

Sophisticated Life Science Research Instrumentation



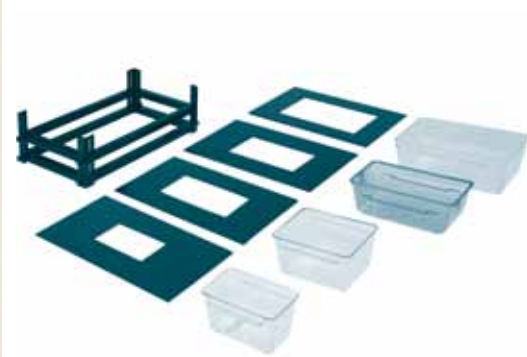
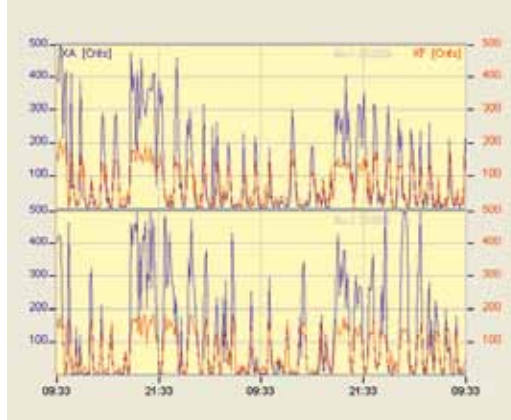
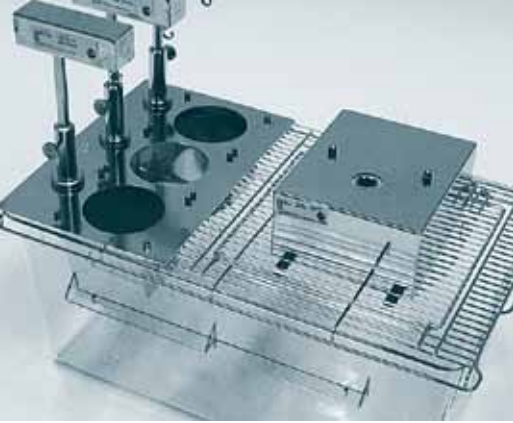
PhenoMaster

Activity Module



PhenoMaster: Activate Automation

www.TSE-Systems.com



General & Specific Activity

YOUR BENEFITS

- **High-throughput, long-term data: in-depth analysis**
- **Walk-away system: Round-the-clock monitoring**
- **Minimum experimenter interference: unbiased data**
- **Numerous experimental set-ups possible: all-in-one system**
- **2-year ALL-IN Warranty**
- **Expandable to multi-arena PhenoWorld**

PhenoMaster can be equipped with a variety of solutions for rodent activity analysis. This makes the system ideal for analysis of general or specific activities in the home cage

Home Cage Measurement

- Based on standard cage sizes
- Short animal habituation
- Long-term measurement without experimenter interference
- Easy maintenance and cleaning
- All paradigms combinable with drinking/feeding/body weight, indirect calorimetry and operant conditioning modules *

Infrared Light Beam Frame

- Dedicated three-dimensional activity measurement by infrared light-beam frame (ActiMot2) with high time resolution (100 Hz)
- Spatial resolution of beams adapted to animal size
- Z-axis (rearing) frame height adjustable for varying animal sizes
- Automatic calculation of center of gravity
- Resolution of light beam frame (raw data of each axis) equals half the beam width; two-dimensional resolution can be as low as 1.0 mm due to movement calculation and smoothing algorithm
- ActiMot2 also usable for temporarily inserted paradigms such as: place preference, open field, light/dark, hole board experiments or separate metabolic PhenoCage calorimetry module

Infrared Motion Sensor

- Passive infrared sensors mounted on the cage lid
- 24/7 monitoring of general activity
- Ideally suited for circadian studies
- Multiple cages controlled by single software
- Time constant of 5 millisecond
- No calibration necessary
- Operational under any lighting conditions
- Wide-angle detector includes rearing events
- Recordings unaffected by grid cover metals
- Measuring interval 1 minute, max. measuring time 720 hrs

Infrared Camera

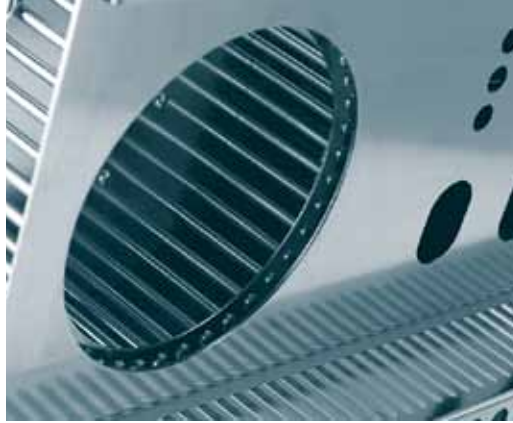
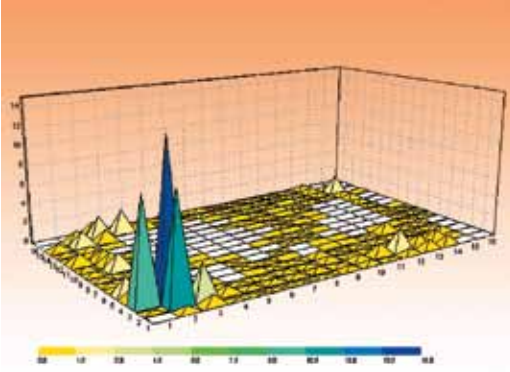
- Infrared-sensitive camera and illumination source mounted in special lid configuration
- No spatial interference with drinking/feeding/body weight sensors (including access control)
- Wide-angle camera covers complete cage surface
- Usable in connection with infrared light-beam frame
- Time movement analysis

LITERATURE EXAMPLE

Spinocerebellar Ataxia

Boy et al., Neurobiol Dis 2010
J. Boy and colleagues analyzed the motoric activity characteristics of a mouse model expressing ataxin-3 with 148 CAG repeats. Home cage activity analysis and open field measurements were done on the PhenoMaster system

* see separate module brochures



Running Wheel Activity/Software

The TSE Systems PhenoMaster can be equipped with modular multi-functional wheel types for specific applications

General Features

- Several variants of running wheels for different applications available
- Suitable for long-term studies
- Made of stainless steel, plastic wheels available for telemetry/NMR applications
- Wheels constitute enriched environment
- Rat and mouse sizes available
- Optional foot shock
- Modular design

Voluntary Running Wheel

- Modular standard wheels for cage types II to IV available
- Usable for motor skill testing, time/distance control, workload control and operant control

Motor Skill Wheel

- Varying rung distances optional
- Added enable/disable function for time/distance control

Workload Control

- Running wheel fitted with a computer-controlled brake mechanism
- Measures willingness to expend energy to enable running behavior
- Also available for exercise calorimetry

Exercise Wheel

- Sealed motorized wheel (CaloWheel) as standalone paradigm for exercise calorimetry studies

- Alternatively, running wheel may be fitted inside a suitable CaloCage
- For general calorimetry module details, please consult the brochure "PhenoMaster Calorimetry"

Operant Conditioning Wheel

- Wheel combinable with operant conditioning unit as reward feature

Motorized Wheel

- Computer-controlled motor-driven wheel
- Also available as sealed CaloWheel for calorimetry
- Run profiles can be programmed and stored
- Sleep deprivation application possible

Software

- All wheels controlled by PhenoMaster software
- Independent programming and monitoring of all wheels controlled by the software
- Comprehensive in-process monitor
- Speed profiles for motorized wheels can be activated at preset time points
- Bidirectional wheel rotations with a resolution of 90° detected
- Differential workloads programmable
- Comprehensive analysis of parameters and functions, depending on wheel type and operational mode
- Complex rewards programmable for learning experiments
- Forced Wheel run profiles can be programmed and stored

YOUR BENEFITS

- **Experimental variability**
- **Flexibility in experimental design, control and analysis**
- **All major statistics packages supported**
- **Individual and grouped analyses**
- **Data from all modules combinable**
- **Highly user-friendly system**

LITERATURE EXAMPLE

Brain Energy Balance

Schmidt et al., Am J Physiol Endocrinol Metab 2008

This research group investigated the functions of brain glucose transporter 3 (GLUT3) by analyzing a hemizygous Slc2a3^{+/-} knock out mouse model. TSE running wheel was used to determine voluntary activity.

| COMBINATORIAL PARADIGM OPTIONS* | | | | | | | | | |
|---------------------------------|-----------------|---------------|-----------------|--------------|---------------------|------------------|-------------------------|----------------------|------------------------|
| PARADIGM | INFRARED CAMERA | ACTIMOT FRAME | INFRAMOT SENSOR | OPERANT WALL | MOTOR RUNNING WHEEL | WORKLOAD CONTROL | VOLUNTARY RUNNING WHEEL | INDIRECT CALORIMETRY | FEED/DRINK/BODY WEIGHT |
| INFRARED CAMERA | | (+) | - | + | + | + | + | + | + |
| ACTIMOT FRAME | (+) | | (+) | + | ? | ? | ? | + | + |
| INFRAMOT SENSOR | - | (+) | | + | + | + | + | + | + |
| OPERANT WALL | + | + | + | | + | + | + | + | + |
| MOTOR RUNNING WHEEL | + | ? | + | + | | - | - | + ¹ | + |
| WORKLOAD CONTROL | + | ? | + | + | - | | ? | ? ² | + |
| VOLUNTARY RUNNING WHEEL | + | ? | + | + | - | ? | | + | + |
| INDIRECT CALORIMETRY | + | + | + | + | + ¹ | ? ² | + | | + |
| FEED/DRINK/BODY WEIGHT | + | + | + | + | + | + | + | + | |

* please enquire about options or multi-combinations not mentioned here.
Particular combinations may depend on cage specifications

- 1) Exercise Running Wheels are motorized
- 2) Exercise Running Wheels are fitted with a brake

+ Paradigm combination possible

- Paradigm combination not possible

(+) Paradigm combination possible, but not recommended

? Please enquire

| TECHNICAL DATA RUNNING WHEELS * | | |
|---------------------------------|---------------------|-------------------|
| | RUNNING WHEEL MOUSE | RUNNING WHEEL RAT |
| DRUM DIAMETER (MM) | 115 | 252 |
| DRUM WIDTH (MM) | 40 | 80 |
| ROD DISTANCE (MM) | 8.9 | 15.5 |
| SHOCK STRENGTH (CALOWHEEL ONLY) | 0 – 3.1 mA | |

* please enquire about specifications not mentioned here

| TECHNICAL DATA ACTIMOT2 IR FRAME * | |
|------------------------------------|--|
| FRAME SIZE (MM) | 289 x 245 515 x 294 530 x 390 515 x 515 |
| BEAM SPACING (MM) | 15 / 30 / 45 / 60 / 90 / 120 |
| MEASUREMENT FREQUENCY (HZ) | 100 |

* please enquire about specifications not mentioned here

International Projects



Specifications subject to change without notice

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