The Innovation Company

LTG Aktiengesellschaft

Industrial Air Diffuser Type DLD for Heating and Cooling

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DLD-E-TP-01 (06/09) 419-33

Components for Room Air Technology

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E-Mail: info@stepyapi.com.tr

The Program for Room Air Technology

Components

Air diffusers for walls, floors and ceilings · LTG System clean® · linear diffusers Coandatrol® · ceiling air diffusers Coandavent® · displacement diffusers · LTG chilling fans cool wave® · induction units Klimavent® · fan coil units Raumluft · ceiling fan coil units Ventotel® · facade fan coil units · airflow control units · labair® system

Engineering services

Technical services for investors, architects, engineers and plant builders during design, construction and operation of buildings. Reliable and precise data relating to the ventilation of air conditioning system are given already before realization of the project, determined by measurements, calculations, building simulations and experiments.

Components for Process Air Technology

Japan

Toho Engineering Co. Ltd.
14-11, Shimizu 3-Chome, Kita Ku
Japan 462 Nagoya
☎ (052) 9 91-10 40, Fax (052) 9 14-98 22
E-Mail: main@tohoeng.com

The Program for Process Air Technology

Components

Axial-flow, centrifugal and tangential fans · Collector system for: coarse and fine particle filtration, separating and compacting, compressing and humidifying.

Engineering services

Technical services for construction engineers and plant designers during development and operation of assembly groups, machines and plants.

Diffusers are decisive in the performance of air conditioning and ventilation systems in rooms

Application

The Industrial Air Diffuser Type DLD has been designed specifically for production buildings characterized by large production equipment with thermal effect caused by high heat loads from machines or an extreme length/ width of the hall (Type DLD.../H) where standard ventilation from the hall's side walls will provide insufficient cooling.

This diffuser is however suitable for installation close to the occupied zone (Type DLD.../N and DLD.../K).

Depending on the type, the installation of the Industrial Air Diffuser DLD may be performed either between the craneway and the hall ceiling at a height of 5...12 m or underneath the craneway at a height of 3...5 m.

Advantages

- One diffuser for any installation height providing both cooling and heating.
- Heavy-duty air diffuser with high heating and cooling capacity.
- Large range of adjustment.
- Low air speed in the occupied zone.
- Good penetration into the occupied space in both heating and cooling mode.
- Modular construction meeting individual requirements, e.g. when changing operating conditions.
- Adjustable air jet : electrical, manual or pneumatic actuator.

Industrial Air Diffuser Type DLD with nozzle facing

You will find the actual ***tender documentations*** at the end of this document.
They are available in word format at your local dealership or at www.LTG-AG.de.

Industrial Air Diffuser Type DLD

Operation

The air diffuser comprises a cylindrical perforated sheet metal casing and integrated nozzle. The supply air enters the casing through a honeycomb flow guide and is deflected when contacting the interior orifice plate. Thus, the flow pattern is standardized even when branching pieces and elbows are used.

Cooling mode

In the cooling mode, the air is diffused horizontally. A wide radial spreading of the cold air ensures that draft phenomena in the occupied zone are avoided.

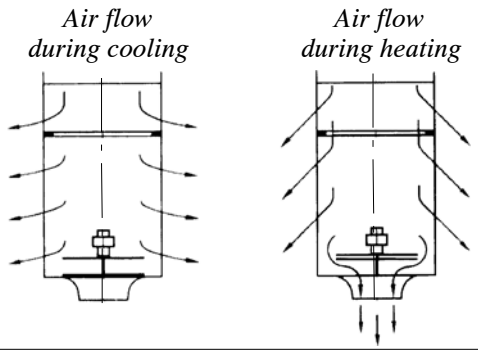
Heating mode

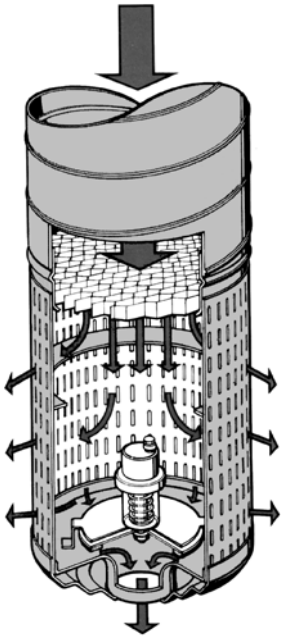
In the heating mode, the air is discharged downwards. An increased flow pulse ensures that the heated air reaches the occupied zone. With a supply air temperature higher than the ambient air temperature, the increased flow pulse is achieved through opening one of the nozzles pointing downwards. The penetration depth may be continously adjusted depending on the temperature difference between the supply air and the ambient air, thus ensuring good penetration into the occupied zone. Continous adjustment may be realized manually, pneumatically or electrically.

Installation

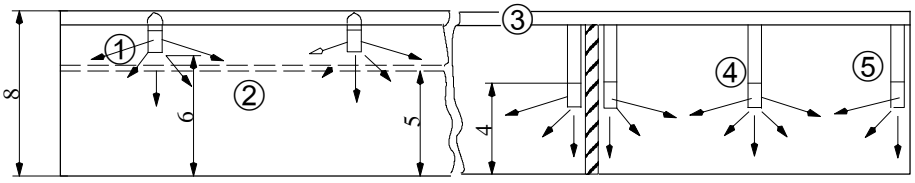
The diffuser can be mounted on a duct bend or take-off below the main duct.

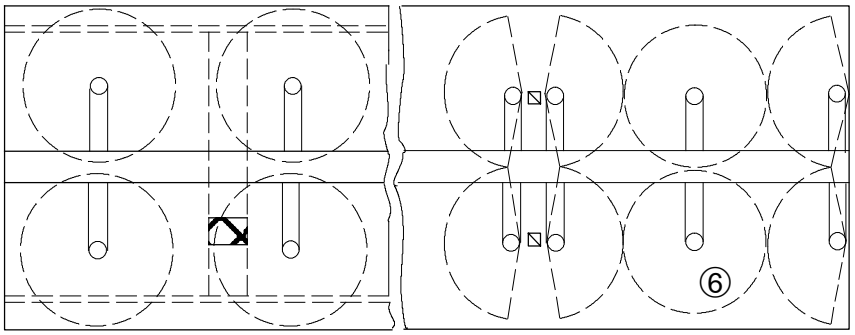
In addition to plug and flange connections, a METU quick-acting clamping device is also available.





Industrial Air Diffuser Type DLD.../D/..
with nozzle and nozzle facing (option)



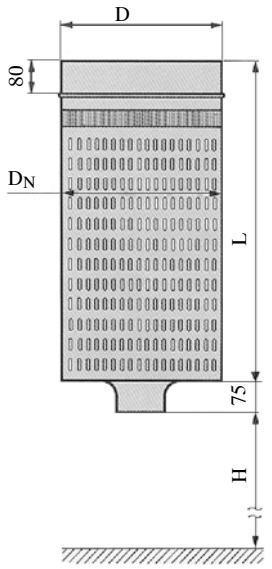


① DLD 400D/H/F
② craneway
③ supply air duct
④ DLD 400D/N/F
⑤ DLD 400D/N/W
⑥ radial air spreading

Industrial Air Diffuser Type DLD

Product range

Size:	Ø 400 mm; Ø 500 mm; Ø 630 mm
Type:	D = with nozzle
Installation height:	H = high N = low (standard version) K = low (for low-activity workplaces)
Installation type	F = 360°, freely suspended W = 180°, wall or column mounted
Duct connection:	plug connection flange METU
Surface finish:	powder coated - similar to RAL, galvanized
Adjustment:	manual, pneumatic, electric



Dimensions /Performance data

Installation height		DLD.../D/**N**/..			
Installation type		**400**/D/N/**W**	**500**/D/N/**W**	**400**/D/N/**F**	**500**/D/N/**F**
Size	D_{Nenn} [mm]	400	500	400	500
Height	L [mm]	770	950	770	950
Connecting diameter	D [mm]	399	499	399	499
Installation height	H [m]	3...5	3...5	3...5	3...5
Recommended flow rate	V [m^3/h]	1500...3000	2500...4000	1500...3500	2500...4500
Cooling mode	Δt_{max} [K]	-10	-10	-10	-10
Heating mode	Δt_{max} [K]	20	20	20	20

Installation height		DLD.../D/**K**/..			
Installation type		**400**/D/K/**W**	**500**/D/K/**W**	**400**/D/K/**F**	**500**/D/K/**F**
Size	D_{Nenn} [mm]	400	500	400	500
Height	L [mm]	770	950	770	950
Connecting diameter	D [mm]	399	499	399	499
Installation height	H [m]	3...5	3...5	3...5	3...5
Recommended flow rate	V [m^3/h]	1000...2500	2000...3500	1000...3000	2500...4000
Cooling mode	Δt_{max} [K]	-10	-10	-10	-10
Heating mode	Δt_{max} [K]	20	20	20	20

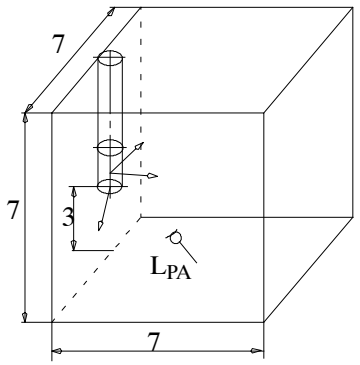
Installation height		DLD.../D/**H**/..			
Installation type		**400**/D/H/**W**	**400**/D/H/**F**	**500**/D/H/**F**	**630**/D/H/**F**
Size	D_{Nenn} [mm]	400	400	500	630
Height	L [mm]	770	770	950	1085
Connecting diameter	D [mm]	399	399	499	629
Installation height	H [m]	5...7	5...7	7...9	9...12
Recommended flow rate	V [m^3/h]	1500...3000	2000...4500	3500...6000	6000...9000
Cooling mode	Δt_{max} [K]	-10	-10	-10	-10
Heating mode	Δt_{max} [K]	20	20	20	20

Industrial Air Diffuser Type DLD

Selection

With a given installation height and flow rate per diffuser, the DLD dimensioning diagram may be used to determine the following values :

- The recommended maximum temperature difference between the supply air and the ambient air in the occupied zone in the heating and cooling mode.
- The sound power level based on which the sound pressure level may be determined for the occupied zone.
- The static pressure loss for duct system calculation.
- The radial air jet diffusion range.
- The size of the ventilated hall area as a criterion for the arrangement of the air diffusers in the hall. The minimum distance between two diffusers should not be lower than the diffusion range.



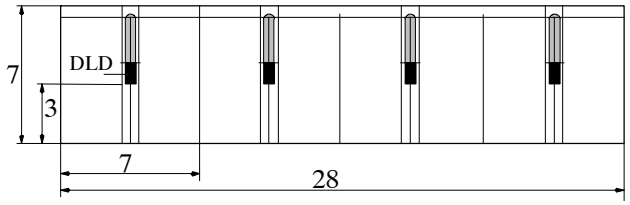
T_N = Reverberation time (abt. 1.5 s)
V = Hall segment volume
L_{PA} = L_{WA} + 10 lg T_N -10 lg V + 14
= L_{WA} + 2 - 25 + 14
= L_{WA} - 9 (acc. to the example given)

Example in the diagram

The example refers to the diagram DLD..../D/N/W on the following page.

Given:

Factory building section (s. sketch)
Depth of section: 7 m
Max. cooling load Q_{Kmax}: 27 kW
Max. heating load Q_{Hmax}: 50 kW
(heating mode)
Installation height H: 3 m



Factory building layout

Unknown values:

Flow rate	V	[m^3/h]
Sound power level	L_{WA}	[dB(A)]
Static pressure loss	Δp	[Pa]
Max. air jet diffusion	A_{max}	[m]
Ventilated hall area	F	[m^2]

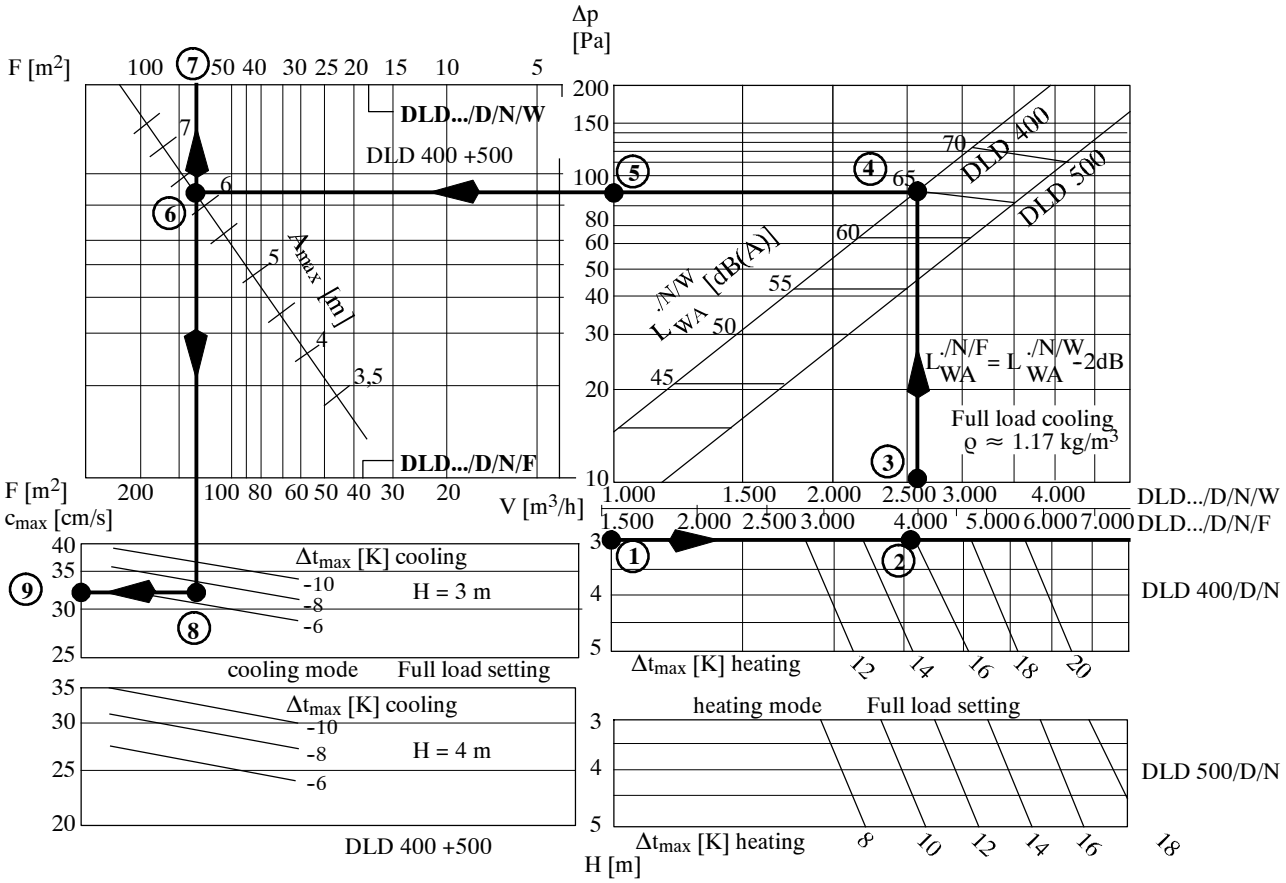
1. H = 3 m
2. Δt_{max} = 16 K (heating)

Reading:

3. V = 2600 m^3/h
   Max. heating capacity/diffuser Q_{Hmax}
   = c • ϱ • V • Δt
   = 1007 • 1.13 • 16 = 13 kW
   Total capacity = 52 kW
   = 52 kW < 50kW ☛ heating mode O.K.
4. L_{WA} = 65 dB(A) /diffuser
   L_{PA} = L_{WA}-10 lg 343 + 16 =
   56 dB(A)
5. Δp = 88 Pa
6. A_{max} = 6.2 m
7. F = 60.4 m^2
   required cooling capacity/diffuser
   =27 kW/4 = 6750 W
8. Selected: Δt = -8 K
   Q_{Kmax} = c • ϱ • V • Δt
   = 6980 W
   Total cooling capacity = 4 • 6980 W
   = 27.9 kW > 27 kW ☛ O.K.
9. c_{max} = 33 cm/s (cooling mode)

Industrial Air Diffuser Type DLD

Selection diagram DLD .../D/N/...

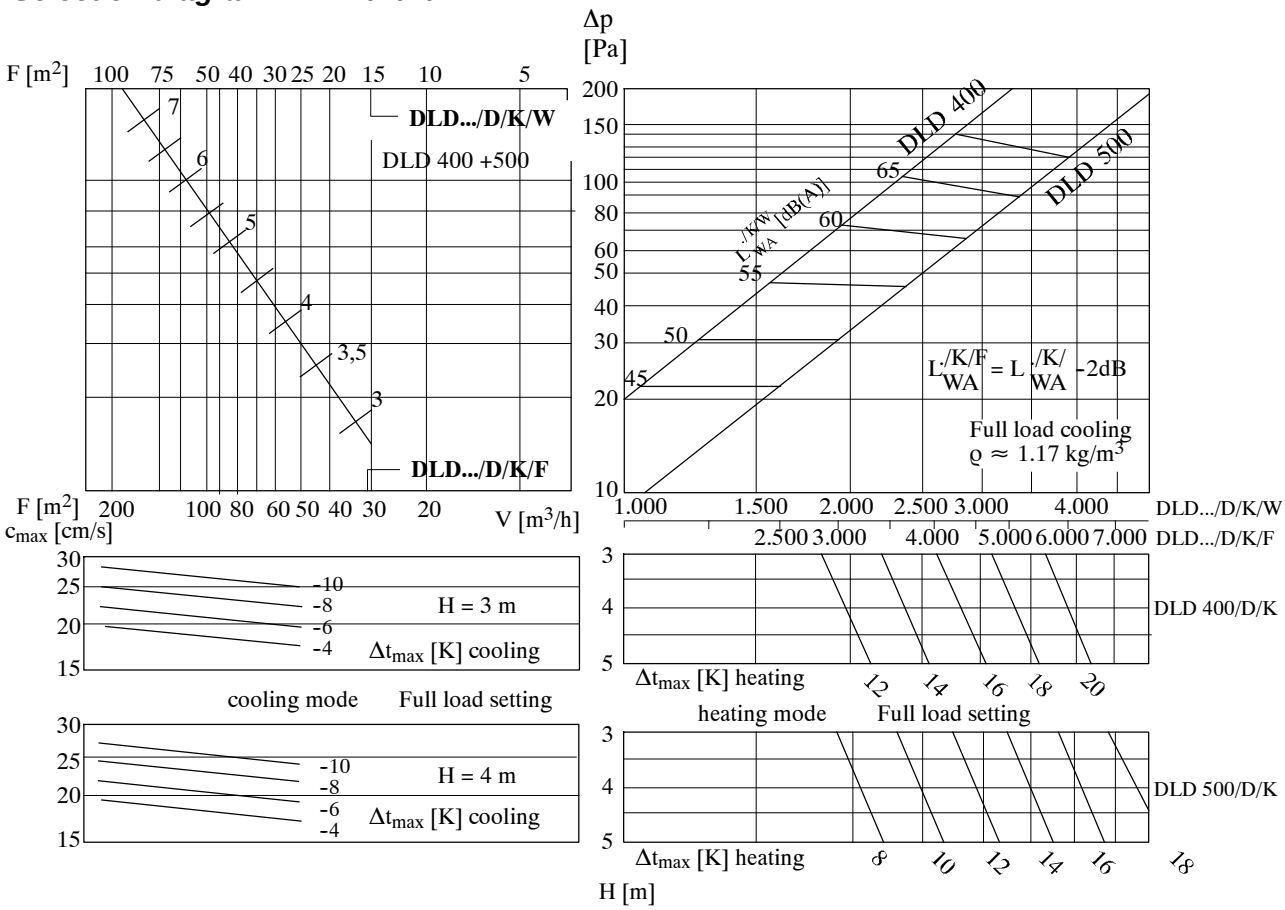


Type DLD.../D/N/...

The Air Diffusers Type DLD..../D/N/W and .../D/N/F are suitable for low installation heights of 3-5 m and high cooling loads. Sizes 400 and 500 are available with a diffusion angle of 180° for wall/column mounting or alternatively with a diffusion angle of 360° when freely suspended.

Industrial Air Diffuser Type DLD

Selection diagram DLD .../D/K/...

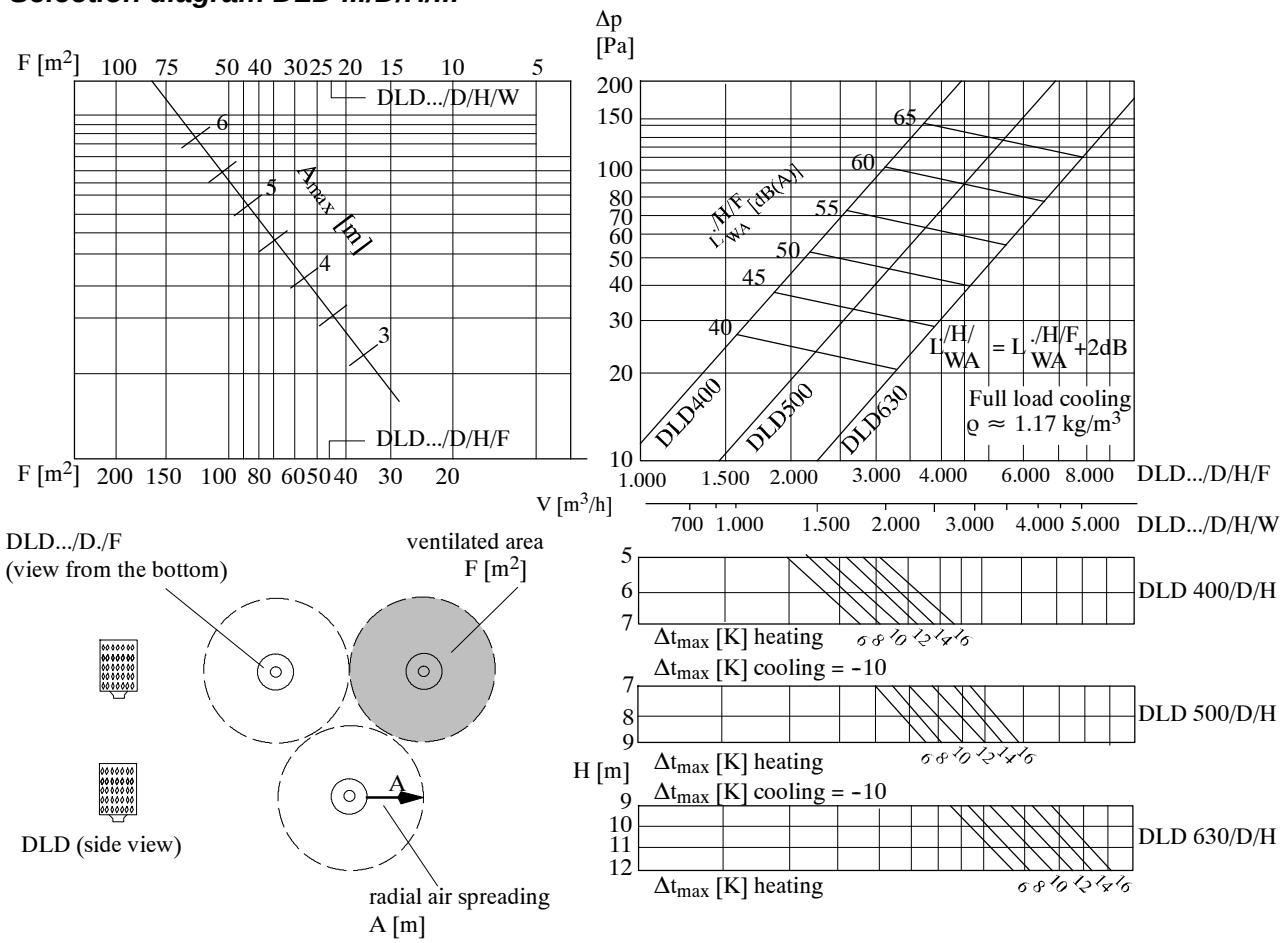


Type DLD.../D/K/...

The Air Diffusers Type DLD..../D/K/W and .../D/K/F are specifically designed for workplaces with a low activity level and allow very low air speeds in the occupied zone at a low installation height. Sizes 400 and 500 are available with a diffusion angle of 180° or 360°.

Industrial Air Diffuser Type DLD

Selection diagram DLD .../D/H/...



Type DLD.../D/H/...

The Air Diffuser Type DLD..../D/H is suitable for significantly higher temperatures of the supply air in the heating mode and for suspension heights of 5 to 12 m, but it may equally be used at lower installation heights in case of high heating loads and low flow rates. Depending on the flow rate, size 400, 500 or 630 may be selected.

Apart from the freely suspended version (Type DLD.../D/H/F) with a diffusion angle of 360°, size 400 is also available in a version for wall/column mounting (Type DLD.../D/H/W) with a diffusion angle of 180°.

Industrial Air Diffuser Type DLD

Air Flow Control Unit Type LSE

Application

In order to obtain a nearly constant air penetration, while considering the temperature difference between the room air and the supply air, the heating and cooling mode flow directions are automatically controlled.

Operation

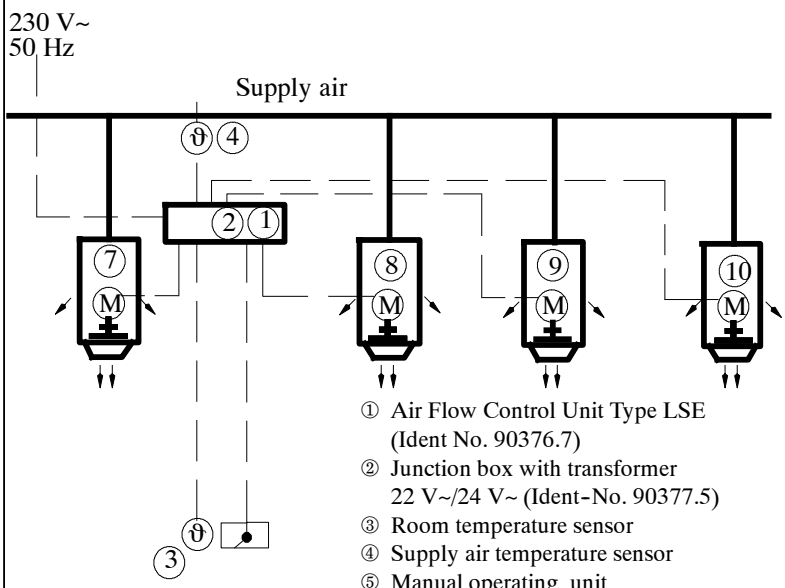
Room temperature and supply air temperature are measured through one sensor each and transmitted to the Air Flow Control Unit LSE capturing and analyzing the analog signals. Depending on the set parameters, an analog output voltage of 0...10 V is released to the DLD diffusers to activate the actuators.

Design

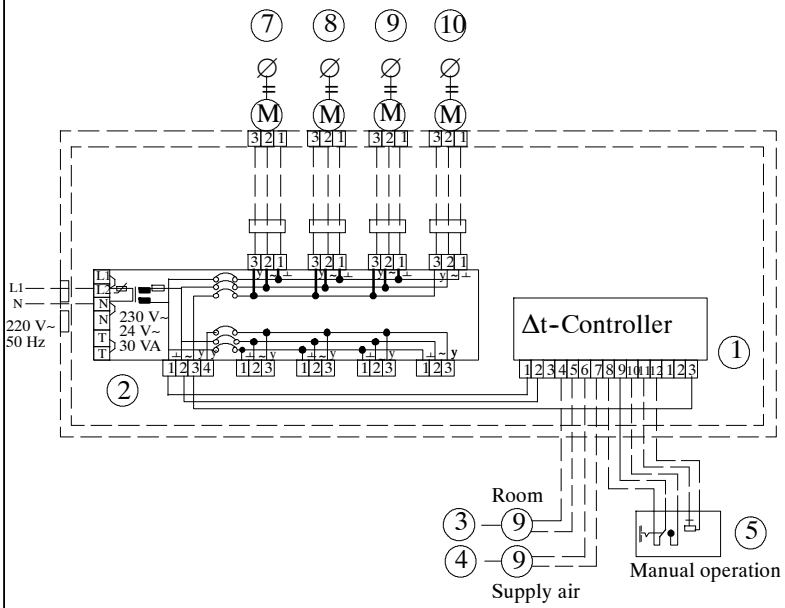
The Air Flow Control Unit LSE comprises a casing for installation in the switch cabinet, a room temperature sensor for installation in the occupied zone and a duct temperature sensor for integration into the supply air run.
Wiring is by the installer according to the diagram.

Performance data

Casing:	temperature resistant up to +100 °C.
Protective system:	IP 20
Dimensions:	100 x 75 x 55 mm
Max. temperature difference between room air and supply air	+/- 10 K
Supply voltage:	24 VAC
Analog output:	0...10 Volt DC
Temperature sensor:	Ni 1000



① Air Flow Control Unit Type LSE (Ident No. 90376.7)
② Junction box with transformer 22 V~/24 V~ (Ident-No. 90377.5)
③ Room temperature sensor
④ Supply air temperature sensor
⑤ Manual operating unit (Ident No. 92957.3)
⑦...⑩ Actuator KM 24 S...



Special version: Transformer and Air Flow Control Unit together in **one** casing, to control up to 4 actuators (Ident No. 92958.1).

Protective system: IP65.

Dimensions: 360 x 200 x 150 mm.

Industrial Air Diffuser Type DLD

Air Flow Control Unit Type LSE

Setting

Various potentiometer settings are possible:

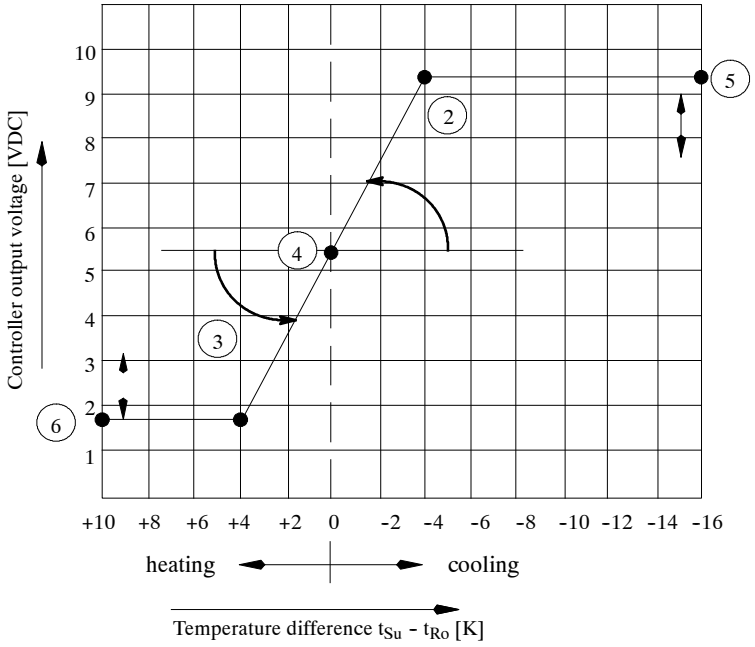
- Characteristics for cooling mode and heating mode can be changed.
- Min./max. boundaries of the actuating signal
- Shifting of the characteristic's breakpoint

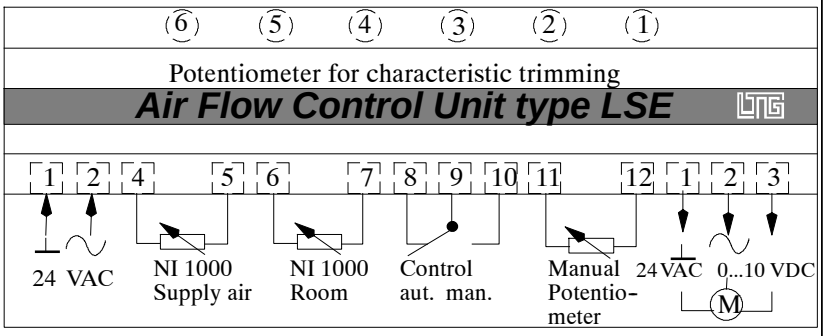
Potentiometers are factory-set.

Potentiometer occupancy for characteristic trimming:

① Sensor balancing (compensation of resistance tolerances)
② Slope of the upper characteristic (cooling)
③ Slope of the lower characteristic (heating)
④ Zero shift (isothermal operation)
⑤ Variation of full-load setting (cooling)
⑥ Variation of full-load limit (heating)

Characteristic at standard setting





Industrial Air Diffuser Type DLD

Nomenclature

DLD ... / . / . / . / . / . / .... / . /

Size:
Ø 400, 500, 630 mm

Type:
D = with nozzle

Installation height:
H = high
N = low (standard)
K = low (for low-activity workplaces)

Installation type:
W = wall-mounted (diffusion angle 180°)
F = freely suspended (diffusion angle 360°)

Duct connection:
S = plug connection
F = flange
M = METU (recommended standard)

Adjustment:
mk = manually adjustable with crank (optional)
mv = manually adjustable with conternut (preset)
p = pneumatic 0.2 ... 10 bar)
e = electric (24 VAC)

Surface:
V = galvanized
P = powder coated similar to RAL,
(please indicate color code)

Nozzle facing:
J = with
O = without

Specification and Schedule of Prices

Industrial Air Diffuser Type DLD

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Qty.	Description	Unit Price in €	Total price in €
	Industrial air diffuser for heating and cooling halls at installation heights of 3 to 12 m. Cooling: In the cooling mode, the air is blown out horizontally. Through broad radial spreading of the cold air, drafts in the occupied space are avoided. Heating: In the heating mode, the air is discharged downwards into the occupied zone. In case of large installation heights, huge excess temperatures of the supplied air during heating or small volume flow rates and low installation heights, the increased flow impulse is achieved by opening a nozzle pointing downward. The penetration depth is infinitely variable depending on the temperature difference between supply and ambient air, thus ensuring an excellent air exchange in the zone close to the floor. Diffuser comprising of: Cylindrical perforated sheet jacket with deflection plate and diffuser head with integrated nozzle including a honeycomb rectifier for unifying the flow pattern when bends are connected in line **Sizes:** o 400 mm Ø o 500 mm Ø o 630 mm Ø **Suspension height:** o H = heigh (5-7 m or 9-12 m resp.) o N = low (3-5 m) **Installation:** o W = wall/column mounting (diffusion angle: 180°) o F = freely suspended (diffusion angle: 360°) **Manufacturer:** **LTG Aktiengesellschaft** **Series:** **Industrial Diffuser** **Type :** **DLD**		

Specification and Schedule of Prices

Industrial Air Diffuser Type DLD

Qty.	Description	Unit Price in €	Total price in €
	Variants: Duct connection: o M = metu (recommended standard) o S = plug connector o F = flanged connection Adjustment: o m = manual o p = pneumatic (0.2..1.0 bar) o e = electrical (0...10 VDC) Surface finish: o V = galvanized o P = powder coated similar to RAL Nozzle jacket: o J = with o O = without **Accessories/special version** (optional, at extra charge): o Air guide control unit Type LSE suitable for max. 10 DLD...../e for connection to 24 V ~ power supply, w/o transformer, w/o distributor, w/o temperature probe, w/o manual control unit. o Manual control unit suitable for LSE in IP 65 casing. o Air control unit, transformer and distributor in IP 65 casing, suitable for max. 4 DLD .../e for connection to 230 V ~ power supply, w/o temperature probe, w/o manual control unit. o Complete control unit for DLD.../e comprising of: air guide control unit, transformer and distributor in IP 65 casing, suitable for 4 DLD .../e, for connection to 230 V ~ power supply, with room temperature and duct temperature probe including IP 65 manual control unit, however w/o wiring between temperature probe and controller or between manual control unit and controller, respectively.		