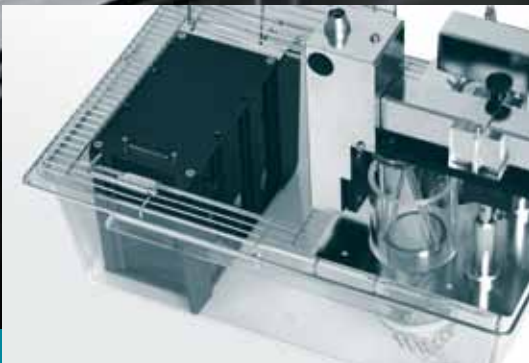


Sophisticated Life Science Research Instrumentation



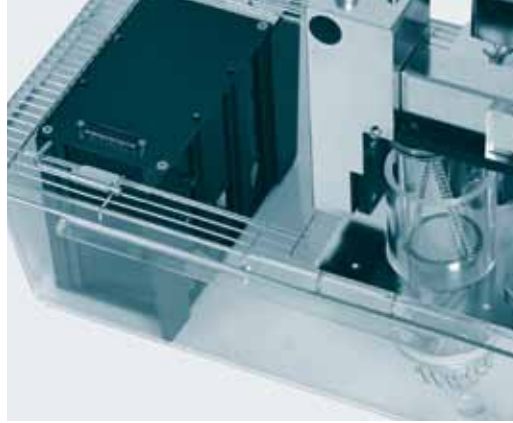
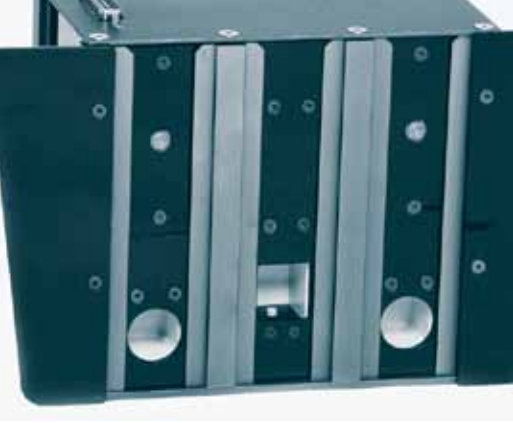
PhenoMaster

Operant Conditioning Module



PhenoMaster: Automate Learning

www.TSE-Systems.com



Operant Conditioning Units

The PhenoMaster can be equipped with a variety of operant conditioning modules to provide options for cognitive testing within long-term home cage measurements

YOUR BENEFITS

- **Precision: trusted sensor technology**
- **Flexibility: modular design for multiple set-ups**
- **Ease of use: minimal experimenter interference required**
- **Fully automated experimental set-up**
- **Comprehensive software control**

Home Cage Measurement

- Based on standard cage sizes for rats and mice
- Short animal habituation
- Programmable operant learning paradigms running without experimenter interference
- Easy maintenance and cleaning
- Paradigm fully integratable with activity measurement or Drinking/Feeding/Body Weight (see dedicated brochures)

Operant Wall Technology

- For operant behavior tasks according to Skinner – in the home cage
- Modular wall structure consisting of freely combinable stimulus, response, or reinforcer elements
- Stimulus by house light, speaker, sonalert, dedicated stimulus lamps, or olfactory module
- Response elements: nose poke module, reaction keys
- Reinforcer elements: pellet/liquid dispenser, running wheel, air puff
- Any combination of units applicable
- Ultra-sensitive levers for facilitated use

Reward Types

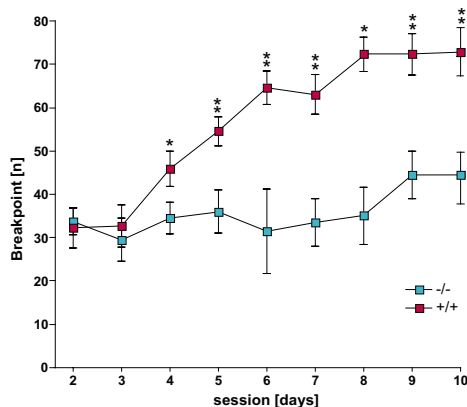
- Food pellet reward
- Liquid reward: liquid dispenser advanced or ultra-precision syringe pump for small volume application (including self-administration)
- Drinking/Feeding access reward also possible in conjunction with access-controlled Drinking/Feeding sensors mounted in the cage lid
- Food or Liquid Access Control also for deprivation prior to learning tasks
- Running Wheel access enabled by operant conditioning
- In extended multi-arena systems (PhenoWorld), gated access to new arenas possible

LITERATURE EXAMPLE

Degenerative Brain Diseases

Urbach et al., Methods in Mol Biol 2010

The book chapter delineates the philosophy behind automated comprehensive neurobehavioral phenotyping with particular attention to intra-home cage technologies such as the PhenoMaster.



Software & Service

General Features

- State-of-the-art and user-friendly software platform concept
- Integration of information derived from all attached hardware modules
- Practically unlimited number of PhenoMaster cages supported by a single control unit
- User-defined exercise protocols and upper limits of consumption
- Sample data, standard paradigms and exercise profiles predefined and storable for adaptation and later re-use

Experimental Design

- Freely programmable learning paradigms: any combination of, for example, light or audio stimuli, nose pokes, lever presses
- Fully automated set-ups programmable
- Access control as operant task
- Minimal experimenter interference

In-Process Control

- Comprehensive in-process control panel
- Online supervision of ongoing experiments

Data Analysis

- Flexible data handling, export and mining
- Basic data base tools for immediate analysis
- Data export supporting major statistics packages
- Filtering and sorting of data

Setup & Service

- For all PhenoMaster cage types, TSE Systems offers dedicated Rack systems with holders for lid storage during access
- Placement of calorimetric cages in environmental cabinets enables climate-control or temperature challenge experiments
- TSE's Two Years ALL-IN Warranty and Service Package includes installation, thorough training and comprehensive support
- Subsequent comprehensive maintenance and service contracts available

LITERATURE EXAMPLE

Learning/Memory

Van den Oever et al., J Proteome Res 2006

The group investigated long-term effects of sucrose self-administration on molecular changes related to memory using a proteomics approach. Learning and memory behavior was tested in a TSE Systems operant behavior system, which is the basis for the PhenoMaster operant wall.

YOUR BENEFITS

- **Flexibility:** experimental design and analysis/data export
- **Easy to use:** one modular software platform for all paradigms
- **Versatile:** combinatorial paradigms
- **State-of-the-art:** continuous further development of open software platform
- **Security:** 2-year ALL-IN warranty
- **Minimum user maintenance:** remote service option

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

International Projects



Specifications subject to change without notice

www.TSE-Systems.com

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