Ceiling diffuser

IDA

SCHAKO KG
Steigstraße 25-27
D-78600 Kolbingen
Telephone +49 (0) 74 63 - 980 - 0
info@schako.de
schako.com

Ceiling Diffuser IDA

Contents

Ceiling Diffuser IDA

Description

Electrically adjustable ceiling diffusers are required **for cooling and heating large halls**.
In order to prevent draughts in the cooling mode, the supply air must largely be discharged **horizontally** from the diffuser. However, in heating mode, the diffuser must have **high penetration depth**, in order to achieve **fast and efficient heating**.
The ceiling diffuser type IDA meets both these requirements ideally. It ensures optimum air distribution in cooling and heating modes.
The diffuser consists of an adjustable air guide funnel and a front plate. The adjustable air guide funnel is varied manually or by means of an electric actuator or a thermocouple in such a way that a vertical (heating mode) or horizontal (cooling mode) supply air jet is created. When using a thermocouple adjustment, a vertical supply air jet (heating mode) is created from a supply air temperature of approx. 26° C. At supply air temperatures < 26° C, a horizontal supply air jet (cooling mode) is created.
A volumetric flow meter can be integrated into the spigot of the plenum box at an extra charge. The measurement error of the volumetric flow meter is ± 5 % at a spigot velocity of 2-5 m/s and a straight flow pattern of at least 1 x D. The measurement is carried out with integrated diffuser. To adjust the damper, the ceiling diffuser must be removed. Alternatively, a cable-operated adjustment can be ordered at an extra charge, which allows the damper to be adjusted on the room side even with mounted diffuser.
With the ROB version, the diffuser plate, the damper, if installed, and the volumetric flow meter can be removed from the plenum box, to allow duct cleaning robots into the ductwork from the room side.

Construction

Faceplate

- made of sheet steel painted to RAL 9010 (white).
- made of sheet steel painted to a different RAL colour (at an extra charge).

Air guide funnel

- made of sheet steel painted to RAL 9005 (black)

Manual adjustment

- made of galvanised sheet steel with a hexagonal socket head screw M6 (to DIN EN ISO 4762)

Model

IDA-Q	-	Square faceplate
IDA-R	-	Round faceplate
IDA-...-ZH	-	for supply air with manually adjustable air guide funnel, horizontal air throw (cooling mode)
IDA-...-ZV	-	for supply air with manually adjustable air guide funnel, vertical air throw (heating mode)
IDA-...-AA	-	for return air, without air guide funnel

Attention!
The optimum function of the IDA-Q-Z-... / IDA-R-Z-... can only be guaranteed in connection with the original plenum box.

Accessories

Plenum box (-SK)

- with lateral connection spigot on the box (-S1, standard)
- with connection spigot from above (-S0)
- with 2 connection spigots offset by 90° (-S2)
- with 2 connection spigots offset by 180° (-S3)
- with 2 lateral connection spigots next to each other (-S5)
  - with air diffuser plate, sheet steel painted to RAL 9005 (black) (only for supply air model)
- Housing and connection spigot made of galvanised sheet steel, inside painted to RAL 9005 (black)
- concealed mounting pole brace made of aluminium painted to RAL 9005 (black)
- Concealed mounting made of plastic, similar to RAL colour 9005 (black) (-VM)

Damper (-DK1)

- in connection spigot
- Damper made of galvanised sheet steel
- Damper fastening made of plastic

Damper (-DK2)

- DK1 with cable-operated adjustment

Electric actuator (3-point activation)

- 24 V AC (standard)
  - without auxiliary switch (-E090)
  - with 2 integrated auxiliary switches (-E093)
- 230 V AC (-E092)

Thermocouple adjustment (-TE01)

- Diffuser adjustment option without electrical energy as a function of the supply air temperature.

Rubber lip seal (-GD1)

- in the plenum box at the connection spigot
- Special rubber

ROB version (-ROB1)

- removable damper and volumetric flow meter (only possible for plenum box SK-Q-...)

Volumetric flow meter (-VME, available for IDA up to NW625)

- Holder made of galvanised sheet steel
- Measuring sensor made of plastic
- Aluminium connections

ball-impact guard (-BS)

- only possible for IDA-Q-... with screw mounting and for NW800 only with concealed mounting. Attention: With reduced drill pattern,
  only possible with plenum box in the same size as the faceplate.
- Steel painted to RAL 9010 (white), other RAL colours possible at an extra charge.

Internal insulation (-Ii)

- thermal insulation at the inside of the plenum box

External insulation (-Ia)

- thermal insulation at the outside of the plenum box

Ceiling Diffuser IDA

Fastening

Concealed mounting (-VM, standard)

- Pole brace fixing, by means of an Allen screw M6 (to DIN EN ISO 4762) at the plenum box.

Screw mounting (-SM)

- for model with ball-impact guard only
- with raised countersunk head tapping screws (on site)

Screw mounting with concealed mounting (-VS)

- Screw mounting (-SM) in combination with concealed mounting (-VM)
- only possible for NW 800 in conjunction with ball-impact guard (-BS)

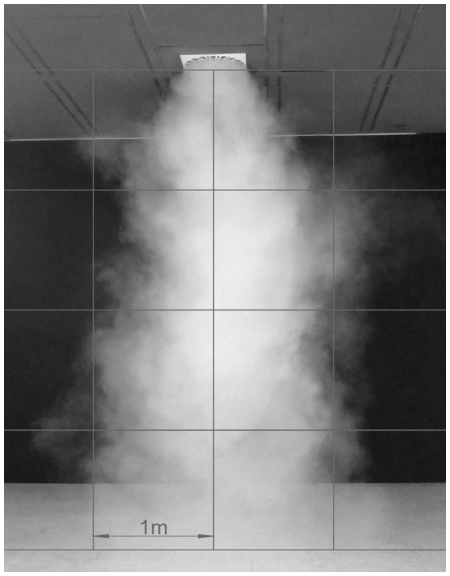
Quick selection

NW		400	500	600	800
V_{min}	(m³/h)	280	300	400	800
	[l/s]	78	83	111	222
V_{max}	(m³/h)	1300	2000	3000	4000
	[l/s]	361	556	833	1111
V at 40 dB(A):					
Cooling mode position	(m³/h)	530	780	1100	1550
	[l/s]	147	217	306	431
Heating mode position	(m³/h)	600	850	1250	1800
	[l/s]	167	236	347	500

Smoke test

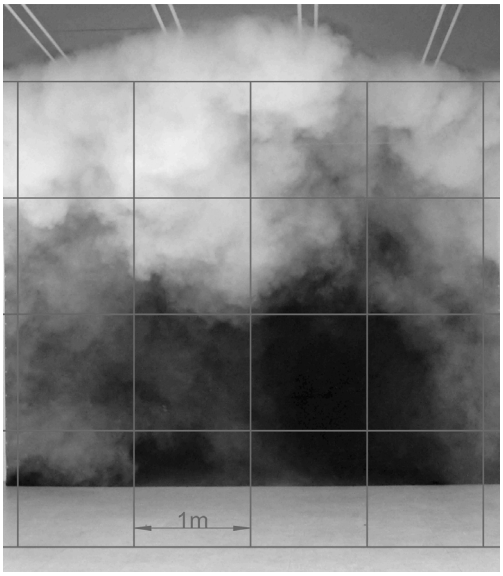
Snapshots of IDA-Q-Z-600-..., mounting height = 4 m

Heating mode



with electric actuator
V_{ZU} = 1250 m³/h
ΔT_0 = + 10 K

Cooling mode



with electric actuator
V_{ZU} = 1250 m³/h
ΔT_0 = - 10 K

Layout example

Assume:
possible installation height in the hall 4.0 m
ΔT_0 = + 10 K

ΔT_0 = - 10 K

Selected:
NW 600
V_{ZU}= 1250 m³/h
maximum penetration depth at +10 K = y_H= 4m
Distance to diffuser = 8 m = x = 4 m
y= 4.0 m -1.8 m = 2.2 m
v_{max} = 0.24 m/s (v_{mittel} = 0.12 m/s) after x + y = 6.2 m

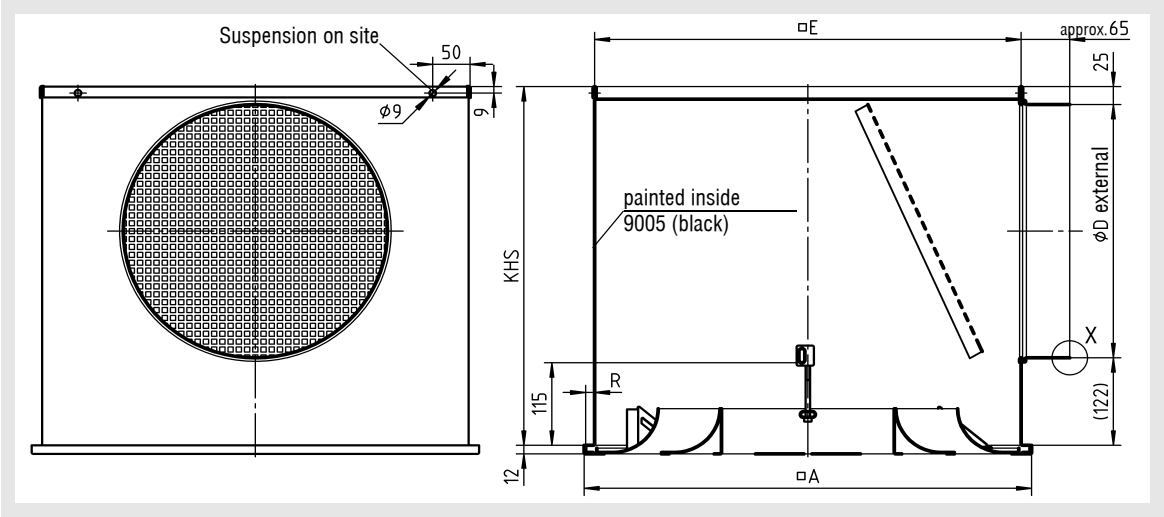
IDA-Q-Z-600-... with plenum box:
$L_{WA\ heating\ mode\ position}$ = 40 dB(A)
Δp_t = 22 Pa
$L_{WA\ Cooling\ mode\ position}$ = 42 dB(A)
Δp_t = 26 Pa

Ceiling Diffuser IDA

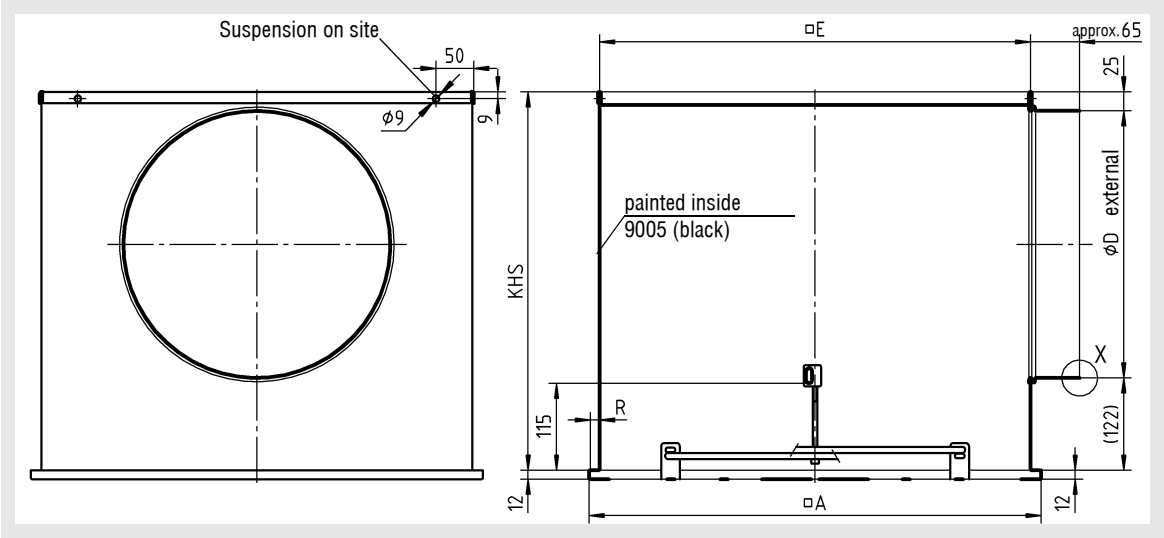
Models and dimensions

Dimensions

IDA-Q-Z-… with plenum box type SK-Q-08-Z-…-S1



IDA-Q-AA-… with plenum box type SK-Q-08-A-…-S1

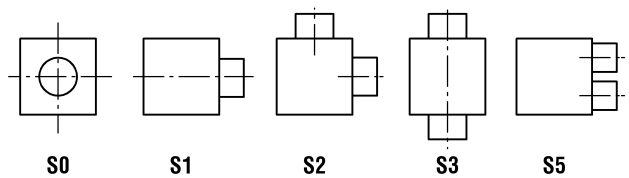


Available sizes

NW	□A	øD	□E	KHS	R	$øD_{max}$ for …-S5
400	398	248	370	395	12	138
500	498	313	470	460	12	198
600	598	353	570	500	12	248
625	623	353	570	500	24	248
800	798	448	770	595	12	353

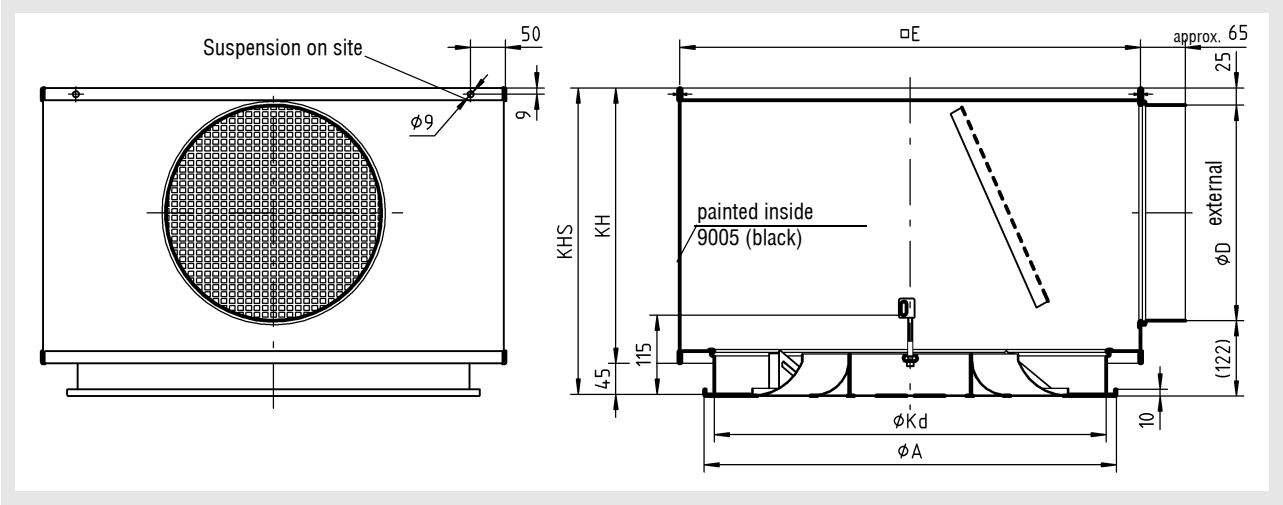
KHS= standard height of box
Special height of plenum box = øD + 147 mm, but at least 245 mm

Spigot positions

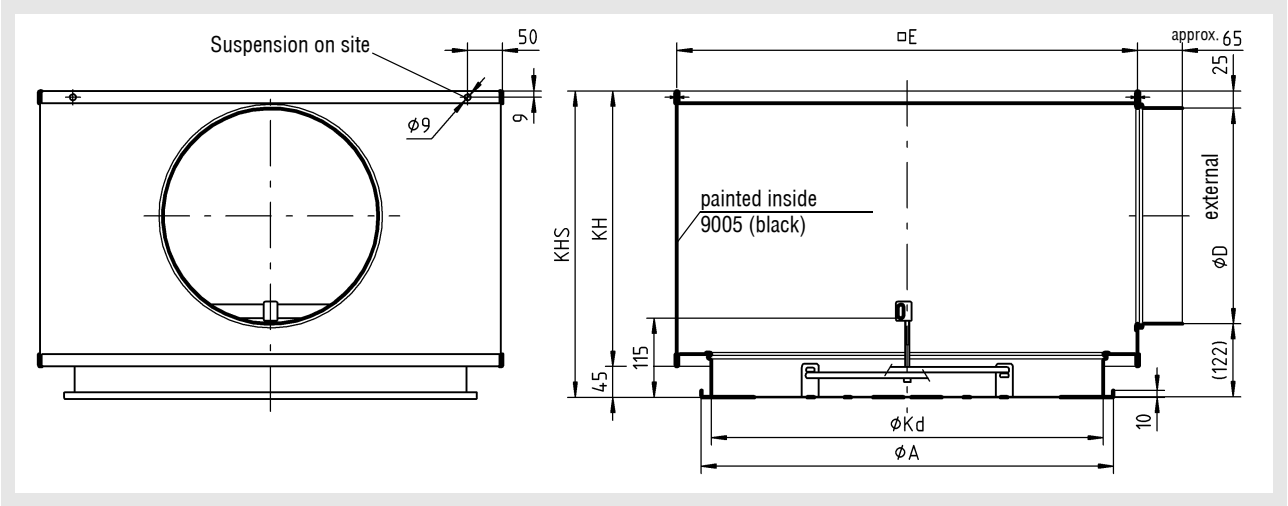


Ceiling Diffuser IDA

IDA-R-Z-… with plenum box type SK-R-08-Z-…-S1



IDA-R-AA-… with plenum box type SK-R-08-A-…-S1



Available sizes

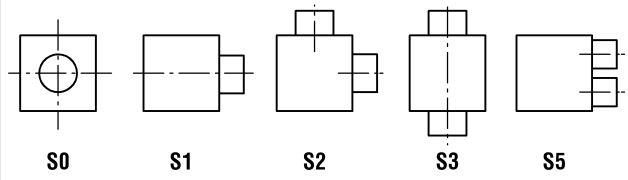
NW	øA	øD	øKd	□E	KH	KHS	$øD_{max}$ for …-S5
400	500	248	470	545	350	395	198
500	600	313	570	670	400	460	298
600	700	353	670	845	455	500	353
625	725	353	670	845	455	500	353
800	900	448	870	945	550	595	398

KHS= standard height of box
Special height of plenum box = øD + 147 mm, but at least 245 mm

Manual adjustment IDA-Q-… / IDA-R-…
for vertical and horizontal supply air pattern

Tool:
Allen key AF 5 (not included in the scope of delivery).

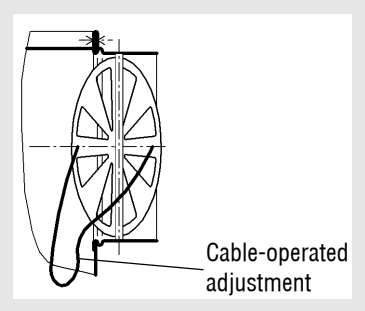
Spigot positions



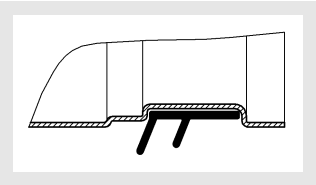
Ceiling Diffuser IDA

Dimensions of accessories

Damper (-DK1)
with cable-operated adjustment (-DK2)

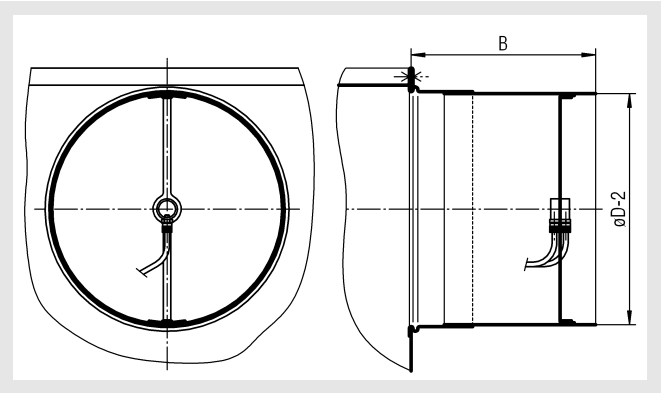


Rubber lip seal (-GD1)
Detail X



ROB version (-ROB1)
Removable damper and volumetric flow meter (possible only for plenum box SK-Q-...).

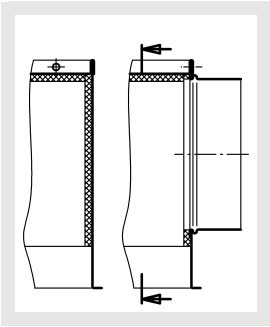
Volumetric flow meter (-VME1)



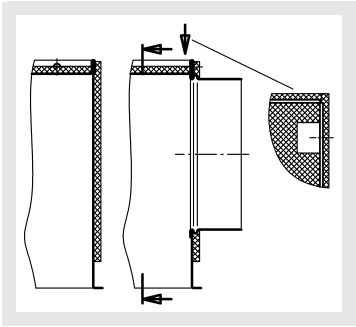
Available sizes

NW	B	øD
400	195	248
500	230	313
600	250	353
625	250	353

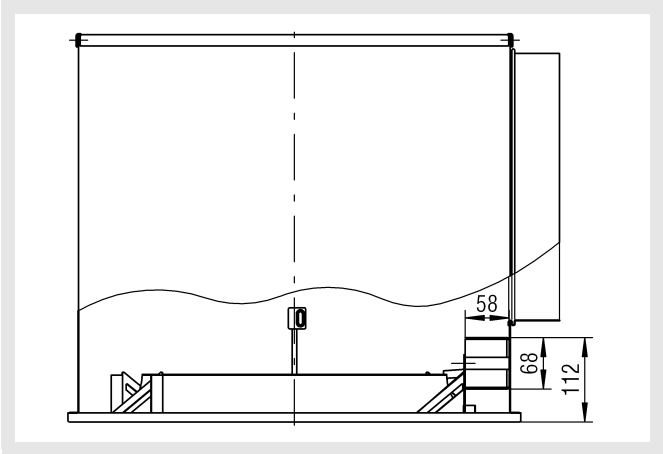
Insulation for SK-...
internal (-Ii)



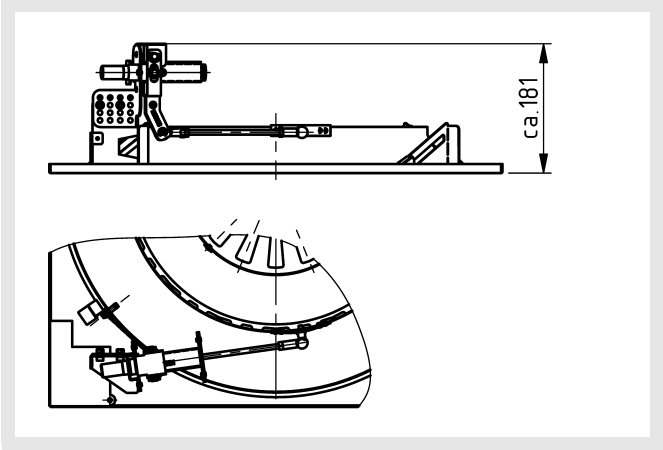
external (-Ia)



Electric actuator (-E090/ -E092 / -E093)
24 V AC / 230 V AC (3-point activation)

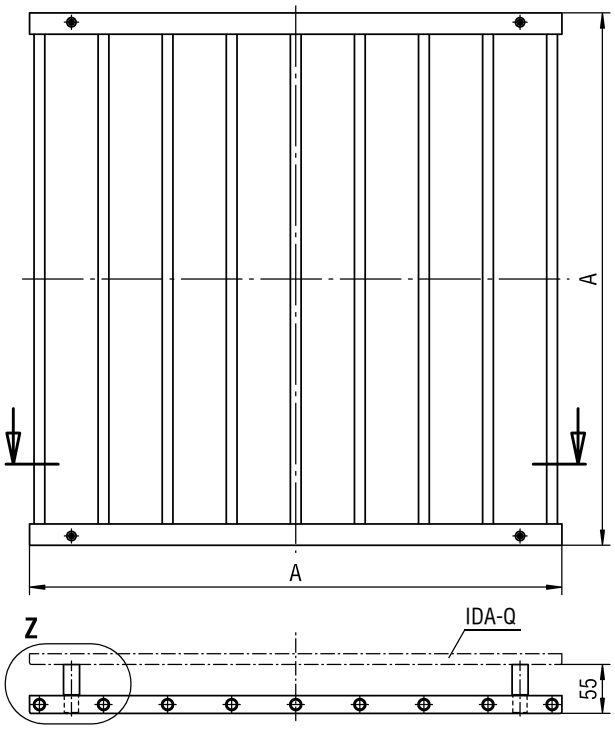


Thermocouple (-TE01)

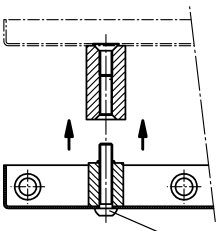


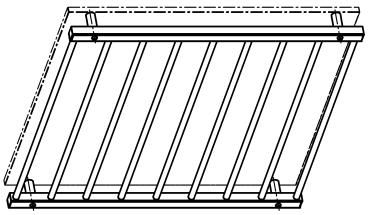
Ceiling Diffuser IDA

ball-impact guard (-BS)
(only possible for IDA-Q-... with screw mounting and for NW 800 with concealed mounting)



Detail Z



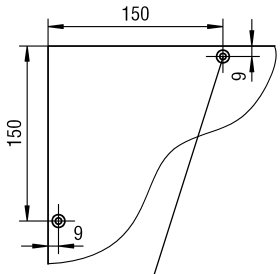


Available sizes

NW	□A
400	398
500	498
600	598
625	623
800*	798

* NW 800:
with VS mounting

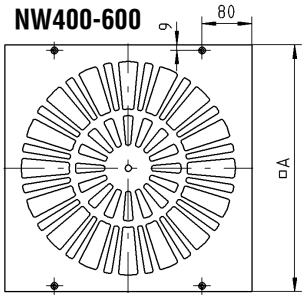
Dimensions VS mounting (for NW 800 only)



Fastening methods

Screw mounting (-SM) (IDA-Q-... only)
for model with ball-impact guard only

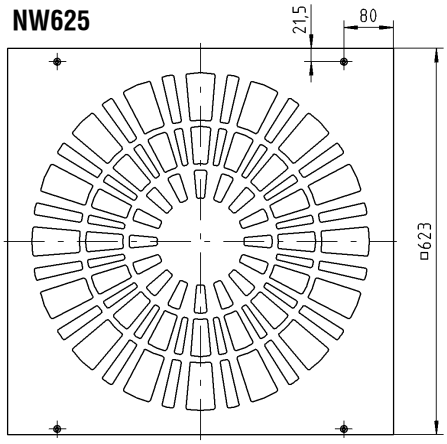
NW400-600



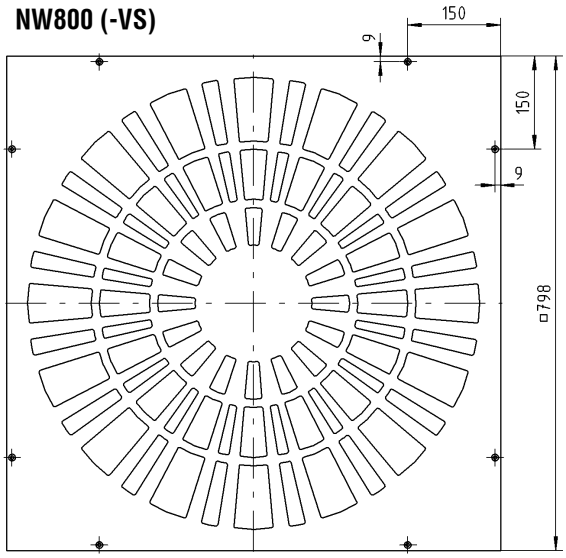
with indentation for slotted shallow-raised countersunk-head tapping screw (on site)

- NW 400-800:
  DIN ISO 7051 pitch 4.8

NW625



NW800 (-VS)



Attention:
With reduced drill pattern, only possible with plenum box in the same size as the faceplate. Reduced drill pattern not possible for nominal size 800.

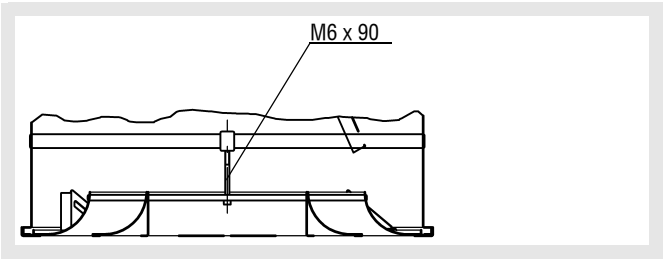
Ceiling Diffuser IDA

Concealed mounting (-VM)
For concealed mounting (VM), the ceiling diffuser IDA NW 400-625 is fixed to the plenum box with a traverse and a hexagonal socket head screw M6 (according to DIN EN ISO 4762) and the IDA NW 800 with two hexagonal socket head screws M6 (according to DIN EN ISO 4762).

Attention: The max. torque of the fastening screw is 0.4 Nm

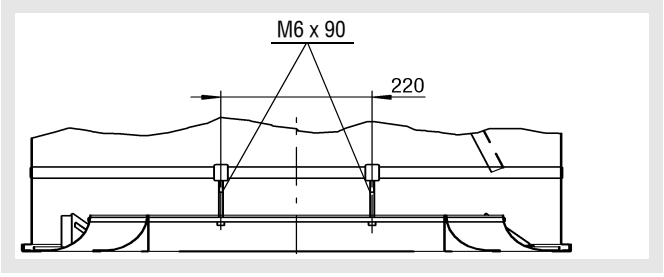
Supply air

IDA-Q-Z.-...-VM-... / SK-Q-08-Z-...-VM-...

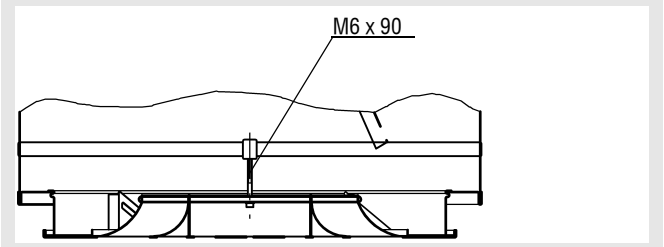


This applies to sizes up to and including NW625.

IDA-Q-Z.-800-...-VM-... / SK-Q-08-Z-800-VM-...

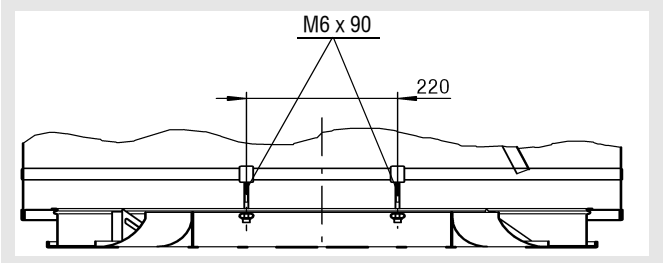


IDA-R-Z.-...-VM-... / SK-R-08-Z-...-VM-...



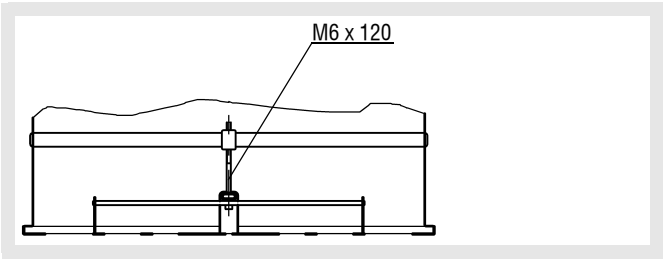
This applies to sizes up to and including NW625.

IDA-R-Z.-800-...-VM-... / SK-R-08-Z-800-VM-...



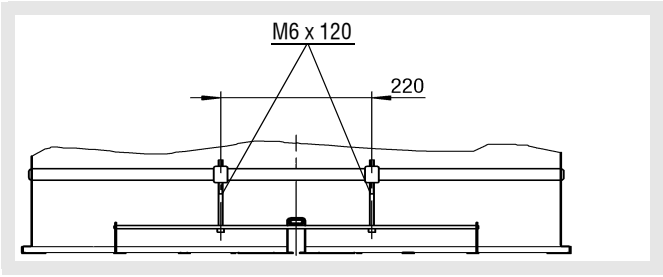
Return air

IDA-Q-AA-...-VM-... / SK-Q-08-A-...-VM-...

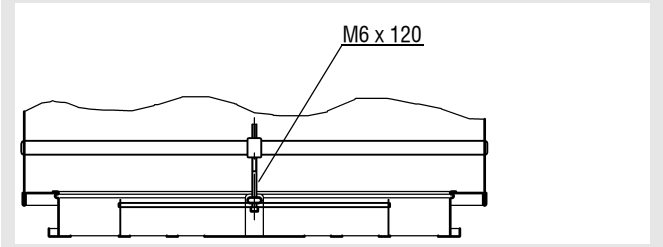


This applies to sizes up to and including NW625.

IDA-Q-AA-800-...-VM-... / SK-Q-08-A-800-VM-...

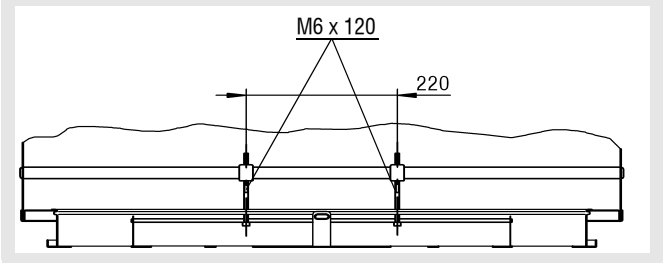


IDA-R-AA-...-VM-... / SK-R-08-A-...-VM-...



This applies to sizes up to and including NW625.

IDA-R-AA-800-...-VM-... / SK-R-08-A-800-VM-...

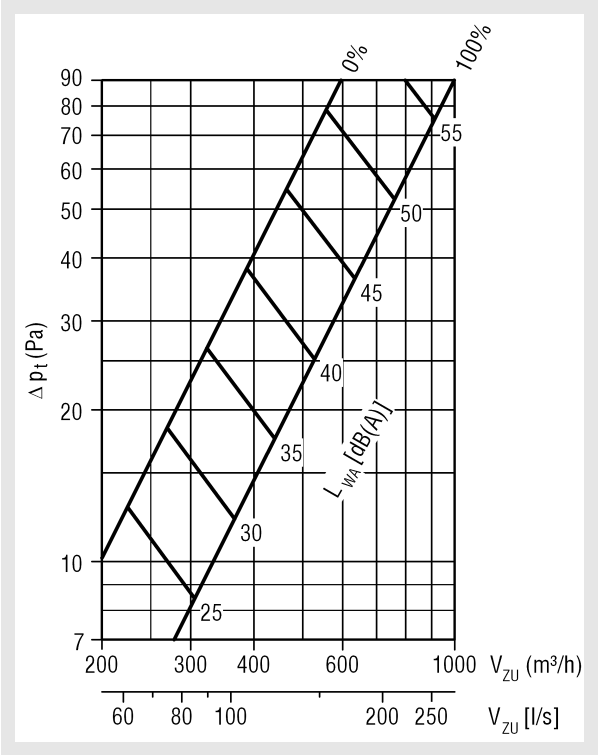


Ceiling Diffuser IDA

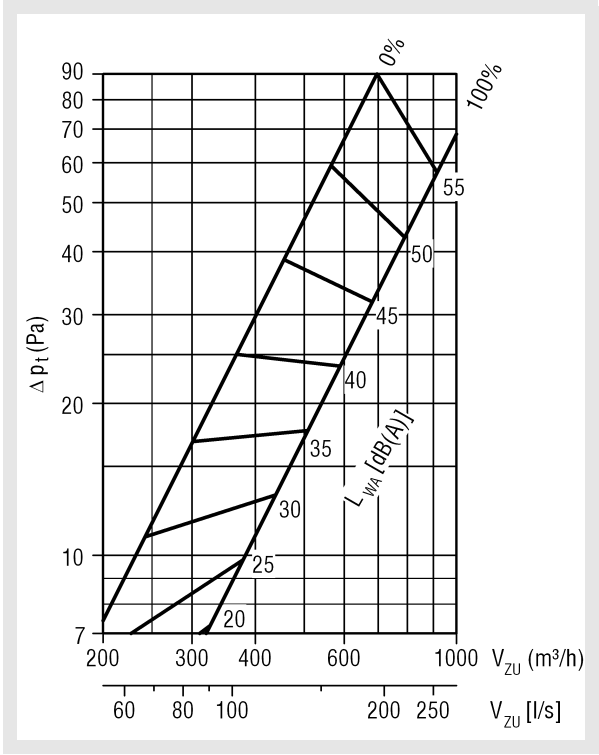
Technical data

Pressure loss and noise level

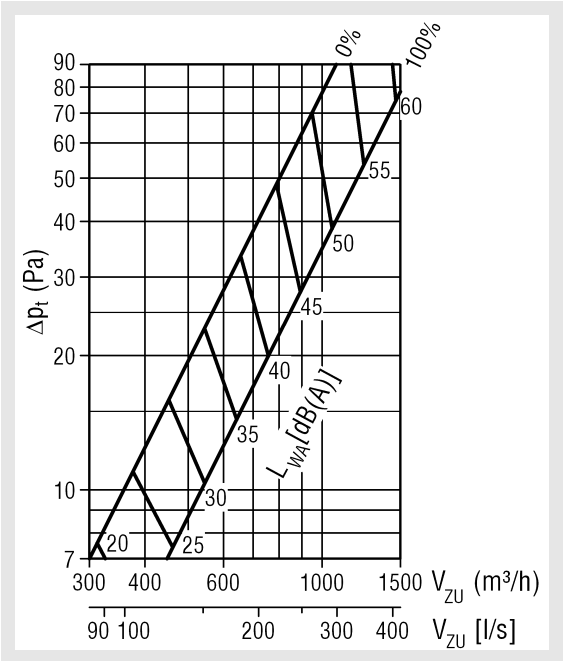
IDA-...-ZH-400-... (Cooling mode)



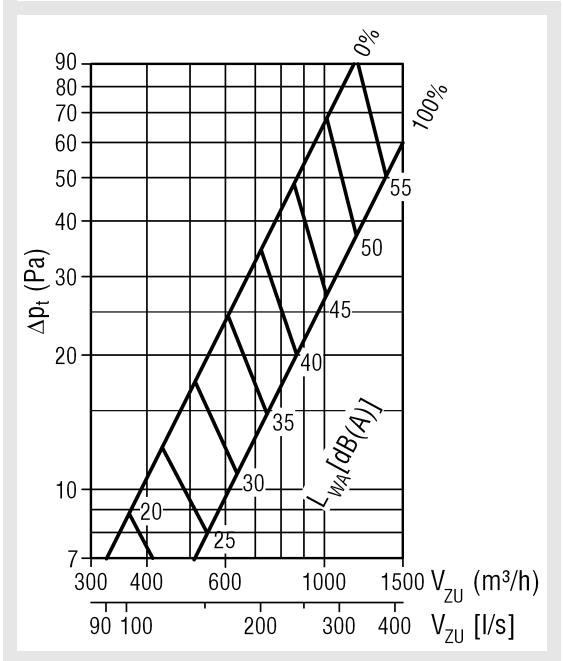
IDA-...-ZV-400-... (Heating mode)



IDA-...-ZH-500-... (Cooling mode)



IDA-...-ZV-500-... (Heating mode)



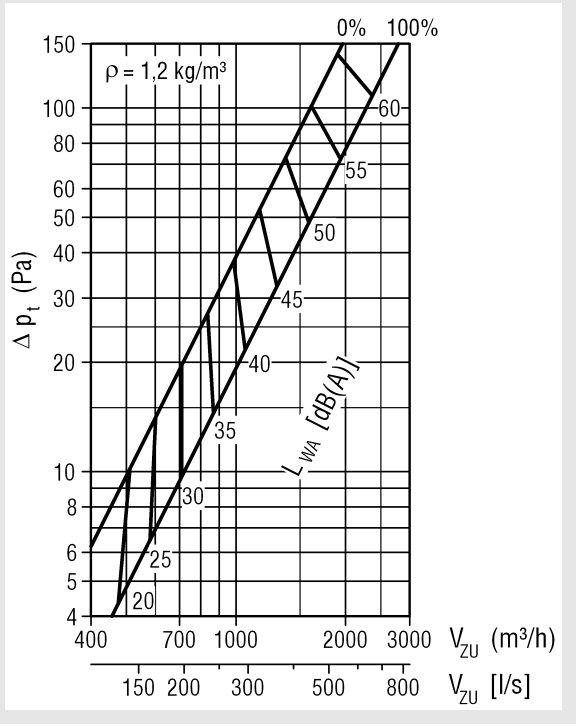
Damper position:

0% = CLOSED

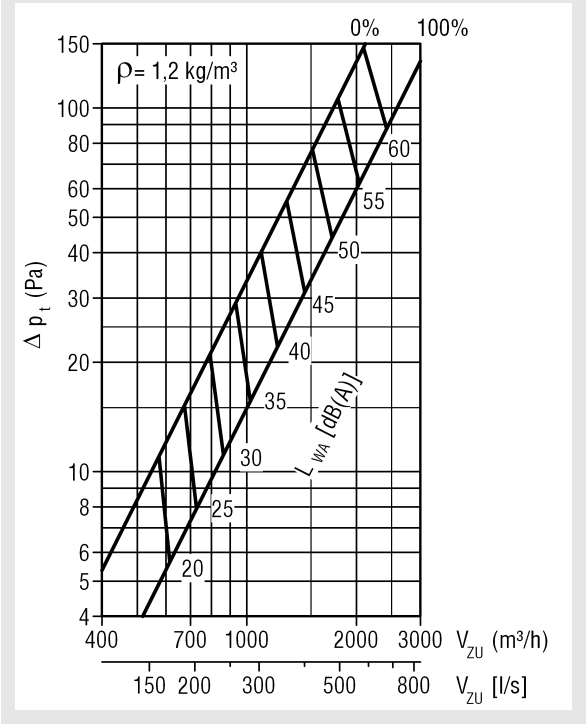
100% = OPEN

Ceiling Diffuser IDA

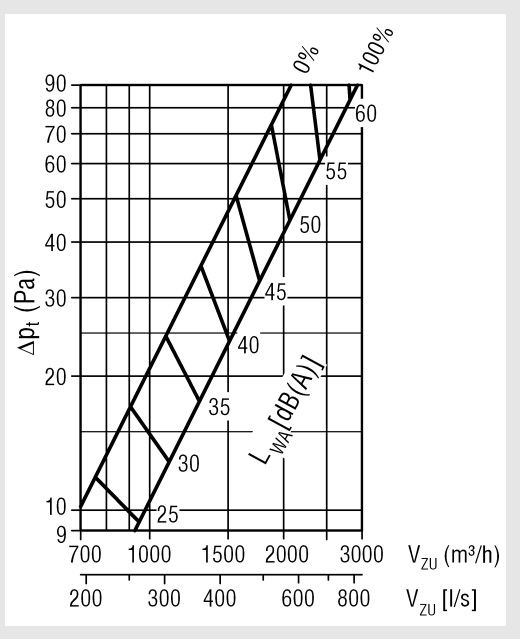
IDA-...-ZH-600/625-... (Cooling mode)



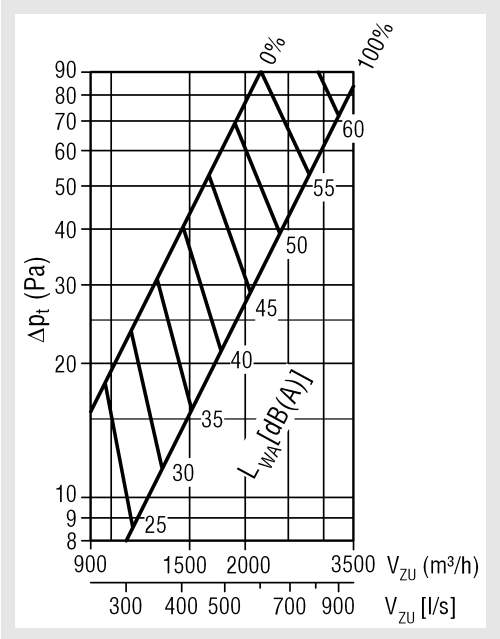
IDA-...-ZV-600/625-... (Heating mode)



IDA-...-ZH-800-... (Cooling mode)



IDA-...-ZV-800-... (Heating mode)



Correction factor (supply air in the range 25 – 50 dB(A))

Frequency	(Hz)	63	125	250	500	1000	2000	4000	8000
KF	(-)	10,7	10,1	2,9	-2,2	-9,8	-15,5	-16,0	-15,1

$L_{W(relativ)} = L_{WA} + KF$

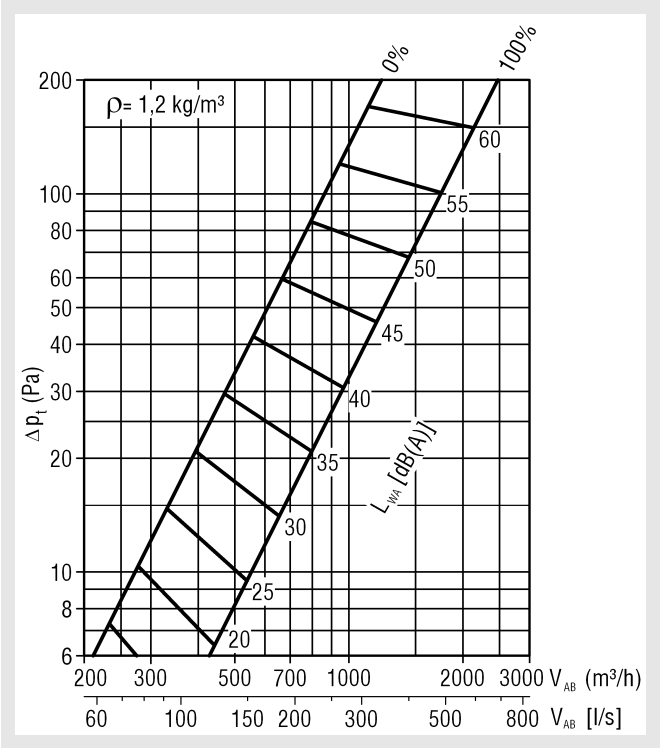
Damper position:

0% = CLOSED

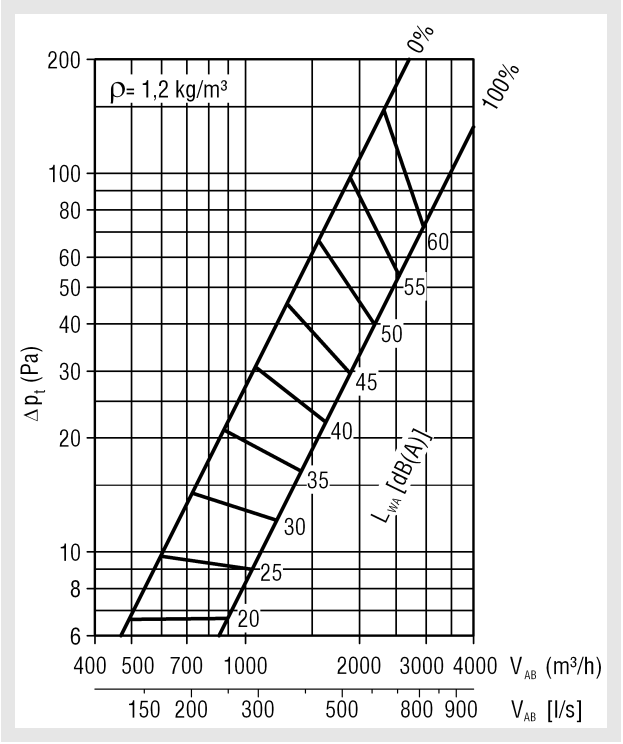
100% = OPEN

Ceiling Diffuser IDA

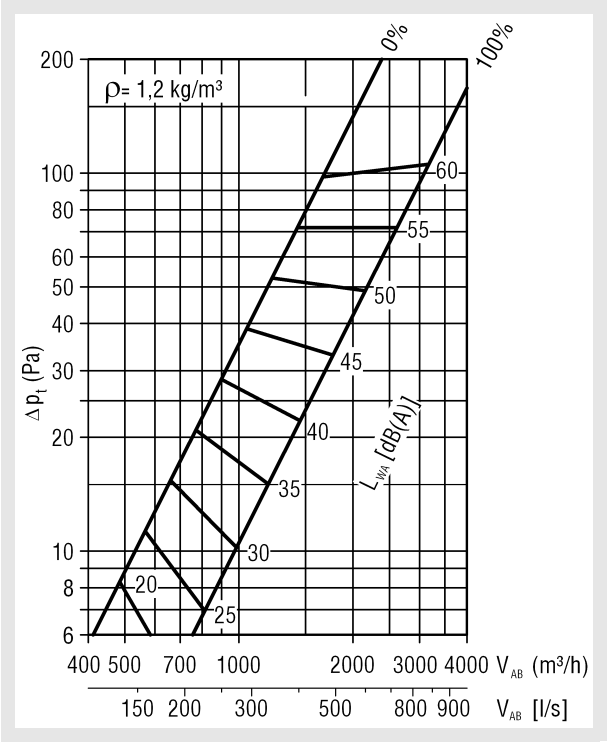
IDA-...-AA-400-...



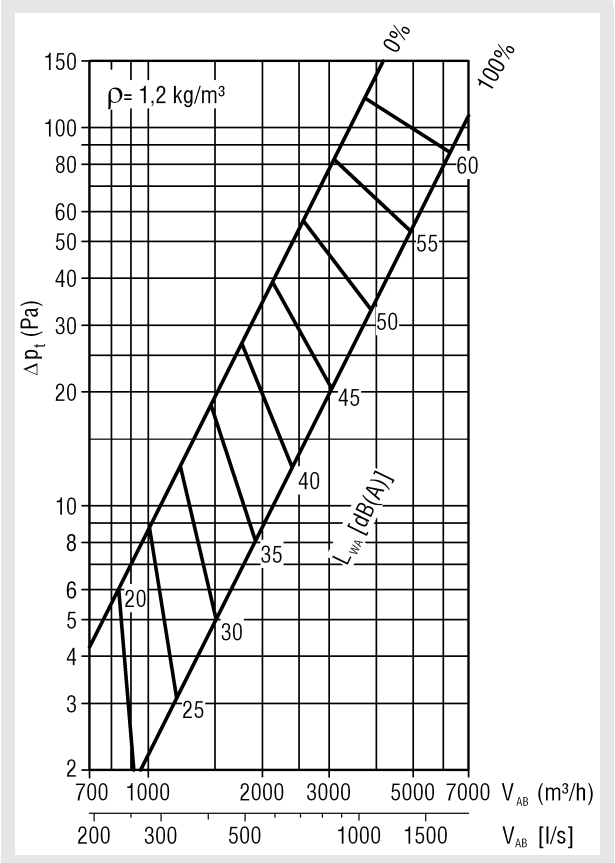
IDA-...-AA-600/625-...



IDA-...-AA-500-...



IDA-...-AA-800-...



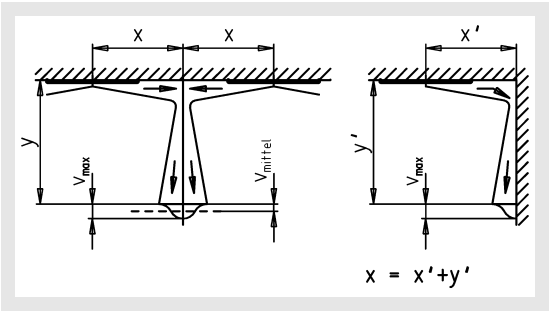
Damper position:

0% = CLOSED

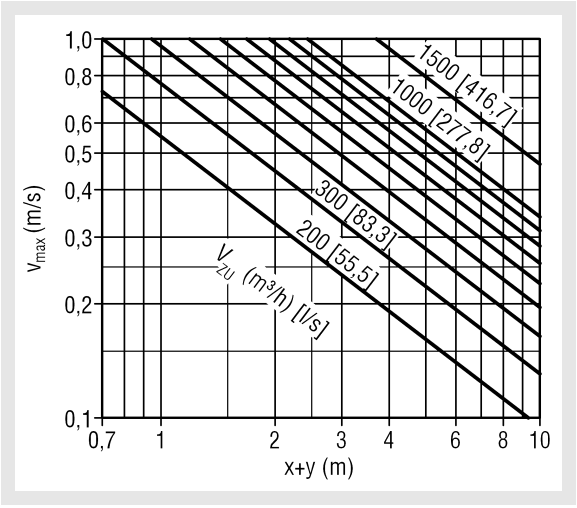
100% = OPEN

Ceiling Diffuser IDA

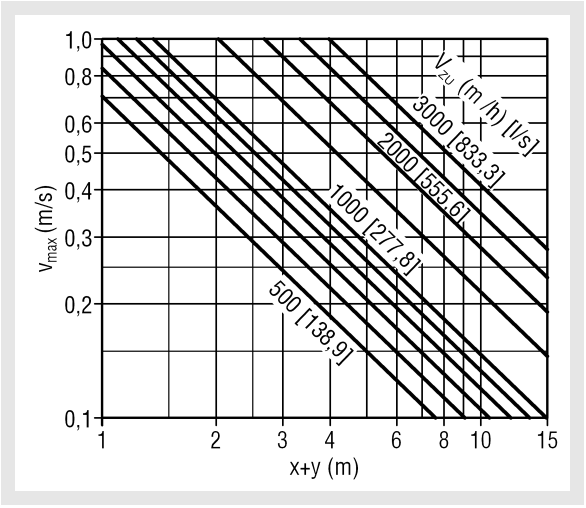
Maximum end velocity of jet
(isothermal) with coanda effect



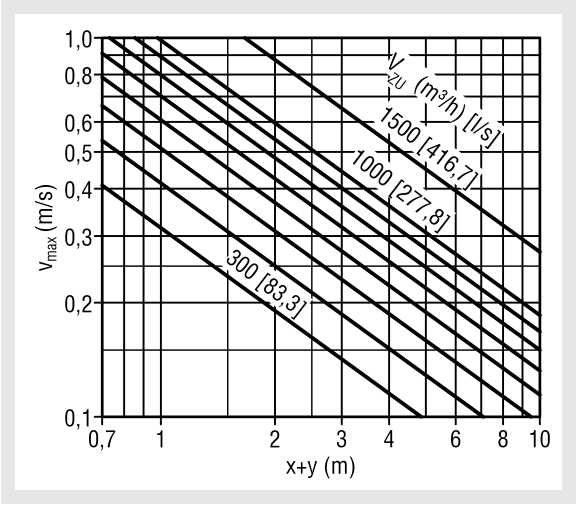
IDA-...-ZH-400-...



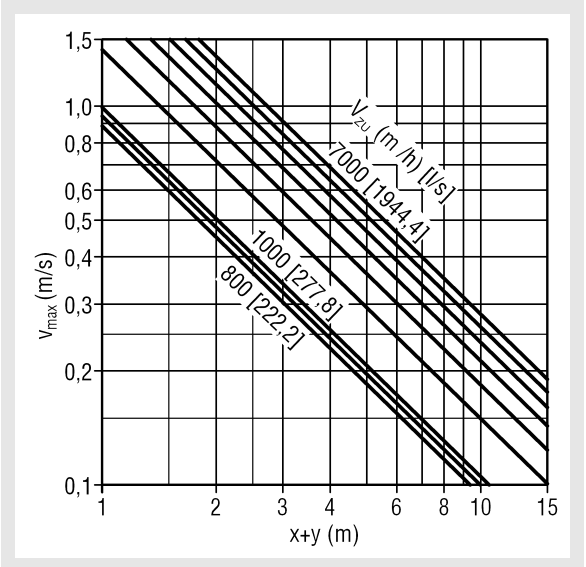
IDA-...-ZH-600/625-...



IDA-...-ZH-500-...

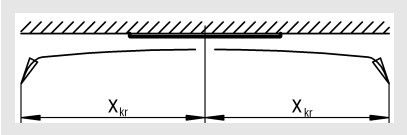


IDA-...-ZH-800-...

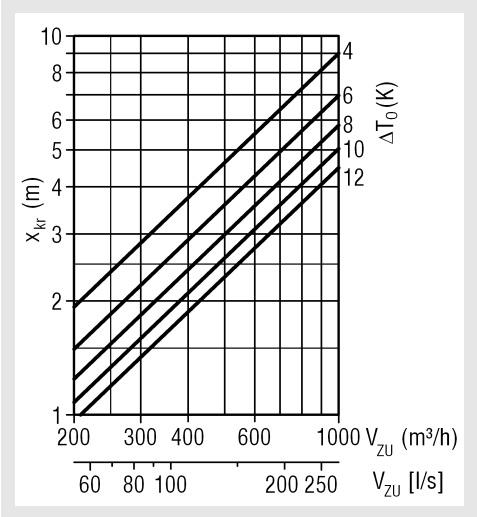


Ceiling Diffuser IDA

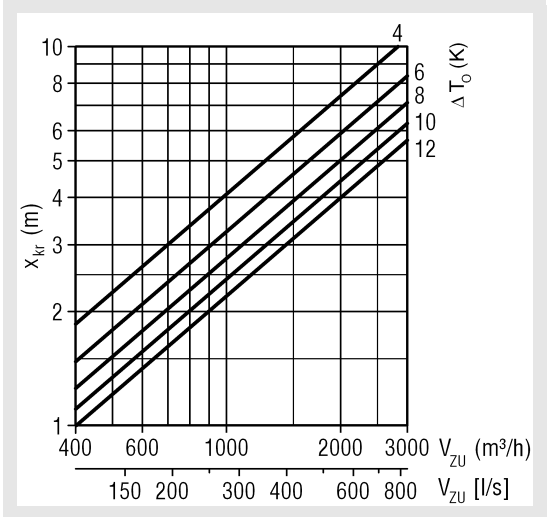
Critical throw



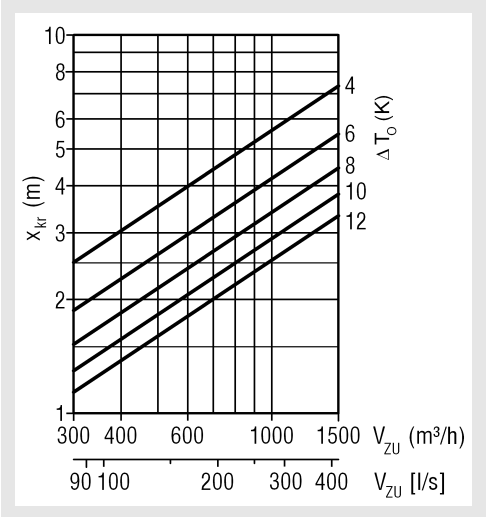
IDA-...-ZH-400-...



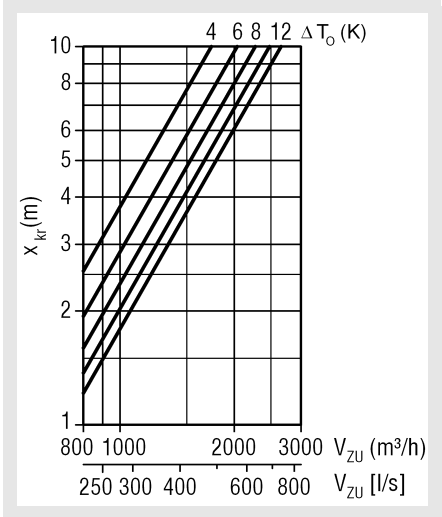
IDA-...-ZH-600/625-...



IDA-...-ZH-500-...

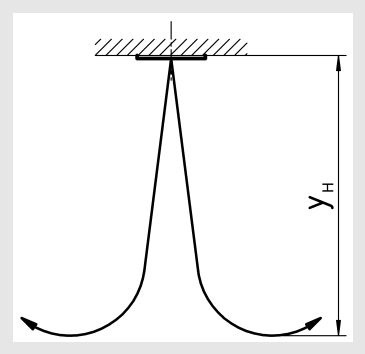


IDA-...-ZH-800-...

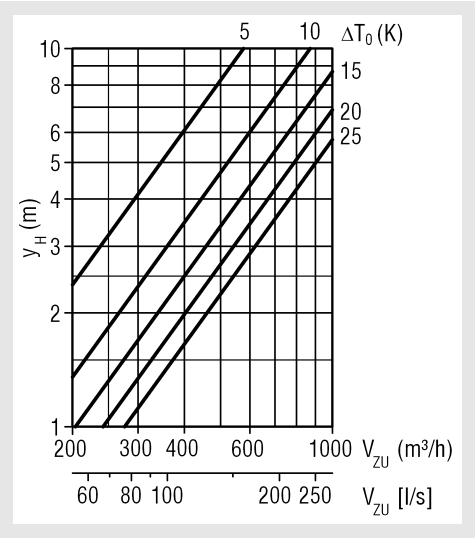


Ceiling Diffuser IDA

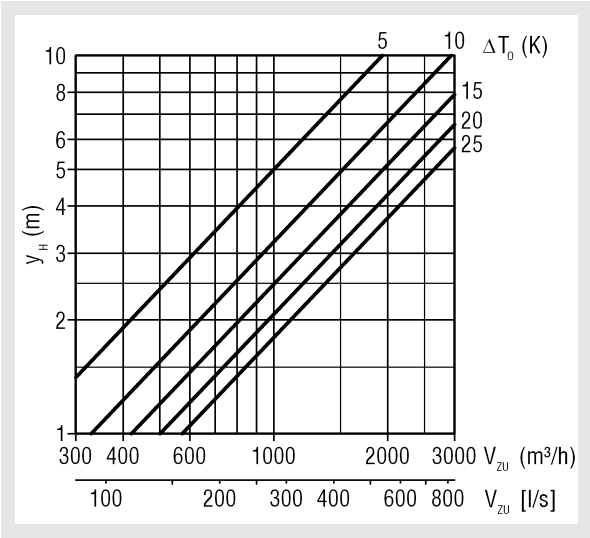
Maximum penetration



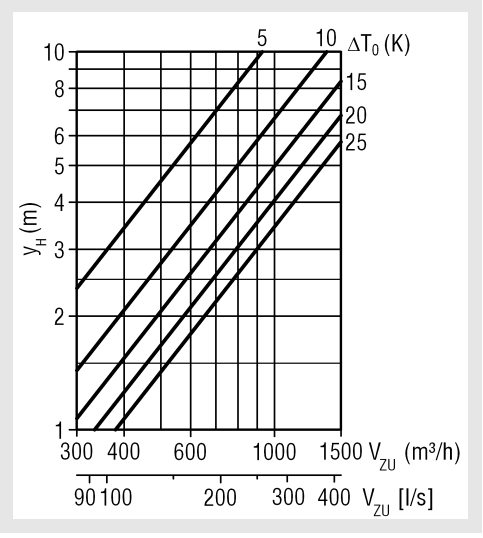
IDA-...-ZV-400-... (in heating mode)



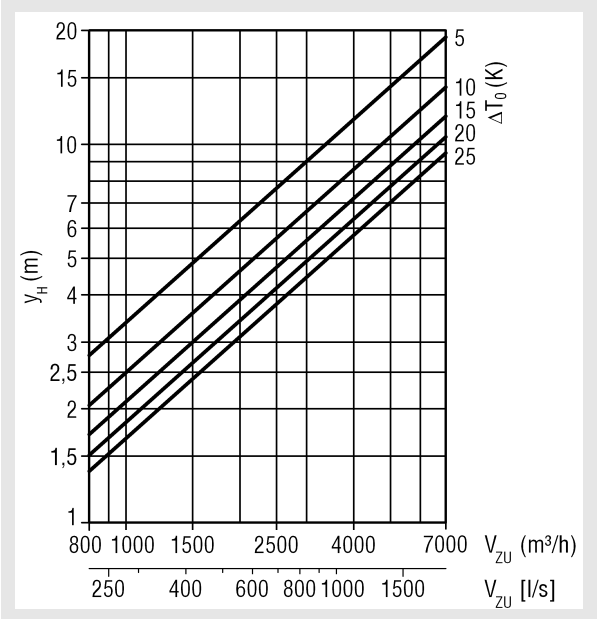
IDA-...-ZV-600/625-... (in heating mode)



IDA-...-ZV-500-... (in heating mode)



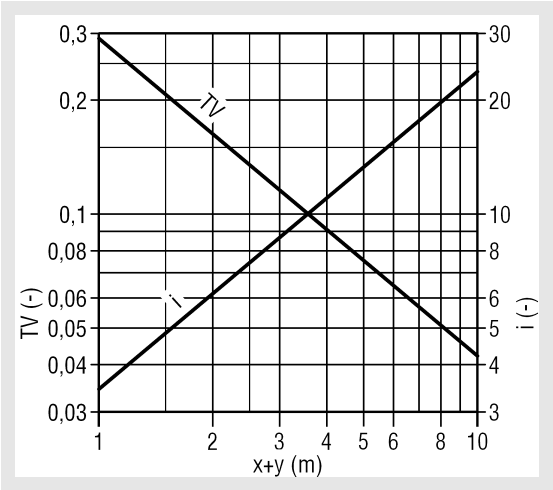
IDA-...-ZV-800-... (in heating mode)



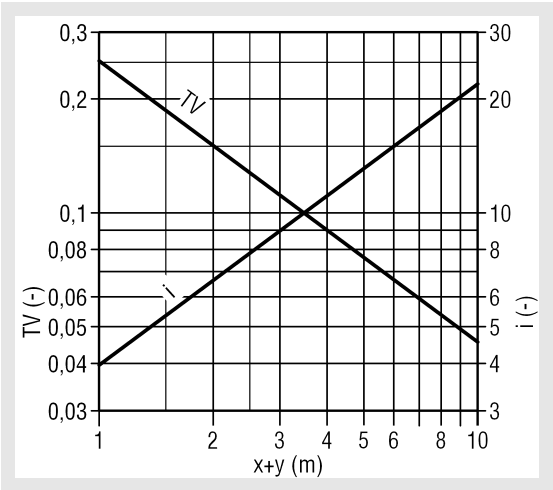
Ceiling Diffuser IDA

Temperature and induction ratios

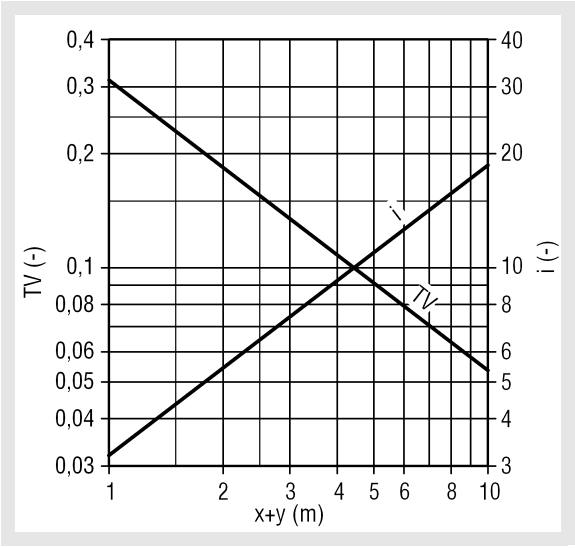
IDA-...-400-...



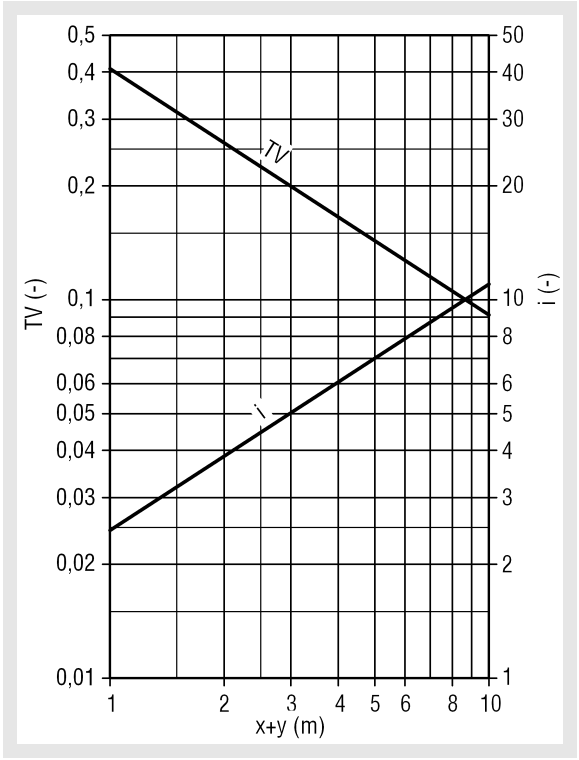
IDA-...-500-...



IDA-...-600/625-...



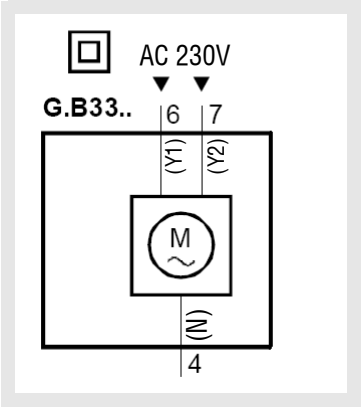
IDA-...-800-...



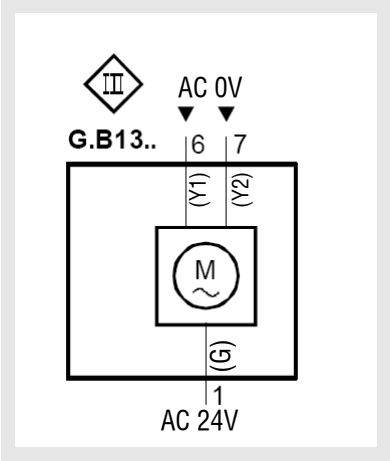
Ceiling Diffuser IDA

Connection diagrams of electric actuators

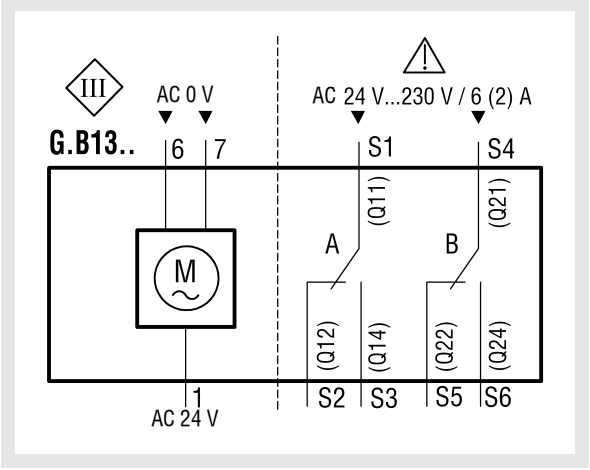
Make Siemens
-E092 (GLB 331.2.E three-point control)



Make Siemens
-E090 (GLB 131.2.E three-point control)



Make Siemens
-E093 (GLB 136.2.E three-point control)
(with 2 integrated auxiliary switches)



Technical data of electric actuators

Make Siemens -E092 (GLB 331.2.E) /
-E090 (GLB 131.2.E) (standard) / -E093 (GLB 136.2.E)

Supply AC 24 V (SELV / PELV) - Operating voltage / Frequency: - Power consumption GLB13..2:	 AC 24 V ±20 % / 50 / 60 Hz 2 VA / 1 W
Supply AC 230 V - Operating voltage / Frequency: - Power consumption GLB33..2:	 AC 230 V ±10 % / 50 / 60 Hz 2 VA / 1 W
Functional data - Nominal lifting power: - Running time for 60 mm stroke:	 250 N 150 s (50 Hz) / 125 s (60 Hz)
Housing protection type - Protection type according to EN 60529: (Observe mounting information)	 IP 40
Protection class - Insulation protection class:	 EN 60 730
Environmental conditions - Temperature:	 -30...+55 °C / -30...+60 °C

Note:
We recommend switching off the drive voltage after reaching the controller position.

Ceiling Diffuser IDA

Legend

V_{ZU}	(m^3/h) [l/s]	=	Supply air volume
V_{AB}	(m^3/h) [l/s]	=	Return air volume
V_X	(m^3/h) [l/s]	=	Total air jet volume at point x
v_{max}	(m/s)	=	Maximum end velocity of jet
v_{mittel}	(m/s)	=	Average end velocity of jet ($v_{mittel} = v_{max} \times 0.5$)
x	(m)	=	horizontal throw
y	(m)	=	vertical throw
x+y	(m)	=	Horizontal + vertical throw
x_{kr}	(m)	=	Critical throw
y_H	(m)	=	Maximum penetration in heating mode
ρ	(kg/m^3)	=	Density
Δp_t	(Pa)	=	Pressure loss
L_{WA}	[dB(A)]	=	A-weighted sound power level
$L_{W(relativ)}$	(dB)	=	relative sound power level
KF	(-)	=	Correction factor
ΔT_0	(K)	=	Temperature difference between supply air temperature and room temperature ($\Delta T_0 = t_{ZU} - t_R$)
ΔT_X	(K)	=	Temperature difference at point x
t_{ZU}	(°C)	=	Supply air temperature
t_R	(°C)	=	Room temperature
i	(-)	=	Induction ratio ($i=V_X/V_{ZU}$)
TV	(-)	=	Temperature ratio ($TV=\Delta T_X/\Delta T_0$)
DS	(%)	=	Damper position (0% = CLOSED / 100% = OPEN)

Ceiling Diffuser IDA

IDA order code

01	02	03	04	05	06	07	08	09	10
Type	Model	Air throw	Nominal size	Material	Drill pattern reduced	Paint	Mounting	Ball-impact guard	Actuator
Example									
IDA	-Q	-ZH	-500	-SB	-000	-9010	-VM	-B0	-E000

Sample
IDA-Q-ZH-500-SB-000-9010-VM-B0-E000
Ceiling diffuser type IDA | square faceplate | horizontal supply air | size 500 | sheet steel | drill pattern not reduced | RAL 9010 white | concealed mounting | without ball-impact guard | without actuator

Order details

01 - Type

IDA = Ceiling diffuser

02 - Model

Q = square faceplate with manually adjustable ventilation funnel
R = round faceplate with manually adjustable ventilation funnel

03 - Air throw

ZH = Horizontal supply air (standard)
ZV = Vertical supply air
AA = Return air

04 - Nominal size

400 = NW 400
500 = NW 500
600 = NW 600
625 = NW 625
800 = NW 800

05 - Material

SB = Sheet steel (standard)

06 - Drill pattern reduced

000 = Drill pattern not reduced (standard)
400 = reduced drill pattern 400
500 = reduced drill pattern 500
600 = reduced drill pattern 600

The drill pattern selected must be smaller than the nominal size selected. Reduced drill pattern not possible for nominal size 800.

07 - Paint

9005 = RAL colour black
9010 = RAL colour white (standard)
xxxx = RAL colour can be freely selected

08 - Mounting

VM = Concealed mounting (standard)
SM = Screw mounting (only in connection with ball-impact guard)
VS = Screw mounting with concealed mounting (available only for NW800 in conjunction with ball-impact guard)

09 - Ball-impact guard

B0 = without ball-impact guard (standard)
BS = with ball-impact guard painted same as faceplate

10 - Actuator

E000 = Without actuator (standard)
E090 = Electric actuator 24V AC / 3-point
E092 = Electric actuator 230V AC / 3-point
E093 = Electric actuator 24V AC / 3-point with 2 integrated auxiliary switches
TE01 = Thermocouple adjustment

Ceiling Diffuser IDA

Order code SK-...-08-...

01	02	03	04	05	06	07	08
Plenum box	Model	Air diffuser	Type of air	Nominal size	Fastening	Material	Damper
Example							
SK	-R	-08	-Z	-500	-VM	-SV	-DK2

09	10	11	12	13	14	15
Rubber lip seal	Measuring device for volumetric flow	ROB version	Insulation	Height of box	Spigot diameter	Spigot position
-GD1	-VME1	-ROB0	-I0	-KHS	-SDS	-S1

Sample
SK-R-08-Z-500-VM-SV-DK2-GD1-VME1-ROB0-I0-KHS-SDS-S1
Plenum box I square design with round diffuser mount I air diffuser IDA I supply air I NW500 I with concealed support I galvanised sheet steel I with damper with cable I with rubber lip seal I with volumetric flow meter I without ROB version I without box insulation I standard height of plenum box I standard spigot diameter I 1 lateral spigot

Order details

01 - Type
SK = Plenum box, square design

02 - Model
Q = Square plenum box for square air diffusers
R = Square plenum box with round diffuser support for round air diffusers

03 - Air diffuser (must be ordered separately)
08 = suitable for IDA-...

04 - Type of air
Z = Supply air
A = Return air

05 - Nominal size
400 = NW400
500 = NW 500
600 = NW 600
625 = NW 625
800 = NW 800

06 - Fastening
VM = Concealed mounting (standard)
SM = Screw mounting (only for the model with ball-impact guard)
VS = Screw mounting with concealed mounting (available only for NW800 in conjunction with ball-impact guard)

07 - Material
SV = Galvanised sheet steel (standard)

08 - Damper
DK0 = Without damper (standard)
DK1 = With damper
DK2 = With damper and cable

09 - Rubber lip seal
GD0 = Without rubber lip seal (standard)
GD1 = With rubber lip seal

10 - Volumetric flow meter
VME0 = without volumetric flow meter in the plenum box (standard)
VME1 = with volumetric flow meter in the plenum box

11 - ROB version
ROB0 = Without ROB version (standard)
ROB1 = With ROB version (not possible for SK-R-...)

12 - Insulation
I0 = Without insulation (standard)
Ia = With box insulation outside
Ii = With box insulation inside

13 - Height of box
KHS = Standard height of box
xxx = Height of box in mm (minimum height = spigot diameter + 147 mm, but at least 245 mm)

14 - Spigot diameter
SDS = Spigot diameter standard
xxx = Spigot diameter in mm

15 - Spigot position
S0 = Spigot from above
S1 = 1 lateral spigot on the box (standard)
S2 = 2 spigots offset by 90°
S3 = 2 spigots offset by 180°
S5 = 2 spigots arranged next to each other

Ceiling Diffuser IDA

Specification text

The ceiling diffuser IDA for cooling and heating large and high halls is specially designed for installation flush with the ceiling, in order to comply with spatial and architectural demands.
In order to prevent draughts in the cooling mode, the supply air must largely be discharged horizontally from the diffuser. However, in the heating mode, the diffuser must have high penetration depth, in order to achieve fast and efficient heating. The ceiling diffuser type IDA with manually adjustable air guide funnel and square faceplate meets both these requirements ideally. Suitable for installation heights ranging from 3 m to 10 m maximum. Diffuser consisting entirely of sheet steel painted with a high-quality powder coating to a RAL colour (RAL 9010 (white), standard). It is fastened by concealed mounting (-VM) using a central fastening screw.
Product: **SCHAKO type IDA-Q-ZH-.../ IDA-Q-ZV-...**

- Return air model without air guide funnel
  Product: **SCHAKO type IDA-Q-AA-...**
- Supply air model with round faceplate and air guide funnel
  Product: **SCHAKO type IDA-R-ZH-.../ IDA-R-ZV-...**
- Return air model with round faceplate without air guide funnel
  Product: **SCHAKO type IDA-R-AA-...**

- with screw mounting (-SM) (IDA-Q only), only for model with ball-impact guard
- with screw mounting with concealed mounting (-VS), only for model with ball-impact guard (-BS) (only for NW 800)

Accessories:

- Plenum box (SK-Q-08 and SK-R-08), made of galvanised sheet steel, inside painted to RAL9005 (black), with fixing lugs, with air diffuser plate (for supply air model only)
  - with damper (-DK1) in the connection spigot Damper made of galvanised sheet steel
    - adjustable with cable (-DK2)
  - with volumetric flow meter (-VME, available for IDA up to NW625)
  - with ROB version (-ROB1), removable damper and volumetric flow meter (only SK-Q)
  - with rubber lip seal (-GD1), at the connection spigot made of special rubber.
  - with thermal insulation
    - internal (-li)
    - external (-la)
  - Height of plenum box can be freely selected, xxx in mm, minimum height = spigot diameter +147 mm, but at least 245 mm.
  - Spigot diameter can be freely selected, xxx in mm
  - Spigot position:
    - S0= spigot from above
    - S1 = lateral spigot on the box (standard)
    - S2= 2 spigots offset by 90°
    - S3= 2 spigots offset by 180°
    - S5= 2 spigots arranged next to each other

- with electric actuator (3-point activation)
  - 24 V AC (standard)
    - without auxiliary switch (-E090)
    - with 2 integrated auxiliary switches (-E093)
  - 230 V AC (-E092)

- Thermocouple adjustment (-TE01) diffuser adjustment option without electrical energy as a function of the supply air temperature (heating mode > 26°C, cooling mode < 26°C).

- Ball-impact guard (-BS), made of steel painted to RAL 9010 (white), other RAL colours possible at an extra charge (possible only for IDA-Q-... with screw mounting and for NW 800 only with concealed mounting). Attention: With reduced drill pattern, only possible with plenum box in the same size as the faceplate.