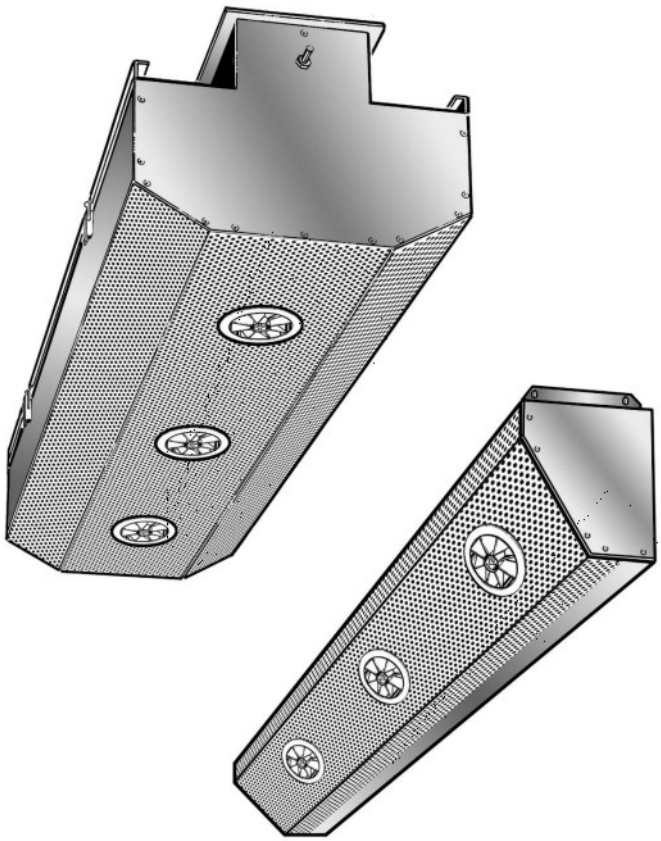
Please note,
type code is new,
see last page.

# Technical Selection



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

DS 4010 E 06.2003/1

Air-conditioning components

Krantz KOMPONENTEN ®
Applied system solutions

# 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 KOMPONENTEN 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.

## Construction design

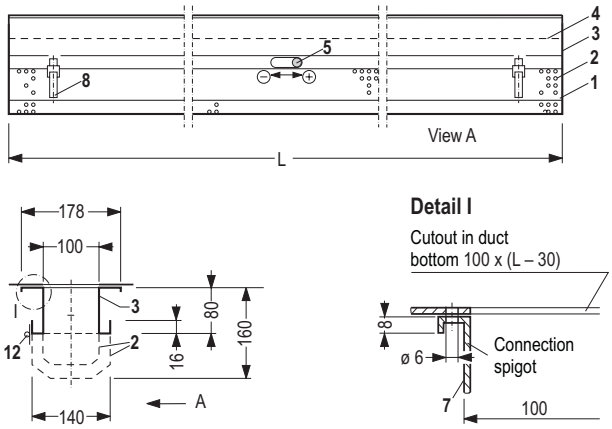
### 1. Trapezoidal displacement outlet

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. For the outlet widths of 290 and 500 mm, an insertion frame **6** is additionally required to connect the outlet to the supply air duct; this additional frame will be put onto the inside of the duct bottom. The connection frame, the duct bottom and the air outlet will be riveted together. The connection spigot of the 140 mm wide outlet is fitted with a flange **7** that can be screwed to the duct bottom from below. The two connection options are shown in Fig. 1, Details I and II.
The perforated plate of the housing can be pulled down for cleaning purposes after releasing a lock **8**.

### Nominal width 140

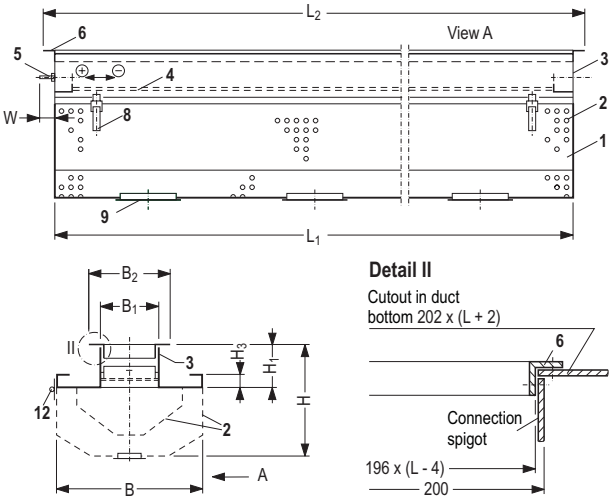



| Nominal width B mm | Nominal length L mm | Volume flow rate range[1] $\dot{V}_A$ l/s | $\dot{V}_A$ m³/h | Weight approx. kg |
|---|---|---|---|---|
| 140 | 800 | 70 – 165 | 250 – 600 | 6 |
| | 1250 | 110 – 265 | 400 – 950 | 8 |
| | 1600 | 140 – 330 | 500 – 1200 | 11 |
| | 1800 | 165 – 390 | 600 – 1400 | 13 |

1) Maximum flow rate when the setting screw/slide **5** is on the right in View A

**Key for all pages:**
**1** Housing
**2** Perforated plate
**3** Connection spigot
**4** Volume flow damper
**5** Setting screw/slide
**6** Insertion frame
**7** Flange
**8** Housing lock
**9** Twist outlet
**10** Suspension strip
**11** Connection frame
**12** Hinge

### Nominal widths 290 and 500



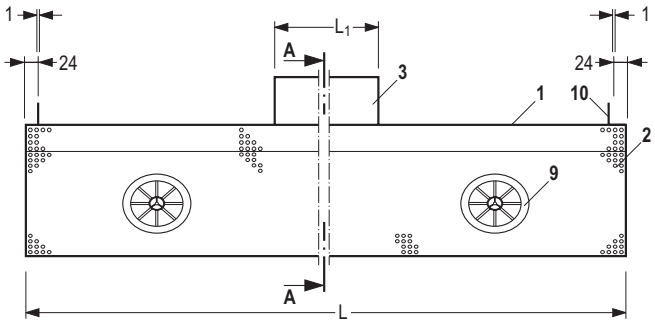

| Nominal width B mm | Nominal length L mm | Volume flow rate range $\dot{V}_A$ l/s | $\dot{V}_A$ m³/h | $B_1$ mm | $B_2$ mm | $L_1$ mm | $L_2$ mm | H mm | $H_1$ mm | $H_3$ mm | Twist outlets units | Position[2] of $\dot{V}$ damper W in mm open | closed | Weight approx. kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 290 | 800 | 155 – 330 | 550 – 1200 | 200 | 234 | 804 | 834 | 235 | 100 | 25 | 2 | 41 | 19 | 15 |
| | 1250 | 235 – 530 | 850 – 1900 | | | 1254 | 1284 | | | | 3 | 28 | 6 | 22 |
| | 1600 | 300 – 670 | 1100 – 2400 | | | 1604 | 1634 | | | | 3 | 38 | 16 | 27 |
| | 1800 | 350 – 750 | 1250 – 2700 | | | 1804 | 1834 | | | | 4 | 45 | 22 | 31 |
| 500 | 800 | 265 – 550 | 950 – 2000 | 200 | 234 | 804 | 834 | 350 | 120 | 30 | 2 | 41 | 19 | 24 |
| | 1250 | 415 – 830 | 1500 – 3000 | | | 1254 | 1284 | | | | 3 | 28 | 6 | 34 |
| | 1600 | 540 – 1100 | 1950 – 4000 | | | 1604 | 1634 | | | | 3 | 38 | 16 | 42 |
| | 1800 | 610 – 1220 | 2200 – 4400 | | | 1804 | 1834 | | | | 4 | 45 | 22 | 47 |

2) Related to setting screw/slide **5** being on the left in View A

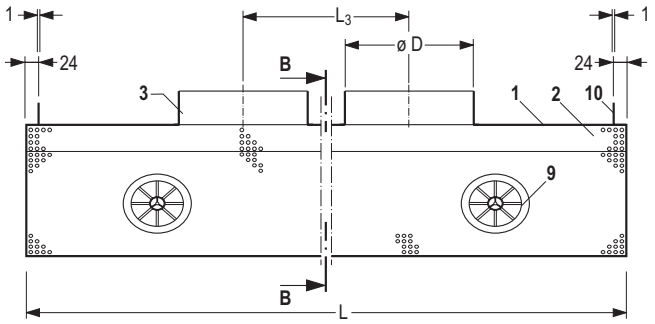
*Figure 1: Trapezoidal displacement outlet - Dimensions*

DS 4010 E Bl. 2 06.2003/1

**Design with rectangular connection spigot**

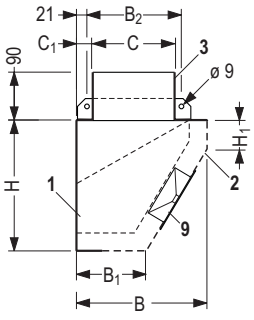



**Design with (two) circular connection spigots**

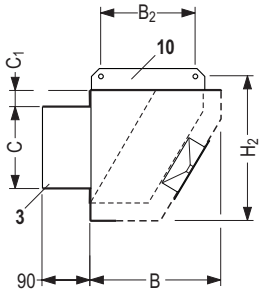



**Section A – A:** Smooth connection spigot

at the top

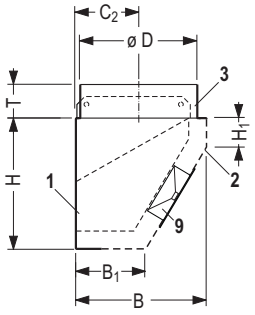



at the rear

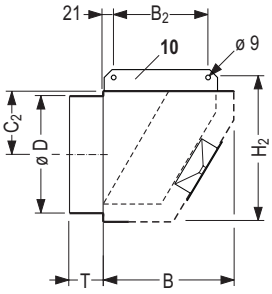



**Section B – B:** Spigot for connection to circular duct

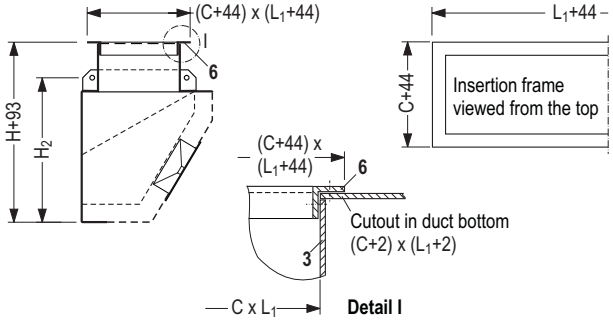
at the top




at the rear




Insertion frame for connection to supply air duct




Connection frame to fit 20 mm corner flanges (optional)

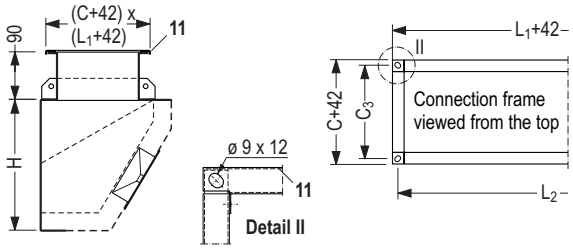



*Figure 2: Semi-trapezoidal displacement outlet - Dimensions*

## 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 8).

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

| Size | Nominal length L mm | Volume flow rate range $\dot{V}_A$ l/s | $\dot{V}_A$ m³/h | Dimensions $L_1$ mm | $L_2$ mm | $L_3$ mm | ø D mm | Twist outlets units | Weight approx. kg |
|---|---|---|---|---|---|---|---|---|---|
| 250 | 1200 | 85 - 235 | 300 - 850 | 446 | 468 | 600 | 199 | 3 | 15 |
| | 1500 | 110 - 300 | 400 - 1100 | 556 | 578 | 750 | 223 | 3 | 19 |
| | 1800 | 125 - 360 | 450 - 1300 | 626 | 648 | 900 | 223 | 4 | 23 |
| 500 | 1200 | 195 - 500 | 700 - 1800 | 626 | 648 | 600 | 279 | 3 | 36 |
| | 1500 | 250 - 625 | 900 - 2250 | 796 | 818 | 750 | 314 | 3 | 45 |
| | 1800 | 300 - 750 | 1100 - 2700 | 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 / Semi-trapezoidal displacement outlet

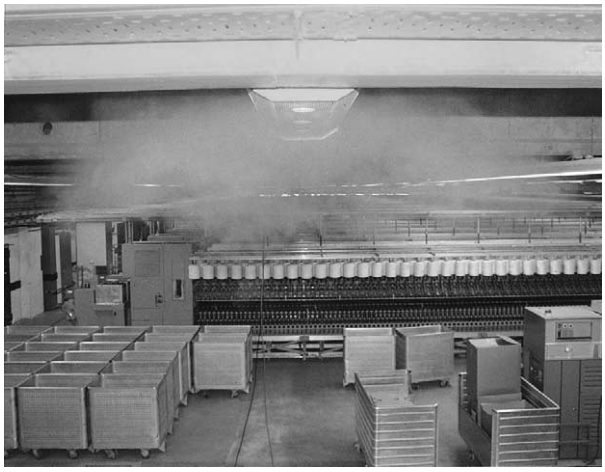


*Figure 3: Trapezoidal displacement outlet - Jet dispersion made visible with smoke tracer*

*Figure 4: Semi-trapezoidal displacement outlet in a test room of the automotive industry*

*Figure 5: 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.

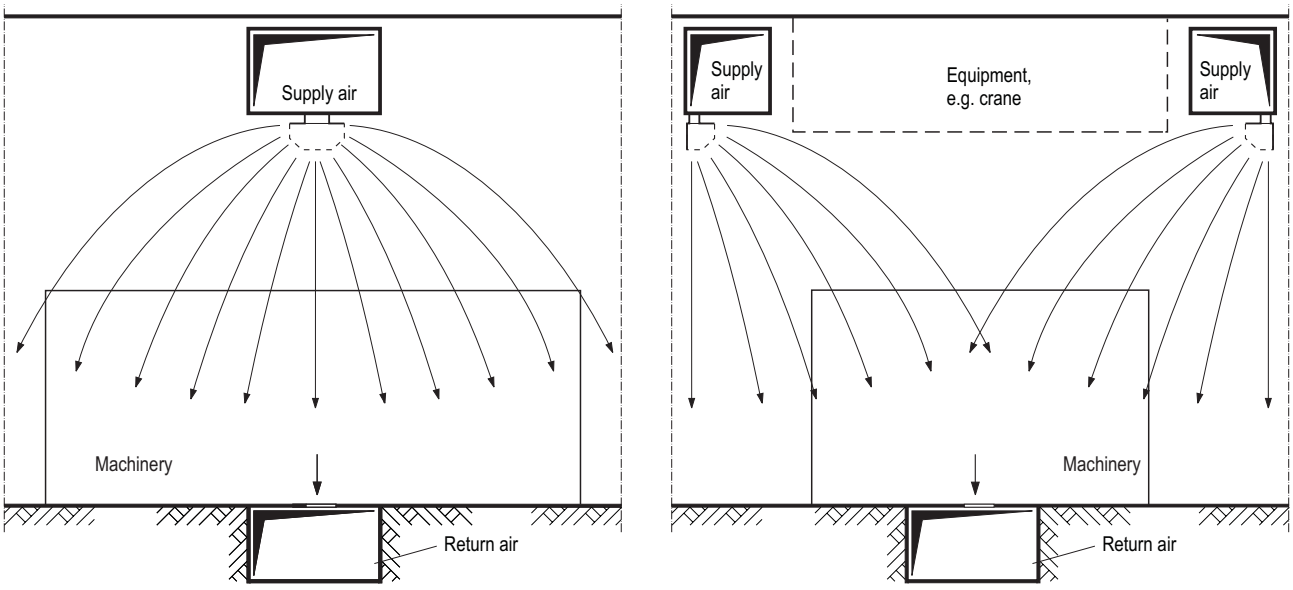



*Figure 6: Air jet pattern of trapezoidal / semi-trapezoidal displacement outlet*

# Trapezoidal / Semi-trapezoidal displacement outlet

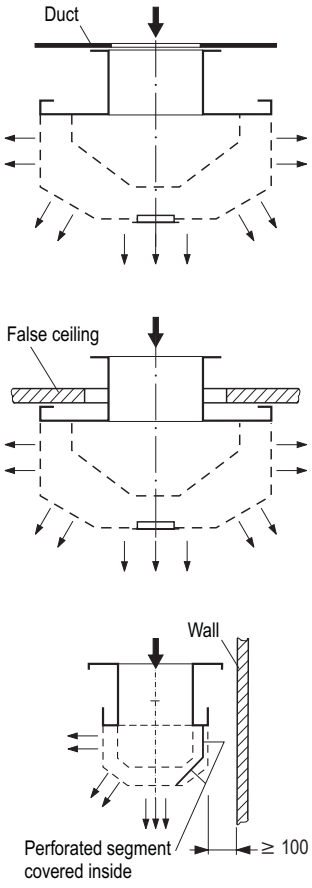
As shown in Figure 6, dust and pollutants are displaced downwards to the return air openings and extracted from the room. This largely prevents air upflow, which considerably reduces the time solid particles remain in the indoor air. Tests made in spinning mills have proved that dust concentration in 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 7 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

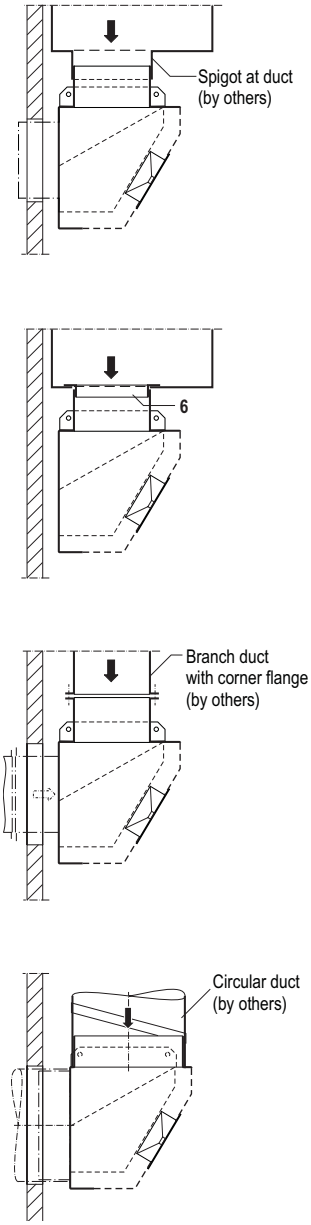
*Figure 7: Trapezoidal displacement outlet - Placement and connection types*

### 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 8.

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

**Connection to supply air duct:**




With smooth connection spigot placed either at the top or at the rear

With insertion frame **6**

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 8: Semi-trapezoidal displacement outlet - Placement and connection types*

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

# Trapezoidal / 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.

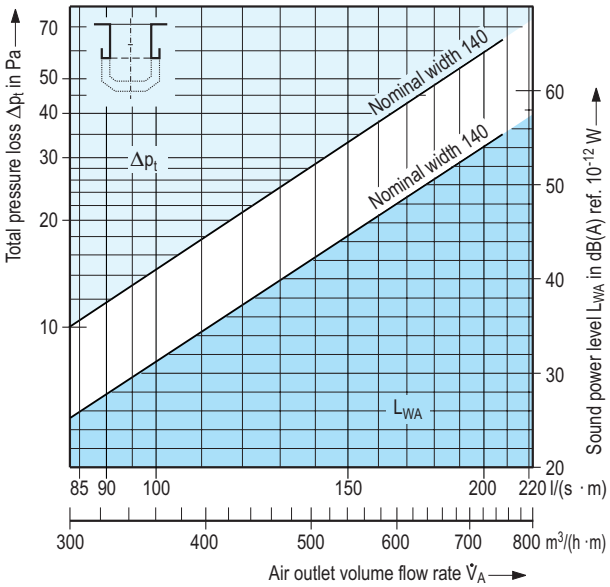
The main technical data is shown in the following table and graphs.

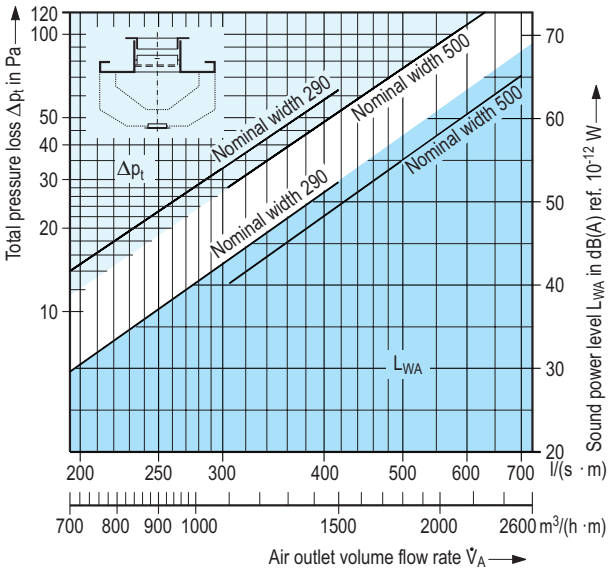
| Technical data | | Trapezoidal displacement outlet | Semi-trapezoidal displacement outlet |
|---|---|---|---|
| Air outlet width: | mm | 140 | |
| | mm | 290 | 250 |
| | mm | 500 | 500 |
| Air outlet length: | mm | 800 | |
| | mm | 1250 | 1200 |
| | mm | 1600 | 1500 |
| | mm | 1800 | 1800 |
| Volume 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 $m^3/(h \cdot m)$ | | | |
| for width of | 140 mm | 300 to 750 | — |
| | 250 mm | — | 250 to 700 |
| | 290 mm | 700 to 1500 | — |
| | 500 mm | 1200 to 2500 | 600 to 1500 |
| 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 | 2 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 | |

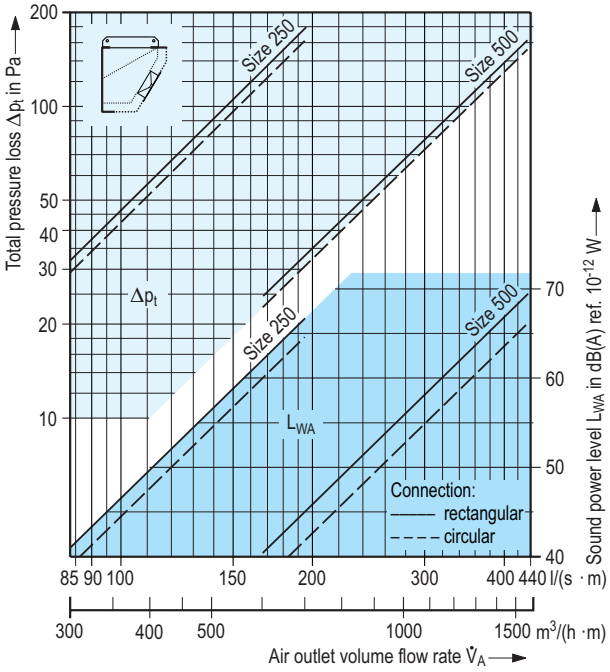
*Figure 9: Semi-trapezoidal displacement outlet of size 500 in a production facility*

1) The graph values apply for damper "open"

## Sound power level and pressure loss 1)



# Trapezoidal / Semi-trapezoidal displacement outlet

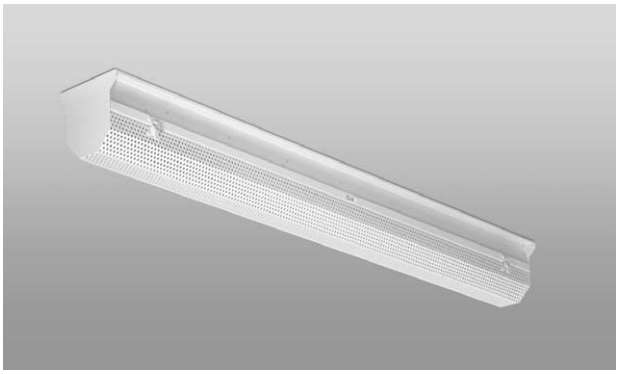


*Figure 10: Trapezoidal displacement outlet of nominal width 140*

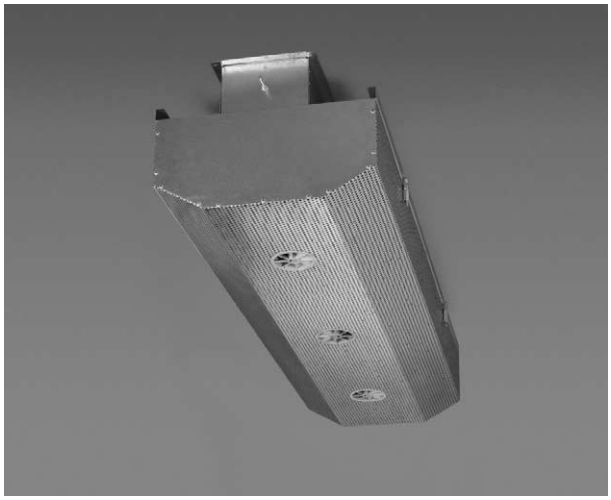


*Figure 11: Trapezoidal displacement outlet of nominal width 290 or 500*

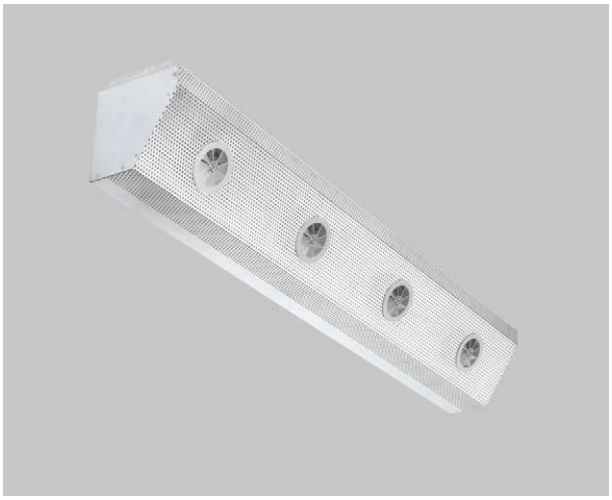


*Figure 12: Semi-trapezoidal displacement outlet of size 250 or 500*

## Type code

Please note, type code is new, see last page.

**Trapezoidal displacement outlet**

VA – T – _____ / _____ – ___

Displacement outlet – Function/Kind – Nominal width – Nominal length – Placement

**Function/Kind**

T = trapezoidal

**Nominal width:** 140, 290 and 500 mm

**Nominal length:** 800, 1250, 1600 and 1800 mm

**Placement**

F = free-hanging
D = flush with ceiling
W = along a wall

**Example:**

Trapezoidal displacement outlet, 140 mm in width, 1250 mm in length, free-hanging from ceiling.

Type: **VA – T – 140 / 1250 – F**

**Semi-trapezoidal displacement o**

Please note, type code is new, see last page.

VA – TH – _____ / _____ – ___– _

Displacement outlet – Function/Kind – Size – Nominal length – Connection type – Connection arrangement

TH = semi-trapezoidal

**Size**
250 or 500

**Nominal length**
1200, 1500 and 1800 mm

**Connection type**

A1 = Rectangular connection spigot for insertion into a supply air duct (standard)
A2 = Rectangular connection spigot with insertion frame for connection to supply air duct (spigot at the top)
A3 = Rectangular connection spigot with connection frame to fit 20 mm corner flange
R = Connection to circular duct (with 2 spigots whose nominal diameter depends on outlet size)

**Connection arrangement**

O = Connection at the top (standard)
H = Connection at the rear

**Example:**

Semi-trapezoidal displacement outlet, size 250, nominal length 1200 mm, connection to spiral seam duct, connection spigot at the top.

Type: **VA – TH – 250 / 1200 – R – O**

# Trapezoidal / 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 – 2500 $m^3/(h \cdot m)$]
  - semi-trapezoidal outlet: 70 – 415 l/(s · m) [250 – 1500 $m^3/(h \cdot m)$]
- Available in several widths and lengths
- Coverage zone of supply air jets: 2 to 8 m

## Tender text

..... units

**Trapezoidal displacement outlet**

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 discharge surface made of perforated sheet metal 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: ☐ free-hanging. ☐ flush with ceiling. ☐ along a wall.

☐ Nominal widths 290 and 500
Housing with trapezoidal discharge surface made of perforated sheet metal and built-in twist outlets - discharge surface to be pulled down for cleaning -, top rectangular spigot for duct connection with built-in volume flow damper adjustable from outside, and insertion frame.
Placement: ☐ free-hanging. ☐ flush with ceiling.

**Technical data:**

Volume flow rate: ..... l/s ($m^3/h$)
Sound power level: ..... dB(A) ref. $10^{-12}$ W
Pressure loss: ..... Pa
Material: Housing and perforated plate made of galvanized sheet metal
☐ Twist outlets[1] made of polystyrene
☐ painted to RAL .....
Dimensions: Nominal width: ..... mm
Nominal length: ..... mm
Make: KRANTZ KOMPONENTEN
Type: VA – T – _____ / _____ – __

..... units

**Semi-trapezoidal displacement outlet**

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 discharge surface made of perforated sheet metal, built-in twist outlets, and connection spigot.

Spigot arrangement ☐ at the top. ☐ at the rear.
Spigot design ☐ **rectangular**
☐ smooth
☐ with insertion frame [2]
☐ with connection frame to fit 20 mm corner flanges
☐ **circular**, 2 pieces, to fit spiral seam or flexible duct.

**Technical data:**

Volume flow rate: ..... l/s ($m^3/h$)
Sound power level: ..... dB(A) ref. $10^{-12}$ W
Pressure loss: ..... Pa
Material: Housing and perforated plate made of galvanized sheet metal
Twist outlets made of polystyrene
☐ painted to RAL .....
Size: ☐ 250 mm ☐ 500 mm
Nominal length: ..... mm
Make: KRANTZ KOMPONENTEN
Type: VA – TH – _____ / _____ – __ – __

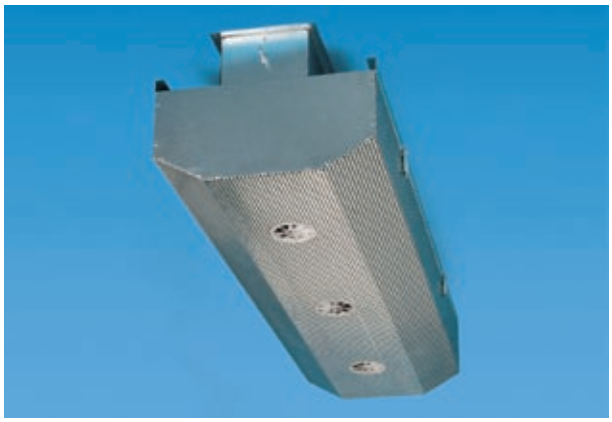
– Subject to technical alteration –

1) Only for nominal widths 290 and 500
2) For connection spigot placed at the top

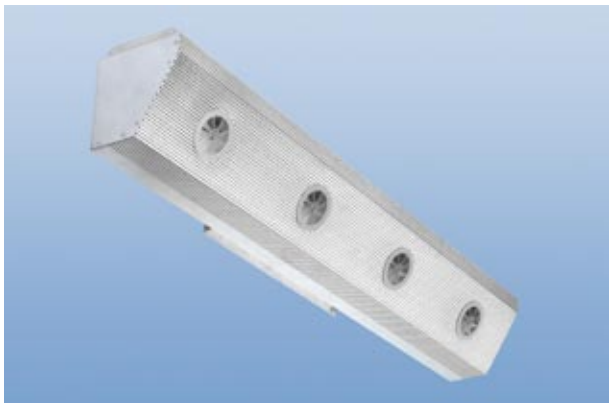
DS 4010 E Bl. 8 06.2003/1

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

# Trapezoidal displacement outlet
# Semi-trapezoidal displacement outlet



*Trapezoidal displacement outlet*



*Semi-trapezoidal displacement outlet*

## Type code

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

- 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 length

| | VA-T | VA-TH |
|---|---|---|
| 800 = Nominal length 800 | ● | |
| 1200 = Nominal length 1200 | | ● |
| 1250 = Nominal length 1250 | ● | |
| 1600 = Nominal length 1600 | ● | |
| 1500 = Nominal length 1500 | | ● |
| 1800 = Nominal length 1800 | ● | ● |

### Connection type (VA-TH only)

A1 = Rectangular connection spigot for insertion into a supply air duct
A2 = Rectangular connection spigot with frame for duct mounting (spigot on top)
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

Subject to technical alteration.

DS 4010 Appendix 05.2009

KOMPONENTEN
Applied system solutions

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