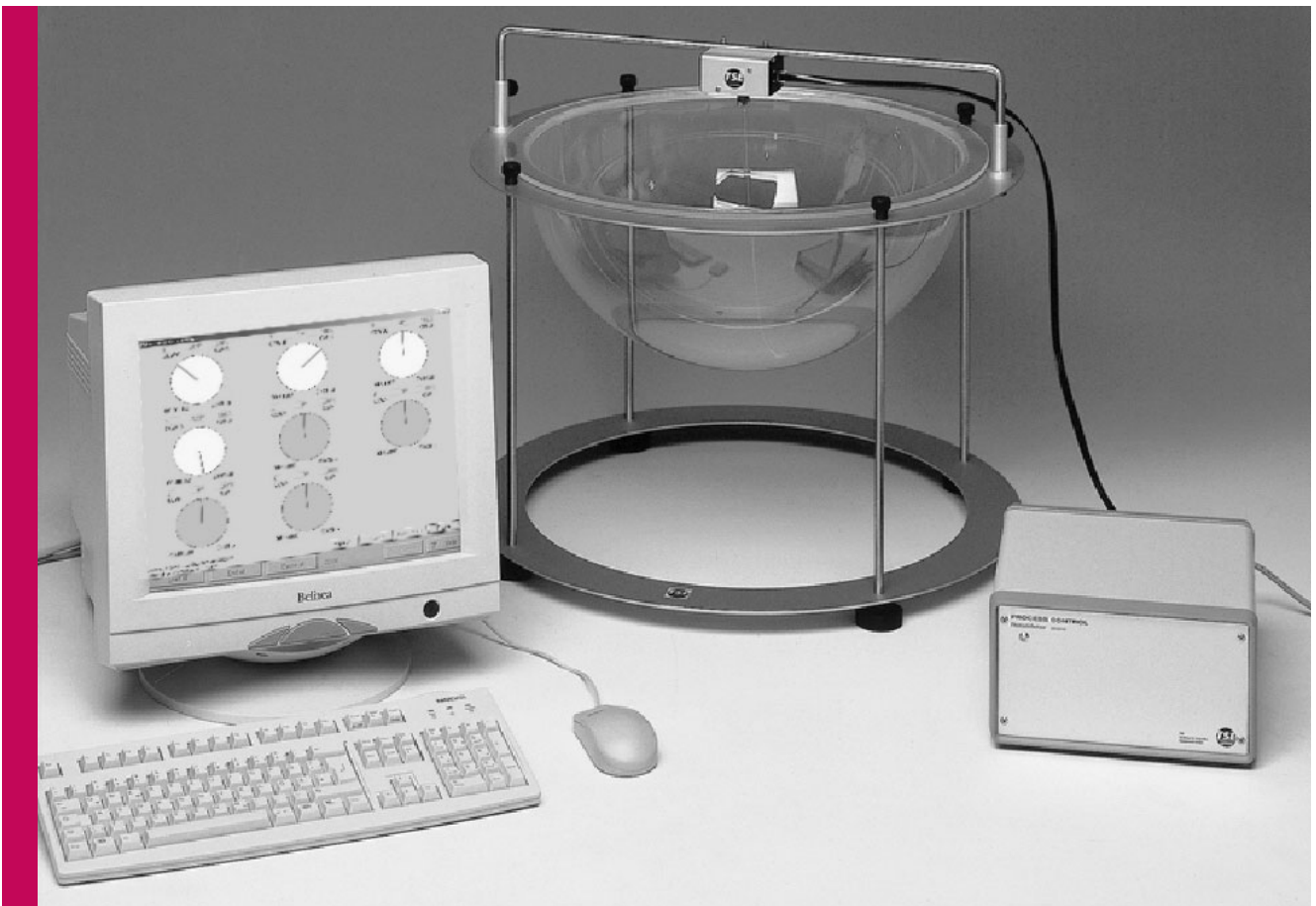


## Product Overview

*Sophisticated Life Science Research Instrumentation*



# **TSE Rotameter System**

**Rotometry monitor for small laboratory animals**



*– Specifications subject to change without notice –*

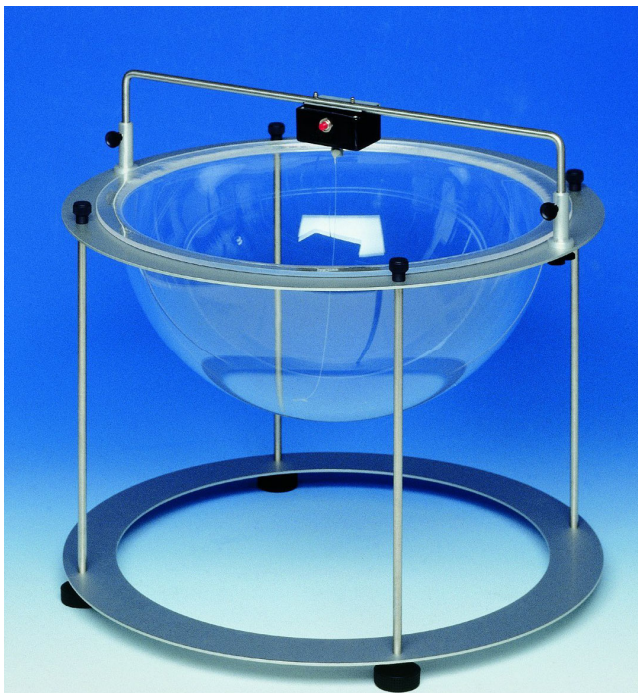


# TSE Rotameter System

## System description

The TSE Rotameter System is a flexible computer-controlled rotometry monitor for small laboratory animals designed to analyze rotational behavior, e.g. induced by unilateral brain lesions in pharmacological studies.

The animal that moves about in a special arena is tethered to a rotary sensor. The low-torque construction ensures that the animal's movement is not restricted in any way. This sensor monitors clockwise and counter-clockwise rotations and records changes of directions. Different sensor sensitivities are available in order to adapt the system to the specific needs of the user.

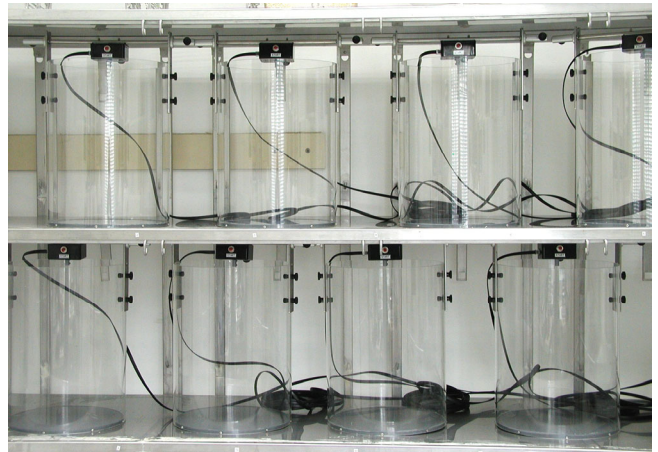


Rat unit (bowl test cage)

## Features

- The experiments can be started and stopped independently from one another in all rotameters which are connected up.
- The *remote start switch* allows to start the experiment immediately after the animal has been placed into the test cage.
- The rotameter system runs under Windows allowing easy data exchange.

- The system can be operated via USB port if required.



Multi-place system with cylinder cages

## Standard components

The system is available for rats and mice and consists of the following components:

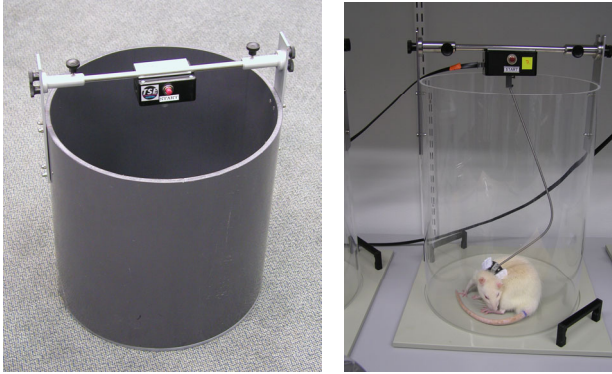
- the rotameter units
- one rotary sensor for each rotameter with remote start switch
- animal harness ("jacket")
- tether
- a process control unit
- a special PCI interface and
- the TSE Rotameter software for Windows

## Rotameter units

In the standard version the rotameter units are designed as open bowl cages made from clear plastic to allow optimum visibility.

The sturdy metal base can be easily dismantled for cleaning purposes.

We also manufacture cylindrical cages made from grey PVC or clear perspex.



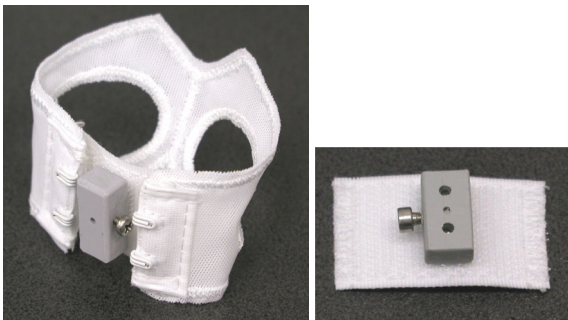
## Bowl Dimensions

**Diameter** 500mm  
**Depth** 250mm

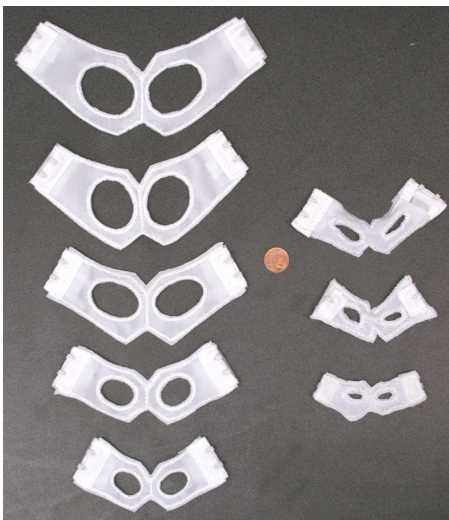
## Cylinder Dimensions

**Diameter** 340mm  
**Depth** 350mm

## The animal harness (“jacket”)



An animal jacket is used to connect the tether to the animal. Different sizes are available depending on animal species and weight.



Animal Jacket sizes for rats (left) and mice (right)  
- The coin has a diameter of 16mm -

## The rotary sensors



Each rotameter is equipped with a special rotary sensor that is mounted to a u-shaped bracket. It records the direction and number of rotations.

The highest possible resolution is 1/250 turn (250 increments for one full rotation = 1.44°). These sensors are connected to the process control unit.

## Process control unit / PC / interface

The process control unit contains the electronics for recording the rotations. It is connected to both the rotary sensors of the rotameter units and to the special computer interface. A connection via a USB interface is possible on request.

## Rotameter software

The comfortable Rotameter software that controls the experimental procedure and collects the animal rotations is very easy to learn and use. It currently runs under the operating systems Windows 2000 and XP.

Working with the system is performed according to the following pattern:

- preparing the setup for an experiment
- running the experiment, and
- analyzing the collected data

*If your experiment requires software features other than those mentioned below please ask for adaptation to your specific needs.*

## Preparing for the experiment

Before the start of the experiment all the data which describe the laboratory animal and the experiment are defined by the operator.

Box	Enable	Animal No.	Weight [g]	Text1	Text2	Text3
1	YES	1001	300	Text01-1	Text02-1	Text03-1
2	YES	1002	300	Text01-2	Text02-2	Text03-2
3	YES	1003	300	Text01-3	Text02-3	Text03-3
4	NO	0	0			
5	NO	0	0			



Control parameters influence the course of the experiment.

Sensor resolution	<input type="text" value="250"/>	Steps
Increment CW / CCW Counters at	<input type="text" value="250"/>	360,00°
Detect direction change at	<input type="text" value="25"/>	36,00°
Scan Start Buttons	<input checked="" type="checkbox"/>	
Add Sum Line (Format 2)	<input checked="" type="checkbox"/>	
Add Diff CW-CCW Line (Format 2)	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/> Write binary file		
Interval	<input type="text" value="10"/>	[ms]

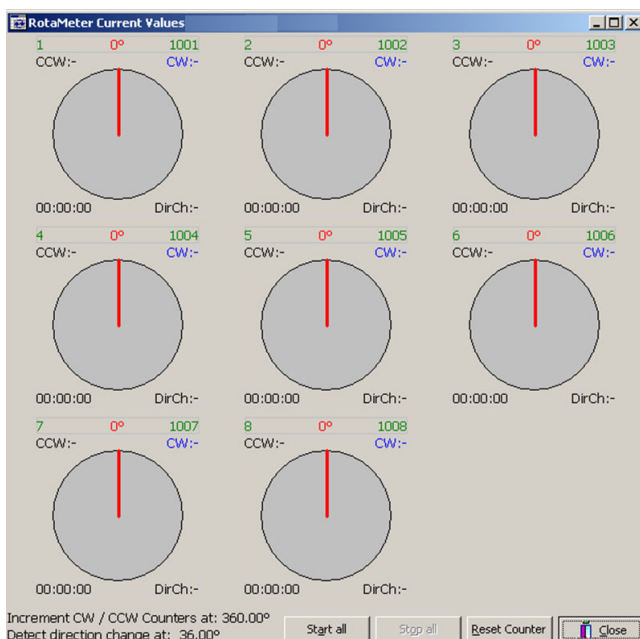
A filter can be used for recording changes of direction; an appropriate value can be selected for this filter. A change in direction will only be registered when the animal has covered the corresponding distance in the opposite direction.

If required the

- total number of counts (CW and CCW separately) and the
- difference CW – CCW

for each box can be output in the export file.

If **Write binary file** has been activated then at the interval entered under it (in milliseconds) the angle setting of the sensors will be recorded and saved in a bin-file. This file can be exported.



The experiment in the boxes will be terminated when the experiment duration has elapsed.

## Staggered Start

After definition of all parameters the experiment can be started immediately for an individual rotameter. The animal is placed in the rotameter and the box symbol in the software is double-clicked. Alternatively the remote start switch on the sensor can be pressed in order to start data acquisition as soon as the animal has been placed into the arena.

Data recording now starts for this rotameter. All required units can be started independent of one another in this way allowing a single user to handle a large number of units.

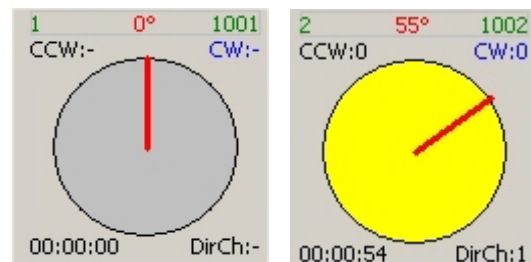
## Simultaneous Start

Alternatively the experiment can be started simultaneously for all rotameters by pressing the *Start all* button.

## The running trial

During execution of the experiment a schematic overview of the rotameters is displayed in the so-called trial monitor.

The color of a rotameter indicates its current status:



- grey rotameters have not yet been started for an experiment
- yellow rotameters have been started for an experiment

When a rotameter has been started a pointer ("radius") which moves synchronously with the rotation of the sensor allows the experiment to be checked continuously.



In addition the following information is displayed:

- box number
- animal number
- number of counterclockwise rotations (seen from above)
- number of clockwise rotations (seen from above)
- elapsed experiment time
- number of changes of direction

The values for CW and CCW are set to zero after each measuring interval. Each unit has its own clock and is independent of the other units.

While the experiment is being carried out so-called event markers can be set in order to document particular events. The event markers appear in the evaluation table and in the export file.

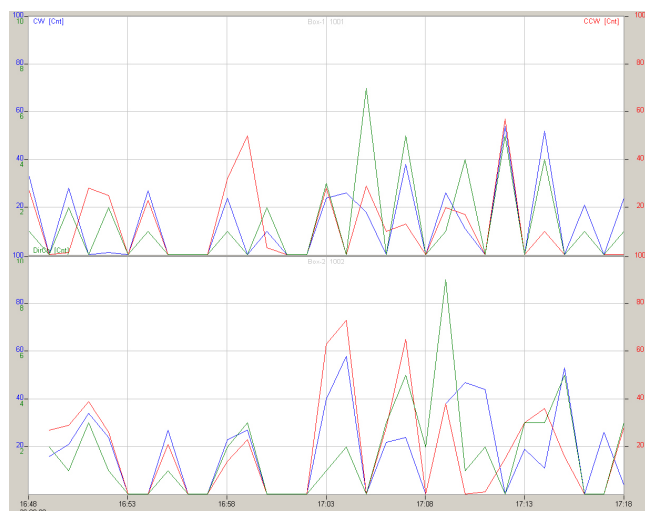
Event markers can be defined before the start of the experiment and while the experiment is being carried out.

## End experiment

In normal cases the experiment in a specific rotameter will be stopped automatically when the preset time has elapsed. The experiments can also be terminated *manually* in all active boxes.

## Evaluating the measuring data

In the run graph the rotation events are shown graphically. Both directions of rotation as well as the number of changes of direction appear as separate curves in a coordinate system with time (in minutes) as the X-axis and number of rotations / changes as the Y-axis.



Measurement analysis is enabled using different evaluation tools, for example:

- mean values
- median values
- sum values

...with respect to time or to all animals within the experiment

User-specific group definition and analysis is also possible.

## Data export

For further statistical calculations in special statistics packages or spread sheet programs (e.g. SAS or Excel) the raw data tables and the analysis tables can be stored in ASCII compatible export files (CSV-format).

Test 04	Exp001	TX001	TX002	TX003		
Box	Weight	Animal No.	Text1	Text2	Text3	
1	0,3	1001	Text01-1	Text02-1	Text03-1	
2	0,3	1002	Text01-2	Text02-2	Text03-2	
3	0,3	1003	Text01-3	Text02-3	Text03-3	
Date	Time	Animal No.	Box	CW [Cnt]	CCW [Cnt]	DirCh [Cnt]
24.03.2006	14:23	1001	1	10	9	14
24.03.2006	14:24	1001	1	12	2	5
24.03.2006	14:25	1001	1	3	10	6
24.03.2006	14:26	1001	1	0	7	5
24.03.2006	14:27	1001	1	1	2	2
24.03.2006	14:28	1001	1	11	2	7
24.03.2006	14:23	1002	2	6	8	12
24.03.2006	14:24	1002	2	11	0	1

If required the

- total number of counts (CW and CCW separately) and
- the difference CW – CCW

for each box can be output in the export file.



## Partial list of users

- Bayer Schering Pharma AG, Berlin, Germany
- Boehringer Ingelheim Pharma GmbH & Co. KG, Biberach, Germany
- Capital University of Medical Science, Beijing, China
- Cerebricon Ltd., Kuopio, Finland
- Charité - Universitätsmedizin Berlin, Berlin, Germany
- F. Hoffmann-La Roche AG, Basel, Switzerland
- Friedrich-Schiller-Universität Jena, Jena, Germany
- Georg-August-Universität Göttingen, Göttingen, Germany
- King's College London, London, Great Britain
- Ludwig-Maximilians-Universität München, Planegg-Martinsried, Germany
- Max-Planck-Institut für Psychiatrie, München, Germany
- Merck KGaA, Darmstadt, Germany
- Merz Pharmaceuticals GmbH, Frankfurt, Germany
- National University of Singapore, Singapore, Singapore
- NOVARTIS PHARMA AG, Basel, Switzerland
- Pfizer Global Research & Development – PGRD, San Diego, CA, USA
- Philipps-Universität Marburg, Marburg, Germany
- ReNeuron, Guildford, Surrey, Great Britain
- Rijksuniversiteit Groningen, Groningen, The Netherlands
- Ruprechts-Karls-Universität Heidelberg, Heidelberg, Germany
- Solvay Pharmaceuticals B.V., Weesp, The Netherlands
- Universite de Marseille, Marseille Cedex, France
- Universite de Provence, Marseille Cedex, France
- University of Cincinnati, Cincinnati, OH, USA
- University of Helsinki, Helsinki, Finland
- University of Ioannina, Ioannina, Greece
- University of Tartu, Tartu, Estland



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- **Baier PC, Schindehutte J, Thinyane K, Flugge G, Fuchs E, Mansouri A, Paulus W, Gruss P, Trenkwalder C.** Behavioral changes in unilaterally 6-hydroxy-dopamine lesioned rats after transplantation of differentiated mouse embryonic stem cells without morphological integration. *Stem Cells* 2004; 22(3): 396-404.
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- **Reum T, Morgenstern R.** Fetal mesencephalic grafts influence the dopamine release in the non-lesioned striatum of 6-OHDA-lesioned rats: a behavioral and in vivo voltammetric study. *Neuroscience Letters* 1994; 173: 172-6.





## Ordering Information

303311-C	<p><b>Rotameter Control Unit-8</b> Rotameter Control Unit, to control up to 8 Rotameter Measuring Units, extendable. Including interface and all connecting cables.</p>
303311-ME	<p><b>Rotameter Measuring Unit</b> Complete with Test Cage, Rotation Sensor, Tether &amp; Jacket. For registration of rotational behavior in small laboratory animals. The smallest registered rotation is 1/250 turn. Consisting of:</p> <p>Test cage choice (please specify):</p> <ul style="list-style-type: none"> <li>• Bowl made of clear acrylic with foot</li> <li>• Cylinder made of grey PVC</li> <li>• Cylinder made of clear perspex</li> <li>• Rotation sensor</li> <li>• Tether with stainless steel spring</li> <li>• 1 Animal Jacket complete with adapter to tether / rotation sensor,</li> </ul> <p>choice (please specify):</p> <ul style="list-style-type: none"> <li>• Mouse Jacket, SMALL, up to 25 g</li> <li>• Mouse Jacket, MEDIUM, 25 to 30 g</li> <li>• Mouse Jacket, LARGE, 30+ g</li> <li>• Rat Jacket, X-SMALL, 100 to 150 g</li> <li>• Rat Jacket, SMALL, 150 to 250 g</li> <li>• Rat Jacket, MEDIUM, 250 to 350 g</li> <li>• Rat Jacket, LARGE, 350 to 500 g</li> <li>• Rat Jacket, X-LARGE, 500+ g</li> <li>• Rat Corset - universal size</li> </ul> <p>Connecting cable (specify length: 2, 4, 6, 8 10, or 12 m)</p>
303311-ME/C	<p><b>Replacement Test Cage Set</b> for Rotameter Measuring Unit. Consisting of:</p> <p>Test cage choice (please specify):</p> <ul style="list-style-type: none"> <li>• Bowl made of clear acrylic with foot</li> <li>• Cylinder made of grey PVC</li> <li>• Cylinder made of clear Perspex</li> </ul>
303311-ME/CAB02	<p><b>Data cable 2 m for Rotameter</b> Measuring Unit &lt;-&gt; Control Unit</p>
303311-ME/CAB04	<p><b>Data cable 4 m for Rotameter</b> Measuring Unit &lt;-&gt; Control Unit</p>
303311-ME/CAB06	<p><b>Data cable 6 m for Rotameter</b> Measuring Unit &lt;-&gt; Control Unit</p>
303311-ME/CAB08	<p><b>Data cable 8 m for Rotameter</b> Measuring Unit &lt;-&gt; Control Unit</p>
303311-ME/CAB10	<p><b>Data cable 10 m for Rotameter</b> Measuring Unit &lt;-&gt; Control Unit.</p>



303311-ME/CAB12	<b>Data cable 12 m for Rotameter</b> Measuring Unit <-> Control Unit.
303311-ME/H	<b>Replacement Tether with stainless steel spring</b> for Rotameter Measuring Unit.
303311-ME/J	<b>Replacement Animal Corset - universal size</b> for Rotameter Measuring Unit.
303311-ME/J-M1	<b>Mouse Jacket, SMALL, up to 25 g</b> for Rotameter Measuring Unit. Complete with adapter to tether / rotation sensor. Mouse Jacket, MEDIUM, 25 to 30 g
303311-ME/J-M2	<b>Mouse Jacket, MEDIUM, 25 to 30 g</b> for Rotameter Measuring Unit. Complete with adapter to tether / rotation sensor.
303311-ME/J-M3	<b>Mouse Jacket, LARGE, 30+ g</b> for Rotameter Measuring Unit. Complete with adapter to tether / rotation sensor.
303311-ME/J-R1	<b>Rat Jacket, X-SMALL, 100 to 150 g</b> for Rotameter Measuring Unit. Complete with adapter to tether / rotation sensor.
303311-ME/J-R2	<b>Rat Jacket, SMALL, 150 to 250 g</b> for Rotameter Measuring Unit. Complete with adapter to tether / rotation sensor.
303311-ME/J-R3	<b>Rat Jacket, MEDIUM, 250 to 350 g</b> for Rotameter Measuring Unit. Complete with adapter to tether / rotation sensor.
303311-ME/J-R4	<b>Rat Jacket, LARGE, 350 to 500 g</b> for Rotameter Measuring Unit. Complete with adapter to tether / rotation sensor.
303311-ME/J-R5	<b>Rat Jacket, X-LARGE, 500+ g</b> for Rotameter Measuring Unit. Complete with adapter to tether / rotation sensor.
303311-ME/S	<b>Replacement Rotation Sensor Set</b> for Rotameter Measuring Unit Consisting of: <ul style="list-style-type: none"> <li>• Rotation sensor</li> <li>• Tether with stainless steel spring</li> <li>• Connecting cable</li> </ul>
303311-S	<b>Rotameter Software Package for WINDOWS</b> The Rotations Measuring software is used to control the complete system, to determine the analysis interval (running minute or absolute date/time), to register clockwise rotations with a high resolution, counter clockwise rotations with a high resolution, changes of directions, to calculate total number of clockwise and counter clockwise rotations, to set marker text and to store and analyze the measuring data. Before starting the experiment, a wide range of animal and trial data can be entered into the Trial Preparation Window. A Trial Monitor shows the current experimental status. The running experiment is shown in the Trial Monitor. After the experiment a Run Table as well as a multifunctional graphics panel show the measuring data. All data are ready for export as an ASCII-format for the use in any standard statistics or graphics software (Excel and others).





■ Behavior

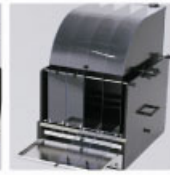
## TSE Systems – your Partner!

As your partner TSE Systems offers you solutions that are fully integrated with state-of-the-art technology and powerful software, customized to your specific needs, dependably consistent and easier to use for meeting even the most challenging research work.

Our committed team is ready to assist you in formulating solutions for your research. Let us become part of your team. Do not hesitate to contact us.



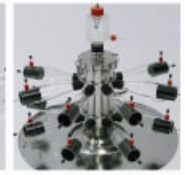
■ Metabolism



■ Motor Function



■ Physiology



■ Inhalation

## System Solutions for Life Science Research

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