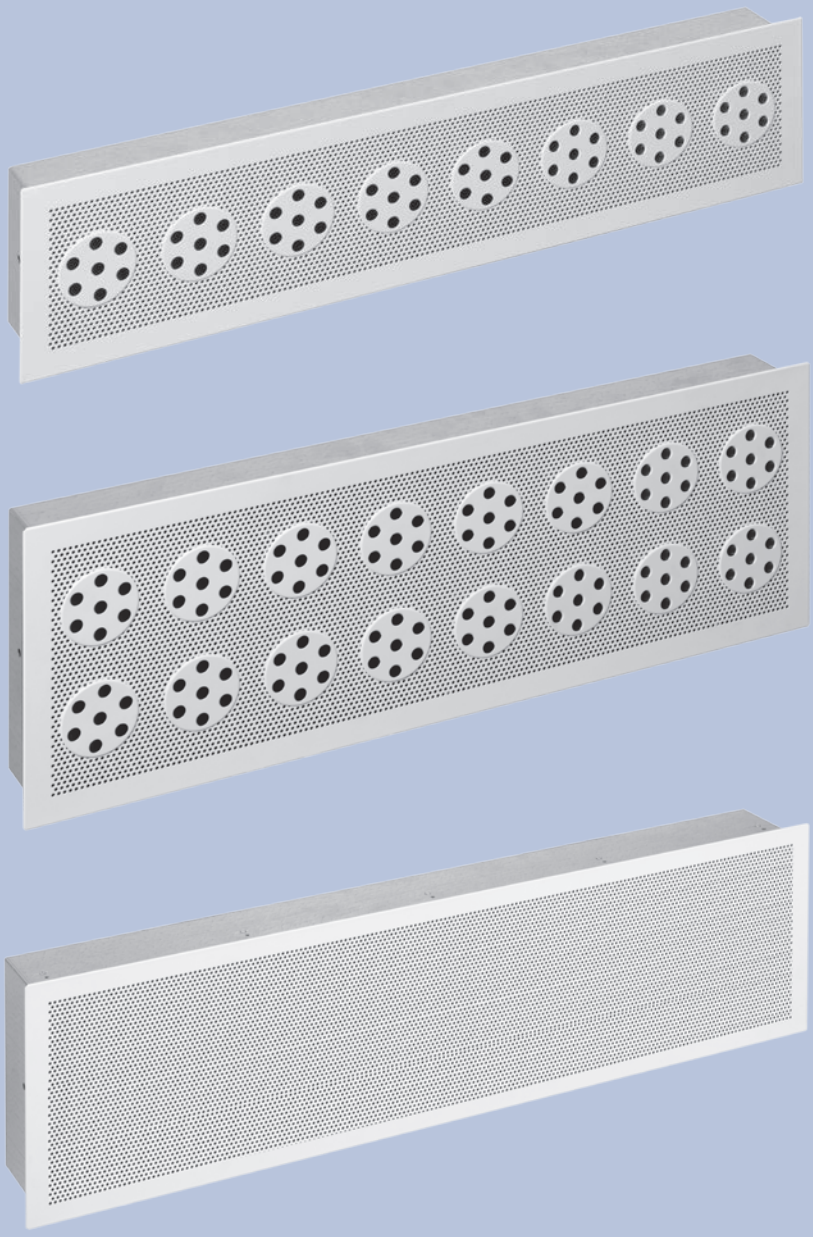

Krantz

Broad multiplex outlet BF-V....

Air distribution systems

DS 4101 E 04.2016

Broad multiplex outlet

Preliminary remarks

The broad multiplex outlet has been developed by Krantz to fulfil the high thermal comfort criteria required in commercial applications. This sidewall air outlet is designed for use in restaurants, assembly rooms, schools and offices, for instance. It is also well suited for hotel rooms.
Very often commercial buildings are fitted with simple air grilles whose drawback is the low momentum of the air jets. Due to this, the air jets are not very stable and they tend to drop too early when cooling, thus causing air draughts.
The broad multiplex outlet is designed to ensure draught-free air supply even at high air flow rates. The high level of thermal comfort with high induction effect is achieved by discharging the supply air simultaneously through nozzle discs and through the outlet perforations (so-called hybrid ventilation). The high-momentum air jets discharged through the nozzle discs induce the low-momentum air stream discharged through the surrounding outlet perforations, thus the percentage of fresh air in the occupied area is high, and so is the air quality. This is what makes all the difference to ordinary sidewall air outlets and air grilles.

The broad multiplex outlet is well suited to replace existing sidewall air outlets and air grilles. This is an optimum way to significantly improve thermal comfort in rooms at low cost.

The broad multiplex outlet can optionally be provided with a perforated design faceplate. The nozzles discs are hidden behind the perforation of the face, thereby the diffuser receives a more pleasing appearance without impairing its performance.

Construction design

The broad multiplex outlet consists of the front plate **1**, with built-in nozzle discs **2** rotatable by 360° and a plain frame, and the connection box **3**. Each nozzle disc is made up of an orifice disc, available in white or black [1)], which is fitted on a black plastic nozzle support. The front plate is fixed to the connection box by means of a clip connection **4** and can be detached from the room side.

The nozzles discs **2** are placed behind the perforation of the optional design faceplate. The adjustment of the nozzle discs can easily be done after removing of the faceplate.

The broad multiplex outlet is available with one or two rows of nozzle discs, in three nominal lengths for each design. As each nominal length is split into two volume flow rate ranges, this outlet can cover a wide range of supply air flow rates (see Table on page 3).

Connection types
Two connection types are available. For connection to a fan coil (FC) the broad multiplex outlet is supplied with a connection box which is open at the back. It is preferable to directly connect the air outlet to the fan coil via a flexible connection; the advantage here is that the flexible connection reduces structure-borne sound. The other connection type ('FL' type) is via a flexible duct; in this case, depending on the outlet design, the connection box is fitted at the back with one or two spigots inclusive of volume flow damper (see Table on page 3).

Mode of operation

The broad multiplex outlet includes several manually rotatable nozzle discs, each of them generating seven thin jets and discharging supply air with turbulence. These nozzle discs are flush-mounted inside the perforated plate which also discharges supply air, but at low turbulence. The supply air flows simultaneously out of the nozzle discs and out of the perforations of the front plate. The combination of turbulent and low-turbulence flow of supply air is called hybrid ventilation according to German guideline VDI 3804.
The high-momentum air jets discharged through the nozzle discs induce the low-momentum air stream discharged through the surrounding perforations of the plate and guide it towards the preset direction.
The characteristic air distribution performance remains also with perforated design faceplate.

Each of the nozzles discs can be manually adjusted by 360° from the room side and after removal of the faceplate (recommended for design faceplate only). Thus the air jets can be spread as broadly as desired. As the air jets generated by the external nozzle discs (on the right and left of the front plate) are flatter than those generated by the other nozzle discs, the global supply air stream is spread out more broadly. With the appropriate setting of the nozzle discs the supply air can be distributed evenly over the entire room width (Fig. 3). If the room configuration does not make it possible to install the broad multiplex outlet in the middle of the wall, the adjustment of the nozzle discs enables to place the air outlet on a side of the wall (so-called asymmetric arrangement, see Fig. 3).

Fig. 4 gives the air velocities and temperatures measured in a hotel room where a broad multiplex outlet was installed in the middle and on the right side of the wall. The indoor air velocities are almost all under 0.2 m/s, most of them are even under 0.15 m/s. The indoor air temperatures are very uniform, with the maximum deviation from the mean being less than ±1 K.

Sound power level and pressure drop

The broad multiplex outlet has been so designed that the sound power level is low even at high air volume flow rates. It thus also complies with limit values for allowable sound pressure level as specified by relevant standards.

Owing to the low pressure drop the broad multiplex outlet is very well suited for connection to fan coils; further, it lowers the energy consumption of the HVAC system.

The design faceplate does not affect the noise and pressure drop.

[1)] Other colours on request

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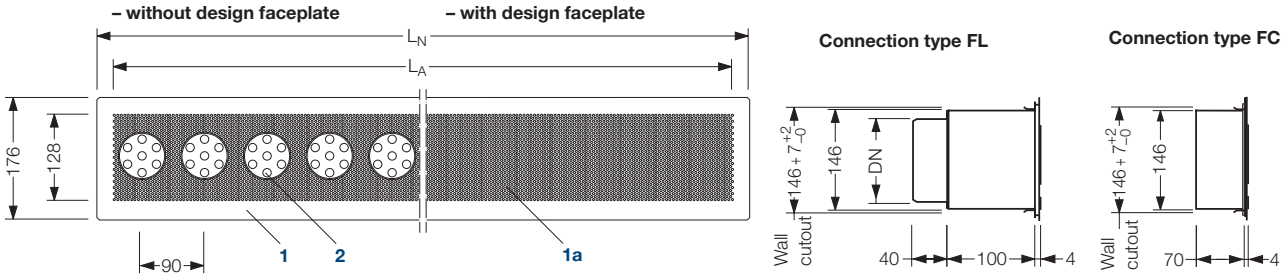
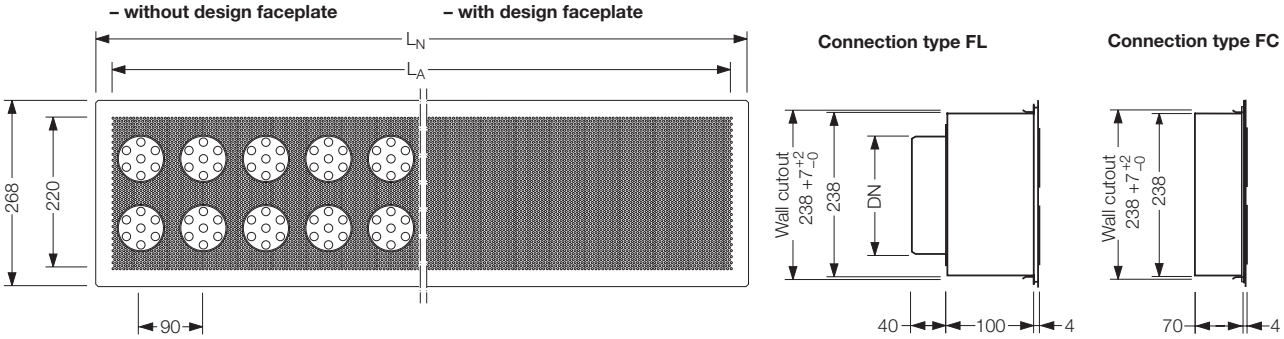
Broad multiplex outlet

Dimensions

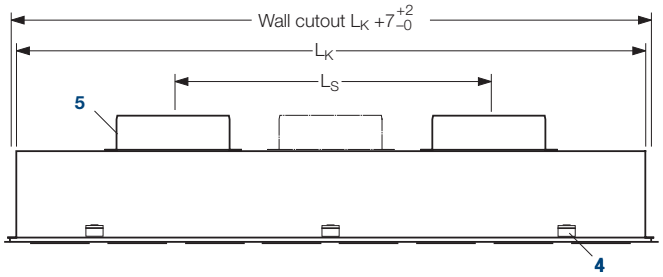
1-row design



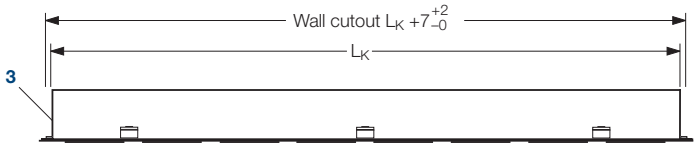
2-row design



Connection type FL: 1-row and 2-row design [1]



Connection type FC: 1-row and 2-row design [1]



Key

- **1** Front plate
- **1a** Perforated design faceplate
- **2** Nozzle discs
- **3** Connection box
- **4** Clip connection
- **5** Connection spigot

[1] Illustration without design faceplate

						1-row design						2-row design					
Nominal length	$\dot{V}$ range	Length				Volume flow rate $\dot{V}$		Nozzle discs	Connection spigot Connection type	Weight Connection type		Volume flow rate $\dot{V}$		Nozzle discs	Connection spigot Connection type	Weight Connection type	
		L_N	L_A	L_K	L_S			Qty	FL	FL	FC			Qty	FL	FL	FC
		mm	mm	mm	mm	l/s	m^3/h	pcs	n • DN	kg	kg	l/s	m^3/h	pcs	n • DN	kg	kg
600	V1	580	533	554	—	22 – 33	80 – 120	6	1 • DN 125	3.3	2.3	44 – 67	160 – 240	12	1 • DN 200	4.3	2.9
	V2					25 – 44	90 – 160					50 – 89	180 – 320				
800	V1	760	713	734	367	33 – 50	120 – 180	8	2 • DN 125	4.4	2.9	67 – 100	240 – 360	16	2 • DN 180	5.7	3.6
	V2					39 – 61	140 – 220					78 – 122	280 – 440				
1 000	V1	940	893	914	457	39 – 61	140 – 220	10		5.4	3.8	78 – 122	280 – 440	20	2 • DN 200	7.2	4.7
	V2					50 – 75	180 – 270					100 – 150	360 – 540				

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Broad multiplex outlet

Layout specifications

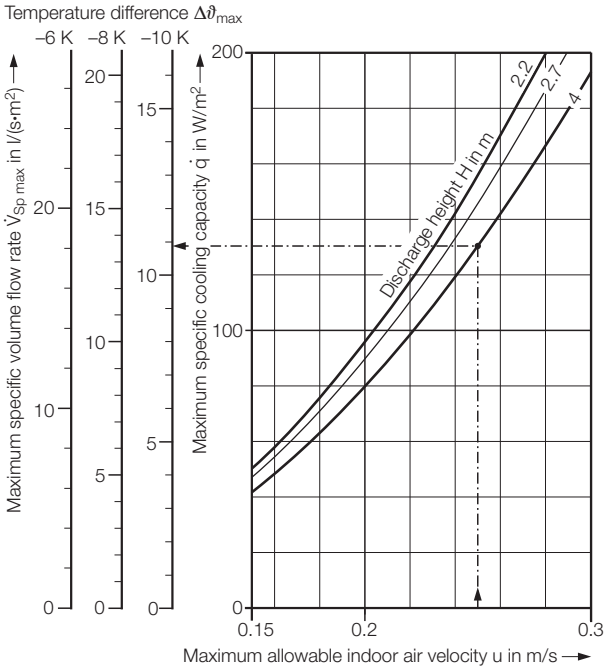
The minimum mounting height (from floor to outlet lower edge) is 2.2 m, the minimum distance from the outlet upper edge to the ceiling 50 mm. The coverage length L_E of the broad multiplex outlet is approx. 6 m and the coverage width B_E of the supply air is approx. 4 m.
The maximum difference in temperature between the supply and indoor air is up to –10 K when cooling and up to +10 K when heating.

Thermal comfort criteria [1] and outlet layout

The outlet layout must comply with the maximum allowable indoor air velocities 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). First, the maximum specific volume flow rate $\dot{V}_{Sp\ max}$ is determined in relation to the indoor air velocity u, the discharge height H and the maximum temperature difference supply air to return air $\Delta\vartheta_{max}$ using Graph 1.

To comply with the maximum allowable indoor air velocities, the volume flow rate supplied to the room $\dot{V}_{Sp\ tats}$ may not exceed the maximum specific volume flow rate $\dot{V}_{Sp\ max}$. On the basis of the maximum specific volume flow rate $\dot{V}_{Sp\ max}$ and the coverage length L_E, the coverage width B_E and the minimum air outlet spacing A_{min} can be determined using the following equations:

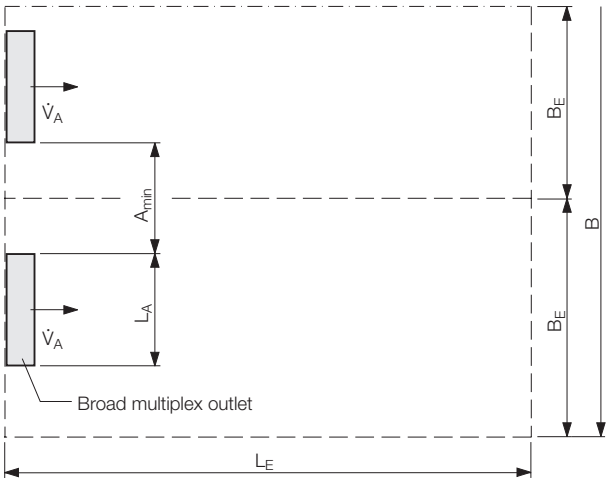
$$B_E = \frac{\dot{V}_A}{\dot{V}_{Sp\ max} \cdot L_E} \qquad A_{min} = B_E - L_A$$



Graph 1: Maximum specific volume flow rate

Key for layout

$\dot{V}_A$ = supply air volume flow rate per air outlet in l/s
$\dot{V}_{tot}$ = total volume flow rate per air outlet in l/s
$\dot{V}_{Sp\ tats}$ = actual specific volume flow rate per m² of floor area in l/(s·m²)
$\dot{V}_{Sp\ max}$ = maximum specific volume flow rate per m² of floor area in l/(s·m²)
u = maximum allowable indoor air velocity in m/s
$\dot{q}$ = max. specific cooling capacity in W/m²
$\Delta\vartheta$ = temperature difference supply air to return air in K
B_E = coverage width in m
L_E = coverage length in m
A_{min} = minimum spacing required between two air outlets in m
L_A = air outlet length 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



Example of layout for the broad multiplex outlet for a classroom with a floor area of 11 · 6 m = 66 m² [2]

1	Coverage length L_E	=	6 m
2	Room width B	=	11 m
3	Total volume flow rate $\dot{V}_{tot}$	=	261 l/s
4	Discharge height H	=	4 m
5	Maximum temperature difference when cooling $\Delta\vartheta_{max}$	=	–10 K
6	Maximum allowable indoor air velocity u	≤	0.25 m/s
7	Allowable sound power level L_{WA}	=	35 dB(A)
8	Actual specific volume flow rate $\dot{V}_{Sp\ tats}$	=	3.9 l/(s·m²) [from **3** : (**1** · **2**)]
9	Volume flow rate per air outlet $\dot{V}_A$	=	130 l/s

10 → 2-row broad multiplex outlet BF-V-2-1000-V2-FC
11 n = 2 units [from **3** : **9**]
12 $\dot{V}_{Sp\ max}$ = 10.8 l/(s·m²) [from Graph 1]

Check of specific volume flow rate:

13 $\dot{V}_{Sp\ tats} < \dot{V}_{Sp\ max}$ = 3.9 l/(s·m²) < 10.8 l/(s·m²)
14 B_E = 130 : (10.8 · 6) = 2 m
15 A_{min} = $B_E - L_A$ = 2 m – 0.94 m = 1.06 m ≈ 1.1 m
16 L_{WA} ≈ 33 dB(A) ref. 10^{-12} W [from Graph 5]
17 Δp_t ≈ 11 Pa [from Graph 5]

[1] See our brochure ref. TB 69 'Layout specifications for thermal comfort'
[2] Design volume flow rates to EN 15251, category II

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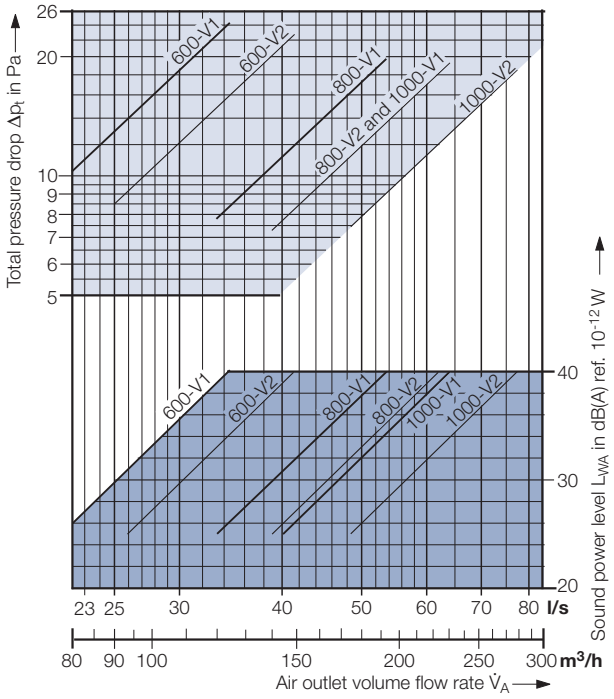
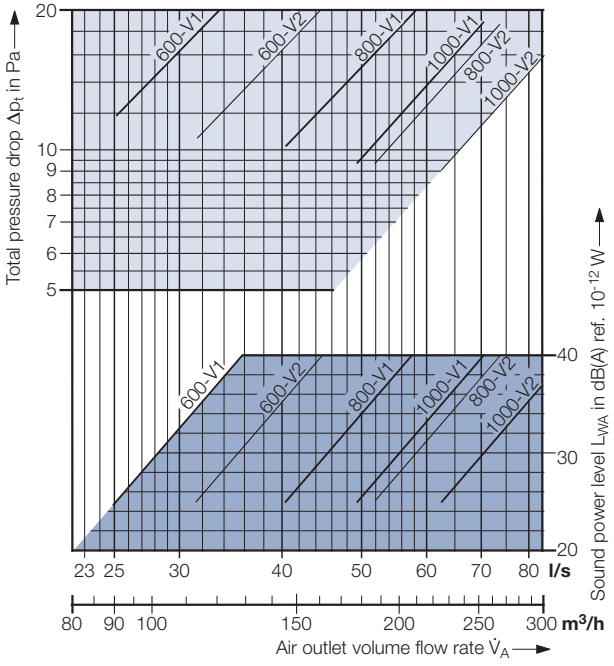
Broad multiplex outlet

Layout for 1-row design



Graph 2: **Connection type FL (with connection spigot)**



Graph 3: **Connection type FC (to fan coil)**

Note:
The measured values apply to damper position ‘open’. When the damper is closed, the pressure drop is 1.5 to 2.5 times higher and the sound power level rises by 1 to 3 dB(A).

Sound power levels < 10 dB are not indicated in this brochure.

1-row design											
Nominal length	$\dot{V}$ range	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					
		l/s	m³/h	Pa	dB(A)	125	250	500	1 K	2 K	4 K
Graph 2: **Connection type FL (with connection spigot)**											
600	V1	22	80	10	26	—	12	27	18	—	—
		28	100	16	33	—	19	34	25	—	—
		33	120	23	39	—	25	40	31	15	—
	V2	25	90	9	24	—	12	25	14	—	—
		32	115	14	32	—	21	33	22	—	—
		39	140	21	38	—	27	40	29	14	—
800	V1	33	120	8	25	—	17	26	19	—	—
		42	150	12	32	—	25	33	26	12	—
		50	180	18	38	—	31	39	32	18	—
	V2	39	140	7	25	—	19	26	19	—	—
		50	180	12	33	—	27	34	28	14	—
		61	220	18	40	—	34	41	34	20	—
1 000	V1	39	140	7	24	—	15	25	15	—	—
		50	180	12	32	—	23	33	24	—	—
		61	220	18	39	—	30	40	30	15	—
	V2	50	180	8	26	—	20	27	19	—	—
		61	220	13	33	—	27	34	25	11	—
		72	260	18	38	—	32	40	31	16	—
Graph 3: **Connection type FC (to fan coil)**											
600	V1	22	80	9	20	—	—	—	19	—	—
		28	100	14	30	11	16	17	28	16	—
		33	120	20	37	18	23	25	35	24	10
	V2	25	90	6	16	—	—	—	14	—	—
		32	115	11	26	12	15	18	24	11	—
		39	140	16	34	20	23	26	32	19	—
800	V1	33	120	7	17	10	11	12	15	—	—
		42	150	10	26	20	20	22	24	13	—
		50	180	15	34	27	27	29	31	20	—
	V2	39	140	5	14	—	11	11	11	—	—
		50	180	9	24	16	22	22	21	12	—
		61	220	13	32	24	30	30	30	21	—
1 000	V1	39	140	6	15	—	—	12	12	—	—
		50	180	10	25	—	19	22	33	10	—
		61	220	14	34	—	27	30	31	18	—
	V2	50	180	6	15	—	14	14	12	—	—
		61	220	9	24	—	22	22	20	11	—
		72	260	12	30	—	29	29	27	18	—

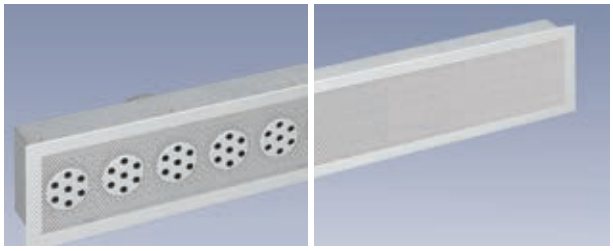
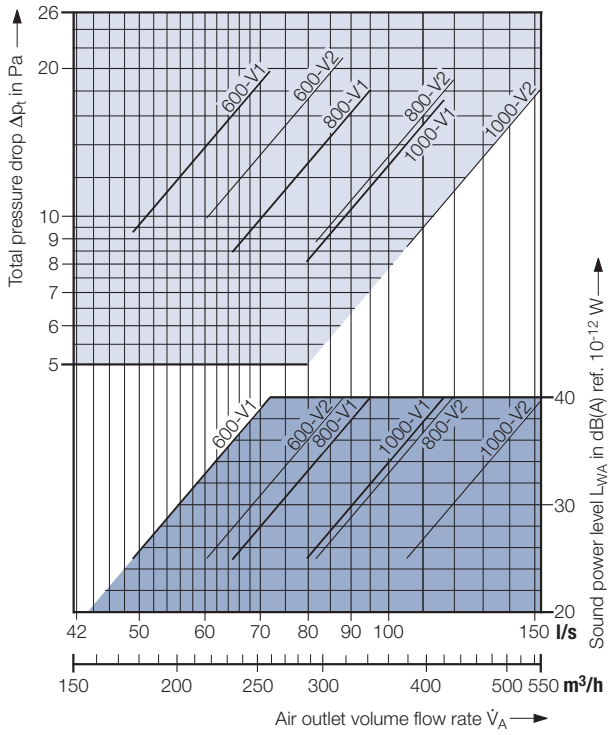


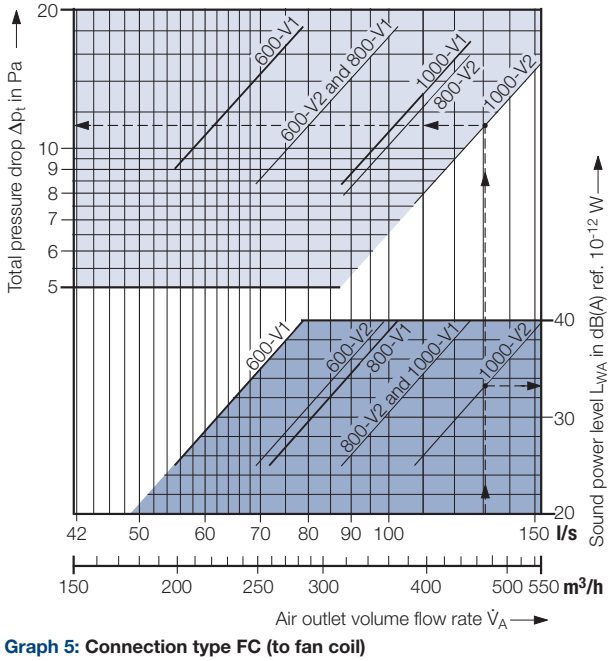
Fig. 1: **Broad multiplex outlet, 1-row design, nominal length 1 000, left: without design faceplate with 2 connection spigots (connection type FL)**
right: with design faceplate (connection type FC)

Broad multiplex outlet

Layout for 2-row design



Graph 4: Connection type FL (with connection spigot)



Graph 5: Connection type FC (to fan coil)

Note:
The measured values apply to damper position ‘open’. When the damper is closed, the pressure drop is 1.5 to 2.5 times higher and the sound power level rises by 1 to 3 dB(A).

Sound power levels < 10 dB are not indicated in this brochure.

2-row design											
Nominal length	$\dot{V}$ range	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					
		l/s	m³/h	Pa	dB(A)	125	250	500	1 K	2 K	4 K
Graph 4: Connection type FL (with connection spigot)											
600	V1	44	160	8	21	11	12	21	16	—	—
		56	200	12	30	19	21	30	25	12	—
		67	240	17	37	26	28	37	32	19	—
	V2	50	180	7	17	—	12	18	13	—	—
		64	230	11	27	—	22	28	23	10	—
		78	280	16	35	—	30	36	30	17	—
800	V1	67	240	9	26	—	18	26	22	—	—
		83	300	14	35	—	26	35	31	15	—
		100	360	20	42	—	33	42	38	22	—
	V2	78	280	8	23	—	17	23	20	—	—
		100	360	13	33	—	27	32	30	16	—
		122	440	20	41	—	35	40	38	23	—
1 000	V1	78	280	8	24	—	14	24	18	—	—
		100	360	13	34	—	24	34	28	13	—
		122	440	19	41	—	32	42	36	21	—
	V2	100	360	8	23	—	18	23	20	—	—
		122	440	12	31	—	25	31	28	14	—
		144	520	16	38	—	32	37	34	21	—
Graph 5: Connection type FC (to fan coil)											
600	V1	44	160	6	16	—	10	12	14	—	—
		56	200	9	25	14	19	22	23	12	—
		67	240	13	33	22	26	29	31	20	—
	V2	50	180	4	12	—	—	10	—	—	—
		64	230	7	22	16	17	20	19	—	—
		78	280	11	30	24	25	28	27	17	—
800	V1	67	240	8	22	12	17	20	20	—	—
		83	300	12	32	21	26	29	29	17	—
		100	360	17	39	28	34	37	36	25	—
	V2	78	280	6	20	13	17	18	16	—	—
		100	360	10	30	23	27	28	27	17	—
		122	440	15	38	31	26	36	35	25	—
1 000	V1	78	280	7	20	—	15	19	16	—	—
		100	360	11	30	—	25	29	27	15	—
		122	440	16	39	—	33	37	35	23	—
	V2	100	360	7	22	—	19	21	19	—	—
		122	440	10	30	—	28	29	27	16	—
		144	520	14	37	—	34	36	34	23	—

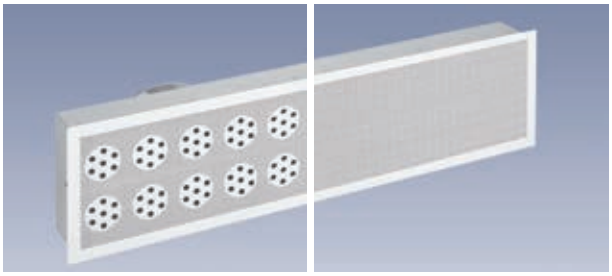


Fig. 2: Broad multiplex outlet, 2-row design, nominal length 1 000, left: without design faceplate with 2 connection spigots (connection type FL)
right: with design faceplate (connection type FC)

Broad multiplex outlet

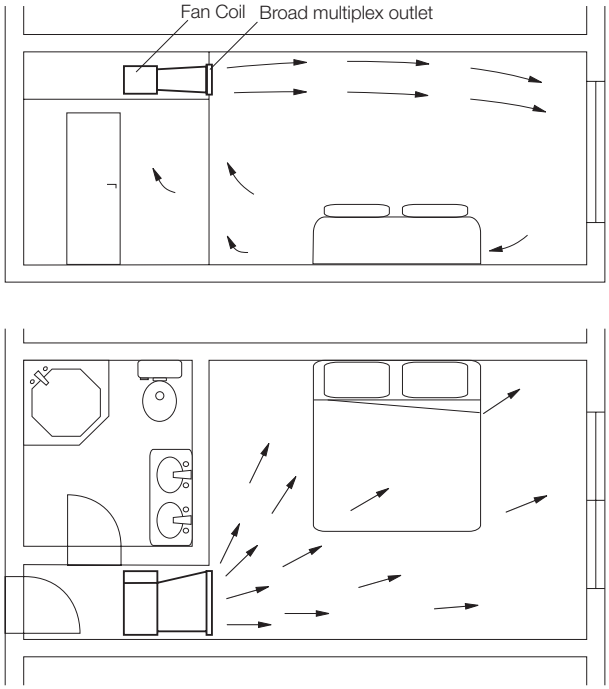


Fig. 3: Basic jet pattern with the outlet positioned close to the right wall (related to air flow direction) of a hotel room

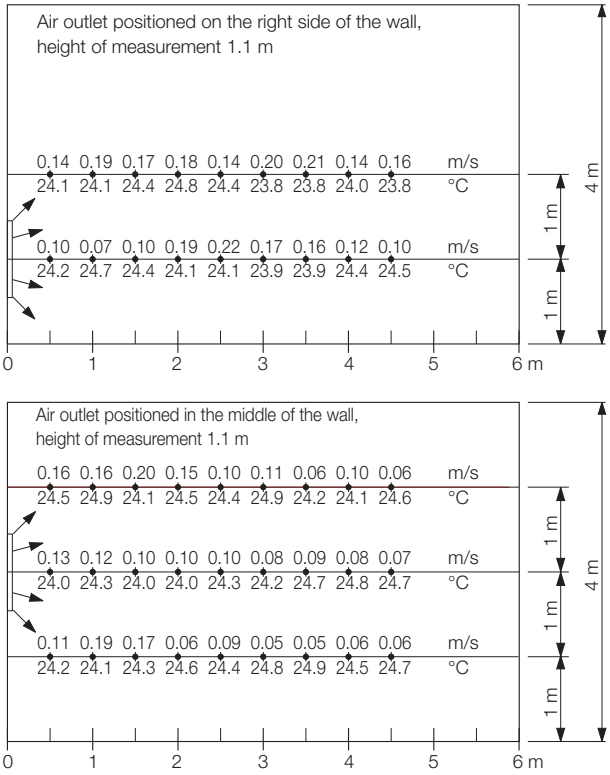


Fig. 4: Indoor air velocities and temperatures as measured in a hotel room
Air outlet volume flow rate $\dot{V}$ = 139 l/s [500 m³/h]
Temperature difference supply air to indoor air $\Delta\vartheta$ = –8 K

Features

- Sidewall air outlet fulfilling the high thermal comfort criteria for commercial applications to EN ISO 7730
- Perforated front plate with built-in nozzle discs in 1-row or 2-row design
- Optionally with perforated design faceplate
- Available in 3 nominal lengths, each being split into two volume flow rate ranges
- Hybrid ventilation system ensuring a high ventilation efficiency in the occupied zone
- The air jets can be spread out as broadly as desired by manually rotating individual nozzle discs by up to 360°
- The broad multiplex outlet may be positioned in the middle or on a side of the room wall (so-called symmetric or asymmetric arrangement)
- Maximum volume flow rate
  1-row design: 75 l/s [270 m³/h]; 2-row design: 150 l/s [540 m³/h]
- Maximum temperature difference between supply and indoor air when cooling and heating ±10 K
- Low sound power level
- Low pressure drop, thus well suited for connection to fan coils
- Mounting height from 2.2 m to 4.0 m

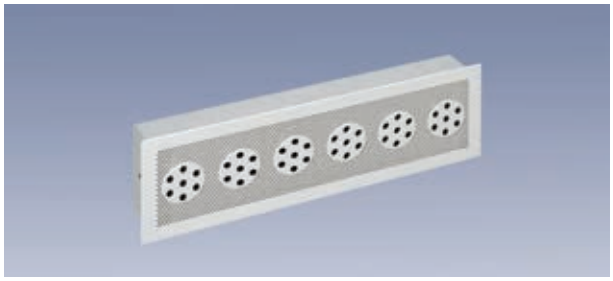


Fig. 5: Broad multiplex outlet, 1-row design, nominal length 600, for connection type FC (Fan Coil)

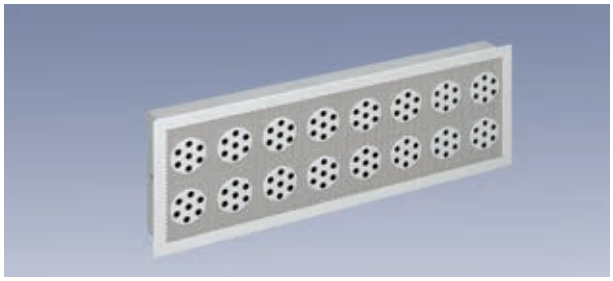


Fig. 6: Broad multiplex outlet, 2-row design, nominal length 800, for connection type FC (Fan Coil)

Broad multiplex outlet

Type code

BF-V – __ – ___ – __ – __ – ___ – __ – __ – __

- Broad multiplex outlet
- Outlet rows
- Nominal length
- Volume flow rate range
- Connection type
- Surface finish
- Colour of discharge element
- Placement in room
- Addition

Outlet rows
1 = 1 row
2 = 2 rows

Nominal length
600 = nomimal length 600
800 = nomimal length 800
1000 = nomimal length 1 000

Volume flow rate range	Nominal length	1-row design		2-row design	
		Volume flow rate		Volume flow rate	
		l/s	m^3/h	l/s	m^3/h
V1	600	22 – 33	80 – 120	44 – 67	160 – 240
	800	33 – 50	120 – 180	67 – 100	240 – 360
	1 000	39 – 61	140 – 220	78 – 122	280 – 440
V2	600	25 – 44	90 – 160	50 – 89	180 – 320
	800	39 – 61	140 – 220	78 – 122	280 – 440
	1 000	50 – 75	180 – 270	100 – 150	360 – 540

Connection type
FC = fan coil
FL = flexible duct

Surface finish
9010 = face painted to RAL 9010, semi-matt [1)]

Colour of discharge element (orifice discs) [1)]
S = black similar to RAL 9005
W = white similar to RAL 9010

Placement in room [2)]
L = to the left
M = in the middle
R = to the right

Addition
O = without design faceplate
PF = with perforated design faceplate

Tender text

.... units
Broad multiplex outlet designed for flush mounting in the upper area of a sidewall, generating a stable and spread-out supply air stream; front plate with built-in nozzle discs generating high-momentum jet bundles and with perforations discharging supply air at low turbulence; the global supply air stream can be spread out as broadly as desired, thus rapid decrease in jet velocity and temperature difference to indoor air; air outlet available for two volume flow rate ranges,

consisting of:
– perforated front plate, available in three nominal lengths, with built-in 2-part nozzle discs in 1-row or 2-row design; each nozzle disc is manually rotatable by 360°;
– optionally the broad multiplex diffuser can be provided with a perforated design faceplate. The nozzles discs are hidden behind the perforation of the face, thereby the diffuser receives a more pleasing appearance without impairing its performance;
– connection box with open back for connection to a fan coil (FC) or with one or two spigots for connection to a flexible duct (FL) inclusive of volume flow damper.
Front plate fixed to connection box by means of a clip connection.

Material:
– Front plate made of galvanized sheet metal, face painted to RAL 9010, pure white [1 + 3)]
– 2-part nozzle discs
→ Orifice disc made of polycarbonate PC-GF-10-V0 body-tinted in a colour similar to RAL 9010, pure white, or similar to RAL 9005, jet-black [1 + 3)]
→ Nozzle support made of acrylonitrile-butadiene-styrene ABS-V0 body-tinted in a colour similar to RAL 9005, jet-black
– Perforated design faceplate made of galvanized sheet metal, painted to RAL 9010 pure white [1)]
– Connection box made of galvanized sheet metal

Make: Krantz
Type: BF-V – __ – ___ – __ – __ – ___ – __ – __ – __

Subject to technical alterations.

[1)] Other colours on request
[2)] Air outlet viewed from the room. Unless otherwise specified in the order, the outlet setting will be for 'M' placement.
[3)] Painted to RAL 9005 (deep black), when combined with perforated design faceplate

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Caverion Deutschland GmbH
Business unit Krantz
Uersfeld 24, 52072 Aachen, Germany
Phone: +49 241 441-1
Fax: +49 241 441-555
info.komponenten@krantz.de
www.krantz.de