

Krantz Components

Floor displacement outlet Q-B – DN 215

Air distribution systems

Krantz

Floor displacement outlet

Construction design and function

Preliminary remarks

Displacement ventilation is an air distribution system for commercial buildings where the supply air is discharged at low turbulence above the floor. Due to the buoyancy forces in the room the air flow generated is a displacement flow characterized by very low velocities from the floor to the ceiling. The supply air is distributed by displacement outlets.

For several years Krantz Components has been supplying displacement outlets for wall, parapet or plinth mounting which discharge the supply air from a room side and achieve a jet penetration depth of up to 6 m.

Yet, in some cases, the building features or the room layout do not enable to discharge the supply air from a wall, parapet, or plinth. Further, in rooms deeper than 6 m it is quite often impossible to place further displacement outlets on the opposite side. It is precisely to ensure an adequate air distribution in such situations that Krantz Components has developed the floor displacement outlet.

Construction design and function

The floor displacement outlet is designed for mounting in floor plenums or raised floors. It mainly consists of the floor insert **1** with a specially shaped carpet protection ring **2** and the discharge element **3** with surrounding radial slots.

On their outer side the radial slots are alternately inclined at different angles to the horizontal. This causes the supply air jets to be more or less spread out, which reduces their velocity. The supply air is distributed horizontally and radially above the floor. The coverage radius of the air jets is 4 to 5 m.

Owing to the buoyancy forces from heat sources in the room (e.g. occupants, electric equipment) the supply air rises gradually and flows through the occupied zone at a very low velocity. The stale and heated indoor air is extracted at ceiling level.

The outlet has a recess **4** in its centre which can accommodate a piece of carpet **11** or a plastic lid **10**.

The floor displacement outlet is fitted with a volume flow rate throttle; the flow rate is set from above via a perforated throttle disc **5**.

The entire outlet unit is inserted into an opening in the floor **9** and held in place with four claw fasteners **12**. The carpet protection ring bears the outlet. There is no need for stepped bores in the floor; if necessary, additional boreholes can be drilled with conventional drills.

The floor displacement outlet is made of polycarbonate. Patent rights issued.

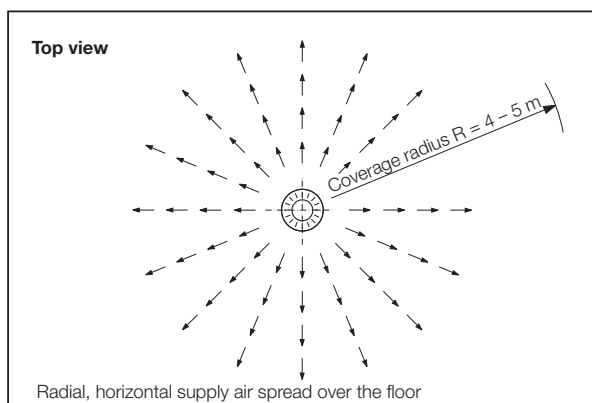
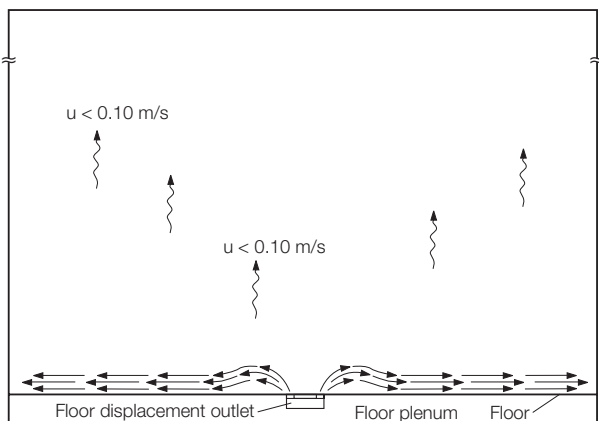


Fig. 1: Jet pattern of floor displacement outlet



Fig. 2: Floor displacement outlet in a raised floor

Floor displacement outlet

Dimensions

- Key**
- 1 Floor insert
 - 2 Carpet protection ring
 - 3 Discharge element
 - 4 Central recess
 - 5 Perforated throttle disc
 - 9 Floor
 - 10 Plastic lid
 - 11 Piece of carpet
 - 12 Claw fastener

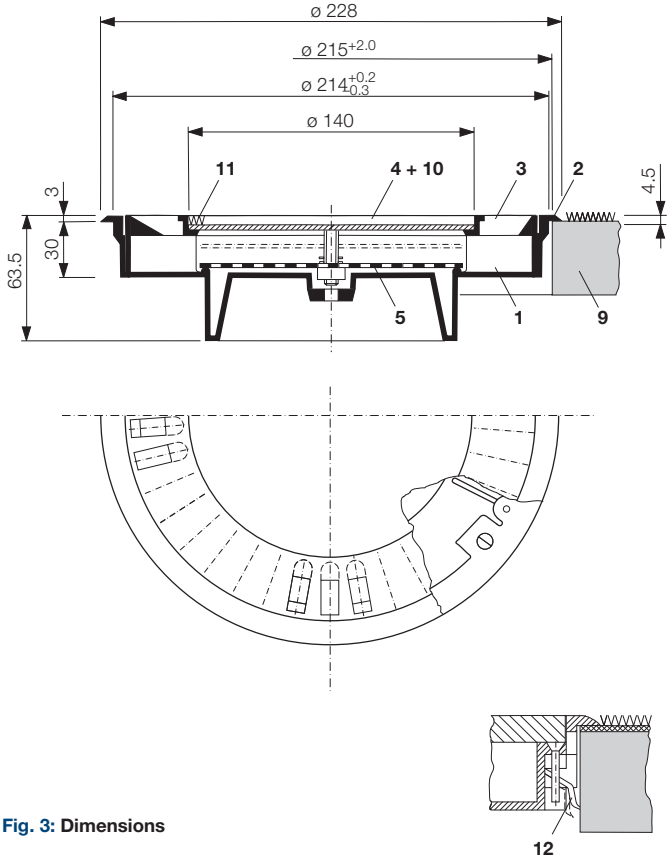


Fig. 3: Dimensions



Fig. 3: Floor displacement outlet in a meeting room

Floor displacement outlet

Air velocities and temperatures

Air velocities and temperatures above the floor

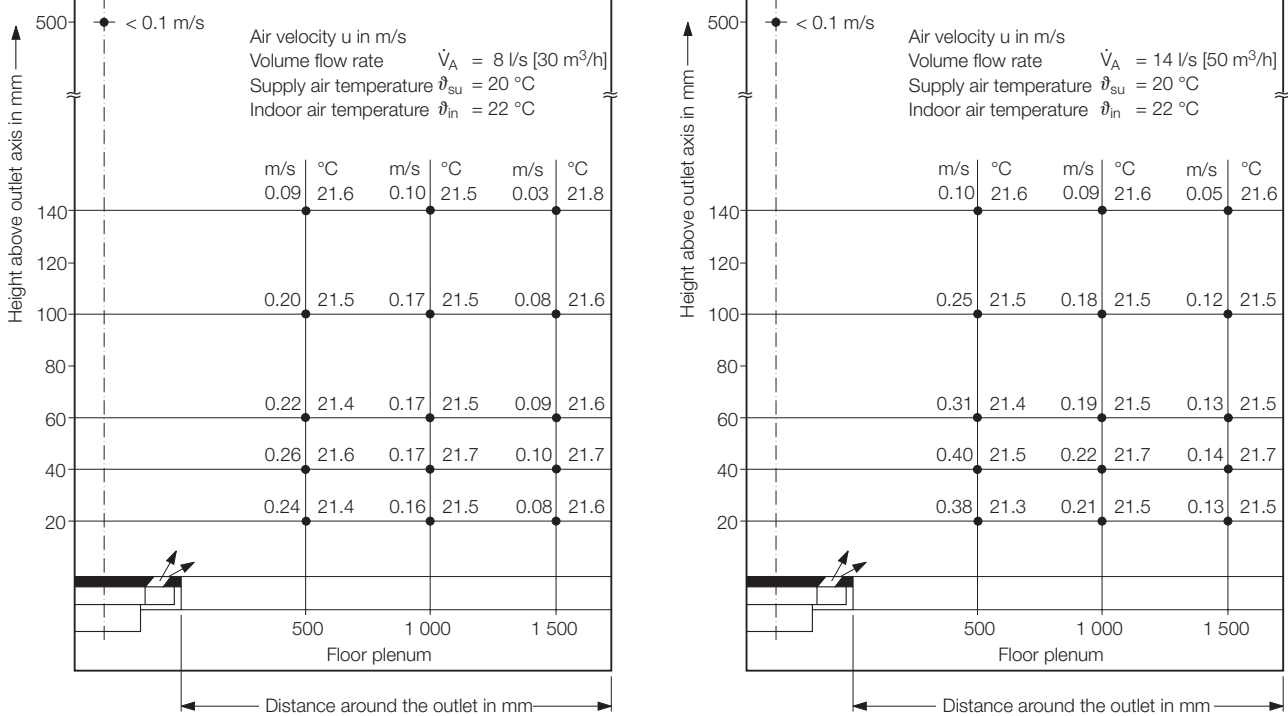


Fig. 5: Air velocities above the floor at two supply air volume flow rates:
 left: $\dot{V}_A = 8 \text{ l/s}$ [$30 \text{ m}^3/\text{h}$]
 right: $\dot{V}_A = 14 \text{ l/s}$ [$50 \text{ m}^3/\text{h}$]

Sound power level

Pressure drop

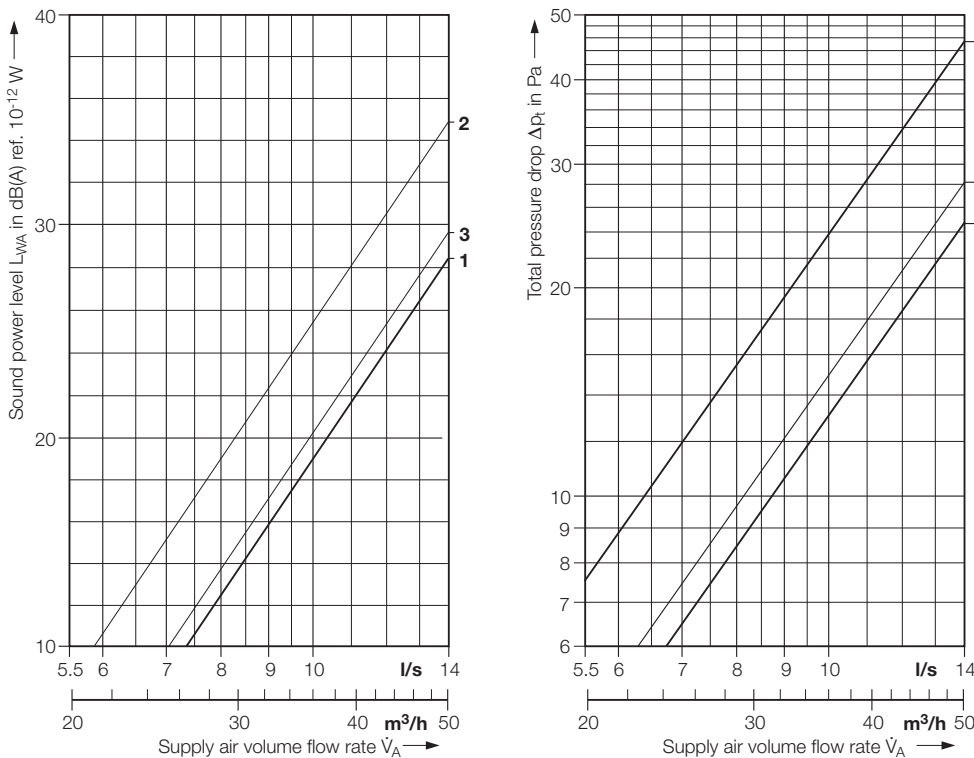


Fig. 6: Sound power level and pressure drop

Floor displacement outlet

Features and layout specifications

Features

- Suited for displacement ventilation in commercial buildings
- For mounting in floor plenums or raised floors
- Jet pattern: low-turbulence horizontal and radial jet spread above the floor
- Outside diameter: 228 mm, outlet height: 63.5 mm
- Coverage radius: 4 to 5 m
- Air volume flow rate: 5.5 to 14 l/s [20 to 50 m³/h]
- Temperature difference between supply air and indoor air: -1 to -4 K
- Indoor air velocities beyond the near-zone < 0.10 m/s
- Low sound power level: $L_{WA} \leq 35$ dB(A) ref. 10^{-12} W
- With volume flow rate throttle adjustable from above during commissioning
- Fits into the same kind of floor openings as for electrical and telecommunications cabling systems
- Fastening to floor with four claw fasteners
- Made of polycarbonate, body-tinted similar to RAL 7037 (dusty grey) ¹⁾

Layout specifications

Air outlet volume flow rate:	5.5 – 14 l/s [20 – 50 m ³ /h]
Temperature difference supply air to indoor air:	-1 to -4 K
Coverage radius of a floor displacement outlet:	4 – 5 m
Min. distance to the next seats:	1 m
Mounting diameter:	214 mm
	fits floor opening \varnothing 215
Load-bearing capacity ²⁾ :	1.4 kN

The air velocities over the floor are shown in Fig. 5 for volume flow rates of 8 and 14 l/s [30 and 50 m³/h]. The air temperatures measured in the floor zone are relatively constant. They are approx. 0.4 K and 0.5 K under the room temperature at air flow rates of 8 l/s and 14 l/s respectively.

¹⁾ Other colours on request

²⁾ Load category to EN 13264: 'particularly light'; point load applied centrally with a steel cube with 25 mm edge length and 2 mm corner radius.

Although the air velocity is < 0.15 m/s already at 1.5 m from the outlet, it is recommended to maintain a minimum distance of 1 m between the outlet and the next seat. This will ensure that the thermal comfort of the occupants is not affected.



Fig. 7: Low-turbulence horizontal jet spread made visible by smoke tracer; the photographs show the air flow at various points in time after discharge

Floor displacement outlet

Type code and tender text

Type code

Q-B - DN 215 - D - ____

Floor displacement outlet
Size
Damper
Accessory

Size

215 = DN 215

Damper

D = throttle disc

Accessory

D = lid for central recess

Tender text

..... units

Floor displacement outlet, circular, for low-turbulence radial and horizontal supply air distribution over the floor,

consisting of:

- floor insert with specially shaped carpet protection ring and four claw fasteners, air discharge element with surrounding radial slots and central recess (4.5 mm deep) for accommodating a piece of carpet, volume flow rate throttle for stepless manual adjustment from above during commissioning,
- accessory: plastic lid to close the central recess.

Material:

- Air outlet made of polycarbonate, outer surfaces scratch resistant, with matted finish; colour similar to RAL 7037 (dusty grey).

Make:

Krantz Components

Type:

Q-B - DN 215 - D - ____

Subject to technical alterations.



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