VKL 10

Dilution system with a dilution factor of 1:10

Model Variations

VKL 10 E

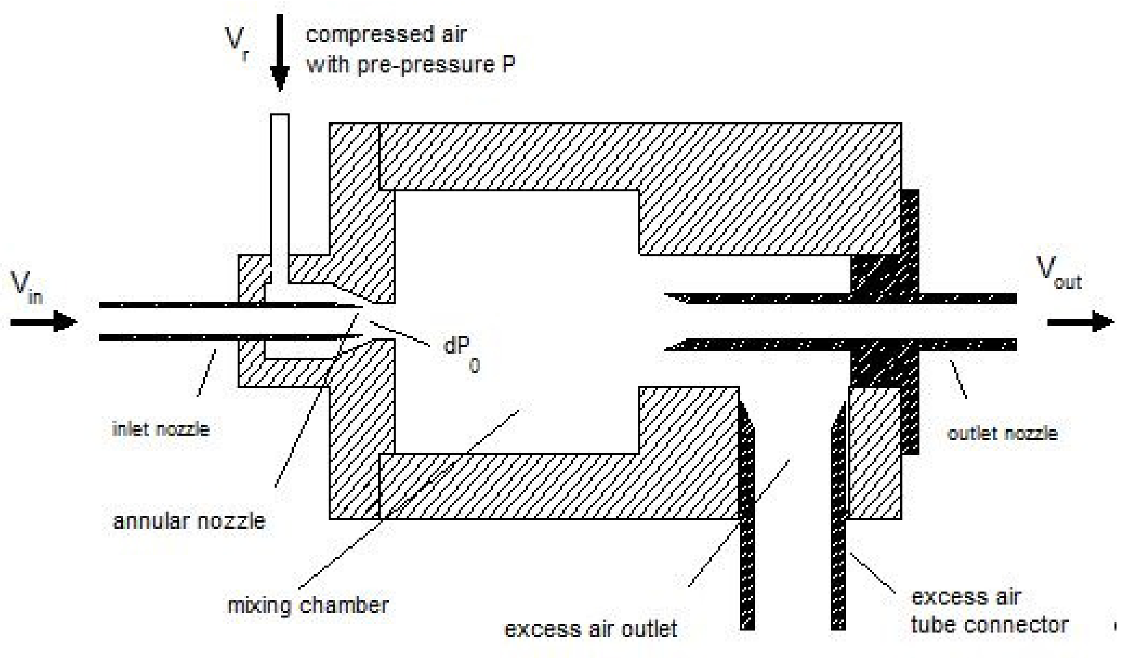
Dilution system made of stainless steel for chemically aggressive aerosols with a dilution factor of 1:10.

VKL 10 ED

Pressure-resistant dilution system made of stainless steel for dilution at up to 10 bar counter-pressure, and for chemically aggressive aerosols with a dilution factor of 1:10.

Description

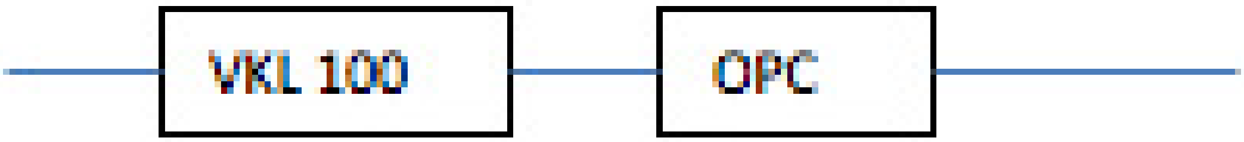
The VKL 10 series of dilution systems can reduce the concentration of aerosols by the dilution factor 01:10, also of very highly concentrated aerosols, in a defined and reliable way. The Palas® VKL 10 dilution systems are used in vertical operation for the particle size range up to 20 µm for powders and dusts. Dilution factors of up to 1:100,000 are achieved by cascading several VKL systems. **Functional principle**



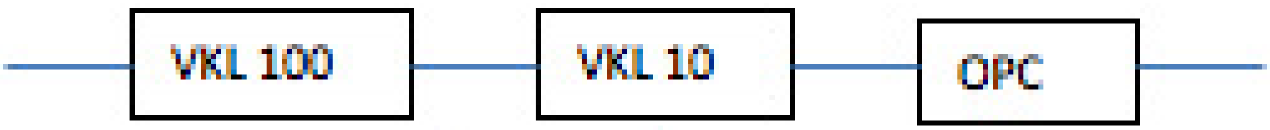
Particle-free air with the volume flow V_R circulates through an annular passage around the suction nozzle. Thus, according to Bernoulli, a volume flow V_{An} is generated at the suction nozzle. The dilution factor V_F is calculated according to the following formula

$$\dot{V}_F = \frac{(\dot{V}_R + \dot{V}_{An})}{\dot{V}_{An}}$$

Representative dilution of particle size distribution of the Palas® dilution systems by cascading VDI report no. 1973 from 2007 proved metrologically that a reproducible aerosol dilution is possible with the Palas® dilution systems down to V_F 100,000. **Simple functional test on-site** With this simple test set-up, the Palas® cascaded dilution systems can be checked by anyone themselves: Firstly a particle measurement is performed with one dilution step. Here it is important that the aerosol concentration, e.g. lab air, to be measured does not exceed the coincidence limit (maximum detectable aerosol concentration). In the second step, the dilution step to be tested is connected in series (cascaded). To check the dilution factor of the test step (pos. 2), the total particle count form the measurement in pos. 1 is divided by the total particle count from pos. 2. **Experimental setup**



Position 1: Lab air



Position 2:nbsp Lab air The VKL 100 serves to measure coincidence-free with the OPC; the VKL 10 is tested. **Measurement example**

Particle class in µm	Number Pos.1
0.2	151648
0.3	71604
0.5	4305
0.7	360
1.0	82
2.0	16
3.0	1
5.0	0
Sum	228016

Particle class in µm	Number Pos.2
0.2	15166
0.3	7290
0.5	524
0.7	65
1.0	21
2.0	3
3.0	0
5.0	2
Sum	23071

Calculation of the dilution factor

$$V_F = \frac{\dot{N}GesPos1}{\dot{N}GesPos2} = 9,88$$

Provided the first measurement is not affected by a coincidence error and the dilution system under test is working (not soiled), a dilution factor of almost 10 is determined. If this should not be the case, there was possibly coincidence in measurement 1. In this case the aerosol concentration has to be decreased or a further dilution step used. Another possibility would be that the dilution step to be tested is soiled. In this case the device has to be cleaned and the test repeated.

VKL 10

Type	Dilution factor* V_F	Pressure - resistant up to 10 bar	Chemically resistant	Heatable up ... °C	dp_{max} in µm	Compressed air 4 – 8 bar	Cascadable	Voltage
DC 100	10, 100				< 5			115 V / 230 V
DC 1000	10, 100, 1000				< 5			115 V / 230 V
DC 10000	10, 100, 1000, 10000				< 5			115V / 230 V
KHG 10	10		x	150	< 20	x	x	115 V / 230 V
KHG 10 D	10	x	x	150	< 20	x	x	115 V / 230 V
PMPD 100	100		x	200	< 5	x		115 V / 230 V
PMPD 1000	1000		x	200	< 5	x		115 V / 230 V
VDD 10	1 – 10				< 10	x		115 V / 230 V
VKL 10	10				< 20	x	x	
VKL 10 E	10		x		< 20	x	x	
VKL 10 ED	10	x	x		< 20	x	x	
VKL 10 V	10				< 20	x	x	
VKL 27	27				< 10	x	x	
VKL 100	100				< 2	x	x	

*Other dilution factors on request

Table 1:nbsp Technical characteristics of Palas® dilution systems

Benefits

- The dilution systems from Palas® are characterized unambiguously. This is documented with a calibration certificate for each individual device.
- The dilution steps deliver a temporally constant, representative dilution with the factors 10 and 100.
- The dilution systems can be cascaded with the factors 100, 1,000, 10,000 and 100,000
- **Low compressed air consumption** , e.g. just **128 l/min** with a dilution factor of 10,000 with four VKL 10 systems
- The dilution steps are combinable with all common particle counters.
- With a simple test set-up these cascaded dilution systems can be **checked by the users themselves**.
- **Isobaric dilution up to 10 bar overpressure / isothermal dilution up to 120°C with the VKL 10 E, VKL 10 ED, KHG 10 and KHG 10 D dilution systems**
- Simple functional test on-site

VKL 10

Datasheet

Parameter	*Description*
Dimensions	100 • 245 • 100 mm
Weight	approx. 4 kg
Dilution factor	1 : 10
Isokinetic suction nozzles	0.028 – 0.06 l/min, 0.23 – 0.5 l/min, 0.6 – 1.6 l/min, 2 – 5 l/min, 28 l/min => 15 – 37 l/min
Maximum particle size	< 20 µm (for dusts)
Special features	Cascadable
Volume flow (clean air)	18 – 45 l/min
Volume flow (suction flow)	2 – 5 l/min
Compressed air supply	4 – 8 bar

Applications

- Aerosol measurement technology: diesel exhaust gases, swarfs, coolant aerosols, weld smoke, oil droplets, test aerosols of filters and inertial separators
- Separation efficiency determination with counting measuring methods, e.g. with dust filters or HEPA/ULPA filters
- Leak test and acceptance measurements of clean rooms, isolators and safety work benches
- Inhalation toxicology
- Quality control of respirator masks and filter cartridges

Palas GmbH
Partikel- und Lasermesstechnik
Greschbachstrasse 3 b
76229 Karlsruhe
Germany

Managing Partner:
Dr.-Ing. Maximilian Weiß
Commercial Register:
register court: Mannheim
company registration number: HRB 103813
USt-Id: DE143585902

Contact: E-Mail: mail@palas.de Internet: www.palas.de Tel: +49 (0)721 96213-0 Fax: +49 (0)721 96213-33