

Dust Generator Wright

For Dust Aerosol Generation during Inhalation Studies



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Dust generating mechanics

Dust Generator acc. to Wright

Introduction

The **TSE Dust Generator acc. to Wright** has been designed to provide uniform, airborne concentrations of dust for long periods of time. Precise scraping and effective dispersion enable dust aerosols to be produced, suitable for inhalation experiments with Head Nose Only and Whole Body Exposure Units.

The scraping is managed by a rotating reservoir and a fixed scraper. Dispersion is carried out by a high velocity flow inside the outlet nozzle.

All component parts of the instrument in contact with the dust are fabricated from inert material. Considering unit density materials, the instrument has a feed rate ranging from 9 milligrams to 73.5 grams per hour.

The **TSE Dust Generator acc. to Wright** is suitable for most dry dusts that can be compressed to dry dust cakes. For compression the TSE pneumatic press can be used (optional).

The dust generator can be used in two different operation modes. For automatic operation the dust generator can be connected via its own control unit to the system control unit. When switching from manual to automatic operation the control can then be carried out by the software.

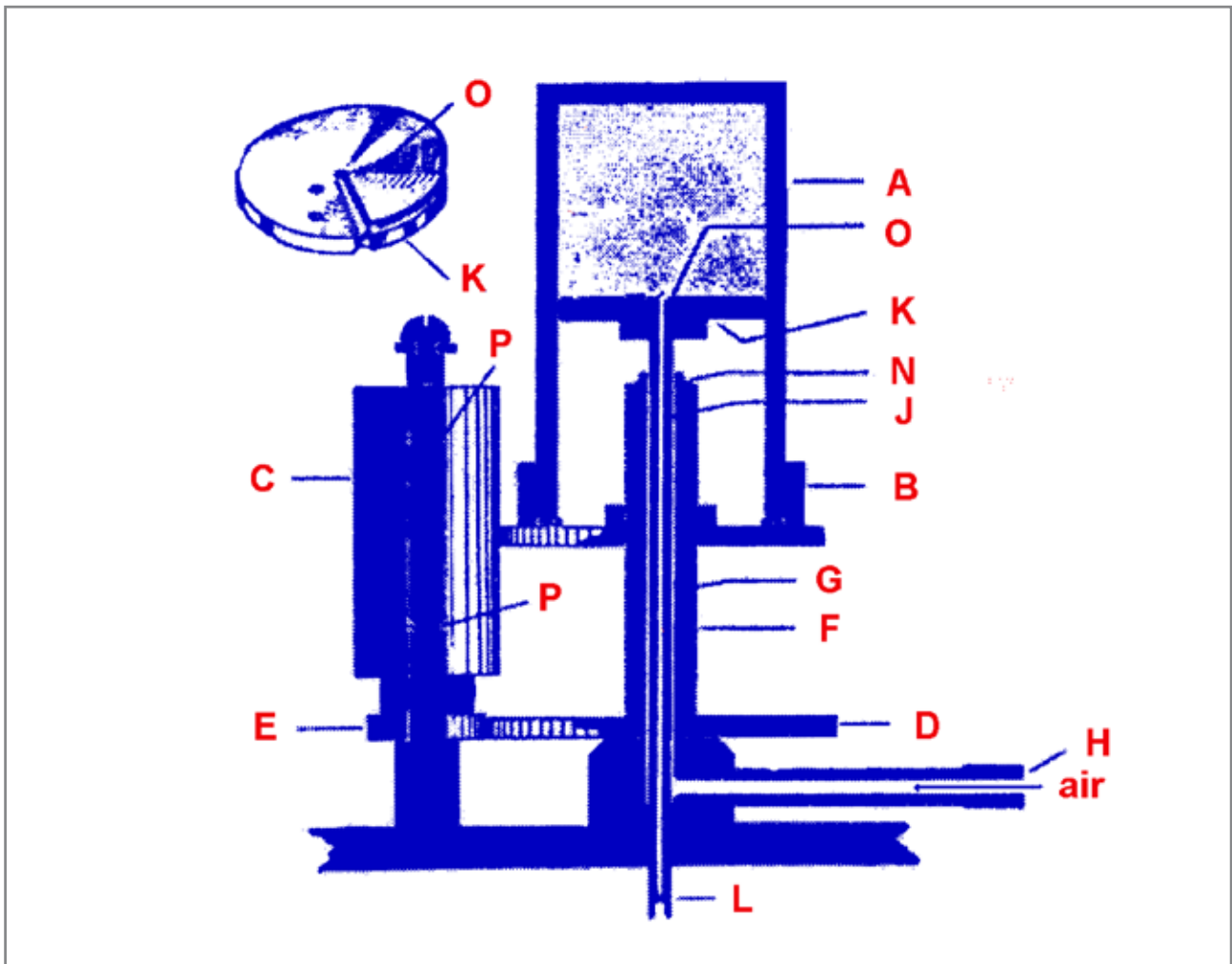
In manual operation a rotary knob on the front panel of the control unit can be used to preset the speed at which the rotating reservoir rotates and thus influence the amount of dust aerosol generated. In automatic operation the speed is set via a feed-back loop to the optional system photometer.

Overview Dust Feeder

The instrument comes with a large (A) and small dust reservoir. There is a corresponding large (K) and small scraper head. The instrument is shipped with one scraper installed. If it is desired to commence experiments with the the other scraper and dust reservoir the mounted components must first be removed.

First pull up the long pinion (C) so as to disengage pinion (E) from gear (D). Cup (A) should then be unscrewed from cap (B) along with the scraper head (K).

The smaller or larger scraper/ reservoir may then be assembled in reverse order. The best solution for inhalation experiments is to place the dust generator above the exposure unit. Dilution air is added inside the reverse flow mixing device (optional), which usually is installed between dust generator and exposure unit.



Schematic diagram of the dust generator



Top view (with small scraper and without reservoir)



Reservoirs (large, small)



Side view with reservoir



Rammers (large, small)



Front view (with small scraper and without reservoir)

Dust Generation

Before starting operation the concentration of dust to be created must first be chosen. Once this had been done the initial operating conditions may be calculated with reference to the next page.

The actual rate of feed to produce a concentration is subject to many variables, including the properties of the dust and the exposure unit into which it is fed. However, once an initial experiment has been performed, it is a simple matter to calculate, by proportion, a new rotational speed to achieve the desired amount.

Calculation

Desired Concentration 10 mg/m³
 System Flow Rate 3 m³/min
 Density of Dust 2 g/cm³

$$\text{Feed Rate (g/min)} = \text{Conc. (mg/m}^3\text{)} \times \text{Flow Rate (m}^3\text{/min)}$$

$$= 10 \times 10^{-3} \text{ g/m}^3 \times 3 \text{ m}^3\text{/min} = 0.03 \text{ g/min} = 1.8 \text{ g/hr}$$

Dividing by the density yields the required volume of dust per hour.

$$V = \text{Feed Rate (g/hr)} / \text{Density (g/cm}^3\text{)}$$

$$= 1.8 \text{ g/hr} / 2 \text{ g/cm}^3 = 0.9 \text{ cm}^3\text{/hr}$$

Referring to the table below, this feed rate may be achieved with the large chamber at approximately 0.07 rpm or with the small chamber at 0.6 rpm.

The large reservoir has a working capacity of 40 cm³ and the small, 5 cm³.

The running time is calculated as follows:

$$\text{Running Time} = \text{reservoir volume (cm}^3\text{)} / \text{req. volume/hr (cm}^3\text{/hr)}$$

$$= 40 \text{ cm}^3 / 0.9 \text{ cm}^3\text{/hr} = 44.4 \text{ hrs} - \text{large reservoir}$$

Amount of Dust Removed (Precompressed dust cm ³ /h)			Amount of Dust Removed (Precompressed dust cm ³ /h)		
RPM	Large Reservoir	Small Reservoir	RPM	Large Reservoir	Small Reservoir
6	73.2	9.3	0.1	1.2	0.16
5	61.2	7.74	0.09	1.1	0.14
4	49.0	6.19	0.08	0.98	0.12
3	36.7	4.64	0.07	0.86	0.11
2	24.5	3.10	0.06	0.73	0.09
1	12.2	1.55	0.05	0.61	0.08
0.9	11.0	1.39	0.04	0.49	0.06
0.8	9.8	1.24	0.03	0.37	0.05
0.7	8.6	1.08	0.02	0.24	0.03
0.6	7.3	0.93	0.01	0.12	0.016
0.5	6.1	0.77	0.009	0.11	0.014
0.4	4.9	0.62	0.008	0.10	0.012
0.3	3.7	0.46	0.007	0.09	0.011
0.2	2.4	0.31	0.006	0.07	0.009

Dust generation versus scraper advance

Ordering Information

Cat. No.	Description
700700-SG-04	Dust Generator "Advanced" for dust generation acc. to Wright, for dispensing dust from compressed substances. Including: <ul style="list-style-type: none">■ stainless steel blade■ electrical motor with enhanced motor power and adjustable speed■ rotation sensor■ control unit for rotation control
700700-HP-15	Manual Hydraulic Press for compression of dust cakes, for dust generation 700700-SG series. Specifications: <ul style="list-style-type: none">■ maximal pressure 15 tons■ lower pressing face diameter: 86 mm■ distance between pressing faces: 38 and 152 mm■ dimensions (mm): 610 x 310 x 190
700800-KM-01	Concentration Measuring Unit for continuous tendency measurement of aerosol concentration in the exposure system

TSE Systems offers additional modules to create a complete exposure system. Please find out more about:

■ **Head Nose Only Exposure Units**

Modular, stackable structure for different size conditioning units. Available for animal sizes from mouse to dog with directed-flow principle

■ **Whole Body Exposure Units**

Robust, user-friendly design for homogeneous test substance distribution. Different volumes available for variable animal sizes and test animal numbers

■ **Cell Culture Exposure System**

Ideally suited system for screening tests with tissue, using Transwell® inserts of varying sizes. Extended viability of cultures by heating/humidification

■ **Nanoparticle Analysis**

TSE System offers instrumentation to analyze nanoparticle size and concentration, such as Condensation Particle Counter or Differential Mobility Analyzer

■ **Daco Inhalation Software**

Control and recording software for inhalation systems with multi-control mode for system extension. Advanced safety and GLP compliance features

■ **Sensors and Controllers**

TSE Systems supplies a number of environmental sensors and mass flow controllers specifically designed for each inhalation system

Specifications subject to change without notice

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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

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.

