

Krantz

RL-C2 radial slot outlet

Air distribution systems



Krantz

RL-C2 radial slot outlet

Introduction

The Krantz RL-C2 radial slot outlet with circular face generates a turbulent mixed flow. It is used for supply and return air distribution in comfort air-conditioning systems and has been optimised both acoustically and in terms of flow. Therefore, the slots, as the most important air distribution elements, were completely redesigned. The geometry was improved using state-of-the-art development and production methods such as CFD analyses and rapid prototyping, until the highest standards of room air flow and acoustics were fulfilled. This has also been confirmed in numerous laboratory measurements.

The air outlet can be installed either flush with the ceiling or freely suspended and is available in 4 different sizes. For special uses such as perimeters and corner areas of rooms the otherwise radially symmetrical air discharge can be individually adjusted using special covers.

Design

The radial slot outlet essentially consists of the air outlet element **1** with circular face and the blades **1a** for radial air discharge. The air outlet element **1** is available not only with a circular connection box **2a** for freely suspended, visible installation but also with a cubical connection box **2b** for installation flush with the ceiling.

The air is supplied via the connection spigot **3**, which is available with and without volume flow damper **4**. The volume flow damper can be adjusted from the room. The air is guided through the connection box **2** and the air outlet element **1** by blades **1a**.

After undoing the central fixing **5** the air outlet element can be removed easily from below. The whole air outlet unit is suspended from fixing points **6** on the connection box.

If used as a return air inlet, the blades **2** are removed ¹⁾ and on request the box is painted black internally.

¹⁾ optionally available with blades too

²⁾ all blades opened;

$\dot{V}_{A \max}$ and $\dot{V}_{A \min}$ are reduced by closing individual blades

Table 1: Technical data and dimensions

| Size | | | 375 | 470 | 600 | 750 |
|---|--------------------|---------------------------------------|-----------|------|-----------|-----|
| Volume flow rate ²⁾ | $\dot{V}_{A \max}$ | m ³ /h | 265 | 415 | 680 | 980 |
| | $\dot{V}_{A \min}$ | m ³ /h | 80 | 130 | 220 | 600 |
| Discharge height | | m | 2,5 – 4,5 | | 2,7 – 4,5 | |
| Dimensions | | | | | | |
| – ATD | ø E | mm | 375 | 470 | 600 | 750 |
| – Circular connection box | ø A | mm | 317 | 402 | 562 | 712 |
| | C | mm | 225 | 285 | 398 | 504 |
| | ø D ₅ | mm | 159 | 199 | 249 | 314 |
| | H ₁ | mm | 285 | 345 | 395 | 480 |
| | L ₁ | mm | 40 | 40 | 60 | 60 |
| | L ₃ | mm | 85 | 105 | 105 | 125 |
| – Cubical connection box | B | mm | 380 | 465 | 625 | 815 |
| | C | mm | 300 | 380 | 550 | 740 |
| | ø D ₅ | mm | 159 | 199 | 249 | 314 |
| | ø D ₆ | mm | 314 | 399 | 559 | 708 |
| | H ₁ | mm | 245 | 305 | 355 | 440 |
| | H ₂ | mm | 60 | 80 | 80 | 100 |
| | L ₁ | mm | 40 | 40 | 60 | 60 |
| | L ₂ | mm | 73 | 93 | 93 | 113 |
| Weight | | | | | | |
| – ATD | kg | 1,2 | 1,9 | 2,8 | 4,4 | |
| – Circular connection box | kg | 2,9 | 4,4 | 7,8 | 11,6 | |
| – Cubical connection box | kg | 4,5 | 6,0 | 12,0 | 18,0 | |
| Max. temperature difference between supply and return air | K | –12 cooling mode (flush with ceiling) | | | | |
| | K | –10 cooling mode (freely suspended) | | | | |
| | K | +10 heating mode (<3 m) | | | | |
| | K | + 5 heating mode (>3 m) | | | | |

Key

- 1** Air outlet element
- 1a** Blades
- 2a** Circular connection
- 2b** Cubical connection box
- 3** Connection spigot
- 4** Volume flow damper
- 5** Central fastening
- 6** Fixing points

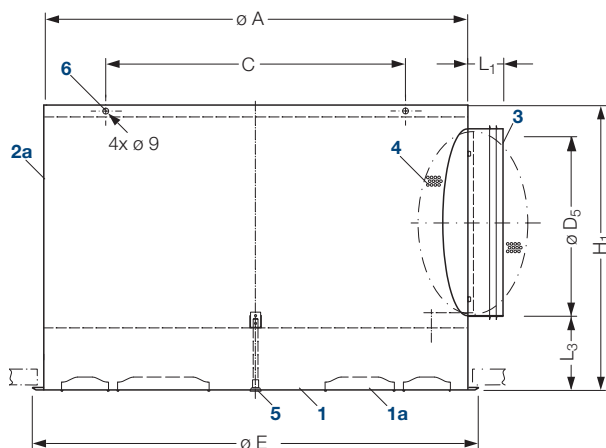


Figure 1: Dimensions with circular connection box

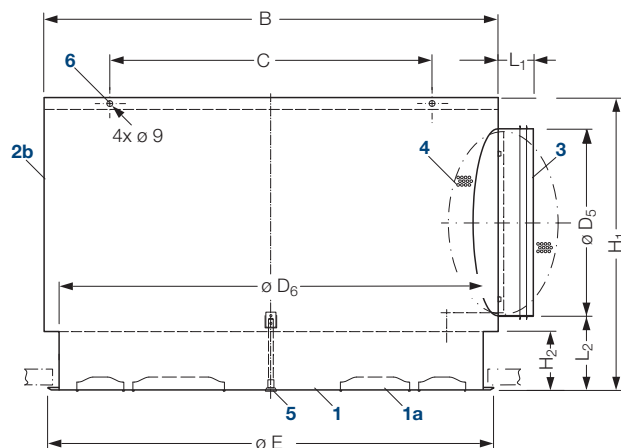


Figure 2: Dimensions with cubical connection box

RL-C2 radial slot outlet

Mode of operation

The circular radial slot outlet generates turbulent mixing air flow with high-induction radial air jets. The discharge direction is horizontal.

Due to the specially adapted blade geometry, the same face plate can be used for both flush and freely suspended installation. The air jet exits horizontally below the plate with high velocity. Due to the radial arrangement of the blades, centrifugal force carries the air to the outside far beyond the plate, even with the freely suspended installation. With the flush installation the Coanda effect causes the air jet to be attracted to the ceiling. The large spread of the air jets ensures high induction with the room air and therefore good dissipation of reduction momentum and temperature.

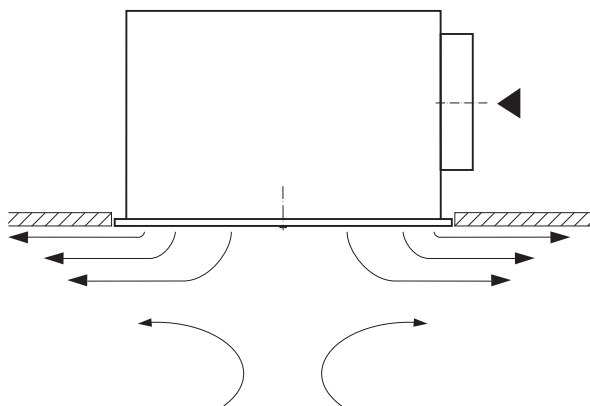


Figure 3: Jet characteristics of outlet installed flush with the ceiling

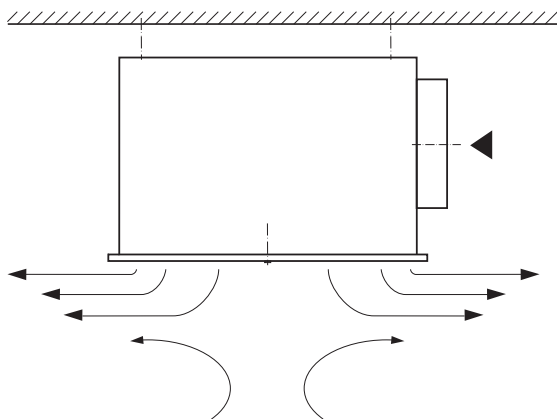


Figure 4: Jet characteristics of outlet freely suspended from the ceiling



Figure 5: Circular radial outlet element with circular connection box

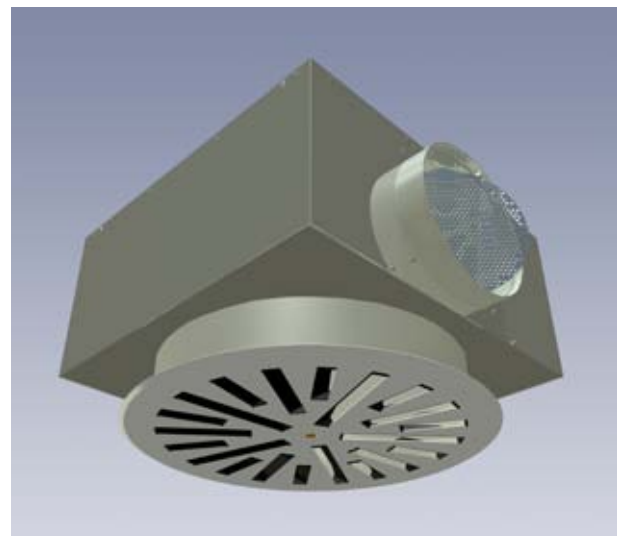


Figure 6: Circular radial outlet element with cubical connection box

Note

For freely suspended installation we recommend limiting the temperature difference between supply air and room air (or return air) to -10 K . This enables stable horizontal air jets to be generated, even with low volume flows.

RL-C2 radial slot outlet

Adjustment of discharge direction

Discharge direction and air flow rates

The radial slot outlet can discharge the supply air horizontally in 4, 3 or 2 directions. For 4-way discharge all blades are open.

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

The air flow rate is thus reduced; the related factors can be read from the following table, by use of the following equation:

$\dot{V}_{Red} = \dot{V}_A \cdot F$

Table 2: Factor F for volume flow reduction

| 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 symmetrical | 0.6 | 0.56 | 0.54 | 0.59 |
| 2-way asymmetrical | 0.6 | 0.56 | 0.52 | 0.54 |

Adjustment of discharge direction

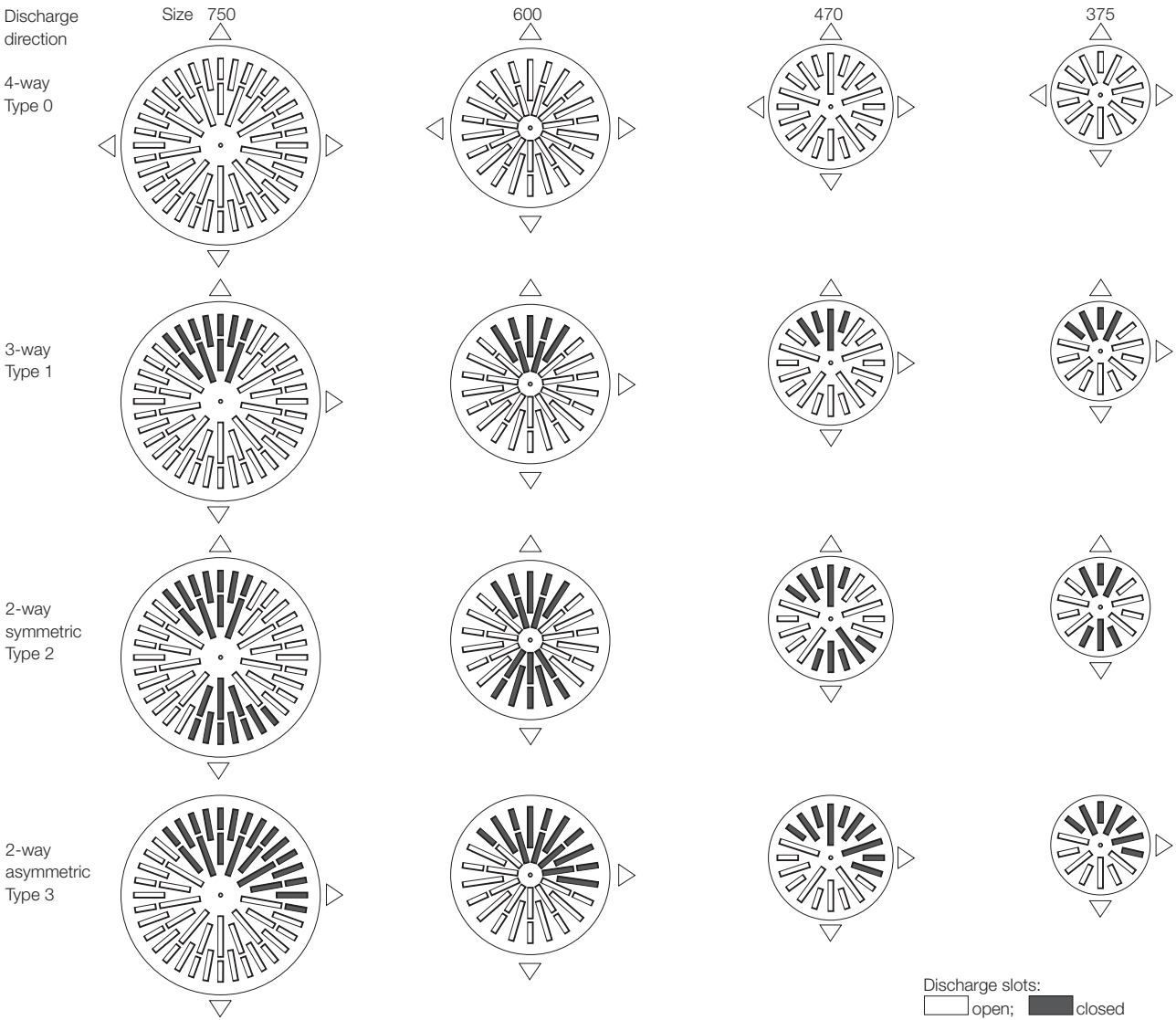


Figure 7: Discharge directions obtained by closing several slots

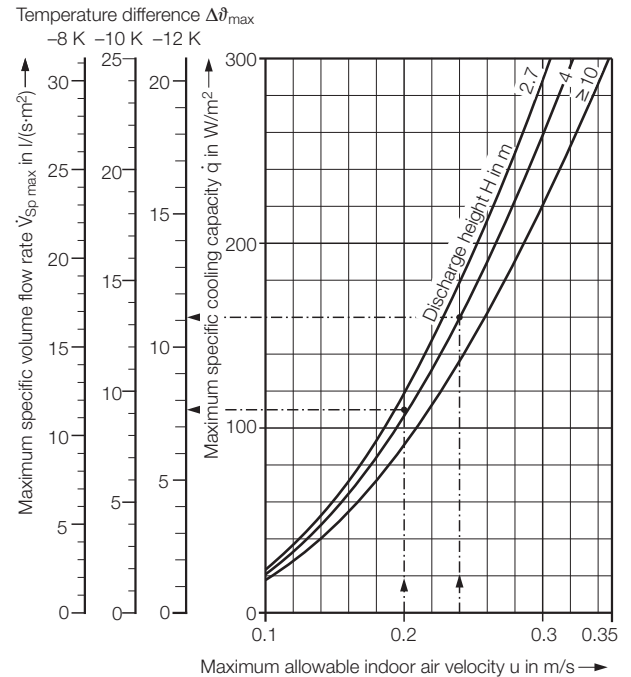
RL-C2 radial slot outlet

Comfort criteria ¹⁾

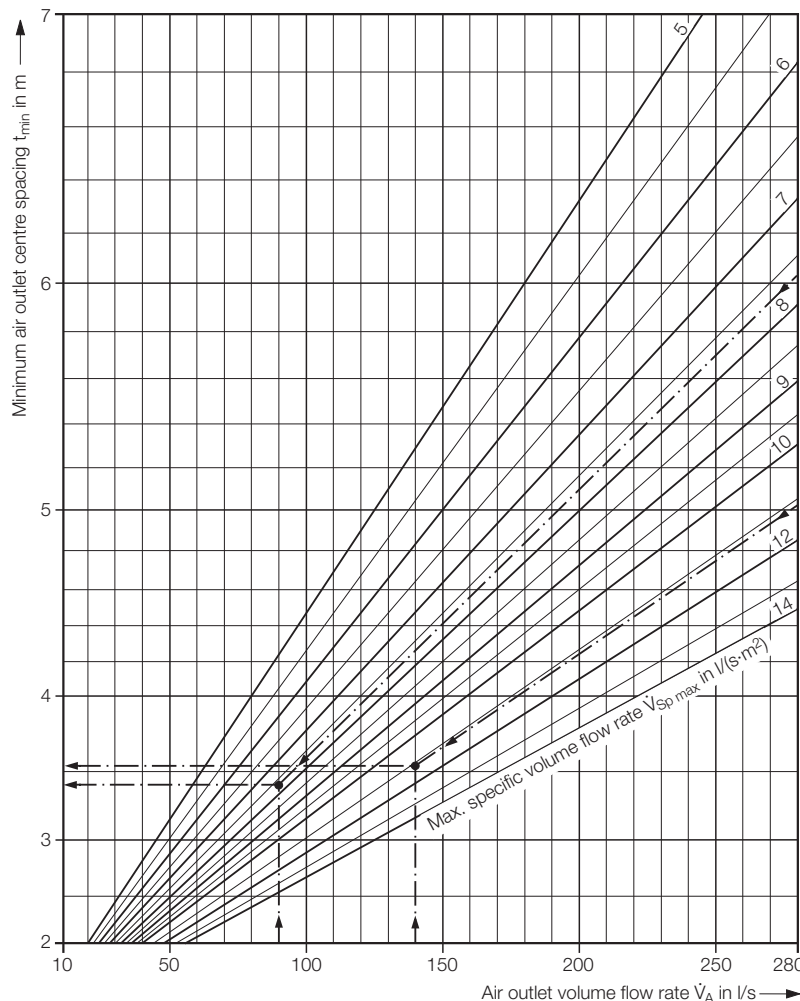
The outlet layout must comply with the maximum allowable indoor air velocities u in the occupied zone in cooling mode. The indoor air velocity depends on the cooling load that is to be removed from the room. The maximum specific cooling capacity \dot{q} depends on the discharge height and the maximum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

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

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



Graph 1: Maximum specific volume flow rate



Graph 2: Minimum air outlet centre spacing

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 if cooling in l/s
- $\dot{V}_{A \min}$ = min. volume flow rate per air outlet if cooling in l/s
- $\dot{V}_{Sp \max}$ = max. specific volume flow rate per m² in l/(s·m²)
- $\dot{V}_{Sp \text{ act}}$ = 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

Size 470 (see layout examples on page 6)

- $\dot{V}_A \text{ selected} = 89 \text{ l/s}$
- $\dot{V}_{Sp \max} = 7.6 \text{ l/(s·m²)}$
- $t_{\min} \approx 3.4 \text{ m}$

Size 600 (see layout examples on page 6)

- $\dot{V}_A \text{ selected} = 139 \text{ l/s}$
- $\dot{V}_{Sp \max} = 11.1 \text{ l/(s·m²)}$
- $t_{\min} \approx 3.5 \text{ m}$

RL-C2 radial slot outlet

Layout for use as supply air outlet

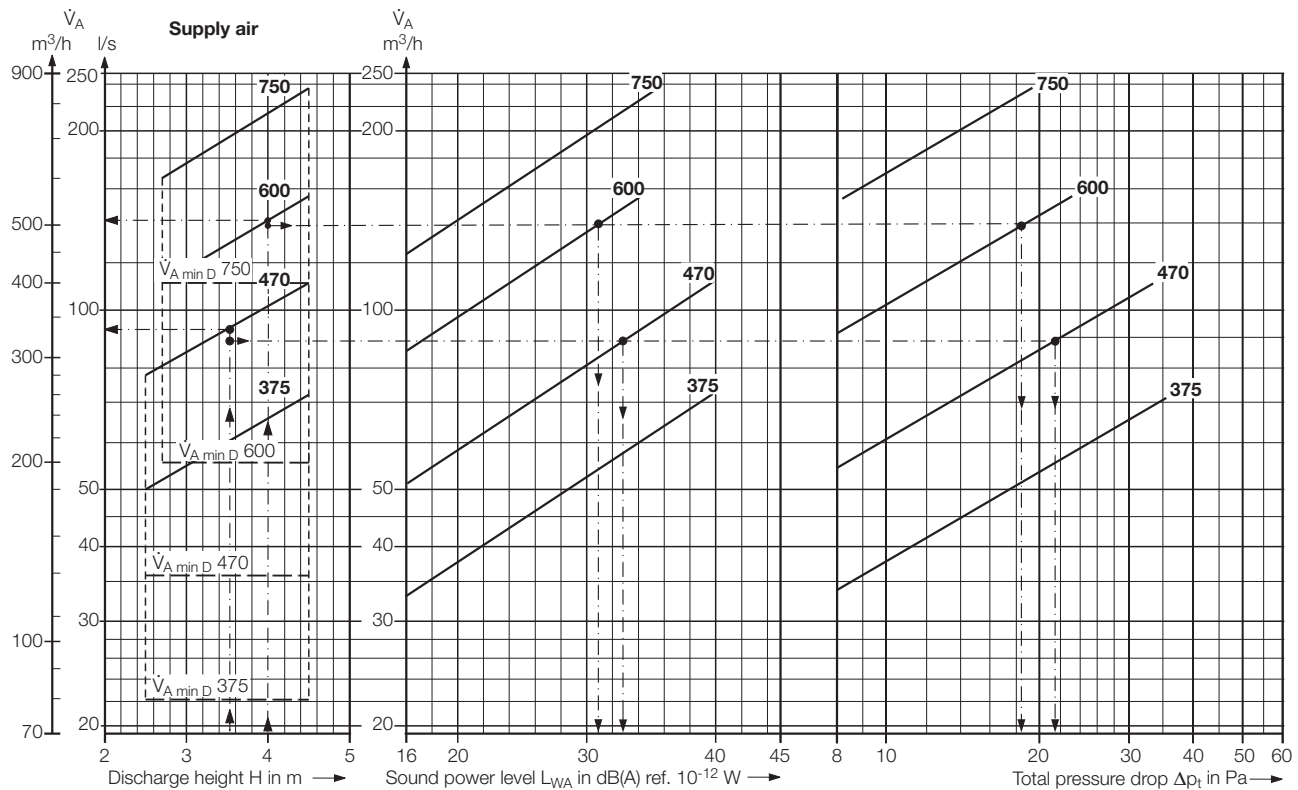


Table 3: If the cubical connection box is selected, the sound power level and pressure drop change

| Size | L_{WA} in dB(A) ref. 10^{-12} W | Δp in % |
|------|-------------------------------------|-----------------|
| 375 | +1 | -12 |
| 470 | | |
| 600 | | |
| 750 | | |

Table 4: Sound power level and pressure drop

| Air outlet volume flow rate \dot{V}_A | Pressure drop Δp_t | Sound power level L_W in dB ref. 10^{-12} W | | | | | | | | | |
|---|----------------------------|---|------------------------------------|-----|-----|-----|----|----|----|----|---|
| | | L_{WA} | Octave band centre frequency in Hz | | | | | | | | |
| \dot{V}_A | Δp_t | L_{WA} | 63 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | |
| I/s | m³/h | Pa | dB(A) | | | | | | | | |
| Size 375 | | | | | | | | | | | |
| 42 | 150 | 12 | 23 | 25 | 30 | 31 | 19 | 11 | — | — | — |
| 56 | 200 | 22 | 31 | 29 | 36 | 39 | 27 | 23 | 10 | — | — |
| 69 | 250 | 35 | 38 | 33 | 41 | 45 | 34 | 32 | 21 | — | — |
| Size 470 | | | | | | | | | | | |
| 69 | 250 | 13 | 25 | 30 | 33 | 31 | 21 | 14 | — | — | — |
| 83 | 300 | 19 | 31 | 34 | 38 | 36 | 26 | 21 | — | — | — |
| 97 | 350 | 26 | 35 | 37 | 43 | 41 | 31 | 27 | 15 | — | — |
| 111 | 400 | 35 | 39 | 40 | 46 | 45 | 34 | 33 | 21 | — | — |
| Size 600 | | | | | | | | | | | |
| 111 | 400 | 12 | 24 | 29 | 32 | 29 | 21 | 14 | — | — | — |
| 139 | 500 | 18 | 31 | 35 | 39 | 36 | 28 | 21 | 11 | — | — |
| 167 | 600 | 26 | 36 | 41 | 44 | 41 | 34 | 27 | 17 | — | — |
| 194 | 700 | 36 | 41 | 46 | 49 | 46 | 38 | 31 | 22 | — | — |
| Size 750 | | | | | | | | | | | |
| 139 | 500 | 7 | 19 | 25 | 27 | 23 | 17 | 12 | — | — | — |
| 194 | 700 | 13 | 30 | 36 | 38 | 33 | 28 | 23 | — | — | — |
| 250 | 900 | 22 | 37 | 44 | 45 | 41 | 35 | 30 | 16 | — | — |

Table 5: Layout examples

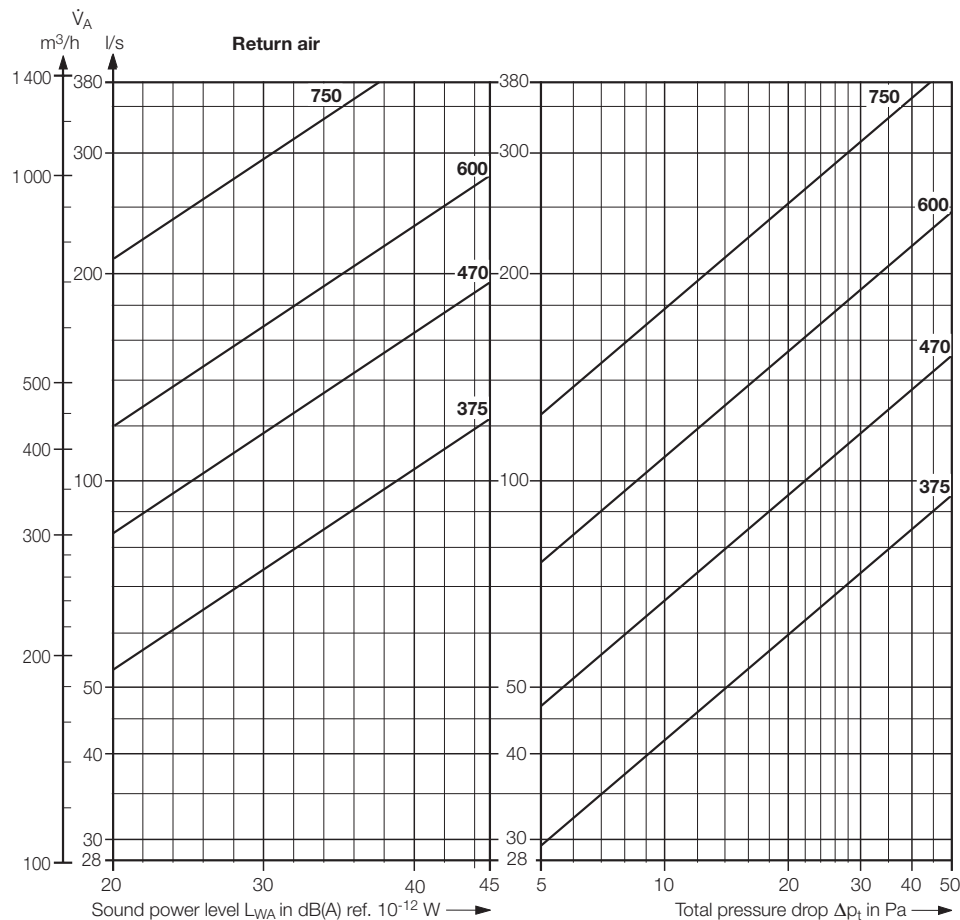
| Installation flush with ceiling; | | | |
|---|-------------------------|------------------------------|--------------------------------|
| Size | 470 | 600 | |
| Place of use | Use in toys factory | Department store | |
| 1 Supply air volume flow rate \dot{V} | I/s | 5 000 | 11 000 |
| 2 Discharge height H | m | 3.5 | 4 |
| 3 Floor area A | m² | 720 | 2 400 |
| 4 Max. allowable 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 5) | | | |
| – Max. allowable indoor air velocity u m/s | | 0.2 | 0.24 |
| – Max. specific volume flow rate $\dot{V}_{Sp \max}$ at $\Delta \vartheta_{\max} = -12$ K | m³/(h·m²) | | |
| – Actual specific volume flow rate $\dot{V}_{Sp \text{ act}}$ [from 1 : 3] | m³/(h·m²) | 7.6 | 11.1 |
| Criterion is met if $\dot{V}_{Sp \text{ actual}} < \dot{V}_{Sp \max}$ | | 6.9 | 4.6 |
| From nomogram | | | |
| 7 $\dot{V}_{A \max}$ | I/s | 93 | 142 |
| | | 111 ¹⁾ (142·0.78) | 142 |
| 8 \dot{V}_A selected | I/s | 90 | 109 ¹⁾ (140·0.78) |
| 9 Z | units | 56 [from 1 : 8] | 6 (specified) 74 ²⁾ |
| 10 L_{WA} | dB(A) | 33 | 31 31 |
| 11 Δp_t | Pa | 21 | 18 18 |
| 12 t_{\min} [[Graph . S.5 below] | m | ≈3.4 | ≈3.5 ≈3.5 |

¹⁾ See table page 4

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

RL-C2 radial slot outlet

Layout for use as return air inlet and features



The diagrams and tables apply to the **circular** connection box with faceplate **without** blades (standard version). All other versions must be determined in accordance with [Table 6](#):

Table 6: Correction values for sound power level and pressure drop

| Size | ΔL_{WA} dB(A) | Δp_t % |
|--------------------------------|--------------------------|-------------------|
| circular connection box | | |
| – with blades | | |
| 375 | +15 | +64 |
| 470 | +15 | +82 |
| 600 | +11 | +70 |
| 750 | +15 | +83 |
| cubic connection box | | |
| – with blades | | |
| 375 | +10 | +69 |
| 470 | +10 | +87 |
| 600 | +16 | +75 |
| 750 | +10 | +88 |
| – without blades | | |
| 375 | | |
| 470 | -8 | -5 |
| 600 | | |
| 750 | | |

Table 7: Sound power level and pressure drop

| Air outlet volume flow rate \dot{V}_A | | Pres- sure drop Δp_t | Sound power level L_W in dB ref. 10^{-12} W | | | | | | | | | |
|---|-------|---------------------------------------|---|------------------------------------|-----|-----|-----|-----|-----|-----|-----|---|
| l/s | m³/h | | L_{WA} dB(A) | Octave band centre frequency in Hz | | | | | | | | |
| | | | | 63 | 125 | 250 | 500 | 1 K | 2 K | 4 K | 8 K | |
| Size 375 | | | | | | | | | | | | |
| 69 | 250 | 27 | 28 | 30 | 31 | 32 | 24 | 23 | 15 | — | — | — |
| 83 | 300 | 39 | 34 | 35 | 35 | 37 | 28 | 29 | 23 | 10 | — | — |
| 97 | 350 | 52 | 38 | 38 | 39 | 41 | 31 | 34 | 30 | 17 | — | — |
| 111 | 400 | 68 | 42 | 42 | 43 | 44 | 34 | 39 | 37 | 24 | — | — |
| Size 470 | | | | | | | | | | | | |
| 97 | 350 | 20 | 24 | 23 | 27 | 28 | 24 | 17 | — | — | — | — |
| 125 | 450 | 34 | 32 | 31 | 34 | 34 | 30 | 28 | 19 | — | — | — |
| 153 | 550 | 51 | 39 | 38 | 39 | 39 | 35 | 37 | 28 | — | — | — |
| 181 | 650 | 72 | 44 | 44 | 43 | 43 | 38 | 45 | 36 | — | — | — |
| Size 600 | | | | | | | | | | | | |
| 167 | 600 | 23 | 29 | 34 | 33 | 28 | 29 | 22 | 12 | — | — | — |
| 194 | 700 | 31 | 34 | 37 | 36 | 32 | 32 | 29 | 20 | — | — | — |
| 222 | 800 | 40 | 38 | 39 | 39 | 35 | 35 | 35 | 26 | 13 | — | — |
| 250 | 900 | 51 | 42 | 41 | 42 | 37 | 38 | 40 | 32 | 20 | — | — |
| Size 750 | | | | | | | | | | | | |
| 222 | 800 | 15 | 21 | 19 | 24 | 17 | 20 | 16 | — | — | — | — |
| 278 | 1 000 | 24 | 28 | 26 | 31 | 23 | 27 | 23 | 12 | — | — | — |
| 333 | 1 200 | 35 | 34 | 32 | 37 | 29 | 32 | 29 | 17 | 14 | — | — |
| 389 | 1 400 | 47 | 38 | 37 | 42 | 34 | 37 | 34 | 22 | 18 | — | — |

Features

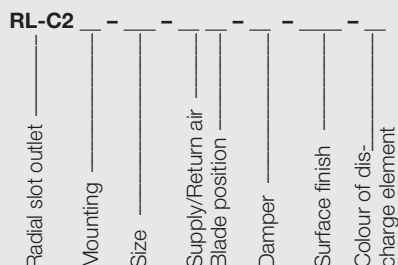
- Turbulent mixing air flow
- Circular air outlet element with circular connection box for freely suspended installation or with cubical connection box for installation flush with ceiling
- Radial symmetrical or asymmetrical jet spread
- Stable supply air jets, even with minimum volume flow
- Maximum temperature difference between supply air and indoor air: –12 K for cooling, +5 K for heating (+10 K up to 3 m room height)
- Low sound power level
- Air outlet element powder-coated to RAL 9010 ¹⁾
- Black or white blades
- Air outlet element can be removed easily from inside the room
- 4 sizes
- Connection box with built-in volume flow damper, adjustable from the room
- Also available as return air inlet

¹⁾ other colours on request

RL-C2 radial slot outlet

Type code and tender specification text

Type code



Mounting

- D = flush with ceiling (cubical connection box)
- F = freely suspended (circular connection box)

Size

- 375 = Size 375
- 470 = Size 470
- 600 = Size 600
- 750 = Size 750

Supply/Return air

- Z = supply air
- A = return air

Blade position

Supply air

- 0 = 4-way air discharge
- 1 = 3-way air discharge
- 2 = 2-way symmetrical air discharge (180°)
- 3 = 2-way asymmetrical air discharge (90°)

Return air

- H = with blades
- N = without blades

Damper

- O = without volume flow damper
- R = with volume flow damper adjustable from the room

Surface finish

- 9010 = face painted to RAL9010, satin
- = face painted to RAL...

Colour of discharge element

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

Tender specification text – Supply air outlet

..... units

Radial slot outlet generating high-induction radial air jets for high-quality indoor air flow, with symmetrical or asymmetrical air discharge, for installation flush with ceiling or freely suspended,

consisting of:

- outlet element with circular face and radial, linear slots, discharge direction 4-sided, 3-sided, 2-sided or 2-sided symmetrical asymmetrical; including central fastening screw with cap,
- circular connection box with built-in central fastening for the outlet element, either cubical or circular, suspension brackets on the top, lateral connection spigot with built-in volume flow damper adjustable from room.

Material:

- Outlet element made of galvanized sheet metal, powder-coated, with face painted to RAL 9010, pure white ¹⁾
- Blades 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

Make: _____ Krantz
Type: RL-C2 __ - __ - Z __ - __ - __ - __

– Return air outlet

..... units

Radial slot outlet as return air inlet, for installation flush with the ceiling or freely suspended,

consisting of:

- outlet element with circular face and radial, linear slots, either with or without blades; including central fastening screw with cap,
- circular connection box with built-in central fastening for the outlet element, either cubic or circular, suspension brackets on the top, lateral connection spigot with built-in volume flow damper adjustable from room.

Material:

- Outlet element made of galvanized sheet metal, powder-coated, with face painted to RAL 9010, pure white ¹⁾
- Blades made of polycarbonate PC GF 10, dyed similar to RAL 9005, jet-black, or RAL 9010, pure white
- Connection box made of galvanized sheet metal ²⁾

Make: _____ Krantz
Type: RL-C2 __ - __ - A __ - __ - __ - __

Subject to change without notice.

¹⁾ other colours on request

²⁾ On request the connection box is painted black internally



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