

Product catalogue

Air Distribution Systems | Cooling and Heating Systems | Filter Systems and Dampers

Krantz A trademark of Caverion



We design, build, operate and maintain intelligent and energy-efficient solutions for buildings and industries.

Our aim is to...
ensure business continuity, safe and comfortable conditions, optimised performance, and cost control for our clients.

Our clients represent,...
among others, real estate owners and developers, real estate users, general contractors, public institutions, and industrial companies.

We are a truly European company with roots in our operating countries across Northern, Central and Eastern Europe and a history dating back to the late 1800's.

M+W Zander (1998) | **Meissner+Wurst** (1912) | **Krantz** (1882) **Zander** (1950) | **Stangl KG** (1929) | **MAB Anlagenbau Austria GmbH Rohr- und Heizungsbau GmbH** (1955) | **Voest-Alpine MCE Austria Allmänna Ingeniörsbyrán** (1901)
Carl Christensen & Co. | **Brdr. Petersens Eftf. A/S Gerdes & Wesenberg** | **Monies & Andersens Eftf E.Rasmussen/ER Electric A/S** (1907) | **EB Installasjon** (1988) | **Asea Brown Boveri** (1987) | **Asea Per Kure AS** (1897) |**A/S Norsk Elektrisk & Brown Boveri** (1908) Elektro Union National Industri (1917) | **Elektrisk Bureau AS** (1882) | **Frognerkilens Fabrikk Norsk Elektrisk Aktielag** (1873) | **AS Norsk Viftefabrik** (1932) **Elmek** (1990) | **Emico AS** (1992) | **Tehsistem SIA** (2001)

Caverion was established in June 2013 when the Building Services and Industrial Services businesses were demerged from YIT Group into a new, independent company. The Caverion shares are traded on Nasdaq Helsinki.

Our vision is to be a leading European provider of advanced and sustainable life cycle solutions for buildings and industries.

12
countries

17,000
personnel

2.4 €
billion revenue

Headquartered
in Helsinki, Finland





Caverion Corporation (est. 2013)

- YIT (1912)
- Huber Oy (1879)
- Krantz (1882)
- Calor AB (1898)
- ABB building systems (1988)
- MCE building systems (1989)
- Caverion GmbH (2007)

Krantz...

...is a trademark of Caverion.

...develops, designs, manufactures and distributes air distribution systems, cooling and heating systems for ceiling and façade installations as well as exhaust gas filtration, dampers and cleanair solutions.

The products are well-known in public and business premises, but also in places where quality and reliability are extremely important like cleanrooms nuclear facilities, biosafety laboratories or isolation wards.

Caverion **Krantz**

- **1882** Founded by engineer Hermann Krantz
- **1920s** Breakthrough in the designing and building of municipal waterworks
- **1920s** High-temperature water heating and first HVAC components for the textile industry
- **1930s** Wastewater treatment plants
- **1940s** Water supply networks and tap water treatment equipment developed in-house
- **1950s** First HVAC components for the nuclear industry
- **1970s** Power plant commissioning Prefabrication and modular solutions for process and power industries
- **1970s** Krantz America, Inc. established in Charlotte, North Carolina
- **1960s** Market leader for HVAC components; 400 patents
- **1980s** First thermal afterburning system supplied
- **1990s** Building system and maintenance services Major maintenance partnerships in pulp and paper and heavy process industries
- **1990s** Going international with major contract for the Athens airport in Greece
- **2000s** Launch of ServiFlex concept, LuxCool and AVACS solutions. Energy Service Company model (ESCO). CleanPlus solution Launch of ClimaCeil solution and ByggSim tool Patented boiler bottom structure for bubbling boiler bed
- **2000s** Special filters for BSL-3/4 laboratories supplied in Hong Kong
- **2009** Completion of Research and Development Centre in Aachen
- **2010s** Installation of modular plug-and-play HVAC solutions Launch of Caverion Mobile Field Solution and apartment-specific fire extinguishing system

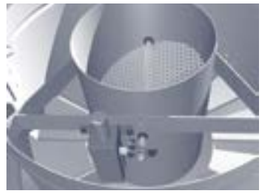
Development of products and systems in their own research and development centre in Aachen

Innovative solutions call for laboratory tests

The range of products and systems includes air outlets for commercial and industrial applications, cooling and heating systems, façade-mounted ventilation systems as well as cleanroom systems.

Adjustable radial outlet with core tube RA-V2
For high air flow rates and great discharge heights, with self-acting thermostatic control unit.





Opticlean OC-Q
The Opticlean can be integrated in an unobtrusive manner into various types of ceiling system. Its mode of operation is such that it prevents the room ceiling from becoming dirty.





Displacement ventilation for indoor firing ranges VA-RSA
The system is designed to ensure an extensive supply air distribution into indoor firing ranges.





Conical displacement outlet VA-K
Low-turbulence displacement flow for halls where supply air must be discharged from a great height.





Chilled beam LuxCool
Multi-service chilled beam with high cooling and heating capacities and low sound power level.





Production facilities Aachen and Mallersdorf

Production including warehousing and shipping in Aachen (Krantz street)
Production of components made of galvanised steel with relatively low painting complexity, including

- Displacement outlets
- Connection boxes
- Induction outlets
- Multiplex outlets



Production facility Mallersdorf
Manufacture of products with high requirements to function and tightness as well as certificates according to:

- DIN EN ISO 3834-2:2006
- KTA 1401
- ASME-NQA-1
- ASME Boiler 8 Pressure Vessel Code Pat 9
- 10CFR50 Appendix B by Tractebel

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Projects by sector



Automotive industry



Banks



Office buildings



Printing companies



Shopping centres/Stores



Airports



Aircraft painting hangars



Research Labs



Hotels



Isolation wards



Nuclear power plants



Movie theatres



Hospitals



Exhibition halls



Museums



Pharmaceutical industry



Production facilities



Restaurants



Swimming pools



Sports halls/Performance



Broadcasting studios



Theatres



Assembly halls/Convention centres



Insurance companies

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Air Distribution Systems 1.1 Ceiling Air Outlets | 1

1.1. Twist outlet DD-N



Applications

Twist outlets for ceiling mounting are proven air outlets from Krantz Components for the commercial and industrial sectors. Thanks to their favourable aerodynamics and acoustics and their attractive appearance and easy mounting, these outlets have been put to successful use for decades. They are particularly suitable for commercial rooms with high-quality indoor air flow requirements such as office buildings, schools, hospitals, etc.



DEA Oil Company AG, Hamburg/D

Features

- Diffuse air distribution system
- Maximum temperature difference between supply air and indoor air: –12 K when cooling, +5 K when heating (+10 K up to 3 m room height)
- Stable jet pattern also at minimum volume flow rate
- Discharge height from 2.2 to 4.5 m
- Low sound power level
- Mounting options: inside a false ceiling, above an open grid ceiling, or exposed
- Twist element easy to mount from below and to fasten with central screw
- Twist element made from polystyrene or aluminium
- Optionally available with perforated cover screen for visually plain ceiling surface
- Connection types A and AF with reducer for connection to flexible duct
- Connection types D and E with connection box and spigot; connection box D with built-in volume flow damper adjustable from room; connection box E with volume flow damper adjustable at the spigot or from room; connection boxes D and E optionally available with acoustic lining
- The twist outlets (with all connection types) can also be used as return air inlets
- A return air inlet (DA-L) with cover screen is available as standard for sizes DN 100 to DN 355

1.1 Twist outlet DD-N

Connection types



Connection type A



Connection type AF



Connection type D



Connection type E

Twist outlet with perforated cover screen



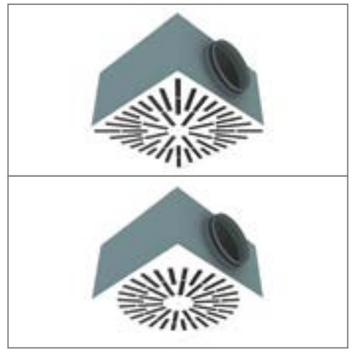
Legend:

2a Sleeve
2b Duct connection spigot
4 Connection box
7 Sleeve
8 Connection spigot
9 Volume flow damper
15 Flange

Technical Data	Twist outlet DD-N – supply air outlet
Volume flow rate range:	11 – 265 l/s [40 – 950 m³/h]
Sizes (plastic):	DN 63, DN 100, DN 125, DN 160, DN 180, DN 250, DN 315
Sizes (aluminium):	DN 250, DN 315, DN 355
Discharge height:	2.2 – 4.5 m
Connection types:	– no connection piece (only discharge element) – reducer (connection type A) – reducer with support flange (connection type AF) – connection box (connection type D), external sleeve – connection box (connection type E), outlet flush with connection box – perforated hood
Damper:	– no volume flow damper – with volume flow damper adjustable from room – with volume flow damper adjustable at spigot (available for connection box of type E)
Insulation:	with or without acoustic lining
Painting:	– powder-coated (for the aluminium type) – wet painted (for the plastic type) – body tinted (only for the plastic type)
Surface finish:	– face painted to RAL 9010, semi-matt – face painted to RAL 7038, semi-matt – face painted to RAL…
Accessories:	with or without perforated cover

Technical Data	Twist outlet DA-L– Return air inlet
Sizes:	DN 100, DN 125, DN 160, DN 180, DN 250, DN 315, DN 355
Surface finish:	– face painted to RAL 9010, semi-matt – face painted to RAL 7038, semi-matt – face painted to RAL…

1.2.1. Radial slot outlet RL-Q2/RL-R2



Applications
The air outlet can be installed either flush with the ceiling or freely suspended. For special purposes such as edge and corner areas in rooms, the otherwise radially symmetrical air discharge behaviour can be individually adjusted by using special cover plates.



Radisson SAS Hotel, Cologne/D

Features

- Turbulent mixing ventilation
- Radial symmetrical or asymmetrical jet dispersion
- Stable supply air jets even at minimal air volume flow rates
- Low sound power level
- With square face for mounting flush with the ceiling or freely suspended
- With square or circular blade array
- With connection box and built-in volume flow damper adjustable from the room
- Air outlet element easily removable from below
- Face sheet metal, powder-coated; blades made of polycarbonate; galvanised sheet metal connection box
- Usable as a return air inlet

Technical Data	Radial slot outlet RL-Q2/RL-R2 Supply air outlet/Return air inlet
Volume flow rate range:	12.5 – 280 l/s [45 – 1 000 m³/h]
Square face:	300, 400, 500, 600, 625
Sizes:	300, 400, 500, 600 (Size 800 on request)
Discharge height:	2.2 – 4.5 m
Maximum temperature difference between supply air and indoor air:	–12 K in cooling mode, +5 K in heating mode (+10 K up to 3 m room height)
Blade array:	square blade array or circular blade array
Blade position supply air:	4-way air discharge, 3-way air discharge, 2-way symmetric air discharge (180°), or 2-way asymmetric air discharge (90°)
Return air:	with or without blades
Connection type:	– without connection box (air outlet element with centre fastening only) – connection box without seal at spigot – connection box with seal at spigot
Damper:	no volume flow damper or with volume flow damper adjustable from room
Surface finish:	face painted to RAL 9010, semi-matt face painted to RAL...
Colour of discharge element:	black similar to RAL 9005 or white similar to RAL 9010

1.2.2. Radial slot outlet RL-C2



Applications
The air outlet can be installed either flush with the ceiling or freely suspended. For special purposes such as edge and corner areas in rooms, the otherwise radially symmetrical air discharge behaviour can be individually adjusted by using special cover plates.



Office building, Aachen/D

Features

- Turbulent mixing ventilation
- Air outlet element and connection box in a round design
- Radial symmetrical or asymmetrical jet dispersion
- Stable supply air jets even at minimal air volume flow rates
- Low sound power level
- Air outlet element easily removable from room
- With connection box and built-in volume flow damper adjustable from the room
- Usable as a return air inlet

Technical Data	Radial slot outlet RL-C2 Supply air outlet/Return air inlet
Volume flow rate range:	22 – 272 l/s [80 – 980 m³/h]
Sizes:	375, 470, 600, 750
Discharge height:	2.2 – 4.5 m
Maximum temperature difference between supply air and indoor air:	–12 K in cooling mode, +5 K in heating mode (+10 K up to 3 m room height)
Mounting:	flush with ceiling (cubical connection box) or freely suspended (circular connection box)
Blade position supply air:	4-way air discharge, 3-way air discharge, 2-way symmetric air discharge (180°), or 2-way asymmetric air discharge (90°)
Return air:	with or without blades
Damper:	no volume flow damper or with volume flow damper adjustable from room
Surface finish:	face painted to RAL 9010, semi-matt face painted to RAL...
Colour of discharge element:	black similar to RAL 9005 or white similar to RAL 9010

1.3.1. Radial outlet RA-N



Applications
Radial outlets from produce high quality diffuse indoor air flow and are ideal for commercial applications.
For mounting flush with ceiling or down-standing, or above open grid ceilings.



Luxor Theatre, Rotterdam/NL

Features

- Diffuse air distribution system
- Radial, horizontal jet dispersion
- Circular or square face
- Low height
- Low sound power level
- Connection to flexible tube or spiral-seam duct via adapter or connection box
- Convenient screw fastener from below
- Also available as return air inlet

Connection types



Connection type A



Connection type D, here with volume flow damper in connection spigot



Connection type E, here with volume flow damper in connection spigot

Legend:

2a Sleeve
2b Spigot
4 Connection box
7 Sleeve at box
8 Connection spigot at box
9 Volume flow damper
11 L-suspension

Technical Data:	Radial outlet RA-N – Supply air outlet / Return air inlet
Volume flow rate range:	28 – 395 l/s [100 – 1 420 m³/h]
Sizes:	DN 100, DN 125, DN 160, DN 180, DN 200, DN 224, DN 250, DN 315, DN 355, DN 400, DN 500
Discharge height:	2,2 – 4,5 m
Maximum temperature difference between supply air and indoor air:	–12 K in cooling mode, +5 K in heating mode (+10 K up to 3 m room height)
Geometry:	circular face, square face for square tile ceiling 600 mm x 600 mm or 625 mm x 625 mm
Connection type:	– no connection piece (only discharge element) – reducer (A) – connection box (D), external sleeve – connection box (E), outlet flush with connection box – perforated hood (L)
Damper:	no volume flow damper or with volume flow damper adjustable from room, or adjustable at spigot (Available only for connection box of type E)
Insulation:	with or without acoustic lining
Surface finish:	face painted to RAL 9010, semi-matt, face painted to RAL...

1.3.2. Radial outlet RA-N2



Applications
They can be installed flush with closed false ceilings or square tile ceilings, above open grid or expanded metal ceilings, or freely suspended from the ceiling.



MARITIM Hotel, Dresden/D

Features

- High-quality diffuse indoor air flow
- Radial, horizontal jet dispersion; therefore high level of thermal comfort
- With circular or square visible surface
- Low height
- Low sound power level
- Connection to flexible or spiral-seam duct via reducer or connection box
- Easy screw fastening from below
- Can also be used as a return air inlet

Connection types



Connection type A, with reducer for duct connection



Connection type D, with connection box for closed false ceilings



Connection type F, with connection box for square tile ceilings

Technical Data	Radial outlet RA-N2 – Supply air outlet/Return air inlet
Volume flow rate range:	28 – 395 l/s [100 – 1 420 m³/h]
Sizes:	DN 250, DN 280, DN 315, DN 355, DN 400, DN 450, DN 500
Discharge height:	2.2 – 4.5 m
Maximum temperature difference between supply air and indoor air:	–12 K in cooling mode, +5 K in heating mode (+10 K up to 3 m room height)
Geometry:	circular face, square face for square tile ceiling 600 mm x 600 mm or 625 mm x 625 mm
Connection type:	– no connection piece (only outlet element) – reducer (A) – connection box (D), external sleeve – connection box (F), for square face
Damper:	no volume flow damper or with volume flow damper adjustable from room
Insulation:	with or without acoustic lining (D)
Surface finish:	face painted to RAL 9010, semi-matt face painted to RAL...

1.3.3. Radial outlet RA-N3



Applications
They can be installed freely suspended from the ceiling, above open grid or expanded metal ceilings, or flush with either closed false ceilings or square tile ceilings.



Media Market, Alexa Shopping Centre, Berlin/D

Features

- For high-quality diffuse indoor air flow
- Radial, horizontal jet dispersion; therefore high level of thermal comfort
- High volume flow rate per size
- Low height
- Low sound power level and pressure drop
- Connection to flexible or spiral seam duct via reducer or connection box
- Easy screw fastening from below
- Can also be used as a return air inlet

Connection types



Connection type A, with reducer for connection to a circular duct or a flexible duct



Connection type D, with connection box for a closed ceiling



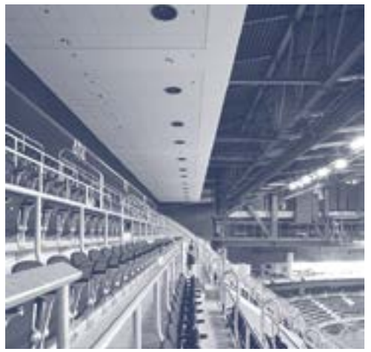
Connection type F, with connection box for a square tile ceiling

Technical Data:	Radial outlet RA-N3 – Supply air outlet/Return air inlet
Volume flow rate range:	26 – 400 l/s [95 – 1 440 m³/h]
Sizes:	DN 355, DN 500
Discharge height:	2.4 – 4.5 m
Maximum temperature difference between supply air and indoor air:	–12 K in cooling mode, +5 K in heating mode (+10 K up to 3 m room height)
Geometry:	circular face, square face for square tile ceiling 600 mm x 600 mm or 625 mm x 625 mm
Collar:	with or without collar 2 or 4
Segment cover:	none or for 3-way discharge or for 2-way symmetric discharge or asymmetric discharge
Connection type:	– no connection piece (only outlet element) – reducer (A) – connection box (D), external sleeve – connection box (F), for square face
Damper:	no volume flow damper or with volume flow damper adjustable from room
Insulation:	with or without acoustic lining
Surface finish:	face painted to RAL 9010, semi-matt face painted to RAL…

1.4.1. Adjustable radial outlet RA-V



Applications
For mounting flush with ceiling or down-standing in high halls, particularly suitable for large thermal load fluctuations.



O2 World, Berlin/D
Photograph Krumnow, Architektur- Industrie- und Werbefotografie, Bannewitz

Features

- Turbulent mixing air flow
- Stepless discharge direction adjustment from horizontal to vertical, manually, or with electric servomotor
- Radial jet dispersion
- Shorter heating-up period with vertical discharge direction
- Connection to spiral seam duct or connection box
- Low height





Left: With connection box
Right: Connection to spiral seam duct

Technical Data	Adjustable radial outlet RA-V
Volume flow rate range:	61 – 1 530 l/s [220 – 5 500 m³/h]
Sizes:	DN 200, DN 224, DN 250, DN 315, DN 355, DN 400, DN 500
Discharge height:	2.5 – 13 m
Maximum temperature difference between supply air and indoor air:	–12 K im Kühlfall, +15 K im Heizfall
Mounting:	flush with ceiling or freely suspended (free-hanging)
Geometry:	round face or square face for square tile ceiling (only up to DN 400) 600 mm x 600 mm or 625 mm x 625 mm
Connection type:	– no connection piece (only discharge element) – duct connection with rivet or screw connection – duct connection with central fastening screw and cross bar – connection box
Damper:	no volume flow damper or with volume flow damper adjustable from room
Insulation:	with or without acoustic lining
Adjustment:	– manual – DN 200 to DN 400 with Siemens servomotors E1 to E6 – DN 500 with Siemens servomotors E7 to E9 and E13 to E15
Surface finish:	face painted to RAL 9010, semi-matt face painted to RAL…

1.4.2. Adjustable radial outlet with core tube RA-V2



Applications
For mounting flush with ceiling or freely suspended in industrial or commercial applications; also suitable for great room heights. Continuous air jet adjustment for cooling and heating.



Opel, Rüsselsheim/D

Features

- Turbulent mixing air flow
- Discharge direction adjustable from horizontal to vertical (downwards)
- Adjustment of discharge direction via thermostatic control unit, electric actuator, or manual adjusting device
- With circular or square face
- Radial jet spread in cooling mode
- Shorter heating-up time due to vertical discharge in heating mode
- Connection directly to circular ducts to EN 1506 or via connection box

Technical Data	Adjustable radial outlet with core tube RA-V2
Volume flow rate range:	111 – 4 444 l/s [400 – 16 000 m³/h]
Sizes:	DN 250, DN 315, DN 355, DN 400, DN 500, DN 630, DN 710, DN 900
Discharge height:	2.8 – 15 m
Maximum temperature difference between supply air and indoor air:	–12 K when cooling to +12 K when heating
Geometry:	round face or square face for square tile ceiling 600 mm x 600 mm or 625 mm x 625 mm
Connection type:	– no connection piece (only discharge element) – duct connection with rivets or screws – connection box (up to DN 710) – duct connection via crossbar
Damper:	– no volume flow damper – with volume flow damper adjustable from room (up to DN 500) – with volume flow damper adjustable at spigot (for DN 630 and DN 710)
Insulation:	with or without acoustic lining
Adjustment:	– manual – with Siemens actuator E1 to E3 – with Belimo actuator E4 to E6 – with thermostatic control unit, 20 – 28 °C or 16 – 28 °C
Surface finish:	face painted to RAL 9010, semi-matt face painted to RAL…

1.5. Microdrall MD



Applications
Mounting flush with ceiling or freely suspended. With air outlet mounting flush with ceiling and horizontal discharge direction, the high-turbulence air jets glide along the ceiling. The resulting flow mixes intensively with indoor air, with indoor air, ensuring rapid temperature equalisation.



Office building, Aachen/D

Features

- Square face
- Square or circular bar array
- Radial jet dispersion
- Cubic connection box
- Convenient screw fastener from below
- Used as return air inlet

Technical Data	Microdrall MD – Supply air outlet/Return air inlet
Volume flow rate range:	61 – 208 l/s [220 – 750 m³/h]
Sizes:	600 (595 x 595 mm) or 625 (620 x 620 mm)
Discharge height:	2.5 – 4.5 m
Geometry:	square face
Lamellenanordnung:	square or circular array
Mounting:	flush with ceiling or freely suspended (on request)
Supply/Return air:	supply air outlet or return air inlet
Connection type:	– no connection piece (only discharge element) – connection box with no seal at the spigot – connection box with seal at the spigot
Damper:	no volume flow damper or with volume flow damper adjustable from room
Surface finish:	face painted to RAL 9010, semi-matt face painted to RAL...

1.6.2. Variable twist outlet with core tube DD-VK



Applications
For installation flush with ceiling or downstanding in high halls, particularly suitable for large thermal load fluctuations.



Waikato art academy, Hamilton/NZ

Features

- Turbulent mixing air flow
- Adjustable discharge direction from horizontal to vertical, manually, or with servomotor
- Radial jet dispersion
- Shorter heating-up period with vertical discharge direction
- Connection to spiral-seam duct or connection box
- Available with curved intake to meet high acoustic requirements

Technical Data	Variable twist outlet with core tube DD-VK
Volume flow rate range:	125 – 3 050 l/s [450 – 11 000 m³/h]
Sizes:	DN 315, DN 400, DN 600, DN 710
Discharge height:	3 – 15 m
Maximum temperature difference between supply air and indoor air:	–12 K when cooling and +15 K when heating
Connection type:	– duct connection with rivet or screw connection – connection box
Design:	– with straight intake and rounded exit – with straight intake and staggered exit – with rounded intake and rounded exit – with rounded intake and staggered exit
Adjustment:	– manual – Siemens servomotor DN 315, DN 400, DN 600 and DN 710, exit rounded, E22 to E24 DN 315, DN 400, exit staggered, E25 to E27 DN 600, DN 710, exit staggered, E28 bis E30
Surface finish:	face painted to RAL...

1.6.3. Variable twist outlet with guide ring DD-VL
1.6.4. Variable twist outlet with jet straightener DD-VG



Lufthansa AG, Hamburg, DD-VG

Applications
For installation flush with ceiling or down-standing in high halls, particularly suitable for large thermal load fluctuations and high acoustic requirements.



DD-VL, Fair of Cologne/D

Features

- Turbulent mixing air flow
- Adjustable discharge direction from horizontal to vertical, manually, or with servomotor
- Radial jet dispersion
- Shorter heating-up period with vertical discharge direction
- Connection to spiral-seam duct or connection box
- Low sound power level
- DD-VG same construction as DD-VL, but in addition with jet straightener
- Very large penetration depth when heating

Technical Data	Variable twist outlet with guide ring DD-VL Variable twist outlet with jet straightener DD-VG
Volume flow rate range:	170 – 2 500 l/s [600 – 9 000 m³/h]
Sizes:	DN 315, DN 400, DN 630
Discharge height:	DD-VL 3 – 10 m DD-VG 5 – 25 m
Maximum temperature difference between supply air and indoor air:	–10 K when cooling and +15 K when heating, with guide ring +20 K when heating, with jet straightener
Function/Kind:	variable with guide ring or variable with jet straightener
Connection type:	– duct connection with rivets or screws[1] – connection box[1]
Adjustment:	– manual – Belimo servomotor DN 315, DN 400 – E7 to E9, and DN 630 – E10 to E12 – Siemens servomotor DN 315, DN 400 – E13 to E15, and DN 630 – E19 to E21
Surface finish:	face painted to RAL...

[1] L-fastener – inside in case of box connection or outside in case of connection to circular duct

1.8. Induction outlet with preset discharge direction IN-N6



Applications
Induction outlets are linear ceiling air outlets that are eminently suited for installation in suspended ceiling systems in commercial buildings.



Guest House Petersberg, Bonn/D

Features

- Stable single jets with alternating inclined discharge, or one-sided single jets at half the volume flow rate, for all ceilings
- Fixed discharge angle of 45° to horizontal
- With connection box and circular connection spigot
- Momentum control device manually adjustable for optimum adjustment of jet momentum to design volume flow rate, or for one-sided air discharge at half volume flow rate

Technical Data	Induction outlet with preset discharge direction IN-N6
Volume flow rate range:	28 – 85 l/(s·m) [100 – 300 m³/(h·m)]
Nominal length:	1 000, 1 200, 1 600 mm
Element width:	90 mm
Discharge height:	4 – 7 m
Maximum temperature difference between supply air and indoor air:	–10 K when cooling, +6 K when heating
Connection type:	connection box or blind rail
Damper:	no volume flow damper or with volume flow damper adjustable from room
Insulation:	with or without acoustic lining
Painting:	wet painted or body-tinted
Surface finish:	– face painted to RAL 9005, matt – face painted to RAL 9010, semi-matt – face painted to RAL…
Accessories:	with or without momentum control device

1.9. Adjustable induction outlet IN-V



Applications
For installation flush with ceiling and where manual adjustment of discharge direction is required.



Office building, Cologne/D

Features

- Diffuse, draught-free air flow
- Stable single jets with alternate or one-sided discharge, for all ceilings
- Discharge direction adjustment from horizontal to nearly vertical
- With connection box and circular connection spigot
- Also available as return air inlet

Technical Data	Adjustable induction outlet IN-V
Volume flow rate range:	**IN-V2** in 1-row to 4-rows design, 11 – 111 l/(s·m) [40 – 400 m³/(h·m)] **IN-V3** in 1-row design, 3 to 17 l/(s·m) [10 bis 60 m3/(h·m)
Length:	1 050, 1 200, 1 350, 1 500 mm
Discharge height:	**IN-V2** 2,7 – 5 m or **IN-V3** 2,5 – 3,5 m
Maximum temperature difference between supply air and indoor air:	–10 K when cooling, +6 K when heating
Function/Kind:	**IN-V2** – Element width 28 mm and **IN-V3** – Element width 15 mm
Outlet rows (**IN-V2 only**)	1-row, 2-rows, 3-rows, 4-rows
Connection type:	– connection box – blank element, open at rear, for continuous lines of outlets, without connection box – blank element, closed at rear, for continuous lines of outlets, without connection box
Option (**IN-V2 only**):	– connection box/diffuser element assembly – installation of diffuser element from room – expansion bracket for blank element – blank element without expansion bracket
Damper:	no volume flow damper or with volume flow damper adjustable from room
Insulation:	with or without acoustic lining
Supply/Return air – **IN-V2**: **IN-V3**:	– supply air, for alternate discharge 0 – 20° – supply air, for alternate discharge 0 – 40° (standard) – supply air, for 1-way discharge – return air – supply air or return air
Surface finish:	– aluminium anodised in natural colour (E6EV1) – face painted to RAL 9010, semi-matt – face painted to RAL…
Profile type:	flush contact profile or ceiling support profile
Colour of discharge element:	black similar to RAL 9005 or white similar to RAL 9010

1.10.1. Opticlean OC-Q



Applications
The Opticlean can be integrated in an unobtrusive manner into various types of ceiling system. Its mode of operation is such that it prevents the room ceiling from becoming dirty.



Savings bank, Euskirchen/D

Features

- Radial, horizontal jet spread at high level of thermal comfort
- Square design for integration into gypsum board ceilings
- Very uniform air discharge; as a result, no or extremely low dirt accumulation on the ceiling
- Segment covers enable the supply air distribution to be adapted to the room geometry, e.g. narrow corridor with 180° discharge
- Low sound power level and low pressure drop
- Also usable as return air inlet

Technical Data	Opticlean OC-Q
Volume flow rate range:	11 – 239 l/s [40 – 860 m³/h]
Sizes:	215, 270, 330, 400, 500, 600, 625
Discharge height:	2.5 – 4.5 m
Maximum temperature difference: When heating:	± 10 K + 10 K up to 3 m ceiling height, + 5 K up to 4.5 m ceiling height
Geometry:	– square faceplate for square tile ceiling 600 mm x 600 mm – square faceplate for square tile ceiling 625 mm x 625 mm – square faceplate with mounting frame for 12.5 mm thick gypsum board ceiling (except for size 625)[1]
Segment cover[2]:	– none (4-way discharge) – 3-way discharge – 2-way symmetric discharge – 2-way asymmetric discharge
Connection type:	– no connection piece (only outlet element) for direct connection using a flexible duct or 90° elbow – connection box
Damper:	with or without volume flow damper adjustable at spigot
Surface finish:	face painted to RAL 9010, semi-matt face painted to RAL…

[1] On enquiry also available for other gypsum board thicknesses

[2] If nothing is specified, the outlet will be supplied without segment cover. The Segment covers serve to reduce the volume flow rate.

1.10.2. Circular Opticlean OC-R



Applications
The Circular Opticlean is designed for mounting in suspended ceiling systems, especially gypsum board ceilings.



catholic St. Mary‘s hospital, Hamburg/D

Features

- High level of thermal comfort thanks to diffuse indoor air flow
- Fulfils thermal comfort criteria for commercial applications as defined in EN ISO 7730
- Steady radial jet spread resulting in high thermal comfort
- Perforated circular faceplate, hole diameter 3 mm
- Strong reduction of dirt accumulation on the ceiling thanks to very even air distribution and the resulting air cushion
- Unobtrusive integration into suspended ceilings
- Also usable as return air inlet

Technical Data	Runder Opticlean OC-R
Volume flow rate range:	25 – 169 l/s [90 – 610 m³/h]
Sizes:	300 and 500
Discharge height:	2.5 – 4.5 m
Maximum temperature difference: When heating:	± 10 K + 10 K up to 3 m ceiling height, + 5 K up to 4.5 m ceiling height
Geometry:	circular faceplate
Connection type:	no connection piece (suitable for connection to flexible duct) or connection box
Damper:	with or without volume flow damper adjustable at spigot (only for design with connection box)
Surface finish:	face painted to RAL 9010, semi-matt face painted to RAL…

Kursaal, Oostende/B





Twist nozzle DW-V2-...-DR
Sidewall Air Outlets



Seat displacement outlet Q-ST
Air Outlets for Assembly Rooms



Adjustable induction outlet IN-V2
Ceiling Air Outlets

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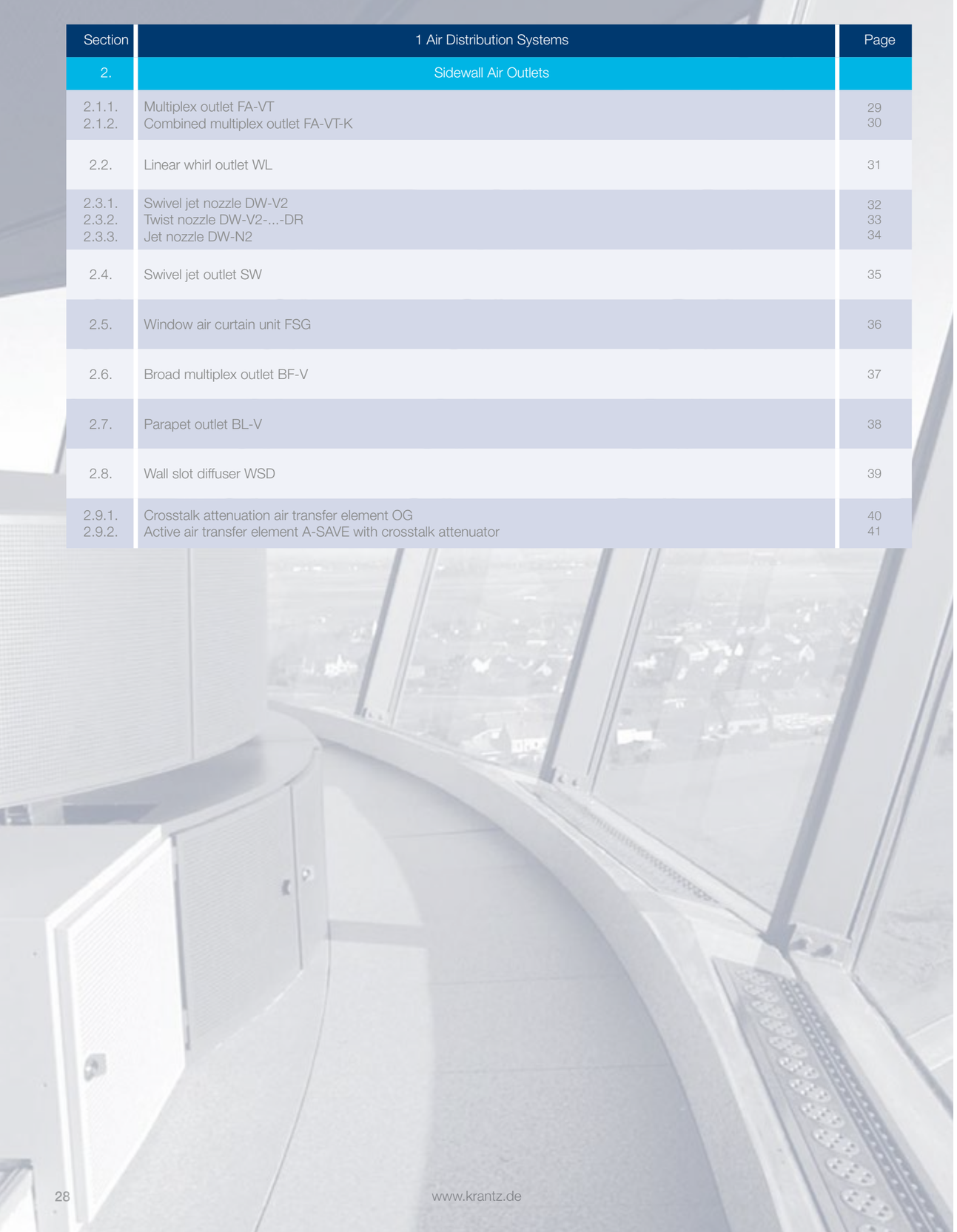


Air Distribution Systems 2.1 Sidewall Air Outlets | 1

2.1.1. Multiplex outlet FA-VT



Applications
For installation in corridor walls of offices, meeting rooms, etc., to provide the occupied zone with supply air spread out into thin single jets.



Marienburg, Nijmegen / NL

Features

- Bundles of thin, free single jets
- Jet bundle elements manually rotatable through 360°
- Pronounced spread of supply air jets
- Rapid decrease in jet velocity and temperature difference
- Single-row or double-row arrangement of jet bundle elements
- With connection box for flexible duct connection
- Also usable as return air inlet

Technical Data	Multiplex outlet FA-VT
Volume flow rate range:	≤ 40 l/(s·m) [145 m³/(h·m)] – 1-row design ≤ 50 l/(s·m) [185 m³/(h·m)] – 2-row design
Nominal length:	600, 800, 1 000 mm
Height of air outlet:	140 mm
Discharge height:	2.2 – 4 m
Design:	non-perforated front plate or perforated front plate
Outlet rows:	1 row, 2 rows, or 2 rows, staggered (each option for supply air or return air)
Multiplex outlet for supply air:	with front plate fitted with round jet bundle elements, each manually rotatable for supply air jet spread as desired by altering the discharge direction; rapid decrease in jet velocity and temperature difference between supply air and indoor air. Supply air discharge through jet bundle elements.
Multiplex outlet for return air:	with front plate fitted with round jet bundle elements. Return air intake through jet bundle elements.
Material 2-part jet bundle elements (nozzle discs):	orifice disc made of polycarbonate PC-GF-10-V0 body tinted in a colour similar to RAL 9010, pure white, or similar to RAL 9005, jet-black[1] nozzle support made of acrylonitrile-butadiene-styrene ABS-V0 body-tinted in a colour similar to RAL 9005, jet-black
Housing and front plate:	galvanised sheet metal, visible part of front plate painted to RAL 9010, pure white[1]

[1] Other colours on request

2.1.2. Combined multiplex outlet FA-VT-K



Applications
For installation in corridor walls of offices, meeting rooms, etc., to discharge supply air in thin single jets from the lower outlet segment into the occupied zone and to remove return air through the upper outlet segment .



Savings bank, Cologne/D

Features

- Combined supply air and return air outlet
- Generation of jet bundles with thin, free, single supply air jets
- Jet bundle elements manually rotatable through 360°
- Pronounced spread of supply air jets
- Rapid decrease in jet velocity and temperature difference
- Jet bundle elements for supply air and return air respectively arranged in one row
- Return air segment also without jet bundle elements; return air intake via perforated faceplate
- Connection box with supply air and return air spigots for flexible duct connection

Technical Data	Combined multiplex outlet FA-VT-K
Volume flow rate range:	≤ 40 l/(s·m) [145 m³/(h·m)] for supply air and return air respectively
Nominal length:	600, 800, 1 000 mm
Height of air outlet:	260 mm
Discharge height:	2.5 – 4 m
Supply/Return air:	supply air, return air, or combined
Design:	non-perforated front plate or perforated front plate
Outlet rows:	1 row, 2 rows, or 2 rows, staggered (each option for supply air or return air)
Multiplex outlet for supply air:	with front plate fitted with round jet bundle elements, each manually rotatable for supply air jet spread as desired by altering the discharge direction; rapid decrease in jet velocity and temperature difference between supply air and indoor air. Supply air discharge through jet bundle elements.
Multiplex outlet for return air:	with front plate fitted with round jet bundle elements. Return air intake through jet bundle elements.
Combined multiplex outlet for supply and return air:	with common front plate, either non-perforated, with round jet bundle elements in lower supply air and upper return air segments; supply air discharge and return air intake through jet bundle elements; or perforated, with round jet bundle elements in lower supply air segment; supply air discharge through jet bundle elements, return air intake through free perforations in upper return air segment.
Material 2-part jet bundle elements (nozzle discs): Housing and front plate:	orifice disc made of polycarbonate PC-GF-10-V0 body tinted in a colour similar to RAL 9010, pure white, or similar to RAL 9005, jet-black[1], nozzle support made of acrylonitrile-butadiene-styrene ABS-V0 body-tinted in a colour similar to RAL 9005, jet-black galvanised sheet metal, visible part of front plate painted to RAL 9010, pure white[1]

[1] Other colours on request

2.2. Linear whirl outlet WL



Applications
For mounting on walls or galleries, with nearly horizontal discharge direction, where penetration depths of 4 to 16 m are required.



Olympia-stadium,, Berlin/D

Features

- Linear free jet consisting of 5 to 7 single jets, depending on type
- Discharge direction nearly horizontal
- Low sound power level
- 3 sizes for different penetration depths
- Also available with low height for low ceiling plenums
- Connection box for flexible duct connection, or direct connection to main air duct

Technical Data	Linear whirl outlet WL
Volume flow rate range:	28 – 300 l/s [100 – 1 100 m³/h]
Nominal sizes:	30, 45, 65 mm (discharge chamber height)
Penetration depth:	4 – 16 m
Discharge height:	2.6 – 6 m
Height x width x length → volume flow rate:	**Size WL-1:** 100 x 250 x 1 000 mm → 100 l/s [350 m³/h] **Size WL-2:** 140 x 340 x 1 038 mm → 140 l/s [500 m³/h] **Size WL-3:** 260 x 370 x 1 100 mm → 305 l/s [1 100 m³/h]
Discharge direction:	one-way discharge
Design – WL-1, WL-2, WL-3:	connection to rectangular duct or connection box[1]
Design – slim linear whirl outlet:	connection spigot or connection to pressurised plenums
Damper:	with or without volume flow damper adjustable from room (only with connection box and connection spigot)
Insulation:	with or without acoustic lining (only with connection box)
Surface finish:	face painted to RAL…
Accessories:	none or with support bracket
Material – WL-1, WL-2, WL-3 Discharge element and support bracket: Connection box and perforated plate: Twist outlets: material – slim linear whirl outlet Discharge element and connection box:	 galvanised sheet metal, desired colour RAL... galvanised sheet metal polystyrene on request galvanised sheet

[1] As standard the connection spigot is placed on the air discharge side.
Other placement options are available on request.

2.3.1. Swivel jet nozzle DW-V2



Applications
For installation on walls, pillars, or galleries, where adjustment of discharge direction with servomotor or by hand is required.



Cinema complex close to ZKM GmbH, Karlsruhe/D

Features

- Circular free jet
- Discharge direction adjustable through ± 30° around the swivel axis
- Adjustment options: manually or by electric actuator, without auxiliary energy, by maintenance-free thermostatic control unit
- The thermostatic control unit allows for resetting; the swivel range can be altered in increments of 5°, up to 20° in total. The mechanism of the thermostatic control unit is protected from undue application of force by a device that can disengage and engage again when the nozzle is swivelled by hand.
- Position of swivel axis also adjustable in the vertical plane, enabling the discharge direction to be altered sideways
- Low sound power level
- Low pressure drop

Technical Data	Swivel jet nozzle DW-V2
Volume flow rate range:	11 – 589 l/s [40 – 2 120 m³/h]
Nominal sizes:	DN 60, DN 80, DN 120, DN 150, DN 200, DN 250
Throw:	3 – 50 m
Discharge height:	2.5 – 10 m
Option:	– connection to pressurised plenum (duct wall) – for slipping onto shaped part – for pushing into circular duct – connector for connection to flexible duct (DW-V2 only)[1]
Adjustment:	– manual – DN 60 to DN 200 - Siemens actuator E22 to E24 – DN 250 - Siemens actuator E25 to E27 – DN 120 to DN 250 - Thermostatic control unit, 20 – 28 °C
Material Nozzle body and collar: Push-in and slip-on ends:	 aluminium in natural colour or painted to RAL… galvanised sheet metal

1. Only suitable for manual adjustment

2.3.2. Twist nozzle DW-V2-DR



Applications
Für Anbau an Wände, Säulen oder Emporenbrüstungen, wenn eine Verstellbarkeit der Ausblasrichtung mit Stellmotor oder von Hand erwünscht ist.



Hanns-Martin-Schleyer-hall, Stuttgart (Porsche Arena)/D

Features

- Twist nozzle with small jet penetration depth for air distribution into narrow spaces, with built-on twist element
- Circular free jet
- Discharge direction adjustable through ± 30° around the swivel axis
- Adjustment options: manually or by electric actuator, without auxiliary energy, by maintenance-free thermostatic control unit
- The thermostatic control unit allows for resetting; the swivel range can be altered in increments of 5°, up to 20° in total. The mechanism of the thermostatic control unit is protected from undue application of force by a device that can disengage and engage again when the nozzle is swivelled by hand.
- Position of swivel axis also adjustable in the vertical plane, enabling the discharge direction to be altered sideways
- Low sound power level
- Low pressure drop

Technical Data	Twist nozzle DW-V2-DR
Volume flow rate range:	up to 395 l/s [1 420 m³/h]
Nominal sizes:	DN 80, DN 120, DN 150, DN 200, DN 250
Throw:	1 – 17 m
Discharge height:	2.8 – 10 m
Option:	– connection to pressurised plenum (duct wall) – for slipping onto shaped part – for pushing into circular duct – connector for connection to flexible duct (DW-V2 only)[1]
Adjustment:	– manual – DN 80 to DN 200 - Siemens actuator E22 to E24 – DN 250 - Siemens actuator E25 to E27 – DN 120 to DN 250 - Thermostatic control unit, 20 – 28 °C
Accessories:	with or without twist element
Material Nozzle body and collar: Push-in and slip-on ends: Twist element:	 aluminium in natural colour or painted to RAL… galvanised sheet metal galvanised sheet metal, black-painted

1. Only suitable for manual adjustment

2.3.3. Jet nozzle DW-N2



Applications
For installation on walls, pillars, or galleries, particularly suitable for rooms with very high acoustic requirements and where the requisite discharge angle can be predetermined.



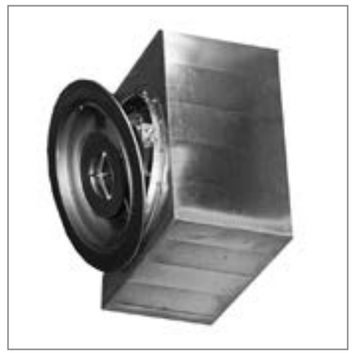
Art- and exhibitionhall of the Federal Republic of Germany, Bonn/D

Features

- Circular free jet
- Fixed discharge direction
- Extremely low sound power level
- Very low pressure drop
- Direct connection to supply air duct or pressurised chamber, or connection with push-in end for spiral seam duct or with slip-on end for shaped parts

Technical Data	Jet nozzle DW-N2
Volume flow rate range:	11 – 589 l/s [40 – 2 120 m³/h]
Nominal sizes:	DN 60, DN 80, DN 120, DN 150, DN 200, DN 250
Throw:	3 – 50 m
Discharge height:	2.5 – 10 m
Option:	– connection to pressurised plenum (duct wall) – for slipping onto shaped part – for pushing into circular duct
Material Nozzle body and collar: Push-in and slip-on ends:	 aluminium in natural colour or painted to RAL… galvanised sheet metal

2.4. Swivel jet outlet SW



Applications
For mounting on walls, pillars, or galleries, where large penetration depths and high volume flow rates per air outlet are required.



Beiersdorf, Hamburg/D

Features

- Circular, high-turbulence free jet
- Discharge direction adjustable in a plane by ± 20° to the air outlet axis, manually or with servomotor
- Penetration depth adjustable by opening or closing the core tube
- Optional ring insert for very large penetration depths
- Connection to side of main supply air duct or with connection box

Technical Data	Swivel jet outlet SW
Volume flow rate range:	110 – 2 800 l/s [400 – 10 000 m³/h]
Nominal sizes:	DN 315, DN 400, DN 600, DN 710
Penetration depth:	up to 30 m
Discharge height:	4 – 6 m
Ring:	with or without ring
Adjustment:	manual or with Belimo servomotor E10 to E12 or E16 to E18
Material Air outlet: Swivel mechanism: Elastic collar:	 aluminium steel, painted airtight, gray polyester fabric, temperature-resistant up to 80 °C
Surface finish:	colour of visible part RAL…[1]

[1] without collar, flange in identical colour powder-coated

2.5. Window air curtain unit FSG



Applications
Installation in window sills for upward-directed air curtain to compensate for heat transmission by the window when cooling and heating.



Carpus+Partner AG, Aachen/D

Features

- Linear air curtain
- Installation in floor or window sill, along the façade
- Max. distance to glass pane: 200 mm
- Small space required (width 55 mm, height 260 to 310 mm)
- With connection box for flexible duct connection

Technical Data	Window air curtain unit FSG
Volume flow rate range:	8 – 25 l/(s·m) [30 - 90 m³/(h·m)], higher volume flow rates on request
Standard lengths:	1 000, 1 200, 1 400, 1 600 mm
Slot width:	3 – 10 mm
Penetration height:	2 – 10 m
Material Discharge element and connection box: Cover profile:	 galvanised sheet metal galvanised sheet metal powder coated to RAL...
Surface finish:	face painted to RAL 9010, semi-matt or face painted to RAL…

2.6. Broad multiplex outlet BF-V



Applications
Installation in the upper area of sidewalls, e.g. in hotel rooms, for spread-out supply air jets and draught-free air distribution.



MARITIM Hotel, Dresden/D

Features

- Sidewall air outlet fulfilling the high thermal comfort criteria for commercial applications to EN ISO 7730
- Perforated front plate with built-in nozzle discs in 1-row or 2-row design
- Combined mixing/displacement ventilation system ensuring a high ventilation efficiency in the occupied zone
- The air jets can be spread out as broadly as desired by manually rotating individual nozzle discs by up to 360°
- The broad multiplex outlet may be positioned in the middle or on the side of the room wall (referred to symmetric or asymmetric arrangement)
- Maximum temperature difference between supply and indoor air ± 10 K
- Low sound power level and low pressure drop, thus well suited for connection to fan coils

Technical Data	Broad multiplex outlet BF-V
Volume flow rate range:	22 – 150 l/s [80 – 540 m³/h]
Nominal length:	600, 800, 1 000 mm
Mounting height:	2.2 – 4 m
Outlet rows:	1-row and 2-row design
Connection type:	fan coil or flexible duct
Placement in room:	to the left, in the middle, or to the right
Surface finish:	face painted to RAL 9010, semi-matt
Material Front plate: 2-part nozzle discs – Orifice disc: – Nozzle support: Connection box:	 galvanised sheet metal, face painted to RAL 9010, pure white or face painted to RAL… polycarbonate PC-GF-10-V0 body tinted in a colour similar to RAL 9010, pure white, or similar to RAL 9005, jet-black or painted to RAL… acrylonitrile-butadiene-styrene ABS-V0 body-tinted in a colour similar to RAL 9005, jet-black galvanised sheet metal

2.7. Parapet outlet BL-V



Applications
Installation in window parapets above existing fan coil units. For façade screening when cooling and heating; it also enables the ventilation of workplaces next to the façade.



Belgocontrol, Brussels/B

Features

- Parapet outlet consisting of a double-row, adjustable induction outlet and a multiplex outlet
- Vertical jet for façade screening and - where required - broadly spread air jet inclined to room for individual workplace ventilation
- No tangential air patterns causing thermal discomfort
- Ideal for replacing simple supply air grilles in window parapets to improve indoor air flow

Technical Data	Parapet outlet BL-V
Volume flow rate range:	up to 200 l/s [720 m³/h]
Volume flow rate:	Nominal length **800** = 69, 76, 83, 97 l/s [250, 275, 300, 350 m³/h] Nominal length **1 025** = 83, 97, 111, 125 l/s [300, 350, 400, 450 m³/h] Nominal length **1 250** = 111, 125, 139, 160 l/s [400, 450, 500, 575 m³/h] Nominal length **1 550** = 139, 153, 181, 200 l/s [500, 550, 650, 720 m³/h}
Nominal length:	800, 1 025, 1 250, 1 550 mm
Nominal width:	202 mm
Material 2-teilige Düsenscheiben – Orifice disc: – Nozzle support: Induction elements: Perforated frontal plate and frame:	 polycarbonate PC-GF-10-V0 body tinted in a colour similar to RAL 9010, pure white, or similar to RAL 9005, jet-black or similar to RAL… acrylonitrile-butadiene-styrene ABS-V0 body tinted in a colour similar to RAL 9005, jet-black polycarbonate PC-GF-10-V0 bodytinted in a colour similar to RAL 9010, pure white, or similar to RAL 9005, jet-black galvanised sheet metal powder-coated to RAL 9010 or similar to RAL…

2.8. Wall slot diffuser WSD



Applications
For installation in gypsum plasterboard walls. The wall slot diffuser is particularly suitable for administrative and office buildings, ideally in conjunction with air-and-water systems (e.g. concrete core cooling, chilled ceiling and chilled sails).



Hospital EINS, Cologne/D

Features

- With 1 or 2 rows for supply air or return air or both combined
- Slot element easy to remove thanks to push-in connection; thus cleanable as per VDI 6022
- Connection box to be installed inside or behind gypsum plasterboard walls; volume flow damper adjustable from room (optional)
- High level of thermal comfort: max. cooling capacity up to 120 W/m²
- High insertion loss with abrasion-resistant acoustic lining of class A2 as per DIN 4102-1 (optional); this negates the need for crosstalk silencers

Technical Data	Wall slot diffuser WSD
Volume flow rate range:	up to 66.5 l/s [240 m³/h] per metre of diffuser length
Nominal length:	525, 1 050, 1 125 mm
Discharge height:	2.4 – 3.5 m
Supply/Return air:	supply air or return air or combined supply and return air (for lengths of 1 050 mm and 1 125 mm)
Outlet rows:	1 row or 2 rows
Design:	with connection box for installation behind or inside a two-layer gypsum board wall, wall thickness = 100 mm
Damper:	with or without volume flow damper adjustable from room
Insulation:	with or without acoustic lining
Surface finish (slot element profile):	 aluminium anodised in natural colour (E6EV1) or face painted to RAL 9010, semi-matt or face painted to RAL…
Colour of discharge element:	black similar to RAL 9005 or white similar to RAL 9010
Material Connection box:	 galvanised sheet metal

2.9.1. Crosstalk attenuation air transfer element OG



Applications
For use in administrative and office buildings, for installation in plasterboard walls.



Crosstalk attenuation air transfer element OG

Features

- Built-in silencer for reducing noise transmission from one room to the other (crosstalk attenuator)
- High level of sound absorption at low pressure drop
- High-quality design
- The acoustic lining is of fire resistance class B1 to DIN 4102-1
- Easy to install

Technical Data	Crosstalk attenuation air transfer element OG
Volume flow rate range:	S-shape: approx. 53 l/(s·m) [190 m³/(h·m)] T-shape: approx. 47 l/(s·m) [170 m³/(h·m)] at a pressure drop of 15 Pa
Nominal length:	500, 1 000 mm
Height:	400 mm
Wall thickness:	S-shape: 100 mm T-shape: 125 mm
Accessories:	front plate with round perforations Rv 5/7 or front plate with rectangular slots 51·5 (other front plate designs on request)
Surface finish:	face painted to RAL 9010, semi-matt or face painted to RAL…
Material Front plate: Housing: Crosstalk silencer:	 galvanised sheet metal powder coated to RAL 9010, pure white galvanised sheet metal abrasion-resistant acoustic lining (Basotect) of fire resistance class B1 to DIN 4102-1

2.9.2 Active air transfer element A-SAVE with crosstalk attenuator



Applications
The A-SAVE (Active-Sound Attenuation and Ventilation Element) is an active air transfer element for absolutely quiet and energy-efficient ventilation of homes. The integrated crosstalk attenuator makes it suitable for ventilation of acoustically sensitive areas such as, for example, bedrooms.



Transverse section of a flat with A-SAVE

Features

- Silent and energy-efficient ventilation of dwellings and offices
- Built-in crosstalk attenuator for reducing room-to-room sound transmission
- Acoustic lining of fire resistance class B1 to DIN 4102-1
- Quick and simple installation

Technical Data	Active air transfer element A-SAVE with crosstalk attenuator
Volume flow rate:	60 m³/h
Nominal length:	872 mm
Height:	400 mm
Wall thickness:	130, 195, 260 mm
Front plate:	with square perforation QG 8 – 12
Surface finish (Front plate and visible sheets):	face painted to RAL 9010, semi-matt or face painted to RAL…
Material Front plate: Housing: Crosstalk silencer:	 galvanised sheet metal powder coated to RAL 9010, pure white galvanised sheet metal abrasion-resistant acoustic lining (Basotect) of fire resistance class B1 to DIN 4102-1

Reference Project
Assembly halls, cafeteria and office

State office for the environmental commitment, Augsburg/D





Linear whirl outlet WL
Sidewall Air outlets



Multiplex outlet FA-VT
Sidewall Air Outlets



Adjustable radial outlet RA-V
Ceiling Air Outlets

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For an illustration of **the principle of turbulent mixing air flow or of displacement ventilation,** please go to the appendix or scan the QR-Code.

3.1. Floor twist outlet DB-E



Applications
Installation in raised floors; air supply from below with high-turbulence vertical flow and large induction effect in floor zone.



Office Building, Schwäbisch Hall/D

Features

- High-induction, rotationally symmetric, stable vertical jet
- For insertion in a stepped bore or installation with a clamp insert in a through bore of the floor tile
- Depending on type: Air outlet element fitted with lock to prevent unauthorised removal
- Suitable for air connection to the ‘pressurised plenum‘ system, or with connection box for duct connection
- With distributor basket for even air supply; also available with throttle device (adjustable from room) for volume flow rate adjustment

Technical Data	Floor twist outlet DB-E
Volume flow rate range:	**DN 150**: 5.5 – 14 l/s [20 – 50 m³/h] **DN 200**: 14 – 50 l/s [50 – 180 m³/h]
Nominal sizes:	DN 150, DN 200
Distributor basket:	**VS:** standard type **VK:** short type **VL:** short type with fixed damper **(DN 200 only)** **VN:** low type **(DN 200 only)** **VP:** perforated sheet metal type **(DN 200 only, aluminium)**
Damper:	no volume flow damper or with throttle device
Clamp insert:	– no clamp insert – clamp nut **(plastic only)** – claw fastener – clamp ring (for DN 150 on request)
Connection type:	floor plenum or Connection box
Material and surface finish Twist element and clamp insert (plastic): Twist element and clamp insert (aluminium): Distributor baskets VSD, VK and VND: Distributor basket VPD: Distributor basket VL: Connection box:	 polycarbonate, painted similar to RAL 7037, dust grey (other colours on request) aluminium, natural colour (powder-coated on request) polycarbonate, body-tinted in a colour similar to RAL 9005, jet-black sheet metal polycarbonate, body-tinted in a colour similar to RAL 9005, jet-black; damper made of sheet metal galvanised sheet metal

3.2. Rotary floor twist outlet DB-D



Applications
Installation in raised floors; air supply from below with large induction effect in floor zone, with inclined air jet axis.



Universal Music, Berlin/D

Features

- High-induction air jet with jet axis incline of 30° to vertical, rotatable for individual adjustment of air velocities at head height for a seated person
- For installation with a clamp insert in a through bore of the floor tile; DN 200 also design for insertion in a stepped bore
- Twist element and clamp insert available in plastic and aluminium
- Depending on type: Air outlet element fitted with lock to prevent unauthorised removal
- Suitable for air connection to the ‘pressurised plenum‘ system, or with connection box for duct connection
- With distributor basket for even air supply; also available with throttle device for volume flow rate adjustment

Technical Data	Rotary floor twist outlet DB-D
Volume flow rate range:	**DN 125**: 5.5 – 16.5 l/s [20 – 60 m³/h] **DN 200**: 14 – 50 l/s [50 – 180 m³/h]
Nominal sizes:	DN 125, DN 200
Distributor basket **DN 125**:	**VD:** distributor with throttle device
Clamp insert **DN 125**:	rotary claw
Distributor basket **DN 200**:	**VS:** standard type **VK:** short type **VN:** low type **VP:** perforated sheet metal type **(aluminium only)** **VL:** short type with fixed damper
Clamp insert **DN 200**:	– no clamp insert – clamp nut **(plastic only)** – claw fastener – clamp ring
Damper **DN 200**:	no volume flow damper or with throttle device
Connection type:	floor plenum or connection box
Material and surface finish Twist element and clamp insert: Distributor baskets VD, VSD, VK and VND: Distributor basket VPD: Distributor basket VL: Connection box:	 polycarbonate, painted similar to RAL 7037, dust grey[1] or natural colour **(DN 200 only)**[1] polycarbonate, painted similar to RAL 9005, jet-black sheet steel polycarbonate, painted similar to RAL 9005, jet-black, Damper, sheet steel galvanised sheet metal

[1] **Other colours on request**

3.3. Adjustable floor outlet BA-V-DN 150



Applications
Installation in raised floors; air supply from below, with adjusting disc to change the discharge pattern from ‘floor twist outlet‘ with high-turbulence vertical flow to ‘floor displacement outlet‘ with low-turbulence, radial horizontal flow.



Luxor Theatre, Rotterdam/NL

Features

- Operation as floor twist outlet or floor displacement outlet
- For insertion in a stepped bore or installation with a clamp insert in a through bore of the floor tile
- Twist element and clamp insert made of plastic
- Suitable for air connection to the ‘pressurised plenum‘ system, or with connection box for duct connection
- With distributor basket for even air supply; also available with throttle device for volume flow rate adjustment

Technical Data	Adjustable floor outlet BA-V-DN 150
Volume flow rate range:	5.5 – 14 l/s [20 – 50 m³/h]
Nominal size:	DN 150
Distributor basket:	standard type or short type
Damper:	no volume flow damper or with throttle device
Clamp insert:	– no clamp insert – clamp nut – claw fastener
Connection type:	floor plenum or connection box
Material and surface finish Air outlet element and clamp insert: Distributor basket: Connection box:	 polycarbonate, colour of visible air outlet parts: coloured similar to RAL 7037, dust grey; (other colours on request) polycarbonate, painted similar to RAL 9005, jet-black galvanised sheet metal

3.4. NTK floor twist outlet DB-N-DN 215



Applications
Installation in floor plenums; air supply from below, with vertical jet axis.



Meeting room

Features

- Slim vertical jet with intensive indoor air admixture
- For low floor plenums, installation with floor insert in floor orifices
- Twist element and clamp insert made of plastic
- For air connection to the ‘pressurised plenum‘ system
- Floor insert with perforated throttle disk
- Available on request with central recess to accommodate floor covering

Technical Data	NTK floor twist outlet DB-N-DN 215
Volume flow rate range:	8.5 – 16.5 l/s [30 – 60 m³/h]
Nominal size:	DN 215
Damper:	throttle device
Accessories:	lid for cental recess
Material Air outlet element:	 polycarbonate
Surface finish:	outer surfaces matted to be made scratch-resistant, body-tinted similar to RAL 7037 or RAL…

3.6. Floor displacement outlet Q-B-DN 200



Applications
Installation in raised floors; air supply from below, to generate low-turbulence, radial horizontal flow for displacement ventilation.



Ströer Out-of-Home Media AG, Headquarters, Cologne/D

Features

- Radial, horizontal jet dispersion
- For insertion in a stepped bore or installation with a clamp insert in a through bore of the floor tile
- Twist element and clamp insert made of aluminium
- For air connection to the 'pressurised plenum' system, or with connection box for duct connection
- With distributor basket for even air supply; also available with throttle device for volume flow adjustment

Technical Data	Floor displacement outlet Q-B-DN 200
Volume flow rate range:	≤ 28 l/s [100 m³/h]
Nominal size:	DN 200
Distributor basket:	**VS:** standard type **VK:** short type **VL:** short type with fixed damper **VN:** low type **VP:** perforated sheet metal type
Damper (distributor basket VS, VN, VP only):	no volume flow damper or with throttle device
Clamp insert:	– no clamp insert – claw fastener – clamp ring
Connection type:	floor plenum or connection box
Material and Surface finish Air outlet element and clamp insert: Distributor basket: Connection box:	 aluminium in natural colour (powder coating on request) polycarbonate or galvanised sheet metal galvanised sheet metal

3.7. Floor displacement outlet Q-B-DN 215



Applications
Installation in floor plenums; air supply from below, to generate low-turbulence, radial horizontal flow for displacement ventilation.



Conference room

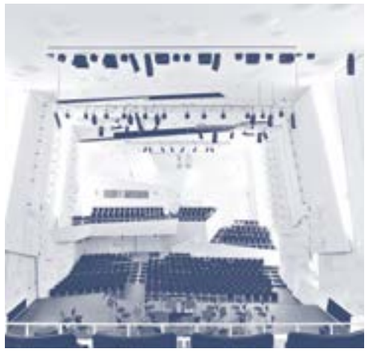
Features

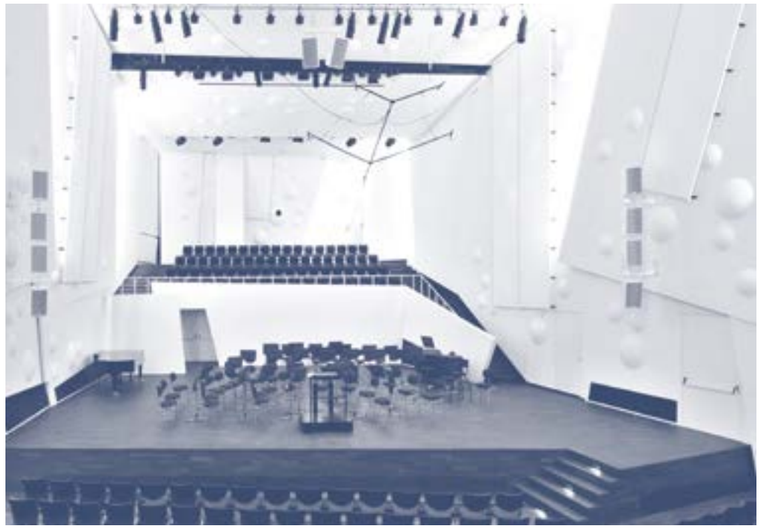
- Radial, horizontal jet dispersion
- For low floor plenums, installation with floor insert in floor orifice
- Twist element and clamp insert made of plastic
- For air connection to the 'pressurised plenum' system
- Floor insert with perforated throttle disk
- Available on request with central recess to accommodate floor covering

Technical Data	Floor displacement outlet Q-B-DN 215
Volume flow rate range:	5.5 – 14 l/s [20 – 50 m³/h]
Nominal size:	DN 215
Damper:	throttle disc
Accessories:	lid for cental recess
Material Air outlet element:	 polycarbonate
Surface finish:	outer surfaces scratch resistant, with matted finish; colour similar to RAL 7037, dust grey

Reference Page
Assembly Halls/Convention Centres

Carl Maria von Weber Music School, Dresden/D





Rectangular displacement outlet Q-R
Displacement Outlets for the Commercial Sector



Step displacement outlet Q-SL
Air Outlets for Assembly Rooms



Floor twist outlet DB-E
Floor Air Outlets

Photographer: Luc Saalfeld FOTOGRAFIK, BBK / Sächsischer Künstlerbund, Dresden

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For an illustration of **measured vertical temperature gradients for different air distribution systems,** please go to the appendix or scan the QR-Code.

1 Air Distribution Systems 4.1 Displacement Outlets for the Commercial Sector

4.1. Rectangular displacement outlet Q-R



Applications
Installation on the floor; in front of a wall, parapet, or pillar; free-standing in room; or integration into room furniture.



The Landtag of North Rhine-Westphalia, Düsseldorf/D

Features

- Even, low-turbulence and draught-free discharge flow
- Single installation or in rows side by side
- Easy to integrate into furniture
- Connection from above or below
- Visually attractive design
- Maintenance-free

Technical Data	Rectangular displacement outlet Q-R
Volume flow rate range:	up to 445 l/s [1 600 m³/h]
Width:	500, 880, 1 000, 1 380 mm
Höhe:	150, 300, 500, 880, 1 000, 1 380 mm
Height:	150, 200, 300 mm
Discharge velocity:	≤ 0.25 m/s
Coverage:	5 – 15 m
Sound power level:	≤ 30 dB(A) ref. 10^{-12} W
Connection type:	rectangular spigot, smooth or with corner flange
Position of connection spigot:	connection spigot on top or at bottom
Material Air outlet:	galvanised sheet metal, face powder coated to RAL...
Surface finish:	face painted to RAL 9010, semi-matt or face painted to RAL...
Accessories:	none or with fasteners for wall mounting

Air Distribution Systems 4.1 Displacement Outlet for the Commercial Sector 1

4.2.1. Circular displacement outlet Q-Z and 4.2.2. Semi-circular displacement outlet Q-ZH



Applications
Circular displacement outlet Q-Z for free-standing placement in room. Semi-circular displacement outlet Q-ZH for mounting on walls or pillars.



Luxor Theatre, Rotterdam /NL(Q-Z)



Axel Springer Verlag, Essen-Kettwig/D (Q-ZH)

Features

- Even, horizontal, low-turbulence discharge flow
- Connection from above or below, depending on type

Technical Data	Circular displacement outlet Q-Z and Semi-circular displacement outlet Q-ZH
Volume flow rate range:	Q-Z: up to 720 l/s [2 600 m³/h] Q-ZH: ≤ 1 300 m³/h
Size:	Q-Z: DN 200, DN 250, DN 315, DN 400, DN 500 Q-ZH: DN 125, DN 160, DN 200, DN 250, DN 315
Diameter:	250 to 630 mm
Height:	400 to 1 500 mm
Discharge velocity:	≤ 0.25 m/s
Coverage zone:	5 – 15 m
Sound power level:	≤ 35 dB(A) ref. 10^{-12} W
Function/Kind:	Q-Z: circular with guidance device or with air distribution mat Q-ZH: semi-circular with air distribution mat
Connection spigot:	to fit DIN 24 145 pipes (folded spiralseam tube) or DIN 24 146 (flexible tubes)
Arrangement:	above or below available for Q-ZM and Q-ZH
Material:	sheet steel housing, finely perforated sheet casing and built-in air distribution devices
Surface finish:	face painted to RAL9010, semi-matt

Air Distribution Systems 4.5 Displacement Outlets for the Commercial Sector

4.5. Wall displacement outlet Q-WL, Q-WR, and Q-WK



Applications
For low-turbulence air flow according to the principle of displacement ventilation, for mounting in room walls at ceiling height, with finely perforated faceplate for air discharge.



Cologne Fairgrounds

Features

- Installation height 2 to 4 m
- Jet pattern downwards along the wall, then over the floor and finally vertical upflow through the occupied zone to the ceiling zone
- Minimum supply air temperature 16 °C
- Minimum distance to ceiling 120 mm
- Connection from behind

Technical Data	Wall displacement outlet Q-WL, Q-WR, and Q-WK
Function/Kind:	Q-WL: linear wall displacement outlet Q-WR: circular wall displacement outlet Q-WK: combined wall displacement outlet
Volume flow rate range:	Q-WL: up to 28 l/(s·m) [100 m³/(h·m)] Q-WR: up to 36 l/s [130 m³/h] Q-WK: up to 28 l/(s·m) [100 m³/(h·m)]
Standard length/Height:	Q-WL: 0.6; 0.8; 1.0 and 1.2 m → Height 180 mm Q-WK: 0.6; 0.8; 1.0 m → Height 280 mm or 1.2 m → Height 310 mm
Nominal diameter:	Q-WR: DN 80, DN 100, DN 125
Outside diameter:	Q-WR: 190, 220, 260 mm
Discharge velocity:	Q-WL: ≤ 0,19 m/s Q-WR: ≤ 1 m/s Q-WK: ≤ 0,19 m/s
Sound power level:	Q-WL: ≤ 33 dB(A) ref. 10^{-12} W Q-WR: ≤ 34 dB(A) ref. 10^{-12} W Q-WK: ≤ 32 dB(A) ref. 10^{-12} W
Damper:	Q-WL and Q-WK: no volume flow damper or with volume flow damper adjustable from room
Fastening:	Q-WR: with claw fasteners or with lip seal
Material:	galvanised sheet metal
Surface finish:	face painted to RAL 9010, semi-matt Q-WR: Faceplate and exit flange painted to RAL...

Air Distribution Systems 4.6 Displacement Outlet for the Commercial Sector

4.6. Ceiling displacement outlet Q-DN and Q-DV



Applications
Placement flush with false ceiling or downstanding below the room ceiling; adjustable or non-adjustable.



Audi - Forum für Tradition and Vision, Ingolstadt/D

Features

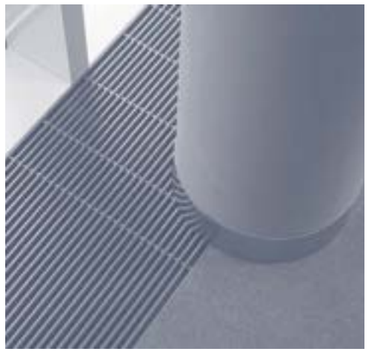
- For low-turbulence air supply from ceiling
- Discharge height 2.5 – 3.5 m
- Vertical downflow supply air jet
- Adjustable type also suitable for heating purposes; adjustment either by hand, or by thermostatic device or servomotor
- Flush with ceiling or downstanding
- Minimum horizontal distance to workplace 1.5 m
- Connection to supply air duct at side or from above

Technical Data	Ceiling displacement outlet Q-DN and Q-DV
Adjustability:	Q-DN: non-adjustable Q-DV: adjustable
Volume flow rate range:	Q-DN: 47 – 140 l/s [170 – 500 m³/h] Q-DV: 94 – 140 l/s [340 – 500 m³/h]
Sizes:	Q-DN: 625 mm x 625 mm (square) or 625 mm x 1 250 mm (rectangular) Q-DV: 625 mm x 625 mm (square)
Air discharge surface:	560 mm / 560 mm
Discharge velocity:	Q-DN: 0,15 – 0.45 m/s Q-DV: 0.30 – 0.45 m/s
Adjustment:	Q-DV: manual or with Siemens servomotor E22 to E24 or thermostatic adjusting unit, 16 – 28 °C
Position of connection spigot:	Connection spigot on top or on side
Material:	galvanised steel
Surface finish:	face painted to RAL9010, semi-matt or face painted to RAL…

4.7. Rectangular floor displacement outlet Q-BR



Applications
The rectangular floor displacement outlet is designed to deliver supply air to commercial rooms with raised floors or floor plenums.



Rectangular floor displacement outlet in front of a façade

Features

- Combined mixing/displacement flow or hybrid flow as described in German VDI 3804 guideline
- For mounting in raised floors
- Volume flow rate up to 55 l/(s·m) [200 m³/(h·m)],
- one-way or two-way discharge
- Draught-free indoor air flow with very low air velocities in the occupied zone
- Large supply air coverage (up to 6 m room depth)

Technical Data	Rectangular floor displacement outlet Q-BR
Supply air volume flow rate:	up to 55 l/(s·m) [200 m³/(h·m)]
Temperature difference supply air to indoor air:	–1 to –6 K
Unit length:	800, 1 000, 1 200, 1 450, 1 700, 1 900 mm
Unit depth:	140, 180, 260 (standard), 340 mm
Unit height:	190 mm (standard) or 130 mm (supply air connection at the bottom)
Supply air connection:	DN 100, DN 125
Position of connection spigots:	at the front (room side) or at the bottom
Grille type (made of aluminium):	linear bar grille or roll-up grille
Material Housing: Grille and support frame:	galvanised sheet metal painted to RAL 7024 (graphite grey), matt aluminium anodised in natural colour (other anodisation colours or RAL colour finishes on request)

Luxembourg Airport



Rectangular displacement outlet Q-R combined with a wall displacement outlet Q-WR Displacement Outlets for Commercial Sector





Swivel jet nozzle DW-V
Sidewall Air Outlets



Plinth displacement outlet Q-S
Displacement Outlets for the Commercial Sector

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Air Distribution Systems 5.1 Displacement Outlet for the Industrial Sector

1

5.1. Circular displacement outlet VA-ZD



Applications
Suitable for rooms where the supply air is discharged at points either at approx. 3 m height or directly above the floor.



Volkswagen AG, Emden/D

Features

- Low-turbulence displacement flow
- Placement at approx. 3 m height or on the floor, free standing in room or in front of a pillar or wall
- Radial discharge direction
- Stepless adjustment of discharge direction from approximately horizontal to vertical downflow
- Adjustment by hand, servomotor, or automatic thermal control unit
- Well suited for cooling and heating
- Connection to duct to DIN 24145

Technical Data	Circular displacement outlet VA-ZD
Volume flow rate range:	≤ 2 800 l/s [10 000 m³/h]
Nominal Sizes:	DN 250, DN 315, DN 355, DN 450, DN 560, DN 630
Primary penetration depth:	up to 14 m
Maximum supply air penetration depth:	up to 20 m
Mounting:	placement on floor or 3 m above the occupied zone
Adjustment:	Belimo servomotor, bowden cable, chain pull, control lever, or thermal control unit
Damper:	no volume flow damper or with volume flow damper
Material:	galvanised sheet metal
Surface finish:	face painted to RAL 9006, semi-matt or face painted to RAL…
Accessories:	fasteners for wall mounting or L-fasteners for suspension

Air Distribution Systems
5.2 Displacement Outlets for the Industrial Sector

5.2. Rectangular displacement outlet VA-RV/VA-RN



Applications
Suitable for rooms with high specific heat loads or light pollutants.



Axel Springer Verlag, Print shop, Essen-Kettwig/D

Features

- Low-turbulence displacement flow
- Installation on or directly above the floor
- Horizontal discharge; with adjustable type (VA-RV), discharge directed to floor when heating
- Flat shape
- Rectangular connection spigot positioned on top

Technical Data	Rectangular displacement outlet VA-RV/VA-RN
Volume flow rate range:	≤ 700 l/(s·m) [2 500 m³/(h·m)]
Adjustability:	VA-RV: adjustable VA-RN: non-adjustable
Width:	1 000, 1 500, 2 000, 2 500 mm
Depth:	350 mm
Height:	765, 1 150 mm
Coverage zone:	up to 20 m
Adjustment:	manual or Belimo actuator E7 or E13
Position of adjustment device:	to the right (related to air flow direction) – standard or to the left (related to air flow direction)
Position of connection spigot:[1]	in top centre or to the left (related to air flow direction) or to the right (related to air flow direction)
Material Housing with built-in parts, air inlet spigot and perforated front plate: Visible outlet parts: Twist outlets:	 galvanised sheet metal optionally powder coated to RAL... polycarbonate body-tinted in a colour similar to RAL 7037, dusty grey

[1] Befindet sich der Anschluss-Stutzen in Luftrichtung links oder rechts, muss bei elektrischer Adjustment der Motor aus Gründen der Zugänglichkeit gegenüber dem Anschluss-Stutzen eingebaut werden.

Air Distribution Systems
5.3 Displacement Outlet for the Industrial Sector

5.3.1. Trapezoidal displacement outlet VA-T
5.3.2. Semi-trapezoidal displacement outlet VA-TH



Applications
For factories with airborne dust, fibres or aerosols, and permanent cooling.



Perscombinatie B.V., Amsterdam/NL
Printing companies

Features

- Low-turbulence displacement flow
- Installation directly below main supply air ducts, as a rule several in a row
- Umbrella-shaped discharge direction from horizontal to downward incline and vertical downflow
- For applications with permanent cooling
- On type partly covered for use directly in front of a wall
- Discharge surface detachable for easy cleaning

Technical Data	Trapezoidal displacement outlet VA-T and Semi-trapezoidal displacement outlet VA-TH
Function / Kind:	VA-T: Trapezoidal displacement outlet VA-TH: Semi-trapezoidal displacement outlet VA-TH
Volume flow rate range:	VA-T: 85 – 695 l/(s·m) [300 – 2 500 m³/(h·m)] VA-TH: 70 – 415 l/(s·m) [250 – 1 500 m³/(h·m)]
Width:	VA-T: 140, 290, 500 mm VA-TH: 250, 500 mm
Length:	VA-T: 800, 1 250, 1 600, 1 800 mm VA-TH: 1 200, 1 500, 1 800 mm
Coverage zone of supply air jets:	VA-T: 4 to 8 m, VA-TH: 2 to 3 m
Connection type (VA-TH only):	– rectangular connection spigot for insertion into a supply air duct – rectangular connection spigot with frame for duct mounting (spigot on top) – cectangular connection spigot to fit corner flange 20 mm – circular duct connection with 2 round spigots
Position of connection spigot (VA-TH only):	on top or at the rear
Material Housing and perforated plate: Twist outlets:	 galvanised sheet metal polystyrene
Surface finish:	face painted to RAL…
Accessories (VA-T-140 only):	cover plate for wall mounting

Air Distribution Systems
5.4 Displacement Outlets for the Industrial Sector

5.4. Swivel displacement outlet VA-S



Applications
Suitable for factories where the supply air ducts must be placed with the air outlets at the walls, and the supply air is to be discharged at low turbulence and large penetration depth into the occupied zone; suitable for cooling and heating.



Südmilch, Heilbronn/D

Features

- Low-turbulence displacement flow
- Placement above the occupied zone, in front of walls or galleries
- Discharge height 3 to 5 m
- Discharge direction adjustable from +10° to -35° to horizontal, manually or with servomotor
- Placement at side of main supply air duct, singly or several in a row

Technical Data	Swivel displacement outlet VA-S
Volume flow rate range:	220 – 500 l/(s·m) [800 – 1 800 m³/(h·m)]
Nominal length:	1 200, 1 600, 2 000, 1 400 mm
Max. supply air penetration depth:	up to 20 m
Adjustment:	manual or with Siemens servomotor E19 to E21
Position of adjusting device:	to the right (related to air flow) or to the left (related to air flow)
Material Housing and perforated plate: Twist outlets:	 galvanised sheet metal polystyrene, hardly inflammable (class B1 to DIN 4102-1)

Air Distribution Systems
5.5 Displacement Outlet for the Industrial Sector

5.5. Radial displacement outlet VA-PV



Applications
For factories where the supply air must be discharged downwards from a height of 4 to 10 m at low turbulence.



Scheyer Verpackungstechnik GmbH (packaging works), Klaus

Features

- Low-turbulence displacement flow
- Placement above the occupied zone at a height of 4 to 10 m, freely suspended
- Jet direction more or less spread, vertical downflow
- When heating, higher jet momentum downwards by opening of core tube
- Well suited for cooling and heating
- Adjustment via thermostatic control unit; advantages: no wiring, no auxiliary energy required; with electric actuator or with manual device

Technical Data	Radial displacement outlet VA-PV
Volume flow rate range:	280 – 2 200 l/s [1 000 – 8 000 m³/h]
Größe:	DN 315, DN 400, DN 500, DN 630, DN 710
Erfassungsradius:	≤ 5 m
Connection type:	duct connection with rivet or screw connection or connection box
Adjustment:	manual or with Siemens actuator E1 to E3, E38 to E40 or thermostatic control unit, 20 – 28 °C
Material Cylindrical and circular outlet parts: Perforated metal sheet and connection box:	 aluminium; visible parts painted to RAL… galvanised sheet metal

Air Distribution Systems 5.6 Displacement Outlets for the Industrial Sector

5.6. Conical displacement outlet VA-K



Applications
For halls where supply air must be discharged from a great height at low turbulence; suitable for cooling and heating.

Features

- Low-turbulence displacement flow, especially suited for aircraft painting hangars
- Air discharge direction adjustable to internal loads
- Built-in electric actuator for adjustment of jet penetration depth
- Low pressure drop
- Temperature difference between supply air and return air up to –5 K in cooling mode and +8 K in heating mode
- Smooth operation in heating-up operation up to Δϑ = + 10 K

Technical Data	Conical displacement outlet VA-K
Volume flow rate range:	280 – 2 800 l/s [1 000 – 10 000 m³/h]
Size:	DN 630, DN 800
Discharge height:	6 – 30 m
Adjustment:	Belimo actuator E41
Mounting:	flush with ceiling or freely suspended
Material Outlet housing with connection spigot, perforated sheet metal cylinder with conical neck, and valve disc:	galvanised sheet metal
Surface finish:	visible parts painted to RAL 9010, pure white or to another RAL…

Air Distribution Systems 5.7 Displacement Outlet for the Industrial Sector

5.7. Laminar outlet VA-L



Applications
For decontaminating individual work-places; placement above workplace.



Philips Research, Eindhoven/NL

Features

- Placement above workplace to be protected
- Vertical supply air flow with extremely low turbulence
- Stable jet pattern at discharge velocities as low as 0.15 m/s
- Effective and economical protection of individual workplaces against pollutants
- Optional lateral shields to protect against cross convections
- Connection from above or at a side

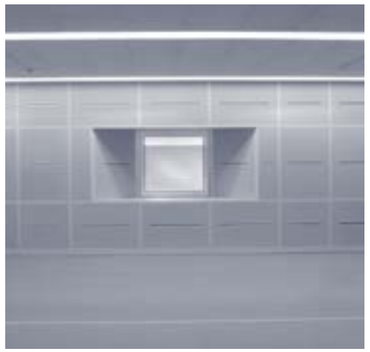
Technical Data	Laminar outlet VA-L
Volume flow rate range:	depends on size 80 – 800 l/s [300 – 3000 m3/h]
Size:	adaptable to workplace
Length:	1 000 to 2 000 mm
Width:	500 – 1 000 mm
Coverage zone:	Unmittelbar unter dem Luftdurchlass
Velocity u, related to L x W:	0.15 – 0.4 m/s
Connection spigot:	Rectangular or round and from top
Material Housing, guide vanes and air discharge element:	galvanised steel

1 Air Distribution Systems
5.8 Displacement Outlets for the Industrial Sector

5.8. Displacement ventilation for indoor firing ranges VA-RSA



Applications
Shooting with firearms in indoor firing ranges releases gases and airborne particles which pollute the indoor air.
The best suitable air distribution system for such facilities is low-turbulence displacement ventilation, also called piston principle in this context, which keeps gases and airborne particles away from the shooter's breathing zone and removes them.



Indoor firing ranges Hamburg-Alsterdorf (Braamkamp)/D Police Force

Features

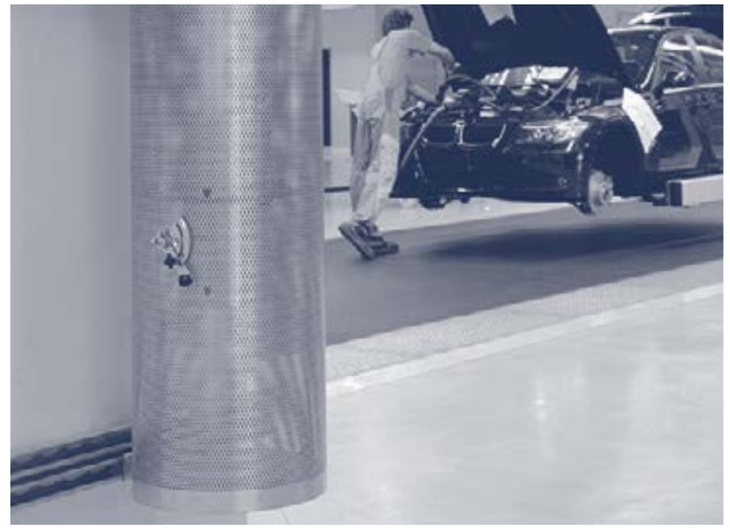
- Breathing zone of the shooter is free of hazardous substances
- High thermal comfort because of draught-free air supply
- Air distribution without influence on ballistics
- Easy and quick assembly (modular system)
- Optional integration of windows and doors for the supervision of the shooters
- Stable piston flow, even at temperature differences of up to ±4 K between supply air and indoor air
- Individual design, tailored to the architecture
- Robust powder coating with free choice of colour
- Support in layout and concept by our experts
- Proof of function during commissioning if desired

Technical Data	Displacement ventilation for indoor firing ranges VA-RSA
Volume flow rate range:	depends on range cross section and amount of pollutants (depending on type of firearm and shooting sequence)
Discharge velocity:	0.25 – 0.35 m/s
Size:	made to match the range cross section
Coverage zone:	entire range cross section and length
Material Air discharge panel: Post-and-beam structure:	 galvanised sheet metal mild steel
Surface finish:	all visible parts like air discharge panels, post-and-beam structure, and cover sheets powder coated to RAL…
Optional:	after completion we offer to carry out a test or an inspection of the delivered displacement outlets (made by an expert according to the guidelines for firing ranges). This service is provided upon the request of the customer.

Reference Page Automotive Industry

BMW AG, Leipzig/D





Circular displacement outlet VA-ZD
Displacement Outlets for the Industrial Sector



Rectangular displacement outlet Q-R
Displacement air wall made up of special displacement air outlet panels Displacement Outlets for the Commercial Sector



Circular displacement outlet for floor installation VA-Z Displacement Outlets for the Industrial Sector

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For an illustration of **air distribution system options for large assembly rooms,** please go to the appendix or scan the QR-Code.

Air Distribution Systems 6.2 Air Outlets for Assembly Rooms | 1

6.2. Seat displacement outlet Q-ST



Applications
For air distribution in assembly rooms with fixed seating, air supply from seat leg.



Kursaal, Oostende/B

Features

- For rooms with raised floors or floor plenums and permanent seating
- Air outlet built into seat leg
- Low-turbulence, horizontal, radial jet dispersion above floor
- Very low sound power level
- Suitable for all seat designs

Technical Data	Seat displacement outlet Q-ST
Supply air volume flow rate:	DN 100: 10 l/s [35 m³/h] DN 127: 11 l/s [40 m³/h] DN 190: 14 l/s [50 m³/h]
Nominal sizes:	DN 100, DN 127, DN 190
Air outlet height:	200 mm
Discharge velocity:	≤ 0.16 m/s
Supply air temperature:	≥ 20 °C
Sound power level:	≤ 16 dB(A) ref. 10^{-12} W
Material Seat leg: Air distributor:	 sheet metal galvanised sheet metal, powder coated to RAL...
Surface finish:	face painted to RAL 9005, matt or face painted to RAL…
Fastening:	connection flange

6.3. Step displacement outlet Q-SR and Q-SL



Applications
For air distribution in assembly rooms with banked seating. Air supply from step front; linear and circular shape.



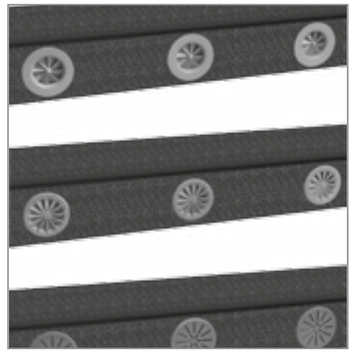
Multipurpose Hall, Dresden/D

Features

- For rooms with steps and raised floor plenums
- Air outlet built into step front
- Low-turbulence jet dispersion near floor
- Low sound power level

Technical Data	Step displacement outlet Q-SR and Q-SL
Function/Kind:	Q-SR: Round frontal plate Q-SL: Rectangular frontal plate
Volume flow rate range:	Q-SR: DN 80: ≤ 10 l/s [35 m³/h] and DN 100: ≤ 16.5 l/s [60 m³/h] Q-SL: ≤ 21 l/(s·m) [75 m³/(h·m)]
Sound power level:	Q-SR: ≤ 27 dB(A) ref. 10^{-12} W Q-SL: ≤ 15 dB(A) ref. 10^{-12} W
Depth:	Q-SR: 80 mm Q-SL: 75 mm
Length:	Q-SL: 500, 1 000, 1 200 mm, or variable
Standard height:	Q-SL: 120 mm, other heights on request
Fastening:	Q-SL: with bracket, claw fastener or screws
Option:	Q-SL: Air intake from the rear or from the bottom
Material Step displacement outlet: Jet straightener:	 galvanised sheet metal Q-SL: Polycarbonate PC GF 10, dark grey
Surface finish:	face painted to RAL…

6.4.1. Step twist outlet DS



Applications
For air distribution in assembly rooms with banked seating. Air supply from step front; circular shape, in three options.



Cinema complex close to ZKM GmbH, Karlsruhe/D

Features

- For assembly rooms with floor steps, with and without fixed seating
- Built into step front
- Turbulent, radial discharge flow with intensive indoor air admixture resulting in rapid drop in jet velocity and fast temperature equalisation
- Installation in wooden or concrete steps
- Connection to pressurised plenum

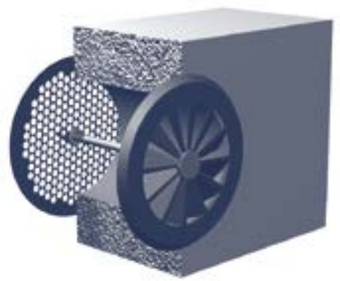
Technical Data	Step twist outlet DS
Function/Kind:	DS-DD: Twist outlet DS-RA: Radial outlet (square face on request) DS-BA: Floor outlet
Volume flow rate range:	DS-DD: DN 63: ≤ 3.3 l/s [12 m³/h] and DN 100: ≤ 10 l/s [35 m³/h] DS-RA: DN 100: ≤ 10 l/s [35 m³/h] DS-BA: DN 150: ≤ 10 l/s [35 m³/h]
Sound power level:	≤ 18 dB(A) ref. 10^{-12} W
Size:	DS-DD: DN 63, DN 100 DS-RA: DN 100 DS-BA: DN 150
Mounting:	installation in a concrete step or in a wooden step
Material Twist outlet: Radial outlet: Floor outlet with clamp ring: Sheet hood: Fixed damper:	 DS-DD: plastic body-tinted to RAL 7038, agate grey[1] DS-RA: galvanised sheet metal, powder-coated to RAL... DS-BA: plastic body-tinted to RAL 7037, dusty grey[1] aluminium galvanised sheet metal

1. Other colours on request

6.4.2. Step twist outlet DS-RA-DN 80



Applications
For air distribution in assembly rooms with banked seating. Air supply from step front; circular shape.



For integration into step risers ≥ 130 mm in height

Features
- Air distribution system for auditoria, convention centres, theatres, and other assembly rooms
- For integration into step risers ≥ 130 mm in height
- Microclimate air distribution system with uniform temperature distribution in the occupied zone and draught-free indoor air flow in the microclimate zone
- Low sound power level
- Maximum temperature difference between supply and indoor air to –5 K and between supply and return air to –12 K, depending on internal heat loads and floor-to-ceiling height
- Low-outlay solution for comfortable climate
- Recommended minimum supply air temperature 18 °C

Technical Data	Step twist outlet DS-RA-DN 80
Function/Kind:	Radial outlet
Volume flow rate range:	≤ 6.9 l/s [≤ 25 m³/h]
Sound power level:	≤ 24 dB(A) ref. 10^{-12} W
Size:	DN 80
Mounting:	Installation in concrete step or in wooden step
Material Twist element: Air distribution plate: Sleeve:	 galvanised sheet metal, powder coated to RAL... galvanised sheet metal aluminium
Surface finish:	no coating or face painted to RAL...

6.4.3. Linear step twist outlet SD-L



Applications
For air distribution into assembly rooms with raised, stepped floors; air supply from the step front; rectangular shape.



Linear step twist outlet with microslots

Features
- Air distribution system for auditoria, conference centres, theatres, and other assembly rooms
- For integration into the step front
- The outlet can be mounted in different step types from the room side
- Low outlay option to ensure thermal comfort
- Strong mixing of supply air jets with indoor air at floor level; as a result, low vertical temperature gradient in the occupied zone

Technical Data	Linear step twist outlet SD-L
Function/Kind:	linear step twist outlet with microslots
Volume flow rate range:	≤ 12.5 l/s [≤ 45 m³/h]
Sound power level:	≤ 22 dB(A) ref. 10^{-12} W
Length:	420 mm, other lengths on request
Fastening:	with screws, brackets or claw fasteners
Material Linear step twist outlet: Fastening brackets and claw fasteners:	 galvanised sheet metal powder coated to RAL 9005, jet-black galvanised sheet metal
Surface finish:	face painted to RAL 9005, matt (other colours on request)

Reference Page
Research Labs

Beiersdorf, Hamburg/D





Twist outlet DD-N
Ceiling Air Outlets



Swivel jet outlet SW
Sidewall Air Outlets



Step displacement outlet Q-SR
Air Outlets for Assembly Rooms

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Applications
Vent and drain caps are mainly applied in water-conducting systems.

Technical Data	Vent and drain caps
Nominal size:	DN 8, DN 10 – Mainly applied as relief cap DN 15, DN 20 – Mainly applied as drain cap
Nominal pressure:	PN 40
Operating temperature:	max. 180 °C
Material Cap: Weld-on socket: Sealing surface:	 brass steel stainless steel

1 Air Distribution Systems 7.1. Circular volume flow controller VRI-DN

7.1. Circular volume flow controller VRI-DN



Applications
For both constant and variable air volume flow rates.
Circular volume flow controller with built-in electronic control system for installation in supply and return air ducts of HVAC systems.



Installation situation in a bank, Frankfurt/D

Features

- Compact design with measuring cross, compact controller, and damper blade
- Compact controller from Belimo with measurement recording device, volume flow sensor, and actuator
- Connection to ducts to EN 1506 and EN 13180 as well as flange connection to EN 12220
- Airtight damper blade to EN 1751
- Optionally available with external insulating shell

Technical Data	Circular volume flow controller VRI-DN
Volume flow rate range:	up to 2 544 l/s [9 160 m³/h]
Size:	DN 100, DN 125, DN 160, DN 200, DN 224, DN 250, DN 315, DN 400, DN 500
Adjustment:	Belimo compact controller, type LMV-D3-MP (up to DN 250) or Belimo compact controller, type NMV-D3-MP (from DN 315 upwards)
Insulation:	no insulation or with insulating shell
Accessories:	smooth pipe end for connection to ducts to EN 1506 and to flexible ducts to EN 13180 or flange connection to EN 12220
Material Housing: Measuring cross: Damper blade seal: Insulating materiall: Covering:	 galvanised sheet metal Aluminium/plastic (PS) silicone mineral wool galvanised sheet metal

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For an illustration of **combination of cooling ceilings with different air distribution systems,** please go to the appendix or scan the QR-Code.

1.1.1. Static cooling ceiling system SKS-4/3, for concealed installation



Applications
High-capacity elements for installation above open, suspended ceilings, and even for exposed mounting; designed for cooling and heating spaces of different types.



Savings bank, Cologne/D

Features

- Standard cooling capacity 175 W/m² of cooling element without suspended false ceiling (to DIN EN 14 240)
- Suitable for high cooling capacities, as required in offices with high heat loads, TV studios, mechanical rooms, or industrial applications
- Uses the storage capacity of the concrete ceiling
- Combinable with any air distribution system
- Installation of cooling elements is independent of the false ceiling, thus design and installation of mechanical equipment and ceiling can largely occur separately
- Low installation height makes this system particularly suitable for renovation and refitting
- The core of the system is an copper meander with aluminium fins for heat transfer thus long lifetime and assured quality; operating pressure 6 bars (consult us on higher values)
- No combustible components

Technical Data	Static cooling ceiling system SKS-4/3, for concealed installation
Dimensions of a cooling element (max. area: 4 m²)	
Nominal length:	1 000 mm – 4 000 mm in steps of 100 mm
Nominal width:	350 mm bis 1 475 mm in steps of 125 mm
Nominal height:	85 mm
Pipe spacing:	125 mm
Connection type:	pipe end for push-in fitting or press-fitting connection, D_a = 12 mm
Installation height:	≥ 185 mm
Surface finish:	standard: similar to RAL 9005, black, matt
Max. operating pressure:	nominal pressure stage PN 6
Connection:	on one side or on alternate sides (depending on number of tubes)
Installation type:	concealed installation in false ceiling (standard) or visible installation or without false ceiling

1.1.2. Static cooling ceiling system SKS-4/3-duo, for concealed installation



Applications
High-capacity elements for installation above open, suspended ceilings; suitable for cooling rooms of different types and uses, but also usable for heating.



Universal Music, Berlin/D

Features

- Standard cooling capacity 216 W/m² of cooling element without suspended ceiling (with reference to DIN 14 240), with high heat removal by convection and radiation
- Suitable for high cooling capacities, as required in offices with high heat loads, television studios, technical rooms, or in the industrial sector
- Uses the retention capacity of the concrete ceiling
- Design and installation of mechanical equipment and ceiling can largely occur separately
- Combinable with any air distribution system
- The core of the system is an copper meander with aluminium fins for heat transfer thus long lifetime and assured quality; operating pressure 6 bars (consult us on higher values)
- No combustible components

Technical Data	Static cooling ceiling system SKS-4/3-duo, for concealed installation
Dimensions of a cooling element (max. area: 4 m²)	
Nominal length:	1 000 mm – 4 000 mm in steps of 100 mm
Nominal width:	400 mm – 1 500 mm in steps of 100 mm
Nominal height:	120 mm
Pipe spacing:	100 mm
Connection type:	pipe end for push-in fitting or press-fitting connection, D_a = 12 mm
Installation height:	≥ 200 mm
Surface finish:	standard: similar to RAL 9005, black, matt
Max. operating pressure:	nominal pressure stage PN 6
Connection:	on one side or on alternate sides (depending on number of tubes)
Installation type:	concealed installation in false ceiling (standard) or visible installation or without false ceiling

2 | Cooling and Heating Systems
2.1 High-capacity Ceiling Systems

1.2. Static cooling ceiling system SKS-5/3, for visible installation



Applications
High-capacity elements for installation as exposed ceiling elements with elegant panelling design. They can be used to make free-hanging chilled sails or chilled islands to be integrated into any type of suspended ceiling. This system is easy to combine with lighting and other ceiling utilities such as air outlets, sprinklers, and loudspeakers.



Eurostation, Anderlecht/B

Features

- Standard cooling output 160 W/m² of element if designed as a chilled sail (to DIN 14 240); heat removal largely by radiation
- Suitable for rooms with cooling loads of up to 120 W/m² under comfortable conditions
- For both cooling and heating
- The system utilizes the storage capacity of the concrete slab
- Well suited for renovation and retrofit applications
- Special fin geometries and underside patterns are easy to manufacture
- The core of the system is an copper meander with aluminium fins for heat transfer thus long lifetime and assured quality; operating pressure 6 bars (consult us on higher values)
- No combustible components

Technical Data	Static cooling ceiling system SKS-5/3, for visible installation
Dimensions of a cooling element (max. area: 4 m²)	
Nominal length:	1 000 mm – 4 000 mm
Nominal width:	430 mm – 1 480 mm
Nominal height:	60 mm
Pipe spacing:	150 mm
Connection type:	pipe end for push-in fitting or press-fitting connection, Da = 12 mm
Recommended mounting height:	≥ 185 mm, i.e. min. 125 mm from element top to ceiling (for no drop in output)
Surface finish:	powder coating to RAL… (standard RAL 9010, white)
Max. operating pressure:	nominal pressure stage PN 6
Connection:	on one side or on alternate sides (depending on number of tubes)
Installation type:	visible installation freely suspendet or integrated in false ceilings

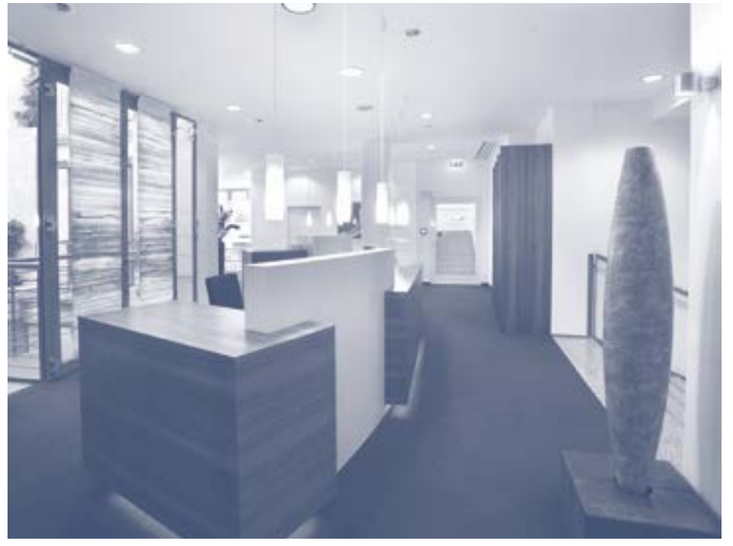
Reference Page
Savings bank

Savings bank, Cologne/D





Active chilled beam
DK-LIG/E



Radial outlet RA-N
Ceiling Air Outlets



Static cooling ceiling system for concealed installation SKS-4/1
High-capacity Ceiling Systems



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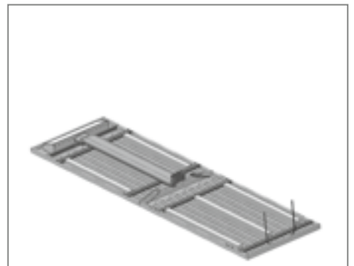
For an illustration of **combination of chilled sails and wall slot diffusers or multiplex outlets, multifunction sail with ceiling displacement outlet** or the **combination of chilled sails and wall displacement outlet,** please go to the appendix or scan the QR-Code.

3.1.1. Multifunction sail AVACS, for visible installation



Applications

AVACS stands for Air Ventilation And Cooling System. The AVACS multifunction sail combines the following functions: cooling, heating, indoor air circulation and sound absorption, which are performed in compliance with thermal comfort criteria. The multifunction sail AVACS is designed for use in combination with metal tile sails from various brands.



John Deere European Parts Distribution Centre, Bruchsal/D

Features

- Heat transfer by convection and radiation, resulting in high thermal comfort
- Very high output in relation to the active sail area (area-output ratio) thanks to built-in induction unit (not visible from below)
- Very high thermal comfort thanks to air distribution above and below the sail
- Suitable for refurbishment of offices and exhibition spaces
- Different types of finish are possible; ceiling services can be integrated
- Good acoustic properties
- Water pipe consists of an smoothly copper meander
- No combustible components

Standardized sizes for elements and sails

Technical Data	Multifunction sail AVACS, for visible installation
Standard cooling capacity:	up to 165 W/m² (10 K) according to DIN EN 14240
Supply air and return air volume flow rates:	between 14 to 28 l/s [50 to 100 m³/h] are possible
Nominal length:	1 500 – 5 500 mm
Nominal width:	1 150 mm
Nominal height:	50 mm
Minimum suspension height:	150 mm
Connection type:	pipe end for push-in fitting or press-fitted connection, D_a = 12 mm
Design:	standard: similar to RAL 9010, white
Max. operating pressure:	nominal pressure stage PN 6
Connection side:	one side (depending on number of pipes and number of water connections per element)
Installation type:	visible installation

3.1.2. Chilled sails made with high-capacity ceiling elements



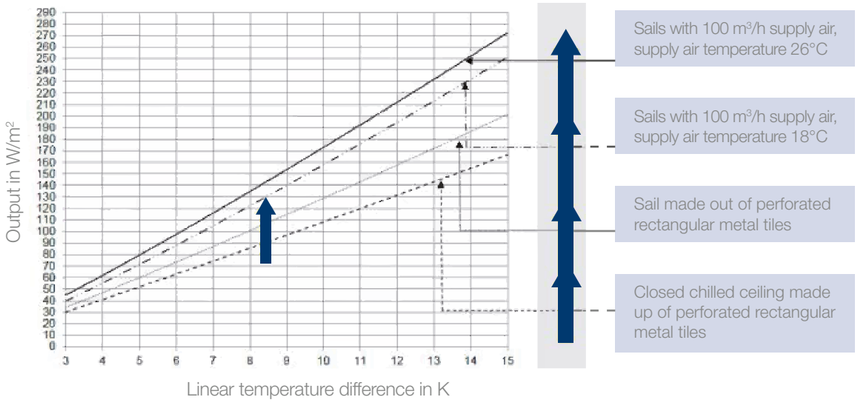
Universal-Music, Berlin/D, Radiant cooling sail

Applications
Standard or individual customised chilled sails using any type of ceiling together with combinable cooling ceiling elements or even chilled beams in any dimensions and designs.

Features

- Prefabricated, compact units with high capacity
- Can be used for cooling and heating
- Can incorporate lighting, air outlets, loudspeakers, smoke detectors and other ceiling utilities
- Easy and rapid installation on site

Higher output resulting from air stream



Waterside output referred to active area to EN 14240, without sound absorbers

Carpus+Partner AG, Aachen/D





Multifunction sail AVACS
Chilled sails



Contact cooling ceiling system for metal ceilings as chilled sail
Cooling and Heating Systems

Adjustable induction outlet IN-V
Ceiling Air Outlets

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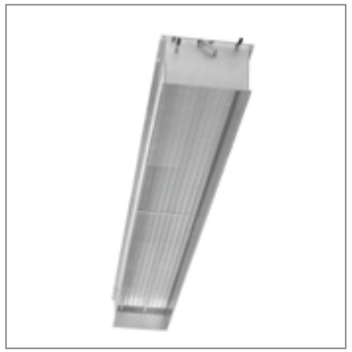
For an illustration of **chilled beam installed close to a façade** or **close to a corridor wall,** please go to the appendix or scan the QR-Code.

4.1. Chilled beam DK-F, without ventilation function



Applications
For room cooling in the commercial sector, trade, and industry, with high cooling capacity. Various installation options: above open ceilings, integrated into ceilings, in visible suspension from the concrete ceiling, or built into the chilled sails.



Audi - Forum für Tradition und Vision, Ingolstadt/D

Features

- Standard cooling capacity up to 400 W/m (B = 600 mm, H = 250 mm, measured following DIN 14518)
- “Silent cooling” principle with heat removal almost solely by way of convection
- Compact construction design and easy mounting
- Well suited for refitting

Technical Data	Chilled beam DK-F, without ventilation function
Nominal width:	300, 400, 500, and 600 mm
Nominal length	1 200, 1 500, 1 800, 2 100, 2 400, 2 700, and 3 000 mm
Nominal height:	180, 250 mm
Surface finish:	DK-FZ: RAL 9011 painted DK-FS: RAL 9010 painted or desired colour to RAL…
Connection type:	pipe end for push-in fitting or press-fitted connection, D_a = 15 mm
Max. operating pressure:	nominal pressure stage PN 6
Screen perforation:	standard Rv 8/9.6 (only for type DK-FS)
Installation type:	concealed installation in false ceiling or visible installation

4.2.1. Chilled beam DK-LIG/Z, with ventilation function, two-sided discharge



Applications
For room cooling and heating in commercial and industrial buildings. High cooling capacities; with fresh air supply to enhance the indoor air quality. For integrated installation in false ceiling systems and for visible installation.



Savings bank, Euskirchen/D

Features

- Compact unit for fresh air supply as well as for cooling and heating according to DIN 15116 – Model 300: cooling capacity up to 620 W/m, heating capacity up to 315 W/m; Model 600: cooling capacity up to 826 W/m, heating capacity up to 352 W/m
- Reflow surface area for secondary air intake
- Many design options with various types of screens, wings, and connections to suspended ceilings
- Heat exchanger cleanable from room thanks to toollers removeable screen
- Thanks to its low height, it is well suited for low storeys in new or refurbished buildings
- Horizontal air distribution and low air velocities in the occupied zone
- Low sound power level
- Optimum layout possible thanks to various sizes of primary air nozzles

Technical Data	Chilled beam DK-LIG/Z, with ventilation function, two-sided discharge
Nominal width:	Model 300: 297 mm for flush installation or 450 mm (if freely suspended, incl. „wings“) Model 600: 597 mm for flush installation or 670 mm (if freely suspended, incl. „wings“)
Nominal length:	1 200, 1 500, 1 800, 2 100, 2 400, 2 700, and 3 000 mm
Nominal height:	Model 300: 285 mm Model 600: 300 mm
Primary air flow rate:	3 – 25 l/(s·m) [10 – 90 m³/(h·m)]
Surface finish:	powder coating to RAL… (standard RAL 9010, white)
Primary air connection:	DN 100 – DN 150 depending on position of spigots
Heat exchanger:	two-pipe system or four-pipe system (for cooling and heating)
Water connection:	pipe end for push-in fitting or press-fitted connection, D_a = 15 mm
Screen:	2-sided discharge, symmetrical
Screen perforation:	standard: Rv 8/9.6
Installation type:	concealed installation in false ceiling or visible installation

4.2.2. Chilled beam DK-LIG/E, with ventilation function, one-sided discharge



Applications
For room cooling and heating in the commercial sector, trade, and industry, for high cooling capacities and simultaneous fresh air supply to improve indoor air quality and humidity control. The secondary air is removed directly from occupied zone. The supply air is discharged on one side.



Office building GAH, Heidelberg/D

Features

- Compact unit for fresh air supply as well as for cooling and heating according to DIN 15116: Cooling capacity up to 620 W/m, heating capacity up to 315 W/m
- Reflow surface for secondary air integrated into the chilled beam; an extra reflow surface is thus no longer required in closed ceiling systems
- Many design options with various types of screens, wings, and connections to suspended ceilings
- Heat exchanger cleanable from room thanks to easily detachable screen
- Thanks to its low height, it is suitable for low storeys in new or refurbished buildings
- Horizontal air distribution with low velocities in the occupied zone
- Low sound power level
- Optimum layout made possible by the range of primary air nozzles available

Technical Data	Chilled beam DK-LIG/E, with ventilation function, one-sided discharge
Nominal width:	297 mm for flush installation or 450 mm (if freely suspended, incl. "wings")
Nominal length	1 200, 1 500, 1 800, 2 100, 2 400, 2 700 and 3 000 mm
Nominal height:	265 mm (1-sided discharge)
Primary air flow rate:	8 – 25 l/(s·m) [30 – 90 m³/(h·m)]
Surface finish:	standard RAL 9010, white or powder coating to RAL…
Primary air connection:	DN 100 – DN 150 depending on position of spigots
Heat exchanger:	two-pipe system or four-pipe system (for cooling and heating)
Water connection:	pipe end for push-in fitting or press-fitted connection, D_a = 15 mm
Screen:	1-sided discharge, symmetrical screen or asymmetrical screen
Perforation of the screen:	standard: Rv 8/9.6
Installation type:	concealed installation in false ceiling or visible installation

4.4. Chilled beam LuxCool



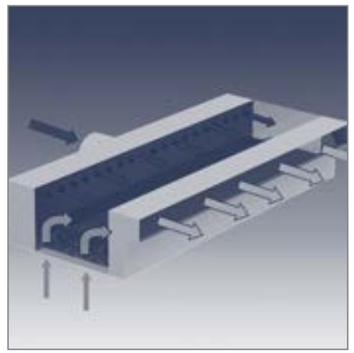
Applications
LuxCool combines the proven technology of our ceiling induction units with a new design which can incorporate ceiling services such as lighting, presence detectors, etc.

Features

- For cooling and heating and fresh air supply according to DIN 15116
- Cooling output: 1 750 W for unit length, ($\Delta\vartheta_{water}$ = 10 K, $\Delta\vartheta_{air}$ = 8 K)
- Heating output: 936 W for unit length, ($\Delta\vartheta_{water}$ = 15 K)
- Fresh air supply
- Primary air volume flow rate 2.8 to 36 l/s [10 to 130 m³/h]
- Can incorporate ceiling services such as lighting, presence detectors, etc.
- Customised solutions
- Suitable for retrofit applications
- Compact unit
- Easy and quick installation

Technical Data	Chilled beam LuxCool
Kind/Function:	LIG: Active chilled beam with ventilation function and induction device in closed housing LC: Active chilled beam with lighting and other functional elements
Nominal length:	2700 mm (standard)
Nominal width:	800 mm
Nominal height (incl. mounting bracket):	320 mm
Surface finish:	powder coating similar RAL 9010 (standard), or RAL…
Heat exchanger:	two-pipe system or four-pipe system (for cooling and heating)
Water connection:	pipe end for push-in fitting or press-fitting connection, D_a = 15 mm
Primary air connection:	Front end DN 125
Installation type:	visible installation (freely suspended)

4.5. Chilled beam DK-LIG-EW



Applications
For room cooling and heating in commercial buildings; designed for high cooling capacities along with fresh air supply to enhance the indoor air quality. This chilled beam is designed for wall or ceiling mounting. It is most suitable for hotel rooms, individual offices, or lobbies.



Chilled beam for wall or ceiling mounting

Features

- Compact unit for fresh air supply as well as cooling and heating
  – waterside cooling capacity up to 660 W/m
  – waterside heating capacity up to 320 W/m
- Its low overall height makes it suitable for low floor-to-ceiling heights in new or refurbished buildings
- Low sound power level
- The range of primary air nozzles available enables optimum unit layout
- Simple installation

Technical Data	Chilled beam DK-LIG-EW
Nominal length:	900, 1 200, 1 500, 1 800, 2 100, 2 400, 2 700, 3 000 mm
Nominal width:	450 mm
Nominal height:	< 200 mm
Primary air flow rate:	5.5 – 23 l/(s·m) [20 – 83 m³/(h·m)]
Surface finish:	unpainted or powder coated to a RAL colour (standard: RAL 9005)
Primary air connection:	DN 100 – DN 150 depending on position of spigots
Heat exchanger:	two-pipe system or four-pipe system
Water connection:	pipe end for push-in fitting or press-fitted connection, D_a = 15 mm
Installation type:	concealed installation

Reference Page
Office building

Office building GAH, Heidelberg/D





Chilled beam
DK-LIG/E



Radial outlet RA-N
Ceiling Air Outlets



Chilled beam DK-LIG/E

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For an illustration of **air flow pattern with façade screening** or **with displacement ventilation,** please go to the appendix or scan the QR-Code.

5.1.3. Ventilation unit (supply/return air) for mixing ventilation LG-ZA-M-SB, for vertical parapet mounting



Applications
Ventilation unit for integration into the parapet of a façade, with direct outdoor and exhaust air connections.
Suitable for new or refurbished buildings.



BAUER - WAGNER - PRIESMEYER
Lawyers & Patent Attorneys, Aachen/D

Features

- For cooling, heating, and fresh air supply from the window parapet
- Outdoor air intake and exhaust air extraction directly through the façade, i.e. ductless ventilation
- F5 filter class (F7 optional)
- Various modes of operation to meet different user requirements:
  – Cooling
  – Heating
  – Operation with heat recovery
  – Operation with recirculated air
  – Operation with outdoor air
  – Infinite fan variation
- Energy-efficient EC-radial fan
- Hygiene tested to German guidelines VDI 6022, sheets 1 and 3, and VDI 3803, to EN 13779 and to DIN 1946-4
- Easy to service and clean (no disassembly needed)
- Complete condensate drain
- Low sound power level

Technical Data	Ventilation unit (supply/return air) for mixing ventilation LG-ZA-M-SB, for vertical parapet mounting
Supply/Return air volume flow rate:	max. 53 l/s [190 m³/h] respectively
Amount of heat recovered:	approx. 50%
Total cooling output: including - for cooling down 33% outdoor air - for room cooling when t_R = 26 °C	720 W 200 W 520 W
Chilled water temperature:	14/17 °C
Total heating output: including - for heating up 33% outdoor air - for room heating when t_R = 22 °C	1 200 W 280 W 920 W
Hot water temperature:	50/40 °C
Operating voltage:	230 V/50 Hz
Width/Height/Depth:	1000 mm/650 mm/297 mm

5.1.5. Ventilation unit for displacement ventilation LG-ZA-Q-SF, for vertical façade mounting



Applications
Ventilation unit for integration into an opaque façade space, with direct outdoor and exhaust air connections; ductless ventilation.
Supply air discharged at low momentum and low turbulence according to the principle of displacement ventilation.



Fraunhofer inHaus-centre, Duisburg/D

Features

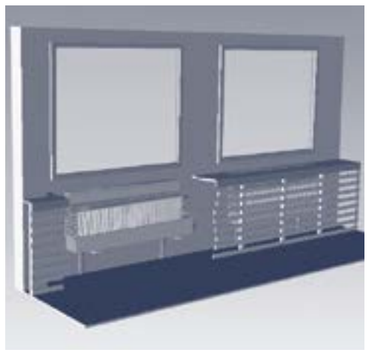
- For cooling, heating, and fresh air supply from the building façade
- Outdoor air intake and exhaust air extraction directly through the façade, i.e. ductless ventilation
- Filter class F7
- Various modes of operation to meet different user requirements:
  – Cooling
  – Heating
  – Operation with heat recovery
  – Operation with recirculated air
  – Operation with outdoor air
  – Infinite fan variation
- Energy-efficient EC-radial fan
- Hygiene tested to German guidelines VDI 6022, sheets 1 and 3, and VDI 3803, to EN 13779 and to DIN 1946, part 4
- Easy to service and clean (no disassembly needed)
- Complete condensate drain
- Low sound power level
- Suitable for new and refurbished buildings

Technical Data	Ventilation unit for displacement ventilation LG-ZA-Q-SF, for vertical façade mounting
Supply/Return air volume flow rate:	max. 33 l/s [120 m³/h] respectively
Amount of heat recovered:	approx. 60%
Total cooling output: including - for cooling down 100% outdoor air - for room cooling when t_R = 26 °C	720 W 200 W 520 W
Chilled water temperature:	14/17 °C
Total heating output: including - for cooling down 100% outdoor air - for room cooling when t_R = 22 °C	1 200 W 280 W 920 W
Hot water temperature:	50/40 °C
Operating voltage:	230 V/50 Hz
Width / Height / Depth:	1000 mm/650 mm/297 mm

5.1.7. Induction unit for mixing ventilation IG-M-SB, for vertical parapet mounting



Applications
Induction unit for cooling, heating, and fresh air supply along the façade, through window parapets; high level of thermal comfort.



Mounted device

Features

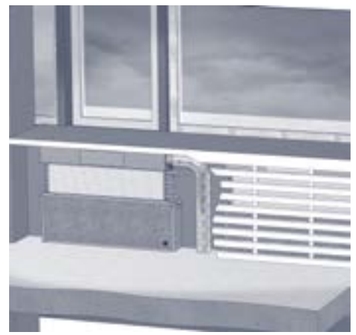
- Low pressure loss (70 to 200 Pa), therefore energy-saving operation
- Low sound power level
- Heating also possible without primary air, which saves energy when heating at night and at weekends
- Heat exchanger cleanable from the front and the rear (in compliance with requirements of VDI 6022). The large fin spacing enables easy cleaning and removes the need for a filter.
- Suitable for new or refurbished buildings
- Condensate tank below heat exchanger, inclusive of drain with ½“ connector

Technical Data	Induction unit for mixing ventilation IG-M-SB, for vertical parapet mounting
Primary air volume flow rate:	8 – 36 l/s [30 – 130 m³/h]
Cooling capacity (total):	max. 1 100 W
Heating capacity:	max. 960 W
Heating capacity, self-convection:	245 W
Nominal unit width:	800, 1000, 1200 mm
Depth:	160 mm
Height:	455 mm
Primary air connection:	left or right, DN 100
Water connection:	left or right, ½“ external thread
Material Housing and air outlet element:	galvanised sheet metal
Surface finish air outlet element:	painted to RAL 9010 (pure white)
Heat exchanger:	copper/aluminium, 2-pipe-/4-pipe system
Admissible operating pressure of heat exchanger:	16 bar

5.1.8. Induction unit for displacement ventilation IG-Q-SB,for vertical parapet mounting



Applications
Induction unit for cooling, heating, and fresh air supply along the façade, through window parapets; high level of thermal comfort.
Low-turbulence supply air discharge at low momentum according to the principle of displacement ventilation.



Induction unit

Features

- Low pressure loss (70 to 200 Pa), therefore energy-saving operation
- Low sound power level
- Heating also possible without primary air, which saves energy when heating at night and at weekends
- Heat exchanger cleanable from the front and the rear (in compliance with requirements of VDI 6022). The large fin spacing enables easy cleaning and removes the need for a filter.
- Suitable for new or refurbished buildings (for replacing high-pressure induction units)
- Condensate tank below heat exchanger, inclusive of drain with ½” connector

Technical Data	Induction unit for displacement ventilation IG-Q-SB, for vertical parapet mounting
Primary air volume flow rate:	8 – 22 l/s [25 – 80 m³/h]
Cooling capacity (total):	max. 500 W
Heating capacity:	max. 660 W
Nominal unit width:	800, 1000, 1200 mm
Depth:	160 mm
Height:	680 mm
Primary air connection:	left or right, DN 100
Water connection:	left or right, ½“ external thread
Material Housing:	galvanised sheet metal
Surface finish:	without powder coating or painted to RAL 9005 (jet-black)
Heat exchanger:	copper/aluminium, 2-pipe-/4-pipe system
Admissible operating pressure of heat exchanger:	16 bar

5.1.9. Induction unit for combijet mixing ventilation IG-K-SB, for vertical parapet mounting



Applications
Induction unit for improved indoor air flow thanks to separated fresh air supply to the workplaces and façade screening.
Multiplex outlet with round jet bundle elements that are individually and manually rotatable through 360° to allow individual spread of the primary air jets directed to the workplaces.



Deutschlandradio, Cologne/D

Features

- Cooling, heating, and fresh air supply from the window parapet while providing a high level of thermal comfort
- Spread of supply air flow by combining different air jets, with quick velocity decay, thus no tangential air patterns
- Improved air flow thanks to separated fresh air supply to the workplaces and façade screening
- Low vertical thermal stratification (< 1 K/m)
- Heat exchanger cleanable from the front and the rear (to VDI 6022). The large fin spacing obviates the need for a filter.
- Suitable for new or refurbished buildings

Technical Data	Induction unit for combijet mixing ventilation IG-K-SB, for vertical parapet mounting
Primary air volume flow rate:	14 – 22 l/s [50 – 80 m³/h]
Cooling capacity (total):	max. 650 W
Heating capacity:	max. 1 100 W
Cold water temperature:	15/17 °C
Hot water temperature:	50/40 °C
Length:	990 mm
Housing width:	160 mm
Air outlet width:	200 mm
Height:	450 mm
Primary air connection:	left or right, DN 100
Water connection:	left or right, ½“ external thread
Air connection:	left or right
Material Housing: Linear bar outlet: Jet elements:	 galvanised sheet metal Aluminium, anodised natural colour or painted to RAL 9010, pure white acryl butadiene styrol ABS coloured pure white, similar to RAL 9010
Heat exchanger:	copper/aluminium, 2-pipe-/4-pipe system
Admissible operating pressure of heat exchanger:	16 bar

5.2.1. Ventilation units for mixing ventilation LG-Z-M-LB and LG-ZUM-M-LB, for horizontal floor mounting



Applications
To air condition office and administrative buildings having façades with floor-to-ceiling glazing, Krantz Components supplies ventilation units for raised floor mounting; they provide the required minimum percentage of outdoor air and remove the internal cooling and heating loads.



Savings bank, Oberhausen/D

Features

- Outdoor air intake directly through the façade; return air extraction via central system
- Cooling and heating via air-to-water heat exchanger
- Cooling with outdoor air (free cooling)
- Mixing & displacement ventilation close to façade
- Energy-efficient EC radial-flow fan
- F7 class filtration of outdoor air

Technical Data	Ventilation units for mixing ventilation LG-Z-M-LB and G-ZUM-M-LB, for horizontal floor mounting
Supply air volume flow rate:	33 l/s [120 m³/h]
Supply air temperature, summer: Total cooling output: including – for cooling down 33 l/s [120 m³/h] of outdoor air: – for cooling a room with t_R = 26 °C: Chilled water temperature:	18 °C (with outdoor air 32 °C/40% relative humidity) 560 W 240 W 320 W 15 / 17 °C
Supply air temperature, winter: Total heating output: including – for heating up 33 l/s [120 m³/h] of outdoor air: – for room heating with t_R = 22 °C: Hot water temperature:	34 °C (with outdoor air –12 °C) 1 840 W 1 360 W 480 W 50/40 °C
Control signal for fan speed:	0 – 10 V DC
Effective power of fan:	20 W (for volume flow rate = 33 l/s [120 m³/h])
Operating voltage:	230 V/50 Hz
Function/Kind:	supply air or supply air and recirculated air
Installation:	for horizontal floor mounting
Heat exchanger:	2-pipe system or 4-pipe system
Grille type (aluminium):	linear bar grille or roll-up grille
Material Housing: Grille and frame:	 galvanised sheet metal, all visible parts (without the grille and frame) are powder coated similar to RAL 9005, jet-black aluminium, anodised in natural colour
Nominal unit width LG-Z-M-LB: Nominal unit width LG-ZUM-M-LB:	1 082 mm 1 198 mm
Housing depth:	600 mm
Housing height (without grille and grille frame): Total housing height, incl. grille:	160 mm 220 mm
Frame grille LG-Z-M-LB: Frame Bodengitter LG-ZUM-M-LB:	950 x 260 mm 1 198 x 260 mm

5.2.2. Ventilation unit (recirculated air) for mixing ventilation LG-UM-M-LB, for horizontal floor mounting



Applications
To ventilate office and administrative buildings that have façades with floor-to-ceiling glazing, Krantz supplies a ventilation unit working with recirculated air and designed for raised floor mounting; this compact unit with high output is able to remove the internal cooling and heating loads resulting from the large glazed area.



Raised floor installation in front of the façade

Features

- Cooling and heating at the façade; unit mounted on raised floor
- Maximum energy saving thanks to energy-efficient EC-cross-flow fan
- Low sound power level
- Ideal in conjunction with a floor-mounted supply air ventilation unit providing a minimum percentage of outdoor air
- Feet adjustable in height to make up for vertical constructional tolerances
- Optionally fitted with flexible connection hoses, valves and actuators

Technical Data	Ventilation unit (recirculated air) for mixing ventilation LG-UM-M-LB, for horizontal floor mounting
Primary air volume flow rate:	55 – 97 l/s [200 – 350 m³/h] (continuous control)
Cooling output: Supply air temperature: Chilled water temperature:	700 W 18,5 °C 15/17 °C
Heating capacity: Supply air temperature: Hot water temperature:	1 515 W 35 °C 50 / 40 °C
Control signal for fan speed:	0 – 10 V DC
Operating voltage:	230 V/50 Hz
Total power requirement (design value):	56 VA
Function/Kind:	recirculated air
Installation:	for horizontal floor mounting
Heat exchanger:	2-pipe system or 4-pipe system
Grille type (aluminium):	linear bar grille or roll-up grille
Material Housing:	galvanised sheet metal, all visible parts (without the grille and frame) are powder coated similar to RAL 9005, jet-black
Nominal unit width:	1 198 mm
Housing depth:	300 mm
Height, without adjustable feet:	185 mm
Linear bar grille (optional roll-up grille):	1 198 x 300 mm

5.2.3. Induction unit for mixing ventilation IG-M-LB, for horizontal floor mounting



Applications
Induction unit for cooling, heating, and fresh air supply along the building façade, via a raised floor, providing a high level of thermal comfort.



Voith Paper Technology Centre GmbH, Heidenheim/D

Features

- Low pressure loss (70 to 200 Pa), therefore energy-saving operation
- Low sound power level
- Heating also possible without primary air, which saves energy when heating at night and at weekends
- Heat exchanger cleanable from the top or the bottom (in compliance with requirements of VDI 6022). The large fin spacing enables easy cleaning and obviates the need for a filter.
- Suitable for new or refurbished buildings

Technical Data	Induction unit for mixing ventilation IG-M-LB, for horizontal floor mounting
Primary air volume flow rate:	4 – 36 l/s [15 – 130 m³/h]
Cooling capacity (total):	max. 1 320 W
Cold water temperature:	15/17 °C
Heating capacity:	max. 1 200 W
Hot water temperature:	50/40 °C
Heating capacity with self-convection:	350 W
Installation:	for horizontal floor mounting
Material Housing: Grille and support frame:	 galvanised sheet metal aluminium anodised in natural colour (other anodization colours or RAL colour finishes on request)
Heat exchanger:	copper/aluminium, 2-pipe-/4-pipe system
Nominal unit width:	1 200 mm (800, 900, 1 200, 1 350, 1 600 mm)
Grille depth:	380 mm
Height, without feet:	210 mm (feet adjustable between 10 and 60 mm)
Admissible operating pressure of heat exchanger:	+16 bar

Reference Page
Printing Shop

Voith Paper Technology Center GmbH, Heidenheim/D





Induction unit for mixing ventilation,
for horizontal floor mounting IG-M-LB



Induction unit for mixing ventilation,
for horizontal floor mounting IG-M-LB



Induction unit for mixing ventilation,
for horizontal floor mounting IG-M-LB

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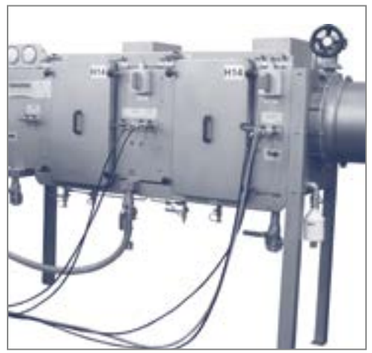
1.1.1. Safe Change Filter Housing with Scanner SCF hightec Triple S



Applications
For the separation of aerosol- and airborne particles, e.g. from HVAC systems in laboratories class BSL3 and BSL4.



Accessories
- Mobile test rack and mobile aerosol feeding
- Leak tightness test device
- Heat seal device
- Disinfection device to disinfect filter housing with formalin or hydrogen peroxide

Features

- Takes into account the following provisions: – “Laboratory Biosafety Manual” by World Health Organisation (WHO) – “Biosafety in Microbiological and Biomedical Laboratories” (BMBL) – EN 12 128 “Biotechnology – Laboratories for research, development and analysis – containment levels of microbiology laboratories, areas of risk, localities and physical safety requirements” therefore suitable for using in laboratories class 3 and class 4 (BSL-3/4)
- Robust filter housing made of stainless steel, material 316 in gastight design according to the tightness requirements of the DIN 25 496, for fine-dust and HEPA filter elements
- In-situ scan system (local and integral) for online efficiency measurements of HEPA filter elements
- Tightness proof frame for HEPA filter elements
- Approved disinfection procedures with formalin and hydrogen peroxide for disinfection of filter housing
- Contamination-free filter exchange (bag-in-bag-out system), utilising safe change technology
- Each filter element is sealed to the housing on both sides using the 3-seal concept (Triple S) so that the barrier from the inside to the outside of the filter housing remains intact even if the maintenance cover is removed

Technical Data	Safe Change Filter Housing with Scanner SCF hightec Triple S
Nominal air flow HEPA filter element (filter class H14):	up to 420 l/s [3 000 m3/h]
Max. initial pressure drop HEPA filter element (filter class H14):	300 Pa

1.1.2. Safe Change Filter Housing optional with Scanner SCF hightec



Applications
For the separation of airborne particles and aerosols which can be contaminated, e.g. by radioactivity or other agents.



Features

- Extremely compact construction, by means of an arrangement of the filter elements side by side (lines) and one above the other (columns)
- The clamping device of the HEPA filter elements is operated from outside and proportioned to ensure the tightness requirements for the seal of the filter element according to DIN 25 496, table 3, under conditions of maximum loading of the filter elements and a retreating sealing
- The filter housing design allows the exchange of the filter elements by means of the safe change technology and without contamination of operational stuff and environment
- Robust filter housing made of stainless steel, material 316, in gastight design according to the tightness requirements of the DIN 25 496, table 3, to insert fine dust- and HEPA filter elements
- Separate insertion port for each filter line, equipped with a special collar for the safe change technology. Special collar, made of aluminium, with two grooves according to DIN 25 466, supplement 1, to take the hollow rubber band for the plastic bag fixation. Undercut grooves with perfectly matched hollow rubber bands ensure a gastight seat of the plastic bag.
- Maintenance covers made of stainless steel to ensure a gastight closing of the insertion ports and a protection of the special collar and the rolled plastic bag. The covers are fixed to the filter housing, by means of four screwing elements with a star shaped handle. Each cover is equipped with a centrally positioned transport handle.
- Clamping of the HEPA filter elements by means of self-adjusting spring system, to ensure the tightness requirements for the seat of the filter element according to DIN 25 496, table 3, under conditions of a retreating sealing caused by e.g. aging. Quick release of the clamping device by means of single acting pneumatic cylinders. For filter element exchange supply of cylinders with compressed air (6 bar oil free and water less) via fast acting coupling positioned at the front side of the filter housing.
- Test groove for each filter element made of stainless steel. In order to prove the leak free seat of the filter element, connect the test groove to the seal test device via fast acting coupling, positioned at the front side on the filter housing.

Technical Data	Safe Change Filter Housing optional with Scanner SCF hightec n x m F./H..
Nominal air flow per filter element:	up to 13 350 l/s [48 000 m3/h] (higher on request)
Admissible differential pressure:	± 6 000 Pa (higher on request)
Design temperature:	90 °C
Tightness of filter housing acc. to DIN 24 496:	leakage rate < $3 \cdot 10^{-5}$ of nominal air flow at bei Δp = 2 000 Pa
Tightness of filter seat acc. to DIN 24 496:	leakage rate < $3 \cdot 10^{-5}$ of nominal air flow at bei Δp = 2 000 Pa

1.1.3. Safe Change Filter Housing SCF$_{classic}$



Applications
Ventilation systems in the chemical, pharmaceutical, or nuclear industry laboratories where toxic particles, radioactive particles, and pathogen agents have to be separated to protect the production process, the environment, and the health of the personnel.



Features

- The clamping devices of the HEPA filter elements are operated from outside and proportioned to ensure the tightness requirements for the seat of the filter element according to DIN 25 496, table 3, under conditions of maximum loading of the filter elements and a retreating sealing
- The filter housing design allows the exchange of the filter elements by means of the safe change technology and without of contamination of operational staff and environment
- Robust filter housing made of stainless steel, material 316 in gastight design according to the tightness requirements of the DIN 25 496, table 3, to insert filter elements
- Intake device for the positioning of filter elements with a vertical air flow
- Insertion ports for filter elements, equipped with a special collar for the safe change technology. Special collar, made of aluminium, with two grooves according to DIN 25 466, supplement 1, to take the hollow rubber band for the plastic bag fixation. Undercut groove with perfectly matched hollow rubber band to ensure total safety with gastight sealing of safe change plastic bag.
- Maintenance covers made of stainless steel, material 1.4541 (AISI/SAE 304) to ensure a gastight closing of the insertion ports and the protection of the special collar and the rolled plastic bag. The covers are fixed to the filter housing, by means of four screwing elements with a star shaped handle. Each cover is equipped with a central positioned transport handle.
- The covers are fixed to the filter housing by means of four screwing elements with a star shaped handle. Each cover is equipped with a centrally positioned transport handle. Clamping of the HEPA filter elements by means of self-adjusting spring system, to ensure the tightness requirements for the seat of the filter element according to DIN 25 496, table 3, under conditions of a retreating sealing caused by e.g. aging. Quick release of the clamping device by means of single acting pneumatic cylinders. For initial filter element fitting and subsequent filter element changes, only a (portable) supply of compressed air (6 bar oil free and waterless) is required. This is via a fast acting coupling positioned on the front of the filter housing.
- Test groove for each filter element made of stainless steel. In order to proof the leak free seat of the filter element connect the test groove to the seal test device via fast acting coupling, positioned at the front side on the filter housing.

Technical Data	Safe Change Filter Housing SCF$_{classic}$ n x m F./H.
Nominal air flow per filter element:	up to 6 675 l/s [24 000 m³/h] (higher on request)
Admissible differential pressure:	± 6 000 Pa (higher on request)
Design temperature:	90 °C
Tightness of filter housing acc. to DIN 24 496:	leakage rate < 3 · 10^{-5} of nominal air flow at bei Δp = 2 000 Pa
Tightness of filter seat acc. to DIN 24 496:	leakage rate < 3 · 10^{-5} of nominal air flow at bei Δp = 2 000 Pa

1.2. HEPA Filter System GS



Applications
The type GS HEPA filter system is used to take in HEPA filter elements. It is an inexpensive alternative to the better known and more reliable SCF$_{classic}$ and SCF$_{hightec}$ Krantz safe change filter housings. It is used where the requirements concerning the construction of the filter housings are not as rigid.



Features

- The connection is realised by a gastight duct system at both the top and bottom side of the housing. This allows the installation of one or more filter housings in circular duct systems one after the other.
- Both directions of airflow – “top-down” or “bottom-up” can be chosen
- Installation resp. fixing is done by either:
  – plugging on static fixed ducts
  – attaching to wall brackets (available on request)
  – positioning on floor supports (available on request)
- The duct connection is designed as a machine-lip flange for pull-ring connection, e.g. Jacob system, DN 300
- A welded flange according to standards EN 12 220, DN 300, is also available as an option

Technical Data	HEPA Filter System GS
Pre-filter – Dimensions of filter elements:	610 x 610 x 50 mm or 610 x 610 x 150 mm
Hight of housing:	348 mm, 443 mm
Nominal air flow per housing:	500 l/s [1 800 m³/h]
Max. air flow per housing[1]:	600 l/s [2 200 m³/h]
Weight without filter elements:	approx. 20 kg or approx. 24 kg
HEPA filter – Dimensions of filter elements:	610 x 610 x 150 mm or 610 x 610 x 292 mm
Hight of housing:	473 mm, 615 mm
Nominal air flow per housing:	280 l/s [1 000 m³/h] or 500 l/s [1 800 m³/h]
Max. air flow per housing[1]:	350 l/s [1 200 m³/h] or 600 l/s [2 200 m³/h]
Weight without filter elements:	approx. 26 kg or approx. 32 kg

[1] According to the performance of used filter elements. Technical data of the filter element manufactuer will apply. Filter housing for higher flow rate above 2 200 m³/h on request!

1.3.1. Mobile HEPA Filter Unit $MFU_{classic}$
1.3.2. Mobile HEPA Filter Unit $MFU_{hightec}$



$MFU_{classic}$

Applications
For the separation of airborne particles and aerosols at variable locations.



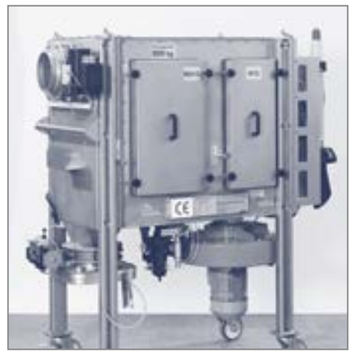
$MFU_{hightec}$

Features

- Air intake and outlet unit
- Robust filter housing
- Gastight circular dampers (raw gas and clean gas side)
- Fan unit
- Silencer unit
- Control unit
- HEPA filter elements, sorption filter elements and fan in a portable unit
- All necessary measurement and control devices are integrated
- Contamination-free filter exchange (bag-in-bag-out)

Technical Data	Mobile HEPA Filter Unit $MFU_{classic}$ and $MFU_{hightec}$ 1x1 F6/H13
Dimensions W x H x D:	$MFU_{classic}$: approx. 915 x 1 820 x 1 000 (800) mm $MFU_{hightec}$: approx. 915 x 1 820 x 1 000 (800) mm
Weight:	approx. 300 kg
Nominal air flow:	840 l/s [3 000 m³/h]
Admissible differential pressure:	± 6 000 Pa
Admissible design temperature:	70 °C
Tightness of filter housing acc. to DIN 24 496:	leakage rate < 3 · 10^{-5} of nominal air flow at bei Δp = 2 000 Pa
Tightness of filter seat acc. to DIN 24 496:	leakage rate < 3 · 10^{-5} of nominal air flow at bei Δp = 2 000 Pa
Fine dust filter element – Filter class F6 acc. to EN 779	
Dimensions W × H × D:	$MFU_{classic}$: 610 × 610 × 78 mm $MFU_{hightec}$: 610 x 610 x 292 mm
HEPA filter element – Filter class H13 acc. to EN 1822	
Dimensions W × H × D:	610 × 610 × 292 mm

1.4.1. Mobile Recleanable Filter Unit $RHF_{hightec}$



Applications
For filtration of dust and airborne particles under adherence to lowest emission standards at variable locations.
– Decommissioning of nuclear facilities
– Pharmaceutical production processes
– Battery manufacture



Features

- Top-down principle
- Lower depths of filter elements for critical dust
- Very high cleaning pressure (up to 4 bar overpressure in nozzle bar)
- Patented, reinforced RHF®
- Pressure loss reduction through cleaning process, i.e.
  – Lower and more constant initial pressure drop after cleaning
  – Higher working pressure drop in filter possible
  – Formation of a filter “cake” on the surface of the filter medium
  – Good separation of agglomerated dust in the hopper
  – Suitable for different kinds of dust, especially for critical particles (rough, sticky, etc.)

Technical Data	Mobile Recleanable Filter Unit $RHF_{hightec}$ RH13 / H13-1500
Dimensions:	1 600 x 1 900 x 790 mm
Air flow:	420 l/s [1 500 m³/h]
Admissible operation pressure:	± 6 000 Pa
Admissible design temperature:	90 °C
Compressed air consumption per reclea-ning:	approx. 0.4 Nm³/filter element
Recleaning time per filter element:	approx. 6 s
Tightness of filter housing acc. to DIN 24 496:	leakage rate < 3 · 10^{-5} of nominal air flow at bei Δp = 2 000 Pa
Tightness of filter seat acc. to DIN 24 496:	leakage rate < 3 · 10^{-5} of nominal air flow at bei Δp = 2 000 Pa

1.4.2. Mobile Recleanable Filter Unit M-SCF$_{classic}$



Applications
For filtration of dust and airborne particles under adherence to lowest emission standards at variable locations.



Mobile recleanable HEPA filter units for a flow of 840 l/s [3 000 m³/h]

✓ Mobile online recleanable HEPA filter block, RHF$_{hightec}$ 1 x 2 and

✓ Mobile air conveyor block, M-SCF$_{classic}$ 1 x 1 V

Features

- Both blocks form independent units and can be transported independently
- For simple room air filtering, M-SCF-V alone can be used. For this block, an extensive range of special accessories is available on request, including additional HEPA filter stages, active carbon filter stages, and plug-in sound damper units.
- To ensure easy decontamination, welded seams on components in contact with the media are free from any gaps and continuously welded.
- The clamping mechanisms for HEPA filter elements can be operated from outside
- Contamination-free filter exchange (bag-in-bag-out)

Technical Data	Mobile Recleanable Filter Unit M-SCF$_{classic}$ 1 x 1 V
Air flow (adjustable):	840 l/s [3 000 m3/h]
Admissible differential pressure:	± 7 000 Pa
Admissible design temperature:	80 °C
Necessary upstream pressure:	6 bar continuous pressure
Compressed air quality:	oil- and water-free, dew point –5 °C
Connection flange raw gas side:	DN 350 (Jakob system)
Tightness of filter housing acc. to DIN 24 496:	leakage rate < 3 · 10-5 of nominal air flow at Δp = 2 000 Pa
Tightness of filter seat acc. to DIN 24 496:	leakage rate < 3 · 10-5 of nominal air flow at Δp = 2 000 Pa

1.5.1. Puridrall PD and Puri-Inlet PE



Applications
Puridrall PD supply air outlet for turbulent mixing air flow, with HEPA filter for cleanroom classes 6 to 8 to DIN EN ISO 14644-1 (VDI 2083) or C and D to the EU-GMP directive.



BIOZ - Bioinnovationszentrum Dresden/D
Resarch labs

Features

- Even dilution of pollutants emitted in the room
- Airtight housing, all parts protected against corrosion and disinfectant-proof
- HEPA filter cell type tested to DIN EN 1822-1, filter class H13 or H14 (optional)
- Connections for differential pressure measurement, particle sampling and leakage testing

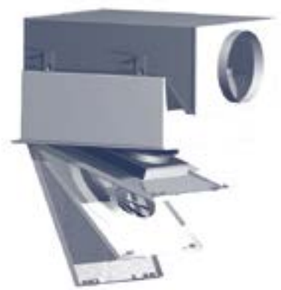
Technical Data	Puridrall PD and Puri-Inlet PE
Volume flow rate range:	PD: 20 – 445 l/s [75 – 1 600 m³/h] PE: up to 555 l/s [2 000 m³/h]
Filter class:	H13, H14[1]
Air outlet nominal diameter:	PD: DN 180, DN 250, DN 315, DN 355, DN 400, DN 500
Discharge height:	2.4 – 4.5 m
Housing cross-section:	330 mm x 330 mm bis 635 mm x 635 mm (depending on the housing size)
Housing height:	320 – 435 mm
Filter cell replacement:	from below or from above
Air-tight housing:	square connection spigot, lateral or with built-in air-tight shutoff damper
Connection spigot:	circular connection spigot, above
Damper actuation:	electric spring-return motor; pneumatic servomotor or damper de-energised “open” / “closed”
Sealing frame :	for dry sealing with surrounding test groove for leakage test or for fluid sealing (gel seal), with surrounding knife edge
HEPA filter cell, cell frame:	dry sealing or fluid sealing[1]
Material Housing, twist outlet, perforated plate, contact pressure frame, and sealing frame: Filter cell frame:	 galvanised sheet metal aluminium
Surface protection Housing, twist outlet, and contact pressure frame:	 Epoxy polyester resin coating, disinfectant-proof
Surface finish Housing: Square visible surface incl. air outlet/inlet:	 RAL 7035 (light grey) RAL 9010 (pure white) or RAL…

[1] Available for sizes 1-6 and size up to 445 l/s [1400 m3/h]; size 7 > 445 l/s [1400 m3/h] corresponds to class H13

1.5.2. Puri-Drall PDK, Puri-Clean PCK, Puri-Inlet PEK with pull-down outlet element



Applications
HEPA filter air outlet with pull-down outlet element, for air cleanliness levels of Class 6 to 8 to EN ISO 14644-1 and Grade C and D to EU GMP. Fields of application for the HEPA filter air outlets are all branches of industry, research and medicine as well as hospital areas where air cleanliness is demanded according to the above-menti-oned levels.



Features

- The installation situation with pull-down outlet element saves time during the implementation of filter scan tests (first test and retests)
- No additional sealing of the air outlets after the fitting or the replacement of the filter
- Modular design – one standard housing for the volume flow rate ranges 69 to 236 l/s [250 to 850 m³/h] (V1 to V4)
- Designs for HEPA filter air outlet with dry sealing (with or without test groove) or fluid sealing
- Discreet integration into the suspended ceiling by square visible surface
- Stable radial flow with strong induction of supply air and room air at the PDK and the PCK
- Build-up of a very uniform supply air cushion below the air outlet; consequently only minor or no accumulation of dirt on the ceiling with the PCK
- Connections for differential pressure measurement, leakage test, optional and test aerosol, optional
- Recovery test according to EN ISO 14644-3 with short recovery times, attested by qualification records

Technical Data	Puri-Drall PDK, Puri-Clean PCK, Puri-Inlet PEK
Air outlet:	**PDK:** Puri-Drall with pull-down element (supply air) **PCK:** Puri-Clean with pull-down element (supply air) **PEK:** Puri-Inlet with pull-down element (exhaust air)
Volume flow rate range:	69 – 236 l/s [250 – 850 m³/h] – standard filter housing 222 – 389 l/s [800 – 1 400 m³/h] – rectangular filter housing
Cross-section housing:	570 x 570 mm – standard filter housing 1 195 x 570 mm – rectangular filter housing
Height of housing:	391 mm – connection housing with lateral rectangular connection spigot 432 mm – connection housing with lateral round connection spigot
Connection spigot:	rectangular, lateral or round, lateral or round, on top
Sealing frame:	for dry seal with or without test groove or for fluid seal
Filter cell:	no filter cell or filter class H13, H14 to DIN EN 1822-1
Material/Surface finish filter housing, sealing frame and air outlet: Filter cell frame: Air distribution element: Air outlet:	 galvanised sheet metal, powder-coated to RAL 9010 (pure white); finish made with epoxy polyester resin, disinfectant-proof aluminium galvanised sheet metal, powder- coated to RAL 9005 (jet black, matt), finish made of epoxy polyester resin, disinfectant-proof galvanised sheet metal, coating with disinfectant-proof epoxy polyester resin, colour to RAL 9010 (pure white) or another RAL colour to be stated by the client

1.6.1. Adsorption Filter CFH$_{classic}$



Applications
For removal of gaseous pollutants, such as elemental or organic iodine.



Features

- Filter housing, in gastight design acc. to the tightness require-ments of DIN 25 496, made of stainless steel material 316
- By compact and modular design realisation of air flow capa-city up to > 8 400 l/s [30 000 m³/h] possible
- Design of the carbon filter stage to take the sorption material: Housing with perforated plates and wired mesh to fix the sorption material at air inlet and outlet side. Riser with filler neck (including shut-off valve and locking piece) for sorption material, intended for connection with pneumatic filling device. Prevention of the forming of channels within the sorption material by development of a riser, also at subsidence of the sorption material.
- System technology for contamination free draining of sorption material, consisting of: Device for a contamination-free drainage of the sorption material for each sorption material chamber consisting of ball cock DN 100 with replacement collar, gastight acc. DIN 25 496. Aluminium made replace-ment collar with undercut double groove for fixing of the maintenance bag for contamination-free sorption material change-out. The rectangular design is equipped with a screw conveyor for complete draining of sorption material.
- Contamination-free filling of sorption material by means of connection of a pneumatic filling device. Compacting of sorption material during filling process by means of approved vibration technology.
- Sampling of sorption material by means of 4 sampling units in gastight design for a direct extraction of sorption material out of the filter bed.

Technical Data	Adsorptionsfilter CFH$_{classic}$
Nominal air flow:	up to > 8 400 l/s [30 000 m³/h]
Admissible design differential pressure:	up to 10 000 Pa
Tightness of filter housing acc. to DIN 24 496:	leakage rate < 3 · 10-5 of nominal air flow at Δp = 2 000 Pa
Dwell time at nominal air flow:	0.5 – 2.50 s
Air flow velocity:	< 0.5 m/s

1.6.2. Adsorption Filter CFH$_{hightec}$



Applications
For removal of gaseous pollutants, such as elemental or organic iodine.



Features

The specialized multi-way sorption filter technology with an arrangement of the filter with an filter bed one upon the other that offers the following advantages

- Highest loading of carbon with pollutants
- Most economical layout by best possible loading of carbon with pollutants at a minimum of bed depth and lowest pressure drop
- Minimum of new carbon and reduction of waste
- Possibility to monitor both filter beds
- Filling the carbon from the second filter bed to the first filter bed without external accessories
- Filter-housing, in gastight design acc. to the tightness requirements of DIN 25 496, made of stainless steel material 316. Barrier slide to separate sorption material in upper and lower filter bed.
- Housing with perforated plates and wired mesh to fix the sorption material at air inlet and outlet side. Riser with filler neck (including shut-off valve and locking piece) for sorption material, intended for connection with pneumatic filling device. Exclusion of the forming of channels within the sorption material by development of a riser, also at subsidence of the sorption material.
- System technology for contamination free draining of sorption material, consisting of: Device for a contamination-free drainage of the sorption material for each sorption material chamber consisting of ball cock DN 100 with replacement collar, gastight acc. DIN 25 496. Aluminium replacement collar with undercut double groove for fixing of the maintenance bag for contamination-free sorption material change-out. The rectangular design is equipped with a screw conveyor for complete draining of sorption material.
- Contamination-free filling of sorption material by means of connection of a pneumatic filling device. Compacting of sorption material during filling process by means of approved vibration technology.
- Sampling of sorption material by means of 4 sampling units in gastight design for a direct extraction of sorption material out of the filter bed

Technical Data	Adsorption Filter CFH$_{hightec}$
Nominal air flow:	up to > 5 550 l/s [20 000 m³/h]
Admissible differential pressure:	up to 10 000 Pa
Tightness of filter housing acc. to DIN 24 496:	leakage rate < 3 · 10-5 of nominal air flow at Δp = 2 000 Pa
Dwell time at nominal air flow:	0.5 – 2.50 s
Air flow velocity:	< 0.5 m/s

1.7. Carbon Cartridges CFS



Applications
Krantz cartridge filter system is designed for effective gas-phase removal of medium concentrations of molecular contamination in fresh air and recirculation air handling systems. This concerns mainly volatile organic components (VOCs), but also sour gases and ammonia. Applications: Airports, Pharma & Food, Industry.



Features

- Sturdy construction
- Ease of use
- Standard dimensions
- Frame manufactured from stainless steel or galvanized steel
- Both with impregnated or non-impregnated carbon

Accessories: Holding frames

- Frame type CFF 16, Dimensions 610 x 610 x 70 mm, Number of cartridges 16
- Frame type CFF 12, Dimensions 508 x 610 x 70 mm, Number of cartridges 12
- Frame type CFF 8, Dimensions 305 x 610 x 70 mm, Number of cartridges 8
- Frame type CFF 4, Dimensions 305 x 305 x 70 mm, Number of cartridges 4

Technical Data	Carbon Cartridges CFS
Material: CFS 452-G and CFS 600-G CFS-452-S and CFS 600-S	 galvanised steel stainless steel
Diameter:	145 mm
Length/Volume: CFS 452-G and CFS-452-S CFS 600-G and CFS 600-S	 452 mm/4,4 l 600 mm/5,9 l
Recommended prefiltration:	M7 to EN 779
Number of canisters per size 610 x 610 mm:	16
Air flow based on filter size:	720 l/s [2 600 m3/h] / 970 l/s [3 500 m3/h] with 16 canisters
Pressure drop at nominal air flow:	< 150 Pa
Max. operating temperature:	55 °C
Max. relative humidity:	95%

3 | Filter Systems and Dampers
3.1 Filter Systems

1.8. Sorption Filter Element WFZ



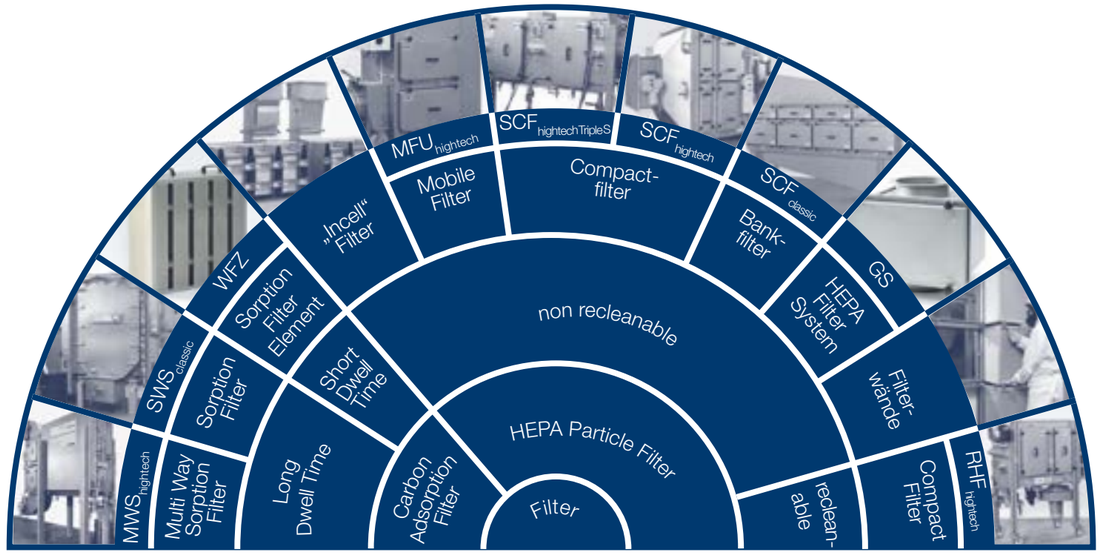
Applications
For the separation of airborne particles, aerosols and olfactory pestering material in the nuclear industry, research, industry etc.

Features

- In compact design with optimised relation between filling volume and filter area, thereby high separation rate respectively factor of decontamination
- Housing with slot boring (Housing floor/bottom with slot perforation)
- Removable cover with square perforations and underlayed elastic cushions
- Housing and cover, stainless steel, material 316

Technical Data	Sorption Filter Element WFZ
Air flow:	max. 420 l/s [1 500 m3/h]
Section area:	1.66 m2
Depth of filter bed:	50 mm
Pressure drop:	Depents of used carbon media
Volume of filling:	approx. 75 l
Weight without filling:	approx. 36 kg
Filter cell size WxHxD:	610 mm x 610 mm x 292 mm

Filter Systems



Filter housing	GS Box	SCF classic	SCF hightec	SCF hightec Triple S
Stainless steel housing	✓	✓	✓	✓
Self adjusting spring system for clamping of filter elements and release of filter elements by means of compressed air	-	✓	✓	✓
Tightness test groove for HEPA filter element	✓	✓	✓	✓
Sealing of HEPA filter elements	single seal	single seal	single seal	triple seal
Special collar for safe change technology	✓	✓	✓	✓
Prefilter possible	separate housing	✓	✓	✓
Two HEPA filter in series possible	-	-	✓	✓
Vertical air flow	✓	✓	✓	✓
Horizontal air flow	-	-	✓	✓
Max. air flow	840 l/s [3 000 m³/h] (1x1)	6 675 l/s [24 000 m³/h] (4x2)	13 350 l/s [48 000 m³/h] (4x4)	840 l/s [3 000 m³/h] (1x1)
Aerosol feeding system and scanner system	-	-	optional	✓ validated according to EN 1822
Srewed parts of housing sealed with special sealant made of silcone rubber	✓	✓	✓	✓
Desinfect ports (formalin or H_2O_2)	-	optional	optional	✓

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2.1.1. Gastight Circular Shut-Off Damper GD-C



Applications
The gastight circular shut-off damper, type GD-C, in solid and maintenance-free design, is used for systems with high tightness requirements.



Features

- The actual leakage rates for housings and seat of damper blade are much lower than specified in the requirement according to DIN 25 496
- The damper is designed to operate without any failure at an operating pressure of 1.1- times of the admissible operating pressure of the damper
- The tightness of seat of damper blade is testable in built-in situation
- For maintenance purposes, e.g. lubricating, if required, no dismantling of the damper from the duct system is necessary
- All media touched parts are welded continuously and without gaps to ensure an easy decontamination

Technical Data	Gastight Circular Shut-Off Damper GD-C
Dimensions:	DN 150, DN 200, DN 250, DN 300, DN 350, DN 400
Actuator:	electrical, pneumatic, manual, or emergency actuating by means of hand wheel
Admissible design temperature:	up to +100 °C
Admissible operation pressure:	10 000 Pa
Adm. leakage rate damper blade incl. seat of damper blade acc. DIN 25 496:	<10 l/(h·m²) at 1 bar, 20 °C, and Δp = 2 000 Pa
Adm. leakage rate housing incl. shaft transition acc. DIN 25 496:	<10 l/(h·m²) at 1 bar, 20 °C, and Δp = 2 000 Pa
Material Robust damper housing: Circular damper blade: Gas-tight shaft transition through housing:	 stainless steel, material 1.4301 (AISI/SAE 304), in gastight design stainless steel, material 1.4301 (AISI/SAE 304) shaft sealing made of viton

2.1.2. Gastight Rectangular Shut-Off Damper GD-R



Applications
The GD-R gastight rectangular shut-off damper is used in ventilation systems for sensitive areas including bio-safety, chemical, nuclear industry, and pharmaceutical laboratories where high leak tightness requirements apply.



Features

- The specially designed kinematical mechanism secures the damper blade at the end positions “open” and “close” by means of special toggle levers in case of electricity failure.
- Two concentric sealing rings fixed to the damper seat create high tightness as well as a test groove in the gap between the two sealing rings. In order to test the leak free seat of the damper blade the test groove can be connected to an appropriate seal test device via a fast acting coupling from outside the damper.
- To protect the sealing, the damper blade starts the opening process with a linear movement. This movement is created by a special lever system, so first the damper runs parallel and after reaching a certain distance the movement turns automatically into a rotating motion. This mechanism avoids transverse loading force to the damper sealing.
- Double shaft transition sealing. Connections to test tightness of shaft transition during operation are available on demand.
- Housing, damper blade, and lever mechanism made of stainless steel.
- All media-touched parts are welded continuously and without gaps to ensure an easy decontamination.
- The housing, the damper seat, and the shaft transition surpass by far the leak tightness requirements of DIN 25 496.
- Electrical, pneumatic, and manual actuators available. The electrical actuator is also available as spring return (fail-safe) version.

Technical Data	Gastight Rectangular Shut-Off Damper GD-R
Dimensions W x H x D in mm:	400 x 400 x 300, 500 x 500 x 300, 600 x 600 x 300, 700 x 700 x 300, 800x 800 x 400, 900 x 900 x 400, 1 000 x 1 000 x 400, 1 100 x 1 100 x 400
Actuator:	electrical, pneumatic, manual, or electrical actuator also available with spring return (fail-safe)
Admissible design temperature for damper:	– 40 °C to + 100 °C[1]
Admissible design temperature for actuator:	– 5 °C to + 70 °C[1]
Admissible operation pressure:	10 000 Pa
Adm. pressure difference for damper blade in closing direction:	10 000 Pa
Adm. leakage rate damper blade incl. seat of damper blade acc. DIN 25 496:	< 10 l/(h·m²) at 1 bar, 20 °C, and Δp = 2 000 Pa
Adm. leakage rate housing incl. shaft transition acc. DIN 25 496:	< 10 l/(h·m²) at 1 bar, 20 °C, and Δp = 2 000 Pa

1. Further range of operating temperatures available on request

2.1.3. Gastight Rectangular Shut-Off Damper S



Applications
Krantz has developed the gastight, rectangular shut-off damper S for use in ventilating systems with high leak tightness requirements, e.g. in nuclear facilities, laboratories, etc.



Features

- The shut-off damper consists of a damper housing, a hinged damper blade with the damper shaft as its bearings, and an actuating cylinder moving the damper blade by an actuating equipment.
- A sealing profile made of silicone rubber is fastened to the damper blade by a leading bar. Upon closure of the damper, this sealing profile is pressed against the damper housing by means of an inflatable silicone tube which produces the sealing effect.
- The sealing profile provided with two double lips allows the tight seat of the damper blade on the mounted shut-off damper to be checked.
- The damper blade and the damper housing are made of stainless steel, the tube leading bars and profiles consist of aluminum. The control unit is placed on the head of the actuating cylinder. The shut-off damper is actuated from a customer provided switchboard cabinet.
- The media supplies needed by the control unit are electric energy as well as compressed air, 3 bar overpressure, oil free and waterless.
- The shut-off damper is actuated by means of a double acting pneumatic cylinder. The control unit ensures the proper sequence of motions including tube inflation and venting.

Technical Data	Gastight Rectangular Shut-Off Damper S
Admissable operating pressure for housing:	± 10 000 Pa
Admissable differential pressure for damper blade in both directions:	± 10 000 Pa
Admissible design temperature for damper:	– 20 °C up to + 120 °C
Adm. leakage rate damper blade incl. seat of damper blade acc. DIN 25 496:	< 10 l/(h·m²) at 1 bar, 20 °C, and Δp = 2 000 Pa
Adm. leakage rate housing incl. shaft transition acc. DIN 25 496:	< 10 l/(h·m²) at 1 bar, 20 °C, and Δp = 2 000 Pa
Medium supply, compressed air, oil free and waterless:	positive pressure 3 bar
Current:	230 V, 50 Hz
Position indication “open” and “close” Mechanical: Electrical:	 position indicator 2 limit switches
Actuator:	pneumatic
Regulation time:	30 s, longer times adjustable
Material: Housing and damper blade: Damper sealing:	 1.4541 (AISI/SAE 321 or B. S. 321 S12) Silicone

2.2.1. Pressure Relief Dampers for high opening pressures, with control function KL-E
2.2.2. Pressure Relief Dampers for high opening pressures, with switching function KL-EM



Pressure Relief Dampers KL-E and KL-EM

Applications

In a great variety of different applications within HVAC systems, pressure relief dampers are used to limit and control the pressure. Typical applications include the protection of ductwork from inadmissible high loading caused by positive pressure or negative pressure, positive pressure ventilation of staircases, or setting a defined pressure drop between adjacent rooms.

Features

KL-E with control function

KL-E is a design variant provided with control function which, as soon as then opening pressure is exceeded, keeps the pressure in the ductwork nearly constant, independent of the range of volume flow. When the pressure in the ductwork reduces to its normal range after the malfunction has been remedied, the damper closes automatically.

- Airtight according to EN 1751, class 1 in closed position
- Opens when opening pressure set is attained
- Almost equal differential pressure independent of range of volume flow (control function)
- Closes automatically when opening pressure is underrated
- Setting of opening pressure by variation of lever arm

KL-EM with switching function

The KL-EM features a switching function. Independent of the range of volume flow of the outlet flow, the damper blade gets fully opened when the opening pressure is exceeded. When the pressure in the ductwork falls below the opening pressure after the malfunction has been remedied, the damper normally remains open. In this state of operation, the damperKL-EM must be closed manually, whereas it closes automatically when the flow is interrupted, e.g. by disabling of the fan. Despite its smaller external dimensions KL-EM is capable of removing flows at higher range of volume flow than with KL-E.

- IAirtight according to EN 1751, class 1 in closed position
- Opens fully when opening pressure set is attained (switching function)
- Closes automatically upon interruption of flow
- Setting of opening pressure by variation of lever arm
- Closing of damper after exceeding of opening pressure by hand

Technical Data	Pressure Relief Dampers with control function KL-E
Dimensions W x H x D:	797 x 497 x 620 mm
Weight:	36 kg
Range of air flow[1]:	0 – 4 720 l/s [0 – 17 000 m³/h]
Opening pressure, adjustable:	600 – 2 500 Pa
Technical Data	**Pressure Relief Dampers with switching function KL-EM**
Dimensions W x H x D:	630 x 400 x 510 mm
Weight:	23 kg
Range of air flow[1]:	$V_{.min.}$ = 5 000 m³/h $V_{.max.}$ = 450 $\sqrt{\text{Opening pressure}}$ [Pa] m³/h
Opening pressure, adjustable:	700 – 2 400 Pa

[1] Higher range of volume flow achievable by parallel connection of several dampers

2.2.3. Pressure Relief Dampers for low opening pressures at high range of volume flow KL-ETE
2.2.4. Pressure Relief Dampers for low opening pressures at low range of volume flow KL-ETM



Applications

In a great variety of different applications within HVAC systems pressure relief dampers are used to limit and control the pressure. Typical applications include the protection of ductwork from inadmissible high loading caused by positive pressure or negative pressure, positive pressure ventilation of staircases, or setting a defined pressure drop between adjacent rooms.



Features

It is often required that a defined pressure gradient of 50 – 150 Pa is set between two neighbouring rooms. This guarantees a directed flow of air in the leakage ports that exist between the rooms and thus avoids the undesired transport of pollutants into the room to be protected. KL-ETE pressure relief dampers can be used in this application both as control device for setting a defined pressure gradient between two rooms and as safety valves to set a limit to a maximum admissible pressure value. Depending on available space and range of volume flow to be relieved, KL-ETE or KL-ETM pressure relief dampers are the optimal choice.

KL-ETE (at high volume flow)

- Airtight according to EN 1751, class 1 in closed position
- Opens when opening pressure set is attained
- Almost equal differential pressure independent of range of volume flow (control function)
- Closes automatically when opening pressure is underrated
- Setting of opening pressure by variation of restoring mass

KL-ETM (at low volume flow)

- Opens when opening pressure set is attained
- Almost equal differential pressure independent of range of volume flow (control function)
- Closes automatically when opening pressure is underrated
- Setting of opening pressure by variation of restoring mass

Technical Data	Pressure Relief Dampers KL-ETE (at high volume flow)
Dimensions W x H x D:	348 x 598 x 485 mm
Weight:	approx. 19 kg
Range of volume flow[1]:	0 – 1 400 l/s [0 – 5 000 m³/h]
Opening pressure, adjustable:	50 – 150 Pa[2]
Technical Data	**Pressure Relief Dampers KL-ETM (at low volume flow)**
Dimensions W x H x D:	250 x 150 x 250 mm
Weight:	approx. 3.5 kg
Range of volume flow[1]:	0 – 84 l/s [0 – 300 m³/h]
Opening pressure, adjustable:	50 – 120 Pa[2]

[1] Higher range of volume flow achievable by parallel connection of several dampers
[2] Higher opening pressure on request

2.3.1. Louver damper, airtight design LD-J



Applications
For installation in air ducts or air openings to regulate air flow.



Features

- Lamellas in airtight design, class C acc. DIN EN 1751. Tightness of damper housing according to type of damper
- The damper is designed to operate without any failure at an operating pressure of 1.1 time the admissible operating pressure
- Warp-resistant hollow body lamellas made of aluminum (optional with coated or eloxiered aluminium
- Lamellas equipped with changeable silicone rubber profile
- Counter rotating lamellas by means of external positioned rod, parallel rotating lamellas available on request
- Maintenance-free operation

Nominal dimensions in mm													
W[1]	400	500	600	700	800	900	1 000	1 200	1 400	1 600	1 800	2 000	-
H[1]	150	300	450	600	750	900	1 050	1 200	1 350	1 500	1 650	1 800	1 950

1. All combinations of W and H dimensions possible, other dimensions also possible

Technical Data	Louver damper, airtight design LD-J
Nominal dimensions (W/H):	see table
Design temperature:	90 °C
Adm. leakage rate damper housing:	class C acc. to DIN EN 1751
Adm. leakage rate damper blades (lamellas):	class 4 acc. to DIN EN 1751
Frame:	stainless steel or galvanised steel, 1.5 mm, by means of a screwed construction
Actuator:	manual, eletrical, or pneumatic

2.3.2. Louver damper, gastight design ND-J



Applications
For installation in air ducts or air openings to regulate air flow.



Features

- Housing and shaft transition in gastight design, lamellas in airtight design
- The damper is designed to operate without any failure at an operating pressure of 1.1 time the admissible operating pressure.
- Frame made from stainless steel, 2 mm thick, with encapsulation of the frame profile
- Warp-resistant hollow body lamellas made of aluminium, 150 mm
- Lamellas equipped with changeable silicone rubber profile
- Counterrotating lamellas by means of external positioned rod. parallel rotating lamellas available on request
- Maintenance-free operation

Nominal dimensions in mm													
W[1]	400	500	600	700	800	900	1 000	1 200	1 400	1 600	1 800	2 000	-
H[1]	150	300	450	600	750	900	1 050	1 200	1 350	1 500	1 650	1 800	1 950

1. All combinations of W and H dimensions possible, other dimensions also possible

Technical Data	Louver damper, airtight design LD-J
Nominal dimensions (W/H):	see table
Design temperature:	90 °C
Adm. leakage rate damper housing:	class C acc. to DIN EN 1751
Adm. leakage rate damper blades (lamellas):	class 4 acc. to DIN EN 1751
Frame:	stainless steel or galvanised steel, 1.5 mm, by means of a screwed construction
Actuator:	manual, eletrical, or pneumatic

2.4. Non Return Damper RK-E20



Applications
Self acting non return dampers will close at reverse airflows in HVAC systems and will lock ducts or air handling units automatically.



Features

- The robust damper housing made from optional stainless or galvanised steel can contain up to seven lamellas.
- The lamellae are made from age resistant reinforced elastic material. A solid reinforcement and stabilisation of the damper blade sealing is done by aluminum reinforcement angles on the incoming flow side of the damper and aluminum plates on the back side.
- The elastic lamellas are heat resistant up to 90 °C. For higher requirements lamellas with higher heat resistance are available as an option (additional price).
- The flow-separating plates at the back side of the damper housing create single ducts behind each lamella to avoid transmission of impulse between partial air flows.

Sizes of damper housing																			
W	200	250	300	315	350	400	-	500	560	600	630	800	900	1000	-	1250	1400	1600	-
H	200	-	300	315	350	400	450	500	560	-	630	800	-	1000	1120	1250	1400	1600	2000
No. of lamellas	2	-	1	1	2	2	2	2	2	-	2	3	-	4	4	5	5	6	7

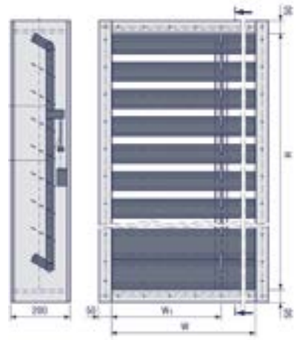
All combinations of W and H dimensions are possible. All dimensions in mm. The companion flanges are not drilled on delivery.

Technical Data	Non Return Damper RK-E20
Dimension (W/H):	see table
Total depth of damper:	360 mm
Admissible design temperature:	90 °C
Adm. leakage rate of damper housing acc. DIN 25 496:	10 l/(h·m²) at 1 bar, 20 °C, and Δp = 2 000 Pa
Adm. leakage rate of damper housing acc. DIN 25 496:	2% of nominal air flow rate at 1 bar, 20 °C and, Δp = 2 000 Pa
Material Damper housing and separating plates: Reinforcing angle and back plate: Lamellae:	 galvanised steel or stainless steel, material 316 aluminium silicone

2.5. Pressure Surge Damper RK-F10



Applications
When there is a requirement that single duct legs or wall openings have to be open in normal operation, but closed in a pressure wave (produced by chemical reactions, gas explosions or mechanical damage to pressure vessels), Krantz recommend the use of their pressure surge damper.



Features

- The pressure wave can reach a positive pressure of approx. 0.45 bar in about 100 milliseconds for a duration of about 1s
- Pressure surge damper of sturdy design, dimensioned for shock waves up to 0.5 bar. The function remains unreduced after a shock wave.
- The pressure surge damper requires no additional power
- Damper housing with connection frame on both sides
- Built-in inclined blades with axis and bearings
- Damper rods on both sides with spring tensioning appliance

Dimensions																	
Nominal width W	200	224	250	280	315	355	400	450	500	560	630	710	800	900	1000	1120	1250
Nominal height H	-	-	-	-	-	-	-	-	500	560	630	710	800	900	1000	1120	1250
W_1	-	-	-	-	-	-	-	-	-	-	315	355	400	450	500	560	625
No. of damper blades									5	6	7	8	9	9	11	13	13

All combinations of W and H dimensions are possible. All dimensions in mm. The companion flanges are not drilled on delivery.

Technical Data	Pressure Surge Damper RK-F10
Dimension (W/H):	see table
Total depth of damper:	360 mm
Admissible design temperature:	100 °C
Pressure blast:	0.45 bar
Material Housing, blades, and damper rods:	 stainless steel, material 321

2.6. Air Flow Control Damper PRD



Applications
The PRD remains the air valve of choice for critical heating, ventilating, and air conditioning applications. The unique operating principle and aerodynamic design make it ideally suited for difficult applications where long term performance is critical to system performance. PRDs can be used in almost any application where ventilation or exhaust air must be modulated.



Features

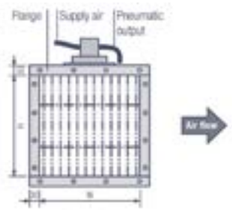
- In solid design, provided for installation in the ductwork
- Valve pneumatically operated over the input range of 0.07 – 1.0 bar positive pressure
- Casing manufactured from stainless steel AISI 316 with a removable side panel for airfoil access without requiring valve removal from the duct
- Expandable pneumatic flexible cells manufactured from EPDM rubber capable of operating at temperatures as high as 120 °C
- Airfoils manufactured from stainless steel
- An air distribution manifold manufactured from virgin material and designed to withstand pressures of at least 2.0 bar. Manifold is supported by a strain relief bracket and comes with a brass, ¼" barbed fitting.

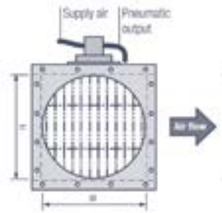
Vortex Shedding Air Flow Measurement
(Vortex Shedding Flow Sensor Option)

- Primary signal directly proportional to velocity (1 to 1 relationship)
- Does not require compensation for temperature, density, and humidity changes
- Linear primary signal
- True velocity
- Not affected by dust/dirt.

Technical Data	Air Flow Control Damper PRD
Dimensions H x W rectangular and circular:	see table 1 and 2 on next page
Pressure drop Δp:	max. _____ Pa, see table on next page
Admissible design temperature for damper:	up to +120 °C
Adm. leakage rate in flow direction:	EN 1751, class 2
Adm. leakage rate for housing acc. DIN 25 496:	<10 l/(h·m²) at 1 bar, 20 °C and Δp = 2 000 Pa

2.6. Air Flow Control Damper PRD



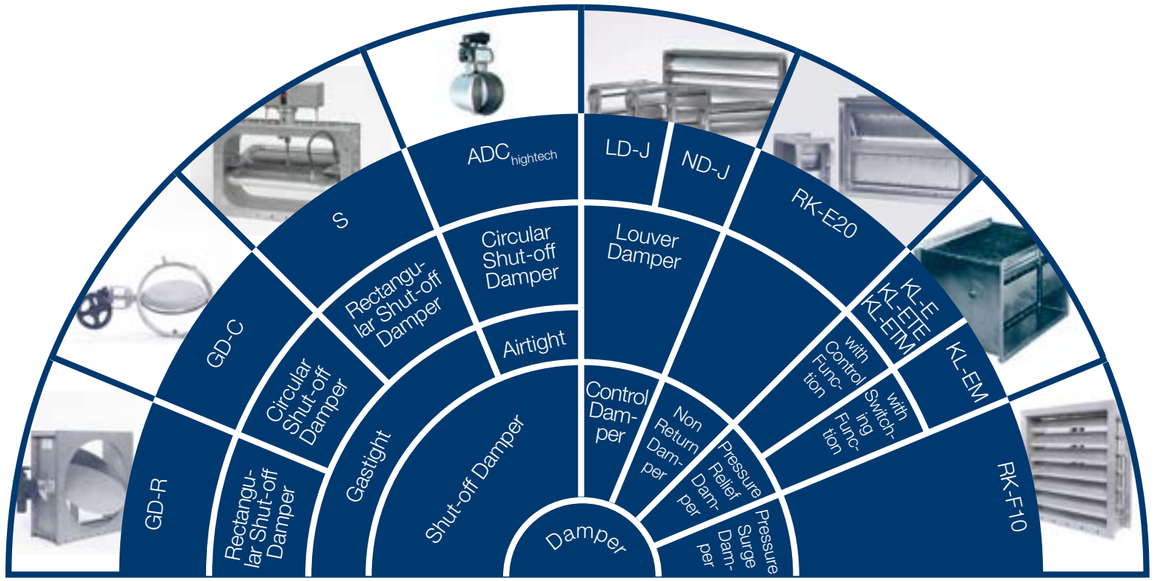


Area calculations for rectangular PRD (m²)							
H/B mm	200	300	400	500	600	700	800
150	0.03	0.04	0.06	0.08	0.09	0.10	0.12
200	0.04	0.06	0.08	0.10	0.12	0.14	0.16
300	0.06	0.09	0.12	0.15	0.18	0.21	0.24
400	0.08	0.12	0.16	0.20	0.24	0.28	0.32

Area calculations for PRD with circular inlet and outlet (m²)				
Diameter	150	200	300	400
150	0.018			
200		0.031		
300			0.071	
400				0.126

If you want further information on
Selection of rectangular valves (pressure drop) or **Selection of circular valves (pressure drop)**, scan the QR-Code below.

Dampers



Krantz offers a wide range of dampers for applications with high tightness requirements, including:

- Gastight Dampers acc. DIN 25 496
- Air Flow Controllers
- Pressure Relief Dampers
- Louver Dampers
- Non-return Dampers
- Pressure Surge Dampers

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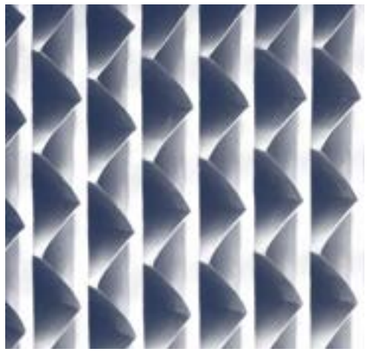
3.1.1. and 3.1.2. HEPA – Filter Elements H13 and H14



Applications
HEPA-filter elements are classified H13 or H14, acc. to DIN EN1822. They are designed to handle higher airflow than the corresponding filter elements produced by other companies. Typical applications are nuclear industry, harmaceutical industry, and BSL 3/4 laboratories.



Slanted spacers

Features

- For new installations, fewer filter elements are required, resulting in significant space savings.
- For existing installations, these filters provide lower resistance, lower energy cost, and substantially longer life; tapered separators provide a high retention capacity.
- Extended filter element lifetimes, as a result of the high retention capacity
- Factory testing for each filter element – your assurance that it meets the rated efficiency
- Easy installation

Technical Data	HEPA – Filter Elements H13 and H14
Size in mm without sealing WxB[1+2]:	**H13** – 305 x 305, 305 x 610, 610 x 610, 762 x 610 **H14** – 305 x 305, 610 x 305, 610 x 610
Depth:	292 mm
Meda:	waterproof fibre glass
Cell side material:	galvanised steel plate, stainless steel, MDF
Separators:	aluminium, high-performance folding
Binding material:	cold vulcanised resin
Sealing:	6 mm flat section, neoprene
Filter efficiency:	**H13** – 99,95 % at MPPS acc. DIN EN 1822 **H14** – 99,995 % at MPPS acc. DIN EN 1822
Initial pressure drop Δp[3]:	**H13** < 250 Pa at flow rate 840 l/s [3 000 m³/h] **H14** < 250 Pa at flow rate 695 l/s [2 500 m³/h]
Final pressure drop Δp:	1 500 Pa
Temperature resistance:	90 °C

1. Other sizes are available
2. The hight dimension H marks the vertical position of the separators. Krantz filter elements should always be installed with vertical separators.
3. Hint: These are the max. upper limits, which will not be exceeded by tolerances (like ±15 %)

3.2. Fibre Filter F



Applications
Return air inlet for filtering textile fibres out of the return air of clean rooms, particularly operating theatres and ancillary rooms; for wall or duct mounting.

Features

- Fibre retention on inward wire-mesh filter
- Filter easily removable by hand, without tools, for maintenance and disinfection purposes
- Mounting in smooth room or duct walls. Standard fibre filter dimensions same as those of customised return air grilles; alternative sizing suitable for tiling
- Available in many sizes
- Material: stainless steel, material No. 1.4301
- Low sound power level
- Optional available with slotted sliding device for air flow adjustment

Available dimensions in mm							
W	225	325	425	525	625	725	825
H	225	325	425	525	625	725	825

All combinations of W and H dimensions are possible

Technical Data	Fibre Filter F - Standard Construction
Volume flow rate range:	65 – 1 670 l/s [230 – 6 000 m³/h]
Dimensions W x H:	225 mm x 225 mm to 825 mm x 825 mm
Depth:	80 mm
Installation:	in a smooth room or duct wall or tiled wall
Material Housing and wire mesh: Visible housing surface:	 stainless steel 1.43.01 ground

3.3. Leak Test Device LT-D



Applications
The portable leak test device is for testing of the permissible leakage air flow e. g. according to DIN 25 496 “HVAC components in nuclear facilities” or KTA 3601 “HVAC systems in nuclear power plants” for:
– The tight seat of filter elements
– The tight seat of damper blades
– The tightness of housings
The measuring devices integrated in the housing will be calibrated before assembly to provide a measuring range from 0.01 to 1.5 l/min up to a theoretical test pressure of 5 000 Pa.

Features

- The leakage air flow is determined following the constant pressure method, which means the housing or the test groove of the seal is filled with air until the predetermined test pressure is reached. The feed in air flow which is necessary to keep the test pressure constant is equivalent to the leakage air flow.
- Two measuring ranges are available: 0.01 – 0.15 l/min (test range I) for small leakage air flow; 0.15 – 1.5l /min (test range II) for higher leakage air flow
- The feed in to reach the predetermined test pressure as well as holding the test pressure constant is done by means of a hand pump
- Each portable seal testing device comes with operating instructions, certificates of calibration of the measuring devices, hand pump, connecting hose with 4 mm inner diameter, and coupling nipples on both sides for fast acting coupling

Technical Data	Leak Test Device LT-D
Leak Test Device:	With calibrated measuring devices for testing the permissible leakage airflow of filters and dampers with tightness proof frame and for tightness measurement of filter housings, fans, damper housings etc. Leak test device for measurement of permissible leakage airflow according DIN 25 496
Leakage rate:	The leakage airflow is determined following the constant pressure method according DIN 25 496, which means the housing or the test groove of the seal is filled with air until the predetermined test pressure is reached. The feed in airflow which is necessary to keep the test pressure constant is equivalent to the leakage airflow. Leakage airflow directly readable on calibrated airflow meters with two measuring ranges available.
Tightness testing device:	The feed in to reach the test pressure as well as holding the test pressure constant is done by means of a hand pump
Pressure gauge:	1 calibrated pressure gauge, Type Magnehelic®, for reading the test pressure
Accessory:	1 connecting hose with 4 mm inner diameter and coupling nipples on both ends 1 hand pump with connecting hose and coupling nipple

3.4.1. Heat Seal Device HS-D$_{classic}$



Applications
Due to the exceptionally high safety requirements for changing filter elements in nuclear facilities and laboratories, Krantz has developed a unique “safe change” procedure, the FZK system, which utilises a heat seal device.



Features

- The Krantz heat seal device consists of the clamping device for the bag, heated element, transformer, and a separating device.
- The heat seal device provides ease of handling and guarantees optimum safety
- The maintenance bag is gathered, clamped tightly and heat sealed so that the contents of the maintenance bag and the inside of the filter housing are sealed and separated in one simple process

Technical Data	Heat Seal Device HS-D$_{classic}$
Heat seal device:	for cutting of PE plastic bags and airtight sealing of bag openings in one step, especially for bag-in/bag-out procedure – FZK system
Material Clamping device: Spanner:	 aluminium stainless steel
Hand-held separating device:	3.2 V, 80 A with cable to transformer
Switch box:	230 V, 50 Hz, 1.2 A with connection cable 2 m

3.4.2. Heat Seal Device HS-D$_{hightec}$

Applications
Due to the exceptionally high safety requirements for changing filter elements in nuclear facilities, bio-safety laboratories, and other facilities where there is a high risk for staff, and the environment, a “safe change” procedure must be used when changing filter elements. The Krantz heat seal device HS-D$_{hightec}$ is designed specifically for use in this procedure.

Features

- Ease of handling by low weight device, completely removable upper sealing bar and automatic process
- Consistent pressure over the seal length (patent pending)
- Guaranteed process parameters
- Documentation of sealing process
- Quality and consistency of sealing (20% improvement versus conventional sealing, confirmed by third party approval)

Technical Data	Heat Seal Device HS-D$_{hightec}$
Dimensions of sealing device (L x H x W)[1]:	1270 x 80 x 155 mm
Dimensions of power generator:	Ø 400 mm
Total weight of sealing device:	17.2 kg
Weight of the upper sealing bar:	3.7 kg
Weight of power generator:	9.5 kg
Power supply:	230 V/50 Hz
Power consumption:	0.6 KW
Complete delivery:	of sealing device with power generator, PC software, and one set of ware parts (PTFE protection and sealing stripes)

[1.] Other dimensions on request

3.5. Vortex Air Flow Measurement

Applications
If a parameter is important, you should measure it directly. This ensures that the control is based on a closed loop.
Typical true flow feedback air flow measurement applications are:

- Fan tracking
- Lab pressurisation control
- Isolation room pressure control
- Outdoor air quantity monitoring
- Volumetric air flow control

Features

Theory of Vortex shedding air flow measurement:
- Bluff body is a trapezoidal shaped strut
- A tube aligns air flow across bluff body
- Pressure pulses at sides of bluff body are sensed
- Multiple sensors across duct are averaged

Advantages of Vortex shedding air flow measurement:

- Primary signal directly proportional to velocity (1 to 1 relationship)
- Does not require compensation for temperature, density, and humidity changes
- Linear primary signal
- True velocity averaging
- Not affected by dust/dirt
- Self cleaning
- Recalibration not required

3.8. Desiccant Dehumidifier MDC



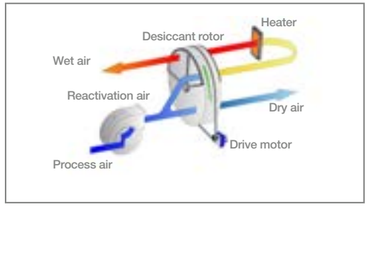
Applications
Our desiccant dehumidifiers are used in the food industry (confectionery, meat processing, dairy, and beer production), drug manufacturing (tablets, ampoules, and drug storage), chemical industry (mineral fertiliser storage and transport), sports facilities (ice rinks) and product storage where close control of air humidity is required



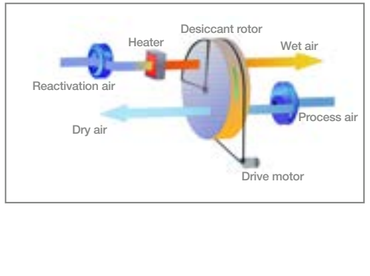
Features

- Volume flow rate range 80 – 2 200 l/s [290 – 8 000 m³/h]
- Housings of the MDC250 to MDC5000 in stainless steel sheet metal
- Housings are made of thick sheet steel (2 mm), coated by powder painting starting with MDC 6000 and larger models
- Panels are insulated with rock wool insulation from MDC1000
- Fans with EC driven motors starting from MDC800
- The rotary wheel is sealed to the housing with a special profile and composition of the rubber gasket, which reduces air leakage to a minimum
- Highest quality of impregnated rotary wheel and air heaters
- The desiccant dehumidifiers conform to all applicable laws and regulations in EU which is approved by the declaration of conformity
- Customised desiccant dehumidifier can be developed and manufactured on request, based on consulting and design of the dehumidification system for a particular application.

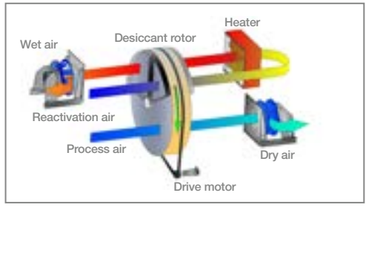
Mode of operation no. 1
involves only one common fan for both air flows. This solution makes the installation easier and allows achieving the lowest possible dew point.

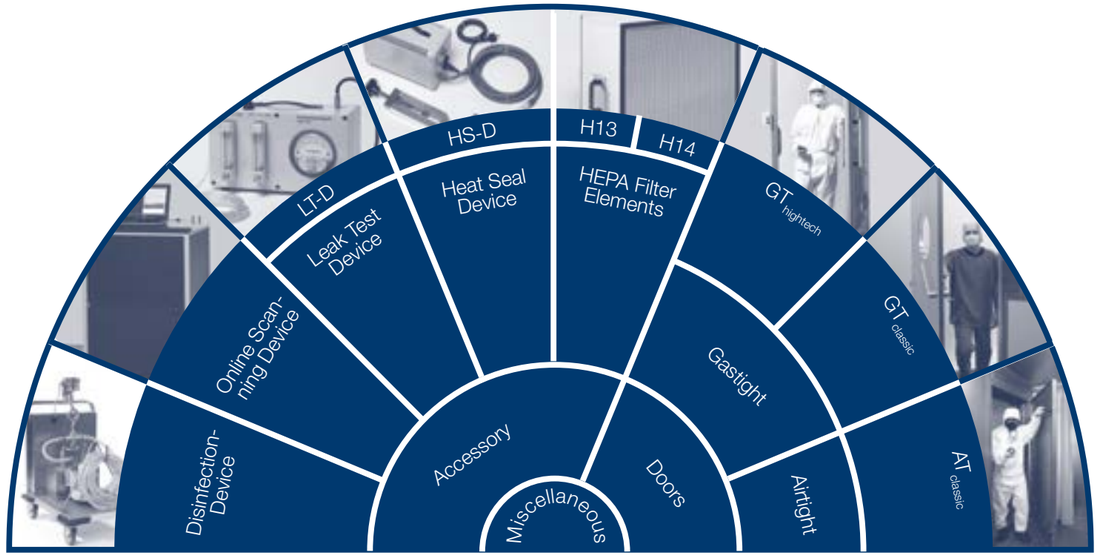


Mode of operation no. 2
is the most common mode of operation and it allows drying the air very efficiently down to almost 0 % RH.



Mode of operation no. 3
provides heat recovery. This solution allows reducing the power consumption and reduces the temperature increase of the dry air.





References



- Bio-safety laboratories BSL 3 and BSL 4
- Isolation wards



- Nuclear power plants
- Nuclear (research) centres
- Waste treatment plants
- Decommissioning of nuclear facilities



- Industrial applications:
  - Pharmaceutical
  - Chemical
  - Airport
- Decommissioning of chemical weapons

Krantz delivers filter systems and dampers worldwide.
If you need a special reference list, Krantz can prepare one according your applications and requirements.
Please contact us for further details.

Technical Articles

Read more about the usage of our products within the following professional articles:

- Layout specifications for thermal comfort
- Opticlean – Ceiling air outlet
- Displacement ventilation installed at the most modern police indoor firing range of Europe
- Design of energy-efficient air distribution systems for Industrial buildings
- Microclimate for large places of assembly – energy efficiency and comfort
- Multifunction sail AVACS
- Decentralised ventilation units
- In-situ Efficiency Measurement for HEPA Filters

To find these documents, either scan the QR-Code below or go to:
http://www.caverion.de/technical-articels

Certificates



















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You can find further information on sales representatives and offices abroad at **www.krantz.de/en**

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◦ Stuttgart			◦ Kuwait	◦ France	
			◦ Singapore	◦ Greece	
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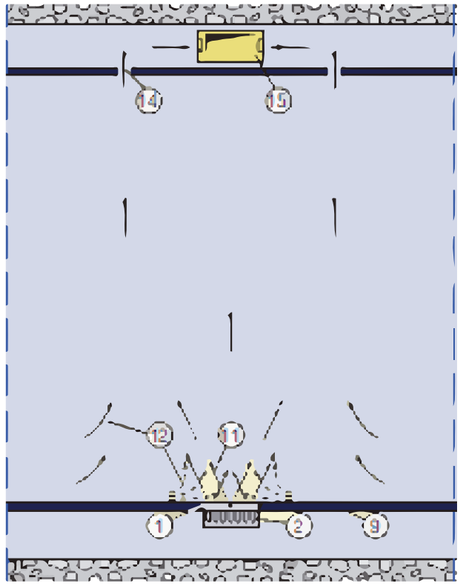
			◦ Taiwan	◦ Ireland	
			◦ Thailand	◦ Island	
			◦ United Arab Emirates	◦ Italy	
				◦ Netherlands	
				◦ Norway	
				◦ Poland	
				◦ Portugal	
				◦ Russia	
				◦ Switzerland	
				◦ Spain	
				◦ Turkey	

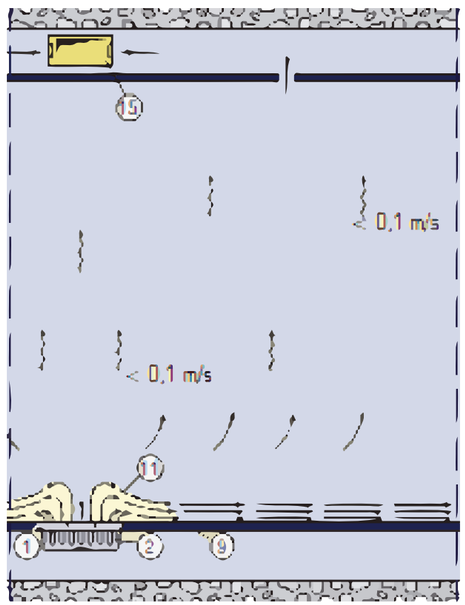
Technical drawings



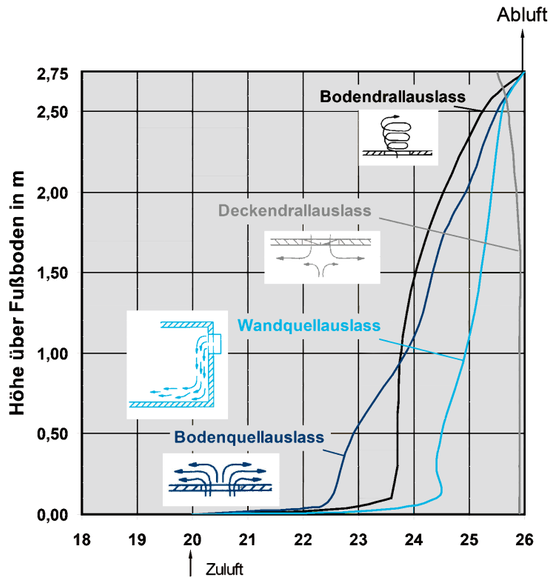
Air Distribution Systems
Floor Air Outlets

Top:
Mode of operation of
„turbulent mixing air flow“

Bottom:
Mode of operation of displacement ventilation (low turbulence displacement air flow)



Technical drawings



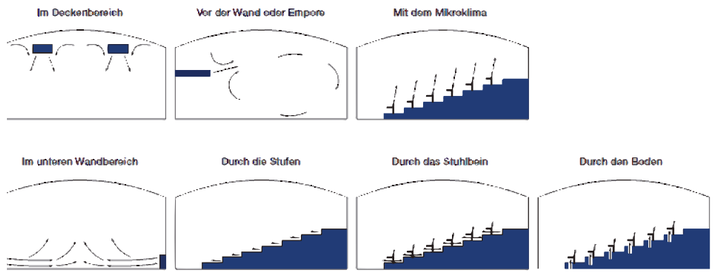
Air Distribution Systems
Displacement Outlets for
the Commercial Sector

Measured vertical temperature gradients
for different air distribution systems

Ventilation efficiency
between 1,0 and 2,00

Heat load
between 1,0 and 0,45

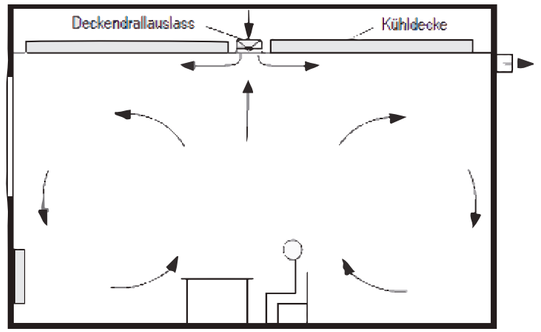
Pollutant load
between 1,0 and 0,25

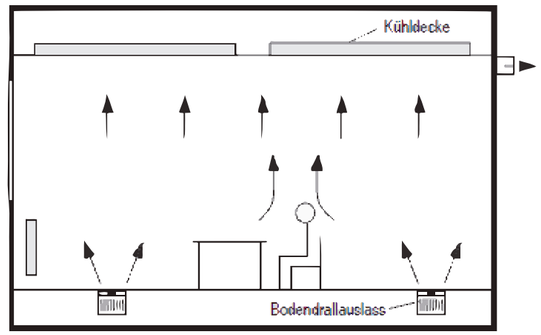


Air Distribution Systems
Air Outlets for Assembly Rooms

Air distribution system options for
large assembly rooms

Technical drawings



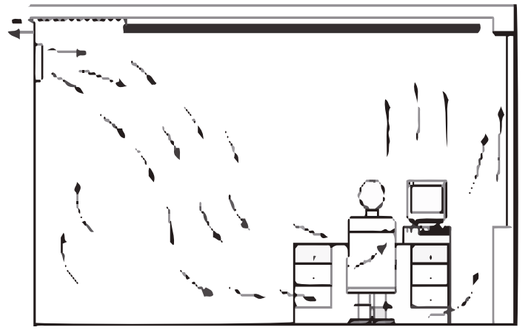


Cooling and Heating Systems
High-capacity Ceiling Systems

Combination of cooling ceilings with
different air distribution systems

Top:
Turbulent mixing air flow

Bottom:
Stratified flow

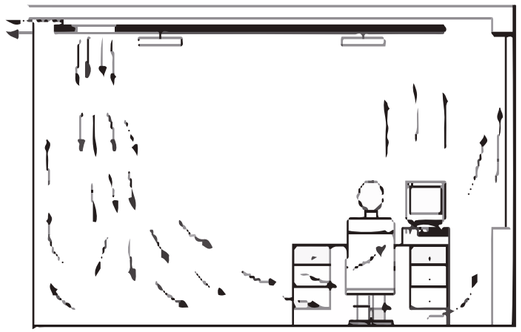


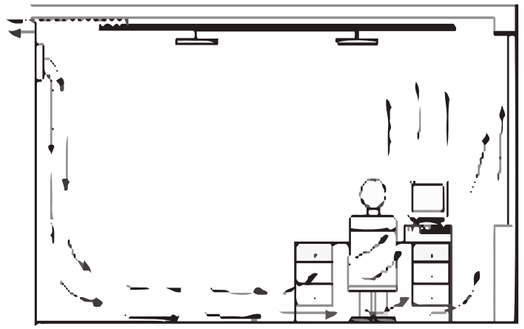
Cooling and Heating Systems
Chilled sails

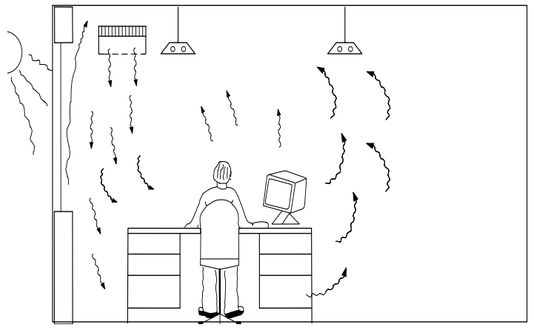
Top:
Combination of chilled sails and
wall slot diffusers or multiplex outlets

Middle:
Multifunction sail with ceiling
displacement outlet

Bottom:
Combination of chilled sails and wall
displacement outlet



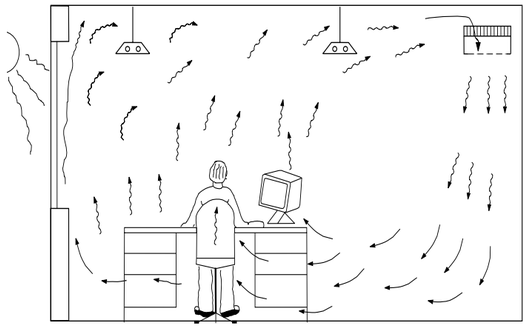


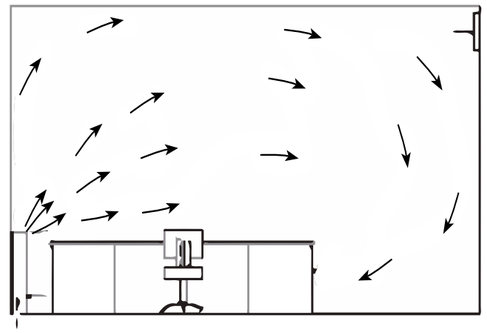


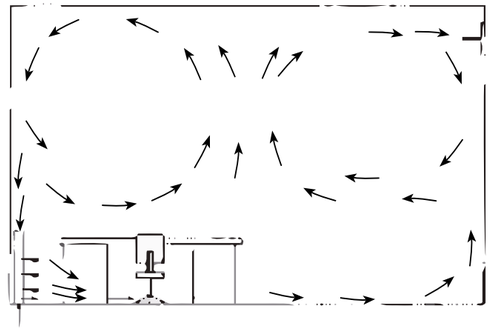
Cooling and Heating Systems
Chilled beams

Top:
Chilled beam installed close to a façade (Section 4.1.)

Bottom:
Chilled beam installed close to a corridor wall (Section 4.1.)







Cooling and Heating Systems
Façade/Floor-mounted Systems

Top:
Air flow pattern with façade screenig

Bottom:
Air flow pattern with displacement ventilation

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