# **Product Overview**



Sophisticated Life Science Research Instrumentation



# **TSE ActiMot / MoTil**

Multi-Purpose Open Field, Hole-Poke, Light-Dark & Home-Cage Activity System for Rats & Mice

www.TSE-Systems.com



- Specifications subject to change without notice -



# TSE ActiMot / MoTil System



4-place ActiMot System (400mm cage height)

The **TSE ActiMot/MoTil system** is a flexible system for studying open field behavior, hole-board exploration and home-cage activity of small laboratory animals. It consists of the following components:

- A ActiMot frames with appropriate test cages or
- △ **MoTil** frames for home cages,
- $\Delta$  One or more control unit(s),
- $\Delta$  one or more control interfaces (PCI slot),
- △ an IBM-compatible computer
- △ the ActiMot/MoTil software for Windows.

A large number of measuring stations can be controlled simultaneously with one computer.

#### ActiMot Configuration

The ActiMot frame is a square-shaped **frame** (*the so-called* **base** *unit*). This frame features two pairs of light-beam strips, each pair consisting of 1 transmitter strip & 1 receiver strip. These basic light barriers strips are arranged at right angles to each other in the same plane. They are used to determine the X and Y coordinates of the animal and thus its location (XY frame).

Each strip can be equipped with 16, 32, 48 or 64 infra-red sensors. The distance between adjacent sensors is 14mm, 28mm or 56mm depending on the resolution required (e.g. rats vs. mice).



480x480mm frame

Please note that the internal spatial resolution is **twice** that the number of sensors due to the fact that whenever an even number of light-beams is interrupted the center of gravity is calculated to lie between adjacent sensors!

The following **standard frame configurations** are the one most often used:



- ∆ Size 250x250mm, 16x16 infra-red sensors, 14mm sensor distance *for mice*
- ∆ Size 480x480mm, 16x16 infra-red sensors, 28mm sensor distance *for rats*.
- △ Size 920x920mm, 32x32 infra-red sensors, 28mm sensor distance *for rats*.



With up to 2 further pairs of unidimensional lightbarrier strips (Z1 and Z2), whose height can be adjusted, **rearing** or **jumping** can be detected in addition to location (*Rearing Indicators*). Adjust the height of the rearing indicator to meet your individual requirements.

The light barrier levels are scanned with a frequency of 100 Hz each on fast computer platforms. They can be operated at almost any light condition, even in complete darkness.

## "Open Field" Experiments

In the open field configuration the **ActiMot** frame is equipped with a **square shaped inner cage**.



250x250mm frame for mice (XY+Z1)

# With transparent cage (*left*) and black infra-red permeable acrylic cage (*right*)

These cages are made from transparent or black acrylic material that is permeable to infra-red light. Low and high cages are available. A lid can be used to close the cage. A metal run grid is available for longer-lasting experiments. It is used in conjunction with a removable feces tray.



480x480mm frame for rats or mice (XY+Z1) Cage = transparent acrylic



920x920mm frame for rats (XY+Z1) Cage = transparent acrylic

The small cages can also be used in larger frames. Special distance plates (*Templates*) are available for this configuration.



480x480mm frame (XY+Z1) Cage = small mouse cage placed in a special template

The option 2 Boxes / Frame is an operation mode in which 2 smaller boxes (each a quarter of the size of a normal box) can be placed diagonally into a single frame that has 16 or 32 light beam sensors. The distance between the light beam sensors is



either 14 mm or 28 mm. This allows the observation of 2 animals within one frame. Each animal is analyzed separately.



2 boxes / frame configuration

# "Light/Dark" Experiments



Black compartments for Light/Dark experiments

In order to carry out anxiety tests a dark compartment with a central gate and a lid is available. This compartment is placed into the transparent acrylic cage and covers either 50% or 33% of the total box area (*please specify on your order*). The material is permeable to infra-red light.



480x480mm frame with black compartment for Light/Dark experiments (50%-50% configuration)

Data analysis allows to divide the box area into 2 zones ("areas") in order to calculate parameters such as visits to dark area or latency to first visit. The parameters provided are described in detail later.

# "Hole-Poke" Experiments

In order to carry out hole-poke experiments (exploration test) the ActiMot boxes can be equipped with floor inserts, the so-called **hole-poke inserts** (hole-boards) that feature 16 holes. The floors are available in rat and mouse configuration:

#### **Hole Dimensions**

Mouse:	16 mm diameter
Rat:	32 mm diameter

For hole-poke evaluation one XY frame that is positioned below the board is used. If a test animal investigates a hole then the light barriers beneath this hole are interrupted and the system records a **visit** to the hole. Frequency and duration of hole visits can then be output in the analysis.

- Unidimensional light barriers in the **Z1 level** can additionally by used to record activity, i.e. travelled distance (XY+Z1 configuration).
- In order to perform detailed activity analyses in addition to monitoring exploratory behavior a second XY-frame (XY-type Rearing indicator) can be combined with the hole-board frame (XY+2<sup>nd</sup>XY or XY+2<sup>nd</sup>XY+Z1 configuration).



Advanced Hole-Poke configuration for mice

## "Place Preference" Experiments

For Place Preference experiments special inserts can be used. These inserts are placed into the acrylic cages providing two compartments with a central gate to let the animal pass. Different surface



structures of the floor inserts of both compartments provide different environments.

ActiMot Options

- Several XY frames (up to 4!) stacked upon each other can also be used for advanced Open Field analysis in several planes! In this combination the first frame is the base unit, the other frames are so-called *Rearing Indicators Type "2<sup>nd</sup>-XY-axis"*.
- The ActiMot boxes can be operated in special sound-attenuating housings. These housings feature a sliding-floor for easy removal of the test box, an observation window, a ventilator and a manually operated house light.
- If you are interested in combining the ActiMot cage with a shockable floor grid in order to monitor conflict drinking ("Vogel Test") please contact us.

#### **MoTil Configuration**

The **MoTil** system is an adaptation of the ActiMot system for recording activity in home cages.

Rectangular frames are used here: in the basic configuration these have a pattern of **2x6** sensor pairs in the X-Y axis and - optionally - **4** light barriers in the Z axis. Extra sensors can be added to increase sensor grid density if required. Data acquisition and evaluation in the **MoTil** system is performed with the MoTil extension of the ActiMot software package (*to be ordered separately*).



Home cage size III frame



MoTil system mounted in racks

# The ActiMot/MoTil Software

The software controls the complete system, records the movement of the test animals and stores the measuring data for subsequent analysis. The software runs under the operating system Windows.

#### Trial Preparation

In the trial preparation phase all control and descriptive parameters are entered by the user.

Animal and Trial Data Cage Left	×
Current Data Directory D:\Data\	
Trial Parameters Habituation 1 💼 min Duration Exp. 10	🛃 min
Animal Data <u>A</u> nimal No. 2 🚖 Age 200 🗲 days <u>G</u> roup Control <u>W</u> eight 25 g	Data Directory
Trial Data <u>I</u> rial No. 2 <u>S</u> E <sub>XP.</sub> No. 3 <u>S</u> Code <u>XYZ</u> Descator ES	
Comment First test Substance Saline	✓ <u>S</u> tart
Dosage Feature 1 Males	Marker
Feature 2         I           Feature 3         I           Feature 4         I	<u>⊀ C</u> ancel ? <u>H</u> elp

### Starting the Trial

After the test preparation has finished, the animal is placed in the cage and data acquisition is started in this specific box

- by pressing a key on the keyboard or
- by the interruption of light barriers combined with the movement of the animal.



Alternatively several cages can first be put into a "**ready**" state in order to start the trials later either



- simultaneously by pressing a key on the keyboard after all animals have been placed into the cages or
- successively by introducing the animals one after the other into the cages using the "trial start at light-beam interruption" option. The trial will start in the corresponding box when in each of both axes (x and y) two light barriers are interrupted simultaneously and at the same time an alteration in the center of gravity takes place, i.e. an animal movement occurs.

This procedure facilitates handling of larger setups.

If a *Habituation Time* has been defined in the trial data window data acquisition is started as soon as this time has elapsed.

## **Trial Monitor**

During the trial a schematic diagram of the boxes connected is shown. The actual location of the test animal is represented by a square whose position changes as the animal moves. This square corresponds to the centre of gravity calculated from the interrupted light beams. Rearing is indicated by a change in color. This trial monitor thus allows a continuous check to be carried out on the trial during data acquisition.



A histogram can be called up any time. The activity data acquired so far are displayed in a line graph.

T	Trial Monitor						
	0	0		0	1		
	o	õ	õ	õ			
	~	~	~	~			
	Ŏ	0	0	0			
	$\cup$		Ť	~ 	J		
	1 Animal 1 34 Sum H 2			02:00 00:19 H 1/ 2			

During **hole-board** experiments the trial monitor displays if a hole is visited by the animal, outputs the total number of visits in this hole as well as the total number of hole visits.

# **Event Markers**

During the running trial so-called **event markers** can be set by the user in order to document particular events. Event markers can be defined **before** the start of the experiment and **while** the experiment is being carried out.

Marker Definiti	on 🗙
Global Marker:	3
Marker <u>1</u>	Unusual noise
Marker <u>2</u>	Marker 2
Marker <u>3</u>	Marker 3
Marker <u>4</u>	Marker 4
Marker <u>5</u>	Marker 5
Box-Specific M	larkers
Marker <u>6</u>	Grooming
Marker <u>7</u>	Marker 7
Marker <u>8</u>	Marker 8
Marker <u>9</u>	Marker 9
Marker1 <u>0</u>	Marker 10
✓ <u>о</u> к	🔥 Close 🍞 Help

### **Trial End**

In normal cases the experiment in a specific box will be stopped **automatically** when the duration has been elapsed. Data acquisition in other boxes is not affected. Theorectically a trial can last up to 500 hours! The test can also be terminated prematurely in a specific box or in all boxes simultaneously.

In order to reduce file size in long-lasting experiments and to allow for intermediate analysis it is possible to **automatically** stop data acquisition in all connected boxes at a user-defined clock time and to **immediately restart the measurement**. New data files are generated by this procedure - no user intervention is required.

#### Data Analysis – Activity Data

For **Open Field** and **Light/Dark experiments** a differentiation is made between single and group analysis.

For *Single analysis* each trial is assessed separately. Instruments used are the *Pattern of Movement*, the *Histogram* and a *Results Table* generator. With the *Spacial Analysis* the distribution of animal activity is visualized in a graph and a table. For *Group analysis* individual results parameters are analyzed at selected time intervals for a whole group of animals. The calculated data are shown as a *Graph* and a *Table*.

# 1. Pattern of Movement

Here the movement of the animal is displayed graphically. The track can be displayed for the whole of its time course. Alternatively a time window can be selected. If a time window is chosen then the results parameters displayed are calculated only for this interval!



Open Field configuration

**Rearings** of the test animal in the Z1 or Z2 levels are documented with different colors. In a system with multiple XY-frames each level can be displayed in a separate graph.



Further information is also provided

- about the width of the current time gate,
- about the position of the time gate relative to the start of the trial and
- about the absolute position in time (clock time).

#### 2. Histogram

In the histogram the distance moved in the analysis window is shown as a line diagram (activity graph). In addition the number of **rearings** registered in levels Z1 or Z2 are shown in different colors. The histogram is always shown for two successive analysis windows (if available).



Histogram

Relative and absolute times for both intervals as well as the size of the current time gate are also given. Below the histogram is a bar in which the relationship between the analysis window and the whole trial is shown.

#### 3. Spacial Analysis

The spacial analysis generates a *Graph* and a *Table*.



The graph provides an overview about the time distribution of the animal's movement in the box using



the coordinates of the X- and Y- sensor levels. The total box area is divided into 256 elements. For each element the system calculates the **total visit time**. The **percentage of visit time** compared to the total time in the box is then output in each element.

The elements are shaded with a pattern of dots or colored in a specific color in order to allow a quick overview about the animal's length of stay. The display can be switched to a three-dimensional graph if required.



3-D display

In the corresponding **table of results** the calculated percentages of visit time for each element are arranged in 16 columns (x-coordinate) and 16 lines (y-coordinate). This table can be exported as an ASCII file for further statistical evaluation.

# 4. Results Table

Here the user can choose among a variety of different results parameters to be calculated for each animal and for a user-defined time interval. The analysis interval is the running time interval calculated from the start of the trial.



For spatial parameters the size of the central area (the periphery is automatically calculated from this value) and the corner sizes are set by the user.

Center <u>S</u> ize	50	\$ %	🔽 Show
Cor <u>n</u> er Size	25	\$ %	🔽 Show

In addition the system allows to define **3 further regions** inside the box. These **areas** (Area 1, 2 and 3) can be used to evaluate exploratory behavior in a light/dark box or to evaluate the animals stay in other regions of interest.



Zone definition

A variety of analysis parameters allows to adjust the calculation of the parameters according the requirements of the user (such as Activity & Hyperactivity thresholds, Rearing duration threshold).

Rearing		
min. Duration Rearing	3	> 500 🔹 ms
max. Break		< 500 🚖 ms
Calculation like DOS-	Version	
Activities		
<u>A</u> ctivity	> 5	🕏 cm/s
<u>H</u> yperactivity	> 20	🔹 cm/s

#### Locomotion/Activity Parameters Time resting (in h:min:s) Time resting/total time (in %) Time moving (in h:min:s) Time hyperactive (in h:min:s) Time hyperactive (in h:min:s) Time hyperactive/total time (in %) Total distance (in m) Locomotory speed (cm/s) Overall speed (cm/s) Moves/Counts

#### **Rearing Behavior**

Rearing time in Z1 (in h:min:s) Rearing time in Z1+Z2 (in h:min:s) Number of rearings in Z1 Number of rearings in Z2 Rearing time in corner 1 (h:m:s) Rearing time in corner 2 (h:m:s) Rearing time in corner 3 (h:m:s) Rearing time in corner 4 (h:m:s) **Spatial Parameters** 

**Center / Periphery Parameters** 



Number of visits Area 1 ...3 Latency Area 1 ...3 (in h:m:s)

#### **Turning Behavior**

Time moving in clockwise direction (in h:min:s) Clockwise movement/total time (in %) Number of clockwise rotations Time moving in counterclockwise direction (in s) Counterclockwise movement/total time (in %) Number of counterclockwise rotations Ratio clockwise/counterclockwise time

New parameters are continuously added to this selection list. If your paradigm requires specific calculations to be implemented please contact us!

The selected results parameters are shown in a table that can be printed out and exported for statistical calculations.

#### Interval Analysis

Analysis	29.10.01 11:27:34
Parameter 1 Parameter 2 Parameter 3 Parameter 4 Parameter 5 Parameter 6 Parameter 7	Time Resting Time Moving Time Periphery Time Center Visits in Center Total Corner Rearings Total Distance (m)
Animal No. Trial Start Duration Group	1 06:10.00 10:01:30 03:00 (h:)min:s
Strain Age Weight Experiment No. Trial No.	0 days 0,0 g 1 1
Code Operator Comment Feature1 Feature2 Feature3 Feature3 Substance	Liebenhoff test
Dosage Habituation	0 min

Analysis Interval Center Corner Area 1 active hyperactive min. Duration Rearing			1 min 50% 20% 50% > 2 cm/s > 20 cm/s 1000 ms					
from 0:00 0:01 0:02	to 0:01 0:02 0:03	1 00:10 00:14 00:28	2 00:50 00:46 00:32	3 01:00 01:00 00:58	4 00:00 00:00 00:02	5 2,0 3,0 3,0	6 5,0 5,0 1,0	7 10,3 8,6 5,5
	MV	00:17	00:43	00:59	00:01	2,7	3,7	8,1

# 5. Analysis design

Group analysis has the aim of calculating *in a single complex calculation step* 

- · the selected data records at
- predetermined time intervals
- to give certain result parameters

and to display these in a table or store them in an export file. In contrast to the results table for single analysis the number of the parameters is *not limited* here.

Choose between a variety of **time interval modes** in order to adapt the data output to meet your individual requirements.

- ⇒ The *absolute interval* allows to calculate the activity for a certain time span, e.g. between 17:00 and 18:00 h on a specific day (calendar date).
- ⇒ The *relative interval* refers to the time which has elapsed since the start of the trial. Start and finish of each interval are defined; days are defined as running days since start of the trial.
- $\Rightarrow$  For *continuous intervals* only the length of the interval is laid down. From the start of the trial this interval is continuously calculated.

Group Analysis			_ 🗆 >
Time Mode	Interval Definition From Date 11.10.01 💌 To Date 11.10.01 💌	13.56 kmin 13.57 kmin design activated.	Save Design
Available Parameters Parameter 28 Speed Area 1 (m/s) 30 Time Area 2 50 Time Area 2/Total Time ( 61 Time Moving Area 2/Tot 52 Time Moving Area 2/Tot 52 Time Moving Area 2/Tot 50 Distance Area 2/Tot 50 Frearing Area 2 80 Speed Area 2 91 Vists Area 1 91 Vists Area 1	Selected Paramete Parameter 70 Visits Area 1 71 Latency Are 56 Rearings Are 57 Distance Are 58 Distance Are 59 Time Area 2	ers From 111001 a 1 111001 a 2 2 2 2 (m) 111001	To 1355 11.1001 1354 1355 11.1001 1356 1356 11.1001 1357

Pre-defined analysis designs can be stored in files for future use.



Mean values are calculated per line and per column. The table can be printed and exported in a file.

Analy sis Parameter Time Resting						
Date 14.11.00 14.11.00 14.11.00 14.11.00	From 11:16 11:17 11:18 11:19 *	To 11:17 11:18 11:19 11:20 MV	MV 00:09 00:17 00:21 00:16	1 00:10 00:20 00:17 00:14 00:15	2 00:11 00:10 00:16 00:18 00:14	3 00:08 00:21 00:31 00:17 00:19
Analysis Para	ameter Tim	e Moving				
Date 14.11.00 14.11.00 14.11.00 14.11.00 * Analysis Para	From 11:16 11:17 11:18 11:19 *	To 11:17 11:18 11:19 11:20 MV e Center	MV 00:51 00:43 00:39 00:44	1 00:50 00:40 00:43 00:46 00:45	2 00:49 00:50 00:44 00:42 00:46	3 00:52 00:39 00:29 00:43 00:41
Date 14.11.00 14.11.00 14.11.00 14.11.00	From 11:16 11:17 11:18 11:19 *	To 11:17 11:18 11:19 11:20 MV	M∨ 00:05 00:03 00:03 00:05	1 00:06 00:05 00:04 00:09 00:06	2 00:01 00:01 00:04 00:01 00:02	3 00:07 00:02 00:01 00:06 00:04
Group analysis: absolute interval						

## (3 data records chosen)

#### Data Analysis – Hole-Poke Data

This evaluation requires a special software extension and is only possible if hole-poke inserts are available in the system. Two different evaluation algorithms are implemented.

The *Table of Results* has the format shown below. In the example the insert has 16 holes. The table outputs one line for each hole defined. For each hole the following parameters are listed:

HoleNo.	Visits	Visits%	Duration	Duration%
1	2	4,8	00:00	1,9
2	5	11,9	00:02	8,3
3	3	7,1	00:01	4,3
4	11	26,2	00:08	42,5
5	5	11,9	00:01	3,9
6	1	2,4	00:00	0,9
7	1	2,4	00:00	0,9
8	1	2,4	00:01	2,8
9	2	4,8	00:00	2,7
10	2	4,8	00:01	5,4
11	1	2,4	00:00	0,7
12	3	7,1	00:01	7,0
13	1	2,4	00:02	12,3
14	3	7,1	00:01	4,3
15	1	2,4	00:00	2,1
16	0	0,0	00:00	0,0

- the number of visits,
- the percentage share of the visits compared to the total number of hole visits (visits%),
- the total visit time per hole (Duration) and

 the percentage share of this visit time in relationship to the total trial period (Duration%)

In the second type of analysis several holes holes can be grouped together to form so-called **analysis groups**. One or more holes can be assigned to each group. Additionally the width of the analysis interval is laid down here.

🥳 Hole-Board Ana	alysis		_ 🗆 ×				
Analysis Groups							
Group 1	Group 2	Group 3	Group 4				
🔽 Hole 1	F Hole 1	F Hole 1	Hole 1				
🔽 Hole 2	F Hole 2	F Hole 2	F Hole 2				
🔽 Hole 3	F Hole 3	F Hole 3	F Hole 3				
🔽 Hole 4	F Hole 4	F Hole 4	F Hole 4				
F Hole 5	🔽 Hole 5	F Hole 5	F Hole 5				
F Hole 6	🔽 Hole 6	F Hole 6	F Hole 6				
F Hole 7	🔽 Hole 7	F Hole 7	F Hole 7				
F Hole 8	🔽 Hole 8	F Hole 8	F Hole 8				
F Hole 9	F Hole 9	🔽 Hole 9	F Hole 9				
F Hole 10	🦵 Hole 10	🔽 Hole 10	F Hole 10				
F Hole 11	🦵 Hole 11	🔽 Hole 11	F Hole 11				
F Hole 12	Hole 12	🔽 Hole 12	F Hole 12				
F Hole 13	Hole 13	F Hole 13	🔽 Hole 13				
F Hole 14	F Hole 14	F Hole 14	🔽 Hole 14				
F Hole 15	🦵 Hole 15	F Hole 15	F Hole 15				
F Hole 16	🗖 Hole 16	F Hole 16	F Hole 16				
C <u>G</u> lobal Analy Analysis Inte	C <u>G</u> lobal Analysis C Analysis Intervals Analysis Interval 1   ➡ min						
<u>T</u> able	<u>E</u> xport	<u> </u> Cļose	? Help				
	Group d	lefinition					

In this summary the following information is given:

- the current Analysis interval,
- the **Distance in m** covered within the analysis interval as a parameter for the activity of the test animal (only if Z1 or Z2 sensor levels are present)
- the number of Hole visits n for each analysis group as well as
- the total Time t which the animal has used to inspect the holes.

Gr 1=1,2,3, Gr 2=5,6,7, Gr 3=9,10,7 Gr 4=13,14	4, 8, 11,12, ,15,16,									
from	to	Run		1		2		3		4
		in m	n	t	n	t	n	t	n	t
0:00	0:01	0,0	4	00:02	1	00:00	1	00:00	1	00:00
0:01	0:02	0,0	5	00:04	0	0	0	0	0	0
0:02	0:03	0,0	2	00:00	2	00:01	4	00:01	0	0
0:03	0:04	0.0	9	00:04	1	00:00	3	00:01	2	00:03
0:04	0:05	0,0	1	00:00	4	00:00	Ō	0	2	00:00

#### Analysis interval 1 minute

If several holes are switched to active within a group then the **Total** of the results of the individual holes will be given. Additional parameters provided are:

#### **Hole Parameters**

Number of visits to **each** hole 1 ... 16 Total visit time for **each** hole 1 ... 16



Number of hole repetitions for **each** hole 1 ... 16 Latency to first hole visit

In a hole-board system equipped with a second XY frame (XY-type rearing indicator) behavior **on the board** can also be analysed using all the locomotory and spatial parameters provided for Open Field evaluation.

Additional parameters provided are:

#### Quadrant Parameters

(the board is divided into 4 quadrants of equal size each containing 4 holes)

Number of visits in each quadrant 1 ... 4 Time spent in each quadrant 1 ... 4 Average speed in each quadrant 1 ... 4 Locomotory distance in each quadrant 1 ... 4 Number of rearings in each quadrant 1 ... 4 Time resting in all quadrants Time moving in all quadrants

#### Data export

For further processing of the results with the aid of complex statistical programs all the calculated parameters can be stored in user-defined export files. Selectable column and decimal separators allow the adaptation of the export file (ASCII format) to the particular import program used.

#### TSE "Drinking + Feeding + MoTil" System

The MoTil home cage frames can be combined with our **TSE Drinking & Feeding Monitor**. This allows concurrent measurement of liquid and food consumption in addition to animal activity.



In this combination system **TSE Drinking & Feeding & MoTil Monitor** the motility data are acquired within the Drinking & Feeding software.



Home cage size III frame with dual-sensor lid for rats

Motility data is integrated into consumption tables and meal analysis tables (basic evaluation = counts).



Rat in a home cage equipped with 1 Drinking & 1 Feeding sensor and placed into a MoTil frame

Sensor 15 -Substance Sensor 16 -Substance Analysis Interval	H2O UAR03 12:00:00 (h:mi	in:s)		
Interval End 22.07.2000 04:38:56 after 22.07.2000 16:38:56 after 23.07.2000 04:38:56 after 23.07.2000 16:38:56 after 24.07.2000 04:38:56 after 24.07.2000 16:38:56 after	Sen h:min:s 12:00:00 24:00:00 36:00:00 48:00:00 60:00:00 72:00:00	sor15 ml 16,3 11,1 18,3 9,7 20,0 8,2	Sensor16 g 21,6 10,0 21,1 9,1 22,7 9,5	Counts 14754 8138 23007 6095 16851 6940

#### Results table - 12h interval analysis - differentiated





Results table - water consumption + activity measured per hour in a 3-day experiment after data import in Excel

Sensor 15 -Substance Sensor 16 -Substance Intermeal Interval Analysis Interval Sampling Interval	H2O UAR03 00:15:00 12:00:00 00:01:00	(h:min: (h:min: (h:min:	s) s)				
Sensor 15	Interval Start h:min:s	Nos.	Dur. h:min:s	Qty. ml	MV Dur. h:min:s	MV Qty. ml	Counts
21.07 2000 16:38:56 after 22.07 2000 04:38:56 after 22.07 2000 04:38:56 after 23.07 2000 04:38:56 after 23.07 2000 04:38:56 after 24.07 2000 04:38:56 after 24.07 2000 16:38:56 after	$\begin{array}{c} 00:00:00\\ 12:00:00\\ 24:00:00\\ 36:00:00\\ 48:00:00\\ 60:00:00\\ 72:00:00\\ \end{array}$	9 4 10 4 11 4 0 42	01: 13: 05 00: 58: 05 01: 43: 07 00: 25: 02 01: 41: 07 00: 10: 00 00: 00: 00 06: 10: 26	16,3 11,1 20,6 7,5 20,0 8,2 0,0 83,6	00:08:07 00:14:31 00:10:19 00:06:16 00:09:12 00:02:30 00:00:00 00:08:29	1,8 2,8 2,1 1,9 1,8 2,0 0,0 2,1	14754 8138 23007 6095 16851 6940 0

Meal interval analysis table - water sensor - 12h interval

Sensor 15 -Substance Sensor 16 -Substance Intermeal Interval Sampling Interval	H2C UAR 00:1 00:0	203 5:00 ( 1:00	(h:min:s) (h:min:s)				
Sensor15	Time h:min:s	No.	Dur. h:min:s	Qty. ml	Gap h:min:s	Rate/Meal ml/min	Counts
21.07.2000 17:31:02 21.07.2000 18:59.09 21.07.2000 20:48:18 21.07.2000 20:48:18 21.07.2000 22:20:28 21.07.2000 23:36:30 21.07.2000 23:34:33 22.07.2000 01:01:40 22.07.2000 01:01:44	00:52:05 02:20:13 04:07:22 05:41:30 06:26:34 06:55:37 07:24:39 08:22:44 09:02:48	1 2 3 4 5 6 7 8 9	00:01:00 00:03:00 00:03:00 00:19:02 00:01:00 00:13:01 00:05:00 00:18:01 00:10:01	1.3 1.7 2.7 0.3 1.5 0.9	01:27:08 01:44:09 01:31:08 00:26:02 00:28:03 00:16:01 00:53:05 00:22:02 02:57:15	1,30 0,56 0,74 0,14 0,19 0,18 0,20 0,20	465 1686 2949 6890 7169 8878 9813 11499 13199
24.07.2000 06:36:18 24.07.2000 16:00:25 Max. number of Total Rate Meal Rate Latency	61:57:21 71:21:28 MoTil count Total Mean 0,0 ml/min 0,2 ml/min 00:52:05	41 42 s 42	00:02:00 00:04:00 06:10:26 00:08:49	2,3 1,4 83,6 2,0	09:22:07 00:35:32 64:22:56 01:34:13	1,18 0,35	73146 75016 75785
Meal sequence table - water sensor							

For further reaching analysis the locomotory data can also be read into the **MoTil software package** for detailed analysis of activity and locomotion.

# Partial List of Users

- Abbott, Ludwigshafen, Germany
- ACTELION Pharmaceuticals AG, Allschwill, Switzerland
- Altana, Hamburg, Germany
- Astrid Lindgren Children's Hospital, Stockholm, Sweden
- Aventis Pharma Deutschland GmbH, Frankfurt, Germany
- Bayer AG, Wuppertal, Germany
- Biopharm GmbH, Berlin, Germany
- Bristol-Myers Squibb GmbH, Regensburg, Germany
- Dr. Willmar Schwabe GmbH & Co., Karlsruhe, Germany
- elbion AG (former AWD, Asta Pharma Group), Dresden, Germany
- Ernst-Moritz-Arndt University, Greifswald, Germany
- ETH Zuerich, Switzerland
- FMP Research Institute of Molecular Pharmacology, Berlin, Germany
- Fraunhofer Institute, Hannover, Germany
- Friedrich Alexander University, Erlangen, Germany
- Gruenenthal GmbH, Aachen, Germany
- Heinrich-Heine University, Duesseldorf, Germany
- INSERM U 549, Paris, France
- Institut de Recherches SERVIER, Suresnes, France
- JSW Joint Science Worldwide Research GmbH, Graz, Austria
- Karolinska Institute, Stockholm, Sweden
- Leibniz Institute for Neurobiology IFN, Magdeburg, Germany



- Max-Planck-Institute, Goettingen, Germany
- Medimod Research Institute GmbH, Reutlingen, Germany
- Merck, Rahway, NY, USA
- Merck KgaA, Darmstadt, Germany
- National Yang Ming University Taipei, Taiwan
- Neuroscienze S.c.ar.l., Cagliari, Italy
- NeuroSearch A/S, Ballerup, Denmark
- Novartis Pharma AG, Basel, Switzerland
- Otto-von-Guericke University, Magdeburg, Germany
- Panum Institute, University of Copenhagen, Denmark
- Queen's University, Kingston, Canada
- Rheinische Friedrich-Wilhelms-University, Bonn, Germany
- Scantox, Lille Skensved, Denmark
- Schering AG, Berlin, Germany
- Solvay Pharmaceuticals GmbH, Hannover, Germany
- Taichung Veterans General Hospital, Taichung, Taiwan
- University of Basel, Switzerland
- University of Berlin, Germany
- University of Bremen, Germany
- University of Dresden, Germany
- University of Hamburg, Germany
- University of Malta, Msida, Malta
- University of Tartu, Estonia
- University of Tuebingen, Germany



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# **Ordering Information**

Cat.No.	Description
ActiMot System	
1. Base Units & Rearing	
Indicators	
a. 250x250mm	
302020/250/16-16	ActiMot base unit 250x250mm, 16*16 ISP (X-Y axis), D: 14mm
302020/250/16-R*	Unidimensional Rearing indicator for 302020/250/16-16: 16 ISP (Z axis), D: 14mm
302020/250/16-16-R	Rearing indicator for 302020/250/16-16: 16*16 ISP (2 <sup>nd</sup> X-Y axis), D: 14mm
b. 480x480mm	Example
202020/420/46 46	1 pc. 302020/480/16-16 Base unit + 1 pc. 302020/480/16-R <b>Z-axis</b> Rearing Indicator
302020/480/16-16	Actiliot base unit 480x480mm, 16"16 ISP (X-Y axis), <b>D: 28mm</b>
302020/480/16-R <sup>**</sup>	Unidimensional Rearing Indicator for 302020/480/16-16: 16 ISP (2 axis), D: 28mm
302020/480/16-16-R	Rearing indicator for 302020/480/16-16: 16 16 ISP (2 X-Y axis), D: 28mm
302020/400/32-32	Actimol base unit 400x40011111, 32 32 ISP (X-1 axis), <b>D: 1411111</b>
302020/480/32-R	Unidimensional Rearing Indicator for 302020/480/32-32: 32 ISP ( <b>2 axis</b> ), D: 14mm
302020/460/32-32-R	Reaning indicator for 502020/460/52-52. 52 52 15P (2 X-Y axis), D. 1411111
<i>C. 920X92011111</i>	ActiMet hass unit 020v020mm 16*16 ISD (X X avia) Dr 56mm
302020/920/16-16	Activitol base unit 920x92011111, 10 10 ISP (X-1 axis), D: 5611111
202020/920/10-R 202020/020/16 16 P	Distribution of the second sec
302020/920/10-10-1	ActiMet has unit 020x020/mm 22*22 ISD (X X avia) Dr 29mm
2020/920/920/22 D*	Actimited base unit 920X92011111, 32 32 13P (A-1 axis), <b>D. 2011111</b>
202020/920/32-R	Display the provided the provided of the provided the pro
202020/920/52-52-R	ActiMet hass unit 020x020/mm 64*64 ISB (X X axis), D. 2011111
2020/20/920/04-04	Lipidimonological Descing indicator for 202020/020/64 64: 64 ISD ( <b>7 exis</b> ) D: 14mm
302020/920/04-R	Distribution Realing indicator for 2020/020/64 64: $64*64$ ISD ( $2^{nd}$ X X axis), D: 14mm
JUZUZU/92U/04-04-K	* Unidimensional Z-axis type Bearing Indicators: You can combine up to 2 indicator unite
	(Z1+Z2) with each ActiMot base unit. They are mounted on different heights.
2. Inner Cages	Heights other than the ones mentioned below are available on request
a. For 250x250mm base unit	



302020-SIC/250	TRANSPARENT acrylic cage with lid for ActiMot unit 250x250mm, height 200mm
302020-SIC/250-IR	BLACK acrylic cage with lid for ActiMot unit 250x250mm, height <b>200mm</b> The material is permeable to infra-red light.
302020-SIC/250-OX	TRANSPARENT acrylic cage with lid for ActiMot unit 250x250mm for O <sub>2</sub> , CO <sub>2</sub> etc. measurements
b. For 480x480mm base unit	
302020-SIC/480	TRANSPARENT acrylic cage with lid for ActiMot unit 480x480mm, height 400mm
302020-SIC/480-200	TRANSPARENT acrylic cage with lid for ActiMot unit 480x480mm, height <b>200mm</b> (used for mice)
302020-SIC/480-IR	BLACK acrylic cage with lid for ActiMot unit 480x480mm, height <b>400mm</b> The material is permeable to infra-red light.
302020-SIC/480-IR-200	BLACK acrylic cage with lid for ActiMot unit 480x480mm, height <b>200mm</b> ( <i>used for mice</i> ) The material is permeable to infra-red light.
302020-SIC/480-OX	TRANSPARENT acrylic cage with lid for ActiMot unit 480x480mm for $O_2$ , $CO_2$ etc. measurements.
c. For 920x920mm base unit	
302020-SIC/920	TRANSPARENT acrylic cage with lid for ActiMot unit 920x920mm, height <b>400mm</b> (will be shipped disassembled)
302020-SIC/920-IR	BLACK acrylic cage with lid for ActiMot unit 920x920mm, height <b>400mm</b> The material is permeable to infra-red light. (will be shipped disassembled)
302020-SIC/920-OX	TRANSPARENT acrylic cage with lid for ActiMot unit 920x920mm for O <sub>2</sub> , CO <sub>2</sub> etc. measurements (will be shipped disassembled)
3. Templates	Templates are used when a smaller cage is to be placed in a larger base unit



	e de la companya de l
302020-SIC/250-480/S	Template for cage 302020-SIC/250 for use in ActiMot unit 480x480mm
302020-SIC/250-920/S	Template for cage 302020-SIC/250 for use in ActiMot unit 920x920mm
302020-SIC/480-920/S	Template for cage 302020-SIC/480 for use in ActiMot unit 920x920mm
4. Grid Floor Sets	The grid floor sets have to be ordered together with the inner cage. Retrofitting of existing cages with grid floors is not possible. They come complete with a stainless steel feces tray.
302020-FG-250	Non-shockable stainless steel floor set " <b>Mouse</b> " for ActiMot unit 250x250mm Rod $\emptyset$ 4 mm distance (rod center to rod center) 8 9mm
302020-FG-480-M	Non-shockable stainless steel floor set " <b>Mouse</b> " for ActiMot unit 480x480mm Rod $\emptyset$ 4 mm, distance (rod center to rod center) 8.9mm
302020-FG-480	Non-shockable stainless steel floor set " <b>Rat</b> " for ActiMot unit 480x480mm Rod $\emptyset$ 6 mm, distance (rod center to rod center) 19.5mm
5. Hole-Poke Inserts	The hole-poke inserts ("hole-boards") are made from grev PVC.
a. Mouse	
302020-HB/250-M	Hole Poke insert " <b>Mouse</b> " with 4x4=16 holes for ActiMot unit 250x250mm Hole diameter: 16mm
302020-HB/480-M	Hole Poke insert " <b>Mouse</b> " with 4x4=16 holes for ActiMot unit 480x480mm Hole diameter: 16mm
302020-HB/920-M	Hole Poke insert " <b>Mouse</b> " with 4x4=16 holes for ActiMot unit 920x920 mm Hole diameter: 16mm
b. Rat	
	Example:         1 pc. 302020/920/32-32 Base unit + 1 pc. 302020/920/32-R Z-axis Rearing Indicator           + 1 pc. 302020-HB/920-R Hole-Poke Insert Rat
302020-HB/480-R	Hole Poke insert <b>"Rat</b> " with 4x4 holes for ActiMot unit 480x480 mm Hole diameter: 32mm
302020-HB/920-R	Hole Poke insert " <b>Rat</b> " with 4x4 holes for ActiMot unit 920x920 mm Hole diameter: 32mm
6. Light-Dark Inserts	These inserts are made from BLACK acrylic material which is permeable to infra-red
v. Light-bark inserts	



a. For 250x250mm base unit	
302020-LDB/250-33	Light/Dark Box 33 % for ActiMot unit 250 x 250 mm.
	For use in acrylic cage types 302020-SIC/250, Black compartment & lid, with central
	gate to let the animal pass. Covers 33 % of the cage area.
302020-LDB/250-50	Light/Dark Box <b>50 %</b> for ActiMot unit 250 x 250 mm
	For use in acrylic cage types 30202-SIC/250 Black compartment & lid with central
	aste to let the animal pass. Covers 50 % of the cage area
b Ear 190×190mm base unit	gale to let the animal pass. Covers 50 % of the cage alea.
D. FOI 400X40011111 Dase unit	
302020-LDB/480-33	Light/Dark Box 33 % for Activity unit 480 x 480 mm.
	For use in acrylic cage types 302020-SIC/480. Black compartment & lid, with central
	gate to let the animal pass. Covers 33 % of the cage area.
302020-LDB/480-50	Light/Dark Box <b>50 %</b> for ActiMot unit 480 x 480 mm.
	For use in acrylic cage types 302020-SIC/480. Black compartment & lid, with central
	gate to let the animal pass. Covers 50 % of the cage area.
c. For 920x920mm base unit	
302020-LDB/920-33	Light/Dark Box 33 % for ActiMot unit 920 x 920 mm.
	For use in acrylic cage types 302020-SIC/920, Black compartment & lid, with central
	gate to let the animal pass. Covers 33 % of the cage area
302020-LDB/920-50	Light/Dark Box <b>50</b> % for ActiMot unit 920 x 920 mm
302020-200/320-30	Egni Dark Box 50 70 for Activity and 520 x 520 min.
	acto to lot the animal page. Covers 50 % of the cage area
7 Control Unito	gale to let the animal pass. Covers 50 % of the cage area.
	Control unit for 2, 4, 0, 40, 24 or 22 ActiMet units, Includes and or more DCI plat
302020-C/X	Control unit for 2, 4, 8, 16, 24 or 32 Activity units. Includes one or more PCI slot
	interfaces. Please replace X with the respective number.
8. Place Preference Inserts	
302020-PPI/250	Place Preference Insert for Motility Measuring Unit ActiMot 250 x 250 mm.
	For use in an acrylic cage 302020-SIC/250 series.
	Complete and consisting of:
	Partition wall (black, permeable to infra-red light) with central gate, mounted to the
	center of the ceiling
	• Each compartment has its own lid (clear, on request black) with a hinge on the rear
	side to introduce the animal
	Manual vertical door (black, permeable to infra-red light), built into the partition wall
	Two floor inserts with different surface structures
302020-PPI/480	Place Preference Inserts with difference Line Value Structures
302020-11 1/400	For use in an applie cage 302020 SIC/480 series
	Complete and expecting of
	Complete and consisting of.
	Partition wall (black, permeable to infra-red light) with central gate, mounted to the
	center of the ceiling
	• Each compartment has its own lid (clear, on request black) with a hinge on the rear
	side to introduce the animal
	Manual vertical door (black, permeable to infra-red light), built into the partition wall
	Two floor inserts with different surface structures
302020-PPI/920	Place Preference Insert for Motility Measuring Unit ActiMot 920 x 920 mm.
	For use in an acrylic cage 302020-SIC/920 series.
	Complete and consisting of:
	Partition wall (black, permeable to infra-red light) with central gate, mounted to the
	center of the ceiling
	<ul> <li>Each compartment has its own lid (clear, on request black) with a hinge on the rear.</li> </ul>
	e Lacto introduce the angle
	Manual vartical door /block normaphic to infra red light) built into the restition well
	<ul> <li>Interview of the partition wall</li> <li>The first inserts with different surface of the table.</li> </ul>
	I WO HOOF INSERTS WITH DIFFERENT SUITACE STRUCTURES
9. Software	
302020-S/ <del>X</del>	Software package for 2, 4, 8, 16, 24 or 32 ActiMot units (incl. Open Field & Dark-Light
1	
	evaluation). Please replace X with the respective number.



10. Housings	
302020-HOU-250	Sound-attenuating housing for 1 ActiMot unit 250x250mm
302020-HOU-480	Sound-attenuating housing for 1 ActiMot unit 480x480mm
302020-HOU-920	Sound-attenuating housing for 1 ActiMot unit 920x920mm
MoTil System	
1. Base Units & Rearing Indicators	
302013-HC	MoTil base unit: Basic resolution = X-axis with 6 ISP, Y-axis with 2 ISP.
	Please specify cage size with order.
	A special template will be delivered with each frame to hold the cage in place.
302013-R	Unidimensional rearing indicator = Z axis with 4 ISP
	Suitable for cage lids with integrated food cribs.
302013-IR	1 additional infra-red sensor pair (for X, Y or Z axis)
	The suitable infra-red sensor configuration depends on the animal species and the
	required resolution of the acquired data
2. Control Units	
302013-C	Control unit (1 pc. for each group of 14 measuring units). Includes one or more PCI slot
	interfaces.
3. Software	
302013-S	Software package MoTil

ISP=Infra-red sensor pairs, D=Distance between sensor pairs

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