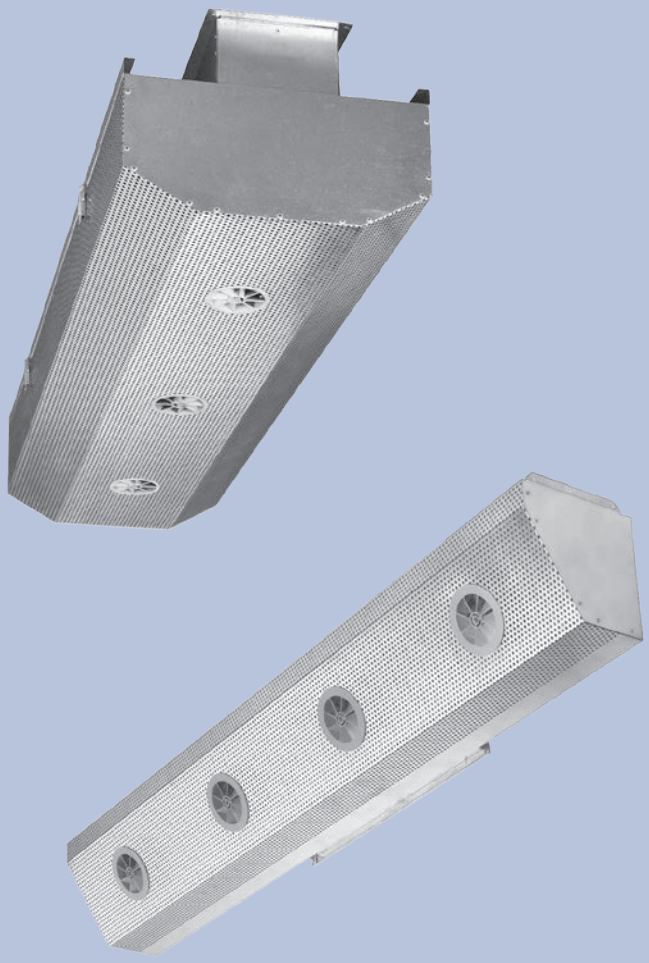
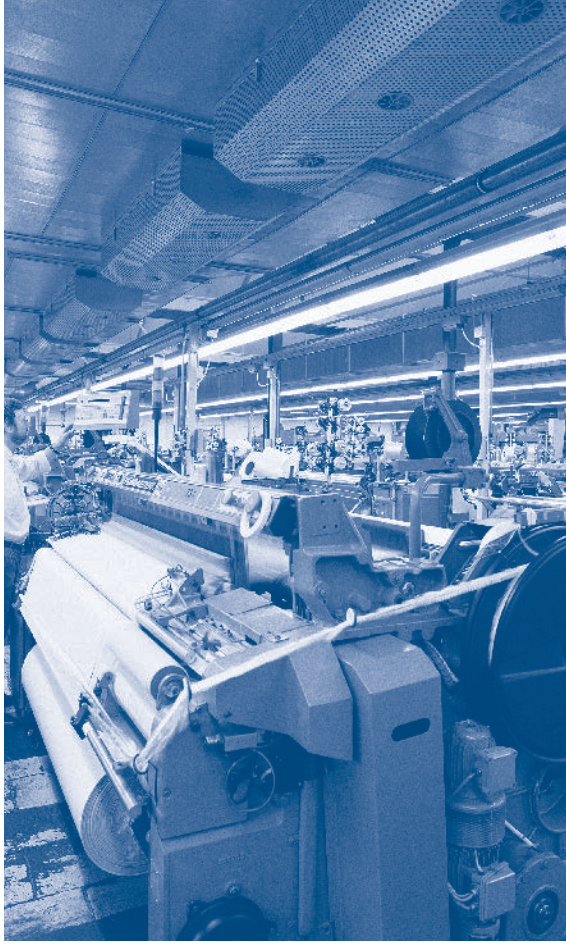




Krantz

Trapezoidal displacement outlet VA-T....
Semi-trapezoidal displacement outlet VA-TH....

Air distribution systems

DS 4010 E 01.2018

Trapezoidal and semi-trapezoidal displacement outlet

Preliminary remarks

Where workplaces or production facilities have to be kept free of airborne dust and fibres or heavy pollutants, the supply air is best discharged above the occupied zone and the return air extracted from the floor zone. The dust and pollutants are displaced downwards with the indoor air to the return air openings. As far as possible, return flows to the ceiling have to be avoided.

This is where air outlets for low-turbulence air flow are used, whose discharge direction has a broad spread with a horizontal to vertically downward incline.

For these applications Krantz provides the trapezoidal and semi-trapezoidal displacement outlets.

While the trapezoidal displacement outlet is best installed above a production area – either flush with the ceiling or free-hanging – the semi-trapezoidal displacement outlet is used where the supply air is to be discharged from the side, e.g. from a room wall or a row of pillars. The outlet placement is also possible on either side of an assembly line, e.g. in car works, or along production machines, e.g. in printing shops.

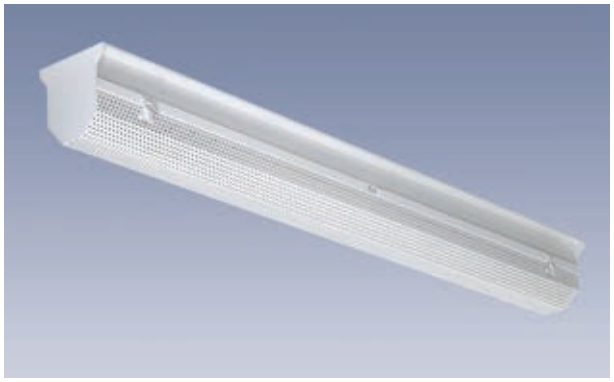


Figure 1: Trapezoidal displacement outlet of nominal width 140

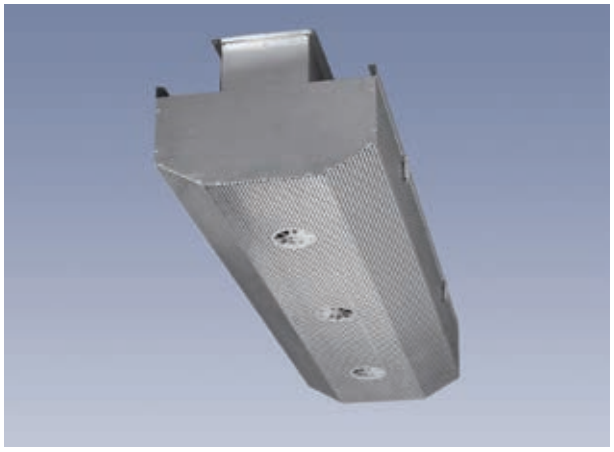


Figure 2: Trapezoidal displacement outlet of nominal width 290 or 500

Figure 3: Semi-trapezoidal displacement outlet of size 250 or 500

Construction design

1. Trapezoidal displacement outlet
The trapezoidal displacement outlet is basically manufactured in three widths: 140, 290 and 500 mm, and in several lengths. Its main components are the housing **1** with trapezoidal inner and outer perforated plates **2** and the connection spigot **3**.

Built into the connection spigot is a volume flow damper **4** which can be adjusted from outside using a setting screw/ slide **5**. The (+) sign stands for higher volume flow rate, the (–) sign for lower volume flow rate.

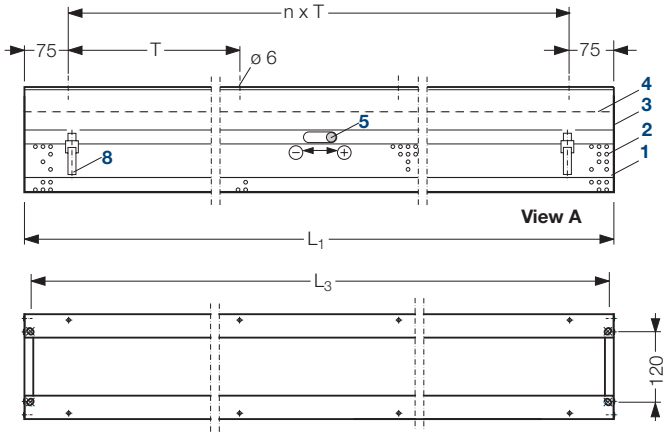
The trapezoidal displacement outlet is installed lengthwise below the supply air duct. The outlets are provided with a flange **11** (Connection type **A3**), which fit to a corner flange of 20 mm. The 140 mm wide outlet can also be fixed to the duct bottom using a drill pattern ø 6 mm, n x T (see figure 4).

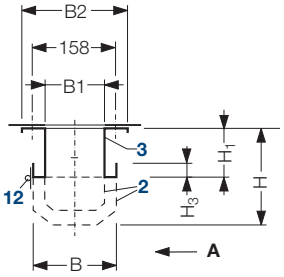
The perforated plate of the housing can be opened for inspection purposes after releasing a lock **8**.

Trapezoidal and semi-trapezoidal displacement outlet

Nominal width 140

Connection type A3: with flange



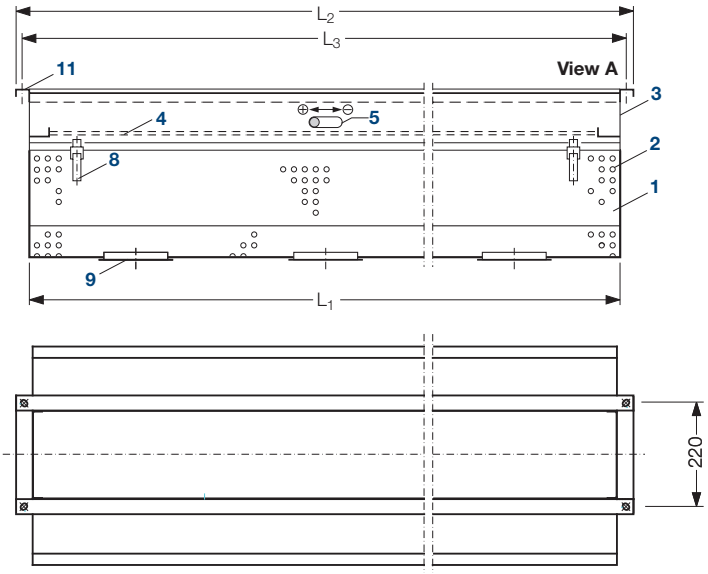


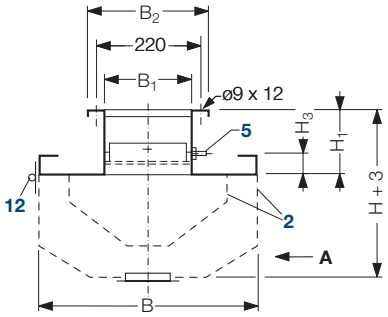
Key for all pages:

1 Housing
2 Perforated plate
3 Connection spigot
4 Volume flow damper
5 Setting slide
8 Housing lock
9 Twist outlet
10 Suspension strip
11 Connection frame
12 Hinge

Nominal widths 290 and 500

Connection type A3: with flange





Nominal width B mm	Nominal length L	Volume flow rate range $\dot{V}_A$ l/s	Volume flow rate range $\dot{V}_A$ m³/h	B_1 mm	B_2 mm	L_1 mm	L_2 mm	L_3 mm	H mm	H_1 mm	H_3 mm	T mm	n piece	Twist outlets piece	Weight ca. kg
140	**800**	70 – 165	250 – 600	100	178	800	–	780	160	80	16	325	2	–	6
	1250	110 – 265	400 – 950			1250		1230				275	4		8
	1600	140 – 330	500 – 1200			1600		1580				290	5		11
	1800	165 – 390	600 – 1400			1800		1780				330	5		13
290	**800**	155 – 330	550 – 1200	200	240	804	844	824	235	100	25	–	–	2	15
	1250	235 – 530	850 – 1900			1254	1294	1274						3	22
	1600	300 – 670	1100 – 2400			1604	1644	1624						3	27
	1800	350 – 750	1250 – 2700			1804	1844	1824						4	31
500	**800**	265 – 550	950 – 2000	200	240	804	844	824	350	120	30	–	–	2	24
	1250	415 – 830	1500 – 3000			1254	1294	1274						3	34
	1600	540 – 1100	1950 – 4000			1604	1644	1624						3	42
	1800	610 – 1220	2200 – 4400			1804	1844	1824						4	47

Figure 4: Trapezoidal displacement outlet - Dimensions

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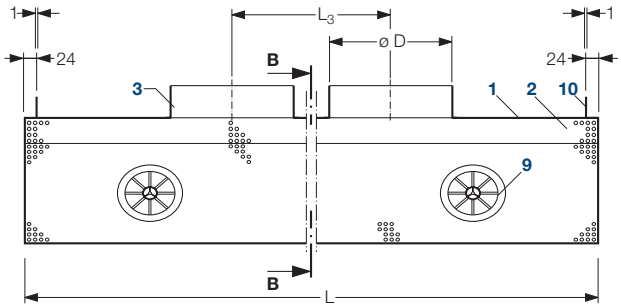
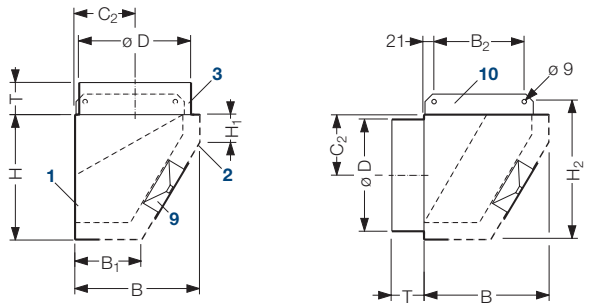
Trapezoidal and semi-trapezoidal displacement outlet

Design with (two) circular connection spigots



Section B – B: Spigot for connection to circular duct
at the top at the rear



Connection frame to fit 20 mm corner flanges (optional)

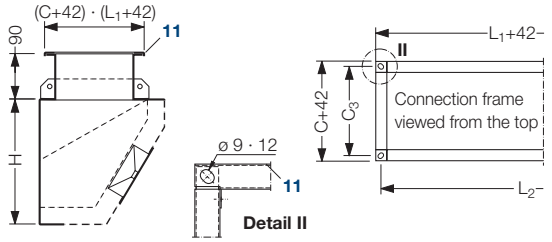


Figure 5: Semi-trapezoidal displacement outlet - Dimensions

2. Semi-trapezoidal displacement outlet

Its main components are the same as those of the trapezoidal displacement outlet, yet with different geometric shapes. The semi-trapezoidal displacement outlet is available in sizes (widths) of 250 and 500 mm and in several lengths. It can be fitted with one rectangular or two circular connection spigots placed at the top or at the rear (see Figure 5).

The semi-trapezoidal displacement outlet is supplied as standard with a fixed damper.

Size	Nominal length	Volume flow rate range		Dimensions				Twist outlets	Weight approx.
	L mm	$\dot{V}_A$ l/s	$\dot{V}_A$ m^3/h	L_1 mm	L_2 mm	L_3 mm	ø D mm	units	kg
250	**1 200**	85 - 235	300 - 850	446	468	600	199	3	15
	1 500	110 - 300	400 - 1 100	556	578	750	223	3	19
	1 800	125 - 360	450 - 1 300	626	648	900	223	4	23
500	**1 200**	195 - 500	700 - 1 800	626	648	600	279	3	36
	1 500	250 - 625	900 - 2 250	796	818	750	314	3	45
	1 800	300 - 750	1 100 - 2 700	896	918	900	354	4	54

Size	Dimensions in mm										
	B	B_1	B_2	C	C_1	C_2	C_3	H	H_1	H_2	T
250	250	134	180	156	32	125	178	250	55	275	40
500	500	280	430	220	50	195	242	500	116	525	60

Trapezoidal and semi-trapezoidal displacement outlet

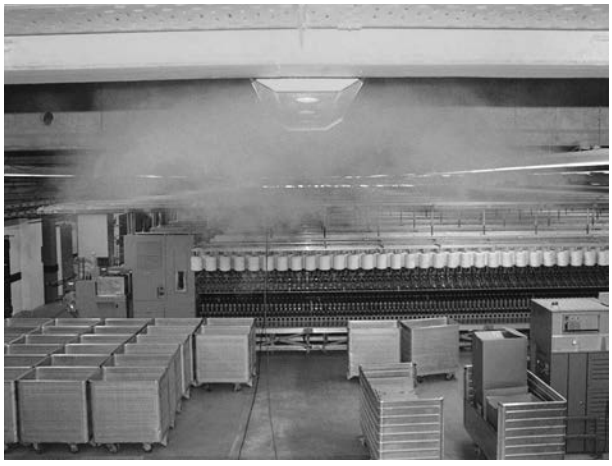


Figure 6: **Trapezoidal displacement outlet - Jet dispersion made visible with smoke tracer**

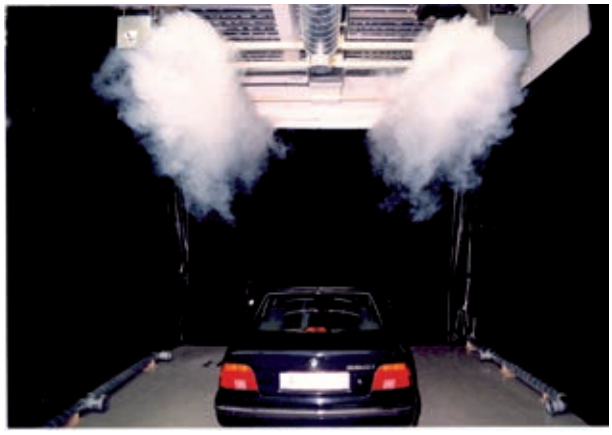


Figure 7: **Semi-trapezoidal displacement outlet in a test room of the automotive industry**

Figure 8: **Trapezoidal displacement outlets below the supply air duct in a weaving mill**

Mode of operation

The perforated plate generates low-turbulence air jets that discharge horizontally to vertically downwards owing to the trapezoidal shape of the housing. Depending on the displacement outlet length, 2 to 4 twist outlets **9** are built into the perforated plates of the 290 and 500 mm wide trapezoidal displacement outlets as well as into the perforated plate of the semi-trapezoidal displacement outlet. These twist outlets generate a high-momentum air flow that induces the supply air from the surrounding perforated plate surface. The result is a very stable total air flow with a coverage of approx. 8 m.

The 140 mm wide trapezoidal displacement outlet is designed for a smaller coverage of 2 to 3 m. Here, the necessary jet stability is obtained without adding twist outlets.

As shown in Figure 9, dust and pollutants are displaced downwards to the return air openings and extracted from the room. This largely prevents air upflow, which considerably reduces the time

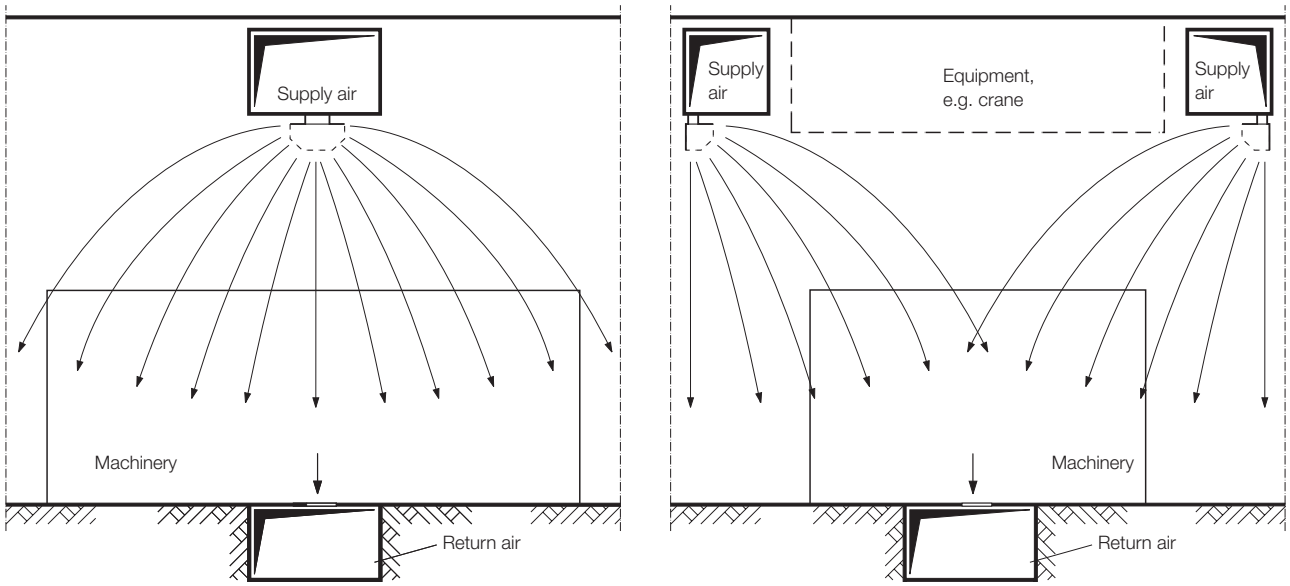


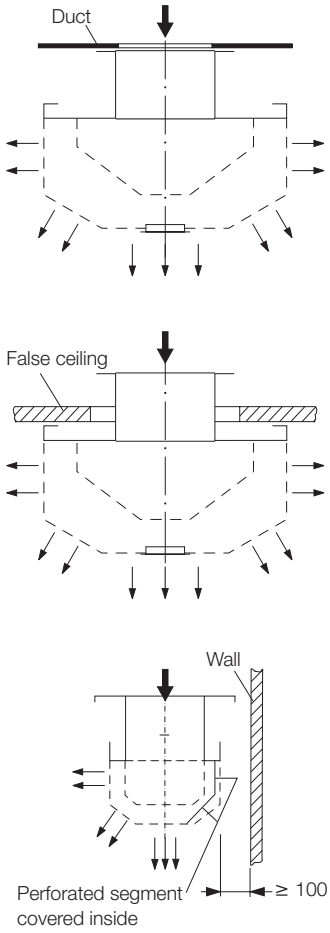
Figure 9: **Air jet pattern of trapezoidal / semi-trapezoidal displacement outlet**

Trapezoidal and semi-trapezoidal displacement outlet

solid particles remain in the indoor air. Tests made in spinning mills have proved that dust concentration in air flow generated by trapezoidal displacement outlets is 50% less than is in indoor air when conventional air outlets are used. It must be noted that even indoor air conditions (room temperature and relative humidity) are obtained in both the machinery area and the occupied zone.

Placement and connection

1. Trapezoidal displacement outlet
The trapezoidal displacement outlet can be placed free-hanging or flush with the ceiling. The 140 mm wide outlet can also be installed along or very close to a wall. In this case the inside of the perforated segment facing the wall is to be covered. As a result, the air flow rate decreases by 50%. Figure 10 shows the different installation options.



Placement:

Free-hanging
Connection to supply air duct using an insertion frame

Flush with ceiling
Air supply from ceiling plenum or via connection to supply air duct

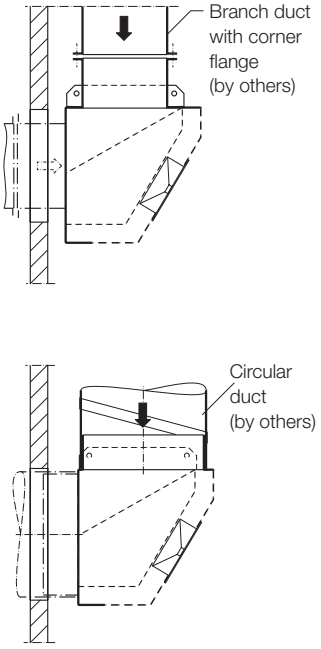
In front of a wall [1)]
Only for 140 mm wide outlet; recommended distance to wall ≥ 100 mm

Figure 10: Trapezoidal displacement outlet - Placement and connection types

[1)] With halved air flow rate; alternatively select semi-trapezoidal displacement outlet

2. Semi-trapezoidal displacement outlet
As a rule, the semi-trapezoidal displacement outlet is placed along a wall or on either side of an assembly line. There are several ways to connect the outlet to the supply air duct as is shown in Figure 11.

Placement: Free-hanging in front of a wall or pillar



Connection to supply air duct:

With rectangular connection frame to fit corner flange at branch duct; spigot placed either at the top or at the rear

With two circular spigots for connection to a circular duct, placed either at the top or at the rear

Figure 11: Semi-trapezoidal displacement outlet - Placement and connection types

Trapezoidal and semi-trapezoidal displacement outlet

Selection and layout

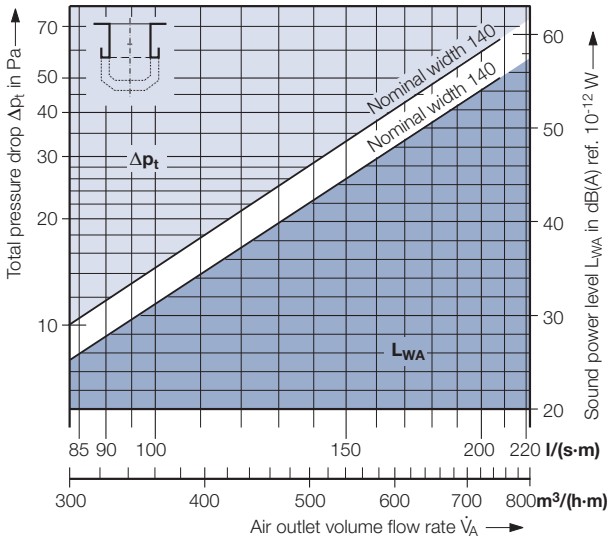
Typical applications for the trapezoidal or semi-trapezoidal displacement outlet are textile factories such as carding, spinning and weaving mills, different areas in car works, e.g. painting shops and assembly lines, as well as printing shops.
The main technical data is shown in the following table and graphs.

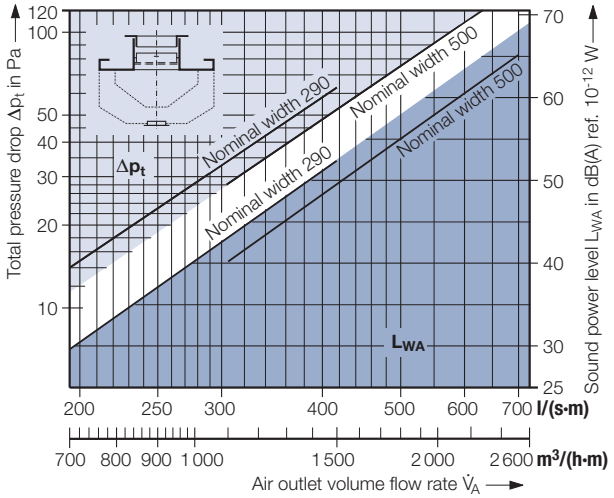
Technical data		Trapezoidal displacement outlet	Semi-trapezoidal displacement outlet
Air outlet width:	mm	140	—
	mm	290	250
	mm	500	500
Air outlet length:	mm	800	—
	mm	1 250	1 200
	mm	1 600	1 500
	mm	1 800	1 800
Volume flow rate in l/(s•m) :			
for width of	140 mm	85 to 210	—
	250 mm	—	70 to 195
	290 mm	195 to 415	—
	500 mm	335 to 695	165 to 415
Volume flow rate in $m^3/(h•m)$:			
for width of	140 mm	300 to 750	—
	250 mm	—	250 to 700
	290 mm	700 to 1 500	—
	500 mm	1 200 to 2 500	600 to 1 500
Discharge height:	m	3 to 4	
Duct spacing for air outlet width of			
– 140 mm (trapezoidal)	m	3,5 to 6	
– 290 and 500 mm (trapezoidal)	m	7 to 10	
– 250 and 500 mm (semi-trapezoidal)	m	7 to 10	
Coverage zone of supply air jets:	m	4 to 8	2 to 3
Temperature difference supply air-indoor air	K	—	–3 to –6
– for width 140:	K	–3 to –6	—
– for widths 290 and 500:	K	–3 to –8	—
Material			
– Outlet housing and perforated plate		galvanized sheet metal	
– Twist outlets		polystyrene	

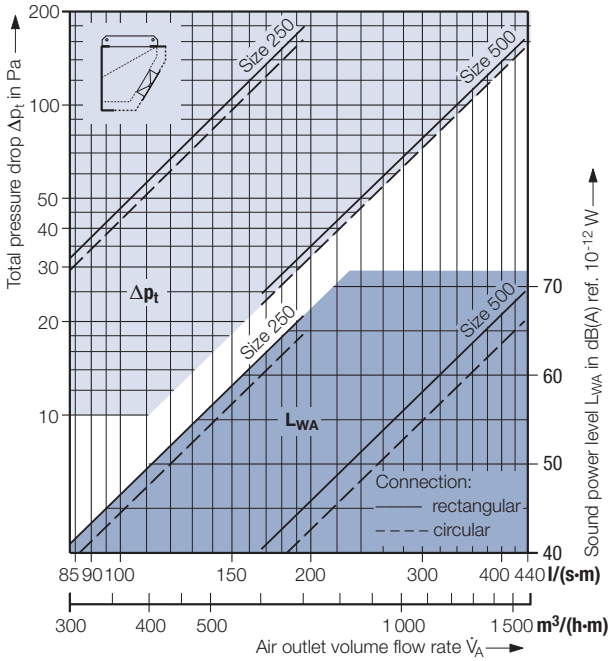
Figure 12: Semi-trapezoidal displacement outlet of size 500 in a production facility

[1] The graph values apply for damper “open”.

Sound power level and pressure drop [1]







Trapezoidal and semi-trapezoidal displacement outlet

Features

- Low-turbulence displacement flow with air discharge at a downward incline
- Well suited for spaces where heavy pollutants are emitted
- For applications with permanent cooling
- Discharge height: 3 to 4 m
- Temperature difference between supply air and indoor air: – 3 to – 6 K or – 3 to – 8 K
- Even, constant indoor air temperature in both the machinery area and the occupied zone
- Supply air connection for
  – trapezoidal outlet: rectangular spigot at the top
  – semi-trapezoidal outlet: one rectangular or two circular spigots placed at the top or at the rear
- Volume flow rate range of
  – trapezoidal outlet: 85 – 695 l/(s·m) [300 – 2 500 m^3/(h·m)]
  – semi-trapezoidal outlet: 70 – 415 l/(s·m) [250 – 1 500 m^3/(h·m)]
- Available in several widths and lengths
- Coverage zone of supply air jets: 2 to 8 m

Type code

VA – __ – ____ / ___ – __ – __ – ____ – __

Displacement outlet – Function / Kind – Size – Nominal length – Connection type – Position of connection spigot – Surface finish – Accessories

Function / Kind

T = Trapezoidal displacement outlet
TH = Semi-trapezoidal displacement outlet

Size

		VA-T	VA-TH
140	= Size 140	•	
250	= Size 250		•
290	= Size 290	•	
500	= Size 500	•	•

Nominal lenght

		VA-T	VA-TH
800	= Nominal length 800	•	
1200	= Nominal length 1 200		•
1250	= Nominal length 1 250	•	
1600	= Nominal length 1 600	•	
1500	= Nominal length 1 500		•
1800	= Nominal length 1 800	•	•

Connection type

		VA-T			VA-TH
		140	290	500	
A3	= Rectangular connection spigot to fit corner flange 20 mm	•	•	•	•
RU	= Circular duct connection with 2 round spigots				•

Position of connection spigot (VA-TH only)

O = Connection spigot on top
H = Connection spigot at the rear

Surface finish

galv = galvanized
…. = Face painted to RAL ….

Accessories(VA-T-140 only)

C = Cover plate for wall mounting

Trapezoidal and semi-trapezoidal displacement outlet

Tender text

Trapezoidal displacement outlet
..... units
with little induction effect for minimum mixing of supply air with indoor air so as to achieve optimum displacement of dust particles and pollutants from the occupied zone, air downflow,
consisting of:
– Nominal width 140
  Housing with trapezoidal, perforated discharge surface to be pulled down for cleaning, and top rectangular spigot for duct connection, with flange and built-in volume flow damper adjustable from outside.
  Placement can optionally be free-hanging, flush with the ceiling or along a wall
– Nominal widths 290 and 500
  Housing with trapezoidal, perforated discharge surface and built-in twist outlets; housing with hinges that can be pulled down for cleaning purposes; the top rectangular spigot for duct connection with built-in volume flow damper, which is adjustable from the outside; and insertion frame.
  Placement can optionally be free-hanging or flush with the ceiling.

Material:
– Housing and perforated plate made of galvanized sheet metal, optional painted to RAL ....
– Twist outlets [1] made of polystyrene

Make: Krantz
Type: VA – T – _____ / _____ – __

Semi-trapezoidal displacement outlet
..... units
with little induction effect for minimum mixing of supply air with indoor air so as to achieve optimum displacement of dust particles and pollutants from the occupied zone, air downflow,
consisting of:
– housing with semi-trapezoidal, perforated discharge surface, built-in twist outlets, and connection spigot. Spigot arrangement can be optionally placed at the top or at the rear. Spigot design **rectangular,** with connection frame to fit 20 mm corner flanges or **circular**, 2 pieces, to fit spiral seam or flexible duct.

Material:
– Housing and perforated plate made of galvanized sheet metal, with the option for it to be painted to RAL ....
– Twist outlets made of polystyrene

Make: Krantz
Type: VA – __ – ____ / ___ – __ – __ – ____ – __

Subject to technical alteration.

[1] Only for nominal widths 290 and 500

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