



Unikat Combifilter

Diesel Particulate Filters (DPF)



Fork lift trucks
Wheel loaders
Generator sets
Mining vehicles
Railway engines



Function

The Unikat Combifilter is an integrated diesel particulate filter and silencer, which typically removes >90% of diesel particulate (PM) from engine exhaust. The filtered particles (soot) are stored in the filter until the vehicle is plugged into a wall mounted regeneration station. Regeneration is typically required on a daily basis either once a work shift (8 hours), or overnight. The Combifilter can be further combined with an AZ diesel

oxidation catalyst for the reduction of the gaseous pollutants carbon monoxide (CO) and hydrocarbons (HC). The AZ catalyst can either be built into the filter outlet or mounted separately upstream of the filter. The unique coating of the AZ catalyst enables it to work both more efficiently and at lower temperatures which makes it suitable for installation in the filter outlet.

Models

A variety of Combifilter models are offered to cover a broad range of applications.

Unikat Combifilter model V features

- Cordierite ceramic monolithic filter.
- 8 hour filter regeneration performed when the vehicle is not in operation.
- Ideal for low load and regular driving conditions.

Unikat Combifilter model K features

- Silicon carbide (SiC) monolithic filter offers superior durability.
- 8 hour filter regeneration performed when the vehicle is not in operation.
- Ideal for heavy-duty driving conditions.

Unikat Combifilter model S features

- Silicon carbide (SiC) monolithic filter offers superior durability.
- 40 minutes regeneration performed when the vehicle is not in operation.
- Ideal for heavy-duty driving conditions.
- Combifilter Control

All models can be delivered as standard systems (regeneration on the vehicle) or as exchange systems (regeneration externally with filter changeout).

Product sizing

To obtain the proper filter size, the engine make, maximum allowed backpressure and driving conditions must be known. The charts on the next pages show the recommended engine intake air flow for each filter size. If you do not have the actual OEM intake air flow, use the

general equation below to determine the approximate value.

Please contact Engine Control Systems or your local distributor for further sizing information or assistance.

Engine intake air flow (m3/h) =

$$\frac{\text{Engine displacement (liters)} \times \text{maximum RPM of engine} \times \text{VE} \times 60}{\text{Engine cycle} \times 500}$$

Engine cycle = 2 for two-stroke engines
and 4 for four-stroke

VE = 0.85 for normally aspirated engines
1.7 for turbocharged
2.0 for turbocharged and aftercooled

Standard system

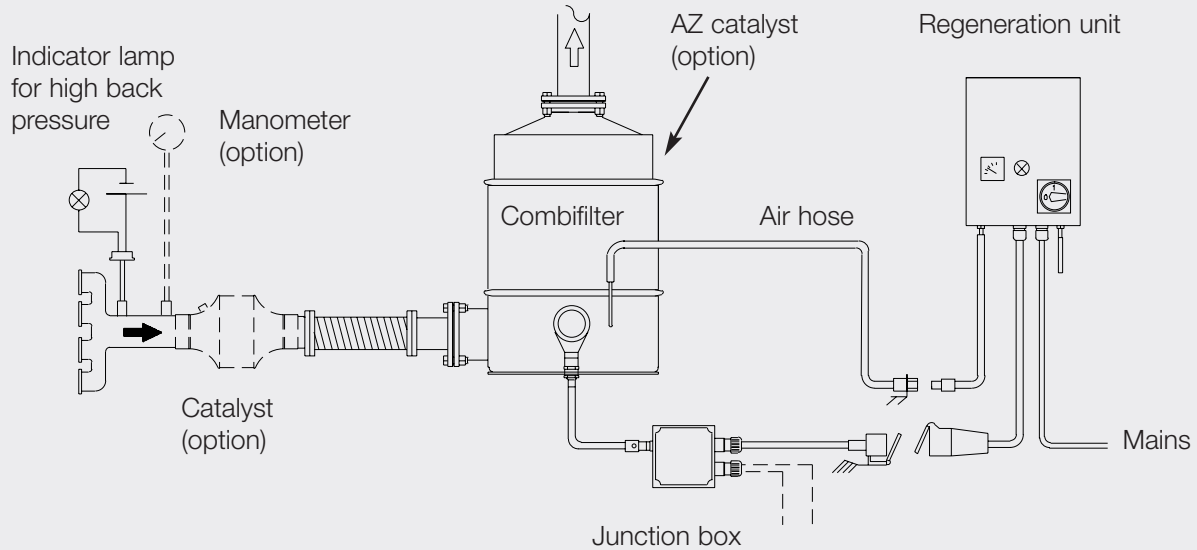
The standard system consists of:

- A Combifilter which is mounted in the exhaust system in place of the original silencer.
- An indicator lamp, which is mounted in the driver's cab and warns of high back pressure.
- A wall mounted regeneration unit with an air pump and components for monitoring regeneration. The unit is installed at the vehicle's parking place.
- Cables and hoses for electrical connections and air supply.

- A starter blocker to prevent the vehicle from starting during regeneration.

Options:

- AZ diesel oxidation catalyst for the reduction of gaseous pollutants. The catalyst can either be built into the filter or mounted separately upstream of the filter.
- A manometer which continuously monitors the back pressure.

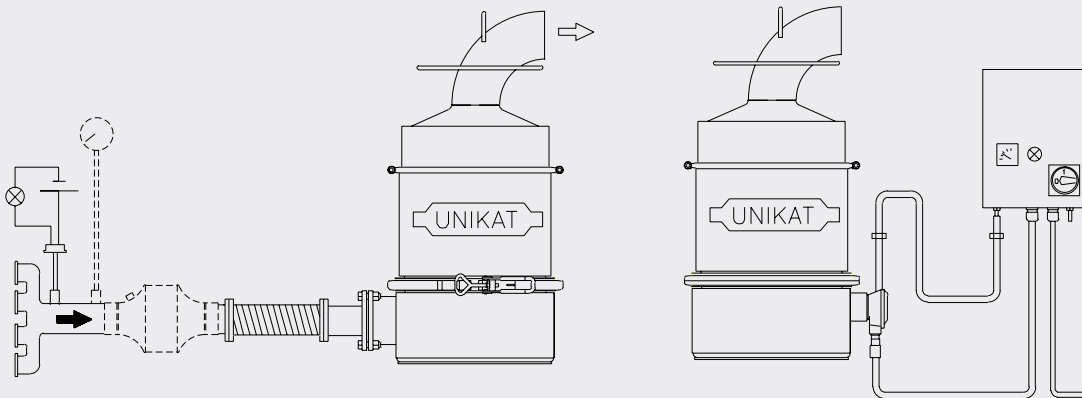


Exchange system

If the vehicle is operating multiple shifts or it is difficult to fit in the time needed to regenerate the filter on a regular basis, an exchange system with two filters can be used. A clean filter simply replaces the dirty filter. The dirty filter is then regenerated on an off-board filter regeneration station.

The exchange system consists of:

- A Combifilter with quick release clamps, which is mounted on the vehicle.
- An exchange filter with quick release clamps and an off-board filter regeneration station, cables and hoses for electricity and air supply.



Combifilter mounted on the vehicle

Exchange filter with off-board filter regeneration station

Unikat Combifilter - Model V

The Unikat Combifilter model V is intended for low load and regular driving conditions and features a cordierite ceramic filter. Regeneration takes eight hours and is performed when the vehicle is not in operation.

With the engine intake air flow shown in the table below, the operation time is 8 hours at normal driving conditions.

The operation time will be shorter if the engine is in poor

mechanical condition, is operated under very heavy loads or the available back pressure is limited. In such cases we recommend a bigger filter size.

Intake air flow m3/h	Item no.	Model	Weight* kg	A mm	B* mm	C** ø mm	EI V/kW
275	700504	V 4	18	225	420	70	230 / 1.5
550	700509	V 9	30 (25)	350	450 (370)	100	230 / 1.8
600	700510	V 10	25	275	475	70	230 / 1.8
650	700512	V 12	35 (30)	350	500 (420)	100	230 / 1.8
1000	700518	V 18	40 (35)	350	600 (520)	100	230 / 1.8
2000	702518	2x V 18	80 (70)	750	650 (570)	140	400 / 3.6

*Size without catalyst in brackets

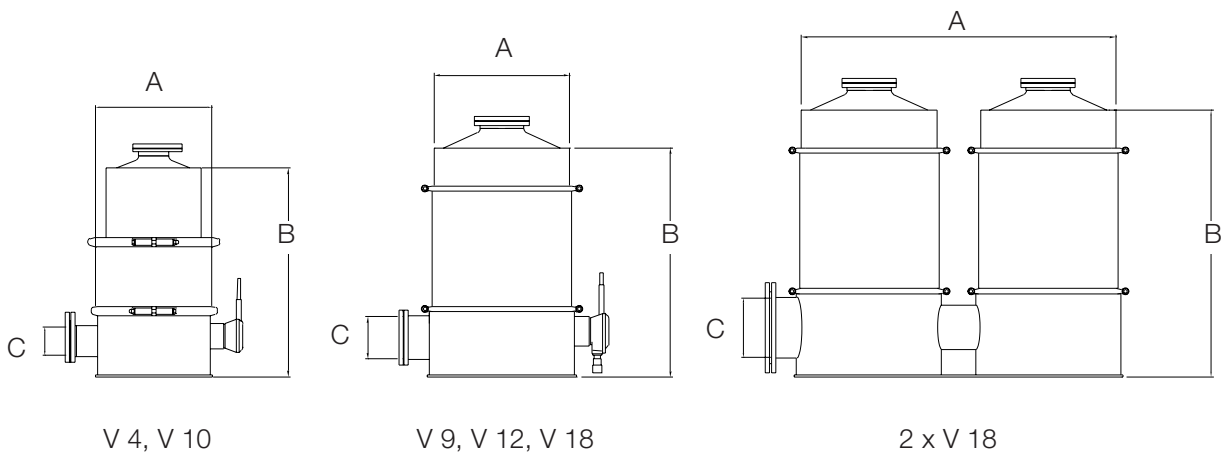
**Max ø

Design - Model V

The choice of inlet and outlet sections depends on the installation, see also page 7. All inlet sections incorporate mounting plates for vertical installation. The inlet and outlet sections can be supplied with brackets for horizontal installation on request.

When ordering, please inform us whether you prefer a vertical or horizontal installation. The inlet sections for the filter models 2 x V 18 can be supplied as a single integrated unit or as separate individual inlet units.

All outlet sections can be optionally supplied with an integrated AZ catalyst for the reduction of gaseous pollutants. A variety of matched flange sets can also be ordered to allow incorporation into existing exhaust pipework.



Unikat Combifilter - Model K

The Unikat Combifilter model K is intended for demanding applications and irregular driving conditions. The model K features a silicon carbide (SiC) filter which offers improved heat resistance and durability.

Regeneration takes 8 hours and is performed when the vehicle is not in operation. With the engine intake air flow shown in the table below, the operation time is 8 hours at normal driving conditions. The

operation time will be shorter if the engine is in poor mechanical condition, is operated under very heavy loads or the available back pressure is limited. In such cases we recommend a bigger filter size.

Intake air flow m ³ /h	Item No.	Model	Weight* kg	A mm	B* mm	C** ø mm	EI V/kW
250	700703	K 3	25 (22)	225	420 (350)	70	230 / 1.5
350	700705	K 5	28 (24)	275	420 (350)	70	230 / 1.8
550	700709	K 9	34 (29)	350	450 (370)	100	230 / 2.2
1000	700718	K 18	44 (39)	350	600 (520)	100	400 / 3.3
1300	700724	K 24	54 (49)	350	800 (655)	100	400 / 3.3
2000	702718	2x K18	88 (78)	750	650 (570)	140	400 / 6.6

*Size without catalyst in brackets

**Max ø

Design - Model K

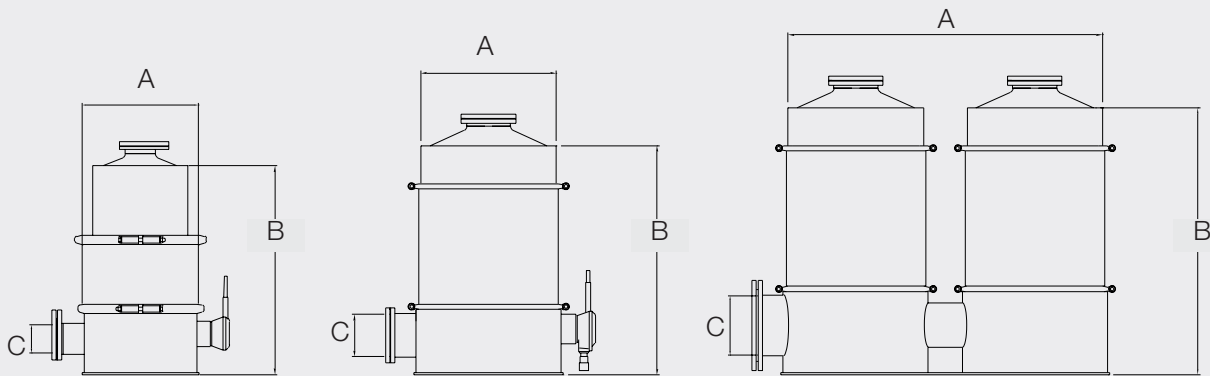
The choice of inlet and outlet sections depends on the installation, see also page 7. All inlet sections incorporate mounting plates for vertical installation. The inlet and outlet sections can be supplied with brackets for horizontal installation on request.

When ordering, please inform us whether you prefer a vertical or horizontal installation.

The inlet sections for filter model 2 x K 18 can be supplied as a single integrated unit or as separate individual inlet units.

All outlet sections can be optionally supplied with an integrated AZ catalyst for the reduction of gaseous pollutants.

A variety of matched flange sets can also be ordered to allow incorporation into existing exhaust pipework.



K 3, K 5

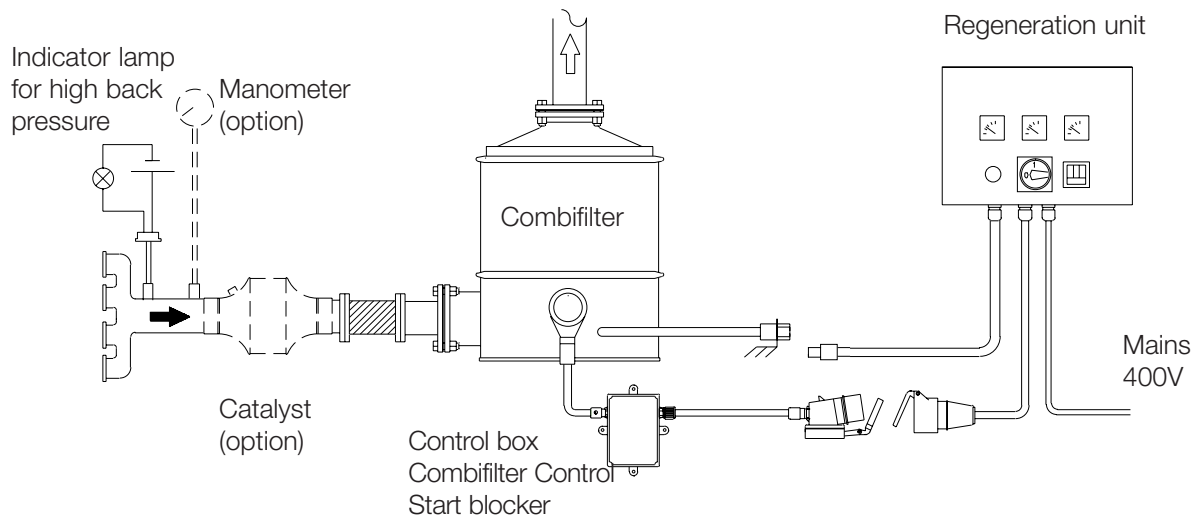
K 9, K 18, K 24

2 x K 18

Combifilter - Model S

The Unikat Combifilter model S is intended for demanding applications and irregular operations and features a silicon carbide (SiC) filter which offers improved heat resistance and durability. The model S is regenerated over 40 minutes when the vehicle is not in operation. A thermostat controls the power to the electrical heaters during the regeneration.

The Combifilter Control measures the temperature in the filter, adjusts the heat to preset temperature and shuts off the elements when regeneration is completed. Internal alarm are logged if the regeneration is interrupted or the operation time is exceeded.



Design - Model S

With the engine intake air flow as shown below the operation time is about 8 hours under normal conditions. The operation time will be shorter if the engine is in poor mechanical condition, is operated under very heavy loads or the

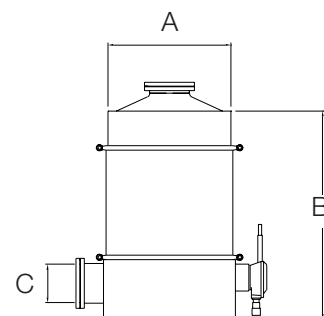
available back pressure is limited. In such cases we recommend a bigger filter size. The choice of inlet and outlet sections depends on the installation, see also page 7. All outlet sections can be optionally supplied with an

integrated AZ catalyst for the reduction of gaseous pollutants. A variety of matched flange sets can also be ordered to allow incorporation into existing exhaust pipework.

	S 3	S 5	S 9	S 18	S 24
Intake air flow (m ³ /h)	250	350	550	1000	1300
Item number	700603	700605	700609	700618	700624
Weight (kg)*	26 (22)	29 (24)	34 (29)	44 (39)	54 (49)
A (mm)	225	275	350	350	350
B (mm)*	505 (410)	515 (375)	470 (370)	750 (605)	800 (655)
C (mm)**	70	70	100	100	100
Mains (V / kW)	400 / 5.4	400 / 9.0	400 / 9.0	400 / 13.5	400 / 13.5

* Weight and size without catalyst in brackets

** Max ø of the counterflange. Please specify pipe diameter when ordering



Inlet and outlet sections for Unikat Combifilter

The choice of inlet and outlet section depends on the installation on the vehicle. All inlet sections incorporate mounting plates for vertical installation. The inlet and outlet sections can be supplied with brackets for horizontal installation on request. When ordering, please inform us whether you prefer a vertical or horizontal installation.

The inlet sections for the filter models 2 x V 18 and 2 x K 18 can be supplied as a single integrated unit or as separate individual inlet units.

Inlet sections for the standard system

- Type B 1 Inlet section with heater and bottom inlet
- Type B 2 Inlet section with heater and side inlet
- Type B 3 Inlet section with heater, quick release clamp and side inlet

Inlet sections for the exchange system

- Type B 4 Inlet section with quick release clamp and side inlet
- Type B 9 Inlet section with quick release clamp and bottom inlet
- Type B 5 Separate inlet section with heater and no inlet

Outlet sections for the standard system

- All outlet sections can be supplied with a catalyst incorporated for the reduction of gaseous pollutants.
- Type T 2 Outlet section with flange and top outlet
 - Type T 3 Outlet section with top outlet and pipe bend
 - Type T 7 Outlet section with flange and side outlet

Outlet sections for the exchange system

- Type T 5 Outlet section with top outlet, pipe bend, hook and handle

Design

The Combifilter housing is manufactured of stainless steel and consists of an inlet section, a filter section and an outlet section. The parts are kept together with clamps which

allows easy dismantling for inspection and service. The choice of inlet and outlet sections depends on the installation. The filter part is sized according to the exhaust

gas volume from the engine. The regeneration unit and junction box are made of shock-proof plastic and are supplied complete with connecting cables and air hose.



Reduction

The Combifilter effectively removes particulate (soot) from diesel exhaust and is also a silencer.

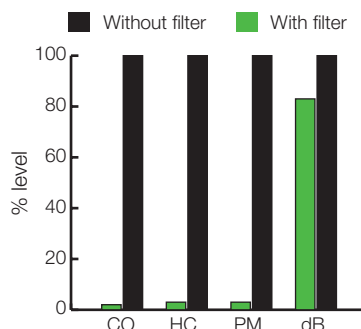
Typical reductions are as follows*:

- Particulate (soot), PM 96 %
- Silencing > 15 dB

If the Combifilter is optionally supplied with an AZ-catalyst, gaseous pollutants are typically removed as follows*:

- Carbon monoxide (CO) 99 %
- Hydrocarbons (HC) 96 %

* Tested according to ISO 8178.



The Combifilter has been fully tested by independent testing houses and we are happy to furnish more details of these tests if required.

For further service or for information on our other products, please contact Engine Control Systems or our distributors.

Warranty policy

Engine Control Systems' products are warranted for workmanship and defects of material for a period of 12 months, max. 2000 hours of operation. The obligation of this warranty is limited to the replacement of the product.

The provisions of this warranty do not apply to the product incorrectly chosen, or installed or operated, nor to any product that has been subjected to damage or negligence.

Engine Control Systems shall not be liable for any incidental or consequential damages or for breach of any express or implied warranty.

Your distributor

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