# Product Range

## Diesel Particulate Filters

## Modular SMF® and SMF®-AR Systems

## Mobile Machinery

## Stationary Applications

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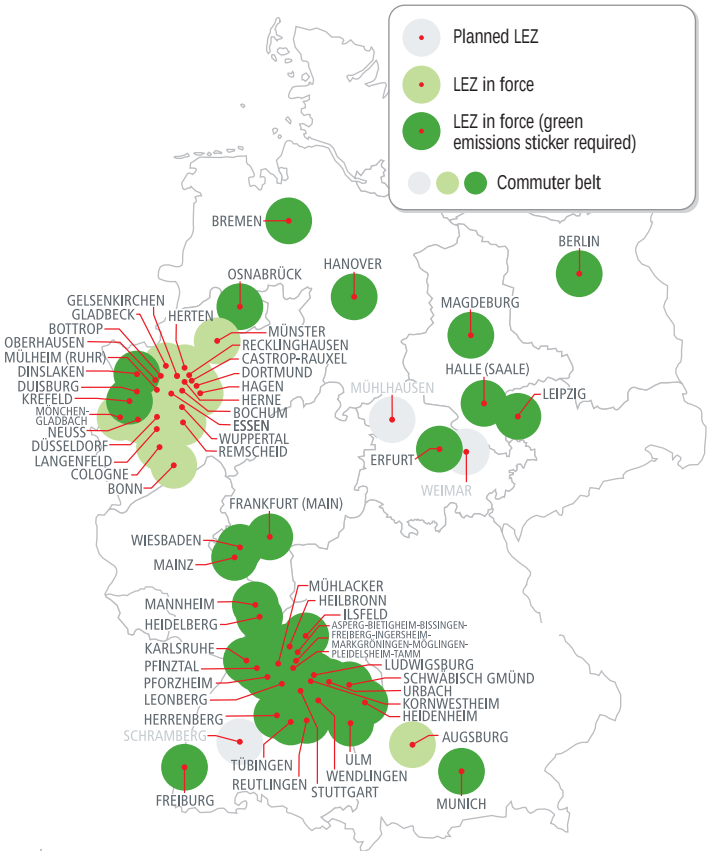
*Clean Solution with Diesel Particulate Filters*

# 1. Challenge: Clean Diesel Emissions for Mobile Machinery and Stationary Applications

## Reducing diesel pollutant emissions

Diesel engines are powerful, long-lasting and offer low fuel consumption. These are precisely the reasons why they are to be found on small and large-scale construction sites, usually in continuous service. However, when diesel is combusted in a diesel engine, the process gives rise to pollutants such as soot particles. The smaller these soot particles are, the easier it is for them to pass through our lungs and on into our bloodstream and other vital organs. Soot particles from diesel engines, then, are known to represent a significant health hazard.

For this reason, numerous measures for reducing pollutant emissions are gradually coming into force at European and national levels. These measures include, for example, EU Directive 2008/50/EC on ambient air quality, which came into force at the beginning of 2005. The declared objective of this directive, its derivative directives and the implementations in national law by the member states (in Germany, the Federal Pollution Control Act, 'Bundesimmissionsschutzgesetz' or BImSchG for short) is to maintain ambient-air quality where it is good and improve it in other cases, and precisely this principle is applied with particular vigour in the case of Europe's major cities and conurbations.




• Low emission zones in Germany

*Appreciable reduction in air pollution*

The regulations oblige city and local authorities to take action against the increasing pollution levels in inner-city areas. Among the measures already taken is the setting-up of low emission zones in Germany and other European countries and the so-called "filter obligation" for construction machinery in Switzerland.

| | Average over | $PM_{10}$ limit (Particulate Matter) |
|---|---|---|
| since 01.01.2005 | **24 h** | **50 µg/m³**<br>No more than **35** violations p. a. permissible/year |
| | **1 year** | **40 µg/m³** |

• EU Directive 2008/50/EC

### Germany

Currently, the driving restrictions in force in low emission zones apply only to passenger cars, light- and heavy-duty trucks and buses. Depending on stipulations for each given LEZ, vehicles must have a red, yellow or green sticker affixed to the inside of their windscreen before they can access the zone.

In 2012, the World Health Organization (WHO) reclassified diesel exhausts as carcinogenic and reassigned them to the same class of hazardous materials as asbestos, arsenic and mustard gas.

Furthermore, some medical studies have identified that construction workers who work in the vicinity of diesel-engined machinery suffer from higher rates of cancer. To protect construction workers, Germany's BG BAU employers' liability insurance association for the construction industry and IG BAU union are demanding the use of "cleaner" construction machinery and consequently the retrofitting of filters to existing older machines as well. As a result, we can soon expect to see invitations to tender for public-sector civil engineering projects insist upon the use of filters in all machinery used on site. Deutsche Bahn (German Rail) is also going down this route, demanding a commitment on the part of engineering companies to use cleaner machinery before it considers awarding them a contract.

Over and above the EU directives that apply, other laws apply in Germany, such as **TRGS 554 (Technical Rules on Hazard Substances – Diesel Engine Emissions)**. This protection regulation covers activities in work areas that can be subject to diesel engines emitting exhaust gases into the ambient air. This includes, for instance, workshops, production shops, construction works below ground, tunnels and truck cargo spaces that are at least partially enclosed. The TRGS rules make the use of diesel particulate filters mandatory, with filtration efficiency rates of at least 90%.

## Switzerland

Switzerland is benchmark when it comes to combatting diesel soot, a primary contributor to airborne particulate matter: particulate filters have been compulsory in construction machinery for a long time now. Since as long ago as 1983, numerous laws have been passed with respect to reducing emissions levels. Within the scope of the "VERT" project (Verminderung der Emissionen von Real-Dieselmotoren im Tunnelbau, or in English, "Reduction of Diesel Emissions in Tunnelling"), a quality test was defined specifically for diesel particulate filters. This test method has since become the internationally recognised standard for testing pollutant-reducing systems. Filters that meet the technically demanding criteria are listed by the Swiss Federal Office for the Environment (FOEN, or BAFU from the German).

| Particulate Filter | | Conformity Certification | | | |
|---|---|---|---|---|---|
| Manufacturer | Filter Family/Type Classification | Assessment Dept. | Certification No. | Date of Certification | Valid Until |
| HJS | SMF®-AR | BAFU | B195/12.06 | 12.2006 | 31.12.2013 |
| HJS | SMF®-CRT | BAFU | B159/03.05 | 03.2005 | 31.12.2013 |
| HJS | SMF®-FBC | BAFU | B195/12.06 | 12.2006 | 31.12.2013 |

• BAFU filter list (extract)

*Appreciable reduction in air pollution*

Only VERT-certified systems that achieve a filtration efficiency rate of at least 97% are allowed to be used in Switzerland. Above all, this applies to particularly harmful ultra-fine particulate matter (particulates with a diameter < 0.1 µm).

Since January 2009, the diesel PM emissions of mobile machinery on construction sites are subject to more stringent regulations. The new provisions laid down in the Air Quality Control Regulation (LRV) are for the most part oriented to the VERT method and stipulate the use of diesel particulate filters for mobile machinery with a power output from as low as 18 kW.

### BAFU filter list (extract)

HJS systems are VERT-certified and included on the BAFU filter list. As such, they meet the tough Swiss specifications for diesel particulate filters (More information: www.umwelt-schweiz.ch).

*Tried-and-tested particulate filter systems for fitting to diesel engines*

### WORLDWIDE – Selection

**Austria:** In Tyrol and the redevelopment area of Vienna, construction machinery with a power output of 18 kW or more are only approved for use when fitted with a diesel particulate filter with a filtration rate of at least 95%.

**UK:** On selected construction sites in London, only construction machinery fitted with exhaust-gas aftertreatment systems are allowed to be used.

**Italy:** Particulate filters are mandatory for construction machinery deployed on public construction sites in South Tyrol.

**USA:** A range of different measures are being taken in the USA to reduce the level of pollutants emitted by construction machinery. The "Diesel Risk Reduction Plan" of the California Air Resources Board (CARB) envisages a reduction in particulate emissions in California of 85% by 2020. Other measures include the use of diesel particulate filters on construction sites in cities such as New York, Washington DC, Houston and Boston.

### Well equipped for making bids

A step ahead with environmental protection technologies: Having particulate filters installed is increasingly becoming a crucial criterion if you are to win new contracts.

# 2. HJS Exhaust-gas Aftertreatment Systems

In order to cut the pollutant emissions of mobile machinery, HJS offers modular diesel particulate filter systems specifically developed for such applications. Our economical and environmentally sound solutions have proven themselves many times over.

## SMF®-Sintered Metal Filter

The centrepiece of all HJS exhaust treatment systems is the Sintered Metal Filter (SMF®), with which the company sets new standards in the global marketplace. In 2003, HJS was awarded the 'Deutscher Umweltpreis' (German Environmental Award) for its development of the SMF®. This closed 100% filter reduces the emissions of soot particles, including fine particulate matter, down to the limit of detection, with a filter efficiency of over 99%.

### Reliable and low on maintenance

The SMF® and the systems based on it are exceptionally reliable in operation, low-maintenance and also benefit from a long service life. HJS systems have proved their worth over many years in more than 250,000 cars, buses, trucks and construction machines.

The advantages offered by the SMF® technology result from its special design as well as its use of sintered metal. Exhaust backpressure is minimised by the fact that there is an unrestricted inflow of gas into the filter pockets from outside. What's more, the ash holding capacity of the SMF® is considerably higher compared with that of a conventional wall-flow (honeycomb) filter. This significantly increases the mileage before an HJS filter requires cleaning, including in the case of older construction machinery and stationary applications that suffer from particularly high oil consumption. The costs for servicing and maintenance as well as the associated downtime costs fall accordingly.

Thanks to their modular construction, HJS Sintered Metal Filters can be adapted to create a range of different versions to suit different applications. They are suitable both as original equipment (OE) and also for retrofitting in mobile machinery and stationary applications.

*Flexible solutions for different applications*

### SMF® advantages at a glance

- ✔ Reduction of soot particles and fine particulate matter by more than 99%
- ✔ Suitable for OE and retrofitting applications
- ✔ Proven system already installed in more than 20,000 construction machines
- ✔ High ash holding capacity and low exhaust backpressure
- ✔ Low-maintenance and economical
- ✔ Reliable with long service life
- ✔ Easy DIY cleaning

• SMF®-Sintered Metal Filter – 100% soot-free

*HJS diesel particulate filters satisfy global requirements*

# Servicing and maintenance

## Automatic monitoring and maintenance indicator

The **HJS Service Unit** monitors a filter automatically by measuring the backpressure and temperature of the exhaust gases. Both pieces of information are displayed by the **HJS "ServiceCheck" display module**, which means the status of the filter is immediately visible at all times. The Service Unit is included in the scope of delivery and ensures the filter functions at optimum efficiency.

## Benefits

- ✔ Constant monitoring of the exhaust backpressure and temperature
- ✔ Overload detection for the particulate filter
- ✔ Automatic indication that the filter needs to be cleaned
- ✔ Lower maintenance costs

• Automatic monitoring with the electronic Service-Check

*The HJS Service Unit complies with the LRV/VERT specifications*

## Maintenance

In addition to combustible soot particles, filter systems also remove all other solid particulate matter from the exhaust gases, above all ash from engine oils and additives. These residues must be removed from the filter at specific intervals by cleaning.

## Cleaning intervals

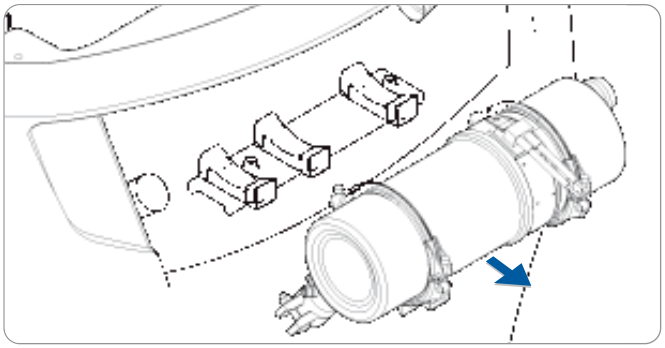
Thanks to the high ash holding capacity of the SMF®, the mileage it can cover before needing to be cleaned is considerably higher compared with that of a conventional wall-flow (honeycomb) filter. Experience shows that many machines can operate for longer than 2.000 hours before the first servicing work needs to be carried out. This makes it possible to keep the running costs for servicing and maintenance as well as the associated downtime costs to a minimum.

## DIY filter cleaning

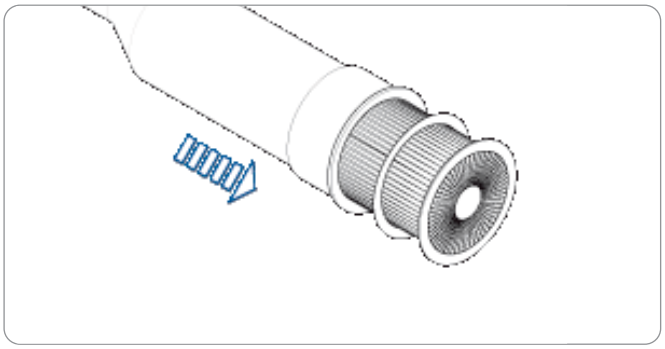
When a filter requires cleaning, you or your local garage can take care of it.

## SMF® filter modules

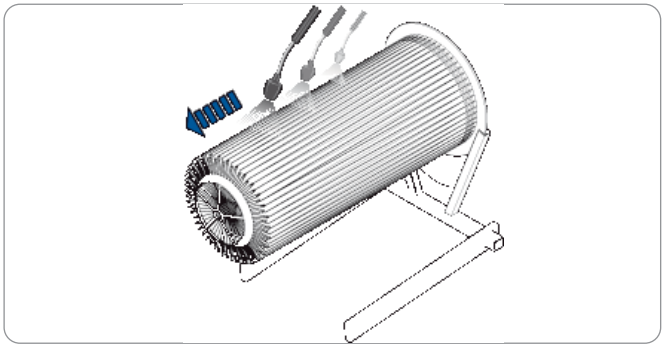
Sintered Metal Filter modules (SMF®) are simple to clean with the aid of a commercially available high-pressure cleaner (the residues must be collected in an oil separator).



• 1. Dismount Filter Module



• 2. Remove SMF® Filter from casing

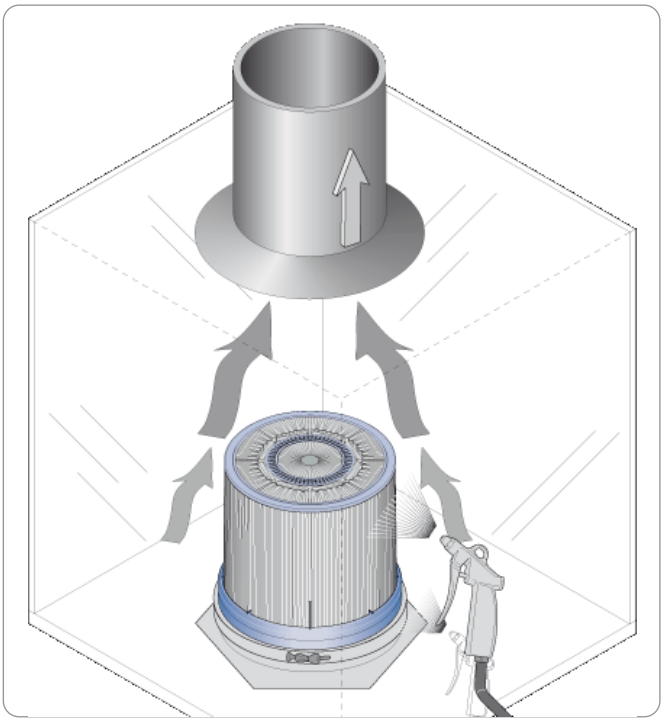


• 3. SMF® Filter cleaning with high pressure washer

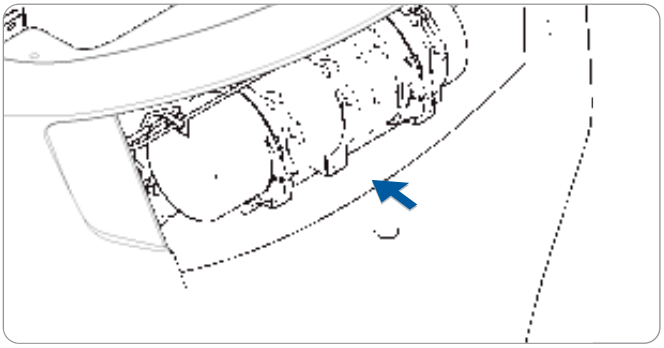
**NOTE:**
Observe all health and safety and environmental protection laws, directives and legal requirements applicable in your country.

## CSMF filter modules

Coated Sintered Metal Filter modules (CSMF) may only be cleaned using compressed air. Manual or automatic cleaning equipment with an extractor unit is required.



• 3b. CSMF – Cleaning with compressed air



• 4. Mounting of filter module

## DPF® refurbishing – Made by HJS

HJS has its very own state-of-the-art system – designed and developed by our own engineers and technicians – for industrially refurbishing your used diesel particulate filters. The cleaning process is performed in a closed loop, so that no pollutants can escape into the environment.

# Certification

**HJS diesel particular filters for mobile machinery and stationary applications …**

… are certified and approved in accordance with **Switzerland's VERT** test method

… are included on the **Swiss BAFU filter** list and as such satisfy the tough specifications laid down by the national **Air Quality Control Regulation (LRV)**

…. are approved by the US **Mine Safety and Health Administration (MSHA)**

… satisfy Germany's **Technical Rules on Hazard Substances (TRGS) 554** – Diesel Engine Emissions

*On the safe side with HJS*

# Practical experience

HJS diesel particulate filter systems are suited for original equipment as well as retrofitting of mobile machinery and stationary applications. Many engine and machinery manufacturers are already convinced – and more than 20.000 applications, such as industrial fork-lift trucks and construction machines, have already been equipped with tailor-made HJS solutions. We see ourselves as a cost- and quality-oriented partner who supplies its customers – you – with effective systems and components.

• Application example – dependant on the available installation space HJS Systems fitted accordingly

# 3. Equipping of Diesel Engines with Particulate Filter Systems

The following procedures must be followed when installing an exhaust-gas aftertreatment system for mobile machinery and stationary applications:

**Application of the Machinery**

**Exhaust-gas temperature 250° to 450°C**

SMF® system

Determine size of filter taking into account maximum permissible exhaust backpressure

Determine size of catalytic converter in line with machinery power rating and emissions standard

Check temperature profile

barely sufficient

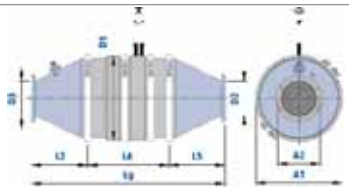
CSMF system (coated filter)

sufficient

SMF® system (uncoated filter)

Take insulation into account

Take installation space into account



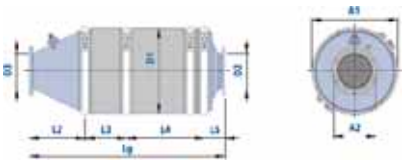
**Exhaust-gas temperature from 150 °C**

SMF®-AR system

Determine size of filter taking into account maximum permissible exhaust backpressure

Take insulation into account

Take installation space into account



**All application specifications, installation guidelines and maintenance manuals provided by HJS Emission Technology GmbH & Co. KG must be complied with.**

# 4. Modular SMF® System

SMF® technology has been developed specifically for applications in the medium to high power range. As a rule, the systems replace the original silencer, and they can be customised as required to match specific machines and stationary applications.

The modular SMF® systems require no extra regeneration aids, additives or intervention in the engine management system. The HJS Service Unit constantly displays the system's instantaneous operating state and indicates when the filter is in need of cleaning.

## Catalytic coating

For low-temperature applications, the Sintered Metal Filter can be given a special coating in order to promote the regeneration process (CSMF = Coated Sintered Metal Filter).

• Modular SMF® system

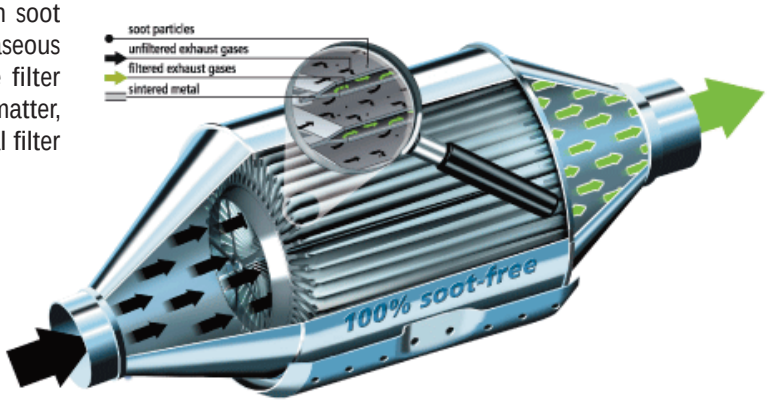
## Application examples for SMF® systems:

Construction machinery, construction vehicles and construction equipment, such as industrial forklift trucks, wheel loaders, backhoe loaders, track loaders, special vehicles, power generating sets and district heating plants

*The right system for your specific requirement*

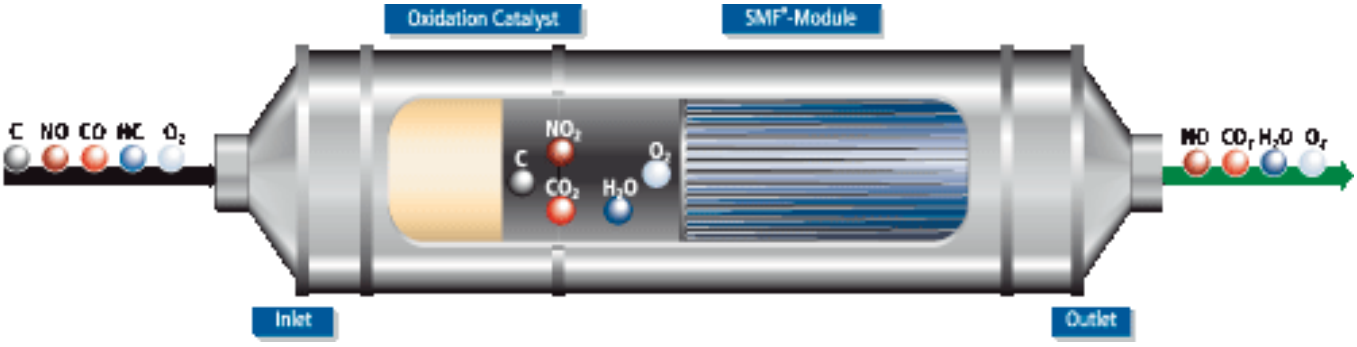
## Functional description

The hot exhaust-gases from the engine – which contain soot particles – are fed into the housing of the SMF®. The gaseous components flow through the microscopic pores of the filter pockets; the soot particles, including the fine particulate matter, are trapped on the surface and deposited on the individual filter pockets.




The CRT* (Continuous Regeneration Technology) effect is used to break down the soot that collects in the SMF®. The HJS system combines a highly efficient, upstream diesel oxidation catalyst (DOC) with an SMF®.

Optimised tuning of the system results in the filter being continuously and effectively freed from the deposited soot.




• The CRT* (Continuous Regeneration Technology) effect continuously frees the filter from the deposited soot

### Benefits

- ✔ No need for time-consuming and costly replacement of mobile machinery and stationary applications
- ✔ Reduction of soot particles and fine particulate matter by more than 99%
- ✔ Catalytic coating provides extended temperature window
- ✔ Flexible adaptation to different machines and engine power outputs

*SMF® system for retrofitting*

* CRT® is a registered trademark of Johnson Matthey Plc (Applic. No. 000906826, Class Code 012).

# 4. Modular SMF® System

## Technical data and requirements

**Max. safe temperature operation for SMF®*:** 650°C exhaust-gas temperature

**Max. safe temperature operation for CSMF**:** 450°C (max. 3% of operating time 450°C < T < 500°C)

**Filter material:** high-temperature-resistant chrome-nickel steel

**Filter housing material:** 1.4301

**Ash holding capacity:** max. 50 g/l filter volume

**Filtration efficiency rate:** (number concentration in range from 20 – 300 nm) > 99%

**Filtration efficiency rate:** (in relation to soot mass) > 97%

* SMF®: uncoated Sintered Metal Filter

** CSMF: coated Sintered Metal Filter

### Application and operating conditions

The following application and operating conditions must be complied with in order to ensure the modular SMF®/CSMF systems from HJS function optimally:

> Engine fulfils Stage II, Stage IIIA or B in Europe, Tiers 2, 3 and 4 in the USA

> Fuels used comply with DIN EN 590 (max. 50 ppm sulphur), DIN 51628 or DIN 14214 with a maximum phosphor concentration of 2 ppm and a maximum alkali concentration of 1 ppm

> Low-ash engine oils

> Exhaust-gas temperatures between 250°C and 450°C for > 35% of operating time for regeneration

> Strain-free, vibration-isolated installation of the systems and secure, gas-tight connection to the existing exhaust system

> Systems never mounted on the engine-gearbox unit

Perfect connection of the system pipework ensures low exhaust backpressure. HJS offers insulating components for all its systems to reduce their surface temperature.

**The systems must only ever be operated in conjunction with the HJS Service Unit and HJS insulation (included in the scope of delivery).**

In order to ensure the systems operate as intended, HJS and its authorised partners offer a temperature-measurement service and one-on-one application consulting.

**All application specifications, installation guidelines and maintenance manuals provided by HJS Emission Technology GmbH & Co. KG must be complied with.**

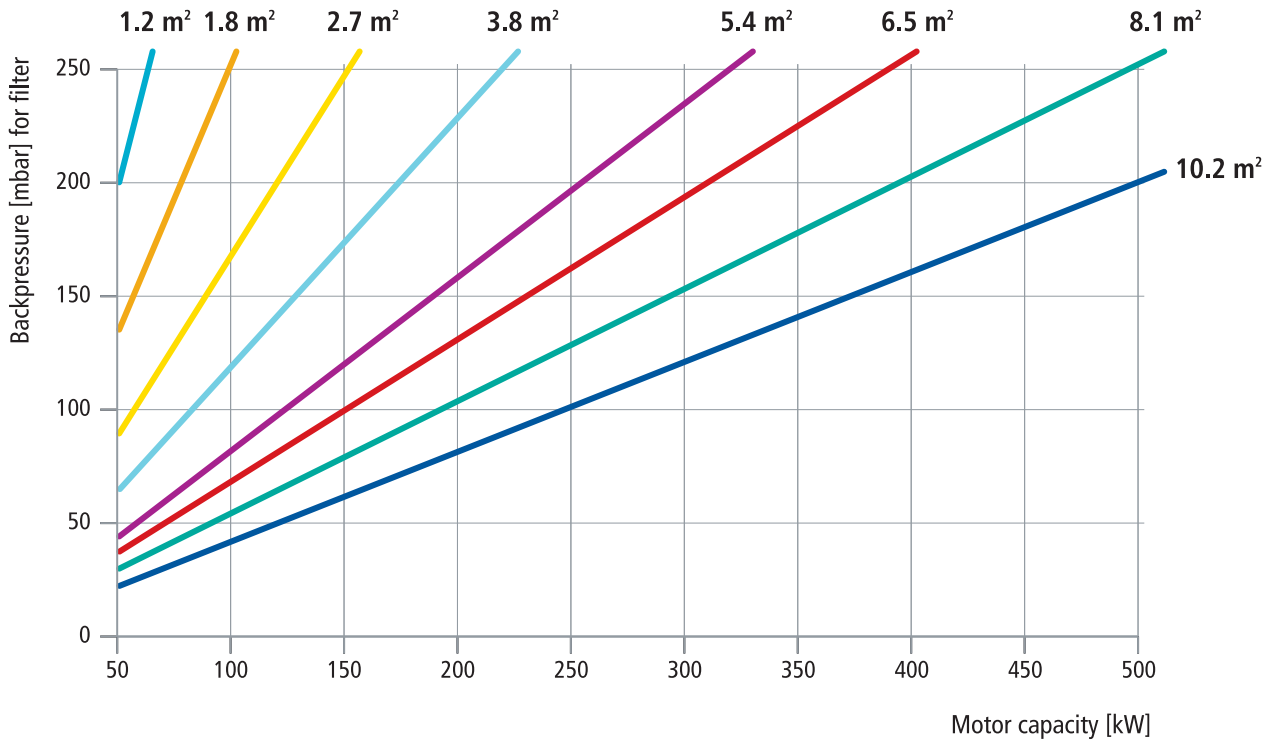
# Dimensioning the filter

HJS offers modular SMF®/CSMF systems with filter surface areas ranging from 1.2 m² to 10.2 m².

To help you choose the right size of filter, the diagram below shows the exhaust backpressure generated by each size of filter (not taking the inlet and outlet modules into account).

• SMF®-Sintered Metal Filter – 100% soot-free

## Filter surface areas* from 1.2 m² to 10.2 m²




* Refers to a filter module with a maximum temperature upstream of the DPF® of 450°C

• Backpressure of the individual filter units

## Example calculation

In the case of a construction machine with a power output of e.g. 250 kW and a maximum permissible exhaust backpressure of 200 mbar (as specified by the engine manufacturer), a filter with a surface area of 5.4 m² can be installed. In this simplified example, it should be noted that the backpressure flow of the inlet and outlet modules is not taken into account. The modules tend to result in a slightly higher backpressure. Further technical data are required if the filter is to be dimensioned more precisely (see Enquiry Forms).

## Dimensioning the catalytic converter

The vehicle and engine data (plus some other data) are required in order to determine the size of catalytic converter (3-inch or 6-inch cat) required. In order to ensure catalytic converters operate as intended, HJS and its authorised partners offer one-on-one assistance (see section HJS Enquiry Form).

# 4. Modular SMF® System

## Considering the installation space available

After determining the size of the filter and catalytic converter, it's time to see how much space is available for installing them.

As a rule, the filter system replaces the original silencer. Alternatively, the particulate filter system can be installed at a different position in the exhaust system.

When selecting the installation position, make sure that there is sufficient clearance between the filter and other components and that the filter can be removed easily for servicing and maintenance work.

The filter unit can be installed horizontally or vertically. The matching inlet and outlet modules must be selected in line with the amount of installation space available in the machine (AXIAL-AXIAL, AXIAL-RADIAL, RADIAL-AXIAL, RADIAL-RADIAL).

To secure the filter, system mounts must be used.

### Dimension tables

The dimension tables contain all dimensions of relevance to installation. All dimensions are stated in millimetres (mm).

This section describes and illustrates the different versions of filter systems with a surface area of 1.2 $m^2$ to 10.2 $m^2$.

### Content of dimension tables

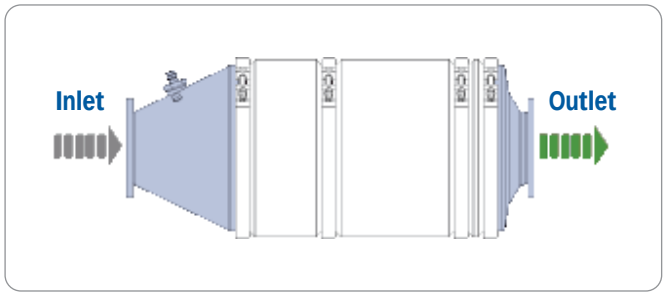
> Inlet module
> 3-inch or 6-inch cat module
> SMF® (uncoated filter) or CSMF (coated filter)
> Outlet module

### Scope of delivery

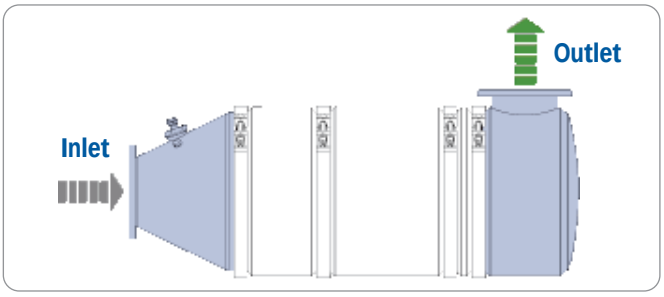
The item numbers listed describe fully assembled filter units with inlet and outlet module, system clamp, gasket set and HJS Service Unit. In addition, all relevant technical documentations, such as the installation guidelines and maintenance manual, are included in the scope of delivery.

**The system mounts and insulation set must be ordered separately. (see Section Individual components)**

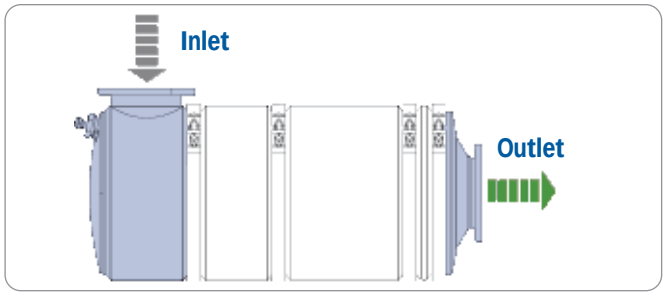
**AXIAL - AXIAL**



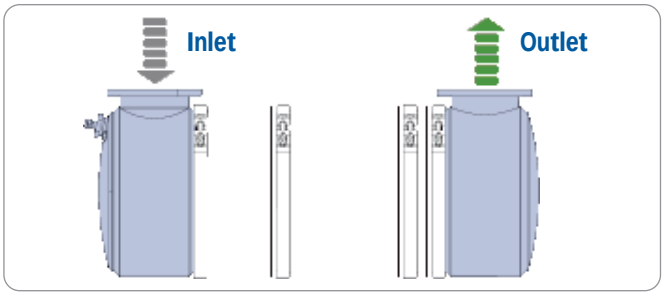

**AXIAL - RADIAL**




**RADIAL - AXIAL**

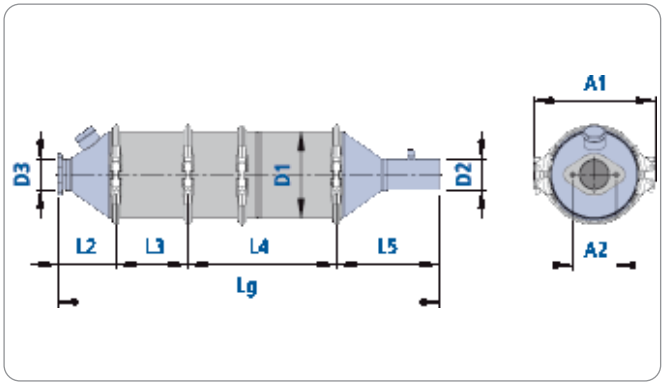



**RADIAL - RADIAL**

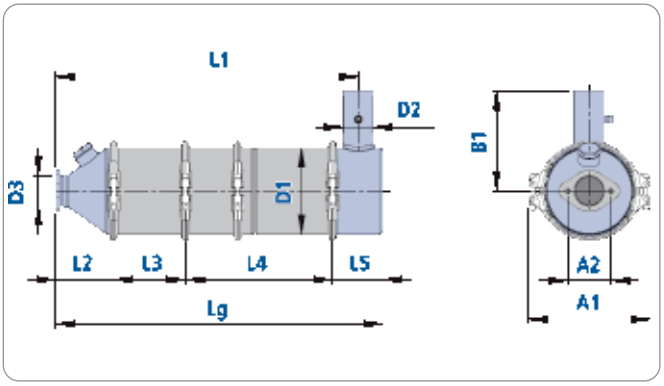


# SMF® – 1.8 m²

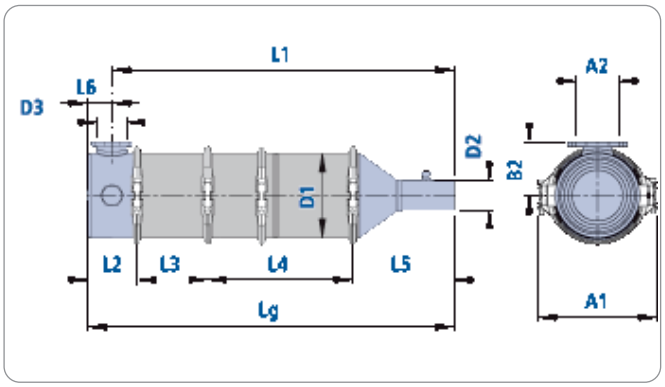
## AXIAL - AXIAL



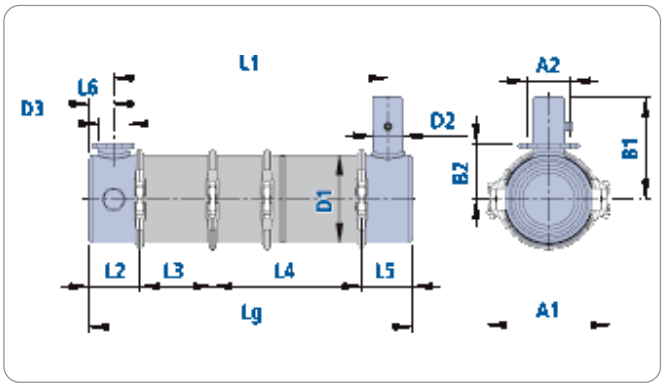

## AXIAL - RADIAL




## RADIAL - AXIAL




## RADIAL - RADIAL




## Measurement Table SMF® – 1.8 m²

| HJS Item No.*1 | System*2 | Confi-guration | Lg | | L1 | | L2 | L3 | | L4 | L5 | L6 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cat 3-inch | Cat 6-inch | Cat 3-inch | Cat 6-inch | | Cat 3-inch | Cat 6-inch | | | | | | | | | | |
| **93 72 0109** | SMF® 1.8 m² | AX - AX | 699 | - | - | - | 106 | 132 | - | 272 | 189 | - | 220 | 80 | - | - | 158 | 55 | 55 |
| **93 72 0110** | SMF® 1.8 m² | AX - AX | - | 758 | - | - | 106 | - | 191 | 272 | 189 | - | 220 | 80 | - | - | 158 | 55 | 55 |
| **93 76 0109** | CSMF 1.8 m² | AX - AX | 699 | - | - | - | 106 | 132 | - | 272 | 189 | - | 220 | 80 | - | - | 158 | 55 | 55 |
| **93 76 0110** | CSMF 1.8 m² | AX - AX | - | 758 | - | - | 106 | - | 191 | 272 | 189 | - | 220 | 80 | - | - | 158 | 55 | 55 |
| **93 72 0111** | SMF® 1.8 m² | AX - RAD | 602 | - | 557 | - | 106 | 132 | - | 272 | 92 | - | 220 | 80 | 184 | - | 158 | 55 | 55 |
| **93 72 0112** | SMF® 1.8 m² | AX - RAD | - | 661 | - | 616 | 106 | - | 191 | 272 | 92 | - | 220 | 80 | 184 | - | 158 | 55 | 55 |
| **93 76 0111** | CSMF 1.8 m² | AX - RAD | 602 | - | 557 | - | 106 | 132 | - | 272 | 92 | - | 220 | 80 | 184 | - | 158 | 55 | 55 |
| **93 76 0112** | CSMF 1.8 m² | AX - RAD | - | 661 | - | 616 | 106 | - | 191 | 272 | 92 | - | 220 | 80 | 184 | - | 158 | 55 | 55 |
| **93 72 0113** | SMF® 1.8 m² | RAD - AX | 685 | - | 640 | - | 92 | 132 | - | 272 | 189 | 45 | 220 | 80 | - | 100 | 158 | 55 | 55 |
| **93 72 0114** | SMF® 1.8 m² | RAD - AX | - | 744 | - | 699 | 92 | - | 191 | 272 | 189 | 45 | 220 | 80 | - | 100 | 158 | 55 | 55 |
| **93 76 0113** | CSMF 1.8 m² | RAD - AX | 685 | - | 640 | - | 92 | 132 | - | 272 | 189 | 45 | 220 | 80 | - | 100 | 158 | 55 | 55 |
| **93 76 0114** | CSMF 1.8 m² | RAD - AX | - | 744 | - | 699 | 92 | - | 191 | 272 | 189 | 45 | 220 | 80 | - | 100 | 158 | 55 | 55 |
| **93 72 0115** | SMF® 1.8 m² | RAD - RAD | 588 | - | 498 | - | 92 | 132 | - | 272 | 92 | 45 | 220 | 80 | 184 | 100 | 158 | 55 | 55 |
| **93 72 0116** | SMF® 1.8 m² | RAD - RAD | - | 647 | - | 557 | 92 | - | 191 | 272 | 92 | 45 | 220 | 80 | 184 | 100 | 158 | 55 | 55 |
| **93 76 0115** | CSMF 1.8 m² | RAD - RAD | 588 | - | 498 | - | 92 | 132 | - | 272 | 92 | 45 | 220 | 80 | 184 | 100 | 158 | 55 | 55 |
| **93 76 0116** | CSMF 1.8 m² | RAD - RAD | - | 647 | - | 557 | 92 | - | 191 | 272 | 92 | 45 | 220 | 80 | 184 | 100 | 158 | 55 | 55 |

*1 Scope of delivery does not include brackets and insulation

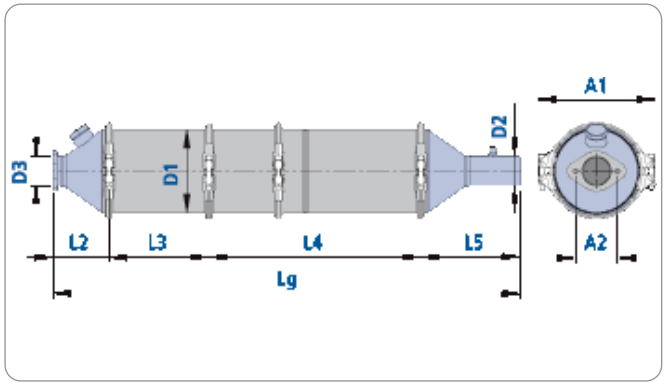
*2 SMF® = uncoated filter; CSMF = coated filter

Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

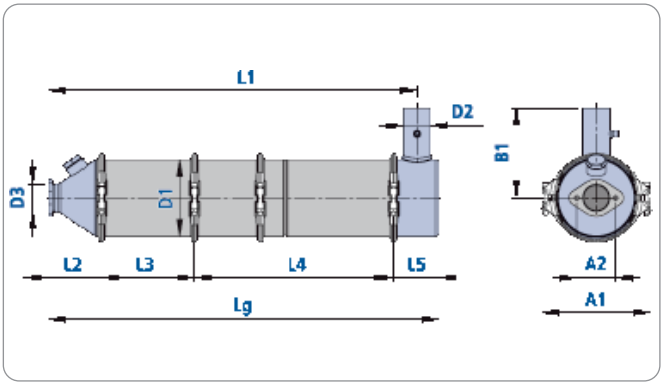
# 4. Modular SMF® System

## SMF® – 2.7 m²

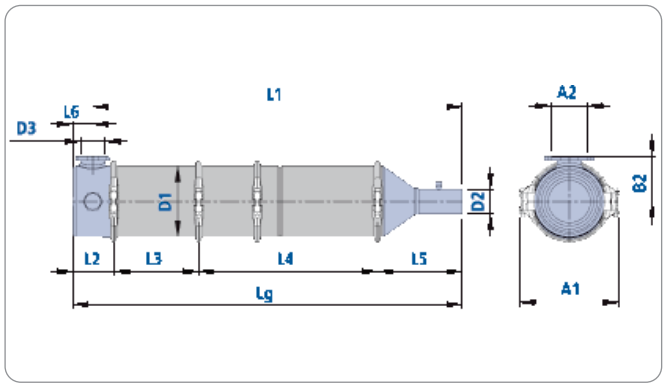
### AXIAL - AXIAL



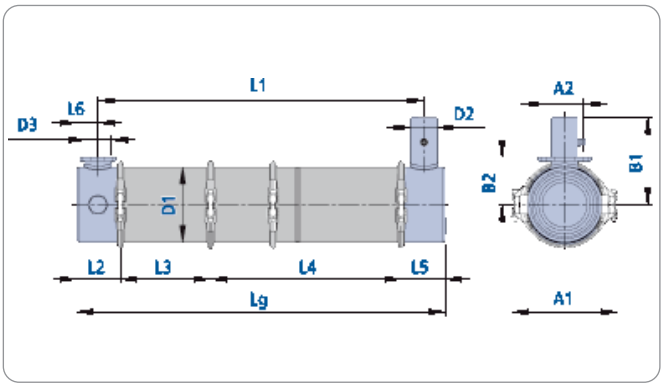

### AXIAL - RADIAL




### RADIAL - AXIAL




### RADIAL - RADIAL




### Measurement Table SMF® – 2.7 m²

| HJS Item No.*1 | System*2 | Confi-guration | Lg | | L1 | | L2 | L3 | | L4 | L5 | L6 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cat 3-inch | Cat 6-inch | Cat 3-inch | Cat 6-inch | | Cat 3-inch | Cat 6-inch | | | | | | | | | | |
| **93 72 0117** | SMF® 2.7 m² | AX - AX | 831 | - | - | - | 106 | 132 | - | 404 | 189 | - | 220 | 80 | - | - | 158 | 55 | 55 |
| **93 72 0118** | SMF® 2.7 m² | AX - AX | - | 890 | - | - | 106 | - | 191 | 404 | 189 | - | 220 | 80 | - | - | 158 | 55 | 55 |
| **93 76 0117** | CSMF 2.7 m² | AX - AX | 831 | - | - | - | 106 | 132 | - | 404 | 189 | - | 220 | 80 | - | - | 158 | 55 | 55 |
| **93 76 0118** | CSMF 2.7 m² | AX - AX | - | 890 | - | - | 106 | - | 191 | 404 | 189 | - | 220 | 80 | - | - | 158 | 55 | 55 |
| **93 72 0119** | SMF® 2.7 m² | AX - RAD | 734 | - | 689 | - | 106 | 132 | - | 404 | 92 | - | 220 | 80 | 184 | - | 158 | 55 | 55 |
| **93 72 0120** | SMF® 2.7 m² | AX - RAD | - | 793 | - | 748 | 106 | - | 191 | 404 | 92 | - | 220 | 80 | 184 | - | 158 | 55 | 55 |
| **93 76 0119** | CSMF 2.7 m² | AX - RAD | 734 | - | 689 | - | 106 | 132 | - | 404 | 92 | - | 220 | 80 | 184 | - | 158 | 55 | 55 |
| **93 76 0120** | CSMF 2.7 m² | AX - RAD | - | 793 | - | 748 | 106 | - | 191 | 404 | 92 | - | 220 | 80 | 184 | - | 158 | 55 | 55 |
| **93 72 0121** | SMF® 2.7 m² | RAD - AX | 817 | - | 772 | - | 92 | 132 | - | 404 | 189 | 45 | 220 | 80 | - | 100 | 158 | 55 | 55 |
| **93 72 0122** | SMF® 2.7 m² | RAD - AX | - | 876 | - | 831 | 92 | - | 191 | 404 | 189 | 45 | 220 | 80 | - | 100 | 158 | 55 | 55 |
| **93 76 0121** | CSMF 2.7 m² | RAD - AX | 817 | - | 772 | - | 92 | 132 | - | 404 | 189 | 45 | 220 | 80 | - | 100 | 158 | 55 | 55 |
| **93 76 0122** | CSMF 2.7 m² | RAD - AX | - | 876 | - | 831 | 92 | - | 191 | 404 | 189 | 45 | 220 | 80 | - | 100 | 158 | 55 | 55 |
| **93 72 0123** | SMF® 2.7 m² | RAD - RAD | 720 | - | 630 | - | 92 | 132 | - | 404 | 92 | 45 | 220 | 80 | 184 | 100 | 158 | 55 | 55 |
| **93 72 0124** | SMF® 2.7 m² | RAD - RAD | - | 779 | - | 689 | 92 | - | 191 | 404 | 92 | 45 | 220 | 80 | 184 | 100 | 158 | 55 | 55 |
| **93 76 0123** | CSMF 2.7 m² | RAD - RAD | 720 | - | 630 | - | 92 | 132 | - | 404 | 92 | 45 | 220 | 80 | 184 | 100 | 158 | 55 | 55 |
| **93 76 0124** | CSMF 2.7 m² | RAD - RAD | - | 779 | - | 689 | 92 | - | 191 | 404 | 92 | 45 | 220 | 80 | 184 | 100 | 158 | 55 | 55 |

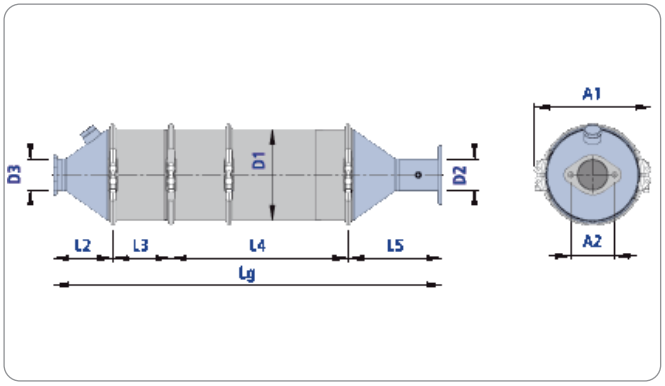
*1 Scope of delivery does not include brackets and insulation

*2 SMF® = uncoated filter; CSMF = coated filter

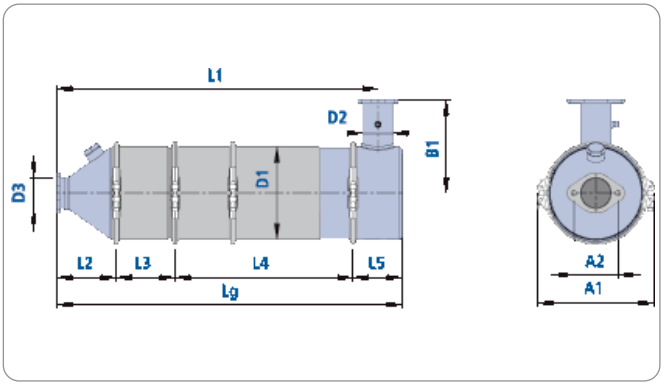
Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

# SMF® – 3.8 m²

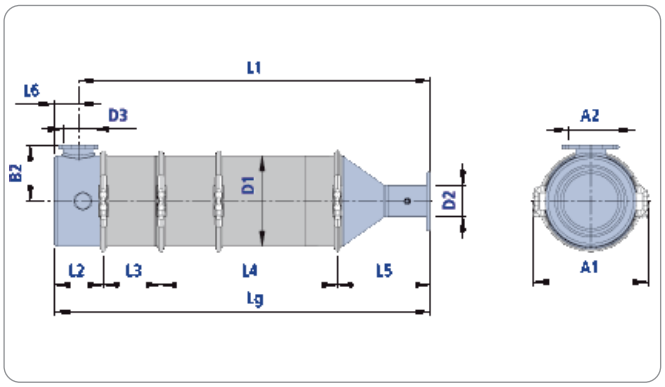
## AXIAL - AXIAL



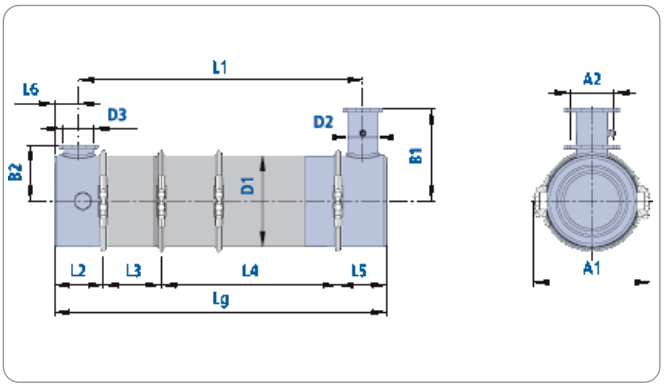

## AXIAL - RADIAL




## RADIAL - AXIAL




## RADIAL - RADIAL




## Measurement Table SMF® – 3.8 m²

| HJS Item No.*1 | System*2 | Confi-guration | Lg | | L1 | | L2 | L3 | | L4 | L5 | L6 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cat 3-inch | Cat 6-inch | Cat 3-inch | Cat 6-inch | | Cat 3-inch | Cat 6-inch | | | | | | | | | | |
| **93 72 0125** | SMF® 3.8 m² | AX - AX | 892 | - | - | - | 135 | 134 | - | 404 | 219 | - | 266 | 100 | - | - | 208 | 70 | 70 |
| **93 72 0126** | SMF® 3.8 m² | AX - AX | - | 966 | - | - | 135 | - | 208 | 404 | 219 | - | 266 | 100 | - | - | 208 | 70 | 70 |
| **93 76 0125** | CSMF 3.8 m² | AX - AX | 892 | - | - | - | 135 | 134 | - | 404 | 219 | - | 266 | 100 | - | - | 208 | 70 | 70 |
| **93 76 0126** | CSMF 3.8 m² | AX - AX | - | 966 | - | - | 135 | - | 208 | 404 | 219 | - | 266 | 100 | - | - | 208 | 70 | 70 |
| **93 72 0127** | SMF® 3.8 m² | AX - RAD | 786 | - | 731 | - | 135 | 134 | - | 404 | 113 | - | 266 | 100 | 216 | - | 208 | 70 | 70 |
| **93 72 0128** | SMF® 3.8 m² | AX - RAD | - | 860 | - | 805 | 135 | - | 208 | 404 | 113 | - | 266 | 100 | 216 | - | 208 | 70 | 70 |
| **93 76 0127** | CSMF 3.8 m² | AX - RAD | 786 | - | 731 | - | 135 | 134 | - | 404 | 113 | - | 266 | 100 | 216 | - | 208 | 70 | 70 |
| **93 76 0128** | CSMF 3.8 m² | AX - RAD | - | 860 | - | 805 | 135 | - | 208 | 404 | 113 | - | 266 | 100 | 216 | - | 208 | 70 | 70 |
| **93 72 0129** | SMF® 3.8 m² | RAD - AX | 868 | - | 813 | - | 111 | 134 | - | 404 | 219 | 55 | 266 | 100 | - | 127 | 208 | 70 | 70 |
| **93 72 0130** | SMF® 3.8 m² | RAD - AX | - | 943 | - | 888 | 111 | - | 208 | 404 | 219 | 55 | 266 | 100 | - | 127 | 208 | 70 | 70 |
| **93 76 0129** | CSMF 3.8 m² | RAD - AX | 868 | - | 813 | - | 111 | 134 | - | 404 | 219 | 55 | 266 | 100 | - | 127 | 208 | 70 | 70 |
| **93 76 0130** | CSMF 3.8 m² | RAD - AX | - | 943 | - | 888 | 111 | - | 208 | 404 | 219 | 55 | 266 | 100 | - | 127 | 208 | 70 | 70 |
| **93 72 0131** | SMF® 3.8 m² | RAD - RAD | 762 | - | 652 | - | 111 | 134 | - | 404 | 113 | 55 | 266 | 100 | 216 | 127 | 208 | 70 | 70 |
| **93 72 0132** | SMF® 3.8 m² | RAD - RAD | - | 836 | - | 726 | 111 | - | 208 | 404 | 113 | 55 | 266 | 100 | 216 | 127 | 208 | 70 | 70 |
| **93 76 0131** | CSMF 3.8 m² | RAD - RAD | 762 | - | 652 | - | 111 | 134 | - | 404 | 113 | 55 | 266 | 100 | 216 | 127 | 208 | 70 | 70 |
| **93 76 0132** | CSMF 3.8 m² | RAD - RAD | - | 836 | - | 726 | 111 | - | 208 | 404 | 113 | 55 | 266 | 100 | 216 | 127 | 208 | 70 | 70 |

*1 Scope of delivery does not include brackets and insulation

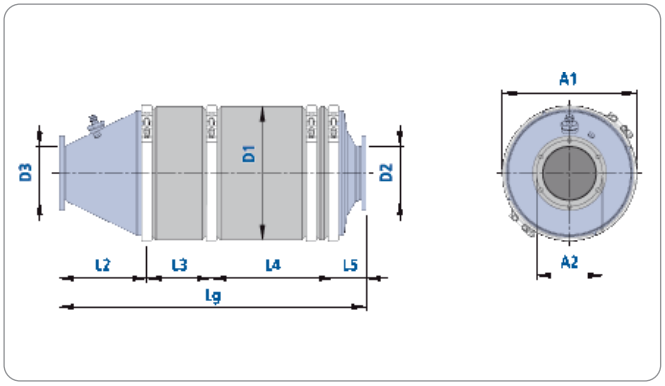
*2 SMF® = uncoated filter; CSMF = coated filter

Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

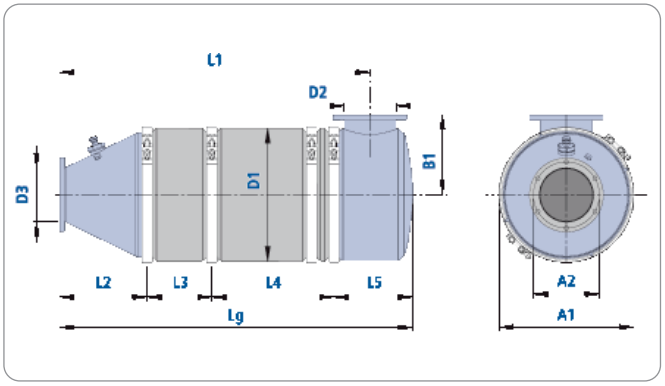
# 4. Modular SMF® System

## SMF® – 5.4 m²

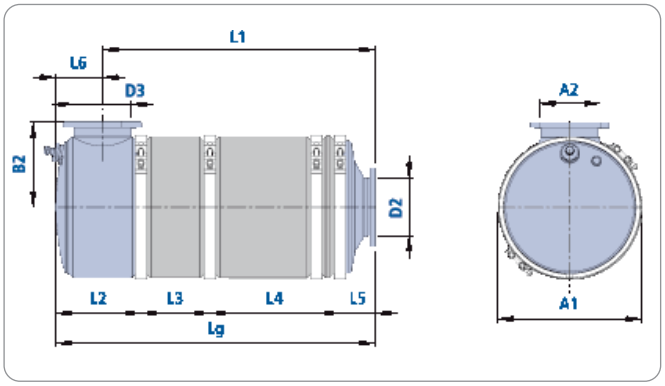
### AXIAL - AXIAL



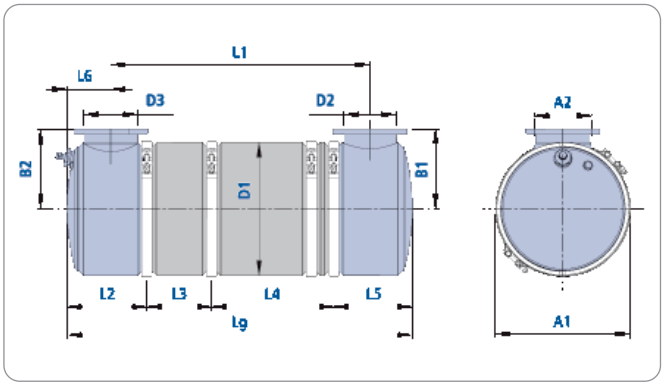

### AXIAL - RADIAL




### RADIAL - AXIAL




### RADIAL - RADIAL




### Measurement Table SMF® – 5.4 m²

| HJS Item No.*1 | System*2 | Confi-guration | Lg | | L1 | | L2 | L3 | | L4 | L5 | L6 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cat 3-inch | Cat 6-inch | Cat 3-inch | Cat 6-inch | | Cat 3-inch | Cat 6-inch | | | | | | | | | | |
| **93 72 0133** | SMF® 5.4 m² | AX - AX | 663 | - | - | - | 211 | 79 | - | 294 | 79 | - | Ø 325 | Ø 159 | - | - | 319 | 129 | 129 |
| **93 72 0134** | SMF® 5.4 m² | AX - AX | - | 740 | - | - | 211 | - | 156 | 294 | 79 | - | Ø 325 | Ø 159 | - | - | 319 | 129 | 129 |
| **93 76 0133** | CSMF 5.4 m² | AX - AX | 663 | - | - | - | 211 | 79 | - | 294 | 79 | - | Ø 325 | Ø 159 | - | - | 319 | 129 | 129 |
| **93 76 0134** | CSMF 5.4 m² | AX - AX | - | 740 | - | - | 211 | - | 156 | 294 | 79 | - | Ø 325 | Ø 159 | - | - | 319 | 129 | 129 |
| **93 72 0135** | SMF® 5.4 m² | AX - RAD | 773 | - | 672 | - | 211 | 79 | - | 294 | 189 | - | Ø 325 | Ø 159 | 192 | - | 319 | 129 | 129 |
| **93 72 0136** | SMF® 5.4 m² | AX - RAD | - | 850 | - | 749 | 211 | - | 156 | 294 | 189 | - | Ø 325 | Ø 159 | 192 | - | 319 | 129 | 129 |
| **93 76 0135** | CSMF 5.4 m² | AX - RAD | 773 | - | 672 | - | 211 | 79 | - | 294 | 189 | - | Ø 325 | Ø 159 | 192 | - | 319 | 129 | 129 |
| **93 76 0136** | CSMF 5.4 m² | AX - RAD | - | 850 | - | 749 | 211 | - | 156 | 294 | 189 | - | Ø 325 | Ø 159 | 192 | - | 319 | 129 | 129 |
| **93 72 0137** | SMF® 5.4 m² | RAD - AX | 644 | - | 539 | - | 192 | 79 | - | 294 | 79 | 105 | Ø 325 | Ø 159 | - | 192 | 319 | 129 | 129 |
| **93 72 0138** | SMF® 5.4 m² | RAD - AX | - | 721 | - | 616 | 192 | - | 156 | 294 | 79 | 105 | Ø 325 | Ø 159 | - | 192 | 319 | 129 | 129 |
| **93 76 0137** | CSMF 5.4 m² | RAD - AX | 644 | - | 539 | - | 192 | 79 | - | 294 | 79 | 105 | Ø 325 | Ø 159 | - | 192 | 319 | 129 | 129 |
| **93 76 0138** | CSMF 5.4 m² | RAD - AX | - | 721 | - | 616 | 192 | - | 156 | 294 | 79 | 105 | Ø 325 | Ø 159 | - | 192 | 319 | 129 | 129 |
| **93 72 0139** | SMF® 5.4 m² | RAD - RAD | 754 | - | 548 | - | 192 | 79 | - | 294 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | 319 | 129 | 129 |
| **93 72 0140** | SMF® 5.4 m² | RAD - RAD | - | 831 | - | 625 | 192 | - | 156 | 294 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | 319 | 129 | 129 |
| **93 76 0139** | CSMF 5.4 m² | RAD - RAD | 754 | - | 548 | - | 192 | 79 | - | 294 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | 319 | 129 | 129 |
| **93 76 0140** | CSMF 5.4 m² | RAD - RAD | - | 831 | - | 625 | 192 | - | 156 | 294 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | 319 | 129 | 129 |

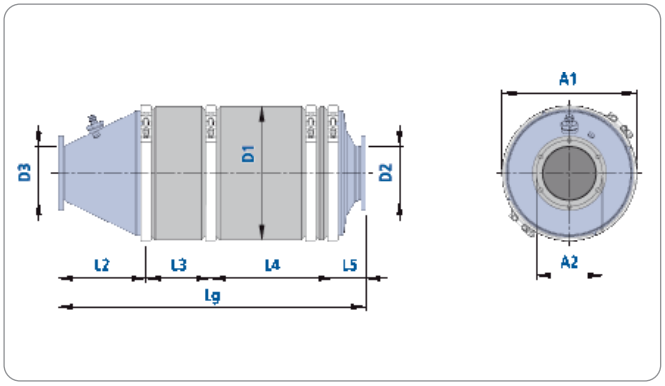
*1 Scope of delivery does not include brackets and insulation

*2 SMF® = uncoated filter; CSMF = coated filter

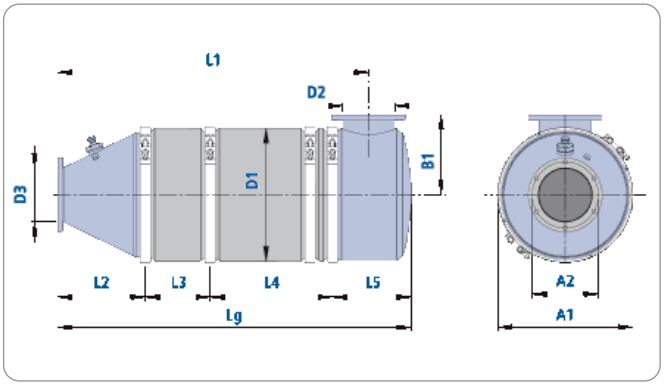
Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

# SMF® – 6.5 m²

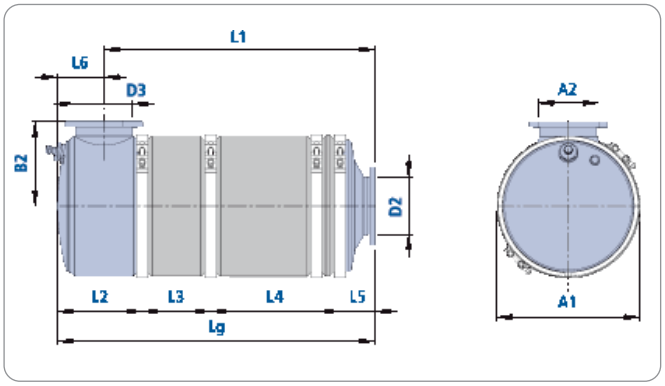
## AXIAL - AXIAL



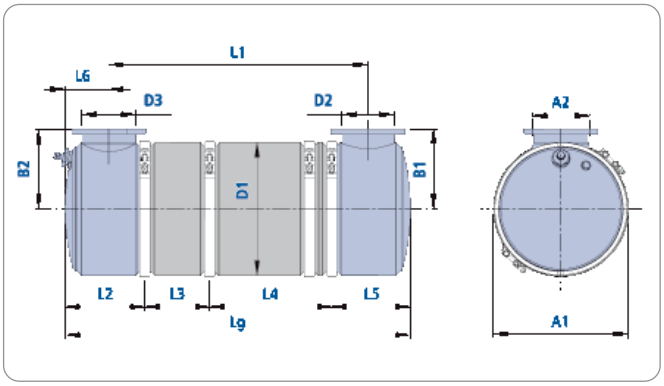

## AXIAL - RADIAL




## RADIAL - AXIAL




## RADIAL - RADIAL




## Measurement Table SMF® – 6.5 m²

| HJS Item No.*1 | System*2 | Confi-guration | Lg | | L1 | | L2 | L3 | | L4 | L5 | L6 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cat 3-inch | Cat 6-inch | Cat 3-inch | Cat 6-inch | | Cat 3-inch | Cat 6-inch | | | | | | | | | | |
| **93 72 0141** | SMF® 6.5 m² | AX - AX | 706 | - | - | - | 211 | 79 | - | 337 | 79 | - | Ø 325 | Ø 159 | - | - | 319 | 129 | 129 |
| **93 72 0142** | SMF® 6.5 m² | AX - AX | - | 783 | - | - | 211 | - | 156 | 337 | 79 | - | Ø 325 | Ø 159 | - | - | 319 | 129 | 129 |
| **93 76 0141** | CSMF 6.5 m² | AX - AX | 706 | - | - | - | 211 | 79 | - | 337 | 79 | - | Ø 325 | Ø 159 | - | - | 319 | 129 | 129 |
| **93 76 0142** | CSMF 6.5 m² | AX - AX | - | 783 | - | - | 211 | - | 156 | 337 | 79 | - | Ø 325 | Ø 159 | - | - | 319 | 129 | 129 |
| **93 72 0143** | SMF® 6.5 m² | AX - RAD | 816 | - | 715 | - | 211 | 79 | - | 337 | 189 | - | Ø 325 | Ø 159 | 192 | - | 319 | 129 | 129 |
| **93 72 0144** | SMF® 6.5 m² | AX - RAD | - | 893 | - | 792 | 211 | - | 156 | 337 | 189 | - | Ø 325 | Ø 159 | 192 | - | 319 | 129 | 129 |
| **93 76 0143** | CSMF 6.5 m² | AX - RAD | 816 | - | 715 | - | 211 | 79 | - | 337 | 189 | - | Ø 325 | Ø 159 | 192 | - | 319 | 129 | 129 |
| **93 76 0144** | CSMF 6.5 m² | AX - RAD | - | 893 | - | 792 | 211 | - | 156 | 337 | 189 | - | Ø 325 | Ø 159 | 192 | - | 319 | 129 | 129 |
| **93 72 0145** | SMF® 6.5 m² | RAD - AX | 687 | - | 582 | - | 192 | 79 | - | 337 | 79 | 105 | Ø 325 | Ø 159 | - | 192 | 319 | 129 | 129 |
| **93 72 0146** | SMF® 6.5 m² | RAD - AX | - | 764 | - | 659 | 192 | - | 156 | 337 | 79 | 105 | Ø 325 | Ø 159 | - | 192 | 319 | 129 | 129 |
| **93 76 0145** | CSMF 6.5 m² | RAD - AX | 687 | - | 582 | - | 192 | 79 | - | 337 | 79 | 105 | Ø 325 | Ø 159 | - | 192 | 319 | 129 | 129 |
| **93 76 0146** | CSMF 6.5 m² | RAD - AX | - | 764 | - | 659 | 192 | - | 156 | 337 | 79 | 105 | Ø 325 | Ø 159 | - | 192 | 319 | 129 | 129 |
| **93 72 0147** | SMF® 6.5 m² | RAD - RAD | 797 | - | 591 | - | 192 | 79 | - | 337 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | 319 | 129 | 129 |
| **93 72 0148** | SMF® 6.5 m² | RAD - RAD | - | 874 | - | 668 | 192 | - | 156 | 337 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | 319 | 129 | 129 |
| **93 76 0147** | CSMF 6,5 m² | RAD - RAD | 797 | - | 591 | - | 192 | 79 | - | 337 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | 319 | 129 | 129 |
| **93 76 0148** | CSMF 6.5 m² | RAD - RAD | - | 874 | - | 668 | 192 | - | 156 | 337 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | 319 | 129 | 129 |

*1 Scope of delivery does not include brackets and insulation

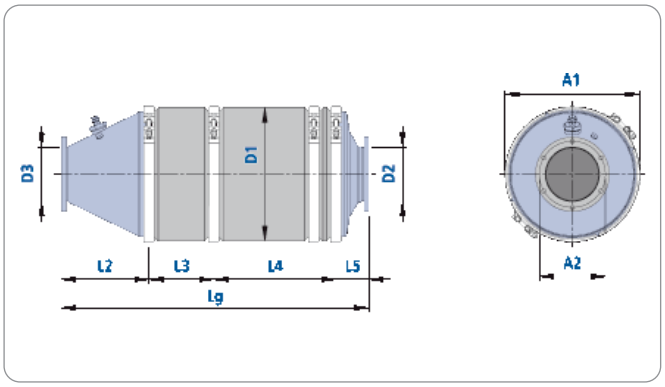
*2 SMF® = uncoated filter; CSMF = coated filter

Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

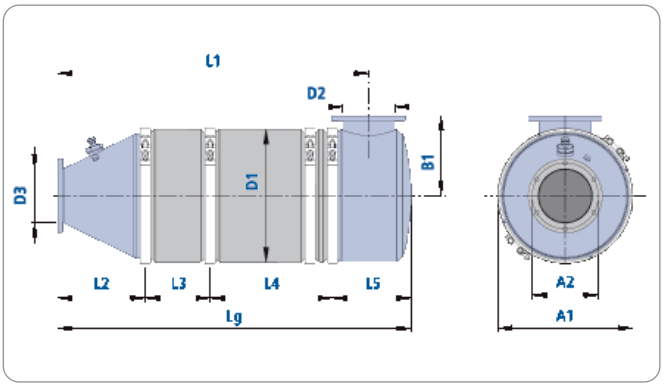
# 4. Modular SMF® System

## SMF® – 8.1 m²

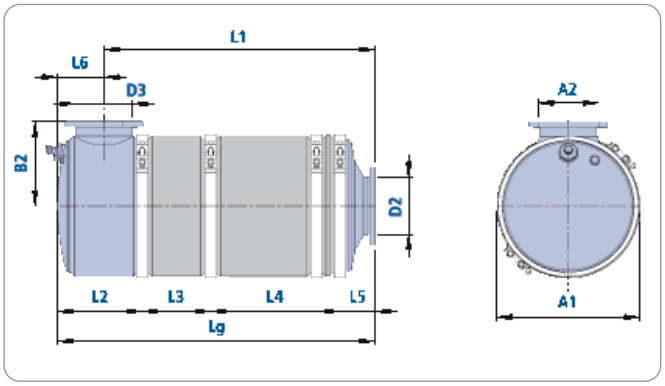
### AXIAL - AXIAL



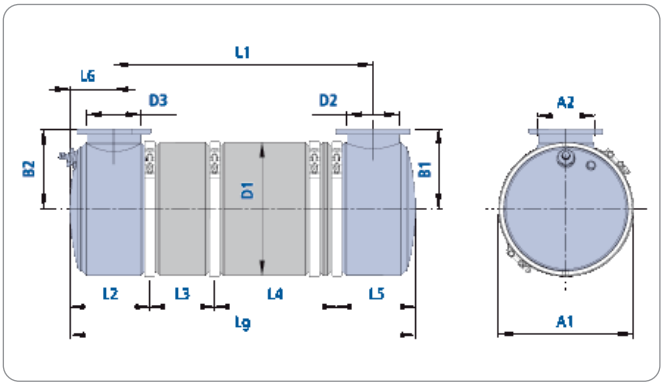

### AXIAL - RADIAL




### RADIAL - AXIAL




### RADIAL - RADIAL




### Measurement Table SMF® – 8.1 m²

| HJS Item No.*1 | System*2 | Confi-guration | Lg | | L1 | | L2 | L3 | | L4 | L5 | L6 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cat 3-inch | Cat 6-inch | Cat 3-inch | Cat 6-inch | | Cat 3-inch | Cat 6-inch | | | | | | | | | | |
| **93 72 0149** | SMF® 8.1 m² | AX - AX | 795 | - | - | - | 211 | 79 | - | 426 | 79 | - | Ø 325 | Ø 159 | - | - | 319 | 129 | 129 |
| **93 72 0150** | SMF® 8.1 m² | AX - AX | - | 872 | - | - | 211 | - | 156 | 426 | 79 | - | Ø 325 | Ø 159 | - | - | 319 | 129 | 129 |
| **93 76 0149** | CSMF 8.1 m² | AX - AX | 795 | - | - | - | 211 | 79 | - | 426 | 79 | - | Ø 325 | Ø 159 | - | - | 319 | 129 | 129 |
| **93 76 0150** | CSMF 8.1 m² | AX - AX | - | 872 | - | - | 211 | - | 156 | 426 | 79 | - | Ø 325 | Ø 159 | - | - | 319 | 129 | 129 |
| **93 72 0151** | SMF® 8.1 m² | AX - RAD | 905 | - | 804 | - | 211 | 79 | - | 426 | 189 | - | Ø 325 | Ø 159 | 192 | - | 319 | 129 | 129 |
| **93 72 0152** | SMF® 8.1 m² | AX - RAD | - | 982 | - | 881 | 211 | - | 156 | 426 | 189 | - | Ø 325 | Ø 159 | 192 | - | 319 | 129 | 129 |
| **93 76 0151** | CSMF 8.1 m² | AX - RAD | 905 | - | 804 | - | 211 | 79 | - | 426 | 189 | - | Ø 325 | Ø 159 | 192 | - | 319 | 129 | 129 |
| **93 76 0152** | CSMF 8.1 m² | AX - RAD | - | 982 | - | 881 | 211 | - | 156 | 426 | 189 | - | Ø 325 | Ø 159 | 192 | - | 319 | 129 | 129 |
| **93 72 0153** | SMF® 8.1 m² | RAD - AX | 776 | - | 671 | - | 192 | 79 | - | 426 | 79 | 105 | Ø 325 | Ø 159 | - | 192 | 319 | 129 | 129 |
| **93 72 0154** | SMF® 8.1 m² | RAD - AX | - | 853 | - | 748 | 192 | - | 156 | 426 | 79 | 105 | Ø 325 | Ø 159 | - | 192 | 319 | 129 | 129 |
| **93 76 0153** | CSMF 8.1 m² | RAD - AX | 776 | - | 671 | - | 192 | 79 | - | 426 | 79 | 105 | Ø 325 | Ø 159 | - | 192 | 319 | 129 | 129 |
| **93 76 0154** | CSMF 8.1 m² | RAD - AX | - | 853 | - | 748 | 192 | - | 156 | 426 | 79 | 105 | Ø 325 | Ø 159 | - | 192 | 319 | 129 | 129 |
| **93 72 0155** | SMF® 8.1 m² | RAD - RAD | 886 | - | 680 | - | 192 | 79 | - | 426 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | 319 | 129 | 129 |
| **93 72 0156** | SMF® 8.1 m² | RAD - RAD | - | 963 | - | 757 | 192 | - | 156 | 426 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | 319 | 129 | 129 |
| **93 76 0155** | CSMF 8.1 m² | RAD - RAD | 886 | - | 680 | - | 192 | 79 | - | 426 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | 319 | 129 | 129 |
| **93 76 0156** | CSMF 8.1 m² | RAD - RAD | - | 963 | - | 757 | 192 | - | 156 | 426 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | 319 | 129 | 129 |

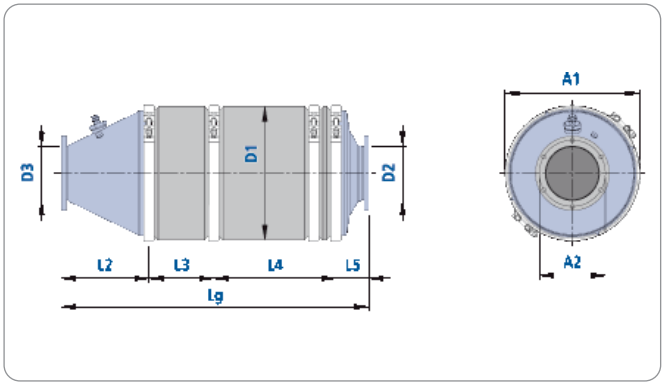
*1 Scope of delivery does not include brackets and insulation

*2 SMF® = uncoated filter; CSMF = coated filter

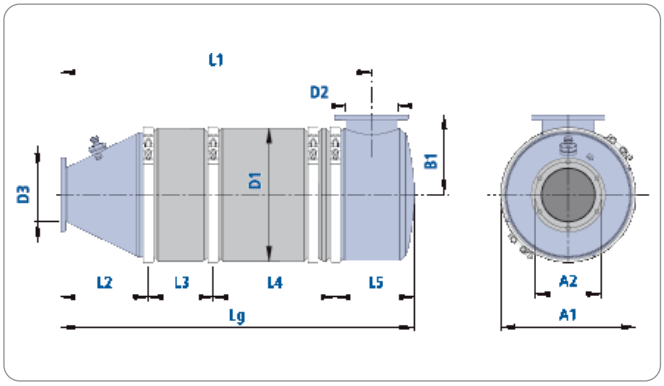
Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

# SMF® – 8.0 m²

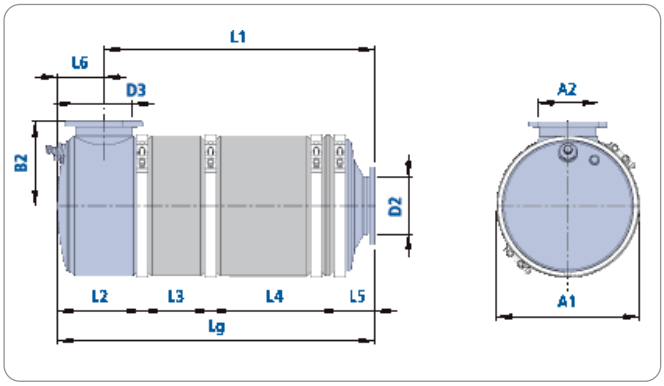
## AXIAL - AXIAL



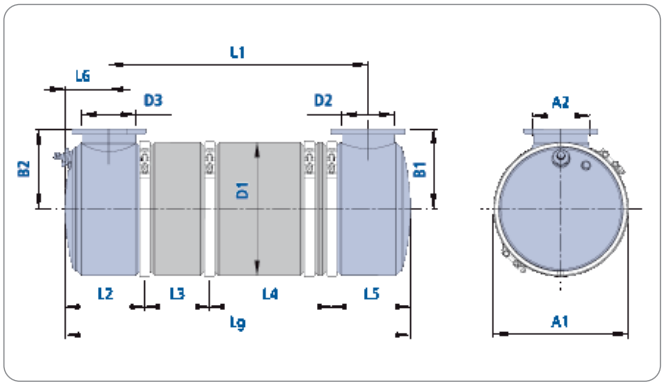

## AXIAL - RADIAL




## RADIAL - AXIAL




## RADIAL - RADIAL




## Measurement Table SMF® – 8.0 m²

| HJS Item No.*1 | System*2 | Confi-guration | Lg | | L1 | | L2 | L3 | | L4 | L5 | L6 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cat 3-inch | Cat 6-inch | Cat 3-inch | Cat 6-inch | | Cat 3-inch | Cat 6-inch | | | | | | | | | | |
| **93 72 0157** | SMF® 8.0 m² | AX - AX | 707 | - | - | - | 211 | 79 | - | 338 | 79 | - | Ø 350 | Ø 159 | - | - | 343 | 129 | 129 |
| **93 72 0158** | SMF® 8.0 m² | AX - AX | - | 784 | - | - | 211 | - | 156 | 338 | 79 | - | Ø 350 | Ø 159 | - | - | 343 | 129 | 129 |
| **93 76 0157** | CSMF 8.0 m² | AX - AX | 707 | - | - | - | 211 | 79 | - | 338 | 79 | - | Ø 350 | Ø 159 | - | - | 343 | 129 | 129 |
| **93 76 0158** | CSMF 8.0 m² | AX - AX | - | 784 | - | - | 211 | - | 156 | 338 | 79 | - | Ø 350 | Ø 159 | - | - | 343 | 129 | 129 |
| **93 72 0159** | SMF® 8.0 m² | AX - RAD | 817 | - | 715 | - | 211 | 79 | - | 338 | 189 | - | Ø 350 | Ø 159 | 204 | - | 343 | 129 | 129 |
| **93 72 0160** | SMF® 8.0 m² | AX - RAD | - | 894 | - | 792 | 211 | - | 156 | 338 | 189 | - | Ø 350 | Ø 159 | 204 | - | 343 | 129 | 129 |
| **93 76 0159** | CSMF 8.0 m² | AX - RAD | 817 | - | 715 | - | 211 | 79 | - | 338 | 189 | - | Ø 350 | Ø 159 | 204 | - | 343 | 129 | 129 |
| **93 76 0160** | CSMF 8.0 m² | AX - RAD | - | 894 | - | 792 | 211 | - | 156 | 338 | 189 | - | Ø 350 | Ø 159 | 204 | - | 343 | 129 | 129 |
| **93 72 0161** | SMF® 8.0 m² | RAD - AX | 685 | - | 583 | - | 189 | 79 | - | 338 | 79 | 102 | Ø 350 | Ø 159 | - | 204 | 343 | 129 | 129 |
| **93 72 0162** | SMF® 8.0 m² | RAD - AX | - | 762 | - | 660 | 189 | - | 156 | 338 | 79 | 102 | Ø 350 | Ø 159 | - | 204 | 343 | 129 | 129 |
| **93 76 0161** | CSMF 8.0 m² | RAD - AX | 685 | - | 583 | - | 189 | 79 | - | 338 | 79 | 102 | Ø 350 | Ø 159 | - | 204 | 343 | 129 | 129 |
| **93 76 0162** | CSMF 8.0 m² | RAD - AX | - | 762 | - | 660 | 189 | - | 156 | 338 | 79 | 102 | Ø 350 | Ø 159 | - | 204 | 343 | 129 | 129 |
| **93 72 0163** | SMF® 8.0 m² | RAD - RAD | 795 | - | 591 | - | 189 | 79 | - | 338 | 189 | 102 | Ø 350 | Ø 159 | 204 | 204 | 343 | 129 | 129 |
| **93 72 0164** | SMF® 8.0 m² | RAD - RAD | - | 872 | - | 668 | 189 | - | 156 | 338 | 189 | 102 | Ø 350 | Ø 159 | 204 | 204 | 343 | 129 | 129 |
| **93 76 0163** | CSMF 8.0 m² | RAD - RAD | 795 | - | 591 | - | 189 | 79 | - | 338 | 189 | 102 | Ø 350 | Ø 159 | 204 | 204 | 343 | 129 | 129 |
| **93 76 0164** | CSMF 8.0 m² | RAD - RAD | - | 872 | - | 668 | 189 | - | 156 | 338 | 189 | 102 | Ø 350 | Ø 159 | 204 | 204 | 343 | 129 | 129 |

*1 Scope of delivery does not include brackets and insulation

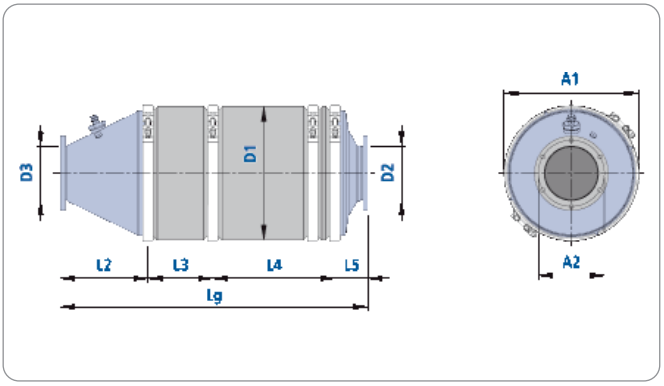
*2 SMF® = uncoated filter; CSMF = coated filter

Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

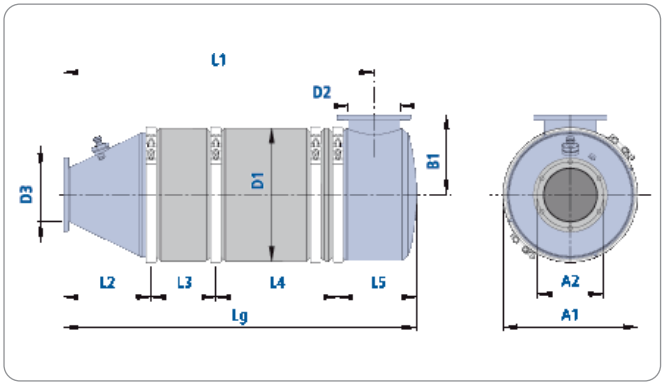
# 4. Modular SMF® System

## SMF® – 10.2 m²

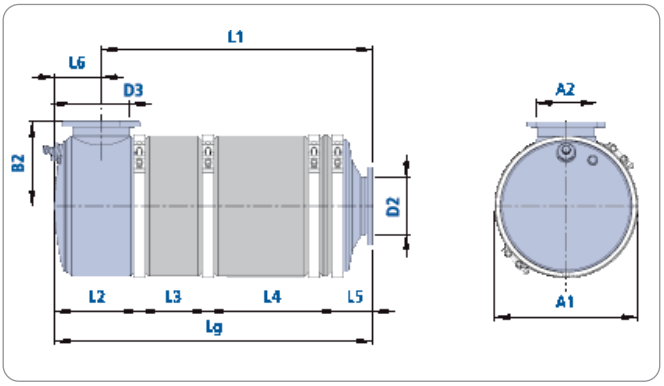
### AXIAL - AXIAL



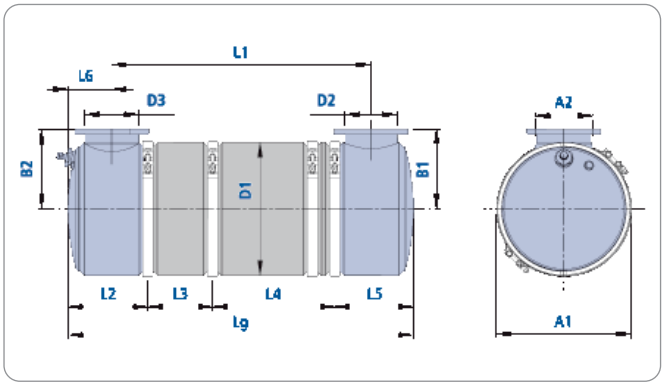

### AXIAL - RADIAL




### RADIAL - AXIAL




### RADIAL - RADIAL




### Measurement Table SMF® – 10.2 m²

| HJS Item No.*1 | System*2 | Confi-guration | Lg | | L1 | | L2 | L3 | | L4 | L5 | L6 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cat 3-inch | Cat 6-inch | Cat 3-inch | Cat 6-inch | | Cat 3-inch | Cat 6-inch | | | | | | | | | | |
| **93 72 0165** | SMF® 10.2 m² | AX - AX | 795 | - | - | - | 211 | 79 | - | 426 | 79 | - | Ø 350 | Ø 159 | - | - | 343 | 129 | 129 |
| **93 72 0166** | SMF® 10.2 m² | AX - AX | - | 872 | - | - | 211 | - | 156 | 426 | 79 | - | Ø 350 | Ø 159 | - | - | 343 | 129 | 129 |
| **93 76 0165** | CSMF 10.2 m² | AX - AX | 795 | - | - | - | 211 | 79 | - | 426 | 79 | - | Ø 350 | Ø 159 | - | - | 343 | 129 | 129 |
| **93 76 0166** | CSMF 10.2 m² | AX - AX | - | 872 | - | - | 211 | - | 156 | 426 | 79 | - | Ø 350 | Ø 159 | - | - | 343 | 129 | 129 |
| **93 72 0167** | SMF® 10.2 m² | AX - RAD | 905 | - | 803 | - | 211 | 79 | - | 426 | 189 | - | Ø 350 | Ø 159 | 204 | - | 343 | 129 | 129 |
| **93 72 0168** | SMF® 10.2 m² | AX - RAD | - | 982 | - | 880 | 211 | - | 156 | 426 | 189 | - | Ø 350 | Ø 159 | 204 | - | 343 | 129 | 129 |
| **93 76 0167** | CSMF 10.2 m² | AX - RAD | 905 | - | 803 | - | 211 | 79 | - | 426 | 189 | - | Ø 350 | Ø 159 | 204 | - | 343 | 129 | 129 |
| **93 76 0168** | CSMF 10.2 m² | AX - RAD | - | 982 | - | 880 | 211 | - | 156 | 426 | 189 | - | Ø 350 | Ø 159 | 204 | - | 343 | 129 | 129 |
| **93 72 0169** | SMF® 10.2 m² | RAD - AX | 773 | - | 671 | - | 189 | 79 | - | 426 | 79 | 102 | Ø 350 | Ø 159 | - | 204 | 343 | 129 | 129 |
| **93 72 0170** | SMF® 10.2 m² | RAD - AX | - | 850 | - | 748 | 189 | - | 156 | 426 | 79 | 102 | Ø 350 | Ø 159 | - | 204 | 343 | 129 | 129 |
| **93 76 0169** | CSMF 10.2 m² | RAD - AX | 773 | - | 671 | - | 189 | 79 | - | 426 | 79 | 102 | Ø 350 | Ø 159 | - | 204 | 343 | 129 | 129 |
| **93 76 0170** | CSMF 10.2 m² | RAD - AX | - | 850 | - | 748 | 189 | - | 156 | 426 | 79 | 102 | Ø 350 | Ø 159 | - | 204 | 343 | 129 | 129 |
| **93 72 0171** | SMF® 10.2 m² | RAD - RAD | 883 | - | 680 | - | 189 | 79 | - | 426 | 189 | 102 | Ø 350 | Ø 159 | 204 | 204 | 343 | 129 | 129 |
| **93 72 0172** | SMF® 10.2 m² | RAD - RAD | - | 960 | - | 757 | 189 | - | 156 | 426 | 189 | 102 | Ø 350 | Ø 159 | 204 | 204 | 343 | 129 | 129 |
| **93 76 0171** | CSMF 10.2 m² | RAD - RAD | 883 | - | 680 | - | 189 | 79 | - | 426 | 189 | 102 | Ø 350 | Ø 159 | 204 | 204 | 343 | 129 | 129 |
| **93 76 0172** | CSMF 10.2 m² | RAD - RAD | - | 960 | - | 757 | 189 | - | 156 | 426 | 189 | 102 | Ø 350 | Ø 159 | 204 | 204 | 343 | 129 | 129 |

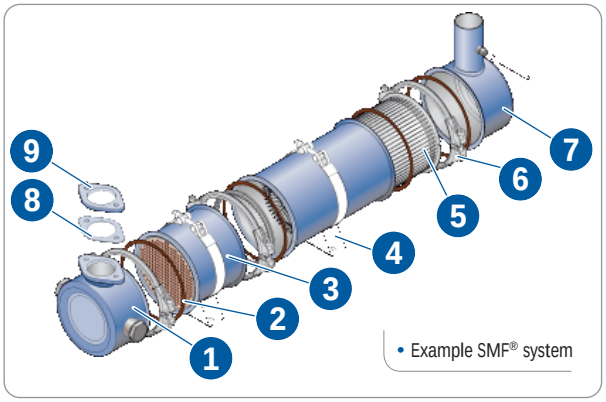
*1 Scope of delivery does not include brackets and insulation

*2 SMF® = uncoated filter; CSMF = coated filter

Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

# Individual components

## The table below contains the data of the individual components of a SMF® system.




1. Inlet Module
2. System Gasket
3. Cat Module
4. System Mount
5. SMF®- / CSMF Filter
6. System Clamp
7. Outlet Module
8. Flange gasket
9. Flange

| Service-Unit | |
|---|---|
| SMF® 94 10 4106 | CSMF 94 10 4107 |

| SMF® system | Cat capacity [l] 3” | 6” | Weight [kg] 3” | 6” |
|---|---|---|---|---|
| SMF® 1.8 m² | 1.2 | 2.4 | 12.5 | 13.5 |
| SMF® 2.7 m² | 1.2 | 2.4 | 16.5 | 17.5 |
| SMF® 3.8 m² | 2.1 | 4.3 | 22 | 24 |
| SMF® 5.4 m² | 4.2 | 8.5 | 45 | 50 |
| SMF® 6.5 m² | 4.2 | 8.5 | 50 | 55 |
| SMF® 8.1 m² | 4.2 | 8.5 | 57 | 62 |
| SMF® 8.0 m² | 4.2 | 8.5 | 55 | 60 |
| SMF® 10.2 m² | 4.2 | 8.5 | 60 | 65 |

| | Confi-guration | Inlet Module 1 | System Gasket 2 | Cat Module 3-inch 3 | Cat Module 6-inch 3 | System Mount 4 | SMF® Filter uncoated 5 | CSMF Filter coated 5 | System Clamp 6 | Outlet Module 7 | Flange gasket 8 | Flange 9 | Insulation 3-inch | Insulation 6-inch |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SMF® 1.8 m² | AX - AX | 93 02 4184 | 93 02 4189 | 93 02 4954 | 93 02 4958 | 93 02 4365 | 93 62 6050 | 93 75 6050 | 93 02 4179 | 93 02 4186 | 93 02 4194 | 93 02 4191 | 94 10 3200 | 94 10 3029 |
| | AX - RAD | 93 02 4184 | 93 02 4189 | 93 02 4954 | 93 02 4958 | 93 02 4365 | 93 62 6050 | 93 75 6050 | 93 02 4179 | 93 02 4188 | 93 02 4194 | 93 02 4191 | 94 10 3201 | 94 10 3030 |
| | RAD - AX | 93 02 4190 | 93 02 4189 | 93 02 4954 | 93 02 4958 | 93 02 4365 | 93 62 6050 | 93 75 6050 | 93 02 4179 | 93 02 4186 | 93 02 4194 | 93 02 4191 | 94 10 3202 | 94 10 3032 |
| | RAD - RAD | 93 02 4190 | 93 02 4189 | 93 02 4954 | 93 02 4958 | 93 02 4365 | 93 62 6050 | 93 75 6050 | 93 02 4179 | 93 02 4188 | 93 02 4194 | 93 02 4191 | 94 10 3203 | 94 10 3031 |
| SMF® 2.7 m² | AX - AX | 93 02 4184 | 93 02 4189 | 93 02 4954 | 93 02 4958 | 93 02 4365 | 93 62 6052 | 93 75 6052 | 93 02 4179 | 93 02 4186 | 93 02 4194 | 93 02 4191 | 94 10 3204 | 94 10 3033 |
| | AX - RAD | 93 02 4184 | 93 02 4189 | 93 02 4954 | 93 02 4958 | 93 02 4365 | 93 62 6052 | 93 75 6052 | 93 02 4179 | 93 02 4188 | 93 02 4194 | 93 02 4191 | 94 10 3205 | 94 10 3034 |
| | RAD - AX | 93 02 4190 | 93 02 4189 | 93 02 4954 | 93 02 4958 | 93 02 4365 | 93 62 6052 | 93 75 6052 | 93 02 4179 | 93 02 4186 | 93 02 4194 | 93 02 4191 | 94 10 3206 | 94 10 3036 |
| | RAD - RAD | 93 02 4190 | 93 02 4189 | 93 02 4954 | 93 02 4958 | 93 02 4365 | 93 62 6052 | 93 75 6052 | 93 02 4179 | 93 02 4188 | 93 02 4194 | 93 02 4191 | 94 10 3207 | 94 10 3035 |
| SMF® 3.8 m² | AX - AX | 93 02 4196 | 93 02 4185 | 94 62 4964 | 94 62 4968 | 93 02 4357 | 93 62 6054 | 93 75 6054 | 93 02 4201 | 93 02 4197 | 93 02 4207 | 93 02 4206 | 94 10 3208 | 94 10 3037 |
| | AX - RAD | 93 02 4196 | 93 02 4185 | 94 62 4964 | 94 62 4968 | 93 02 4357 | 93 62 6054 | 93 75 6054 | 93 02 4201 | 93 02 4199 | 93 02 4207 | 93 02 4206 | 94 10 3209 | 94 10 3038 |
| | RAD - AX | 93 02 4198 | 93 02 4185 | 94 62 4964 | 94 62 4968 | 93 02 4357 | 93 62 6054 | 93 75 6054 | 93 02 4201 | 93 02 4197 | 93 02 4207 | 93 02 4206 | 94 10 3210 | 94 10 3040 |
| | RAD - RAD | 93 02 4198 | 93 02 4185 | 94 62 4964 | 94 62 4968 | 93 02 4357 | 93 62 6054 | 93 75 6054 | 93 02 4201 | 93 02 4199 | 93 02 4207 | 93 02 4206 | 94 10 3211 | 94 10 3039 |
| SMF® 5.4 m² | AX - AX | 94 62 4006 | 94 03 0006 | 94 62 2317 | 94 62 2034 | 94 03 6275 | 93 62 4096 | 93 75 4096 | 94 62 2033 | 94 11 2208 | 94 03 0026 | 94 20 2200 | 94 10 3212 | 94 10 3053 |
| | AX - RAD | 94 62 4006 | 94 03 0006 | 94 62 2317 | 94 62 2034 | 94 03 6275 | 93 62 4096 | 93 75 4096 | 94 62 2033 | 94 11 4019 | 94 03 0026 | 94 20 2200 | 94 10 3213 | 94 10 3054 |
| | RAD - AX | 94 11 4012 | 94 03 0006 | 94 62 2317 | 94 62 2034 | 94 03 6275 | 93 62 4096 | 93 75 4096 | 94 62 2033 | 94 11 2208 | 94 03 0026 | 94 20 2200 | 94 10 3214 | 94 10 3056 |
| | RAD - RAD | 94 11 4012 | 94 03 0006 | 94 62 2317 | 94 62 2034 | 94 03 6275 | 93 62 4096 | 93 75 4096 | 94 62 2033 | 94 11 4019 | 94 03 0026 | 94 20 2200 | 94 10 3215 | 94 10 3055 |
| SMF® 6.5 m² | AX - AX | 94 62 4006 | 94 03 0006 | 94 62 2317 | 94 62 2034 | 94 03 6275 | 93 62 4099 | 93 75 4099 | 94 62 2033 | 94 11 2208 | 94 03 0026 | 94 20 2200 | 94 10 3216 | 94 10 3057 |
| | AX - RAD | 94 62 4006 | 94 03 0006 | 94 62 2317 | 94 62 2034 | 94 03 6275 | 93 62 4099 | 93 75 4099 | 94 62 2033 | 94 11 4019 | 94 03 0026 | 94 20 2200 | 94 10 3217 | 94 10 3058 |
| | RAD - AX | 94 11 4012 | 94 03 0006 | 94 62 2317 | 94 62 2034 | 94 03 6275 | 93 62 4099 | 93 75 4099 | 94 62 2033 | 94 11 2208 | 94 03 0026 | 94 20 2200 | 94 10 3218 | 94 10 3060 |
| | RAD - RAD | 94 11 4012 | 94 03 0006 | 94 62 2317 | 94 62 2034 | 94 03 6275 | 93 62 4099 | 93 75 4099 | 94 62 2033 | 94 11 4019 | 94 03 0026 | 94 20 2200 | 94 10 3219 | 94 10 3059 |
| SMF® 8.1 m² | AX - AX | 94 62 4006 | 94 03 0006 | 94 62 2317 | 94 62 2034 | 94 03 6275 | 93 62 3736 | 93 75 3736 | 94 62 2033 | 94 11 2208 | 94 03 0026 | 94 20 2200 | 94 10 3220 | 94 10 3061 |
| | AX - RAD | 94 62 4006 | 94 03 0006 | 94 62 2317 | 94 62 2034 | 94 03 6275 | 93 62 3736 | 93 75 3736 | 94 62 2033 | 94 11 4019 | 94 03 0026 | 94 20 2200 | 94 10 3221 | 94 10 3062 |
| | RAD - AX | 94 11 4012 | 94 03 0006 | 94 62 2317 | 94 62 2034 | 94 03 6275 | 93 62 3736 | 93 75 3736 | 94 62 2033 | 94 11 2208 | 94 03 0026 | 94 20 2200 | 94 10 3222 | 94 10 3064 |
| | RAD - RAD | 94 11 4012 | 94 03 0006 | 94 62 2317 | 94 62 2034 | 94 03 6275 | 93 62 3736 | 93 75 3736 | 94 62 2033 | 94 11 4019 | 94 03 0026 | 94 20 2200 | 94 10 3223 | 94 10 3063 |
| SMF® 8.0 m² | AX - AX | 94 62 4242 | 94 03 0005 | 94 62 2416 | 94 62 2006 | 94 03 6276 | 93 62 4301 | 93 75 4301 | 94 62 1994 | 94 11 4245 | 94 03 0026 | 94 20 2200 | 94 10 3224 | 94 10 3065 |
| | AX - RAD | 94 62 4242 | 94 03 0005 | 94 62 2416 | 94 62 2006 | 94 03 6276 | 93 62 4301 | 93 75 4301 | 94 62 1994 | 94 11 4574 | 94 03 0026 | 94 20 2200 | 94 10 3225 | 94 10 3066 |
| | RAD - AX | 94 11 4565 | 94 03 0005 | 94 62 2416 | 94 62 2006 | 94 03 6276 | 93 62 4301 | 93 75 4301 | 94 62 1994 | 94 11 4245 | 94 03 0026 | 94 20 2200 | 94 10 3226 | 94 10 3068 |
| | RAD - RAD | 94 11 4565 | 94 03 0005 | 94 62 2416 | 94 62 2006 | 94 03 6276 | 93 62 4301 | 93 75 4301 | 94 62 1994 | 94 11 4574 | 94 03 0026 | 94 20 2200 | 94 10 3227 | 94 10 3067 |
| SMF® 10.2 m² | AX - AX | 94 62 4242 | 94 03 0005 | 94 62 2416 | 94 62 2006 | 94 03 6276 | 93 62 4248 | 93 75 4248 | 94 62 1994 | 94 11 4245 | 94 03 0026 | 94 20 2200 | 94 10 3228 | 94 10 3069 |
| | AX - RAD | 94 62 4242 | 94 03 0005 | 94 62 2416 | 94 62 2006 | 94 03 6276 | 93 62 4248 | 93 75 4248 | 94 62 1994 | 94 11 4574 | 94 03 0026 | 94 20 2200 | 94 10 3229 | 94 10 3070 |
| | RAD - AX | 94 11 4565 | 94 03 0005 | 94 62 2416 | 94 62 2006 | 94 03 6276 | 93 62 4248 | 93 75 4248 | 94 62 1994 | 94 11 4245 | 94 03 0026 | 94 20 2200 | 94 10 3230 | 94 10 3072 |
| | RAD - RAD | 94 11 4565 | 94 03 0005 | 94 62 2416 | 94 62 2006 | 94 03 6276 | 93 62 4248 | 93 75 4248 | 94 62 1994 | 94 11 4574 | 94 03 0026 | 94 20 2200 | 94 10 3231 | 94 10 3071 |

# 5. Modular SMF®-AR System

Owing to greatly differing application profiles with exhaust-gas temperatures that are frequently too low, mobile machinery and stationary applications are usually fitted with active systems, such as the SMF®-AR (Sintered Metal Filter with thermoelectric self-regeneration) system developed by HJS. With this system, the particulate filter can be regenerated at almost any engine operating point, irrespective of exhaust-gas temperature. The heat necessary to burn off the particulate matter is generated by the SMF®-AR system itself.

Thanks to the compact and modular design of the SMF®-AR system, it can be put to use in many different applications. Pipes and brackets can be modified as required to match the different machines and vehicles. As a rule, SMF®-AR systems replace the original silencer.

## Application examples for SMF®-AR systems:

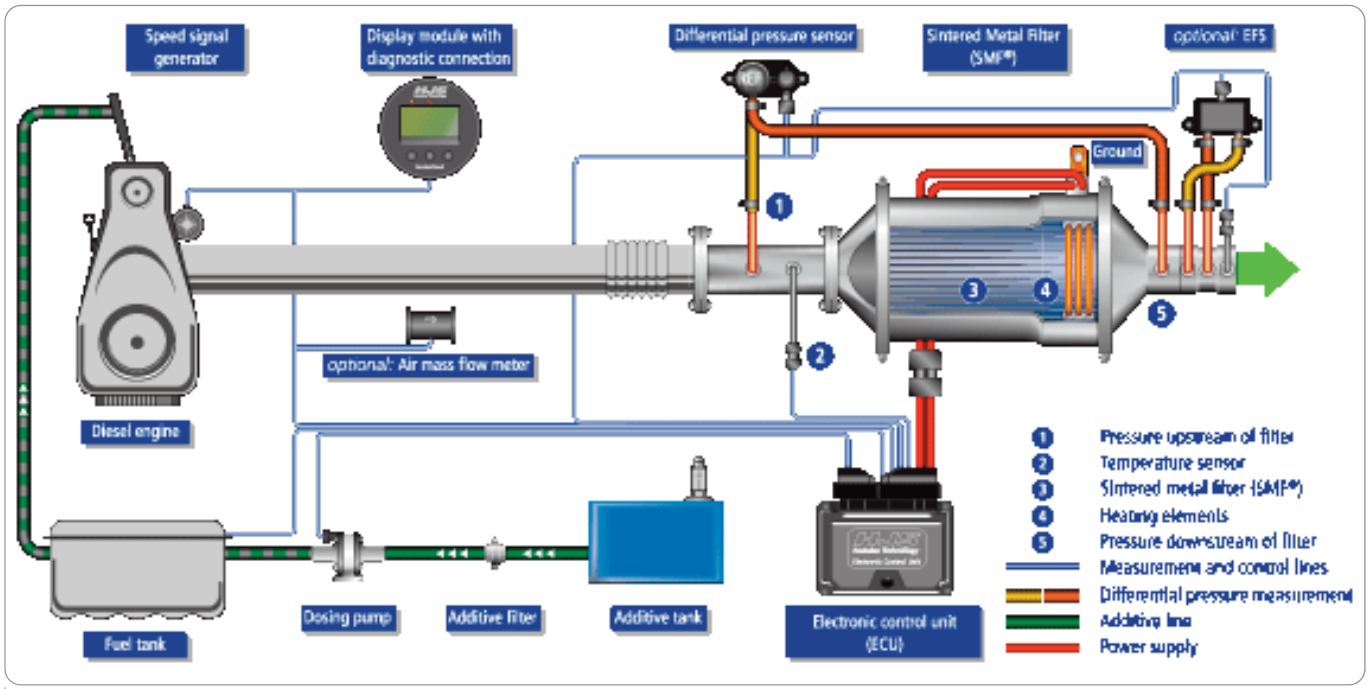
Construction machinery and construction equipment, such as forklift trucks, mini hydraulic excavators, wheel loaders, industrial trucks and power generating sets.

• SMF®-AR system with heating elements that encircle the filter

## Functional description

The SMF®-AR system filters the exhaust gases until an optimum quantity of soot for regeneration has been collected in the filter. The system makes use of the positive active properties of a fuel additive that on the one hand lowers the soot's ignition temperature and on the other hand increases its burn-off speed.

The soot trapped in the filter can, therefore, be burned off automatically in a regeneration process when the exhaust-gas has a temperature of around 400°C. If, however, the necessary temperature is not reached – which is frequently the case in the low-load range – the system's active, thermoelectric regeneration function cuts in.




• Functional Principle SMF®-AR

## Technical description: air mass flow meter (AMFM) and exhaust flow sensor (EFS)

The AMFM forwards the intake air mass flow measured to the ECU. The HJS EFS (exhaust flow sensor) uses the pressure difference in a Venturi nozzle to measure the exhaust-gas volumetric flow or mass flow that flows through this nozzle.

The pressure sensor communicates with the ECU via the CAN bus. With the aid of a temperature sensor, the exhaust-gas volumetric flow is converted to a mass flow. The mass flow is used to control the electric heater.

## Active, thermoelectric regeneration

The control unit triggers (active) regeneration by means of the heating elements that encircle the filter. The soot that has built up in the filter is ignited by the energy radiated by the heating elements. After the initial ignition of the soot layer, the regeneration process runs automatically until completed, that is, all the soot has been burned off. This occurs at regular intervals. However, the control unit not only triggers ignition of the soot, but also doses the optimum amount of additive, monitors the filter load and, with the help of sensors, calculates the best timing for regeneration. In addition, a self-learning driving-cycle recognition functionality generally ensures that a regeneration cycle that has already started is not interrupted when the engine is switched off.

Thanks to the high soot holding capacity of the SMF®-AR system, there isn't just one single ideal moment for regeneration, rather regeneration takes place within a wide time slot. Terminating regeneration by switching off the engine therefore poses absolutely no problem to reliable, safe operation of the SMF®-AR system.

A further advantage of the SMF® is its high ash holding capacity, which allows for long servicing and cleaning intervals.

• Soot ignition following initial ignition

## SMF®-AR advantages at a glance

- ✔ Suitable for OE and retrofitting applications
- ✔ Reduction of soot particles and fine particulate matter by more than 99%
- ✔ Particularly suitable for low-temperature applications
- ✔ Fully automatic, active regeneration
- ✔ Robust thanks to the use of sintered metal (SMF®) – Suitable for use in construction machinery
- ✔ Reliable operation
- ✔ Low maintenance
- ✔ Longer service life
- ✔ $NO_2$-neutral regeneration
- ✔ Use of fuels with a high share of sulphur as well as other “special” fuels (e.g. kerosene) on request

# 5. Modular SMF®-AR System

## Technical data and requirements

**Max. safe temperature operation for SMF®*:** 650°C exhaust-gas temperature

**Filter material:** high-temperature-resistant chrome-nickel steel

**Filter housing material:** 1.4301

**Ash holding capacity:** max. 50 g/l filter volume

**Filtration efficiency rate:** (number concentration in range from 20 – 300 nm) > 99%

**Filtration efficiency rate:** (in relation to soot mass) > 97%

**Length of regeneration period:** 3 – 7 minutes

**Max. power consumption of heater:** SMF®-AR 1.2 $m^2$ - 3.8 $m^2$: 1 kW with 12-V on-board supply system

**Max. power consumption of heater:** SMF®-AR 5.4 $m^2$ - 8.1 $m^2$: 2.2 kW with 24-V on-board supply system

**Min. size alternator:** 80 Ah

**Particulate load before regeneration:** 20 – 30 g/$m^2$

**Surface temperature during regeneration without insulation:** max. 800°C (peak)

**Surface temperature during regeneration with insulation:** max. 300°C

**Additive consumption:** 1 l/2000 l diesel (depending on volume of particulates emitted by engine)

**Additive contents:** organometallic iron compound

**Additive pollutant categories:** Xn; R48/22, R65, R66

### Application and operating conditions

The following application and operating conditions must be complied with in order to ensure the modular SMF®-AR systems from HJS function optimally:

> Engine fulfils Stage II, Stage IIIA or B in Europe, Tiers II, III and IV in the USA

> Diesel fuel in compliance with DIN EN 590

> Exhaust-gas temperatures from 150°C for regeneration

> Crucial factors when selecting the additive tank (sizes available: 2 l, 3 l and 5 l) are the installation space available and the maintenance interval desired

> Tank size in line with the average consumption figure and annual mileage covered or number of operating hours

> Strain-free, vibration-isolated installation and secure, gas-tight connection to the existing exhaust system

> Systems never mounted on the engine-gearbox unit

> Only components approved and released by the system supplier are fitted

Perfect connection of the system pipework ensures the exhaust backpressure is low. HJS offers insulating components for all its systems to reduce their surface temperature. The systems are operated in conjunction with the HJS Service Unit (included in the delivery scope).

In order to ensure the systems operate as intended, HJS and its authorised partners offer a temperature-measurement service and one-on-one application consulting.

**Make sure that personnel are protected against (accidental) contact with hot components!**

**All application specifications, installation guidelines and maintenance manuals provided by HJS Emission Technology GmbH & Co. KG must be complied with.**

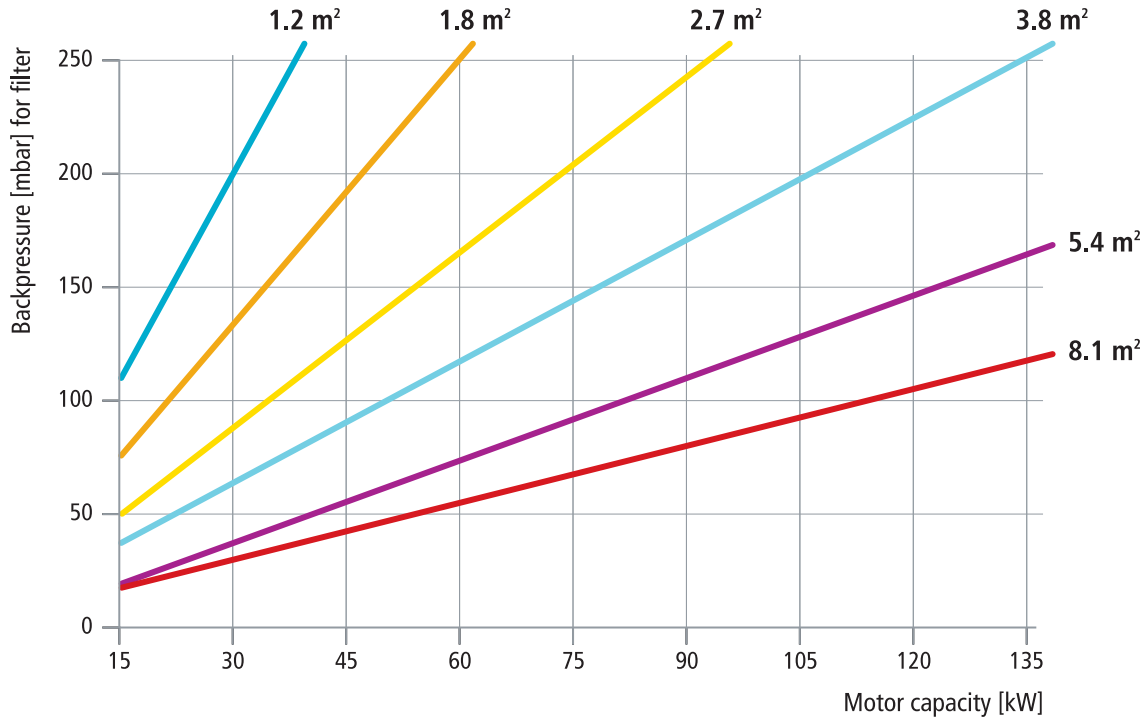
# Dimensioning the filter

HJS offers SMF®-AR systems with filter surface areas ranging from 1.2 m² to 8.1 m².

To help you choose the right size of filter, the diagram below shows the exhaust backpressure generated by each size of filter (not taking the inlet and outlet modules into account).

• SMF®-Sintered Metal Filter – 100% soot-free

## Filter surface areas* from 1.2 m² to 8.1 m²




*Refers to a filter module with a maximum temperature upstream of the DPF® of 200°C

• Backpressure of the individual filter units

## Example calculation

In the case of a construction machine with a power output of e.g. 250 kW and a maximum permissible exhaust backpressure of 150 mbar (as specified by the engine manufacturer), a filter with a surface area of 3.8 m² can be installed. In this simplified example, it should be noted that the backpressure flow of the inlet and outlet modules is disregarded. Radial modules tend to result in a slightly higher backpressure. Further technical data are required if the filter is to be dimensioned more precisely (see Section HJS Enquiry Form).

# 5. Modular SMF®-AR System

## Considering the installation space available for SMF®-AR systems

After determining the size of the filter, it's time to see how much space is available for installing them.

As a rule, the filter system replaces the original silencer. Alternatively, the particulate filter system can be installed upstream of the silencer.

When selecting the installation position, make sure that there is sufficient clearance between the filter and other components and that the filter can be removed easily for servicing and maintenance work.

The filter unit can be installed horizontally or vertically. The matching inlet and outlet modules must be selected in line with the amount of installation space available in the machine (AXIAL-AXIAL, AXIAL-RADIAL, RADIAL-AXIAL, RADIAL-RADIAL).

To secure the filter, system mounts must be used.

### Dimension tables

The dimension tables contain all dimensions of relevance to installation. All dimensions are stated in millimetres (mm). This section describes and illustrates the different versions of filter systems with a surface area of 1.2 $m^2$ to 8.1 $m^2$.

### The dimension tables contain the data of the:

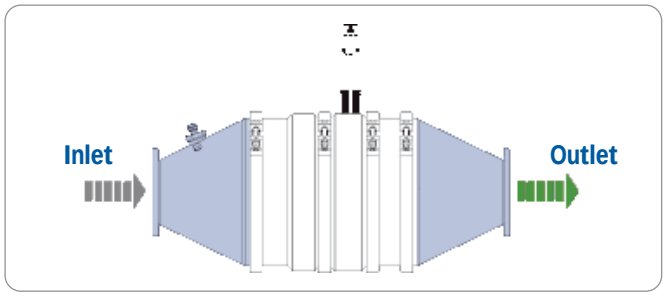
> Inlet module
> SMF®-AR
> Outlet module

### Scope of delivery

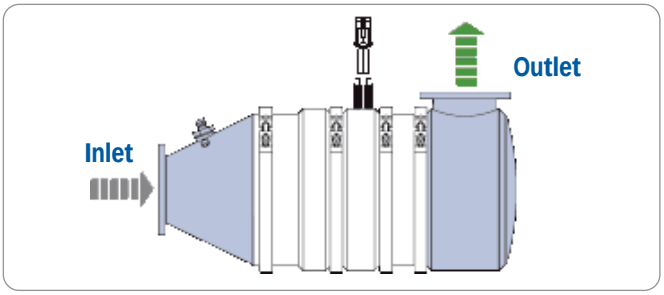
The item numbers listed describe fully assembled filter units with inlet and outlet module, regeneration unit, system clamp, gasket set, wire mesh set, dosing pump (12V/24V), voltage transformer and HJS Service Unit. In addition, all relevant technical documentations, such as the installation guidelines and maintenance manual, are included in the scope of delivery.

**The system mounts, additive, air mass flow meter/EFS, transformer, insulation set and tank must be ordered separately. (see individual components)**

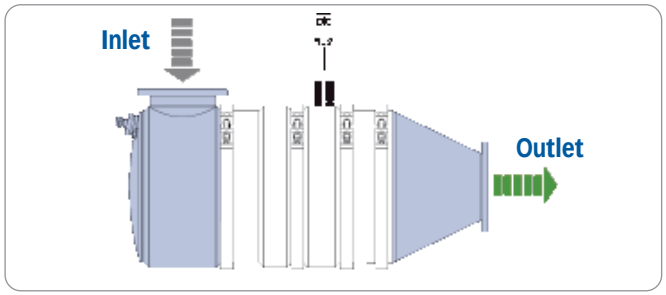
### AXIAL - AXIAL



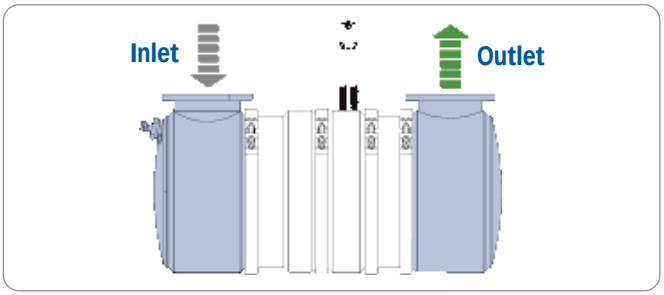

### AXIAL - RADIAL




### RADIAL - AXIAL

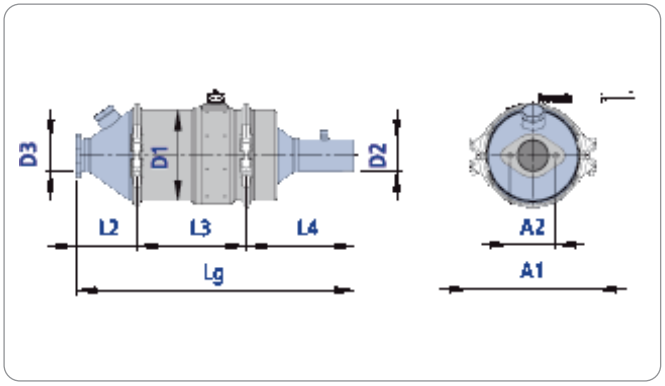



### RADIAL - RADIAL



# 1.2-m² SMF®-AR system

## AXIAL - AXIAL

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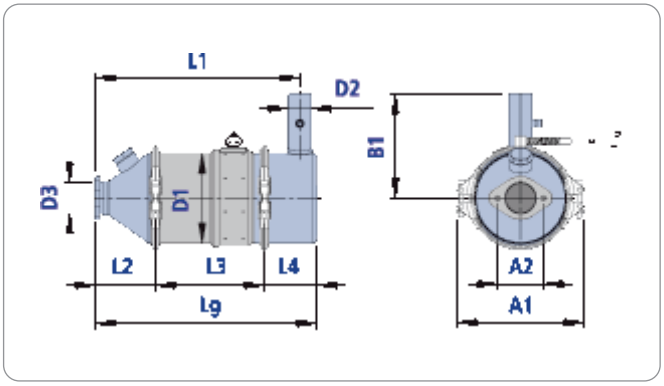
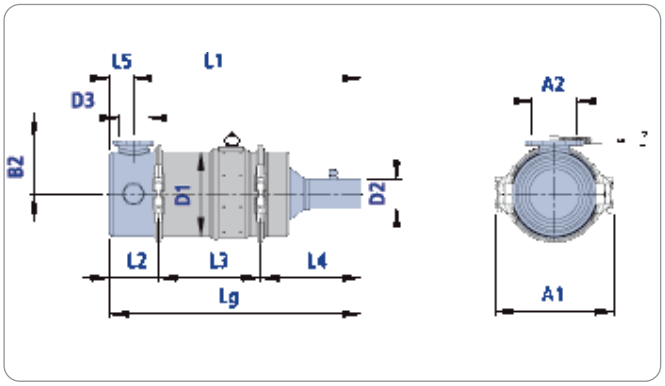
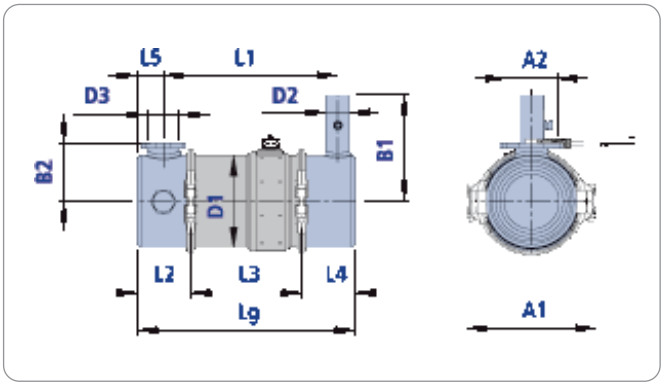



## RADIAL - AXIAL




## RADIAL - RADIAL




## Dimension table for 1.2-m² SMF®-AR system

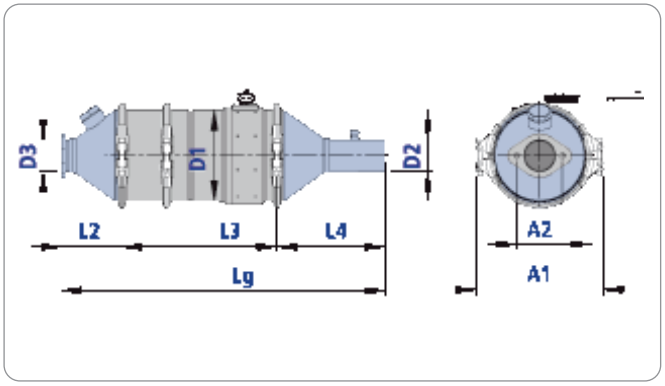
| Item No.*[1] | System | Confi-guration | Lg | L1 | L2 | L3 | L4 | L5 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **93 71 3001** | SMF®-AR 1.2 m² | AX - AX | 487 | - | 106 | 192 | 189 | - | 220 | 80 | - | - | Ø 158 | Ø 55 | Ø 55 |
| **93 71 3002** | SMF®-AR 1.2 m² | AX - RAD | 390 | 360 | 106 | 192 | 92 | - | 220 | 80 | 184 | - | Ø 158 | Ø 40 | Ø 55 |
| **93 71 3003** | SMF®-AR 1.2 m² | RAD - AX | 473 | 428 | 92 | 192 | 189 | 45 | 220 | 80 | - | 100 | Ø 158 | Ø 55 | Ø 55 |
| **93 71 3004** | SMF®-AR 1.2 m² | RAD - RAD | 367 | 301 | 92 | 192 | 92 | 45 | 220 | 80 | 184 | 100 | Ø 158 | Ø 40 | Ø 55 |

*[1] Scope of delivery does not include the system mounts, insulation, additive, air mass flow meter/EFS and tank.
Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

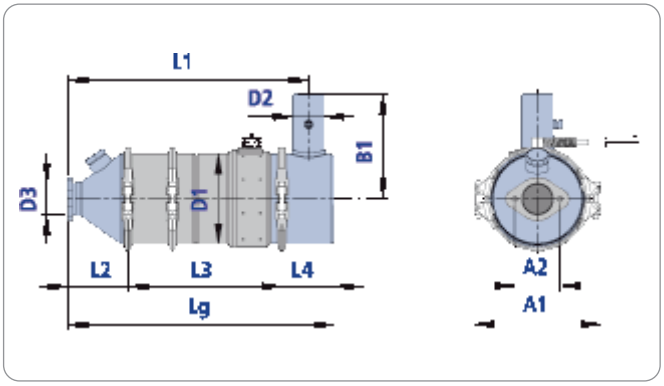
# 5. Modular SMF®-AR System

## 1.8-m² SMF®-AR system

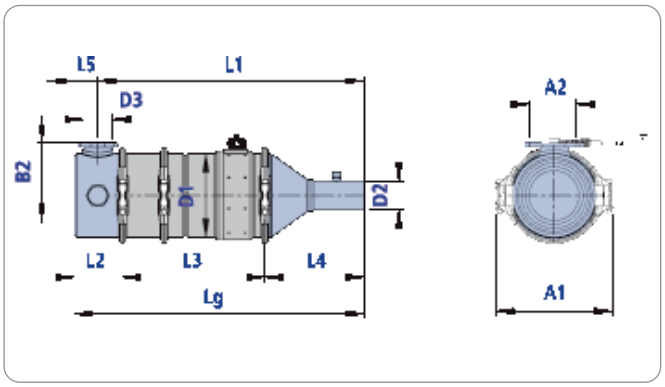
### AXIAL - AXIAL



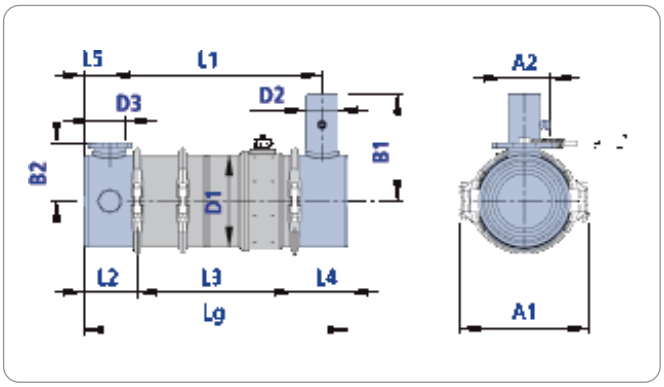

### AXIAL - RADIAL




### RADIAL - AXIAL




### RADIAL - RADIAL



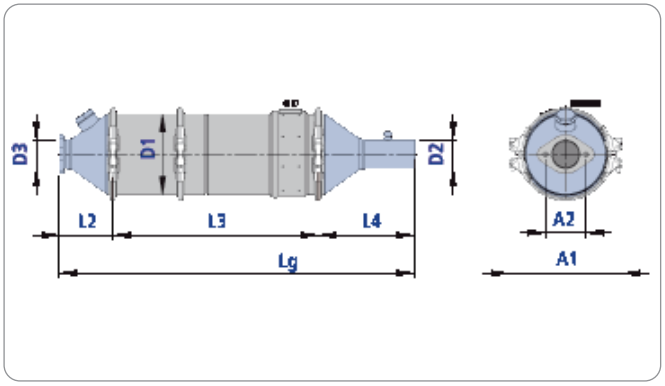

### Dimension table for 1.8-m² SMF®-AR system

| Item No.*[1] | System | Confi-guration | Lg | L1 | L2 | L3 | L4 | L5 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **93 71 3005** | SMF®-AR 1.8 m² | AX - AX | 567 | - | 106 | 272 | 189 | - | 220 | 80 | - | - | Ø 158 | Ø 55 | Ø 55 |
| **93 71 3006** | SMF®-AR 1.8 m² | AX - RAD | 470 | 424 | 106 | 272 | 92 | - | 220 | 80 | 184 | - | Ø 158 | Ø 55 | Ø 55 |
| **93 71 3007** | SMF®-AR 1.8 m² | RAD - AX | 553 | 508 | 92 | 272 | 189 | 45 | 220 | 80 | - | 100 | Ø 158 | Ø 55 | Ø 55 |
| **93 71 3008** | SMF®-AR 1.8 m² | RAD - RAD | 456 | 366 | 92 | 272 | 92 | 45 | 220 | 80 | 184 | 100 | Ø 158 | Ø 55 | Ø 55 |

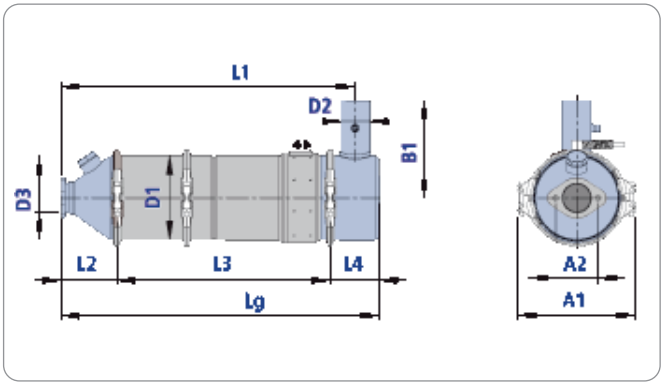
*[1] Scope of delivery does not include the system mounts, insulation, additive, air mass flow meter/EFS and tank.
Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

# 2.7-m² SMF®-AR system

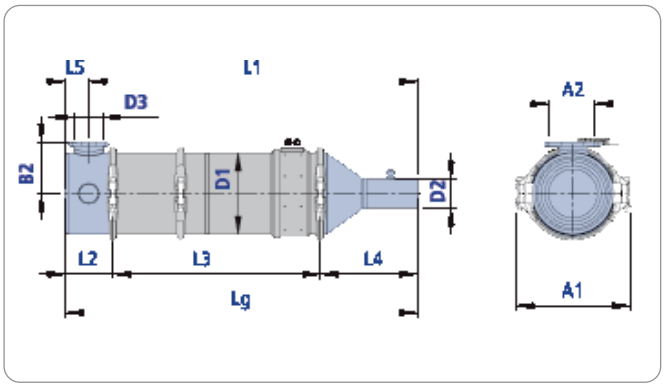
## AXIAL - AXIAL



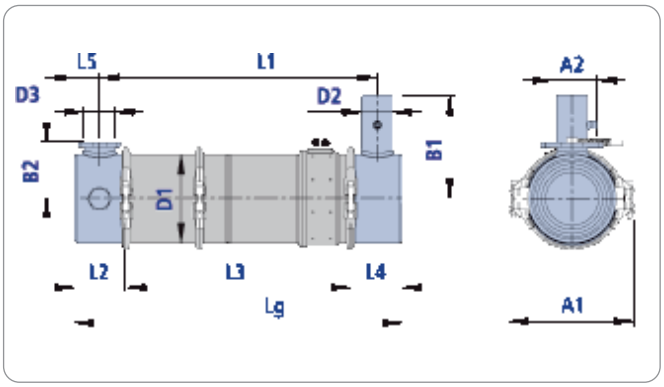

## AXIAL - RADIAL




## RADIAL - AXIAL




## RADIAL - RADIAL




## Dimension table for 2.7-m² SMF®-AR system

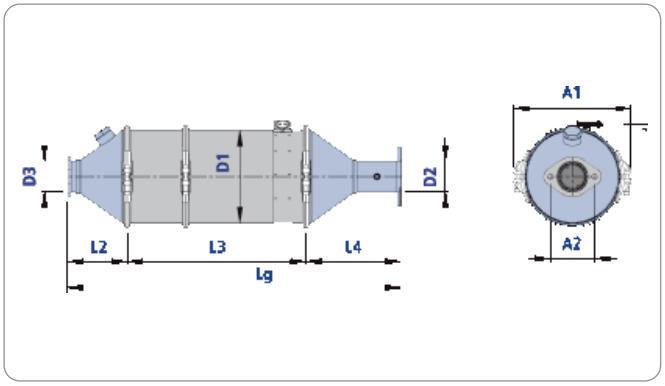
| Item No.*[1] | System | Confi-guration | Lg | L1 | L2 | L3 | L4 | L5 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **93 71 3009** | SMF®-AR 2.7 m² | AX - AX | 699 | - | 106 | 404 | 189 | - | 220 | 80 | - | - | Ø 158 | Ø 55 | Ø 55 |
| **93 71 3010** | SMF®-AR 2.7 m² | AX - RAD | 602 | 557 | 106 | 404 | 92 | - | 220 | 80 | 184 | - | Ø 158 | Ø 55 | Ø 55 |
| **93 71 3011** | SMF®-AR 2.7 m² | RAD - AX | 685 | 640 | 92 | 404 | 189 | 45 | 220 | 80 | - | 100 | Ø 158 | Ø 55 | Ø 55 |
| **93 71 3012** | SMF®-AR 2.7 m² | RAD - RAD | 588 | 498 | 92 | 404 | 92 | 45 | 220 | 80 | 184 | 100 | Ø 158 | Ø 55 | Ø 55 |

*[1] Scope of delivery does not include the system mounts, insulation, additive, air mass flow meter/EFS and tank.
Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

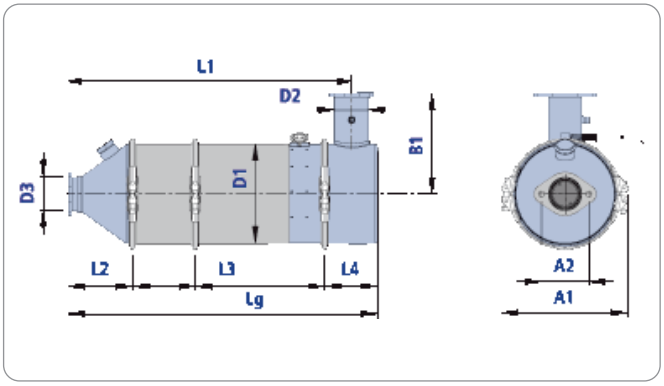
# 5. Modular SMF®-AR System

## 3.8-m² SMF®-AR system

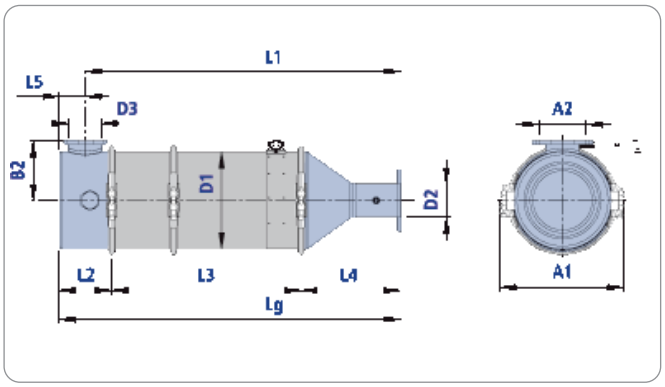
### AXIAL - AXIAL



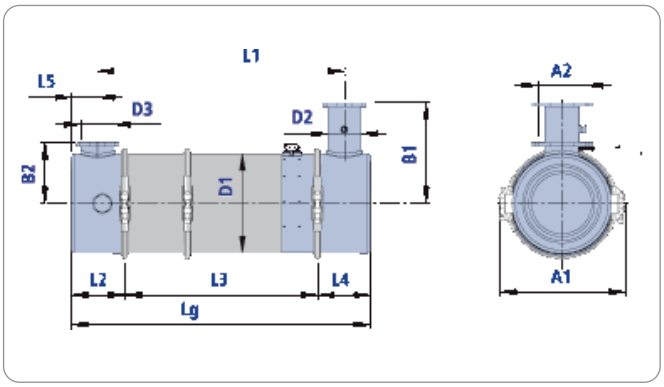

### AXIAL - RADIAL




### RADIAL - AXIAL




### RADIAL - RADIAL



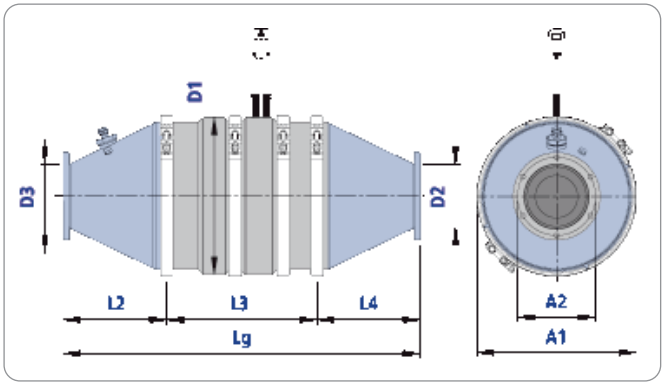

### Dimension table for 3.8-m² SMF®-AR system

| Item No.*1 | System | Bauform | Lg | L1 | L2 | L3 | L4 | L5 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 93 71 3013 | SMF®-AR 3.8 m² | AX - AX | 755 | - | 135 | 405 | 215 | - | 266 | 100 | - | - | Ø 208 | Ø 70 | Ø 70 |
| 93 71 3014 | SMF®-AR 3.8 m² | AX - RAD | 653 | 598 | 135 | 405 | 113 | - | 266 | 100 | 216 | - | Ø 208 | Ø 70 | Ø 70 |
| 93 71 3015 | SMF®-AR 3.8 m² | RAD - AX | 731 | 643 | 111 | 405 | 215 | 55 | 266 | 100 | - | 127 | Ø 208 | Ø 70 | Ø 70 |
| 93 71 3016 | SMF®-AR 3.8 m² | RAD - RAD | 629 | 519 | 111 | 405 | 113 | 55 | 266 | 100 | 216 | 127 | Ø 208 | Ø 70 | Ø 70 |

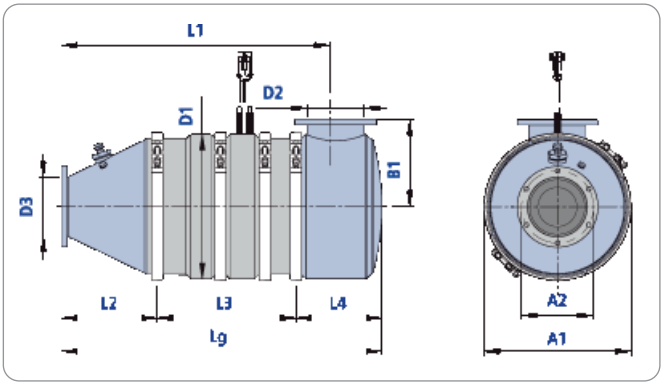
*1 Scope of delivery does not include the system mounts, insulation, additive, air mass flow meter/EFS and tank.
Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

# 5.4-m² SMF®-AR system

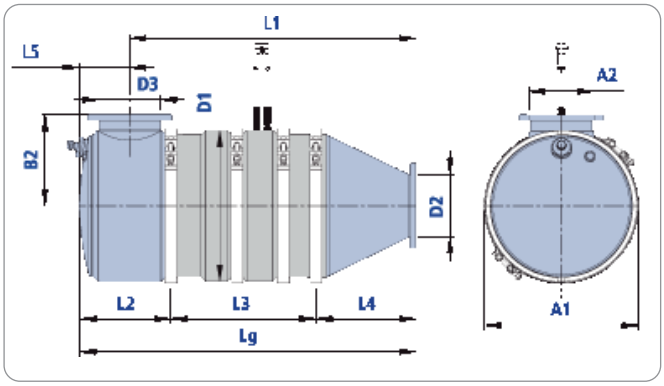
## AXIAL - AXIAL



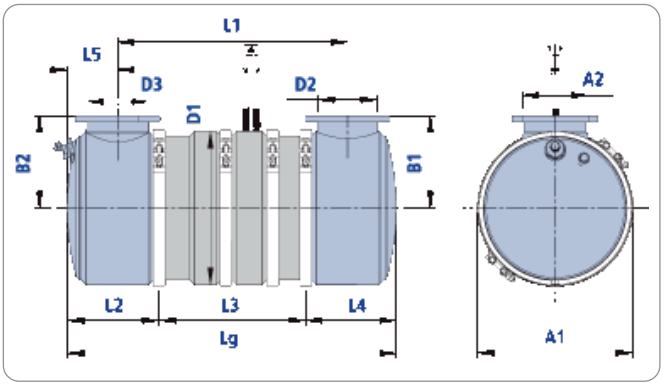

## AXIAL - RADIAL




## RADIAL - AXIAL




## RADIAL - RADIAL




## Dimension table for 5.4-m² SMF®-AR system

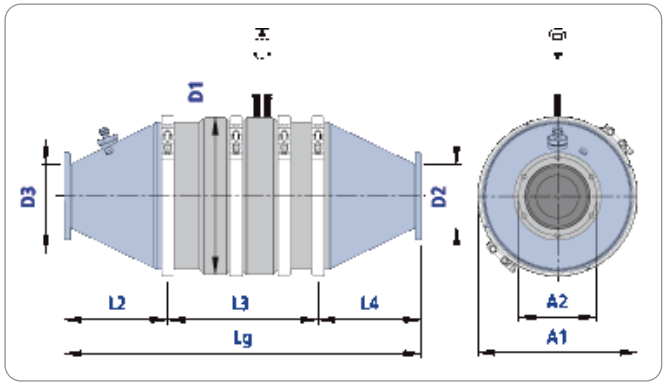
| Item No.*[1] | System | Confi-guration | Lg | L1 | L2 | L3 | L4 | L5 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 93 71 3017 | SMF®-AR 5.4 m² | AX - AX | 728 | - | 211 | 306 | 211 | - | Ø 325 | Ø 159 | - | - | Ø 319 | Ø 129 | Ø 129 |
| 93 71 3018 | SMF®-AR 5.4 m² | AX - RAD | 706 | 605 | 211 | 306 | 189 | - | Ø 325 | Ø 159 | 192 | - | Ø 319 | Ø 129 | Ø 129 |
| 93 71 3019 | SMF®-AR 5.4 m² | RAD - AX | 709 | 604 | 192 | 306 | 211 | 105 | Ø 325 | Ø 159 | - | 192 | Ø 319 | Ø 129 | Ø 129 |
| 93 71 3020 | SMF®-AR 5.4 m² | RAD - RAD | 687 | 480 | 192 | 306 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | Ø 319 | Ø 129 | Ø 129 |

*[1] Scope of delivery does not include the system mounts, insulation, additive, air mass flow meter/EFS, tank and transformer.
Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

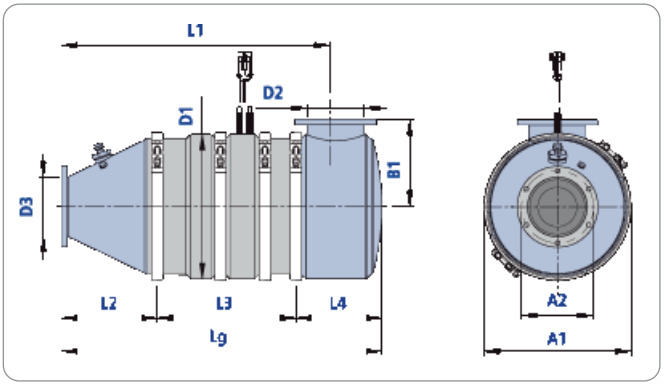
# 5. Modular SMF®-AR System

## 8.1-m² SMF®-AR system

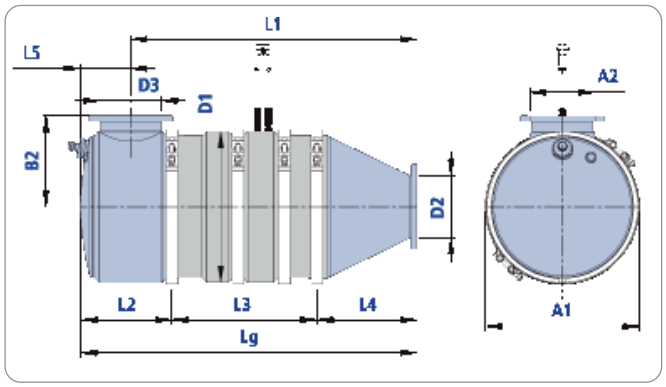
### AXIAL - AXIAL



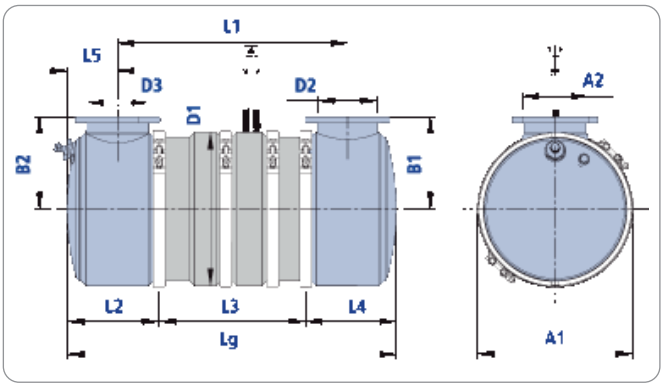

### AXIAL - RADIAL




### RADIAL - AXIAL




### RADIAL - RADIAL



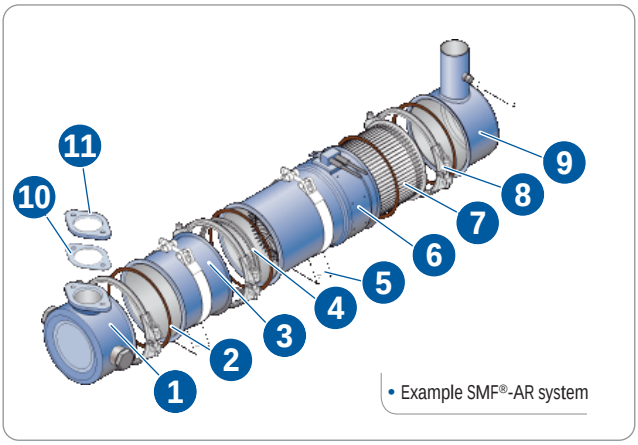

### Dimension table for 8.1-m² SMF®-AR system

| Item No.*1 | System | Confi-guration | Lg | L1 | L2 | L3 | L4 | L5 | A1 | A2 | B1 | B2 | ø D1 | ø D2 | ø D3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 93 71 3021 | SMF®-AR 8.1 m² | AX - AX | 863 | - | 211 | 441 | 211 | - | Ø 325 | Ø 159 | - | - | Ø 319 | Ø 129 | Ø 129 |
| 93 71 3022 | SMF®-AR 8.1 m² | AX - RAD | 842 | 740 | 211 | 441 | 189 | - | Ø 325 | Ø 159 | 192 | - | Ø 319 | Ø 129 | Ø 129 |
| 93 71 3023 | SMF®-AR 8.1 m² | RAD - AX | 844 | 739 | 192 | 441 | 211 | 105 | Ø 325 | Ø 159 | - | 192 | Ø 319 | Ø 129 | Ø 129 |
| 93 71 3024 | SMF®-AR 8.1 m² | RAD - RAD | 823 | 616 | 192 | 441 | 189 | 105 | Ø 325 | Ø 159 | 192 | 192 | Ø 319 | Ø 129 | Ø 129 |

*1 Scope of delivery does not include the system mounts, insulation, additive, air mass flow meter/EFS, tank and transformer.
Comment: The specified dimensions [in mm] are subject to tolerances. Precise dimensions on request.

# Individual components

## The table below contains the data of the individual components of a SMF®-AR system.




• Example SMF®-AR system

1. Inlet Module
2. System Gasket
3. Middle Module
4. Wire Mesh
5. System Mount
6. Heating cabinet
7. SMF® Filter
8. System Clamp
9. Outlet Module
10. Flange gasket
11. Flange

| Additive (1 liter) |
|---|
| 94 60 0250 |

| Additive tank, incl. venting valve | |
|---|---|
| 2 liter | 93 02 4272 |
| 3 liter | 93 02 4273 |
| 5 liter | 93 02 4275 |

| SMF®-AR system | Weight [kg] |
|---|---|
| SMF® 1.2 m² | 9 |
| SMF® 1.8 m² | 11 |
| SMF® 2.7 m² | 15 |
| SMF® 3.8 m² | 20 |
| SMF® 5.4 m² | 35 |
| SMF® 8.1 m² | 45 |

| | Confi-guration | Inlet Module 1 | System Gasket 2 | Middle Module 3 | Wire Mesh 4 | System Mount 5 | Heating cabinet 6 | SMF®-Filter 7 | System Clamp 8 | Outlet Module 9 | Flange gasket 10 | Flange 11 | Regeneration unit | Insulation set |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SMF® 1.2 m² | AX - AX | 93 02 4184 | 93 02 4189 | - | - | 93 02 4365 | 93 02 6001 | 93 02 4378 | 93 02 4179 | 93 02 4215 | 93 02 4194 | 93 02 4191 | 93 02 6026 | 93 02 4352 |
| | AX - RAD | 93 02 4184 | 93 02 4189 | - | - | 93 02 4365 | 93 02 6001 | 93 02 4378 | 93 02 4179 | 93 02 4218 | 93 02 4194 | 93 02 4191 | 93 02 6026 | 93 02 4353 |
| | RAD - AX | 93 02 4190 | 93 02 4189 | - | - | 93 02 4365 | 93 02 6001 | 93 02 4378 | 93 02 4179 | 93 02 4215 | 93 02 4194 | 93 02 4191 | 93 02 6026 | 93 02 4354 |
| | RAD - RAD | 93 02 4190 | 93 02 4189 | - | - | 93 02 4365 | 93 02 6001 | 93 02 4378 | 93 02 4179 | 93 02 4218 | 93 02 4194 | 93 02 4191 | 93 02 6026 | 93 02 4351 |
| SMF® 1.8 m² | AX - AX | 93 02 4184 | 93 02 4189 | 93 02 4168 | 93 02 4178 | 93 02 4365 | 93 02 6001 | 93 02 4177 | 93 02 4179 | 93 02 4186 | 93 02 4194 | 93 02 4191 | 93 02 6026 | 93 02 4315 |
| | AX - RAD | 93 02 4184 | 93 02 4189 | 93 02 4168 | 93 02 4178 | 93 02 4365 | 93 02 6001 | 93 02 4177 | 93 02 4179 | 93 02 4188 | 93 02 4194 | 93 02 4191 | 93 02 6026 | 93 02 4316 |
| | RAD - AX | 93 02 4190 | 93 02 4189 | 93 02 4168 | 93 02 4178 | 93 02 4365 | 93 02 6001 | 93 02 4177 | 93 02 4179 | 93 02 4186 | 93 02 4194 | 93 02 4191 | 93 02 6026 | 93 02 4318 |
| | RAD - RAD | 93 02 4190 | 93 02 4189 | 93 02 4168 | 93 02 4178 | 93 02 4365 | 93 02 6001 | 93 02 4177 | 93 02 4179 | 93 02 4188 | 93 02 4194 | 93 02 4191 | 93 02 6026 | 93 02 4317 |
| SMF® 2.7 m² | AX - AX | 93 02 4184 | 93 02 4189 | 93 02 4193 | 93 02 4178 | 93 02 4365 | 93 02 6003 | 93 02 4175 | 93 02 4179 | 93 02 4186 | 93 02 4194 | 93 02 4191 | 93 02 6026 | 93 02 4319 |
| | AX - RAD | 93 02 4184 | 93 02 4189 | 93 02 4193 | 93 02 4178 | 93 02 4365 | 93 02 6003 | 93 02 4175 | 93 02 4179 | 93 02 4188 | 93 02 4194 | 93 02 4191 | 93 02 6026 | 93 02 4320 |
| | RAD - AX | 93 02 4190 | 93 02 4189 | 93 02 4193 | 93 02 4178 | 93 02 4365 | 93 02 6003 | 93 02 4175 | 93 02 4179 | 93 02 4186 | 93 02 4194 | 93 02 4191 | 93 02 6026 | 93 02 4322 |
| | RAD - RAD | 93 02 4190 | 93 02 4189 | 93 02 4193 | 93 02 4178 | 93 02 4365 | 93 02 6003 | 93 02 4175 | 93 02 4179 | 93 02 4188 | 93 02 4194 | 93 02 4191 | 93 02 6026 | 93 02 4321 |
| SMF® 3.8 m² | AX - AX | 93 02 4196 | 93 02 4202 | 93 02 4211 | 93 02 4204 | 93 02 4357 | 93 02 6004 | 93 02 4174 | 93 02 4201 | 93 02 4197 | 93 02 4207 | 93 02 4206 | 93 02 6026 | 93 02 4323 |
| | AX - RAD | 93 02 4196 | 93 02 4202 | 93 02 4211 | 93 02 4204 | 93 02 4357 | 93 02 6004 | 93 02 4174 | 93 02 4201 | 93 02 4199 | 93 02 4207 | 93 02 4206 | 93 02 6026 | 93 02 4324 |
| | RAD - AX | 93 02 4198 | 93 02 4202 | 93 02 4211 | 93 02 4204 | 93 02 4357 | 93 02 6004 | 93 02 4174 | 93 02 4201 | 93 02 4197 | 93 02 4207 | 93 02 4206 | 93 02 6026 | 93 02 4326 |
| | RAD - RAD | 93 02 4198 | 93 02 4202 | 93 02 4211 | 93 02 4204 | 93 02 4357 | 93 02 6004 | 93 02 4174 | 93 02 4201 | 93 02 4199 | 93 02 4207 | 93 02 4206 | 93 02 6026 | 93 02 4325 |
| SMF® 5.4 m² | AX - AX | 94 62 4006 | 94 03 0006 | 93 02 4166 | 93 02 4345 | 93 02 4358 | 93 02 6005 | 93 02 4164 | 94 62 2033 | 93 02 4167 | 94 03 0026 | 94 20 2200 | 93 02 6026 | 93 02 4580 |
| | AX - RAD | 94 62 4006 | 94 03 0006 | 93 02 4166 | 93 02 4345 | 93 02 4358 | 93 02 6005 | 93 02 4164 | 94 62 2033 | 93 02 4169 | 94 03 0026 | 94 20 2200 | 93 02 6026 | 93 02 4581 |
| | RAD - AX | 94 11 4012 | 94 03 0006 | 93 02 4166 | 93 02 4345 | 93 02 4358 | 93 02 6005 | 93 02 4164 | 94 62 2033 | 93 02 4167 | 94 03 0026 | 94 20 2200 | 93 02 6026 | 93 02 4582 |
| | RAD - RAD | 94 11 4012 | 94 03 0006 | 93 02 4166 | 93 02 4345 | 93 02 4358 | 93 02 6005 | 93 02 4164 | 94 62 2033 | 93 02 4169 | 94 03 0026 | 94 20 2200 | 93 02 6026 | 93 02 4583 |
| SMF® 8.1 m² | AX - AX | 94 62 4006 | 94 03 0006 | 93 02 4166 | 93 02 4345 | 93 02 4358 | 93 02 6006 | 93 02 4162 | 94 62 2033 | 93 02 4167 | 94 03 0026 | 94 20 2200 | 93 02 6026 | 93 02 4584 |
| | AX - RAD | 94 62 4006 | 94 03 0006 | 93 02 4166 | 93 02 4345 | 93 02 4358 | 93 02 6006 | 93 02 4162 | 94 62 2033 | 93 02 4169 | 94 03 0026 | 94 20 2200 | 93 02 6026 | 93 02 4585 |
| | RAD - AX | 94 11 4012 | 94 03 0006 | 93 02 4166 | 93 02 4345 | 93 02 4358 | 93 02 6006 | 93 02 4162 | 94 62 2033 | 93 02 4167 | 94 03 0026 | 94 20 2200 | 93 02 6026 | 93 02 4586 |
| | RAD - RAD | 94 11 4012 | 94 03 0006 | 93 02 4166 | 93 02 4345 | 93 02 4358 | 93 02 6006 | 93 02 4162 | 94 62 2033 | 93 02 4169 | 94 03 0026 | 94 20 2200 | 93 02 6026 | 93 02 4587 |

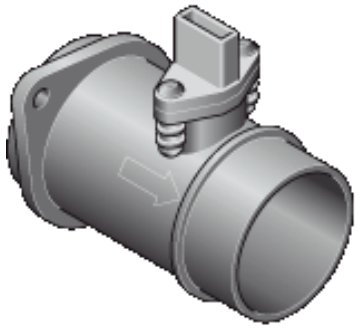
A 130–100 mm reducing flange (HJS No. 94 01 2235) can be used for the SMF® 5.4 m² and 8.1 m² systems.

# 5. Modular SMF®-AR System

## Selecting the air mass flow meter (AMFM) or exhaust flow sensor (EFS)

**1.2 m² - 8.1 m² regeneration unit**
(part of the complete system)
Item No. 93 02 6026

### Air mass flow meter (AMFM)



| Item No. | AMFM inside Ø [mm] | AMFM inlet outside Ø [mm] | AMFM outlet outlet Ø [mm] | Mass flow rate range min. [kg/h] | max. [kg/h] | Rated power output [kW] |
|---|---|---|---|---|---|---|
| 93 02 0133 | 50 | 60 | 60 | 65 | 430 | 15 - 25 |
| 93 02 4404 | 60 | 70 | 70 | 50 | 580 | 30 - 45 |
| 93 02 0132 | 62 | 70 | 70 | 105 | 540 | 50 - 70 |
| 93 02 0130 | 71 | 80 | 80 | 170 | 795 | 75 - 85 |
| 93 02 0131 | 78 | 86 | 84 | 230 | 860 | 85 - 100 |
| 93 02 0134 | 82 | 92 | 92 | 250 | 1140 | 100 - 135 |

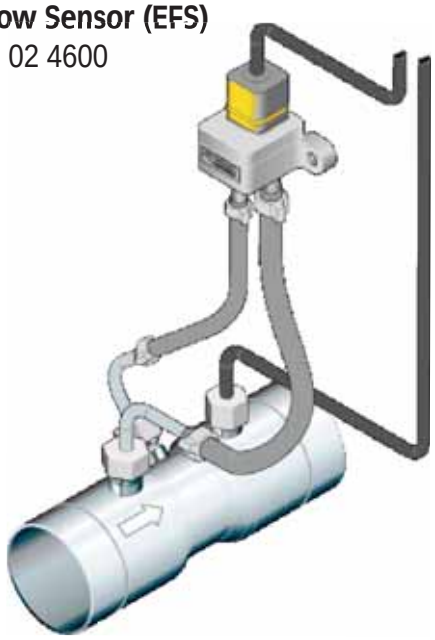
**Note:** All data stated must be checked against the actual mass flow values of the respective engine. System serviceability is guaranteed only if the engine's mass flow is within the measurement range of the air mass flow meter.

**Dosing pump 12 V**
(part of the complete system)
Item No. 94 60 0028

**Dosing pump 24 V**
(part of the complete system)
Item No. 94 60 0240

**Voltage transformer for AMFM**
Item No. 93 02 4350

### Exhaust Flow Sensor (EFS)
Item No. 93 02 4600



### Venturi tube

| Item No. Venturi tube | HJS-EFS outside Ø [mm] | Mass flow rate range min. [kg/h] | max. [kg/h] |
|---|---|---|---|
| 93 02 4610 | 55 | 60 | 500 |
| 93 02 4611 | 60 | 75 | 600 |
| 93 02 4612 | 70 | 90 | 900 |
| 93 02 4613 | 105 | 220 | 1200 |

**Dosing pump 12 V**
(part of the complete system)
Item No. 94 60 0028

**Dosing pump 24 V**
(part of the complete system)
Item No. 94 60 0240

**In the case of 24-V systems, a voltage transformer must be used in the power supply circuit for the air mass flow meter!**

# 7. Extended Guarantee Applicable to HJS Systems for Mobile Machinery and Stationary Applications

HJS grants a guarantee of 2 years or 2.000 operating hours – whichever occurs first – on the systems it supplies, as long as the systems are used for the purpose and in the manner intended.

All products of HJS Emission Technology GmbH & Co. KG are built to a very high quality standard and are covered by the following extended guarantee conditions:

1. The vehicle/machine is in its standard, series-production configuration and has been serviced and maintained as specified by the manufacturer at the time the systems and components are fitted.
2. The systems and components have been fitted properly and in full by an authorised specialist workshop (see also installation certificate).
3. The installation certificate has been filled in in full and returned.
4. The user manual and maintenance instructions have been complied with.

Any modifications to the system, to the components and/or to the system configuration, as well as the fitting of any components not approved by HJS, will immediately render all claims made under warranty or extended guarantee invalid.

The HJS Application Guidelines valid at any given time form the basis of the technical application and operating conditions.

Filter cleaning procedures are not covered by the terms of the statutory warranty and extended guarantee.

In the event of a valid warranty or guarantee claim, HJS will either remedy the defect or exchange the defective system or system components/assemblies originally supplied by HJS.

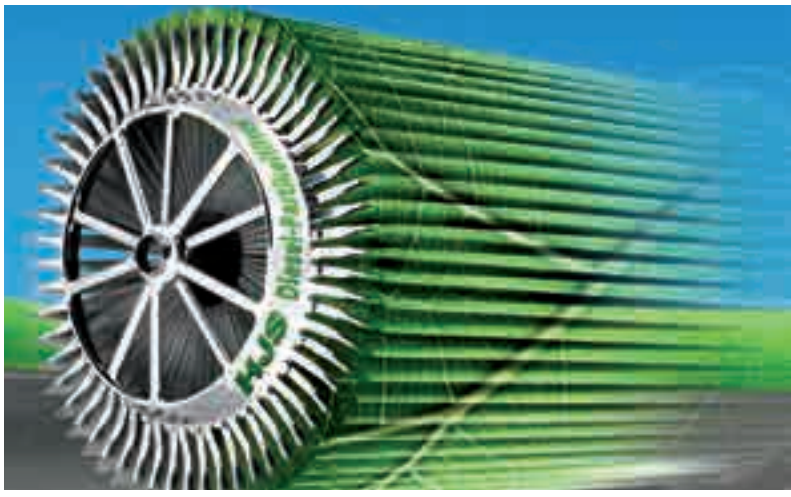
Warranty and guarantee claims must be made in writing to HJS and include all the data that can be read out of the HJS Service Unit that belongs to the system. To enable HJS to analyse potentially damaged components with as little delay as possible and as conveniently as possible for the customer, we ask customers to contact us as quickly as possible, either by telephone or in writing, before they disassemble any system components.

Our Terms and Conditions of Sales and Delivery can be found on our website at www.hjs.com.

Made in Germany

**Put your trust in HJS DPF® and benefit from our many years of experience in the business**

- ✔ Minimal downtime
- ✔ Extremely low-maintenance
- ✔ Low servicing costs
- ✔ Active protection of health and the environment




*I an future with HJS!*