



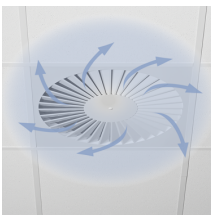
Circular diffuser faces with circular plenum box



Square diffuser face with square plenum box



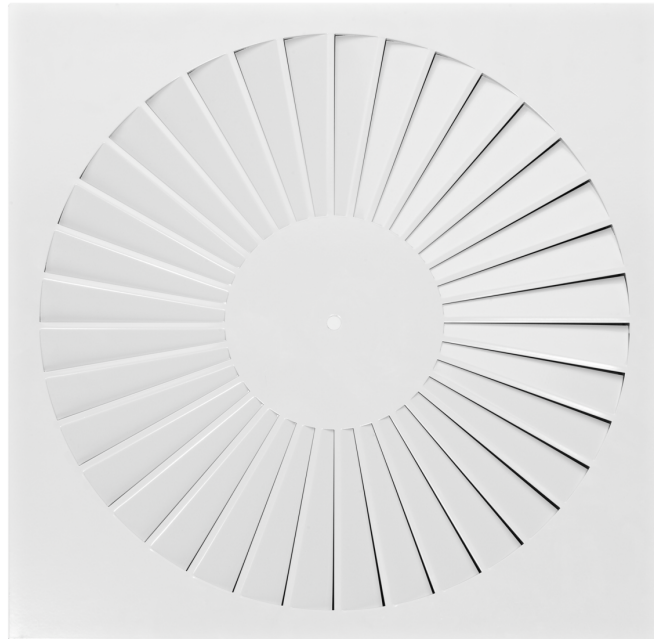
Circular diffuser face with circular plenum box and top entry spigot



Horizontal swirling air discharge

Ceiling diffusers

FD



For comfort zones, with fixed air control blades

Circular and square ceiling swirl diffusers that create high induction levels, for high room air change rates

- Nominal sizes 300, 400, 500, 600, 625
- Volume flow rate range 9 – 235 l/s or 31 – 846 m³/h
- Diffuser face made of galvanised sheet steel, powder-coated
- For supply and extract air
- For variable and constant volume flows
- For all types of ceiling systems, and with an extended border also suitable for freely suspended installation
- High induction results in a rapid reduction of the temperature difference and airflow velocity
- Very high room air change rate possible thanks to row arrangement with a minimum pitch distance of 0.9 m
- Ideal for comfort zones
- Circular diffuser faces can be easily mounted without tools in a circular plenum box with horizontal spigot

Optional equipment and accessories

- Exposed diffuser face available in RAL CLASSIC colours
- Square plenum box with cord-operated damper unit and pressure tap

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General information

Application

- Ceiling swirl diffusers are used as supply air or extract air diffusers for comfort zones
- Attractive design element for building owners and architects with demanding aesthetic requirements
- Horizontal swirling supply air discharge for mixed flow ventilation
- The efficient swirl creates high induction levels, thereby rapidly reducing the temperature difference and airflow velocity (supply air variant)
- For variable and constant volume flows
- For supply air to room air temperature differences from -12 – +10 K
- For room heights up to 4 m (lower edge of suspended ceiling)
- For all types of ceiling systems
- With an extended border also suitable for freely suspended installation (supply air variant)

Special features

- High induction results in a rapid reduction of the supply air to room air temperature difference and airflow velocity
- For all types of ceiling systems, and with an extended border also suitable for freely suspended installation
- Horizontal or vertical duct connection
- Very high room air change rate possible thanks to row arrangement with a minimum pitch distance of 0.9 m

Nominal sizes

- 300, 400, 500, 600, 625

Variants

- FD-Q: square diffuser face
- FD-R: circular diffuser face
- FD-*-Z: Supply air
- FD-*-A: Extract air

Connection

- H: horizontal duct connection
- V: vertical duct connection

Accessories

Lip seal

- For circular plenum boxes with horizontal connection spigot, the lip seal is only available in combination with the flow adjustment damper. Otherwise, it can always be selected optionally.

Attachments

- M: Damper element for volume flow rate balancing
- MN: Pressure tap and cord-operated damper unit for volume flow rate balancing with the diffuser face in place (only possible with square plenum box)

Construction features

- Spigot suitable for circular ducts to EN 1506 or EN 13180
- Square plenum boxes and plenum boxes with vertical connection
 - With spigot made of galvanised sheet steel
 - Groove only available if lip density characteristic has been selected

Circular plenum boxes with horizontal spigot for nominal sizes 250, 400L, 400H and 600

- Spigot made of black ABS
- Spigots are fitted with a groove for a lip seal
- Retrofitting of the lip seal is possible at a later stage
- Damper blade and lip seal (optional) are factory fitted
- Plenum box for supply air, with an optimised equalising element that ensures a uniform airflow through the diffuser face
- Simple installation of the diffuser face due to central fixing screw with cap
- Plenum box for supply air, with an optimised equalising element that ensures a uniform airflow through the diffuser face
- Simple installation of the diffuser face due to central fixing screw with decorative cap

Materials and surfaces

- Grille face made of galvanised sheet steel
- Q; R: Plenum box made of galvanised sheet steel including galvanised sheet steel cross bar to support the diffuser face
- Plenum boxes with vertical connection and square plenum boxes with horizontal connection: for supply air always with galvanised perforated plate for air distribution
- Circular plenum boxes with horizontal spigot: Equipped as a plenum box for supply air with an equalising element made of polyester
- Square plenum boxes and plenum boxes with vertical spigot: Spigot made of galvanised sheet steel
- Circular plenum boxes with horizontal spigot: Spigot made of black ABS, according to UL94, V0 flame retardant
- Lip seal made of Evoprene
- Diffuser face powder-coated, RAL 9010, pure white
- P1: Powder-coated, RAL Classic colour

Standards and guidelines

- Sound power level of the air-regenerated noise measured according to EN ISO 5135

Maintenance

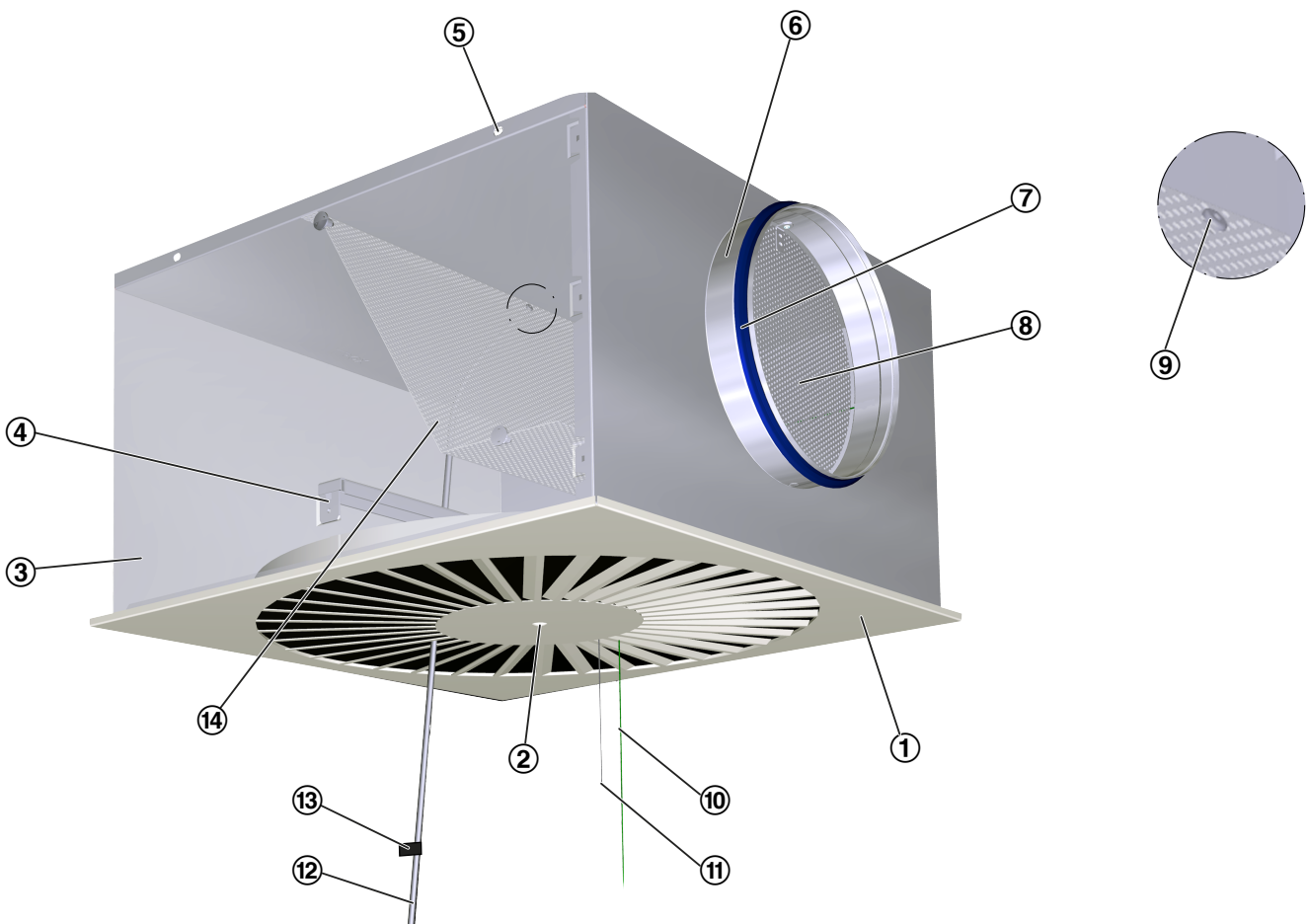
- Low maintenance as construction and materials are not subject to wear
- Inspection and cleaning to VDI 6022

Function

Ceiling swirl diffusers in air conditioning systems create a swirl to supply air to rooms. The resulting airflow induces high levels of room air, thereby rapidly reducing the airflow velocity and the temperature difference between supply air and room air. Ceiling swirl diffusers allow for large volume flow rates. The result is a mixed flow ventilation in comfort zones, with good overall room ventilation, creating only very little turbulence in the occupied zone.

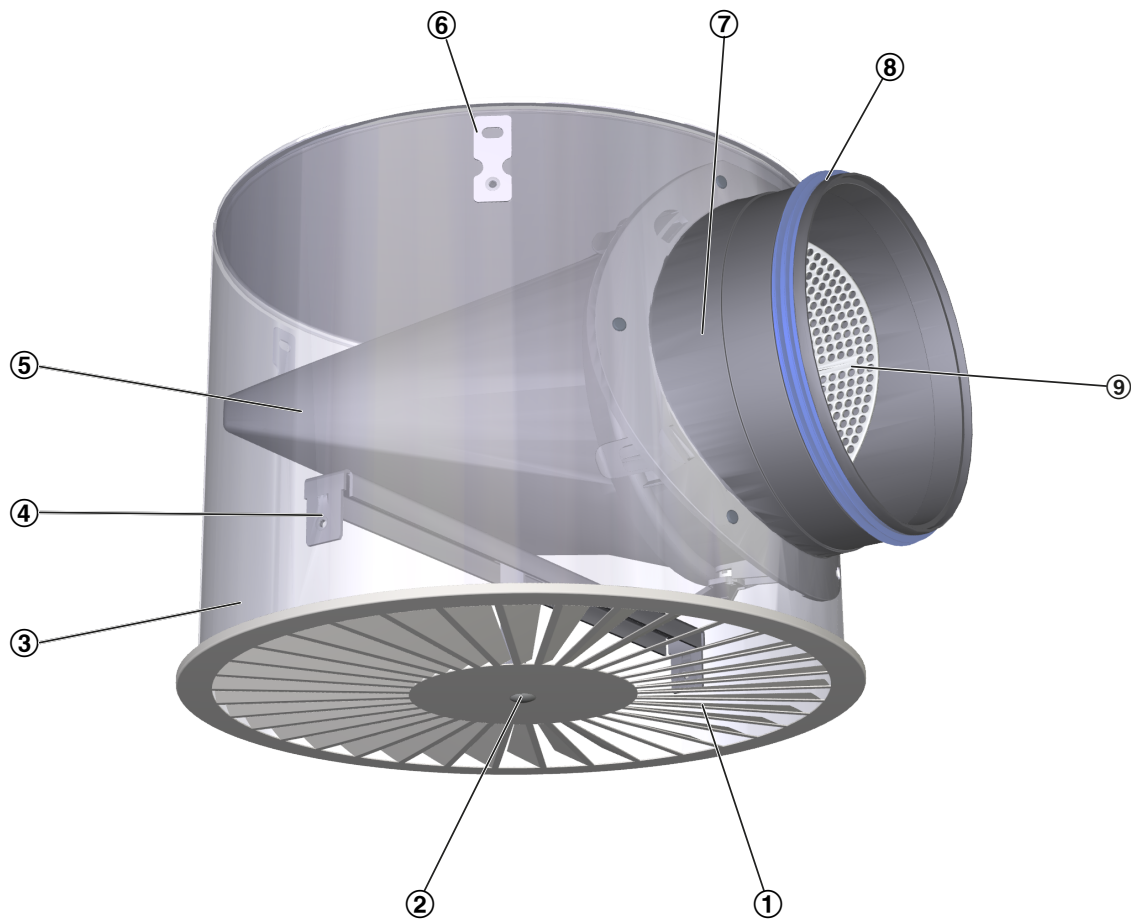
Type FD ceiling swirl diffusers have fixed blades. Air discharge is horizontal omni directional. The supply air to room air temperature difference may range from -12 to $+10$ K. A damper blade (optional) simplifies volume flow rate balancing for commissioning. Pressure tap and cord-operated damper blade (optional) allow for volume flow rate balancing with the diffuser face in place. To give rooms an aesthetic, uniform look, Type FD diffusers may also be used for extract air.

Schematic illustration of FD with square plenum box and side entry spigot



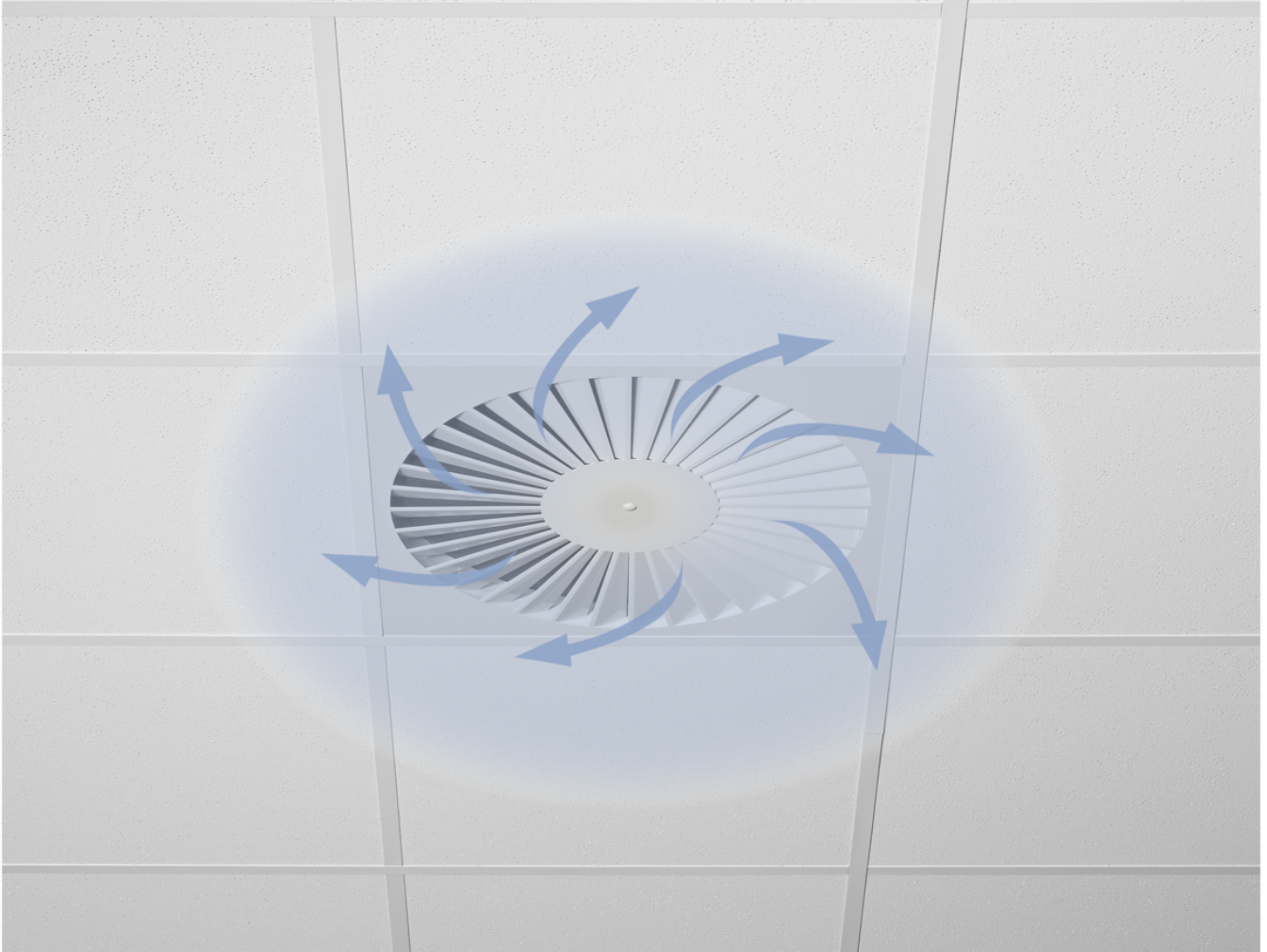
- | | |
|--|---|
| ① Diffuser face | Optional |
| ② Central fixing screw with decorative cap | ⑦ Lip seal |
| ③ Plenum box | ⑧ Damper blade for volume flow rate balancing |
| ④ Cross bar | ⑨ Pressure tap |
| ⑤ Suspension hole | ⑩ Green cord for closing the damper blade |
| ⑥ Spigot | ⑪ White cord for opening the damper blade |
| | ⑫ Measuring tube |
| | ⑬ Text label indicating plenum box variant |
| | ⑭ Perforated plate as an equalising element (only for supply air) |

Schematic illustration of FD with circular plenum box and side entry spigot



- ① Diffuser face
- ② Central fixing screw with decorative cap
- ③ Plenum box
- ④ Cross bar
- ⑤ Equalising element (Z: for supply air)
- ⑥ Suspension bracket
- ⑦ Spigot
- Optional
- ⑧ Double lip seal
- ⑨ Damper blade for volume flow rate balancing

Horizontal omni directional flow



Technical data

Nominal sizes	300, 400, 500, 600, 625 mm
Minimum volume flow rate, with $\Delta t_z = -6$ K	9 – 28 l/s or 31 – 102 m ³ /h
Maximum volume flow rate, with LWA \approx 50 dB(A)	70 – 235 l/s or 252 – 846 m ³ /h
Supply air to room air temperature difference	-12 – 10 K

Quick sizing

The quick sizing table gives a good overview of the possible volume flow rates and the corresponding sound power levels and differential pressures.

The minimum volume flow rates apply to a supply air to room air temperature difference of -6 K.

The maximum volume flow rates apply to a sound power level of approx. 50 dB (A) with damper blade position 0°.

Exact values for all parameters can be determined with our Easy Product Finder design program.

FD-*Z-H (supply air), sound power level and total differential pressure

NS	qv [l/s]	qv [m ³ /h]	0°		45°		90°	
			Δp_t [Pa]	LWA [dB(A)]	Δp_t [Pa]	LWA [dB(A)]	Δp_t [Pa]	LWA [dB(A)]
300	9	31	1	<15	1	<15	2	<15
	35	126	13	28	17	27	27	27
	55	198	31	39	41	40	67	39
	80	288	67	50	87	54	142	54
400	16	59	1	<15	1	<15	2	<15
	60	216	10	24	14	25	27	26
	105	378	32	39	42	40	83	44
	145	522	60	50	81	53	158	57
500	24	85	1	<15	2	<15	4	<15
	80	288	12	24	19	26	43	29
	135	486	33	39	53	41	123	45
	185	666	62	50	99	54	231	58
600, 625	28	102	1	<15	1	<15	3	<15
	95	342	10	25	15	25	29	24
	160	576	28	39	41	40	81	39
	225	810	55	50	81	52	160	53

0°, 45°, 90°: Damper blade position

FD-*-Z-V (supply air), sound power level and total differential pressure

NS	qv [l/s]	qv [m³/h]	0°		45°		90°	
			Δpt [Pa]	LWA [dB(A)]	Δpt [Pa]	LWA [dB(A)]	Δpt [Pa]	LWA [dB(A)]
300	9	31	1	<15	1	<15	2	<15
	30	108	9	25	11	25	19	25
	50	180	26	38	32	38	54	38
	70	252	51	49	62	49	106	49
400	16	59	1	<15	1	<15	2	<15
	60	216	10	24	13	23	23	24
	105	378	31	39	40	39	72	42
	145	522	60	50	77	51	138	55
500	24	85	1	<15	1	<15	4	<15
	80	288	11	24	14	23	44	29
	130	468	28	38	36	39	117	44
	180	648	54	50	70	53	223	56
600, 625	28	102	1	<15	1	<15	2	<15
	95	342	9	25	12	24	28	27
	160	576	26	40	35	41	78	44
	220	792	50	51	67	55	148	57

0°, 45°, 90°: Damper blade position

Specification text

This specification text describes the general properties of the product. Texts for variants can be generated with our Easy Product Finder design program.

Specification text

Ceiling swirl diffusers with square or circular diffuser face. Supply air and extract air variants for comfort zones, for a maximum air change rate of 35 per hour. Diffuser face with individually manually adjustable air control blades for horizontal swirling supply air discharge creating high induction levels. For installation into all types of suspended ceilings. Ready-to-install component consisting of the diffuser face with radially arranged, individually adjustable black or white set of air control blades and a plenum box, which is also square in the case of square faceplates (-Q) and round in the case of rounded faceplates (-R). The plenum box has an equalising element for supply air. The plenum box always includes a horizontally or vertically arranged spigot, cross bar and drilled holes or suspension lugs for suspension. The diffuser face is fixed to the cross bar with a central screw, concealed by a decorative cap. Spigot suitable for ducts to EN 1506 or EN 13180. Sound power level of the air-regenerated noise measured according to EN ISO 5135.

Special features

- High induction results in a rapid reduction of the supply air to room air temperature difference and airflow velocity
- For all types of ceiling systems, and with an extended border also suitable for freely suspended installation
- Horizontal or vertical duct connection
- Very high room air change rate possible thanks to row arrangement with a minimum pitch distance of 0.9 m

Materials and surfaces

- Grille face made of galvanised sheet steel
- Q; R: Plenum box made of galvanised sheet steel including galvanised sheet steel cross bar to support the diffuser face
- Plenum boxes with vertical connection and square plenum boxes with horizontal connection: for supply air always with galvanised perforated plate for air distribution
- Circular plenum boxes with horizontal spigot: Equipped as a plenum box for supply air with an equalising element made of polyester
- Square plenum boxes and plenum boxes with vertical spigot: Spigot made of galvanised sheet steel
- Circular plenum boxes with horizontal spigot: Spigot made of black ABS, according to UL94, V0 flame retardant
- Lip seal made of Evoprene
- Diffuser face powder-coated, RAL 9010, pure white
- P1: Powder-coated, RAL Classic colour

Technical data

- Nominal sizes: 300, 400, 500, 600, 625 mm
- Minimum volume flow rate, for $\Delta tZ = -6$ K: 9 - 28 l/s or 31 - 102 m³/h
- Maximum volume flow rate, at LWA \cong 50 dB(A): 70 - 235 l/s or 252 - 846 m³/h
- Supply air to room air temperature difference: -12 to +10 K

Order code

FD - Q - Z - H - M - L / 500 / P1 - RAL ...
 | | | | | | | |
 1 2 3 4 5 6 7 8

1 Type

FD Swirl diffuser

2 Construction style

R Circular

Q Square

3 System

Z Supply air

A extract air

4 Connection

H horizontal

V vertical (the plenum box is always circular)

5 Damper blade for volume flow rate balancing

No entry: without damper blade

M with damper blade

MN with cords and pressure tap (only with square plenum box)

Order example: FD-Q-Z-H-MN/500/P1-RAL 9016

Construction style

System

Connection

Damper blade for volume flow rate balancing

Accessories

Nominal size

Exposed surface

6 Accessories

No entry: without accessories

L with lip seal

7 Nominal size [mm]

300, 400, 500, 600, 625

8 Exposed surface

No entry: powder-coated RAL 9010, pure white

P1 Powder-coated, specify RAL CLASSIC colour

Gloss level

RAL 9010 GU50

RAL 9006 GU30

All other RAL colours GU70

Note: Circular plenum boxes with horizontal spigot are only available without damper unit and lip seal or with damper unit and lip seal. Features 2 and 4 define the plenum box geometry.

Square

Supply air

Horizontal

With cord and pressure tap

without accessories

500

RAL 9016, traffic white, GU70

Order example: FD-R-Z-H/600

Construction style

System

Connection

Damper blade for volume flow rate balancing

Accessories

Nominal size

Exposed surface

Circular

Supply air

Horizontal

Without

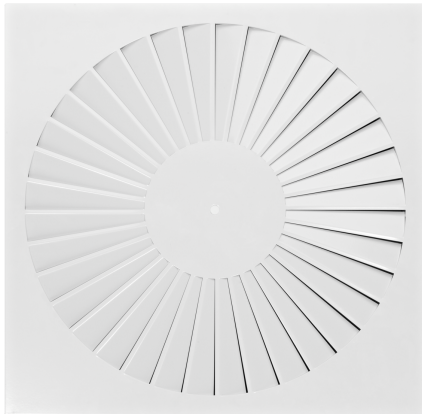
Without

600

RAL 9010, pure white, GU50

Variants

FD-Q



FD-Q-*-H

Variants

- Ceiling swirl diffuser with square diffuser face
- With square plenum box for horizontal duct connection

Nominal sizes

- 300, 400, 500, 600, 625 mm

Construction

- Square diffuser face
- Plenum box for horizontal duct connection
- Square opening to accommodate the diffuser face
- Equalising element that ensures a uniform airflow through the diffuser face (supply air variant)
- Simple installation of the diffuser face due to central fixing screw with decorative cap
- Damper blade for volume flow rate balancing (optional)
- Pressure tap and cord-operated damper blade for volume flow rate balancing (optional)
- Lip seal (optional)

Construction features

- Spigot suitable for circular ducts to EN 1506 or EN 13180
- Spigot with groove for lip seal (if accessory lip seal has been ordered)

FD-Q-*-V

Variants

- Ceiling swirl diffuser with square diffuser face
- With circular plenum box for vertical duct connection

Nominal sizes

- 300, 400, 500, 600, 625 mm

Construction

- Plenum box for vertical duct connection
- Circular opening to accommodate the diffuser face
- Equalising element that ensures a uniform airflow through the diffuser face (supply air variant)
- Simple installation of the diffuser face due to central fixing screw with decorative cap

- Damper blade for volume flow rate balancing (optional)
- Lip seal (optional)

Construction features

- Spigot suitable for circular ducts to EN 1506 or EN 13180
 - Spigot with groove for lip seal (if accessory lip seal has been ordered)
-

FD-R**FD-R-*-H****Variants**

- Ceiling swirl diffuser with circular diffuser face
- With circular plenum box for horizontal duct connection

Nominal sizes

- 300, 400, 500, 600, 625 mm

Construction

- Plenum box for horizontal duct connection
- Circular opening to accommodate the diffuser face
- Equalising element that ensures a uniform airflow through the diffuser face (supply air variant)
- Simple installation of the diffuser face due to central fixing screw with decorative cap
- Damper blade for volume flow rate balancing (optional)
- Lip seal (optional)

Construction features

- Spigot suitable for circular ducts to EN 1506 or EN 13180
 - Spigot with groove for lip seal (if accessory lip seal has been ordered)
-

FD-R-*-V**Variants**

- Ceiling swirl diffuser with circular diffuser face
- With circular plenum box for vertical duct connection

Nominal sizes

- 300, 400, 500, 600, 625 mm

Construction

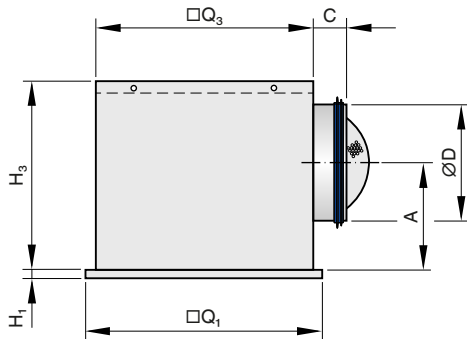
- Circular diffuser face
- Plenum box for vertical duct connection
- Circular opening to accommodate the diffuser face
- Equalising element that ensures a uniform airflow through the diffuser face (supply air variant)
- Simple installation of the diffuser face due to central fixing screw with decorative cap
- Damper blade for volume flow rate balancing (optional)
- Lip seal (optional)

Construction features

- Spigot suitable for circular ducts to EN 1506 or EN 13180
 - Spigot with groove for lip seal (if accessory lip seal has been ordered)
-

Dimensions

Square diffuser face with plenum box for horizontal duct connection



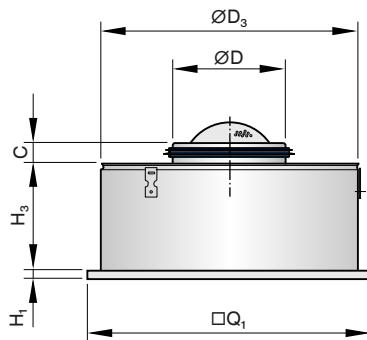
FD-Q-*-H

NS	□Q ₁	H ₁	□Q ₃	H ₃	ØD	A	C	①	m
300	298	8	290	250	158	139	50	AKUni001	4
400	398	8	372	295	198	164	50	AKUni002	6.2
500	498	8	476	295	198	164	50	AKUni003	8.5
600	598	8	567	345	248	199	48	AKUni004	11.6
625	623	8	567	345	248	199	48	AKUni004	11.9

① Plenum box

Weights apply to the supply air variant.

Square diffuser face with plenum box for vertical duct connection

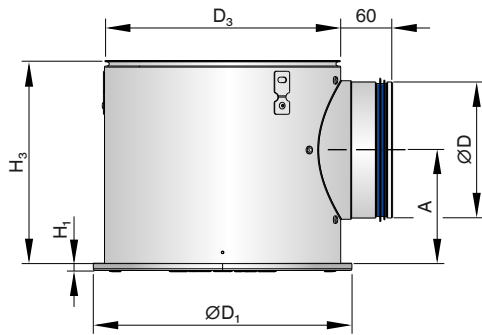


FD-Q-*-V

NS	□Q ₁	H ₁	ØD ₃	H ₃	ØD	C	m
300	298	8	275	200	158	50	3
400	398	8	364	200	198	50	4.7
500	498	8	462	200	198	50	6.7
600	598	8	559	200	248	48	8.9
625	623	8	559	200	248	48	9.2

Weights apply to the supply air variant.

Circular diffuser face with circular plenum box for horizontal duct connection



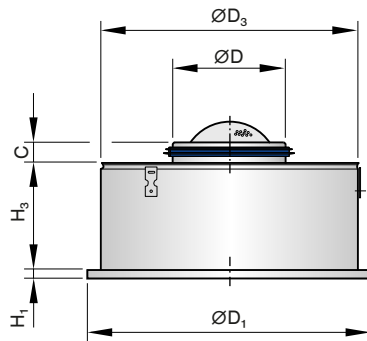
FD-R-*-H

NS	ØD ₁	H ₁	H ₃	ØD ₃	ØD	A	①	m
	kg							
300	273	8	243	274	158	139	AKR-01	2.4
400	362	8	290	363	198	166	AKR-02	3.8
500	460	8	290	461	198	166	AKR-03	5.2
600	573	8	344	574	248	195	AKR-05	7.4
625	573	8	344	574	248	195	AKR-05	7.6

Weights apply to the supply air variant.

① Plenum box

Circular diffuser face with plenum box for vertical duct connection

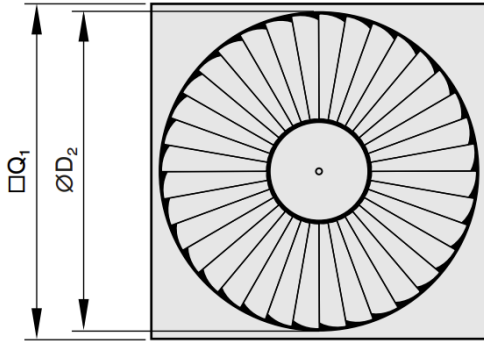


FD-R-*-V

NS	ØD ₁	H ₁	H ₃	ØD ₃	ØD	C	①	m
	kg							
300	300	8	285	278	158	50	AK-Uni-013	2.8
400	400	8	330	362	198	50	AK-Uni-014	4.4
500	500	8	330	460	198	50	AK-Uni-015	6.3
600	600	8	380	557	248	48	AK-Uni-016	8.5
625	625	8	380	557	248	48	AK-Uni-016	8.7

Weights apply to the supply air variant.

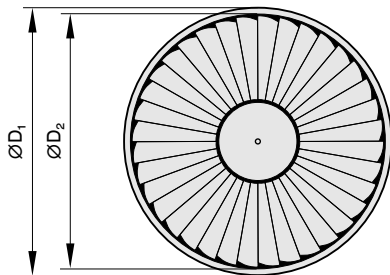
Diffuser face FD-Q



FD-Q

NS	$\square Q_1$	$\varnothing D_2$	A_{eff}
			m^2
300	298	250	0.0088
400	398	350	0.0180
500	498	450	0.0251
600	598	538	0.0295
625	623	538	0.0295

Diffuser face FD-R



FD-R

NS	$\varnothing D_1$	$\varnothing D_2$	A_{eff}
			m^2
300	300	250	0.0088
400	400	350	0.0180
500	500	450	0.0251
600	600	538	0.0295
625	625	538	0.0295

Product details

Installation in T-bar ceilings



Installation in T-bar ceilings, arrangement in a row



Installation in continuous ceilings

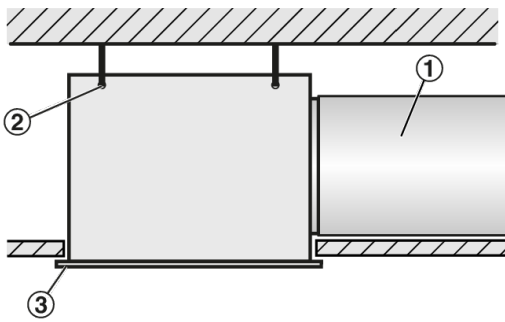


Installation and commissioning

- Preferably for rooms with a clear height up to 4.0 m
- Flush ceiling installation
- Freely suspended installation only with an extended border (supply air variant)
- Horizontal or vertical duct connection
- If necessary, carry out volume flow rate balancing with the damper unit

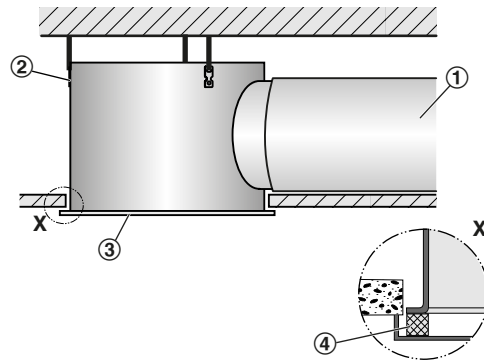
These are only schematic diagrams to illustrate installation details.

Flush ceiling installation with square plenum box



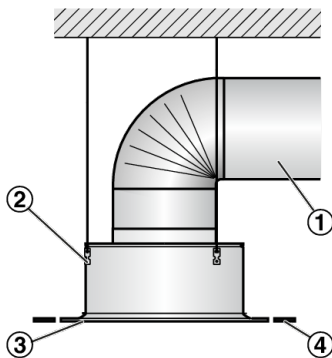
- ① Duct
 - ② Suspension hole
 - ③ Diffuser face
- Horizontal duct connection
 - 4 suspension holes
 - Suspension with cords, wires or hangers, to be provided by others

Flush ceiling installation with circular plenum box



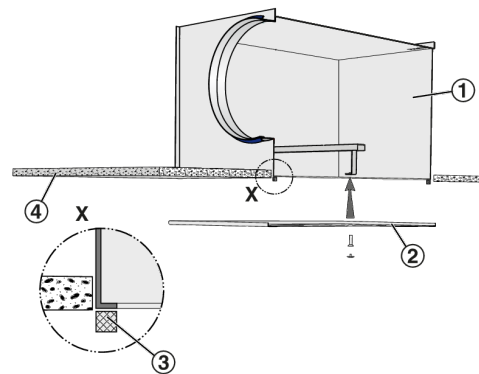
- ① Duct
 - ② Suspension bracket
 - ③ Diffuser face
- Horizontal duct connection
 - 3 suspension brackets
 - Suspension with cords, wires or hangers, to be provided by others

Freely suspended installation



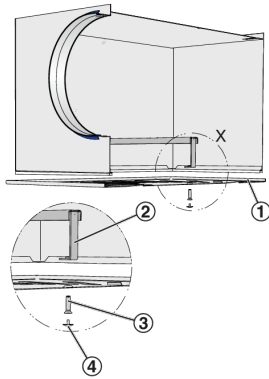
- ① Duct
 - ② Suspension bracket
 - ③ Diffuser face
 - ④ Extended border
- Vertical duct connection
 - 3 suspension brackets
 - Suspension with cords, wires or hangers, to be provided by others

Diffuser face – sealing



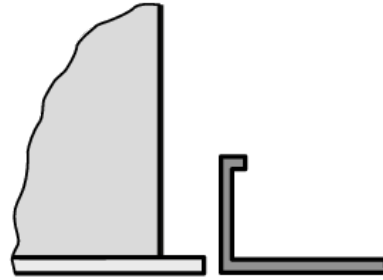
- ① Plenum box
 - ② Diffuser face
 - ③ Seal
 - ④ Ceiling tile
- The self-adhesive sealing tape (included in supply package) has to be applied to the return edges of the plenum box by others

Diffuser face – central screw fixing



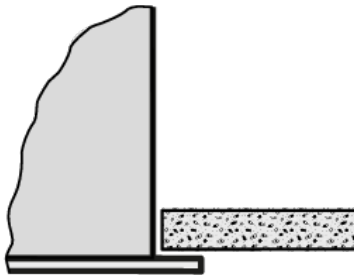
- ① Diffuser face
 - ② Cross bar
 - ③ Central fixing screw
 - ④ Decorative cap
- Using the central fixing screw, fix the diffuser face to the cross bar of the plenum box
 - Attach the decorative cap

Installation in metal ceilings



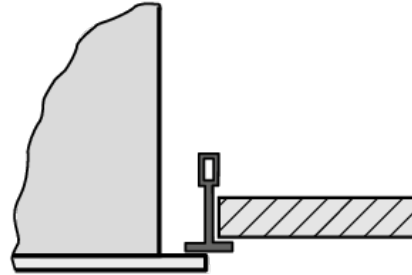
- Fix the plenum box to the ceiling
- Ceiling tile of the metal ceiling is independent of the air terminal device
- Fix the diffuser face after the ceiling has been completed

Installation in continuous ceilings



- Fix plenum box (including diffuser face, if necessary) to the ceiling
- Adjust ceiling tile as required (flush or offset)
- If necessary, fix the diffuser face only after the ceiling has been completed

Installation in T-bar ceilings



- Fix the plenum box to the ceiling
- The T-bar ceiling is independent of the air terminal device
- Fix the diffuser face below the T-bars after the ceiling has been completed

Volume flow rate balancing

When several diffusers are connected to just one volume flow controller, it may be necessary to balance the volume flow rates.

- Ceiling diffusers with universal plenum box and damper blade (variant -M): The diffuser face can be removed to access the damper blade; the damper blade can then be set to any position between 0 and 90°
- Ceiling diffusers with universal plenum box, damper blade and pressure tap (variant -MN): The diffuser face need not be removed as the damper blade can be set with two cords (white and green).

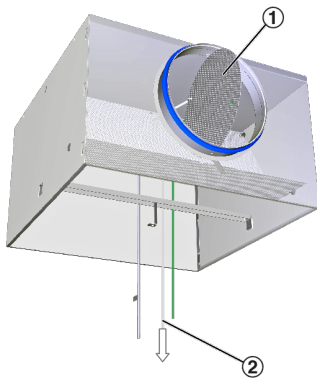
Volume flow rate measurement

Ceiling diffusers with universal plenum box, damper blade and pressure tap (variant -MN) allow for volume flow rate balancing even with the diffuser face in place.

- Connect the measuring tube to the digital manometer
- Read the effective pressure
- Read the volume flow rate off the characteristic or calculate it
- If necessary, adjust the damper blade position with the cords

A characteristic is included with each AK-Uni plenum box.

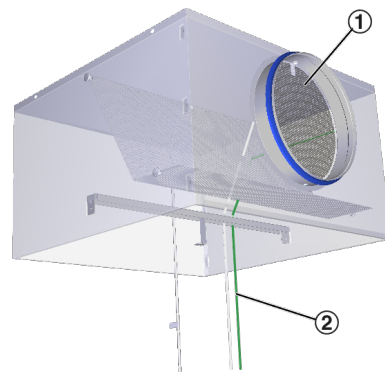
AK-Uni-...-MN Volume flow rate balancing



- ① Damper blade
- ② White cord for opening the damper blade

Open, 0°

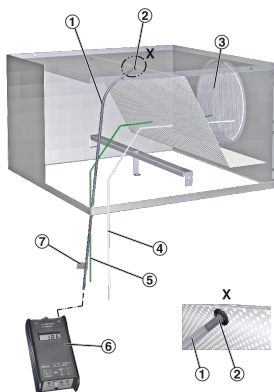
AK-Uni-...-MN Volume flow rate balancing



- ① Damper blade
- ② Green cord for closing the damper blade

Maximum restriction, 90°

AK-Uni-...-MN volume flow rate measurement



- ① Measuring tube
- ② Pressure tap
- ③ Damper blade for volume flow rate balancing
- ④ White cord for opening the damper blade
- ⑤ Green cord for closing the damper blade
- ⑥ Digital manometer
- ⑦ Text label indicating plenum box variant

Volume flow rate calculations

$$\textcircled{1} \quad q_v = C \times \sqrt{\Delta p_w}$$

$$\textcircled{2} \quad q_v = C \times \sqrt{\Delta p_w} \times \sqrt{\frac{1.2}{\rho}}$$

- ① For an air density of 1.2 kg/m
- ② For other air densities

Nomenclature

A [mm]

Position of the spigot, defined by the distance of the spigot centre line to the lower edge of the plenum box.

A_{eff} [m²]

Effective air discharge area

C [mm]

Length of the spigot

∅D [mm]

Outer diameter of the spigot

∅D₁ [mm]

Outer diameter of a circular diffuser face

∅D₂ [mm]

Diameter of a circular diffuser face style

∅D₃ [mm]

Diameter of a circular plenum box

H₁ [mm]

Height of diffuser face

H₃ [mm]

Height of plenum box

L_{WA} [dB(A)]

A-weighted sound power level of air-regenerated noise

m [kg]

Weight

NS [mm]

Nominal size

Δp_t [Pa]

Total differential pressure

□Q₁ [mm]

Outer diameter of a square diffuser face

□Q₃ [mm]

Dimensions of a square plenum box

q_v [m³/h]; [l/s]

Volume flow rate

Δt_z [K]

Supply air to room air temperature difference, i.e. supply air temperature minus room temperature

Lengths

Lengths are given in [mm] unless stated otherwise.

All sound power levels are based on 1 pW.