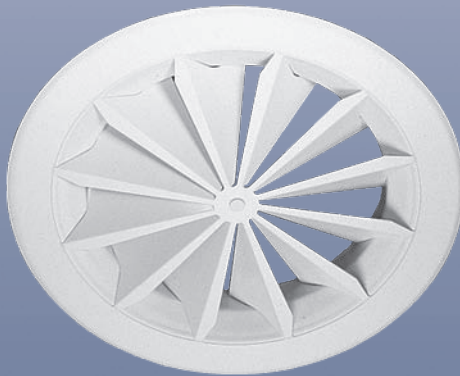
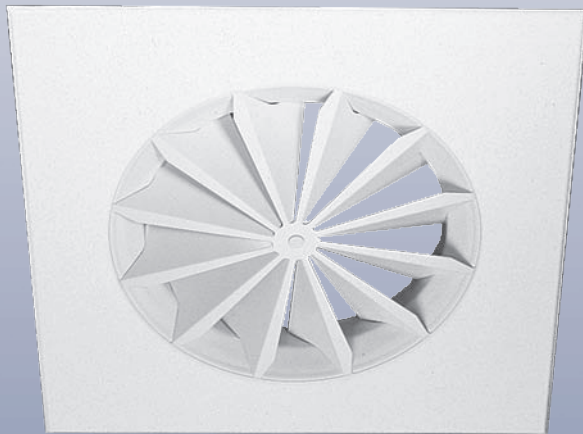




Radial outlet RA-N....

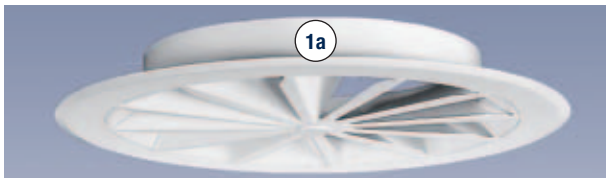
Radial outlet RA-N

Preliminary remarks

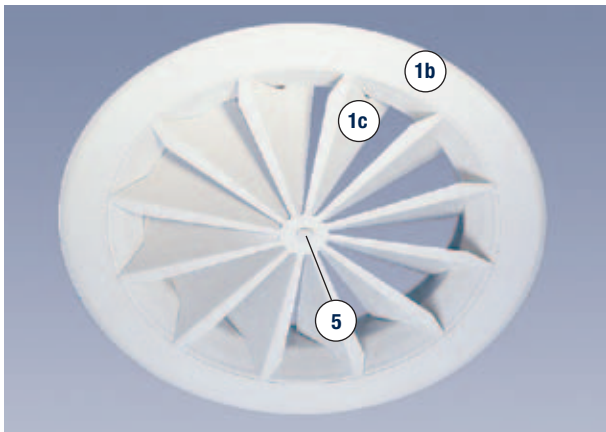
Radial outlets from KRANTZ KOMPONENTEN produce high-quality diffuse indoor air flow and are eminently suitable for commercial applications. Twelve radial vanes in a star-shaped arrangement radiate from the air outlet centre to the circumference. The vane undersides are flush with the surrounding area of the outlet face. So the radial outlet fits visually flush with the false ceiling. Thanks to their low height and different connection types, radial outlets can be installed in all suspended ceiling systems, particularly those with low ceiling plenums.

Construction design

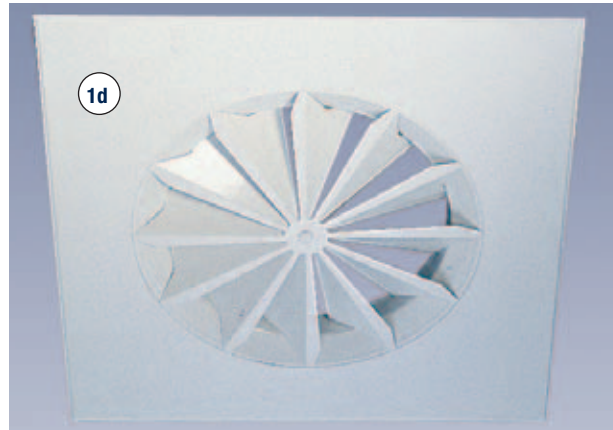
The main components are the short spigot **1a** with moulded air outlet face, the built-in radial vanes **1c** and the central fastening screw **5**. The radial outlet is available either with circular face **1b** or with square face **1d** to fit into square tile ceilings □ 600 or □ 625 ¹⁾.



Radial outlet with short spigot **1a**



Radial outlet with circular face **1b**



Radial outlet with square face **1d**

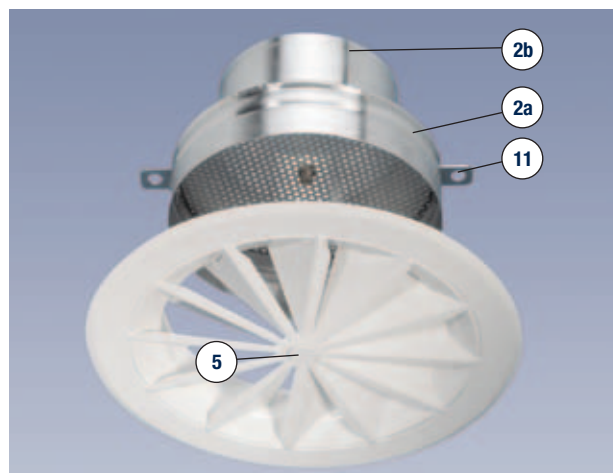
The following connection types are available for duct connection:

Connection type A ²⁾

With connection type A, a reducer **2** is used for connection to the duct system. This reducer has on one side a sleeve **2a** for accommodating the radial outlet and on the other side a spigot **2b** for duct connection.

Two L-suspensions **11** are fitted on opposite sides of the reducer for ceiling suspension.

Connection type A is mainly used for placing radial outlets in closed false ceilings or above open grid ceilings. With this connection type radial outlets can be used at low cost.



Connection type **A**

Connection types D and E ²⁾

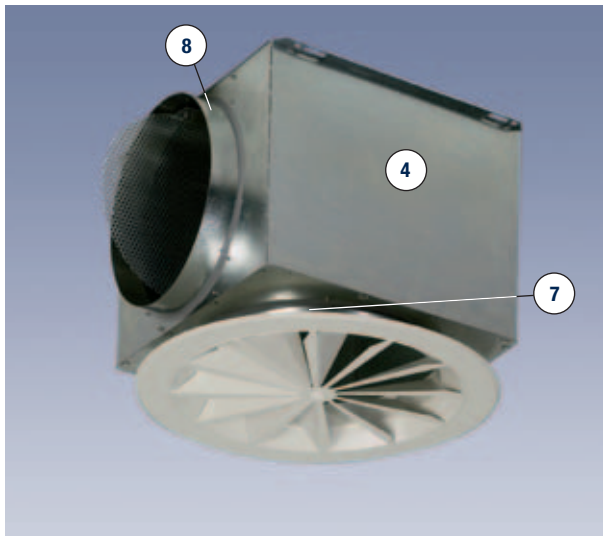
Duct connection is via flat connection boxes **4**. Both connection types are eminently suitable for outlet installation above false ceilings with low plenums, or for exposed mounting.

In connection type D, the radial outlet is attached to the box using an external sleeve **7**; in connection type E it is installed with its circular face flush with the box.

¹⁾ Customized dimensions available on enquiry

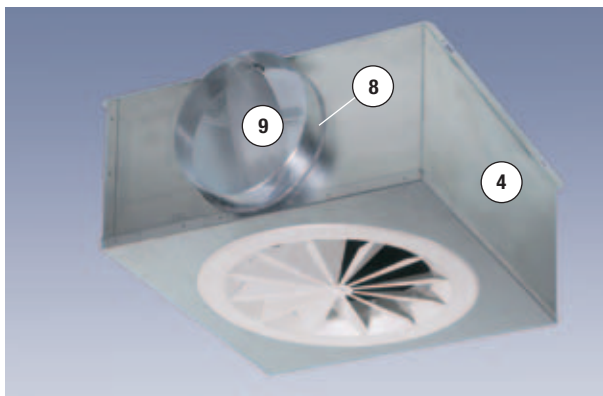
²⁾ See also installation options on page 4

Radial outlet RA-N



Connection type D, here with volume flow damper in connection spigot

Connection type E is mainly used for exposed mounting or for outlet placement above open grid ceilings. It also enables to use radial outlets in **thin closed false ceilings**.



Connection type E, here with volume flow damper in connection spigot

In general:

In all connection types, the radial outlet is inserted from below and screwed in its centre using the fastening screw **5**.

The connection spigot **8** for flexible duct or spiral seam duct is fitted to the side of the connection box. A volume flow damper **9** can be installed in the connection spigot and adjusted from the room.

The connection boxes are optionally available with acoustic lining for higher insertion loss.

Besides the low height, the advantages of duct connection via connection boxes are easy volume flow rate adjustment and good insertion loss.

Mode of operation

Due to the Coanda effect the supply air slides along the air outlet exit, forming rotationally symmetric, radial jets with horizontal discharge direction. The radial vanes provide the supply air jets with high turbulence and a great induction effect: the horizontal-discharge supply air is thus intensively mixed with indoor air. The result is high-quality, even and draught-free indoor air flow.

Radial outlets from KRANTZ KOMPONENTEN are part of the diffuse air distribution system and can be used up to a temperature difference of -12 K when cooling and $+5\text{ K}$ when heating ($+10\text{ K}$ up to 3 m ceiling height).

Return air inlet

Radial outlets can also be used as return air inlets. This applies to all connection types.

Sound power level and pressure drop

Typical features of radial outlets are low sound power level and low pressure drop. For size DN 315, for example, with connection type D, at an air outlet volume flow rate $\dot{V}_A = 139\text{ l/s}$ [$500\text{ m}^3/\text{h}$] the values are:

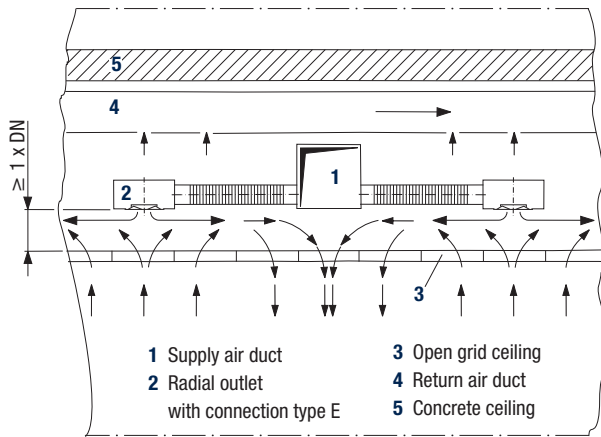
- sound power level = 35 dB(A) ref. 10^{-12} W
- pressure drop = 27 Pa

Design specifications

Radial outlets can be mounted in closed false ceilings, exposed, or placed above open grid ceilings, thus being invisible from the room. This is made very easy by the different connection types available. It is essential that the vertical distance between the upper edge of the open grid ceiling and the discharge plane be $\geq 1 \times \text{DN}$.

In air distribution with radial outlets, supply and return air openings may be positioned close together. Disruptions in jet dispersion or risks of short-circuiting are ruled out if the height difference between the lower edge of the return air opening and the discharge plane of the radial outlet is kept to minimum 250 mm . If the radial outlet and the return air opening are in the same plane, the horizontal centre spacing should be at least five times the nominal diameter ($5 \times \text{DN}$) of the outlet.

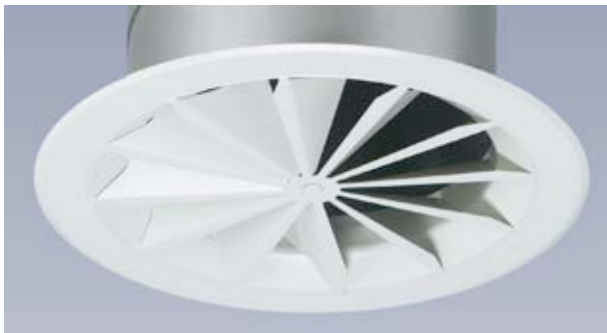
Radial outlet RA-N



Radial outlets fitted above an open grid ceiling. The return air is removed evenly over the whole ceiling and collected in a return air duct directly above the radial outlets.



Radial outlet in a strip ceiling

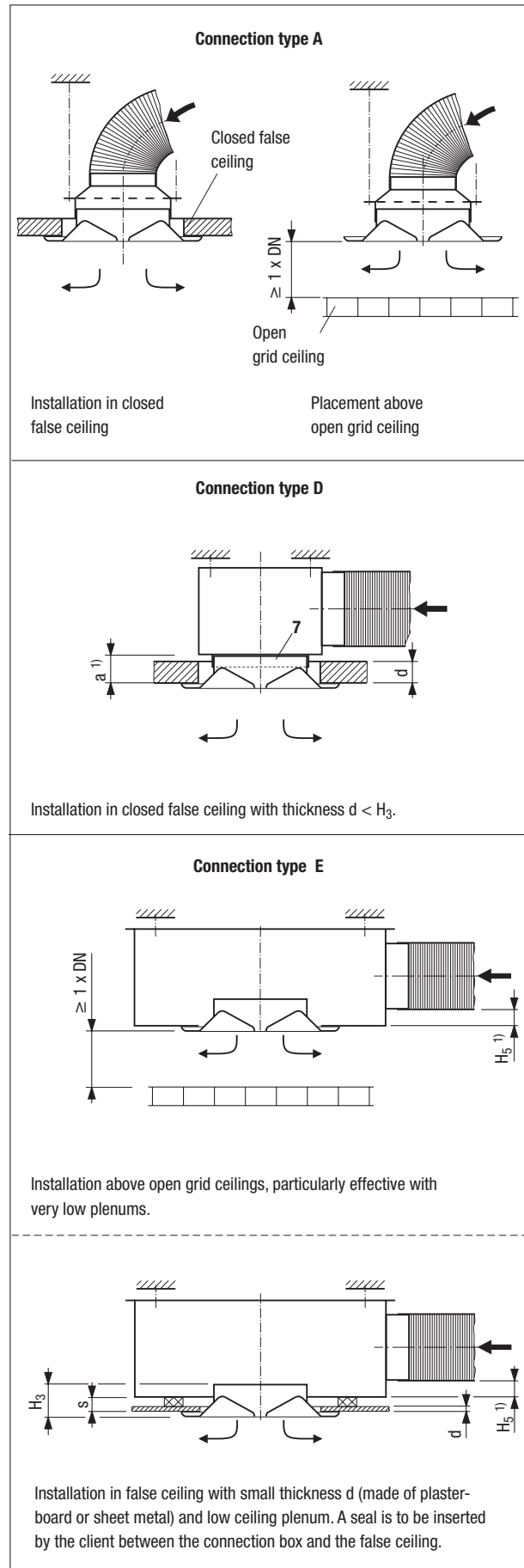


Radial outlet with connection type A, for exposed mounting



Radial outlet with connection type E, for exposed mounting

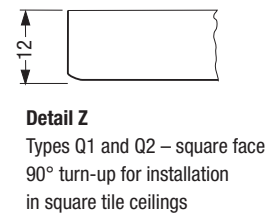
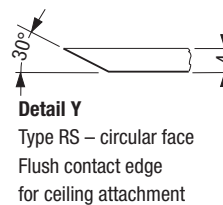
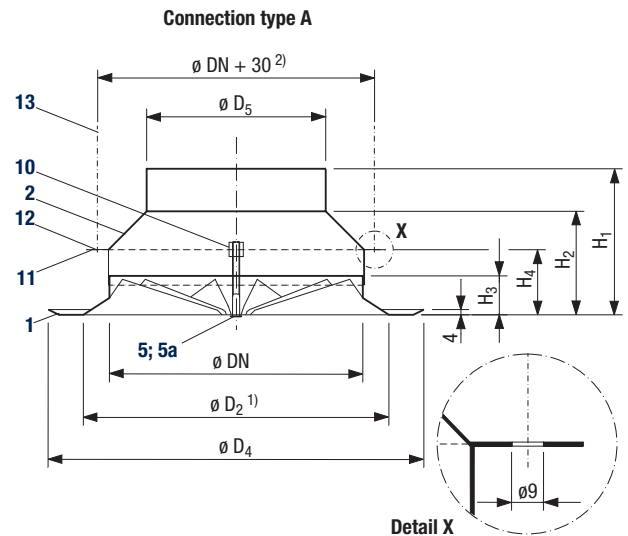
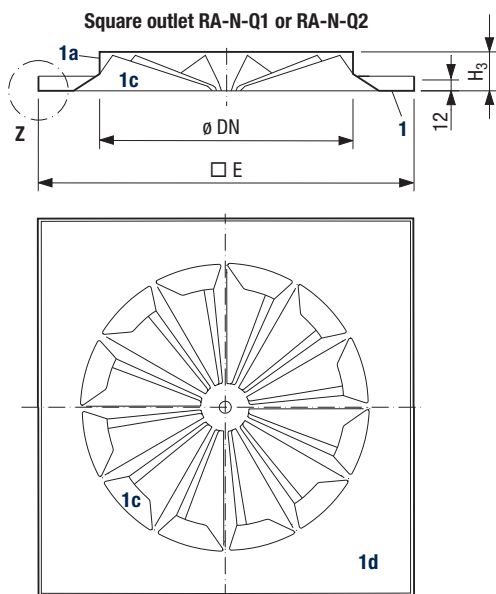
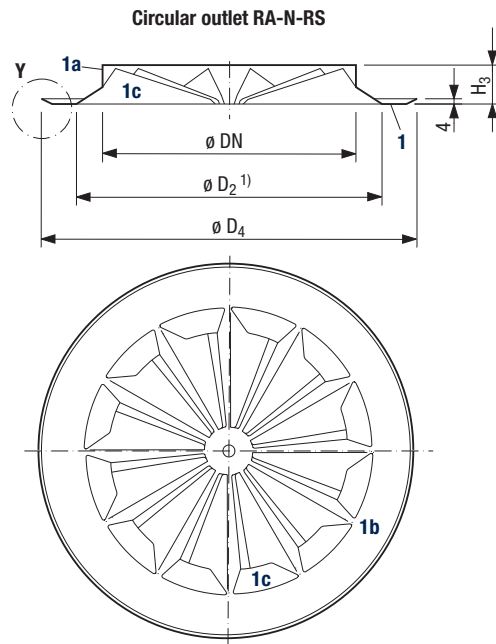
Installation options



¹⁾ See table on page 6

Radial outlet RA-N

Dimensions for connection type A



Key for all pages

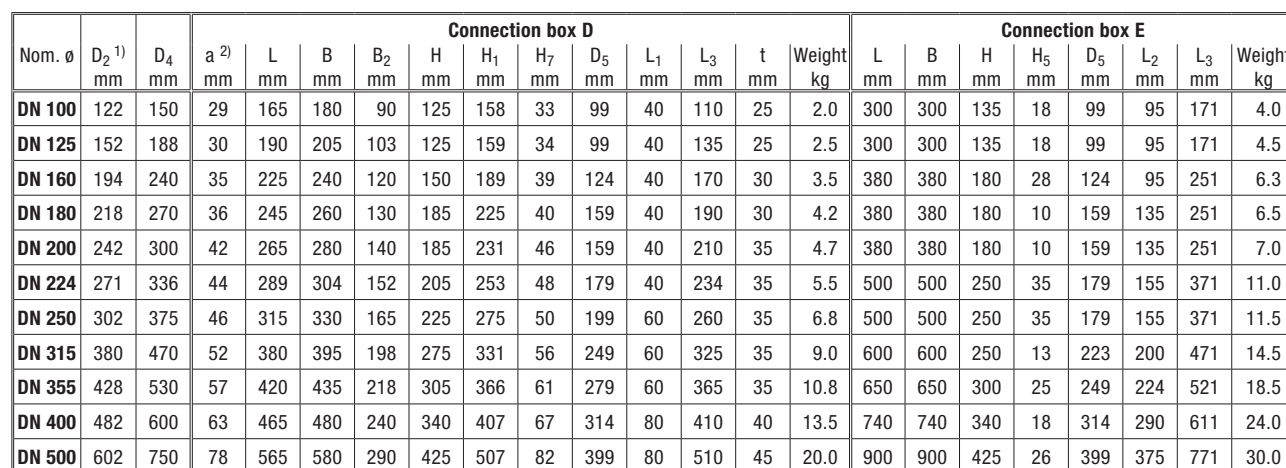
Key for all pages	Material
1 Radial outlet	sheet metal, powder coated
2 Reducer	aluminium
4 Connection box	galvanized sheet metal
5 Fastening screw	galvanized sheet metal
5a Cap	brass, powder coated
6 Acoustic lining (optional)	mineral wool
7 Sleeve at box	galvanized sheet metal
8 Connection spigot at box	
9 Volume flow damper	
10 Fastening of radial outlet up to DN 200 with M6 from DN 224 with M8	
11 L-suspension	
12 Bore for suspension	
13 Threaded rod or similar (by others)	
14 Adjustment device for volume flow damper	

Nom. ø	H ₁ mm	H ₂ mm	H ₃ mm	H ₄ mm	D ₂ 1) mm	D ₄ mm	D ₅ mm	RA-N-RS Weight kg	RA-N-Q1		RA-N-Q2	
									□ E mm	Weight kg	□ E mm	Weight kg
DN 100	95	55	28	50	122	150	99	0.3	595	3.2	620	3.5
DN 125	108	68	29	52	152	188	99	0.5		3.2		3.5
DN 160	115	75	32	53	194	240	124	0.7		3.3		3.5
DN 180	111	71	34	58	218	270	159	1.0		3.3		3.6
DN 200	122	82	36	60	242	300	159	1.1		3.3		3.6
DN 224	132	92	39	62	271	336	179	1.4		3.4		3.6
DN 250	149	109	43	70	302	375	179	1.6		3.4		3.7
DN 315	168	128	51	78	380	470	223	2.2		3.6		3.9
DN 355	200	140	56	85	428	530	249	3.2		3.7		4.0
DN 400	196	136	62	90	482	600	314	3.8		3.8		4.1
DN 500	211	151	77	107	602	750	399	6.0	—	—	—	—

¹⁾ Ceiling cutout

²⁾ Nominal diameters DN 355, DN 400 and DN 500 have a third L-suspension at a 90° angle

Dimensions for connection types D and E



2) For false ceilings with thickness $d > a$, the sleeve height must be correspondingly larger. In such a case, please specify the required 't' dimension.

Radial outlet RA-N

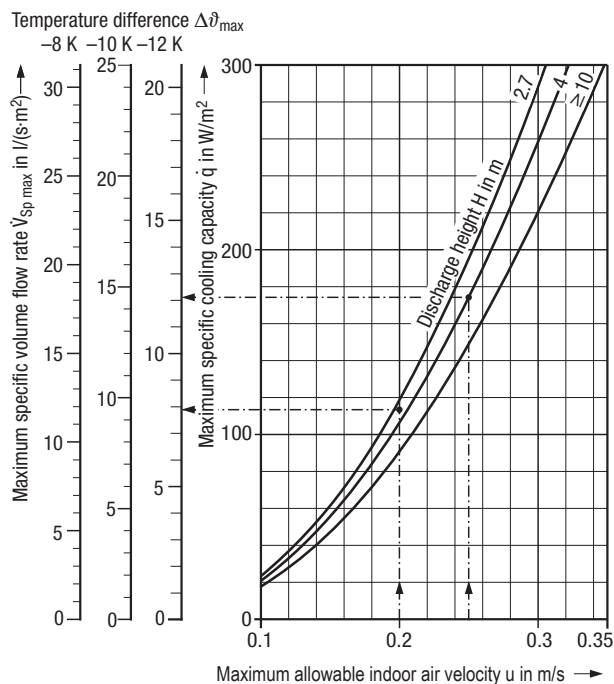
Comfort criteria and minimum air outlet centre spacing

Comfort criteria ¹⁾

The outlet layout must comply with the maximum allowable indoor air velocities u in the occupied zone in the cooling mode. The indoor air velocity depends on the cooling load that is to be removed from the room. The maximum specific cooling capacity $\dot{q}$ depends on the discharge height and the maximum allowable indoor air velocity u (Graph 1).

Graph 1 enables to determine for the cooling mode the maximum specific volume flow rate $\dot{V}_{Sp\ max}$ in relation to the maximum specific cooling capacity and the maximum temperature difference $\Delta\vartheta_{max}$. The volume flow rate supplied to the room $\dot{V}_{Sp\ tats}$ may not exceed this value.

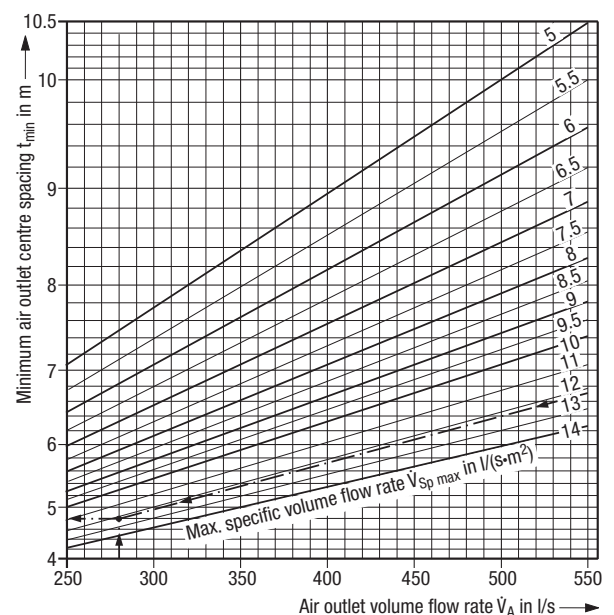
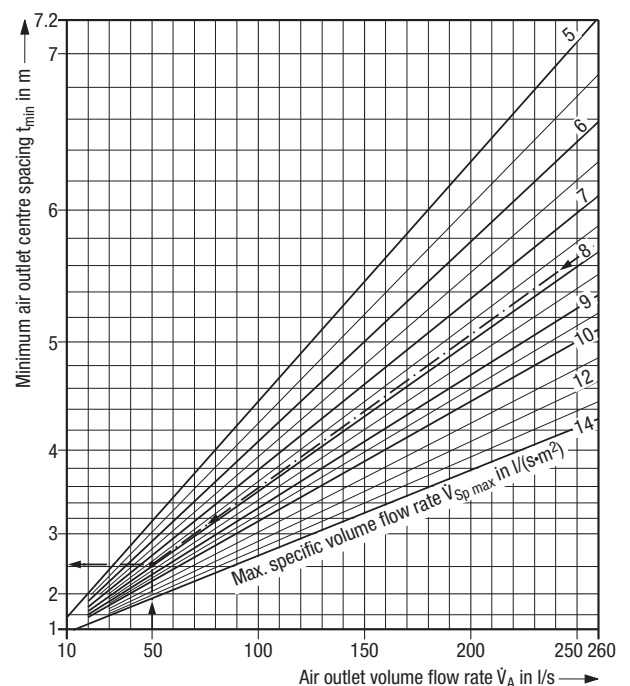
Graph 2 enables to determine the minimum centre spacing between two outlets on the basis of the maximum specific volume flow rate.



Graph 1: Maximum specific volume flow rate

Key for layout:

- $\dot{V}_A$ = volume flow rate per air outlet in l/s
- $\dot{V}_{A\ max}$ = max. volume flow rate per air outlet when cooling in l/s
- $\dot{V}_{A\ min}$ = min. volume flow rate per air outlet when cooling in l/s
- $\dot{V}_{Sp\ max}$ = max. specific volume flow rate per m² of floor area in l/(s·m²)
- $\dot{V}_{Sp\ tats}$ = actual specific volume flow rate per m² of floor area in l/(s·m²)
- u = max. allowable indoor air velocity in m/s
- $\dot{q}$ = max. specific cooling capacity in W/m²
- $\Delta\vartheta_{max}$ = max. temperature difference supply air to return air in K
- t_{min} = minimum air outlet centre spacing in m
- H = discharge height in m
- L_{WA} = sound power level in dB(A) ref. 10⁻¹² W
- Δp_t = total pressure drop in Pa

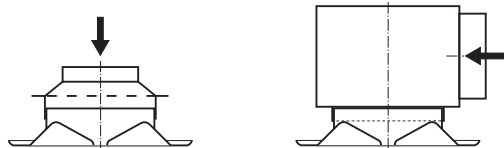


Graph 2: Minimum air outlet centre spacing

¹⁾ See our brochure ref. TB 69 'Layout specifications for thermal comfort'

Radial outlet RA-N

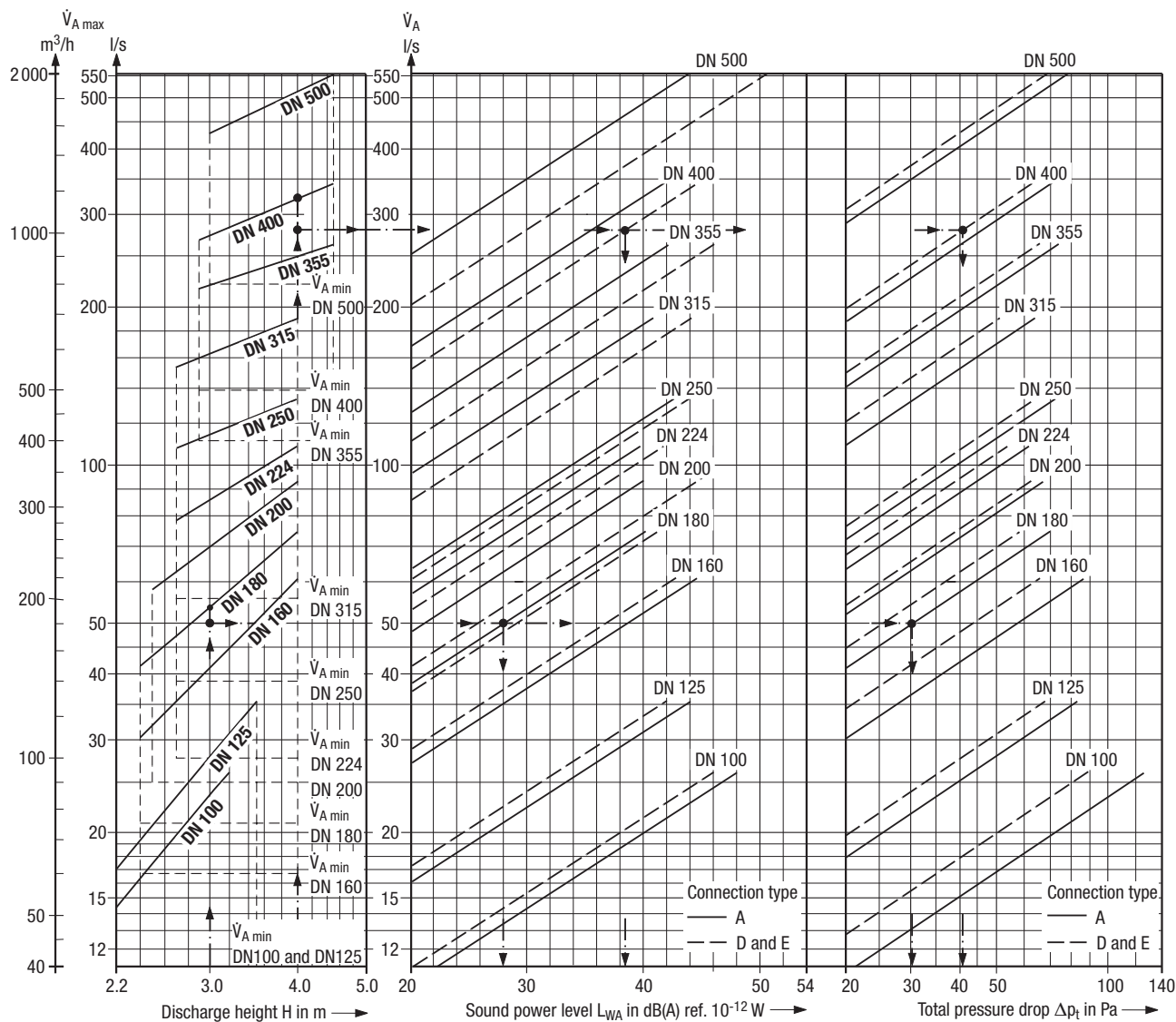
Connection types A, D and E - Layout sheet



Connection type A

D and E

The sound power levels in connection type A apply to connection to a round duct with 90° elbow. The chart values for sound power level and pressure drop in connection types D and E apply to damper position 'open' and connection box **without** acoustic lining. With acoustic lining, sound power levels are about 2 dB(A) ref. 10⁻¹²W lower than indicated in the chart. The pressure drop is not affected by the acoustic lining.



Layout examples				
Size			DN 180	DN 400
Connection type			A	E
Application			Office	Department store
1	Supply air volume flow rate $\dot{V}$	l/s	150	6720
2	Discharge height H	m	3	4
3	Floor area A	m ²	20	1200
4	Max. allowable sound power level L_{WA} dB(A) ref.10 ⁻¹² W		35	45
5	Temperature difference $\Delta\vartheta_{\max}$	K	−12	−12
6	Comfort criteria (see page 7)			
	– Max. allowable indoor air velocity u	m/s	0.2	0.25
	– Max. specific volume flow rate $\dot{V}_{Sp \max}$	l/(s·m ²)	7.8	12.2
	– Actual specific volume flow rate $\dot{V}_{Sp \text{ tats}}$ [from 1 : 3]	l/(s·m ²)	7.5	5.6
	Criterion is met if $\dot{V}_{Sp \text{ tats}} < \dot{V}_{Sp \max}$			

From nomogram			
Size		DN 180	DN 400
7 $\dot{V}_{A max}$	l/s	52	328
8 Z	[$\geq \dot{V} : \dot{V}_{A max}$]	3	24
9 $\dot{V}_A$	[$\dot{V} : Z$]	50	280
10 L_{WA}	dB(A) ref. 10 ⁻¹² W	28	38
11 Δp_t	Pa	≈ 30	≈ 40
12 t_{min}	[Graph 2 on p. 7]	≈ 2.5	4.8

Radial outlet RA-N

Connection types A, D and E – Sound power level and insertion loss

			Connection type A								Connection types D and E							
Size	Air outlet volume flow rate $\dot{V}_A$		Total pressure drop Δp_t Pa	Sound power level ²⁾ L_W in dB ref. 10^{-12} W							Total pressure drop Δp_t Pa	Sound power level ²⁾ L_W in dB ref. 10^{-12} W						
DN	l/s	m ³ /h		L_{WA} dB(A)	Octave band centre frequency in Hz							L_{WA} dB(A)	Octave band centre frequency in Hz					
					125	250	500	1 K	2 K	4 K			125	250	500	1 K	2 K	4 K
100	11	40	22	22	22	26	22	14	—	—	15	20	19	17	22	11	—	—
	16	60	50	34	31	35	33	28	20	11	35	33	31	31	34	26	24	—
	22	80	90	43	37	42	41	38	33	25	63	41	37	38	41	35	34	21
	25	90	113	47	39	45	45	43	39	33	80	45	39	41	43	39	38	28
125	16	60	18	21	19	22	21	14	—	—	15	19	17	17	21	—	—	—
	22	80	32	30	27	31	30	25	14	—	25	28	27	27	30	18	—	—
	28	100	50	37	32	37	36	33	22	12	40	35	34	33	36	26	21	—
	33	120	72	42	36	41	41	39	30	21	60	40	38	38	41	33	28	17
160	28	100	18	21	17	20	21	17	—	—	13	19	17	21	18	13	—	—
	33	120	25	27	21	25	27	23	15	—	19	24	22	26	23	18	15	—
	39	140	34	31	25	29	31	27	21	—	26	29	27	31	28	23	20	—
	45	160	45	35	28	32	34	30	25	14	34	33	31	35	32	27	24	14
180	50	180	57	39	32	36	39	35	30	21	44	37	35	39	36	31	28	18
	55	200	30	28	28	28	28	21	11	—	25	29	27	32	30	21	14	—
	60	220	38	31	30	31	31	25	16	—	31	32	30	35	32	25	18	—
	66	240	46	34	33	33	34	28	20	—	38	35	33	38	35	28	22	12
200	72	260	55	36	34	35	36	31	24	13	45	38	36	40	37	31	25	16
	72	260	64	39	36	37	38	34	27	18	53	40	38	42	39	34	29	20
	50	180	19	19	19	21	19	14	—	—	17	26	20	26	22	21	20	—
	60	220	28	27	25	27	26	22	12	—	26	32	26	32	28	27	26	16
224	72	260	40	32	29	31	31	28	20	—	36	37	37	33	32	31	31	16
	83	300	53	36	31	34	34	32	25	17	50	41	35	41	37	36	35	25
	95	340	70	40	34	37	38	36	31	24	65	45	39	45	41	40	39	29
	55	200	16	19	23	21	18	13	—	—	13	21	22	24	17	16	13	—
250	70	250	24	26	30	28	25	20	—	—	23	28	29	31	24	23	20	12
	83	300	35	31	34	33	30	26	17	—	31	34	35	35	37	30	29	18
	97	350	49	36	37	36	34	31	24	17	43	38	39	41	34	33	30	22
	110	400	64	40	40	39	38	36	31	24	56	42	43	45	38	37	34	26
315	70	250	18	23	26	25	24	14	—	—	17	24	26	27	21	18	14	—
	83	300	27	28	30	29	28	20	12	—	24	29	31	32	26	23	19	—
	97	350	36	32	34	33	32	26	19	—	33	34	36	37	31	28	24	13
	110	400	48	36	37	36	36	31	24	15	43	38	40	41	35	32	28	17
355	125	450	62	40	40	39	39	35	29	22	55	42	44	45	39	36	32	21
	125	450	27	28	30	31	28	21	—	—	22	30	31	31	27	26	18	—
	140	500	33	31	32	34	31	25	12	—	27	33	34	34	30	29	21	—
	153	550	40	34	34	36	34	28	17	—	32	37	38	38	34	33	25	13
400	165	600	47	37	36	38	36	32	22	12	38	40	41	41	36	36	28	16
	180	650	57	39	38	40	39	35	26	17	45	42	43	43	39	38	30	18
	165	600	28	28	32	29	27	24	11	—	25	32	37	35	29	28	18	—
	195	700	39	33	35	33	31	29	19	—	34	37	41	39	33	33	24	12
450	220	800	51	37	38	37	35	33	25	16	44	41	44	43	37	37	30	18
	250	900	65	41	41	40	39	37	31	23	57	44	47	46	40	40	35	23
	265	950	73	42	41	41	39	38	32	25	63	46	48	47	41	42	37	26
	220	800	28	28	35	29	27	23	11	—	25	31	38	32	27	27	19	—
500	250	900	36	32	37	33	31	27	17	—	32	35	41	36	31	31	23	11
	280	1000	45	35	40	35	34	31	22	11	40	38	43	39	35	34	27	16
	305	1100	54	38	42	38	36	34	26	16	48	41	45	42	38	37	31	20
	330	1200	64	41	44	40	39	37	30	21	58	43	47	44	40	39	34	24
555	330	1200	27	28	35	28	27	22	—	—	24	35	39	36	34	30	22	—
	390	1400	36	33	39	33	33	28	18	—	33	40	43	41	39	36	29	17
	445	1600	47	36	41	35	35	32	23	13	44	44	46	44	42	40	33	23
	500	1800	60	40	44	38	38	37	29	20	55	47	49	47	45	43	37	28
	555	2000	75	43	45	40	40	40	33	25	66	50	52	49	48	46	41	32

¹⁾ Values apply to connection to round duct with 90° elbow.

²⁾ Applies to damper position 'open' and connection box without acoustic lining. With acoustic lining the values are about 2 dB(A) ref. 10^{-12} W lower.

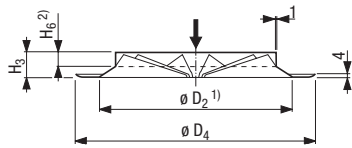
The pressure drop is not affected by the acoustic lining.

Insertion loss in dB						
Size DN	Connection box without acoustic lining Octave band centre frequency in Hz					
	125	250	500	1 K	2 K	4 K
100	3	2	0	6	8	7
125	3	2	1	5	6	8
160	2	2	0	3	4	7
180	3	2	1	6	3	5
200	2	2	1	4	2	3
224	4	2	2	6	3	4
250	4	2	5	4	4	4
315	4	2	6	6	4	4
355	4	2	3	4	3	3
400	4	2	2	3	3	2
500	3	2	2	3	3	2

Insertion loss in dB						
Size DN	Connection box with acoustic lining Octave band centre frequency in Hz					
	125	250	500	1 K	2 K	4 K
100	3	2	3	7	10	10
125	3	2	2	6	10	11
160	3	2	3	7	8	8
180	2	2	3	9	7	6
200	3	2	4	8	7	7
224	3	2	5	8	6	7
250	4	2	6	7	6	8
315	3	2	6	6	5	6
355	4	2	5	6	4	5
400	3	2	5	6	4	4
500	3	2	5	6	4	4

Radial outlet RA-N

Nomogram, dimensions and sound power level



Size	D ₂ ¹⁾	D ₄	H ₃	H ₆ ²⁾	Fastening screw	Weight	Min. volume flow rate ³⁾	
DN	mm	mm	mm	mm		kg	l/s	m ³ /h
100	122	150	28	21.0	M6	0.15	11	40
125	152	188	29	20.5		0.30	11	40
160	194	240	32	21.0		0.45	16	60
180	218	270	34	21.5		0.70	21	75
200	242	300	36	22.5		0.80	25	90
224	271	336	39	23.5	M8	1.00	28	100
250	302	375	43	25.5		1.15	39	140
315	380	470	51	29.0		1.50	55	200
355	428	530	56	31.5		2.20	110	400
400	482	600	62	34.5		2.65	140	500
500	602	750	77	45.0		4.35	220	800

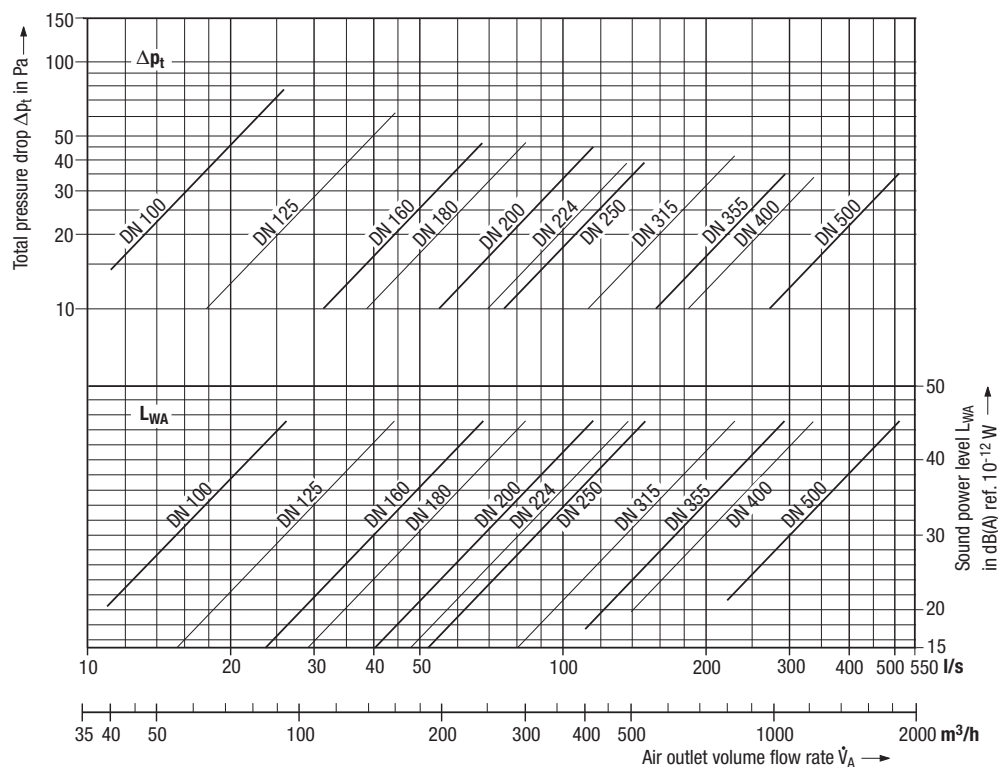
¹⁾ Ceiling cutout

²⁾ Spigot length up to radius

³⁾ Maximum volume flow rate depends on discharge height, see nomogram (page 8)

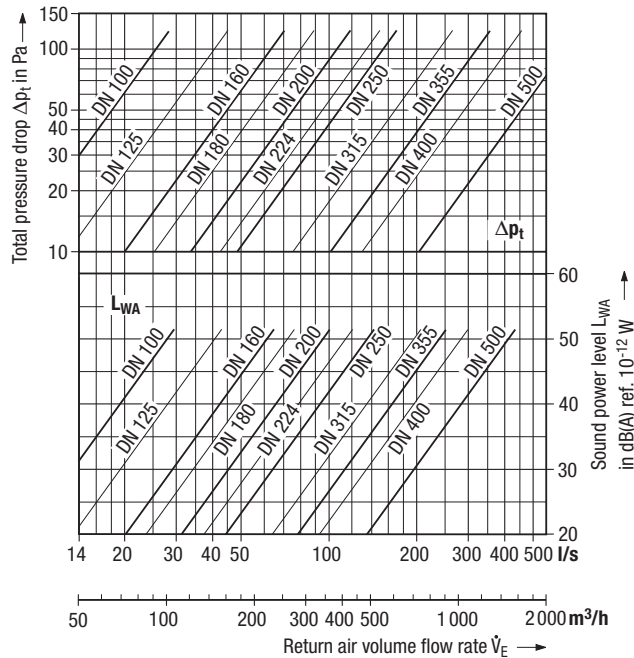
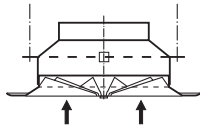
Note: The chart and table values apply to axial air supply to the outlets.

Size DN	Air outlet volume flow rate $\dot{V}_A$		Total pressure drop Δp_t Pa	Sound power level L_W in dB ref. 10^{-12} W							
	l/s	m ³ /h		L_{WA} dB(A)	Octave band centre frequency in Hz						
					63	125	250	500	1 K	2 K	4 K
100	14	50	22	26	25	28	28	25	20	14	—
	21	75	50	38	34	37	38	36	34	28	19
	25	90	71	44	37	40	43	41	40	35	29
125	16	60	9	16	16	20	20	16	—	—	—
	25	90	19	28	24	30	30	27	22	11	—
	33	120	34	36	31	37	38	35	32	23	13
160	30	110	9	21	23	26	25	21	13	—	—
	40	145	16	29	29	32	32	29	22	13	—
	55	200	31	39	36	40	41	38	34	27	19
180	45	160	13	28	23	34	32	27	20	—	—
	55	200	20	33	30	37	37	33	26	17	—
	66	240	29	38	35	39	41	38	32	24	15
200	50	180	8	21	27	24	25	20	11	—	—
	66	240	15	29	33	31	32	28	21	13	—
	83	300	23	35	38	36	37	34	29	22	14
224	55	200	6	19	19	21	23	18	11	—	—
	72	260	11	26	26	28	30	25	20	11	—
	89	320	16	32	31	34	35	31	27	19	11
250	78	280	10	25	29	30	30	24	17	—	—
	95	340	15	31	33	35	35	30	24	15	—
	110	400	21	36	36	39	39	35	30	22	12
315	105	380	9	22	30	28	28	18	12	—	—
	128	460	13	28	34	32	33	25	19	10	—
	150	540	18	33	38	36	37	31	26	18	—
355	140	500	9	21	29	28	26	19	13	—	—
	165	600	12	27	33	33	31	25	20	12	—
	195	700	17	32	37	36	35	30	26	19	—
400	165	600	7	25	31	31	29	23	18	10	—
	220	800	13	33	39	39	37	31	26	18	16
	280	1000	21	39	45	45	43	37	32	24	22
500	250	900	7	25	30	29	28	23	19	12	—
	330	1200	12	33	38	37	36	31	27	20	—
	415	1500	19	39	44	43	42	37	33	26	17

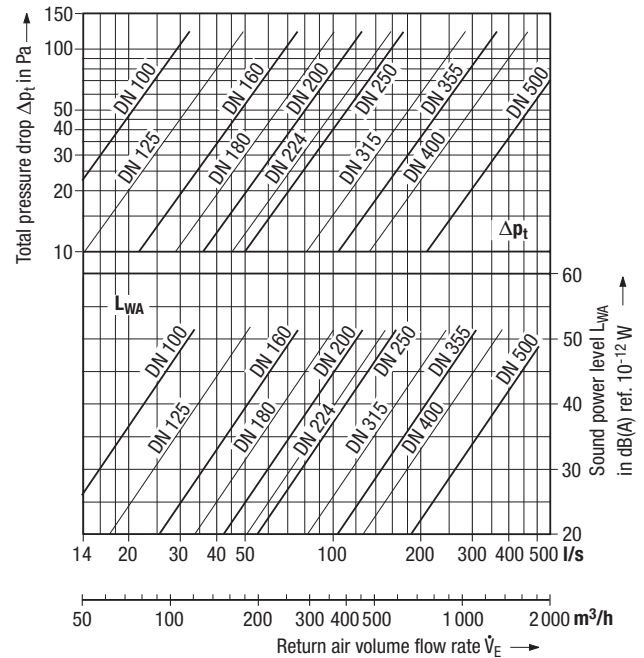
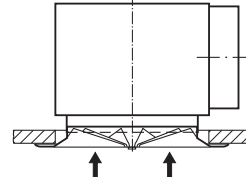


Radial outlet RA-N used as return air inlet

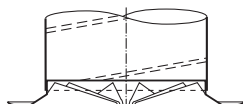
Connection type A



Connection type D



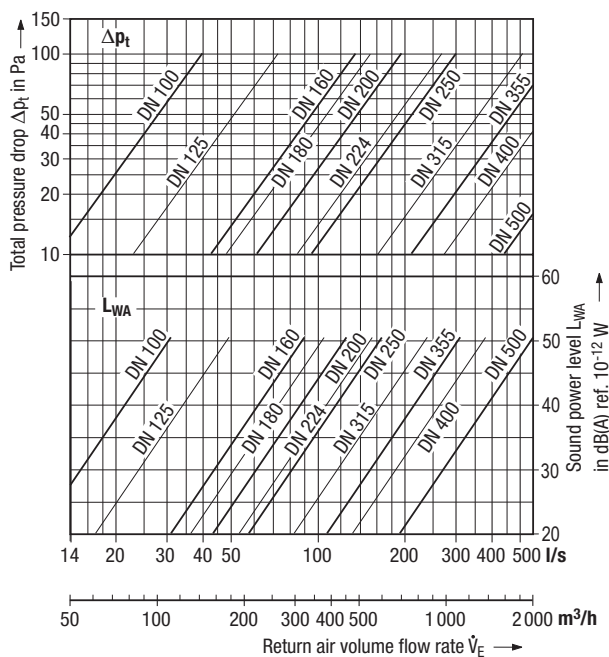
Single element



Duct connection



Ceiling installation



Radial outlet with circular face in a boutique

Radial outlet RA-N

Features



Radial outlet with circular face in a reception area



Radial outlet with square face in a casino

Features

- Diffuse air distribution system
- Maximum temperature difference between supply air and indoor air: -12 K when cooling, +5 K when heating (+10 K up to 3 m ceiling height)
- Stable supply air jets, even at minimum volume flow rate
- Discharge height from 2.2 to 4.5 m
- Low sound power level
- Installation options: in a closed false ceiling, above an open grid ceiling, or exposed
- Fastening with central fastening screw; air outlet element easy to remove from below
- Outlet material: galvanized sheet metal, powder coated
- Radial vanes flush with the outlet face
- Available in 11 sizes ranging from DN 100 to DN 500; volume flow rate range from 11 to 556 l/s [40 to 2 000 m³/h]
- Available as standard with circular or square face
- Outlet connection either to a circular duct via a reducer or to a connection box optionally fitted with a volume flow damper and acoustic lining
- With all connection types the radial outlet can also be used as return air inlet

Radial outlet RA-N

Type code

RA-N	-	-	DN	-	-	-	-	-	-
Radial outlet		Geometry	Size	Connection type	Damper	Insulation		Surface finish	

Geometry

RS	=	circular face
Q1	=	square face for square tile ceiling 600 mm x 600 mm
Q2	=	square face for square tile ceiling 625 mm x 625 mm

Size

100	=	DN 100	250	=	DN 250
125	=	DN 125	315	=	DN 315
160	=	DN 160	355	=	DN 355
180	=	DN 180	400	=	DN 400
200	=	DN 200	500	=	DN 500
224	=	DN 224			

Connection type

O	=	no connection piece (only discharge element)
A	=	reducer (connection type A)
D	=	connection box (connection type D), external sleeve
E	=	connection box (connection type E), outlet flush with connection box
L	=	perforated hood

Damper

O	=	no volume flow damper
R	=	with volume flow damper adjustable from room
S	=	with volume flow damper adjustable at spigot ²⁾

Insulation

O	=	without acoustic lining
I	=	with acoustic lining

Surface finish

9010	=	face painted to RAL 9010, semi-matt
....	=	face painted to RAL

Tender text ¹⁾

..... units

Radial outlet for high-quality indoor air flow with minimal temperature gradient in the occupied zone,

consisting of:

air outlet element with short spigot and radial vanes – vane undersides flush with surrounding face area –, either with circular face for various ceiling mounting options or with square face with turn-up for mounting in square tile ceilings, and with central fastening screw with cap;

connection to the duct system either via a reducer fitted with opposite L-suspensions or via a flat connection box with connection spigot, central fastener for fixing the air outlet, and flange bores for suspension; connection box optionally fitted with volume flow damper adjustable from the room or – only for connection type E – at the spigot; optional acoustic lining.

Materials:

- Radial outlet made of galvanized sheet metal, powder coated to RAL 9010, pure white, or RAL
- Reducer made of aluminium
- Connection box made of galvanized sheet metal

Make:

KRANTZ KOMPONENTEN

Type:

RA-N – ____ – DN ____ – ____ – ____

Subject to technical alterations.

¹⁾ This tender text also applies in case the radial outlet is used as a return air inlet

²⁾ Available only for connection box of type E

