

# INFASTAUB



*Breathe The Difference: Pure Air*

## INFA-MICRON

### Cassette filter / Cartridge filter

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# INFA-MICRON, MKR - MKM - MPR

## Developed for high performance filtration

The filter class INFA-MICRON is a complete series for dedusting of sophisticated processes where toxic dusts or powders, e.g. API (Active Pharmaceutical Ingredient), occur. Lowest residual dust contents up to  $0.001 \text{ mg/m}^3$  and reliable protection of staff during operating and maintenance are demanded for these applications. Cassette filters MKR and MKM as well as cartridge filter MPR are applied for these special demands.

Requirements for operating safety and protection against contamination plus consideration of health and environmental aspects while dedusting require a special construction and manufacturing of these filter units. Risks during filtration of high active ingredients, harmful or toxic dusts and suspended matters are minimized with these units.

## Compelling construction for safe operation

The range of the INFA-MICRON filter series permits its use for a multitude of mostly dangerous manufacturing processes. The specific demands of the most different areas of application were considered at construction. The modular design of the filter series allows an optimum of flexibility. Extra equipment or individual components for special purposes or building conditions can be produced by request. Thus customised unique filters are available on the one hand and favorable series modules on the other hand.

Change of filter cartridges and filter cassettes can be performed on all INFA-MICRON filter units without any tools. If requested, the inspection covers can be opened without screws or other laborious locking devices with only few moves. The filter cartridges and filter cassettes are tightly fixed with pneumatic (for MKR and MKM alternatively also mechanical) fastening devices in the filter unit.

Measures of constructive explosion protection ensure safety while operating the filter units. In case of an explosion in the raw gas area of the filter the extending flame front is held back in the filter elements of the 1st filter stage. The resulting explosion overpressure is relieved into the clean gas side above the 1st filter stage, so that explosion overpressures of only max. 1 bar g rise within the filter housing. Because of pressure shock resistant construction the explosion is kept isolated inside the filter. Explosion pressure relief or explosion suppression systems are not necessary.

This was proved by explosion tests for dusts of dust explosion class St2 as well as gases of groups II A and II B and for hybrid mixtures.

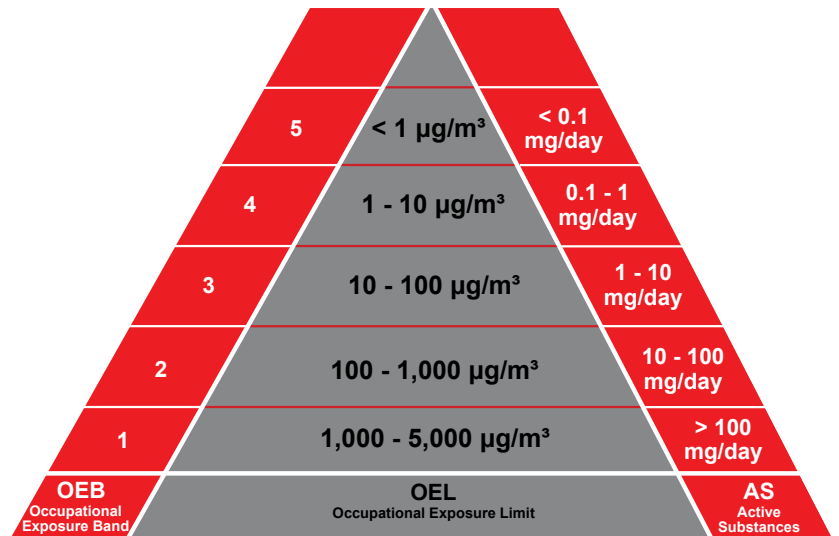




## Containment and safety

With regard to environmental and operator's protection, containment plays a crucial role, e.g. in the pharmaceutical production. Safety requirements for man and environment are very high here. All risks related to possible contamination must be excluded. INFA-MICRON filter units are adapted to these special demands and fulfil the requirements up to OEL 5 depending on their individual components.

Secure systems are used for changing filter cartridges and filter cassettes as well as for dust discharge free of contamination. The "Safe-Change" technology (see page 15) is very often used for filter media change and for dust discharge. This method fulfils the highest demands when handling dangerous substances taking into account the safety for employees and environment.



**INFA-MICRON: Suitable up to OEL 5**



## INFA-MICRON and its target groups

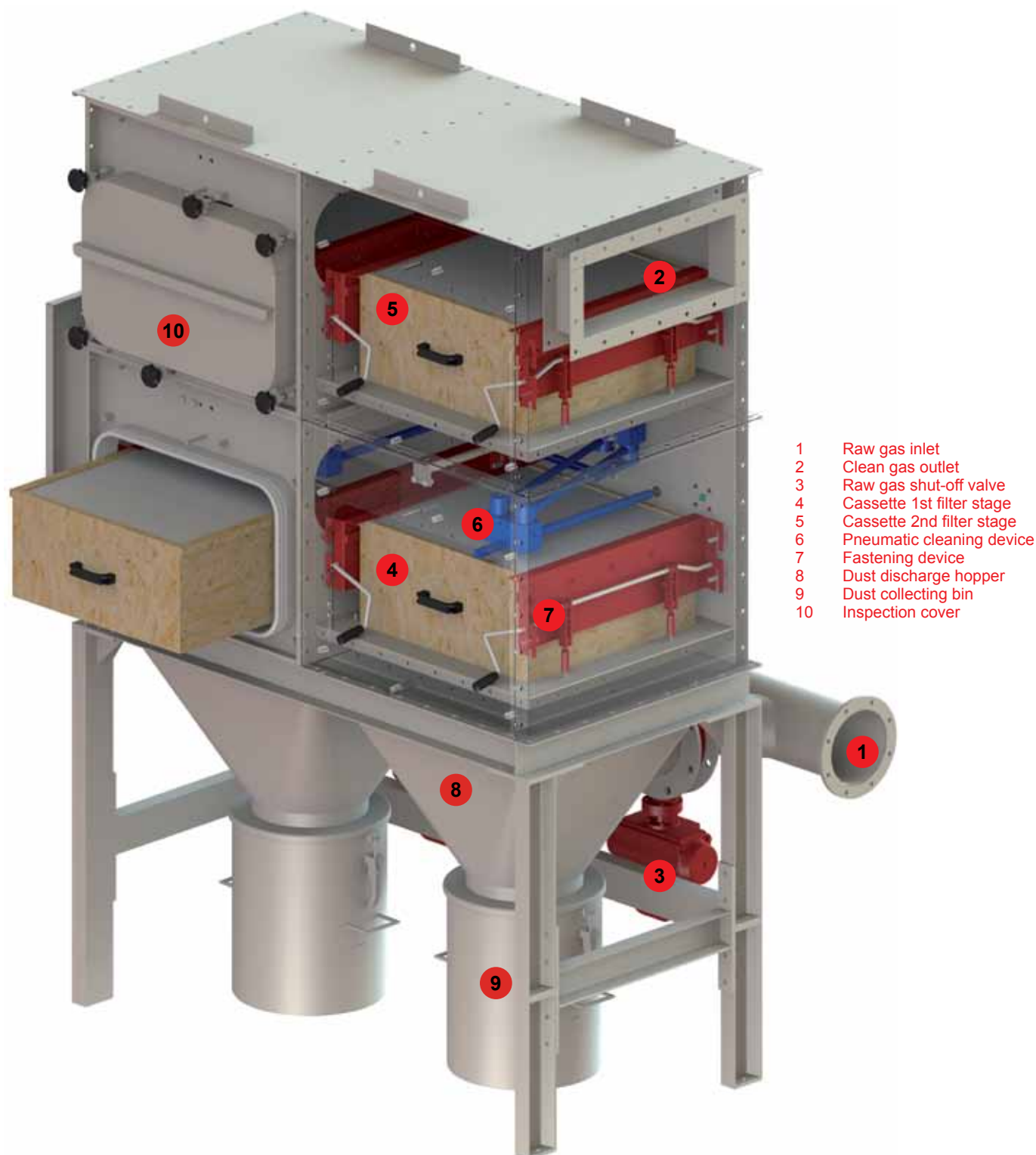
The main fields of application of INFA-MICRON filter units:

- ▣ Production of potential dangerous or valuable products
- ▣ Dust-raising processes as e.g. mills, tablet presses, granulators, coaters, mixers and packaging machines
- ▣ Potentially explosive dusts, gases and hybrid mixtures
- ▣ Processes with highest demands on residual dust content, functionality, safety for operating and maintenance as well as availability
- ▣ Branches chemistry, pharmacy, metal / heavy metal, disposal, hazardous waste, recycling, nuclear technology etc.

## INFA-MICRON, MKR cassette filter

The cassette filter system INFA-MICRON MKR is available as cleanable dust collector with one or two filter stages as well as non-cleanable, downstream safety filter. The filter sizes cover air volume ranges of > 500 m<sup>3</sup>/h.

Big volume flows can be cleaned by parallel arrangement of several units. The 2-stage design guarantees residual dust contents as low as 0.001 mg/m<sup>3</sup>. Filter cassettes of class H13 are used as filter medium for the cleanable 1st stage and H13 to U15 for the non-cleanable 2nd stage.



## Functionality

The dust-laden air enters the raw gas chamber of the filter housing via the raw gas channel. Part of the dust already thereby falls into the dust discharge hopper. Afterwards the raw gas flows upwards through the 1st filter stage, separating the fine dust in the foldings of the filter cassette.

The air of the 1st filter stage passes the 2nd filter stage (optional), which is used as safety filter, in the same direction. The cleaned gas leaves the filter unit through the clean gas outlet.










Regeneration of the 1st filter stage is carried out by pressurized air cleaning using a backflush system. Via a nozzle arm, which moves back and forth over the entire length and width, the filter cassettes are cleaned by backflush air.

The adhesive dust is blown out downwards. The raw gas is interrupted during cleaning phase by closing a pneumatically operated shut-off valve at the raw gas inlet of this filter chamber. By this the fine and light dust can sink completely into the dust discharge hopper and passes to the discharge.

Cleaning of the filter cassettes is carried out in individually adjustable intervals by time cycle or depending on differential pressure. With multi chamber filters the filter chambers are cleaned successively. The raw gas flow through a filter chamber in cleaning mode is diverted to the other chambers which are in filtration mode. This way a continuous exhaust of technical processes is guaranteed.



## Standard design features

-  Cleanable cassette filter in modular design with one or two filter stages with change of filter cassettes on the clean gas side
-  Closed filter housing made of mild steel S235JR with hopper and dust discharge system respectively dust collection equipment
-  Pneumatic cleaning device with movable nozzle arm (backflush system) for cassettes of the 1st filter stage. Cassettes of the 2nd filter stage are not cleanable and will be changed after reaching the maximum pressure drop
-  Modular system for flexible adaptations to individual requirements, suitable up to +80 °C
-  Electronic, programmed control unit for filter cleaning triggered by time cycle or differential pressure incl. control of nozzle arm and shut-off valve, surveillance of single operating conditions by proximity switches and indication by plain-text display
-  Use of particulate filter cassettes of filter class H13 and higher (HEPA), tested according to DIN EN 1822
-  Filter cassettes in compact design with MDF-frame allow easy handling and thermal waste treatment (hazardous-waste incineration)
-  Leak-proof test device for every filter cassette
-  Minimum shutdown time as well as low operating and maintenance costs because of high reliability and easy handling

## Technical data

MKR ./20-./20		
Volume flow single chamber	[m <sup>3</sup> /h]	500 - 2,000 (peak flow)
Volume flow multi chamber	[m <sup>3</sup> /h]	> 500
Operating temperature	[° C]	max. 80, optional 180
Raw gas dust content	[g/m <sup>3</sup> ]	< 1.5
Clean gas dust content	[mg/m <sup>3</sup> ]	< 0.001 (after 2nd filter stage)
Separation efficiency 1st filter stage	(DIN EN 1822)	H13 (99.95 %)
Separation efficiency 2nd filter stage	(DIN EN 1822)	H13 (99.95 %) - up to U15 (99.9995%)
Filter surface 1st stage	[m <sup>2</sup> /cassette]	20
Filter surface 2nd stage	[m <sup>2</sup> /cassette]	20
Cleaning interval		controlled by differential pressure or time
Filter pressure drop per filter stage	[Pa]	400 - 1,200
Housing strength	[mbar] g	max. +/- 250
Compressed air supply	[bar]	6
Number of chambers per filter		1 - 6

## Options

- ❏ 2nd filter stage (not cleanable) as safety filter respectively "back up filter"
- ❏ Various accessories, e.g.
  - ❏ Shut-off valve and dust collecting bin at dust discharge
  - ❏ Level indicator within the dust bin
  - ❏ Fan
  - ❏ Contact sensors for locking of dust collecting bin, inspection cover and shut-off valve's blade position
  - ❏ Lift cart for safe change of dust bin
  - ❏ Mobile service bracket for changing filter cassettes
- ❏ "Safe-Change" system for change of dust collecting bin and filter cassettes free of contamination
- ❏ Dust discharge by lid bag, glove-box or endless bag system
- ❏ Dust discharge by pneumatic conveying into central barrel with "Safe-Change" system
- ❏ Adaptability for customized dust collecting barrel
- ❏ Explosion protected design according to directive 94/9/EG (ATEX)
- ❏ Pressure-shock resistant design for reduced explosion pressure up to 1.0 bar g without additional, expensive relieve device for dusts of explosion class St2 gases up to group IIB and hybrid mixtures
- ❏ Separated single chamber isolation e.g. for operating with hybrid mixtures
- ❏ Gas tight by welded and strengthened filter housing for pressures up to +/- 250 mbar g
- ❏ All housing parts, internal parts or components in contact with the product made of stainless steel
- ❏ Filter cassette frame made of mild steel or stainless steel
- ❏ Filter cassettes in different qualities and grades up to U15 according to DIN EN 1822
- ❏ Filter control as PLC with any special function and interface to master process control system
- ❏ Design for hot gases up to 180 °C
- ❏ Electric heating of filter housing including thermal insulation
- ❏ Control system and motors for special voltages, e.g. 500 V
- ❏ Connections for DOP / DEHS tests of 1st and 2nd filter stage
- ❏ Design „Through the wall“ for fitting into cleanroom walls
- ❏ "First rinse" (moistening of the cassettes with demineralised water prior to opening the inspection covers)

## Individual components for highest flexibility



Lift cart for a safe dust bin change



Dust collecting bin with contact sensors



Filter cassette frame made of stainless steel



"Safe-Change" collar for filter cassettes

## INFA-MICRON, MKM mobile filter unit

The movable cassette filter unit INFA-MICRON MKM with wheels is specially designed for mobile applications, e.g. in laboratories. The automatically working filter unit sucks in the dusts directly at the source of origin. The function corresponds to the cassette filter INFA-MICRON MKR.











MKM is characterised by a low height and small dimensions. The residual dust content amounts as low as  $0.001 \text{ mg/m}^3$ , so that the cleaned air can recirculate into the workroom, except from sucked gases or aerosols.

The mobile filter unit is serially equipped with 2 filter stages. The dust separation is done in the 1st filter stage which is cleaned pneumatically by a mobile nozzle arm. The 2nd filter stage serves as a safety filter only and is not cleanable. In case of malfunction a contamination of the cleaned air is therefore prevented.




















## Standard design features

-  Mobile two-stage, cleanable cassette filter with change of filter cassettes on the clean gas side, suitable up to +80 °C
-  Closed filter housing made of mild steel S235JR with hopper and dust collection bin as well as exhaust fan and programmed control
-  Pneumatic cleaning device with movable nozzle arm (backflush system) for cassette of the 1st filter stage. Cassette of the 2nd filter stage is not cleanable and will be changed after reaching the maximum pressure drop
-  Horizontal side by side arrangement of filter stages
-  Electronic, programmed control unit for filter cleaning triggered by time cycle or differential pressure incl. control of nozzle arm and shut-off valve, surveillance of single operating conditions by proximity switches and indication by plain-text display
-  Use of particulate filter cassettes of filter class H13 and higher (HEPA), certified by DIN EN 1822
-  Filter cassettes in compact design with MDF-frame allow easy handling and thermal waste treatment (hazardous-waste incineration)
-  Leak-proof test device for every filter cassette
-  Filter delivered completely assembled and ready-to-operate
-  Minimum shutdown time as well as low operating and maintenance costs because of high reliability

## Options

-  Various accessories, e.g.
  -  suction hose
  -  shut-off valve at dust bin
  -  level indicator within the dust bin
  -  Contact sensors for locking of dust collecting bin, inspection cover and shut-off valve's blade position
  -  Mobile service bracket for changing filter cassettes
-  Cladding with smooth metal sheets (stainless steel, aluminium or galvanized S235JR) for use in areas which have to be cleaned easily
-  "Safe-change" system for change of dust collecting bin and filter cassettes free of contamination
-  Explosion protected design according to directive 94/9/EG (ATEX)
-  Gas tight by welded and reinforced filter housing for pressures up to +/- 250 mbar g
-  All housing parts, internal parts or components in contact with the product made of stainless steel
-  Filter cassette frame made of mild steel or stainless steel
-  Filter cassettes in different qualities and grades up to U15 according to DIN EN 1822
-  Design for hot gases up to 180 °C
-  Control system and motors for special voltages, e.g. 500 V

## Technical data

MKM 1/20- 1/20		
Volume flow	[m³/h]	500 - 2,000 (peak flow)
Operating temperature	[° C]	max. 80, optional 180
Raw gas dust content	[g/m³]	< 1.5
Clean gas dust content	[mg/m³]	< 0.001
Separation efficiency 1st filter stage	(DIN EN 1822)	H13 (99,95 %)
Separation efficiency 2nd filter stage	(DIN EN 1822)	H13 (99.95 %) - up to U15 (99.9995%)
Filter surface 1st filter stage	[m²/cassette]	20
Filter surface 2nd filter stage	[m²/cassette]	20
Cleaning interval		controlled by differential pressure or time
Filter pressure drop (incl. filter housing)	[Pa]	1,000 - 2,500
Housing strength	[mbar] g	up to +/- 250
Compressed air supply	[bar]	6

## INFA-MICRON, MPR cartridge filter

The cartridge filter INFA-MICRON MPR was especially developed for dust which are high potentially dangerous and also are filtration-technically demanding. Its horizontally inserted filter cartridges are cleaned by a jet pulse system, supported by a special injector. This method allows the separation also with adhesive or sticking dusts, because the jet pulse cleaning brings in higher cleaning energy into the filter cartridges than the backflush system of cassette filters. In addition, the filter cartridges can be precoated or operated with a continuous additive supply. The cleanability is thereby preserved on a long-term.

The MPR cartridge filter is a user-friendly and high efficient de-dusting unit. Efficiency of this filter series covers a wide range of filtration duties in pharmaceutical, chemical, metallurgical and nuclear-technical industry. The processes in these industrial branches are very demanding on dust separation efficiency. Infastaub offers suitable handling systems according to requirements of contamination protection. Like the cassette filter MKR the maintenance staff can carry out the dust disposal and the change of filter media free of contamination with the help of the "Safe-Change" system.

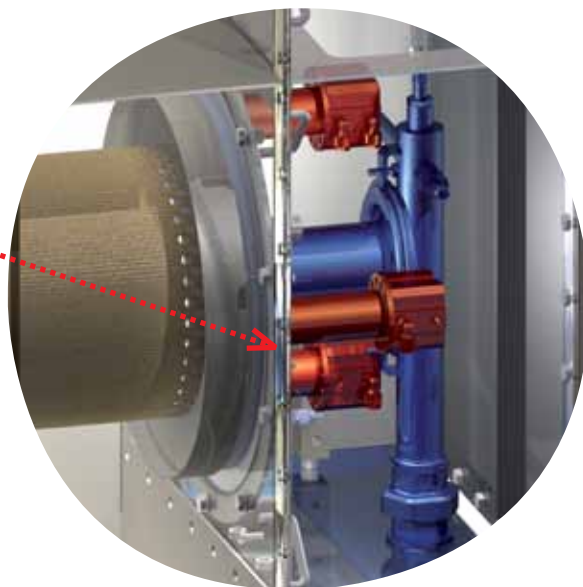


## Dust load and pneumatic cleaning

The dust-laden air flows to the entire filter surface and passes the filter cartridges of the 1st filter stage from outside to inside. The carried dust is separated on the exterior side of the filter cartridges. The flow through the 2nd filter stage is directed from inside to outside. Afterwards the air leaves the filter in cleaned condition.

Cleaning of the filter cartridges is done in periodic intervals by short-term, abrupt pulses of compressed air, called jet-pulse technique, in which the dust layer is detached by pulse transmission. In order to increase the efficiency of the cleaning pulse, especially with regard to the sinking of fine and light dusts, the air-flow is interrupted in the respective chamber by closing its raw gas shut-off valve. Also sticky or crusted dusts are cleaned by jet-pulse this way. The differential pressure decreases, the raw gas shut-off valve open and the filtration cycle starts from the beginning.

With multi chamber filters only one chamber is cleaned at a time in this "offline mode". Meanwhile the raw gas flow of this chamber is diverted to the other chambers in filtration mode.



## Cleaning by jet pulse injector technology

The injector system is of essential importance for energy efficient filtration. INFA-MICRON MPR uses an injector, which takes advantage of the so-called Coanda effect. During cleaning a precise compressed air stream flows out of an annular gap of the Coanda injector, which is placed at the intake of the filter cartridge. It is guided via a convex surface. The primary air (pressurised air) follows the convex surface without stalling and achieves almost sonic velocity. An extreme suction pressure is generated in the interior of the Coanda injector thereby, which sucks accordant secondary air into the filter cartridge and enforces the cleaning effect.

## Advantages of the jet pulse cleaning for filter cartridges with Coanda injector

- Highest efficiency of all mechanical and pneumatic cleaning types due to suction of high quantities of secondary air
- Optimum cleaning enables long lifetime of filter material
- Optional precoating or continuous additive supply for better cleanability of adhesive respectively sticky dusts
- Up to 80 % less consumption of pressurised air per cleaning cycle compared to cassette filters

## Standard design features

- ▣ Cleanable cartridge filter in modular design with one or two filter stages with horizontally arranged filter cartridges
- ▣ Closed filter housing made of mild steel S235JR with hopper and dust discharge system respectively dust collection equipment
- ▣ Spring supported pneumatic fastening of filter cartridges on the clean gas side for easy filter change and permanent safe tightening between raw and clean gas area and to exterior ambience
- ▣ Increased safety because of filter cartridges sealed to the outside, which are an additional barrier within containment philosophy
- ▣ High efficient jet pulse cleaning system with Coanda injector for filter cartridges of 1st stage
- ▣ Raw gas dust load up to  $30 \text{ g/m}^3$ , up to  $10 \text{ g/m}^3$  for filter units with constructive explosion protection
- ▣ Modular system for flexible adaption to individual requirements, suitable up to  $+80 \text{ }^\circ\text{C}$
- ▣ Electronic, programmed control unit for filter cleaning triggered by time cycle or differential pressure incl. Coanda injector and shut-off valve, monitoring of single operating conditions by proximity switches and indication by plain-text display
- ▣ Minimum shutdown time as well as low operating and maintenance costs because of high reliability and easy handling

### The cleanable particulate cartridge filter for demanding processes



## Options

- ❑ 2nd filter stage (not cleanable) as safety filter respectively "back-up filter"
- ❑ Various accessories , e.g.
  - ❑ Shut-off valve and dust collecting bin at dust discharge
  - ❑ Level indicator within the dust bin
  - ❑ Fan
  - ❑ Contact sensors for locking of dust collecting bin, inspection cover and shut-off valve's blade position
  - ❑ Lift cart for a safe change of dust bin
  - ❑ Mobile service help for change of filter cartridges
- ❑ "Safe-Change" system for change of dust collection bin and filter cartridges free of contamination
- ❑ Dust discharge by lid bag, glove box or endless bag system
- ❑ Dust discharge by pneumatic conveying into central barrel with "Safe-Change" system
- ❑ Adaptability for customized dust collecting barrel
- ❑ Explosion protected design according to directive 94/9/EG (ATEX)
- ❑ Pressure-shock resistant design for reduced explosion pressure up to 1.0 bar g without additional, cost expensive relieve devices for dusts of explosion class St2, gases up to group IIB and hybrid mixtures
- ❑ Gas tight welded and strengthened filter housing for pressures up to +/- 250 mbar
- ❑ All housing parts and internal parts or components in contact with the product made of stainless steel
- ❑ Filter media in different qualities and grades up to H14 according to DIN EN 1822
- ❑ Filter control as PLC with any special function and interface to master process control system
- ❑ Design for hot gases up to 130 °C
- ❑ Electric heating of filter housing including thermal insulation
- ❑ Control system and motors for special voltages, e.g. 500 V
- ❑ Connections for DOP / DEHS tests of 1st and 2nd filter stage
- ❑ Design „Through the wall“ for fitting into cleanroom walls
- ❑ "First rinse" (moistening of the filter cartridges with demineralised water prior to opening the inspection covers)
- ❑ Precoating or continuous additive supply for better cleanability of filter cartridges while operating with adhesive or sticky dusts

## Advantages of cartridge filters over cassette filters

- ❑ Increased safety because of filter cartridges sealed to the outside, which are an additional barrier within containment philosophy
- ❑ Round safe change collar: More safety because of easier handling
- ❑ Suitable for higher raw gas dust load and adhesive products



## Secure systems and protection from contamination



Change of filter cartridge ...



... with "Safe-Change" plastic bag ...



... also at dust collecting bin

## Technical data

MPR ./20-./20		
Volume flow single chamber	[m³/h]	500 - 1,500
Volume flow multi chamber	[m³/h]	> 500
Operating temperature	[° C]	max. 80, optional 130
Raw gas dust content	[g/m³]	max. 30
Clean gas dust content	[mg/m³]	< 0.001 (after 2nd filter stage)
Separation efficiency 1st filter stage	(EN 60335 / DIN EN 1822)	M (99.9 %) - H13 (99.95 %)
Separation efficiency 2nd filter stage	(DIN EN 1822)	H14 (99.995 %)
Filter surface 1st filter stage	[m²/cartridge]	20
Filter surface 2nd filter stage	[m²/cartridge]	20
Cleaning interval		controlled by differential pressure or time
Filter pressure drop per filter stage	[Pa]	600 - 1,200
Housing strength	[mbar] g	max. +/- 250
Compressed air supply	[bar]	6
Number of chambers per filter		1 - 6

## Change of filter media and dust collection bin free of contamination ("Safe-Change")

To avoid risk exposures on staff by dangerous dusts during maintenance work, change of filter media has to be realisable as free of contamination as possible.

In order to avoid contact of maintenance staff with dust from inside the filter, a plastic bag is fixed at the access opening to the filter cassette (MKR /MKM) or filter cartridge (MPR). This plastic bag is fixed firmly on the so-called change collar with an elastic rubber ring. A spread of dust out of the filter into the abience is prevented therefore. The filter element is pulled into the plastic bag when changing it. The plastic bag is securely closed and cut off from the change collar. A new filter cassette / cartridge is connected

via a new plastic bag to the change collar and is pushed into the filter housing. Therefore no dust can escape from the open filter during the entire process.

The same procedure can be applied when changing the dust collecting bin. In this case the separated dust is continuously collected in the plastic bag of the bin. The bin is lowered after reaching maximum filling level and changed by an empty one.

Alternative systems are so-called endless liner, glove-boxes or pneumatic collection and transport systems.

"Safe-Change" system for a safe cassette change



# Service and maintenance

Infastaub offers professional service - from supply of spare and wear parts to commissioning and maintenance up to modernisation of your filter unit.

In order to a secure operating of your processes and quality of your required dedusting, correct commissioning of the filter unit is of great importance, especially if it's a matter of safety-relevant or explosive endangered dedusting.

Commissioning covers an extensive function testing as well as a detailed training of your operating staff.

In order to keep your filter unit in long-term operation, we offer the Infastaub maintenance service with periodic inspections and services for your filter unit.



Commissioning



Maintenance, repair, servicing



Spare parts



Filter media



# INFASTAUB

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