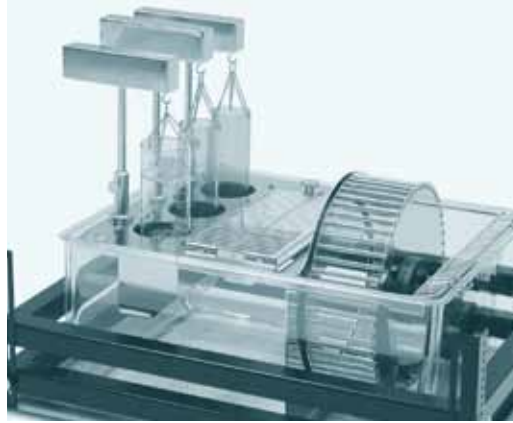


Running Wheel

For Small Laboratory Animals



Running Wheel: Flexible Modularity



Running Wheel Systems

TSE Running Wheel System is a flexible activity system for small laboratory animals (rats, mice). It can be configured for different applications

Voluntary Wheel Running

Most of TSE Systems Running Wheels can be operated within a home cage. Thus, the animal itself sets the running wheel in motion. In the most basic configuration the voluntary (spontaneous) activity of the animal in a home cage is measured.

For safe use in home cages, an exactly fitting separating panel with opening prevents the rotary sensor from becoming soiled by litter and the animal from accessing the wheel's rear. This means that the running wheels are particularly suitable for long-term circadian studies, as the animals can be kept in their usual surroundings. An optional lid is available to close the wheel if it is supposed to be operated outside the home cage.

Wheels for voluntary running are available with stand-alone counter units or as computer-controlled systems.

With stand-alone systems, two counter units can be provided, according to the system configuration. The basic version counts the total number of right and left rotations, respectively. The advanced version counts the right and left rotations, separately.

In the standard version the running wheels are made of stainless steel. For telemetric and NMR measurements all components can be completely made from plastics.

Wheels for voluntary running are available with the following additional special functionalities:

- An "enabled / disabled" mode allows for time and / or distance control of voluntary running. This can also be used for wheel running as a new reward feature by operant control
- Workload control is implemented by defined resistance variation through a brake system to the wheel drum which may be used in exercise studies including exercise indirect calorimetry
- Wheel drums with variable rod distances allow for automated motor skill testing (new paradigm)

Motorized Running Wheel

In this configuration the running wheel is driven by a motor so that the animal is forced into action (forced activity for exercise or sleep deprivation paradigms). The motor speed can be steplessly defined by the operator.

Motorized wheels are available as stand-alone units or as computer-controlled systems. Computer controlled systems include speed profile design and storage as well as automated application of a selected speed profile in running experiments. Motorized running wheels are provided with removable waste pans and are usually operated outside the home cage. A specialized sleep deprivation wheel is available which features a closed,

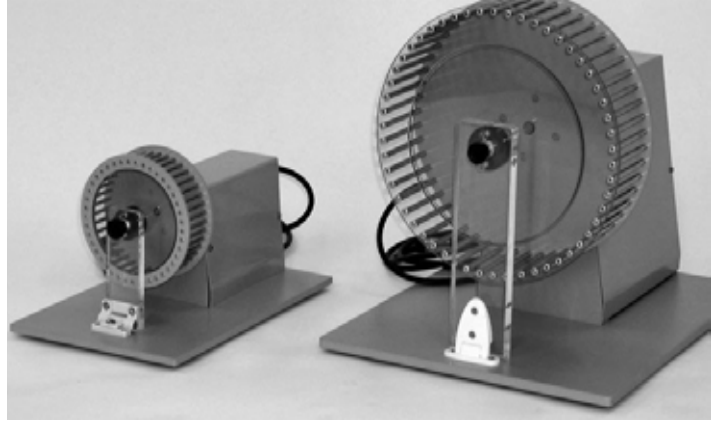
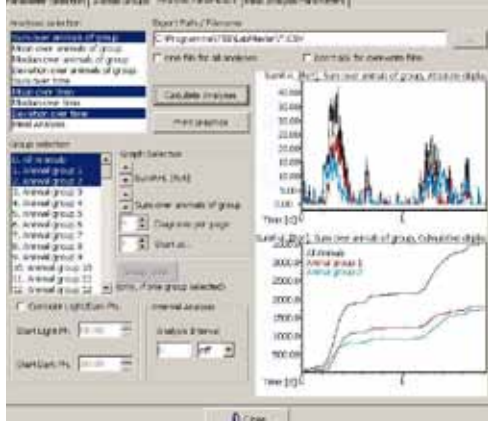
motorized running wheel and drinking supply.

Calorimetric Wheel

If the motorized running wheel is operated in a closed compartment then the O₂ and CO₂ content of the exhaled air can be measured. This allows to calculate a number of calorimetric parameters such as energy expenditure and respiratory quotient (RER) during exercise. Calorimetric wheels, the so-called Calo-Wheels, are always computer-controlled. In the PhenoMaster system, exercise calorimetry wheels can be mounted inside the home cage (see separate brochure).

Options

- Combined wheel systems are available which can be operated in active & passive mode. This means that change-over time between the systems is no longer required. Please contact us for more information
- A stimulus generator for intracranial self-stimulation can be integrated in the system for voluntary wheel running. The stimulus is given after the animal has covered a predefined distance (positive reinforcement). Amplitude, time, polarity, etc. of the stimulus can be defined by the operator
- Alternatively a foot shock stimulus generator can be connected directly to the metallic grid of the drum in order to apply a foot shock (negative reinforcement)



Software Control

All 3 types of wheels are available as computer controlled systems

PhenoMaster Software Package

The process control unit contains the electronics for recording the running wheel rotations and controlling the motor speed in the motorized wheel. It is connected to both the rotary sensors of the running wheels and the special computer interface. The running wheel system runs under Windows 2000/XP.

The experiments can be started and stopped independently from one another in all running wheels which are connected. During the experiment the current activity values are displayed in a table. In the experiment setup you can choose between the number of rotations (left and right) or the distance traveled either in cm or inch.

Analysis Menu

In the analysis menu measuring parameters can be selected and animal groups defined. The results can then be calculated for the selected measuring parameters and groups and exported as a CSV file.

Various parameters and functions are available for the analysis. They depend on the wheel type chosen and the operating mode, e.g. for the voluntary running wheel the rotations:

- Mean values
- Median Values
- Sum values
- Deviation

If the function "Consider Light / Dark Phases" is activated then the user can define the time for the start of the day and night phases. This will produce an additional calculation for the light-dark-cycle.

YOUR BENEFITS

- Flexibility: modular functionality
- Configuration for different applications
- Long-term studies possible
- Active & Passive mode - no change-over times
- Home Cage measurement possible
- Made of stainless steel
- Fully automated
- 90° resolution for left/right rotation

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

LITERATURE EXAMPLE

Learning & Memory

Lin et al, J Physiology 2009
 Voluntary wheel running of mice was used to analyze the effects of exercise on cognitive function. The group found differential effects on neuro-plasticity and learning, depending on the type of exercise.

RUNNING WHEEL ORDERING INFORMATION	
RW CAGE ADAPTER KIT	303400-ADPT
RW CONTROL UNIT For up to 8 RW, extendable	303400-C/08
RW CONTROL UNIT For up to 16 RW, extendable	303400-C/16
RW CONTROL UNIT For up to 24 RW, extendable	303400-C/24
RW CONTROL UNIT For up to 32 RW, linkable with add. control units	303400-C/32
RW COUNTERS 2 FOR 1 RW	303400-COU-CC
RW MOTOR CONTROL	303400-MS
ENABLED / DISABLED FUNCTION	303400-RW-V-EDF
AUTOMATED WORKLOAD CONTROL	303400-RW-V-EDFAWC
BASIC UNIT FOR VOLUNTARY RW MOUSE WITHOUT DRUM	303400-RW-V-M-BU
DRUM STANDARD For Voluntary RW Mouse	303400-RW-V-MD1-S
DRUM FOR MOTOR SKILL TESTS For Voluntary RW Mouse	303400-RW-V-MD2-MST
BASIC UNIT FOR VOLUNTARY RUNNING WHEEL RAT WITHOUT DRUM	303400-RW-V-R-BU
DRUM STANDARD For Voluntary RW Rat	303400-RW-V-RD1-S
DRUM FOR MOTOR SKILL TESTS For Voluntary RW Rat	303400-RW-V-R-D2-MST
RUNNING WHEEL (ACTIVE) MOUSE For connecting to Control Unit/software package or motor-control	303400-RWA-M
CALOWHEEL MOUSE (Active RW)	303400-RWA-M/CW
RUNNING WHEEL (Active) Rat For connecting to Control Unit/software package or motor-control	303400-RWA-R
CALOWHEEL RAT (Active RW) For performing exercise calorimetry	303400-RWA-R/CW
RW SOFTWARE LICENCE 1 Channel; For 1 RW, complete and comprising	303400-S-001
SHOCKER For shockable Running Wheel floor grid	303400-SHOCK
STIMULATOR FOR RUNNING WHEELS	303400-STI

RW = Running Wheel

Specifications subject to change without notice



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.

www.TSE-Systems.com

Info@TSE-Systems.com