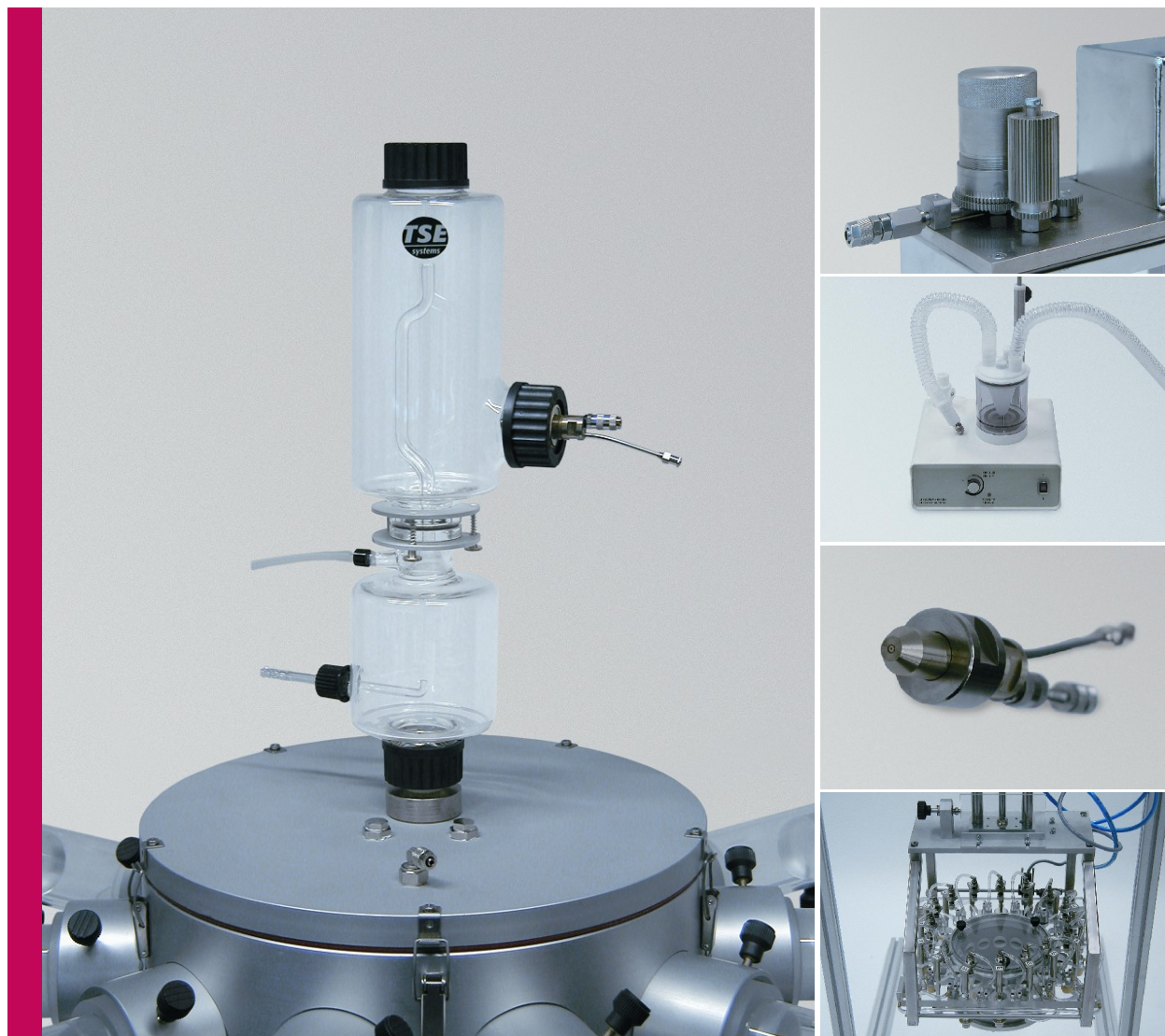
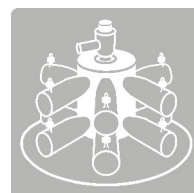


Product Overview

Sophisticated Life Science Research Instrumentation



Aerosol Conditioning
Complete Solutions for Inhalation Systems
Toxicological – Medical – Environmental Studies

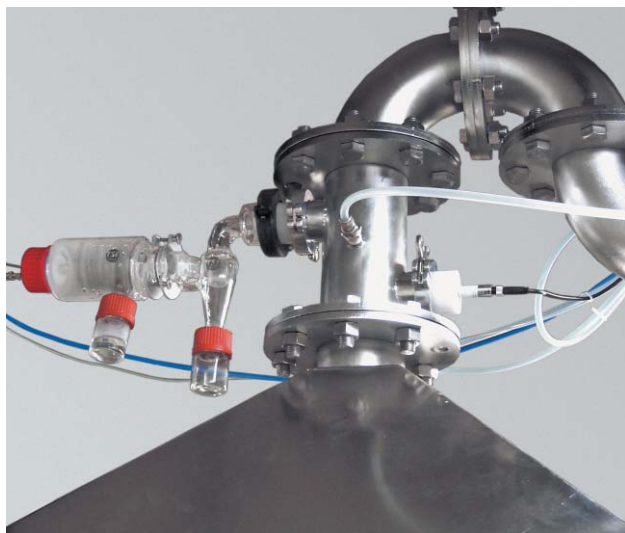


www.TSE-Systems.com



- Aerosol Conditioning
- Generation of Liquid Aerosols and Vapors
- Aerosol Generators for Special Applications
- Dust Generators
- Cigarette Smoke Generators

– Specifications subject to change without notice. –



■ Aerosol conditioning line for Whole Body Unit



■ Water-jacketed mixing units for aerosol conditioning

Aerosol Conditioning Units

TSE provides different kinds of aerosol conditioning units according to the aerosol properties and the individual customer's requirements.

- Dual pre-separation of large and small aerosol particles via preseparator and cyclone
- Collection of aerosol remaining in the preseparator unit for reuse or controlled disposal
- Different types of reverse flow mixing devices are available for thorough mixing of aerosol and fresh air – control of aerosol flow and concentration via system adapted sensors, regulation units and DACO software
- Corona Discharge Unit for reducing positive and negative electrical charges on aerosol particles

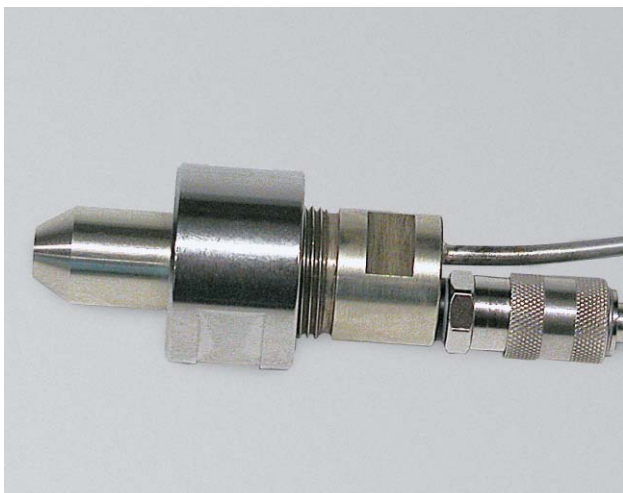


■ Corona Discharge Unit

The adjustment of the test atmosphere is possible in the following ways, among others:

- by using controlled humidification units, and
- by thermostating devices in the aerosol supply line such as water-jacketed glassware

The combination of different aerosol conditioning methods is possible as well as a freely adjustable aerosol-to-air ratio via electronic flow controllers. The units can be connected to the different exposure units by suitable adapters or mounting stands.



■ Aerosol nozzle – mixing part



■ Aerosol nozzle – outlet area



■ Aerosol nozzle – mounted on preseparator

Aerosol Nozzles

Various aerosol nozzles are provided for the efficient nebulization of liquids in air and to generate aerosols with different particle sizes, e.g. two-stream nozzles with different specifications. An essential feature of the nozzles is a very uniform cone-shaped cloud of test substance and very small droplet sizes.

TSE aerosol nozzles are characterized by

- Small aerosol nozzle size – short dwell time in the nozzle causes rapid spraying of the test substance
- Adjustable nozzle opening so that it is possible to set different spray conditions
- Special design for air-liquid mixing procedure for creation of droplets with a diameter smaller than $3\ \mu\text{m}$
- The possibility of being completely dismantled for easy and thorough cleaning

High-viscosity substances can be dispersed into the test atmosphere by using a heated aerosol nozzle; a nozzle adapter is available for connection to different types of aerosol conditioning units.

The liquid supply to the nozzle is possible via various TSE high-precision dosing units – even for very small amounts/doses of test substance.



■ Vapor generator for volatile organic compounds (VOCs)



■ Ultrasonic nebulizer

Liquid Aerosol and Vapor Generators

As well as the generation of liquid aerosols via an aerosol nozzle, TSE also offers further instruments for aerosolizing liquids, such as ultrasonic nebulizers for the application of small amounts of aerosol and for research into inhaled medications.

The nebulizers are equipped with a disposable substance container – no test substance contamination by residues from previous tests takes place.

Collision nebulizers are recommended for the loss-free nebulization of larger amounts of substance from a liquid reservoir that can be refilled while the test is running (option).

All liquid aerosol generators are equipped with the necessary adapters for connection to the exposure unit.

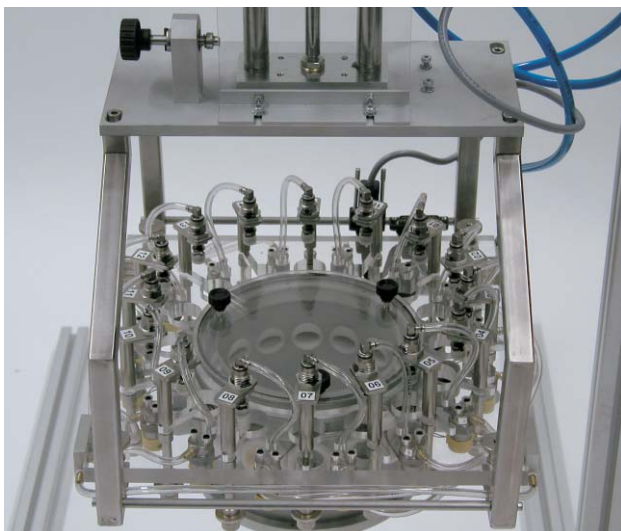
For working with vapor-air mixtures different types of evaporation units are available depending to the customer's specifications and the particular test substance used.



■ Collision nebulizer

For example, TSE can provide generators for volatile organic compounds (VOCs) such as benzene, hydrocarbons, etc. for toxicological research, e.g. in investigations into the maximum workplace concentrations of chemicals.

Control and online monitoring of all aerosol or vapor generators is possible with the DACO software (see page 27).



■ *Mixing unit of the MDI Activator-16*

MDI Activators and Others

As a special solution in the aerosol generation field TSE can offer activators for the automatically controlled triggering of MDIs – single-place and multi-place solutions are available.

The TSE MDI Activator-16 allows the individual and computer-controlled operation of 16 metered dose inhalers at the same time. The main advantage of an MDI application is the use of test substances consisting of the same compounds or generated under similar conditions to the end-product.

An online control and monitoring software is used together with the MDI Activator. All parameters such as shaking time, activation time, pause time, filling activators and activation pattern are entered within the application planning window in a clear, separate window.

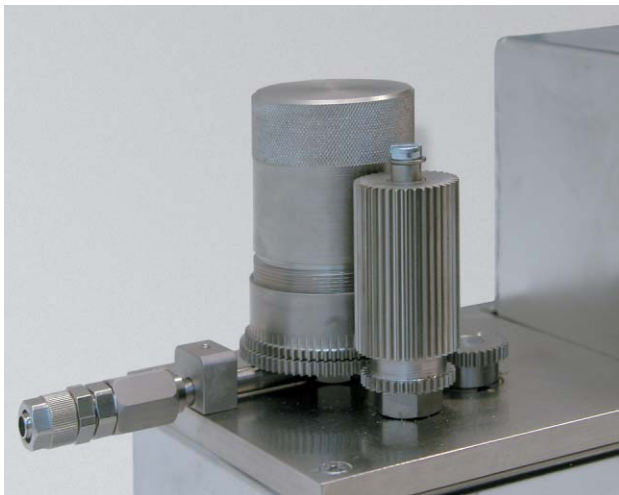
TSE can offer further user-specified generators for the generation of test atmospheres such as ozone generators and special spray cans on request.



■ *MDI Activator-16*



■ Dust Generator acc. to Wright



■ Dust generating mechanics

Dust Generators acc. to Wright

Dust Generators acc. to Wright are designed for working with finely powdered and dry substances. They are made from robust, wear-resistant material like stainless steel and operate with an exact and accurate mechanism.

They are available with

- Small and large dust reservoirs – for low and high substance concentrations
- Automatic and manual operation control

In the automatic operation control version aerosol generation takes place with simultaneous concentration measurement using a concentration measuring unit (option). A pneumatic press for compressing the substance in the reservoir is also available.



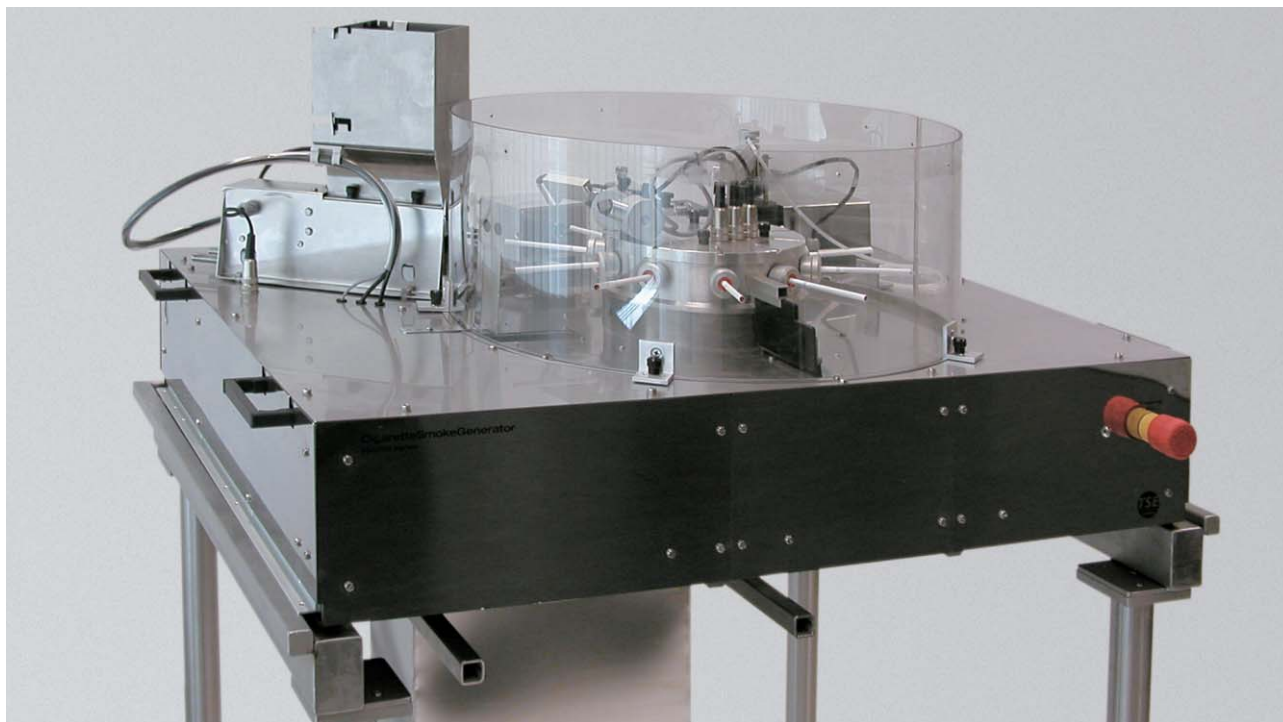
■ Bundschuh Dust Generator

Bundschuh Dust Generator

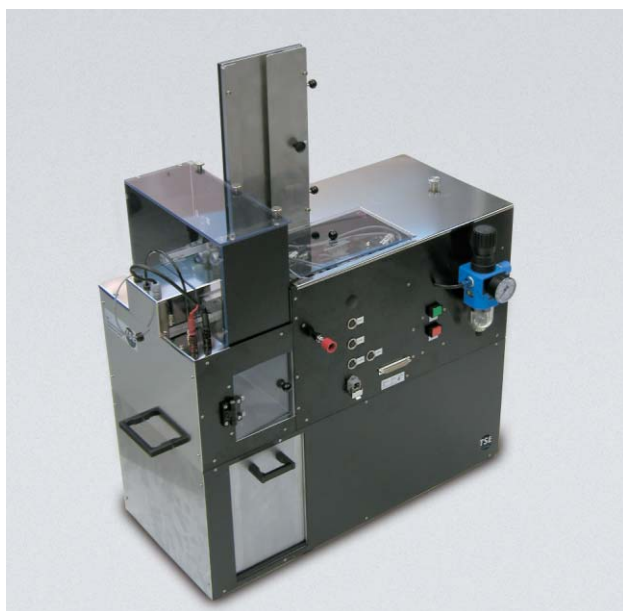
The Bundschuh Dust Generator is for use with loose materials and for generating high aerosol concentrations as well as for long-term tests. It has been designed to disperse amounts from 10g to 550g per hour and can also be used with finely ground fibrous substances and without previous test substance compression.

The substance reservoir is equipped with stirrer and ventilation for continuous dust conditioning during the experiment and the test substance is dispersed by a venturi nozzle which is driven by compressed air.

The perfect setting of aerosol concentration is guaranteed by a coarse and fine adjustment mechanism.



■ Cigarette Smoke Generator with cigarette wheel and cigarette magazine



■ Cigarette Smoke Generator for basic operations

Cigarette Smoke Generators

A Cigarette Smoke Generator is designed for automatically producing cigarette smoke for analytical and experimental investigations such as COPD studies into health damage caused by cigarette smoke. The instrument offers automatic filling, igniting, smoking, ejecting and reloading of cigarettes. It is equipped with different sensors for monitoring current machine status such as butt length, cigarette loading, burning cigarettes, etc.

- A wheel for 10 cigarettes as standard, other versions available on request
- Continuous cigarette smoking for several hours is possible – smoked cigarettes are automatically ejected and new cigarettes are reloaded
- Cigarette magazine for up to 250 cigarettes for continuous reloading during operation; the capacity can be further increased as an option
- For use with standard cigarettes of different sizes and diameters

The smoking of cigarettes according to ISO profile – 1 puff/min, 35 ml/puff, 2 seconds duration – is possible. The advanced model offers additionally the possibility for various settings of drawing and puff duration, puff volume and max. number of puffs.



■ Automatic loading of a cigarette

Control and recording software

The test parameters for the Cigarette Smoke Generator can be set by using the SMG-10 software. During the experiment the operating status and individual actions can be followed by the status display in the software.

The status display shows a graphical presentation of the wheel, a table with test data and several submenus to define experiment parameters. The entry of control parameters such as puffs per minute, puff volume, max. number of puffs per cigarette as well as descriptive text can be made via the setup menu.

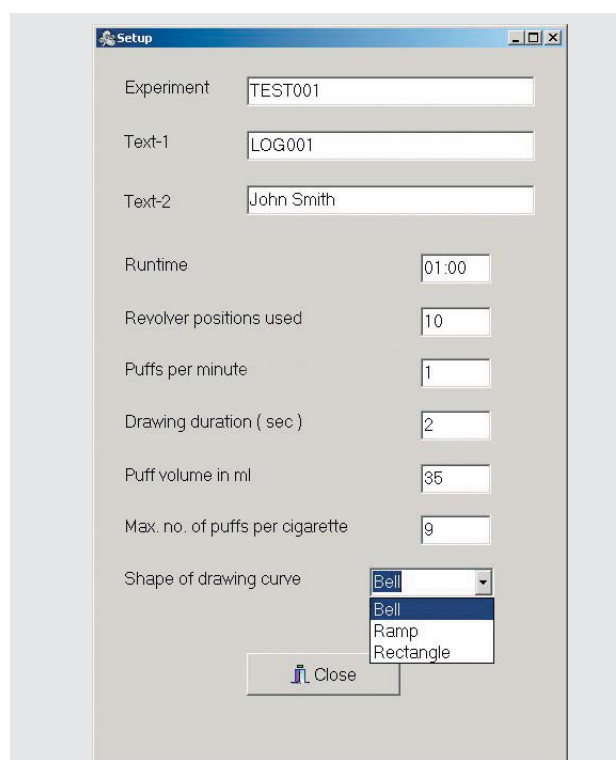
Different puff profiles can be set for smoking a cigarette – bell, ramp, rectangle.

An additional menu for monitoring and testing the hardware inputs/outputs is available as well as a software function for checking the mechanical operation, e.g. rotation of the cigarette wheel if no experiment is taking place.

The whole smoking process, e.g. number of smoked cigarettes, smoke volume generated, etc., is recorded automatically, shown and saved in tabular form.



■ Status display of a cigarette wheel and measuring data

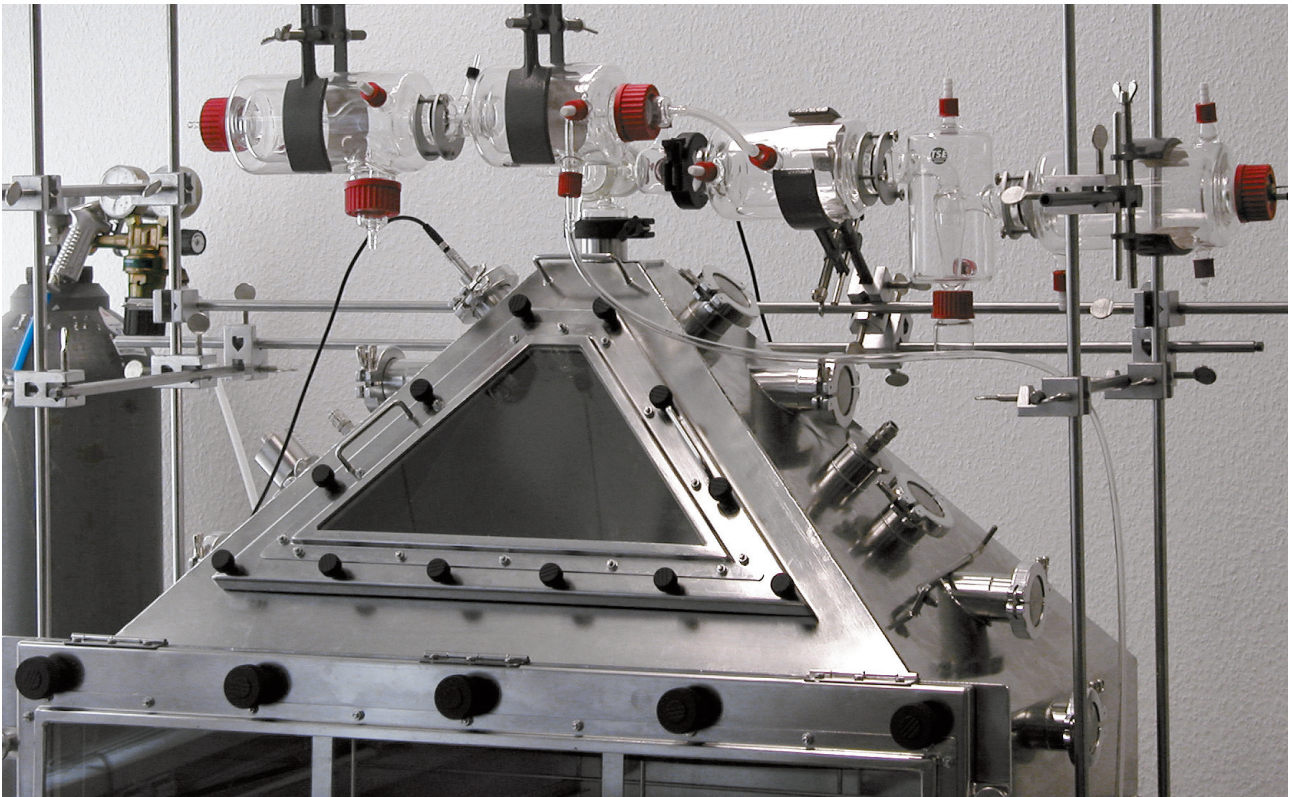


■ Setup menu Cigarette Smoke Generator

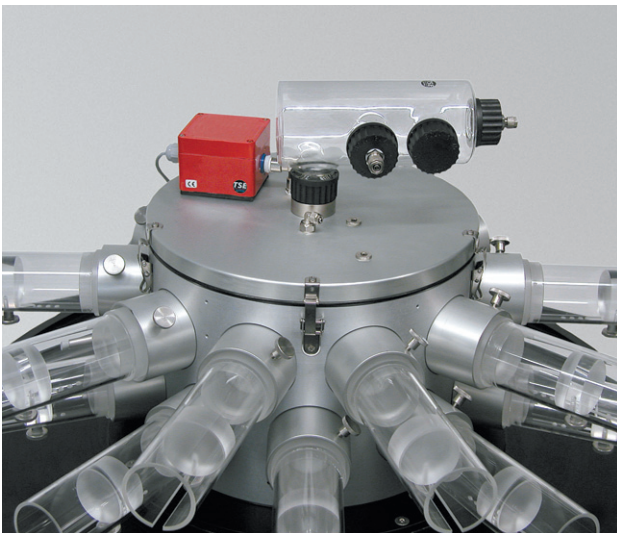


Examples

Sophisticated Life Science Research Instrumentation



■ Small Whole Body Unit with aerosol conditioning line



■ Aerosol-air mixing device with CO sensor



■ Humidity conditioning line





Contact us

Sophisticated Life Science Research Instrumentation



■ *Inhalation*

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.



■ *Obesity*



■ *Behavior*



■ *Motor Function*



■ *Physiology*

System Solutions for Life Science Research

■ Worldwide

TSE Systems GmbH
Siemensstraße 21
61352 Bad Homburg
Germany

Phone: +49-(0)6172-789-0
Fax: +49-(0)6172-789-500

■ USA/Canada/Mexico

TSE Systems, Inc.
784 S. Poseyville Road
Midland, MI 48640
USA

Phone: 1-989-698-3067
Fax: 1-989-698-3068

Toll-Free (USA/Canada)
Phone: 1-866-466-8873
Fax: 1-866-467-8873

www.TSE-Systems.com
info@TSE-Systems.com