TSE
Technical & Scientific
Equipment GmbH

TSE Power Meter

for small laboratory animals

No. 303550

Contents

TSE Power Meter

1.   General information

A variety of devices is employed in assessing analgesic or anti-inflammatory drug effects.

This newly designed "Power Meter" is an **incapacitance tester** that reproducibly and accurately determines the weight distribution on the two hind paws of a small animal.

The animal is placed in a special restraining cage fixed to a dual-sensor unit where contact is made to the built-in force transducers by two small contact platforms. This sensor unit is connected to the computer via a small signal amplifier ("control unit"). The control unit has a built-in power supply which provides the PM sensor unit with power, amplifies and filters the measuring signals and controls the PC. The unit is calibrated before it leaves the factory.

The user defines a force threshold that has to be exceeded in order to trigger data acquisition. The measuring procedure is started with a foot switch so that the operator can handle the animal with both hands. The force exerted from both limbs is now continuously monitored by the sensitive force transducers. The trial is ended

when a maximum trial duration has elapsed or when the foot switch is depressed again.

Immediately after the end of the trial the system outputs a force graph and calculates the maximum force exerted in each channel as well as the average value over the course of the trial. Readings may be obtained in grams, newtons or ponds.

The system is available for rats and mice. The systems differ in the maximum force that can be measured. Different types of restraining cages are offered.

Standard system for rats

Base plate (L x B x H)   400mm x 240mm x 15mm

Force sensors
Measuring range   up to 600 pond
Accuracy   0.02%
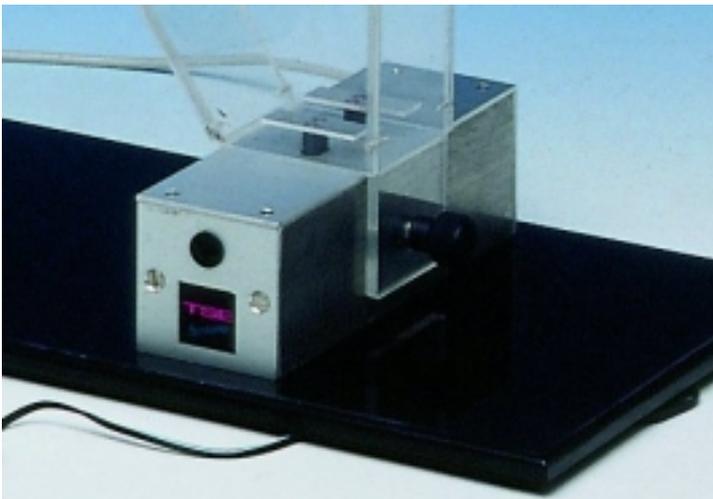Max. overload   2400 pond

Contact platforms (L x B)   40mm x 15mm
Center to center distance   35mm

The system is supplied with 2 rectangular contact platforms as standard. Special contact platforms are available on request.

2.   System installation

2.1.   Components

The system consists of:

- an **interface**,
- a **control unit**,
- a special **Power Meter sensor unit**,
- a **Plexiglas measuring cage**,
- **Software for Windows,** which controls the trial and is used for recording and storing the measuring data (force).

2.2.   Installation steps

⇒ The interface is built into a PC.
⇒ The control unit is connected to the interface with the cable supplied.
⇒ The PM sensor unit cable is connected to the control unit.
⇒ The measuring cage is mounted on the sensor unit and fixed in position with the knurled screw.
⇒ The software is installed in the computer.
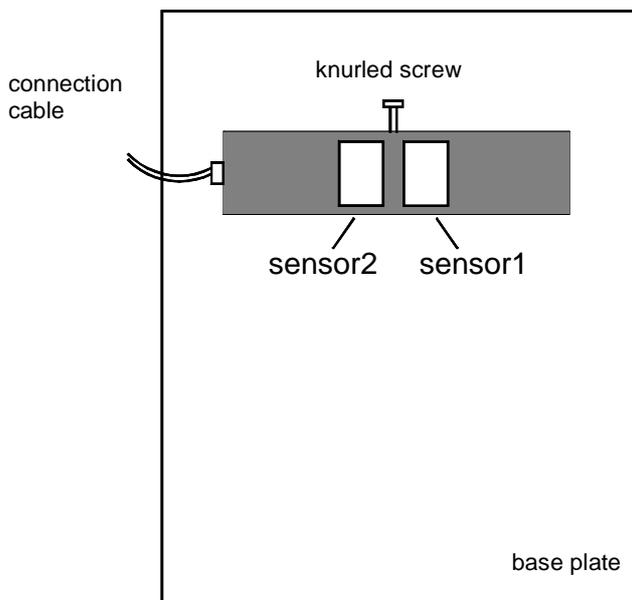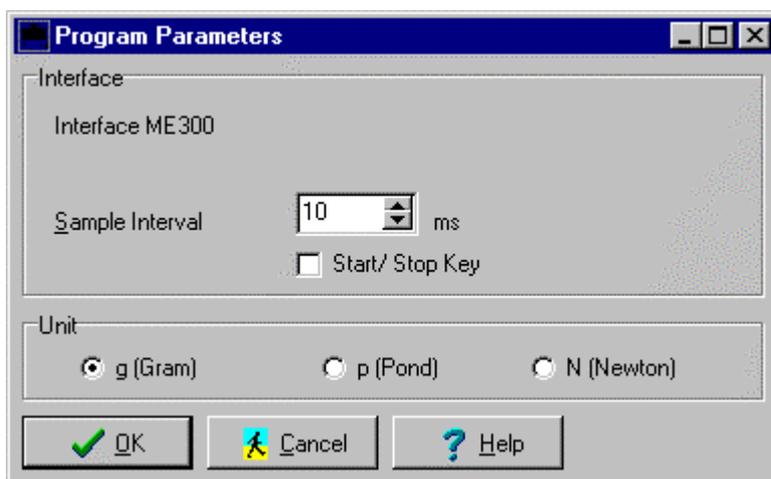
2.3.   Control unit
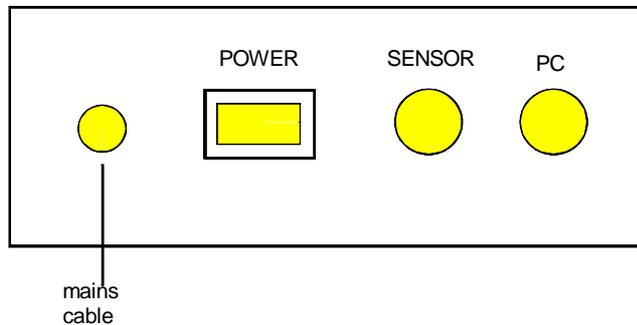
Rear panel features:

--	mains cable (permanently attached)
POWER	mains switch
SENSOR	PM sensor input
PC	signal output to PC

3.   Software configuration and calibration

3.1.   Setting the program parameters

When the software has been installed it must be adapted to the existing hardware.
This is carried out with the menu item ***Program parameters***.

The information shown under **interface** group varies according to the ADC converter used. The **sample interval** can be selected. If the system is supplied with a **foot switch** then this can be activated here. The operator has to decide the **units** (p, g or N) in which the results are to be outputted.
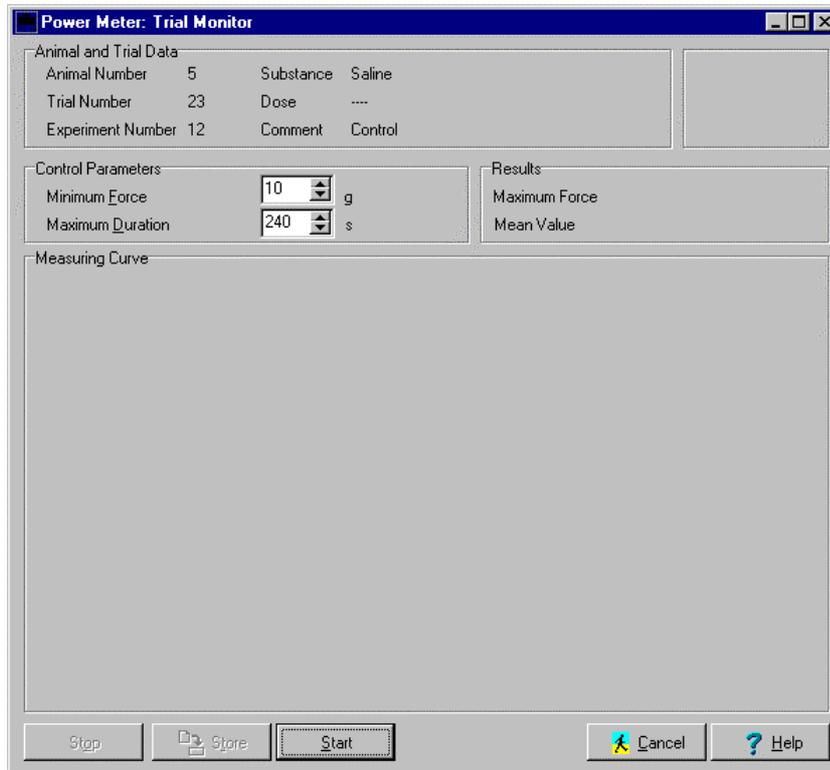
3.2. Calibration

The force sensors must be calibrated before the first experiment.

The calibration is carried out – separately for each channel – using 2 values. Value 1 must be smaller than Value 2 as the calibration curve is calculated from these two points. Normally zero is used as Value 1 (unloaded sensor). A value which is slightly above the expected maximum value in the trial is used for Value 2. A corresponding **calibration weight** is required for Value 2.

1. Switch on control unit.
2. Select menu item *Calibration*. The table shows the values used in the last calibration.
3. The sensors are initially **not** loaded.
4. Select channel 1.
5. Operate **Calibration** button.
6. Enter zero in the input field.
7. Operate **ADC OK** button. The ADC value is entered in the table.
8. Place calibration weight on the contact platform and wait until the sensor is stable.
9. Enter the weight in the input field.
10. Operate **ADC OK** button. The force is measured and entered in the table.
11. Repeat whole procedure for channel 2.

*Note: 1 pond corresponds to 9.807 x 10^{-3} newton*

4.   Carrying out an experiment

Before starting the measurement

- Switch on control unit and wait 5 minutes.

- Carry out a calibration if necessary.

- Before the measurement check that the selected **data archive** is correct.

- The so-called trial monitor is opened to measure the force. This trial monitor always shows the current measuring status.

- The data which characterize the animal and the trial must first be entered here (animal number, trial and experiment number).

- The required **minimum force** and the maximum **trial duration** belong to the control parameters.

- Fasten the measuring cage and put the animal into the cage in the measuring position.

- A trial is started with the **Start** button.

- The actual measured values are now continuously outputted in an internal ADC-format (0...4095).

- In **Phase 1** a check is made as to whether the set **minimum force** has been exceeded. As long as the exerted force lies below this value the ADC value appears **black**.

- When the minimum force is exceeded the real measurement starts (**Phase 2**). When Phase 2 starts the color of the ADC values changes from black to **green**.
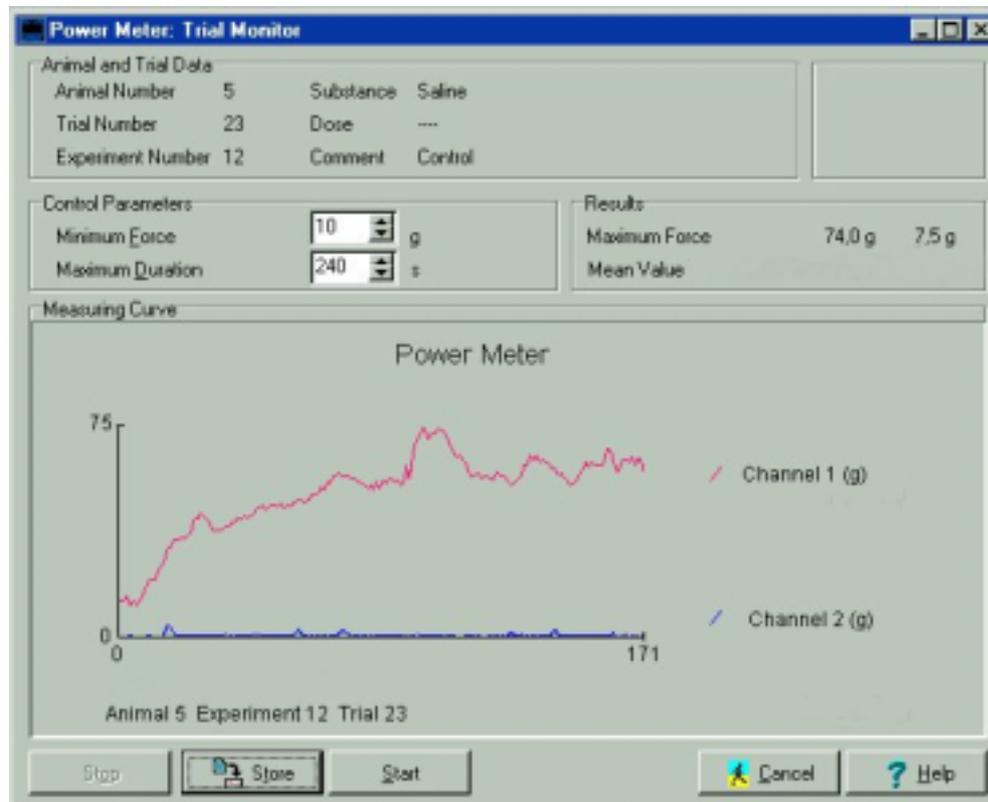
The measuring curve

- When the measuring period has elapsed or the foot switch is operated the **maximum values** of the force is calculated and outputted for both channels.

- At the same time the **mean value** is shown – if desired.

- The course of the measurement is shown in a coordinate system with **force as the Y-axis** and time as the X-axis (relative value). The final value of the Y-axis corresponds to the calculated maximum value for the run curve. The curve offset on the Y-axis corresponds to the minimum force selected.

- If the operator accepts the measured values then operating the **Store** button, which is available when the measurement has finished, will save them. The measurements are stored together with the animal and trial data as well as the actual date and time.

5.   Data analysis

5.1.   The run table

5.1.1.   Display a table

The menu item *Analysis/Table* can be used to call up a table containing a list of all the trial data stored in the set data archive. The contents of the display window can be printed out with the **Print** button.

```
Anim   Trial    Exp      Date      Start     Chan1       Chan2
   1     12      14  09.03.99  10:09:43     147,2        87,1 p
   1     12      14  09.03.99  10:10:47      91,9        66,2 p
   1     12      14  09.03.99  17:03:06       1,3        71,4 g
   1     12      14  09.03.99  17:05:51      48,9        35,1 g
   1     12      14  09.03.99  17:07:26     250,7       110,3 g
```

The following are outputted:

- Animal number
- Trial number
- Experiment number
- Date
- Starting time
- **Maximum force of both channels in the selected units**

The additional display of the mean value is possible as an option.

5.1.2.   Exporting a table

The table can be stored in a file with the **in File** button. The operator must select a **name** (Windows convention) and the required **extension**. The system checks whether a file with this name already exists and indicates if this is the case. The generated file is stored in the program directory.

5.2. Loading and processing a graph

The measuring data graph can be shown again at any time. A click with the RIGHT-HAND mouse key on the graph opens an additional menu which allows numerous alterations to be made to the graph. This also allows the **printout** and **export** of the graph.

TSE
Technical & Scientific
Equipment GmbH

Saalburgstr. 157
D-61350 Bad Homburg / Germany

Phone: **+49 (0) 6172-789-0**
Fax: **+49 (0) 6172-789-500**
E-mail: **info@TSE-Systems.de**
Internet: **http://www.TSE-Systems.de**