

HYDAC INTERNATIONAL

HYDAC Process Technology Gas Filters Product Overview



HYDAC Gas Filtration – Service-life Insurance for your System



The areas of application

- Offshore and marine
- Petrochemical industry / refinery
- Pipelines
- Power plants
- Booster stations
- Compressor stations
- Gas turbines
- Industrial pumps
- Hydrogen applications



Media to be filtered

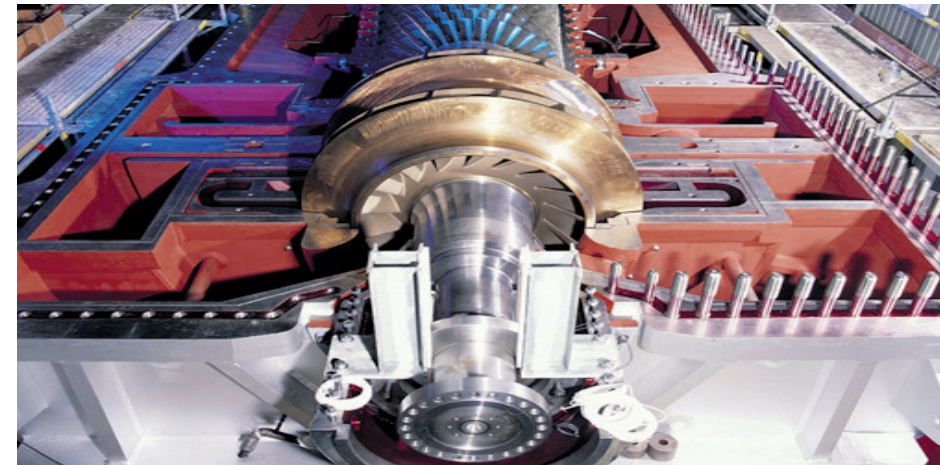
The aim is the reliable removal of particles (sand, rust, abrasion, paraffins, asphaltene, etc.) and fluids (aerosols, oil mist, condensate, etc.).

- Seal gas / inert gas / buffer gas
- Fuel gas
- Heating and cooling gas
- Flushing gas
- Other technical gases



Components to be protected

- Sealing systems for turbo compressors
- Turbine blades
- Injection nozzles
- Pistons
- Valves



Worldwide and local: HYDAC company network

With over 8000 employees worldwide, HYDAC is one of the leading suppliers of fluid-power, hydraulic and electronic equipment. More than 50 overseas subsidiaries and over 500 sales and service partners guarantee competent on-site service – wherever you need our support.

Our wide range of products, combined with our expertise in development, manufacturing, sales and service, allows HYDAC to provide comprehensive filtration concepts – from individual filter components to the complete system.

The Challenge

Fluid or particulate contaminations of gas can significantly impair the service life of major components of systems and plants.

This can result in costly maintenance and repair work, or even complete downtime.

Typical problems caused solid and fluid aerosols becoming deposited on components include:

- Erosion
- Deposits
- Fouling
- Corrosion

The HYDAC solution

Our filtration strategies are geared towards your specific requirements – based on established standard solutions or specially developed components and systems.

- Wide product portfolio
 - Particle filter
 - Coalescence filter
 - Pre-separator
- Compact and maintenance-friendly filter design
- High-quality filter element technology produced in-house
- Optimised filter dimensioning
- Customised designs and special solutions
- Worldwide service and sales
- Continuous development in HYDAC's own research and development facilities

Certified quality for the highest standards



NOTE

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.



Filter development on a scientific basis

To provide the right environment to develop, revise and optimise filtration solutions tailored to specific applications, HYDAC has established its own research and development centre, the only one of its kind in the world. At the HYDAC FluidCareCenter, fundamental knowledge on fluids and their properties is increased and developments are scrutinized on the test bench.



● Lab services / technical cleanliness

● Multi-pass test rig

- Filtration performance and contamination retention
- Inspection with Multi-Pass-Test ISO 16889



● Hydromechanical test field / universal test bench

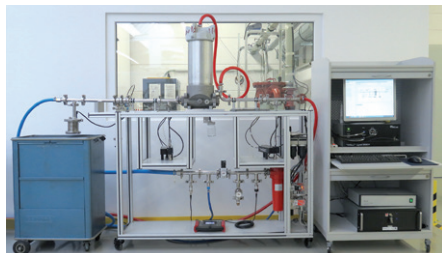
Measurement of:

- Collapse burst pressure to ISO 2941
- Flow change fatigue strength to ISO 3724
- Flow characteristics to ISO 3968



● Bubble-point test bench

- Quality testing for filter elements to ISO 2942



● Testing and characterisation of filter elements for gas filters to ISO 12500

- Characterisation of coalescence filter media
- Fractional separation efficiency / distribution measurement: determination of aerosol percentage in raw and pure gases
- Automated test sequences



High level of operating reliability thanks to correct filter calculation

Auslegung der HYDAC Gasfilter

Filtertyp auswählen: mit Zyklen Double Filter: mit

Mit Zyklen:

Betriebsdruck: bar(a)

Betriebstemperatur: °C

Gasstrom (Normalbetrieb): Nm³/h

Gasstrom (Auslegung): % Nm³/h

Hauptgase in Sperrgasstrom: %

Gas 1: Chem. B: (CH₄) mol. %

Gas 2: Chem. B: (C₃H₈) mol. %

Gas 3: Chem. B: (C₂H₆) mol. %

Gas 4: Chem. B: (C₅H₁₂) mol. %

Gas 5: Chem. B: (CO₂) mol. %

Ergebnis: mbar (Filterelement) mbar (Filter)

Normvolumenstrom: Nm³/h (Gas)

Volumenstrom: l/s (Gas)

Massenstrom: kg/h (Gas)

Geschwindigkeit: m/s (im Eintritt bei 100%, soll < 20 m/s sein)

Flüssigkeitsanteil: Vol.-% (z.B. bei Betriebsbedingungen)

Flüssigkeitsstrom: l/s (200.20) kg/h

K-value: cm/s (Geschw. der Flüssigkeitsteilchen, muss < 15 cm/s sein)

Filterbezeichnung:

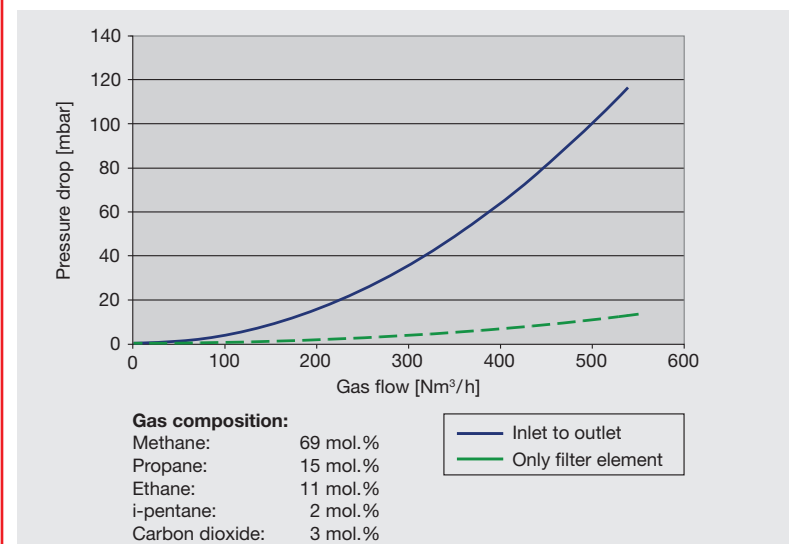
Step 1: Checking the prerequisites

- Determining the application data by means of filter specification form (the filter specification form is provided on the second from last page of this brochure)
- Minimum required information for filter calculation: operating pressure, operating temperature, flow rate and gas composition

Step 2: Filter sizing

Determining the filter size on basis of HYDAC calculation software*:

- The calculation software calculates the pressure loss curve for the gas filter in accordance with the present process conditions
- Calculation of the pressure drop also takes into consideration the actual filter geometry and real gas behaviour
- A mixture of up to five gases can be selected as the medium
- If the gas components are in a liquid state, they will be identified and the volume percentage will be calculated
- The result is also given in graph form



- The program is based, amongst other things, on numerous real measurements using nitrogen, as well as different theoretical simulations (CFD)

Step 3: Determining the filtration rating

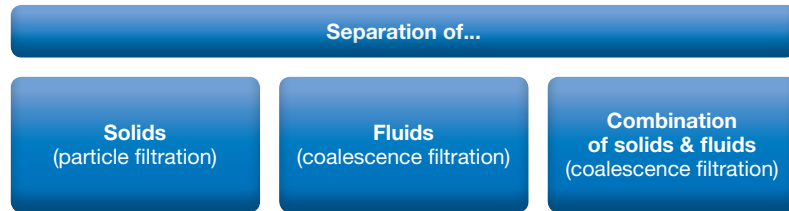
- As a basic rule: as coarse as possible – as fine as necessary

*The customer-specific filter calculation is performed exclusively at HYDAC Head Office

Separation Method

Gas Filtration

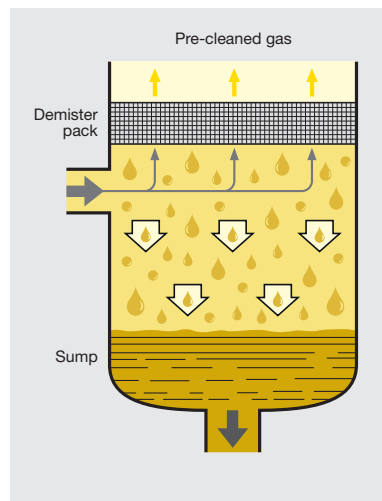
The aim of the gas filtration is the reliable removal of particles (sand, rust, abrasion, paraffins, asphaltene, etc.) and fluids (aerosols, oil mist, condensate, etc.). Filtration can generally be divided up into the following focal areas:



Pre-filtration

In the case of gas severely contaminated with fluids and surging fluids, using a pre-separator upstream from the main filter is strongly recommended.

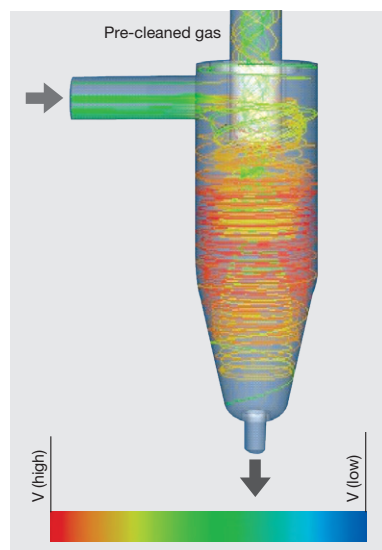
There are two procedures to choose from:



Demister

In a demister (droplet separator), the moist gas is fed through a demister pack (wire mesh) where it is redirected repeatedly. A baffle plate can be placed upstream from the demister pack to separate surging fluids and coarse particle contaminations. As fluid droplets have a greater inertia than the gas, they become deposited and as the deposits increase they flow down into a collection area.

HYDAC product:
● GDS



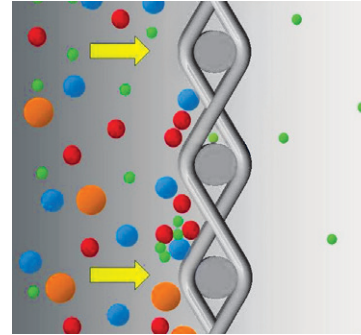
Cyclone

The tangential in-flow and tapering housing cross-section encourage a downwards spiral flow to form. Particles and aerosols are pressed against the housing wall by centrifugal forces and they sediment in a collection space in the bottom section. The cyclone is suitable for separating both high solid particle content and fluid.

HYDAC product:
● GCS

Particle filtration

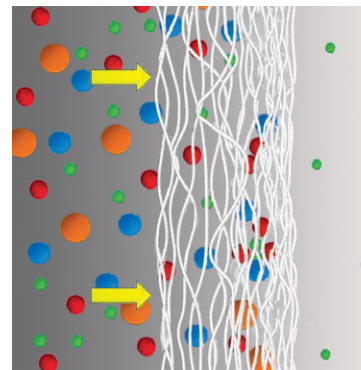
In gas filtration, depth filter media are mainly used. In certain less critical applications, however, a surface filter such as a screen basket filter may also be sufficient.



Surface filtration

Particles are mainly separated at the surface of the filter material (nominal retention rate – 90 % to 95 % of particles above the specified filtration rating). Once a specified pressure loss is reached, the filter elements need to be cleaned.

HYDAC product:
● GFS, GFL



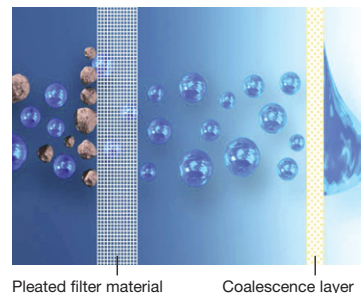
Depth filtration

The medium to be filtered passes into the filter structure. The particles to be removed remain caught in the deeper layers of the filter (absolute retention rate – at least 99.5 % of particles above the specified filtration rating must be retained). As the filter element fills up, flow resistance rises, causing the differential pressure across the filter element to increase. The filter elements need to be cleaned or replaced.

HYDAC products:
● GFL, GFH, GF1, GF2, GF3, GF4, FGF, GPF

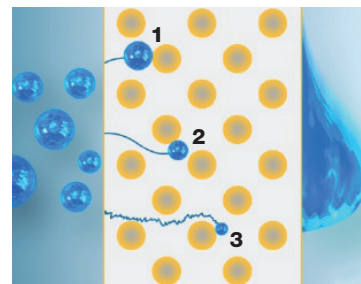
Coalescence filtration

In coalescence filtration, depth filter materials are used exclusively. In a coalescence filter, the gas is fed through a highly permeable mesh. Aerosols make contact with the fibres and are retained there as the result of adhesion force. Separated fluids can retain further aerosols, with the droplets gradually becoming larger and then flowing downwards as the result of gravity.



The filter materials are selected to enable all physical coalescence mechanisms to be utilised optimally.

- 1 = Direct retention:
droplet size > 1 µm
- 2 = Inertia collision:
droplet size 0.3 to 1 µm
- 3 = Diffusion/"Brownian motion":
droplet size < 0.3 µm

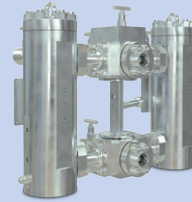


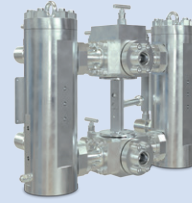
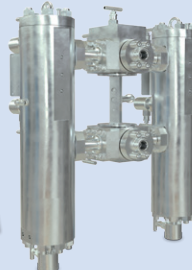
HYDAC products:
● GFL, GFH, GF1, GF2, GF3, GF4, GCF



HYDAC Gas Filters – the Various Types

*Other pressure ranges on request

| Gas Filter GF series All gas filters in the GF series are available with particle and coalescence filter elements (except GFS) | | Filter type | Standard pressure range* |
|---|---|------------------------------------|--------------------------|
| GFS |  | Single/double screen basket filter | Up to 16 bar |
| GFL |  | Single/double inline filter | Up to 16 bar |
| GFH |  | Single inline filter | Up to 1050 bar |
| GF1 |  | Single inline filter | Up to 1000 bar |
| GF2 |  | Single inline filter | Up to 700 bar |
| GF3 |  | Single inline filter | Up to 400 bar |
| GF4 |  | Single/double inline filter | Up to 100 bar |
| FGF |  | Single inline filter | Up to 100 bar |

| Gas Particle Filter | Filter type | Standard pressure range* |
|---------------------|---|--|
| GPF |  | Single/double inline filter Up to 250 bar |

| Gas Coalescer Filter | Filter type | Standard pressure range* |
|---|---|--|
| GCF |  | Single/double inline filter Up to 250 bar |
| GCF with integrated cyclone pre-separator |  | Single/double inline filter Up to 250 bar |


| Pre-separator | Filter type | Standard pressure range* |
|---------------|---|--|
| GCS |  | Cyclone pre-separator Up to 250 bar |
| GDS |  | Demister Separator Up to 250 bar |

Double Filter
HYDAC
Exclusive


HYDAC Filter Elements

Nominal filtration: filtration ratings > 25 µm / absolute filtration: filtration ratings < 25 µm


Particle filter elements

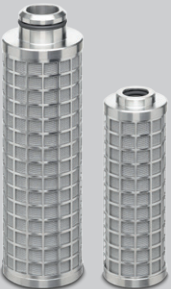
| | | |
|---|-------------------------------------|---|
|  | Screen basket | |
| | Available for filter type | <ul style="list-style-type: none"> ● GFS |
| | Filter material, filtration ratings | <ul style="list-style-type: none"> ● Wire mesh, 25 µm – 500 µm ● Perforated plate, 1000 µm – 10000 µm |

| | | |
|--|---|---|
|  | Chemicon® metal fibre fleece & wire mesh | |
| | Available for filter type | <ul style="list-style-type: none"> ● GFL, GFH, GF1, GF2, GF3, GF4, FGF, GPF |
| | Filter material, filtration ratings | <ul style="list-style-type: none"> ● Chemicon® metal fibre fleece, 0.1 µm – 25 µm ● Wire mesh, 25 µm – 500 µm |

| | | |
|---|--|---|
|  | Processmicron® glass fibre fleece | |
| | Available for filter type | <ul style="list-style-type: none"> ● GFS, GFL, GFH, GF1, GF2, GF3, GF4, FGF, GPF |
| | Filter material, filtration ratings | <ul style="list-style-type: none"> ● Processmicron® glass fibre fleece, 0.1 µm – 25 µm |

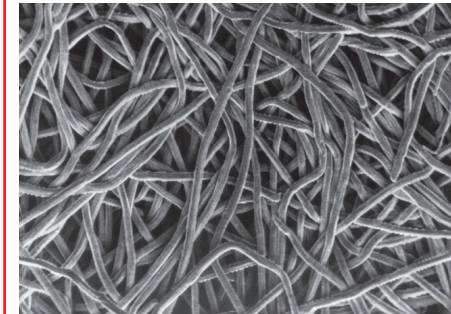
Coalescence filter elements

| | | |
|---|-------------------------------------|--|
|  | Chemicon® metal fibre | |
| | Available for filter type | <ul style="list-style-type: none"> ● GFL, GF2, GF3, GF4, FGF, GCF |
| | Filter material, filtration ratings | <ul style="list-style-type: none"> ● Chemicon® metal fibre fleece, 0.1 µm – 25 µm |

| | | |
|---|--|---|
|  | Processmicron® glass fibre fleece | |
| | Available for filter type | <ul style="list-style-type: none"> ● GFL, GF2, GF3, GF4, FGF, GCF |
| | Filter material, filtration ratings | <ul style="list-style-type: none"> ● Processmicron® glass fibre fleece, 0.1 µm – 25 µm |

Filter Materials

Chemicon® metal fibre



Technical data

- Filter material: stainless steel (1.4404)
- Filtration rating: 0.1 µm to 25 µm
- Temperature: up to max +400 °C

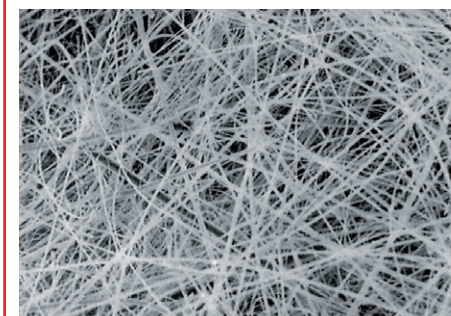
Special features

- Depth filter material (absolute retention rate)
- Pore size is continuously reduced from contaminated side to clean side → particles of various sizes are deposited in the depth structure of the filter layers with minimum influence on the flow behaviour
- Sintered stainless steel fibres – no fibre migration possible
- Very high chemical, mechanical and thermal stability
- Easy to pleat
- High porosity: up to 80 %

Advantages

- Minimum pressure loss thanks to very high porosity
- No electrostatic charge buildup
- No fibre migration
- Very high pressure stability
- Increased filter element service life
- Very large filter area when fleece folded in star shape

Processmicron® glass fibre fleece



Technical data

- Filter material: combination of micro glass fibre media and wire mesh (1.4404)
- Filtration rating: 0.1 µm to 20 µm absolute
- Temperature: up to max +100 °C

Special features

- Depth filter material (absolute retention rate)
- Pore size is continuously reduced from contaminated side to clean side → particles of various sizes are deposited in the depth structure of the filter layers with minimum influence on the flow behaviour
- Good chemical, mechanical and thermal stability

Advantages

- Low pressure loss thanks to high porosity
- No fibre migration
- High pressure stability
- High filter element life expectancy
- Very large filter area when fleece folded in star shape

HYDAC Betterfit Gas Filter Elements

HYDAC Betterfit filter elements have the same functional qualities and dimensions as standard coalescence filter elements available on the market.

There are two filter element types to choose from:

- Version with standard market design
- Betterfit – optimised design for more system reliability

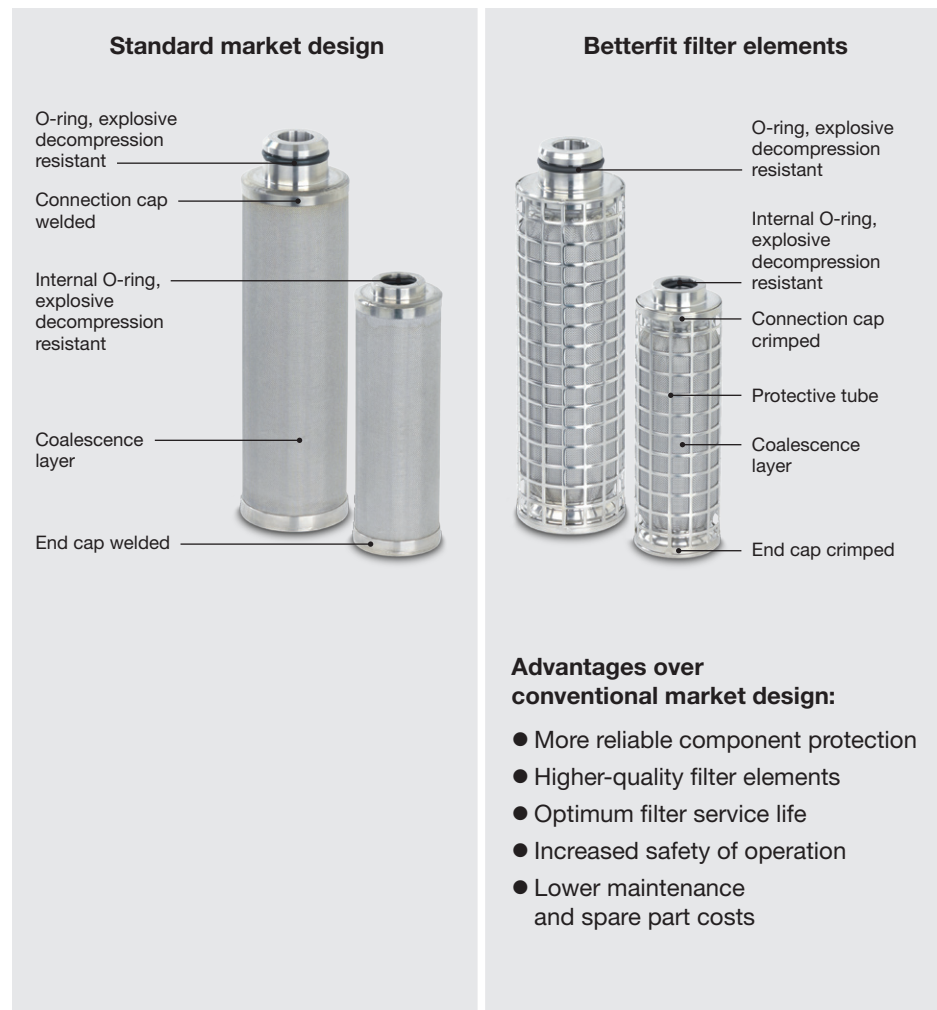
Two filter materials to choose from:

- Chemicron® metal fibre fleece for applications with aggressive gases or higher temperature ranges
- Processmicron® glass fibre fleece for unproblematic gases and low temperature ranges

Chemicron® metal fibre

Technical data:

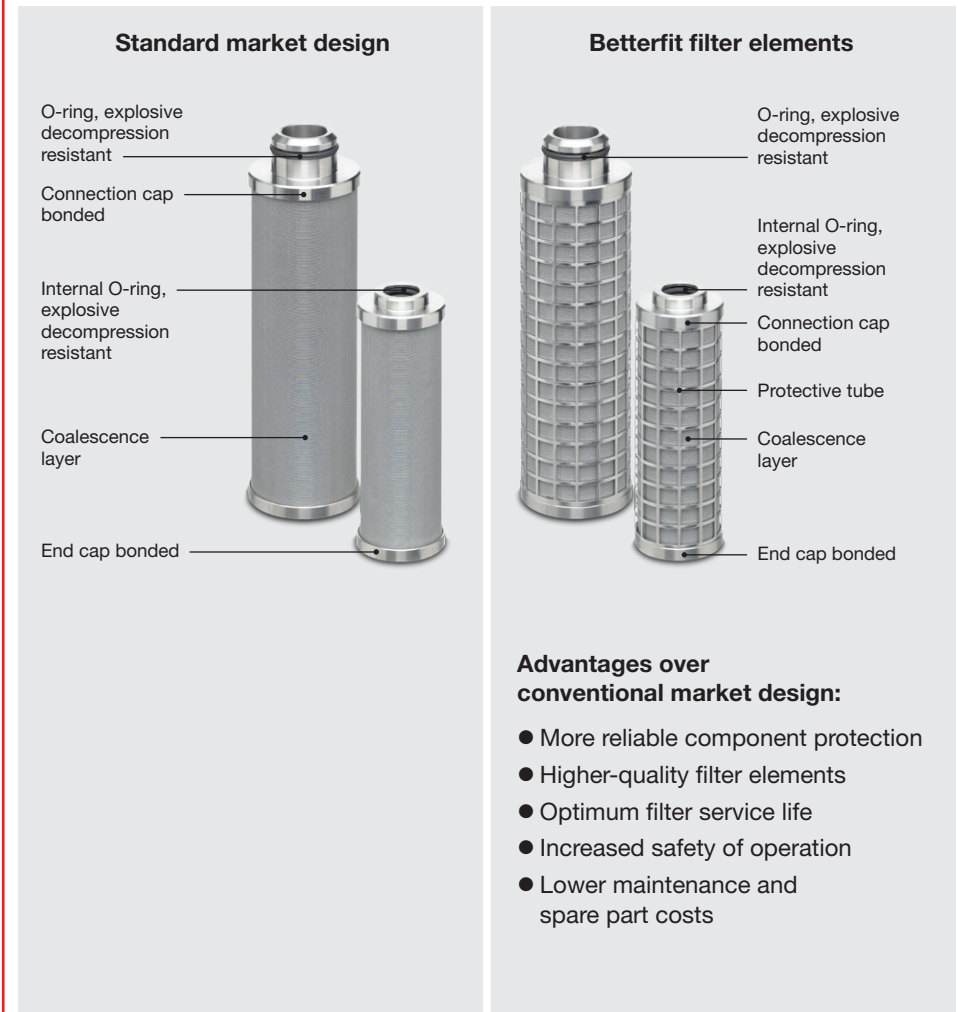
- Chemicron® metal fibre fleece, sintered
- Depth filtration up to 0.1 µm (solids or droplets)
- Burst pressure > 30 bar



Processmicron® glass fibre fleece


Technical data:


- Processmicron® glass fibre fleece
- Depth filtration up to 0.1 µm (solids or droplets)
- Burst pressure > 12 bar



Product Overview

HYDAC Gas Filter GF Series

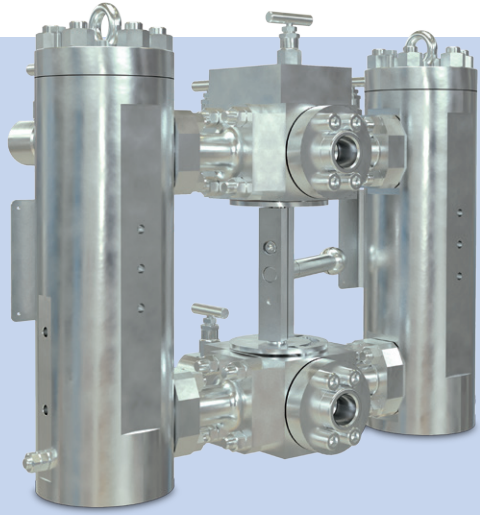
| GF5 | Operating pressure | Technical data | |
|---|--------------------|---|--|
|  | Up to 16 bar | T _{min} / T _{max} | ● -46 °C / +235 °C |
| | | p _{max} | ● 16 bar |
| | | Connection size | ● DN 50 – DN 1000 |
| | | Housing material | ● Stainless steel* ● Carbon steel |
| | | Screen basket material, filtration rating | ● Wire mesh, 25 µm – 500 µm ● Perforated plate, 1000 µm – 10000 µm |
| GF6 | Operating pressure | Technical data | |
|  | Up to 16 bar | T _{min} / T _{max} | ● -46 °C / +235 °C |
| | | p _{max} | ● 16 bar |
| | | Connection size | ● DN50 – DN 1000 |
| | | Housing material | ● Stainless steel* ● Carbon steel |
| | | Filter material, filtration rating | ● Chemicon® metal fibre fleece, 0.1 µm – 25 µm ● Processmicron® glass fibre fleece, 0.1 µm – 25 µm ● Wire mesh, 20 µm – 500 µm |
| GF4 | Operating pressure | Technical data | |
|  | Up to 100 bar | T _{min} / T _{max} | ● -46 °C / +235 °C |
| | | p _{max} | ● 100 bar |
| | | Connection size | ● G 1" |
| | | Housing material | ● Stainless steel* |
| | | Filter material, filtration rating | ● Chemicon® metal fibre fleece, 0.1 µm – 25 µm ● Processmicron® glass fibre fleece, 0.1 µm – 25 µm ● Wire mesh, 20 µm – 500 µm |
| FGF | Operating pressure | Technical data | |
|  | Up to 100 bar | T _{min} / T _{max} | ● -46 °C / +235 °C |
| | | p _{max} | ● 100 bar |
| | | Connection size | ● DN 50 – DN 200 |
| | | Housing material | ● Stainless steel* |
| | | Filter material, filtration rating | ● Chemicon® metal fibre fleece, 0.1 µm – 25 µm ● Processmicron® glass fibre fleece, 0.1 µm – 25 µm |

| GF3 | Operating pressure | Technical data | |
|---|--------------------|-------------------------------------|--|
|  | Up to 400 bar | T _{min} / T _{max} | ● -46 °C / +235 °C |
| | | p _{max} | ● 400 bar |
| | | Connection size | ● G½" to G2" |
| | | Housing material | ● Stainless steel* |
| | | Filter material, filtration rating | ● Chemicon® metal fibre fleece, 0.1 µm – 25 µm ● Processmicron® glass fibre fleece, 0.1 µm – 25 µm ● Wire mesh, 20 µm – 500 µm |
| GFH | Operating pressure | Technical data | |
|  | Up to 1050 bar | T _{min} / T _{max} | ● -196 °C / +85 °C |
| | | p _{max} | ● 1050 bar |
| | | Connection size | ● Autoclave ¼" – 9/16" tube |
| | | Housing material | ● Stainless steel* |
| | | Filter material, filtration rating | ● Chemicon® metal fibre fleece, 0.1 µm – 25 µm ● Wire mesh, 20 µm – 500 µm |
| GF1 | Operating pressure | Technical data | |
|  | Up to 1050 bar | T _{min} / T _{max} | ● -40 °C / +85 °C |
| | | p _{max} | ● 1000 bar |
| | | Connection size | ● Autoclave ¼" – 9/16" tube |
| | | Housing material | ● Duplex (1.4462) |
| | | Filter material, filtration rating | ● Chemicon® metal fibre fleece, 0.1 µm – 25 µm ● Wire mesh, 20 µm – 500 µm |
| GF2 | Operating pressure | Technical data | |
|  | Up to 1050 bar | T _{min} / T _{max} | ● -46 °C / +235 °C |
| | | p _{max} | ● 700 bar |
| | | Connection size | ● Autoclave ¼" – 9/16 tube ● NPT ¼" – ½" |
| | | Housing material | ● Stainless steel*, Duplex (1.4462) |
| | | Filter material, filtration rating | ● Chemicon® metal fibre fleece, 0.1 µm – 25 µm ● Processmicron® glass fibre fleece, 0.1 µm – 25 µm ● Wire mesh, 20 µm – 500 µm |

All gas filters in the GF series are available with particle and coalescence filter elements (except GFS) Other filter designs on request.

*Stainless steel: 1.4571 or similar (Group 316); others on request

Gas Particle Filter GPF for Particle Filtration



Application range

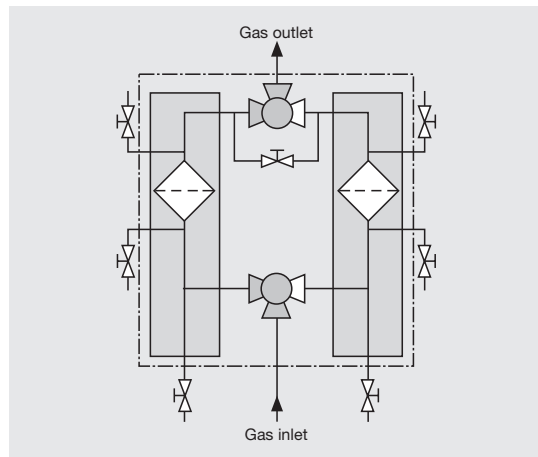
- Filtration of dry gases

Features

- Reversible double stainless-steel filter
- Double Block and Bleed variant for applications with high pressures and hazardous gases
- Low-Pressure variant available for applications with low pressures

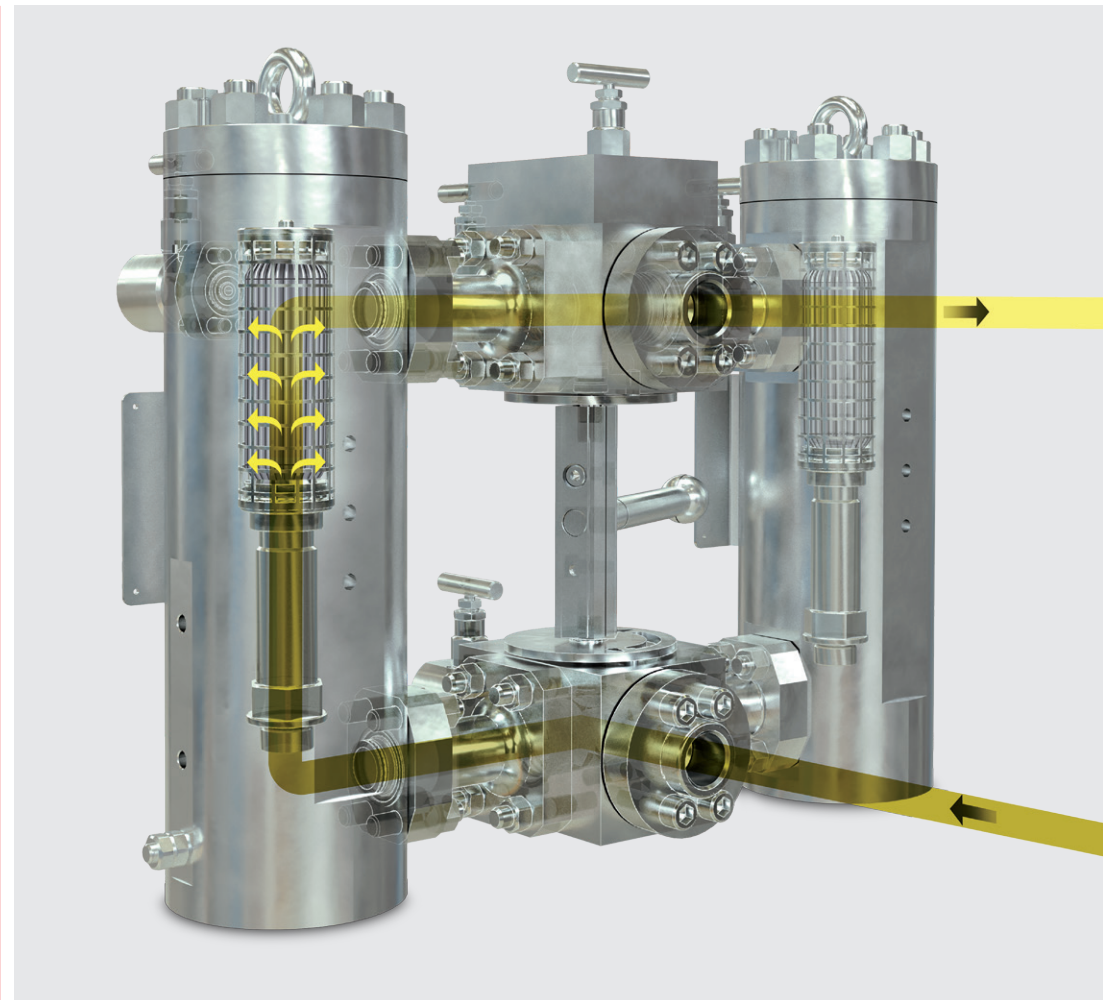
Advantages

- Pressure-loss-optimised design
- Reliable filtration of particulate contamination down to 0.1 µm
- Compact design
- Double-sealing design for hazardous gases
- Design with no weld seams for best corrosion resistance (H₂S)
- No pressure loss caused by switchover process
- Simple filter element change
- High contamination retention capacity of the filter elements
- No reduction in cross-section (particularly change-over valve and filter element)
- No welded parts



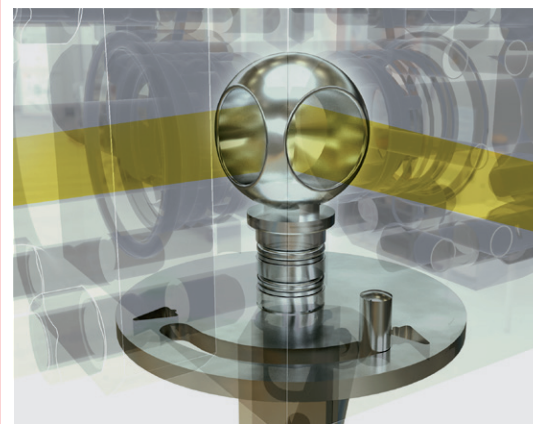
Circuit diagram, GPF

| Technical data* | Gas Particle Filter GPF |
|--|--|
| Versions | <ul style="list-style-type: none"> ● Single filter ● Double filter (Single Block) ● Double filter (Double Block and Bleed DBB) |
| Connection sizes | ● DN 15 to DN 50 |
| Standard pressure ranges | ● Up to 250 bar |
| T _{min} / T _{max} | ● -46 °C to +235 °C |
| Filtration rating | ● 0.1 µm to 25 µm |
| Filter element type | <ul style="list-style-type: none"> ● Particle filter element: <ul style="list-style-type: none"> ● Chemicron® metal fibre fleece ● Processmicron® glass fibre fleece |
| Housing material* | ● Stainless steel: 1.4571 or similar (Group 316) |
| Sealing material | <ul style="list-style-type: none"> ● Standard: FKM EDR ● Optional: FEPM/FFKM/FVMQ/NBR |
| *Other materials/filter designs on request | |



Function

- The gas to be filtered enters the filter housing through the filter inlet on the bottom change-over valve
- Flow through the filter element is from the inside to the outside
- Particle contaminations are held and retained in the filter element

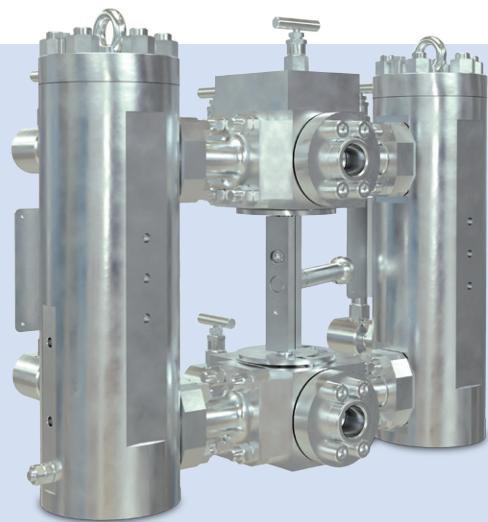


HYDAC ball change-over valve

Change-over does not interrupt filtration

- Filtration is performed either in the left or the right filter housing.
- The adjacent filter housing is first pressurised via the pressure balance valve
- The balance valve is either flange-mounted to the change-over valve or integrated into a separate line. It joins both housings on the clean side
- After hydraulic balance has been achieved, the filter is changed over by the double change-over valve
- Practically no pressure loss during change-over thanks to maximum negative overlap of the change-over balls (change-over ball valve specially developed by HYDAC Accessories)
- Constant gas flow even during change-over

Gas Coalescer Filter GCF for Particle and Aerosol Filtration



Application range

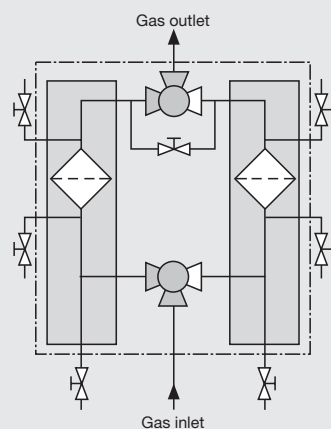
- Filtration of moist gases

Features

- Reversible double stainless-steel filter
- Double Block and Bleed variant for applications with high pressures and hazardous gases
- Low-Pressure variant available for applications with low pressures

Advantages

- Pressure-loss-optimised design
- Reliable filtration of fluid and particulate contamination down to 0.1 µm
- Compact design
- Double-sealing design for hazardous gases
- Design with no weld seams for best corrosion resistance (H₂S)
- No pressure loss caused by switchover process
- Simple filter element change
- High contamination retention capacity of the filter elements
- No reduction in cross-section (particularly change-over valve and filter element)
- No welded parts

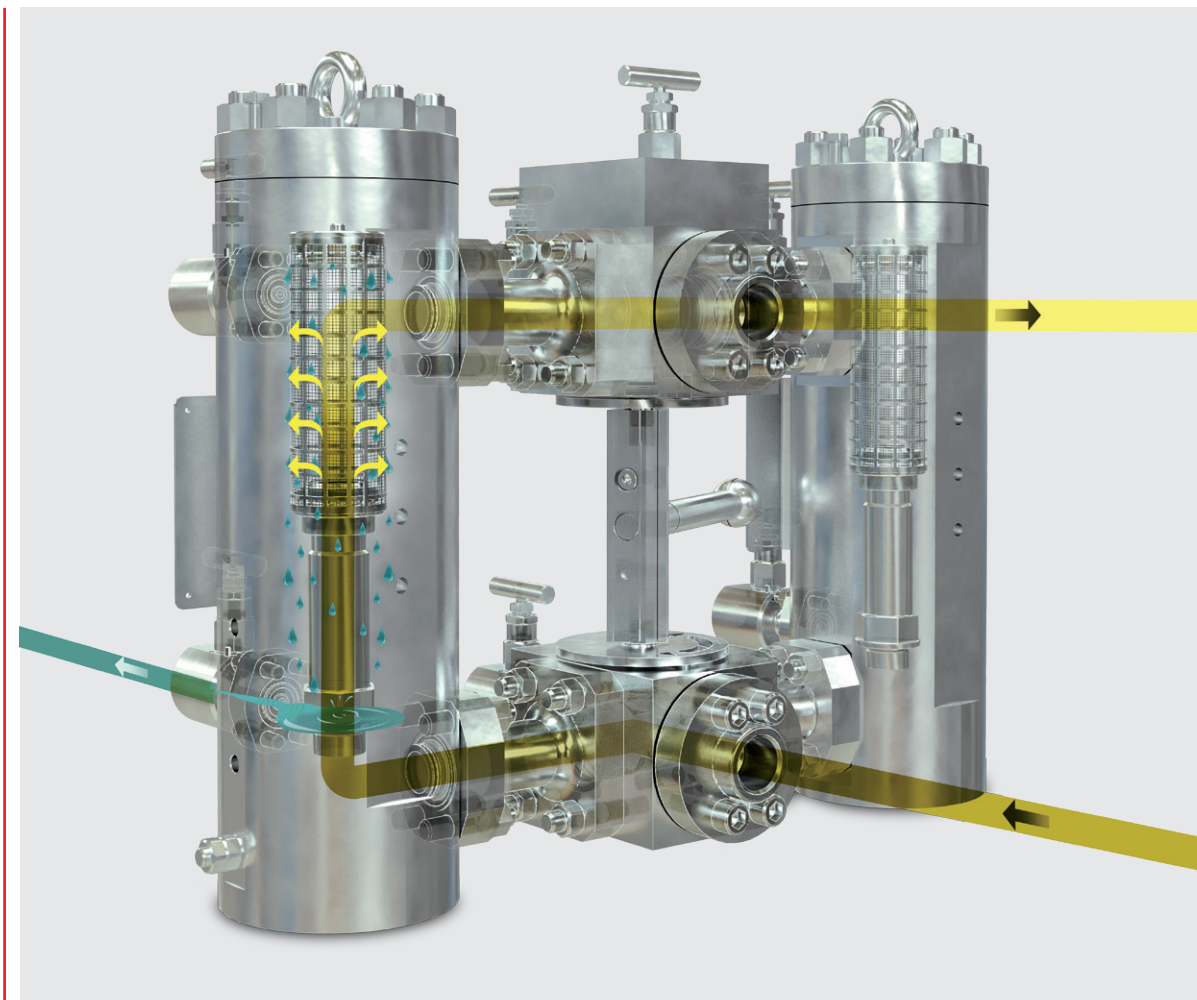


Circuit diagram, GCF w/o cyclone

Technical data*

| Gas Coalescer Filter GCF | |
|-------------------------------------|--|
| Versions | <ul style="list-style-type: none"> ● Single filter ● Double filter (Single Block) ● Double filter (Double Block and Bleed DBB) |
| Connection sizes | ● DN 15 to DN 50 |
| Standard pressure ranges | ● Up to 250 bar |
| T _{min} / T _{max} | ● -46 °C to +235 °C |
| Filtration rating | ● 0.1 µm to 25 µm |
| Filter element type | <ul style="list-style-type: none"> ● Coalescence filter element: <ul style="list-style-type: none"> ● Chemicon® metal fibre fleece ● Processmicron® glass fibre fleece |
| Housing material* | ● Stainless steel: 1.4571 or similar (Group 316) |
| Sealing material | <ul style="list-style-type: none"> ● Standard: FKM EDR ● Optional: FEPM/FFKM/FVMQ/NBR |

*Other materials/filter designs on request

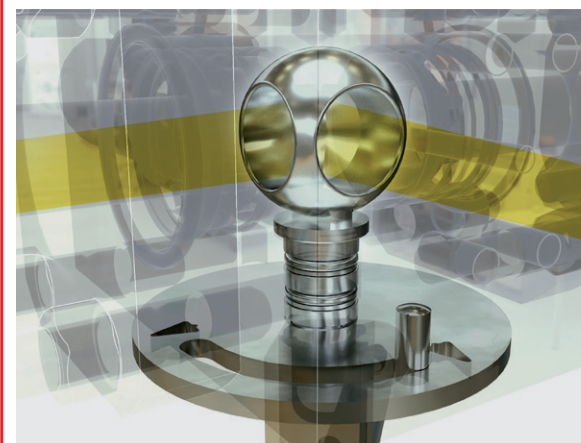


Function

- The gas to be filtered enters the filter housing through the filter inlet on the bottom change-over valve
- Flow through the filter element is from the inside to the outside
- Particle contaminations are held and retained in the filter element
- Fluid media (aerosols, oil mist) are coalesced at the filter element
- If the liquid phase percentage in the gas is too high, preventing full coalescence at the filter element at normal filtration speeds, using a pre-separator is recommended

Change-over does not interrupt filtration

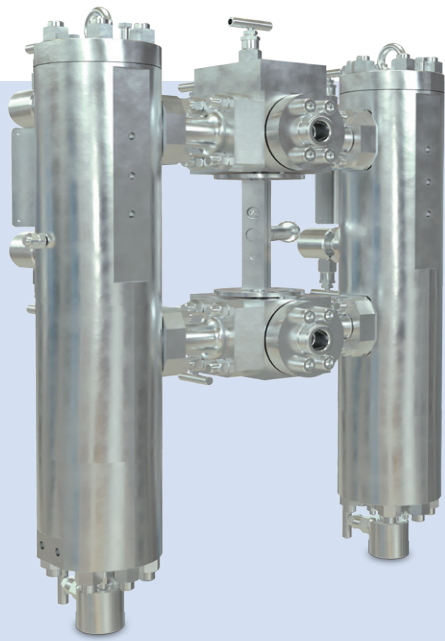
- Filtration is performed either in the left or the right filter housing
- The adjacent filter housing is first pressurised via the pressure balance valve
- The balance valve is either flange-mounted to the change-over valve or integrated into a separate line. It joins both housings on the clean side
- After hydraulic balance has been achieved, the filter is changed over by the double change-over valve
- Practically no pressure loss during change-over thanks to maximum negative overlap of the change-over balls (change-over ball valve specially developed by HYDAC Accessories)
- Constant gas flow even during change-over



HYDAC ball change-over valve

Gas Coalescer Filter GCF with Integrated Cyclone Pre-Separator

Double Filter
HYDAC
Exclusive



Application range

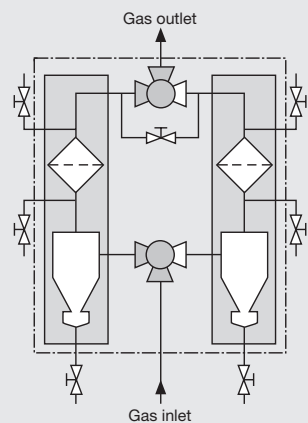
- For applications where moist gases and a large amount of aerosols, oil mists or condensate can be expected

Features

- Efficient pre-separation of fluids and coarse contamination by means of integrated cyclone pre-separator
- Depending on the operating conditions, the cyclone can separate aerosols down to 5 µm and particle contamination down to 2 µm
- Significantly longer filter element service life thanks to integrated cyclone pre-separator
- Pressure-loss- and flow-optimised design (compared with upstream gas separators)
- Double Block and Bleed variant for applications with high pressures and/or hazardous gases

Advantages

- Reliable filtration of fluid and particulate contamination down to 0.1 µm
- Double-sealing design for hazardous gases
- Design with no weld seams for best corrosion resistance (H₂S)
- No pressure loss caused by switchover process
- Simple filter element change
- High contamination retention capacity of the filter elements
- No reduction in cross-section (particularly change-over valve)
- Cost reduction in overall system thanks to flow- and pressure-loss-optimised integrated cyclone pre-separator

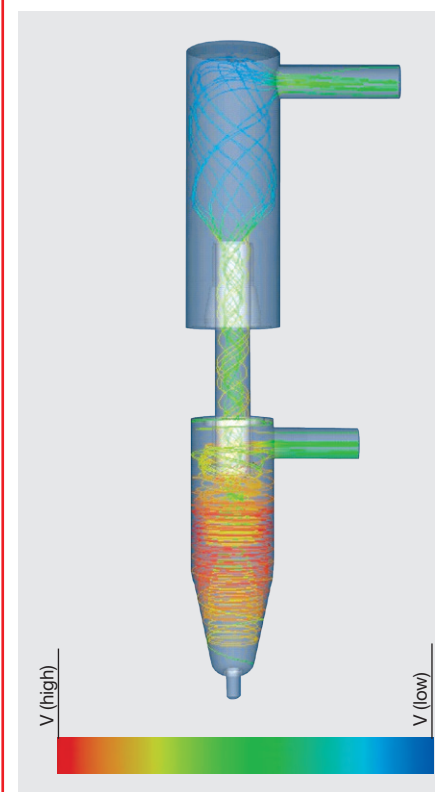
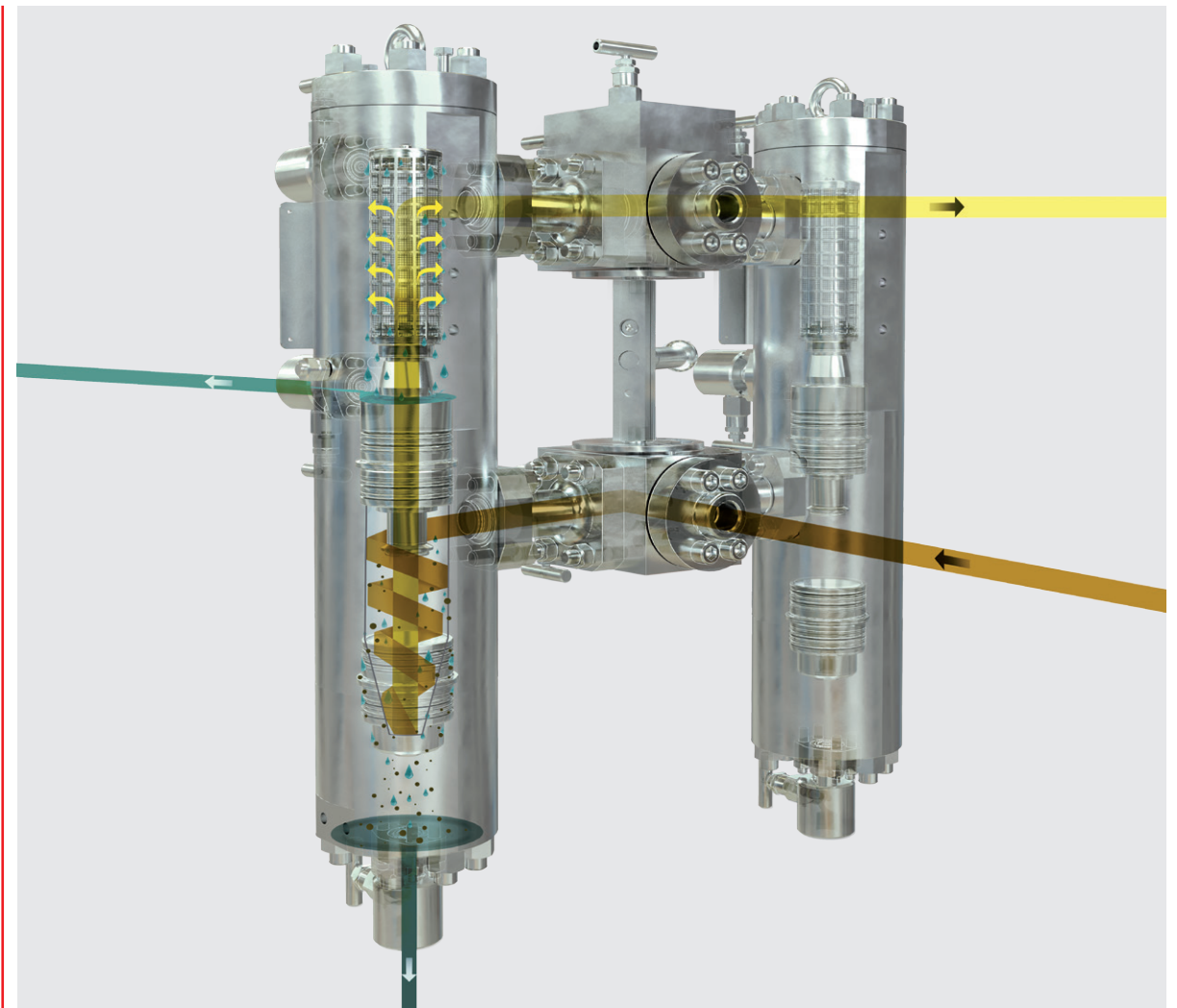


Circuit diagram, GCF with integrated cyclone pre-separator

Technical data*

Gas Coalescer Filter GCF with cyclone

| | |
|--|--|
| Versions | <ul style="list-style-type: none"> ● Single filter ● Double filter (Single Block) ● Double filter (Double Block and Bleed DBB) |
| Connection sizes | ● DN 15 to DN 50 |
| Standard pressure ranges | ● Up to 250 bar |
| T _{min} / T _{max} | ● -46 °C to +235 °C |
| Filtration rating | ● 0.1 µm to 25 µm |
| Filter element type | <ul style="list-style-type: none"> ● Coalescence filter element: <ul style="list-style-type: none"> ● Chemicon® metal fibre fleece ● Processmicron® glass fibre fleece |
| Housing material* | ● Stainless steel: 1.4571 or similar (Group 316) |
| Sealing material | <ul style="list-style-type: none"> ● Standard: FKM EDR ● Optional: FEPM/FFKM/FVMQ/NBR |
| *Other materials/filter designs on request | |



Flow simulation

Function

- The gas to be filtered enters the filter housing through the filter inlet on the bottom change-over valve
- Surging fluids and larger aerosol quantities and coarse contaminant particles are filtered at the cyclone. Depending on the operating conditions (type of gas, pressure, density, temperature, speed), the cyclone separates aerosols and particle contamination down to 5 µm
- This provides significant relief for the filter elements downstream, thus extending their service life considerably
- Flow through the filter element is from the inside to the outside
- Particle contamination is collected and retained in the filter element. In addition liquid phases (aerosols/oil mists) are coalesced by the filter element
- The separated fluids are collected inside the filter housing in collecting chambers (contaminated side: cyclone trap/clean side: chamber beneath the filter element) and they can be drained via appropriate valves
- The volumes of the collection chambers are dimensioned generously to allow reliable draining from the filter even for surging fluids

Change-over does not interrupt filtration

- See description on page 19

Pre-Separator Gas Cyclone Separator GCS



Application range

- The cyclone is suitable for separating both high solid particle amounts and fluids
- Separation of aerosol droplets ($> 5 \mu\text{m}$) and surging fluids **before main filtration**

Features

- The cyclone has a more compact design and greater separation performance than a demister, as it is less sensitive to fluctuations in the operating conditions (pressure and flow)

Alternative solution (cost reduction):

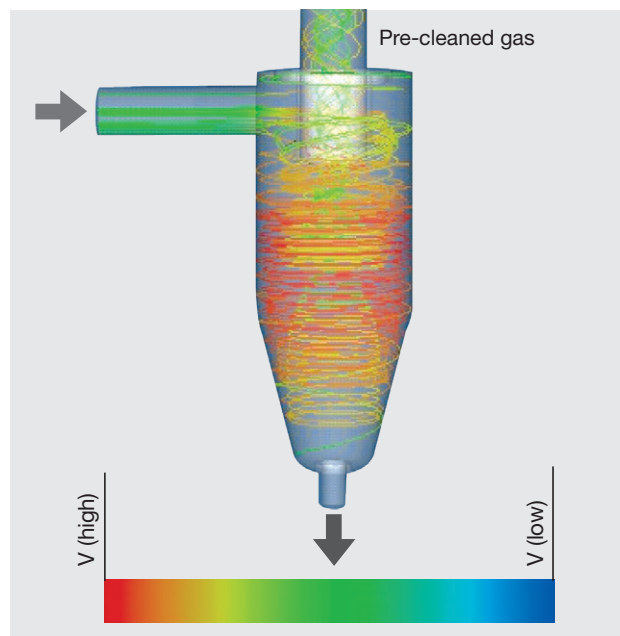
- HYDAC seal gas filter with integrated cyclone: patented change-over double filter, optimised for flow and pressure loss (see page 20/21)

Advantages

- Stable separation rate, covering a wide range of filtrate speeds
- Maintenance-free and wear-free as no consumable parts, such as demister pack or filter elements
- Maximum safety thanks to double seals
- Self-cleaning

Function

- The tangential in-flow and tapering housing cross-section encourage a downwards spiral flow to form
- Particles and aerosols are pressed against the housing wall by centrifugal forces and they are fed through a collection space in the bottom section



Flow simulation

| Technical data* | Gas Cyclone Separator GCS |
|--|---|
| Connection sizes | • DN20 to DN50 |
| Standard pressure ranges | • Up to 250 bar |
| T _{min} / T _{max} | • -46 °C to +235 °C |
| Filtration performance | • Up to $> 5 \mu\text{m}$ depending on the operating conditions |
| Housing material* | • Stainless steel: 1.4571 or similar (Group 316) |
| Sealing material | • Standard: FKM EDR • Optional: FEPM/FFKM/FVMQ/NBR |
| *Other materials/filter designs on request | |

Pre-Separator Gas Demister Separator GDS



Application range

- Separation of aerosol droplets ($> 15 \mu\text{m}$) and surging fluids **before main filtration**

Features

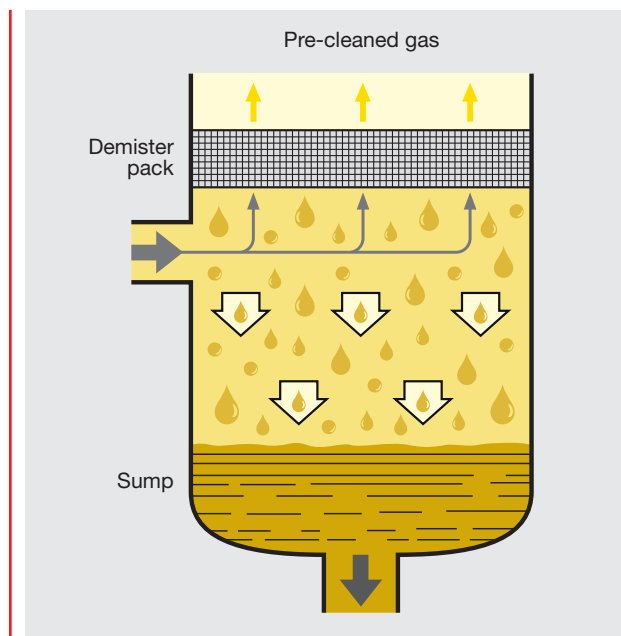
- Unlike a cyclone, the demister is not entirely suitable for solid contamination and fluctuating operating conditions, as this greatly impairs the filtration performance

Advantages

- Maximum safety thanks to double seals
- Low-maintenance thanks to particularly long-life demister pack design
- Low pressure loss

Function

- In a demister (droplet separator), the moist gas is fed through a demister pack (wire mesh) where it is redirected repeatedly
- A baffle plate is placed upstream from the demister pack
- As fluid droplets have a greater inertia than the gas, they become deposited and as the deposits increase they flow down into a collection area

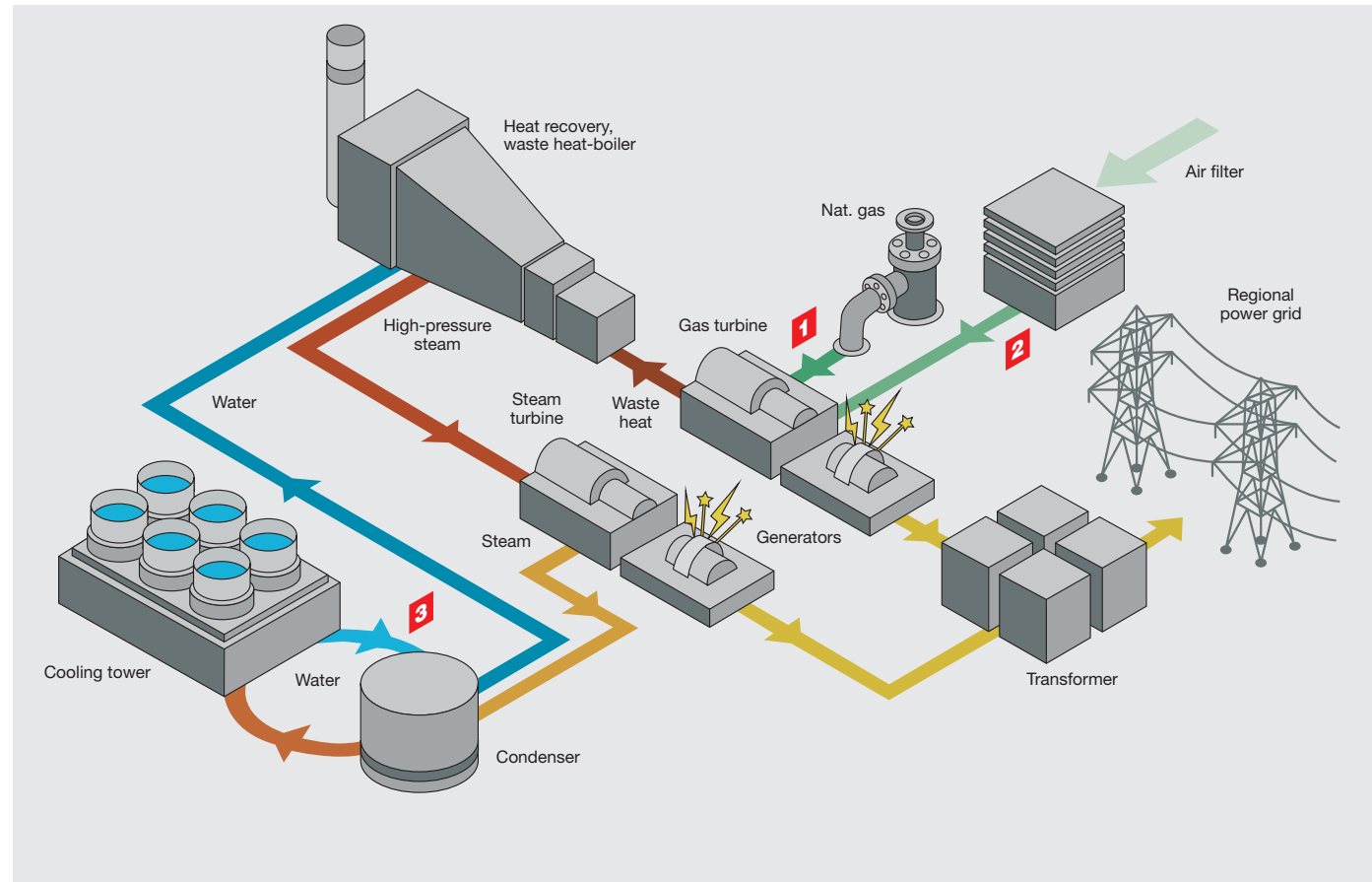


Demister function

| Technical data* | Gas Demister Separator GDS |
|--|--|
| Connection sizes | • DN20 to DN50 |
| Standard pressure ranges | • Up to 250 bar |
| T _{min} / T _{max} | • -46 °C to +235 °C |
| Filtration performance | • Aerosol droplets and surging fluids $> 15 \mu\text{m}$ |
| Housing material* | • Stainless steel: 1.4571 or similar (Group 316) |
| Sealing material | • Standard: FKM EDR • Optional: FEPM/FFKM/FVMQ/NBR |
| *Other materials/filter designs on request | |

Typical Application Examples

Power plants

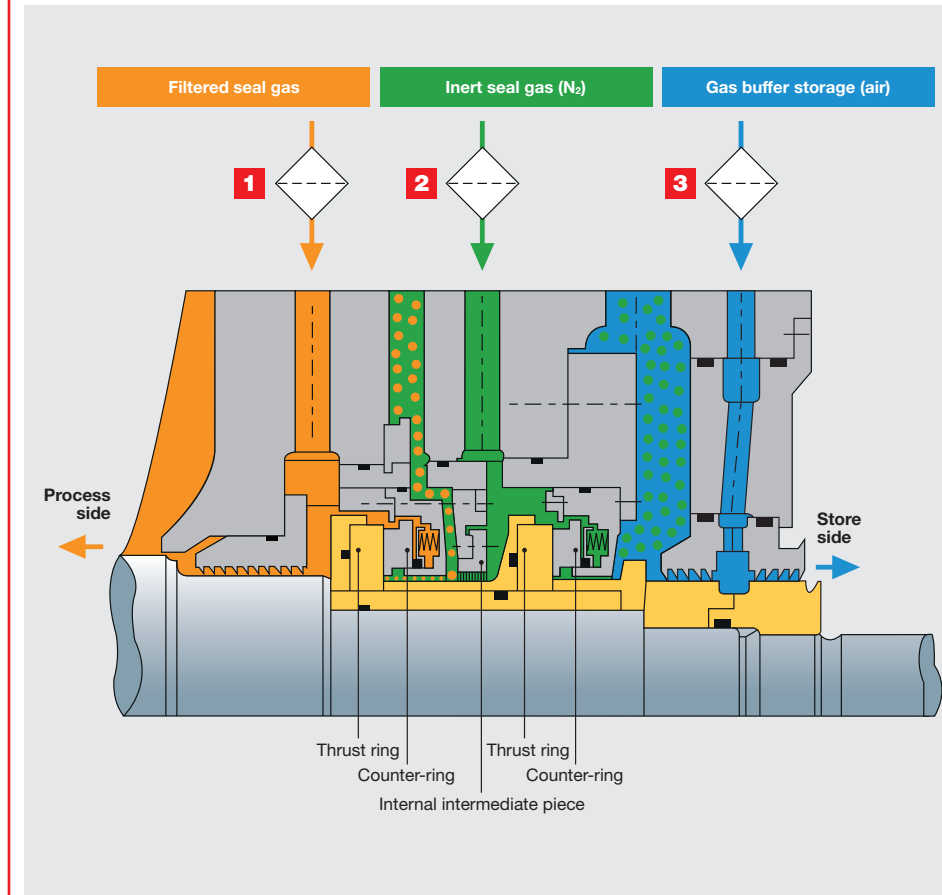


Application:

In order to function at their best, fuel gas systems require clean and dry gases. If pre-filtration is insufficient, solids and aerosols can enter the combustion system unhindered, causing wear and abrasion in components and necessitating costly maintenance and repair work.

- 1 Fuel gas filtration**
HYDAC solutions: FGF, GFL, GFS
- 2 Air filtration**
HYDAC solutions: GFL, GFS
- 3 Cooling water filtration**
HYDAC solutions: Coarse filter: AutoFilt® RF series
Fine filter: Inline filter

Turbo machines in the petrochemical industry



Application:

Dry gas seals of turbo machines are very complex systems and extremely sensitive to contamination by solid particles, aerosols and condensates.

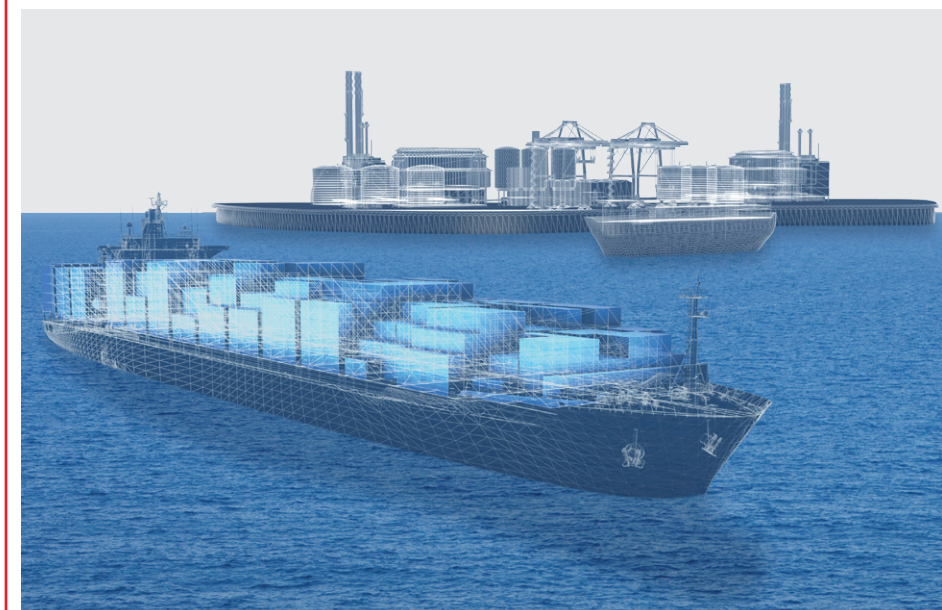
As the shaft rotates, a tiny gap of just 3 µm forms in the seal through which the seal gas flows.

To protect this seal, the seal gases must be filtered appropriately to ensure the seal has as long a service life as possible.

HYDAC solutions:

- 1** GCF with or without cyclone pre-separator, GCS, GDS
- 2** GCF, GPF
- 3** GPF

Offshore and marine



Application:

To allow ship engines and subsystems to function optimally, clean and dry gases are needed. If pre-filtration is insufficient, solids and aerosols can enter the system unhindered, causing wear and abrasion in components and necessitating costly maintenance and repair work.

Air filtration

HYDAC solutions: GPF, GFL, GF3

Fuel gas filtration

HYDAC solutions: GCF, GFL, FGF

Flushing gas filtration

HYDAC solutions: GFL, GFS

Oil and gas industry



Application:

In the oil and gas industry, clean gases are needed to provide smooth functioning and to protect all kinds of components:

- Injection nozzles, rotor blades and other turbine components, such as measurement equipment and seals
- Rotor blades and seal gas seals of compressors along with their measurement and control equipment
- Service work: flushing of fuel gas lines with non-hazardous gases (e.g. N₂ or inert gas)

Air filtration

HYDAC solutions:
GPF, GFL, GF3

Fuel gas filtration

HYDAC solutions:
GCF, GFL, FGF

Seal gas filtration

HYDAC solutions:
GCF, GPF, GCS, GDS

Flushing gas filtration

HYDAC solutions:
GFL, GFS

Water injection

HYDAC solutions:
Coarse filter: AutoFilt® RF series
Fine filter: Inline filter

Pipeline flushing

HYDAC solutions:
Screen basket filter, AutoFilt® RF series, inline filter

Sealing water filtration

HYDAC solutions:
Screen basket filter, AutoFilt® RF series, inline filter

MEG filtration

HYDAC solutions:
Customer-specific filter element technology

Gas Filter Specification Form

Company: _____ Tel.: _____
 Name: _____ Fax: _____
 Address: _____ Mobile: _____
 _____ E-mail: _____

Application: _____ (attach sketch as required)

Gas:

| Gas components | Mol. % |
|---|--------|
| For gas mixtures please state all components with their composition percentages, or attach the gas analysis for a more precise calculation. | |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

Operating Data:

| | | | |
|---|---|--|--|
| Operating pressure: p _{min} _____ bar (g) p _{max} _____ bar (g) | Design data: p _{design} _____ bar (g) T _{design} _____ °C | Operating temp.: T _{min} _____ °C T _{max} _____ °C | Flow single: _____ / _____ Normal Design Mark applicable measuring unit with a cross Kg/h Nm ³ /h scfm @ 273 K & 1,013 bar(a) |
|---|---|--|--|

Design Data:

| | | | | |
|---|--|---|---|--|
| Filter type: <input type="checkbox"/> Single filter <input type="checkbox"/> Double filter | Pre-separator: <input type="checkbox"/> Yes <input type="checkbox"/> No | Design code: <input type="checkbox"/> AD 2000 <input type="checkbox"/> EN 13445 <input type="checkbox"/> ASME <input type="checkbox"/> U-Stamp Other: _____ | Filter element: <input type="checkbox"/> Particle <input type="checkbox"/> Coalescence Filtration rating: _____ | Materials: Container: _____ Filter element: _____ Seal: _____ |
|---|--|---|---|--|

| | |
|---|--|
| Connection size: _____ DN inch <input type="checkbox"/> <input type="checkbox"/> Mark applicable measuring unit with a cross | Maximum permitted differential pressure at cleaner element: p _{max. clean} _____ mbar with flow of: _____ Kg/h Nm ³ /h scfm @ 273 K & 1,013 bar(a) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Mark applicable measuring unit with a cross |
|---|--|

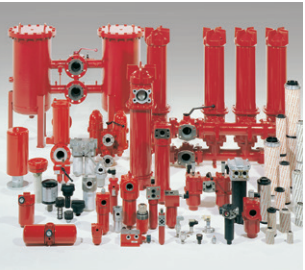
Explosion Protection: If explosion protection is required, please request the ATEX specifications form!

| | | |
|----------------------------------|-------------------------------------|---------------------------------------|
| <input type="checkbox"/> Without | <input type="checkbox"/> ATEX _____ | <input type="checkbox"/> IEC Ex _____ |
|----------------------------------|-------------------------------------|---------------------------------------|

Comments / Accessories:



Accumulator Technology 30,000



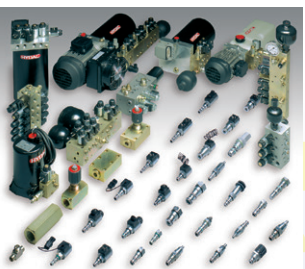
Filter Technology 70,000



Process Technology 77,000



Filter Systems 79,000



Compact Hydraulics 53,000



Accessories 61,000

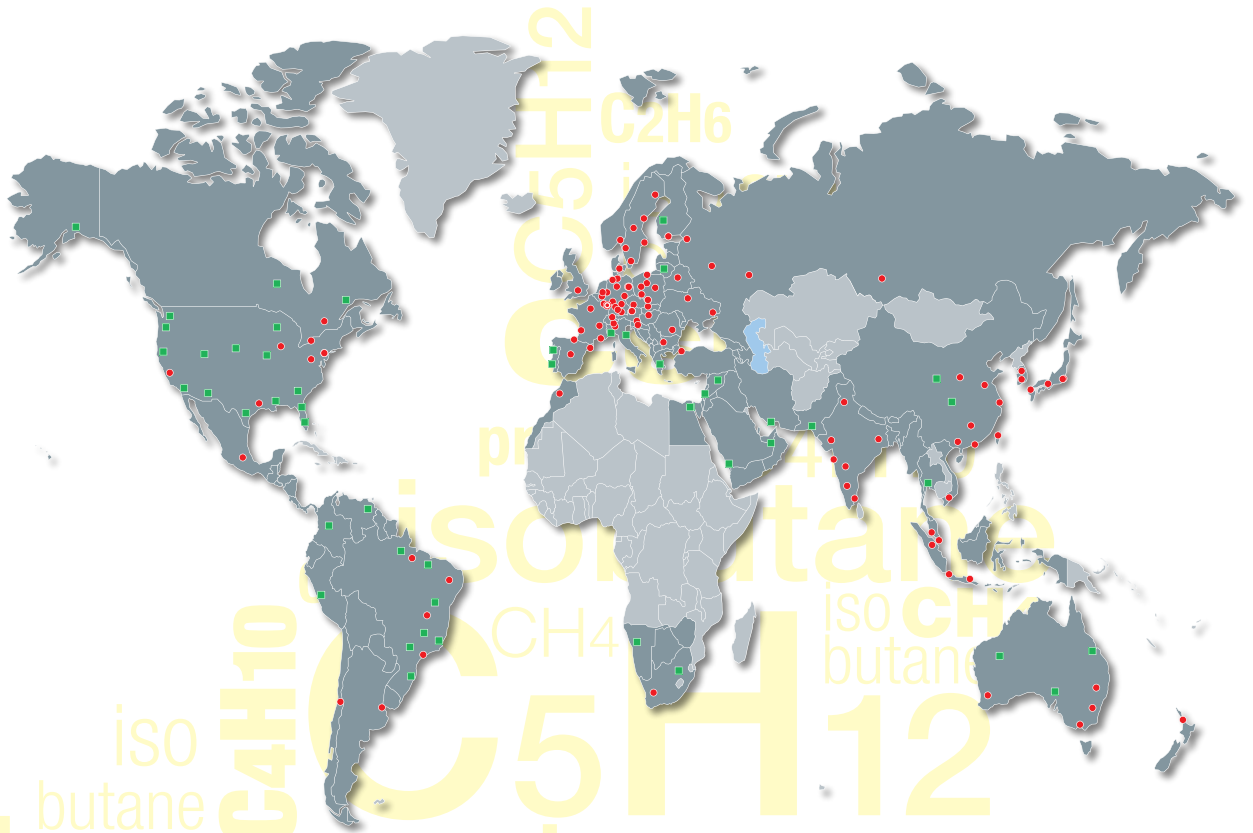


Electronics 180,000



Cooling Systems 57,000

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