

Induction outlet IN-N6....
– with preset discharge direction

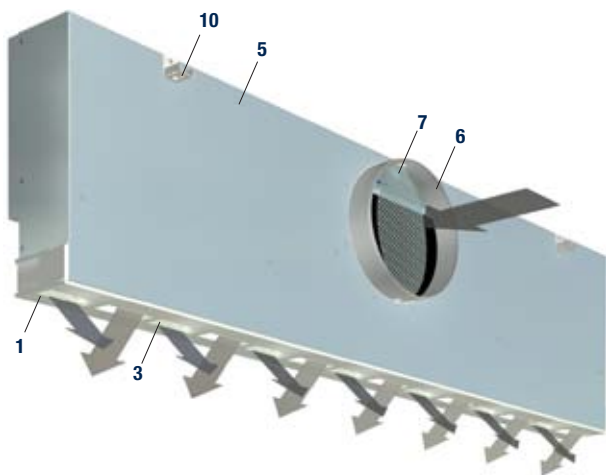
Induction outlet

Preliminary remarks

Induction outlets from KRANTZ KOMPONENTEN are linear ceiling air outlets that are eminently suited for installation in suspended ceiling systems in commercial buildings. They have been in successful use for decades and are available with **preset discharge direction**¹⁾, as described here, for discharge heights of 4 to 7 m and volume flow rates of 28 to 83 l/(s·m) [100 to 300 m³/(h·m)].

Construction and function

The main components of the induction outlet are the linear discharge element **1** and the connection box **5** with connection spigot **6**. The discharge element has a number of consecutive jet channels **3** which are inclined at a 45° angle to the horizontal, alternately to the right and to the left. This enables alternate discharge where half the air outlet volume flow rate is discharged to the right and the other half to the left.



Induction outlet

An optional momentum control device **2**, fitted directly on the inside of the discharge element, enables to alter the free discharge area between 100% and 0%, individually per discharge side. The discharge area can therefore be fully or partially closed. So the jet momentum can be adapted exactly to the layout volume flow rate. Also, one discharge side can be fully closed for one-sided discharge as required, with air outlet placement near a wall, for example. The outlet then operates with half the volume flow rate. The momentum control device **2** is easy to adjust manually from the room.

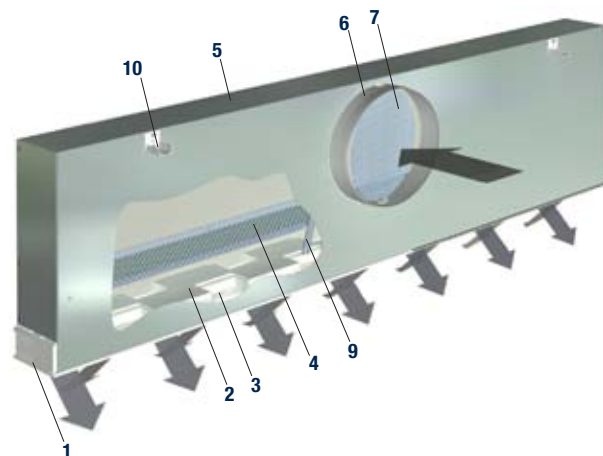
The connection to the supply air duct is made with the connection box **5**. For higher insertion loss, the connection box is also available with acoustic lining **8** on request. At the side of the connection box is the spigot **6** for duct connection. An optional volume flow damper **7** can be installed in the connection spigot and operated from the room.

A side of the connection box is fitted with two suspension brackets **10** for ceiling suspension.

Where streamlined air outlet rows are required for uniform ceiling appearance, for example, blind rails are available whose visible part corresponds to that of the induction outlets.

As the air flows through the jet channels, many single high-stability and high-induction jets form. This results in rapid equalization of supply air temperature and room temperature.

The induction outlet generates a diffuse indoor air flow with draught-free, intensive flushing of the occupied zone. Allowable indoor air velocities to EN ISO 7730 are met.

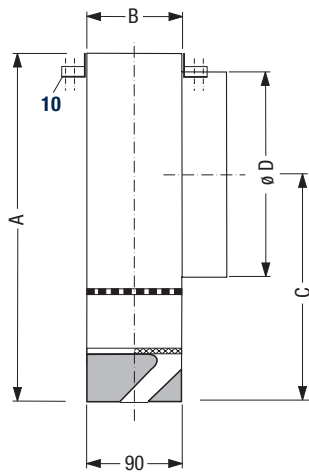
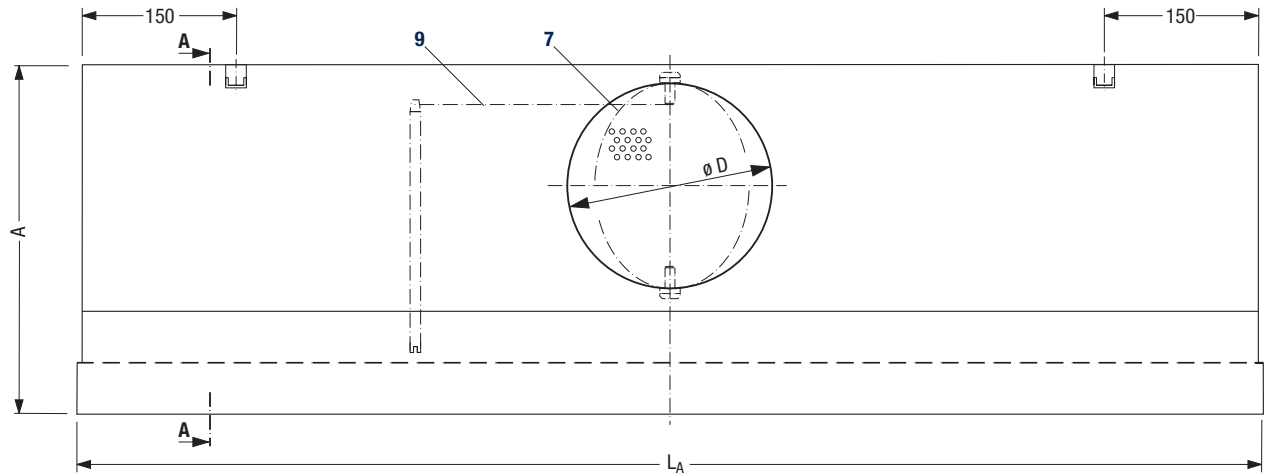


Induction outlet with momentum control device to adapt jet momentum to the given volume flow rate

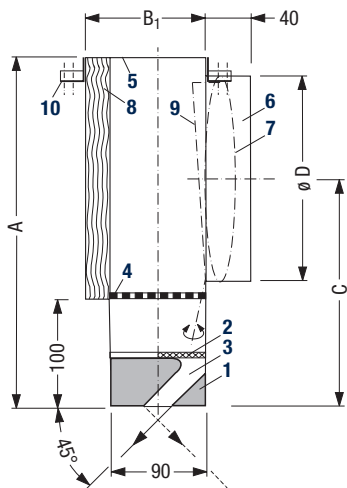
¹⁾ With adjustable discharge direction, see publication DS 4082

Induction outlet

Dimensions



Section A – A
Connection box, shown without acoustic lining, without volume flow damper



Section A – A
Connection box, shown with acoustic lining and volume flow damper **7** in connection spigot, adjustable from room

Key for all pages		Material
1	Discharge element	polystyrene
2	Momentum control device ¹⁾	polystyrene
3	Jet channel	—
4	Perforated metal sheet	galvanized sheet metal
5	Connection box	
6	Connection spigot	
7	Volume flow damper ¹⁾ in connection spigot, adjustable from room	galvanized sheet metal
8	Acoustic lining ¹⁾	
9	Adjustment device (for volume flow damper)	galvanized sheet metal
10	Suspension bracket	

¹⁾ optional

Type	Nominal length L_N	Air outlet					Connection box					Weight	
		Volume flow rate		Discharge height H m	Actual length L_A mm	Element width B_E mm	A mm	B mm	B_1 mm	C mm	D mm	without acoustic lining	with acoustic lining
		\dot{V}_A l/(s·m)	\dot{V}_A m ³ /(h·m)									W approx. kg	W approx. kg
IN-N6	1 000	28 – 83	100 – 300	4 – 7	990	305	90	111	200	179	8	10.5	
	1 200				1 155	325			210	199	9.5	11.5	
	1 600				1 650	350			222	223	12.5	15	

Induction outlet

Layout sheet

Comfort criteria ¹⁾

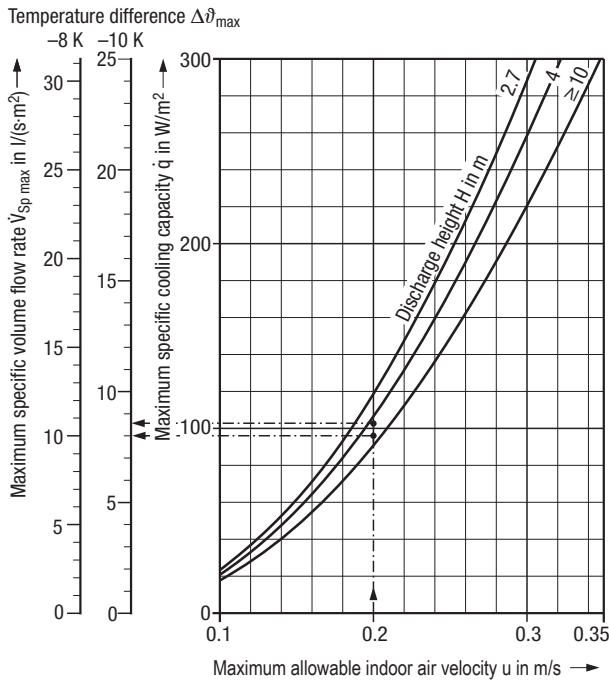
The outlet layout must comply with the maximum allowable indoor air velocities u in the occupied zone in the cooling mode. The indoor air velocity depends on the cooling load that is to be removed from the room. The maximum specific cooling capacity \dot{q} depends on the discharge height and the maximum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

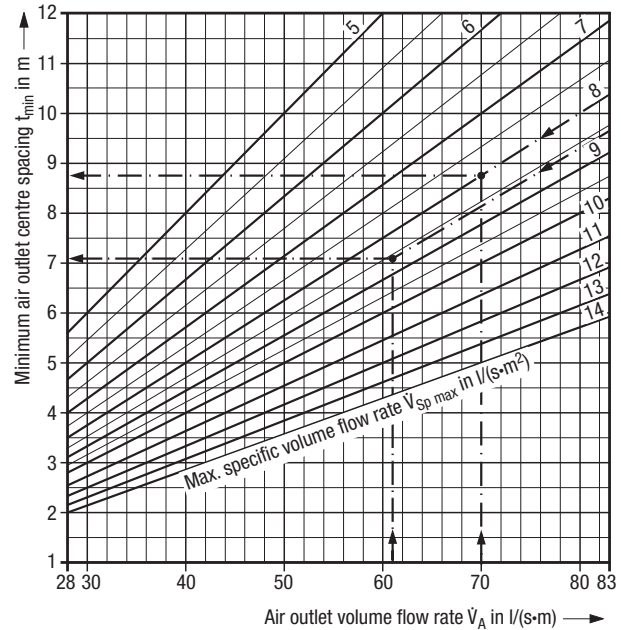
specific cooling capacity and the maximum temperature difference $\Delta\vartheta_{max}$. The volume flow rate supplied to the room $\dot{V}_{Sp\ tats}$ may not exceed this value.

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

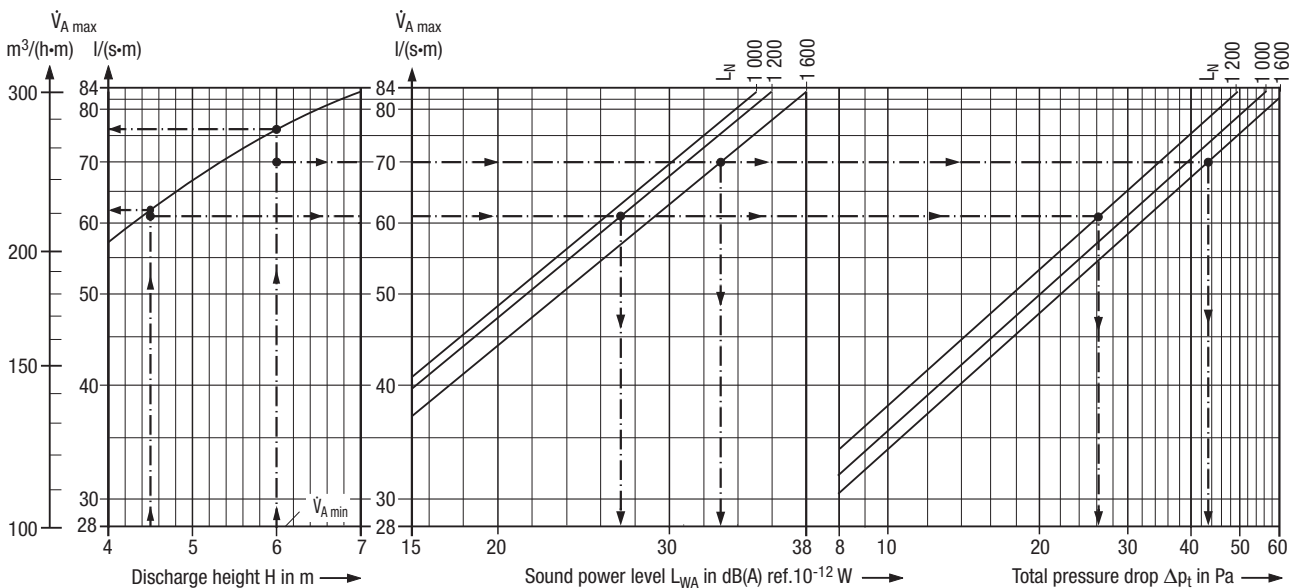
¹⁾ See our brochure ref. TB 69 'Layout specifications for thermal comfort'



Graph 1: Maximum specific volume flow rate



Graph 2: Minimum air outlet centre spacing



The graph curves apply to a connection box without acoustic lining and a volume flow damper in position 'open'. If the connection box is fitted with acoustic lining, the sound power level is lower by approx. 3 dB, while the pressure drop remains unchanged (see also 'Note' on page 5).

Induction outlet

Sound power level, pressure drop and insertion loss

Layout example				
Application:		Office	Museum	
1 Nominal length	mm	1 200	1 600	
Connection box (acoustic lining)		without	with	
2 Supply air volume flow rate	\dot{V} l/s	4 000	14 000	
3 Discharge height	H m	4.5	6	
4 Floor area	A m ²	720	1 900	
5 Max. allowable sound power level L_{WA}	dB(A) ref. 10 ⁻¹² W	35	40	
6 Comfort criteria (see page 4)				
– Max. allowable indoor air velocity u	m/s	0.2	0.2	
– Max. specific volume flow rate	l/(s·m ²)	8.6	8	
$\dot{V}_{Sp\ max}$ at $\Delta\vartheta_{\max} = -10$ K		[Graph 1]	[Graph 1]	
– Actual specific volume flow rate $\dot{V}_{Sp\ tats}$	l/(s·m ²)	5.6	7.4	
		[from 2:4]	[from 2:4]	
Criterion is met if $\dot{V}_{Sp\ tats} < \dot{V}_{Sp\ max}$				
From nomogram				
7 $\dot{V}_{A\ max}$	l/(s·m)	62	75	
8 Z_1 [$\geq \dot{V} : \dot{V}_{A\ max}$]	m	66	200	
9 Z_2 [$Z_1 : L_A$]	units	55	125	
10 \dot{V}_A [$\dot{V} : Z_1$]	l/(s·m)	61	70	
11 L_{WA}	dB(A)	≈ 27	≈ 33	
12 Δp_t	Pa	≈ 26	≈ 43	
13 t_{\min} [Graph 2]	m	≈ 7.1	≈ 8.8	

Key for layout:

\dot{V}_A = volume flow rate per m of air outlet length in l/(s·m)

$\dot{V}_{A\ max}$ = max. volume flow rate per m of air outlet length in l/(s·m),
when cooling, correlated with discharge height H

$\dot{V}_{A\ min}$ = min. volume flow rate per m of air outlet length in l/(s·m),
when cooling

$\dot{V}_{Sp\ max}$ = max. specific volume flow rate per m² in l/(s·m²)

$\dot{V}_{Sp\ tats}$ = actual specific volume flow rate per m² of floor area in l/(s·m²)

$\Delta\vartheta_{\max}$ = max. temperature difference supply air to return air in K

H = discharge height in m

u = max. allowable indoor air velocity in m/s

\dot{q} = max. specific cooling capacity in W/m²

t_{\min} = minimum air outlet centre spacing in m

L_A = air outlet length in mm

L_N = nominal length of air outlet in mm

L_{WA} = sound power level in dB(A) ref. 10⁻¹² W

Δp_t = total pressure drop in Pa

Note for layout:


When the volume flow damper is closed, the sound power level rises by 6 to 8 dB without acoustic lining and by 3 to 6 dB with acoustic lining, while the pressure drop nearly doubles.

Air outlet volume flow rate		Total pressure drop Δp_t	Sound power level L_W in dB ref. 10 ⁻¹² W						
\dot{V}_A			L_{WA}	Octave band centre frequency in Hz					
l/(s·m)	m ³ /(h·m)	Pa	dB(A)	125	250	500	1 K	2 K	4 K
Nominal length = 1 000									
50	180	20	18	26	24	15	—	—	—
61	220	30	23	30	29	20	13	—	—
72	260	41	28	33	33	25	19	25	—
83	300	54	32	36	37	29	24	20	12
50	180	20	21	26	27	16	12	—	—
61	220	30	26	30	32	22	18	11	—
72	260	41	31	33	36	37	24	18	—
83	300	54	35	36	40	31	29	24	12
Nominal length = 1 200									
50	180	18	19	27	25	16	—	—	—
61	220	27	24	31	30	21	14	—	—
72	260	37	29	34	34	26	20	16	—
83	300	49	33	37	38	30	25	21	13
50	180	19	22	27	28	17	13	—	—
61	220	27	27	31	33	23	19	12	—
72	260	37	32	34	37	28	25	19	—
83	300	49	36	37	41	32	30	25	13
Nominal length = 1 600									
50	180	22	21	29	27	18	—	—	—
61	220	32	26	33	32	23	16	—	—
72	260	44	31	36	36	28	22	18	—
83	300	57	35	39	40	32	27	23	15
50	180	22	24	29	30	19	15	—	—
61	220	32	29	33	35	25	21	14	—
72	260	44	34	36	39	30	27	21	10
83	300	57	38	39	43	34	32	27	15

Sound power levels < 10 dB are not listed

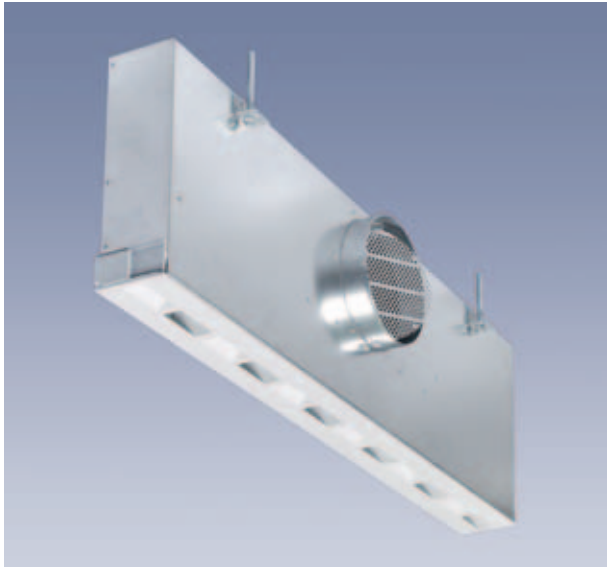
Insertion loss in dB						
Octave band centre frequency in Hz						
125	250	500	1 K	2 K	4 K	8 K
Connection box with acoustic lining						
0	2	9	17	15	12	15
Connection box without acoustic lining						
0	1	9	9	9	7	10

 Connection box **with** acoustic lining

 Connection box **without** acoustic lining

Induction outlet

Applications and features



Induction outlet with preset discharge direction and connection box without acoustic lining



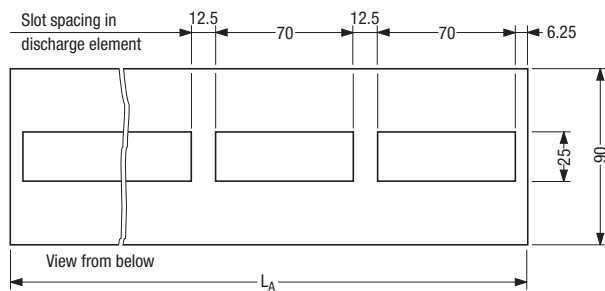
Induction outlet with preset discharge direction and connection box with acoustic lining

Applications

Discharge element made of polystyrene
 with optional manually adjustable momentum control device
 Air outlet volume flow rate: 28 – 83 l/(s·m) [100 – 300 m³/(h·m)]
 Visible air outlet width: 90 mm
 Discharge direction: 45° to the horizontal.

Application:

Rooms with discharge heights of 4 to 7 m.



If the induction outlet IN-N-6 is used in HVAC plants also intended for room heating, about 50% of the return air is to be extracted in the floor zone to improve room flushing.

The induction outlet is suitable for one-sided discharge with half the volume flow rate.

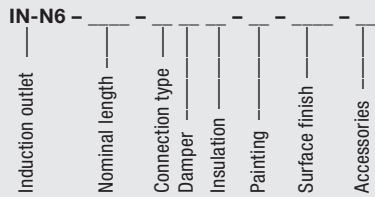
Features

- Single jets with alternating discharge at 45° to the horizontal, for any ceiling type
- Air volume flow rate ranging from 28 to 83 l/(s·m) [100 to 300 m³/(h·m)]
- Diffuse, draught-free indoor air flow
- Discharge height between 4 and 7 m
- Max. temperature difference between supply air and indoor air: -10 K when cooling, +6 K when heating
- Low sound power level
- Volume flow damper available on request, built into the connection spigot and adjustable from room
- Optional momentum control device, manually adjustable, for optimum adjustment of jet momentum to layout volume flow rate or for one-sided air discharge at half volume flow rate
- Available in 3 nominal lengths (1 000, 1 200 and 1 600)
- Connection box made of galvanized sheet metal, air discharge element made of polystyrene
- Blind rails for visually streamlined air outlet rows

Induction outlet

Type code and tender text

Type code



Nominal length

- 1000 = nominal length 1 000
- 1200 = nominal length 1 200
- 1600 = nominal length 1 600

Connection type

- K = connection box
- B = blind rail

Damper

- 0 = no volume flow damper
- R = with volume flow damper adjustable from room

Insulation

- 0 = without acoustic lining
- I = with acoustic lining

Painting

- N = wet painted
- E = body-tinted

Surface finish

- 9005 = face painted to RAL 9005, matt
- 9010 = face painted to RAL 9010, semi-matt
- = face painted to RAL

Accessories

- 0 = none
- I = momentum control device

Tender text - Induction outlet

..... units

Induction outlet with high induction effect for diffuse indoor air flow with single jets at minimal temperature gradients in the occupied zone, particularly suitable for installation in suspended ceiling systems,

consisting of:

- linear discharge element with consecutive jet channels alternately inclined at a 45° angle, discharging the air jets at an incline alternately right and left; visible air outlet width 90 mm; optional momentum control device;
- connection box with lateral suspension brackets, optionally available with volume flow damper in the connection spigot, adjustable from room; optionally fitted with acoustic lining.

Material:

- Discharge element made of polystyrene body-tinted in a colour similar to RAL 9005, jet-black, or optionally wet painted to RAL
- Connection box made of galvanized sheet metal

Make: KRANTZ KOMPONENTEN

Type: IN-N6 - ____ - K ____ - ____ - ____ - ____

- Blind rail

..... units

Blind rail for visually streamlined air outlet rows, visible part corresponding to that of the induction outlet, visible width 90 mm

Material:

Blind rail made of polystyrene body-tinted in a colour similar to RAL 9005, jet-black; face wet painted to RAL

Make: KRANTZ KOMPONENTEN

Type: IN-N6 - ____ - B O O - ____ - ____ - O

Subject to technical alterations.



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