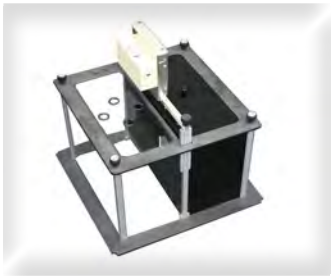
Sophisticated Life Science Research Instrumentation

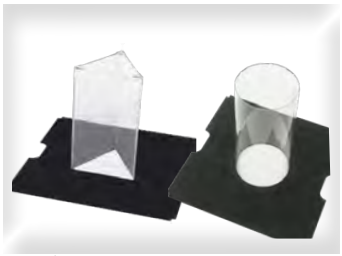
Multi Conditioning

The ALL-IN-ONE Solution for Mice & Rats

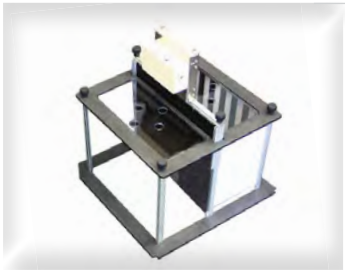
Active Avoidance
Latent Inhibition
Learned Helplessness



Passive Avoidance
Light/Dark Test

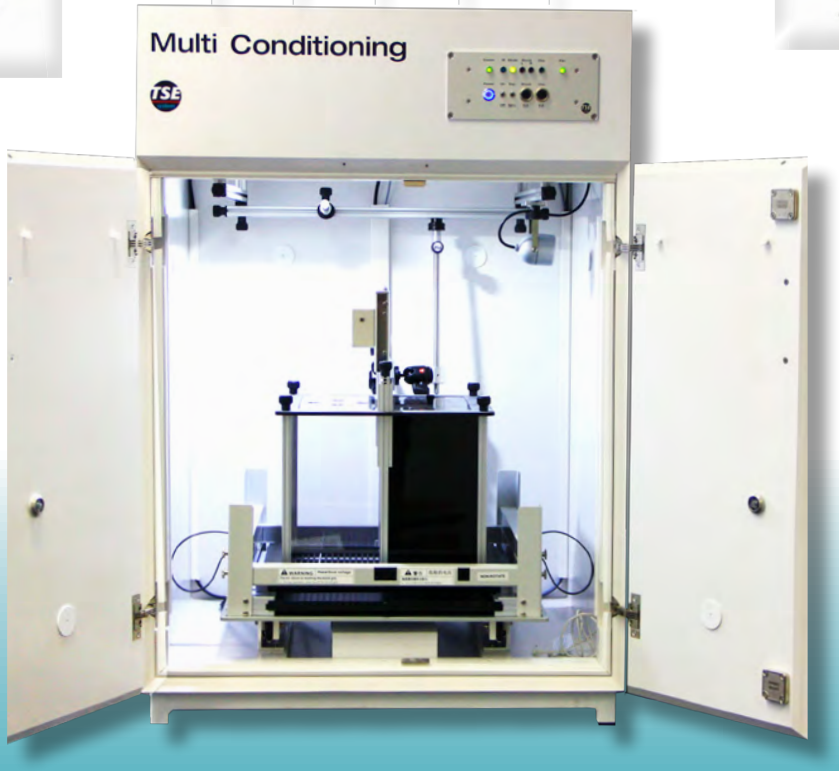


Fear Conditioning
Panic Response



Place Preference

Open Field



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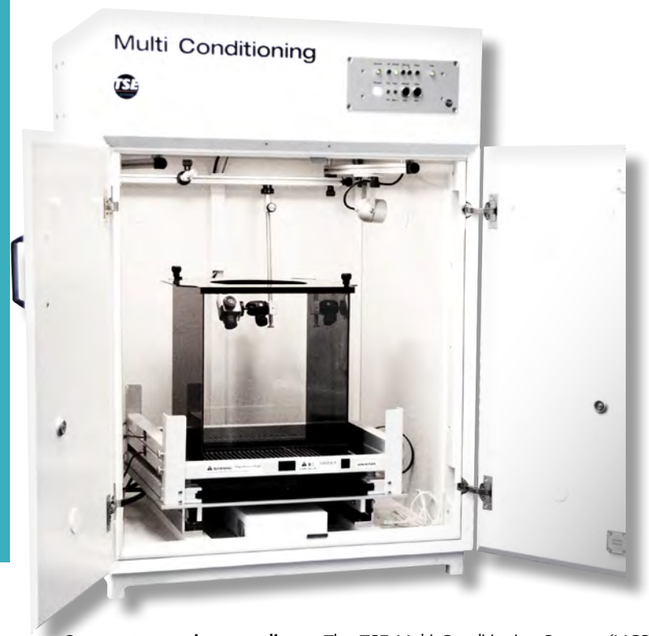
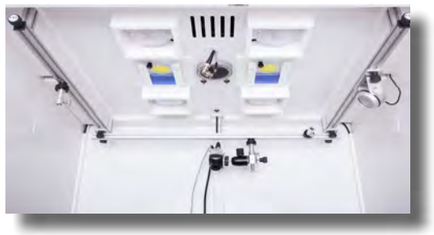



Stimulus elements


Flexible camera installation on sliding metal bars

One system - nine paradigms. The TSE Multi Conditioning System (MCS) is the first and only multi-purpose modular test platform on today's market that can accommodate nine paradigms to evaluate learning and memory, emotion and stress-related behaviors in mice and rats. The universal base unit can be equipped with modular components including a variety of arenas, accessories and the corresponding software package according to the researchers needs, thus offering maximal flexibility. Multiple test boxes can be started/ stopped simultaneously or independently.

Multi Conditioning: Hardware

Universal Base Unit

- Available as combination system for rats and mice (large) or mice only system (small)
- Sound attenuating housing & ventilator (additional sound mats optional)
- Sliding floor for ease in changing arenas

Lights

- Software controlled illumination (via light sensor)
- House lights of variable intensity (white/red)
- Individually-controlled variable intensity (max 1000 lux) LEDs for stimulus presentation with included blue covers for context modification (additional colors available)

Acoustic Signals

- Background white noise generator (max 100dB)
- Software controlled stimulus sine sound /noise generator for constant or pulsating sounds of variable frequency (2.5 – 22 kHz) and intensity (max 100dB)
- Panic response tone for rats (ultrasound 22kHz)

Infrared Light Beam Frame

- High-resolution frame for ultra sensitive movement detection in 3 dimensions (XY and Z, for rearing and jumping behaviors)

Modular Arenas, Shock Grids & Accessories

- Arenas of various sizes, designs, materials & colors, including a home cage style arena
- Arenas can be used with the shock grid, a grid cover plate or a litter/sand tray
- Species-specific shock grid with 10-rod pattern for guaranteed shock delivery (max. 3.1mA, set in steps of 0.025mA), usable in two orientations to provide the animal with a tactile cue
- Additional tactile discrimination is obtained by grid cover plates available with different surface structures
- Special arenas with visual wall cues
- Various dividers for two-compartment paradigms with/ without gate, automated gates optional
- Simultaneous video monitoring from up to 2 angles
- Movable aluminum bars allow camera installation anywhere within the housing
- Simple integration of other equipment (via ceiling outlets and mounting system) such as microphones or rotary joints for optogenetics and electrophysiology, software integration via TTL signal
- Combine it with our wireless telemetry system Stellar for simultaneous EEG, ECG, Blood Pressure and Activity measurements

ADVANTAGES

Cost Effective, especially for several paradigms
Space Saving, only one base unit is required
Flexible, applicable to many animal models

Testing under any lighting condition & in complete darkness
Common hardware for comparability across paradigms
Common software guaranties user-friendliness

Multi Conditioning: Dedicated Software

Depending on the behavioral paradigm you choose, the Multi Conditioning System offers three distinct software packages that can be purchased in any combination. Each of these software packages features a user-friendly interface with a highly flexible trial parameter selection window which guides the user step-by-step through experimental design. The software can control up to four test boxes simultaneously. Additionally, basic GLP functions such as user administration and the creation of an audit trail are included as well.

Package 1 - Fear conditioning

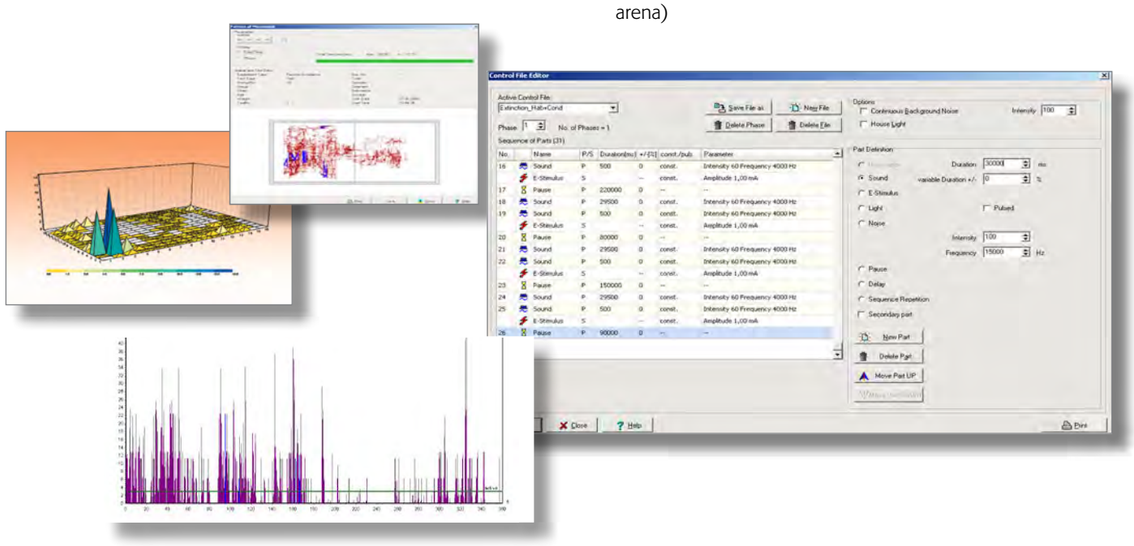
- Suitable for **contextual/cued and trace fear conditioning**, as well as **panic response** paradigms
- Applicable for animal models of Alzheimers's, anxiety disorders and diseases with cognitive decline
- Variable shock amplitude, with constant/pulsating current
- File editor guides through experiment definition (sound/ light/shock/delay parameters)
- Comprehensive freezing analysis
- Detailed movement & activity analysis, incl. rearing
- Automated shock response analysis (jumping and freezing)
- Calculated parameters include number, time, duration, % freezing, chronological list of freezing events according to user-defined thresholds, and many more
- Panic response analysis in rats

Package 2 - Two-Compartment Paradigms

- Paradigms: Active & Passive Avoidance, Place Preference, Learned Helplessness, Latent Inhibition, Light/Dark Test
- Possible applications are depression, addiction, anxiety, Schizophrenia, obsessive compulsive disorder and drug development
- Software-driven transfer gate for Passive Avoidance, Place Preference, and Light / Dark Test
- Independent shock delivery in both compartments
- Variable shock amplitude, constant/pulsating current
- Automated shock response analysis
- Compartment-specific movement & activity analysis
- **Active Avoidance**: Fear motivated associative learning in which the animal learns to predict the aversive foot shock and escape by moving to the other compartment (active avoidance arena)
- **Learned Helplessness:** Assessment by exposing the animal to an unpredictable and inescapable aversive foot shock. Animals show deficits in a subsequent avoidance task (choice of 2- compartment arenas)
- **Latent Inhibition:** Familiar stimuli are harder to acquire meaning than unfamiliar stimuli (active avoidance arena)
- **Passive Avoidance:** Animals learn to stay in a bright compartment to avoid an aversive foot shock in the dark compartment (light/dark arena)
- **Conditioned Place Preference:** Animals learn to associate a particular environment with a response such as a reward or an aversive drug effect (2-compartment arena with visual and tactile cues)
- **Light/Dark Test:** Conflict test between staying in a safe dark place and exploring a novel bright environment (light/dark arena)

Package 3 – Locomotor Activity/Open Field

- For assessment of e**xploratory behavior, activity & anxiety** in an (open field) arena or the home cage
- Manifold applications, e.g. behavioral phenotyping
- User-defined regions of interest
- Calculation of nearly 100 parameters related to movement type, timing and path
- User-defined detection thresholds e.g. for hypo/hyperactivity
- Various graphical display options for activity/exploratory patterns incl. movement tracks



Selected Publications

Sophisticated Life Science Research Instrumentation

Fear Conditioning in Immunology Research

Osborne BF, Caulfield JI, Solomotis SA, Schwarz JM. Neonatal infection produces significant changes in immune function with no associated learning deficits in juvenile rats. Dev Neurobiol. 2017 Oct;77(10):1221-1236.

Active Avoidance Task in OCD Research

Hatalova H, Radostova D, Pistikova A, Vales K, Stuchlik A. Detrimental effect of clomipramine on hippocampus-dependent learning in an animal model of obsessive-compulsive disorder induced by sensitization with d2/d3 agonist quinpirole. Behav Brain Res. 2017 Jan 15;317:210-217.

Activity, Fear Conditioning & Avoid-Escape Behavior in Anxiety Research

Azzinnari D, Sigrist H, Staehli S, Palme R, Hildebrandt T, et al. Mouse social stress induces increased fear conditioning, helplessness and fatigue to physical challenge together with markers of altered immune and dopamine function. Neuropharmacology. 2014 Oct;85:328-41.

Fear Conditioning in PTSD Research

Gräff J, Joseph NF, Horn ME, Samiei A, Meng J, et al. Epigenetic priming of memory updating during reconsolidation to attenuate remote fear memories. Cell. 2014 Jan 16;156(1-2):261-76.

Fear Conditioning in Alzheimer's Research

Gräff J, Rei D, Guan JS, Wang WY, Seo J, et al. An epigenetic blockade of cognitive functions in the neurodegenerating brain. Nature. 2012 Feb 29;483(7388):222-6.

Fear Conditioning in Anxiety Research

Toth I, Neumann ID, Slattery DA. Social fear conditioning: a novel and specific animal model to study social anxiety disorder. Neuropsychopharmacology. 2012 May;37(6):1433-43.

Learned Helplessness in Depression Research

Pryce CR, Azzinnari D, Sigrist H, Gschwind T, Lesch KP, Seifritz E. Establishing a learned-helplessness effect paradigm in C57BL/6 mice: behavioural evidence for emotional, motivational and cognitive effects of aversive uncontrollability per se. Neuropharmacology. 2012 Jan;62(1):358-72.

Passive Avoidance in Behavioral Phenotyping

Baarendse PJ, van Grootheest G, Jansen RF, Pieneman AW, Ogren SO, et al. Differential involvement of the dorsal hippocampus in passive avoidance in C57bl/6J and DBA/2J mice. Hippocampus. 2008;18(1):11-9

Panic response in Panic Disorders Research

Nicolas LB, Klein S, Prinssen EP. Defensive-like behaviors induced by ultrasound: further pharmacological characterization in Lister-hooded rats. Psychopharmacology (Berl). 2007 Oct;194(2):243-52.

Service & Warranty

TSE Systems offers a Two (2) Years ALL-IN Premium Warranty with all new products, including:

- 24/7 technical hotline
- Remote maintenance and update function
- On-site visits upon necessity
- Free replacement parts during warranty

After the expiry of the warranty period, TSE Systems offers comprehensive extensions of the warranty or economical maintenance and repair contracts to ensure the continued smooth running of your instruments. Please contact us for further details.