

Krantz

Floor twist outlets DB-E....
for commercial rooms

Air distribution systems

Krantz

Floor twist outlets

Construction design

Preliminary remarks

Air outlets from Krantz Components for use in raised floor systems operate according to the principle of air distribution from bottom to top and discharge the supply air draught-free into the room. Heat, air pollutants and odorous substances are displaced from the occupied zone to the ceiling zone and removed with the return air. The replacement of indoor air with conditioned supply air is very intensive and the resultant air quality in the occupied zone is extraordinarily good.

Construction design

The main component of the floor twist outlet is the air outlet element **1** with radially arranged air slots **1a**. The DB-E floor twist outlet is used in conventional raised floor systems. If the floor plan is altered, the floor tiles with or without air outlets are easily interchangeable. The local air supply can therefore be increased or reduced as required. There are two connection methods (Figure 1):

Floor plenum system: The supply air enters the air outlet from below. The space under the raised floor acts as an air plenum.

Ductline system: The floor twist outlet is connected to the duct system by means of a rectangular connection box with flexible tubing.

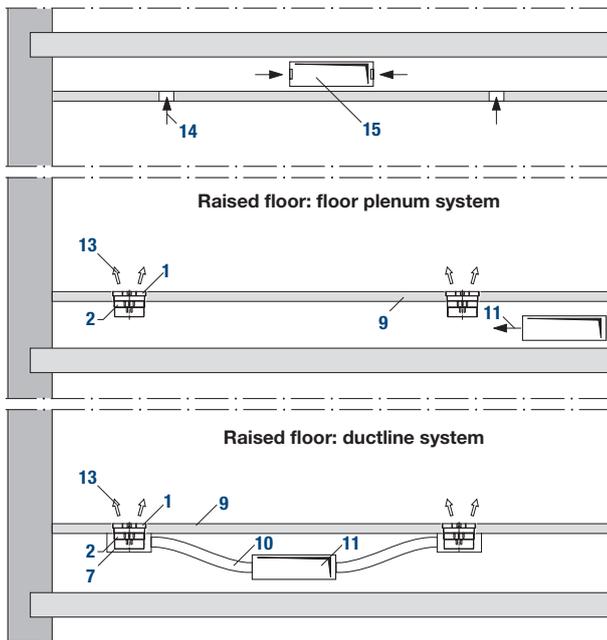


Figure 1: Air supply options
Above: directly from the pressurized plenum
Below: via flexible tubing and connection box

¹⁾ For the preferred air outlet type (kind, size, material) or possible combination of individual components see table on page 11, Types available

There are tried and tested methods for installing the air outlet:

1. Insertion in the stepped bore in the floor tile.
2. Installation with clamp insert in a through bore in the floor tile. There is a collar on the top of the clamp insert which functions as edging for the tile cutout around the air outlet. This option is useful for raised floors with carpeting. The clamp insert can be fixed to the floor tile with a clamp nut **5a**, claw fastener **5b** or clamp collar **5d**. The DN 200 twist element is also lockable to prevent unauthorized removal ¹⁾.

A standard floor twist outlet accessory is the distributor basket **2** for even air supply. There are different types to choose from (Figure 2):

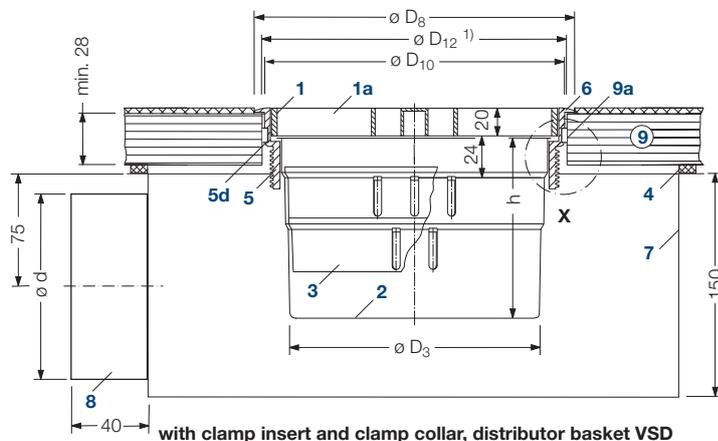
- Standard design, with throttle device: VSD (without throttle device: VS)
- Short type, for low plenums of raised floors; without throttle device: VK
- Low type, with openable basket bottom to enable additional air supply from below, best for raised floors with thicker tiles and lower plenums, with throttle device: VND (without throttle device: VN)
- Perforated sheet metal type for floor air outlets made of aluminium, with VPD throttle device
- Short type with fixed damper for even supply air distribution when using DN 200 in assembly rooms or with low air outlet volume flow rates: VL



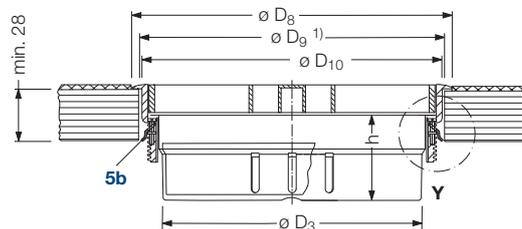
Figure 2: Different types of distributor basket

Floor twist outlets made of plastic

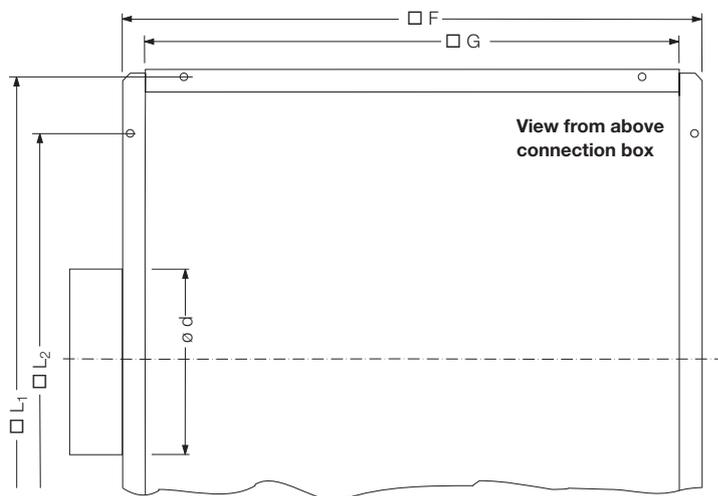
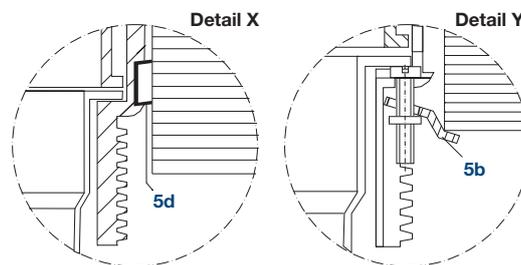
Dimensions



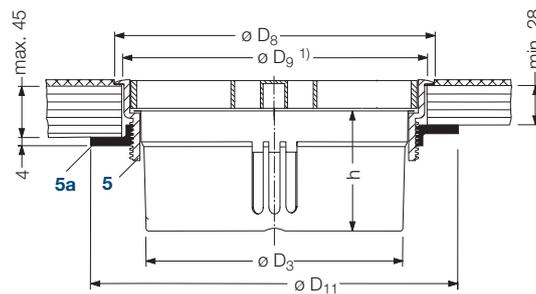
with clamp insert and clamp collar, distributor basket VSD



with clamp insert and claw fastener, distributor basket VND



View from above connection box



with clamp insert and clamp nut, distributor basket VK

Key for all pages

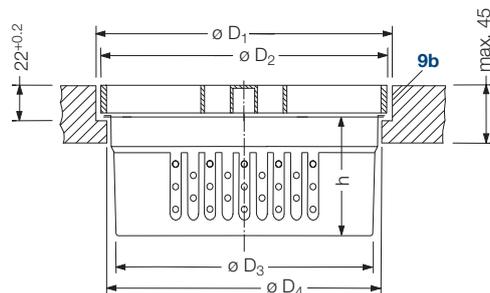
- | | | |
|----------------------|---------------------|-----------------------|
| 1 Floor twist outlet | 5b Claw fastener | 9b Stepped bore |
| 1a Air slot | 5d Clamp collar | 10 Flexible tube |
| 2 Distributor basket | 6 Protective collar | 11 Supply air |
| 3 Throttle device | 7 Connection box | 12 Induced indoor air |
| 4 Sealing (on site) | 8 Connection spigot | 13 Supply air jets |
| 5 Clamp insert | 9 Raised floor | 14 Return air |
| 5a Clamp nut | 9a Through bore | 15 Return air duct |

Dimensions in mm

Size	Floor twist outlet			Clamp insert				
	$\varnothing D_1$	$\varnothing D_2$	$\varnothing D_4$	$\varnothing D_8$	$\varnothing D_9^{1)}$	$\varnothing D_{10}$	$\varnothing D_{11}$	$\varnothing D_{12}^{1)}$
DN 150	150 ^{+0.2}	149.5 ^{+0.4}	141 ⁺¹	172	161 \pm 1	158 ^{+0.5}	205	165 \pm 1
DN 200	200 ^{+0.3}	199.5 ^{+0.4}	191 ⁺¹	230	211 \pm 1	208 ^{+0.5}	255	215 \pm 1

Size	Distributor basket							
	VS, VSD		VK		VN, VND		VL	
	$\varnothing D_3$	h	$\varnothing D_3$	h	$\varnothing D_3$	h	$\varnothing D_3$	h
DN 150	131	105	135	54	—	—	—	—
DN 200	173	126	180	80	183	52	180	80

Size	Connection box				
	$\varnothing d$	F	G	L ₁	L ₂
DN 150	79	280	250	270	200
DN 200	124	380	350	370	300



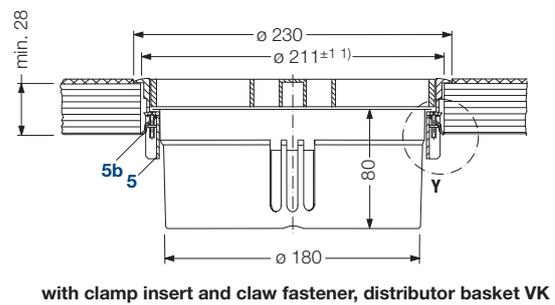
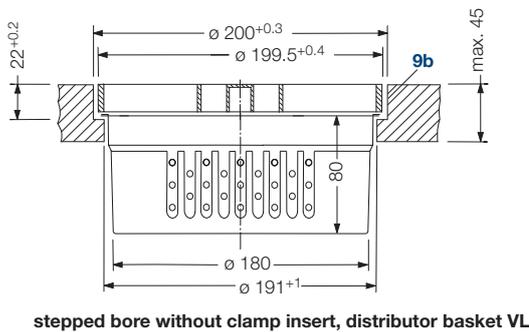
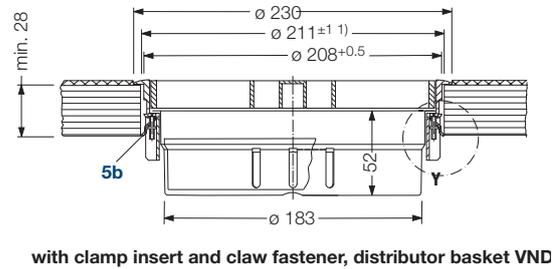
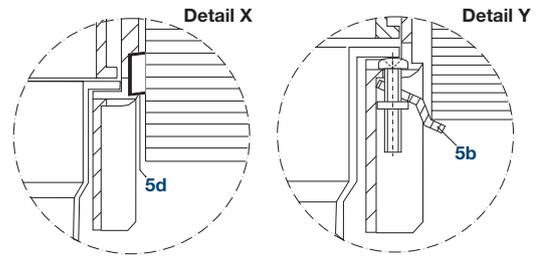
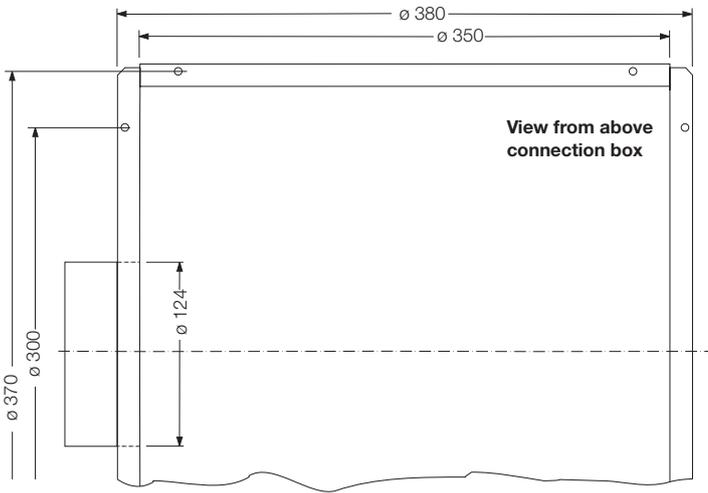
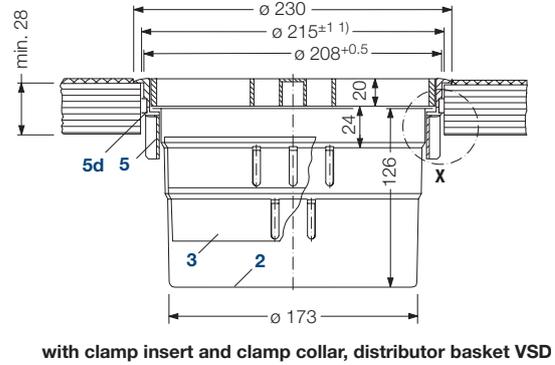
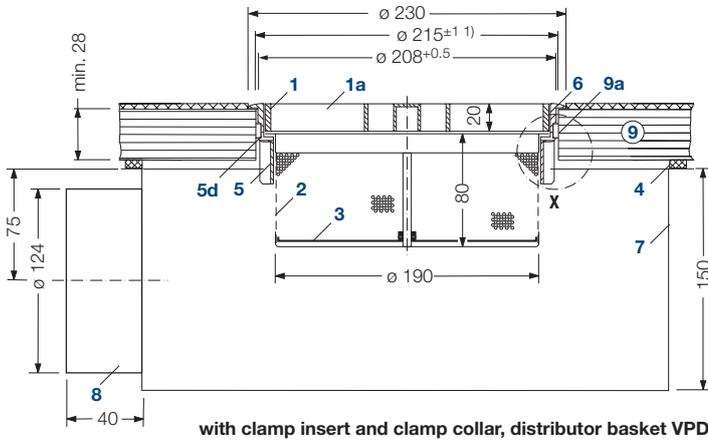
stepped bore without clamp insert, distributor basket VL

Note: Any distributor basket can be used for the respective installation options. Likewise connection box 7 can be used for the air outlet placement in the other figures.

¹⁾ $\varnothing D_9$ = \varnothing -through bore for clamp insert with clamp nut or claw fastener;
 $\varnothing D_{12}$ = the same for clamp collar

Floor twist outlets made of aluminium

Dimensions



Note: Any distributor basket can be used for the respective installation options. Likewise connection box 7 can be used for the air outlet placement in the other figures.

1) $\varnothing 211 \pm 1$ = \varnothing -through bore for clamp insert with claw fastener;
 $\varnothing 215 \pm 1$ = the same for clamp collar

Floor twist outlets

Mode of operation, technical data

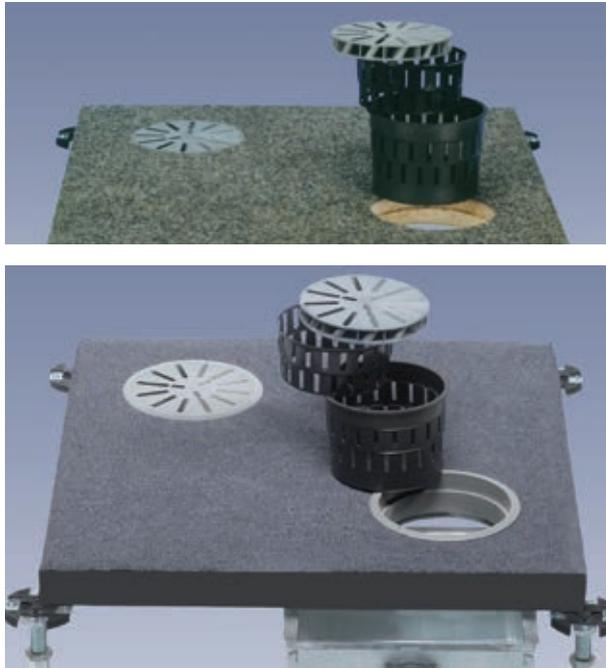


Figure 3: Floor twist outlet DB-E-DN 150 with VSD-type distributor basket; example for installation in floor tiles;
Above: with stepped bore,
Below: with clamp insert and connection box

Mode of operation

The supply air flows into the distributor basket and then through the radial air slots into the room.

Due to the many slots single twisted, high-turbulence air jets form with an intensive induction effect (Fig. 4). This causes a rapid velocity reduction and a fast equalization of the supply air temperature and the indoor air temperature.

The supply from below produces an upflow in the same direction as the buoyancy caused by the heat loads in the room. This up-flow conveys the warm and stale indoor air to the ceiling, where it

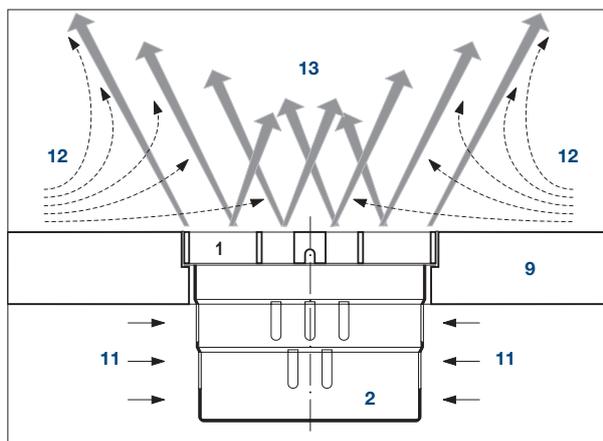


Figure 4: Mode of operation of floor twist outlet

is removed, while the desired indoor air conditions are maintained in the occupied zone. This results in an excellent air quality or high ventilation efficiency.

Recommended minimum spacing between seats is \Rightarrow 1 m for size DN 150 and \Rightarrow 1 to 1.5 m for DN 200.



Figure 5: Jet pattern of floor twist outlet made visible with smoke tracer

Technical data

Nominal diameter		DN 150	DN 200			
Air volume flow rate	l/s	5.5 – 14	14 – 50			
	m ³ /h	20 – 50	50 – 180			
With occupants in room, max.	l/s	12.5	42			
	m ³ /h	45	150			
Max. temperature difference supply air–return air	K	±10				
Supply air temperature	°C	18 – 30				
Max. load-bearing capacity ¹⁾	kN	7.5	12	5.6		
		Twist element made of		PC	Al	PC
		For tile size				
		Floor twist outlets per tile, max.				
500 mm x 500 mm	unit	2	1			
600 mm x 600 mm	unit	4	1			
Min. air outlet spacing	m	approx. 0.3	approx. 0.6			
Min. distance between seat and air outlet	m	approx. 1	approx. 1.5			

¹⁾ Load category to EN 13264: 'heavy'; point load applied centrally with a steel cube with 25 mm edge length and 2 mm corner radius

Floor twist outlets

Temperature equalization

Jet temperature and velocity

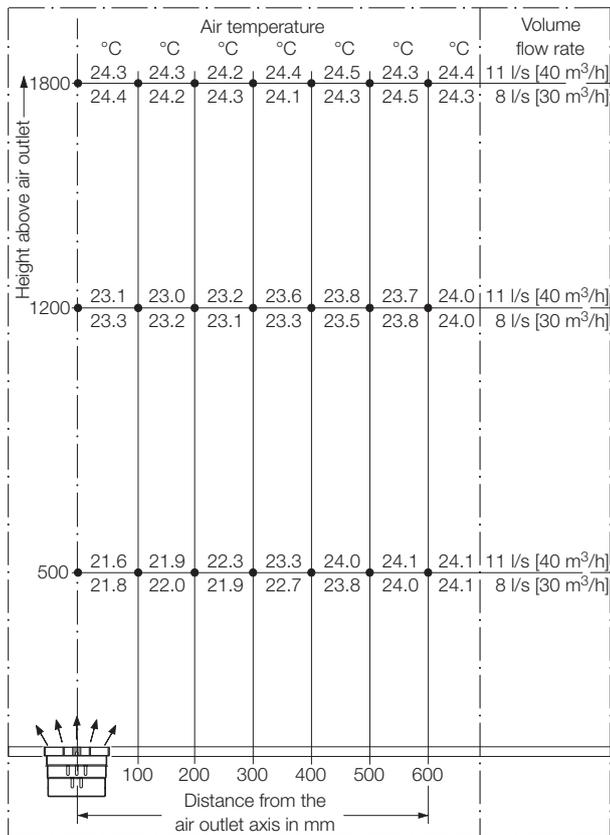
The generation of high-induction supply air jets with rapid velocity reduction and fast equalization of jet temperature and indoor air temperature help a great deal in preventing draughts. Air outlets from Krantz Components are known to be eminently suited to meet this requirement. With air supply from below, **floor twist outlets** thus produce excellent results in draught-free ventilation.

The following figures illustrate jet temperatures for different measurement heights above the floor twist outlets and document the quick reduction of temperature difference between supply air and indoor air. The jet velocity curve is shown on pages 7 and 8.

The jet temperature measurements are based on:
 Supply air temperature = 19°C (prior to discharge)
 Room temperature = 24°C (at a height of 1.2 m)

- Air outlet volume flow rate
- **DN 150:** 8 and 11 l/s [30 and 40 m³/h]
 - **DN 200:** 33 and 42 l/s [120 and 150 m³/h]

Size DN 150



Size DN 200

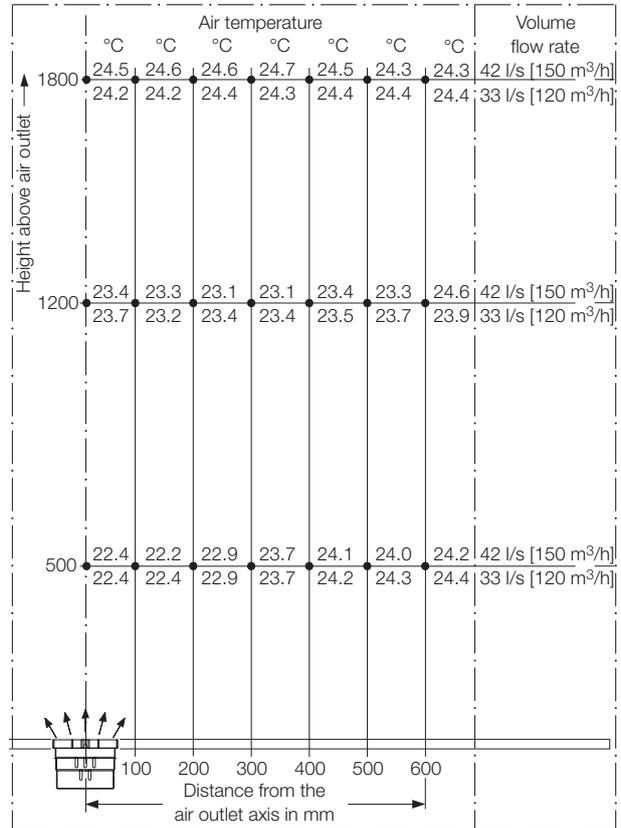


Figure 6: Floor twist outlet in an office

Floor twist outlets

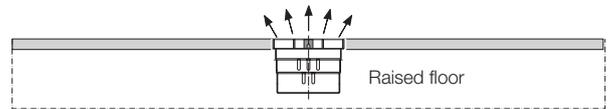
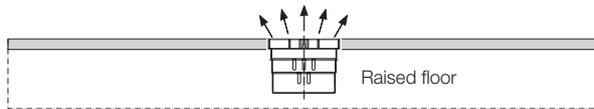
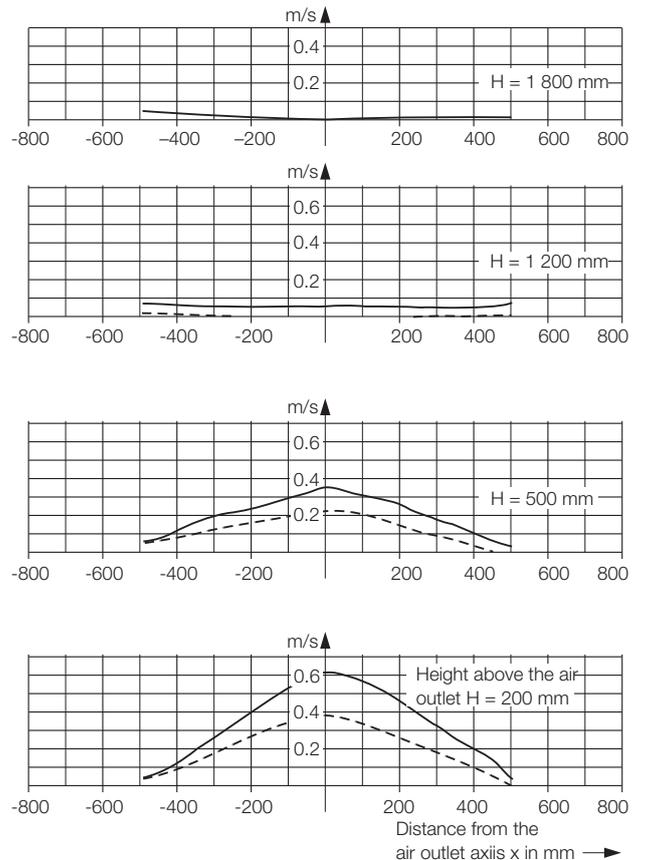
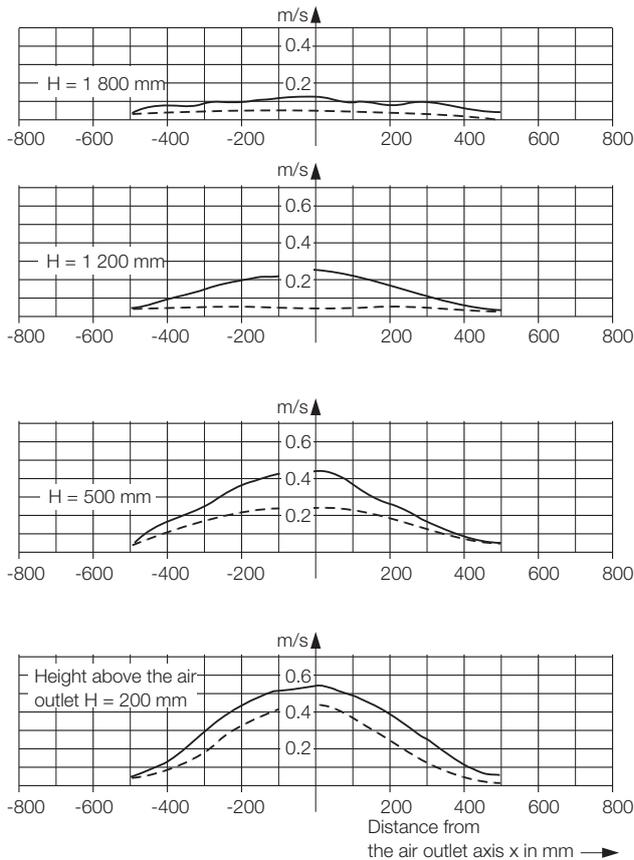
Jet velocity for size DN 150

1. Mean value for DN 150

Air outlet volume flow rate ——— = 11 l/s [40 m³/h];
 - - - - - = 8 l/s [30 m³/h]

a) Temperature difference between supply air and indoor air $\Delta\vartheta = -2$ K (1.2 m height)

b) Temperature difference between supply air and indoor air $\Delta\vartheta = -4$ K (1.2 m height)



Note:

In the graphs (pages 7 and 8) the jet velocities are shown for different reference levels above the floor twist outlets DN 150 and DN 200. The jet velocities are shown resp. for a large and a small volume flow rate and a large and small temperature difference between supply air and indoor air. The theoretical discharge velocity for the large volume flow rate with DN 150 amounts to $\Rightarrow 3.4$ m/s and with DN 200 $\Rightarrow 4.1$ m/s.

The jet velocity – for the resp. larger volume flow rate – has already dropped for size DN 150 at 500 mm height to approximately 0.45 m/s and for size DN 200 at 500 mm height to approximately 0.8 m/s. At a height of 1800 mm jet velocity is ≤ 0.2 m/s.

Floor twist outlets

Jet velocity for size DN 200

2. Mean value for DN 200

Air outlet volume flow rate — = 42 l/s [150 m³/h];
 - - - - = 33 l/s [120 m³/h]

a) Temperature difference between supply air and indoor air $\Delta\vartheta = 0$ K (1.2 m height)

b) Temperature difference between supply air and indoor air $\Delta\vartheta = -5$ K (1.2 m height)

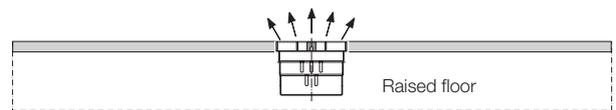
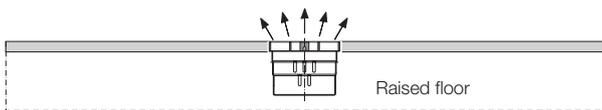
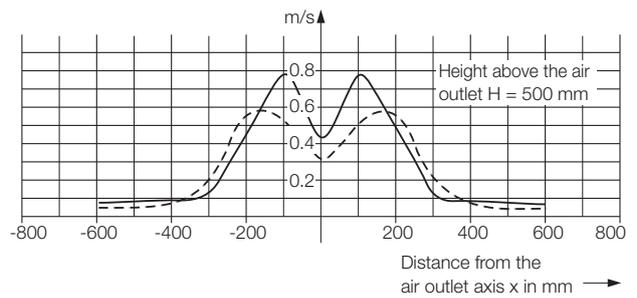
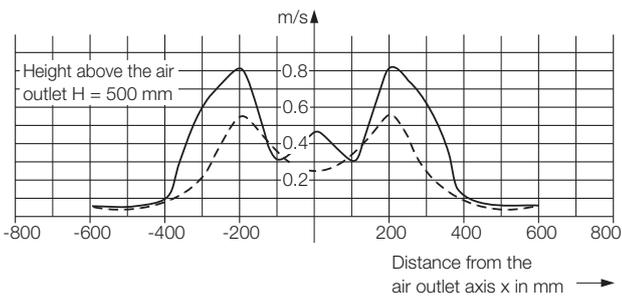
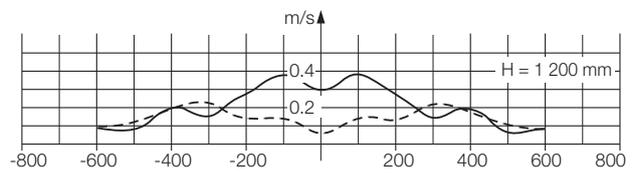
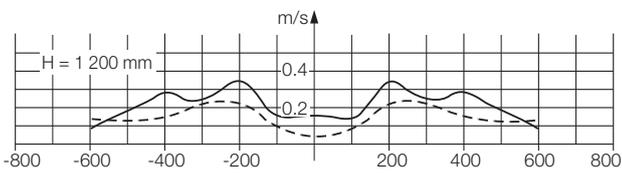
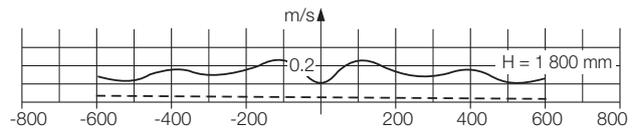
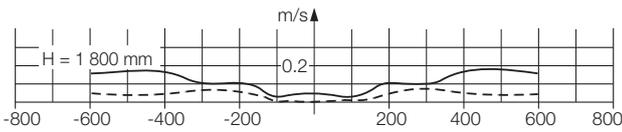
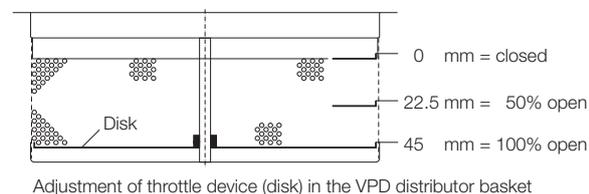
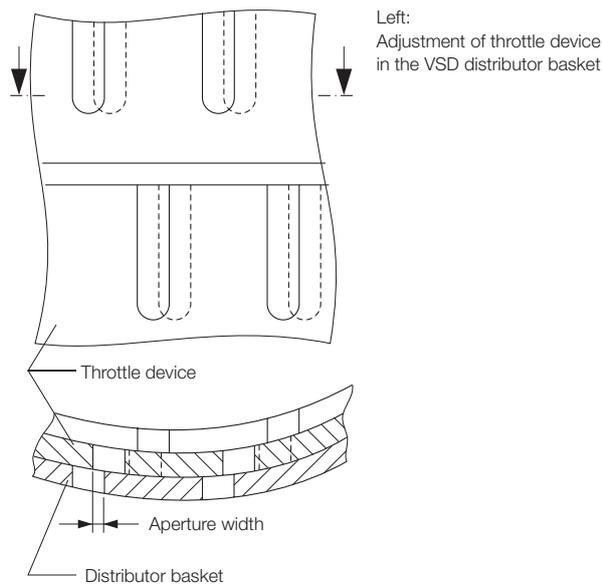
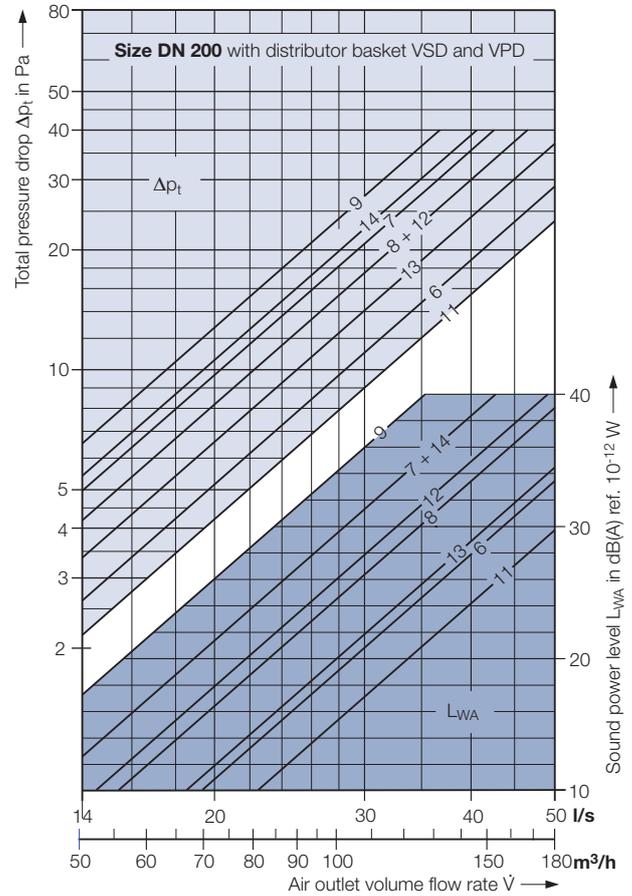
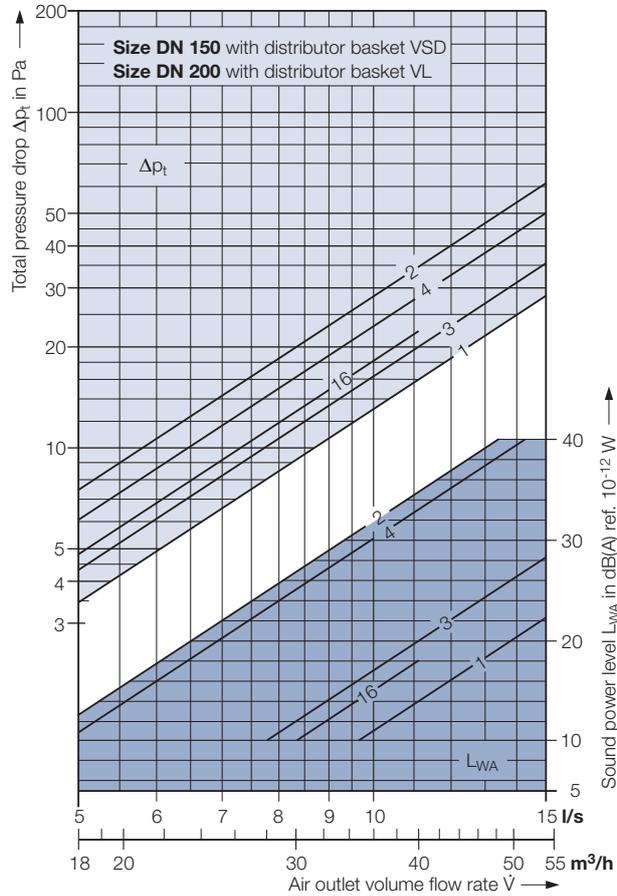


Figure 7: View of installed DN 200 floor twist outlets,
Left: in stepped bore
Right: with clamp insert in a through bore

Floor twist outlets

Sound power level and pressure drop ¹⁾



Key to graphs

No.	Size	Type	Distributor basket	
			Throttle device ²⁾ % open	Aperture width / Disk lift mm
1	DN 150	VSD	100	5.0
2			50	2.5
3			100	5.0
4			50	2.5
6	DN 200	VSD	100	8.0
7			50	4.0
8			100	8.0
9	DN 200	VPD	50	4.0
11			100	45.0
12			50	22.5
13	DN 200	VPD	100	45.0
14			50	22.5
16	DN 200	VL	without throttle device	

¹⁾ The sound power level and pressure drop pertain to the use of the VSD, VPD and VL distributor baskets. When using VK and VND distributor baskets, the values approximate those of the VSD distributor basket.

²⁾ The throttle device in the VSD distributor basket enables reduction of air volume rate, preferably up to 50% as well as full shutoff

without connection box
 with connection box

Floor twist outlets

Layout specifications

Sound power level and total pressure drop

No.	Air outlet volume flow rate		Total pressure drop	Sound power level L_W in dB ref. 10^{-12} W								
	\dot{V}_A			L_{WA}	Octave band centre frequency in Hz							
	l/s	m ³ /h	Pa		dB(A)	63	125	250	500	1 K	2 K	4 K
DN 150 with distributor basket VSD												
1	8	30	9	6	22	12	—	—	—	—	—	—
	11	40	18	14	30	20	17	11	—	—	—	—
	12.5	45	20	17	33	23	20	14	—	—	—	—
	14	50	24	20	36	26	23	17	12	—	—	—
2	8	30	18	27	20	18	20	18	27	—	—	—
	11	40	35	35	28	26	28	26	35	12	—	—
	12.5	45	43	38	31	29	31	29	38	15	—	—
	14	50	52	42	35	33	35	33	42	19	—	—
3	8	30	12	12	23	18	17	—	—	—	—	—
	11	40	20	20	31	26	25	17	12	—	—	—
	12.5	45	25	23	34	29	28	20	15	—	—	—
	14	50	32	26	37	32	31	23	18	—	—	—
4	8	30	16	25	23	21	25	20	23	—	—	—
	11	40	28	33	31	29	33	28	31	13	—	—
	12.5	45	35	36	34	32	36	31	34	16	—	—
	14	50	44	39	37	35	39	34	37	19	—	—
DN 200 with distributor basket VSD												
6	25	90	8	16	27	20	19	14	10	—	—	—
	33	120	14	24	35	28	27	22	18	10	—	—
	42	150	20	29	40	33	32	27	23	15	—	—
	50	180	30	34	45	38	37	32	28	20	11	—
7	25	90	15	27	32	26	28	24	23	16	—	—
	33	120	25	34	39	33	35	31	30	23	13	—
	42	150	38	39	44	38	40	36	35	28	18	—
8	25	90	12	22	22	26	25	19	17	—	—	—
	33	120	21	29	29	33	32	26	24	15	—	—
	42	150	33	35	35	39	38	32	30	21	11	—
	50	180	45	39	39	43	42	36	34	25	15	—
9	25	90	19	32	22	28	32	27	30	19	10	—
	33	120	34	39	29	35	39	34	37	26	17	—

No.	Air outlet volume flow rate		Total pressure drop	Sound power level L_W in dB ref. 10^{-12} W								
	\dot{V}_A			L_{WA}	Octave band centre frequency in Hz							
	l/s	m ³ /h	Pa		dB(A)	63	125	250	500	1 K	2 K	4 K
DN 200 with distributor basket VPD												
11	25	90	6	13	22	19	17	10	—	—	—	—
	33	120	11	20	29	26	24	17	15	—	—	—
	42	150	17	25	34	31	29	22	20	10	—	—
	50	180	23	30	39	36	34	27	25	15	—	—
12	25	90	12	23	27	20	19	17	19	18	—	—
	33	120	21	30	34	27	26	24	26	25	13	—
	42	150	33	36	40	33	32	30	32	31	19	—
	50	180	45	41	45	38	37	35	37	36	24	—
13	25	90	10	17	18	20	20	15	13	—	—	—
	33	120	17	25	26	28	28	23	21	12	—	—
	42	150	26	30	31	33	33	28	26	17	—	—
	50	180	47	34	35	37	37	32	30	21	—	—
14	25	90	16	27	22	26	24	21	23	21	11	—
	33	120	27	34	29	33	31	28	30	28	18	—
	42	150	42	39	34	38	36	33	35	33	23	—
	50	180	42	39	34	38	36	33	35	33	23	—
DN 200 with distributor basket VL												
16	8	30	13	10	8	9	6	8	6	—	—	—
	10	35	17	14	12	13	10	12	10	5	—	—
	11	40	22	18	16	17	14	16	14	9	—	—

Size	Insertion loss in dB in dB							Mean value
	Octave band centre frequency in Hz							
	125	250	500	1 K	2 K	4 K	8 K	
DN 150	19	14	9	7	6	6	3	9
DN 200	16	11	7	3	4	3	0	6
DN 150	17	15	11	7	7	5	2	9
DN 200	14	11	8	3	2	4	2	6

	without connection box
	with connection box

Layout specifications

Size DN 150

In applications with very high comfort requirements, the DN 150 floor twist outlet has proved to be most effective. This applies for use in offices with more or less even specific heat loads and in rooms with different local heat load factors such as EDP rooms or control rooms.

We recommend an air outlet volume flow rate in the machinery zone of about 12.5 l/s [45 m³/h] and in the occupied zone of maximum 10 l/s [35 m³/h].

Minimum air outlet spacing of workplaces with continual presence of personnel must be 1 m.

A denser air outlet placement is more effective for specific heat removal from the machinery zone. Here it is better to use size DN 150, since the floor tiles can accommodate up to four air outlets, depending on measurements. Size DN 150 thus enables an exact adjustment of the supply air volume flow rate to different local machinery heat loads.

Floor twist outlets

Types available and features

Size DN 200

Selecting air outlets with large volume flow rates has the following advantages:

- low number of air outlets,
- few apertures in raised floor,
- few supply pipes with direct duct connection,
- low investment costs.

In such cases the use of size DN 200 has proved to be effective. The volume flow rate is four times larger than with size DN 150. It amounts to max. 50 l/s [180 m³/h], in the occupied zone max. 42 l/s [150 m³/h].

Due to the large (local) volume flow rate, higher jet velocities occur in the near zone of the outlet as compared with size DN 150. A brief spell above the air outlet is not, however, uncomfortable.

Types available

Component	Size					
	DN 150			DN 200		
	Materials ¹⁾					
	PC	Al	St	PC	Al	St
Twist element	•			•	•	
For installation in through bore:						
Clamp insert						
- with clamp collar SR		2)		• 3)	• 4)	
- with claw fastener SK	•			• 3)	• 4)	
- with clamp nut SM	•			• 3)		
For installation in through and stepped bore						
Distributor basket						
- Standard type VS	•			•		
- with throttle device VSD	•			•		
- Short type VK	•			•		
- Low type VN				•		
- with throttle device VND				•		
- Perforated sheet metal type with throttle device VPD						• 5)
- Short type with fixed damper VL				•		
Connection box			•			•

• = available

1) PC = polycarbonate; Al = aluminium; St = galvanized sheet metal;

2) On request

3) Standard lock

4) Optional lock

5) Only combinable with aluminium type

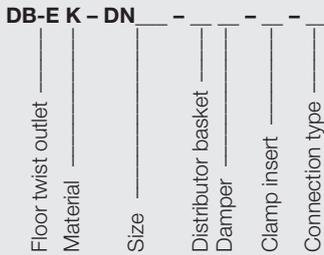
Features

- For turbulent mixing air flow in the commercial sector with air supply from the floor
- Installation in conventional raised floor systems
- Air supply direct from the pressurized plenum or via connection box with flexible tubing
- High-induction, rotationally symmetric, stable vertical jet
- Supply air flow in the direction of thermal flow, from floor to ceiling
- Intensive admixture of supply air and indoor air
- High ventilation efficiency
- Max. temperature difference supply air – return air ±10 K
- Supply air temperature 18 – 30°C
- Low sound power level
- Min. distance between air outlet and seat approx. 1 m to 1.5 m
- Air volume flow rate 5,5 – 14 l/s [20 – 50 m³/h] for DN 150 and 14 – 50 l/s [50 – 180 m³/h] for DN 200
- Available in sizes DN 150 and DN 200
- Floor installation by insertion in a stepped bore or installation with a clamp insert in a through bore of floor tile
- Fastening of clamp insert to the floor tile either with clamp collar or claw fastener, also with clamp nut in the plastic option
- Twist element and clamp insert DN 200 made of polycarbonate or aluminium, connection box made of galvanized sheet metal
- The DN 200 twist element can be locked against unauthorized removal; this lock is
 - standard if clamp insert is made of polycarbonate,
 - optional if clamp insert is made of aluminium
- Different distributor baskets made of polycarbonate and steel, with or without throttle device
- Short type with fixed damper for low volume flow rates for use in assembly rooms
- Can be walked over, driven over and can support a wheelchair

Floor twist outlets made of plastic

Type code ant tender text

Type code



Material

K = Plastic

Size

150 = DN 150
200 = DN 200

Distributor basket

VS = Standard type
VK = Short type
VL²⁾ = Short type with fixed damper
VN²⁾ = Low type

Damper

O = no volume flow damper
D = with throttle device

Clamp insert

SO = no clamp insert
SR³⁾ = Clamp nut
SK = Claw fastener
SM = Clamp ring

Connection type

P = Floor plenum
K = Connection box

Tender text

..... Units

Air outlet for floor installation with high induction effect in floor zone for rapid reduction of air discharge velocity and intensive energy exchange with indoor air

consisting of:

- Twist element with radial slots to generate twist effect
- optional with distributor basket
 - Standard distributor basket with surrounding slots in basket casing, optional with throttle device for reduction of supply air volume flow rate as required for the individual air outlet.
 - Short distributor basket with surrounding slots in basket casing, best for low raised floors, without throttle device.
 - Short distributor basket with surrounding slots in basket casing, best for low raised floors, without throttle device.
 - Low distributor basket²⁾ with surrounding slots in basket casing and openable bottom, best for raised floors with thicker tiles and lower plenums, optional with throttle device for reduction of supply air volume flow rate as required for the individual air outlet.
 - Short type with fixed damper²⁾ for even supply air distribution when used in assembly rooms or with low air outlet volume flow rates.
- optional with clamp insert for installation in through bore of floor tile optional with clamp collar³⁾, with claw fastener or with clamp nut.
- Twist element of DN 200 with lock against unauthorized removal.
- Connection box for direct connection of air outlet to a flexible tube.

Air outlet can be walked over, driven over and can support a wheelchair.

Materials:

- Twist element made of polycarbonate, painted similar to RAL 7037, dust grey¹⁾
- Clamp insert made of polycarbonate, painted similar to RAL 7037, dust grey¹⁾
- Distributor baskets VSD, VK and VND made of polycarbonate, body-tinted in a colour similar to RAL 9005, jet-black
- Distributor basket VPD made of sheet metal
- Distributor basket VL made of polycarbonate, body-tinted in a colour similar to RAL 9005, jet-black; damper made of sheet metal
- Connection box made of galvanized sheet metal

Make:

Krantz Components

Type:

DB-EK - DN ___ - ___ - ___ - ___

Subject to technical alterations.

¹⁾ Other colours on request

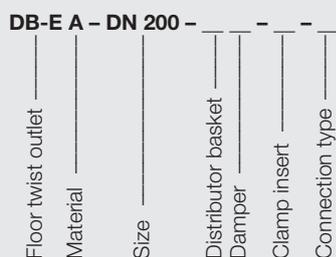
²⁾ Available for DN 200

³⁾ On request for DN 150

Floor twist outlets made of aluminium

Type code and tender text

Type code



Material

A = Aluminium

Size

200 = 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

O = no volume flow damper
D = with throttle device

Clamp insert

SO = no clamp insert
SK = Claw fastener
SR = Clamp ring

Connection type

P = Floor plenum
K = Connection box

Tender text

..... Units

Air outlet for floor installation with high induction effect in floor zone for rapid reduction of air discharge velocity and intensive energy exchange with indoor air,

consisting of:

- Twist element with radial slots to generate twist effect,
- optional with distributor basket
 - Standard distributor basket with surrounding slots in basket casing, optional with throttle device for reduction of supply air volume flow rate as required for the individual air outlet.
 - Short distributor basket with surrounding slots in basket casing, best for low raised floors, without throttle device.
 - Low distributor basket with surrounding slots in basket casing and openable bottom, best for raised floors with thicker tiles and lower plenums, optional with throttle device for reduction of supply air volume flow rate as required for the individual air outlet.
 - Perforated sheet metal distributor basket, including throttle device for reduction of supply air volume flow rate as required for the individual air outlet.
 - Short type with fixed damper for even supply air distribution when used in assembly rooms or with low air outlet volume flow rates.
- optional with clamp insert for the installation in through bore of floor tile, optional with clamp collar or with claw fastener.
- optional twist element with lock against unauthorized removal.
- Connection box for direct connection of air outlet to a flexible tube.

Air outlet can be walked over, driven over and can support a wheelchair.

Materials:

- Twist element made of aluminium, natural colour ¹⁾
- Clamp insert made of aluminium, natural colour ¹⁾
- Distributor basket made of galvanized sheet metal or polycarbonate
- Distributor baskets VSD, VK and VND made of polycarbonate, body-tinted in a colour similar to RAL 9005, jet-black
- Distributor basket VPD made of sheet metal
- Distributor basket VL made of polycarbonate, body-tinted in a colour similar to RAL 9005, jet-black; damper made of sheet metal Connection box made of galvanized sheet metal

Make:

Krantz Components

Type:

DB-EA - DN 200 - - - - -

Subject to technical alterations.

¹⁾ Powder-coated on request

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The logo for Krantz GmbH, featuring the word "Krantz" in a stylized, blue, cursive script font.