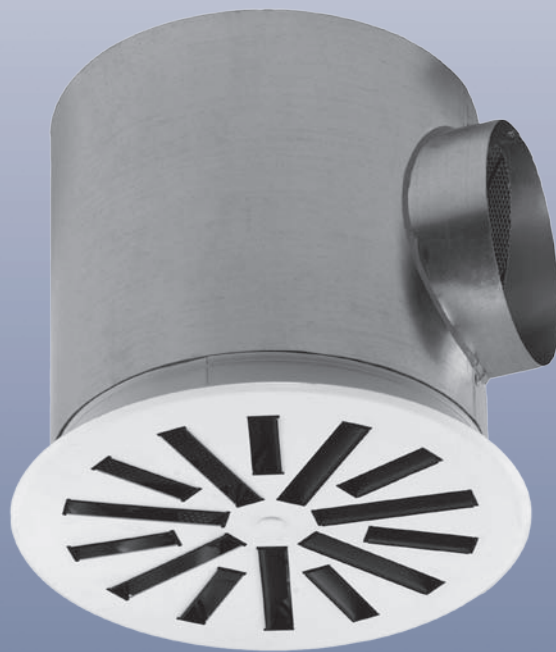




Radial slot outlet RL-C....

Radial slot outlet RL-C

Construction design

Preliminary remark

The circular-type radial slot outlet RL-C generates turbulent mixing air flow and is designed for air distribution in commercial applications. It is particularly suitable for spaces with high indoor air flow requirements and can be installed flush with the ceiling or freely suspended. The discharge direction can be adjusted by altering the position of several bars.

This air outlet can also be used as a return air inlet.

Construction design

The RL-C outlet is available in 4 sizes. It consists of the circular faceplate **1** with built-in bars **1a** that can be adjusted individually, and of the circular connection box **2**. For installation freely suspended from the ceiling, the outlet element is fitted with additional lateral air slots **1b**.

As standard the lateral connection spigot **3**¹⁾ is fitted with a damper **4** adjustable from the room.

The outlet element can be easily taken down after removing the central fastening **5**. The RL-C outlet will be suspended at appropriate holes **6** (ø 9 mm) positioned in the upper part of the connection box, e.g. with customary quick fasteners.

Key for all pages

- | | |
|----------------------------------|---------------------------------------|
| 1 Faceplate | 3 Lateral spigot ¹⁾ |
| 1a Adjustable bars | 4 V damper |
| 1b Lateral air slot | 5 Central fastening |
| 2 Circular connection box | 6 Holes for outlet suspension |

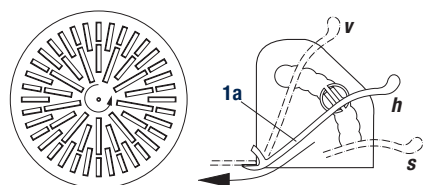
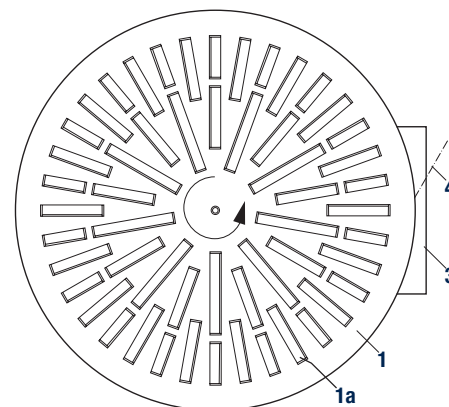


Fig. 1: Sectional view of adjustable bar and possible bar positions

Detail of Fig. 2, section A - A
Bar position for discharge direction:
h horizontal
v vertical
s closed position



Bottom view of size 750

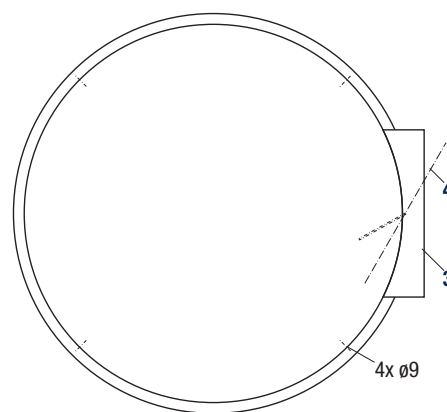
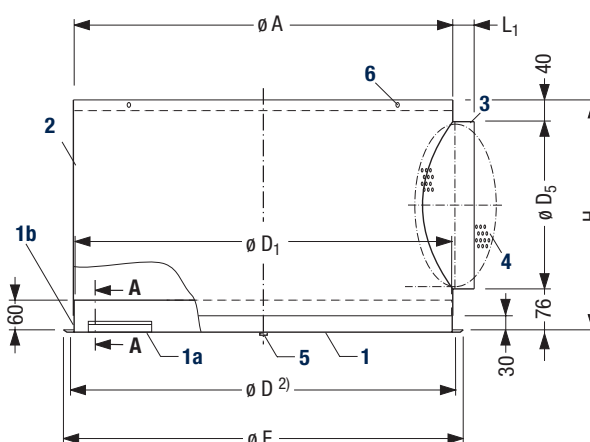


Fig. 2: Dimensions

Size		375	470	600	750
ø E	mm	375	470	600	750
ø D ²⁾	mm	355	450	580	730
ø D ₁	mm	314	399	559	708
ø D ₅	mm	159	199	249	314
L ₁	mm	40	40	60	60
H	mm	280	320	370	435
ø A	mm	317	402	562	712
Weight	kg	4.7	6.8	11.3	17.2

¹⁾ Spigot on top available on request

²⁾ Ceiling cutout

Radial slot outlet RL-C

Mode of operation



Fig. 3: Radial slot outlet RL-C, size 375

Mode of operation

The radial slot outlet generates turbulent mixing air flow with high-induction radial air jets. As standard the preset bar position, i.e. discharge direction, is horizontal.

Altering the bar position enables to adjust the discharge direction from horizontal to a downward incline. By closing several bar segments the discharge pattern may also be changed from full 4-way discharge to partial discharge.

A key and instructions are available for subsequent bar adjustment.

The radial slot outlet to be used as a return air inlet has its bars set to the vertical position as standard, but it can also be supplied with horizontal bars or without bars.

Application

Size		375	470	600	750
$\dot{V}_A$ max	l/s	72	111	156	236
	m ³ /h	260	400	560	850
$\dot{V}_A$ min – flush with ceiling	l/s	22	36	56	111
	m ³ /h	80	130	200	400
$\dot{V}_A$ min – freely suspended	l/s	28	44	69	167
	m ³ /h	100	160	250	600
Discharge height		m		2.5 – 4.5	
Max. temperature difference supply air – indoor air $\Delta\vartheta$		–12 K when cooling +10 K when heating (≤ 3 m) + 5 K when heating (> 3 m)			

Installation flush with the ceiling

With such installation and horizontal air discharge the high-turbulence air jets slide along the ceiling. The resulting flow achieves intensive admixture of indoor air concomitant with fast reduction of temperature and jet velocity.

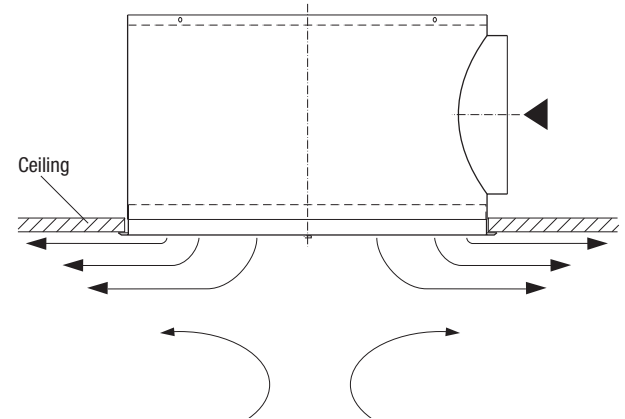


Fig. 4: Jet pattern of outlet installed flush with the ceiling

Installation freely suspended from the ceiling

In this case the outlet element is fitted with additional lateral slots. The additional air jets so obtained stabilize the whole supply air flow and raise the discharge flow, thus achieving large radial penetration depth into the room, even when cooling. The reduction of temperature and jet velocity is the same as for outlet installation flush with the ceiling.

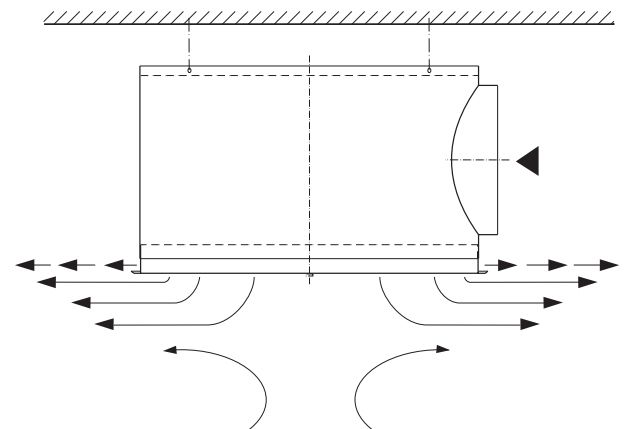


Fig. 5: Jet pattern of outlet installed freely suspended from the ceiling

Radial slot outlet RL-C

Adjustment of discharge direction

Discharge direction and air volume flow rates

The radial slot outlet can discharge the supply air horizontally in 4, 3 or 2 directions. For 4-way discharge all bars are in the ‘h’ position.

If air discharge is required only 3-way, 2-way symmetric, or 2-way asymmetric, then several slots are to be closed as shown below.

The air volume flow rate is thus reduced; the related factors can be read off the following table.

Volume flow rate factor F				
$\dot{V}_{Red} = \dot{V}_A \cdot F$				
Jet direction	Size			
	750	600	470	375
4-way	1.0	1.00	1.00	1.00
3-way	0.8	0.78	0.78	0.72
2-way symmetric	0.6	0.56	0.54	0.59
2-way asymmetric	0.6	0.56	0.52	0.54

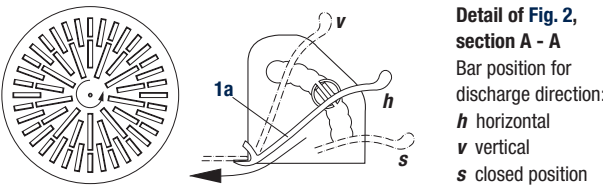


Fig. 7: Sectional view of adjustable bar and possible bar positions

Adjustment of discharge direction

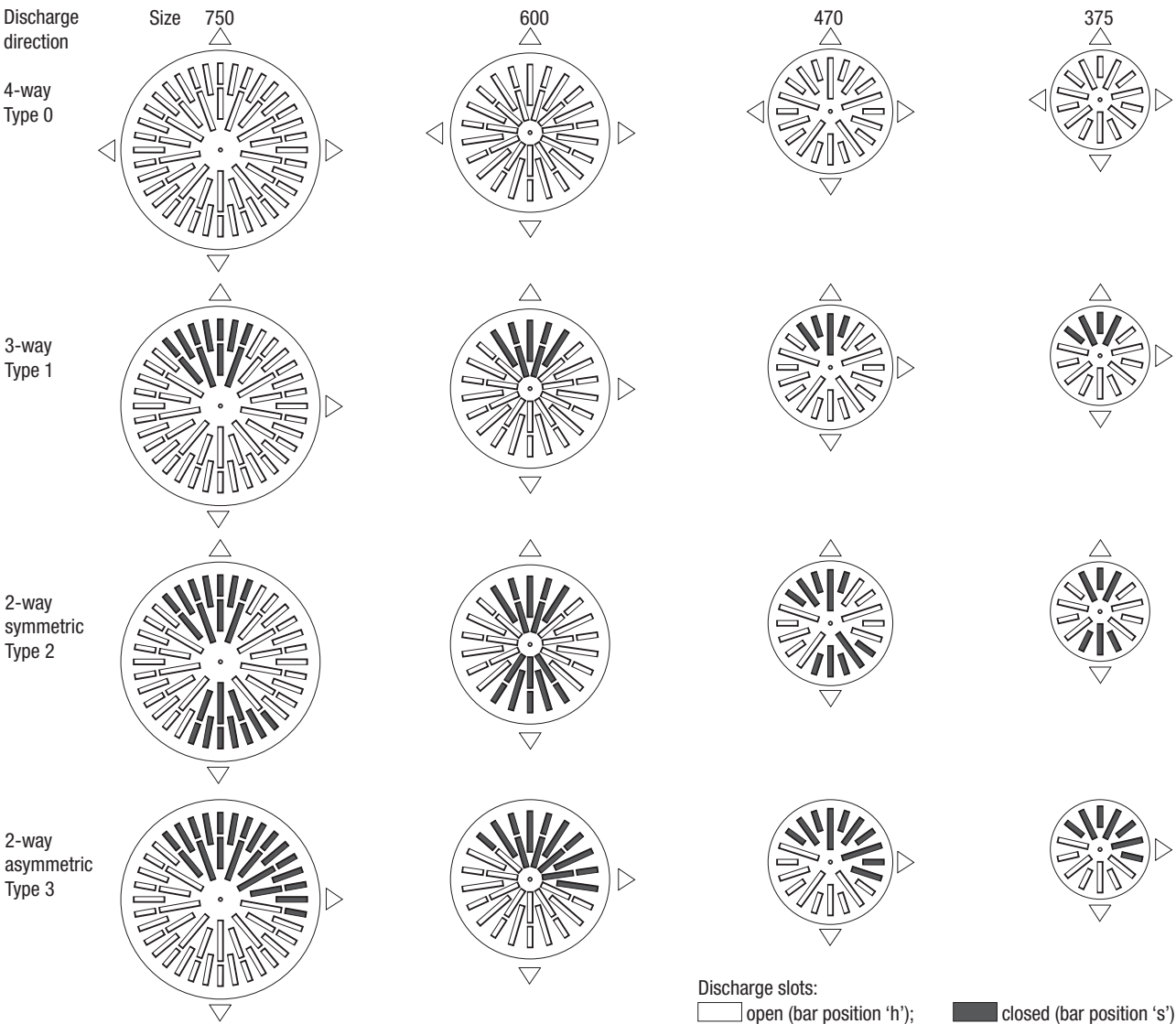


Fig. 6: Discharge directions obtained by closing several slots

Radial slot outlet RL-C

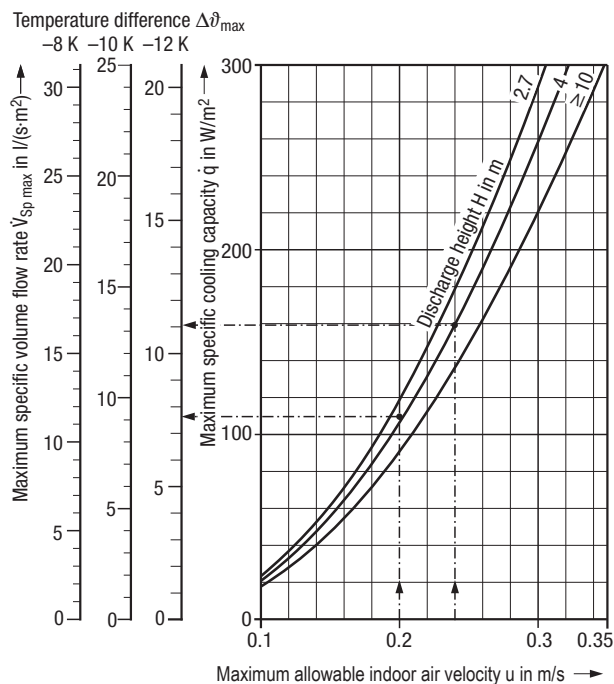
Comfort criteria

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.

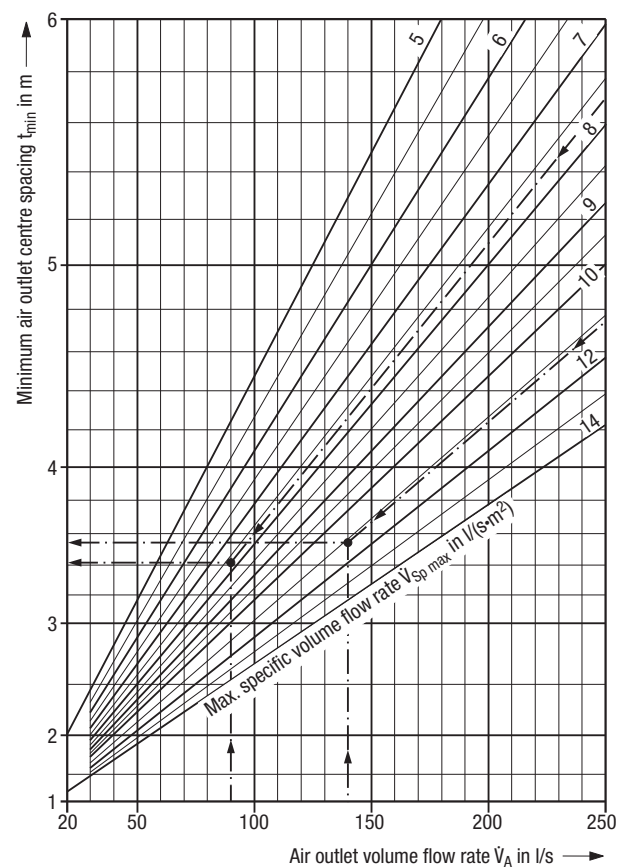
Graph 2 enables to determine the minimum centre spacing between two outlets on the basis of the maximum specific volume flow rate.



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

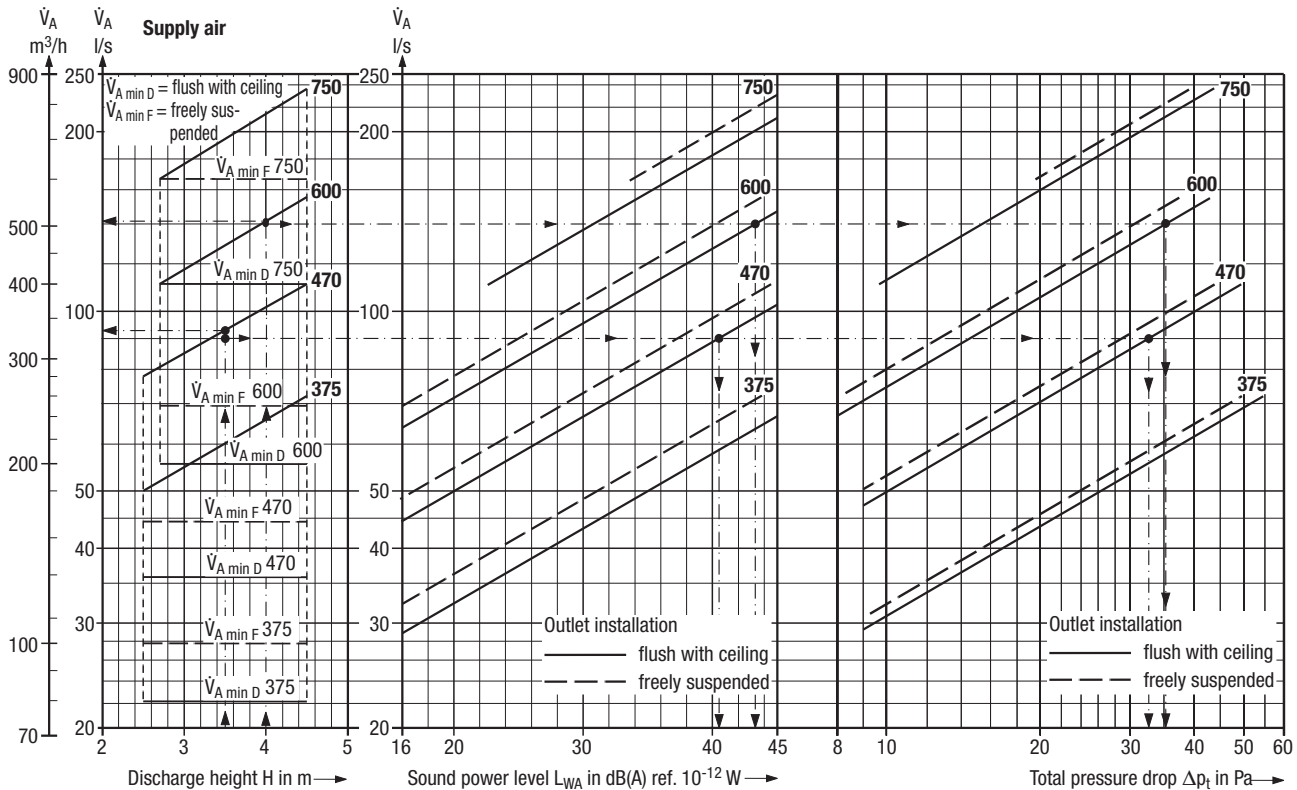
See layout examples on page 6

Size		470	600
$\dot{V}_{A\ selected}$	l/s	90	140
$\dot{V}_{Sp\ max}$	l/(s·m ²)	7.7	11.1
t_{min}	m	≈3.4	≈3.6

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

Radial slot outlet RL-C

Layout for use as supply air outlet



Sound power level depending on installation

Air outlet volume flow rate $\dot{V}_A$	flush with ceiling / horizontal										freely suspended / horizontal									
	Sound power level L_W in dB ref. 10^{-12} W										Sound power level L_W in dB ref. 10^{-12} W									
	Octave band centre frequency in Hz										Octave band centre frequency in Hz									
l/s m^3/h	125	250	500	1K	2K	4K	L_{WA}	125	250	500	1K	2K	4K	L_{WA}	125	250	500	1K	2K	4K
Size 375																				
31	110	18	17	25	10	5	—	—	—	—	15	18	22	10	—	—	—	—	—	—
56	200	38	35	43	34	34	23	5	35	32	39	32	31	21	5	—	—	—	—	—
69	250	46	40	48	42	44	35	11	43	35	44	38	41	32	19	—	—	—	—	—
Size 470																				
50	180	20	28	27	14	5	—	—	17	22	24	11	—	—	—	—	—	—	—	—
72	260	33	39	38	30	26	14	—	30	35	36	27	22	11	—	—	—	—	—	—
111	400	47	48	47	43	44	32	20	44	43	44	39	41	33	17	—	—	—	—	—
Size 600																				
69	250	19	28	24	17	—	—	—	16	25	22	14	—	—	—	—	—	—	—	—
111	400	35	42	38	35	27	16	—	32	38	35	32	24	14	—	—	—	—	—	—
156	560	47	50	46	46	42	33	24	44	45	44	43	39	30	21	—	—	—	—	—
Size 750																				
111	400	23	32	27	22	7	—	—	20	29	26	17	—	—	—	—	—	—	—	—
167	600	37	42	37	37	31	15	—	34	38	35	33	29	14	—	—	—	—	—	—
236	850	49	46	42	46	47	32	17	46	41	37	40	45	28	15	—	—	—	—	—

Insertion loss in dB						
Octave band centre frequency in Hz						
Size	125	250	500	1 K	2 K	4 K
375	5	3	2	3	3	2
470	4	2	2	3	3	2
600	3	2	2	3	3	2
750	2	2	3	3	3	2

The values for sound power level and pressure loss apply for bar position 'horizontal' (standard) and $\dot{V}$ damper 'open', for 4-way discharge. With 3-way or 2-way discharge the volume flow rate is reduced; see Table "Volume flow rate factor F" at the top of page 4.

Layout examples

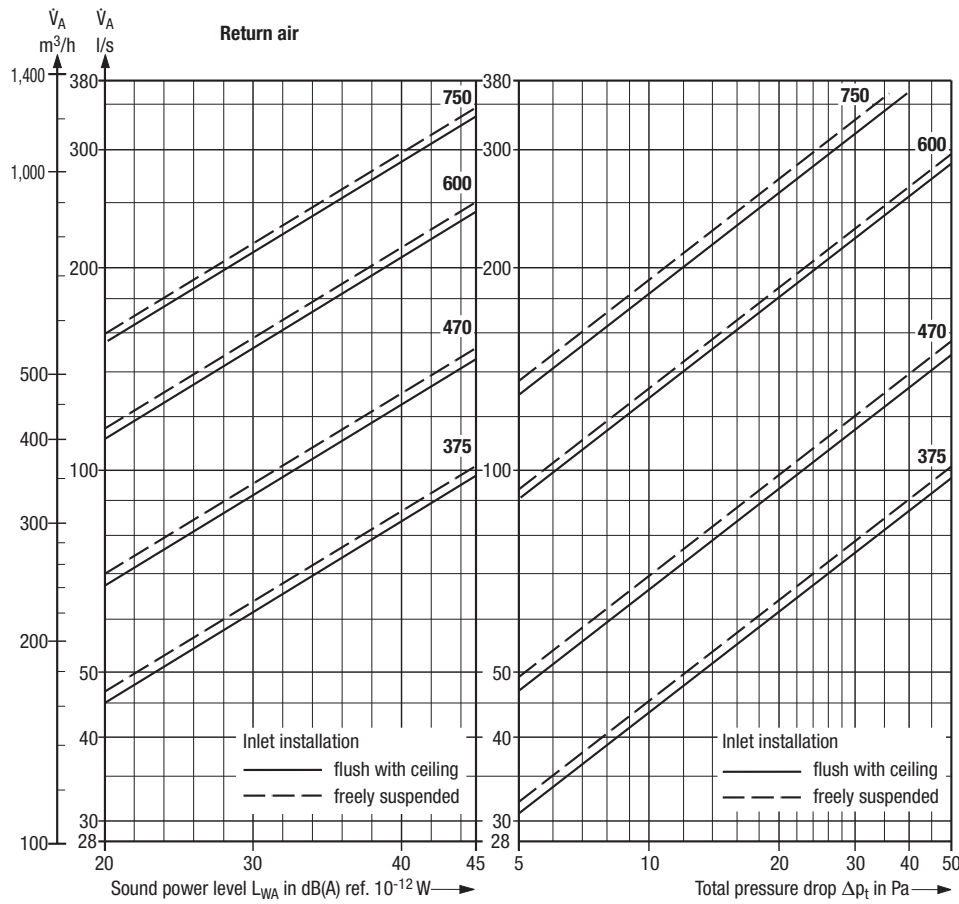
Installation flush with ceiling			
Size		470	600
Application		Toys factory	Department store
1 Supply air volume flow rate $\dot{V}$	l/s	5 000	11 000
2 Discharge height H	m	3.5	4
3 Floor area A	m^2	720	2 400
4 Max. perm. sound power level L_{WA} dB(A) ref. 10^{-12} W		45	45
5 Discharge direction		all units 4-way	6 units 3-way rest 4-way
6 Comfort criteria (see page 6)			
– Max. allowable indoor air velocity u m/s		0.2	0.24
– Max. specific volume flow rate $\dot{V}_{Sp \text{ max}}$ at $\Delta \vartheta_{\text{max}} = -12 \text{ K}$ $\text{l/(s} \cdot \text{m}^2)$		7.6	11
– Actual specific volume flow rate $\dot{V}_{Sp \text{ tats}}$ [from 1 : 3] $\text{l/(s} \cdot \text{m}^2)$		6.9	4.6
Criterion is met if $\dot{V}_{Sp \text{ tats}} < \dot{V}_{Sp \text{ max}}$			
From nomogram			
7 $\dot{V}_{A \text{ max}}$ l/s		93	142
			111 ¹⁾ (142·0.78)
8 $\dot{V}_A$ selected l/s		90	109 ¹⁾ (140·0.78)
9 Z units		56	6
		[from 1 : 8]	(specified)
10 L_{WA} dB(A) ref. 10^{-12} W		40	43
11 Δp_t Pa		32	35
12 t_{min} [Graph 2, p.5] m		≈ 3.4	≈ 3.6

1) See table on page 4

2) Number = $\frac{11\,000 - (109 \cdot 6)}{140} \approx 74$

Radial slot outlet RL-C

Layout for use as return air inlet and features



Note to graphs left and tables below:

The values for sound power level and pressure drop apply for bar position 'vertical' and $\dot{V}$ damper 'open'.

For **horizontal** bar position the following correction factors are to be used:

For freely suspended installation

Size	ΔL_{WA} dB(A)	Δp_t %
375	9	-6
470	10	11
600	11	22
750	11	27

For installation flush with ceiling

Size	ΔL_{WA} dB(A)	Δp_t %
375	12	16
470	12	45
600	12	47
750	12	52

Sound power level with freely suspended installation and vertical bar position

Air inlet volume flow rate $\dot{V}_A$		freely suspended / vertical						
		Sound power level L_W in dB ref. 10^{-12} W						
		L_{WA}	Octave band centre frequency in Hz					
I/s	m ³ /h	dB(A)	125	250	500	1 K	2 K	4 K
Size 375								
47	170	20	21	25	20	9	—	—
75	270	35	34	37	33	31	24	11
101	365	45	38	41	39	42	39	24
Size 470								
69	250	21	24	26	20	6	—	—
114	410	36	38	38	33	32	24	6,5
147	530	44	42	41	37	42	36	23
Size 600								
117	420	20	23	24	20	11	—	—
183	660	35	38	34	32	31	24	—
244	880	44	45	37	36	41	39	—
Size 750								
169	610	22	27	24	22	12	—	—
256	920	35	36	33	33	31	21	—
339	1220	44	40	37	38	42	35	—

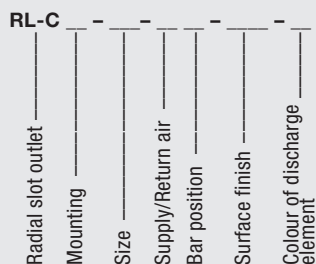
Features

- Air outlet element and connection box are circular
- Turbulent mixing air flow
- For installation flush with the ceiling or freely suspended
- Radial jet spread
- Several slots can be closed so as to enable asymmetric jet spread
- Discharge direction adjustable from horizontal to a downward incline
- Maximum temperature difference between supply air and indoor air:
-12 K when cooling, +5 K when heating (+10 K up to 3 m room height)
- Discharge height from 2.5 to 4.5 m
- Air outlet element powder-coated to RAL 9010
- Black or white bars
- Air outlet element easy to take down from room
- 4 sizes
- Connection box with built-in volume flow damper adjustable from room
- Also available as return air inlet

Radial slot outlet RL-C

Type code and tender text

Type code



Mounting

- D = flush with ceiling
- F = freely suspended

Size

- 375 = size 375
- 470 = size 470
- 600 = size 600
- 750 = size 750

Supply/Return air

- Z = supply air
- A = return air

Bar position

Supply air ¹⁾

- 0 = 4-way air discharge
- 1 = 3-way air discharge
- 2 = 2-way symmetric air discharge (180°)
- 3 = 2-way asymmetric air discharge (90°)

Return air ²⁾

- H = bar position horizontal
- V = bar position vertical
- N = no bars

Surface finish

- 9010 = face painted to RAL9010, semi-matt
- = face painted to RAL... ³⁾

Colour of discharge element

- S = black similar to RAL 9005
- W = white similar to RAL 9010

Tender text

..... units

Radial slot outlet generating high-induction radial air jets for high-quality indoor air flow, with discharge direction manually adjustable from horizontal to a downward incline, with symmetric or asymmetric air discharge,

consisting of:

- outlet element with circular face and radial slots with built-in adjustable bars – bar underside nearly flush with face – and central fastening screw with cap,
- circular connection box with built-in central fastening for the outlet element and lateral connection spigot with built-in volume flow damper adjustable from room.

Installation flush with ceiling or freely suspended,

Material:

- Outlet element made of galvanized sheet metal, powder-coated, with face painted to RAL ...
- Adjustable bars made of polycarbonate PC GF 10, body-tinted similar to RAL 9005, jet-black, or RAL 9010, pure white.
- Connection box made of galvanized sheet metal.

The RL-C outlet can also be used as return air inlet.

Make: KRANTZ KOMPONENTEN
Type: RL-C __ - __ - __ - __ - __

Subject to technical alterations.

¹⁾ Bar position: horizontal

²⁾ Unless otherwise specified in the order, the return air inlet is supplied with vertical bar position

³⁾ Other colours on request