

THERMAL GRADIENT RING

Thermal preference phenotyping in mice



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Thermal Gradient Ring (TGR)

Best Choice for thermal preference studies.

Fully automated temperature preference and temperature avoidance.

Increased thermal test sensitivity and accuracy.

*Out-of-the box apparatus ready to use in **ANY-maze** software.*

Background

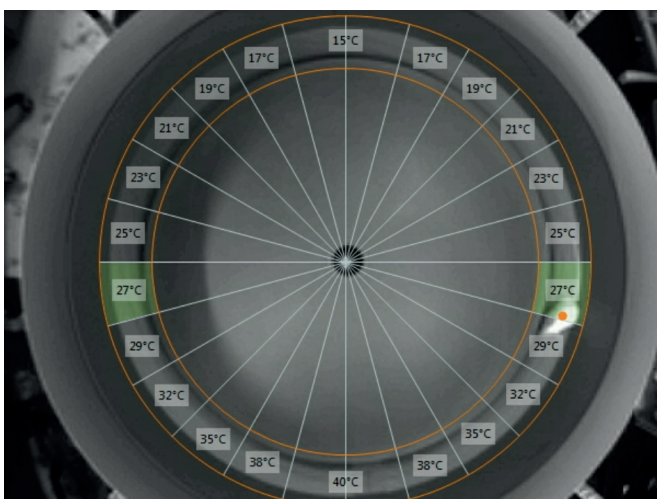
- The TGR invention paper showed how circular design allowed to dissect exploratory behaviour from thermal selection (2016, F. Touska et al.)
- The **novel circular thermal gradient assay** opens new opportunities for thermal preference and avoidance and addresses limitations imposed by classic linear equipment.
- The TGR can **clearly discriminate temperature-dependent phenotypes or drug effects.**

Typical device applications

The TGR has been used to study sensory neuropathies (2020, Valek et al.), diabetic peripheral neuropathy with symptoms of the thermosensory impairment (2022, Sasajima), TRP channels (2022, Ujisawa) and CCI-induced thermal hyperalgesia.

The TGR records and analyses thermal preference phenotyping in mice. For neuropathic pain studies, peripheral neuropathy, temperature sensitivity and insensitivity assessment in basic research, phenotyping and drug screening.

Product Description



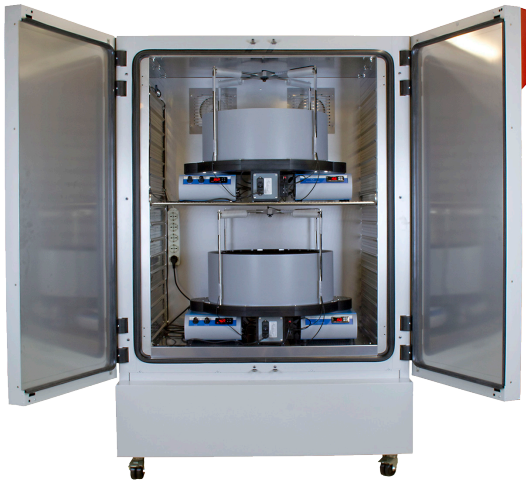
In the TGR **mice can freely move around the ring**, thereby avoiding the stereotypical habit that mice have of staying in a corner, as occurs in rectangular systems.

An infrared camera is located on the upper side of the apparatus, together with a visible and infrared illuminator and an infrared transmissive inner wall.

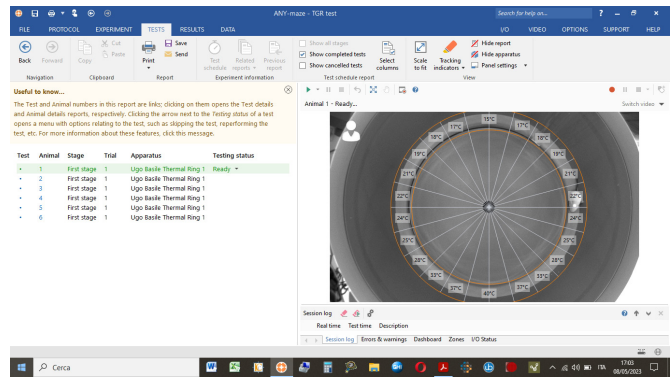
The animal is freely moving and its position is **tracked by the camera**, and **no user intervention is required** to gather time spent in each temperature zone (12 zones in duplicate) and many other parameters.

The behavioral data is obtained by video-tracking with ANY-maze software and generate measurement parameters, such as:

- **Thermal zone occupancy:** percentage of time spent in a zone.
- **Zone entries:** number of entries in each zone.
- **Preference temperature:** calculated as the weighted preferred temperature.
- **Cumulative distance:** calculation of the cumulative distance per zone or per the whole apparatus.
- **Coordinates of location within the Ring:** can be used to visualize mouse behaviour in the ring with Heat Maps.



Temperature controlled cabinet (-10/+100 °C range temperature) to hold up to two Thermal Gradient Rings under constant temperature and sound isolation, to be not depending on of the lab room temperature.



ANY-maze Video-tracking software automatically analyses Measurement Parameters. A dedicated (TGR limited) ANY-maze software is available at a low price of the also available ANY-maze full version which include TGR apparatus ready to use.

Features

Circular design

12 zones per side (specular), 40cm² each

CCD-IR-camera (included in the standard package, with its dedicated support) and ANY-maze video-tracking software

Heater and cooler on opposite sides, to establish a symmetric gradient

Thermal insulated ring-shaped aluminum runway, with special grip floor.

Designed for tethered and non-tethered mice. (no swivel provided)

4 thermocouples embedded in the thermal gradient ring sensing the temperature.

Benefits

Duplicate values, no border effects, no spatial cues.

Temperature Δ proportionally divided into 12 (in the method paper 15°C-40°C = 2.27°C per zone)

Behavior recorded automatically during test time.

Gradient setup superior to two-plate choice design.

More sensitive than previous methods: bias-free, reproducible data.

For optogenetic, electrophysiology and other tethered animal studies.

The exact temperature gradient measured in real time.

Main references

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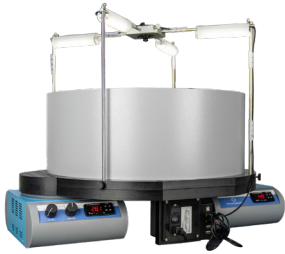
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Z. Winter, P. Gruschwitz, S. Eger, F. Touska and K. Zimmermann, 2017, "Cold Temperature Encoding by Cutaneous TRPA1 and TRPM8-Carrying Fibers in the Mouse", Frontiers in Molecular Neuroscience

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Specifications - Operation

Ring temperature range	From 10°C up to 65° C
Temperature feedback	By 4 thermocouples monitored in real time by ANY-maze software
Animal detection	Via ANY-maze specific protocol for TGR through integrated USB camera
Illumination	Set of 4 dual visible /IR light
Power	Universal input 85-264 VAC, 50-60Hz, 300W max

Physical

Aluminium runway	Internal diameter 45 cm; External diameter 57,5 cm; Corridor width 6 cm
Maze wall height	15 cm standard; 24 cm on request
Dimensions	76x60x60(h)cm
Weight	39 Kg
Shipping weight	54 Kg
Packing	120x80x70(h)cm (wooden pallet)

Ordering informations

35550	Thermal Gradient Ring, including heating and cooling elements, circular corridor, walls and thermal probes, USB camera and support with dual (visible/I.R.) lights. Software ANY-maze to be ordered separately.
60000-TG	ANY-maze software, Thermal Gradient Ring specific version (limited TGR TEST ONLY)
60000	ANY-maze software full license (TGR and all other ANY-maze test included in the full version)

Optional items

35580-US	Thermal conditioned cabinet for Thermal Gradient Ring US power supply (no TGR included) ready to hold 2 TGR device
35580-EU	Thermal conditioned cabinet for Thermal Gradient Ring EU power supply (no TGR included) ready to hold 2 TGR device

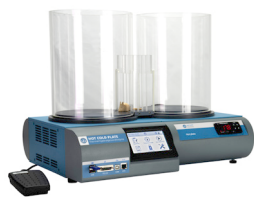
Extra warranty (standard 12 months + 12 months with product registration)

35550-UBC12	UB Care 12 Additional hardware warranty extension 12 months.
35550-UBC24	UB Care 24 Additional hardware warranty extension 24 months.

Related Products



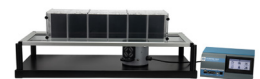
Tail Flick Unit - Thermal stimulation, D'Amour & Smith method
Product Code: 37560



Thermal Place Preference for Mice and Rats
Product code: 35350/35360



Hot/Cold Plate - Screening of Thermal Hyperalgesia/ Allodynia
Product code: 35300



Plantar Test for Thermal Stimulation - Hargreaves Apparatus
Product code: 37570

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more than 40,000 citations in the main bibliographic search engines.

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Ugo Basile SRL
Via Giuseppe Di Vittorio, 2
21036 Gemonio (VA) ITALY
Tel. +39 0332 744574
Get a quote: sales@ugobasile.com



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