previous experiment are retained and only need to be altered if this is necessary.

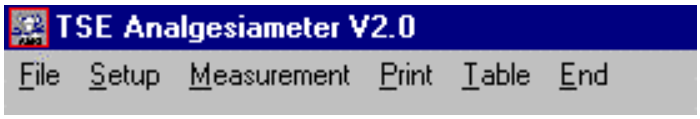
Text fields 1- 5
For identifying the measurement.

2 Text fields "Group"
The system arranges the measuring data in groups. The groups are identified by these two labels. The labels also appear as column headings in the export file.

The ***Table area*** is found beneath this; the values are shown here during the measurement.

N=
Shows the number of groups measurements in the currently selected file. A group measurement consists of any number of individual measurements. A series of measurements consists of 1-N group measurements. N=0 means that the file still does not contain any measuring data.

4. The menu item "File"

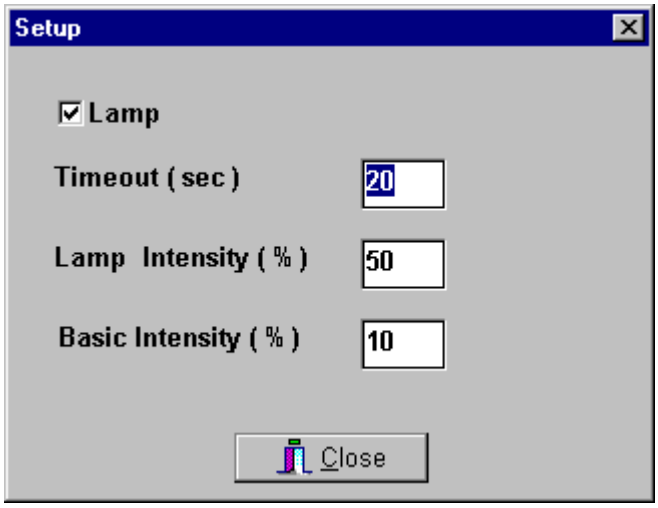


Before the measurement a decision must be made about which file the data of the following measurement are to be stored in. When the menu item **File** is clicked the window "Open" is opened. This now allows

- a **new file name** to be entered if a new file is to be created, or
- an existing name to be selected. In this case the new measuring data are appended to the data which are already stored in the file.

The files are stored in an internal binary format (.BIN).

5. The menu item "Setup"



The hardware parameters must be defined here before the start of the experiment.

Lamp

The software can be used not only for the tail-flick analgesia system, but also for Randall-Selitto measuring setups.

If the option "**Lamp**" is activated then the lamp of a tail-flick measuring system will be controlled.

Time out (sec)

Range: **0 - 60 seconds**.
This entry determines the maximum time that the lamp is switched on, i.e. when this time has elapsed the lamp will be automatically switched off, even if the foot switch is not released. This prevents the animal from being burned.

Lamp Intensity (%)

Range: 10 – 100%.
Sets the intensity of the radiation unit for the measurement (as a percentage of the maximum light intensity). The optimal setting for the type of laboratory animal used must be determined by tests. *Guide value*: untreated control animals should show a pain reaction after about 5 seconds.

Basic Intensity (%)

Range: 0 – 50%.
Preheating time as a percentage of the maximum light intensity. If a value larger than zero is set the lamp does not go out completely between the individual measurements, but remains switched on at a lower intensity. This preheating means that the radiation unit reaches the measuring intensity more rapidly after switching on. Recommendation: 10%.

6. Performing a measurement

If a file has been selected and all the entries carried out in Setup then a test can be carried out.

6.1. Preparation

- Fasten the animal in the measuring cage.
- Slide the appropriate measuring cage onto the holding rail of the base plate.
- Slide a suitable tail support behind the cage.
- Position the tail in the groove of the tail support.
- It may be necessary to adjust the height and position of the lamp.

The rotary knob above the radiation unit can be used to adjust its height and therefore to focus the beam optimally. Once the height has been adjusted it should not be altered again during a series of measurements as otherwise the measured values will no longer be comparable. The second rotary knob, which is side-mounted, allows the unit to be positioned horizontally. The rotary knob on the base plate can be used to rotate the radiation unit.

6.2. Starting a group measurement

- A measurement is started by activating the menu item ***Measurement/Start*** or by pressing the function key F2. This clears the table area; the first field is marked with a blue cursor.
- The status display changes to RUN (green bar).
- All the subsequent single measurements form a group measurement. It is characterized by the two group labels. A new group only begins when the measurement has been stopped in between.
- The lamp is switched on by pressing down the **Foot switch**. The time display at the top right-hand side (in seconds) starts to run.
- As soon as the animal shows a clear pain reaction by a clear movement of its tail (exceeding the pain threshold) the foot switch must be released. This switches the lamp off immediately or returns it to the basic intensity. The timer stops and shows the elapsed time. The value is shown and the cursor jumps to the next field.
- When the **Time out** (***Setup***) time has elapsed the lamp is automatically switched off.

6.3. Overwriting values

Incorrect measurements can be corrected as follows: place the cursor on the value to be overwritten with the mouse or via the keyboard (left/right arrows) and carry out the measurement again.

1,2	*2,0	1,1	2,2	*2,2

Corrected measurements are indicated in both the table area and later in the protocol by an asterisk (*) before the measurement.

6.4. Ending a group measurement

Measurement/Stop (F3) ends the current group measurement. The measuring data are stored in the file. A new group measurement can now be triggered with Start – after altering the group labels if this is necessary.

6.5. Cancel

Measurement/Cancel rejects the **complete group measurement,** i.e. all the values of this measurement are deleted.

7. Data Output

7.1. The menu item "Table"

The measuring values of the loaded file are shown in tabular form on the monitor:

```
Test1   10mg/kg KG   10.02.1999   /   17:28
2,9    2,1    2,1    1,7    1,6    2,2

Test2   10mg/kg KG   10.02.1999   /   17:29
1,7    1,7    1,5
```

Each group measurement (Start–Stop) is overwritten with the group labels and the date and time.

An export file that can be easily imported into a statistical program for further evaluation is generated here. The file will automatically receive the extension *.CSV (ASCII format). The arrangement of the group data in the export file can be altered by the option "Groups in Columns" in the ***Table*** menu.

If activated the data are arranged in columns:

```
                    20 11.02.1999 / 17:03   Smith                XYZ  Testgroup  Rat

1a                     1b                    1c
25mg/kg BW             50mg/kg BW            75mg/kg BW
11.02.1999 / 17:03     11.02.1999 / 17:03    11.02.1999 / 17:04
                2,4                   2,9                   1,4
                1,9                   2,3                   4,8
                1,7                   2,1                   4,1
                1,8                   2,1                   3,7
                1,8                   1,9                   3,2
                  2                   1,7
                1,9
```

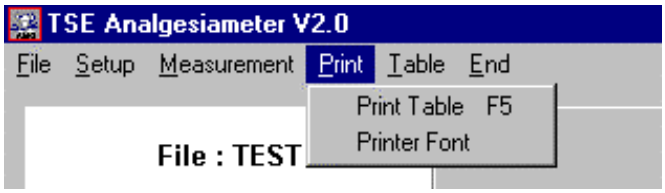
The header lists the experiment number, date and time as well as the descriptive parameters (data of the first measurement). The two group labels are used as the column headings. Under them the date and time of the particular group measurements are given. The measured values are listed below these.

If the option has **not** been activated the measurements will be arranged **line by line**. The file then has the following format:

```
 20 11.02.1999 / 17:03   Smith                XYZ  Testgroup  Rat

1a  25mg/kg BW           11.02.1999 / 17:03    2,4        1,9  1,7  1,8  1,8    2  1,9
1b  50mg/kg BW           11.02.1999 / 17:03    2,9        2,3  2,1  2,1  1,9  1,7
1c  75mg/kg BW           11.02.1999 / 17:04    1,4        4,8  4,1  3,7  3,2
```

8. The protocol – menu item "Print"



All measurements are printed out in the form of a protocol. In addition the number of single measurements in the group, the mean value and the standard deviation will be given. The group labels as well as the date and time head each group measurement. The descriptive parameters appear in the protocol header.

If the descriptive parameters are altered in the main screen after the first measurement then the altered values will be listed before the particular measurement.

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