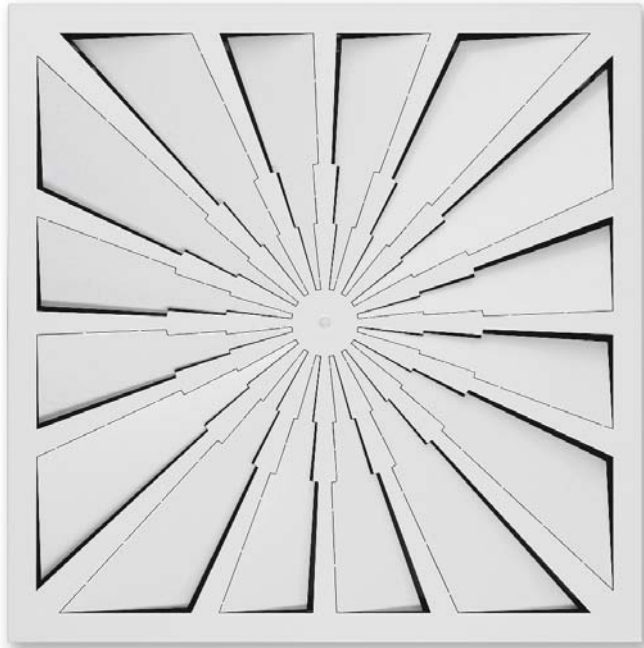


Ceiling swirl diffusers

Type FDE



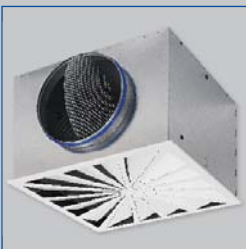
For high volume flow rates, with fixed air control blades

Square ceiling swirl diffusers

- Nominal sizes 600, 625
- Volume flow rate range 51 – 365 l/s or 184 – 1314 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
- High induction results in a rapid reduction of temperature differences and airflow velocities

Optional equipment and accessories

- Exposed diffuser face available in RAL CLASSIC colours
- Plenum box with cord-operated damper blade and pressure tap



Plenum box
with damper blade
(optional)



Horizontal
swirling air discharge

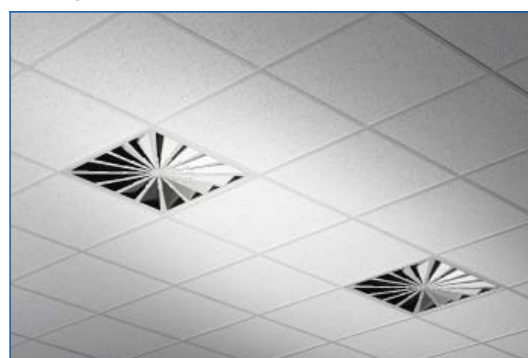
Type		Page
FDE	General information	1.1 – 154
	Order code	1.1 – 158
	Quick sizing	1.1 – 159
	Dimensions and weight	1.1 – 160
	Installation details	1.1 – 161
	Specification text	1.1 – 162
	Basic information and nomenclature	1.6 – 1

Installation examples

Installation in T-bar ceilings



Installation in T-bar ceilings, arrangement in a row



Description

For detailed information on plenum boxes see Chapter K1 – 1.5.

Application

- Type FDE ceiling swirl diffusers are used as supply air or extract air diffusers for comfort zones
- Horizontal swirling supply air discharge for mixed flow ventilation
- The efficient swirl creates high induction levels, thereby rapidly reducing temperature differences and airflow velocities (supply air variant)
- For variable and constant volume flows
- For supply air to room air temperature differences from –12 to +10 K
- For room heights up to 4.2 m (lower edge of suspended ceiling)
- For all types of ceiling systems

Variants

- FDE-Z: Supply air
- FDE-A: Extract air

Nominal sizes

- 600, 625

Attachments

- M: Damper blade for volume flow rate balancing
- MN: Pressure tap and cord-operated damper blade for volume flow rate balancing with the diffuser face in place

Accessories

- Lip seal

Special characteristics

- For high volume flow rates, with fixed air control blades
- High induction results in a rapid reduction of temperature differences and airflow velocities
- For all types of ceiling systems
- Horizontal duct connection

Parts and characteristics

- Square diffuser face
- Diffuser face with radially arranged fixed air control blades
- 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
- Damper blade for volume flow rate balancing (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)

Materials and surfaces

- Diffuser face, perforated plate with border, plenum box and cross bar made of galvanised sheet steel
- Lip seal made of rubber
- Perforated plate and border electrocoated RAL 9005, jet black
- Diffuser face powder-coated RAL 9010, pure white
- P1: Powder-coated, RAL CLASSIC colour

Installation and commissioning

- Preferably for rooms with a clear height up to 4.2 m
- Flush ceiling installation
- Horizontal duct connection
- If necessary, carry out volume flow rate balancing with damper blade

Standards and guidelines

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

Maintenance

- Maintenance-free as construction and materials are not subject to wear
- Inspection and cleaning to VDI 6022

Technical data

Nominal sizes	600, 625 mm
Minimum volume flow rate, at -6 K	51 – 365 l/s or 184 – 1314 m ³ /h
Maximum volume flow rate, at approx. 50 dB(A)	330 – 365 l/s or 1188 – 1314 m ³ /h
Supply air to room air temperature difference	-12 to +10 K

Function

Functional description

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.

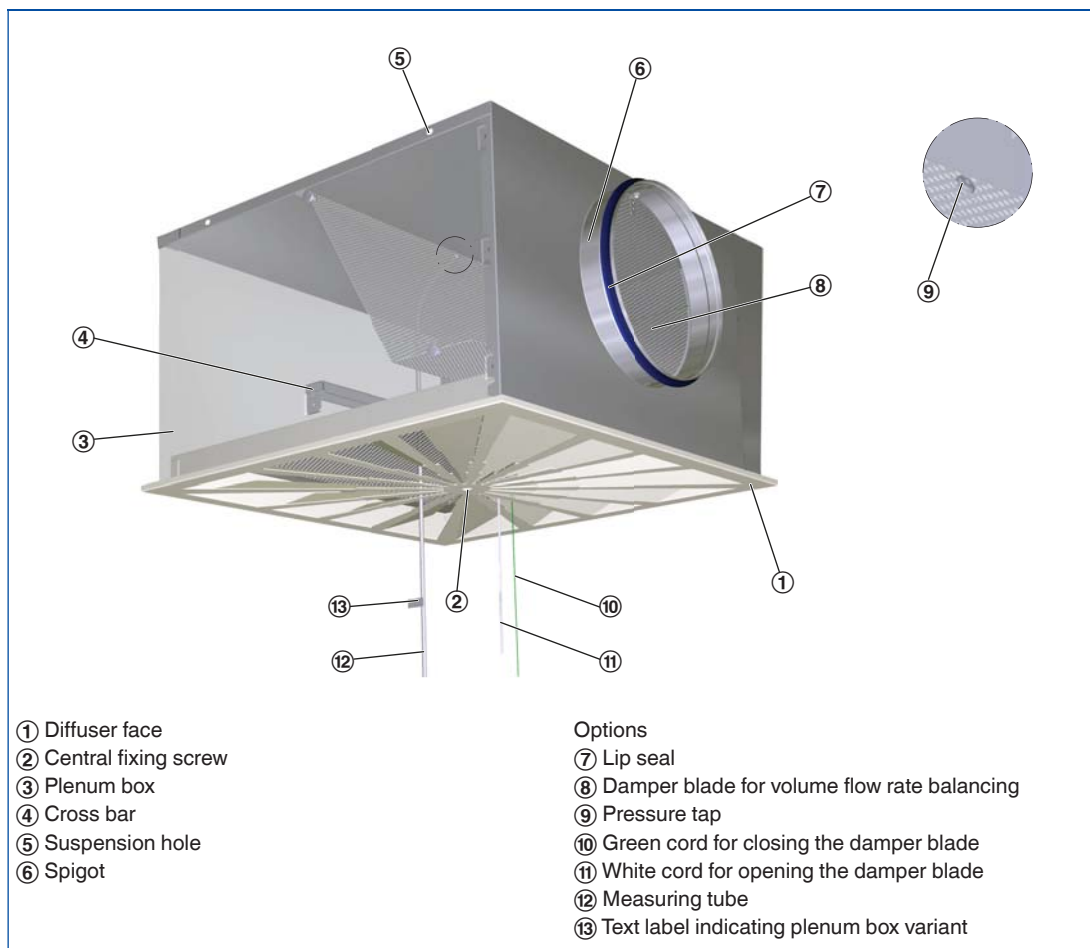
Type FDE ceiling swirl diffusers have fixed blades. Air discharge is horizontal omni directional.

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 FDE diffusers may also be used for extract air.

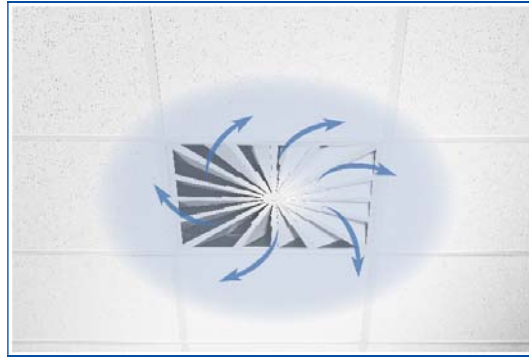
Schematic illustration of FDE



Air patterns

Horizontal air discharge

Horizontal omni directional air discharge



Order code

FDE

FDE - Z - H - M - L / 625 x 248 / P1 - RAL ...

1 2 3 4 5 6 7

1 Type

FDE Swirl diffuser

2 System

Z Supply air

A Extract air

3 Connection

H Horizontal

4 Damper blade for volume flow rate balancing

No entry: none

M With

MN With cords and pressure tap

5 Accessories

No entry: none

L With lip seal

6 Nominal size [mm]

Size x ØD

600 x 248

625 x 248

600 x 313

625 x 313

7 Exposed surface

No entry: powder-coated RAL 9010, pure white

P1 Powder-coated, specify RAL CLASSIC colour

Gloss level

RAL 9010 50 %

RAL 9006 30 %

All other RAL colours 70 %

Order example

FDE-Z-H-M-L/625x248/P1-RAL 9016

System	Supply air
Connection	Horizontal
Damper blade for volume flow rate balancing	With
Accessories	Lip seal
Nominal size	625 x 248
Exposed surface	RAL 9016, traffic white, gloss level 70 %

FDE-Z (supply air)

Quick sizing tables provide a good overview of the volume flow rates and 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 programme.

Quick sizing – sound power level and total differential pressure

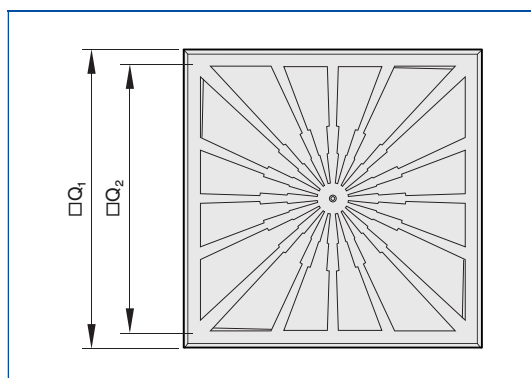
Nominal size	\dot{V}		Damper blade position					
			0°		45°		90°	
	l/s	m³/h	Δp_t	L_{WA}	Δp_t	L_{WA}	Δp_t	L_{WA}
			Pa	dB(A)	Pa	dB(A)	Pa	dB(A)
600 × 248, 625 × 248	51	184	2	<15	3	<15	6	<15
	145	522	14	26	22	30	46	38
	235	846	38	39	57	44	122	51
	330	1188	75	50	113	56	240	62
600 × 313, 625 × 313	51	184	1	<15	1	<15	3	<15
	160	575	10	26	14	28	28	31
	260	936	25	39	37	42	74	45
	365	1314	50	50	73	52	145	56

1



FDE

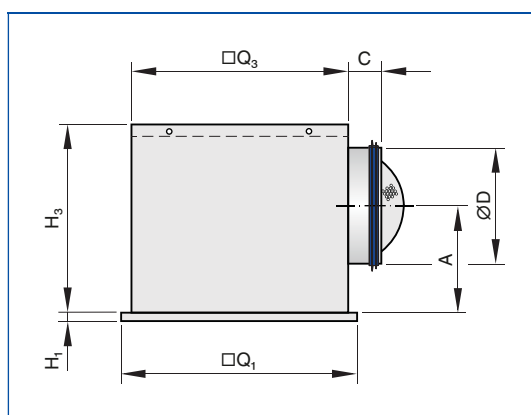
Diffuser face FDE



Dimensions

Nominal size	□Q ₁	□Q ₂	A _{eff}
	mm		m ²
600 × 248	598	543	0.0447
600 × 313	598	543	0.0447
625 × 248	623	543	0.0447
625 × 313	623	543	0.0447

Square diffuser face with plenum box
for horizontal duct connection



Dimensions [mm] and weight [kg]

Nominal size	□Q ₁	H ₁	□Q ₃	H ₃	ØD	A	C	Plenum box	m
	mm								kg
600 × 248	598	8	567	345	248	199	48	AK-Uni-004	13.1
600 × 313	598	8	567	410	313	222	50	AK-Uni-011	14.4
625 × 248	623	8	567	345	248	199	48	AK-Uni-004	13.1
625 × 313	623	8	567	410	313	222	50	AK-Uni-011	14.1

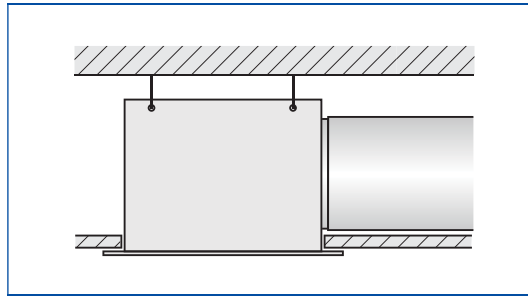
Weights apply to the supply air variant

Installation types

For more installation details see Chapter K1 – 1.6.

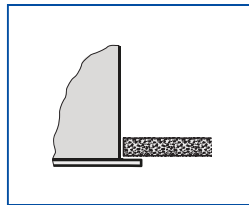
These are only schematic diagrams to illustrate installation details.

Flush ceiling installation with square plenum box

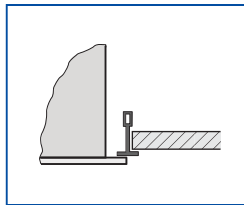


Ceiling systems

Continuous ceiling

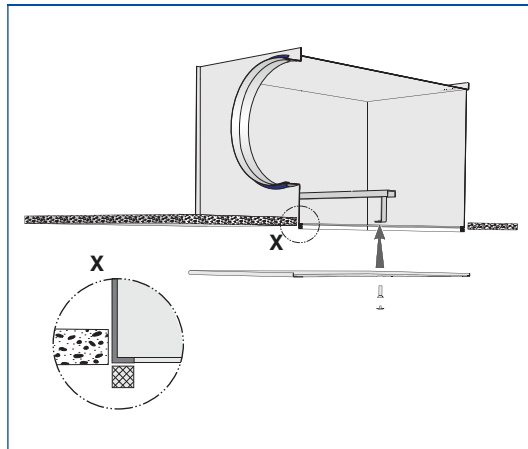


T-bar ceiling

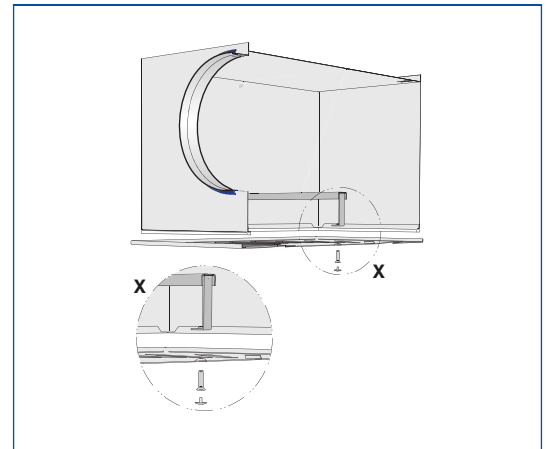


Diffuser face sealing and fixing

Diffuser face – sealing



Diffuser face – central screw fixing



Standard text

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

Ceiling swirl diffusers with square diffuser face. Supply air and extract air variants for comfort zones. Diffuser face with fixed 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 which consists of the casing, diffuser face, spigot, and a cross bar to which the diffuser face is fixed. The diffuser face is fixed to the cross bar with a central screw. 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 characteristics

- For high volume flow rates, with fixed air control blades
- High induction results in a rapid reduction of temperature differences and airflow velocities
- For all types of ceiling systems
- Horizontal duct connection

Materials and surfaces

- Diffuser face, perforated plate with border, plenum box and cross bar made of galvanised sheet steel
- Lip seal made of rubber
- Perforated plate and border electrocoated RAL 9005, jet black
- Diffuser face powder-coated RAL 9010, pure white
- P1: Powder-coated, RAL CLASSIC colour

Technical data

- Nominal sizes: 600, 625 mm
- Minimum volume flow rate, with -6 K: 51 – 365 l/s or 184 – 1314 m³/h
- Maximum volume flow rate, with approx. 50 dB(A): 330 – 365 l/s or 1188 – 1314 m³/h
- Supply air to room air temperature difference: -12 to +10 K

Sizing data

- \dot{V} _____ [m³/h]
- Δp_t _____ [Pa]
- L_{WA} Air-regenerated noise _____ [dB(A)]

Order options

1 Type

FDE Swirl diffuser

2 System

- Z** Supply air
- A** Extract air

3 Connection

- H** Horizontal

4 Damper blade for volume flow rate balancing

- No entry: none
- M** With
- MN** With cords and pressure tap

5 Accessories

- No entry: none
- L** With lip seal

6 Nominal size [mm]

Size x ØD

- 600 x 248**
- 625 x 248**
- 600 x 313**
- 625 x 313**

7 Exposed surface

- No entry: powder-coated RAL 9010, pure white
- P1** Powder-coated, specify RAL CLASSIC colour
- Gloss level
- RAL 9010 50 %
- RAL 9006 30 %
- All other RAL colours 70 %

Ceiling diffusers

Basic information and nomenclature



- Product selection
- Principal dimensions
- Nomenclature
- Sizing and sizing example
- Installation information
- Commissioning

Ceiling diffusers

Basic information and nomenclature

Product selection

	Ceiling swirl diffusers								
	AIRNAMIC	VDW	TDV-SilentAIR	RFD	FD	TDF-SilentAIR	VD	VDL	FDE
Diffuser face style									
Circular	●	●	●	●	●	●		●	
Square	●						●		●
Diffuser face									
Circular	●	●	●	●	●	●		●	
Square	●	●	●	●	●	●	●		●
Galvanised sheet steel		●	●	●	●	●		●	●
Aluminium				●			●		
Plastic	●								
Air control blades									
Fixed	●			●	●	●			●
Adjustable		●	●				●	●	
Plastic, black and white		●	●						
Duct connection									
Horizontal	●	●	●	●	●	●	●	●	●
Vertical		●	●	●	●	●	●	●	
FLEXTRO	●	●	●		●	●			
Attachments									
Damper blade	●	●	●	●	●	●			●
Pressure tap		●	●	●	●	●			●
Actuator							●	●	
Accessories									
Lip seal	●	●	●	●	●	●			●
Protective cage							●	●	
Extended border							●	●	
Nominal sizes									
Circular diffuser face	400, 600	300, 400, 500, 600, 625	300, 400, 500, 600, 625		300, 400, 500, 600, 625	300, 400, 500, 600, 625			
Square diffuser face	300, 600, 625	300, 400, 500, 600, 625, 825					425, 600, 775, 1050		600, 625
Spigot*				125, 160, 200, 250, 315, 400				315, 400, 630, 800	250, 315
Technical data									
Volume flow rate range [l/s]	13 – 385	7 – 470	11 – 315	4 – 330	9 – 235	10 – 295	95 – 1490	65 – 1080	51 – 365
Volume flow rate range [m ³ /h]	47 – 1386	25 – 1692	40 – 1134	14 – 1188	31 – 846	36 – 1026	342 – 5364	234 – 3888	184 – 1314
Supply air to room air temperature difference	-12 – +10 K						-12 – +15 K		-12 – +10 K
●	Possible								
	Not possible								

*Nominal diameter

Ceiling diffusers

Basic information and nomenclature

Product selection

1

	Design ceiling swirl diffusers		Ceiling swirl diffusers with perforated face plate
	XARTO	ADD	DCS
Diffuser face style			
Circular	●	●	●
Square	●		●
Diffuser face			
Circular	●	●	
Square	●	●	●
Galvanised sheet steel	●	●	●
Aluminium			
Plastic			
Air control blades			
Fixed	●	●	●
Adjustable			
Plastic, black and white			
Duct connection			
Horizontal	●	●	●
Vertical		●	●
FLEXTRO			
Attachments			
Damper blade	●	●	
Pressure tap		●	
Actuator			
Accessories			
Lip seal	●	●	
Protective cage			
Extended border			
Nominal sizes			
Circular diffuser face	600	250, 300, 450, 500, 600	
Square diffuser face	600, 625	250, 300, 450, 500, 600, 625	600, 625
Spigot*		125, 160, 200, 250, 315	125, 160, 200, 250, 315, 400
Technical data			
Volume flow rate range [l/s]	31 – 265	20 – 465	4 – 260
Volume flow rate range [m ³ /h]	110 – 954	72 – 1674	16 – 936
Supply air to room air temperature difference	-12 – +10 K		
●	Possible		
	Not possible		

*Nominal diameter

Ceiling diffusers

Basic information and nomenclature

Product selection

1

	Ceiling diffusers						
	VDR	ADLQ	DLQ	ADLR	DLQL	DLQ-AK	DLK-Fb
Diffuser face style							
Circular	●			●			
Square		●	●		●	●	●
Diffuser face							
Circular	●			●			
Square		●	●	●	●	●	●
Galvanised sheet steel			●		●	●	●
Aluminium	●	●		●			
Plastic							
Air control blades							
Fixed		●	●	●	●	●	●
Adjustable	●						
Plastic, black and white							
Duct connection							
Horizontal	●	●	●	●	●	●	●
Vertical	●			●	●		
FLEXTRO		●					
Attachments							
Damper blade		●	●	●	●		
Pressure tap		●	●	●			
Actuator	●						
Accessories							
Lip seal		●	●	●	●		
Protective cage							
Extended border							
Nominal sizes							
Circular diffuser face	630, 800			244, 300, 356, 412, 468, 542, 598, 654			
Square diffuser face		250, 300, 400, 500, 600, 625	250, 300, 400, 500, 600, 625	600 625	250, 300, 400, 500, 600	300, 400, 500, 600, 625	600, 625
Spigot*	315, 400, 630, 800						
Technical data							
Volume flow rate range [l/s]	175 – 1495	20 – 665	20 – 700	20 – 650	6 – 285	40 – 565	220 – 460
Volume flow rate range [m³/h]	630 – 5382	72 – 2394	72 – 2520	72 – 2340	22 – 1026	144 – 2034	792 – 1656
Supply air to room air temperature difference	-10 to +15 K	-10 to +10 K					
●	Possible						
	Not possible						

*Nominal diameter

Ceiling diffusers

Basic information and nomenclature

Principal dimensions

ØD [mm]

Outside diameter of the spigot

ØD₁ [mm]

Outer diameter of a circular diffuser face

ØD₂ [mm]

Diameter of a circular diffuser face style

ØD₃ [mm]

Diameter of a circular plenum box

□Q₁ [mm]

Outer diameter of a square diffuser face

□Q₂ [mm]

Dimensions of a square diffuser face style

□Q₃ [mm]

Dimensions of a square plenum box

H₁ [mm]

Distance (height) from the lower edge of the suspended ceiling to the lower edge of the diffuser face

H₂ [mm]

Height of a ceiling diffuser, from the lower edge of the suspended ceiling to the upper edge of the spigot

H₃ [mm]

Height of a ceiling diffuser with plenum box, from the lower edge of the suspended ceiling to the upper edge of the plenum box or of the spigot

A [mm]

Position of the spigot, defined by the distance of the spigot centre line to the lower edge of the suspended ceiling

C [mm]

Length of the spigot

m [kg]

Weight

Nomenclature

L_{WA} [dB(A)]

A-weighted sound power level of air-regenerated noise

 \dot{V} [m³/h] and [l/s]

Volume flow rate

Δt_z [K]

Supply air temperature difference

Δp_t [Pa]

Total differential pressure

A_{eff} [m²]

Effective air discharge area

All sound power levels are based on 1 pW.

Ceiling diffusers

Basic information and nomenclature

1 Sizing with the help of this catalogue

This catalogue provides convenient quick sizing tables for ceiling diffusers. The tables give supply air volume flow rates for all nominal sizes. The maximum volume flow rates are for an open damper blade. A smaller opening of the damper blade results in higher sound power levels and a higher total differential pressure. The tables show values for damper blade positions 45° and 90°.

Sizing data for other volume flow rates and damper blade positions can be determined quickly and precisely using the Easy Product Finder design programme.

Sizing example

Given data

$\dot{V} = 300 \text{ l/s}$ (1280 m³/h)
 Square ceiling diffuser, steel,
 with fixed air control blades
 Maximum sound power level 40 dB(A)
 with damper blade position 45°
 Four-way air discharge

Quick sizing

Type DLQ
 Nominal sizes: 600, 625
 Selected: DLQ/600

Easy Product Finder



The Easy Product Finder allows you to size products using your project-specific data.

You will find the Easy Product Finder on our website.

The screenshot shows the 'Easy Product Finder' software interface. The main window is titled 'Projekt 1 - TROX Easy Product Finder - Standard des Projektes: Deutschland'. The interface is divided into several sections:

- Projektstruktur:** Shows 'Projekt 1' and 'Neue Position: Bestellkennzahl' with the value 'DLQ AK // 600 // 0 // 0 // 0 // RAL 9010'.
- Produktbaum:** A tree view showing product categories like 'Luftkurkklasse', 'Drallkurkklasse', 'Deckenluftkurkklasse', etc., with 'DLQ, ADLQ' selected.
- Eingabe (Input):**
 - Volumenstrom [m³/s]: 1.280 (792 - 2795)
 - Zwischenräume/Abstände [m]:
 - a: 6.00 (x2,0)
 - b₁: 1.20 (1,0 - 2,0)
 - x: 3.00 (x1,2)
 - l = b₁ + x = 4,2
 - Temperaturunterschied [K]: 8,0 (-12,0 - 4,4)
- Lufttechnische Ergebnisse (Air Technical Results):**

v_{10}	= 0,15	m/s
Δp_{10}	= -1,3	K
v_1	= 0,32	m/s
Δp_1	= -1,3	K
- Akustische Ergebnisse (Acoustic Results):**

Zu/A	dB(A)	Pa
dot	34	
LWA	38	
LWNC	32	

Ceiling diffusers

Basic information and nomenclature

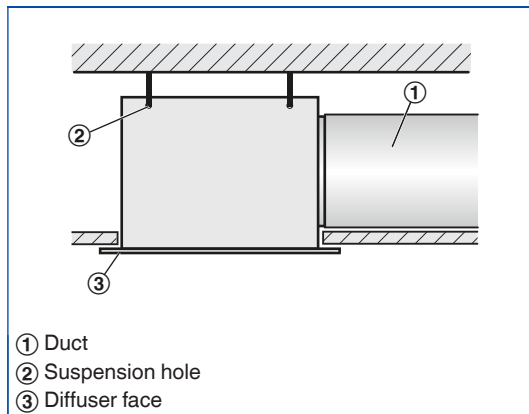
Description

Installation information

- Installation and making connections to be performed by others
- The optimum aerodynamic function is only achieved with flush ceiling installation
- The diffuser face is fixed to the plenum box cross bar using the central fixing screw
- Central fixing screw is concealed by a decorative cap

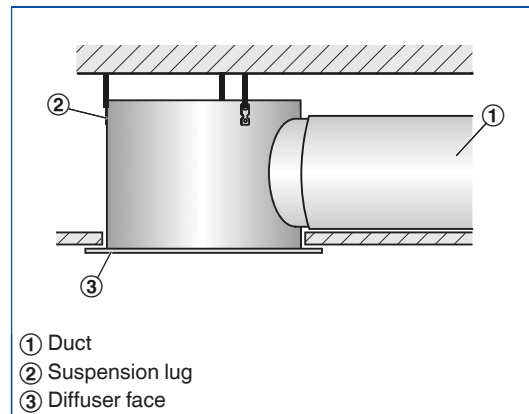
Installation types

Flush ceiling installation with square plenum box



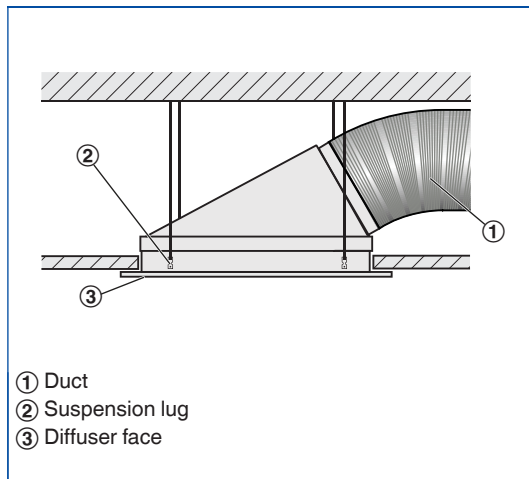
- Horizontal duct connection
- Four suspension holes
- Suspension with cords, wires or hangers, to be provided by others

Flush ceiling installation with circular plenum box



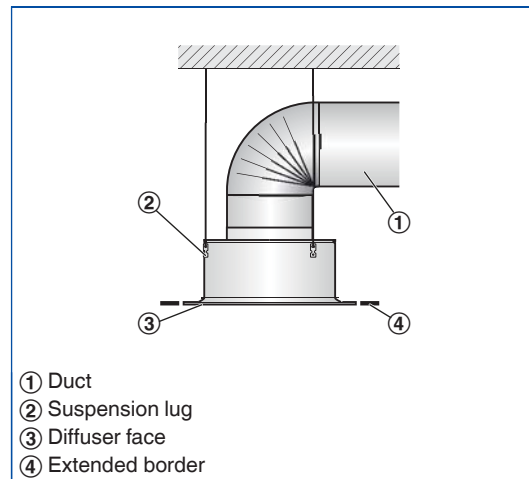
- Horizontal duct connection
- Three suspension lugs
- Suspension with cords, wires or hangers, to be provided by others

Flush ceiling installation with plenum box FLEXTRO



- Spigot at 30° angle
- Four suspension lugs
- Suspension with cords, wires or hangers, to be provided by others

Freely suspended installation



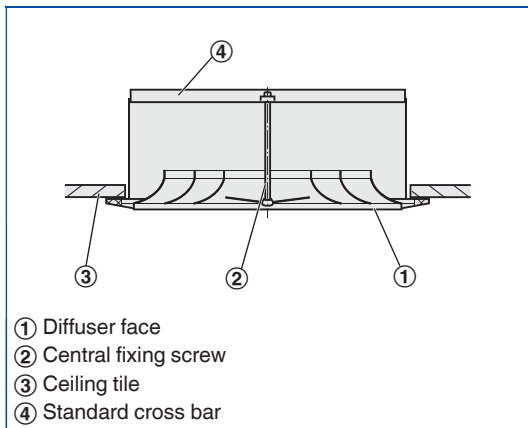
- Vertical duct connection
- Three suspension lugs
- Suspension with cords, wires or hangers, to be provided by others

Ceiling diffusers

Basic information and nomenclature

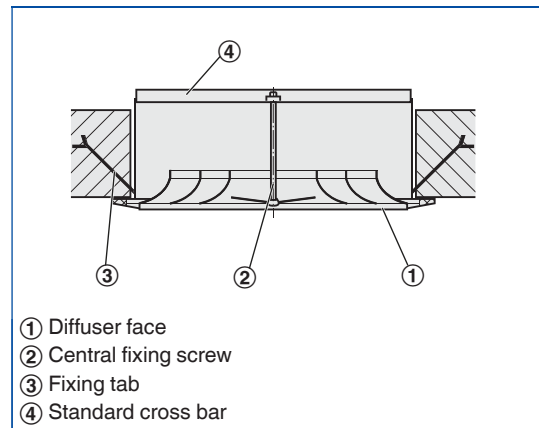
1 Installation without plenum box

Flush ceiling installation with standard cross bar G1, screw-fixed to ceiling



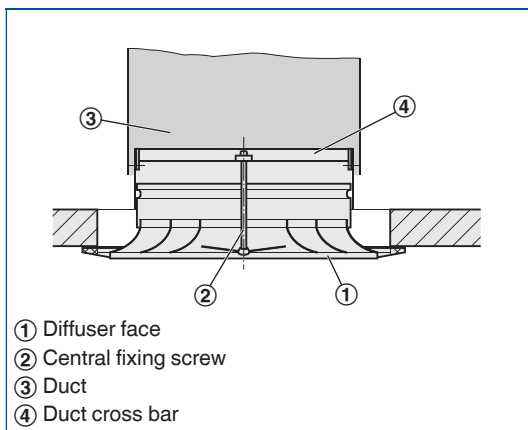
- No spigot
- Fixing of the standard cross bar to the ceiling tile is to be performed by others

Flush ceiling installation with standard cross bar G1, with fixing tabs mortared in



- No spigot
- The standard cross bar has to be mortared into the ceiling by others

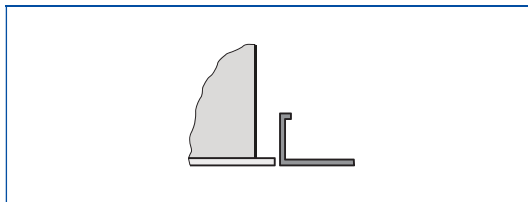
Flush ceiling installation with duct cross bar E1



- Vertical duct connection
- Fixing of the duct cross bar to the duct is to be performed by others

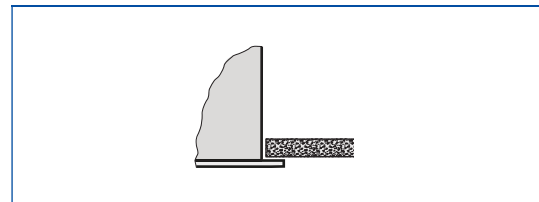
Ceiling systems

Installation into grid ceilings



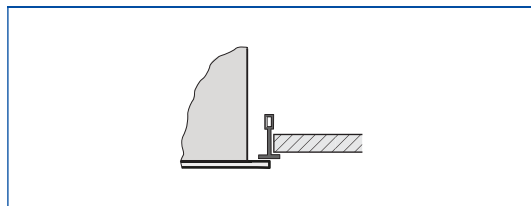
- Fix the plenum box to the ceiling
- The ceiling tile of the grid ceiling is independent of the ceiling diffuser
- Fix the diffuser face after the ceiling has been completed

Installation in continuous ceilings



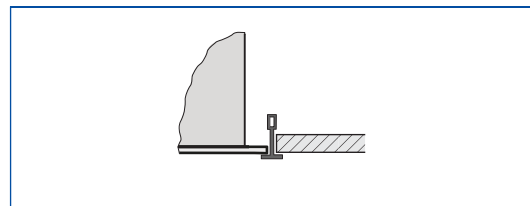
- Fix plenum box (including diffuser face, if necessary) to the ceiling
- Adjust plasterboard ceiling tile as required
- If necessary, fix the diffuser face after the ceiling has been completed

Installation in T-bar ceilings



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

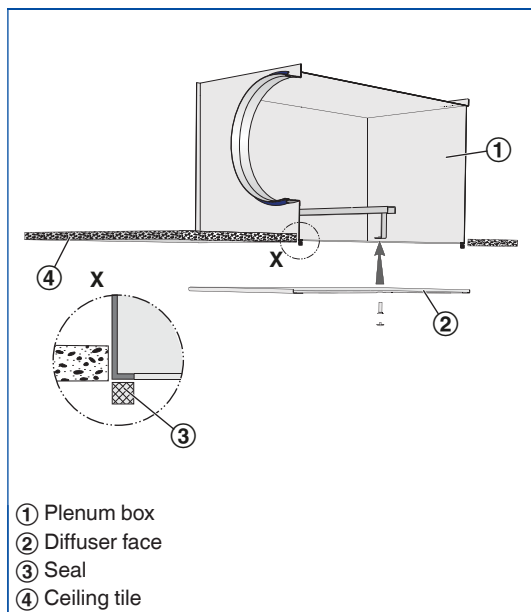
Installation in T-bar ceilings, diffuser face rests on T-bars



- Fix the plenum box to the ceiling, if necessary
- The diffuser rests on the T-bars

Diffuser face sealing and fixing

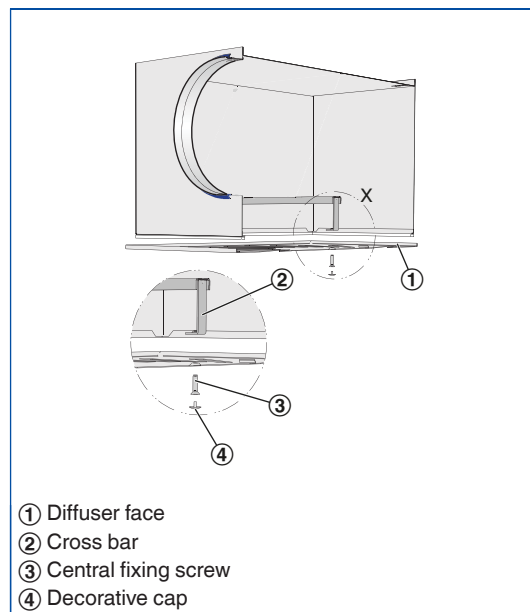
Diffuser face – sealing



- ① Plenum box
- ② Diffuser face
- ③ Seal
- ④ Ceiling tile

- The self-adhesive sealing tape (supplied) 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

Ceiling diffusers

Basic information and nomenclature

Commissioning

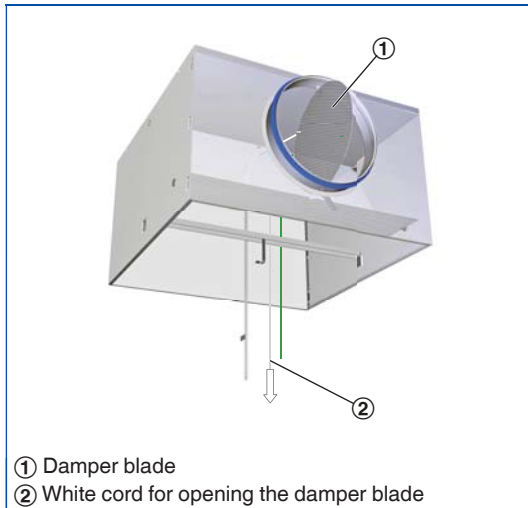
1

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.

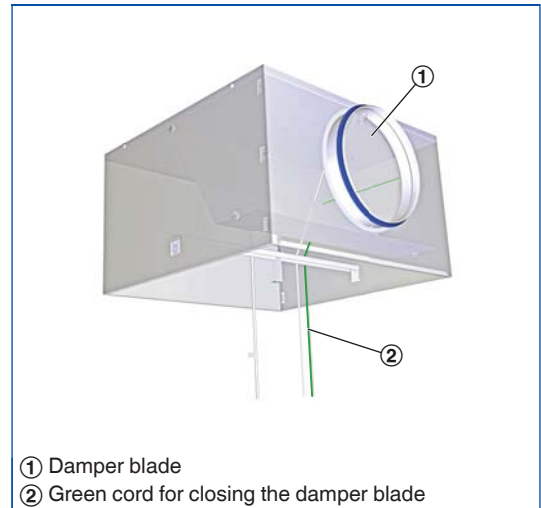
- AIRNAMIC, XARTO, FLEXTRO:
The diffuser face can be removed to access the damper blade; the damper blade can then be set in 15° intervals between 0 and 90°
- Ceiling diffusers with universal plenum box and damper blade (variant -M):
The diffuser face can be removed to access the damper blade; the damper 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 since the damper blade can be set with two cords (white and green).

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



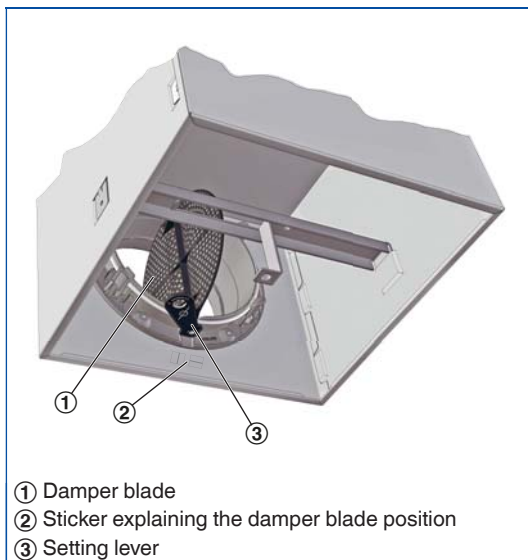
Open, 0°

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



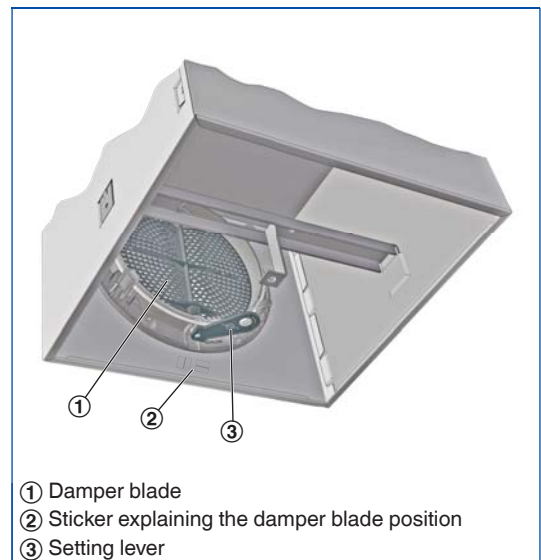
Closed, 90°

AIRNAMIC, XARTO, FLEXTRO Volume flow rate balancing



Open, 0°

AIRNAMIC, XARTO, FLEXTRO Volume flow rate balancing



Closed, 90°

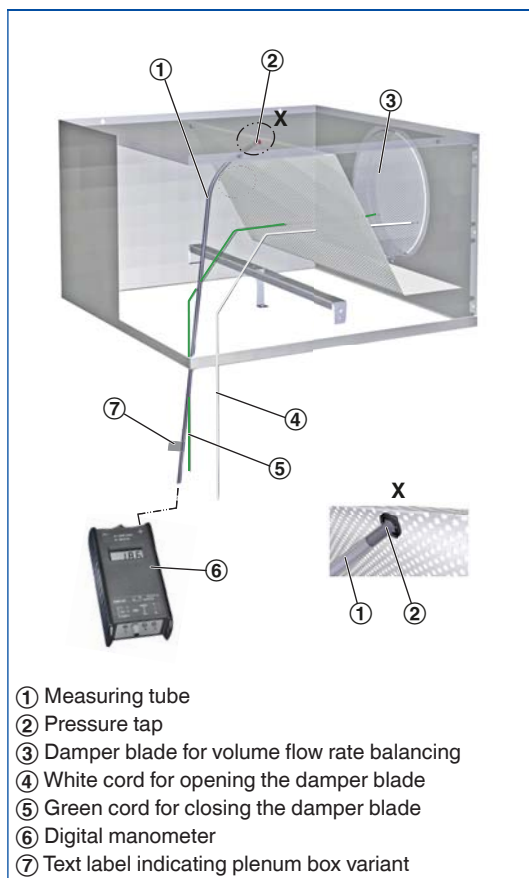
Volume flow rate measurement

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 measurement



For K values for the AK-Uni plenum boxes refer to Chapter K1 – 1.5.

Volume flow rate calculation for air density 1.2 kg/m³

$$\dot{V} = C \times \sqrt{\Delta p_w}$$

Volume flow rate calculation for other air densities

$$\dot{V} = C \times \sqrt{\Delta p_w} \times \sqrt{\frac{1.2}{\rho}}$$