

superior products for

Behavioral Research



Video Tracking
Operant Conditioning
Circadian Biology
Sensory Motor
Analgesia
Social Interaction
Anxiety & Depression
Reward & Addiction
Food & Drink / Metabolism
Learning, Memory & Attention
Locomotor Activity & Exploration
In Vivo Electrophysiology & Optogenetics

 **Harvard
Apparatus**

 **COULBOURN
INSTRUMENTS**

Panlab

divisions of **Harvard Bioscience, Inc.**

Regenerative
Medicine

Electro-
poration
&
Electrofusion

Microdialysis

Animal,
Organ & Cell
Physiology

Electro-
physiology
&
Cell Biology
Research

Molecular
Sample
Preparation

**Behavioral
Research**

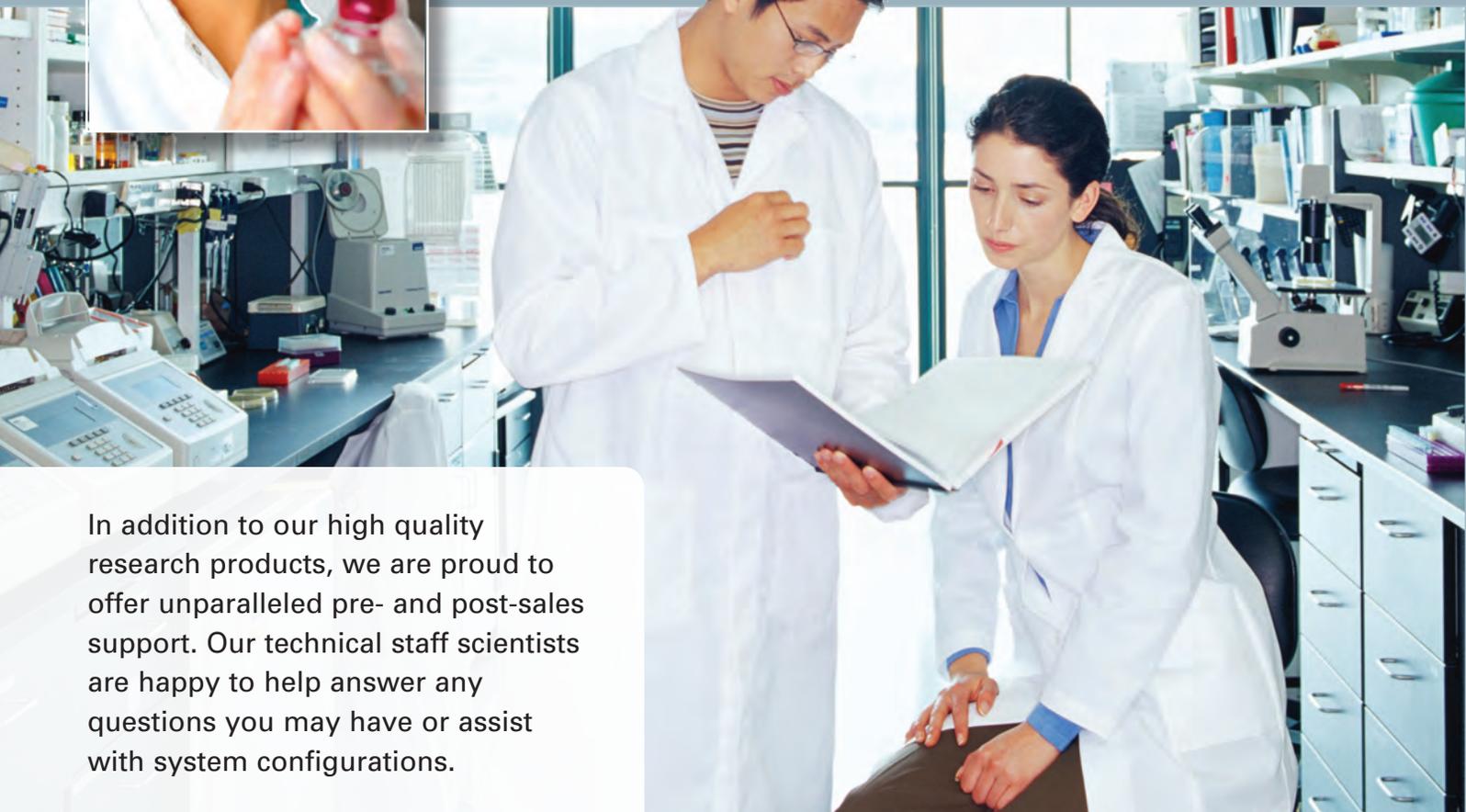
catalogs of interest

Pumps

Surgical
Tools

Do you have a technical question?

Our staff of scientists have the **answers** you need!



In addition to our high quality research products, we are proud to offer unparalleled pre- and post-sales support. Our technical staff scientists are happy to help answer any questions you may have or assist with system configurations.

Contact us or visit our websites for access to:

- ▶ Research Articles
- ▶ Product Specifications
- ▶ Working Procedures
- ▶ Demonstration Videos
- ▶ Instruction Manuals
- ▶ Application Sheets

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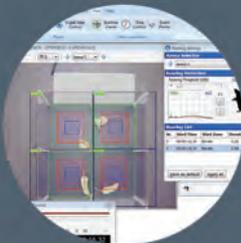
Our products help solve relevant problems in basic and clinical psychopharmacology. Applications include the study of brain functions (cognition, memory, emotion...), the study of related pathologies (Alzheimer's, Parkinson's, depression, addiction...) as well as the discovery and screening of new therapeutic compounds.

Our goal has always been to offer our customers the best service and full attention which translates into a dynamic business focus, while a constant effort is made to guarantee that high quality standards are accomplished in every detail.

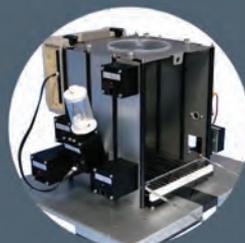
The company is constantly renewing and evolving its business model in order to better accommodate itself to the flexible and changing nature of the research market. With more than 30 years' experience, Coulbourn Instruments and Panlab have built a solid portfolio of high quality products for the automated evaluation of behavior in small laboratory animals. The addition of Triangle Biosystems International and Multi Channel Systems to the Harvard Bioscience family opens new possibilities for combining behavioral analysis with in vivo neuronal recording and stimulation (electrical or optogenetic).

We are not only gaining expertise but also building a new environment for fusing technologies, know-how and resources; a new synergy for creating innovative products for Neuroscience research.

All together, we aim to provide the most comprehensive and trusted solutions for behavioral studies.



**SMART Video
Tracking System
V3.0**



**Modular Operant
Box for Operant
Conditioning**



**TBSI Solutions for
Neural recording,
Electrical &
Optogenetic
Stimulation**



**MCS Solutions for
In Vivo Wireless
Electrophysiology**



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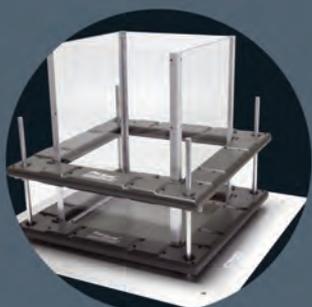
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Species Guide for Behavioral Systems

To help you become more familiar with our product line, we have added **small animal icons for every product.** These icons will help guide you to which species can be used with each system. Below are the animal icons you will see throughout this catalog.



rabbit



guinea pig



rat



mouse



insect



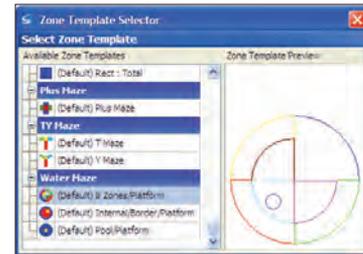
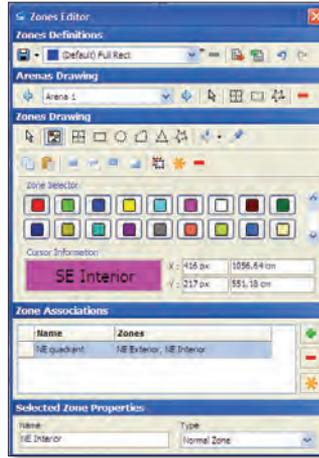
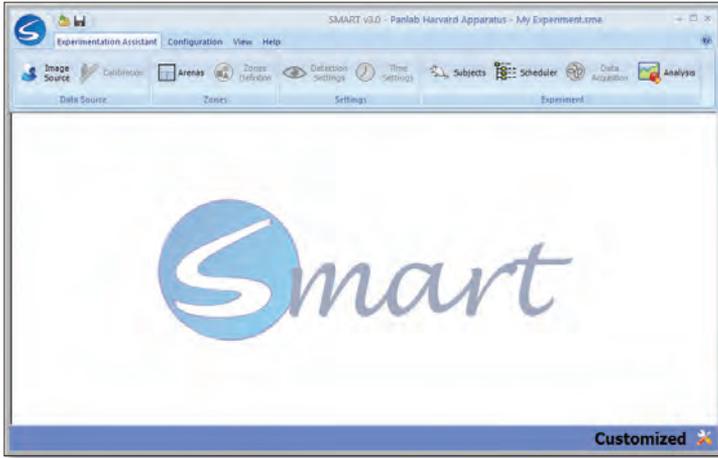
fish

Video Tracking



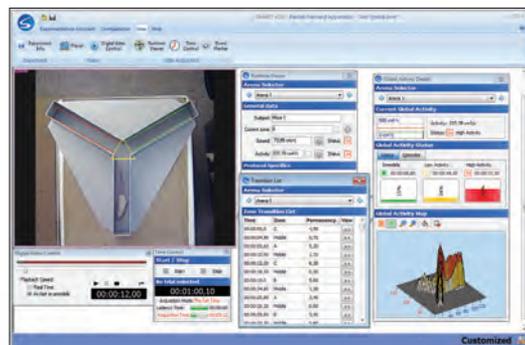
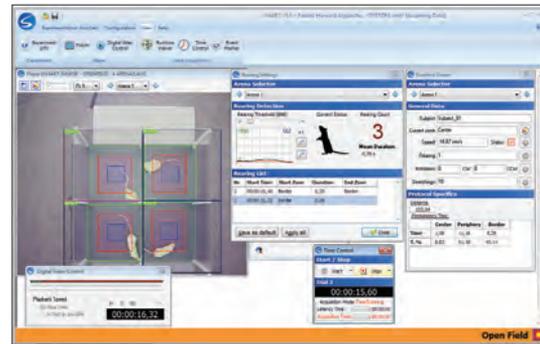
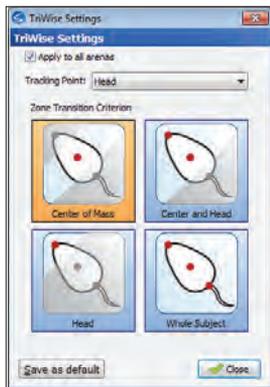
SMART Video Tracking System V3.0

Video Tracking • SMART Video Tracking System V3.0



KEY FEATURES

- ▶ Flexibility, reliability, productivity and simplicity all combined in one system
- ▶ Modular structure to fit all experimental needs, basic and advanced, and budgets
- ▶ Designed with the latest in both hardware and software technologies, SMART V3.0 represents over 15 years experience for increased functionality and maximum productivity for your experiments



SMART V3.0 offers the most flexible and easy-to-learn software on the market for the automated evaluation of behavior in the widest range of pre-clinical and neuroscience applications. Utilizing advanced image analysis, SMART V3.0 allows the recording of activities, trajectories, events, social interactions and global activity. SMART V3.0 provides users the versatility of a modular system with the capabilities of a broadband package. Our enhanced data analysis includes customizable data reports and complete calculations for unlimited behavioral paradigms.

Developed with the daily experimental process in mind – SMART V3.0 features an easy-to-use interface, a highly flexible structure fitting most applications and budgets. Advanced features ensure reliable data and increased productivity, saving valuable time and resources.

Optimal Flexibility & Reliability

SMART V3.0 offers the flexibility to maximize users' control over their experiment. Each experimental file contains settings information (camera, calibration, brightness/contrast, detection, and timing), zone definition, subject data, experiment schedule, registered trials, and the user-defined analysis report configuration. A built-in digital video recorder is included in all SMART V3.0 platforms!

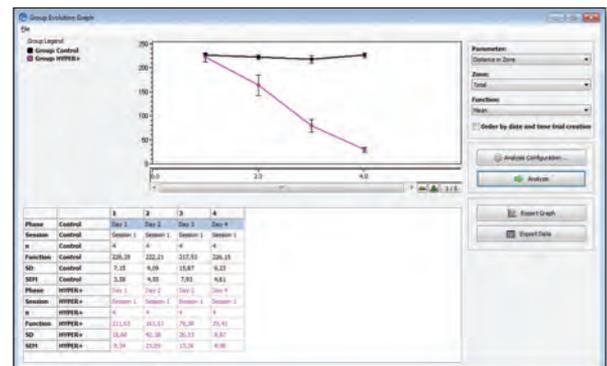
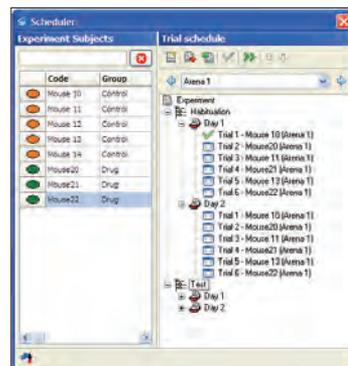
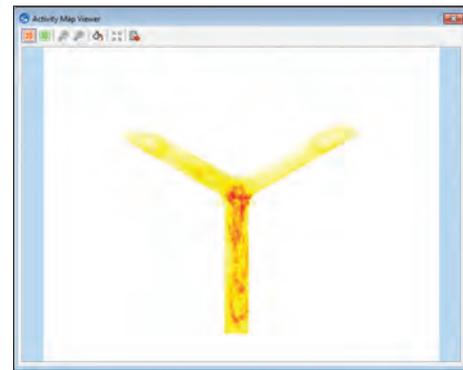
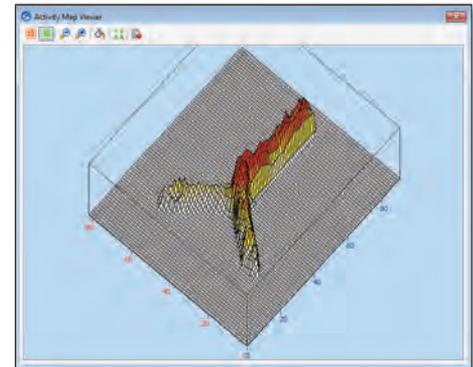
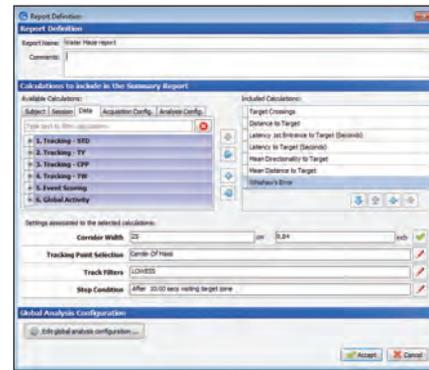
Our software features optimized static background detection algorithms, ensuring robust tracking even under the difficult conditions of low contrast. SMART V3.0 has the capability for user defined brightness and contrast levels in different zones of the same experiment. Now users can optimize different settings for each arena individually as well.

Subject and group information is now stored in a database for easier experimental integration. This data is easily organized via our experimental scheduler tool to manage the subjects, groups, and trials in different phases and sessions more easily.

RunTime panels provide useful information about the experimental progress for real-time information on current trial: time, zone position, speed, movement pattern and zone transition. Our new Group Evolution Graph tool allows fast viewing of inter-group differences.

SMART Experimental Modules

Need optimal flexibility to create unique experiments? Choose our customized module, SMART-CS for a fully editable system suited for a single subject. This option features free addition of arenas, zones, and associations, access to advanced timing settings, and completely user-defined calculations and data report configuration.



Video Tracking

SMART Video-Tracking System V3.0 (continued)

Running classic behavior experiments and looking to save time and expense? Opt for our experiment-targeted modules for pre-configured setup and data reports for such tests as water maze (SMART-WM), plus maze (SMART-PM), open field (SMART-OF), place preference (SMART-CPP), forced swim test (SMART-FST), etc.

SMART Extensions

Our Global Activity Extension – SMART-GA – is ideal for activity related experiments. This option uses frame-to-frame detection for precise monitoring of spontaneous activity and immobility, such as in the forced swim test and tail suspension test. This information is impressively illustrated on our advanced 2D and 3D activity map tools.

Simultaneously track subjects in different enclosures with our Multiple Arena Extension – SMART-MA. Limited only by the PC's performance, this extension allows for hundreds of different trials at the same time to optimize experimental productivity and throughput.

Increase precision and behavior recognition with the color detection mode and the automated 3-point detection if head, center mass and base-tail provided by our TriWise Extension - SMART-TW. Limited capabilities depending on experimental conditions - ask for information.

Integrate software with external devices for stimulus, cues, or other hardware for even more capabilities with SMART-IO.

Track several subjects in the same arena and their interactions with our Social Interaction Module – SMART-SI. Limited capabilities depending on experimental conditions - ask for information.

Conveniently bundled packages allow us to offer the full flexibility of our system for less! Choose the bundle that best meets your needs!

SMART Packages

SMART Basic Pack

For one animal in one arena. Includes:

- **SMART V3.0**
- **SMART-RC**
- **SMART-CS**
- **CONVANAUSB**
- **SMART-GA**

SMART Super Pack

The components of the basic pack plus:

- **SMART-MA**
- **SMART-TW**

SMART Premium Pack

Optimal flexibility by adding the remaining preconfigured modules to the super pack:

- **SMART-OF**
- **SMART-CPP**
- **SMART-WM**
- **SMART-FST**
- **SMART-PM**
- **SMART-SI**
- **SMART-TY**

Parameters Measured

SMART-CS (Customized Module)

- Information about Subjects, Session and Configuration
- Tracking calculation in user-defined zones (entries, time, distance covered, speed, resting/slow/fast displacements, etc.)
- Specific calculations for Global activity (spontaneous activity, immobility/low/high movements, 2D and 3D map activity images)
- All the standard advanced calculations provided in the experiment targeted module for water maze, open-field, plus-maze, T-Y maze, place preference, forced-swimming test, social interaction – spontaneous alternation triplet, Whishaw's error, relative time in zones, parallel index, turning tendency, mean directionality, etc.
- Integrated behavior through the TriWise 3-points detection (rearing, rotations, contacts between subjects)
- Time evolution report lists (zone transitions, activity episodes, scored events, registered contacts)
- Track X,Y coordinate report
- Group evolution graph

SMART-OF (Open-Field)

- Information about Subjects, Sessions and Configuration
- Tracking calculation in center, periphery, wall zone and total (entries, time, distance covered, speed, resting/slow/fast displacements, etc.)
- Specific calculations: parallel index, turning tendency
- Time evolution report lists (zone transitions, scored events)
- Group evolution graph

SMART-PM (Elevated-Plus Maze)

- Information about Subjects, Sessions and Configuration
- Tracking calculation in closed arms, open arms, center and total (entries, time, distance covered, speed, resting/slow/fast displacements etc.)
- Time evolution report lists (zone transitions, scored events)
- Group evolution graph

SMART-WM (Water Maze)

- Information about Subjects, Sessions and Configuration
- Tracking calculation in quadrants, border zone, platform and total (entries, time, distance covered, speed, resting/slow/fast displacements etc.)
- Specific calculations: latency to target, target crossings, distance to target, mean distance to target, Mean directionality, Whishaw's Error
- Time evolution report lists (zone transitions, scored events)
- Group evolution graph

SMART-TY (T- or Y- Mazes)

- Information about Subjects, Sessions and Configuration
- Tracking calculation in arms, center and total (entries, time, distance covered, speed, resting/slow/fast displacements etc.)
- Specific calculations: first arm choice, first arm choice latency, spontaneous alternation triplets, Max Alternation triplet, total arm entries
- Time evolution report lists (zone transitions, scored events)
- Group evolution graph

SMART-CPP (Conditioned Place Preference)

- Information about Subjects, Sessions and Configuration
- Tracking calculation in drug/placebo related compartment, corridor and total (entries, time, distance covered, speed, resting/slow/fast displacements etc.)
- Specific calculations: relative time in compartments
- Time evolution report lists (zone transitions, scored events)
- Group evolution graph

SMART-SI (Social Interaction)

- Information about Subjects, Sessions and Configuration
- Tracking calculation in the experimental area for each subject (entries, time, distance covered, speed, resting/slow/fast displacements etc.)
- Specific calculations: contact number between subjects, contact mean duration, relative movement, proximity
- Time evolution report lists (zone transitions, scored events)
- Group evolution graph

SMART-FST (Forced-Swim and Tail-Suspension Test)

- Information about Subjects, Sessions and Configuration
- Global and specific activity/immobility episodes calculations (total and mean duration, frequency, latency to first occurrence)
- Time evolution report lists (Activity/immobility episode list, manual scored events)
- Group evolution graph

NOTE We offer a full line of cameras, animal enclosures and mazes for all your experiments – please contact your local representative for more information.

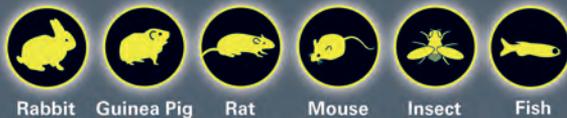
Ordering Information

Order #	Model	Product
SMART V3.0 Packs		
76-0695	SMARTBASIC	Smart V3.0 Basic Pack
76-0696	SMARTSUPER	Smart V3.0 Super Pack
76-0697	SMARTPREMIUM	Smart V3.0 Premium Pack
SMART V3.0 Platform		
76-0681	SMART V3.0	Smart V3.0 Platform – Requires Modules
76-0682	SMARTCS	Customizable Experimental Module
76-0688	SMARTOF	Open Field Preconfigured Module
76-0690	SMARTWM	Water Maze Preconfigured Module
76-0689	SMARTPM	Plus Maze Preconfigured Module
76-0691	SMARTTY	T/Y Maze Preconfigured Module
76-0692	SMARTCPP	Place Preference Preconfigured Module
76-0693	SMARTFST	Forced Swim Test And Tail Suspension Test Preconfigured Module
76-0687	SMARTSI	Social Interaction Preconfigured Module (Up to 8 Subjects In One Arena)
SMART V3.0 Extensions		
76-0683	SMARTGA	Global Activity Extension
76-0686	SMARTMA	Multiple Arena Extension
76-0685	SMARTTW	TriWise Extension
76-0267	SMARTIO	Input-Output Extension
Smart V3.0 Accessories		
76-0694	SMARTRC	Remote Data Acquisition Start/Stop Control
76-0262	CONVANAUSB	A/D Video Converter (USB), for Laptop and Desktop
76-0703	FRBOARD3	A/D Video Converter (PCI), for Desktop Only

REFERENCES

- Rajsanga P et al. (2015) *Thunbergia laurifolia* extract ameliorates cognitive and emotional deficits in olfactoryectomized mice. *Pharm Biol.* 2015 Aug;53(8):1141-8. (object recognition test)
- Wang L et al. (2015) Cognitive recovery by chronic activation of the large-conductance calcium-activated potassium channel in a mouse model of Alzheimer's disease. *Neuropharmacology.* 2015 May;92:8-15. (water maze)
- Zádor F et al. (2015) Low dosage of rimonabant leads to anxiolytic-like behavior via inhibiting expression levels and G-protein activity of kappa opioid receptors in a cannabinoid receptor independent manner. *Neuropharmacology.* 2015 Feb; 89:298-307. (plus maze)
- Giménez-Llort L et al. (2015) AVCRI104P3, a novel multitarget compound with cognition-enhancing and anxiolytic activities: Studies in cognitively poor middle-aged mice. *Behav Brain Res.* 2015 Feb 27. pii: S0166-4328(15)00121-7. (water maze)
- Ali T et al. (2015) Melatonin attenuates D-galactose-induced memory impairment, neuroinflammation and neurodegeneration via RAGE/NF- κ B/JNK signaling pathway in aging mouse model. *J Pineal Res.* 2015 Jan;58(1):71-85. (water maze)
- Doguc DK et al. (2015) Are there any remarkable effects of prenatal exposure to food colourings on neurobehaviour and learning process in rat offspring? *Nutr Neurosci.* 2015 Jan;18(1):12-21. (water maze, open-field, forced swimming test)
- Rodriguez-Espinosa N et al. (2015) Effects of acute and repeated cocaine on markers for neural plasticity within the mesolimbic system in rats. *Psychopharmacology (Berl).* 2015 Jan;232(1):57-62. (locomotor activity)
- Sun P et al. (2015) Fear conditioning suppresses large-conductance calcium-activated potassium channels in lateral amygdala neurons. *Physiol Behav.* 2015 Jan;138:279-84. (open-field test)
- Wang YP et al. (2015) Dopamine receptor D1 but not D3 essential for morphine-induced conditioned responses. *Genet Mol Res.* 2015 Jan 16;14(1):180-9. (open field)
- Inoue T et al. (2015) Planarian shows decision-making behavior in response to multiple stimuli by integrative brain function. *Zoological Letters* (2015) 1:7. (Chemotaxis assay in Planarian)

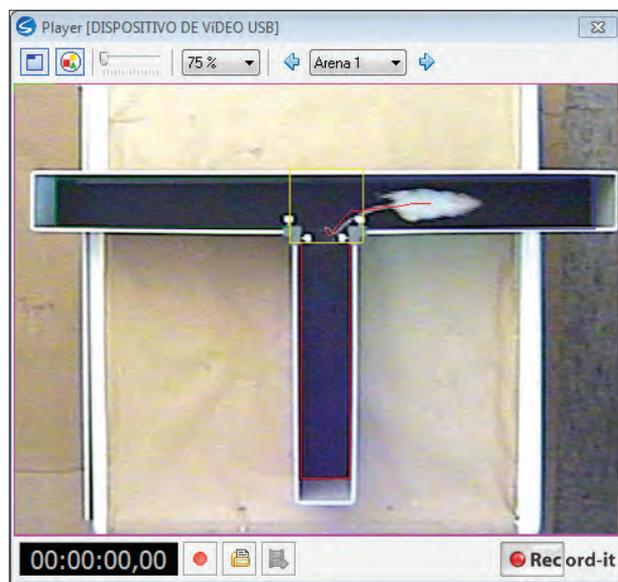
Video Tracking



Rabbit Guinea Pig Rat Mouse Insect Fish

RECORD-IT! Digital Video Recording Systems

Video Tracking • RECORD-IT! Digital Video Recording Systems



KEY FEATURES

- ▶ Ensure traceability
- ▶ Systems available for one to 8 cameras
- ▶ Record each camera independently as defined by the user
- ▶ Generates digital video files that can be processed with standard codecs in a Microsoft® Windows environment (no proprietary format restrictions)
- ▶ Independent video files can be generated on-the-fly
- ▶ Compatible with our SMART video tracking system, but not exclusive

We offer several different options for external digital video recording for ensuring traceability and security by saving the experimental images in a video file.

The RECORD-IT line of advanced built-in and external solutions for storing experimental videos makes the process so simple. Easily integrated with our SMART system, RECORD-IT can also be used with other tracking programs – all that is necessary is to install the appropriate video decoder modules.

Independent digital video can be generated on-the-fly, without the need for exportation and/or post-generation processing for each record-stop sequence.

Ordering Information

Order #	Model	Product
Digital Video Recording		
76-0698	RECORDIT1USB	Digital Video Recorder Software for Single Image Source (Includes One A/D USB Converter)
76-0527	RECORDIT4	Digital Video Recorders for up to 4 Image Sources
76-0531	RECORDIT8	Digital Video Recorders for up to 8 Image Sources
76-0603	RECORDITLIVE4	Cables, Adapters, Multiplexer/Switch for up to 4 Cameras
76-0604	RECORDITLIVE8	Cables, Adapters, Multiplexer/Switch for up to 8 Cameras
76-0601	RECORDITMON	HDMI Monitor Accessory for RECORDIT16 Systems

NOTE

We offer a full line of Cameras, Animal Enclosures and Mazes for all your experiments – please contact your local representative for more information.

Video Tracking



Built-in RECORD-IT! BASIC NEEDS



RECORD-IT!1USB MEDIUM NEEDS



RECORD-IT!4 to 16 ADVANCED NEEDS

SMART Built-In/External Solution	SMART V3.0 BUILT-IN Option - Recording settings and START/STOP are directly available from the software image source player. (Bundled with SMART V3.0 only)	EXTERNAL - RECORDIT!1USB software solution provided with the CONVANAUSB digitizer.	EXTERNAL - Computer based design complete solution provided with RECORDIT! software and hardware (computer + multiple camera digitizer card).
Computer Dependency	Always on the same computer as SMART.	Requires a computer - Either system running SMART or another.	Need to be used in a different computer than SMART.
Digital Video Recording / Tracking Simultaneous Process of the Same Experiment	YES - Both Video Tracking and Video Recording of the current experiment can be done simultaneously.	YES - Only when SMART and RECORDIT!1 USB software are installed in a different computer (they cannot be ran at the same time with the same image source in the same computer) and using adequate T-connector. Not possible with webcam.	YES - Only when purchased with the RECORDITLIVE options.
Digital Video File Specifications	Xvid format, short/medium duration: depends of computer performance and HD size (4 Mb/min).	Xvid format, short medium duration: depends of computer performance and HD size (4 Mb/min).	MPEG-4 format- Support long duration recording.
Image Source	Compatible with any image source detected by SMART 3.0 (webcam, WIA camera, camera connected to the CONVANAUSB or FRBOARD3 digitizers).	Compatible with any image source detected by SMART 3.0 (webcam, WIA camera, camera connected to the CONVANAUSB or FRBOARD3 digitizers).	Analog cameras.
Convenience	HIGH - Integrated solution & simultaneous tracking. Can work on laptop.	MEDIUM - Independent system, still handy and user-friendly. Can work on laptop.	MEDIUM/HIGH - Independent system, still handy and user-friendly. Multiple-cameras easy set-up!
Performance	LOW - Very demanding when recording is done simultaneously to tracking. From 10-16 fps for webcam and USB digitalizer, 25 fps with PCI digitalizer. Needs high computer performance: 2-3 GHz multicore, 2-4 RAM, HD500Gb, W7 32-64bits.	MEDIUM - From 10-16 fps for webcam and USB digitalizer, 25 fps with PCI digitalizer. Needs low/ standard computer performance: 2 GHz multicore, 2 RAM HD500Gb, W7 32-64bits	HIGH - From 25 fps (PAL) to 30 fps (NTSC) of 4 to 8 cameras with the optimal resolution needed for tracking process. Provided with independent high-performance computer: 3 GHz dual-core, 2 RAM, HD-1Tb, W7 32-64bits.
Camera Number & Productivity	LOW - One camera; single experiment at a time.	MEDIUM - One camera; can be used independently from SMART, each one in a different experiment.	HIGH - Multiple cameras, can be used independently from SMART, each one in a different experiment.
License Key	SMART USB Flash License key needed for recording video files.	Specific RECORDIT!1USB Flash License key needed for recording video files.	Electronic License key included.
SMART V2-5, & Smart JUNIOR Compatibility	NO - Only available with the SMART V3.0 platform.	YES - Fully compatible with the condition that related codecs are installed. The recorded videos can be opened from these versions.	YES - Fully compatible with the condition that related codecs are installed. The recorded videos can be opened from these versions.
Other Specific Features	None	None	User selectable quality levels in order to minimize the HD space and to maximize the precision of the tracking process, if required.
Quality/Price Ratio	Cost-saving solution - Provided with any SMART V3.0 platform without any additional cost!	MEDIUM/LOW if the user already has a computer to run it.	Higher Cost - For advanced needs.

Video Tracking



Rabbit



Guinea Pig



Rat



Mouse



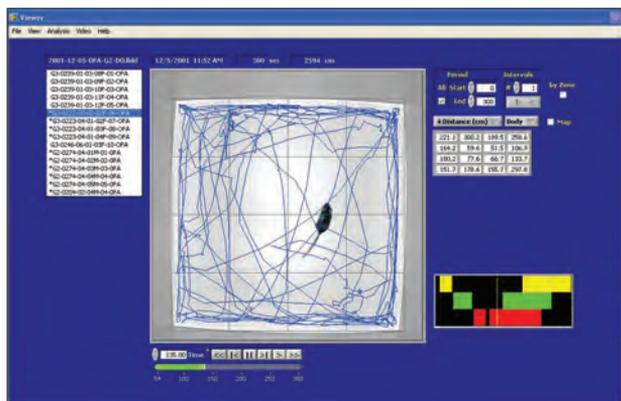
Insect



Fish

LimeLight Video Tracking Software

Video Tracking • LimeLight Video Tracking Software



KEY FEATURES

- ▶ Developed in close collaboration with behavioral neuroscientists
- ▶ Flexible and powerful video tracking system
- ▶ Ideal for: Open Field, Plus Maze, Zero Maze, Novel Object Recognition, Conditioned Place Preference

PARAMETERS MEASURED

- ▶ Distance travelled in each region (cm or %)
- ▶ Time spent in each region (sec or %)
- ▶ Crossings into each region
- ▶ Body length from nose to base tail (mm), together with stretch-attend bouts
- ▶ Pointing direction (orientation)
- ▶ Mean distance from center
- ▶ Latency to zone
- ▶ Distance and velocity vs. time
- ▶ Statistics for scored behaviors (1st and 2nd order)
- ▶ Statistics on occurrence of stimuli (output control)
- ▶ Zone sequencing
- ▶ Circling

COMPONENTS INCLUDED

- ▶ Software
- ▶ Instruction manual
- ▶ Software updates of acquired system (excludes upgrades)

LimeLight can be adapted to meet the needs of a wide range of applications. With a complete range of features, this video tracking system is very easy to configure and operate to acquire meaningful data.

LimeLight easily tracks up to four arenas simultaneously. A single camera can be used for multiple arenas or for greater flexibility, one camera can be used for each arena. Powerful enough to track white or black animals on any background, special lighting is not necessary. Images are collected up to 30 frames per second for a single animal or up to eight frames per second when tracking four arenas at once. Images are compressed and stored for later review and off-line scoring of complex behaviors. Video can easily be exported to AVI or QuickTime format for inclusion in presentations.

Our system simplifies zone creation through dedicated interfaces for open field and elevated plus maze testing. A custom zone setup permits unlimited flexibility for more specialized applications with an easy-to-use click-and-drag interface. Zone configurations can be edited during analysis and applied to previously recorded trials.

Scored behaviors can be noted by assigning a key stroke or by mouse clicking, either during the trial or video playback. Video can be played back frame-by-frame, backwards and forwards, at real-time speed or fast forward speed, with key commands for each mode. The user can opt to scroll quickly through the video by dragging the green slider beneath the image. Behaviors can be selected by clicking on the green buttons or by the key commands selected for each behavior. The user can select to preserve previous scores for some behaviors while re-analyzing to concentrate on scoring others. Up to 20 different sets of behaviors, with 16 behaviors each, can be stored and selected for use on any trial. Statistics on scored behaviors can be viewed and exported to Excel for analysis.

A main analysis window provides a graphic overview for each trial. Acquired data can be exported zone-by-zone or as a summary to Excel or a text file. Data from a group of animals can be collected into a single data file for later analysis. Data handling is extremely flexible.

LimeLight's interface makes it a pleasure to use. Dozens of shortcuts make navigating the many features of the program nearly instantaneous. Most displays, for example, can be double-clicked to display more details of an analysis or to change the displayed parameters, without searching through menus for the relevant item.

During the recording of a trial, LimeLight allows you to save the images collected for viewing or conversion to a QuickTime movie. QuickTime movie formatted segments can be imported into PowerPoint or other presentation software.

The LimeLight Analysis window shows a complete list of the animals contained in the data file – simply click on an animal to instantly display their motion path. If images from the trial were stored, a movie of the trial is available for viewing using the video buttons and key commands below the image. The trial analysis is also displayed, to the right, detailing the number of crossings per grid square as an intensity graph. A simple checkbox changes the display to a table format with numbers for each grid square. A pull-down menu allows the user to select from the many different analysis parameters, such as distance travelled, time in each grid square, mean length in each grid square, latency to each square, etc. A double-click on the color map exports the data to a text file and opens the file in Excel.

A portion of the trial can be analyzed, rather than the full trial, by toggling the “all/part” checkbox and setting the starting and ending time for the desired portion. Scored behaviors are also shown in the analysis window to the lower right; double clicking the graph produces a more detailed analysis.

Grids can be adjusted or custom zones can be created from arbitrary groups of grid squares by double-clicking on the image. Separate windows are accessible for viewing distance and speed against time, mean distance to center, animal length and circling. Any selected parameter can be exported directly to an Excel spreadsheet for instant viewing and statistical analysis.

Tracking can be based on body (center of mass, nose, or tail) via pull-down menu. Complex analyses such as animal length, speed and distance against time, mean distance to center and more are available via the Analysis screen.

Users can easily divide all the trials stored into a number of groups with the Groups Window. Once groups are specified, batch exporting of zone and grid data to Excel is easy with a single command. Parameters included in batch analysis are:

- Grid or Zone crossings
- Distance travelled
- Time spent in grid or zone
- Mean length of the animal
- % time animal spent in a particular length range
- Animal orientation

Options for batch analysis allow:

- Selection of a portion of each trial for analysis - user specifies the analysis start and end time relative to the trial start and end
- Division of the trials into multiple intervals for analysis
- Divide trials into named groups for subsequent analysis to compile mean and standard error for each group

Ordering Information

Order #	Product
ACT-300A	LimeLight Video Tracking Software
ACT-300A-U	LimeLight Upgrade to Version 3
Accessories for use with LimeLight	
ACT-711	Actimetrics USB Interface
ACT-VP-02	USB Camera Kit (includes lens, mounting bracket and cabling)
U90-04	USB 2.0 Mini 4-Port Hub

NOTE We offer a full line of Open Field Chambers & Mazes for use with our Tracking Systems. Contact us for more information.

REFERENCES:

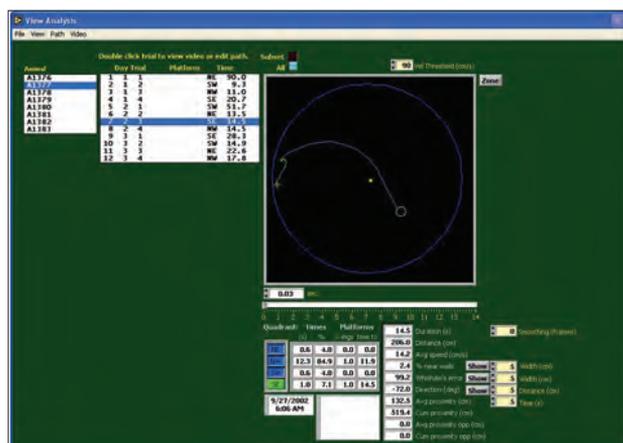
- Wagnon, J.L., Korn, M.J., Parent, R., Tarpey, T.A., Jones, J.M., Hammer, M.F., Murphy, G.G., Parent, J.M., and Meisler, M.H. (2015). Convulsive seizures and SUDEP in a mouse model of SCN8A epileptic encephalopathy. *Human molecular genetics* 24, 506-515.
- Dias, B.G., Goodman, J.V., Ahluwalia, R., Easton, A.E., Andero, R., and Ressler, K.J. (2014). Amygdala-dependent fear memory consolidation via miR-34a and Notch signaling. *Neuron* 83, 906-918.
- Ohmura, Y., Tanaka, K.F., Tsunematsu, T., Yamanaka, A., and Yoshioka, M. (2014). Optogenetic activation of serotonergic neurons enhances anxiety-like behaviour in mice. *The international journal of neuropsychopharmacology / official scientific journal of the Collegium Internationale Neuropsychopharmacologicum* 17, 1777-1783.
- Mastwal, S., Ye, Y., Ren, M., Jimenez, D.V., Martinowich, K., Gerfen, C.R., and Wang, K.H. (2014). Phasic dopamine neuron activity elicits unique mesofrontal plasticity in adolescence. *The Journal of neuroscience : the official journal of the Society for Neuroscience* 34, 9494-9496.
- Dewan A, Pacifico R, Zhan R, Rinberg D, Bozza T. (2013) Non-redundant coding of aversive odours in the main olfactory pathway. *Nature*. 497:486-489.
- Timothy P. O'Leary and Richard E. Brown (2013) Optimization of apparatus design and behavioral measures for the assessment of visuo-spatial learning and memory of mice on the Barnes maze. *Learning and Memory* 20: 85-96.
- Harris AP, Holmes MC, de Kloet ER, Chapman KE, Seckl JR (2013) Mineralocorticoid and glucocorticoid receptor balance in control of HPA axis and behaviour. *Psychoneuroendocrinology* 38:648-58.
- Moore SJ, Deshpande K, Stinnett GS, Seasholtz AF, Murphy GG. (2013) Conversion of short-term to long-term memory in the novel object recognition paradigm. *Neurobiology of Learning and Memory* 105:174-85.
- Francisco J. Monje, Isabella Divisch, Marvie Demit, Gert Lubec & Daniela D. Pollak (2013) Flotillin-1 is an evolutionary-conserved memory-related protein up-regulated in implicit and explicit learning paradigms *Annals of Medicine* 45:301-307.

Video Tracking



WaterMaze Video Tracking Software for the Morris Water Maze

Video Tracking • WaterMaze Video Tracking Software for the Morris Water Maze



WaterMaze, designed in collaboration with Richard Morris (University of Edinburgh), is an entirely new concept for taking the strain out of running Morris water maze experiments. WaterMaze incorporates a unique Project Manager for designing and executing complex experiments with multiple animals, starting points and platform positions. Reference memory, working-memory and other designs in which trials are interleaved in different ways can be accommodated easily. Once the project parameters are specified, each day WaterMaze tells the user which animal to run next and to which platform. Even the most complex experiments can be run accurately and efficiently, increasing experimental throughput.

The Project Manager keeps track of complex trial sequences for up to 100 animals at a time. The sequence of trials, including different starting positions, maximum trial durations and platform locations, can be specified independently for each animal or copied from one animal to others in the trial. The program can be set such that each animal gets all its daily trials together before the next animal is run, or with all animals being trained on one trial before they are moved to the next.

No matter how complex the experiment, the Project Manager keeps track and tells the user at the start of each new day how many trials are to be run for each animal. Then, through the course of a day's experiment, the program prompts the user for each animal in turn, showing on the live video image where the platform should be placed and where the animal should be released. The user is free to concentrate on animal behavior, not on animal bookkeeping. If necessary, preset sequences can be overridden and trials performed in any user-specified order. At the end of each trial, data are saved in pre-named files automatically. Problem subjects can be removed from the project at any time with the click of a button. Those that meet the learning criterion can be tagged and the program will automatically remove them from further training sessions.

For all its flexibility, WaterMaze is easy to use. Because the WaterMaze designers are also users, the features have been built to match the daily routine of running experiments. Controls and menus are placed in logical and intuitive arrangements, so that even complex protocols can be setup in a few minutes. Online Help windows are provided throughout the program.

KEY FEATURES

- ▶ Unique Project Manager to design and execute complex trial sequences
- ▶ Extremely flexible and easy to use
- ▶ Robust tracking
- ▶ Simple to setup with standard CCD cameras

PARAMETERS MEASURED

- ▶ Thigmotaxis
- ▶ Moser's zone
- ▶ Whishaw's corridor
- ▶ Gallagher's proximity
- ▶ Quadrant times and crossings

WaterMaze's analysis capabilities are unparalleled. Analyses can be viewed for single trials or exported for multiple trials directly to Excel. Scan through hundreds of trials easily with clickable animal and trial lists. Parameters include thigmotaxis, Moser's zone, Whishaw's corridor, Gallagher's proximity, quadrant times and crossings and more. Suggestions for new analyses from our users are regularly incorporated. Swim paths can be exported to standard drawing programs. Movies of each trial can be stored and viewed through the WaterMaze Analysis windows or exported to PowerPoint and other presentation software.

WaterMaze's tracking is robust and easy to setup with standard CCD cameras and video boards. No special lighting or video-processing hardware is necessary. Utilizing a state-of-the-art image-processing software and video-capture card, images are acquired at up to 30 frames per second. The WaterMaze program identifies the animal whether it is lighter or darker than the background. A unique algorithm screens out changing shadows and changing lighting conditions that might occur during the trial. On-line interpolation identifies and smoothes occasional loss of signal that can occur if an animal swims briefly underwater or under hanging cue objects. A special set-up window can be used to measure the evenness of lighting across the pool surface, helping to eliminate deep shadows.

The path is displayed in real time as the trial progresses. Landmarks or other cues of any color can be arranged in and around the pool, and the program can control multiple On-Demand (Atlantis) Platforms. Movies of each trial can be stored for later review or for export in QuickTime format to PowerPoint or other presentation software.

At the end of each trial, the experimenter can type notes concerning the trial. The trial can be stopped manually or automatically when the animal reaches the platform or after a set interval. The program indicates the next animal, platform location and start position.

Remote switches can be used to start, stop and save trials. Multiple switches for each function can be placed around the pool if desired. With the program in auto-sequence mode and autosave mode, multiple trials can be performed without a mouse or keyboard!

WaterMaze goes far beyond existing programs in its ease of use and flexibility. Because it is designed in close consultation with users, WaterMaze is integrated seamlessly with the experiment.

See additional information on our Circular Pool and Water Tanks on pages 54-55.

Ordering Information

Order #	Product
ACT-200A	WaterMaze Software and Analysis Suite
ACT-200A-U	WaterMaze Upgrade to Version 4
Accessories for use with WaterMaze	
ACT-711	Actimetrics USB Interface
ACT-VP-02	USB Camera Kit (includes lens, mounting bracket and cabling)
Optional Accessories	
ACT-200-4-D	WaterMaze Tank 4-Foot Diameter, Dark Interior
ACT-200-4-L	WaterMaze Tank 4-Foot Diameter, Light Interior
ACT-200-6-D	WaterMaze Tank 6-Foot Diameter, Dark Interior
ACT-200-6-L	WaterMaze Tank 6-Foot Diameter, Light Interior
ACT-201	WaterMaze Platform
ACT-202	Adjustable WaterMaze Platform
ACT-204A	Nautilus WaterMaze Platform (requires an ACT-711 USB Interface)

NOTE

See pages 54-55 for more information on our Circular Pools and Tanks.

REFERENCES:

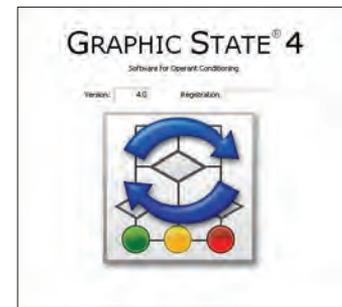
- Lee, Y.S., Ehninger, D., Zhou, M., Oh, J.Y., Kang, M., Kwak, C., Ryu, H.H., Butz, D., Araki, T., Cai, Y., et al. (2014). Mechanism and treatment for learning and memory deficits in mouse models of Noonan syndrome. *Nature neuroscience* 17, 1736-1743.
- Richards, B.A., Xia, F., Santoro, A., Husse, J., Woodin, M.A., Josselyn, S.A., and Frankland, P.W. (2014). Patterns across multiple memories are identified over time. *Nature neuroscience* 17, 981-986.
- de Hoz, L., and Martin, S.J. (2014). Double dissociation between the contributions of the septal and temporal hippocampus to spatial learning: the role of prior experience. *Hippocampus* 24, 990-1005.
- Bruno M. da Silva, Tobias Bast, and Richard G.M. Morris (2013) Spatial memory: behavioral determinants of persistence in the watermaze delayed matching-to-place task. *Learning and Memory* 21: 28-36.
- A. S. Sengar, J. Ellegood, A. P. Yiu, H. Wang, W. Wang, S. C. Juneja, J. P. Lerch, S. A. Josselyn, R. M. Henkelman, M. W. Salter, and S. E. Egan (2103) Vertebrate *Intersectin1* Is Repurposed to Facilitate Cortical Midline Connectivity and Higher Order Cognition. *The Journal of Neuroscience*, 33: 4055-4065.
- G. I. Cancino, A. P. Yiu, M. P. Fatt, C. B. Dugani, E. R. Flores, P. W. Frankland, S. A. Josselyn, F. D. Miller, and D. R. Kaplan (2013) p63 Regulates Adult Neural Precursor and Newly Born Neuron Survival to Control Hippocampal-Dependent Behavior *Journal of Neuroscience* 33:12569-12585.
- Alonso Martinez-Canabal, Katherine G. Akers, Sheena A. Josselyn, Paul W. Frankland (2013) Age-dependent effects of hippocampal neurogenesis suppression on spatial learning. *Hippocampus* 23:66-74.
- Kotermanski SE1, Johnson JW, Thiels (2013) Comparison of behavioral effects of the NMDA receptor channel blockers memantine and ketamine in rats. *Pharmacology, Biochemistry and Behavior* 109:67-76.

Operant Conditioning



Habitest Modular Behavioral Test Systems

Operant Conditioning • Habitest Modular Behavioral Test Systems



KEY FEATURES

- ▶ **Maximum flexibility**
- ▶ **Modular design for economical and re-configurable options**
- ▶ **Wide range of stimulus response sensors**

Designed for maximum flexibility, Habitest allows the user to implement the most behavioral test protocols in a single system of modular test arenas using modular stimulus and response devices. Habitest applications span the behavioral gamut, including:

- Mazes
- Runways
- Operant Conditioning
- Spatial Activity
- Ergometry
- Active Avoidance
- Passive Avoidance
- Fear Conditioning
- Place Preference
- Feeding and Drinking

With Habitest, users can create an endless variety of test environments, instantly and seamlessly reconfiguring for an endless variety of experimental modalities.

Habitest Stimulus and Response modules slip into the tracks of our cages and hubs. Stimulus response modules include those for visual and auditory stimuli, shockers, liquid and/or dry feeders, olfactory stimuli and ergometric activity.



Operant Conditioning

Ordering Information

Order #	Product
Control and Data Acquisition	
GS4.0	Graphic State® Notation 4 Software
GS4-UP	Graphic State® Upgrade to Version 4 (requires U90-10 USB Interface)
H01-01	System Power Base
H02-08	Habitest Linc (a system may include from 1 to 8 Lincs)
H03-04	Environmental Connection Board (ECB) and Linc Cable
U90-11	USB Interface
Test Cages	
Mouse:	
H10-11M-PA	Passive Avoidance Cage, Mouse
H10-11M-SC	Shuttle Cage, Mouse
H10-11M-TC	Test Cage, Mouse (includes infusion and stimulation lid, requires floor)
H10-11M-TC-NSF	Non-Shock Floor for Mouse Test Cage
H10-11M-TC-SF	Shock Floor for Mouse Test Cage (requires shocker and cable)
Rat:	
H10-11R-PA	Passive Avoidance Cage, Rat
H10-11R-SC	Shuttle Cage, Rat
H10-11R-TC	Test Cage, Rat (includes infusion and stimulation lid, requires floor)
H10-11R-TC-NSF	Non-Shock Floor for Rat Test Cage
H10-11R-TC-SF	Shock Floor for Rat Test Cage (requires shocker and cable)
Visual Stimuli*	
H11-01M	House Light, Mouse
H11-01R	House Light, Rat
H11-03M	Cue Light, Mouse
H11-03R	Cue Light, Rat
Auditory Stimuli*	
H12-01M	Speaker Module, Mouse
H12-01R	Speaker Module, Rat
H12-07	Seven-Tone Audio Cue (requires speaker module)
H12-08	White Noise Generator (requires speaker module)
A12-33	Programmable Tone/Noise Generator (requires speaker module)
Electrical Stimuli*	
H13-15	Precision Animal Shocker, Manual
H13-17A	Precision Animal Shocker, Manual and Programmable
A13-16	Shock Level Tester
H93-01-25	25 Ft. shock Cable (7.62 m)
Gustatory Stimuli*	
H14-01M	Pellet Delivery Trough, Mouse
H15-01R	Pellet Delivery Trough, Rat
H14-23M	Pellet Feeder, Mouse, 20 mg
H14-23R	Pellet Feeder, Rat, 45 mg

Ordering Information

Order #	Product
Levers*	
H21-03M	Response Lever, Mouse
H21-03R	Response Lever, Rat
H23-17MB	Retractable Lever, Mouse
H23-17RB	Retractable Lever, Rat
Lickometers*	
H24-01M	Optical Lickometer, Mouse (requires H20-94)
H24-01M-CA	Access Controlled Lickometer, Mouse
H24-01R	Optical Lickometer, Rat (requires H20-94)
H24-01R-CA	Access Controlled Lickometer, Rat
Other Response Sensors*	
H24-05	Contact Sensor
H24-61	Infrared Activity Monitor (ceiling mount)

*Additional options are available – contact us for more information

Contact your local Sales and Application Specialist to learn more about our line of mouse and rat hubs, runways, response sensors, stimuli and additional options to configure the optimal behavioral research configuration for your application.

NOTE

Ideal Modular System for:

- Self-Administration
- Operant Conditioning
- Fixed Ratio
- Variable Ratio
- Fixed Interval
- Variable Interval
- Progressive Ratio
- Vogel Test
- Learned Helplessness
- DMTS-DNMTS

And more! Contact our Application Specialists to discuss the optimal configuration for your needs!

REFERENCES:

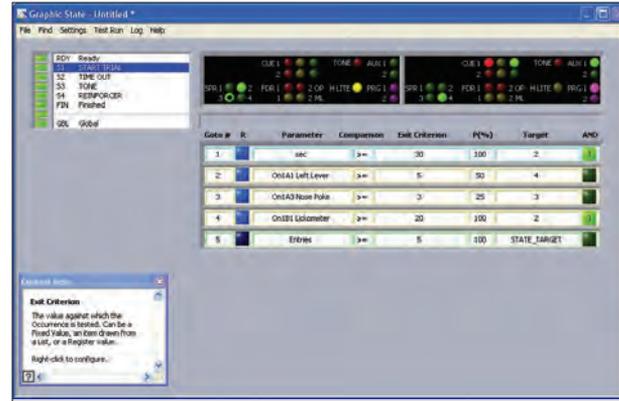
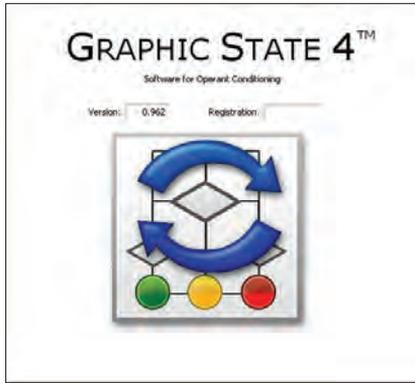
- Mychasiuk R et al. (2015) A mild traumatic brain injury (mTBI) induces secondary attention-deficit hyperactivity disorder-like symptomology in young rats. *Behav Brain Res.* 2015 Jun 1;286:285-92. (5CSRTT)
- Cyr M et al. (2015) Deficit in sustained attention following selective cholinergic lesion of the pedunculopontine tegmental nucleus in rat, as measured with both post-mortem immunocytochemistry and in vivo PET imaging with [¹⁸F]fluoroethoxybenzovesamical. *Behav Brain Res.* 2015 Feb 1;278:107-14. (5CSRTT)
- Ramirez F et al. (2015) Active avoidance requires a serial basal amygdala to nucleus accumbens shell circuit. *J Neurosci.* 2015 Feb 25;35(8):3470-7. (Shuttle)
- Tedesco V et al. (2014) Extinction, applied after retrieval of auditory fear memory, selectively increases zinc-finger protein 268 and phosphorylated ribosomal protein S6 expression in prefrontal cortex and lateral amygdala. *Neurobiol Learn Mem.* 2014 Nov;115:78-85. (Fear conditioning)
- Yokoi K et al. (2014) Effect of dietary nickel deprivation on vision, olfaction, and taste in rats. *J Trace Elem Med Biol.* 2014 Oct;28(4):436-40. (Taste preference/aversion)
- Capozzo A et al. (2014) Continuous stimulation of the pedunculopontine tegmental nucleus at 40 Hz affects preparative and executive control in a delayed sensorimotor task and reduces rotational movements induced by apomorphine in the 6-OHDA parkinsonian rat. *Behav Brain Res.* 2014 Sep 1;271:333-42. (operant conditioning)
- Wiley JL et al. (2014) Cross-substitution of 9-tetrahydrocannabinol and JWH-018 in drug discrimination in rats. *Pharmacol Biochem Behav.* 2014 Sep;124:123-8. (operant conditioning)
- Buckley JL et al. (2014) Rimonabant's reductive effects on high densities of food reinforcement, but not palatability, in lean and obese Zucker rats. *Psychopharmacology (Berl).* 2014 May;231(10):2159-70. (Food reinforcement)
- Klarer M et al. (2014) Gut vagal afferents differentially modulate innate anxiety and learned fear. *J Neurosci.* 2014 May 21;34(21):7067-76. (fear conditioning)

Operant Conditioning



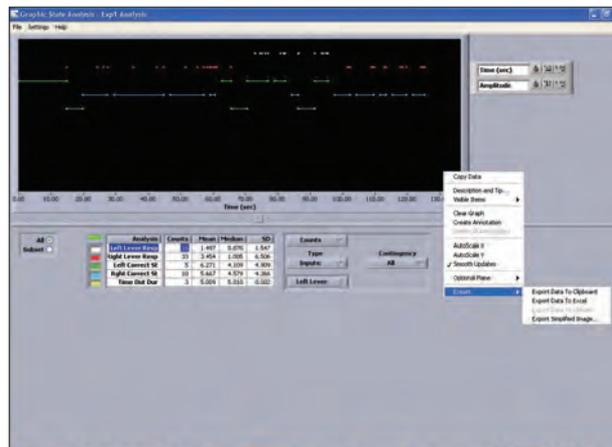
Graphic State[®]4 Software for Behavioral Applications

Operant Conditioning • Graphic State[®]4 Software for Behavioral Applications



KEY FEATURES

- ▶ Simpler communication, **NEW** USB interface
- ▶ Greater flexibility to run simultaneous experiments different Linc configurations
- ▶ Enhanced functionality with newly added math function capabilities
- ▶ Easily display the critical information for each experiment by independently configuring the Run Time Display for each protocol
- ▶ Improved time resolution as short as 1 millisecond
- ▶ Software upgrades available for existing Graphic State[®] 2 and 3 users – add all the new features with your existing hardware!



We have enhanced the industry standard software for writing behavioral experiment protocols. Now, it is even easier to design the most complex experiments by simple point-and-click through Graphic State® 4 software.

Designed to allow researchers to create interactive experiment-control protocols for behavioral experiments using state logic, Graphic State® 4 offers a new elegance with unparalleled power and incredible simplicity.

With a simple “point and click” the user selects options and represents the structure of each state graphically. Inherently user-friendly, the screen contains all the options and acts as a universal prompt. Any questions can be resolved by activating our context sensitive help screens.

Graphic State® 4 structures the experiment as a series of states through which the experiment moves, with each state specifying a stimulus configuration in the test environment, a set of time and/or response requirements which cause the program to exit that state and progress to the next. The software indicates when each state and the entire protocol are logically complete so that the session cannot end up “hanging”, unable to progress to a Finish state.

Our software offers a complete data analysis structure with graphic and digital analysis in which counts, rate, latencies and durations can be created. A data file log in text format is included so the user can specify events to be highlighted and save for analyses in other programs.

Graphic State® 4 Allows

- **Ability to create subject-draw lists that assign subjects in order or randomly**
- **Global stimuli, once activated the stimuli will be on in every state**
- **Stimuli can be set to flash on/off at user selectable rates for user defined periods of time**

Ordering Information

Order #	Product
GS4.0	Graphic State® 4 Software
GS4-UP	Graphic State® 4 Upgrade (requires U90-10)
U90-11	USB Interface

NOTE

Graphic State® 4 software is used in conjunction with the Habitest Modular Test System hardware – please see pages 14-15 for more information on the options available to configure the optimal behavioral research configuration for your application.

REFERENCES

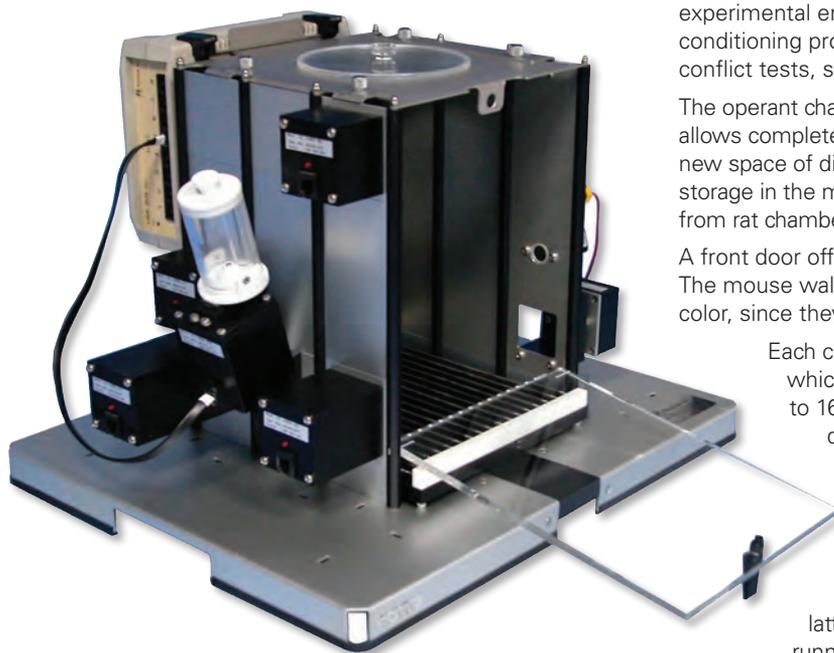
- Aparicio CF et al. (2015) A long-term study of the impulsive choices of Lewis and Fischer 344 rats. *Learn Behav.* 2015 Sep;43(3):251-71.
- Ball KT et al. (2015) Yohimbine reinstates extinguished 3,4-methylenedioxymethamphetamine (MDMA; ecstasy) seeking in rats with prior exposure to chronic yohimbine. *Behav Brain Res.* 2015 Aug 1;294:1-6.
- Bassareo V et al. (2015) Monitoring dopamine transmission in the rat nucleus accumbens shell and core during acquisition of nose-poking for sucrose. *Behav Brain Res.* 2015 Jul 1;287:200-6.
- Ruda-Kucerova J et al. (2015) Sex Differences in the Reinstatement of Methamphetamine Seeking after Forced Abstinence in Sprague-Dawley Rats. *Front Psychiatry.* 2015 Jul 6;6:91.
- Botanas CJ et al. (2015) Methoxetamine, a ketamine derivative, produced conditioned place preference and was self-administered by rats: Evidence of its abuse potential. *Pharmacol Biochem Behav.* 2015 Jun;133:31-6.
- Shelkar GP et al. (2015) Alpha-melanocyte stimulating hormone modulates ethanol self-administration in posterior ventral tegmental area through melanocortin-4 receptors. *Addict Biol.* 2015 Mar;20(2):302-15.
- Cyr M et al. (2015) Deficit in sustained attention following selective cholinergic lesion of the pedunculopontine tegmental nucleus in rat, as measured with both post-mortem immunocytochemistry and in vivo PET imaging with [¹⁸F]fluoroethoxybenzovesamicol. *Behav Brain Res.* 2015 Feb 1;278:107-14. [5CSRTT]
- Perova Z et al. (2015) Depression of excitatory synapses onto parvalbumin interneurons in the medial prefrontal cortex in susceptibility to stress. *J Neurosci.* 2015 Feb 18;35(7):3201-6.
- Tipps ME et al. (2015) Acute ethanol withdrawal impairs contextual learning and enhances cued learning. *Alcohol Clin Exp Res.* 2015 Feb;39(2):282-90.
- Wen JL et al. (2015) Involvement of the dopaminergic system in the consolidation of fear conditioning in hippocampal CA3 subregion. *Behav Brain Res.* 2015 Feb 1;278:527-34.
- Shimp KG et al. (2015) Affective and cognitive mechanisms of risky decision making. *Neurobiol Learn Mem.* 2015 Jan;117:60-70.

Operant Conditioning



Modular Operant Box for Operant Conditioning

Operant Conditioning • Modular Operant Box for Operant Conditioning



Our Modular Operant Chamber is an entirely modular experimental enclosure designed to conduct operant conditioning procedures (e.g. food reinforcement, DMTS, conflict tests, self-administration, etc).

The operant chamber is an entirely modular structure which allows complete disassembling or rearrangement to build a new space of different dimensions/components or to enable storage in the minimum space. It can be easily transformed from rat chamber to mouse chamber (or vice versa).

A front door offers total accessibility inside the chamber. The mouse walls and cover can be of different material or color, since they are totally removable.

Each chamber is associated with a LinkBox which provides power to up to 8 (expandable to 16) Operant Modules (levers, lights, sound, dispensers, electrical shock) conferring full autonomy to the chambers.

Special accessories are provided for self-administration procedures.

Only one cable connects the LinkBox to the PC (Packwin V2.0 Software), the latter for advanced protocol configuration and running.

Cost-saving solutions available for basic paradigms and teaching purposes. Compact chamber packages, without modular walls, are provided with basic operant module composition (lever, a light, a food or drink dispenser, shock grid and a link box).

KEY FEATURES

- ▶ Entirely modular system
- ▶ Easily transformed between rat and mouse chamber
- ▶ Reduced number of cables
- ▶ Possibility of customization
- ▶ Up to 8 stations can be connected at once to PC through a single cable
- ▶ No PCI cards required - has USB connection, one cable links all!

PARAMETERS MEASURED

- ▶ Many user-defined parameters (Packwin V2.0 software)

COMPONENTS INCLUDED

- ▶ Operant Chamber (mouse or rat)
- ▶ Instruction manual
- ▶ Cables and connectors
- ▶ 2 year warranty

NOTE For set-ups greater than 8 stations, please contact technical support for assistance.

Operant Conditioning

Specifications*

Base Dimensions (W x D x H)	440 x 360 x 35 mm (17 x 14 x 1.4 in)
Working Area (Mouse)	200 x 200 x 250 mm (8 x 8 x 10 in)
Working Area (Rat)	250 x 250 x 250 mm (10 x 10 x 10 in)
Material Composition	Stainless steel, aluminum and methacrylate
Power Supply	110 V/220 V, 50/60 Hz
Maximum Number of Stations (When Working with PC)	8 stations connected to a PC
Connection of Several Units to PC	No need of PC interface, direct connection through one cable
Certifications	CE compliant

Ordering Information

Order #	Model	Product
76-0002	PACKWIN V2.0	Packwin Software platform, requires experimental module
76-0595	PACKWINUPG	Packwin Upgrade to V2.0
76-0592	PACKWINCS	Packwin Customized Module
76-0593	PACKWINHO	Nine-Hole Experimental Module, for 5-CSRT task procedure only
76-0594	PACKWINVT	Vogel Test Module
76-0701	PACKWINCSFR	Freezing Experimental Module
76-0702	PACKWINCSST	Startle Experimental Module
76-0156	LINKBOX01	Link and Power, one required per chamber

Compact Chambers

76-0146	LE1002CP	Operant Chamber with Pellet Dispenser, Lever, Light, Shock Grid and LinkBox, Mouse
76-0147	LE1002CL	Operant Chamber with Drop Liquid Dispenser, Lever, Light, Shock Grid and LinkBox, Mouse
76-0148	LE1005CP	Operant Chamber with Pellet Dispenser, Lever, Light, Shock Grid and LinkBox, Rat
76-0147	LE1005CL	Operant Chamber with Drop Liquid Dispenser, Lever, Light, Shock Grid and LinkBox, Rat

Modular Chambers

76-0151	LE1002	Operant Chamber, Mouse
76-0152	LE1005	Operant Chamber, Rat

Grid Floor

76-0153	LE100201	Shock Grid, Mouse
76-0154	LE100501	Shock Grid, Rat
76-0706	LE100201S	Non-Shock Grid, Mouse
76-0652	LE100501S	Non-Shock Grid, Rat

Ordering Information

Order #	Model	Product
Visual Stimuli*		
76-0343	LE100267	Light, Mouse
76-0361	LE100567	Light, Rat
76-0344	LE1002677	Adjustable Light Stimuli, Mouse
76-0362	LE1005677	Adjustable Light Stimuli, Rat
Auditory Stimuli*		
76-0333	LE100244	6-Tone Audio Generator with External Switch, Mouse
76-0352	LE100544	6-Tone Audio Generator with External Switch, Rat
76-0332	LE100243	White Noise Generator, Mouse
76-0351	LE100543	White Noise Generator, Rat
Electrical Stimuli*		
76-0159	LE10026	Shock Generator with Scrambler (requires Shock Grid)
Gustatory Stimuli*		
76-0335	LE100250	Pellet Dispenser with Magazine, Mouse
76-0353	LE100550	Pellet Dispenser with Magazine, Rat
76-0337	LE100252	Magazine Only, Mouse
76-0355	LE100525	Magazine Only, Rat
Levers*		
76-0342	LE100265	Response Lever, Mouse
76-0346	LE100565	Response Lever, Rat
76-0341	LE100264	Retractable Lever, Mouse
76-0359	LE100564	Retractable Lever, Rat

*Additional options are available – Lickometers, dispensers, isolation cubicles – contact us for more information.

Contact your local Sales and Application Specialist to learn more about the additional operant modules available to configure the optimal behavioral research configuration for your application.

REFERENCES

- Biesdorf C et al. (2015) Dopamine in the nucleus accumbens core, but not shell, increases during signaled food reward and decreases during delayed extinction. (extinction of food reward)
- García-Gutiérrez MS et al. (2015) Increased vulnerability to ethanol consumption in adolescent maternally separated mice. *Addict Biol.* 2015 May 18. (ethanol self-administration)
- Jeanblanc J et al. (2015) Light alcohol intake during adolescence induces alcohol addiction in a neurodevelopmental model of schizophrenia. *Addict Biol.* 2015 May;20(3):490-9. (ethanol self-administration)
- Aristizabal JA et al. (2015) Context specificity of extinguished schedule-induced drinking within an ABA renewal design in rats. *Psicológica* (2015), 36, 337-366. (extinction of schedule induced adjunctive drinking (polydipsia))
- Cotter R et al. (2015) The trace amine-associated receptor 1 modulates methamphetamine's neurochemical and behavioral effects. *Front Neurosci.* 2015 Feb 13;9:39. (Self-administration)
- Agustín-Pavón C et al. (2014) Focal lesions within the ventral striato-pallidum abolish attraction for male chemosignals in female mice. *Behav Brain Res.* 2014 Feb 1;259:292-6. (sucrose preference)
- Fuentes S et al. (2014) Sex-dependent effects of an early life treatment in rats that increases maternal care: vulnerability or resilience? *Front Behav Neurosci.* 2014 Feb 25;8:56. (delay-discounting)

Operant Conditioning

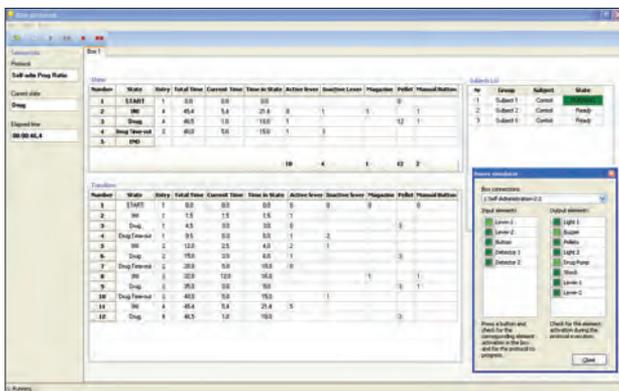
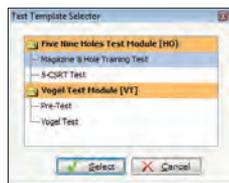
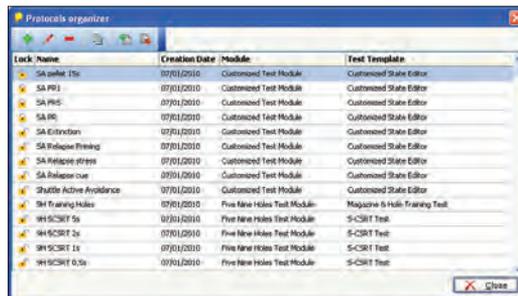
software species is hardware specific

Rabbit Guinea Pig Rat Mouse Insect Fish

Packwin Software for Operant/Behavioral Chambers V2.0

Operant Conditioning

Packwin Software for Operant/Behavioral Chambers V2.0



Packwin V2.0 is a user-friendly and versatile software platform providing powerful tools to conduct a wide range of behavioral research experiments. Modular in structure, Packwin can be purchased in different configurations to meet the unique needs of our researchers:

Packwin Customized Module – With a straightforward state editor interface, Packwin eliminates the

Parameters Measured

PACKWINCS (Customized Module)

- Customized Summary Report: Exp. Duration, Number of responses/cues/reinforcements (as well as latencies, mean duration, rate, inter-response time, inter-state time, breaking point etc.)
- Response by time report: number of response by user-defined intervals of time
- Response pattern report by group: pattern plot of response distribution along the time
- Responses list: name, starting time, duration.
- Single-sessions reports: Events history, Acquisition Replay, Cumulated curve and Response pattern plots

PACKWINHO (5-CSRT Task)

- Total number of correct, incorrect, premature, perseverative responses and corresponding hole distribution, number of responses during time-out
- Mean response latencies (correct, incorrect, magazine)
- Number and % of omissions, choice accuracy
- Number of trials made, duration of the session
- Single-sessions reports (Events history, Acquisition Replay, Cumulated curve and Response pattern plots)

PACKWINVT (Vogel Test)

- Pre-test calculations: exp. duration, total number of licks, licks rate, drinking time, first lick latency
- Test calculations: exp. duration, number of licks (total and during shock), licks rate, drinking time, first lick and shock latency, number of shocks, mean time for completing blocks of licks, suppression time, mean inter-lick response, mean shock latency
- List of detect licks and shocks (starting time, duration, start state, end state)

PACKWINCSFR (Fear Conditioning)

- Summary table: duration and number of freezing episodes in each period of the protocol (habituation, cue, shock, inter-trial time)
- List of freezing episodes: starting time, duration etc.
- Number and duration of freezing episodes in each user-defined intervals of time

PACKWINCSST (Startle Reflex)

- Summary table: mean startle calculation (maximum amplitude, latencies to the maximum, duration, latency to the onset, average surface) for each period of the protocol (habituation, pulse trial, pre-pulse pulse trial, control trial)
- List of startle response evaluated in each period of the protocol: maximum amplitude, latency to the maximum, Duration, latency to the onset, average surface

Ordering Information

Order #	Model	Product
76-0002	PACKWIN V2.0	Packwin Software platform, requires experimental module
76-0595	PACKWINUPG	Packwin Upgrade to V2.0
76-0592	PACKWINCS	Packwin Customized Module
76-0593	PACKWINHO	Nine-Hole Experimental Module, for 5-CSRT task procedure only
76-0594	PACKWINVT	Vogel Test Module
76-0701	PACKWINCSFR	Freezing Experimental Module
76-0702	PACKWINCSST	Startle Experimental Module
76-0156	LINKBOX01	Link and Power, one required per chamber

NOTE

Additional hardware is required –please see pages 18-19 (Operant Box), page 80 (Vogel Test Box), page 73 (5/9 Holes Box) and pages 69-70 (Startle and Freezing Box) for more information on our behavioral boxes or contact your local Sales and Application Specialist for more information on the right system for you!

REFERENCES

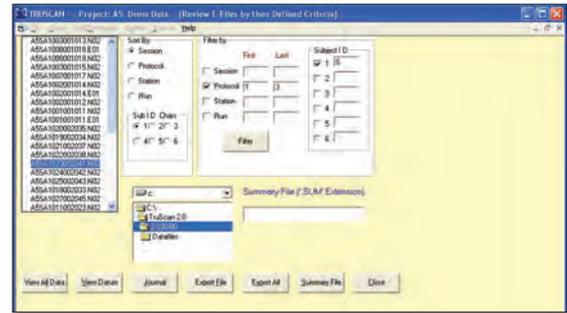
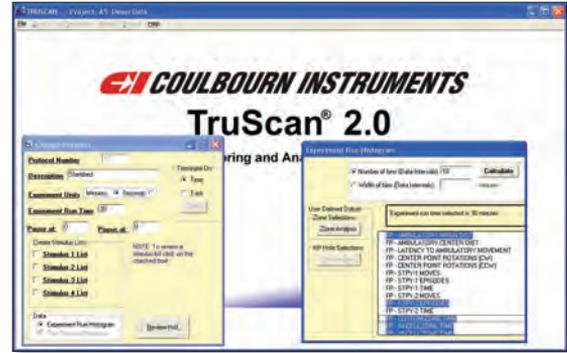
- Biesdorf C et al. (2015) Dopamine in the nucleus accumbens core, but not shell, increases during signaled food reward and decreases during delayed extinction. (extinction of food reward, rat, Brazil, Germany)
- García-Gutiérrez MS et al. (2015) Increased vulnerability to ethanol consumption in adolescent maternal separated mice. *Addict Biol.* 2015 May 18. (ethanol self-administration, mice, Spain)
- Jeanblanc J et al. (2015) Light alcohol intake during adolescence induces alcohol addiction in a neurodevelopmental model of schizophrenia. *Addict Biol.* 2015 May;20(3):490-9. (ethanol self-administration, rat, France)
- Aristizabal JA et al. (2015) Context specificity of extinguished schedule-induced drinking within an ABA renewal design in rats. *Psicológica* (2015), 36, 337-366. (extinction of schedule induced adjunctive drinking (polydipsia), rat, Spain)
- Cotter R et al. (2015) The trace amine-associated receptor 1 modulates methamphetamine's neurochemical and behavioral effects. *Front Neurosci.* 2015 Feb 13;9:39. (Self-administration, rat, New Zeland, Italy, UK)
- Navarrete F et al. (2014) Effects of naltrexone plus topiramate on ethanol self-administration and tyrosine hydroxylase gene expression changes. *Addict Biol.* 2014 Sep;19(5):862-73. (ethanol self-administration, mice, Spain)
- Faure JB et al. (2014) Attention and executive functions in a rat model of chronic epilepsy. *Epilepsia.* 2014 May;55(5):644-53. (5 hole box, rat, France)
- Agustín-Pavón C et al. (2014) Focal lesions within the ventral striato-pallidum abolish attraction for male chemosignals in female mice. *Behav Brain Res.* 2014 Feb 1;259:292-6. (sucrose preference, mice, Spain)
- Fuentes S et al. (2014) Sex-dependent effects of an early life treatment in rats that increases maternal care: vulnerability or resilience? *Front Behav Neurosci.* 2014 Feb 25;8:56. (delay-discounting, rat, Spain)
- Wagner KV et al. (2014) Hippocampal Homer1 levels influence motivational behavior in an operant conditioning task. *PLoS One.* 2014 Jan 21;9(1):e85975. (operant reward learning, mice, Spain)

Locomotor Activity & Exploration



Locomotor Activity & Exploration • Tru Scan for Open Field Activity Monitoring

Tru Scan for Open Field Activity Monitoring



KEY FEATURES

- ▶ **Optimal precision**
- ▶ **Small Arenas for Mice**
- ▶ **Economical and Scalable**
- ▶ **Controlled Presentation of Audio, Visual and Electrical Stimuli**
- ▶ **Powerful Innovative Software**
- ▶ **Flat Sensor Rings: Conduct nose poke and floor plane activity simultaneously**
- ▶ **Expandable up to 10 stations**

Tru Scan is a versatile and simple system to monitor open field activity. Utilizing our interchangeable sensor rings, Tru Scan ensures precise tracking in up to three planes. Nose poke task, place preference, conditioned freezing, light/dark tests can also be performed in our Tru Scan test arenas. Additional accessories, such as shock floors, video mounted TV cameras, high-brite cue, noise/tone generators and wall mounting brackets are available for use with the system, making Tru Scan extremely functional and flexible.

Experimental protocols are setup through a simple point-and-click user interface, saved and recalled by number for future use. All selected data is compiled and analyzed according to the parameters defined in the protocol.

Versatility and simplicity are the defining benefits of Tru Scan. All selected data is gathered, analyzed and presented in the same way whenever the experimental protocol is run without reselection.

The software also features subject, operator and protocol IDs as well as automatic data storage and stimulus presentation, if desired. Data analysis is fully automated for each subject or across subjects with results presented in a table or graphically. Results are calculated for all user-selected parameters. Graphical data can be copy-pasted directly into publication documents.

Data is stored as raw coordinate sets with real time date stamps for each of the sensor rings used. This allows experiments to be re-run without animals to re-analyze data, using more and shorter histogram bins or new data elements to find other behaviors or effects not observed in the original analysis. This unique feature minimizes the number of animals needing to be tested. Raw data may also be easily exported to a spreadsheet for further statistical analysis.

Locomotor Activity & Exploration

Tru Scan interfaces through a single USB port.

The Tru Scan system offers two arena sizes – one for mice and one for rats – thus optimizing environmental area and beam spacing to be appropriate for each species, resulting in greater overall system accuracy.

A slide-out floor/drop pan facilitates easier maintenance.

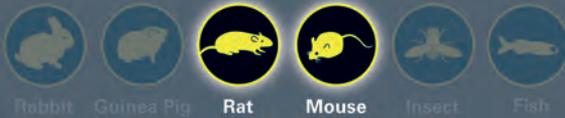
Tru Scan stimulus accessories are available for increased flexibility of the system. Nose poke task, place preference, conditioned freezing, light/dark test can also be performed with our Tru Scan test arenas.

Ordering Information	
Order #	Product
Control and Data Acquisition	
TRU SCAN 2.07	Control and Data Acquisition Tru Scan Software
TRU SCAN 2.07UP	Tru Scan Upgrade to Version 2.07
L18-16XHS-10A	Tru Scan Expander Box (for 2-10 stations)
E63-10HS	Tru Scan Linc
U90-11	USB Interface
Mouse	
E63-10	Tru Scan Arena for Mouse
E63-12	Sensor Ring for Mouse Tru Scan Arena (250 x 250 mm, 10 x 10 In)
E63-13	Shock Floor for Mouse Tru Scan Arena
E63-14	Nose Poke Floor for Mouse Tru Scan Arena
E63-16	Light/Dark Box for Mouse Tru Scan Arena
E63-19	Lid for E63-10 Mouse Tru Scan Arena (recommended when using shock)
Rat	
E63-20	Tru Scan Arena for Rat
E63-22	Sensor Ring for Rat Tru Scan Arena (400 x 400 mm, 16 x 16 In)
E63-23	Shock Floor for Rat Tru Scan Arena
E63-24	Nose Poke Floor for Rat Tru Scan Arena
E63-26	Light/Dark Box for Rat Tru Scan Arena
E63-29	Lid for E63-20 Rat Tru Scan Arena (recommended when using shock)
Accessories	
E63-91	Elevation Rod Kit
E63-03	Hi-Brite Cue for Tru Scan
A69-20	Tone/White Noise Generator (Requires speaker)
H10-24TS	Isolation Cubicle for Tru Scan Arenas
H12-01R	Speaker Module (Requires H94-00 wall mount bracket)
H29-01	Balance Arm for All Cages
H94-00	Wall Mount Bracket

REFERENCES

- Chan MH et al. (2015) The group II metabotropic glutamate receptor agonist LY379268 reduces toluene-induced enhancement of brain-stimulation reward and behavioral disturbances. *Psychopharmacology (Berl)*. 2015 Sep;232(17):3259-68.
- Kim HW et al. (2015) Genetic reduction of mitochondrial complex I function does not lead to loss of dopamine neurons in vivo. *Neurobiol Aging*. 2015 Sep;36(9):2617-27.
- Isherwood SN et al. (2015) Dissociable effects of mGluR5 allosteric modulation on distinct forms of impulsivity in rats: interaction with NMDA receptor antagonism. *Psychopharmacology (Berl)*. 2015 Sep;232(18):3327-44.
- Bi Y et al. (2015) Neuroprotective effects of alkaloids from *Piper longum* in a MPTP-induced mouse model of Parkinson's disease. *Pharm Biol*. 2015 Oct;53(10):1516-24
- Amato D et al. (2015) Neuropharmacology of light-induced locomotor activation. *Neuropharmacology*. 2015 Aug;95:243-51.
- Li J et al. (2015) Dexmedetomidine Attenuates Neurotoxicity Induced by Prenatal Propofol Exposure. *J Neurosurg Anesthesiol*. 2015 Apr 2.
- Llorente-Berzal A et al. (2015) 2-AG promotes the expression of conditioned fear via cannabinoid receptor type 1 on GABAergic neurons. *Psychopharmacology (Berl)*. 2015 Aug;232(15):2811-25.
- Purves-Tyson TD et al. (2015) Testosterone attenuates and the selective estrogen receptor modulator, raloxifene, potentiates amphetamine-induced locomotion in male rats. *Horm Behav*. 2015 Apr;70:73-84.
- Cui SQ et al. (2015) Puerarin protects against damage to spatial learning and memory ability in mice with chronic alcohol poisoning. *Braz J Med Biol Res*. 2015 Jun;48(6):515-22.
- Madsen HB et al. (2015) Role of 4- and 6-containing nicotinic receptors in the acquisition and maintenance of nicotine self-administration. *Addict Biol*. 2015 May;20(3):500-12.
- Son Y et al. (2015) Cranial irradiation regulates CREB-BDNF signaling and variant BDNF transcript levels in the mouse hippocampus. *Neurobiol Learn Mem*. 2015 May;121:12-9.
- Stouffer EM et al. (2015) A high-fat diet impairs learning that is dependent on the dorsal hippocampus but spares other forms of learning. *Hippocampus*. 2015 May 19.
- Hosken IT et al. (2015) Relaxin-3 receptor (Rxfp3) gene knockout mice display reduced running wheel activity: implications for role of relaxin-3/RXFP3 signalling in sustained arousal. *Behav Brain Res*. 2015 Feb 1;278:167-75. *Hippocampus*. 2015 May 19.
- Wurzman R et al. (2015) Repetitive grooming and sensorimotor abnormalities in an ephrin-A knockout model for Autism Spectrum Disorders. *Behav Brain Res*. 2015 Feb 1;278:115-28.
- Kim TH et al. (2015) Oxcarbazepine and its active metabolite, (S)-licarbazepine, exacerbate seizures in a mouse model of genetic generalized epilepsy. *Epilepsia*. 2015 Jan;56(1):e6-9.
- Rantala J et al. (2015) Urokinase-type plasminogen activator deficiency has little effect on seizure susceptibility and acquired epilepsy phenotype but reduces spontaneous exploration in mice. *Epilepsy Behav*. 2015 Jan;42:117-28.
- Song Z et al. (2015) Function of Ca²⁺-calmodulin-dependent protein kinase IV in Ca²⁺-stimulated neuronal signaling and behavior. *Sci China Life Sci*. 2015 Jan;58(1):6-13.

Locomotor Activity & Exploration



IR Actimeter for Locomotor Activity Assessment



KEY FEATURES

- ▶ Interchangeable frames can be used without distinction for rearing activity or poking modes
- ▶ Can be used without a computer (independent control units)
- ▶ Can be used with open field transparent walls or directly with the home cage
- ▶ Simultaneous recording of up to 16 cages or 32 IR frames
- ▶ Dedicated PC optional, not required

PARAMETERS MEASURED

- ▶ Fast/Slow stereotypies; i.e. movements without displacement (control unit and SEDACOM)
- ▶ Fast/Slow rearings (control unit and SEDACOM)
- ▶ Fast/Slow nose-spoke (control unit and SEDACOM)
- ▶ Global activity – total IR counting (ActiTrack)
- ▶ Analysis of animal tracking: distance covered, speed, rearings, permanence time in selected zones, etc. (ActiTrack)
- ▶ Intervals of inactivity (ActiTrack)

For a complete system, the following items are needed:

- IR Frame
- One frame needed for x, y monitoring
- Two frames needed for x, y and z monitoring
- Support for frames
- Data Logger

Options for additional features:

- SEDACOM Software with RS-232/USB adapter, see pages 38-39
- ActiTrack Software, see page 26
- Transparent Arenas
- Arena Dividers
- Hole Poke Board

The Infrared (IR) Actimeter allows the study of spontaneous locomotor activity, rearing and optional hole-board test parameters for exploration in rodents. A reliable system for easy and rapid drug screening and phenotype characterization in both day and night lighting conditions.

The system involves a two dimensional (X and Y axes) square frames, a frame support and a control unit. Each frame counts with 16 x 16 infrared beams for optimal subject detection.

The system is completely modular: each frame may be used for evaluation of general activity (one or more animals), locomotor, stereotypic movements, rearings or exploration (nose-spoke detection in the hole-board option). The infrared photocell system can be set with up to 15 levels of sensitivity in order to adapt the frames to the species of the animal (rats, mice). It can also be set to ignore the beams that are obstructed by objects (e.g. the walls/corners of the home cage). Use the system with existing home cages for longer experiments (circadian cycle studies) or with our transparent arenas for shorter, locomotor activity evaluation.

The frames can be controlled by independent control units or directly through our SEDACOM software, which allows easy export of data (through RS-232/USB serial port) to Excel™. Optionally, the ActiTrack software option may be used to analyze animal trajectories (distance, speed, permanence time in selected zones) and then provide additional complementary data to that obtained using the control units.

Locomotor Activity & Exploration

Specifications

System Dimensions (W x D x H):

LE 8811	450 x 450 x 200 mm (18 x 18 x 8 in)
LE 8812	220 x 220 x 200 mm (9 x 9 x 8 in)

Number of InfraRed Beams Per Frame	32 (16 per axis)
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InfraRed Photocells Spacing:

LE 8815	25 mm (1 in)
LE 8816	13 mm (0.5 in)

Material Composition	Aluminum, polypropylene
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Maximum Number of Stations	32 InfraRed Frames per computer (either SEDACOM or ActiTrack)
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Power Requirements	110/220 VAC, 50/60 Hz
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Certifications	CE compliant
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Ordering Information

Order #	Model	Product
76-0127	LE8815	IR FRAME, 450 x 450 mm (18 x 18 in), 16 x 16 IR Beams
76-0128	LE8816	IR FRAME, 250 x 250 mm (10 x 10 in), 16 x 16 IR Beams
76-0131	LE8817	Support for 76-0127
76-0132	LE8818	Support for 76-0128
76-0134	LE8825	Data Logger (up to 200 Hours Memory) and PC Interface

Optional Accessories

76-0406	SEDACOMV2.0	SEDACOM Software V2.0
76-0608	CONRS232USB	RS-232/USB Adapter for the SEDACOM software.
76-0003	ACTITRACK	Enhanced Tracking Software for up to 32 Frames, includes RS232/USB adapter
76-0129	LE8814	Transparent Arena 440 x 440 mm (17 x 17 in) (Open Field)
76-0130	LE8813	Transparent Arena 210 x 210 mm (8 x 8 in) (Open Field)
76-0133	LE8820	Hole Poke Base for 76-0127 (16 holes, .4 mm diam., 10 mm depth)
76-0125	LE8821	Transparent Arena with Divider for 2 Animals for 76-0127, needs ActiTrack software
76-0126	LE8823	Transparent Arena with Divider for 2 Animals for 76-0128, needs ActiTrack software

REFERENCES

- Hara Y et al. (2015) Reduced prefrontal dopaminergic activity in valproic acid-treated mouse autism model. *Behav Brain Res.* 2015 Aug 1;289:39-47. (mice, Japan)
- Shibasaki Y et al. (2015) Atomoxetine reverses locomotor hyperactivity, impaired novel object recognition, and prepulse inhibition impairment in mice lacking pituitary adenylate cyclase-activating polypeptide. *Neuroscience.* 2015 Jun 25;297:95-104. (mice, Japan)
- Onaka Y et al. (2015) CRTH2, a prostaglandin D2 receptor, mediates depression-related behavior in mice. *Behav Brain Res.* 2015 May 1;284:131-7. (mice, Japan)
- Botia B et al. (2015) Basal anxiety negatively correlates with vulnerability to ethanol-induced behavioral sensitization in DBA/2J mice: modulation by diazepam. *Alcohol Clin Exp Res.* 2015 Jan;39(1):45-54. (mice, France)
- Socala K et al. (2015) Evaluation of Anticonvulsant, Antidepressant-, and Anxiolytic-like Effects of an Aqueous Extract from Cultured Mycelia of the Lingzhi or Reishi Medicinal Mushroom *Ganoderma lucidum* (Higher Basidiomycetes) in Mice. *Int J Med Mushrooms.* 2015;17(3):209-18. (mice, Poland)
- Michel A et al. (2014) Unprecedented therapeutic potential with a combination of A2A/NR2B receptor antagonists as observed in the 6-OHDA lesioned rat model of Parkinson's disease. *PLoS One.* 2014 Dec 16;9(12):e114086. (rat, Belgium)
- Bouabid S et al. (2014) Manganese-induced atypical parkinsonism is associated with altered Basal Ganglia activity and changes in tissue levels of monoamines in the rat. *PLoS One.* 2014 Jun 4;9(6):e98952. (rat, France, Morocco)
- Legastelois R et al. (2014) Deciphering the relationship between vulnerability to ethanol-induced behavioral sensitization and ethanol consumption in outbred mice. *Addict Biol.* 2014 Mar;19(2):210-24. (mice, France)

Locomotor Activity & Exploration

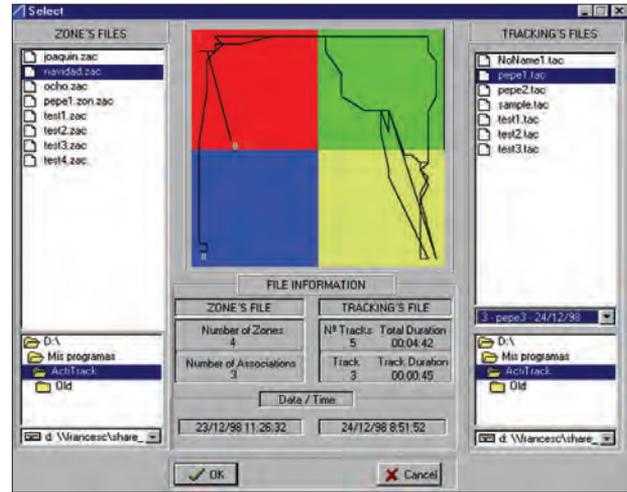
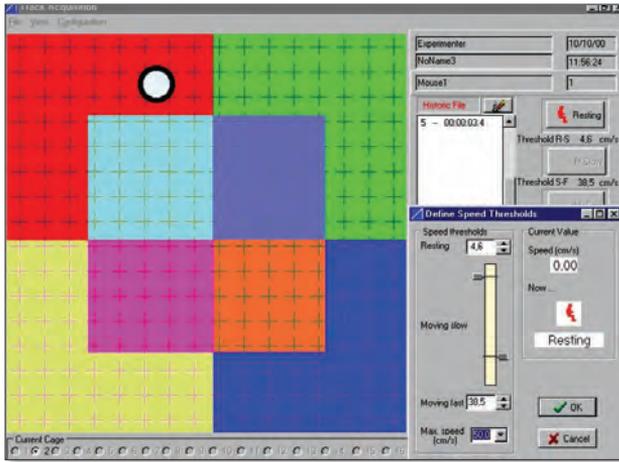
software species is hardware specific

Rabbit Guinea Pig Rat Mouse Insect Fish

ActiTrack Software for IR Actimeter

Locomotor Activity & Exploration

ActiTrack Software for IR Actimeter



KEY FEATURES

- ▶ Control up to 32 frames
- ▶ Provides spatial position, pattern of displacement and rearings
- ▶ User-adjustable thresholds for classifying activity into fast, slow and resting movements
- ▶ Allows track re-analysis with an unlimited number of user-defined zones
- ▶ Enables replay of experiment using different threshold for movement speed definition
- ▶ Can be installed in as many computers as required for track analysis

PARAMETERS MEASURED

- ▶ Traveled distance (and %) into user-defined zones
- ▶ Maximum, minimum and mean speed
- ▶ Time (and %) moving fast, slow and resting
- ▶ Permanence time (and %) into user-defined zones
- ▶ Number of entrances into user-defined zones
- ▶ Number and mean duration of rearings
- ▶ Number of clockwise and counter-clockwise turns
- ▶ Track history analysis

COMPONENTS INCLUDED

- ▶ Software installation and License USB Key
- ▶ RS232/USB Adapter
- ▶ Instruction manual in digital format

Ordering Information

Order #	Model	Product
76-0003	ActiTrack	Tracking Software for up to 32 IR Frames

REFERENCES

- Hara Y et al. (2015) Reduced prefrontal dopaminergic activity in valproic acid-treated mouse autism model. *Behav Brain Res.* 2015 Aug 1;289:39-47. (mice, Japan)
- Shibasaki Y et al. (2015) Atomoxetine reverses locomotor hyperactivity, impaired novel object recognition, and prepulse inhibition impairment in mice lacking pituitary adenylate cyclase-activating polypeptide. *Neuroscience.* 2015 Jun 25;297:95-104. (mice, Japan)
- Onaka Y et al. (2015) CRTH2, a prostaglandin D2 receptor, mediates depression-related behavior in mice. *Behav Brain Res.* 2015 May 1;284:131-7. (mice, Japan)
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- Bouabid S et al. (2014) Manganese-induced atypical parkinsonism is associated with altered Basal Ganglia activity and changes in tissue levels of monoamines in the rat. *PLoS One.* 2014 Jun 4;9(6):e98952. (rat, France, Morocco)
- Legastelois R et al. (2014) Deciphering the relationship between vulnerability to ethanol-induced behavioral sensitization and ethanol consumption in outbred mice. *Addict Biol.* 2014 Mar;19(2):210-24. (mice, France)



Rabbit



Guinea Pig



Rat



Mouse



Insect



Fish

Rodent Activity Wheel and Cage



KEY FEATURES

- ▶ Easy way to quantify rodent voluntary exercise in their home cage environment
- ▶ External or internal wheel options
- ▶ For rat, mice and hamsters
- ▶ Ideal for high throughput experiments

APPLICATIONS

- ▶ Activity - circadian rhythms, exercise
- ▶ Cognition - environmental enrichment
- ▶ Disease models:
 - Huntington's
 - Attention-Deficit Hyperactivity Disorder
 - Addiction
 - Anorexia and more

The Rodent Activity Wheel represents a very simple and clever way to register animal voluntary physical activity in its home cage environment.

The use of this high throughput tool is particularly relevant for research involving circadian rhythms, phenotyping and drug testing. The animals are housed individually in the home cages equipped with the running wheel.

Two models of rodent activity wheel are available with external or internal wheel. The external wheel option is provided to preserve animal living space.

The total number of wheel rotations made by the animal is displayed on an external individual counter or multi-counter device. Multi-counter allows storing the data in user-defined time intervals and exporting them to the SEDACOM PC interface in a format compatible with Excel™.

Ordering Information*

Order #	Model	Product
76-0412	LE904	External Activity Wheel and Cage, Rat
76-0413	LE905	External Activity Wheel and Cage, Mouse
ACT-551		Internal activity wheel, Mouse
ACT-551-MS		Internal activity wheel, Mouse, Magnetic Switch
ACT-552		Internal activity wheel, Rat
ACT-552-MS		Internal activity wheel, Rat, Magnetic Swit

Options

76-0414	LE907	Single Wheel Counter (1 by wheel)
76-0243	LE3806	Multi-Counter (up to 30 wheels)
76-0406	SEDACOMV2.0	SEDACOM V2.0
76-0608	CONRS232USB	RS232/USB Adapter

* Other activity wheel options are available. Ask for information.

Circadian Biology



Rabbit



Guinea Pig



Rat



Mouse



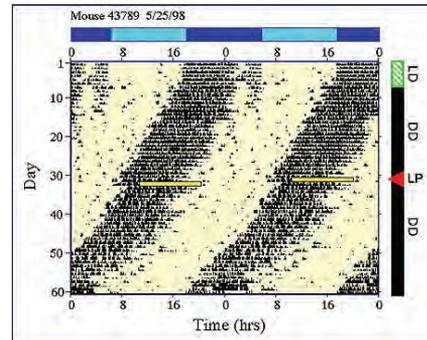
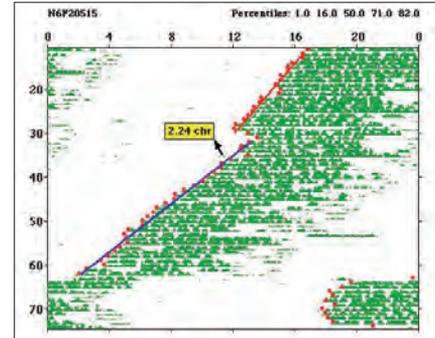
Insect



Fish

ClockLab Software for Circadian Biology Studies

Circadian Biology • ClockLab Software for Circadian Biology Studies



KEY FEATURES

- ▶ Up to 448 channels on a desktop or laptop machine
- ▶ USB interface for instant setup
- ▶ Reliability with over 500,000 hours of trouble-free operation logged and thousands of publications
- ▶ Independent Start and Stop for each channel with user-selectable file names and files can be in different directories for convenient segregation of multiple, concurrent experiments
- ▶ Monitor almost any sensor – including running wheels and infrared motion detectors
- ▶ Integrated light control and light recording at 1-minute precision into each data file – no need to guess about blown bulbs, accidental chamber openings or faulty, mis-programmed or inaccurate light timers! Lights are controlled in up to 96 different animal chambers independently using the simple menu and slider control panel.
- ▶ High-density switch connections
- ▶ Remote data access via internet to download files via FTP or network capabilities
- ▶ Record switches, motion detectors, Minimitter ER-4000's
- ▶ Real-time viewing of actograms, both scaled and percentile, simply by pressing buttons to view them in sequence
- ▶ Automatic detection of low activity levels for all channels viewed simply on a single window
- ▶ Clock synchronization of to the computer's internal clock
- ▶ Multicomputer site license provided for ClockLab Analysis, the most sophisticated and easy-to-use circadian analysis package available!

ClockLab is the most sophisticated and easy-to-use data analysis tool for Circadian Biology studies. As the clear industry standard, ClockLab combines a point-and-click interface with state-of-the art algorithms. Embedded controls transform each graph into a powerful and interactive tool for data analysis. Measure phase shifts in under 30 seconds with our fast and simple-to-use ClockLab program. Applied to mice, hamsters, rats, drosophila, humans, bees, algae, Eurasian Lynx, squirrels, gopher turtles, horseshoe crabs and soil chemistry signals from the Mars Viking Lander, this system really is the most flexible available on the market.

With ClockLab, simply paste actograms and other plots into your presentation graphics programs like PowerPoint, Illustrator or Photoshop – each graph is completely editable. Automated detection of activity onsets and offsets make it possible to:

- Measure phase shifts
- Measure mean alpha
- Predict future activity onsets

Actograms are zoomable for easy navigation through long files, just drag on an interesting part of the actogram, zoom in, and then click to display the periodogram, FFT or activity profile for the chosen data segment – it is that simple! Export all data and analyses to spreadsheet files.

Ordering Information

Order #	Product
ACT-500	ClockLab Analysis Software for Circadian Biology
ACT-551	Mouse Cage with Running Wheel
ACT-551-MS	Mouse Cage with Running Wheel, Magnetic Switch
ACT-551-FIL	Mouse Cage with Running Wheel – Filter Lid
ACT-551-FILTER	Type 2 Reemay Filter Lid for ACT-551-FIL
ACT-551-BOT	Bottle and Tube for ACT-551 with Filter Lid
ACT-551-RS	Replacement Switch for ACT-551
ACT-552	Rat Cage with Running Wheel
ACT-552-MS	Rat Cage with Running Wheel, Magnetic Switch
ACT-553	7 Channel Breakout Box (ClockLab)
ACT-554	Light Sensor
ACT-556	ClockLab 56-Channel Interface and Software (includes one ACT-556A)
ACT-556B	ClockLab Additional 56-Channel Interface (448 max channels)
ACT-557	4-Channel Stimulus Breakout Box
ACT-558	4-Channel Stimulus Light Expansion

REFERENCES

- Bedont, J.L., LeGates, T.A., Slat, E.A., Byerly, M.S., Wang, H., Hu, J., Rupp, A.C., Qian, J., Wong, G.W., Herzog, E.D., et al. (2014). *Lhx1* controls terminal differentiation and circadian function of the suprachiasmatic nucleus. *Cell reports* 7, 609-622.
- Azzi, A., Dallmann, R., Casserly, A., Rehrauer, H., Patrignani, A., Maier, B., Kramer, A., and Brown, S.A. (2014). Circadian behavior is light-reprogrammed by plastic DNA methylation. *Nature neuroscience* 17, 377-382.
- Hatori, M., Gill, S., Mure, L.S., Goulding, M., O'Leary, D.D., and Panda, S. (2014). *Lhx1* maintains synchrony among circadian oscillator neurons of the SCN. *eLife* 3, e03357.
- Liu, S., Lamaze, A., Liu, Q., Tabuchi, M., Yang, Y., Fowler, M., Bharadwaj, R., Zhang, J., Bedont, J., Blackshaw, S., et al. (2014). WIDE AWAKE mediates the circadian timing of sleep onset. *Neuron* 82, 151-166.
- Cavanaugh, D.J., Geratowski, J.D., Woollorton, J.R., Spaethling, J.M., Hector, C.E., Zheng, X., Johnson, E.C., Eberwine, J.H., and Sehgal, A. (2014). Identification of a circadian output circuit for rest:activity rhythms in *Drosophila*. *Cell* 157, 689-701.
- Balmert, N.J., Rund, S.S., Ghazi, J.P., Zhou, P., and Duffield, G.E. (2014). Time-of-day specific changes in metabolic detoxification and insecticide resistance in the malaria mosquito *Anopheles gambiae*. *Journal of insect physiology* 64, 30-39.
- Seung-Hee Yoo, Jennifer A. Mohawk, Sandra M. Siepka, Yongli Shan, Seong Kwon Huh, Hee-Kyung Hong, Izabela Kornblum, Vivek Kumar, Nobuya Koike, Ming Xu, Justin Nussbaum, Xinran Liu, Zheng Chen, Zhijian J. Chen, Carla B. Green, Joseph S. Takahashi (2013) Competing E3 Ubiquitin Ligases Govern Circadian Periodicity by Degradation of CRY in Nucleus and Cytoplasm. *Cell* 28:1091-1105.
- Michael A. Crickmore, Leslie B. Vosshall (2013) Opposing Dopaminergic and GABAergic Neurons Control the Duration and Persistence of Copulation in *Drosophila*, *Cell* 155:881-893.
- Tracy A. Bedrosian, Celynn A. Vaughn, Anabel Galan, Ghassan Daye, Zachary M. Weil, and Randy J. Nelson (2013) Nocturnal Light Exposure Impairs Affective Responses in a Wavelength-Dependent Manner. *Journal of Neuroscience* 33:13081-13087.
- Sungwon An, Rich Harang, Kirsten Meeker, Daniel Granados-Fuentes, Connie A. Tsai, Cristina Mazuski, Jihee Kim, Francis J. Doyle III, Linda R. Petzold, and Erik D. Herzog (2013) A neuropeptide speeds circadian entrainment by reducing intercellular synchrony. *PNAS* 110:E4355-E4361
- Zhang L, Hastings MH, Green EW, Tauber E, Sladek M, Webster SG, Kyriacou CP, Wilcockson (2013) Dissociation of circadian and circatidal timekeeping in the marine crustacean *Eurydice pulchra*. *DC. Current Biology* 23:1863-73.
- LeGates, T.A., Altimus, C.M., Wang, H., Lee, H.K., Yang, S., Zhao, H., Kirkwood, A., Weber, E.T., and Hattar, S. (2012). Aberrant light directly impairs mood and learning through melanopsin-expressing neurons. *Nature* 491:594-598.
- Fonken, L.K., Kitsmiller, E., Smale, L., and Nelson, R.J. (2012). Dim nighttime light impairs cognition and provokes depressive-like responses in a diurnal rodent. *Journal of Biological Rhythms* 27:319-327.
- Eastwood, E., Allen, C.N., and Raber, J. (2012). Effects of neonatal methamphetamine and thioperamide exposure on spatial memory retention and circadian activity later in life. *Behavioural Brain Research* 230:229-236.
- Karatsoreos, I.N., Bhagat, S., Bloss, E.B., Morrison, J.H., and McEwen, B.S. (2011). Disruption of circadian clocks has ramifications for metabolism, brain, and behavior. *Proc Natl Acad Sci U S A* 108, 1657-1662.
- Luciano DiTacchio, Hiep D. Le, Christopher Vollmers, Megumi Hatori, Michael Witcher, Julie Secombe, Satchidananda Panda (2011) Histone Lysine Demethylase JARID1a Activates CLOCK-BMAL1 and Influences the Circadian Clock. *Science* 333:1881-1885.
- S.-K. Chen, T. C. Badea & S. Hattar (2011) Photoentrainment and pupillary light reflex are mediated by distinct populations of ipRGCs. *Nature* 476:92-95.
- Gareth T. Banks and Patrick M. Nolan (2011) Assessment of Circadian and Light-Entrainable Parameters in Mice Using Wheel-Running Activity. *Current Protocols in Mouse Biology* 369-381.
- Takashi Kudo, Dawn H. Loh, Dika Kuljis, Cara Constance, and Christopher S. Colwell (2011) Fast Delayed Rectifier Potassium Current: Critical for Input and Output of the Circadian System. *Journal of Neuroscience* 31:2746-2755.
- Tadahiro Goda, Karolina Mirowska1, Jake Currie, Min-Ho Kim, Neethi Varadaraja Rao, Gloribel Bonilla, Herman Wijnen (2011) Adult Circadian Behavior in *Drosophila* Requires Developmental Expression of cycle, But Not period. *PLoS Genetics* 7:e1002167.

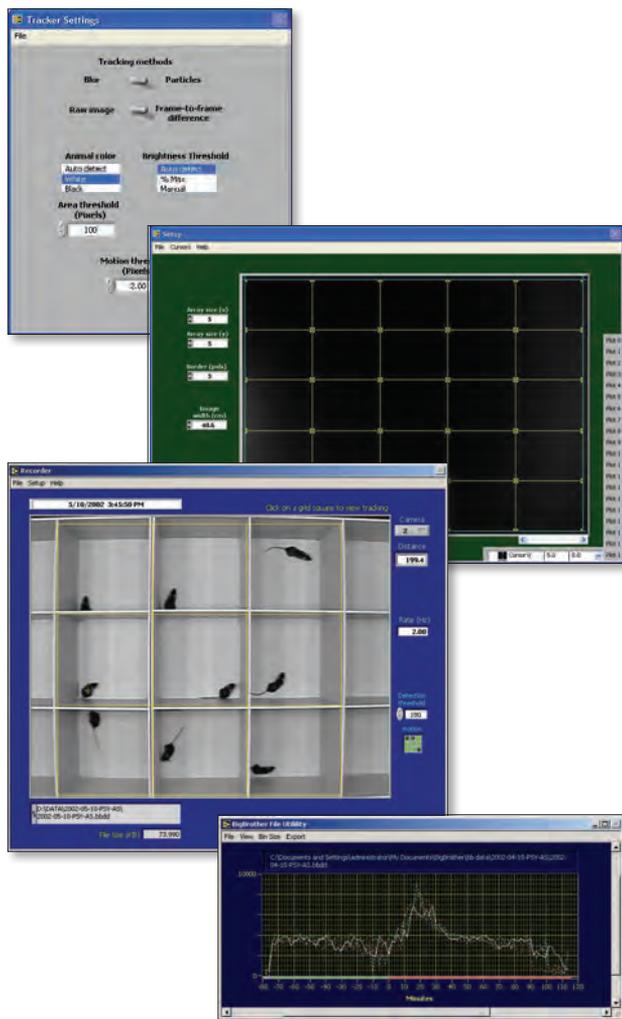


Rabbit Guinea Pig Rat Mouse Insect Fish

Big Brother Video Based Tracking for Circadian Studies

Circadian Biology

• Big Brother Video Based Tracking for Circadian Studies



Big Brother is a video-based activity monitor for behavioral neuroscience, neuropharmacology and circadian biology applications. Big Brother tracks the distance travelled by each monitored animal via our USB cameras. The resulting data can be analyzed and viewed in the analysis program. For long-term monitoring of circadian biology, records can be imported into ClockLab, the standard analysis program for the field of circadian biology analysis.

The system can record up to 200 animals easily using up to 4 cameras. Up to 50 animals can be tracked by each camera. Event markers for time of drug application, environmental changes, etc. can be applied independently for each channel or all channels can be marked at once.

Big Brother stores the complete frame-by-frame path of each animal for detecting stereotype and other behaviors. The image on the camera can be divided into any number of zones. The animal in each zone is tracked independently for maximum flexibility. The Big Brother system has been used to track animals from Drosophila to zebra fish to mice.

With superior temporal resolution, Big Brother locates each animal up to 4 times per second, depending on the number of animals being tracked, and calculates the distanced travelled compared to the previous location. The distance is added to the cumulative total for the current minute and after each minute, the total distance is recorded and reset to zero.

Our cameras are infrared sensitive so tracking is possible and uniform under visible, infrared or on a light-dark cycle where lighting changes from one to the other during the testing period.

Data analysis is simple as the data exports to a spreadsheet file or directly to an open Excel worksheet multiple analyses for all the animals in a file. For circadian analysis, ClockLab Analysis also features numerous batch analysis features.

KEY FEATURES

- ▶ Easy setup and operation for tracking up to 200 animals
- ▶ Event markers and path tracking for stereotypy and detection of other behaviors of interest
- ▶ Extremely flexible
- ▶ High temporal resolution, locating each subject up to four times per second
- ▶ Infrared sensitive for recording where light levels vary
- ▶ Extensive batch analysis

Ordering Information

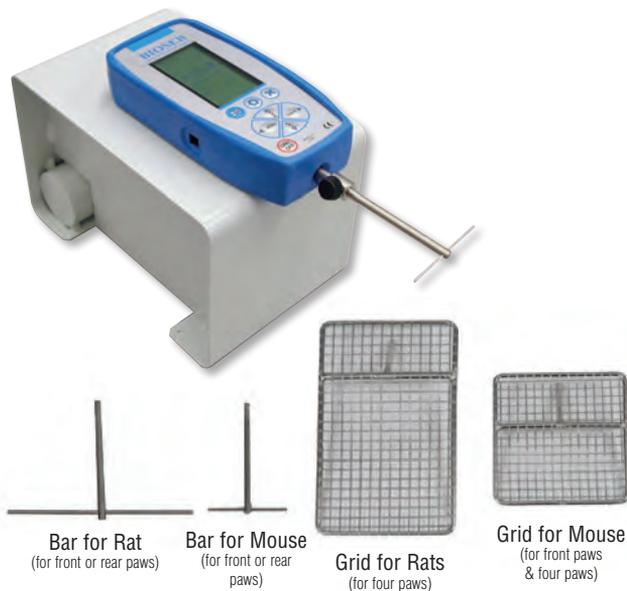
Order #	Product
ACT-400	Big Brother Video Based Tracking Software, up to 200 subjects
ACT-711	USB Interface
ACT-VP-02	USB Camera Kit, Includes Lens, Mounting Bracket and Cabling

NOTE See our other products that can be used for Circadian Applications:

- Rodent Activity Wheel, page 27
- OxyletPro, pages 88-89



Grip Strength Meter for Evaluation of Muscular Strength



Bar for Rat
(for front or rear paws)

Bar for Mouse
(for front or rear paws)

Grid for Rats
(for four paws)

Grid for Mouse
(for front paws & four paws)

KEY FEATURES

- ▶ Stand alone system, PC optional, not required
- ▶ Fits rats or mice with a simple change of grip accessories
- ▶ Multi-units display: kgs, grams, lbs, Newtons
- ▶ New and unique internal computations allow direct reading of average value, standard deviation and variability for up to 100 subject animals

PARAMETERS MEASURED

- ▶ Maximum force developed by the front and hind paws

COMPONENTS INCLUDED

- ▶ Display unit with RS-232 connection for PC
- ▶ Metal stand
- ▶ One accessory (one or two grids/bars)
- ▶ Instruction manual
- ▶ 1 year warranty

OPTIONS

- ▶ RS-232 cable
- ▶ RSIC software
- ▶ Additional grid/bar

The grip strength meter allows the study of neuromuscular functions in rodents by determining the maximum force displayed by an animal. This test is included in the Functional Observational Battery (FOB) to screen for neurobehavioral toxicity. In this context, changes in grip strength are interpreted as evidence of motor neurotoxicity.

The grip strength meter is positioned horizontally and the subjects are held by the tail and lowered towards the apparatus. The animals are allowed to grasp the metal grid or T-bar and are then pulled backwards in the horizontal plane. The force applied to the grid or to the bar just before it loses grip is recorded as the peak tension. This force can be measured in kilograms, grams, pounds or Newtons.

Data output is carried out through RS-232, printer, or chart recorder.

Depending on the grid type used, grip strength can be measured from the front or hind paws.

Specifications

Dimensions of Single System (W x D x H)	400 x 180 x 200 mm (15.7 x 7 x 7.9 in)
Dimensions of 2 Grid System (W x D x H)	750 x 180 x 200 mm (29.5 x 7 x 7.9 in)
Sensor Capacity	0-2 kG (20N)
Sampling Speed	1000 Hz
Measurement Range	0 to 2000 grams
Resolution	0.1 gram
Accuracy	0.1 % of full scale
Material Composition	Stainless steel (Grid)
Power Supply	110/220 VAC

Ordering Information

Order #	Model	Product
76-0483	BIOGS3	Grip Strength Test Complete with 1 Accessory, 110 or 220 Volts
Options		
76-0484	BIOASIC	Data Acquisition RSIC Software Windows® XP (Dongle and CD)
76-0485	BIOAGRS232	RS-232 Cable
76-0479	BIOGRIPBR	Bar for Rats (Front Paws)
76-0480	BIOGRIPBS	Bar for Mice (Front or Rear Paws)
76-0481	BIOGRIPGR	Grid for Rats (Front or Four Paws)
76-0482	BIOGRIPGS	Grid for Mice (Front & Four paws)

REFERENCES

Menzies FM et al. (2015) Calpain inhibition mediates autophagy-dependent protection against polyglutamine toxicity. *Cell Death Differ.* 2015 Mar;22(3):433-44. (mice, UK, USA)

Sensory Motor & Coordination



NEW Rota Rod for Motor Coordination, Endurance, and Fatigue Resistance Studies



KEY FEATURES

- ▶ NEW Touchscreen User Interface
- ▶ Combined Rota Rod for mice and rats available
- ▶ Mechanical detection of fall
- ▶ Individual lane timers
- ▶ Constant speed and fixed acceleration rate modes

PARAMETERS MEASURED

- ▶ Animal latency to fall
- ▶ Rotation speed when fall occurs

COMPONENTS INCLUDED

- ▶ Rota Rod unit with integrated control panel
- ▶ Cylinder for mice, rats or both depending on the model
- ▶ Extension hood for rats (only LE8305, LE8505, and LE8355)
- ▶ Cables and connectors
- ▶ Certificate of calibration
- ▶ Instruction manual
- ▶ Set of spare fuses
- ▶ 2 year warranty

OPTIONS

- ▶ SEDACOM software

Our Rota Rod provides an easy way to test the effects of drugs, brain damage, or diseases on motor coordination or fatigue resistance in rodents.

The animal is placed on the rotating lane of the Rota Rod and the timer is started. When the animal drops safely into its own lane, the time latency to fall (minutes and seconds) and rotation speed are automatically recorded. A removable upper separator for rat models is included to prevent interference between animals running in adjacent lanes.

The Rota Rod is controlled by an advanced microprocessor which provides precise timing control and ultra-accurate speed regulation. Rotation can be electronically set at a constant speed (4-40 rpm). Alternatively, acceleration rate may be selected at a defined time (30 sec to 10 min, 1 sec increments). Acquired data is saved in table form by lanes/trials.

Now even easier to use! The new touchscreen graphic user interface allows clear visualization of timing and speed for each lane. Change modes, adjust speed, and create protocols right from the main screen for greater flexibility with maximum functionality and usability.

Sensory Motor & Coordination



Specifications

Model	Base Unit Dimensions mm (inch) (W x D x H)	Total Height mm (inch)	Fall Height cm	Lane Width mm (inch)	Drum Diameter mm (inch)	Rod Diameter mm (inch)	Extra Hood Height mm (inch)
LE8205	362 x 240 x 375 (14.25 x 9.45 x 14.75)	400 (15.75)	20	50 (2)	250 (9.8)	30 (1)	NA
LE8305	362 x 240 x 375 (14.25 x 9.45 x 14.75)	400 (15.75)	21.5	75 (3)	250 (9.8)	60 (2)	130 (5)
LE8505	362 x 240 x 375 (14.25 x 9.45 x 14.75)	400 (15.75)	20 (mouse drum); 21.5 (rat drum)	50 (2) - mouse drum; 75 (3) - rat drum	250 (9.8)	30 (1) - mouse drum; 60 (2) - rat drum	130 (5)
LE8355	362 x 245 x 624 (14.25 x 9.65 x 24.57)	649 (25.55)	47	153 (6)	250 (9.8)	80 (3)	130 (5)



Ordering Information

Order #	Model	Product
76-0770	LE8205	Accelerating Rota Rod with Touchscreen, 5 Mice
76-0771	LE8305	Accelerating Rota Rod with Touchscreen, 4 Rats
76-0772	LE8505	Accelerating Rota Rod with Touchscreen, 4 Rats or 4 Mice
76-0773	LE8355	Accelerating Rota Rod with Touchscreen, 2 Large Rats
Options		
76-0406	SEDACOM	Sedacom V2.0 Software
Spare Parts		
76-0373	LE8580	4 Rat Drum for LE8505
76-0374	LE8550	4 Mice Drum for LE8505

REFERENCES

Yin N et al. (2015) Silver nanoparticle exposure induces rat motor dysfunction through decrease in expression of calcium channel protein in cerebellum. *Toxicol Lett.* 2015 Sep 2;237(2):112-20.

Iderberg H et al. (2015) Pharmacological stimulation of metabotropic glutamate receptor type 4 in a rat model of Parkinson's disease and L-DOPA-induced dyskinesia: Comparison between a positive allosteric modulator and an orthosteric agonist. *Neuropharmacology.* 2015 Aug;95:121-9.

Qin X et al. (2015) Soluble Epoxide Hydrolase Deficiency or Inhibition Attenuates MPTP-Induced Parkinsonism. *Mol Neurobiol.* 2015 Aug;52(1):187-95.

Pineda-Farias JB et al. (2015) Role of anoctamin-1 and bestrophin-1 in spinal nerve ligation-induced neuropathic pain in rats. *Mol Pain.* 2015 Jul 1;11:41.

Espejo-Porras F et al. (2015) Changes in the endocannabinoid signaling system in CNS structures of TDP-43 transgenic mice: relevance for a neuroprotective therapy in TDP-43-related disorders. *J Neuroimmune Pharmacol.* 2015 Jun;10(2):233-44.

Iderberg H et al. (2015) Activity of serotonin 5-HT_{1A} receptor 'biased agonists' in rat models of Parkinson's disease and L-DOPA-induced dyskinesia. *Neuropharmacology.* 2015 Jun;93:52-67.

Lamont MG et al. (2015) Mice deficient in carbonic anhydrase type 8 exhibit motor dysfunctions and abnormal calcium dynamics in the somatic region of cerebellar granule cells. *Behav Brain Res.* 2015 Jun 1;286:11-6.

Mogilski S et al. (2015) Antinociceptive, anti-inflammatory and smooth muscle relaxant activities of the pyrrolo[3,4-d]pyridazinone derivatives: Possible mechanisms of action. *Pharmacol Biochem Behav.* 2015 Jun;133:99-110.

Iderberg H et al. (2015) NLX-112, a novel 5-HT_{1A} receptor agonist for the treatment of L-DOPA-induced dyskinesia: Behavioral and neurochemical profile in rat. *Exp Neurol.* 2015 May 30;271:335-350.

Lebreton F et al. (2015) Sleep Physiology Alterations Precede Plethoric Phenotypic Changes in R6/1 Huntington's Disease Mice. *PLoS One.* 2015 May 12;10(5):e0126972.

Linsell O et al. (2015) Effect of styrene maleic acid WLN55,212-2 micelles on neuropathic pain in a rat model. *J Drug Target.* 2015 May;23(4):353-9.

Su SH et al. (2015) MeCP2 in the rostral striatum maintains local dopamine content critical for psychomotor control. *J Neurosci.* 2015 Apr 15;35(15):6209-20.

Söderlund GB et al. (2015) Acoustic noise improves motor learning in spontaneously hypertensive rats, a rat model of attention deficit hyperactivity disorder. *Behav Brain Res.* 2015 Mar 1;280:84-91.

Pereda D et al. (2015) Mice lacking chromogranins exhibit increased aggressive and depression-like behaviour. *Behav Brain Res.* 2015 Feb 1;278:98-106.

Kao FC et al. (2015) MeCP2-mediated alterations of striatal features accompany psychomotor deficits in a mouse model of Rett syndrome. *Brain Struct Funct.* 2015 Jan;220(1):419-34.

Sensory Motor & Coordination



Rabbit



Guinea Pig



Rat



Mouse



Insect



Fish

NEW Small Animal Treadmill



Treadmill Model LE8710M						Running
	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	
Stop	Dist.(cm) 0017	0013	0017	0012	0017	
	Time-S 00:00	00:11	00:00	00:14	00:00	
	Num-S 0000	0001	0000	0001	0000	
Intensity	1.0	0.4	0.6	0.2	0.0	
Time:	0:00:56		Speed:	30.0 (cm/s)		(mA)
Settings	Reset All	+	-	Speed	Intensity	

Treadmills are rolling belts with an adjustable speed and slope, enabling forced exercise training and accurate testing of fatigue in rodents. Different models are available from one to five lanes.

These treadmills have an adjustable speed (up to 150 cm/s), slope (from -25 to +25 degrees), and a control unit. The rolling belt is built with specially selected materials to guarantee the best performance under conditions of intensive use and requires minimum maintenance. It is also designed with simplicity for keeping it clean. The lanes have sufficient width for the subject to correct its errors in coordination, thereby allowing an exact measurement of the fatigue without deficiencies in motor coordination.

The integrated new touchscreen graphic user interface allows controlling the speed of the belt, the intensity of the stimulus as well as provides a clear visualization of the measured data. The data can be transferred to a computer through the optional SEDACOM software (USB communication). New conditions are available for stopping the session independently in each lane using the following parameters: trial duration, traveled distance, shock received...

The electrical shock supplied by the grid is of constant intensity (from 0 to 2 mA), that is, the current which circulates through the animal (and therefore its effect) only depends on the value of the mA chosen and not of the subject (quantity of body mass in contact with the bars, perspiration, etc.)

The apparatus can optionally be provided with an air isolated enclosure for respiratory metabolism studies - single lane versions only. Gas analyzer, air supply and switching units as well as software must be purchased separately for use with air tight option.

See page 89 for more information on the treadmill option of the OxyletPro system for indirect calorimetry experiments.

KEY FEATURES

- ▶ New Touchscreen User Interface
- ▶ Silent operation, even at high speeds
- ▶ Accurate control of shock intensity
- ▶ Positive/Negative slope
- ▶ High performance motor
- ▶ Easy to clean
- ▶ Air-puff option for negative stimuli
- ▶ New stop control conditions

PARAMETERS MEASURED

- ▶ Total distance covered
- ▶ Distance covered at each moment
- ▶ Accumulated shock time per animal
- ▶ Number of contacts with the shock grid

COMPONENTS INCLUDED

- ▶ Treadmill with control unit
- ▶ Allen key
- ▶ Cables and connectors
- ▶ Instruction manual
- ▶ 2 year warranty

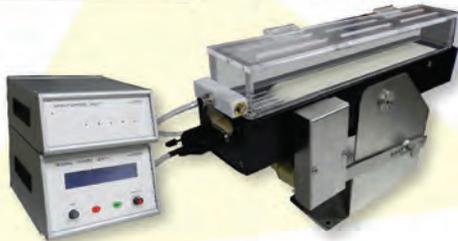
OPTIONS

- ▶ Air tight lid for calorimetry studies (available only on single lane models)
- ▶ SEDACOM software

Sensory Motor & Coordination



**AIRPUFF
OPTION!**



An Air-puff accessory option is available for our entire range of Treadmills (only available for the more recent version of treadmills, call for information). Use Air-puff instead of shock as an aversive motivating stimulus for forced exercise in small laboratory animals for a more ethical option. Our air-puff and shock options are completely interchangeable - use one or the other as required by your current experimental needs. Air source (suggested sources are either bottle/gas tank or compressor) and regulators are not provided and should be purchased through local supplier.

Specifications

Current Range	Adjustable from 0 to 2 mA
Belt Speed	Adjustable from 5 to 150cm/sec
Running Lanes	1, 2, or 5, depending upon model selected
Shock Grid	190 mm (7.5 in) long x 100 mm (4 in) wide
Slope Adjustment	Negative and positive slope from -25° to 25°
Maximum Number	1 per computer with SEDACOM
Certifications	CE compliant
Power Requirements	110 or 220 VAC, 50/60 Hz

Ordering Information

Order #	Model	Product
Single Lane Treadmills		
76-0890	LE8700TS	Single Lane Treadmill, Rat with shock (with standard lid)
76-0891	LE8708TS	Single Lane Treadmill, Mouse with shock (lid to be ordered separately)
76-0554	LE8708ST	Standard Lid for Mouse (to be used in conjunction with 76-0304)
76-0712	LE8700CST	Standard Lid for Rat (to be used in conjunction with 76-0553)
76-0892	LE8715TS	Single Lane Treadmill, Rabbit with shock
Double Lane Treadmills		
76-0893	LE8706TS	Double Lane Treadmill, Rat with shock
76-0894	LE8709TS	Double Lane Treadmill, Mouse with shock
5-Lane Treadmills		
76-0895	LE8710RTS	5-Lane Treadmill, Rats with shock
76-0896	LE8710MTS	5-Lane Treadmill, Mouse with shock
5-Lane Treadmill Accessories		
76-0312	LE8740R	Set of 5 Corridors, Rat to convert 5-Lane Mouse Treadmill
76-0313	LE8740M	Set of 5 Corridors, Mouse to convert 5-Lane Rat Treadmill
76-0314	LE8730R	Replacement shock grid for rat
76-0315	LE8730M	Replacement shock grid for mice
Optional Accessories		
76-0406	SEDACOMV2.0	SEDACOM V2.0 Software for Data Acquisition
Air-Puff Accessories		
76-0707	LE8700AP	Air-puff option for LE8700 treadmill
76-0708	LE8708AP	Air-puff option for LE8708 treadmill
76-0709	LE8706AP	Air-puff option for LE8706 treadmill
76-0710	LE8709AP	Air-puff option for LE8709 treadmill
76-0711	LE8710RAP	Air-puff option for LE8710R treadmill
76-0705	LE8710MAP	Air-puff option for LE8710M treadmill

REFERENCES

- Santos-Alves E et al. (2015) Exercise modulates liver cellular and mitochondrial proteins related to quality control signaling. *Life Sci.* 2015 Aug 15;135:124-30. (LE8700, rat, Portugal, Spain)
- Brull A et al. (2015) Phenotype consequences of myophosphorylase dysfunction: insights from the McArdle mouse model. *J Physiol.* 2015 Jun 15;593(12):2693-706. (mouse, Spain)
- Ignacio DL et al. (2015) Thyroid hormone and estrogen regulate exercise-induced growth hormone release. *PLoS One.* 2015 Apr 13;10(4):e0122556. (rat, Brazil).
- González-Barriga A et al. (2015) Cell membrane integrity in myotonic dystrophy type 1: implications for therapy. *PLoS One.* 2015 Mar 23;10(3):e0121556. (LE8710M air puff, mouse, The Netherlands).

Sensory Motor & Coordination



Rotameter for Evaluating Rotation Behavior



KEY FEATURES

- ▶ Rotation sensor with adjustable TTL output signal
- ▶ Configuring experiment duration and time intervals of counting
- ▶ Counting the number of partial and complete left and right turns
- ▶ Adjustable harness with soft ring (new design)
- ▶ New optional Data Transfer Software, SEDACOM V2.0

PARAMETERS MEASURED

- ▶ Number of partial and complete left and right turns (control unit)
- ▶ Data given by user-defined time intervals (multicounter and SEDACOM)

COMPONENTS REQUIRED

- ▶ Rotation sensor and support
- ▶ Animal harness
- ▶ Container (either a bowl or a cylinder)
- ▶ Cables and connectors
- ▶ Instruction manual
- ▶ 2 year warranty

OPTIONS

- ▶ Double counter (left & right turn)
- ▶ Programmable counter with 30 inputs (up to 15 Rotameters)

Rotational behavior has proved a popular technique for screening the behavioral effects of a wide variety of lesions, drugs, and other experimental manipulations on the brain of rodents. This test is widely carried out in experiments using animal models of Parkinson's Disease with unilateral lesions in the dopaminergic nigrostriatal system.

The subject wears an adjustable harness with velcro connected to the rotation sensor by a flexible tie. Wide ranges of harnesses are available to fit different animal sizes. The subject is then placed into a transparent container (cylindrical or oval) with a lateral support for a vertical stand.

A bi-directional rotation sensor provides a double (right and left turns) output with adjustable regulation of pulses/turns. Experiment duration and time intervals of measurement can be set. An external multicounter is necessary for data storage; it counts the number of partial and complete left and right turns depending of the adjustments made on the rotation sensors.

The computer interface SEDACOM allows easy exportation of data (through RS-232 serial port) in a format compatible with Excel™.

Specifications

Fraction of Turn	Units of 1/4 turns (selectable)
Dimension of the container–Cylinder	400 mm (15.8 in) diam, 300 mm (12 in) High
Dimension of the container–Bowl	400 mm (15.8 in) diam, 200 mm (8 in) High

Ordering Information

Order #	Model	Product
76-0244	LE902-SR	Left & Right Rotation Sensor, Adjustable Turn Resolution
76-0245	LE902-AS	Rat Harness with Soft Ring and Connecting Wire
76-0555	LE902-ASE	Mouse Harness with Soft Ring and Connecting Wire
76-0556	LE902BT	Bowl Container with Supporting Rod
76-0247	LE902-RP	Cylindrical Container with Supporting Rod
Optional Accessories		
76-0242	LE902-CC	Double Counter (Left & Right Turns)
76-0243	LE3806	Programmable MultiCounter with 30 Inputs (up to 15 Rotameters)
76-0406	SEDACOMV2.0	SEDACOM V2.0
76-0608	CONRS232USB	RS232/USB Adapter

REFERENCES

Ilderberg H et al. (2015) Activity of serotonin 5-HT1A receptor 'biased agonists' in rat models of Parkinson's disease and L-DOPA-induced dyskinesia. *Neuropharmacology*. 2015 Jun;93:52-67.

Molinet-Dronda F et al. (2015) Monoaminergic PET imaging and histopathological correlation in unilateral and bilateral 6-hydroxydopamine lesioned rat models of Parkinson's disease: A longitudinal in-vivo study. *Neurobiol Dis*. 2015 May;77:165-72.



HSE-HA Rodent Shocker

NEW versions with low current and 0.1mA accuracy now available!



KEY FEATURES

- ▶ For testing anticonvulsant drugs
- ▶ For mice and rats
- ▶ Two types of electrodes are available: for eyes or ears
- ▶ Foot switch operation
- ▶ Security circuit for maximum users safety

Cerebral seizures, preferably in mice, are produced using constant sinusoidal alternating current to determine the effect of anticonvulsant drugs. For the reliable induction of seizures it is necessary to achieve satisfactory current flow. Eye electrodes and (especially in mice) ear electrodes are used for this purpose.

Special attention has been devoted to integrate a security circuit for users safety. It allows only to give a shock if the electrical resistance between the two electrodes is low enough. Furthermore there is a security key so that only trained people can use the unit.

Specifications

Stimulation Frequency	50 Hz or 60 Hz according to supply frequency
Stimulus Duration	0.1 sec to 9.9 sec in steps of 0.1 sec, selected after pressing a button, the selected time is indicated
Stimulus Energy	Up to 75 W
Output	Constant current, fully floating
Output Current Standard Version	0 to 300 mA, 0 to 150 mA, 0 to 100 mA depending on maximum stimulation voltage selected, the setting is made on a 10-turn potentiometer and the selected value is shown on the digital display
Output Current LC Version	0 to 30mA and 0 to 20mA depending on selected voltage
Limitation of Maximum Stimulation Voltage	250 V, 500 V, 750 V in 3 steps, selected by button
Digital Display	The selected stimulation current is indicated continuously in mA, the actual current applied is shown during application and can be called up later by pushing a button, the selected stimulation time is shown on pressing the TIME button, bargraph indicates the course of the stimulation time.
Supply	110 VAC, 60 Hz or 220 VAC, 50 Hz
Dimensions, H x W x D	150 x 260 x 360 mm (5.91 x 10.2 x 14.2 in)
Weight	5 kg (11 lb)

Ordering Information

Order #	Product
73-0105	Rodent Shocker Sine-Wave Shock Generator with Foot Switch, 115 VAC, 60 Hz
73-0106	Rodent Shocker Sine-Wave Shock Generator with Foot Switch, 230 VAC, 50 Hz
73-3946	Rodent Shocker RS Type 221/LC Low Current Version, 230 VAC, 50 Hz including foot switch, output power 75 VA, maximum current at 750V is 20 mA, at 500V and 250V 30mA, selectable in steps of 0.1 mA
73-3047	Rodent Shocker RS Type 221/LC Low Current Version, 115 VAC, 50 Hz including foot switch, output power 75 VA, maximum current at 750V is 20 mA, at 500V and 250V 30mA, selectable in steps of 0.1 mA
73-0107	Ear Shock Electrodes for Mice and Rats, Pair
73-0108	Eye Shock Electrode for Mice and Rats

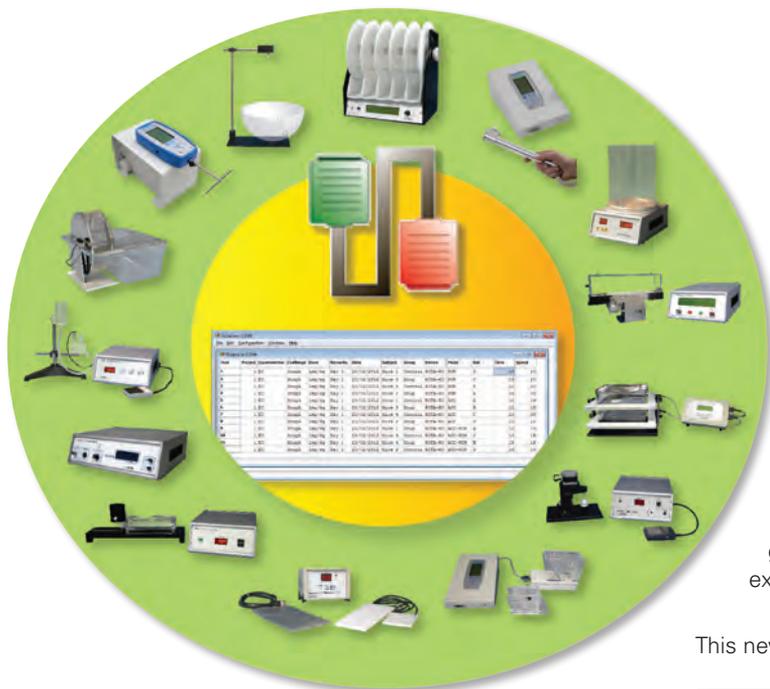
Sensory Motor & Coordination

software species is hardware specific.

Rabbit Guinea Pig Rat Mouse Insect Fish

SEDACOM Data Transfer Software V2.0

Sensory Motor & Coordination • SEDACOM Data Transfer Software V2.0



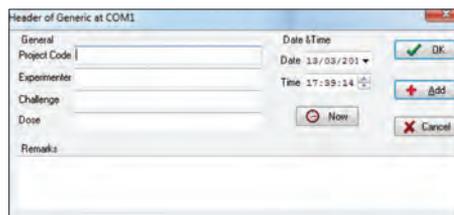
SEDACOM V2.0 is the latest version for our data transfer software featuring a very easy, convenient and cost-effective means for data collection. Data collected in SEDACOM is easily visualized and exported to other statistical software for further post-analysis processing.

SEDACOM V2.0 can be used with a wide range of devices including our:

- **Rota Rods** – page 32
- **Treadmills** – pages 34, 89
- **IR Actimeter** – page 24
- **Activity Wheel** – page 27
- **Tail Flick Meter** – page 40
- **Hot Plate Meter** – page 41
- **Plethysmometer** – page 49
- **Paw Pressure Test** – page 48
- **Incapacitance Meter** – page 52
- **Electronic Von Frey** – page 47
- **Grip Strength Meter** – page 31
- **Rotameter** – page 36

SEDACOM V2.0 features a new Device Panel from which the Device Runtime panel and communication serial port can be selected. An Experiment Header panel is provided for entering general experimental information (project name, experimenter, treatment, date, time, etc).

This new version can be run in two modes:



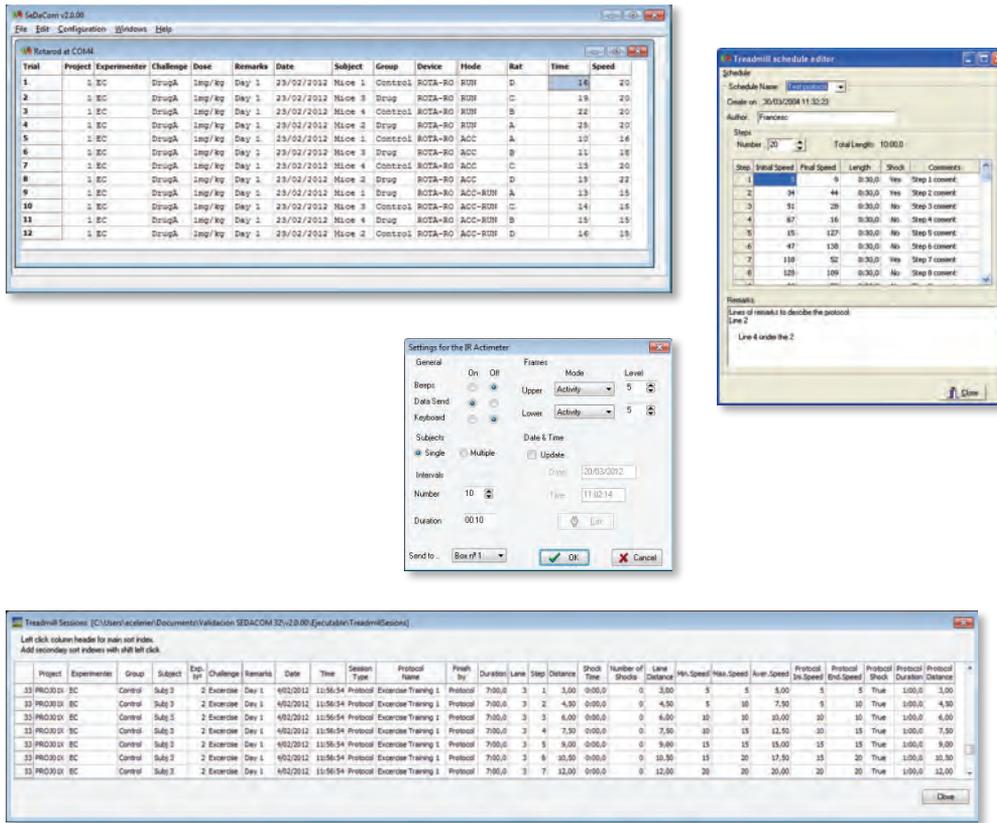
GENERIC Mode: for use with devices that transmit data via plain ASCII format ending in CR+LF. Data collected in GENERIC mode will be displayed in a text-like runtime panel format and export as a txt file.

DEVICE Mode: for use with our manufactured systems. The new Runtime Panel presents the data in a table format for easier post-experimental analysis. Data is updated per user-defined time intervals for easier tracking of the experimental progress.

SEDACOM V2.0 also offers device control for corresponding hardware – the software will allow:

- Speed and shock control through the Speed Protocol Editor for our treadmill models (pages 34-35)
- Configuration and timing settings for our IR Actimeter (pages 24-25)
- Start/Stop/Pause requests

Sensory Motor & Coordination



Data is saved as raw files (.RAW) as well as SED files (.SED), which will contain experiment header, subject and session information in the DEVICE mode. Data from subsequent trials can be stored in the same SED file for easier experiment organization.

SEDACOM V2.0 is now provided with a USB Flash key which includes the software installer, license, and User's manual. Data acquisition can be performed on any user-selected PC/ laptop and just requires the USB Flash key to be installed into an available USB port on that computer. Data can be visualized and exported without the USB Flash key.

SEDACOM V2.0 is available for trial. Please contact your local representative for more information.

Ordering Information

Order #	Model	Product
76-0406	SEDACOM V2.0	SEDACOM Data Collection Software
76-0608	CONRS232USB	RS-232/USB Adapter



Tail Flick Meter for Evaluating Thermal Analgesia



KEY FEATURES

- ▶ Optimal detection due to perfect alignment of heat stimulus and photo beam trigger
- ▶ Photo beams with adjustable sensitivity
- ▶ A light beam shows the point on which the heat source will focus
- ▶ Manual and remote timer and trigger
- ▶ Groove for correct tail placement
- ▶ Automatic cut-off
- ▶ New optional data transfer software, SEDACOM V2.0

PARAMETERS MEASURED

- ▶ Time latency response to thermal stimulus

COMPONENTS INCLUDED

- ▶ Control Unit with RS-232 port to PC
- ▶ Stimulation unit
- ▶ Mouse tail adapter
- ▶ Holder for rat or mouse - must specify at time of order
- ▶ Footswitch
- ▶ Instruction manual
- ▶ Calibration certificate
- ▶ Cables and connectors
- ▶ Set of spare fuses
- ▶ 2 year warranty

OPTIONS

- ▶ LE7106T Tail-Temperature recorder
- ▶ SEDACOM software
- ▶ RS-232/USB Adapter

This system features radiant heat applied on the animal's tail; when the animal feels discomfort, it reacts by a sudden tail movement (tail flick) which automatically stops the stimulation and the timer for the measurement of the animal reaction time (period from the beginning of the stimulation until detection of the animal's response).

This test has proved particularly sensitive for studying the analgesic properties of pharmacological substances. It can also be used to evaluate basal thermal pain sensitivity or to study putative genetic differences among control animals.

The LE7106 Tail-flick Meter consists of a stimulation unit (containing the halogen lamp for the heat stimulus) and an electronic control unit. The system can be used for rats and mice of different sizes. The animal is placed in a restrainer

with its tail protruding on the platform of the stimulus unit. The animal's tail is positioned on a slot of adjustable width equipped with a groove that guarantees a correct placement. A remote foot-switch controls the test start/stop allowing rapid hands-free experiments.

A photo beam with adjustable sensitivity detects the tail flick and the latency is automatically presented on a digital display on the control unit. Measurements of reaction time are given with a 0.1 precision. A cut-off time can be set to avoid tissue damage (by default: 20 s). The groove system for the tail and the adjustment of response sensitivity ensure optimum repeatability and reliability of results.

SEDACOM software can be used to automatically record the results on a PC through a RS-232 port with our RS-232/USB adapter.

Specifications

Control Unit Dimensions (W x D x H)	350 x 350 x 130 (14 x 14 x 5 in)
Stimulation Unit Dimensions (W x D x H)	400 x 140 x 155 (16 x 5.5 x 6 in)
Power Supply	110/220 VAC, 50/60 Hz
Material Composition	Methacrylate, Halogen Lamp
Certifications	CE compliant

Ordering Information

Order #	Model	Product
76-0293	LE7106	Tail Flick Analgesia Meter
76-0183	LE5016	Mice restrainer (small animals)
76-0184	LE5018	Mice restrainer (large animals)
76-0185	LE5020	Rat restrainer 150 gr.
76-0186	LE5022	Rat restrainer 250 gr.
76-0187	LE5024	Rat restrainer 400 gr.
76-0188	LE5025	Rat restrainer 500 gr.
Options		
76-0406	SEDACOMV2.0	SEDACOM V2.0
76-0608	CONRS232USB	RS-232/USB Adapter
76-0294	LE7106T	Tail-Temperature Recorder

REFERENCES

- Park J et al. (2015) Pain perception in acute model mice of Parkinson's disease induced by 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP). *Mol Pain*. 2015 May 17;11:28.
- Bhalla S et al. (2015) Endothelin ETA Receptor Antagonist Reverses Naloxone-precipitated Opioid Withdrawal in Mice. *Canadian Journal of Physiology and Pharmacology*, 10.1139/cjpp-2015-0022
- Rodríguez-Gaztelumendi A et al. (2014) An altered spinal serotonergic system contributes to increased thermal nociception in an animal model of depression. *Exp Brain Res*. 2014 Jun;232(6):1793-803.



Hot-Plate for Evaluating Thermal Analgesia



KEY FEATURES

- ▶ Digital set point
- ▶ Built-in electronic timer
- ▶ Foot switch timing operation
- ▶ New optional data transfer software, SEDACOM V2.0

PARAMETERS MEASURED

- ▶ Time latency to 'paw licking'
- ▶ Time latency to 'jumping'

COMPONENTS INCLUDED

- ▶ Base with heating plate
- ▶ Footswitch
- ▶ Cables and connectors
- ▶ Certificate of calibration
- ▶ Instruction manual
- ▶ Set of spare fuses
- ▶ 2 year warranty

OPTIONS

- ▶ SEDACOM software
- ▶ RS-232/USB Adapter

The Hot-Plate performs rapid and precise screening of analgesic drug properties on small-laboratory animals according to the 'hot-plate test'. The animal's pain sensitivity alterations induced by a specific experimental context change and/or genetic manipulations can also be evaluated through this method.

The hot-plate test, initially described by N.B. Eddy and D. Leimbach (1953), evaluates thermal pain reflexes due to footpad contact with a heated surface. During the experiments, the animal is confined in a removable clear acrylic cylinder where the latency time to the first hind paw or/and jumping responses are measured.

The Hot-Plate features a thick aluminum plate (10 mm) provides a high temperature stability and even surface distribution. The plate temperature can be held at a set point between 45 and 62°C ($\pm 0.1^\circ\text{C}$) by multiple proportional feedback circuits that minimize overshoot. A built-in timer activated by an external foot switch allows precise measurement of reaction time (0.1 sec precision). A remote foot-switch controls the test start/stop allowing rapid hands-free experiments. The operator can read the animal reaction time from the display or from a PC computer using SEDACOM software. Trial number, plate temperature and reaction time are then sent to the software through a RS-232 port.

Specifications

Base Dimensions (W x D x H)	200 x 300 x 110 mm (8 x 12 x 4 in)
Plate Dimensions (D)	200 mm (8 in)
Cylinder Dimensions (D x H)	200 x 250 mm (8 x 10 in)
Operating Temperature	45 to 62 degrees Celsius; 0.1 steps
Reaction Time	3 digits, 0.01 sec increment
Material Composition	Clear methacrylate (animal holder), aluminum (plate)
Power Requirements	110 or 220 VAC, 50/60 Hz
Certifications	CE compliant

Ordering Information

Order #	Model	Product
76-0113	LE 7406	Hot-Plate Thermal Analgesia Meter
Options		
76-0406	SEDACOMV2.0	SEDACOM V2.0
76-0608	CONRS232USB	RS-232/USB Adapter

REFERENCES

- Fornaguera C et al. (2015) PLGA nanoparticles prepared by nano-emulsion templating using low-energy methods as efficient nanocarriers for drug delivery across the blood-brain barrier. *J Control Release*. 2015 Aug 10;211:134-43.
- Parvathy SS et al. (2015) Coadministration of indomethacin and minocycline attenuates established paclitaxel-induced neuropathic thermal hyperalgesia: Involvement of cannabinoid CB1 receptors. *Sci Rep*. 2015 Jun 18;5:10541.



Hot/Cold Plate for Testing Animal Sensitivity



KEY FEATURES

- ▶ Unmatched temperature stability and control for both hot and cold
- ▶ Fast acclimation to set temperatures
- ▶ Homogeneous temperature surface distribution
- ▶ BSRamp software will allow the user to define temperature ramps (slope in °C/min, start and end points) and store results

PARAMETERS MEASURED

- ▶ Animal reaction time to hot or cold stimulus

COMPONENTS INCLUDED

- ▶ Stimulation Unit
- ▶ Footswitch
- ▶ USB cable
- ▶ BSRamp software
- ▶ Instruction manual
- ▶ One year warranty

The Hot/Cold Plate Analgesia Meter is based on a metal plate which can be heated to 65°C and cooled to -3°C (with an ambient temperature between 20°C and 25°C). An electronic thermostat maintains the plate's temperature and the front panel displays the temperature.

The animal's pain sensitivity resulting from exposure to heat or cold is tested by placing the animal on the surface of the plate and starting a built-in timer. The operator stops the timer at the instant the animal lifts its paw from the

plate, reacting to the discomfort. The front panel timer then displays the number of seconds the animal took to react. Animal reaction time is a measurement of animal resistance to pain and is used to measure efficacy of analgesics.

The plate is designed to be very simple to use and very fast to reach the set temperature (as example from ambient to 4°C, the most used threshold value, it takes less than 10 minutes, and from 4°C to 65°C it takes only 5 minutes). The Hot/Cold Plate, is accurate to less than 0.5°C (IEC metrology standard) and perfectly constant in the animal holder system. The preset temperature will not change for more than 0.1°C when a 400g rat is placed on the plate, and return to the set temperature is almost immediate.

In addition, the instrument can be adjusted to be used for "TEMPERATURE RAMPS". Predefined by the user, this feature is mainly used for studies with telemetry implants. In addition to displaying the reaction time, the Cold/Hot Plate Analgesia Meter is capable of sending data via USB interface to a computer.

The operator can start and stop the timer with the front panel start/stop switch or with the included footswitch, which allows "hands-free" operation.

Specifications

Temperature Range	-3°C to 65°C (in 20°C to 25°C ambient environment, 50% RH)
Temperature Accuracy	±0.5°C
Temperature Uniformity	±0.5°C on Plate
Power Requirements	110/220 VAC automatic, 100 W
Dimensions:	
Plate	165 x 165 mm (6.5 x 6.5 in)
Control Unit	305 x 280 x 158 mm (12 x 11 x 6 in)
Weight	6.5 kg

Ordering Information

Order #	Model	Product
76-0112	LE7420	Hot/Cold Plate Including BSRamp Software

REFERENCES

- Celik F et al. (2014) Therapeutic effects of thymoquinone in a model of neuropathic pain. *Curr Ther Res Clin Exp.* 2014 Jan 2;76:11-6. (Neuropathy, rat, Turkey)
- Oliveira A et al. (2014) Morphine glucuronidation increases its analgesic effect in guinea pigs. *Life Sci.* 2014 Jul 30;109(2):104-10. (Guinea pig, Portugal)
- Piel MJ et al. (2014) Pain assessment in animal models of osteoarthritis. *Gene.* 2014 Mar 10;537(2):184-8. (review, USA)



Thermal Place Preference



KEY FEATURES

- ▶ Easily monitor thermal place preference and nociceptive thresholds
- ▶ Unrestrained animals allows for maximum accuracy
- ▶ Optional Automatic Detection Software eliminates the user subjectivity by establishing an automatic response

PARAMETERS MEASURED

- ▶ Time spent in each zone
- ▶ Time of zone trespassing
- ▶ Temperature of each zone

OPTIONS

- ▶ Automatic detection software – which includes tripod, 3 USB cables and USB Camera

This behavioral assay will allow monitoring of temperature preferences, nociceptive thresholds and investigate the role of a given gene or compound on these thresholds.

As advised by A. Moqrich and published in Moqrich et al (Science 2005, 307: 1468-72), this test allows researchers to work on unrestrained animals whom are free to choose their preferred position between two compartments at different temperatures.

Completely investigator-independent, the Two Temperature Choice Test elicits a nociceptive response from the subject. The obtained value is a temperature or temperature range indicating the sensitivity of the subject.

Using automatic detection software (optional), the user sets the temperature of each zone, defines a protocol of temperature changes or ramps, and starts the measurement process. Two animals can be observed simultaneously and independently, making the system remarkable efficient. The animals are video tracked and the software records their position vs. temperature and time.

When the optional automatic detection software is not used, temperatures must be defined manually and the user must measure the time and animal position.

Specifications

Temperature Range	-3°C to +65°C (room temperature 20 to 25°C)
Temperature Accuracy	± 0.5°C
Power Supply	150 Watts, 120/240 VAC
Dimensions (L x W x H)	32 x 57 x 45.5 cm (12.6 x 22.4 x 17.9 in) including cage
Animal Cage	330 x 165 x 300 mm (13 x 6.5 x 11.8 in)
Animal Cage Material	Clear plexiglass

Ordering Information

Order #	Model	Product
76-0475	BIOT2CT	Thermal Place Preference
76-0476	BIODHCPSOFT	Thermal Place Preference Software

REFERENCES

Descoeur J, Pereira V, Pizzoccaro A, Francois A, Ling B, Maffre V, Couette B, Busserolles J, Courteix C, Noel J, Lazdunski M, Eschalier A, Authier N, Bourinet E. Oxaliplatin-induced cold hypersensitivity is due to remodeling of ion channel expression in nociceptors. *EMBO J. Mol Med* 2011 May; 3(5):266-78.

Mishra S, Tisel S, Orestes P, Bhangoo S, Hoon M. TRPV1-lineage neurons are required for thermal sensation. *EMBO J.* 2011 February; 30, 582-593.



Thermal Gradient Test



KEY FEATURES

- ▶ Continuous thermal gradient established over a 120 cm long base plate
- ▶ Monitor 2 mice or 1 rat

PARAMETERS MEASURED

- ▶ Up to 20 temperature zones measured per animal
- ▶ Time spent in each temperatures zone
- ▶ Temperature of zone over time period
- ▶ Overall distance travelled

COMPONENTS INCLUDED

- ▶ Two thermal units
- ▶ Controllers
- ▶ Cage
- ▶ Base plate

Independent Thermal Test Demonstrates Place Preference and Temperature Comfort Thresholds for Rodents!

As described by Moqrich et al. 2005, our Thermal Gradient Test monitors thermal nociception completely independently on freely moving rodents. A continuous temperature gradient (5 to 55°C) is established over a 120 cm long base plate on which the animal is free to walk. After an exploration period of acclimation, the animal clearly shows a distinct zone preference.

Our model is an automated system which maintains the temperature gradient stable over the surface and over time.

The accompanying software, coupled to a video camera, displays for each animal the time spent in each temperature zone, together with overall distance travelled. The encrypted data and video images are recorded synchronously in real time during the experiments and the user is able to replay the files to analyze or review.

Specifications

Overall Dimensions (L x W x H):

2 mice/1 rat	139 x 30 x 40 cm (54.7 x 11.8 x 15.6 in)
--------------	--

Overall Weight:

2 mice/1 rat	25 kg (33.1 lbs)
--------------	------------------

Power Supply

	110/220 VAC
--	-------------

Number of Lanes

	2 Mice/1 Rat
--	--------------

Lane Dimensions:

2 mice/1 rat	125 x 10 x 15 cm (49.2 x 3.9 x 5.9 in)
--------------	--

Temperature Range

	5 to 55° C at plate surface 20 to 25°, 50% RH at environment
--	---

Temperature Stability

	1°C surface, over time
--	------------------------

System Material:

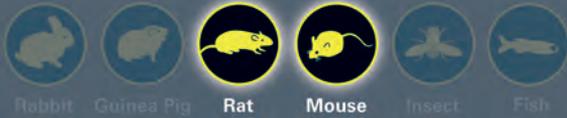
Base Plate	Aluminum Alloy
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Walls	Gray PPC
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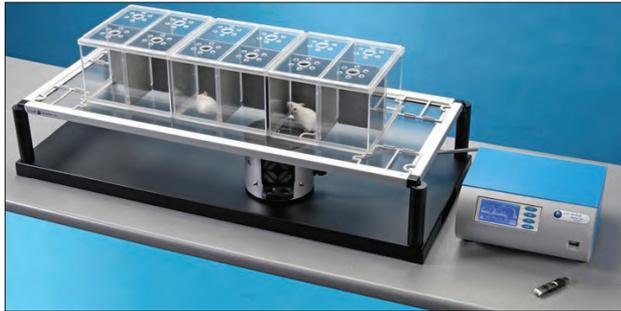
Top Cover	Transparent PPC
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Ordering Information

Order #	Model	Product
76-0477	BIOGRADIENT	Thermal Gradient Test, 2 Mice/1 Rat



NEW Plantar Test (Hargreaves Apparatus)



KEY FEATURES

- ▶ Automatic detection of paw withdrawal (no visual score needed!)
- ▶ For measurement of hyperalgesia to thermal stimulation in unrestrained animals
- ▶ Automatic detection of the behavioral end point
- ▶ Validity unaffected by repeated testing
- ▶ Greater bioassay sensitivity than other thermal or mechanical tests
- ▶ Modular animal enclosure, from 3 to 12 spaces, conveniently designed to restrain mice or rats
- ▶ Data portability via the included memory key
- ▶ Software included
- ▶ NEW: orofacial stimulation by optional holders

The Plantar Test Instrument (Hargreave's Method) measures response to infrared heat stimulus, applied to the plantar surface. This is the original apparatus, designed in close cooperation with Prof. Ken Hargreaves, who devised the method.

Focus the infrared source below the Plantar surface and with the press of a button ... latency to paw withdrawal and infrared intensity are recorded automatically (i.e. no manual scoring, as in other models available on the market!).

The Plantar Test represents a remarkable advance in methodology, as it combines the best features of all other methods of measuring pain sensitivity. Unique to the Plantar Test, the animal is unrestrained during experiments. Unlike other models available on the market, time latency is recorded automatically by a fiber optic sensor, without having to rely on the experimenter observation of the animal behavior, thus avoiding unwanted experimental bias.

A specific filter is used to cut off the visible part of the light spectrum, which would disturb the animal on test and provide an unwanted clue. A feedback circuit detects false starts.

Data appear on the front panel and may be exported to a USB pen-drive, or to the PC via USB; both USB pen-drive and software are included in the standard package.

Specifications

Operating temperature	15° to 30°C
I.R. Intensity	adjustable in the interval 01-99 (in one-digit steps)
Dimensions (assembled)	85 x 40 x 35 cm (33.5 x 16 x 14 in.)
Animal Enclosure	3 modular boxes, each 20 x 20 x 14(h) cm (8 x 8 x 5.5 in.)
Power Requirement	universal mains 85-264 VAC, 50-60Hz

Ordering Information

Order #	Model	Product
72-6693	37370	Plantar test (Hargreaves Apparatus)



Rabbit



Guinea Pig



Rat



Mouse



Insect



Fish

NEW Dynamic Plantar Anesthesiometer

Analgesia • Dynamic Plantar Anesthesiometer



KEY FEATURES

- ▶ Automatic detection of paw withdrawal (no visual score needed!)
- ▶ Consistent application of force at an adjustable rate (force ramp)
- ▶ Software included as standard
- ▶ Data portability via the included memory key
- ▶ NEW: orofacial stimulation by optional holders

The Dynamic Plantar Aesthesiometer has been designed to automate the assessment of “touch sensitivity” on the plantar surface of rats or mice and comes ready to work with both Mice and Rats. It is known by some as the Electronic Von Frey or Plantar Von Frey instrument, but differently from Von Frey devices, Latency time, and Actual Force at the time of paw withdrawal reflex are automatically detected and recorded.

The Dynamic Plantar Anesthesiometer consists of a movable force-actuator below a network platform upon which the operator deposits the rodent. A Perspex enclosure renders the animal unrestrained for the duration of the experiment.

The operator places the actuator beneath the paw (proper placement ensured via an angled mirror) and the actuator confers a use-defined force on a Von Frey-type filament. The filament exerts an increasing force to the plantar surface, starting below the threshold of detection and increasing until the animal removes its paw. At the retraction reflex movement when the paw is withdrawn, the registers and displays the actual force at which paw withdrawal occurred.

Specifications

Force range	0 to 50.0 grams, in 0.5g steps
Force increasing rate	adjustable in the interval 1 to 20 seconds, in 1 s steps
Filament travel	12 mm
Latency time	on graphic display, in 0.1s steps
Connection to PC	through DELTA 9-pin connector

Ordering Information

Order #	Model	Product
72-6704	37450	Dynamic Plantar Anesthesiometer



Electronic Von Frey for Evaluating Mechanical Allodynia



KEY FEATURES

- ▶ The threshold value can be obtained in only one test, and in a highly reproducible manner
- ▶ Elimination of the problems of filament standardization
- ▶ Now provided with embedded video option!
- ▶ The end-point value is automatically recorded
- ▶ New unit dedicated for mice!

COMPONENTS INCLUDED

- ▶ Electronic Von Frey unit
- ▶ 10 disposable plastic tips
- ▶ 1 spring tip for thresholds between 0 and 10 grams
- ▶ Footswitch to reset the display to zero
- ▶ Carrying case for transport

Unique - Electronic Von Frey!

- Internal statistical computations allows direct reading of average value, standard deviation and variability in subject groups and up to 100 animals

The new model of electronic Von Frey unit EVF4 represents an easy-to-use instrument allowing you to quickly determine the mechanical pain sensitivity threshold in rodents (both rats and mice).

Basically, a tip is applied against the central edge of the animal hind paw. Paw withdrawal caused by the stimulation is registered as a response. The corresponding force applied (pain sensibility threshold) is recorded by the system and displayed on the large backlighted screen of the Von-Frey unit with a resolution of 0.1 grams. A different tip is used for rat (hard plastic tip) and mice (elastic spring tip).

The electronic instrument does not present any temperature or hygrometry drift, which used to be an issue with the manual version of the filaments. Now available with embedded video!

Specifications

Measurement Range EVF3&4: 0 to 500 g, EVFM: 0 to 7 g, 120% overload allowed without causing any damage to the sensor.

Precision:

Resolution 0.1 g

Accuracy 0.2 g

Temperature Compensation from 0 to 50°C

Statistical Functions Average value and standard deviation are computed for all the data stored

Internal Memory up to 100 values

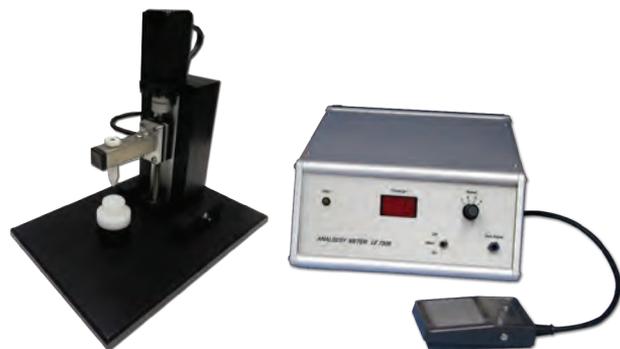
Power Supply 110-220 VAC (other voltages on request)

Ordering Information

Order #	Model	Product
76-0487	BIO-EVF3-S	Electronic Von Frey 0-500g complete with hard and soft tips, foot switch, casing and logger software
76-0886	BIO-PVF	Enclosure for 2 rats or 4 mice for VF stand
76-0887	BIO-STD-EVF	Elevated stand with metal mesh, delivered without cage, fit up to 2 encloses
76-0488	BIO-EVF-D	Hard plastic tips, 10 units
76-0489	BIO-EVFR-S	Elastic (spring) tips, 1 unit



Paw & Tail Pressure Meter for Evaluating Mechanical Pain



KEY FEATURES

- ▶ Digital display
- ▶ Pressure increasing rate adjustment
- ▶ Footswitch control

PARAMETERS MEASURED

- ▶ Pressure applied on the paw until the withdrawal or animal vocalizes (rats)
- ▶ Pressure applied on the tail until withdrawn (mice)
- ▶ Pressure applied on the paw until a flexor response of the toes (mice)

COMPONENTS INCLUDED

- ▶ Control unit with RS-232 communication port to PC
- ▶ Stimulation unit
- ▶ Pedal switch
- ▶ Flat and pointed tip points
- ▶ Instruction manual
- ▶ Cables and connectors
- ▶ Set of spare fuses
- ▶ 2 year warranty

OPTIONS

- ▶ SEDACOM software
- ▶ RS-232/USB Adapter

The Randall & Selitto test is based on determination of the animal threshold response to pain induced in the paw by the application of an increasing pressure.

In the LE7306 paw-pressure, a stimulation unit allows the gradual increase (at selectable rates) of the pressure applied on the animal paw. The pressure increase is achieved by a step-motor inducing the progressive advancement of a sliding support with a distal conic tip (1 mm diameter).

The conic point is mounted on an extensometric load cell, making possible the visualization on the digital display of the current force applied at each moment of the test (grams). The motor and tip units are mounted on a pivoting stand preventing any excess pressure on the animal paw.

The control unit makes possible the adjustment of the force transducer, balance and reset, as well as the selection of the step-motor current speed.

A remote foot-switch controls the motor allowing rapid hands-free experiments. An automatic system is activated once the distal extreme of the sliding support track is reached or when the pedal is released at the test ending point. Then, the motor reverse its rotation at its higher speed, sliding up the conic tip again.

SEDACOM software can be used to automatically record the results on a with our RS-232/USB adapter.

Specifications

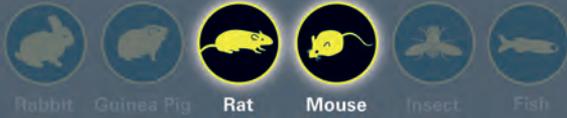
Power Supply	110/220 VAC, 50/60 Hz
Stimuli Resolution	1 gram
Maximum Stimuli	999 gram
Material Composition	Methacrylate
Certifications	CE Compliant
Control Unit Dimensions (W x D x H)	350 x 350 x 130 mm (14 x 14 x 5 in)
Stimulation Unit Dimensions (W x D x H)	150 x 210 x 166 mm (6 x 8.3 x 6.5 in)

Ordering Information

Order #	Model	Product
76-0234	LE7306	Rat Paw Pressure Analgesia-Meter
Options		
76-0406	SEDACOMV2.0	SEDACOM V2.0
76-0608	CONRS232USB	RS232/USB Adapter

REFERENCES

- Elhabazi K et al. (2014) Assessment of morphine-induced hyperalgesia and analgesic tolerance in mice using thermal and mechanical nociceptive modalities. *J Vis Exp.* 2014 Jul 29;(89):e51264 (tail pressure, mouse, France)
- Balakumar M et al. (2013) Benefits of early glycemic control by insulin on sensory neuropathy and cataract in diabetic rats. *Indian J Exp Biol.* 2013 Jan;51(1):56-64. (Paw pressure, rat)
- Spanevello MD et al. (2013) Acute delivery of EphA4-Fc improves functional recovery after contusive spinal cord injury in rats. *J Neurotrauma.* 2013 Jun 15;30(12):1023-34. (Paw pressure, rat)
- Weibel R et al. (2013) Mu Opioid Receptors on Primary Afferent Nav1.8 Neurons Contribute to Opiate-Induced Analgesia: Insight from Conditional Knockout Mice. *PLoS One.* 2013 Sep 12;8(9):e74706. (Tail pressure, mouse)
- Sánchez Robles EM et al. (2012) Cannabinoids and muscular pain. Effectiveness of the local administration in rat. *Eur J Pain.* 2012 Sep;16(8):1116-27. (paw pressure, rat)



Plethysmometer for Evaluating Paw Volume



KEY FEATURES

- ▶ Computer interface
- ▶ "Check solution" status button
- ▶ Conductive solution is easy to prepare or source
- ▶ Footswitch control
- ▶ Automatic zero adjustment

PARAMETERS MEASURED

- ▶ Paw volume (ml)

COMPONENTS INCLUDED

- ▶ Control Unit with RS-232 communication port to PC
- ▶ Pedal switch
- ▶ Stimulation unit
- ▶ Instruction manual
- ▶ Cables and connectors
- ▶ Set of spare fuses
- ▶ Certificate of calibration
- ▶ 2 year warranty

OPTIONS

- ▶ 1 ml, 3 ml or 5 ml cell with electrode
- ▶ 1 ml, 3 ml or 5 ml volume gauge
- ▶ SEDACOM software
- ▶ RS-232/USB Adapter

Digital Water Plethysmometer

The Digital Water Plethysmometer is designed to provide a highly useful tool in the measurement of small volume changes. This test is typically used to follow the evolution of the inflammatory response experimentally induced in rodents and to screen potential anti-inflammatory or anti-oedema properties of pharmacological substances.

The volume transducer is formed by two Perspex tubes interconnected and filled with a conductive solution and a platinum electrode for each chamber. All the system is supported by a stand (included) that can be placed over the control unit.

The water displacement produced by the immersion of the animal paw in the measuring tube is reflected into the second tube, inducing a change in the conductance between the two platinum electrodes. The Plethysmometer Control Unit detects the conductance changes and generates an output signal to the digital display indicating the volume displacement measured (0.01 ml resolution). The current value remains in the digital display until a new trial starts. The Control Unit is automatically zeroed between successive readings, thus making intermediate adjustments unnecessary.

The system includes as standard a volume transducer with its related calibrator and a 100 ml solution. A remote footswitch allows rapid hands-free experiments and can be used to set control the end point of the measurement. SEDACOM software, ordered separately, can be used to automatically record the results on a PC.

(continued on next page)

Plethysmometer for Evaluating Paw Volume (continued)

Specifications	
Control Unit Dimensions (W x D x H)	280 x 280 x 110 mm (11 x 11 x 4 in)
Stimulation Unit Dimensions (W x D x H)	230 x 220 x 300 mm (9 x 9 x 12 in)
Power Supply	220/110 VAC, 50/60 Hz
Starting	By panel key or pedal switch
Resolution	3 digits, 0.01 steps
Material Composition	Clear methacrylate (cell), stainless steel (stand), platinum (electrode)
Certifications	CE compliant

Ordering Information		
Order #	Model	Product
76-0220	LE7500	Digital Water Plethysmometer (electrodes, cell, calibrator and SEDACOM software supplied separately)
76-0221	LE7504	1 ml Cell with Electrode and 1 ml Calibrator
76-0223	LE7503	3 ml Cell with Electrode and 3 ml Calibrator
76-0222	LE7505	5 ml Cell with Electrode and 5 ml Calibrator
Options		
76-0224	LE7506	Platinum Electrode
76-0225	LE75301	1 ml Calibrator for Plethysmometer
76-0226	LE75303	3 ml Calibrator for Plethysmometer
76-0436	LE75305	5 ml Calibrator for Plethysmometer
76-0406	SEDACOMV2.0	SEDACOM V2.0
76-0608	CONRS232USB	RS232/USB Adapter

REFERENCES

- Silva JC et al. (2015) Antinociceptive and anti-inflammatory activities of the ethanolic extract of *Annona vepretorum* Mart. (Annonaceae) in rodents. *BMC Complement Altern Med*. 2015 Jun 24;15:197. (Brazil)
- Coura CO et al. (2015) Mechanisms involved in the anti-inflammatory action of a polysulfated fraction from *Gracilaria cornea* in rats. *PLoS One*. 2015 Mar 25;10(3):e0119319. (rat)
- Illuri R et al. (2015) Anti-Inflammatory Activity of Polysaccharide Fraction of *Curcuma longa* Extract (NR-INF-02). *Antiinflamm Antiallergy Agents Med Chem*. 2015;14(1):53-62. (rat)
- Ravalji M et al. (2015) Investigation of centrally and peripherally acting analgesic and anti-inflammatory activity of biological immune response modulator (an Amazonian plant extract) in animal models of pain and inflammation. *Int J Basic Clin Pharmacol*. 2015; 4(2): 342-348. (mouse)
- Batista JA et al. (2014) Polysaccharide isolated from *Agardhiella ramosissima*: chemical structure and anti-inflammation activity. *Carbohydr Polym*. 2014 Jan;99:59-67.
- Belkouch M et al. (2014) Functional up-regulation of Nav1.8 sodium channel in A afferent fibers subjected to chronic peripheral inflammation. *J Neuroinflammation*. 2014 Mar 7;11:45. (rat)
- Carneiro JG et al. (2014) Peripheral Antinociception and Anti-Inflammatory Effects of Sulphated Polysaccharides from the Alga *Caulerpa mexicana*. *Basic Clin Pharmacol Toxicol*. 2014 Mar 27. [Epub ahead of print] (mouse)
- Chaudhary H et al. (2014) A novel nano-carrier transdermal gel against inflammation. *Int J Pharm*. 2014 Apr 25;465(1-2):175-86.
- Damasceno SR et al. (2014) Carvacryl acetate, a derivative of carvacrol, reduces nociceptive and inflammatory response in mice. *Life Sci*. 2014 Jan 14;94(1):58-66. (mouse)
- Dias JM et al. (2014) Gabapentin, a Synthetic Analogue of Gamma Aminobutyric Acid, Reverses Systemic Acute Inflammation and Oxidative Stress in Mice. *Inflammation*. 2014 May 7. [Epub ahead of print] (mouse)
- Jeengar MK et al. (2014) Improvement of Bioavailability and Anti-Inflammatory Potential of Curcumin in Combination with Emu Oil. *Inflammation*. 2014 Jul 16. [Epub ahead of print] (rat)
- Lopes LC et al. (2014) Pharmacological characterization of *Solanum cernuum* Vell.: 31-norcycloartanones with analgesic and anti-inflammatory properties. *Inflammopharmacology*. 2014 Jun;22(3):179-85. (
- Pereira JG et al. (2014) Polysaccharides isolated from *Digenea simplex* inhibit inflammatory and nociceptive responses. *Carbohydr Polym*. 2014 Aug 8;108:17-25. (mouse)
- Queiroz JC et al. (2014) Evaluation of the Anti-Inflammatory and Antinociceptive Effects of the Essential Oil from Leaves of *Xylopia laevigata* in Experimental Models. *ScientificWorldJournal*. 2014;2014:816450. (mouse)
- Rizzo LY et al. (2014) In vitro, in vivo and in silico analysis of the anticancer and estrogen-like activity of guava leaf extracts. *Curr Med Chem*. 2014;21(20):2322-30. (mouse)
- Sakat SS et al. (2014) Release-active dilutions of diclofenac enhance anti-inflammatory effect of diclofenac in carrageenan-induced rat paw edema model. *Inflammation*. 2014 Feb;37(1):1-9. (rat)
- Al.Farajeh MA et al. (2013) Evaluation of Immunomodulatory Effects of Antiepileptic Drug Phenytoin. *Jordan Journal of Biological Sciences*. Volume 6, Number 4, December, Pages 328 – 333. (mouse)
- Muhammad N et al. (2013) Analgesic and anti-inflammatory profile of n-hexane fraction of *viola betonicifolia*. *Tropical Journal of Pharmaceutical Research*. Vol 11, No 6. (mouse)
- Nalbantsoy A et al. (2013) Viper venom induced inflammation with *Montivipera xanthina* (Gray, 1849) and the anti-snake venom activities of *Artemisia absinthium* L. in rat. *Toxicol*. 2013 Apr;65:34-40. (rat)
- Pinto NV et al. (2013) Inflammatory and hyperalgesic effects of oxidized multi-walled carbon nanotubes in rats. *J Nanosci Nanotechnol*. 2013 Aug;13(8):5276-82.
- Sakat SS et al. (2013) Release-Active Dilutions of Diclofenac Enhance Anti-inflammatory Effect of Diclofenac in Carrageenan-Induced Rat Paw Edema Model. *Inflammation*. 2013 Sep 5. In Press (rat)
- Ullah N et al. (2013) Bioisosteric synthesis of nitrogen containing derivatives of salicyl alcohol, their in vivo pharmacological studies with molecular modelling. *Medicinal Chemistry Research*, October 2013, Volume 22, Issue 10, pp 4677-4684
- Vishwakarma S et al. (2013) Tubastatin, a selective histone deacetylase 6 inhibitor shows anti-inflammatory and anti-rheumatic effects. *Int Immunopharmacol*. 2013 May;16(1):72-8. (mouse)



Dynamic Weight Bearing Test for Measuring the Postural Equilibrium on Freely Moving Rodents



KEY FEATURES

- ▶ Measure independently the weight bore by each limb of a freely moving animal
- ▶ Data capture allows for analysis and replay to be performed for user validation of data
- ▶ Accuracy and resolution insured by an initial calibration
- ▶ Minimal stress design minimizes habituation period for higher throughput

PARAMETERS MEASURED

- ▶ Weight for each paw (g and % total animal weight)
- ▶ Weight for grouped front and rear paws (g and %total animal weight)
- ▶ Left/Right and Front/Rear weight ratio
- ▶ Surface for each paw (mm²)
- ▶ Surface for grouped front and rear paws (mm²)
- ▶ Variability (standard deviation/mean) for each parameter
- ▶ Parameters are given for each posture and as a mean for the whole experiment
- ▶ Duration of different postures (4 paws, rearing...) over the whole experiment (s)
- ▶ Total time spent on each paw over the whole experiment (s)
- ▶ Raw data is encrypted (GLP) and recorded with a sampling rate of 10 Hz including synchronized video recording

COMPONENTS INCLUDED

- ▶ Animal cage
- ▶ One sensor
- ▶ USB interface
- ▶ Webcam
- ▶ Software

Newly developed, our Dynamic Weight Bearing Test, features a floor instrumented cage. This allows independent measurement of the weight bore by each limb for the freely moving animal.

This system accuracy and resolution are ensured via a metrological calibration performed prior to the data capture. During the data capture, the raw data for each paw are synchronized with the images from a video camera and

the averaged values are encrypted and recorded on a PC through a USB link along with the sampling rate of 10 Hz.

Analysis and replay can be performed on-site or remotely. Replaying the experiment with the recorded video file allows the operator to further complement the posture and behavior of the animal, enhancing the interest of the test. During this time, the user can check and secure each limb recognition. The weight distribution of the animal, per limb, is shown in the result window for each time period with the mean and variation coefficient. All data is presented in the Excel file.

Specifications

Overall Dimensions (L x W x H cm):

Mouse	17 x 17 x 22 cm (6.7 x 6.7 x 8.6 in)
Rat	30 x 30 x 35 cm (11.8 x 11.8 x 14 in)

Overall Weight:

Mouse	1 kg (2.2 lbs)
Rat	2.5 kg (5.5 lbs)

Power Supply

From PC USB port

Animal Cage Internal Dimensions:

Mouse	11.5 x 11.5 x 22 cm (4.5 x 4.5 x 8.6 in)
Rat	22 x 22 x 30 cm (8.6 x 8.6 x 12 in)

Sensor Accuracy:

Mouse	1 g (0.035 oz)
Rat	1 g (0.035 oz)

Sensor Resolution:

Mouse	0.2 g (0.007 oz)
Rat	0.8 g (0.028 oz)

Sensor Range:

Mouse	15 to 50 g (0.53 to 1.76 oz)
Rat	150 to 500 g (5.29 to 17.63 oz)

Cage Material:

Floor	Gray PPC
Walls	Transparent PPC

Computer Requirements

Windows 7, CORE I3 or I5 processor with a minimum of 3 Go of RAM
--

Ordering Information

Order #	Model	Product
76-0474	BIO-DWB-M	Dynamic Weight Bearing Test, Mouse
76-0728	BIO-DWB-R	Dynamic Weight Bearing Test, Rat
76-0718	BIODWB DUAL	Dynamic weight bearing test, with camera, two sensor pads, interface and software (PC not included) – dual for rats and mice
76-0493	BIODWBMC	Replacement pad for mice
76-0719	BIODWBRC	Replacement pad for rat



Rabbit



Guinea Pig



Rat



Mouse



Insect



Fish

Incapacitance Meter (Static Weight bearing test)



Analgesia • Incapacitance Meter

KEY FEATURES

- ▶ **New touchscreen graphic interface for enhanced functionality**
- ▶ **Assess spontaneous pain in absence of the application of any experimental noxious or non-noxious stimulus**
- ▶ **Specially designed animal holders (mouse and rat) to get relevant results more rapidly**
- ▶ **Data given using user selected unit (grams, Newton, ounces, or pounds)**
- ▶ **Easy and precise instrument**

PARAMETERS MEASURED

- ▶ **Current value of the weight applied on each sensor**
- ▶ **Mean value calculated in user-defined interval of time**

The Incapacitance test represents an unsurpassed method for assessing spontaneous pain in laboratory animal model with inflammation or nerve injury in one hind paw (neuropathy, incision, etc). Indeed, classic measurements of nociceptive thresholds as used in most of the experimental studies allow assessment of only a pain sensitivity level, not a spontaneous pain level, in the absence of experimental nociceptive stimuli.

In the incapacitance test, the animal is located in a holder specially designed to maintain the animal comfortably positioned on two separated sensor plates. The Panlab/Harvard Apparatus Incapacitance tester enables the quantification of the spontaneous postural changes reflecting spontaneous pain by independently measuring the weight the animal applies to each hind paw on two separate sensors. In the absence of hind paw injury, rats applied equal weight on both hind paws, indicating a postural equilibrium. After unilateral hind paw tissue injury, a change in the weight distribution on the sensor can be detected, with a lower weight applied to the injured paw.

The current value of the weight applied on each sensor cell is shown on the new touchscreen display of the LE7950 control unit in a user-selected unit (grams, Newton or oz/lbs). A remote footswitch controls the test start/stop allowing rapid hands-free experiments. The control unit can also display statistics (mean, SD) for the groups of animals under test during the measurements. No PC is required for running the Incapacitance Test, although the possibility is given to send collected data from the instrument to a PC through the RS-232/USB Adapter and interfacing with SEDACOM 2.0.

Specifications

Resolution	0.05 gr (0.002 oz)
Average	1 to 300 seconds
Overpressure	2000 gr (70.55 oz)
Control Unit Dimensions	17 x 25 x 10 cm (6.7 x 9.8 x 4 in)

Ordering Information

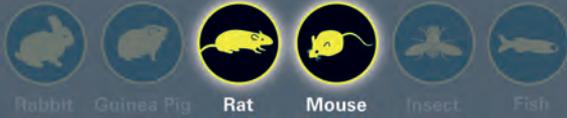
Order #	Model	Product
76-0115	LE7900	Incapacitance Test Sensor
76-0116	LE7920	Incapacitance Test Holder, Mouse
76-0117	LE7930	Incapacitance Test Holder, Rat
76-0118	LE7950	Incapacitance Test Control Unit

Optional Accessories

76-0406	SEDACOMV2.0	SEDACOM V2.0
76-0608	CONRS232USB	RS232/USB Adapter

REFERENCES

- Le Cudennec C et al. (2014) Face-to-face comparison of the predictive validity of two models of neuropathic pain in the rat: analgesic activity of pregabalin, tramadol and duloxetine. Eur J Pharmacol. 2014 Jul 15;735:17-25.*
- Mohan G et al. (2013) Pre-emptive, early, and delayed alendronate treatment in a rat model of knee osteoarthritis: effect on subchondral trabecular bone microarchitecture and cartilage degradation of the tibia, bone/cartilage turnover, and joint discomfort. Osteoarthritis and Cartilage, Volume 21, Issue 10, Pages 1595-1604.*
- Vaysse L et al. (2011) GABAergic pathway in a rat model of chronic neuropathic pain: Modulation after intrathecal transplantation of a human neuronal cell line. Neurosci. Res. 69(2):111-120.*
- Tétreault P et al. (2011) Weight bearing evaluation in inflammatory, neuropathic and cancer chronic pain in freely moving rats. Physiology & Behavior, Volume 104, Issue 3, Pages 495-502.*
- Laboureyras E et al. (2009) Long-Term Pain Vulnerability After Surgery in Rats: Prevention by Nefopam, an Analgesic with Antihyperalgesic Properties. Anesth. Analg. 109:623-631.*



Social Box for Mice



KEY FEATURES

- ▶ Removable compartment dividers allow using the box for many behavioral paradigms
- ▶ Material does not retain odors
- ▶ Manual sliding doors
- ▶ Optimized for video-tracking systems with non-reflecting material

The social interaction test by pairs provides a popular and standard paradigm to study general social behavior. This test allows the experimental subject to freely explore an unfamiliar congener in its home cage or in a neutral environment. Social exploration is measured by the time spent by the experimental subject around the congener as well as the amount and duration of behaviors that compose social interaction (e.g. sniffing, following, grooming, biting, mounting, wrestling, etc). Social avoidance behavior is used in a wide variety of models, for instance for assessing neophobia anxiety and depression-like behaviors.

Our social box provides an ideal experimental environment to conduct social interaction tasks. The box is divided in three interconnected compartments. Sliding doors are available for confining the animal in one specific compartment during the test. Two grid enclosures containing "stranger" mice can be placed in the box allowing a close interaction with the animal tested (as well as protection in case one of them manifests strong aggressive behavior).



Specifications*

Social Interaction Box	Clear Grey Methacrylate floor, transparent walls
Box Dimension	42 x 60 x 22 (H) cm (16.5 x 24 x 8.7 in)
Compartment Dimension	20 x 42 x 22 (H) cm (8 x 16.5 x 8.7 in)
Grid Enclosures	Dimensions: 8 (D), 18 (H) cm; Grey PVC top/bottom; Stainless steel grid (3 mm diameter, 7.4 mm spaced)

*Can be used with our video-tracking systems (ask for details)

Ordering Information

Order #	Model	Product
76-0663	LE894	3-Compartments Social Test Box for Mice
76-0674	LE894A	Grid Enclosure for Social Test in Mice

NOTE

See pages 4 to 7 for information on our SMART 3 Video Tracking System with Social Interaction Module!



Rabbit



Guinea Pig



Rat



Mouse



Insect



Fish

Circular Pool for Evaluating Learning & Memory

Learning Memory & Attention • Circular Pool for Evaluating Learning & Memory



KEY FEATURES

- ▶ Polypropylene pool
- ▶ Complete system, all in one station (water pump, thermostat and tubing all included)
- ▶ Control box maintains the water temperature between 22-32°C depending on ambient
- ▶ Two platform sizes
- ▶ 4 wheels for portability
- ▶ Ideal environment to carry out the Morris and Aquatic Radial Maze studies

COMPONENTS INCLUDED

- ▶ Circular pool with support
- ▶ Water pump
- ▶ Heater, electro valve and level controller
- ▶ 1 target island with two platform size options
- ▶ Set of 2 spare fuses
- ▶ Instruction manual
- ▶ 2 year warranty

Morris Water Maze is for spatial working memory studies. The circular pool is manufactured in polypropylene and stands on a support with four wheels for portability.

We propose a complete solution for water maze settings since the heater, the water circulation pump, the level controller and the electro valve for pool filling are contained in a unique control box. The level controller acts directly on the electro valve, turning it off when the liquid reaches capacity. The water temperature is maintained between 22°C and 32°C depending on the ambient room temperature. Two easily interchangeable platforms are supplied (80 and 110 mm) that can be located anywhere in the pool.

For Aquatic Radial Water Maze, a removable-floating eight radial-arm maze structure and associated platforms can be provided upon request.

Both Morris and Radial Water Mazes may be associated with our Video-Tracking Systems for detection and analysis of animal displacements and behavior throughout the test. Please refer to chart below.

NOTE

Custom Aquatic Arm Mazes are also available—
inquire more details.

For Video Tracking options, please see our SMART
Video Tracking on pages 4-7, or WaterMaze Video
Tracking options on pages 12-13.

Learning Memory & Attention

Specifications

Heater Intensity	3000 W
Heating Speed	3° celsius / hour (model LE820-200)
Temperature	22-32 degrees celsius (depending on environment)
Power Requirements	110/220 VAC / 50 Hz
Certifications	CE compliant

Ordering Information

Order #	Model	Product
76-0020	LE820-90*	Circular Pool; 90 x 50 cm (35.4 x 19.7 in) (D x H)
76-0021	LE820-120*	Circular Pool; 120 x 60 cm (47 x 23.6 in) (D x H)
76-0022	LE820-140*	Circular Pool; 140 x 60 cm (55 x 23.6 in) (D x H)
76-0023	LE820-170*	Circular Pool; 170 x 60 cm (67 x 23.6 in) (D x H)
76-0024	LE820-200*	Circular Pool; 200 x 60 cm (79 x 23.6 in) (D x H)
76-0642	LE772906	6-Arm Aquatic Radial Arm Maze for 90 cm (35.4 in) diameter pool
76-0638	LE7721206	6-Arm Aquatic Radial Arm Maze for 120 cm (47 in) diameter pool
76-0640	LE7721706	6-Arm Aquatic Radial Arm Maze for 170 cm (67 in) diameter pool
76-0643	LE772908	8-Arm Aquatic Radial Arm Maze for 90 cm (35.4 in) diameter pool
76-0639	LE7721208	8-Arm Aquatic Radial Arm Maze for 120 cm (47 in) diameter pool
76-0641	LE7721708	8-Arm Aquatic Radial Arm Maze for 170 cm (67 in) diameter pool

* Including Heater, water pump, level controller, electro valve and Island Set

Options

76-0025	LE820-500	Island Set (110 and 80 mm Diameter Platforms)
76-0026	LE820-300	Automatic Island 'Atlantis' (controlled by Smart Video Tracking Software)
76-0550	LE772500	Target Island Platform for Aquatic Radial Maze

Economy Circular Pools

ACT-200-4-D	–	WaterMaze Tank, 4 ft (122 cm) Diameter, Dark Interior
ACT-200-4-L	–	WaterMaze Tank, 4 ft (122 cm) Diameter, Light Interior
ACT-200-6-D	–	WaterMaze Tank, 6 ft (183 cm) Diameter, Dark Interior
ACT-200-6-L	–	WaterMaze Tank, 6 ft (183 cm) Diameter, Light Interior
ACT-201	–	WaterMaze Platform
ACT-202	–	Adjustable WaterMaze Platform
ACT-204A	–	Nautilus WaterMaze Platform (requires an ACT-711 USB Interface and the WaterMaze software)

NOTE

See our SMART 3.0 pages 4-7, or WaterMaze pages 12-13 video tracking options for use with our circular pools and tanks.





Rabbit



Guinea Pig



Rat



Mouse



Insect



Fish

Barnes Maze for Evaluating Learning & Memory



KEY FEATURES

- ▶ Platform made with non-reflective perspex material for video-tracking systems
- ▶ Material will not retain odors
- ▶ Rotatable platform
- ▶ Goal box with ramp
- ▶ Provided with starting cylinder and false goal boxes

The Barnes maze is a popular test for assessing spatial learning and memory in rats and mice.

The animal is placed in a brightly lit environment, on the top of the Barnes maze, which consists of a large round open platform with a fixed number of peripheral holes. In such an open environment, rats naturally seek a dark enclosed surrounding, which is provided in the form of a dark box (goal box) under one of the round holes around the perimeter of the platform. The amount of time required for the animal to locate the goal box using visuo-spatial cues surrounding the maze periphery is measured by the researcher.

The Barnes Maze experiment is conducted without dietary restrictions or stress, making this option an interesting alternative to the radial maze and water maze test for its use in the behavioral phenotyping of genetically-modified mice.

Specifications

Platform Material	Clear Gray Perspex, can be provided in white or black color under request
Platform Diameter	Mouse: 92 cm (36 in), Rat: 122 cm (48 in)
Platform Height	90-100 cm (35 - 39 in)
Number of Platform Holes	Mouse: 20 holes, Rat: 18
Diameter of Holes	Mouse: 5 cm (2 in); Rat: 10 cm (4 in)
Spacing of Holes	Mouse: 7.5 cm (3 in), Rat: 20° angle-spaced
Distance from Border	2 cm (0.8 in)
Goal Box	20 (D) x 9 (W) x 9 (H) cm (8 x 3.5 x 3.5 in)
Starting Cylinder	8 cm diameter (3 in) 12.5 cm height (4.9 in)

Ordering Information

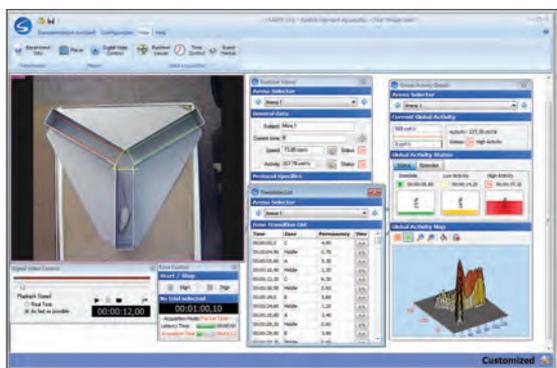
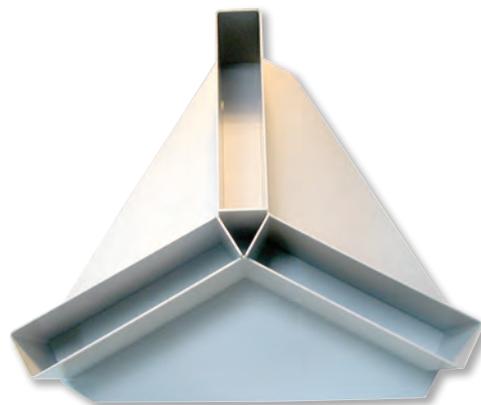
Order #	Model	Product
76-0549	LE851	Barnes maze, Mouse
76-0716	LE854	Barnes maze for Rat

NOTE

See pages 4-7 for information on our SMART 3 and LimeLight Video Tracking Systems, pages 10-11, for use in conjunction with our Barnes Maze.



T-Y Maze for Evaluating Learning & Memory



KEY FEATURES

- ▶ Optimized material for best results using video-tracking systems
- ▶ Non-reflective color to eliminate glare
- ▶ Material will not retain odors

The T-Y mazes are commonly used for assessing spatial working memory in rats and mice, especially for spontaneous alternation or delayed alternation tasks.

The T-Y maze tasks are simple tasks both sensitive to rats and mice. The mazes are made with non-reflective and odor resistant material well suited for any video-tracking system.

Specifications

T-mazes	Maze has a black floor with grey walls
T-maze for Mice	Arms: 30 x 6 x 15 cm (12 x 2.5 x 6 in) (L x W x H)
T-maze for Rat	Arms: 50 x 10 x 25 cm (20 x 4 x 10 in) (L x W x H)
Y-Mazes	Maze is grey (floors and walls) and is provided with manually removable doors
Y-Maze for Mice	Arms: 30 x 6 x 15 cm (12 x 2.5 x 6 in) (L x W x H)
Y-Maze for Rat	Arms: 45 x 10 x 35 cm (18 x 4 x 14 in) (L x W x H)

NOTE

Contact us for customized design.

Ordering Information

Order #	Model	Product
76-0430	LE844	T Maze, Rat
76-0078	LE843	T Maze, Mouse
76-0440	LE849	Y Maze, Rat
76-0079	LE847	Y Maze, Mouse

NOTE

See pages 4-7 for more information on our SMART 3 and LimeLight Video Tracking Systems, pages 10-11 for use in conjunction with our T-Y Mazes.

Learning Memory & Attention



Radial Maze for Evaluating Working & Reference Memory



KEY FEATURES

- ▶ Allows automated standard experiments
- ▶ Different possibilities of control for opening and closing the doors (manual or automated)
- ▶ Different possibilities for animal detection (photoelectric cells or video-tracking)
- ▶ Mounted on a tripod of adjustable height

COMPONENTS INCLUDED

- ▶ Radial Maze
- ▶ LE766/8 Control unit (except LE760 and LE762)
- ▶ 8 food baskets (one at each arm's end)
- ▶ Tripod
- ▶ 2 year warranty

Our Eight Arms Radial Maze is extensively used in behavioral laboratories for evaluating spatial memory but also non-spatial memory associated with motivational cues (classically, food).

We propose 3 solutions for Panlab radial maze:

- Manual radial maze LE760/LE762 that can be used optionally with the SMART video tracking software
- Semi-automated radial maze LE767/LE769 that can be used optionally with the SMART video tracking software
- Automated radial maze with photobeams LE766/LE768

Our Radial Maze consists of a central area with eight sliding doors giving access to eight equally-sized arms. The maze, made of black plexiglass, is mounted on a tripod with adjustable height (1m max). Each arm has lateral walls with a height higher on the proximal side of the arm than on the distal side. On the distal extreme of each arm, a detachable recessed cup can be installed or replaced by cover (all included).

The sliding doors can be opened and closed automatically or manually:

- Automated doors operation can be controlled by the animal position throughout the test using the Mazesoft-8 software associated with photoelectrical cell mounted on the radial maze and the corresponding control unit. See the application sheet available in the Download section.

- Manual doors operation can be made remotely by the user by using the switches available on the control unit.
- Manual doors operation can be made in situ by the user by using the threads provided for opening or closing each door.

A water version of our Radial Maze is also available (see our circular pool product pages 54 and 55, or contact us for more details).

Parameter Measured	Monitoring System Suggested
Chronological sequence of animal positioning in the radial maze	MazeSoft-8 and SMART
Time of entry in each zone	MazeSoft-8 and SMART
Current position	MazeSoft-8 and SMART
Total number of entries in each zone	MazeSoft-8 and SMART
Total number of reference and working memory	MazeSoft-8 and SMART
Other integrated parameters: number of visits into the arms, response latency, etc...	MazeSoft-8

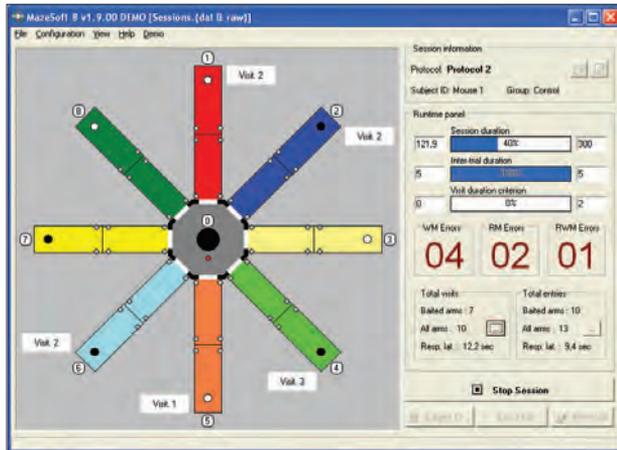
Specifications*	
Radial Maze Dimensions:	
Rat (W x D x H)	1690 x 1690 x 1250/1450 mm (67 x 67 x 49 /57 in)
Mouse (W x D x H)	867 x 867 x 1250/1450 mm (34 x 34 x 49/57 in)
Position Detection Technique	IR beams in the arms, weight cell in the central island or SMART Video Tracking
Sliding Doors Operation	Manually or automated w/MAZESOFT-8 or SMART
Material Composition	Methacrylate, aluminum, stainless steel
Power Requirement	110/220 VAC, 50/60 Hz

Ordering Information		
Order #	Model	Product
76-0227	LE760	Standard Radial Maze, Rat
76-0228	LE762	Standard Radial Maze, Mouse
76-0229	LE767	Semi-Automated Radial Maze, Rat with SMART
76-0230	LE769	Semi-Automated Radial Maze, Mouse with SMART
76-0231	LE766	Automated Radial Maze, Rat (requires MAZESOFT-8)
76-0232	LE768	Automated Radial Maze, Mouse (requires MAZESOFT-8)
Options		
76-0681	SMART	SMART Video-Tracking Software
76-0682	SMARTCS	Customized Module
76-0144	MAZESOFT-8	MAZESOFT-8 Software

software species is hardware specific

Rabbit Guinea Pig Rat Mouse Insect Fish

MAZESOFT-8 Software for Learning & Memory



KEY FEATURES

- ▶ Complete and easy-to-use for standard experiments
- ▶ Use of photo cell technology for animal position detection
- ▶ Manual or automatic control of the doors
- ▶ Provides integrated parameters (number of errors, number of distinct arms visited, etc)
- ▶ Data reports can be reorganized according to factors entered in the trial header (animal, groups, etc)
- ▶ Data export to Excel

PARAMETERS MEASURED

- ▶ Duration of the experiment
- ▶ Current position of the animal
- ▶ Number of working memory errors (repeated "visit" in the baited arms)
- ▶ Number of reference memory (number of "visit" in the unbaited arms)
- ▶ Total number of visited arms
- ▶ Response latency (total duration of the experiment / total number of visited arms)
- ▶ Number of different arms visited during the experiment (between 0 and 8)
- ▶ Number of arms visited until an 'error' (last arm visited included)
- ▶ List table showing the chronological order of the visited arms and entries into the arms
- ▶ List table showing the chronological order of the entries into the different zones of the radial maze

COMPONENTS INCLUDED

- ▶ Software installation and USB license key
- ▶ Cables and connectors
- ▶ Instruction manual in digital format

MAZESOFT-8 is complete and easy-to-use software for monitoring radial maze experiments. It has been specially designed to work with our Radial Maze and is equipped with rows of infrared photocells for the automated detection of animal position.

The software allows for the full control of the arm doors either manually (by means of a button panel in the computer screen) or automatically, when a trained subject is being tested.

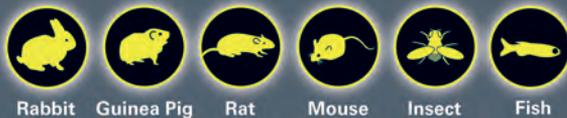
MAZESOFT-8 allows the user selection of standard protocols for the study of working and reference memory in laboratory animals. The protocols are easy to configure, the user only has to enter critical parameters: designation of the baited arms, conditions to stop the experiment, time-interval between each trial, door monitoring mode and criterion for considering the arm visited. Each protocol configuration can be saved and opened for use when necessary. A "trial header" can be used for recording all the necessary information associated with the current experiment (code of trial, experimenter, challenge, dose, subject identification, comments).

In MAZESOFT-8, the maze is divided into 17 sections: 8 equally sized arms (each one divided into proximal and distal section) and a central area. One experiment can be composed of several trials, depending on the number of experimental groups and animals per group used in the study. The system considers an arm being visited when the subject has been detected in the distal part of the arm. During each trial, the elapsed time, permanence time in each area and current position of the animal can be visualized in real-time. Real-time information about the animal position and the number of visits made are also graphically shown on the screen. A runtime data panel shows the cumulated number of working and reference memory errors together with other important data (response latency, number and list of visits and entries into the arms, etc.)

MAZESOFT-8 provides a summary data table containing the complete information about each session (subject name, group, date) together with all the integrated data of interest. The tables of the session can be reorganized before exportation according to parameters previously entered in the trial header (by subjects, by groups, by experimenter, etc.). Data from the summary database as well as the detailed chronological listing of the animal positions for each session can be easily exported to Excel™.

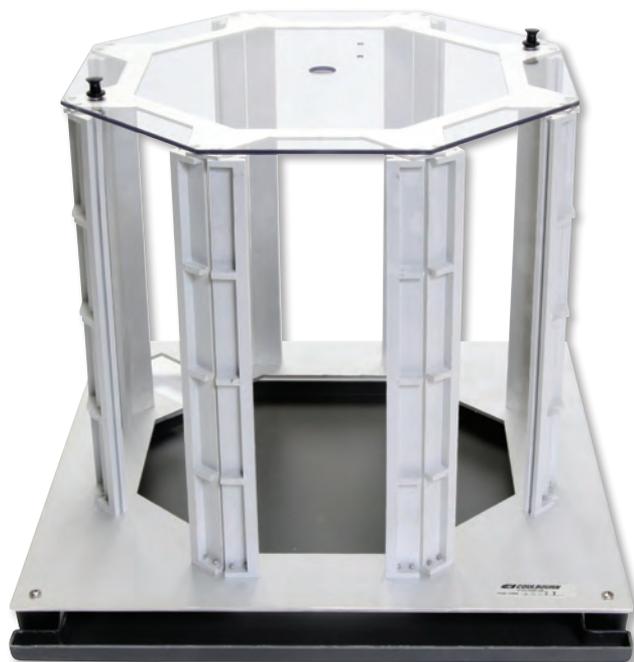
Ordering Information

Order #	Model	Product
76-0144	MAZESOFT-8	MAZESOFT-8 Software



Habitest Runways & Hubs

Learning Memory & Attention • Habitest Runways & Hubs



KEY FEATURES

- ▶ Maximum flexibility
- ▶ Modular design for economical and re-configurable options
- ▶ Wide range of stimulus response sensors

Adding to the modular flexibility of the Habitest product line, we offer hubs and runways to expand the possibilities of our hardware. Hubs are available in four styles – square, hexagon, octagon and dodecagon (only for rat) and are used primarily for runway intersections in the radial arm maze, T-maze, Y-maze and other maze configurations. Featuring the same bay tracks, any of our stimuli/response modules can easily be added to create unique testing environments.

Runways are used to interconnect the hubs, modular test cages, shuttle cages and running wheel boxes. These can be installed in any bay track of our standard cages or can be joined together, end to end to double the length of the runway using our terminator/joiners. The terminator/joiner has a double set of tracks and can also accept standard stimuli/response modules. Photocell sensors are available to detect animal entries, passage, and exits from the runways.

Ordering Information		
Order #	Model	Product
Control and Data Acquisition		
GS4.0	Graphic State® Notation 4 Software	
GS4-UP	Graphic State® Upgrade to Version 4 (requires U90-11 USB Interface)	
H01-01	System Power Base	
H02-08	Habitest Linc (a system may include from 1 to 8 Lincs)	
H03-04	Environmental Connection Board (ECB) and Linc cable	
U90-11	USB Interface	
Hubs		
Mouse		
H10-35M-04	Square Hub, Mouse – floor to be ordered separately	
H10-35M-04-NSF	Non-shock Floor for Mouse Square Hub	
H10-35M-04-SF	Shock Floor for Mouse Square Hub	
H10-35M-06	Hexagon Hub, Mouse – floor to be ordered separately	
H10-35M-06-NSF	Non-shock Floor for Mouse Hexagon Hub	
H10-35M-06-SF	Shock Floor for Mouse Hexagon Hub	
H10-35M-08	Octagon Hub, Mouse – floor to be ordered separately	
H10-35M-08-NSF	Non-shock Floor for Mouse Octagon Hub	
H10-35M-08-SF	Shock Floor for Mouse Octagon Hub	
Rat		
H10-35R-04	Square Hub, Rat – floor to be ordered separately	
H10-35R-04-NSF	Non-shock Floor for Rat Square Hub	
H10-35R-04-SF	Shock Floor for Rat Square Hub	
H10-35R-06	Hexagon Hub, Rat – floor to be ordered separately	
H10-35R-06-NSF	Non-shock Floor for Rat Hexagon Hub	
H10-35R-06-SF	Shock Floor for Rat Hexagon Hub	
H10-35R-08	Octagon Hub, Rat – floor to be ordered separately	
H10-35R-08-NSF	Non-shock Floor for Rat Octagon Hub	
H10-35R-08-SF	Shock Floor for Rat Octagon Hub	
H10-35R-12	Dodecagon Hub, Rat – Non-shock floor and drop pan included	
Runways		
Mouse		
H10-37M-NSF-14	14.5" Mouse Runway with Non-Shock Floor (368 mm)	
H10-37M-SF-14	14.5" Mouse Runway with Shock Floor (368 mm)	
H10-37M-TJ	Terminator/Joiner for Mouse Runways	
H10-37M-NSF-04	Mouse Goal Box with Non-Shock Floor	
Rat		
H10-37R-NSF-09W	9" Wide Rat Runway with Non-Shock Floor (229 mm)	
H10-37R-NSF-14	14.5" Rat Runway with Non-Shock Floor (368 mm)	
H10-37R-SF-14	14.5" Rat Runway with Shock Floor (368 mm)	
H10-37R-NSF-29	29" Rat Runway with Non-Shock Floor (737 mm)	
H10-37R-SF-29	29" Rat Runway with Shock Floor (737 mm)	
H10-37R-TJ	Terminator/Joiner for Rat Runways	
H10-37R-NSF-06	Rat Goal Box with Non-Shock Floor	

Ordering Information		
Order #	Model	Product
Accessories		
H90-00M-M-KT01	Blank Panel Set, Mouse	
H90-00R-M-KT01	Blank Panel Set, Rat	
H10-37-MDM	Manual Guillotine Door, Mouse – for any mouse hub, runway or terminator/joiner	
H10-37-MDR	Manual Guillotine Door, Rat – for any rat hub, runway, or terminator/joiner	
H10-37-GDL	Guillotine Door Lifter, for H10-37-MDM and H10-37-MDR)	
H13-15	Precision Animal Shocker, Manual*	
H13-17A	Precision Animal Shocker, Programmable*	
A13-16	Shock Level Tester	
H93-01-25	25ft. Shock Cable** (7.6 meters)	

* Shock cable is required, must be ordered separately

** Additional cable lengths are available; contact your local representative for more information

NOTE

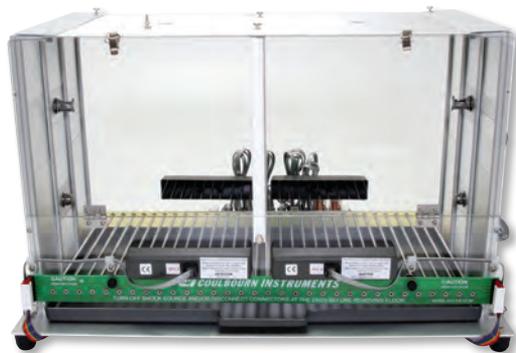
Please see Graphic State, page 16-17, for use with our Hubs & Runways.

REFERENCES

- Mychasiuk R et al. (2015) A mild traumatic brain injury (mTBI) induces secondary attention-deficit hyperactivity disorder-like symptomatology in young rats. *Behav Brain Res.* 2015 Jun 1;286:285-92. (5CSRTT)
- Cyr M et al. (2015) Deficit in sustained attention following selective cholinergic lesion of the pedunculopontine tegmental nucleus in rat, as measured with both post-mortem immunocytochemistry and in vivo PET imaging with [¹F]fluoroethoxybenzovesamicol. *Behav Brain Res.* 2015 Feb 1;278:107-14. (5CSRTT)
- Ramirez F et al. (2015) Active avoidance requires a serial basal amygdala to nucleus accumbens shell circuit. *J Neurosci.* 2015 Feb 25;35(8):3470-7. (Shuttle)
- Tedesco V et al. (2014) Extinction, applied after retrieval of auditory fear memory, selectively increases zinc-finger protein 268 and phosphorylated ribosomal protein S6 expression in prefrontal cortex and lateral amygdala. *Neurobiol Learn Mem.* 2014 Nov;115:78-85. (Fear conditioning)
- Yokoi K et al. (2014) Effect of dietary nickel deprivation on vision, olfaction, and taste in rats. *J Trace Elem Med Biol.* 2014 Oct;28(4):436-40. (Taste preference/aversion)
- Capozzo A et al. (2014) Continuous stimulation of the pedunculopontine tegmental nucleus at 40 Hz affects preparative and executive control in a delayed sensorimotor task and reduces rotational movements induced by apomorphine in the 6-OHDA parkinsonian rat. *Behav Brain Res.* 2014 Sep 1;271:333-42. (operant conditioning)
- Wiley JL et al. (2014) Cross-substitution of 9-tetrahydrocannabinol and JWH-018 in drug discrimination in rats. *Pharmacol Biochem Behav.* 2014 Sep;124:123-8. (operant conditioning)
- Buckley JL et al. (2014) Rimonabant's reductive effects on high densities of food reinforcement, but not palatability, in lean and obese Zucker rats. *Psychopharmacology (Berl).* 2014 May;231(10):2159-70. (Food reinforcement)
- Stouffer EM et al. (2015) A high-fat diet impairs learning that is dependent on the dorsal hippocampus but spares other forms of learning. *Hippocampus.* 2015 May 19. (radial maze)
- Klarer M et al. (2014) Gut vagal afferents differentially modulate innate anxiety and learned fear. *J Neurosci.* 2014 May 21;34(21):7067-76. (fear conditioning)
- Wartman BC et al. (2014) The impact of multiple memory formation on dendritic complexity in the hippocampus and anterior cingulate cortex assessed at recent and remote time points. *Front Behav Neurosci.* 2014 Apr 21;8:128. (operant conditioning)



Habitest Passive Avoidance Box



KEY FEATURES

- ▶ **Maximum flexibility**
- ▶ **Modular design for economical and re-configurable options**
- ▶ **Wide range of stimulus response sensors**

These Passive Avoidance cages are patterned after our modular test cages, with full 3-bay modular walls on each end. Each cage accepts our stimulus-response modules of the appropriate size (mouse or rat). The rat cage also accepts runways, so it may be joined to hubs and other cages in the same manner as the rat operant test cages and hubs. The module bays, three in each compartment each accept 8 module height units; the same as our standard test cages.

Animal transit and position are sensed and reported by a photocell sensor system. Users may select automatic shock routing to simplify programming or operate the shock transfer relays from the environmental connection board.

Modular in design, these Passive Avoidance cages expand beyond active and passive avoidance applications, making our system optimally versatile. Adding in stimuli, feeders and response sensors makes the cage useful for many other applications, such as place preference or other operant studies. Optional guillotine doors can easily replace the open door barrier that comes with the cage. The door is opened and remains so for the duration of a 28 volt signal that triggers its opening. An operating mechanism de-energizes when the signal terminates, allowing the door to close. Thus, only the weight of the thin sheet metal door bears down, very important should there be an animal that does not clear the door path below.

The cage floors and drop pans are easily removed with just a snap and slide for cleaning convenience. A connector on each end of the grid floor circuit board disconnects the shock cable from the shocker so that the floor may be removed and replaced in seconds.

Our Passive Avoidance cages include a drop pan, shock floor, two photocell sensor pairs and one barrier/doorway. Passive Avoidance cages have a permanently blacked-out left compartment. Blank modules are needed and should be ordered separately to fill the cage.

Ordering Information

Order #	Product
GS4.0	Graphic State® Notation 4 Software
GS4-UP	Graphic State® Upgrade to Version 4 (requires U90-10 USB Interface)
H01-01	System Power Base
H02-08	Habitest Linc (a system may include from 1 to 8 Lincs)
H03-04	Environmental Connection Board (ECB) and Linc cable
U90-11	USB Interface
Shuttle Cages	
Mouse:	
H10-11M-PA	Passive Avoidance Cage, Mouse
H10-11M-XX-DP	Extra Drop Pan for Mouse Shuttle and Passive Avoidance Cages
H10-11M-XX-GD	Guillotine Door for Mouse Shuttle and Passive Avoidance Cages
Rat:	
H10-11R-PA	Passive Avoidance Cage, Rat
H10-11R-XX-DP	Extra Drop Pan for Rat Shuttle and Passive Avoidance Cages
H10-11R-XX-GD	Guillotine Door for Rat Shuttle and Passive Avoidance Cages
Accessories	
H10-24	Isolation Cubicle, Wide (W x D x H) 762 x 450 x 470 mm (ID 30 x 17.75 x 18.5 in)
H10-24A	Isolation Cubicle, Wide (W x D x H) 762 x 450 x 470 mm (ID 30 x 17.75 x 18.5 in) with high attenuation liner
H90-00M-M-KT01	Blank Panel Set, Mouse
H90-00R-M-KT01	Blank Panel Set, Rat
H13-15	Precision Animal Shocker, Manual*
H13-17A	Precision Animal Shocker, Programmable*
A13-16	Shock Level Tester
H93-01-25	Shock Cable** 7.62 meters (25 ft)

* Shock cable is required, must be ordered separately

** Additional cable lengths are available; contact your local representative for more information



Passive Avoidance Box to Assess Working Memory



KEY FEATURES

- ▶ **Weight transducer technology for accurate animal detection**
- ▶ **Very precise and stable intensity of shock delivered into the black compartment**
- ▶ **Neither PC interface nor PC cards are required**
- ▶ **Safety system which guarantees that the shock intensity received by the animal is always the same value independent of the grid bars treaded**

PARAMETERS MEASURED

- ▶ **Latency to enter into the black compartment**

COMPONENTS INCLUDED

- ▶ **Passive Avoidance Box**
- ▶ **Control unit with RS-232 communication port**
- ▶ **Motorized door (controlled by the ShutAvoid software)**
- ▶ **Cables and connectors**
- ▶ **Instruction manual**
- ▶ **2 year warranty**

OPTIONS

- ▶ **ShutAvoid software to control up to 8 Active or Passive boxes**
- ▶ **LE10026 Shocker unit with scrambler (0-2mA output)**

Passive Avoidance is fear-motivated testing classically used to assess short-term or long-term memory on small laboratory animals.

Passive Avoidance working protocols involve timing of transitions, i.e. time that the animal takes to move from the white compartment to the black one after a conditioning session. During the conditioning session, entry into the black compartment is punished with a mild inescapable electrical shock.

Our Passive Avoidance box (LE870/872) is defined by a large white illuminated compartment and a small black dark compartment separated by a guillotine gate. The animal's position is detected by using high sensitivity weight transducers providing accuracy and reliable detection (zones entries) systems utilizing photocell beams or on grid floor displacements.

This Passive Avoidance Box is controlled by the ShutAvoid software.

Specifications

Mouse Box Dimensions (W x D x H)	250 x 250 x 240 mm (9.8 x 9.8 x 9.4 in) white compartment; 195 x 108 x 120 mm (7.7 x 4.3 x 4.7 in) black compartment
Rat Box Dimensions (W x D x H)	310 x 310 x 240 mm (12 x 12 x 9.4 in) white compartment; 195 x 108 x 120 mm (7.7 x 4.3 x 4.7 in) black compartment
Min. Weight Detected	10 grams (mouse box); 40 grams (rat box)
Material Composition	Methacrylate, aluminum, stainless steel
Maximum Number of Stations	8 stations connected to a PC
Connection of Several Units to PC	Neither PC interface nor PC card are required. One cable connects all units to the PC
Certifications	CE compliant
Power Supply	110/220 VAC, 50/60 Hz

Ordering Information

Order #	Model	Product
76-0199	LE870	Passive Avoidance Cage, Rats
76-0200	LE872	Passive Avoidance Cage, Mice
Options		
76-0202	SHUTAVOID	Software to Control up to 8 Active/Passive Boxes
76-0159	LE10026	Shock Generator with, Scrambler, 0-2 mA Output

REFERENCES

Orejana L. et al. (2015) Sildenafil Decreases BACE1 and Cathepsin B Levels and Reduces APP Amyloidogenic Processing in the SAMP8 Mouse. *J Gerontol A Biol Sci Med Sci.* 2015 Jun;70(6):675-85. (mouse)

Learning Memory & Attention

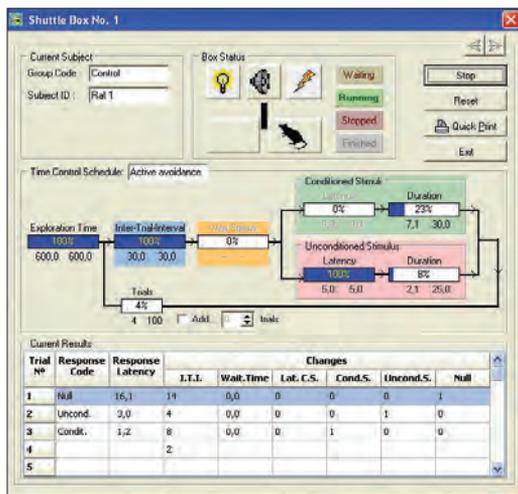
software species is hardware specific

Rabbit Guinea Pig Rat Mouse Insect Fish

ShutAvoid Software for Active & Passive Avoidance

Learning Memory & Attention

ShutAvoid Software for Active & Passive Avoidance



KEY FEATURES

- ▶ Good for both Active and Passive Avoidance
- ▶ Experimental chambers can be controlled independently
- ▶ Our unique test mode enables immediate and reliable box checking
- ▶ The program runs automatically when the animal is detected in the cage
- ▶ Animal position and current data can be visualized onscreen
- ▶ Provides integrated data
- ▶ Analyze data in user-defined intervals of time

PARAMETERS MEASURED

- ▶ Number and latency of conditioned responses (Active Avoidance)
- ▶ Number and latency of unconditioned responses (Active Avoidance)
- ▶ Number and latency of null responses (Active Avoidance)
- ▶ Number and latency of responses during intertrial (Active Avoidance)
- ▶ Number of compartment crossing during the intertrial interval (Active Avoidance)
- ▶ Mean of the response latencies (Active Avoidance)
- ▶ Latency to enter into the black compartment (Passive Avoidance)

COMPONENTS INCLUDED

- ▶ Software Installer with USB protection key
- ▶ Cables and connectors
- ▶ Instruction manual
- ▶ Free software updates of the acquired version

SHUTAVOID Software controls up to eight Shuttle Boxes or Passive Cages independently. The software detects how many cages are physically present and activates the corresponding windows. The system includes a test mode to enable immediate and reliable checking of the box features to ensure all of the elements of the experimental chamber are functioning.

The program controls the presentation of visual and acoustic stimuli and shock duration, at the same time that it records the position of the experimental animal in each compartment of the experimental cage.

Unlimited number of schedules can be defined and used either by common or different experimental cages. The protocol editor allows the configuration of all the basic parameters necessary to set an active and passive avoidance experiment: habituation period, duration of the intertrial interval (fixed or randomized), activation and duration of the conditioned stimulus (light, sound or both), activation, latency and duration of the unconditioned stimulus (electrical shock), latency for considering the response as "null", door status (open/closed), number of trials, cut-off time for response, etc.

The program runs automatically when the animal is detected in the cage (independently for each cage). During the acquisition of data, information about the protocol state, animal position and current data can be visualized for each cage on the corresponding control window.

Data related to each of the observed animal responses are stored into result files that pick up the information acquired during the working session. The data files can be open and re-analyzed to generate ASCII-coded reports in which the information is summarized for each trial or groups of trials (user-defined).

Ordering Information

Order #	Model	Product
76-0202	ShutAvoid	PC Software to Control up to 8 Shuttle Boxes or Passive Avoidance Boxes

REFERENCES

Méndez-López M et al. (2015) Effects of a high protein diet on cognition and brain metabolism in cirrhotic rats. *Physiol Behav.* 2015 Oct 1;149:220-8.

Río-Alamos C et al. (2015) Neonatal handling decreases unconditioned anxiety, conditioned fear, and improves two-way avoidance acquisition: a study with the inbred Roman high (RHA-I)- and low-avoidance (RLA-I) rats of both sexes. *Front Behav Neurosci.* 2015 Jul 10;9:174.

Orejana L et al. (2015) Sildenafil Decreases BACE1 and Cathepsin B Levels and Reduces APP Amyloidogenic Processing in the SAMP8 Mouse. *J Gerontol A Biol Sci Med Sci.* 2015 Jun;70(6):675-85.

Pereda D et al. (2015) Mice lacking chromogranins exhibit increased aggressive and depression-like behaviour. *Behav Brain Res.* 2015 Feb 1;278:98-106.

Aso E et al. (2015) Cannabis-based medicine reduces multiple pathological processes in A PP/PS1 mice. *J Alzheimers Dis.* 2015;43(3):977-91.

Zitman FM et al. (2014) Dentate Gyrus Local Circuit is Implicated in Learning Under Stress—a Role for Neurofascin. *Mol Neurobiol.* 2014 Dec 17

Flores Á et al. (2014) The hypocretin/orexin system mediates the extinction of fear memories. *Neuropsychopharmacology.* 2014 Nov;39(12):2732-41.

Baud A et al. (2014) Genomes and phenomes of a population of outbred rats and its progenitors. *Sci Data.* 2014 Jun 10;1

Negrón-Oyarzo I et al. (2014) Effects of chronic stress in adolescence on learned fear, anxiety, and synaptic transmission in the rat prelimbic cortex. *Behav Brain Res.* 2014 Feb 1;259:342-53.

Related Hardware

- ▶ Shuttle Box, see pages 66-67
- ▶ Passive Avoidance Box, see page 63



Rabbit



Guinea Pig



Rat



Mouse



Insect



Fish

Shuttle Box for Active & Passive Avoidance



KEY FEATURES

- ▶ **Highly sensitive weight transducer system for accurate animal detection**
- ▶ **Easy to set up different wall shapes and colors**
- ▶ **Optional guillotine door for passive avoidance**
- ▶ **Compartments with independent grid floor**
- ▶ **Front and top doors for easy access inside the box**
- ▶ **Up to 8 active boxes can be controlled simultaneously from one PC**
- ▶ **Neither PC interface nor PC cards are required**
- ▶ **Safety system which guarantees that the shock intensity received by the animal is always the same value independent of the grid bars treaded**

COMPONENTS INCLUDED

- ▶ **Active Box (Shuttle Box)**
- ▶ **Control Unit with RS-232 communication port**
- ▶ **Cables and connectors**
- ▶ **Instruction manual**
- ▶ **2 year warranty**

OPTIONS

- ▶ **Motorized door to convert Active Box into Passive Box**
- ▶ **Sound Attenuating Box**
- ▶ **ShutAvoid software to control up to 8 active or passive boxes**
- ▶ **LE10026 shocker unit with scrambler (0-2 mA output)**

The Shuttle Boxes LE916 (Rats) and LE918 (Mice) provide the ideal environment to carry out conditioned reflexes (Active and Passive Avoidance) in learning and memory studies.

The Shuttle Box (LE916-918) consists of two equally sized compartments with two independent grid floors. A front door, in addition to the top ones, allows easy access inside the box. The cage contains a general sound generator and a visual stimulus (light) for each compartment.

The animal is detected by two weight transducers located above the static grids, avoiding the problems inherent to photoelectrical or grid tilting systems (high speeds of displacements in mice, tail detection in rats).

Our Shuttle Box is easy to set up and dismantle. Therefore, reconverting it to traditional Passive Box is straightforward by adding a sliding door (LE916D for mice or LE918D for rats). It is also possible to set up different wall shapes or colors in order to further condition the subject of study either visually or spatially.

The Shuttle Boxes are controlled by the ShutAvoid software.

Specifications

Cage Dimensions (W x D x H):

LE916 Rat	510 x 250 x 240 mm (20 x 10 x 9.5 in) internal; 580 x 360 x 305 mm (23 x 14 x 12 in) external
LE918 Mouse	590 x 190 x 240 mm (23 x 7.5 x 9.5 in) internal; 580 x 360 x 305 mm (23 x 14 x 12 in) external

Minimum Weight Detected 10 grams (Mouse Box); 40 grams (Rat Box)

Material Composition Methacrylate, aluminum, stainless steel

Maximum Number of Stations (with ShutAvoid) 8 stations connected to a PC

Certifications CE compliant

Power Supply 110/220 VAC, 50/60 Hz

Ordering Information

Order #	Model	Product
76-0250	LE916	SHUTTLE BOX with Static Floor (Needs Shocker) Rat
76-0251	LE918	SHUTTLE BOX with Static Floor (Needs Shocker) Mouse
76-0157	LE26	Sound Attenuating Box
Options		
76-0202	SHUTAVOID	PC SOFTWARE to Control up to 8 Active/Passive Boxes
76-0159	LE10026	Shock Generator with Scrambler, 0-2 mA Output
76-0252	LE916D	Guillotine Door for Rat Shuttle Box LE916 and Make it Capable to Run Passive Avoidance Experiments
76-0253	LE918D	Guillotine Door for Mouse Shuttle Box LE918 and Make it Capable to Run Passive Avoidance Experiments
76-0606	LE918P	White Contextual Kit, Mouse
76-0607	LE916P	White Contextual Kit, Rat

REFERENCES

Méndez-López M et al. (2015) Effects of a high protein diet on cognition and brain metabolism in cirrhotic rats. *Physiol Behav.* 2015 Oct 1;149:220-8.

Río-Alamos C et al. (2015) Neonatal handling decreases unconditioned anxiety, conditioned fear, and improves two-way avoidance acquisition: a study with the inbred Roman high (RHA-I)- and low-avoidance (RLA-I) rats of both sexes. *Front Behav Neurosci.* 2015 Jul 10;9:174.

Orejana L et al. (2015) Sildenafil Decreases BACE1 and Cathepsin B Levels and Reduces APP Amyloidogenic Processing in the SAMP8 Mouse. *J Gerontol A Biol Sci Med Sci.* 2015 Jun;70(6):675-85.

Pereda D et al. (2015) Mice lacking chromogranins exhibit increased aggressive and depression-like behaviour. *Behav Brain Res.* 2015 Feb 1;278:98-106.

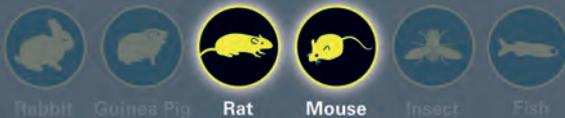
Aso E et al. (2015) Cannabis-based medicine reduces multiple pathological processes in AβPP/PS1 mice. *J Alzheimers Dis.* 2015;43(3):977-91.

Zitman FM et al. (2014) Dentate Gyrus Local Circuit is Implicated in Learning Under Stress—a Role for Neurofascin. *Mol Neurobiol.* 2014 Dec 17

Flores Á et al. (2014) The hypocretin/orexin system mediates the extinction of fear memories. *Neuropsychopharmacology.* 2014 Nov;39(12):2732-41.

Baud A et al. (2014) Genomes and phenomes of a population of outbred rats and its progenitors. *Sci Data.* 2014 Jun 10;1

Negrón-Oyarzo I et al. (2014) Effects of chronic stress in adolescence on learned fear, anxiety, and synaptic transmission in the rat prelimbic cortex. *Behav Brain Res.* 2014 Feb 1;259:342-53.



Habitest Shuttle Box



KEY FEATURES

- ▶ **Maximum flexibility**
- ▶ **Modular design for economical and re-configurable options**
- ▶ **Wide range of stimulus response sensors**

The Habitest shuttle cages are patterned after our modular test cages, with full 3-bay modular walls on each end. Each cage accepts our stimulus-response modules of the appropriate size (mouse or rat). The rat cage also accepts runways, so it may be joined to hubs and other cages in the same manner as the rat operant test cages and hubs. The module bays, three in each compartment, each accept 8 module height units; the same as our standard test cages.

Animal transit and position are sensed and reported by a photocell sensor system. Users may select automatic shock routing to simplify programming or operate the shock transfer relays from the environmental connection board.

Modular in design, these shuttle cages expand beyond active and passive avoidance applications, making our system optimally versatile. Adding in stimuli, feeders and response sensors makes the cage useful for many other applications, such as place preference or other operant studies. Optional guillotine doors can easily replace the open door barrier that comes with the cage. The door is opened and remains so for the duration of a 28 volt signal that triggers its opening. An operating mechanism de-energizes when the signal terminates, allowing the door to close. Thus, only the weight of the thin metal door bears down, very important should there be an animal that does not clear the door path below.

The cage floors and drop pans are easily removed with just a snap and slide for cleaning convenience. A connector on each end of the grid floor circuit board disconnects the shock cable from the shocker so that the floor may be removed and replaced in seconds.

All shuttle cages include a drop pan, shock floor, two photocell sensor pairs and one barrier/doorway. Blank modules are needed and should be ordered separately to fill the bays of the cage walls.

Passive Avoidance boxes are identical to the shuttle boxes, except have a permanently blacked-out left compartment. See page 62 for more information on our Passive Avoidance Cages.

Ordering Information

Order #	Product
Control and Data Acquisition	
GS4.0	Graphic State® Notation 4 Software
GS4-UP	Graphic State® Upgrade to Version 4 (requires U90-11 USB Interface)
H01-01	System Power Base
H02-08	Habitest Linc (a system may include from 1 to 8 Lincs)
H03-04	Environmental Connection Board (ECB) and Linc cable
U90-11	USB Interface
Shuttle Cages	
Mouse:	
H10-11M-SC	Shuttle Cage, Mouse
H10-11M-XX-DP	Extra Drop Pan for Mouse Shuttle and Passive Avoidance Cages
H10-11M-XX-GD	Guillotine Door for Mouse Shuttle and Passive Avoidance Cages
Rat:	
H10-11R-SC	Shuttle Cage, Rat
H10-11R-XX-DP	Extra Drop Pan for Rat Shuttle and Passive Avoidance Cages
H10-11R-XX-GD	Guillotine Door for Rat Shuttle and Passive Avoidance Cages
Accessories	
H10-24	Isolation Cubicle, Wide (W x D x H) ID 762 x 451 x 470 mm (30 x 17.75 x 18.5 in)
H10-24A	Isolation Cubicle, Wide (W x D x H) ID 762 x 451 x 470 mm (30 x 17.75 x 18.5 in) with high attenuation liner
H90-00M-M-KT01	Blank Panel Set, Mouse
H90-00R-M-KT01	Blank Panel Set, Rat
H13-15	Precision Animal Shocker, Manual*
H13-17A	Precision Animal Shocker, Programmable*
A13-16	Shock Level Tester
H93-01-25	Shock Cable** 7.62 m (25 ft)

* Shock cable is required, must be ordered separately

**Additional cable lengths are available; contact your local representative for more information



Startle & Fear Combined System



KEY FEATURES

- ▶ Combined system for startle/freezing
- ▶ Combined system for mice/rats
- ▶ Weight transducer sensitivity optimized
- ▶ Different spacial context configurations available for fear conditioning paradigms
- ▶ Accurate and traceable data
- ▶ USB connection, one cable links all!

PARAMETERS MEASURED

- ▶ Time of experiment at which each inactivity event has occurred (FREEZING)
- ▶ Duration of each inactivity event (FREEZING)
- ▶ Summary table of the total amount of freezing in each state of the experiment (FREEZING)
- ▶ Number and duration of freezing episodes in each user-defined intervals of time (FREEZING)
- ▶ Maximum amplitude of startle response (STARTLE)
- ▶ Latency until the maximum amplitude of startle response (STARTLE)
- ▶ Duration of the startle response (STARTLE)
- ▶ Latency until the beginning of the startle response (STARTLE)
- ▶ Average of the startle response (STARTLE)
- ▶ Mean startle values for each trial type (STARTLE)

COMPONENTS INCLUDED

- ▶ Experimental chamber
- ▶ Sound proof box
- ▶ Load cell amplifier
- ▶ Station interface
- ▶ Instruction manual
- ▶ 2 year warranty

OPTIONS

- ▶ Shock Generator
- ▶ Air Puff Unit
- ▶ Packwin V2.0 Software with:
 - Freezing Module
 - Startle Module

The StartFear Combined system is a polyvalent system for conducting both fear conditioning and startle reflex experiments in one same enclosure, regardless if the animal is a rat or a mouse (from 15g to 300 g).

Basically, the StartFear system allows recording and analysis of the signal generated by the animal movement through a high sensitivity Weight Transducer system.

The analogical signal is transmitted to the FREEZING and STARTLE software modules through the load cell unit for recording purposes and posterior analysis in terms of activity/immobility (FREEZING) or startle response characterization (STARTLE).

An additional interface associated with corresponding hardware allows controlling the stimuli (light, sounds, shock, air puff) from the STARTLE and FREEZING modules of the PACKWIN software (PACKWINCSST and PACKWINCSFR, respectively).

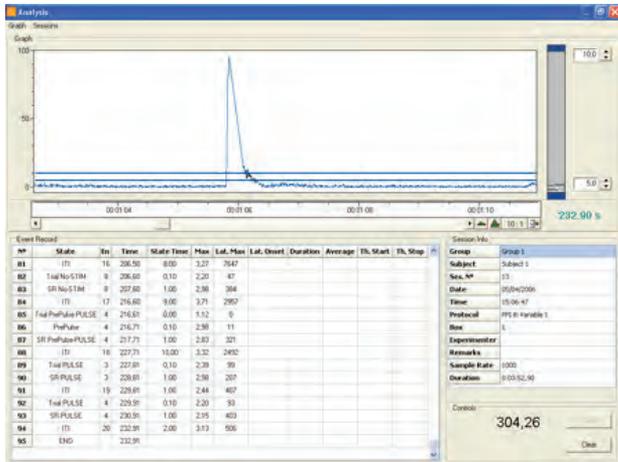
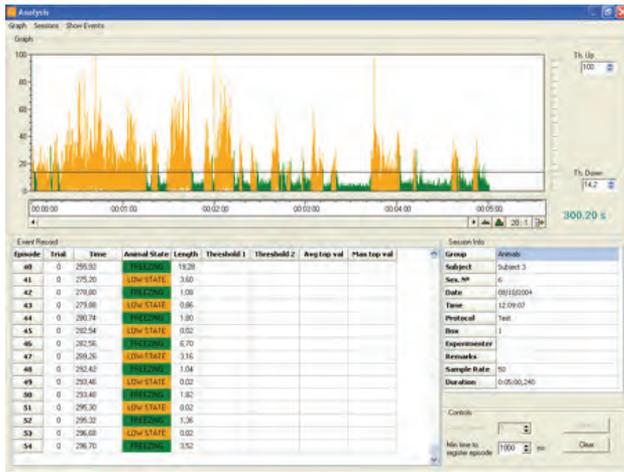
The StartFear cage is made with black methacrylate walls and a transparent front door. In fear conditioning experiment, the walls, cover and floor can be of different materials or colors. Moreover, a transparent cylinder can be placed into the experimental chamber in order to modify the contextual spatial perception of the subject during the test phase.

(continued on next page)

Learning Memory & Attention

Learning Memory & Attention • Startle & Fear Combined System

Startle & Fear Combined System (continued)



Specifications

Chamber Dimensions (W x D x H)	250 x 250 x 250 mm (9.8 x 9.8 x 9.8 in)
Material Composition	Methacrylate, aluminum, stainless steel
Maximum Number of Stations	8 stations connected to a PC
Sounds Frequency and Amplitude	PrePulse/pulse: adjustable from 200 to 10,000 Hz - max 120 dB; white noise: from 60 to 120 dB
Certifications	CE compliant
Power Supply	110/220 VAC, 50/60 Hz
Soundproof Box Dimensions (W x D x H)	670 x 530 x 550 mm (26 x 20.8 x 21.6 in)

Ordering Information

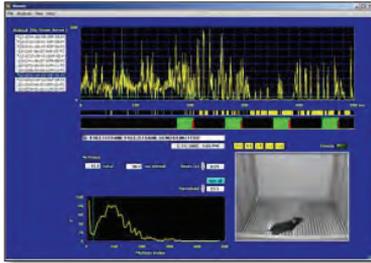
Order #	Model	Product
76-0280	LE116	FREEZING AND STARTLE Threshold Sensor including Sound Attenuating Box
76-0240	LE100501M	Special electrified grid for very small animals (6 mm bar-spaced)
76-0675	LE117MM	Mouse Holder for Startle Reflex (up to 25 g)
76-0235	LE117M	Mouse Holder for Startle Reflex (up to 35 g)
76-0236	LE117R	Rat Holder for Startle Reflex (up to 150-200 g)
76-0676	LE117RR	Rat Holder for Startle Reflex (up to 250-300 g)
76-0281	LE111	Load Cell Amplifier (One for Each Chamber)
76-0282	LE118	Stimuli Interface Unit (1 Chamber)
76-0283	LE1188	Stimuli Interface Unit (up to 8 Chambers)
76-0002	PACKWIN	Packwin Software
76-0701	PACKWINCS-FR	Packwin Freezing Experiment Module
76-0702	PACKWINCS-ST	Packwin Startle Experiment Module
Options		
76-0159	LE10026	Shock Generator with Scrambler, 0-2 mA Output
76-0286	LE119	Air Puff Unit
76-0328	LE115	Contextual Kit for Fear Conditioning

REFERENCES

- Pallarès M et al. (2015) Finasteride administration potentiates the disruption of prepulse inhibition induced by forced swim stress. *Behav Brain Res.* 2015 Aug 1;289:55-60. (Startle PPI)
- Chausseot R et al. (2015) Cognitive dysfunction in the dystrophin-deficient mouse model of Duchenne muscular dystrophy: A reappraisal from sensory to executive processes. *Neurobiol Learn Mem.* 2015 Jul 17. (Fear conditioning and startle)
- Xu XF et al. (2015) Integrin-linked Kinase is Essential for Environmental Enrichment Enhanced Hippocampal Neurogenesis and Memory. *Sci Rep.* 2015 Jun 22;5:11456. (Fear conditioning)
- Goddyn H et al. (2015) Functional Dissociation of Group III Metabotropic Glutamate Receptors Revealed by Direct Comparison between the Behavioral Profiles of Knockout Mouse Lines. *Int J Neuropsychopharmacol.* 2015 May 21.
- Sase S et al. (2015) Individual phases of contextual fear conditioning differentially modulate dorsal and ventral hippocampal GluA1-3, GluN1-containing receptor complexes and subunits. *Hippocampus.* 2015 Apr 25. (Fear conditioning)
- Awad W et al. (2015) Dissociation of the Role of Infralimbic Cortex in Learning and Consolidation of Extinction of Recent and Remote Aversion Memory. *Neuropsychopharmacology.* 2015 Apr 15 (fear Conditioning)
- Bollen B et al. (2015) Emotional disorders in adult mice heterozygous for the transcription factor Phox2b. *Physiol Behav.* 2015 Mar 15;141:120-6. (Fear conditioning)
- Mucic G et al. (2015) Networks of protein kinases and phosphatases in the individual phases of contextual fear conditioning in the C57BL/6J mouse. *Behav Brain Res.* 2015 Mar 1;280:45-50. (Fear Conditioning)
- Sase S et al. (2015) Contextual fear conditioning modulates hippocampal AMPA-, GluN1- and serotonin receptor 5-HT1A-containing receptor complexes. *Behav Brain Res.* 2015 Feb 1;278:44-54. (Fear conditioning)
- Sun P et al. (2015) Fear conditioning suppresses large-conductance calcium-activated potassium channels in lateral amygdala neurons. *Physiol Behav.* 2015 Jan;138:279-84. (Fear conditioning)



FreezeFrame Software for Fear Conditioning



KEY FEATURES

- ▶ **Only video-based system for fear conditioning, a standard in the field**
- ▶ **Optimization of sensitivity with automation**
- ▶ **Proprietary motion detection algorithm to filter out shadows, light flicker and camera noise – detecting movements as small as 1 mm**
- ▶ **Superior performance in low light**

FreezeFrame is the first video-based system for fear conditioning and has become the standard in its field. Combining the sensitivity of the human observer with the objectivity and throughput of automation, FreezeFrame is able to measure minute movements of grooming, sniffing, turning and rearing. The animal is monitored 2-4 times per second for data that is far more objective and reproducible. FreezeFrame can also be utilized for learned helplessness experiments, including tail suspension test and the Porsolt Forced Swim Test.

FreezeFrame is not a tracking system – featuring a proprietary motion detection algorithm, the system filters out shadows, light flicker and camera noise to detect movements as small as 1 mm. FreezeFrame offers superior performance in low-light and is fully validated, with greater than 90% concordance with trained human observers.

Easily store and recall multiple stimulus protocols for training and testing phases. Video images can be stored for future review and also exported as QuickTime and AVI movies for presentation. Batch export of data and analyses to Excel allows for easy analyzing of % freezing, number of bouts, bout duration and intervals for specified periods.

Either white noise or pure tone can be delivered through the computer's sound card. The FreezeFrame system accommodates multiple sounds of different amplitude, frequency and quality throughout a single trial. Stimuli – including lights, external sound generators and/or shock generators are also controlled through the computer.

NOTE

Please contact your local sales and application specialist for more information on the environmental hardware and accessories available for the test cage configuration.

Ordering Information

Order #	Product
ACT-100A	FreezeFrame Software (for 1-4 subjects)
ACT-100A-U	FreezeFrame Upgrade to Version 3
ACT-110	FreezeFrame Shock Control Expansion Kit
ACT-120	FreezeFrame Light/Tone Control Expansion Kit
ACT-130	FreezeFrame Fan/House Light Control Kit
ACT-141	FreezeFrame Audio Expansion Kit

REFERENCES

- Ainsley, J.A., Drane, L., Jacobs, J., Kittelberger, K.A., and Reijmers, L.G. (2014). Functionally diverse dendritic mRNAs rapidly associate with ribosomes following a novel experience. *Nature communications* 5, 4510.
- Liu, C.C., Tsai, C.W., Deak, F., Rogers, J., Penuliar, M., Sung, Y.M., Maher, J.N., Fu, Y., Li, X., Xu, H., et al. (2014). Deficiency in LRP6-mediated Wnt signaling contributes to synaptic abnormalities and amyloid pathology in Alzheimer's disease. *Neuron* 84, 63-77.
- Jahrling, J.B., Hernandez, C.M., Denner, L., and Dineley, K.T. (2014). PPARgamma recruitment to active ERK during memory consolidation is required for Alzheimer's disease-related cognitive enhancement. *The Journal of neuroscience : the official journal of the Society for Neuroscience* 34, 4054-4063.
- Heckman, L.D., Chahrouh, M.H., and Zoghbi, H.Y. (2014). Rett-causing mutations reveal two domains critical for MeCP2 function and for toxicity in MECP2 duplication syndrome mice. *eLife* 3:e02676
- Chen, T., Lu, J.S., Song, Q., Liu, M.G., Koga, K., Descalzi, G., Li, Y.Q., and Zhuo, M. (2014). Pharmacological rescue of cortical synaptic and network potentiation in a mouse model for fragile X syndrome. *Neuropsychopharmacology : official publication of the American College of Neuropsychopharmacology* 39, 1955-1967.
- Gomez, A.M., Froemke, R.C., and Burden, S.J. (2014). Synaptic plasticity and cognitive function are disrupted in the absence of Lrp4. *eLife* 3:e04287.
- Ramirez S, Liu X, Lin PA, Suh J, Pignatelli M, Redondo RL, Ryan TJ, Tonegawa S. (2013). Creating a false memory in the hippocampus. *Science* 341:387-91.
- Trouche S1, Sasaki JM, Tu T, Reijmers LG. (2013) Fear extinction causes target-specific remodeling of perisomatic inhibitory synapses. *Neuron*. 80:1054-65.
- Parkhurst CN, Yang G, Ninan I, Savas JN, Yates JR, Lafaille JJ, Hempstead BL, Littman DR, Gan WB. (2013) Microglia promote learning-dependent synapse formation through brain-derived neurotrophic factor. *Cell*. 155:1596-1609.
- A. S. Sengar, J. Ellegood, A. P. Yiu, H. Wang, W. Wang, S. C. Juneja, J. P. Lerch, S. A. Josselyn, R. M. Henkelman, M. W. Salter, and S. E. Egan (2103) Vertebrate Intersectin1 Is Repurposed to Facilitate Cortical Midline Connectivity and Higher Order Cognition *The Journal of Neuroscience* 33: 4055-4065.
- Qi Shi, Marguerite Prior, Xiangdong Zhou, Xiaoying Tang, Wanxia He, Xiangyou Hu, and Riqiang Yan (2013) Preventing Formation of Reticulon 3 Immunoreactive Dystrophic Neurites Improves Cognitive Function in Mice. *The Journal of Neuroscience* 33: 3059-3066.
- Carmelina Gemma, Matthew Fister, Charles Hudson, Paula C. Bickford (2013) Improvement of memory for context by inhibition of caspase-1 in aged rats. *European Journal of Neuroscience* 22:1751-1756.
- Miho Terunuma, Raquel Revilla-Sanchez, Isabel M. Quadros, Qiudong Deng, Tarek Z. Deeb, Michael Lumb, Piotr Siczinski, Philip G. Haydon, Menelas N. Pangalos, and Stephen J. Moss (2013) Postsynaptic GABAB Receptor Activity Regulates Excitatory Neuronal Architecture and Spatial Memory *The Journal of Neuroscience* 34: 804-816.
- Liu, X., Ramirez, S., Pang, P.T., Puryear, C.B., Govindarajan, A., Deisseroth, K., and Tonegawa, S. (2012). Optogenetic stimulation of a hippocampal engram activates fear memory recall. *Nature* 484, 381-385.
- Lugo, J.N., Brewster, A.L., Spencer, C.M., and Anderson, A.E. (2012). Kv4.2 knockout mice have hippocampal-dependent learning and memory deficits. *Learning and Memory* 19:182-189.

Learning Memory & Attention



5/9 Holes for Attention Performance



KEY FEATURES

- ▶ Hole LEDs with adjustable intensity
- ▶ Very complete and flexible system when used with Packwin software
- ▶ Up to 8 stations can be connected to a single PC using a single cable

PARAMETERS MEASURED

- ▶ Number of correct responses
- ▶ Number of incorrect responses
- ▶ Number of persevering actions
- ▶ Number of omissions
- ▶ Number of anticipatory responses
- ▶ Number of trials performed
- ▶ Responses latency
- ▶ Reinforcement (food, drink) intake latency
- ▶ Number of responses during the time-out
- ▶ And many other user-defined parameters

COMPONENTS INCLUDED

- ▶ Nine holes box (with 9 stainless steel lids)
- ▶ Control unit with RS-232 communication
- ▶ Pellet dispensers
- ▶ Feeder with light-beam detection technology
- ▶ Stimuli light
- ▶ Cables and connectors
- ▶ Instruction manual
- ▶ Set of spare fuses
- ▶ 2 year warranty

OPTIONS

- ▶ Packwin Software to control up to 8 boxes simultaneously

The 5/9 Hole Box is commonly used to evaluate attention performance using a visual discrimination task in laboratory animals.

The 5/9 Hole Box is composed of a test chamber, food or drink dispenser, a LinkBox to connect it to the PC and the Packwin V2.0 Software.

The 5/9 Hole Box is assembled with black aluminum walls and a transparent front door. The box is equipped with an arc of 9 contiguous apertures set into the rear wall, a house light, a food pellet dispenser and a 'pusher' to detect the nose-pokes into the food holder. The holes not used in the experiment may be blocked up using a metal insert. Each hole is equipped with photocell beams and internal LED providing visual cues specific to each hole. The intensity of the LED can be adjusted in LinkBox using the digital selector. The box is placed on a stainless-steel platform and the associated tray is easily removable to clean.

We also offer a 5/9 Hole Box optimized for performing tests with mice. This new box is supplied with 9 pellet dispensers in order to give the reward directly into the right stimulus hole when a correct response is fulfilled.

All 5/9 Hole Boxes can be used with the versatile Packwin V2.0 software in order to control the experiment (protocol configuration, experiment running) and obtain relevant data such as correct responses, incorrect responses, omissions, premature responses, perseverant responses, time out responses, total receptacle head entries, etc.

Different experimental paradigms for sustained attention, animal models of impulsive behavior and lateralized-discrimination task can be conducted using the 5/9 Hole Box.

Specifications

Cage Dimensions:

LE509 Rat Cage (W x D x H)	252 x 280 x 240 mm (9.9 x 11 x 9.5 in) internal; 440 x 360 x 315 mm (17 x 14 x 12.4 in) external
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LE507 Mouse Cage (W x D x H)	190 x 220 x 240 mm (7.5 x 8.7 x 9.4 in) internal; 440 x 360 x 315 mm (17 x 14 x 12.4 in) external
-------------------------------------	--

Holes Dimensions:

Rat	23 mm (0.09 in) hole diameter; 14 mm (0.35 in) hole deep
Mouse	13 mm (0.05 in) hole diameter; 10 mm (0.04 in) hole deep

Material Composition	Plexiglass, aluminum, stainless steel
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Maximum Number of Stations	8 stations connected to a PC
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Power Supply	110/220 VAC, 50/60 Hz
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Ordering Information

Order #	Model	Product
76-0000	LE509	Rats 5/9 Holes Cage with PC Interface
76-0001	LE507	Mice 5/9 Holes Cage with PC Interface
76-0367	LE512	Mice 5/9 Hole Box with Pellet Dispenser
76-0002	PACKWIN	PC Software to Control up to 8 Cages
76-0593	PACKWIN-HO	Nine Hole Module
76-0592	PACKWIN-CS	Customized Module



Elevated Plus Maze & Elevated Zero Maze



KEY FEATURES

- ▶ Modular structure which allows storage in minimum space
- ▶ Available in a number of colors

PARAMETERS MEASURED

- ▶ Animal position, speed, distance and more (video tracking)

COMPONENTS INCLUDED

- ▶ Gray walls
- ▶ Plus Maze
- ▶ Black floor base
- ▶ Gray floor
- ▶ Transparent borders for open arms
- ▶ 2 year warranty

OPTIONS

- ▶ SMART or LimeLight Video Tracking Systems



The standard Elevated Plus Maze is commonly used to assess anxiety-like behavior in laboratory animals. The maze is usually a cross shaped maze with two open arms and two closed arms, which are elevated above the floor.

This task exploits the conflict between the innate fear that rodents have of open areas versus their desire to explore novel environments. Security is provided by the closed arms whereas the open arms offer exploratory value. When anxious, the natural tendency of rodents is to prefer enclosed dark spaces to opened brightly lit spaces. In this context, anxiety-related behavior is measured by the degree to which the rodent avoids the unenclosed arms of the maze.

The maze which can be used with our Video-Tracking Systems.

Elevated-Zero mazes (or Elevate-O mazes) that provide an experimental area without central zone, are also available for rats or mice (grey wall with black floor and additional interchangeable grey floor).

Specifications

Dimensions:

LE840 Rats Maze (W x D x H) 1000 x 1000 x 500 mm (39 x 39 x 19.7 in)
arms: 100 x 450 mm (3.9 x 17.7 in)

LE842 Mice Maze (W x D x H) 650 x 650 x 150 mm (26 x 26 x 6 in)
arms: 60 x 295 mm (2.4 x 11.6 in)

Material Composition Methacrylate, aluminum

Transparent Walls Height 30 mm rat (1.2 in), 18 mm (0.7 in) mouse

Position Detection Technique Manual or Video-tracking

Ordering Information

Order #	Model	Product
76-0074	LE840	Elevated Plus Maze, Rat
76-0075	LE842	Elevated Plus Maze, Mouse
76-0680	LE841	Elevated Zero Maze, Rat
76-0369	LE845	Elevated Zero Maze, Mouse

Anxiety & Depression



Rabbit



Guinea Pig



Rat



Mouse



Insect



Fish

Modular Elevated Plus Maze



Our Modular Elevated Plus-Maze is a sturdy apparatus frequently used to measure anxiety levels in rodents and to screen potential anxiolytic drugs. The standard version allows for the end wall of the closed arm to be closed off. Available options for our Elevated Plus Mazes include a raised edge on the open arm as well as a model with removable end walls on the closed arms (advantageous for modifications and upgrading the maze as needed).

Specifications

Dimensions:

Arm Width	10 cm (4 in)
Arm Length	50 cm (20 in)
Wall Height	30 cm (12 in)
Runway Height from Floor	55 cm (22 in)

Ordering Information

Order #	Product
H10-35-EPM	Elevated Plus Maze for Rat or Mouse
H10-35-EPM-EWR	Elevated Plus Maze for Rat or Mouse with Removable End Wall
H10-35-EMP-ARM	Extra Pair of Interchangeable Open Arms with Raised Edges
H10-35-EPM-X	Raised Edge Option for Elevated Plus Maze Open Arms

NOTE

For video tracking options, please see our SMART video tracking, pages 4-7, or LimeLight video tracking options, pages 10-11.

NOTE

Mazes are constructed using our Habitest Runways and Hubs. See pages 60-61 for more information.



Rabbit



Guinea Pig



Rat



Mouse



Insect



Fish

Open Field Box



KEY FEATURES

- ▶ **Optimized design for video tracking**
- ▶ **Material non-odor absorbent**
- ▶ **Easy to clean**

Open Field experiments allow the evaluation of animal basal activity and its evolution in response to novelty or anxiogenic environment, to pharmacological treatment, lesion or to genetic modification.

Our square open fields are available for rats and mice. The arena is made of durable material which is non-odor absorbing and easy to clean. The arena is surrounded by high walls and is available in different non-reflective colors for video tracking purposes. The system is entirely collapsible allowing easy storage in minimum space. The floor can be divided into equal squares by special order for the direct counting of animal activity.

Customization is possible. Please contact Technical Support for more details!

Our Tru Scan Arenas and IR actimeters can also be used for open field applications - see pages 22-23 and 24-25 for more information.

Ordering Information

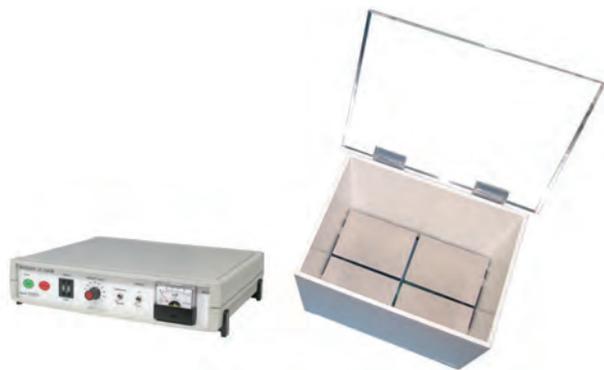
Order #	Model	Product
76-0190	LE802SC	Open Field for Mouse, Square (W x D x L) 45 x 45 x 40 cm (18 x 18 x 16 in) with Divider for 4 animals
76-0529	LE805M	Open Field for Mouse with Food and Drink Access, 25 x 25 cm (9.8 x 9.8 in)
76-0189	LE800SC	Open Field for Rat, Square (W x D x L) 90 x 90 x 40 cm (35.4 x 35.4 x 15.7 in) with Divider for 4 animals
76-0532	LE805R	Open Field for Rat with Food and Drink Access, 45 x 45 cm (18 x 18 in)
76-0650	LE806	Open Field, Circular – 90 cm (35.4 in) diameter, 40 cm (15.7 in) height, clear beige

NOTE

For video tracking options, please see our SMART video tracking, pages 4-7, or LimeLight video tracking options, pages 10-11.



Aron Test for Screen Anxiolytic Substances



KEY FEATURES

- ▶ An elegant and economical solution for screening anxiolytic drugs in mice
- ▶ Punishment based conflict test
- ▶ Shock with adjustable intensity

PARAMETERS MEASURED

- ▶ Number of punished crossings

COMPONENTS INCLUDED

- ▶ Aron box
- ▶ Control unit footswitch
- ▶ Cables and connectors
- ▶ Instruction manual
- ▶ 2 year warranty

The Aron Test, or Four Plates Test, is an animal model of anxiety in which the exploration of the novel surroundings is suppressed by the delivery of a mild electric foot shock.

The apparatus consists of a cage floor with four identical rectangular metal plates (8 x 11 cm) (3 x 4 in) separated from one another by a gap of 4 mm (0.2 in). The plates are connected to a shocker unit that can generate electric foot shocks.

Following the habituation period, the animal is subjected to an electric shock when crossing (transition) from one plate to another, i.e. two legs on one plate and two legs on another. Boissier et al. 1968 described this test first. The number of punished crossings is generally calculated for a period of 60 seconds. A substance with anxiolytic properties induces an increase in the number of punished passages.

Specifications

Cage Materials	White, transparent plastic and stainless steel
Dimensions (H x W x D)	16 x 25 x 18 cm (6.3 x 9.8 x 7 in)
Shock	0-3 mA, timer 0-10 sec, square pulse
Shock Delivery	Footswitch

Ordering Information

Order #	Model	Product
76-0006	LE830*	Aron Test Box

* Shock generator (76-0159) must be ordered separately.

REFERENCES

Andreasen JT et al. (2013) A combined 7 nicotinic acetylcholine receptor agonist and monoamine reuptake inhibitor, NS9775, represents a novel profile with potential benefits in emotional and cognitive disturbances. *Neuropharmacology*, Volume 73, October 2013, Pages 183–191.

Chlon-Rzepa G et al. (2013) New 8-aminoalkyl derivatives of purine-2,6-dione with arylalkyl, allyl or propynyl substituents in position 7, their 5-HT1A, 5-HT2A, and 5-HT7 receptor affinity and pharmacological evaluation. *Pharmacological Reports* 65: 1529.

Hache G et al. (2012) Antinociceptive effects of fluoxetine in a mouse model of anxiety/depression. *NeuroReport* 2012, 23:525–529.

Bourin M et al. (2010) Implication of 5-HT2 receptor subtypes in the mechanism of action of the GABAergic compound etifoxine in the "four-plate" test in Swiss mice. *Behavioural Brain Res.* 208(2):352-358.

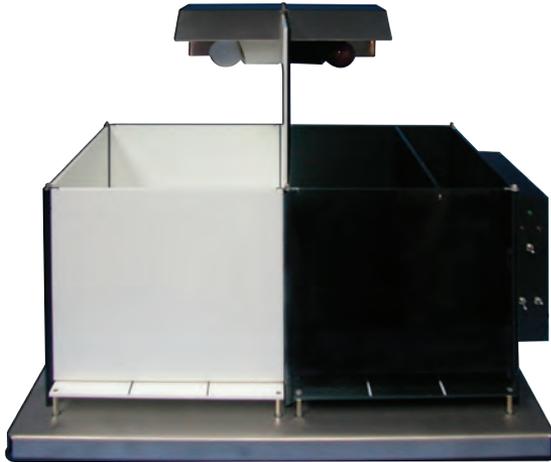
Foreman MM et al. (2009) Anxiolytic effects of lamotrigine and JZP-4 in the elevated plus maze and in the four plate conflict test. *Eur J Pharmacol.* 602(2-3):316-20.

Jacobsen JP et al. (2008) SK3 K+ channel-deficient mice have enhanced dopamine and serotonin release and altered emotional behaviors. *Genes Brain Behav.* 7(8):836-48.

Masse F et al. (2008) Anxiolytic-like effects of DOI microinjections into the hippocampus (but not the amygdala nor the PAG) in the mice four plates test. *Behav. Brain Res.* 188(2):291-297.



Black & White Test



KEY FEATURES

- ▶ Compartments with independent and highly contrasted illumination
- ▶ Can be associated with weight transducer technology for optimal animal detection
- ▶ Easy to clean between trials
- ▶ Easy connection to a PC through RS-232 port

PARAMETERS MEASURED

- ▶ Total time spent in each compartment latency to the first change of compartment
- ▶ Number of changes between the black and white compartments
- ▶ Total duration of the experiment

COMPONENTS INCLUDED

- ▶ Experimental chamber
- ▶ Cables and connectors
- ▶ Instruction manual
- ▶ Set of spare fuses
- ▶ 2 year warranty

OPTIONS

- ▶ PPCWIN Software to control up to 8 automated boxes simultaneously

Our Black and White Box allows easy and quick evaluation of an animal's anxiety as reflected in their behavior. The test identifies behavioral modifications resulting from pharmacological agents. The Black and White Box assesses the animal's displacement in two compartments with different sizes, color, and illumination.

The experimental box is made from perspex. It has small black compartments and a larger white compartments separated by a connecting gate. Each compartment has its own removable perspex floor which is the same color as the walls. The floor has a line grid pattern that measures 90 X 90 mm (3.5 x 3.5 in). The compartments are independently illuminated: the white one with a 100 W white bulb and the black one with a 40 W red bulb. Both bulbs are 370 mm (14.5 in) from the floor of the box.

The Black and White Box can be supplied with a weight transducer system for automated animal detection and photocell beams for evaluation of general activity during the test. The automated experimental chambers (up to 8) are associated to the PC-based control software PPCWIN for data storage and analysis.

Specifications

Chamber Dimensions, H x W x D

Mouse:

White Compartment	240 x 250 x 250 mm (9.5 x 9.8 x 9.8 in)
Black Compartment	240 x 250 x 160 mm (9.5 x 9.8 x 6.3 in)
Door	70 x 70 mm (2.6 x 2.6 in)

Rat:

White Compartment	240 x 310 x 310 mm (9.5 x 12.2 x 12.2 in)
Black Compartment	240 x 310 x 200 mm (9.5 x 12.2 x 7.9 in)
Door	100 x 100 mm (3.9 x 3.9 in)

Ordering Information

Order #	Model	Product
76-0007	LE810	Experimental Chamber for Mouse
76-0008	LE816	Automated Experimental Chamber for Mouse: with Weight Transducer
76-0009	LE812	Experimental Chamber for Rat
76-0010	LE818	Automated Experimental Chamber for Rat: with Weight Transducer
76-0011	PPCWINV2.0	Software for Chamber Control and Data Analysis (8 Units)

REFERENCES

Giménez-Llort L et al. (2015) AVCR1104P3, a novel multitarget compound with cognition-enhancing and anxiolytic activities: studies in cognitively poor middle-aged mice. *Behav Brain Res.* 2015 Jun 1;286:97-103.

Baeta-Corral R et al. (2014) Bizarre behaviors and risk assessment in 3xTg-AD mice at early stages of the disease. *Behavioural Brain Research, Behav Brain Res.* 2014 Jan 1;258:97-105.

Anxiety & Depression



Anxiety & Depression • Vogel Test

Vogel Test



The Vogel test has become a standard for fast screening the potential anxiolytic properties of drugs. In this procedure the drinking behavior is punished by mild shocks which leads to a significant reduction of water consumption in deprived animals. Drinking responses are then reestablished using drugs with anxiolytic properties.

Our Vogel test consists of a standard home cage with a grid floor. An electronic unit associated with a special nipple ensures the detection and counting of the licks reflecting the animal drinking behavior. Using this exclusive nipple design, any casual and non-specific contacts of the animal with the nipple will not be considered as a drinking response.

Our multi-cage configuration allows the Vogel test to be performed on up to 32 cages. The cages are associated with our LinkBox Interface (1 for each 8 cages) ensuring the functional interaction between the lick sensor system, the LE10025 Shock generator (1 per cage) and the Packwin software for advanced protocol configuration and data acquisition.

The interconnection among the cages and the computer is carry out by a RS-232 serial communication.

KEY FEATURES

- ▶ Allows Vogel experiments directly in the animal's home cage
- ▶ Exclusive nipple system to exclude non-specific contacts
- ▶ Up to 32 cages can be associated with a single computer

PARAMETERS MEASURED

- ▶ Total number of licks per trial
- ▶ Total number of shocks received per trial

COMPONENTS INCLUDED

- ▶ LinkBox interface for up to 8 cages
- ▶ Cage with lick detector
- ▶ Bottle with special nipple
- ▶ Cables and connectors
- ▶ Instruction manual
- ▶ 2 year warranty

OPTIONS

- ▶ Packwin Software to control up to 32 cages
- ▶ LE10025 Shocker unit with scrambler (0-2 mA output) plus lick detector

Specifications

LE3208	Internal memory for up to 99 trials
LE10025	Shocker intensity: from 0.1 to 2 mA; duration: from 0.1 to 10 sec

Ordering Information

Order #	Model	Product
76-0316	LE862	Vogel Test Set for mice or rats <300g (Excluding Control Unit)
76-0621	LE865	Vogel Test Set for Large Rats (Excluding Control Unit)
76-0334	LE10025	Shock Generator with Scrambler (1 per Cage) Plus Lick Detector
76-0156	LINKBOX01	Link Box Interface for up to 8 Cages
76-0002	PACKWIN2.0	Packwin 2.0
76-0594	PACKWINVT	Packwin Vogel Test Module
76-0592	PACKWINCS	Customized module
Options		
76-0319	LE8624	Vogel Test Nipple Plus Bottle
76-0320	LE8626	Electric Contacts for Nozzle and Grid



Immobilization Board



KEY FEATURES

- ▶ Induce emotional stress of unmatched intensity
- ▶ Enhance the quality of the psychological component of stress
- ▶ Designed to avoid animal lesion and escaping (no physical stress induced)
- ▶ Obtain optimal homogeneity and reproducibility in the results
- ▶ Easily adaptable for any mouse sizes
- ▶ Easy to clean

This Immobilization Board has a new design for optimizing restraint procedures for psychological stress studies in rodents.

Forced immobilization "Restraint" is commonly used as a model of stress in small laboratory animals, especially for producing psychological stress. In this context, the Immobilization Board is an adaptation of the standard immobilization board used in neuroendocrinological and behavioral studies in rats and mice (Kvetnansky and Mikulaj, 1970; Chesnokova et al, 1998; Golub et al, 2004).

The Immobilization Board consist of a central board made of non-porous (odor-resistant) material and has 4 movable arms for animal paw fixation. Adhesive tape is used to fixate all four paws. Once the paws are fixated, a Velcro ribbon is used to secure the rodent's body. The Velcro ribbon goes all the way around the Board for optimal restraint.

The new design aims to solve all the reported problems associated with the use of commonly used immobilization boards. The Immobilization Board is an attractive alternative to standard cylindrical restrainers. Our Immobilization Board provides unmatched quality for animal restraint while reducing physical stress and eliminating the possibility of escape. The quality of psychological stress is optimized, leading to homogeneity and reproducibility in the results.

Specifications

Board Dimension	17.5 x 7 x 3.8 cm (6.9 x 2.8 x 1.5 in)
Arms Length	7.5 cm (3 in)

Ordering Information

Order #	Model	Product
76-0442	OT151	Immobilization Board for mice



Rabbit



Guinea Pig



Rat



Mouse



Insect



Fish

Forced Swimming Test for Screening Anti-Depressive Effects

Anxiety & Depression • Forced Swimming Test



KEY FEATURES

- ▶ **Standard transparent cylinder**
- ▶ **Available in other sizes by special order**

The forced swimming test is a relatively simplistic and widely used model for testing depression. The forced-swimming paradigm was originally adopted by Porsolt et al. (1978). Naïve rats and mice forced to swim in a transparent cylinder (aversive and confined environment) innately fight to escape the apparatus. Following failed attempts to escape, they become immobile (i.e. float), a behavior generally considered as despair or “depressive-like.” Prior treatment with antidepressants decreases the time spent immobile and increases the latency to reach the first immobility episode.

We provide several different sized transparent cylinders for the forced swimming test.

Specifications

LE804 (D x H)	10 x 25 cm (4 x 10 in)
LE803 (D x H)	20 x 50 cm (8 x 20 in)
LE803L (D x H)	30 x 50 cm (12 x 20 in)

NOTE

Contact us for customized design.

Ordering Information

Order #	Model	Product
76-0471	LE804	Small Cylinder with Base for FST Experiments
76-0472	LE803	Medium Cylinder with Base for FST Experiments
76-0494	LE803L	Large Cylinder with Base for FST Experiments

NOTE

To automate the Forced Swim test, please also see our SMART video tracking on pages 4-7, or FreezeFrame Software options, pages 71.



Tail Suspension Test



KEY FEATURES

- ▶ Fast evaluation of antidepressive, psychotropic drugs based on L. Steru and R.D. Porsolt based models
- ▶ Up to 6 mice monitored at the same time
- ▶ Automatic measurement of immobility
- ▶ New box and tail suspension method
- ▶ Reanalysis enhanced, immobility threshold can be readjusted
- ▶ Capable of automatic randomization
- ▶ Direct exportation of the results into Excel
- ▶ Calculates energy and power in motion
- ▶ Optional video recording to adjust the activity threshold

PARAMETERS MEASURED

- ▶ Strength of movements
- ▶ Immobility time

COMPONENTS INCLUDED

- ▶ Transducers and electronic elements
- ▶ 1 set of 3 perspex compartments with adjustable floor height
- ▶ 1 software licence (USB dongle with product ID tag) before cables and connectors
- ▶ Cables and connectors
- ▶ Instruction manual
- ▶ 1 year warranty

The automatic tail-suspension test allows a fast and reliable screening of the psychotropic properties (anti-depressants, sedatives) of drugs.

The measuring principle is based on the energy expended by mice trying to escape from their suspension. During the test, the movements are analyzed in terms of force, energy and power developed over time.

A complete system includes the suspension cages (3 mice or 6 mice at a time) and a USB based user-friendly software to run, record, analyze and replay the experiments. The results are either printed or stored in an Excel file format. The new version 4 of the tail suspension test can combine strain sensors with video acquisition.

Specifications

Material Composition	Black and white perspex, metal hook
Maximum Number of Stations	6 per computer
Power Supply Standard	110/220 VAC, 50/60 Hz

Ordering Information

Order #	Model	Product
76-0780	BIO-TST4	Additional Set of 3 Cages for Mice
76-0781	BIO-TST-CAGE	Interface and Software for BSTST2CA
76-0782	BIO-TST-VID	Optional USB Video Camera with Lens and Stand to Record Suspension and Adjust Threshold
76-0783	BIO-TST-UPG	Tail Suspension Test Upgrade to Version 4 (for USB based cages only)

REFERENCES

- Weber T et al. (2015) Adult AMPA GLUA1 receptor subunit loss in 5-HT neurons results in a specific anxiety-phenotype with evidence for dysregulation of 5-HT neuronal activity. *Neuropsychopharmacology*. 2015 May;40(6):1471-84.
- Hache G et al. (2015) Antinociceptive activity of the new triple reuptake inhibitor NS18283 in a mouse model of chemotherapy-induced neuropathic pain. *Eur J Pain*. 2015 Mar;19(3):322-33.
- Petit AC et al. (2014) Converging translational evidence for the involvement of the serotonin 2A receptor gene in major depressive disorder. *Prog Neuropsychopharmacol Biol Psychiatry*. 2014 Oct 3;54:76-82.
- Csölle C et al. (2014) The absence of P2X7 receptors (P2rx7) on non-haematopoietic cells leads to selective alteration in mood-related behaviour with dysregulated gene expression and stress reactivity in mice. *Int J Neuropsychopharmacol*. 2013 Feb;16(1):213-33.
- Caffin F et al. (2013) Altered skeletal muscle mitochondrial biogenesis but improved endurance capacity in trained OPA1-deficient mice. *J Physiol*. 2013 Dec 1;591(Pt 23):6017-37.
- Csölle C et al. (2013) Neurochemical Changes in the Mouse Hippocampus Underlying the Antidepressant Effect of Genetic Deletion of P2X7 Receptors. *PLoS One*. 2013 Jun 21;8(6):e66547.
- Guilloux JP et al. (2013) Antidepressant and anxiolytic potential of the multimodal antidepressant vortioxetine (Lu AA21004) assessed by behavioural and neurogenesis outcomes in mice. *Neuropharmacology*. 2013 Oct;73:147-59.
- Serradj N et al. (2013) Early postnatal motor experience shapes the motor properties of C57BL/6J adult mice. *Eur J Neurosci*. 2013 Nov;38(9):3281-91.



Place Preference Box



KEY FEATURES

- ▶ Allows a combination between the visual and tactile cues defining each compartment
- ▶ Weight transducer technology allows animal detection optimization in low-contrast conditions
- ▶ Software for automated storage and analysis of the data
- ▶ Up to 8 stations can be connected at once to PC through a single cable

PARAMETERS MEASURED

- ▶ Total number of entries into the compartments
- ▶ % distribution of the entries into different compartments
- ▶ Permanence time in each compartment
- ▶ % permanence time in respect to the total duration
- ▶ Chronological sequence of animal displacements

COMPONENTS INCLUDED

- ▶ Place preference box with removable floors
- ▶ Instruction manual
- ▶ Opaque extractable wall covers

OPTIONS

- ▶ PPCWIN software (for automated animal position detection)
- ▶ SMART or LimeLight video-tracking systems

The Place Preference Box is a standard experimental chamber for automated assessment of conditioned place preference and aversion in rodents, two tests widely used for screening the reinforcing properties of drugs (or natural stimuli) as well as for investigating the brain neurobiological systems implicated in reward and addiction.

The experimental box consists of two perspex compartments of the same size interconnected by a central grey corridor. The compartments can be differentiated by both visual and tactile cues: the color of the walls in each compartment (white or black) and the texture of the floors (smooth or rough). The box is provided with transparent front walls which may be covered with extractable opaque covers (included). Manually operated sliding doors are provided to manage the access to the two compartments from the corridor.

The experimental box can be supplied with or without automatic animal position detection system. The automated animal position detection is carried out by a weight transducer system which is associated to the PC-based control software PPCWIN, see page 84.

Specifications

Experimental Box Dimensions (W x D x H):	
Rat Compartments	300 x 300 x 340 mm (11.8 x 11.8 x 1.3 in)
Corridor	80 x 100 x 340 mm (0.3 x 4 x 11.8 in)
Doors	100 x 140 mm (4 x 0.55 in)
Mouse Compartments	100 x 130 x 130 mm (4 x 5 x 5 in)
Corridor	72 x 72 x 130 mm (3 x 3 x 5 in)
Doors	60 x 60 mm (2.4 x 2.4 in)
Position Detection Technique	Weight transducers
Material Composition	Perspex
Connection of Several Units to PC	Neither PC interface nor PC card are required. One cable connects all units to the PC.
Certifications	CE compliant
Power Requirement	110/220 VAC, 50/60 Hz

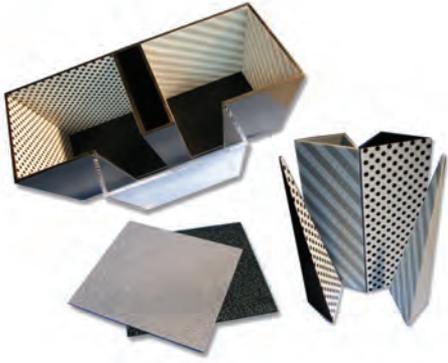
Ordering Information

Order #	Model	Product
76-0216	LE890	Standard Place Preference System for Rats
76-0217	LE891	Standard Place Preference System for Mice
76-0218	LE892	Automated Place Preference System for Rats Using Weight Transducers
76-0219	LE893	Automated Place Preference System for Mice Using Weight Transducers
76-0011	PPCWIN	Software Associated to Automated Boxes (up to 8 units)

NOTE See SMART on pages 4-7 and LimeLight on pages 10-11 for our vide tracking options for use with the Place Preference Boxes.



Spatial Place Preference Box



KEY FEATURES

- ▶ Allows combination between the visual, tactile and spatial cues defining each compartment
- ▶ Optimize the differentiation between compartments
- ▶ Minimize initial place preference during pre-test phase
- ▶ Transparent walls to minimize time in corridor
- ▶ Video-tracking system optimizes detection

PARAMETERS MEASURED

- ▶ Total number of entries into compartments
- ▶ % distribution of entries into different compartments
- ▶ Permanence time in each compartment
- ▶ % permanence time in respect to the total duration
- ▶ Chronological sequence of animal displacement

COMPONENTS INCLUDED

- ▶ Spatial Place Preference Box
- ▶ 2 reversible floors (one dark grey, one light grey)
- ▶ 4 parallel piped triangles (two with stripes and two in dots)
- ▶ 2 three sided pyramids (one, stripes and one, dots)
- ▶ 2 sliding doors (one, stripes and one, dots)

OPTIONS

- ▶ SMART or LimeLight Video Tracking Systems
- ▶ PPCWIN

Our spatial place preference box is an experimental chamber developed to optimize place preference and aversion studies in small laboratory animals, especially mice. The design of the box is based on a close collaboration with prominent Professors Dr. Rafael Maldonado and Dr. Olga Valverde from the Laboratory of Neuropharmacology in Barcelona, Spain.

The apparatus consists of a box with two equally sized compartments interconnected by a rectangular corridor. The compartments are differentiated by the motifs painted on the walls (dots or stripes) and the color (different shade of grey tones, light or dark) and texture (smooth or rough) of the floor. The innovation of our box is the possibility to combine a new additional spatial dimension allowing the animal to differentiate the different compartments in a more discriminative manner. Transparent walls are also used to minimize the time the animal spends in the corridor.

The introduction of these new discriminative elements allow:

- Optimizing the results obtained in the place preference and aversion paradigms (low variability in the response, reduced number of animals per group)
- Organizing the discriminative elements in a wide variety of configurations for studies evaluating spatial or contextual memory
- Using the elements as discriminative cues associated with drug exposure in other diverse experimental designs.

The spatial place preference box can be used with SMART or LimeLight video-tracking systems for detection and analysis of animal position throughout the test, see page 4 or 10. It can also be used with PPCWIN, see page 84.

Specifications

Reversible Floor Textures One side rough, one side smooth

Box Dimensions for Mice (W x D x H):

Total (ext.) 46 x 27 x 25 cm (18 x 10.6 x 10 in)

Compartments (int.) 20 x 18 x 25 cm (8 x 7 x 10 in)

Aisle (int.) 20 x 7 x 25 cm (8 x 2.75 x 10 in)

Box Dimensions for Rats (W x D x H):

Total (ext.) 88 x 47 x 45 cm (35 x 18.5 x 17.7 in)

Compartments (int.) 40 x 34 x 45 cm (15.75 x 13 x 17.7 in)

Aisle (int.) 25 x 13 x 45 cm (10 x 5 x 17.7 in)

Walls Width 6 mm (0.2 in)

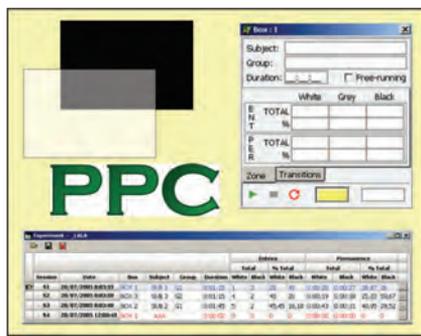
Ordering Information

Order #	Model	Product
76-0278	LE895	Spatial Conditioned Place Preference for Mice
76-0279	LE897	Spatial Conditioned Place Preference for Rats
76-0376	LE896	Spatial Place Preference Mice-Position Detection Weight Cells
76-0441	LE898	Spatial Place Preference Rats-Position Detection Weight Cells
76-0011	PPCWIN	PPCWIN Software (to be used with LE896/LE898)

software species is hardware specific

Rabbit Guinea Pig Rat Mouse Insect Fish

PPCWIN Software



KEY FEATURES

- ▶ Easy-to-use software for standard conditioned place preference experiments
- ▶ For both place preference and black and white experiments
- ▶ A test mode enables immediate checking of the communication between the software and the experimental chambers
- ▶ Current animal position can be visualized in real-time during the acquisition of data
- ▶ Provides integrated results
- ▶ Tables of results are easily exportable in Excel format for further analysis
- ▶ RS-232 or USB port for direct connection to a computer

PARAMETERS MEASURED

- ▶ Total number of entries into the black, white and grey compartments
- ▶ % distribution of entries into the different compartments
- ▶ Permanence time in each compartment
- ▶ % permanence time in respect to the total experimental duration
- ▶ Chronological sequence of animal displacements
- ▶ Latency to the first transition regardless to the initial position
- ▶ Experiment duration

COMPONENTS INCLUDED

- ▶ Software installation and USB license key
- ▶ Cables and connectors
- ▶ Instruction manual in digital format

Related Hardware

- ▶ Place Preference Box, see page 82
- ▶ Spatial Place Preference Box, see page 83
- ▶ Black & White Box, see page 77

PPCWIN is easy-to-use software for monitoring Conditioned Place Preference (or aversion) tests and Black and White experiments (for anxiety). It has been specially designed to work with the Automated Place Preference and Black and White Boxes. These Boxes are equipped with weight transducers which automatically detect the animal's position.

PPCWIN controls up to 8 experimental chambers independently. The system includes a test mode enabling immediate and reliable checking of the communication between the software and the experimental chambers.

The Place Preference and Black and White Boxes are basically divided in two different compartments connected by a grey corridor/door. One experiment can be composed of several sessions, depending on the number of experimental groups and animals per group used in the study. PPCWIN is easy to configure. The user only needs to enter the desired duration of experiment and some specific information about the session (subject name, group, etc). During data acquisition information about protocol state, animal position and current data can be visualized for each cage on the corresponding control window.

PPCWIN provides a raw data table with all the standard parameters for conditioned place preference and black and white experiments (permanence time in the compartments, number of entries, etc.) and a detailed chronological sequence of animal displacements for each session. A report table can be generated containing the results from different stored session. Data from the tables of result can be easily exported in formats widely used to perform complementary analysis.

Ordering Information

Order #	Model	Product
76-0011	PPCWINV2.0	PPCWIN Software for up to 8 Boxes

REFERENCES

Shui Y et al. (2015) Homer1a disruption increases vulnerability to predictable subtle stress normally sub-threshold for behavioral changes. *Brain Res.* 2015 Apr 24;1605:70-5.



Self Administration Box



KEY FEATURES

- ▶ Entirely modular box
- ▶ Easily removable waste tray
- ▶ Associated with Packwin software
- ▶ Reduced number of cables
- ▶ Neither PC interface nor PC cards are required

PARAMETERS MEASURED

- ▶ Number of responses (lever pressing or nose-poke)
- ▶ Response rate
- ▶ Number of reinforcements received
- ▶ Number of responses during drug injection & time-out
- ▶ User-defined parameters capabilities
- ▶ Cumulative curve graph
- ▶ Reponse pattern graph

COMPONENTS INCLUDED

- ▶ Experimental chamber
- ▶ Instruction manual
- ▶ Cables and connectors
- ▶ 2 year warranty

OPTIONS

- ▶ Linkbox (power connection box)
- ▶ Wide range of modules
- ▶ Sound-attenuating box
- ▶ Packwin software

The self-administration box is an entirely modular experimental enclosure designed to conduct a wide variety of different schedules for studying reward and addiction in laboratory animals.

The chamber is assembled with black aluminum walls and a transparent front door. The chambers employ a stainless-steel grid floor that allows waste to collect in a removable tray. All floor components (including the grid) are removable for systematic cleaning.

Special modules are available for self-administration and self-stimulation procedures: lever or nose-spoke, food or drink dispensers, drug delivery system and stimuli (light, sound, shock, etc.). Each chamber is associated with a LinkBox which provides power to up to 8 (expandable to 16) self-administration modules conferring to the chambers a full autonomy. Only one cable connects the LinkBox to the PC, this last for advanced protocol configuration and running.

All self-administration boxes are associated with the potent and versatile Packwin software which allows configuring any kind of user-defined schedules (training, priming, fixed-ratio, progressive ratio, extinction, relapse, etc.) and providing relevant data in this context (number of pressing on active and inactive levers, number of injections received, pattern response graph, etc.). Packwin must be ordered separately.

Ordering Information

Order #	Model	Product
76-0151	LE1002	Modular Operant Chamber, Mice (needs Shockable Grid)
76-0152	LE1005	Modular Operant Chamber, Rat (needs Shockable Grid)
76-0153	LE100201	Mice Shockable Grid
76-0154	LE100501	Rats Shockable Grid
76-0156	LINKBOX01	Link & Power Supply for up to 8 Chamber Modules. RS-232 Output
76-0157	LE26	Sound-Proof Box
76-0566	LE26M	Sound-Proof Box, Mice
76-0002	PACKWIN	Multipurpose Behavior Software
76-0592	PACKWINCS	Customized Experimental Module, needs experimental modules

NOTE Contact representative for optional modules and accessories.

REFERENCES

Bodetto SP et al. (2014) Differential regulation of MeCP2 and PP1 in passive or voluntary administration of cocaine or food. *Int J Neuropsychopharmacol.* 2014 Dec;17(12):2031-44.



NEW The OxyletPro™ System - Physiocage



KEY FEATURES

- ▶ Home cage advantage, minimizing stress to the subjects
- ▶ Easily expanded and upgraded as needs grow and change
- ▶ Optimized performance with minimal maintenance
- ▶ Unmatched versatility with small footprint; adaptable system for mice and rat models
- ▶ Highly accurate monitoring of food and drink consumption; combining our specially designed dispensers with our weight transducer technology

APPLICATIONS

- ▶ Obesity
- ▶ Diabetes
- ▶ Metabolic disorders
- ▶ Nutrition studies
- ▶ Chronobiology/circadian rhythm studies
- ▶ Drug screening
- ▶ Phenotyping

The OxyletPro System is a modular and integrated system for the study of respiratory metabolism (O₂ consumption and CO₂ production), food and drink intake, activity and rearing measurements in specially adapted, autoclavable home cages.

The system has been optimized for studies in laboratory research models and utilizes indirect calorimetry to evaluate respiratory metabolism.

Food and drink intake and activity are evaluated using Panlab's weight transducer technology. This highly stable technology permits the continuous assessment of consumption and spontaneous activity with superior accuracy.

For a more comprehensive evaluation of activity, an Infrared (IR) frame can be added to monitor rearing behavior.

OxyletPro's unique modular design allows for simple expandability. Start with the configuration that meets your requirements today, and expand as needs change and grow.

Special configurations are available for exercise physiology studies with our single lane, airtight treadmills (see Treadmills section p. 34-35 and p. 89).

Indirect Calorimetry

OxyletPro uses a standard rodent home cage and uses an airtight lid to ensure the integrity of the sample environment. Simply change from a mouse lid to a rat lid - that is how easy it is to adapt the system for both species.

The plastic home cages are autoclavable, making cleaning easy.

The air supply and switching unit allows for independent flow control to each connected cage and sends the cage samples in tandem to the gas analyzer for O₂ and CO₂ concentration analysis. The air is previously stabilized in our air reservoir. Since the flow is independently controlled for each cage, the system has the flexibility to conduct simultaneous experiments of subjects of varying species and/or size, making OxyletPro extremely efficient.

Our gas analyzer features a high quality laser diode O₂ sensor and Infrared spectroscopy CO₂ sensor, allowing 0.01% resolution.

Food and Drink Intake

Opt for our airtight lids with transducers to add on food and drink intake monitoring! High precision extensometric weight transducers are integrated into our airtight lid design and feature easy to access food and drink dispensers.

This extremely stable technology allows intake monitoring with the highest possible accuracy (0.02 g for food and 0.01 g for liquid).

Activity and Rearing

Add on the sensor platform, which houses a third extensometric weight transducer and continuously record spontaneous activity to clearly identify circadian patterns and activity levels. This highly precise capability will allow you to detect activity without displacement; even the finest movements by mice are detected.

For additional activity monitoring, our IR sensor bars are added to detect occurrence and duration of rearing events. detect occurrence and duration of rearing events.

Ordering Information

Order #	Model	Product
Home Cage		
76-0800	LE1331	OxyletPro Home Cage, Requires Lid
Lid Options		
76-0801	LE1332	Oxylet Pro Airtight Lid, Rat
76-0802	LE1333	Oxylet Pro Airtight Lid, Mouse
76-0804	LE1338	Oxylet Pro Airtight Lid, No Intake Monitoring, Rat
76-0805	LE1339	Oxylet Pro Airtight Lid, No Intake Monitoring, Mouse
76-0824	LE1340	Oxylet Pro Intake Lid, no airtight, Rat
76-0825	LE1341	Oxylet Pro Intake Lid, no airtight, Mouse
Home cage floor option		
76-0806	LE1317	Grid for Rat
76-0807	LE1318	Grid for Mouse
76-0808	LE1312	Plastic floor with holes for Rat
76-0809	LE1316	Plastic floor with holes for Mouse

Ordering Information

Order #	Model	Product
Indirect calorimetry hardware		
76-0810	LE405	Grid Floor, Rat
M3-0565	LE1318	Grid Floor, Mouse
M3-0559	LE1312	Plastic Floor with Holes, Rat
M3-0563	LE1316	Plastic Floor with Holes, Mouse
Indirect Calorimetry Components		
M3-0195	LE405	O ₂ /CO ₂ Analyzer*
76-0811	LE4002FL	Air Supply and Switching Unit, up to 2 chambers
76-0812	LE4004FL	Air Supply and Switching Unit, up to 4 chambers
76-0823	LE1334	Reference Chamber (one per every 8 cages)
*Needs Calibration gas cylinders/regulators that should be purchased locally.		
Intake dispensers		
76-0821	LE1336R	Drink Dispenser with Bottle, Rat
76-0814	LE1336M	Drink Dispenser with Bottle, Mouse
76-0822	LE1337R	Food Dispenser, Rat
76-0815	LE1337M	Food Dispenser, Mouse
Intake & Activity hardware		
76-0813	LE1335	Intake & Activity Platform
76-0459	LE1308	Rearing Monitoring IR Frames
Software		
76-0817	METABOLISM V3.0	Metabolism V3.0 Software, requires software modules
76-0818	METAOXY	Metabolism V3.0 Software, requires software modules
76-0819	METAINT	Intake Software Module
76-0820	METACTION	Activity Software Module
Neonate Components*		
76-0426	LE4002FLN	Neonate Rat Air Supply and Switching Unit, 2 chambers
76-0427	LE4004FL	Extension Neonate Rat Air Supply and Switching Unit, 4 chambers
76-0428	LE1310	Neonate Chamber, 215 ml
76-0429	LE1311	Neonate Chamber, 550 ml
* Ask for availability		
Consumables & spare parts		
00749	00749	Air filter, 0.3 micron
004616	004616	Air filter, 0.45 micron
007557	007557	Air filter, D65 for LE1334 lid
004653	004653	Nafion tube

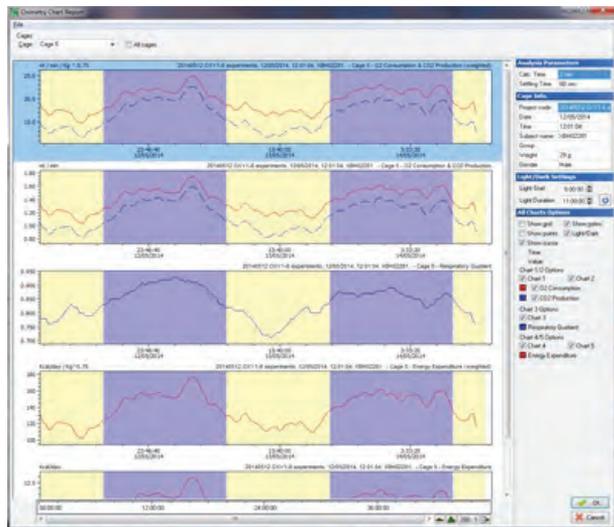
NOTE

Gas tanks of specific O₂ and CO₂ concentrations are required for system calibration and are not supplied with the system. For additional details, please contact your local representative.

software species is hardware specific

Rabbit Guinea Pig Rat Mouse Insect Fish

METABOLISM Software and Associated Modules



KEY FEATURES

- ▶ Converts and analyzes analog signals received from the different modules of our OxyletPro System
- ▶ Calculates data in user-defined intervals of time
- ▶ Allows correlation between food/drink consumption, O₂/CO₂ metabolism and associated spontaneous animal activity

PARAMETERS MEASURED

- ▶ O₂ consumption
- ▶ CO₂ production
- ▶ Respiratory quotient (O₂/CO₂)
- ▶ Energy expenditure (using Weir equation)
- ▶ Average air flow
- ▶ Food consumption by user-defined interval of time
- ▶ Drink consumption by user-defined interval of time
- ▶ Mean activity by user-defined interval of time
- ▶ Number of rearing by user-defined interval of time
- ▶ Meal Pattern Analysis
- ▶ Treadmill data if applicable – speed, covered distance, number of shocks received, total duration of shocks received

COMPONENTS INCLUDED

- ▶ Software installation and USB license key
- ▶ Cables and connectors
- ▶ Instruction manual in digital format

Metabolism offers software modules for respiratory metabolism (META-OXY), intake (META-INT), and activity (META-ACT) to complement our OxyletPro modular hardware. METABOLISM allows the extraction of the data obtained from these devices, as well as the calculation of important parameters, for physiological studies. A combined evaluation of the respiration, metabolism, food/drink intake, spontaneous activity and rearing is then rendered possible by the use of this very simple and easy-to-use software.

The NEW user interface features an Experiment Assistant which simplifies and expedites the setup and an Advanced Scheduler Tool for organizing and managing OxyletPro experiments. The Data analysis enhancements include runtime viewers and charts for real time monitoring, batch analysis and an option for data averaging.

Now with an improved, 1-minute switching time, OxyletPro and Metabolism provides greater resolution for the parameters calculated for each user-defined time interval.

METABOLISM has modules which allow the measurement of different parameters. These modules are ordered separately:

- **META-OXY** -> for O₂/CO₂ metabolism studies (Including treadmill-based studies).
- **META-INT** -> for Food and Drink Intake studies
- **META-ACT** -> for Activity studies (Including rearing)

The program gets data in digital form from the devices.

Analog output from each of the software modules is intergrated and a graphical representation of the time course for each parameter is available. Evaluation curves allow an easy correlation between calorimetry, intake and activity.

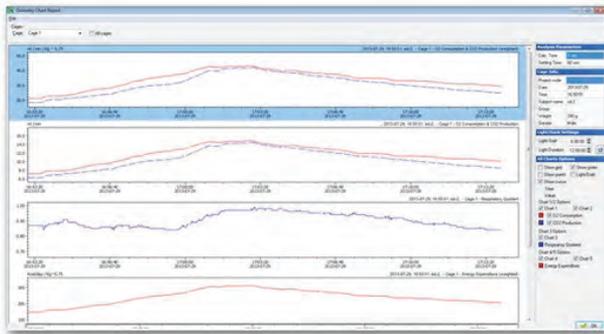
Gathered data can be processed and re-processed using different time intervals of calculation. The program displays a data table which can be saved in Excel format for further analysis.

Ordering Information

Order #	Model	Product
76-0080	METABOLISM	Metabolism Studies Platform Needs Metabolism Experimental Modules for Calorimetry, Food & Drink Intake and/or Associated Activity and Rearing Respectively
76-0145	META-OXY	Metabolism Software Experimental Module Calorimetry (Respiratory Metabolism, for Physiocage and Treadmill)
76-0081	META-INT	Metabolism Software Experimental Module Food & Drink Intake Monitoring
76-0087	META-ACT	Metabolism Software Experimental Module Activity and/or Rearing Recording



Treadmill for Indirect Calorimetry



KEY FEATURES

- ▶ Rolling belts with adjustable speed and slope
- ▶ Minimum maintenance required
- ▶ Easy to clean
- ▶ High performance motor
- ▶ Silent operation, even at high regimes
- ▶ Accurate control of the intensity of the shock delivered
- ▶ Positive and negative slope (-25 to +25 degrees)
- ▶ Indirect calorimetry measurement for V_Omax determination

The OxyletPro system is a modular system allowing the integration of respiratory metabolism (O₂ consumption / CO₂ production). Panlab provides a complete Oxylet solution enabling forced exercise training in a treadmill combined with indirect calorimetry in rodents.

Basically, the Panlab Treadmill consists of a rolling belt with adjustable speed (up to 150 cm/s) and slope (from -25 to 25 degrees) and a control Unit.

The treadmill unit controls the speed of the belt, shows measured data in its display and provides electrical shock to the grid. The electrical shock supplied by the grid is of constant intensity (from 0 to 2 mA), that is, the current which circulates through the animal (and therefore its effect) only depends on the value of the mA chosen and not of the subject (quantity of body mass in contact with the bars, perspiration, etc.)

For metabolism studies, the treadmill is provided with an air isolated enclosure. The LE400 air flow control unit allows a fine regulation of the air flow inside the treadmill and sends the air to the LE450 gas analyzer for O₂/CO₂ gas concentrations determination.

The associated METABOLISM software transfers the data from the treadmill control unit and the gas analyzer to a PC computer using RS232/USB outputs for data storage and further analysis. The METABOLISM software can also be used for controlling the treadmill speed (fixed speed or software speed programmed increase).

Specifications

Current Range	adjustable from 0 to 2 mA
Belt Speed	adjustable from 0 to 150cms/sec
Running Lanes	1
Slope	adjustable from -25° to 25°

Ordering Information

Order #	Model	Product
76-0897	LE8700CTS	Single Lane Treadmill, Rat for calorimetry with shock
76-0891	LE8708TS	Single Lane Treadmill, Mouse with shock (needs airtight component LE8708CO).
76-0678	LE8708CO	Air tight cover component for LE8708
76-0811	LE4002FL	Air Flow regulator and switching unit
76-0810	LE405	O ₂ /CO ₂ Gas Analyser
76-0823	LE1334	Reference Chamber
76-0817	METABOLISM V3.0	Metabolism software Platform. Needs Metabolism Experimental Modules for Calorimetry.
76-0818	METAOXY	Metabolism Software Experimental Module - Calorimetry (respiratory metabolism).



Rabbit



Guinea Pig



Rat



Mouse



Insect



Fish

PheComp System for Compulsive Food and Drink Intake and Activity



KEY FEATURES

- ▶ Multiple combinations of food/drink dispensers
- ▶ Uninterrupted recording
- ▶ Very highly stable weight transducers
- ▶ Registers account for food and drink wastage
- ▶ External dispensers avoid any influence on living space and minimizes artifacts

PARAMETERS MEASURED

With Compulse

- ▶ Food or drink consumption by user-defined time interval
- ▶ Meal pattern analysis

With ActiTrack (see page 26)

- ▶ Spontaneous activity by user-defined time interval
- ▶ Ambulatory behavior by user-defined time interval
- ▶ Stereotyped behavior by user-defined time interval
- ▶ Rearing behavior
- ▶ Movement pattern: resting/slow/fast movement classification
- ▶ Permanence time and entries into user-defined zones

COMPONENTS INCLUDED

- ▶ Home cage
- ▶ Floor grid
- ▶ Top lid with filter
- ▶ Platform (bridge amplifiers, A/D converter, data display)

OPTIONS

- ▶ IR frames for activity and rearing recording
- ▶ Wire bar lid

The innovative PheComp system ideally measures food/liquid consumption and correlated motor activity in rodents to assess compulsive behavior.

The PheComp system uses our weight transducer technology to measure food and drink consumption, thus allowing a continuous signal and precise analysis of the animal's meal pattern as visualized by the software. Up to four external units for food and/or drink can be connected to each animal home cage, as defined by the user. The system registers absorbed food and waste produced by means of highly stable weight transducers mounted to the platform supporting each cage. The volume of water consumed as well as any possible bottle leakage is also accounted for with the same transducer technology.

Animal activity and rearing is recorded simultaneous to the food and drink monitoring using two-dimensional IR frames mounted on either side of the home cage. The signals from the transducers and IR frames are amplified, digitized and collected by our PheComp software for analysis. A track is also recorded and can be analyzed using our ActiTrack software (see page 26) for animal locomotor activity analysis.

The PheComp system is completely scalable – connect up to 12 cages to one computer by simply daisy-chaining each cage to the next in sequence.

Our PheComp system, with its modular design, is perfect for a wide range of experimental procedures characterizing the evolution of the animal compulsive behavior including:

- General testing of obese vs. non-obese subjects
- Compulsive behaviors through choice test, bitter test, starvation, etc)
- Screening of anti-obesity compounds

Specifications

Accuracy < 0.03 mg for both food and drink

Mouse Home Cage Dimensions (W x D x H):

Platform Dimensions 410 x 320 x 75 mm (16 x 12.6 x 2.95 in)

IR Activity Frame 400 x 290 x 13 mm (15.75 x 11.4 x 0.5 in),
16 x 9 beams (16 mm spacing) (0.6 in)

Rearing IR Frame 400 x 13 (H) mm (16 x 0.5 in),
(16 mm spacing) (0.6 in)

Rat Home Cage Dimensions (W x D x H):

Platform Dimensions 410 x 320 x 75 mm (16 x 12.6 x 2.95 in)

IR Activity Frame 489 x 372 x 13 mm (19.25 x 11.4 x 0.5 in),
16 x 9 beams (22 mm spacing) (0.9 in)

Rearing IR Frame 431 x 13 (H) mm (17 x 0.5 in),
(22 mm spacing) (0.9 in)

Ordering Information

Order #	Model	Product
76-0203	MultiTake	PheComp System cage for Mouse including ACE home cage, lid with filter, grid floor, bridge amplifiers, A/D converter, RS232 (USB), data display. Requires combinations of 76-0209 and 76-0210.
76-0520	MultiTake Rat	PheComp System cage for Rat including ACE home cage, lid with filter, grid floor, bridge amplifiers, A/D converter, RS232 (USB), data display. Requires combinations of 76-0539 and 76-0540.
76-0204	Compulse	PheComp System Software
Options		
76-0209	LE1401	Feeder for Mouse
76-0210	LE1402	Drink Unit for Mouse, 150 ml
76-0206	LE8827	PheComp IR Frame for Activity/ Rearing, Mouse
76-0205	LE1404	PheComp Home Cage Filter Top, Mouse
76-0207	LE1405	PheComp Grid Floor, Mouse
76-0208	LE1406	PheComp Wire Bar Lid, Mouse
76-0539	LE1501	Feeder for Rat
76-0540	LE1502	Drink Unit for Rat
76-0525	LE8857	PheComp IR Frame for Activity/ Rearing, Rat
76-0542	LE1504	PheComp Home Cage Filter Top, Rat
76-0543	LE1505	PheComp Grid Floor, Rat
76-0544	LE1506	PheComp Wire Bar Lid, Rat
76-0003	ActiTrack	ActiTrack Software for Activity/ Rearing

REFERENCES

Martin Agnoux A et al. (2014) Relative contribution of foetal and post-natal nutritional periods on feeding regulation in adult rats. *Acta Physiol (Oxf)*. 2014 Jan;210(1):188-201. (rat, France)

Shin JC et al. (2013) The flavonoid myricetin reduces nocturnal melatonin levels in the blood through the inhibition of serotonin N-acetyltransferase. *Biochem Biophys Res Commun*. 2013 Oct 18;440(2):312-6. (rat, South Korea)

Viñals X et al. (2012) Effects of repeated treatment with MDMA on working memory and behavioural flexibility in mice. *Addiction Biology*, Volume 18, Issue 2, pages 263-273. (mouse, Spain)

Bura SA et al. (2010) Effects of chronic nicotine on food intake and anxiety-like behaviour in CB1 knockout mice. *Eur. Neuropsychopharmacology*. 20(6):369-378. (mouse, Spain)



TBSI Solutions for Neural Recording, Electrical & Optogenetic Stimulation

In Vivo Electrophysiology & Optogenetics

MCS Solutions for In Vivo Wireless Electrophysiology



Triangle BioSystems International (TBSI) is working with research scientists to develop an expanding portfolio of products that include wireless, multiplexed, and tethered recording solutions, along with wireless optogenetic and electrical stimulation systems.

KEY FEATURES:

- ▶ **Wireless, multiplexed, and tethered recording solutions**
- ▶ **Precise data transmission**
- ▶ **Versatile software**
- ▶ **Universal compatibility**
- ▶ **Customized for your needs**



For an easy study of locomotion, sleep, social interaction, operant conditioning, and behavioral pharmacology/lesions. Wirelessly transmits data obtained from electrodes. Supports 5, 15, 31, 63, and 126 recording channels systems. Minimum 50 kHz sampling rate per recording channel. Continue to record 24/7 with the wireless charging Inductive Power option, which can be added to any of the TBSI wireless headstages.



Tethered recording setup with minimal wiring. 3 wires for 32 channels, adding just 1 wire for each additional headstage. Up to seven 32 channel headstages per system. With the M-Series amplifier system, you can record up to 31 channels of data using just three wires, with each additional headstage requiring only one extra wire. Many customers take advantage of this system's minimal wiring by implementing a commutator for wire rotation management, thereby preventing the animal from tangling its tether and compromising the experiment.



Tethered headstage of choice throughout the Neuroscience community. 1:1 channel to wire ratio. Single headstages and total solutions available.

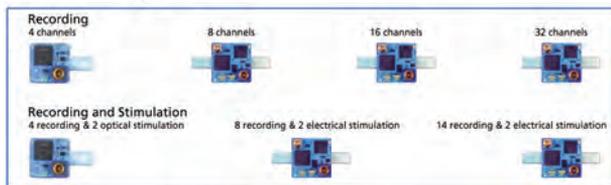


Dual channel stimulators: wireless programmable and pre-programmable. Capable of 100us minimum pulse width. Up to +/- 1mA output current. StimWare (required) enables user-configurable control over three tiers of nested pulse patterns. The dual channel stimulation systems allow researchers to generate and upload two separately customizable waveform patterns to a stimulator headstage, wirelessly. Products are offered for both optogenetic and electrical stimulation. TBSI's StimWare and OptoStimWare applications allows the user direct control over the details of the uploaded stimulation pattern, including three optional tiers of nested patterns.

NOTE Ask for information for the possible combination of the TBSI solutions with our products for behavioral studies.



MCS Solutions for In Vivo Wireless Electrophysiology



KEY FEATURES

- ▶ Options for electrical and optical stimulation (W2100-System)
- ▶ 4, 8, 16 or 32 channels
- ▶ 16-bit resolution
- ▶ Lightweight headstage
- ▶ Wide effective range (5 m)
- ▶ Flexible battery options
- ▶ Excellent signal-to-noise ratio

Multi Channel Systems (MCS) offers products for precise scientific measuring in the field of electrophysiology for research groups at universities and for the pharmaceutical industry. The MCS wireless in vivo solutions are the all-in-one solution for amplifying, recording, and analyzing in vivo data from up to 32 channels.

The wireless in vivo systems are the all-in-one solution for amplifying, recording, and analyzing in vivo data from up to 32 channels. The systems include everything you need: compact headstage with integrated A/D converter, digitized transmission, powerful receiver, batteries, as well as the popular MC_Rack software package.

The most advantageous feature of the Wireless-Systems is the amplification and digitization of the data on the headstage itself. This way, only digital data is sent to the receiver, which ensures that your data is not diluted or distorted. With its excellent signal-to-noise ratio, it is the ideal solution for spikes, LFP, EEG, ECG, and ECoG.

Multi Channel Systems offers two different Wireless-Systems: The basic W-System and the advanced W2100-System. Most features are the same for both systems; however, the advanced W2100-System offers more possibilities e.g. regarding stimulation and sampling rate

Special highlight on the new advanced W2100-System options:



Equipped with a connector to plug in two LEDs, the headstage is ideal for optogenetic experiments. A programmable interface provides the synchronization of recording and light stimulation.

Key features

- Small-sized headstage with integrated A/D converter and the possibility to connect two LED lights for optical stimulation.
- The Wireless2100-System converts the recorded signals into digital data already on the headstage.
- The signal-to-noise ratio is excellent and most important, independent from the distance between sender and receiver.
- The signal amplitude is independent of the distance, too, and the data arrives safely and completely at the receiver for further analysis.

NOTE Ask for information for the possible combination of the MCS solutions with our products for behavioral studies.

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