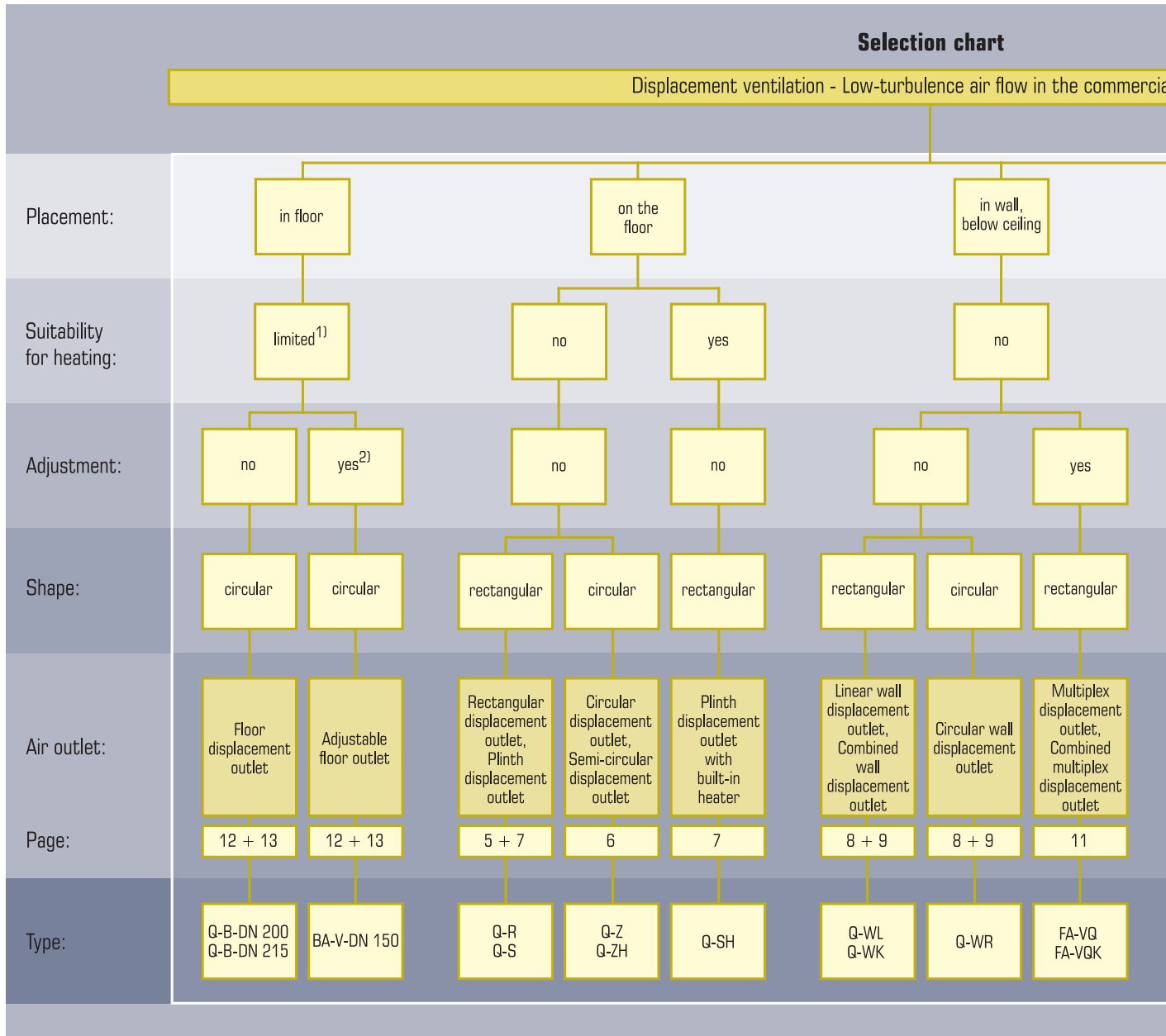


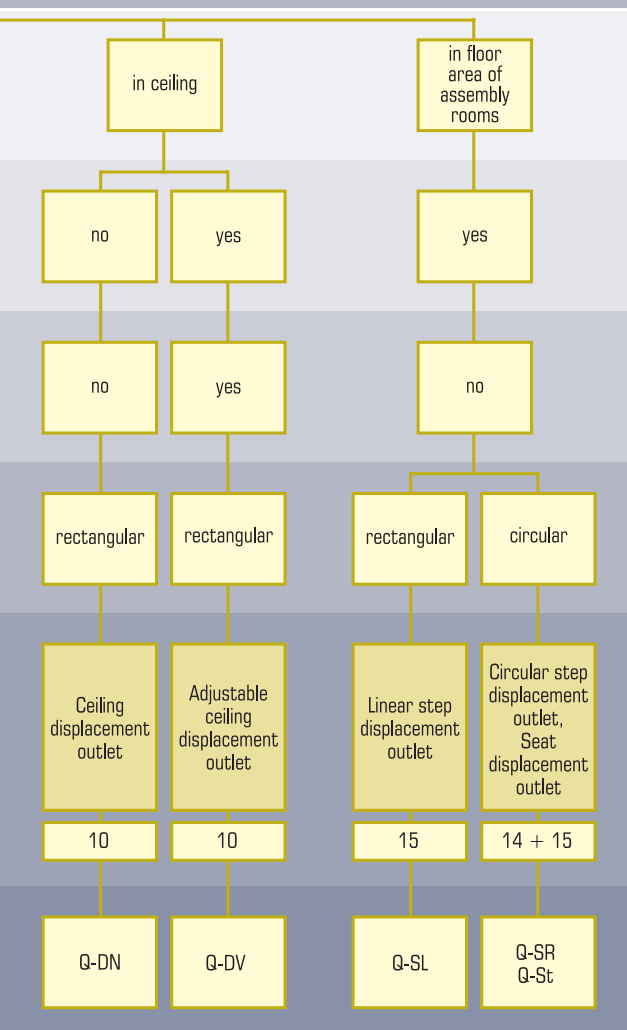


Displacement air outlets

Low-turbulence air flow
in the commercial sector

Displacement ventilation - Low-turbulence air flow in the commercial sector





1) With sufficient covering area $\leq 5 \text{ m}^2/\text{air outlet}$

2) Adjustment of discharge pattern:

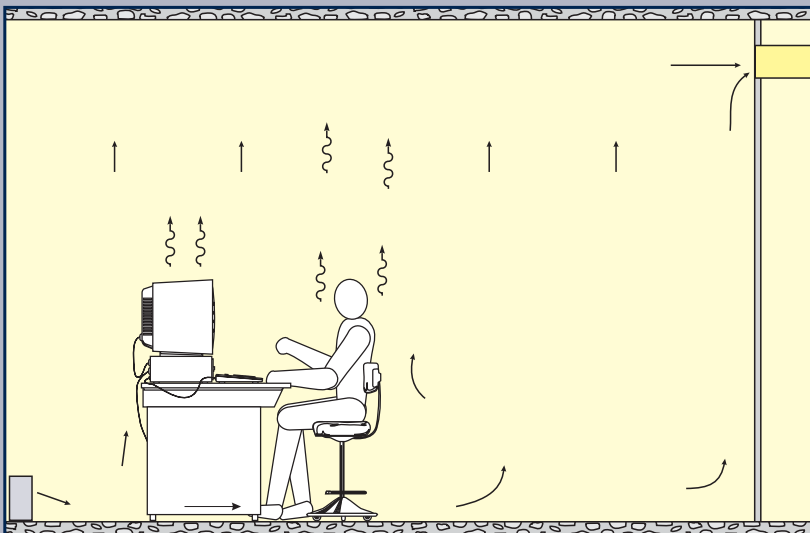
low-turbulence displacement flow or turbulent mixing air flow

KRANTZ KOMPONENTEN provides a broad range of displacement air outlets for commercial applications.

In displacement ventilation, supply air is discharged into the room at low momentum and low turbulence. Since the supply air is colder than the indoor air, it first spreads extensively over the floor. Due to buoyancy forces generated by occupants, electric equipment, solar gain, etc., it then moves gradually upwards and displaces the warmer stale indoor air to the ceiling area where it is extracted. The fresh air is thus supplied directly to the occupants; this ensures a high air quality in the occupied zone.

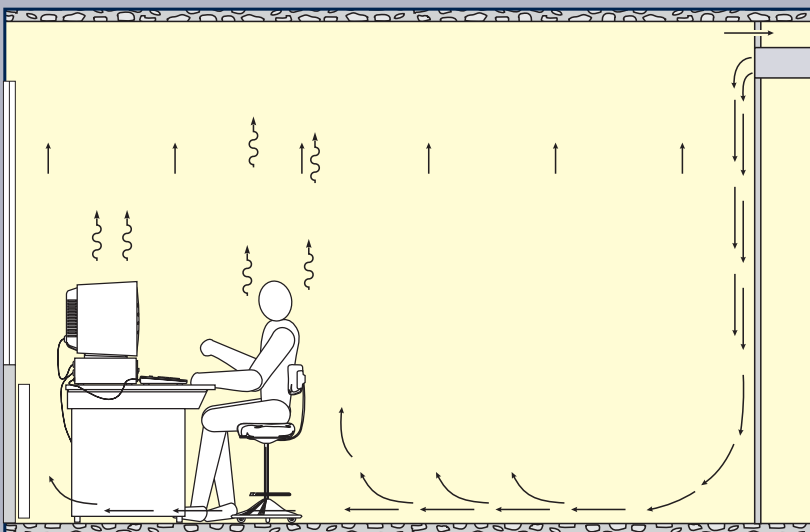
KRANTZ KOMPONENTEN displacement outlets are available in different geometric shapes, for installation in or on the floor, in walls, or in ceilings. They are used in a variety of environments ranging from offices, meeting rooms, foyers and restaurants, to large assembly rooms such as theatres, lecture halls, and convention centres.

Displacement air outlets are basically designed for cooling, i.e. where supply air is colder than indoor air. Yet some displacement outlet models from **KRANTZ KOMPONENTEN** can also be used for heating.



Supply air discharge at floor level

Supply air discharge in upper wall or ceiling area



Rectangular displacement outlet Type Q-R

The air outlet is installed on the floor in front of a wall, parapet or pillar, or free-standing, or it is built into furniture available in the space. Several outlets may be arranged in a row side by side.

The supply air is discharged horizontally from the perforated frontal plate and flows into the room at very low velocity, at about 10 to 30 cm above the floor.

In rooms of very large depth, additional outlets can be installed at the opposite wall as well as at parapets or pillars.

Features:

- Placement on floor, in front of a wall, parapet or pillar, or free-standing
- Outlets arranged singly or in a row side by side
- Even, horizontal, low-turbulence supply air flow
- Easy to integrate into furniture
- Connection from the top or bottom

Volume flow rate:	up to 445 l/s up to 1 600 m³/h
Discharge velocity:	≤ 0.25 m/s
Coverage zone:	5 – 15 m
Sound power level:	≤ 30 dB(A)
Depth:	150 – 400 mm
Width:	500 – 1 380 mm
Height:	150 – 1 380 mm

Technical layout to DS 4021

Rectangular displacement outlet, type Q-R,
in the restaurant at the 'De Koninklijke
Schouwburg' theatre, Den Haag / NL



Rectangular displacement outlet, type Q-R, in the canteen of the publishing house 'Mitteldeutsches Druck- und Verlagshaus' at Halle / D

Rectangular displacement outlet, type Q-R



Air jet pattern of Q-R



Circular displacement outlet, type Q-Z

Semi-circular displacement outlet, type Q-ZH

The circular displacement outlet is installed free-standing in the room. It is preferably used where air outlets may not be installed in walls or at wall bases, nor in the floor, for architectural reasons or due to room layout.

After even, radial, horizontal discharge through the perforated casing, the supply air flows into the room at very low velocity and at about 10 to 30 cm above the floor.

The semi-circular displacement outlet, type Q-ZH, is designed for installation in front of a wall or pillar.

Features:

- Circular outlet free-standing in room; semi-circular outlet to be placed in front of a wall or pillar, or in a room corner
- Even, horizontal, low-turbulence supply air flow
- Connection from the top or bottom, depending on outlet model

Volume flow rate:	40 – 720 l/s ¹⁾ 150 – 2 600 m ³ /h ¹⁾
Discharge velocity:	≤ 0.25 m/s
Coverage zone:	5 – 15 m
Sound power level:	≤ 35 dB(A)
Diameter:	250 – 630 mm
Height:	400 – 1 500 mm

¹⁾ Applies to type Q-Z;
for type Q-ZH: 50% less

Technical layout to DS 4022

Semi-circular displacement outlet, type Q-ZH;
special design installed in the control room of the
Axel Springer printing shop in Essen / D



Circular displacement
outlet, type Q-Z



Semi-circular displace-
ment outlet, type Q-ZH



Air jet pattern of Q-Z



Semi-circular displacement outlet, type Q-ZH, in the restaurant
of the business park at Mägenwil / CH



Circular displacement outlet, type Q-Z, at 'Nord-
deutsche Landeszentralbank' in Braunschweig / D



Plinth displacement outlet

Type Q-S and type Q-SH with built-in heater

This air outlet is used to supply air in rooms with raised floors. It is fitted directly onto a floor opening at the wall base. Several outlets may be arranged in a row side by side. Type Q-SH includes a heating device and is therefore well suited for room heating.

The supply air flows from the pressurized plenum into the air outlet and through its perforated frontal plate into the room. Type Q-S discharges the supply air horizontally, while type Q-SH discharges the air horizontally and vertically at the same time. In the cooling mode, the vertically discharged air tilts towards the floor and flows deep into the room along with the horizontally discharged air. The maximum discharge velocity is 0.20 m/s. With type Q-SH, in the heating mode approx. 75% of the supply air is discharged horizontally through the lower outlet segment. The rest of the supply air flows up towards the built-in heater while inducing indoor air from the window area, and moves upwards along the window pane.

If a jet penetration depth of more than 6 m is required, it will be necessary either to install two opposite rows of plinth displacement outlets or to add floor displacement outlets into the raised floor.



Plinth displacement outlet, type Q-S, in an office of the 'Metallbank', Frankfurt / D

Features:

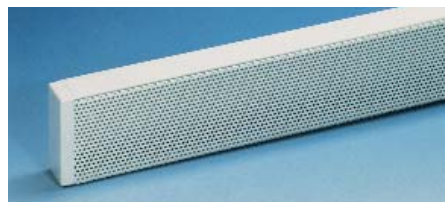
- Placement at wall base in rooms with raised floors
- Outlets arranged singly or in a row side by side
- Type Q-SH well suited for room heating
- Horizontal discharge with type Q-S; discharge simultaneously horizontal and vertical with type Q-SH

Type		Q-S	Q-SH	
Size		—	1	2
Volume flow rate, max.:	$l/(s \cdot m)$ $m^3/(h \cdot m)$	28 100	21 75	42 150
Coverage zone:	m	6	6	6
Sound power level:	dB(A)	≤ 35	≤ 30	≤ 35
Depth:	mm	≤ 100	150	200
Length:	mm	475 – 1 600	1 000, 1 250, 1 500	
Height:	mm	100 – 150	150	300

Technical layout to DS 4008 and DS 4050



Plinth displacement outlet, type Q-S, at 'Kunsthalle Bremen' / D



Plinth displacement outlet, type Q-S



Air jet pattern of Q-S



Plinth displacement outlet with built-in heater, type Q-SH



Air jet pattern of Q-SH (when heating)

Wall displacement outlet

Types Q-WL, Q-WR, and Q-WK

This air outlet is installed in the upper section of a room wall (preferably corridor wall) close to the ceiling. The supply air is discharged through the perforated visible surface at low momentum and low turbulence; it first flows along the wall down to the floor, spreads over the entire floor area and then moves upwards from the heat sources to the ceiling where it is exhausted.

The supply air flows around furniture placed against the wall without any disruption of jet pattern and indoor air flow. The return air is removed either above or at the side of the outlet.

There are three outlet types available:

1. linear wall displacement outlet, type Q-WL,
2. circular wall displacement outlet, type Q-WR, and
3. combined wall displacement outlet, type Q-WK.

The combined wall displacement outlet includes a segment for return air extraction.

Features:

- Installation in a room wall close to the ceiling
- Installation height: 2 to 4 m
- Jet dispersion down the wall, then jet spread over the floor and finally vertical upflow through the occupied zone to the ceiling
- Minimum supply air temperature: 16 °C
- Minimum distance to ceiling: 120 mm
- Outlet connection at the rear

Wall displacement outlet, type Q-WL



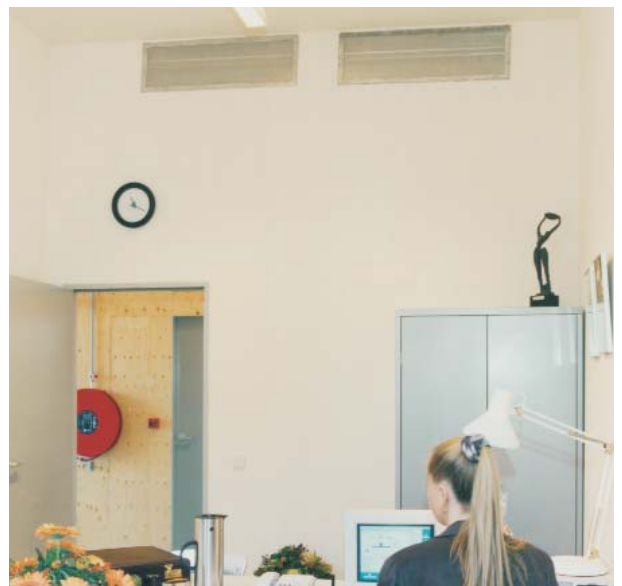
Wall displacement outlet, type Q-WR



Wall displacement outlet, type Q-WK



Wall displacement outlet, type Q-WL, in a meeting room



Wall displacement outlet, type Q-WK, in an office at 'Mediapark Hilversum', Hilversum / NL



Wall displacement outlet, type Q-WR, in a conference room at 'Galerie Wiener Platz' in Cologne / D

Air jet pattern of Q-WL



Air jet pattern of Q-WR



Air jet pattern of Q-WK



Type		Q-WL	Q-WR	Q-WK
Volume flow rate, max.:	l/s m ³ /h	28 100 ¹⁾	36 130	28 100 ¹⁾
Discharge velocity:	m/s	≤ 0.19	≤ 1	≤ 0.19
Coverage zone, approx.:	m	6	6	6
Sound power level:	dB(A)	≤ 33	≤ 34	≤ 32
Depth:	mm	120	94	150
Length:	m	0.6; 0.8; 1.0; 1.2	190; 220; 260 ²⁾	0.6; 0.8; 1.0; 1.2
Height:	mm	180	190; 220; 260 ²⁾	280 up to L = 1 000 310 with L = 1 200

¹⁾ Per metre of length

²⁾ For this type, diameter in mm

Technical layout to DS 4055



Wall displacement outlet, type Q-WK, in an office

Ceiling displacement outlet

Types Q-DN and Q-DV

The ceiling displacement outlet is used for low-turbulence air supply from the ceiling. It is available with rectangular or square perforated air discharge element and can be installed flush with the ceiling or free-hanging.

The supply air is discharged at low momentum and low turbulence vertically down to the floor where it spreads out over the entire area; it then moves upwards from the heat sources to the ceiling where it is exhausted.

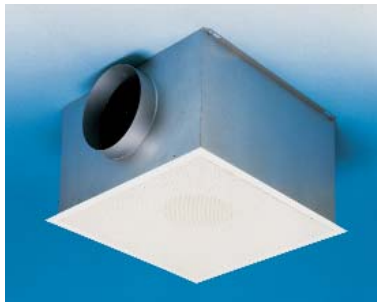
There are two outlet types available: Q-DN is not adjustable, Q-DV is adjustable. The adjustable type is fitted with an openable/closable core tube positioned above the air discharge element; this type can therefore also be used for heating. If the supply air is warmer than the indoor air, the core tube is opened via a servomotor or a thermostatic device; this raises the momentum of the supply air jet and lengthens its penetration depth.

Because of the vertical downflow, the ceiling displacement outlet should not be placed above a permanent workplace.

Features:

- For low-turbulence air supply from the ceiling
- Discharge height: 2.5 - 3.5 m
- Vertical supply air downflow
- Adjustable type also suitable for heating; adjustment by hand, servomotor, or thermostatic device
- Installation flush with ceiling or free-hanging
- Minimum horizontal distance to workplace: 1.5 m
- Connection to supply air duct at side or on top

Ceiling displacement outlet, type Q-DN or Q-DV (same appearance)



Air jet pattern of Q-DN and Q-DV left: cooling mode; right: heating mode (only Q-DV)



Ceiling displacement outlet, type Q-DN, in the cafeteria at 'Mediapark Hilversum', Hilversum / NL



Type	Q-DN	Q-DV
Supply air volume flow rate:	45 – 140 l/s 170 – 500 m³/h	94 – 140 l/s 340 – 500 m³/h
Discharge velocity:	0.15 – 0.45 m/s	0.30 – 0.45 m/s
Temperature difference:		
supply air – indoor air	–1 K to –6 K	+4 K to –6 K
supply air – return air	–3 K to –8 K	+4 K to –8 K
Height:	375 mm	
Size:		
Rectangular model	300 x 1 800 mm	–
Square model	560 x 560 mm	560 x 560 mm

Technical layout to DS 4079

Multiplex displacement outlet

Type FA-VQ

Combined multiplex displacement outlet

Type FA-VQK

Multiplex displacement outlet

For installation preferably in room walls allowing for rear connection to the duct system. This air outlet mainly consists of circular jet bundle elements arranged in one or two rows inside a rectangular perforated plate. Each jet bundle element has 7 thin jet channels with plane discharge angle. The supply air is discharged both by the jet bundle elements and by the plate perforations. The jet bundles have higher momentum and induce the low-turbulence air flowing out of the surrounding plate. The orientation of the jet channels, and hence the air discharge direction, can be altered by rotating the jet bundle elements. The supply air flow can thus be spread to suit personal requirements. Depending on the discharge direction the supply air spreads out over a more or less large wall area and flows down to the floor to slide across the room in a thin layer; it is then gradually driven up by the buoyancy forces generated by various heat sources in the room, and is finally exhausted by the return air openings in the ceiling. The air flow generated is a typical displacement flow.

Features:

- Supply air outlet for installation in the upper section of a room wall
- No minimum spacing to ceiling required; discharge height 2.3 - 4 m
- Jet spread adjustable by hand
- Jet bundle elements arranged in one or two rows (volume flow rate of 2-row design up to 53 l/(s · m); 190 m³/(h · m))
- Minimum supply air temperature: 16 °C
- With connection box for flexible duct connection
- Also usable as return air inlet

Volume flow rate, max.:	1 row	28 l/(s · m); 100 m³/(h · m)
	2 rows	53 l/(s · m); 190 m³/(h · m)
Coverage zone:	approx. 6 m	
Temperature difference:		
supply air – indoor air	–1 K to –6 K	
supply air – return air	–3 K to –8 K	
Sound power level:	≤ 32 dB(A)	
Depth:	100 mm	
Length:	0.6; 0.8 and 1.0 m	
Height:	1 row: 140 mm; 2 rows: 260 mm	

Technical layout to DS 4099 for both types



Multiplex displacement outlet, type FA-VQ, in a Tchibo coffee shop in Berlin / D



Multiplex displacement outlet, type FA-VQ, 1-row design



Multiplex displacement outlet, type FA-VQ, 2-row design



Combined multiplex displacement outlet, type FA-VQK, with jet bundle elements for supply air in the lower segment



Air jet pattern of FA-VQ

Combined multiplex displacement outlet

For both supply air and return air. Installation and arrangement same as for Multiplex displacement outlet. The perforated plate is divided into a lower supply air segment and an upper return air segment. The supply air segment is fitted with jet bundle elements and works like the 1-row Multiplex displacement outlet. The return air is exhausted by the upper segment of the perforated plate.

Features:

- For both supply air and return air; for installation in the upper section of a room wall
- No minimum spacing to ceiling required; discharge height 2.3 - 4 m
- Same jet pattern as 1-row Multiplex displacement outlet
- Minimum supply air temperature: 16 °C
- With connection box as well as supply air and return air spigots for connection to flexible ducts

Volume flow rate, max.:	28 l/(s · m)
(for supply air and return air respectively)	100 m³/(h · m)
Coverage zone:	approx. 6 m
Temperature difference:	
supply air – indoor air	–1 K to –6 K
supply air – return air	–3 K to –8 K
Sound power level:	≤ 28 dB(A)
Depth:	100 mm
Length:	0.6; 0.8 and 1.0 m
Height:	260 mm

Floor displacement outlet

Types Q-B and BA-V

The floor displacement outlet is designed for rooms with raised floors and is mainly used in areas where the fresh air is to be supplied directly to the room occupants, e.g. in assembly rooms, offices, etc.

The supply air is discharged at low velocity through specially shaped openings. The shape and position of the openings generate stable radial jets that flow down to the floor due to the Coanda effect; the result is a low-turbulence, horizontal, radial supply air flow at low velocity.

Features:

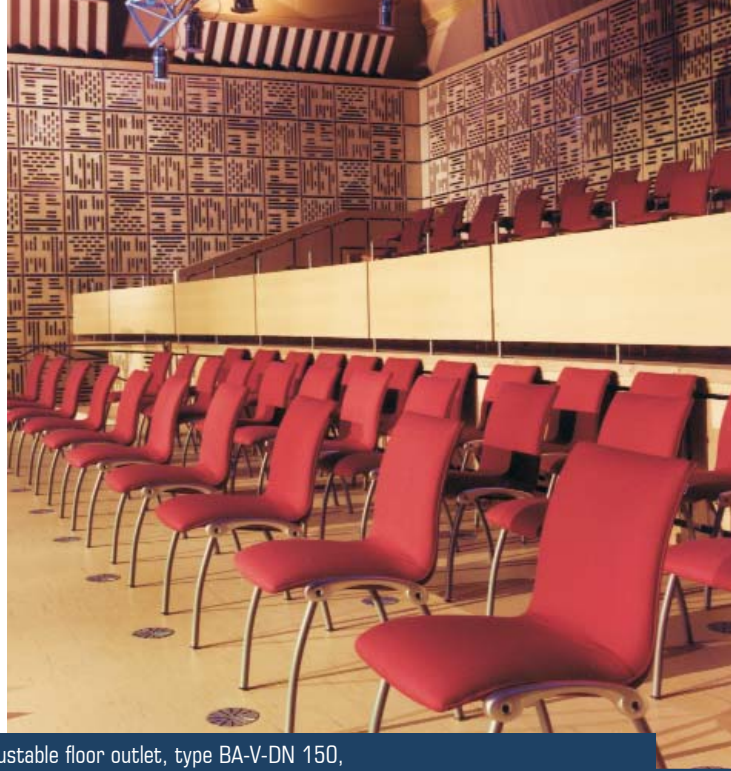
- For rooms with pressurized floor plenums
- Types Q-B-DN 200 and BA-V-DN 150 also available with connection box for connection to duct system
- Supply air jets first inclined upwards, but quickly deflected to horizontal; radial air distribution above floor
- Type Q-B-DN 215 with central recess for insertion of carpeting
- Types Q-B-DN 200 and BA-V-DN 150 with distributor basket optionally fitted with throttle device adjustable from room
- Type BA-V-DN 150 so adjustable that it can operate as a floor displacement outlet or as a floor twist outlet with turbulent vertical upflow



Adjustable floor outlet, type BA-V-DN 150, in a slot machine hall at 'Holland Casino', Utrecht / NL



Figures above:
Floor displacement outlet, type Q-B-DN 200, at 'Congress Center Messe Frankfurt', Frankfurt am Main / D



Adjustable floor outlet, type BA-V-DN 150, at the VARA studios in Hilversum / NL



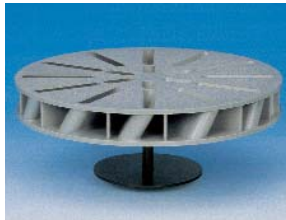
Adjustable floor outlet, type BA-V-DN 150, in a lecture hall of Amsterdam University, Amsterdam / NL

Floor displacement outlet, type Q-B-DN 200, with clamp insert in floor tile

Floor displacement outlet type Q-B-DN 215

Adjustable floor outlet, type BA-V-DN 150; outlet element with adjustment disc

Air jet pattern of Q-B and BA-V



Floor displacement outlet, type Q-B-DN 215, in a meeting room at Lotto Rheinland-Pfalz, Koblenz / D

Type		Q-B-DN 215	Q-B-DN 200	BA-V-DN 150
Volume flow rate, max.:	l/s	≤ 14	≤ 28	≤ 14
	m ³ /h	≤ 50	≤ 100	≤ 50
Air velocity above floor ¹⁾ :	m/s	< 0.15	< 0.15	< 0.15
Coverage zone:	m	4 – 5	4 – 5	4 – 5
Outside diameter:	mm	215	200	150
Height, max.:	mm	65	145 ²⁾	125 ²⁾

¹⁾ At 1 m from air outlet

²⁾ With distributor basket

Technical layout to DS 4062, DS 4007, DS 4047

Seat displacement outlet Type Q-St

The seat displacement outlet is used for air distribution in theatres and other assembly rooms. It is designed for connection to a raised floor with pressurized plenum. The seat leg is constructed as a perforated metal cylinder; it houses a distribution unit which evenly distributes the supply air across the cylinder height. The radially discharged air flows at very low, steady velocity and at low height across the floor.

Features:

- For rooms with floor plenums and fixed seating
- Air outlet built into seat leg
- Low-turbulence, radial and horizontal air spread over the floor
- Very low sound power level
- Suitable for any seat design

Volume flow rate:	5.5 – 14 l/s 20 – 50 m³/h
Discharge velocity:	≤ 0.16 m/s
Sound power level:	≤ 16 dB(A)
Nominal sizes:	DN 100, DN 127, DN 190
Standard height:	200 mm

Technical layout to DS 4028

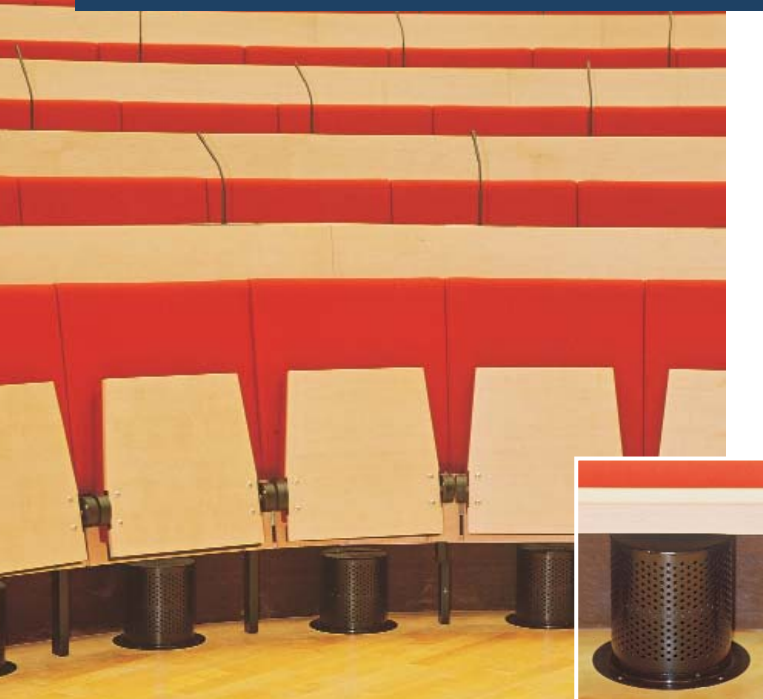
Seat displacement outlet, type Q-St, in an auditorium at 'Musical Production GmbH', Berlin / D



Air jet pattern of Q-St



Seat displacement outlet, type Q-St,
in an auditorium at 'Konrad-Adenauer-Stiftung e.V.', Berlin / D



Seat displacement outlet, type Q-St,
at 'Musical Theater Duisburg', Duisburg / D

Step displacement outlet Types Q-SL and Q-SR

For air distribution in theatres and other assembly rooms with raised floors and seating arranged on steps. The seating can be fixed or removable.

The air outlet is built into the step front and is available in 2 types:

- linear step displacement outlet, type Q-SL, with rectangular frontal plate,
- circular step displacement outlet, type Q-SR, with circular frontal plate.

The linear outlet is variable in length and its height depends on the step height. With curved step fronts, the linear outlets can be arranged in polygons. A built-in jet straightener raises the air jet direction, thus preventing jet constriction and jet acceleration.

The circular step displacement outlet discharges the supply air at low turbulence both axially and radially; this is why the outlet protrudes 8 mm from the step front. The centre distance between 2 circular step displacement outlets is at least 500 mm.

Features:

- For rooms with steps and raised floors
- Air outlet built into step front
- Low-turbulence supply air flow close to floor
- Low sound power level

- 1) With standard height 120 mm
 2) Other heights on request
 3) For this type, diameter in mm



Step displacement outlet, type Q-SL, at Theater Hof, Hof/Saale / D

Type	Q-SL	Q-SR	
		DN 80	DN 100
Volume flow rate:	$\leq 21 \text{ l/(s} \cdot \text{m)}^{1)}$ $\leq 75 \text{ m}^3\text{/(h} \cdot \text{m)}^{1)}$	10 l/s $\leq 35 \text{ m}^3\text{/h}$	16.5 l/s $\leq 60 \text{ m}^3\text{/h}$
Discharge velocity:	$\leq 0.18 \text{ m/s}$	$\leq 0.7 \text{ m/s}$	
Sound power level:	$\leq 15 \text{ dB(A)}$	$\leq 27 \text{ dB(A)}$	
Standard height:	120 mm ²⁾	146 mm ³⁾ and 212 mm ³⁾	
Depth:	75 mm	80 mm	
Length:	500, 1 000, 1 200 and 1 500 mm	-	

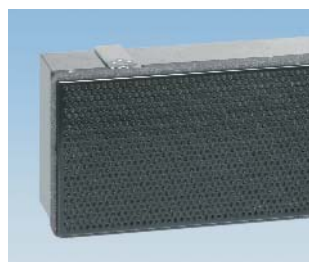
Technical layout to DS 4054



Step displacement outlet, type Q-SL, in the auditorium of the Nordic Embassies, Berlin / D



Step displacement outlet, type Q-SR, at 'Kölnarena', Cologne / D



Step displacement outlet
 top: type Q-SL
 bottom: type Q-SR

Air jet pattern
 top: type Q-SL
 bottom: type Q-SR



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