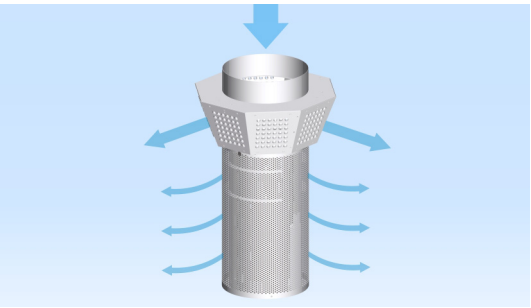
AIR TECH
SYSTEMS

Technical Brochure

LTG Air Diffusers

Industrial air diffusers ILQ*sf*
System SmartFlow

smart flow intelligent industry



For production halls

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Technical brochure
Industrial air diffusers ILQ*sf* LTG System SmartFlow

LTG Comfort Air Technology

- Air-Water Systems
- **Air Diffusers**
- Air Distribution

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Notes

Dimensions stated in this brochure are in mm.

Dimensions stated in this brochure are subject to General Tolerances according to DIN ISO 2768-vL.

Straightness and twist tolerances for extruded aluminum profiles according to DIN EN 12020-2.

Length tolerance: ≤ 1,5 m ± 1,5 mm;
≥ 1,5 m ± 2,0 mm.

The surface finishes meet standard indoor use requirements, i.e. room climate requirements according to DIN EN ISO 7730. Other finishes meeting special use requirements are available on request.

The actual tender documentations are available in word format at your local dealership or at www.LTG.net.

LTG planning tools – we support you !

Visit us on www.LTG-inc.net and get helpful tools such as dimensioning programs, air flow videos and all product information !

Also available: our product overviews about air diffusers, air-water systems and air distribution products.

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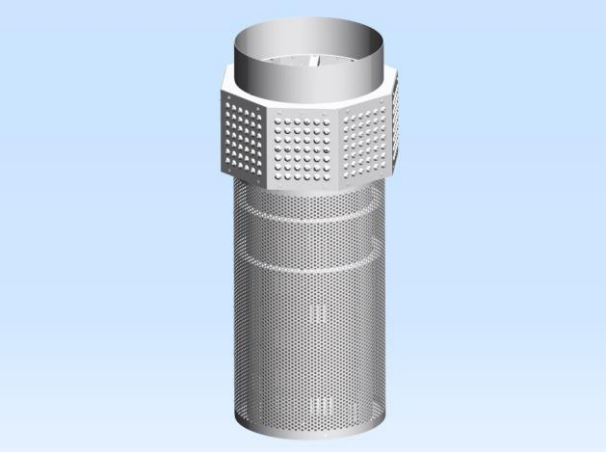
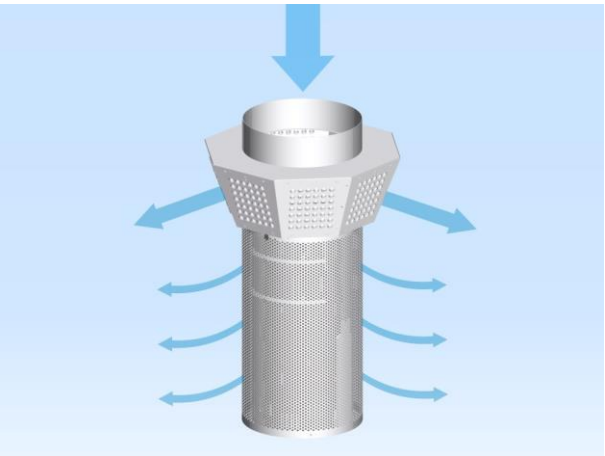
Views of unit



Floor-standing version



Freely suspended version, with air diffusion

Application

The industrial air diffuser ILQ*sf* is the first air diffuser that displaces pollutants from the work area with both constant and variable flow rates, and discharges them effectively without intense mixing with the room air.

The discharge of substances by thermal lift at machines, and the effectiveness of recording equipment, is not impaired by the room flow of the air diffusers. Mechanically self-operated or motor-powered adjustment ensures a constant flow pulse, over the entire control range (1:4) and optimum ventilation effectiveness and efficiency, while providing high thermal comfort.

The ILQ*sf* is suitable for on-demand ventilation, heating and cooling with high and variable material and thermal loads in large buildings, e.g. production facilities, sports halls, lobbies, trade fair buildings and atriums. Thanks to the large control range, it can also be used for hybrid ventilation, i.e. in combination with natural ventilation using natural smoke/heat extraction systems.

The ILQ*sf* offers optimum conditions to ensure high energy efficiency and flexibility, since the local supply air volumes can be easily set and regulated over a wide range.

Installation, positioning

To benefit from the advantages of layered or displacement flow, the air diffusers should be positioned close to the floor, on walls or columns, or free-standing in the room. Even with a mounting level of up to 3 m, a displacement flow is achieved in the case of cooling.

The hall can be efficiently heated with the same positions. In case of good thermal insulation and low heating loads, the room air can be heated with minimum flowrate by the upper mixing head (mixed ventilation only).

Materials, surface finish

- Steel, galvanized
- Steel, powder-coated as per RAL
- Stainless steel V4A

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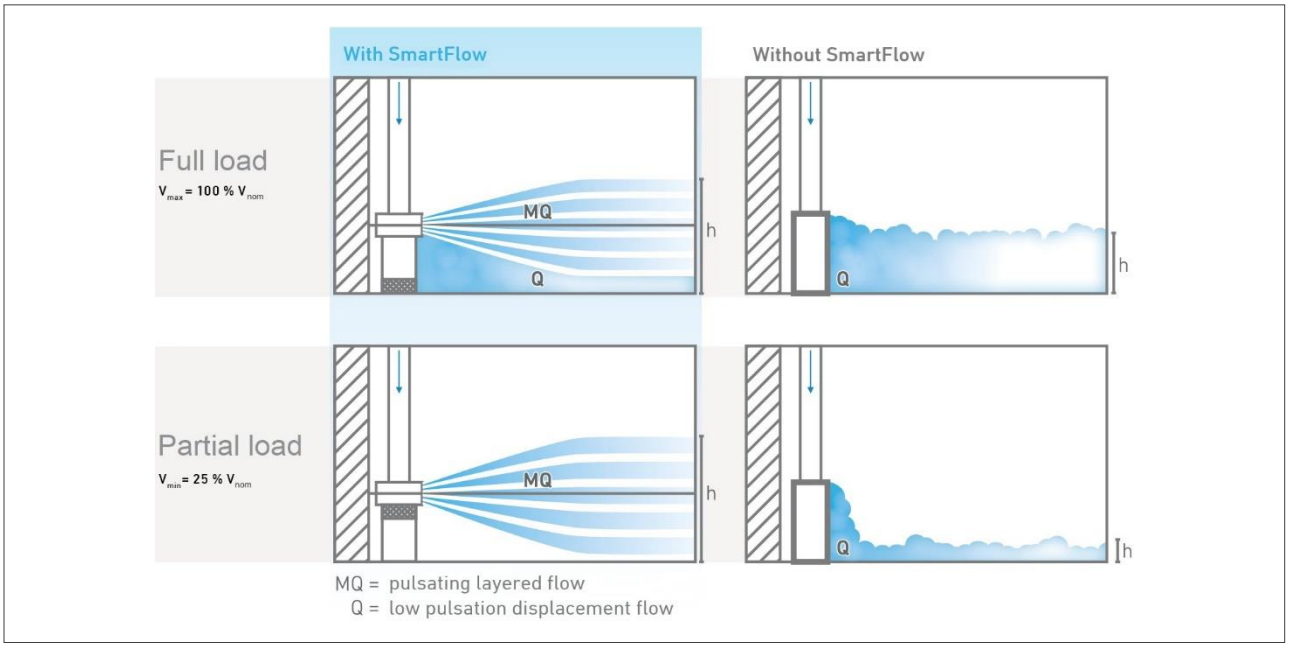
Mode of operation of LTG SmartFlow System

The LTG SmartFlow System offers good room air quality and high thermal comfort with very low energy requirement. These advantages come to the fore particularly for on-demand ventilation in partial loadoperation. Theideal flow form is selected, depending on the required flow rate, with a constant pressure difference in the air diffuser by adjusting the diffuser area. In one design variant, the air diffuser is mechanically self-adjusting. Compared with an air diffuser regulated conventionally using a throttle element in the air inlet, pollutant displacement is more effective and the penetration depth is greater due to the higher internal pressure.

The LTG SmartFlow principle is based on an optimized superimposition of locally limitedmixed ventilation (V_{min}) and displacement ventilation.

Compared to displacement ventilation with a constant layer height, it is possible with mixed/displacement ventilation to discharge the same partial cooling load with the smaller flow rate. At 25 % of the maximum cooling load, the flow rate of the ILQ*sf* air diffuser with purely local mixed ventilation can be reduced by an additional 60 % compared with diffusers with displacement ventilation or purely layered ventilation. The transition from mixed to displacement ventilation ($V_{min} \rightarrow V_{max}$) is smooth in SmartFlow technology.



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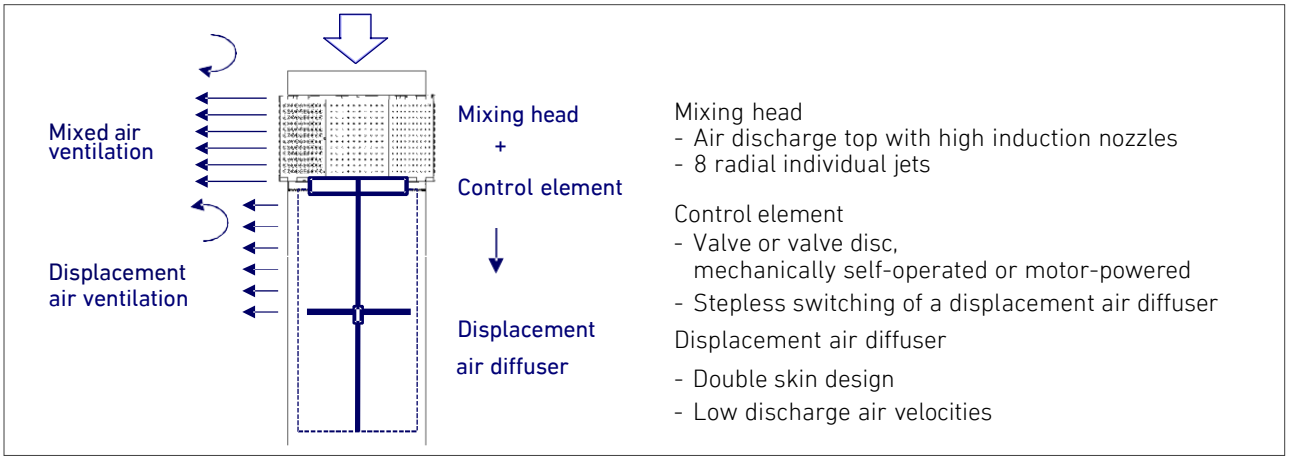
Mode of operation of air diffuser

The classic industrial air diffuser adjusts the air direction, for heating and cooling, from vertical to horizontal indirectly upwards, and requires a relatively high flow rate for heating from a higher installation level. Pure displacement air diffusers are, due to their low flow pulse, less suitable for heating up and for V_{min} operation.

The ILQ*sf* benefits from the advantages of mixed air and displacement air ventilation. It consists of two air diffusers arranged in series and a control element located between them.

The upper mixing head distributes 25 of the maximum supply air quantity radially inside the room via 8 individual jets. The static pressure remains constant in the operating range.

In the version with mechanically self-operated adjustment, a counterweight-loaded disc inside the cylindrical displacement air diffuser shifts at a constant internal pressure (30 or 50 Pa) with the flow rate between V_{min} and V_{max}.
In the version with an electric actuator, the displacement air diffuser is operated with a butterfly valve infinitely variable between 25...100 %. The mixing zone remains largely confined to the frequented zone.
In the lower cylinder, supply air is discharged with low impetuous as displacement air. Compared with a displacement-air-only diffuser, the penetration depth and the layer height vary only slightly with the flow rate. The mean layer height is determined from the ratio of thermic air flows, machine waste air and supply air flows.

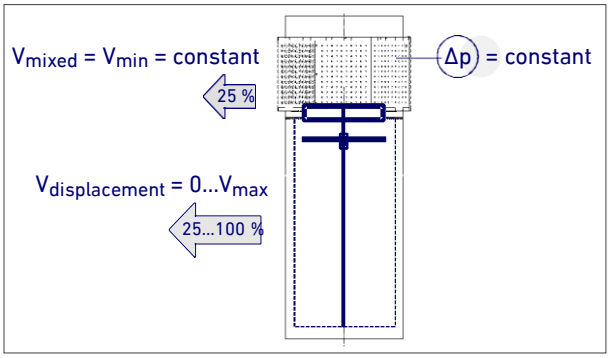


Function principle of ILQsf

Versions

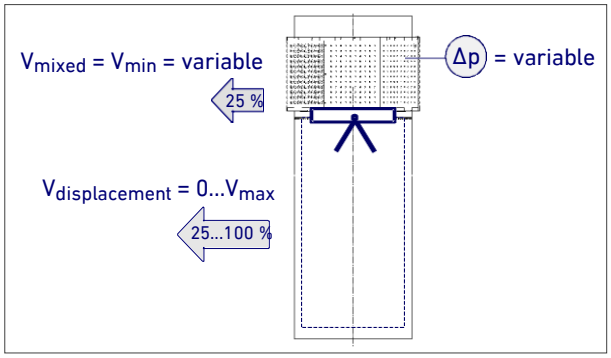
Type ILQsf .../S – mechanically self-operated adjustment

- Without external power supply (electrical connection)
- Self-operated pressure controller Δp = constant
- Pressure Δp adjustable via weight (30 or 50 Pa)
- Variable flow rate (DCV)
- Operating range 1:4



Type ILQsf .../E – motor-powered adjustment

- Actuator 0...10 V
- Pressure controller Δp = variable
- Variable flow rate (DCV)
- Positive switching for heating mode (mixing head only)
- Operating range 1:(>4)



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Heating

In the case of heating, the penetration depth is considerably greater than in a displacement air diffuser. Compared with a displacement outlet, heating with smaller flow rates is feasible.

For installation heights of 1 m and above (bottom edge of diffuser), the mixing head is angled in order to obtain a discharge direction of 20 ° downwards. With a differential pressure of 50 Pa, radial penetration depths of more than 7 m are achieved at 10 K over temperature.

In the case of positioning close to the floor, a horizontal jet direction and a pressure difference of 30 Pa are sufficient for heating the air layers on the floor.

Cooling

In the case of cooling, on-demand operation (V_{min} to V_{max}) achieves, in comparison with a displacement-only air diffuser, a higher ventilation effectiveness and efficiency above all, at partial load.

With overhead suspension, the mixing jets stabilize the supply air bell to achieve wide-ranged displacement ventilation, which also makes it possible to stay under the air diffuser.

On the floor, in vicinity to thediffuser, a higher layer thickness is formed, which particularly in cases of partial load achieves a better displacement of pollutants while permitting a higher bottom temperature for the supply air.

The comfort range starts from < 2 m distance from the air diffuser and also conforms to the requirements for seated activity according to Class B in DIN EN ISO 7730.

Room flow in case of heating, floor-standing, Δt = +10 K

Room flow in case of cooling, floor-standing, Δt= -5 K

Room flow in case of heating, up to 3 m high Δt = +10 K

Room flow in case of cooling, up to 3 m high, Δt= -5 K

Rapid selection

Size	Connection diameter	V_{min} [m³/h] Δp= 30 Pa	L_{WA} [dB(A)]	V_{max} [m³/h] Δp= 30 Pa	L_{WA} [dB(A)]	V_{min} [m³/h] Δp= 50 Pa	L_{WA} [dB(A)]	V_{max} [m³/h] Δp= 50 Pa	L_{WA} [dB(A)]
315	Ø 250	290	41	830	57	390	51	1030	63
	Ø 315	310	40	1310	63	400	48	1700	66
500	Ø 400	650	45	2500	62	840	51	3380	68
	Ø 500	850	45	3400	64	1140	50	4370	69
630	Ø 630	–	–	–	–	2130	57	7190	67

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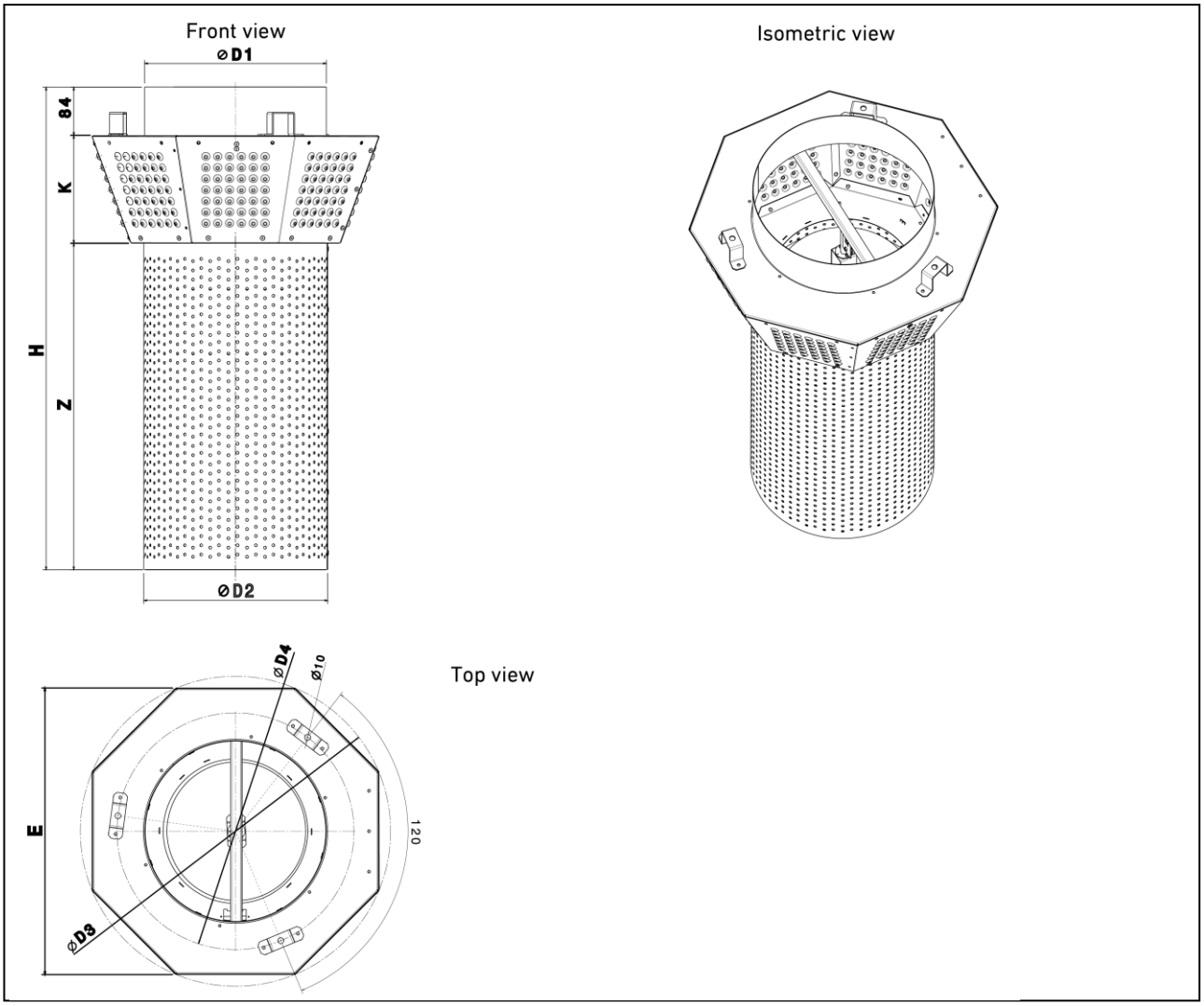
Dimensions of freely suspended version



Size	D1 [mm]	D2 [mm]	D3 [mm]	D4 [mm]	H [mm]	Z [mm]	K [mm]	S [mm]	L [mm]	E [mm]	Weight ca. [kg]
315	315/250	322	537	410	837	566	187	663	251	496	20
500	500/400	507	834	640	1286	900	300	1130	396	770	30
630	630	647	899	765	1454	1000	370	1300	510	830	48

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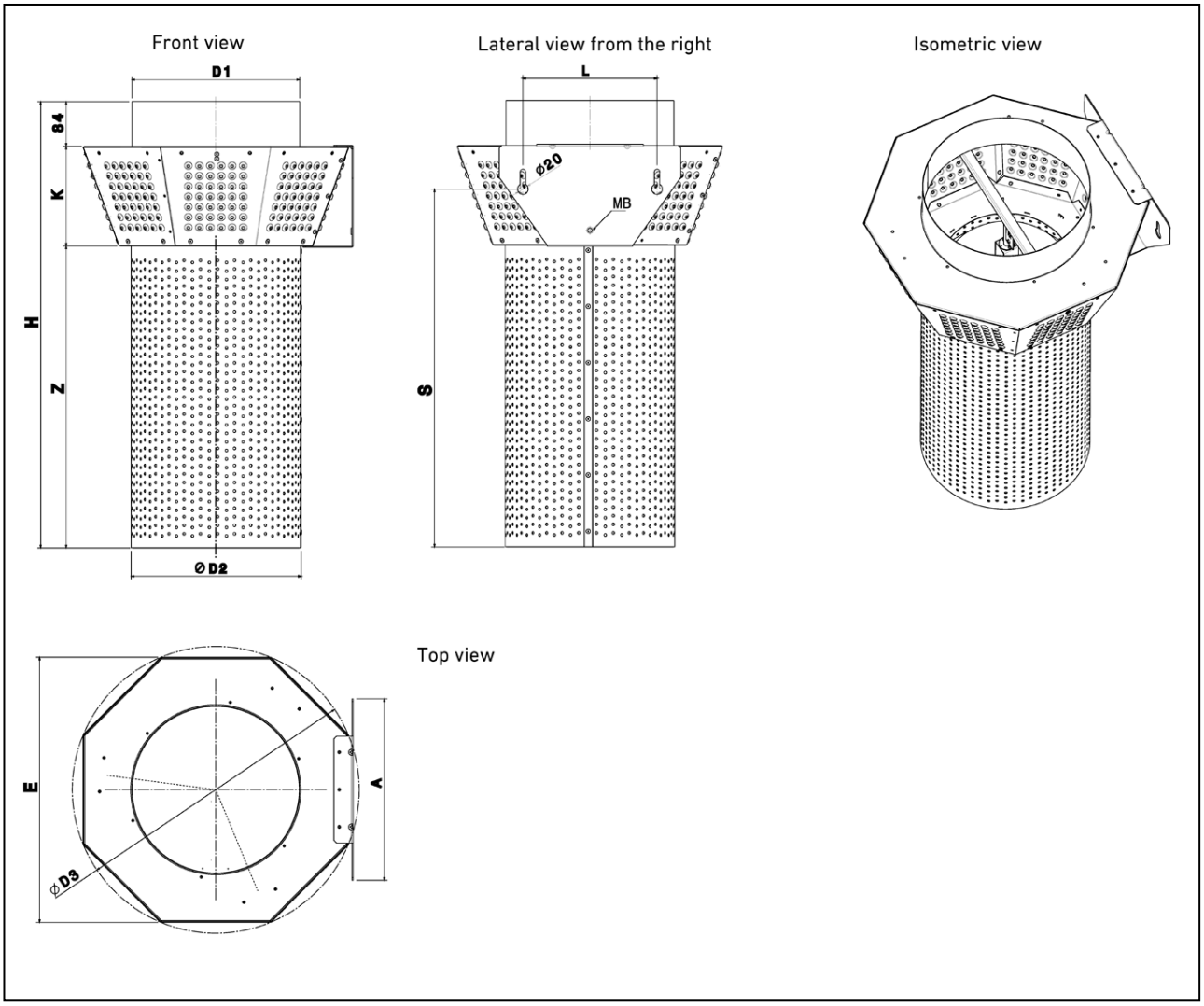
Dimensions of freely suspended version, wall mounted



Size	D1 [mm]	D2 [mm]	D3 [mm]	H [mm]	Z [mm]	K [mm]	S [mm]	L [mm]	E [mm]	A [mm]	Weight ca [kg]
315	315/250	322	537	837	566	187	663	251	496	340	20
500	500/400	507	834	1286	900	300	1130	396	770	500	30
630	630	647	899	1454	1000	370	1300	510	830	620	48

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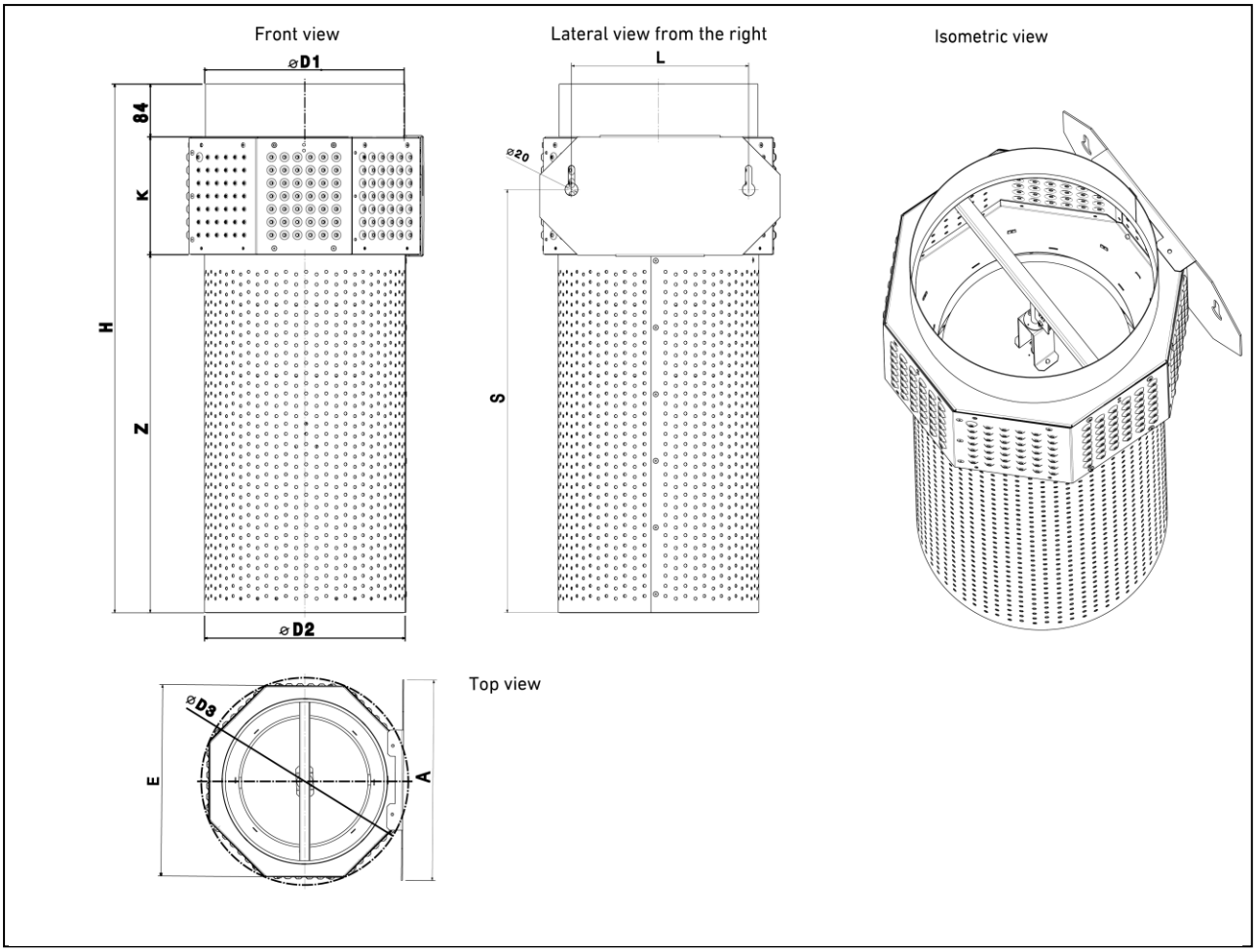
Dimensions of floor-standing version



Size	D1 [mm]	D2 [mm]	D3 [mm]	H [mm]	Z [mm]	K [mm]	S [mm]	L [mm]	E [mm]	A [mm]	Weight ca. [kg]
315	315/250	322	393	837	566	187	663	280	363	380	20
500	500/400	507	602	1286	900	300	1118	400	556	500	30
630	630	647	765	1454	1000	370	1288	440	700	600	48

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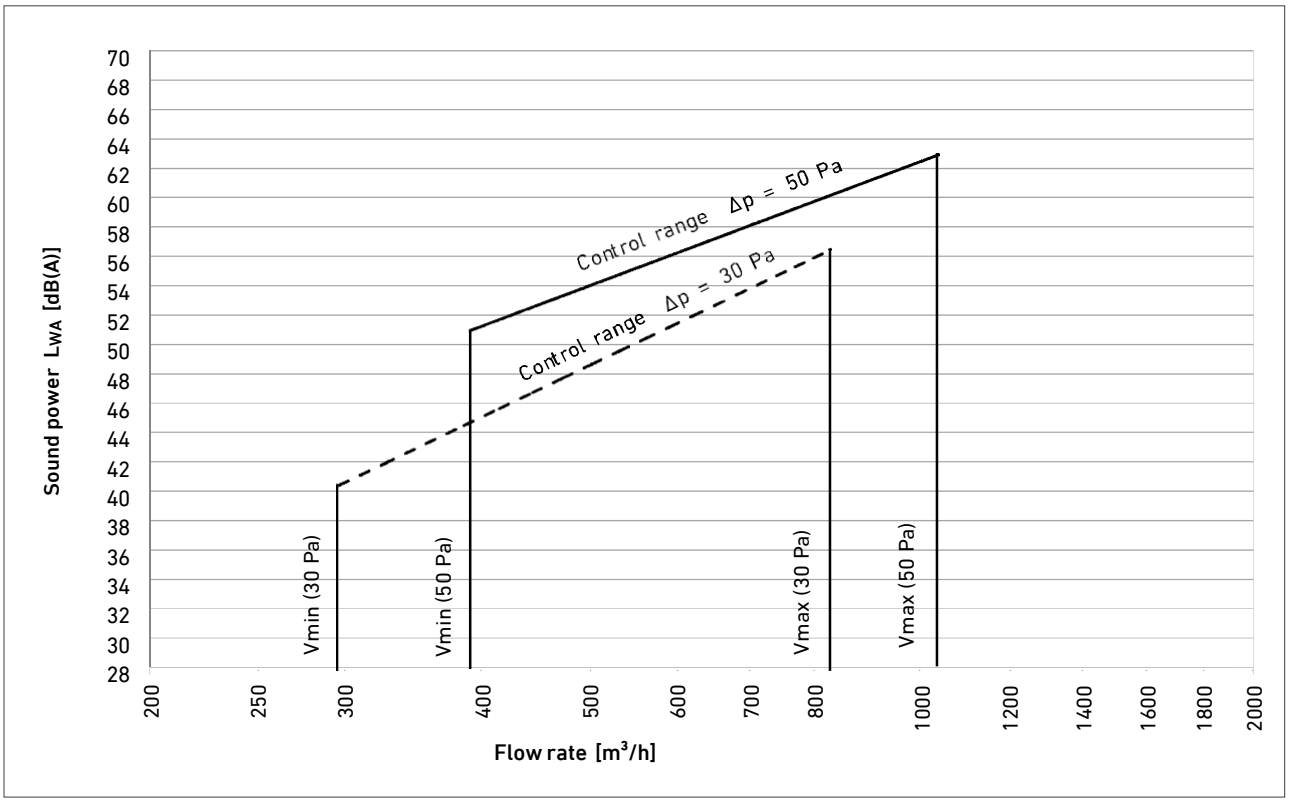
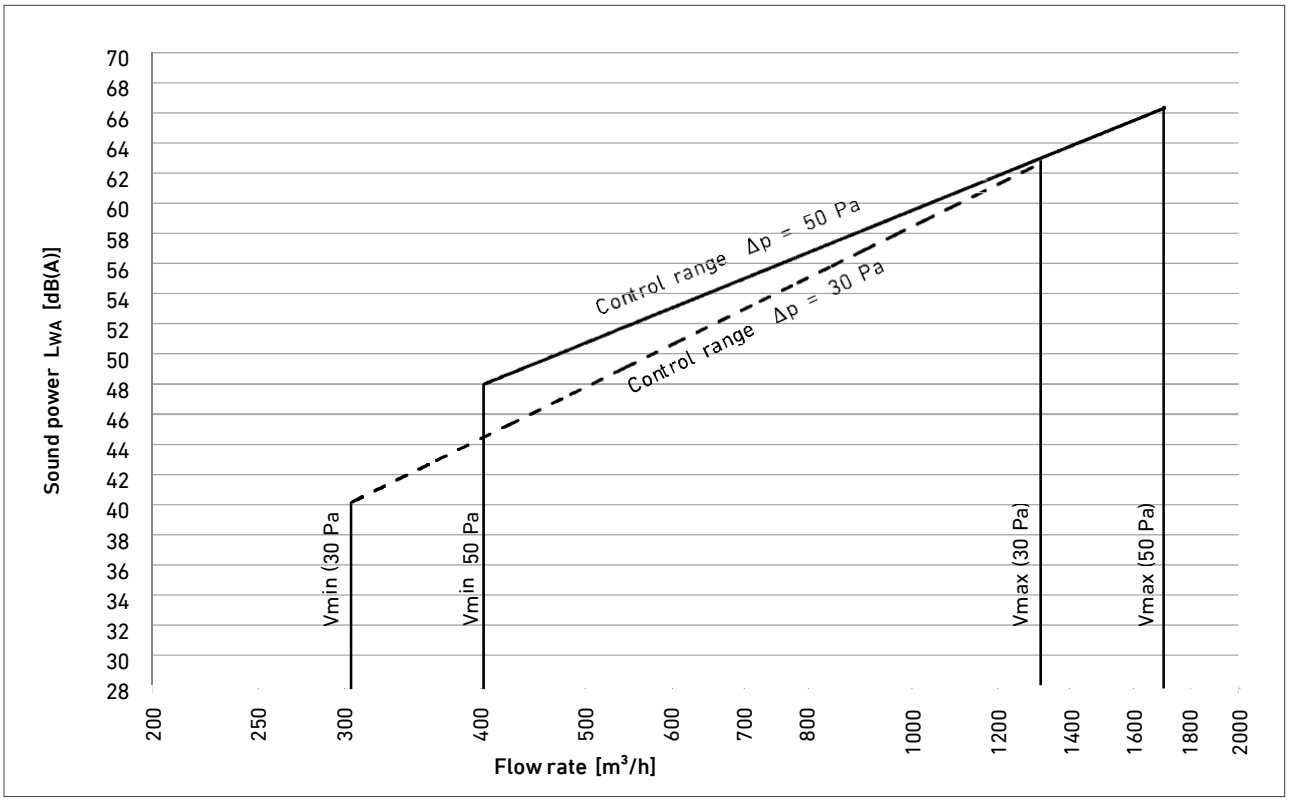
Dimensioning diagram, size 315, with connection D_{nom} 250 mm



Sound power, size 315, with connection D_{nom} 315 mm



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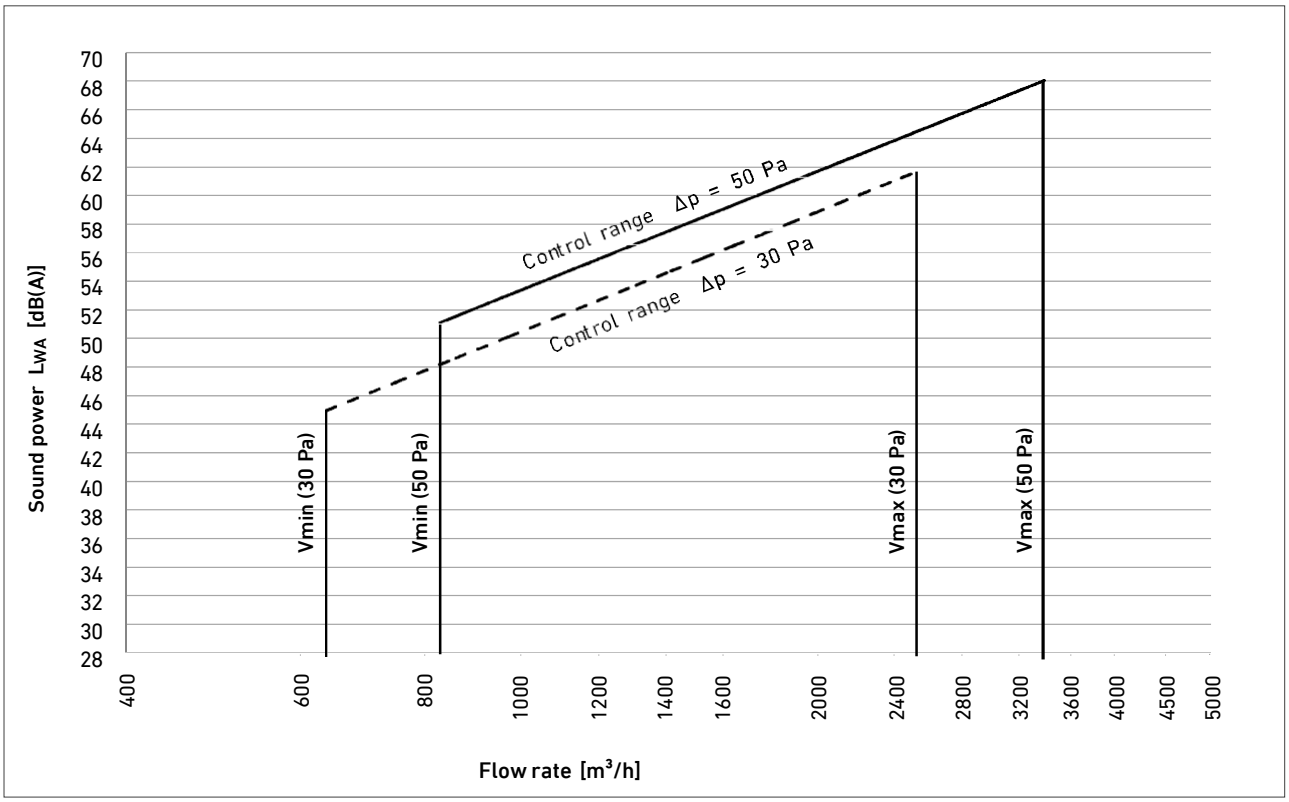
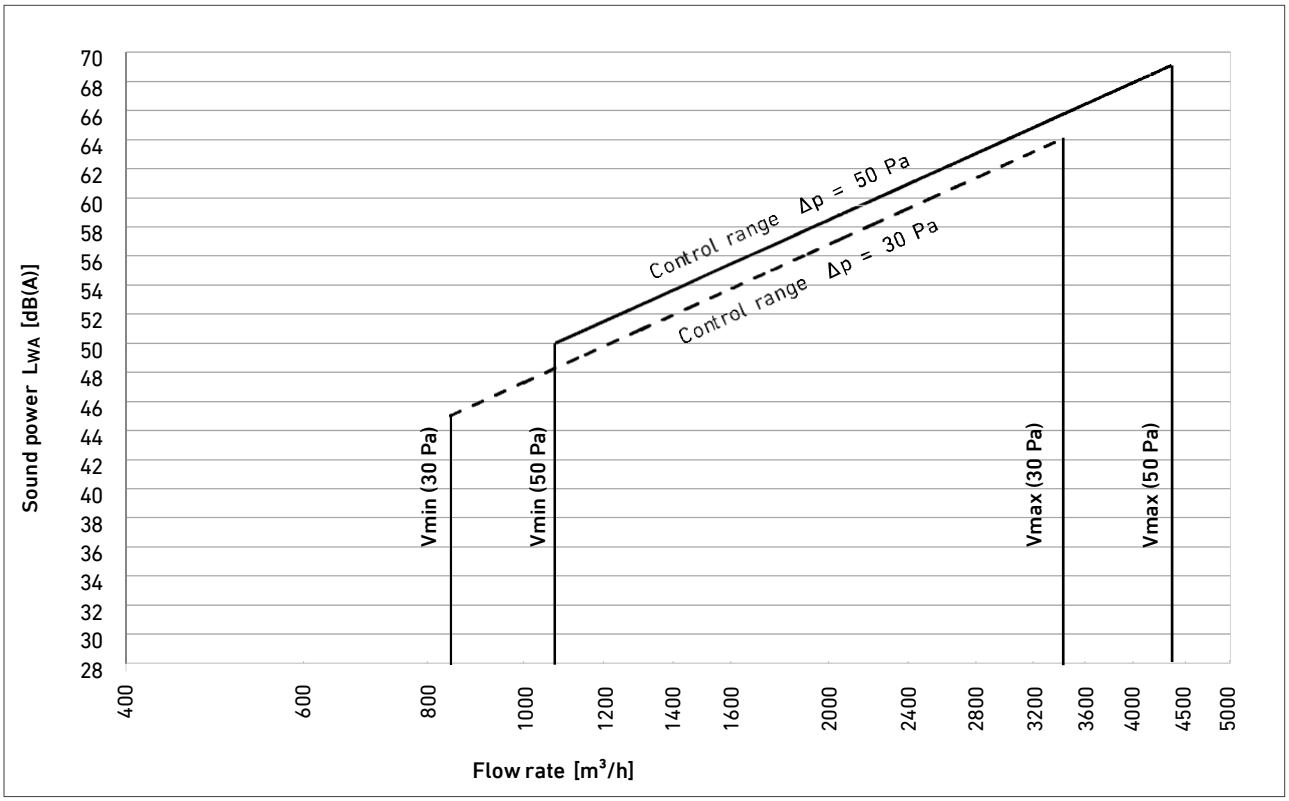
Dimensioning diagram, sound power, size 500, with connection D_{nom} 400



Dimensioning diagram, sound power, size 500, with connection D_{nom} 500



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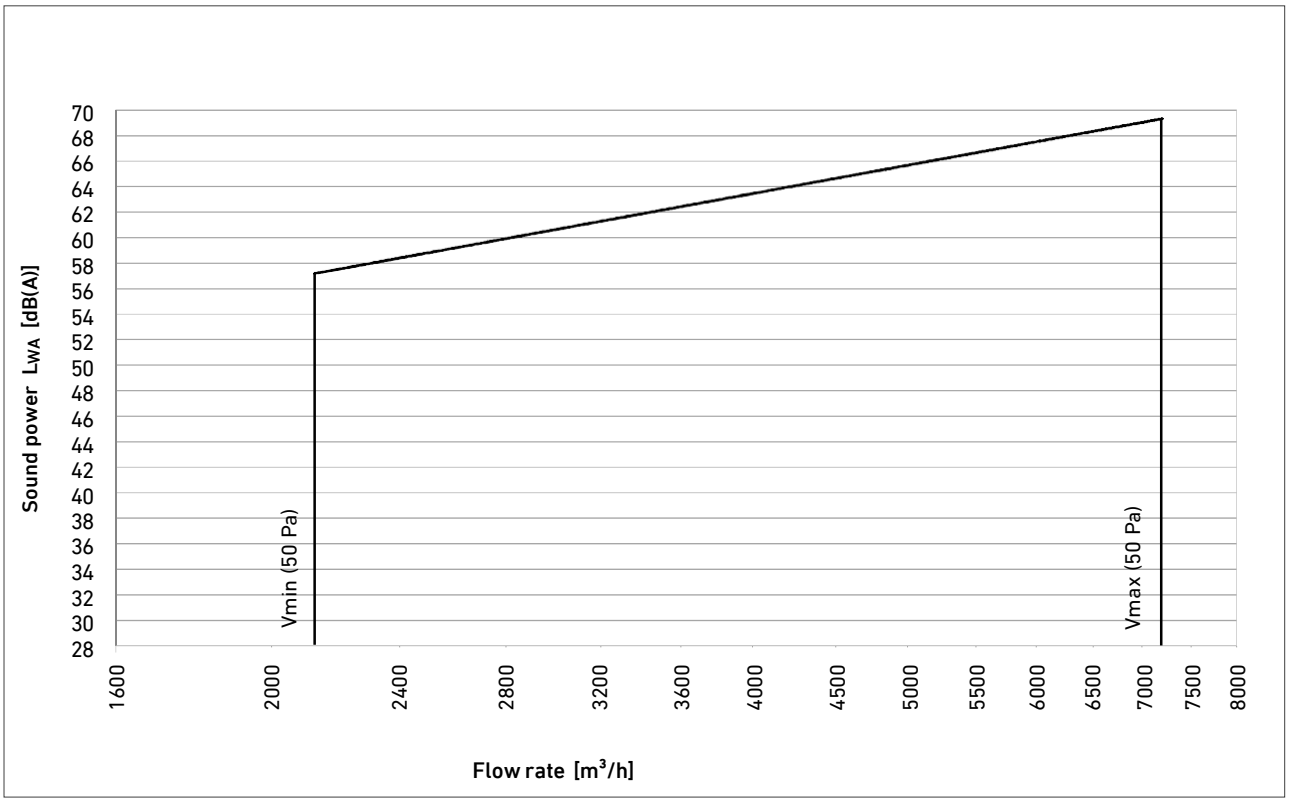
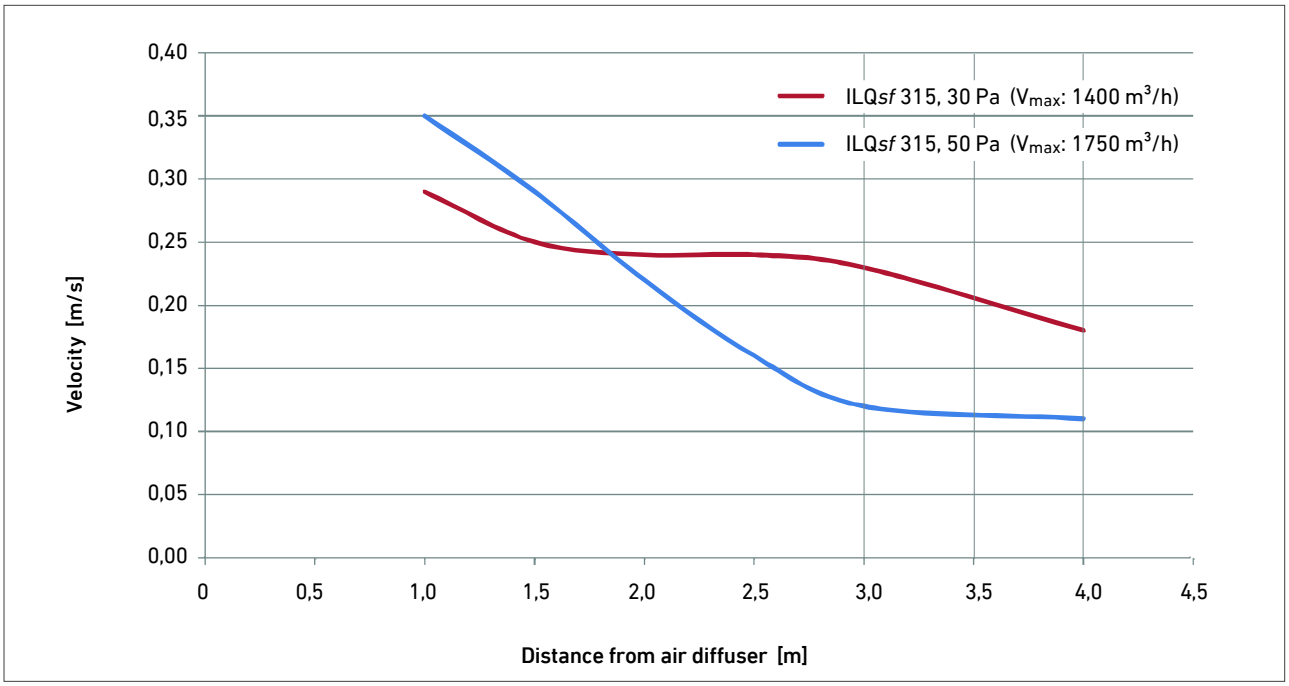
Dimensioning diagram, sound power, size 630, with connection D_{nom} 630



Air velocities in vicinity, size 315



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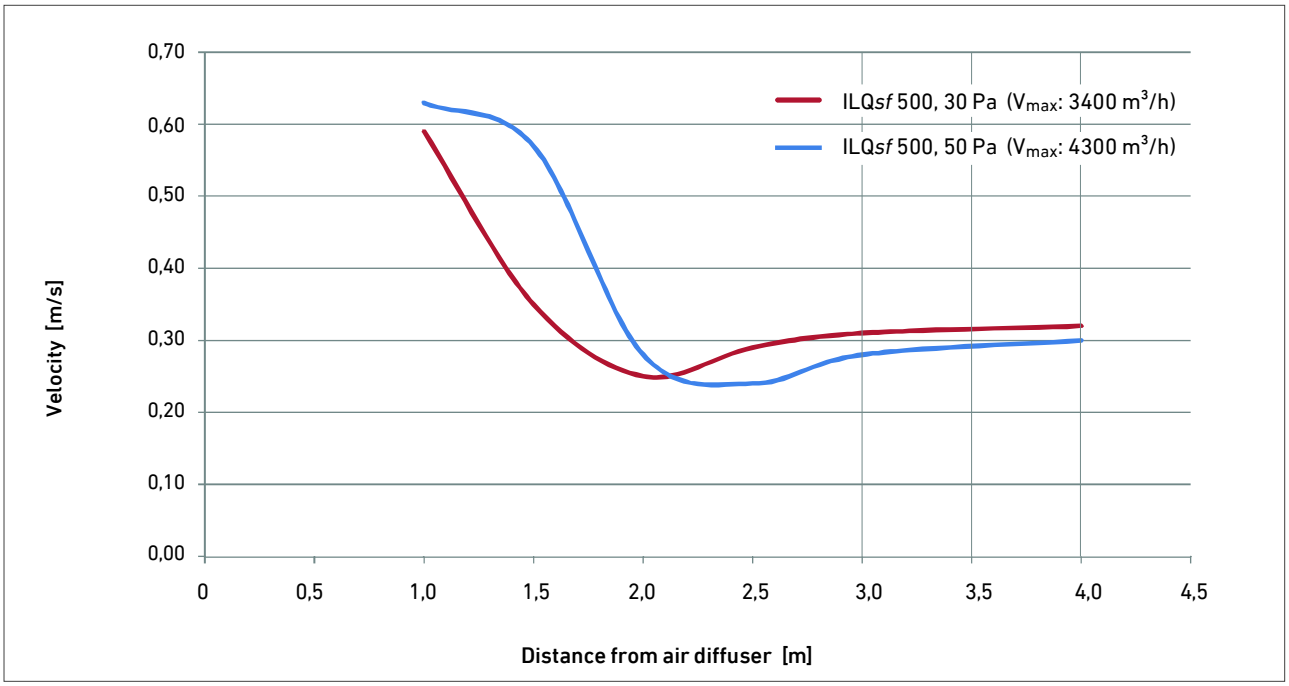
Air velocities in vicinity, size 500



Design according to layer thickness

With layered ventilation, the level of the fresh air layer should be at least 2 m. The supply air flow required here must compensate for the thermic air flows at the machines and also the waste air extracted at the machines in the frequented zone. For design according to VDI 3802, the surfaces of the production equipment, their height, alignment and temperatures must be known to permit calculation of the uplift volume flows. This allows the distances between the air diffusers and the supply air flow rates to be determined. In an early project engineering phase, however, these quantities are usually not known.

In practice the optimum supply air quantities per m^2 are set based on experience, and later optimised during commissioning (see table). This is why it is very important for the flow rates to be easily reset during operation or to be regulated over a wider range.

To achieve low thermal load values (< 0.6), the air diffusers should be positioned as close as possible to the floor. If the material loads are extracted upwards by the load, even smaller material load values are obtained (< 0.3). Materials heavier than air should be extracted at floor level. An air diffuser position at the 3 m level then has advantages.

Design according to thermal comfort

The ILQ*sf* are designed for a constant static pressure loss over the full regulation range in the connection cross-section.

The pictures on page 6 show the distribution of room air velocities for size 615 at a bottom temperature of -5 K and two installation heights in the room, depending on the distance from the air diffuser. Since the mixing head in vicinity determines the velocities, a distance of 2 m is recommended for V_{min} too.

In the case of cooling, the radial penetration depths are sufficiently greater with more than 10 m.

Thermal loads and flow rates based on VDI 3802 and VDI 2262

Production	Supply air flow rate [$m^3/h/m^2$]		Thermal load [W/m^2]
Mechanical production	20...75 (10...40)		50...250 (10...75) *
Assembly, Bodymaking	20...30		25...45
Foundry	Diecasting Sand treatment	60...80 50...60	200...300 50...100
Forming technology	Cold forming Hot forming	20...30 30. 50	100...200 150...300
Storage	0...10		0...10

* Heat generated in the room when cooling lubricants are used, enclosure, direct cooling and chip removal in a machine tool

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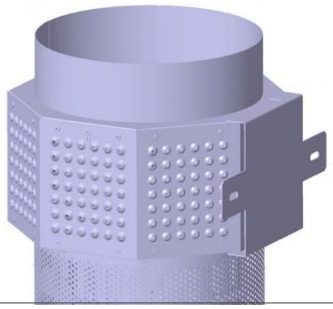
Installation

Installation on the floor

The round air diffuser is set up on the floor or on a platform and directly connected to the air duct network. It is optionally fastened directly to the floor using angle sections supplied by others, or by a wall mounting in the case of wall / column mounting.

Type ILQ*sf* ..././../B/W/...
floor-standing version

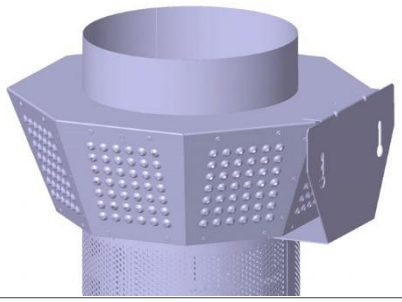


Wall fixture for floor mounting

Installation above the frequented area

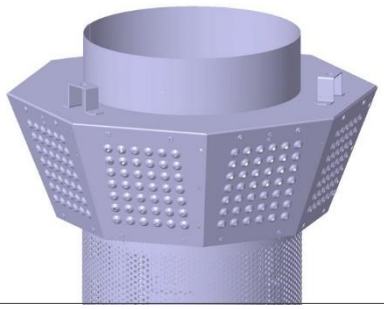
If the air diffuser is mounted on a wall or column, this is achieved by a wall mount that is directly connected by a screw connection to the air diffuser and to the wall or column. Accurate vertical alignment must be ensured. In the case of freely suspended mounting, the air diffuser is suspended from the ceiling using threaded rods and the mounting angles provided on the diffuser.

Type ILQ*sf* ..././../H/W/...
freely-suspended version
(wall mounting)



Wall fixture for freely suspended version

Type ILQ*sf* ..././../H/F/...
freely-suspended version



Ceiling fixture for ceiling mounting

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Nomenclature, ordering code

ILQ*sf*	315	/	S	/	30	/	B	/	W	/	315	/	V
(1)	(2)		(3)		(4)		(5)		(6)		(7)		(8)

(1)	Series	ILQ*sf*	=	Industrial air diffuser
(2)	Size	315	=	315
		500	=	500
		630	=	630
(3)	Control	S	=	Mechanically self-operated adjustment
		E	=	Motor-powered adjustment
		0	=	Without
(4)	Static operating Pressure	30	=	... in Pa
		50	=	... in Pa
		–	=	Variable (without adjustment)
(5)	Version	B	=	Floor-standing
		H	=	Suspended
(6)	Installation	W	=	Wall / column mounting
		F	=	Freely suspended (angle of discharge 360 °)
(7)	Connecting diameter	250	=	Ø 250 (size 315 only)
		315	=	Ø 315 (size 315 only)
		400	=	Ø 400 (size 500 only)
		500	=	Ø 500 (size 500 only)
		630	=	Ø 630 (size 630 only)
(8)	Surface, material	V	=	galvanised
		P	=	Powder-coated as per RAL .... (indicate RAL number)
		E	=	Stainless steel V4A

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SYSTEMS

Comfort Air Technology

Air-Water Systems
Air Diffusers
Air Distribution

Process Air Technology

Fans
Filtration Technology
Humidification Technology

Engineering Services

Laboratory Test & Experiment
Field Measurement & Optimisation
Simulation & Expertise
R&D & Start-up

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Grenzstraße 7
70435 Stuttgart
Germany
Tel.: +49 711 8201-0
Fax: +49 711 8201-720
info@LTG-inc.net
www.LTG-inc.net

LTG Incorporated
105 Corporate Drive, Suite E
Spartanburg, SC 29303
USA
Tel..: +1 864 599-6340
Fax: +1 864 599-6344
info@LTG-INC.net
www.LTG-INC.net

ILQsf-eng-TP (12/24) 419-185
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