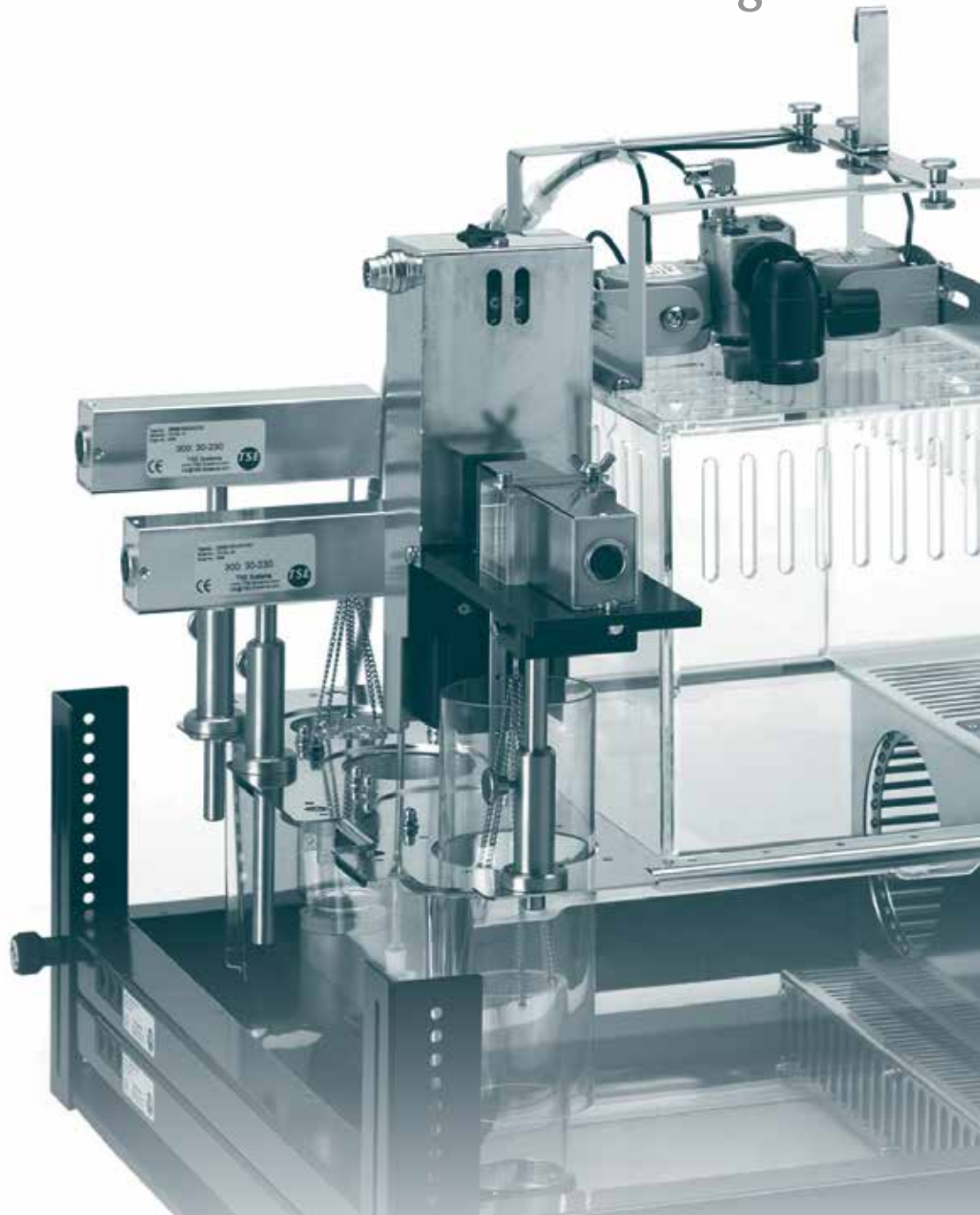


Sophisticated Life Science Research Instrumentation



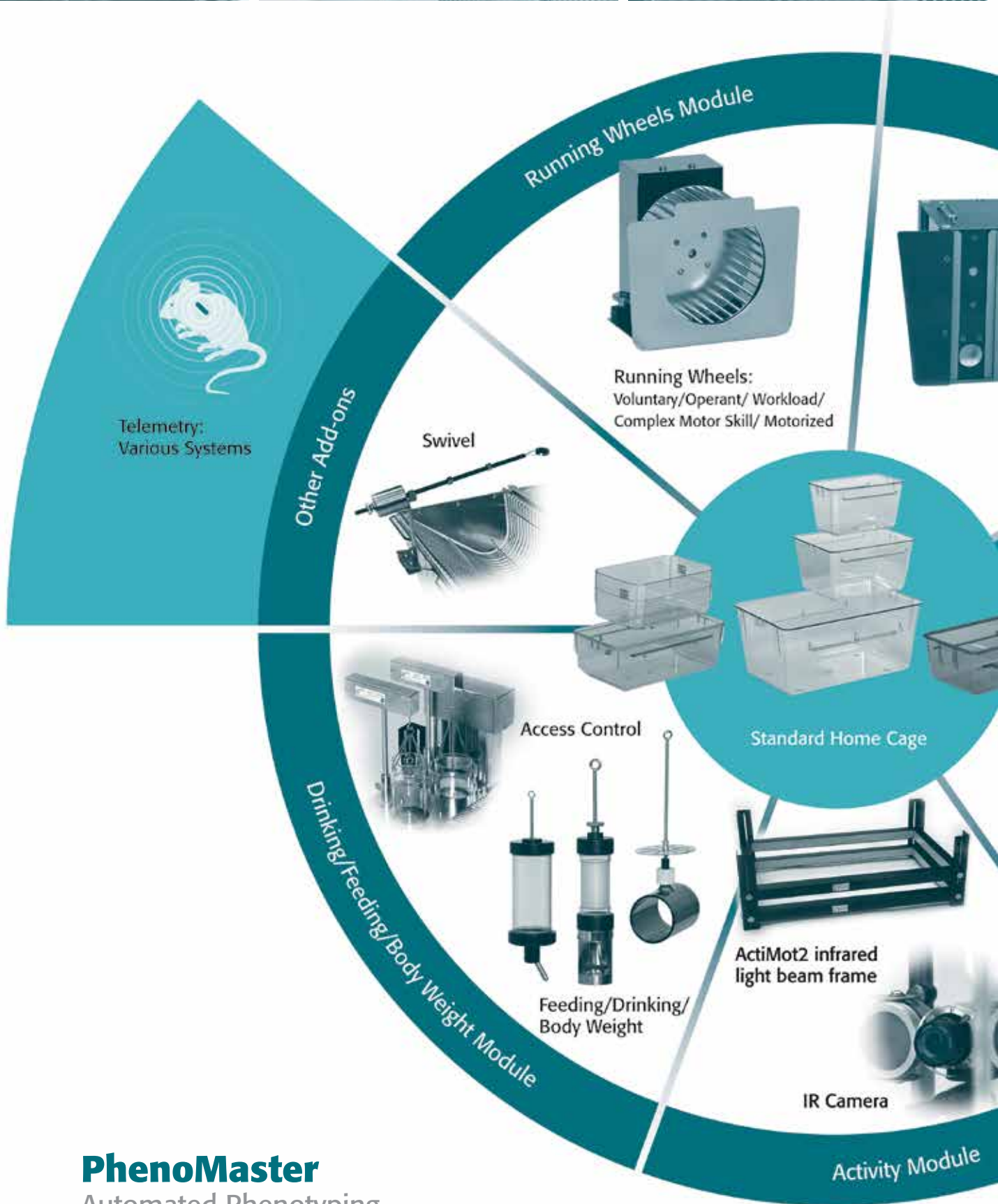
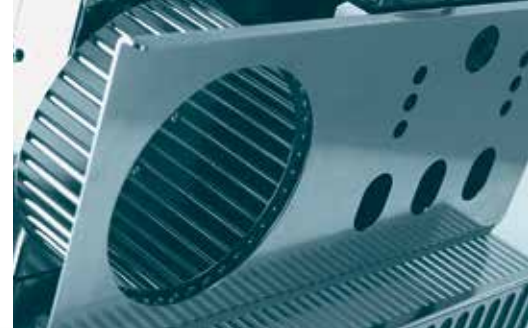
# PhenoMaster

Integrated Behavior & Metabolism Monitoring



Automated Phenotyping: New Horizons

[www.TSE-Systems.com](http://www.TSE-Systems.com)



# PhenoMaster

Automated Phenotyping

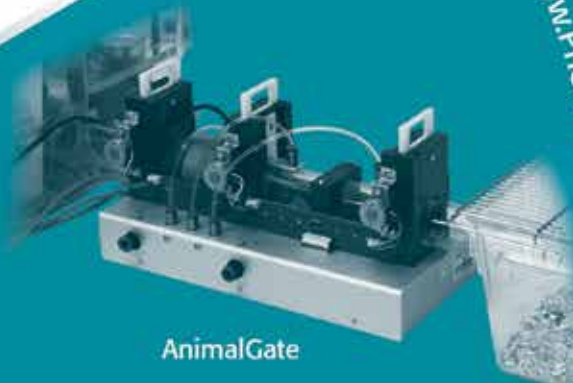




Operant Learning Module



Operant Wall



AnimalGate

For detailed information, please see separate brochure  
[www.PhenomWorld.com](http://www.PhenomWorld.com)  
**PhenomWorld**  
**Multi-Arena System**

Calorimetry Module



CaloSys indirect calorimetry



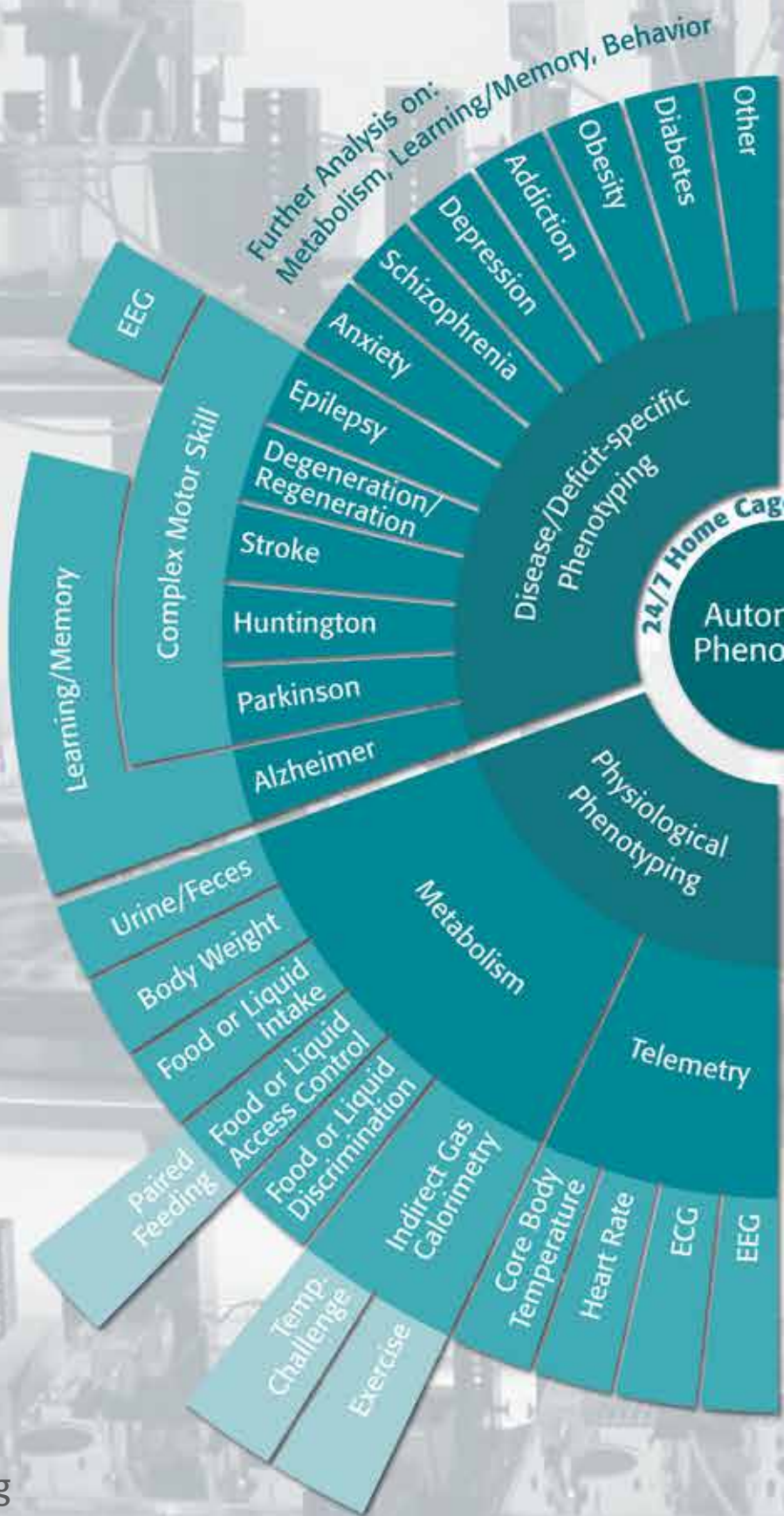
Exercise CaloWheels



CaloTreadmill



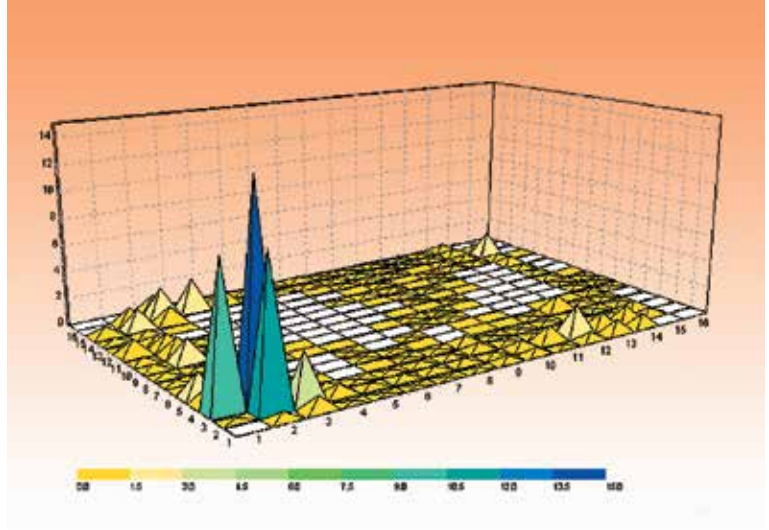
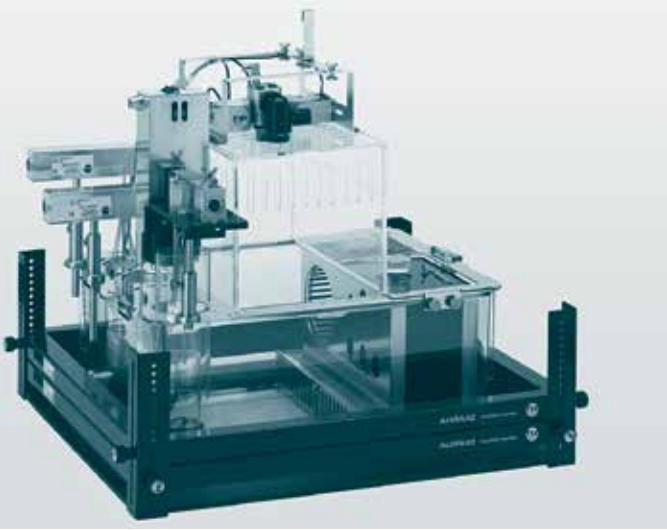
Metabolic PhenoCage



**PhenoMaster**  
Automated Phenotyping







## Hardware: Integrated Modules

The TSE Systems PhenoMaster is a comprehensive modular platform for automated behavioral and metabolic phenotyping of rodents

### YOUR BENEFITS

- **High-throughput, long-term data: in-depth analysis**
- **Home cage measurement: enhanced animal welfare and natural behavior**
- **Expandable modular system: growing with your needs**
- **Minimum experimenter interference: unbiased data**
- **Enhanced data accuracy**
- **Numerous experimental set-ups possible: all-in-one system**
- **High-precision calorimetry**
- **2-year ALL-IN Warranty**
- **Expandable to multi-arena PhenoWorld**
- **Sturdy construction**

### Home Cage Measurement

- Based on standard cage sizes
- Short animal habituation
- 24/7 monitoring: long-term measurement without experimenter interference. Continuous data acquisition
- Easy maintenance and cleaning
- Multiple analysis modules
- Stress-reduced, enriched environment
- Continuous data acquisition

### Drinking/Feeding & Body Weight Monitoring

- High precision sensors in the cage lid
- Up to 6 sensors (depending on cage size) can be mounted: food choice/ diets & addiction experiments possible
- Access control module for deprivation or paired/yoked feeding experiments
- Efficient spillage protection

### Activity Monitoring

- Multi-purpose three-dimensional activity measurement by infrared light-beam frame (ActiMot2) with high time and spatial resolution
- ActiMot2 also usable for temporary paradigms such as open field, light/dark, hole board experiments
- Running Wheel activity module: enables measurement of voluntary activity, rotational direction, time & distance control, complex motor skills, workload control experiments

### Metabolic Analysis

- Push or pull respirometry
- Indirect calorimetry in the CaloSys module: energy expenditure using optional high-speed gas sensors
- Dedicated metabolic PhenoCages for urine and feces separation and quantification, combinable with drinking/feeding sensors and activity monitoring
- CaloWheel and CaloTreadmill allow exercise calorimetry studies

### Operant Conditioning

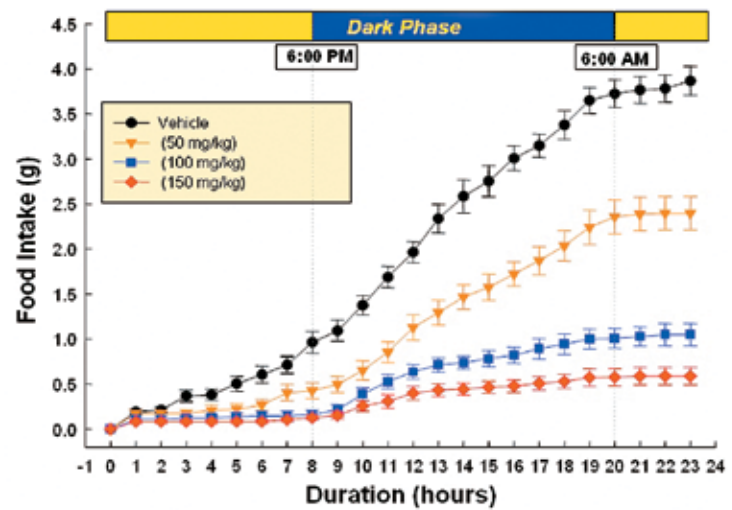
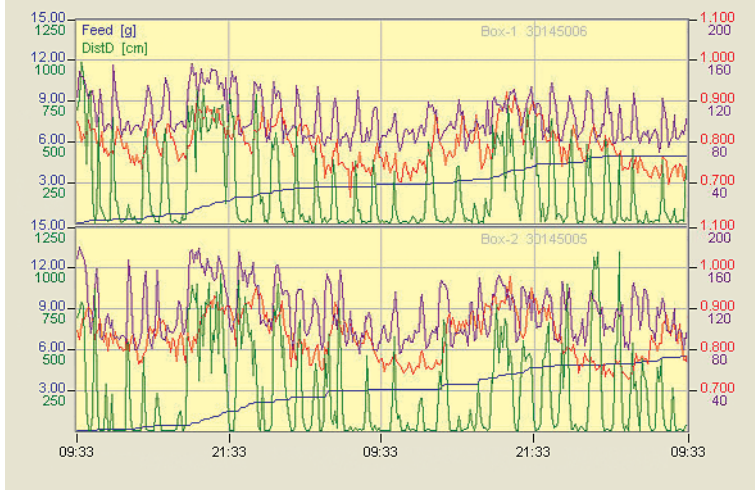
- Versatile operant learning module
- Modular wall design
- Interactive control of other home cage modules such as food access or running wheel as reward

### LITERATURE EXAMPLE

#### Obesity Research

*Fischer et al., Nature 2009*

J. Fischer and colleagues identified the function of the human FTO gene in energy homeostasis by long-term measurement of indirect calorimetry and physical activity parameters of *Fto*-deficient mice in the CaloSys and ActiMot2 modules of the PhenoMaster.



# Software: Design & Control at Your Fingertips

The TSE Systems PhenoMaster comes with a modular, flexible software platform

## General Features

- Integrates and synchronizes information from all hardware modules
- Practically unlimited number of cages supported
- Raw data storage
- Open for customized modular extension, for example optogenetics
- Individual animal or user-specified group analysis possible
- Parameter-specific analyses and displays

## Experimental Design

- Comprehensive set-up menu
- User-specified limits, for example refractory period for activity monitoring
- Programming of i.e. time- and/or consumption controlled food access
- Easy setup of long-term or repeat monitoring

## In-Process Control

- Full experimental control
- Constant supervision of ongoing experiments
- In-process values and graphics available
- Immediate response and experimental alterations possible
- Event markers may be placed during a running experiment

## Data Analysis & Export

- Filtering of experimental data
- Useful statistical tools implemented for immediate analysis
- Export formats supporting leading statistics programs

## Module-specific Features

- Activity measurement differentiates ambulatory and fine movements
- Optional exclusion of repetitive movements such as tail flicks
- Activity frame: separate areas individually definable
- Parameters from different modules combinable in graphs
- Calorimetry module constantly monitored for air quality and flow uniformity
- Programmable remote alarm unit available for calorimetry module – direct message to phone when preselected limits are violated

## YOUR BENEFITS

- Flexibility in experimental design, control and analysis
- All major statistics packages supported
- Individual and grouped analyses
- Data from all modules combinable
- Full design and in-process control
- Highly user-friendly system
- Minimum user service: remote maintenance option

## LITERATURE EXAMPLE

### Stress Research

*Kuperman et al., PNAS 2009*

The research group from the Weizman Institute analysed the neuroendocrine response to stress overexpressing the dox-inducible response mediator Urocortin in mice. Calorimetry, feeding/drinking and locomotor activity were studied with the PhenoMaster system.

## International Projects

**TSE Systems is proud to have been chosen as the SME partner in a number of internationally funded projects.**



### **PhenoScale (2009-2012)**

This project targets the high-throughput, standardized characterization of wild type, mutant and transgenic mouse strains, developing hardware and SOPs in the process.

**[www.phenoscale.com](http://www.phenoscale.com)**



### **RATstream™ (2007-2010)**

During the duration of this project, the automated high-throughput phenotypical characterization of rat models for neurodegenerative and psychiatric diseases has been achieved.

**[www.ratstream.eu](http://www.ratstream.eu)**



### **TSE Systems 24h Service**

TSE Systems offers an outstanding, global 24/7 premium customer service. Our experienced experts are dedicated to complete customer satisfaction and will solve your problem by e-mail, phone or an on-site visit.

*Specifications subject to change without notice*

**[www.TSE-Systems.com](http://www.TSE-Systems.com)**

**[Info@TSE-Systems.com](mailto:Info@TSE-Systems.com)**