

## Variable Dilution System

## VDS 562



Variable Dilution System VDS 562 for moderate to high dilution, to be calibrated for various flow rates.

The Variable Dilution System VDS 562 was especially developed to lower concentration levels of highly concentrated aerosols to adequate concentration levels by one device, without external particle-free air supply and negligible pressure drop.

For optimal aerosol-analytical conditions, several measurement and test applications require a defined reduction of the particle number concentration (VDI 3491). Depending on the application, dilution factors between  $> 1$  up to  $1'000'000$  can become necessary. In practise, especially the realisation of high dilution factors ( $> 1'000$ ) is complicated (e.g.: cascading of dilution systems) and is accompanied either by a considerable pressure drop or by an excessive air consumption. The dilution factor of a VDS 562 can be varied within each operation range over approximately one decade. According to the customer's requirements, one VDS 562 device can be calibrated for multiple flow rates from 28,3 l/min up to 100 l/min.

### Applications

- reduction of high particle concentrations to analytically-suited concentration levels

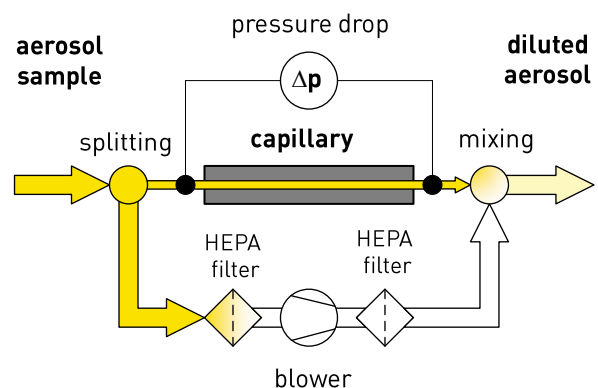
- dilution of raw gas concentrations approval/validation of clean rooms (VDI 2083)
- avoidance of agglomeration (coagulation) in sampling lines for process monitoring
- validation of optical particle counters for clean room applications (ISO 21501-4)

### Features

- considerable high, infinitely variable dilution by one device (up to 1:100'000)
- to be calibrated at factory for multiple flow rates between 28,3 l/min – 100 l/min
- pressure drop compensation by implemented blower (active dilution)
- controlled set point dilution and possibility of remote-controlled adjustment

### Principle of operation

The principle of operation of the VDS 562 is based on the approved dilution principle used by Topas, where the inlet aerosol flow is split at first due to a flow resistance (capillary).



Principle of operation of the Variable Dilution System VDS 562.



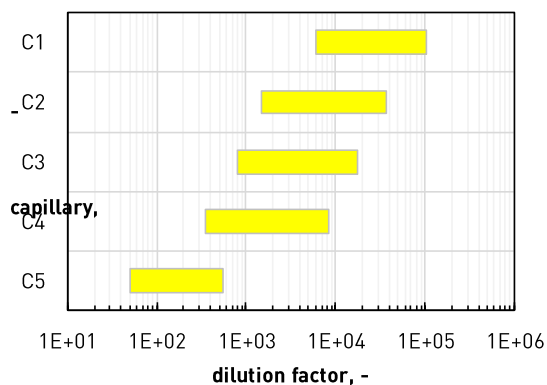
## Specifications

After particle separation from the bypass (HEPA filter), both the capillary flow and bypass flow are mixed back. This results in a reduced concentration at the outlet of the dilution system.

A controlled blower within the bypass compensates pressure drop (of the capillary) and serves for auto-mated readjustment of the capillary flow rate to ensure a constant dilution over time.

### Details

The dilution range of the VDS 562 depends on the used capillary type and the operation flow rate. For calibration at factory, the flow rate(s) and the main range of dilution (capillary) have to be specified. Ex-change of capillary type necessitates also a device calibration at factory.



Dilution range of various capillaries (C1 ... C5) for an operation flow rate of 28,3 l/min.

The adjustment of the operation flow rate and set point dilution is done via USB by the associated control software "VDS562WIN". Respective calibration data are transferred to the dilution system via "VDS562WIN" and are thus available for operation.

### Accessories (optional)

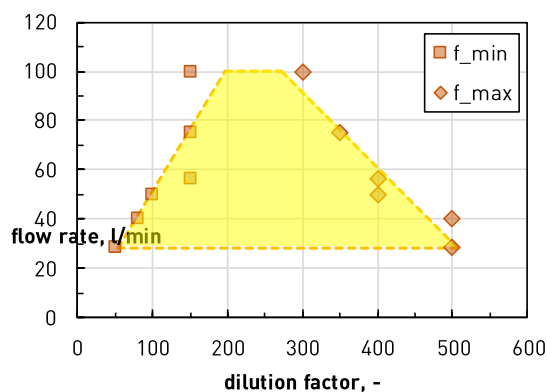
- antistatic silicon tube ( $\varnothing$  4,8 mm,  $\varnothing$  7,9 mm)

### References

Jørgensen (2019) Comparison of four nanoparticle monitoring instruments relevant for occupational hygiene applications. J. Occup. Med. Toxicol., 14, 28, doi: 10.1186/s12995-019-0247-8

Romano et al. (2015) Numerical and experimental analysis of airborne particles control in an operating theater. Build. Environ., 89, 369 - 379. doi: 10.1016/j.buildenv.2015.03.003

Wenner et al. (2017) Aerosol Generation During Bone-Sawing Procedures in Veterinary Autopsies. Vet. Pathol., 54(3) 425-436. doi: 10.1177/0300985816688744



VDS 562 operation range example, calibrated for six flow rates with nominal dilution of 50 ... 500 (capillary C5) at 28,3 l/min.

### Technical specifications

dilution factor	variable, based on type of capillary and operation flow rate (e.g.: 6'000 ... 100'000)
pressure drop	100 ... 400 Pa, depends on dilution range
flow rate	several flow stages between 28,3 ... 100 l/min, calibration at factory
control response time	< 2 min
filter category	HEPA
filter capacity	20 g
PC-interface	USB
power supply	115 ... 230 V AC
dimensions (w x h x d)	300 x 200 x 130 mm
weight	2,5 kg
normative references	VDI 2083, VDI 3491, ISO 21501-4

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QMS certified according to DIN EN ISO 9001.



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