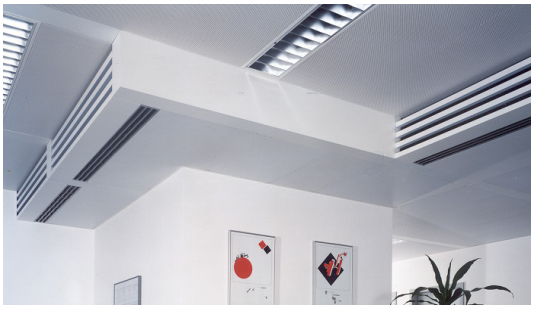
AIR TECH
SYSTEMS

Technical Brochure

LTG Air-Water Systems

LTG Induction LTG FanPower

Air conditioning system Indivent



Ceiling installation

www.LTG.net

Technical brochure • Air conditioning system Indivent, ceiling installation

LTG Comfort Air Technology

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

Content

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.
For the outlet grille special tolerances stated in the drawing apply.

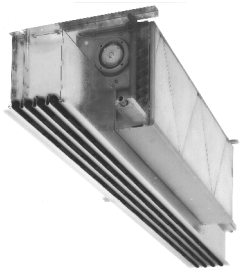
Straightness and twist tolerances for extruded aluminium profiles according to DIN EN 12020-2.

The surface finish is designed to meet the requirements for applications in buildings - room climate according to DIN 1946 part 2. Other requirements on request.

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

Air conditioning system Indivent®, ceiling installation

Product overview

Type	Induction unit type LHG	Fan coil unit type LVC	Fan coil unit type VKE
Geräteansicht			
Function	Induction unit for constant primary air flow rate	Fan coil unit for recirculation air operation	Fan coil unit for recirculation air operation and high caloric capacity
Water system	Two-pipe system, four-pipe system		
Variants	Water-side control by valves Air-side control by bypass dampers with damper actuator	Water-side control by valves Fresh air intake on request	Water-side control by valves
Installation	Over the core wall in a ceiling bulkhead (without suspended ceiling) Over the core wall in a suspended ceiling		
Sypply air guidance	2-directional (linear diffuser type LDB)	1-directional (diffusion socket)	
Sizes	500, 630, 800, 1000, 1200	630, 800, 1000, 1200	1100

Types

LTG offers different types for any application. The main distinctive feature of the LTG induction units is the way the temperature is controlled.

Two-pipe system
The unit has only one heat exchanger through which chilled water flows for cooling and hot water for heating. Thus, it is only possible to either heat or cool in a single water circuit.

Four-pipe system
The unit has two separate water systems, one for heating, the other for cooling. Thus, chilled and hot water will always remain separate. The four-pipe system fulfills all requirements on varying loads and small control zones.

Valve control (water-side control)
The heating or cooling output of the heat exchanger is controlled by modifying the water flow.

Damper control (air-side control)
The heating or cooling output is controlled by modifying the flow of secondary air. Adjustable dampers guide the air current through the air cooler or the air heater or they divert the secondary air through a bypass avoiding the heat exchanger. The water flow remains constant.

Air conditioning system LTG Indivent® for ceiling installation

Application

Modern air conditioning systems are required to remove heat loads and airborne substances from the occupied space in a safe and effective manner, without producing any draft.

The air conditioning system's construction, however, must leave room for flexibility with view to the appearance and use of the room. Furthermore, the system must be cost effective within a wide performance range.

The LTG air conditioning system Indivent® meets these requirements. It offers high thermal comfort by combining the advantages of both a mixed and a displacement air flow.

Installation, positioning

Units are usually installed over the 'core' wall, in a ceiling bulkhead or in a suspended ceiling. Indivent units require connection to the air conditioning system's primary air supply and the chilled water system.

Installation example for Indivent® system

Advantages

- **Comfort**
  - High cooling capacities and uniform temperatures in the entire occupied space.
  - High thermal comfort due to low air speeds and low turbulence.
  - High air quality - heat and airborne pollution are exhausted at high level.
- **Economy**
  - The Indivent® system requires only one compact, room saving air duct system since the heat loads are being removed via a compact chilled water system.
- **Flexibility**
  - Interior design of ceiling, lighting and window elements is permitted.
  - Workplaces in the room may be arranged according to requirement, without any restrictions.

Mode of operation

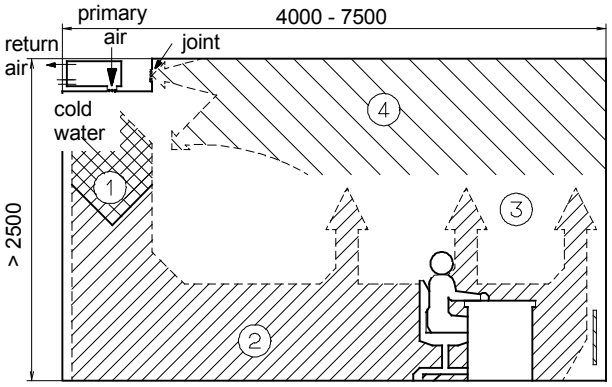
The LDB linear diffuser with integrated cooling is installed in the ceiling over the core wall while heating is provided through radiators located under the window. With this configuration, identical flow patterns during summer and winter are achieved.

Recirculated air is drawn in from the room and across a cooling coil. The mixture of fresh air and recirculated air is blown into the room through a linear diffuser. In the local mixed air zone ① the temperature/velocity differences between the ambient air and the supply air are reduced.

Close to the floor, the cooled air jet ② directs itself at low speed and with little turbulence across the occupied space towards the window. The air velocity is virtually independent of the cooling load. The temperature difference between the head and the foot level is less than 1K.

Air heated by room loads rises to high level ③.

Above the occupied space a cushion of warm room air with an increased pollution concentration is formed and removed from the room. In this way the formation of temperature layers ensures cost effective system operation ④.



Scheme of Indivent® system flow pattern

① **Mixed air flow**
Reduction of velocity/temperature differences due to high induction mixing with ambient air

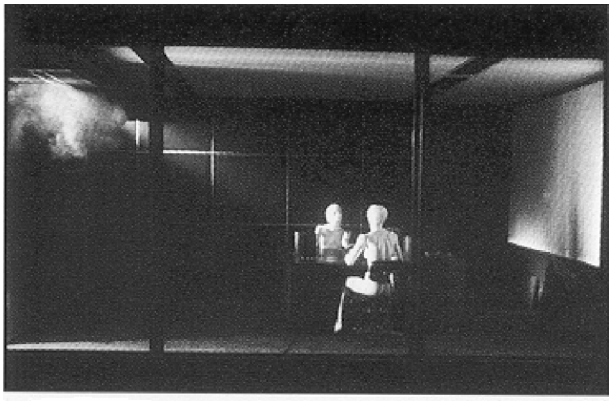
② **Displacement air flow**
Supply air mixed with ambient air, moves towards the facade

③ Thermal effect and displaced room air transport air borne pollution and thermal loads to high level.

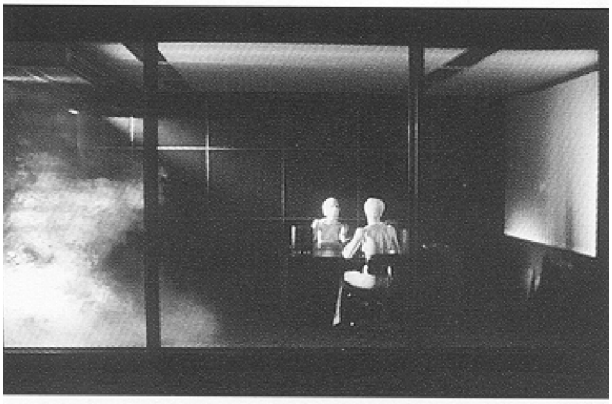
④ Return flow path to the exhaust location and for mixing with supply air

Air Conditioning System LTG Indivent® for ceiling installation

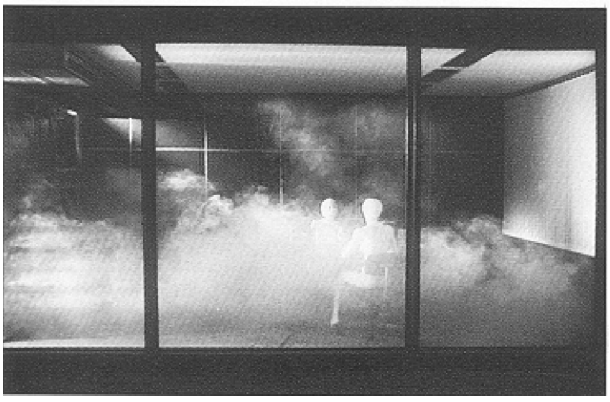
Indoor air flow



Local mixed air zone



Deflection of the air flow near the floor



Air heated by occupants or equipment rises to high level

Proposed installation

The **best installation position** for the linear diffusers depends on:

- use of the room
- type of room
- ceiling design
- return air path inside the false ceiling.

Flexibility of diffuser design and adjustment, ensures a perfect solution from both flow technology and aesthetic aspects, for example:

Ideal location for the induction unit/ fan coil unit with return air is within an **open grid ceiling**.

Equally successful are **closed false ceilings or ceiling bulkheads** that are separated through walls extending to the room soffit. Shadow joints in the ceiling boxes or in the marginal gap serve as return air openings. The average speed in these openings should not exceed 0.6 to 0.9 m/s (jet contraction not considered).

For installation of LTG linear diffusers in the area close to the corridor, the following is recommended:

- If there are no ceiling bulkheads separating the supply air from the return air, a distance of about 1 m must be kept between the return air opening and the air diffuser.
- Install the linear diffuser in parallel to the corridor wall. Optimum distance: 0.6 to 1 m.
- When using full height cupboards , a minimum distance of 0.2 m between the air diffuser and the cupboard front must be provided.
- Cabinets directly underneath air diffusers will have no impact on the indoor air flow if a clearance of about 0.4 m to the ceiling is allowed.

Installation example for LTG air conditioning system Indivent®

Active chilled beams and induction units for ceiling installation
Induction unit type LHG

View of unit

LTG type LHG units are induction units for 2-pipe systems (cooling or heating), with an integrated linear diffuser type LDB.

Mode of operation

The primary air from the air conditioning AHU (fresh air rate) is diffused through nozzles at high speed.

At the same time, secondary air is drawn in from the room. This secondary air is cooled within a heat exchanger.

Primary air is mixed with this cooled secondary air, then delivered into the room through the linear diffuser.

Depending on the unit type, control may be performed by water-side valves, or air-side bypass damper. Heating is, in general, performed through static heating at the facade.

Advantages

- **High cooling capacity**
  due to high capacity heat exchanger
- **Low-noise operation**
  due to the optimized shape of the nozzles and their arrangement
- **Flexible nozzle equipment**
  multiple nozzle sets that offer flexible selection, allow for optimum indoor air flow
- **High operational safety**
  low-friction ball-bearings and torsion free casing.
- **Maintenance-free actuators**
  Maintenance-free and safe-to-operate electrical (0 - 10 V) permanent or 3 point) and pneumatic actuators for any controller type.
- **High induction ratio**
  thanks to an excellent aerodynamic energy conversion of the primary air flow.
- **Computer-based selection using special programs**
  Indivent® units are sized using special LTG computer programs.
- **Fire protection**
  is ensured through the use of primary air nozzles of aluminum and primary air sockets of sheet steel (both options on request).

Design

LDB linear diffuser

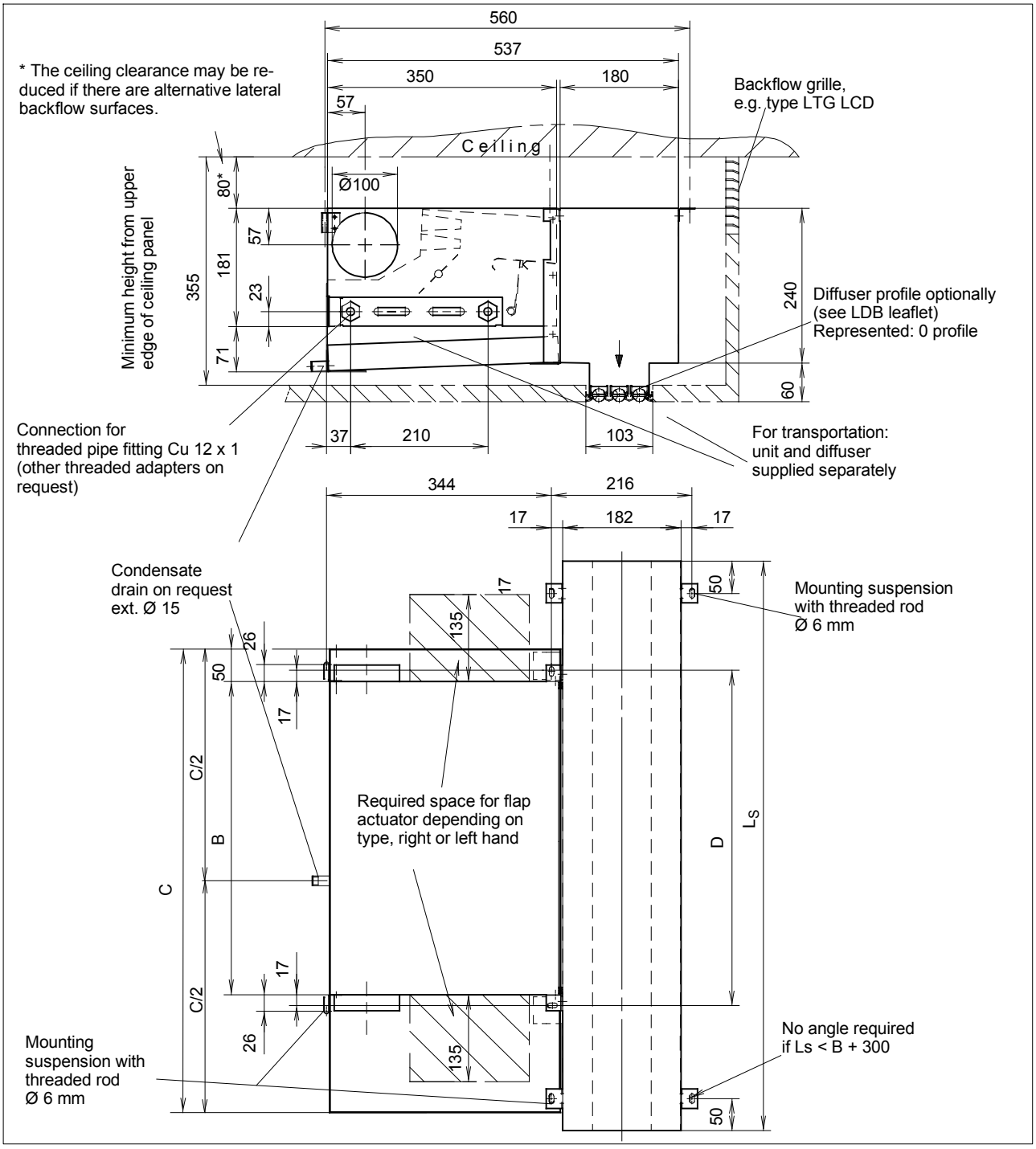
Cylinders:	polystyrene black, mat polystyrene white, mat
Rails:	aluminum natural anodised painted (similar to RAL) or high-gloss chromium-plated
Air distribution box:	galvanized steel

Integrated cooling

Housing:	galvanized steel
Heat exchanger:	copper pipe with pressed-on aluminum fins
Filter:	class EU2

Air conditioning system Indivent® for ceiling installation
Induction unit type LHG

Dimensions



Size	Dimension B [mm]	Dimension C [mm] Condensate collector	Dimension D [mm]	Dimension L_S [mm] Outlet length	Weight* [kg]
500	497	725	531	600 - 1500	19 (21.5)
630	642	870	676	730 - 2000	24.5 (26)
800	797	1030	831	900 - 2500	28 (30.5)
1000	997	1230	1031	1100 - 2500	34 (36.5)
1250	1242	1470	1276	1350 - 2500	40 (42.5)

* Values are given for units without bypass. Values for units with bypass in ( )

Air conditioning system Indivent® for ceiling installation
Induction unit type LHG, 2-pipe-system – cooling or heating

Technical data size 500

Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ [W/K] L_S = 800 mm	$Q_k/\Delta t$ [W/K] L_S = 1200 mm	$Q_k/\Delta t$ [W/K] L_S = 1500 mm
200	40	28	13	21	30	*
	50	30	17	23	32	35
	60	32	20	**	35	38
250	40	30	13	24	31	*
	50	32	17	26	34	37
	60	34	20	**	36	40
300	40	31	13	25	32	*
	50	34	17	27	35	38
	60	36	20	**	37	41
	70	37	23	**	40	44
	80	39	27	**	**	46
w_{ok} / Δp_w = 200 [kg/h] / 21.1 [kPa]						

Technical data size 1000

Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ [W/K] L_S = 1250 mm	$Q_k/\Delta t$ [W/K] L_S = 1750 mm	$Q_k/\Delta t$ [W/K] L_S = 2500 mm
200	60	28	20	35	44	*
	80	31	27	39	49	60
	100	33	33	**	54	66
250	60	30	20	36	46	*
	80	33	27	40	51	63
	100	35	33	**	56	69
300	60	31	20	37	48	*
	80	34	27	42	53	65
	100	37	33	**	58	71
	120	39	40	**	**	76
	140	40	47	**	**	81
w_{ok} / Δp_w = 350 [kg/h] / 21.1 [kPa]						

Technical data size 630

Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ [W/K] L_S = 1000 mm	$Q_k/\Delta t$ [W/K] L_S = 1500 mm	$Q_k/\Delta t$ [W/K] L_S = 2000 mm
200	40	26	13	26	*	*
	50	28	17	28	37	*
	60	30	20	30	39	45
250	40	28	13	27	35	*
	50	30	17	30	38	*
	60	32	20	32	41	47
300	40	30	13	28	36	*
	50	32	17	31	40	*
	60	34	20	33	43	49
	70	36	23	**	45	52
	90	38	27	**	**	57
w_{ok} / Δp_w = 250 [kg/h] / 21.1 [kPa]						

Technical data size 1250

Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ [W/K] L_S = 1500 mm	$Q_k/\Delta t$ [W/K] L_S = 2000 mm	$Q_k/\Delta t$ [W/K] L_S = 2500 mm
200	65	27	22	38	48	*
	80	29	27	42	52	60
	110	32	33	**	59	68
250	65	29	22	40	50	*
	80	31	27	44	54	63
	110	34	33	**	61	71
300	65	32	22	42	52	*
	80	33	27	45	56	65
	100	35	33	**	61	71
	125	37	42	**	**	78
	145	39	48	**	**	82
w_{ok} / Δp_w = 420 [kg/h] / 21.1 [kPa]						

Technical data size 800

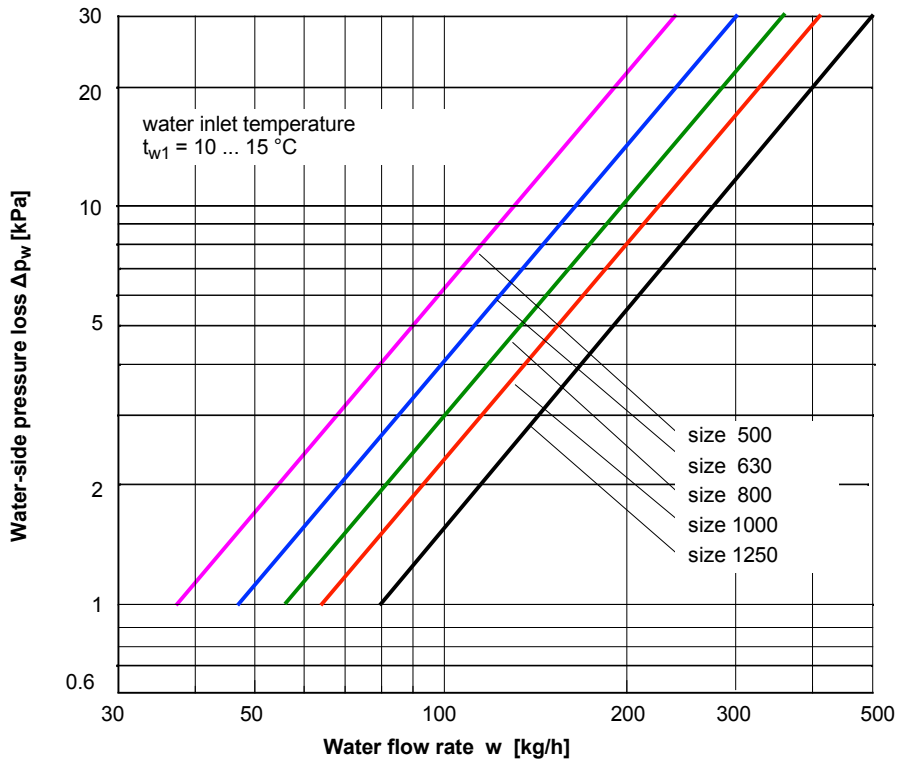
Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ [W/K] L_S = 1000 mm	$Q_k/\Delta t$ [W/K] L_S = 1500 mm	$Q_k/\Delta t$ [W/K] L_S = 2000 mm
200	50	27	17	28	37	*
	65	30	22	31	41	48
	80	32	27	**	44	52
250	50	29	17	29	39	*
	65	32	22	32	43	50
	80	34	27	**	46	55
300	50	31	17	30	40	*
	65	33	22	33	44	52
	80	36	27	**	48	57
	100	38	33	**	**	62
	120	40	40	**	**	66
w_{ok} / Δp_w = 300 [kg/h] / 21.1 [kPa]						

Legend:

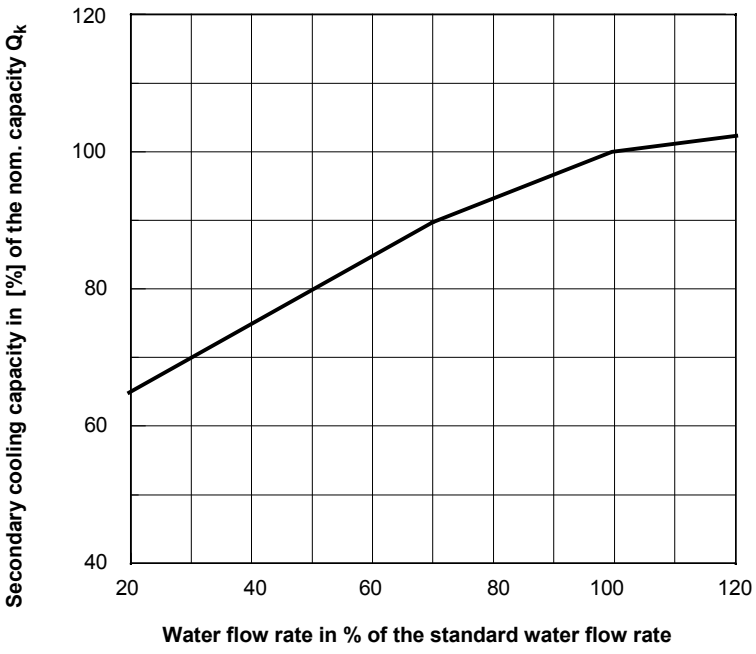
Δp	static pressure at the primary air spigot
V_P	primary air flow rate (± 10%)
L_{wA}	acoustic power level (± 3 dB)
Q_P	primary cooling capacity (fresh air) (± 5%)
Δt_P	temperature difference between room air and primary air
Δt	temperature difference between suction air temperature before entering the heat exchanger and water supply
Q_k	secondary cooling capacity (heat exchanger) (± 5%)
w_{ok}	standard water flow rate at cooling capacity
Δp_w	water-side pressure loss
*	primary air flow rate too low for slot length
**	primary air flow rate too high for slot length
L_S	diffuser length

Air conditioning system Indivent® for ceiling installation
Induction unit type LHG, 2-pipe system – cooling or heating

Water-side pressure loss



Loss of secondary cooling capacity when changing the water flow rate



Note :
The minimum water flow rate w
in the heat exchanger
must be at least 20%
of the standard water flow rate (w_{ok})
taking into consideration the water-side
pressure equalization.

Nominal water flow rates
Size 500: 200 kg/h
Size 630: 250 kg/h
Size 800: 300 kg/h
Size 1000: 350 kg/h
Size 1250: 420 kg/h

Air conditioning system Indivent® for ceiling installation Induction unit type LHG

Selection examples

Given values:

Required cooling capacity:	$Q_{k\ soll}$	=	550	W
Water inlet temperature:	t_{VL}	=	16	°C
Room temperature/ suction air temperature before entering the heat exchanger:	t_R/t_A	=	26	°C
Primary air flow rate:	V_P	=	65	m^3/h
Static pressure at primary air socket:	Δp	=	250	Pa
Primary air temperature:	t_P	=	18	°C
Installation dimensions / slot length :	L_S	=	1500	mm

→ **LHG, size 800**
selected (according to selection chart)

Resulting according to selection chart:

Primary cooling capacity:	**Q_P**	22 W/K x 8 K = **176 W** (with $\Delta t_P = t_R - t_{Pri}$ = 8 K)
Secondary cooling capacity (at standard flow rate)	**Q_k**	43 W/K x 10 K = **430 W** (with $\Delta t = t_A - t_{VL}$ = 10 K)
Total cooling capacity:	**Q_{kges}**	176 W + 430 W = **606 W**
Sound power level:	**L_{wA}**	**32 dB(A)**

The total cooling capacity is larger than the required cooling capacity.
Since the primary cooling capacity depends on the primary air flow rate,
and the latter is fixed due to the required air change rate,
the secondary cooling capacity may be reduced by changing the water volume.

Required secondary cooling capacity:

$Q_{k\ soll} - Q_P$ =	**Q_{kerf}**	550 W - 176 W = **374 W**
Share of the secondary cooling capacity in percent when using the standard water flow rate		374 W / 430 W = 0,87 → **87 %**

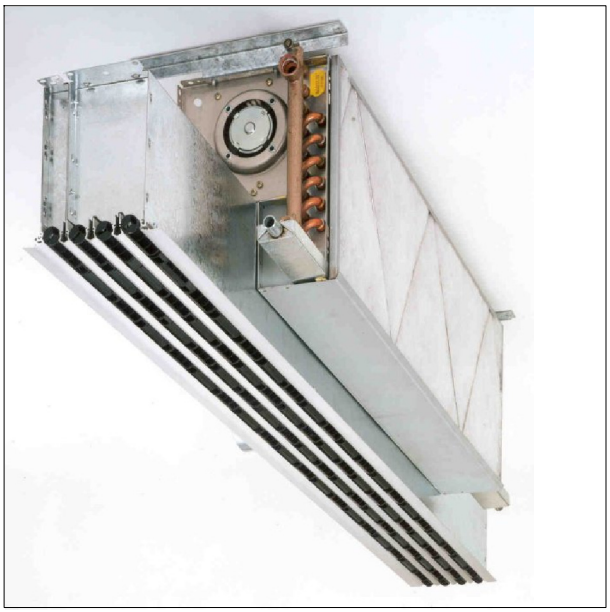
According to the diagrams (previous page) the following values are obtained:

Water flow rate at 87% secondary cooling capacity: about 62 % of the standard flow rate (reading)	300 kg/h x 0,62 = **186 kg/h**
Pressure loss at 186 kg/h:	ca. **9 kPa** (reading)

The secondary cooling capacity may be adjusted through selection of the unit size,
the slot length and by changing the water flow rate.

Air conditioning system Indivent® for ceiling installation
Fan coil unit type LVC, 2-pipe-system – cooling or heating

View of unit



Application

The fan coil unit type LVC has been designed for two-pipe systems with water-side control by valves.

Mode of operation

LVC units incorporate a built-in tangential fan which draws in air from the ceiling void and cools it within a heat exchanger. The heat exchanger is fitted with an intake filter.

The tangential fans are low-noise and maintenance-free. The speed control is performed through a pole-changing internal rotor motor with five speeds, wired to a factory-mounted terminal box (for terminal connection refer to page 21).

The fan coil units are essentially recirculation type air units but a connection for fresh air is available on request. With that option, the fresh air is supplied through a separate, one-row supply air slot.

Advantages

- **Several sizes**
  Four sizes for capacity range
- **Low-noise operation**
  due to efficient tangential fan
- **Cost effective**
  due to low-energy fan operation
- **Easy control**
  Single or group control
- **Flexibility**
  On request, the unit is also available with connection for fresh air
- **Adaptability**
  due to adjustable outlet for optimising room air flow
- **Design**
  The slot profiles are available in a variety of versions and colours.
- **Space saving**
  Compact construction suits low ceiling voids.
- **Maintenance-friendly**
  due to easy-to-replace filter, maintenance-free motor.

Design

LDB linear diffuser

Cylinders:	polystyrene black, mat polystyrene white, mat
Rails:	aluminium natural anodised painted (similar to RAL) or high-gloss chromium-plated
Air distribution box:	galvanized steel

Integrated cooling

Housing:	galvanized steel
Heat exchanger:	copper pipe with pressed-on aluminum fins
Filter:	Class EU2

Attention: The water inlet temperature must stay above dew-point (≧ 16 °C) since the unit is not designed for operation with condensate formation.

Air conditioning system Indivent® for ceiling installation
Fan coil unit LVC-2 with linear diffuser LDB 20/8/4 or LDB 12/8/4

Specification

Fan coil unit with one heat exchanger for heating or cooling the ambient air.

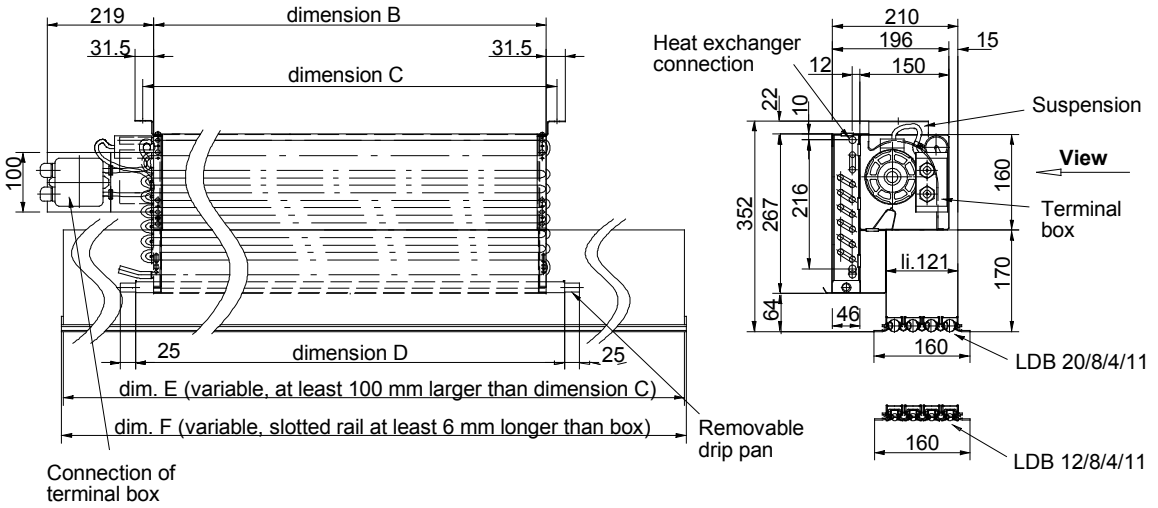
Central water-side control.

Vertical or horizontal installation (in the ceiling).

Water connection on the right or left with 1/2" internal thread and venting.

Dimensions

BG	B [mm]	C [mm]	D [mm]	**weight** [kg] / **diffuser length** [mm]
500	527	563	685	21 / 1250
630	627	663	885	26 / 1250
800	857	893	1085	31 / 1500
1000	1057	1093	1335	37 / 1750
1250	1257	1293	1535	44 / 2000



View always on outlet

- cross-flow fan motor always on the left
- side water connection LHS or RHS (picture shows LHS)

Connection heat exchanger:

shown 12 mm Cu-tube,
other dimensions with connection 1/2" internal thread.

Please note:
Position and size of the inspection openings must meet constructional requirements

Ceiling fan coil unit type LVC with LDB 20/8/4/11 (LDB 12/8/4/11)

Electrical current and power consumption for units with and without filter

Size	**Imax** [mA]	**Electrical power consumption P_{el}** (± 20 %) [W] **Speed**				
		I	**II**	**III**	**IV**	**V**
630 and 800	90	17 W	18 W	19 W	20 W	22 W
1000 and 1250	130	16 W	18 W	20 W	22 W	24 W

For more technical data, refer to the next page

Speed control wiring diagram

Refer to page 21.

Air conditioning system LTG Indivent® for ceiling installation
Fan coil unit type LVC-2 with linear diffuser LDB 20/8/4

Technical data size 630

Speed	Box length 1000 mm						Box length 1500 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
I	190	36	48	170	37	43	200	35	45	180	36	42
II	230	43	54	210	42	47	240	39	54	210	41	48
III	270	50	60	240	47	55	280	45	61	250	49	55
IV	310	50	67	280	50	63	320	48	66	290	52	63
V	350	50	70	310	54	68	360	50	69	320	54	66

w_{ok} / Δp_w = 200 [kg/h] / 20 [kPa]

Technical data size 800

Speed	Box length 1000 mm						Box length 1500 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
I	180	34	50	170	37	45	190	34	54	180	35	50
II	220	41	58	200	41	54	240	39	62	210	40	57
III	260	48	66	240	45	63	290	44	70	260	45	66
IV	310	49	73	290	49	71	330	46	78	300	49	75
V	350	50	80	330	51	77	380	49	83	340	51	80

w_{ok} / Δp_w = 200 [kg/h] / 22 [kPa]

Technical data size 1000

EC motor	Box length 1500 mm						Box length 2000 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
	190	26	50	180	29	44	180	26	48	180	29	46
	280	35	70	260	39	64	280	35	70	270	39	65
	370	43	84	330	46	78	390	42	84	360	46	80
	450	48	97	400	51	90	490	47	98	440	51	91
	580	55	112	510	57	108	670	56	113	610	58	106

w_{ok} / Δp_w = 200 [kg/h] / 23 [kPa]

Technical data size 1250

EC motor	Box length 1500 mm						Box length 2000 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
	180	30	55	170	30	47	200	26	54	190	30	47
	280	37	78	250	37	70	310	36	76	270	37	72
	370	45	91	330	45	85	410	43	92	360	46	86
	450	50	112	410	50	98	490	48	106	440	51	101
	590	54	120	530	58	118	630	54	122	570	58	116

w_{ok} / Δp_w = 200 [kg/h] / 25 [kPa]

V - flow rate (approx. values, tolerance ±10%)
L_{wA} - sound power level ±3 dB(A) (without casing)
Δt - temperature difference between suction air temperature before entering the heat exchanger and water supply

$Q_{k\,oF}$ - cooling capacity (without filter)
$Q_{k\,mF}$ - cooling capacity (with filter)
w_{ok} - standard flow rate at cooling capacity
Δp_w - water-side pressure loss

Air conditioning system LTG Indivent® for ceiling installation
Fan coil unit type LVC-2 with linear diffuser LDB12/8/4

Technical data size 630

Speed	Box length 1000 mm						Box length 1500 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
I	180	39	45	160	39	40	190	39	47	180	38	42
II	220	45	52	190	44	46	220	42	53	210	43	47
III	250	50	56	220	47	50	370	47	59	250	48	53
IV	290	52	61	260	52	58	310	51	64	280	50	61
V	320	53	70	290	54	63	340	52	70	310	58	63

w_{ok} / Δp_w = 200 [kg/h] / 20 [kPa]

Technical data size 800

Speed	Box length 1000 mm						Box length 1500 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
I	170	36	48	150	36	44	200	37	49	160	36	43
II	200	42	57	180	41	51	240	42	57	200	41	52
III	250	48	63	220	45	59	290	48	65	240	46	60
IV	290	49	69	260	49	65	340	51	73	290	49	67
V	330	52	76	290	52	71	390	52	79	330	51	73

w_{ok} / Δp_w = 200 [kg/h] / 22 [kPa]

Technical data size 1000

EC motor	Box length 1500 mm						Box length 2000 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
	170	27	48	160	30	43	240	26	60	170	29	44
	250	40	67	230	39	64	300	38	72	260	39	64
	320	46	79	290	46	75	440	46	83	330	47	77
	390	51	91	360	52	86	480	50	96	430	52	90
	490	57	105	450	58	100	590	56	107	560	58	103

w_{ok} / Δp_w = 200 [kg/h] / 23 [kPa]

Technical data size 1250

EC motor	Box length 1500 mm						Box length 2000 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
	150	27	54	150	28	48	180	26	57	170	29	48
	200	39	74	230	39	67	230	38	77	250	39	70
	290	47	89	300	46	81	270	45	92	330	45	83
	370	51	100	340	50	94	320	51	103	370	50	96
	480	57	116	440	57	107	360	58	118	480	58	113

w_{ok} / Δp_w = 200 [kg/h] / 25 [kPa]

V - flow rate (approx. values, tolerance ±10%)
L_{wA} - sound power level ±3 dB(A) (without casing)
Δt - temperature difference between suction air temp. before entering the heat exchanger and water supply

$Q_{k\,oF}$ - cooling capacity (without filter)
$Q_{k\,mF}$ - cooling capacity (with filter)
w_{ok} - standard flow rate at cooling capacity
Δp_w - water-side pressure loss

Air conditioning system LTG Indivent® for ceiling installation
Fan coil unit LVC-2 with separate fresh air box and LDB 20/8/4 or LDB 12/8/4

Specification

Fan coil unit with one heat exchanger for heating or cooling the ambient air.

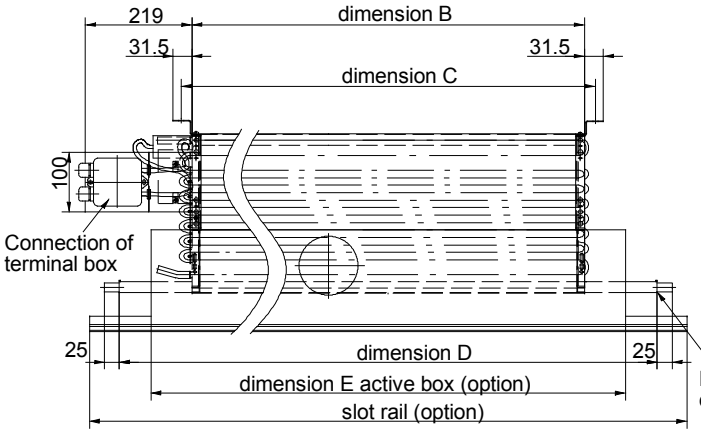
Central water-side control.

Vertical or horizontal installation (in the ceiling).

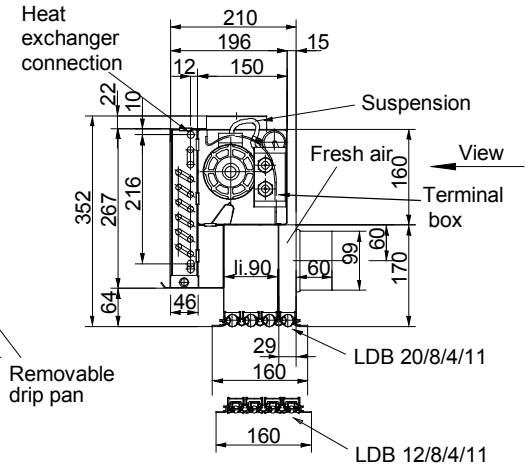
Water connection on the right or left with 1/2" internal thread and venting.

Dimensions

Size	B [mm]	C [mm]	D [mm]	Weight [kg] / diffuser length [mm]
500	527	563	685	21 / 1250
630	627	663	885	26 / 1250
800	857	893	1085	31 / 1500
1000	1057	1093	1335	37 / 1750
1250	1257	1293	1535	44 / 2000



View always on outlet
- tangential fan motor always on the left
- side water connection LHS or RHS
  (picture shows LHS)



Connection heat exchanger:

shown 12 mm Cu-tube,
other dimensions with connection 1/2" internal thread.

Please note:
Position and size of the inspection openings must meet constructional requirements

Ceiling fan coil unit type LVC with separate fresh air box with LDB 20/8/4 or LDB 12/8/4

Electrical current and power consumption for units with and without filter

Size	Imax [mA]	Electrical power consumption P_{el} (± 20 %) [W] Speed				
		I	II	III	IV	V
630 and 800	90	17 W	18 W	19 W	20 W	22 W
1000 and 1250	130	16 W	18 W	20 W	22 W	24 W

For more technical data, refer to pages 17 and 18.

Speed control wiring diagram

Refer to page 21.

Air conditioning system Indivent® for ceiling installation
Fan coil unit type LVC-2 with linear diffuser LDB 20/8/3 or LDB 12/8/3

Specification

Fan coil unit with one heat exchanger for heating or cooling the ambient air.

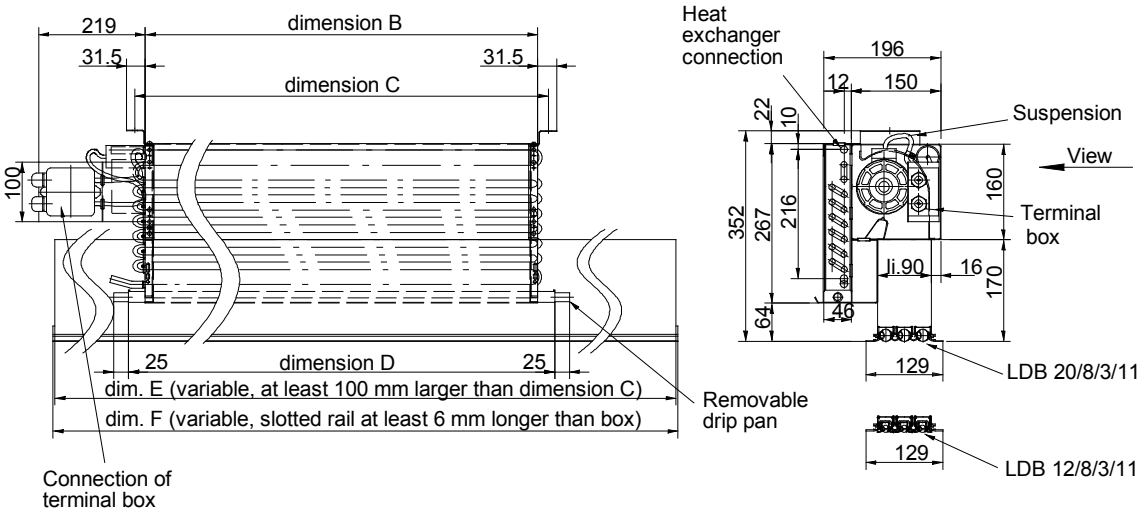
Central water-side control.

Vertical or horizontal installation (in the ceiling).

Water connection on the right or left with 1/2" internal thread and venting.

Dimensions

Size	**B** [mm]	**C** [mm]	**D** [mm]	**Weight** [kg] / **diffuser length** [mm]
500	527	563	685	21 / 1250
630	627	663	885	26 / 1250
800	857	893	1085	31 / 1500
1000	1057	1093	1335	37 / 1750
1250	1257	1293	1535	44 / 2000



View always on outlet
- tangential fan motor always on the left
- side water connection LHS or RHS
  (picture shows LHS)

Connection heat exchanger:

shown 12 mm Cu-tube,
other dimensions with connection 1/2" internal thread.

Please note:
Position and size of the inspection openings must meet constructional requirements

Ceiling fan coil unit type LVC with LDB 20/8/3 or LDB 12/8/3

Electrical current and power consumption for units with and without filter

Size	**Imax** [mA]	**Electrical power consumption P_{el}** (± 20 %) [W] **Speed**				
		I	**II**	**III**	**IV**	**V**
630 and 800	90	17 W	18 W	19 W	20 W	22 W
1000 and 1250	130	16 W	18 W	20 W	22 W	24 W

For more technical data, refer to pages 17 and 18.

Speed control wiring diagram

Refer to page 21.

Air conditioning system Indivent® for ceiling installation
Fan coil unit LVC-2 with LDB 20/8/4 with sep. fresh air box or with LDB 20/8/3

Technical data size 630

Speed	Box length 1000 mm						Box length 1500 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
I	180	40	46	180	40	43	190	37	47	180	38	45
II	210	45	52	190	43	48	220	43	53	210	42	50
III	260	51	58	230	48	55	260	47	61	240	48	57
IV	300	51	64	260	51	61	310	51	65	280	52	62
V	340	57	68	290	55	65	350	55	70	290	56	68

w_{ok} / Δp_w = 200 [kg/h] / 20 [kPa]

Technical data size 800

Speed	Box length 1000 mm						Box length 1500 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
I	190	34	49	170	35	46	200	38	52	160	36	47
II	210	40	57	200	40	52	240	44	59	200	41	54
III	250	47	64	240	45	61	280	47	71	240	46	62
IV	290	51	71	280	48	68	330	51	75	280	49	70
V	330	54	77	310	51	74	360	53	81	310	52	74

w_{ok} / Δp_w = 200 [kg/h] / 22 [kPa]

Technical data size 1000

EC motor	Box length 1500 mm						Box length 2000 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
	160	27	49	140	30	44	210	26	51	170	29	44
	250	41	68	230	39	60	300	37	69	250	39	63
	330	47	81	300	46	76	390	44	84	3330	45	77
	410	52	92	360	52	86	450	51	93	390	51	87
	520	57	103	450	57	100	630	56	110	510	57	101

w_{ok} / Δp_w = 200 [kg/h] / 23 [kPa]

Technical data size 1250

EC motor	Box length 1500 mm						Box length 2000 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
	160	27	53	140	27	47	180	25	54	160	27	47
	250	36	74	230	37	66	280	36	74	250	35	67
	320	47	88	300	45	82	360	45	89	330	43	83
	400	51	99	360	49	93	440	51	102	390	50	95
	520	58	112	470	56	109	560	56	116	510	56	109

w_{ok} / Δp_w = 200 [kg/h] / 25 [kPa]

V - flow rate (approx. values, tolerance ±10%)
L_{wA} - sound power level ±3 dB(A) (without casing)
Δt - temp. diff. between suction air temp. before entering the heat exchanger and water supply
V_P - fresh air flow rate
$Q_{k\,oF}$ - cooling capacity (without filter)
$Q_{k\,mF}$ - cooling capacity (with filter)
w_{ok} - standard flow rate at cooling capacity
Δp_w - water-side pressure loss
$L_{wA\,P}$ - sound power level fresh air

Acoustic power level for separate fresh air box

V_{prim} [m³/(hm)]	80	90	100
$L_{wA\,P}$ [dB(A)]	25	28	31

The **total acoustic power level** may be calcul. as follows:
$L_{wA} = 10 * \log (10^{0.1*L_{wA\,P}} + 10^{0.1 * L_{wA,LVC}})$

Air conditioning system Indivent® for ceiling installation
Fan coil unit LVC-2 with LDB 12/8/4 + sep. fresh air box or with LDB 12/8/3

Technical data size 630

Speed	Box length 1000 mm						Box length 1500 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
I	170	39	43	160	40	39	180	40	44	170	37	42
II	190	45	49	180	45	45	210	45	51	200	43	49
III	220	51	54	210	48	51	240	49	58	220	48	54
IV	250	53	58	230	52	58	270	52	66	250	51	60
V	270	57	60	250	55	61	300	56	69	270	55	63

w_{ok} / Δp_w = 200 [kg/h] / 20 [kPa]

Technical data size 800

Speed	Box length 1000 mm						Box length 1500 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
I	160	36	44	140	36	39	180	36	49	160	35	44
II	190	41	52	170	40	47	200	41	53	190	40	53
III	220	46	60	200	45	54	250	49	64	220	45	61
IV	250	48	65	230	48	62	290	51	72	270	49	67
V	280	51	74	260	50	67	320	53	78	300	51	73

w_{ok} / Δp_w = 200 [kg/h] / 22 [kPa]

Technical data size 1000

EC motor	Box length 1500 mm						Box length 2000 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
	150	28	44	140	29	40	180	28	47	160	30	42
	210	40	62	200	39	57	250	41	65	260	39	60
	270	47	75	250	45	68	320	48	77	300	46	73
	330	52	82	300	50	78	400	52	88	360	51	83
	410	57	95	370	56	94	510	58	101	460	57	95

w_{ok} / Δp_w = 200 [kg/h] / 23 [kPa]

Technical data size 1250

EC motor	Box length 1500 mm						Box length 2000 mm					
	without filter			with filter			without filter			with filter		
	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t$ [W/K]	V [m³/h]	L_{wA} [dB(A)]	$Q_{k\,mF}/\Delta t$ [W/K]
	130	28	49	120	23	42	150	25	49	140	27	45
	210	40	67	180	34	61	240	36	69	200	36	65
	270	44	80	240	43	75	310	45	85	270	48	77
	330	50	90	300	49	87	370	51	96	330	51	91
	410	57	104	380	56	101	490	56	111	420	58	101

w_{ok} / Δp_w = 200 [kg/h] / 25 [kPa]

Legend

V - flow rate (approx. values, tolerance ±10%)
L_{wA} - sound power level ±3 dB(A) (without casing)
Δt - temp. diff. between suction air temperature before entering the heat exchanger and water supply
V_P - fresh air flow rate
$q_{k\,oF}$ - cooling capacity (without filter)
$Q_{k\,mF}$ - cooling capacity (with filter)
w_{ok} - standard flow rate at cooling capacity
Δp_w - water-side pressure loss
$L_{wA\,P}$ - sound power level fresh air

Acoustic power level for separate fresh air box

V_P	[m³/(hm)]	80	90	100
$L_{wA\,P}$	[dB(A)]	25	28	31

The **total acoustic power level** may be calcul. as follows:
$L_{wA} = 10 * \log (10^{0.1*LwA\,P} + 10^{0.1\,*\,LwA,LVC})$

Air conditioning system Indivent® for ceiling installation
Fan coil unit type LVC-2, 2-pipe-system – cooling or heating

Selection Example

Given values:

Required cooling capacity:	$Q_{k\ soll}$	=	840 W
Water inlet temperature:	t_{VL}	=	16 °C
Room temperature/ Suction air temperature before entering the heat exchanger:	t_R/t_A	=	26 °C
Fresh air flow rate:	V_P	=	150 m^3/h
Fresh air temperature:	t_P	=	18 °C
Installation dimensions / slot length:	L_S	=	1500 mm
Cooling capacity fresh air:	Q_P	=	400 W (with $\Delta t_P = t_R - t_P$ = 8 K)
Secondary cooling capacity (heat exchanger):	Q_k	=	$Q_{k\ soll} - Q_P$ = 440 W
With $\Delta t = t_A - t_{VL}$ = 10 K specific secondary cooling capacity	$Q_k/\Delta t$	=	44 W/K

With a given box length of 1500 mm and $Q_k/\Delta t$ = 47 W/K*, the following unit may be selected:*

→ **LVC, size 800 with LDB 20/8/4 with separate fresh air box at speed I**

The following total cooling capacity is obtained:

Total cooling capacity at standard water flow rate: ($Q_{k\,mF} + Q_P$): **Q_{kges}** 470 W + 400 W = **870 W**

The total cooling capacity is larger than the required cooling capacity. Since the fresh air cooling capacity depends on the fresh air flow rate, and the latter is fixed by the required air change rate, the secondary cooling capacity may be reduced by changing the nominal water volume.

Required secondary cooling capacity: ($Q_{k\ soll} - Q_P$) **Q_{kerf}** 840 W - 400 W = **440 W**

Share of the secondary cooling capacity in % when using the nominal water volume: 440 W / 470 W = **0.93 → 93 %**

According to the diagrams on page 39 the following is obtained:

Water flow rate
at a 94% secondary cooling capacity: **160 kg/h**

Pressure loss at 160 kg/h: **abt. 16 kPa** (reading)

The secondary cooling capacity may be influenced by the choice of the size, the slot length and by the modification of the water flow rate.

Calculation of the total acoustic power level

The total acoustic power level is calculated by adding up the individual acoustic power levels:

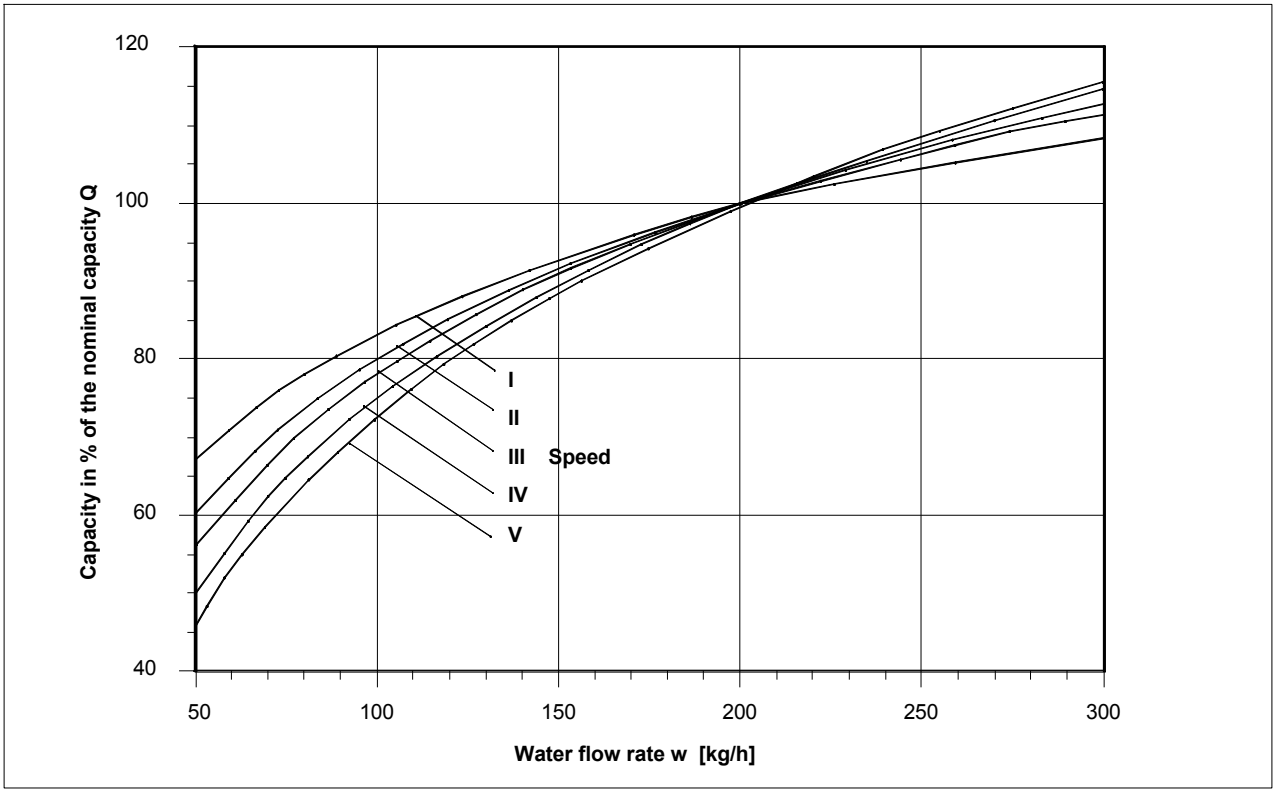
Acoustic power level of the unit: $L_{wA,LVC}$ = 36 dB(A) (from the selection chart)

Acoustic power of fresh air: $L_{wA\,P}$ = 31 dB(A) (V_P = 100 m^3/hm)

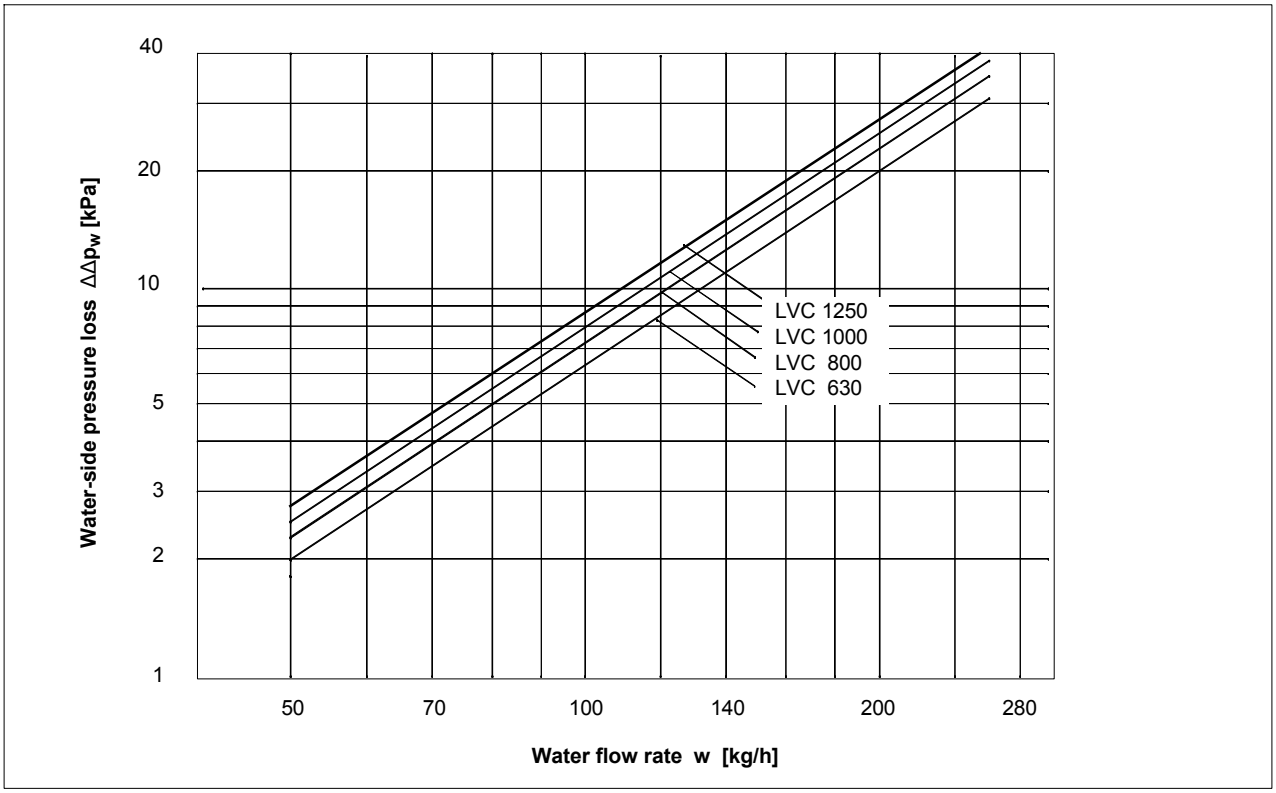
Total acoustic power level: **L_{wA}** = $10 * \log (10^{0.1*31} + 10^{0.1*35})$ = **37.4 dB(A)**

Air conditioning system Indivent® for ceiling installation
Fan coil unit type LVC-2, 2-pipe-system – cooling or heating

Capacity with different water flow rates



Water-side pressure loss for different water flow rates



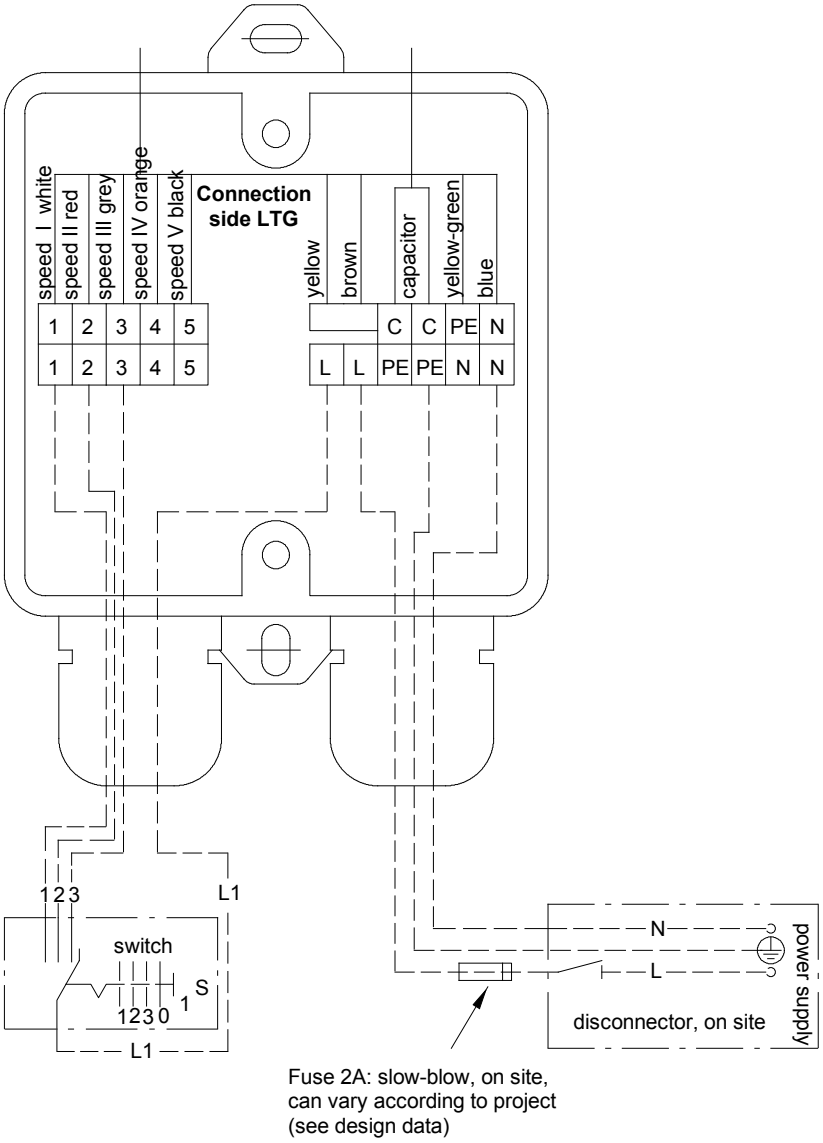
Tel. +49 711 8201-0 · Fax +49 711 8201-720 · info@LTG-AG.com · www.LTG-AG.com

Air conditioning system Indivent® for ceiling installation
Fan coil unit type LVC-2, 2-pipe-system – cooling or heating

Speed control wiring diagram

Note: - Capacitor motor with 5 tappings
- Multiple unit triggering possible
- The technical data contain details about the current consumption and the corresponding electrical power

Note :
For a smooth and safe start of the fan coil units, it is necessary to use speed III.



Air conditioning system Indivent® for ceiling installation
Fan coil unit type LVC

Nomenclature

LVC - 2 / 800 / S / F / L / - - - / D

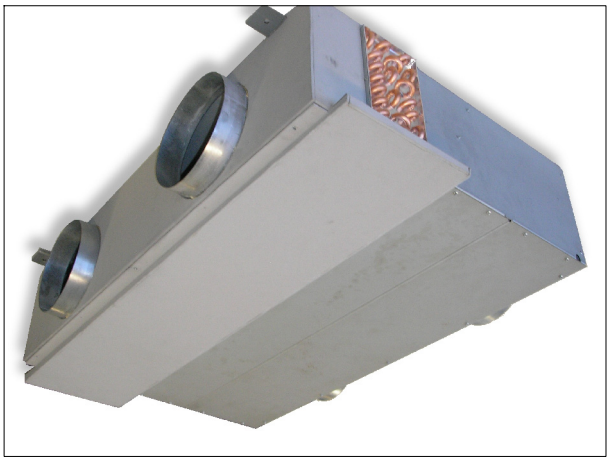
2-pipe unit	**2**		
4-pipe unit (valve-controlled)	**4**		
Size	**630**		
	800		
	1000		
	1250		
Design	Standard	**S**	
Filter	without	**–**	
	with	**F**	
Water connection	left side	**L**	
	right side	**R**	
Fresh air	without fresh air connection	**- - -**	
	with separate fresh air box	**P . .**	
Valves	straight-way 3-point valve	**D**	
	3-way 3-point valve	**3**	
	straight-way valve, thermal	**T**	

LDB 20/8 / 3 / 00 / – – / E6 - EV1 / 2000 / S / 1

Diffuser type	LDB 12/8		
	LDB 20/8		
No. of slots		**3**	
		4	
Border profile left - right		**0...8**	
Additional profile	left - right	**1...7**	
	without	**–,**	
Surface	anodized, brushed	**E2**	
	anodized, unbrushed	**E6**	
	painted, glossy	**LG**	
	painted, matt	**LM**	
	chromium-plated	**C**	
	unfinished	**R**	
	special finish	**X**	
Colour	painted	**RAL colour**	
	anodized	**anodizing shade**	
Slot length [mm]			**. . . .**
Nozzle colour	black		**S**
	white		**W**
	grey aluminium		**G**
	chromium plated		**C**
End caps	without		**–**
	both sides		**1**
	left side		**2**
	right side		**3**

Air conditioning system Indivent® for ceiling installation
Fan coil unit type VKE

View of unit

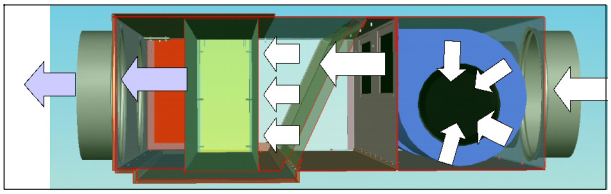


Application

The ceiling fan coil unit type VKE is specifically designed for versatile application in hotels and office buildings and offers a wide range of possibilities for air distribution system designs. This provides engineers and owners a lot of flexibility regarding the installation of the unit and with the overall layout of the room.

Mode of operation

The fan draws in ambient air which is then led through a heat exchanger and discharged back into the room. The heat exchanger is fed with cold water for cooling and hot water for heating.



Functional scheme fan coil unit type VKE

Advantages

- LTG system with LTG diffusers
- Possibility of individual adjustment of the cooling capacity according to the use of the room
- Low-noise operation
- Low installation costs since all the components are factory-wired and integrated in the unit
- Energy efficient by optimisation controls
- Maintenance-friendly design

Design

Ceiling fan coil unit type VKE, with two- or four-pipe heat exchanger for a high caloric capacity, made of copper pipe with press-fitted aluminium fins, for a maximum operating pressure of 10 bar, for connection to a cold and/or hot water system, with water-side control by high-precision valves.

Fan impeller made of plastic, inflammable according to UL 94 HB (non inflammable version on request).

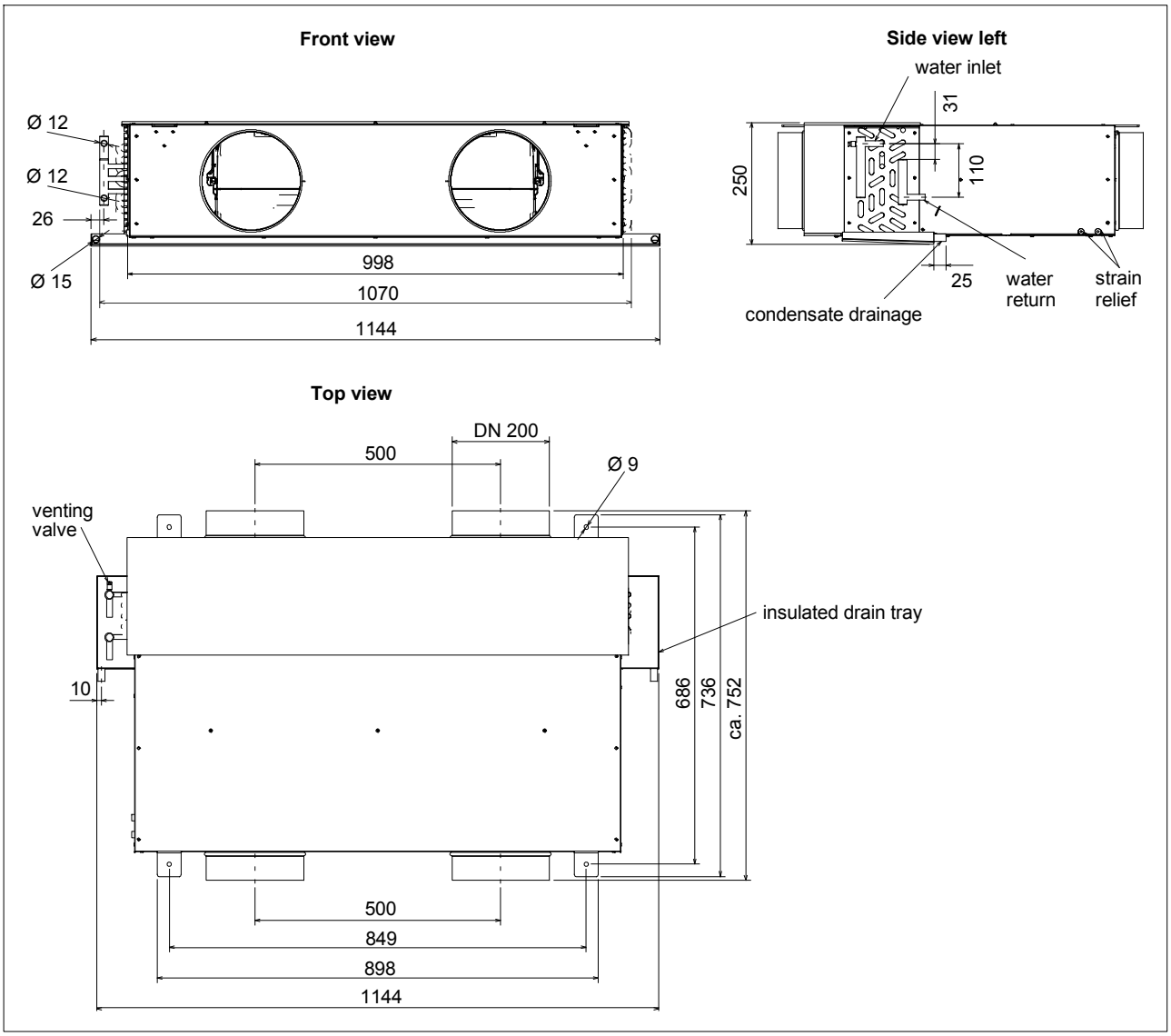
Always insulated version for condensate formation during operation.

Fan features: safe starting, steady characteristic and low noise level, 6-pole single-phase motor with running capacitor.

Size 1100.

Air conditioning system Indivent® for ceiling installation
Fan coil unit type VKE

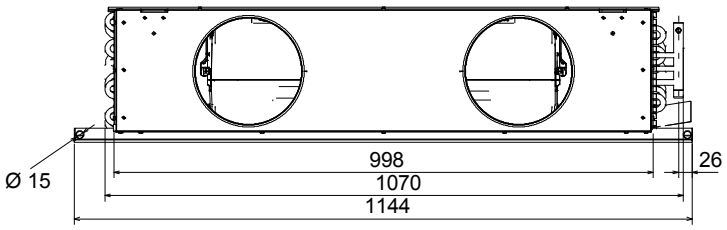
Dimensions 2-pipe unit, water connection left



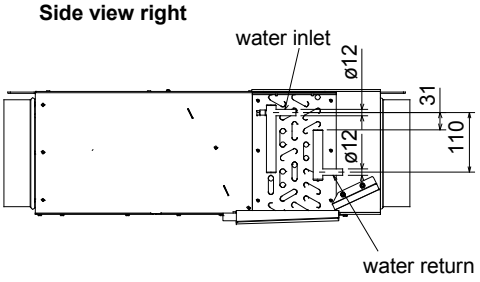
Air conditioning system Indivent® for ceiling installation
Fan coil unit type VKE

Dimensions, 2-pipe unit, water connection right

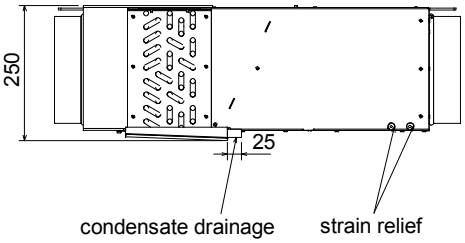
Front view



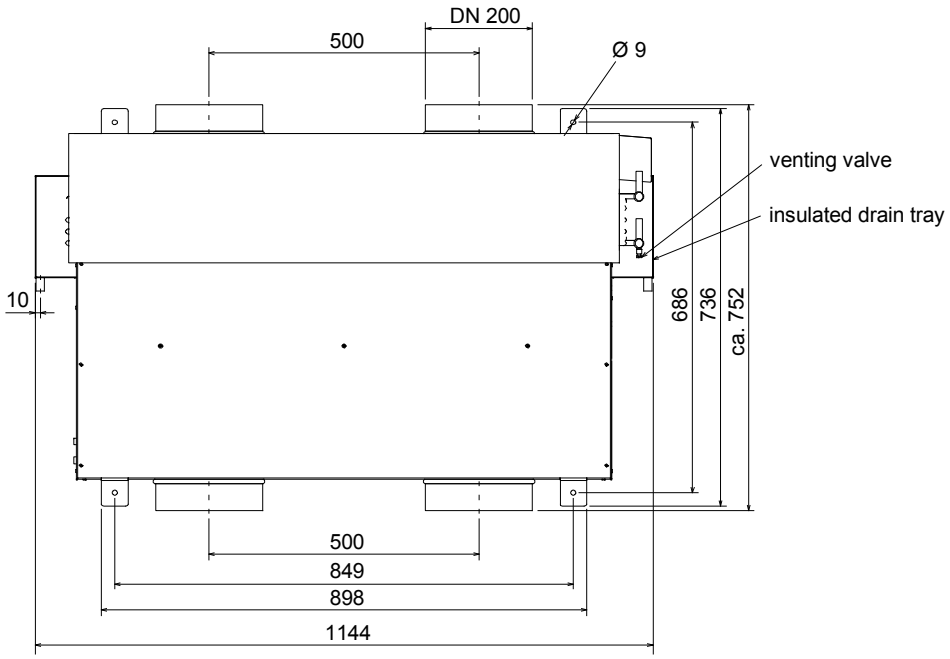
Side view right



Side view left



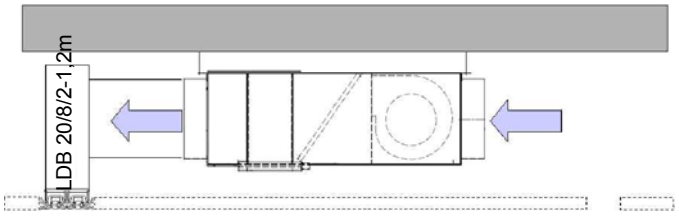
Top view



Air conditioning system Indivent® for ceiling installation
Fan coil unit type VKE-4, 4-pipe-system – cooling and heating

Technical data standard application Z2-0, LDB 20/8/2 pressure side

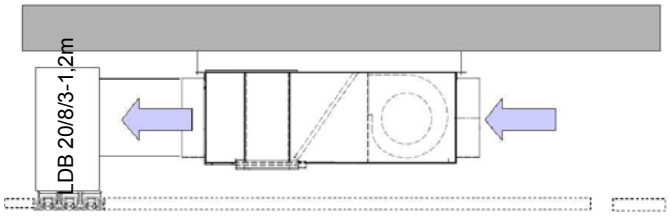
Acoustics data without impact of ceiling, including diffuser insertion loss and flow noise (maximum improvement of sound levels ~ 2 dB depending on the outlets' position in the ceiling and the ceiling's insulating properties).



n [-]	Pressure increase Return air [Pa]	Supply air [Pa]	Δp [Pa]	L_{wA} [dB(A)]	V [m³/h]	P_{el} [W]	Q_k [W/K]	Q_h [W/K]
I	0	5.0	5.0	29	179	9	54	36
II	0	8.5	8.5	35	234	13	70	45
III	0	16.8	16.8	44	316	46	92	57
IV	0	28.3	28.3	51	411	55	115	67
V	0	41.2	41.2	55	481	68	131	73

Technical data standard application Z3-0, LDB 20/8/3 pressure side

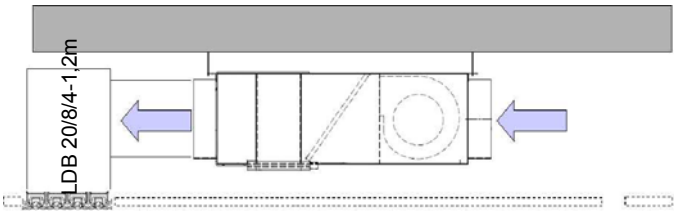
Acoustics data without impact of ceiling, including diffuser insertion loss and flow noise (maximum improvement of sound levels ~ 2 dB depending on the outlets' position in the ceiling and the ceiling's insulating properties).



n [-]	Pressure increase Return air [Pa]	Supply air [Pa]	Δp [Pa]	L_{wA} [dB(A)]	V [m³/h]	P_{el} [W]	Q_k [W/K]	Q_h [W/K]
I	0	2.6	2.6	28	199	9	60	40
II	0	4.9	4.9	33	258	13	77	49
III	0	9.5	9.5	42	359	46	102	62
IV	0	17.3	17.3	49	478	55	130	72
V	0	26.2	26.2	55	582	68	152	78

Technical data standard application Z4-0, LDB 20/8/4 pressure side

Acoustics data without impact of ceiling, including diffuser insertion loss and flow noise (maximum improvement of sound levels ~ 2 dB depending on the outlets' position in the ceiling and the ceiling's insulating properties).



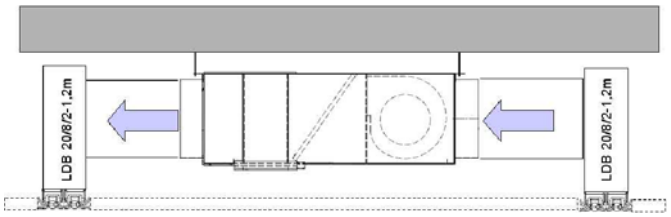
n [-]	Pressure increase Return air [Pa]	Supply air [Pa]	Δp [Pa]	L_{wA} [dB(A)]	V [m³/h]	P_{el} [W]	Q_k [W/K]	Q_h [W/K]
I	0	1.7	1.7	28	207	9	62	41
II	0	3.2	3.2	33	270	13	80	50
III	0	5.9	5.9	44	380	46	107	64
IV	0	10.9	10.9	49	513	55	140	75
V	0	16.5	16.5	55	641	68	163	79

Air conditioning system Indivent® for ceiling installation
Fan coil unit type VKE-4, 4-pipe-system – cooling and heating

Technical data standard application Z2-A2, LDB 20/8/2 pressure side, LDB 20/8/2 suction side

Since structure-borne sound is low, ceiling will not result in significant improvement of sound levels.

Acoustics data without impact of ceiling.

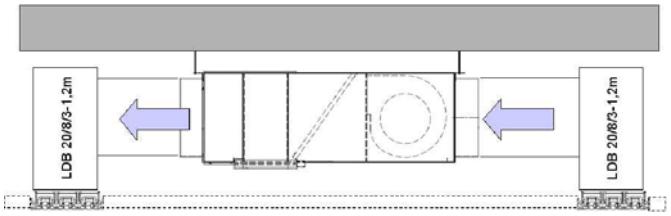


n [-]	Pressure increase Return air [Pa]	Supply air [Pa]	Δp [Pa]	L_{wA} [dB(A)]	V [m³/h]	P_{el} [W]	Q_k [W/K]	Q_h [W/K]
I	-7.7	3.1	10.8	31	129	9	40	27
II	-12.9	6.1	19.0	37	162	13	50	33
III	-22.9	10.4	33.3	46	208	46	63	41
IV	-36.1	16.8	52.9	51	236	55	70	45
V	-47.3	22.1	69.4	55	257	68	76	49

Technical data standard application Z3-A3, LDB 20/8/3 pressure side, LDB 20/8/3 suction side

Since structure-borne sound is low, ceiling will not result in significant improvement of sound levels.

Acoustics data without impact of ceiling.

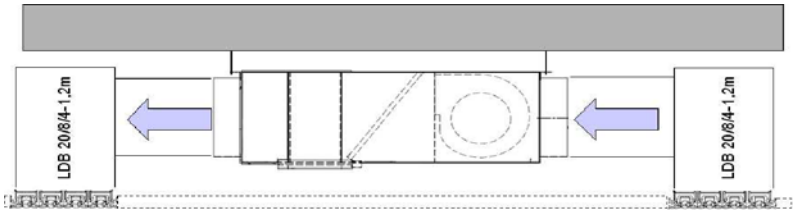


n [-]	Pressure increase Return air [Pa]	Supply air [Pa]	Δp [Pa]	L_{wA} [dB(A)]	V [m³/h]	P_{el} [W]	Q_k [W/K]	Q_h [W/K]
I	-5.3	2.3	7.6	29	157	9	48	32
II	-8.5	3.6	12.1	35	210	13	63	41
III	-16.6	6.3	22.9	44	278	46	82	51
IV	-28.0	11.3	39.3	50	337	55	97	59
V	-39.2	15.5	54.7	54	380	68	107	64

Technical data standard application Z4-A4, LDB 20/8/4 pressure side, LDB 20/8/4 suction side

Since structure-borne sound is low, ceiling will not result in significant improvement of sound levels.

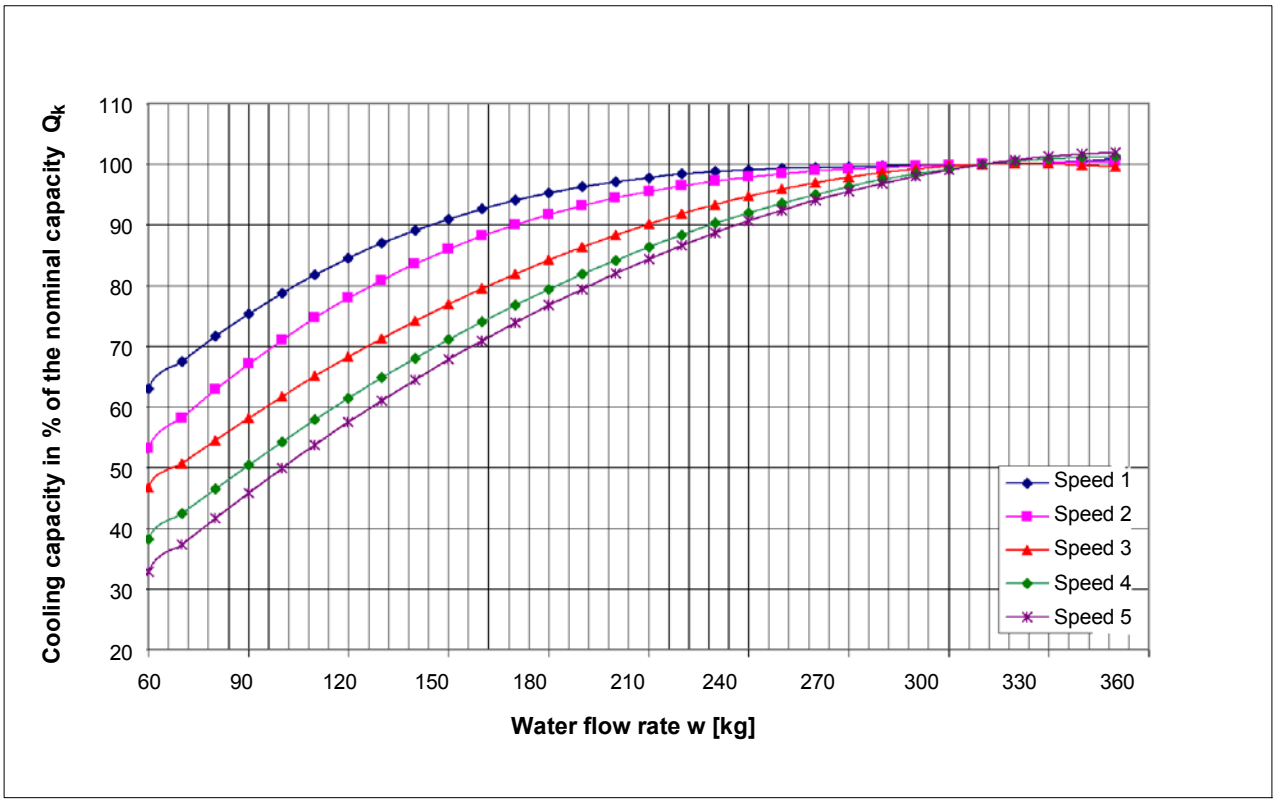
Acoustics data without impact of ceiling



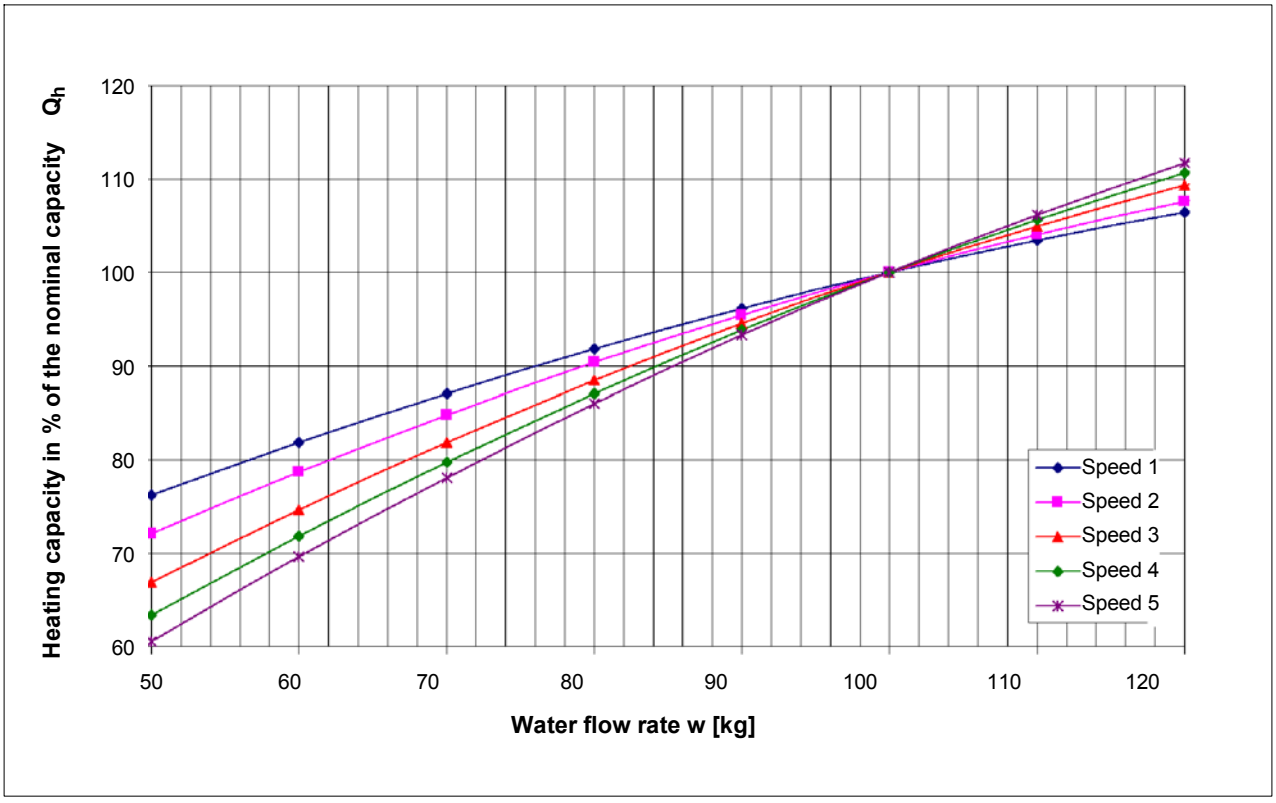
n [-]	Pressure increase Return air [Pa]	Supply air [Pa]	Δp [Pa]	L_{wA} [dB(A)]	V [m³/h]	P_{el} [W]	Q_k [W/K]	Q_h [W/K]
I	-4.4	1.7	6.1	28	169	9	52	35
II	-6.9	2.7	9.6	33	227	13	68	44
III	-13.0	5.2	18.2	43	307	46	89	55
IV	-22.9	9.1	32.0	50	387	55	109	64
V	-33.3	13.1	46.4	55	443	68	122	70

Air conditioning system Indivent® for ceiling installation
Fan coil unit type VKE

Cooling capacity for different water flow rates



Heating capacity for different water flow rates



Air conditioning system Indivent® for ceiling installation
Fan coil unit type VKE

Installation

For installation on site the units are provided with 9 mm Ø through holes (fixing material by customer).

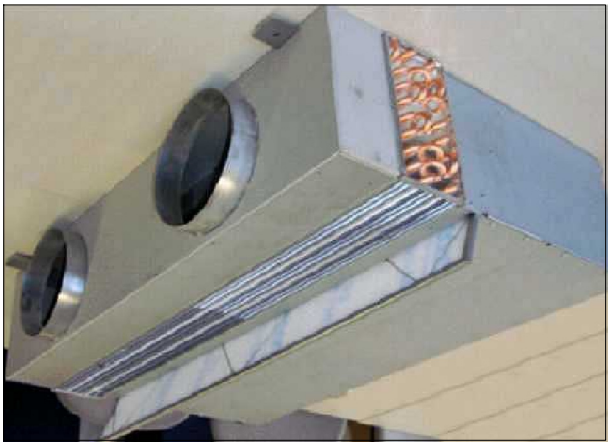
To avoid structure-borne sound transmission use vibration dampers when installing the unit and avoid any direct contact with ceiling elements.

Maintenance

The fan coil unit VKE is maintenance-friendly. Major components may be removed as shown below.

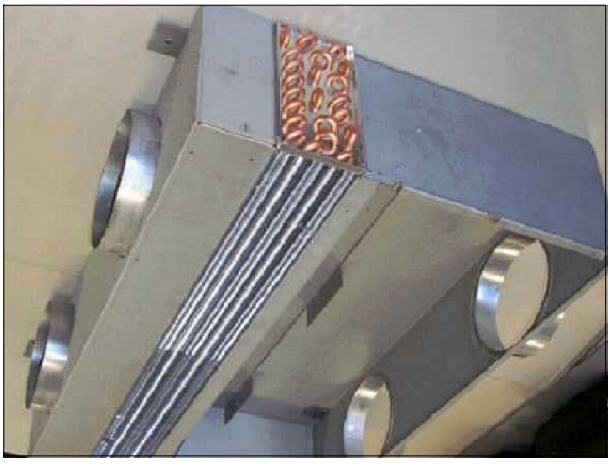
Repair and maintenance of the units must be carried out in compliance with applicable regulations.

1. Removal of condensate tray, cleaning



2. Replacement of plug-in filter

3. Removal of lower plate, vacuum-cleaning of heat exchanger on the pressure side



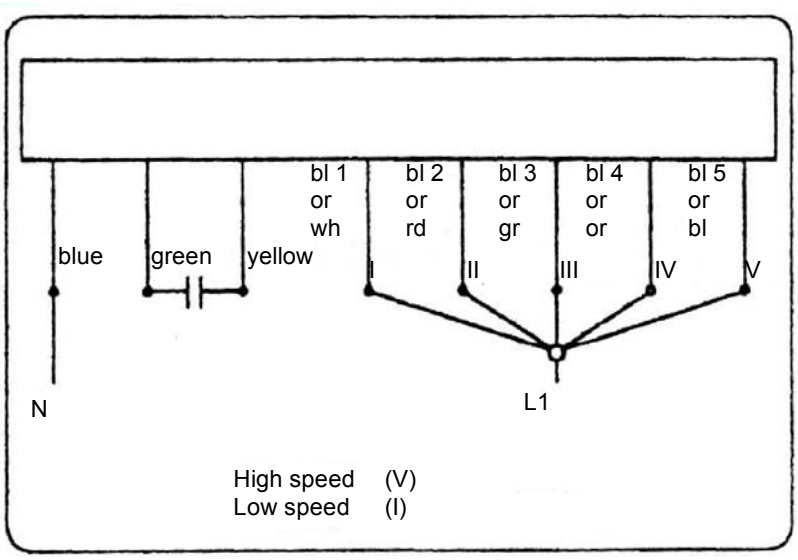
4. Removal of fan unit including mounting flange

Air conditioning system Indivent® for ceiling installation
Fan coil unit type VKE

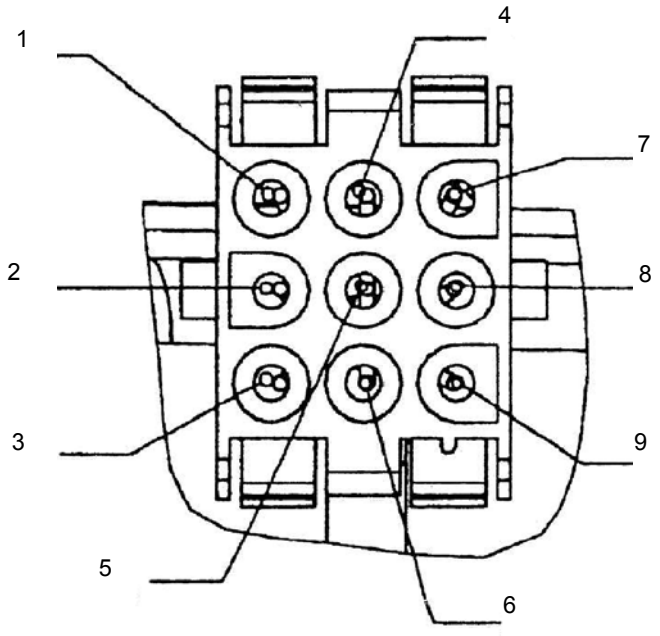
Speed control wiring diagram

Note: - 5-speed capacitor motor (internal switching of temperature controller)
- group activation possible
- for power consumption and output refer to technical data

A 2.3 m cable and mating connector are included in the delivery.



1: L1 white
2: L2 red
3: L3 grey
4: L4 orange
5: L5 black
6: -
7: -
8: N blue
9: PE green/yellow



Air conditioning system Indivent® for ceiling installation
Fan coil unit type VKE

Nomenclature

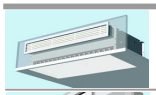
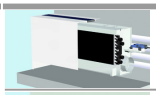
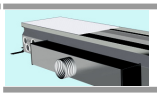
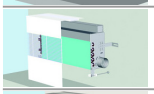
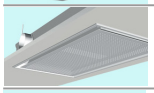
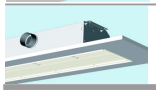
VKE - 2 / 1100 / F / L / 2A200 / D

2-pipe unit	**2**		
4-pipe unit (valve controlled)	**4**		
Size	**1100**		
Filter	without	**–**	
	with	**F**	
Water connection	on the left	**L**	
Socket	pressure-side, Ø 200	**2A200**	
	suction-side, Ø 200	**2A200**	
Valves	straight-way 3-point	**D**	
	3-way 3-point	**3**	

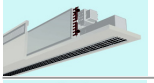
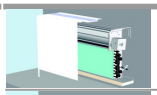
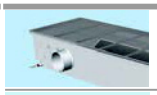
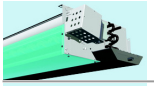
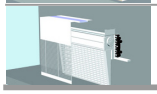
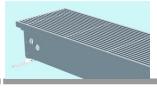
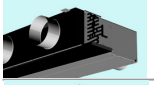
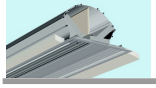
AIR TECH SYSTEMS

Product Overview
LTG Air-Water Systems

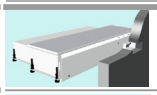
LTG Induction – Induction Units

Ceiling installation	Sill Installation	Floor Installation
 HFF *suite* SilentSuite	 HFV / *HFVsf* System SmartFlow	 HFB / HFB *sf* System SmartFlow
 LHG System Indivent	 HFG	
 HDF / HDF *sf* System SmartFlow	 QHG	
 HDC		

LTG FanPower – Fan Coil Units

Ceiling Installation	Sill Installation	Floor Installation
 LVC System Indivent	 VFC	 VKB
 VKH	 QVC	 SKB
 VKE		
 KFA CoolWave		

LTG Decentral – Decentralised Ventilation Units

Ceiling Installation	Sill Installation	Floor Installation
 FVS Univent	 FVP *pulse-V* System PulseVentilation	 FVP *pulse-B* System PulseVentilation
		 FVD/FVDplus

Engineering Services

 LTG Engineering Services Comfort Air Technology

AIR TECH
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 / Analysis
R&D / Start-up

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

Indivent-eng-TP (10/16) 416-126