

Technical Information

Ceiling Air Diffuser Supply Air / Extract air Combination INDULCLIP Z-A INDUDRALL Z-A



- Supply air and extract air in a single compact unit
- Large air flow rates
- High temperature difference
- Size 600 / 625 mm
- INDULVENT design

FUNCTION / DIMENSIONS



Function

INDULCLIP Z-A and INDUDRALL Z-A is a combination of supply air and extracts air in a compact unit.

The supply air section, at the outer edge of the unit, feeds air into the room through a proven design of swirl diffuser. High-inductive and still comfortable, even at temperature differences of -10K and high air flow rates.

The extract air in the centre of the diffuser is transferred through a connection socket to the exhaust side of the ventilation system.

Each INDULCLIP Z-A and INDUDRALL Z-A unit is made up of a plenum box and the front plate. The front plate is attached to the plenum box with a 4-point connection.

Visually, the two air diffusers correspond to the front plate of our ceiling fan coil system INDULVENT ec. An INDULVENT II installation can, therefore, be supplemented with these innovative units for the supply and extract of air.

Dimensions and weights

Both INDULCLIP Z-A and INDUDRALL Z-A are supplied as square units in the nominal sizes 600 and 625.

Dimensions

А	=	598 mm, Size 600, or
		623 mm, Size 625
С	=	594 mm (fits both front plate sizes)
Е	=	570 mm
R	=	12 mm
H1	=	335 mm
H2	=	185 mm
ØD	=	198 mm (supply or extract air)

Weights

Plenum box 11.5 kg Front plate 2.5 kg



Dual-chamber plenum box

Supply-air connection with butterfly damper (optional)

Extract-air connection with butterfly damper (optional)



Front plate with 4-point mounting



Please note:

The products we supply have general tolerances to DIN ISO 2768 Parts 1 and 2, which apply to the mechanical and plant engineering sectors.

Colour deviations due to different degrees of gloss, different ways of applying colour, and different materials are due to the manufacturing processes used and are not justification for complaints.

TECHNICAL DATA



View of front plate of INDULCLIP Z-A (RQD) Suitable for ceiling installation

View of front plate of INDUDRALL Z-A (RQF)

Suitable for ceiling installation and mounting without a suspended ceiling



Design information

The "local air velocity EN 7730:2006 is the average air velocity at any desired location within the common area.

Permissible velocity:	DIN EN ISO 7730:2007
Method of measurement:	DIN EN 13182:2002
Common area:	DIN EN 13779:2007

The limits of the "common area" and the highest permissible "local air velocity" must be agreed between the owner and the planner or installer.

Our selection graphs give the "average local air velocity" when cooling at a supply air temperature difference of -6 K. It is determined from numerous measurement points uniformly distributed in a room. Half of the velocities are higher than the value given by the graph and half are lower.

The "local air velocities" that occur in practice may differ from the predicted values due to, on the one hand, the degree of turbulence in the mixing air flows, or, on the other, to room air motions not caused by the air guidance system, such as cold facades, heating, proximity to a door and similar factors.

Arrangement information

The degree of comfort provided by an air-conditioning system is determined not just by having a low ambient air velocity at the smallest possible temperature difference in a room, but also by constant air distribution in the common area.

We recommend:

Air outlets should be uniformly distributed throughout the room.

TECHNICAL DATA



Ventilation system design

Design is carried out using the smallest x dimension. The "average local air velocity" given in the graph is for Δt_{SUP} = -6 K. Correction factors for other supply air temperature differences are given in the table below.

Corrections	for loca	al air vel	ocities a	t ∆tsup ≠	-6 K

Supply air temp. difference Δt_{SUP} [K]	-2 K	-6 K	-10 K
Approx. velocity change Δ v_xv [m/s]	-0.02	0	+0.04

Please note:

Be sure to follow the instructions on page 3 of this Technical Information! The design information lays down definitions and terminology. The permissible "local air velocity" must be determined in accordance with DIN EN ISO 7730.

This Technical Information become invalid if combined with other diffuser types. In case of doubt, please ask our technical consultants.

Minimum supply air flow rate

If these diffusers are operated at supply air temperature differences down to Δt_{SUP} = -10 K, make sure the minimum supply air flow rate does not fall below \dot{V}_{SUP} =150 m³/h.



Definitions of x and y jet paths



Kiefer Klimatechnik www.kieferklima.de

TECHNICAL DATA



Acoustic design and pressure loss



Supply/extract air flow rate $\dot{V}_{SUP} = \dot{V}_{ETA} [m^3/h]$ For corrections ΔL_3 , see table below)

Acoustic diagrams

The graphs apply for	r:
Room height	$H_{R} = 3.0 \text{ m}$
Reverberation time	$T_N = 0.6 s$
Air flow rate	$\dot{V}_{SUP} = \dot{V}_{ETA}$

Acoustic power

Correction factor ΔL_1 for other room heights H_R

H _R [m]	2.5	2.75	3.0	3.5	4.0	4.5	5.0	6.0
$\Delta L_1[dB(A)]$	+0.8	+0.4	0	-0.7	-1.2	-1.8	-2.2	-3.0

Correction factor ΔL_2 for other reverberation times T_N

T _N [s]	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2
$\Delta L_2 [dB(A)]$	-1.8	-0.8	0	+0.7	+1.2	+1.8	+2.2	+3.0

0200220 \$ 50 45 Sound pressure level in room LP [dB(A)] 40 35 INDUDRALL Z-A 30 400 1500 500 700 800 600 1000

Specific air flow rate V_S [m³/hm²]

Supply/extract air flow rate $\dot{V}_{SUP} = \dot{V}_{ETA} [m^3/h]$ For corrections ΔL_3 , see table below)

Deviation = ((Veta /	' VSUP)) – 1)) x 100	[%]
	(,			L · · J

Deviation %	-50	-25	-10	0	+10	+20	+30	+50
ΔL_3 [dB(A)]	-3.0	-2.0	-1.3	0.0	+1.5	+3.0	+4.5	+8.0

Relative sound power level

Frequency [Hz]	63	125	250	500	1 K	2 K	4 K	8 K
$\Delta L [dB]$	+12	+5	-2	-5	-6.5	-8	-9	-15

Pressure losses:

INDULCLIP Z-A:	$\Delta p_{sSUP} \Delta p_{sETA}$	= =	V² _{SUP} / 16400 [Ра] V² _{ETA} / 8600 [Ра]
INDUDRALL Z-A:	$\Delta p_{sSUP} \Delta p_{sETA}$	= =	V² _{SUP} / 21800 [Pa] V² _{ETA} / 8600 [Pa]

TENDER TEXT



Ceiling air diffuser supply air/extract air combinations INDULCLIP Z-A and INDUDRALL Z-A

Compact unit providing combined air supply and extract air as square panel, supply side as high inductive swirl diffusers which can accommodate a supply air temperature difference up to -10K over a wide range of air flow rate. Also suitable for variable air flow rate systems (VVS).

Front plate consisting of:

- Zinc-plated steel sheet, coated (colour RAL 9010), with high-induction, matt-black or grey (similar to RAL 7035) • INDULCLIP / INDUDRALL discharge elements.
- Outlet hole in the centre of the front plate with a wire grille, matt black or grey (similar to RAL 7035). .
- Four-point fastening between front plate and plenum box: four fastening screws with white plastic caps. .

	Size:	600 x 600 mm or 62	5 x 625 mm		
	Manufacturer:	Kiefer			
	Туре:	INDULCLIP Z-A or I	NDUDRALL Z-A		
	Pos.	Quantity	Туре	Size: mm	Price per piece €
	Extra charge for	coating front plate in a	n RAL-colour of your choice		
	Pos.	Quantity	Туре	Size mm	Price per piece €
	Dual-chamber p	plenum box consistin	g of:		
	Annufacturer:	Visible parts painted b ight mounting points Ø Kiefer	ack, two connection sockets Ø 19 9 mm in housing cover.	8 mm on opposite sid	es for supply air and
	туре: т	NDULCLIP Z-A / INDU	JRALL Z-A	0:	
	Pos.	Quantity	Туре	mm	€
	Additional charg	e for supply air butterfly	/ damper (controllable from the roo	om side without dismo	bunting the front plate)
	Pos.	Quantity			Price per piece €
]	Additional charg Pos.	e for extract air butterfl Quantity	y damper (controllable from the ro	om side without dismo	ounting the front plate) Price per piece €
 Kiefe	r Klimatechnik	Ceiling air diffuser inle	et/outlet combinations INDUI CLIP 7-A		Page 6 / 8

SIGNS AND SYMBOLS



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Jet paths

X1, X2 Xn	Horizontal ceiling jet paths	[m]	
	to point where two ceiling		
	jet paths meet		
XW1, XW2 XW1	Horizontal ceiling jet paths	[m]	
	to wall or facade		
у	Vertical jet path	[m]	
Modia flows			
	Air flow rate, general	[m ³ /b]	
v Va	Specific oir flow rate general	[1117/11] m ³ /bm ² 1	
VS Vo	Specific air flow rate per metro	[[] ² /[]]]	
V Spez	Specific all now rate per metre	[111-/1111] [m3/b]	
V ges	Posizeulation air flow rate	[111 ⁻⁷ /1] [m ³ /b]	
VRCA	Recirculation air flow rate act value	[[[]~/[]]	
VKI	for INDULY (ENT remote owitch	e i[m•/n]	
140	Desingulation of flow rate and	5 3/1- 1	
VKZ	Recirculation air flow rate, set	[mº/n]	
· · · ·	value II for INDULVENT remote switch		
V1	Recirculation air flow rate, min.setting[m ³ /h]		
1	for automatic operation of INDULVE	=NI	
V2	Recirculation air flow rate, max.	[m³/h]	
	for automatic operation of		
	INDULVENT		
VSUP	Supply air flow rate per diffuser	[m³/h]	
V	Supply air flow rate per metre	[m³/hm]	
Vав	Extract air flow rate	[m³/h]	
Voda	Extract air flow rate per room	[m³/h]	
V tra	Cross flow air flow rate per diffuser	[m³/h]	
Vета	Extract air vol. flow per diffuser	[m³/h]	
V RCA	Recirculation air flow rate per room	[m³/h]	
Vена	Exhaust air flow rate per room	[m³/h]	
Ůsec	Secondary air flow rate per diffuser	[m³/h]	
ṁw	Cooling water mass flow	[kg/h]	
ṁк	Condensate mass flow	[kg/h]	
Temperature	es and temperature differences		
Т	Temperature, general	[°C]	
T _{Ida}	Measured ambient air temperature	[°C]	
tw∨	Cooling water supply temperature	[°C]	
twR	Cooling water return temperature	[°C]	
t _{mW}	Average cooling water temperature	[°C]	
	$t_{mW} = (t_{WV} + t_{WR})/2$		
T1	Ambient air temp., minimum setting	[°C]	
	for automatic operation of INDULVE	ENT	
T2	Ambient air temp., maximum setting] [°C]	
	for automatic operation of INDULVENT		
$\Delta t_{\sf SUP}$	Temp. difference supply air/ambien	t air [K]	
Δt_{WV-R}	Temperature difference		
	cooling water supply / return	[K]	

Static pressures and pressure differences Minimum pressure on supply air side [Pa] **p**_{sSUP} Static pressure of recirculation part [Pa] **D**_{SRCA} Static pressure loss, general [Pa] Δp_s [kPa] Cooling water pressure drop Δp_{sW} Pressure drop on supply air side [Pa] Δp_{sSUP} Pressure drop on extract air side [Pa] Δp_{sETA} Total pressure drop [Pa] Δp_{sges} Velocities Velocity of air leaving diffuser [m/s] V₀ Average ambient air velocity [m/s] \overline{V}_{XY} after jet path x + y \overline{V}_{X} Average ambient air velocity [m/s] after jet path x \overline{V}_y Average ambient air velocity [m/s] after jet path y **Cooling capacities** Cooling capacity on cooling water side [W] Qw QSUP Cooling capacity on supply air side [W] Total power [W] Qges Acoustics Sound power level Lw [dB(A)] Sound pressure level [dB(A)] I P Correction for sound level ΔL. [dB] D Input attenuation [dB] Other data H_R Room height [m] Reverberation time T_N [s] Room air humidity [%RH] ρ_{RL} Area A... [m²] (e.g. floor area of room) Y1 Control voltage minimum setting [V] Y2 Control voltage maximum setting [V]

Designation of types of air to DIN EN 13779:2007

ODA
SUP
IDA
TRA
ETA
RCA
EHA
SEC
LEA
MIA

Status: March 2009

THE SPECIALIST FOR CLIMATE CONTROL



Product Range

Components

Linear, wall, ceiling, and displacement outlets, chilled ceilings, ceiling fan coil systems, transfer grilles, concrete core cooling with supply air.

Axial and radial ventilators, hotgas ventilators, plastic ventilators.

Systems

Air conditioning systems of all types for comfort (offices, administration buildings, department stores, libraries, museums, etc.) and industrial purposes (mechanical engineering, high technology, textile, plastics, chemical, automobile, drinks, foodstuffs and other industries).

Services

Advice and Planning

We will advise you in all questions concerning the application of our systems, carry out system investigations, and prepare cost estimates including calculation of cooling loads, piping networks, energy costs, and operating efficiency. Preparation of structure proposals for air distribution, lighting, ceiling systems. Illumination calculations using the latest software tools. Design and implementation of control concepts in our own instrumentation and control department

We incorporate our knowledge and experience in product innovations and new projects.

Air-conditioning laboratory

Expert reports, ambient air flow analyses in full-scale trials in our laboratory. Acoustic and aerodynamic investigations of airconditioning components. Development of innovative airconditioning components. Calorific performance measurements of air and water components on the test stand.

Comfort measurements on site to assess thermal comfort and room air quality.

Maintenance and Service

Maintenance service contracts for all types of ventilation and air-conditioning systems.

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With release of this publication, all earlier versions of the INDULCLIP Z-A Technical Information lose their validity.