

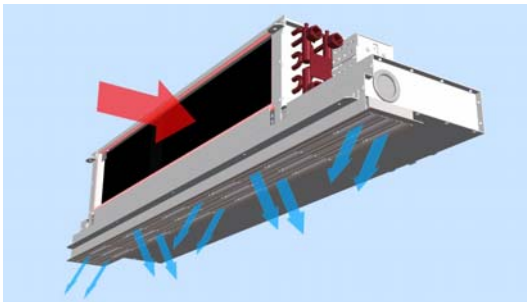
Technical Brochure

LTG Air-Water Systems

LTG FanPower

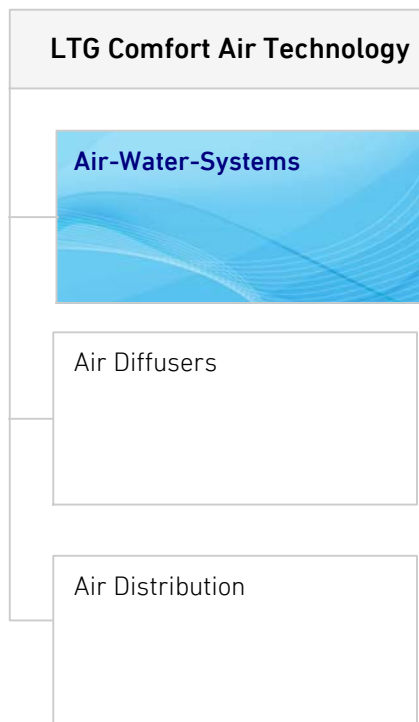
VKL Combination of fan coil unit and
linear air diffuser

system
indivent



Ceiling installation

Technical brochure • VKL Combination of fan coil unit and linear air diffuser



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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. 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.

LTG planning tools – we support you!

Visit the **download area on our website** with helpful tools, such as dimensioning programs, streaming videos and product information!

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

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LTG FanPower

Fan Coil Units

The air conditioning classic – energy-efficient and low-noise

The principle: A fan conveys room air through a heat exchanger and cools or heats the room.

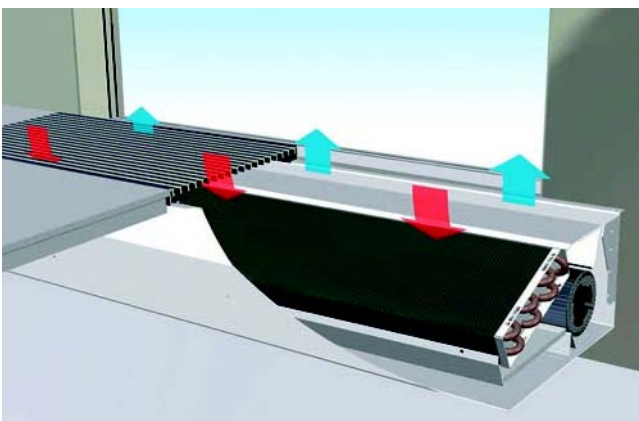
LTG fan coil units use both radial and tangential fans to implement the best flow and acoustics for different installation situations. Flexible and high-performance.

LTG fan convectors with tangential technology are characterized by a particularly even and large-area flow through the heat exchanger. Low pressure loss and low noise level with high cooling or heating output.

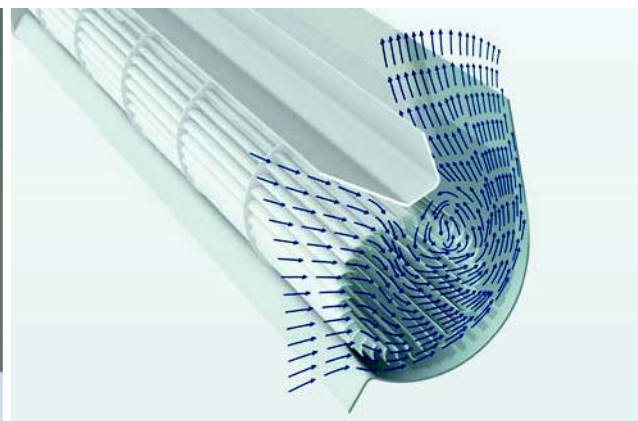
The latest drive technology generation (EC-technology) also permits capacity modulation at the lowest electrical energy consumption.

Benefits

- Best flow form, e.g. with displacement ventilation
- Demand-controlled air conditioning
- Low power consumption of the fan by smart EC-technology
- Rapid response for cooling and heating output
- Fresh air supply possible



Fan coil chart (floor installation example)



Air flow in the fan coil unit with tangential flow

Technical brochure • VKL Combination of fan coil unit and linear air diffuser LTG System Indivent

Application

Modern air conditioning concepts must evacuate heat loads and airborne substances from the frequented area reliably and without draughts. LTG's Indivent air conditioning system makes it possible to extend the displacement air ventilation – the introduction and distribution of cooled fresh air at floor level – to ceiling level if required for the application.

The system provides a high level of thermal comfort by combining the advantages of mixed and displacement air ventilation.

Installation, placement

Units are installed over the 'core' wall, in a ceiling bulkhead or in a suspended ceiling.

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.

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 LTG System Indivent

Characteristics

- Comfort
 - High cooling capacities and uniform temperatures across the entire frequented area.
 - Outstanding thermal comfort thanks to low air velocity and low turbulence of the air flow.
 - The thermal dynamic carries heat and airborne substances upwards, considerably improving the room air quality.
- Cost-effectiveness
 - All that is required is a single compact and space-saving air duct system, since the heat loads are efficiently evacuated via a cold water system.
- Flexibility
 - Interior designers are free to design the ceiling, lighting and window elements as they wish.
 - Workplaces can be arranged in the room in any desired configuration.

Delivery range

Products with System Indivent:

- Fan coil unit **VKL**, installation in ceilings, 2- or 4-pipe unit with one heat exchanger for cooling or/and heating, separate fresh air connection on demand, with 3-row linear diffuser LDB 12style, 3 sizes.
- Fan coil unit **VKE**, installation in ceilings, valve-controlled 2- or 4-pipe unit with one heat exchanger for cooling or/and heating. 1 size.
- Induction unit **LHG**, installation in ceilings, valve-controlled 2-pipe unit with one heat exchanger for cooling or heating, with 3-row linear diffuser LDB 20classic, 4 sizes

Technical brochure • VKL Combination of fan coil unit and linear air diffuser LTG System Indivent

Mode of operation

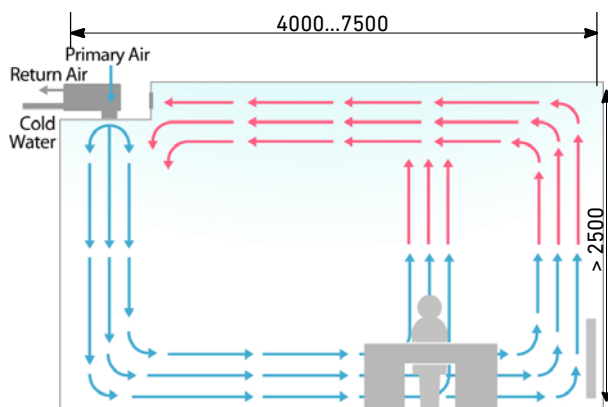
An LTG highly inductive linear air diffuser LDB with integrated recirculated air cooling is installed at ceiling level at the core wall. Heaters on the window side of the room provide the heating. This arrangement ensures that the flow pattern remains the same in summer and in winter.

An LTG highly inductive linear air diffuser LTD with integrated recirculated air cooling is installed at ceiling level at the core wall. Heaters on the window side of the room provide the heating. This arrangement ensures that the flow pattern remains the same in summer and in winter.

The resultant cooled airstream ② is redirected at floor level and moves at low speed and with little turbulence across the frequented area towards the window. The air velocity is virtually independent of the cooling capacity. The temperature difference between head and foot level is no more than 1 Kelvin.

Any air heated by individuals or equipment in the room moves upwards ③.

A cushion of warm room air with increased pollutant concentration forms above the frequented area. The airborne substances and heat loads are then discharged from the room along with the return air. In this way, the temperature layers generated by the System Indivent ensure economical operation.



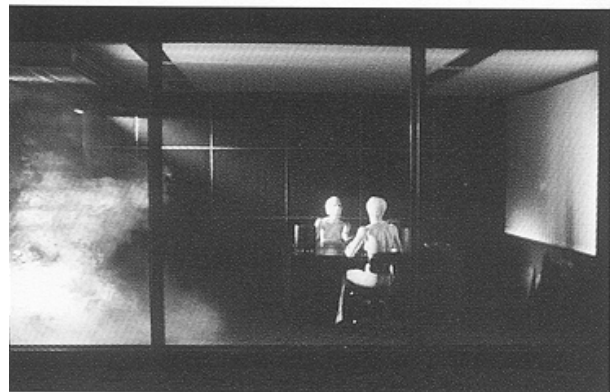
System illustration

- ① **Mixed air flow**
Reduction of temperature due to high induction mixing with ambient air
- ② **Displacement air flow**
Supply air mixed with ambient air moves from the corridor towards the façade
- 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

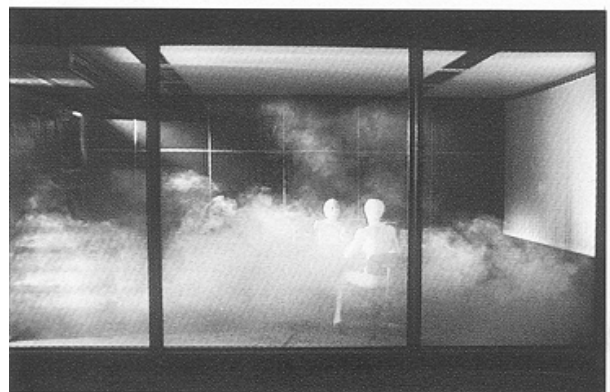
Air flow



Local mixed air zone



Deflection of the air flow near the floor



Air heated by occupants or equipment rises to high level

Technical brochure • VKL Combination of fan coil unit and linear air diffuser

Unit view



Application

The fan coil unit VKL is a combination of fan coil unit and linear diffuser; for heating, cooling and dehumidification.

It was specifically designed for hotels and office buildings with high demands placed on appearance, comfort and ease of maintenance.

Installation, placement

Installation is inside ceiling panelling or a suspended ceiling, and is also feasible in cramped conditions. In the room, only the LDB 12style is visible.



Mode of operation

In the local mixed air zone the temperature differences between the ambient air and the supply air are reduced. That enables a high degree of comfort to be achieved even in condensing operation.



Design

Linear diffuser type LDB 12style

Rails: Aluminium natural anodised, or painted (similar to RAL)
Supply air plenum: galvanised steel

Unit

Housing: galvanised metal sheet
Condensate tray: stainless steel
Heat exchanger: Copper pipe with pressed-on aluminium fins.
Filter: Class EU2

Accessories

For water-side unit connection

- Transition ½" resp. vent ½"
- Flexible connection hoses
- With and without venting, with and without insulation

Accessories for control

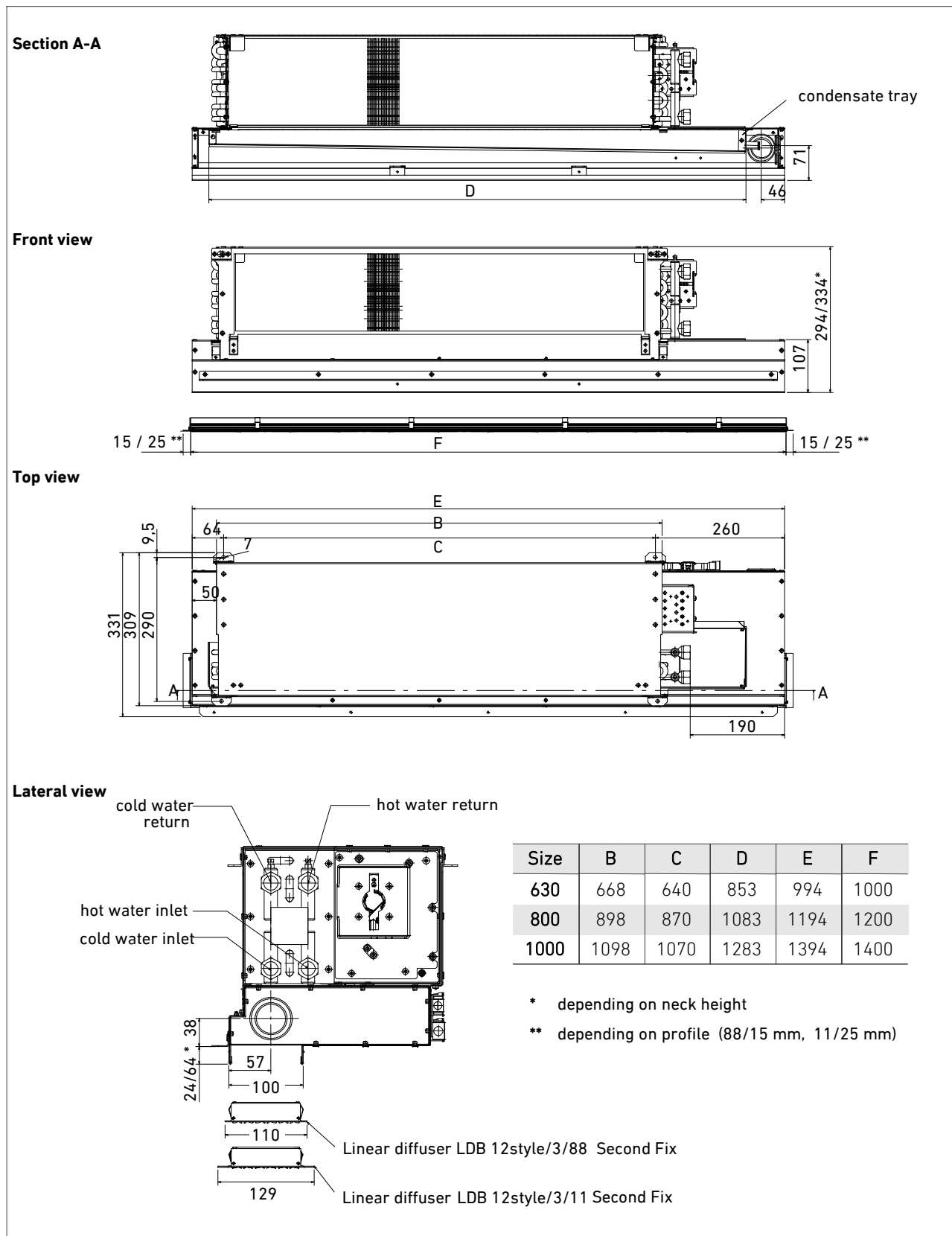
- Valves optionally with continuous, thermal or 3-point actuators

Maintenance

Complete maintenance - filter change, cleaning of condensate tray, removal and cleaning of heat exchanger - is performed via the air diffuser, without additional service openings.

Technical brochure • VKL Combination of fan coil unit and linear air diffuser

Dimensions



Technical brochure • VKL Combination of fan coil unit and linear air diffuser 4-pipe system (cooling and heating)

Cooling mode

Suction temperature 26 °C
Cold water supply temperature 16 °C
Condensing operation 6 °C
Relative humidity 50 %
Nominal water flow rate 200 kg/h

Heating mode

Suction temperature 22 °C
Hot water supply temperature 55 °C
Nominal water flow rate 120 kg/h

Technical data size 630

U [V]	V [m ³ /h]	L _{WA} [dB(A)]	L _{A18} [dB(A)]	Q _{Sk} ¹⁾ [W]	Q _{ges} ²⁾ [W]	Q _{k sens} ²⁾ [W]	Q _{Sh} [W]	t _{KW-RL} [°C]	t _{KW-RL} ²⁾ [°C]	t _{WW-RL} [°C]
3.9	107	35	29	-270	-767	-502	749	17.2	8.1	49.6
4.9	134	40	34	-323	-889	-593	875	17.4	8.5	48.7
6.2	168	45	38	-383	-1022	-695	999	17.6	9.0	47.9
7.7	210	50	43	-448	-1162	-808	1124	17.9	9.5	47.0

Δp_k = 20 [kPa] Δp_h = 4 [kPa]

Technical data size 800

U [V]	V [m ³ /h]	L _{WA} [dB(A)]	L _{A18} [dB(A)]	Q _{Sk} ¹⁾ [W]	Q _{ges} ²⁾ [W]	Q _{k sens} ²⁾ [W]	Q _{Sh} [W]	t _{KW-RL} [°C]	t _{KW-RL} ²⁾ [°C]	t _{WW-RL} [°C]
3.7	140	35	29	-352	-1011	-658	952	17.5	8.8	48.2
4.6	175	40	34	-421	-1172	-776	1106	17.8	9.3	47.1
5.8	219	45	39	-498	-1343	-908	1265	18.1	9.9	46.0
7.3	273	50	43	-581	-1520	-1050	1422	18.5	10.5	44.8

Δp_k = 24 [kPa] Δp_h = 5 [kPa]

Technical data size 1000

U [V]	V [m ³ /h]	L _{WA} [dB(A)]	L _{A18} [dB(A)]	Q _{Sk} ¹⁾ [W]	Q _{ges} ²⁾ [W]	Q _{k sens} ²⁾ [W]	Q _{Sh} [W]	t _{KW-RL} [°C]	t _{KW-RL} ²⁾ [°C]	t _{WW-RL} [°C]
3.5	167	35	28	-417	-1205	-781	1112	17.8	9.3	47.1
4.4	208	40	33	-499	-1396	-922	1289	18.1	10.0	45.8
5.5	261	45	39	-589	-1598	-1076	1472	18.5	10.6	44.5
6.9	326	50	43	-685	-1803	-1240	1646	18.9	11.3	43.2

Δp_k = 28 [kPa] Δp_h = 6 [kPa]

- 1) Non-condensing operation, supply temperature 16 °C
- 2) Condensing operation, supply temperature 6 °C

- U - Control voltage (with filter)
- V - Flow rate
- L_{WA} - Sound power level ± 3 dB(A) (without casing)
- L_{A18} - Sound pressure level, 18 m² Sabine
- Q_{Sk} - Cooling capacity of secondary air
- Q_{k ges} - Total cooling capacity
- Q_{k sens} - Sensible cooling capacity
- Q_{Sh} - Heating capacity of secondary air
- t_{KW-RL} - Cold water return temperature
- t_{WW-RL} - Hot water return temperature
- Δp_k - Pressure loss cooling mode
- Δp_h - Pressure loss heating mode

Technical brochure • VKL Combination of fan coil unit and linear air diffuser 2-pipe system (cooling or heating)

Optimised for non-condensing operation, without filter.

Technical data size 630

U [V]	V [m ³ /h]	L _{WA} [dB(A)]	L _{A18} [dB(A)]	Q _{Sk} [W]	Q _{Sh} [W]
3.9	135	35	29	-320	959
5.1	174	40	34	-407	1208
6.5	216	45	38	-496	1442
8.0	261	50	43	-584	1646

$\Delta\rho_k = 28$ [kPa] $\Delta\rho_h = 9$ [kPa]

Cooling mode

Suction temperature 26 °C
Cold water supply temperature 16 °C
Nominal water flow rate 200 kg/h

Heating mode

Suction temperature 22 °C
Hot water supply temperature 55 °C
Nominal water flow rate 120 kg/h

Technical data size 800

U [V]	V [m ³ /h]	L _{WA} [dB(A)]	L _{A18} [dB(A)]	Q _{Sk} [W]	Q _{Sh} [W]
3.5	175	35	29	-409	1244
4.7	228	40	34	-530	1584
6.0	286	45	38	-652	1906
7.5	348	50	43	-770	2193

$\Delta\rho_k = 36$ [kPa] $\Delta\rho_h = 12$ [kPa]

Technical data size 1000

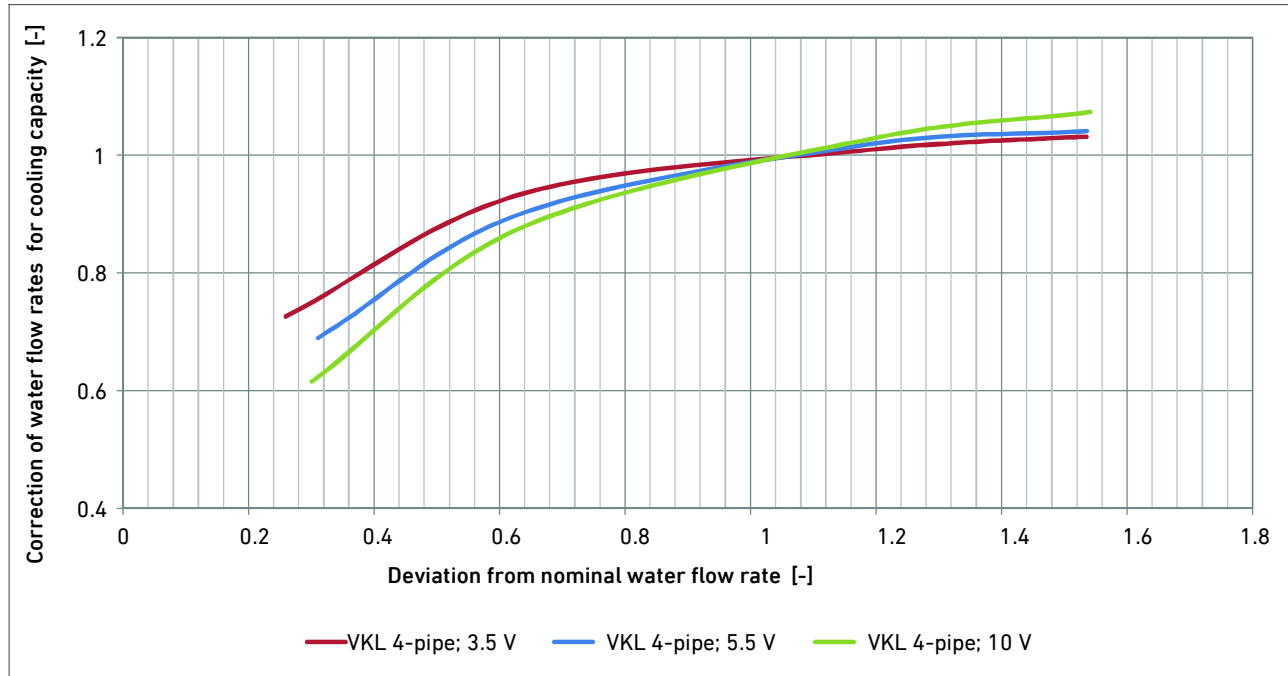
U [V]	V [m ³ /h]	L _{WA} [dB(A)]	L _{A18} [dB(A)]	Q _{Sk} [W]	Q _{Sh} [W]
3.3	205	35	29	-481	1462
4.5	271	40	34	-628	1870
5.8	341	45	38	-774	2260
7.2	417	50	43	-911	2612

$\Delta\rho_k = 41$ [kPa] $\Delta\rho_h = 14$ [kPa]

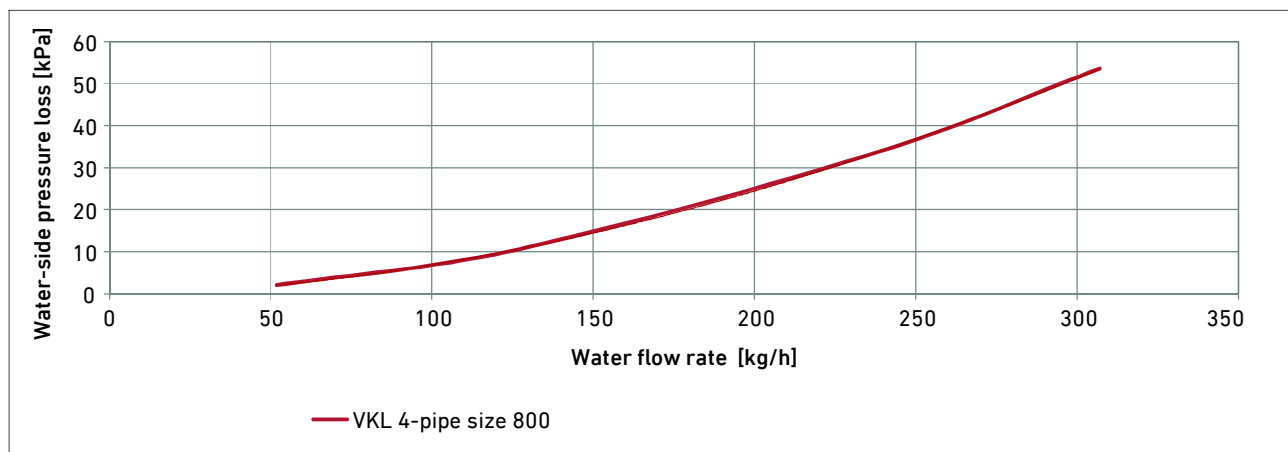
- U - Control voltage (without filter)
- V - Flow rate
- L_{WA} - Sound power level ± 3 dB(A)
 (without casing)
- L_{A18} - Sound pressure level, 18 m² Sabine
- Q_{Sk} - Cooling capacity of secondary air
- Q_{Sh} - Heating capacity of secondary air

Technical brochure • VKL Combination of fan coil unit and linear air diffuser

Water flow rates



Water-side pressure loss with different water flow rates, cooling mode



Technical brochure • VKL Combination of fan coil unit and linear air diffuser

Speed control wiring diagram for EC motor

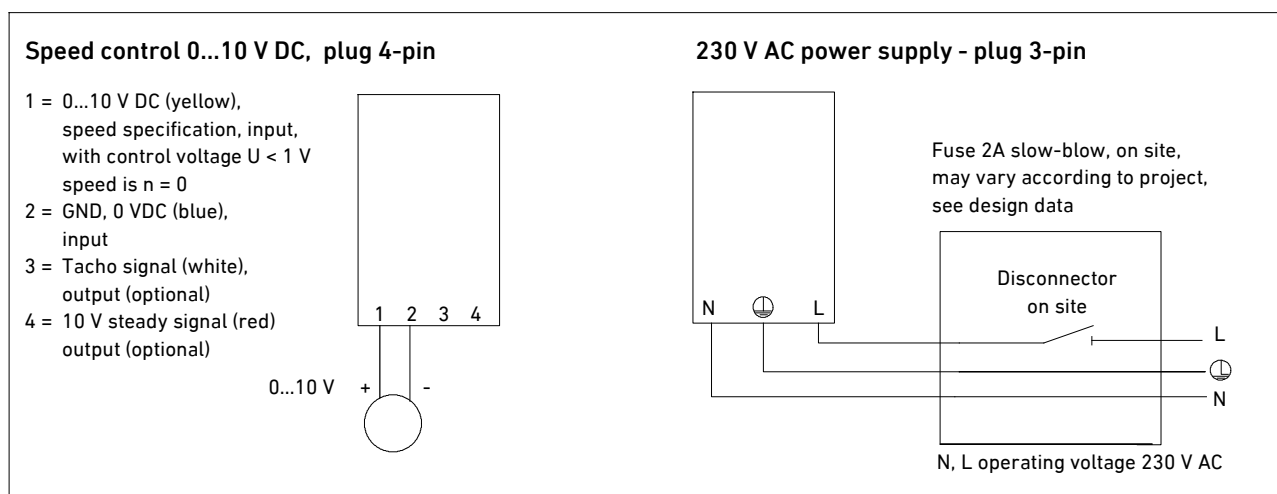
Two connections are necessary for electrically connecting the fan coil unit. These are provided by plug connections, protection IP 21. The plugs are preassembled on the motor side at the factory. Only the supplied mating plugs have to be assembled by others accordingly.

Note: As a rule, we are not familiar with the full scope of the ventilation, air-conditioning and control engineering systems. For this reason, the designs, drawings and

circuit diagrams only show the systems that are relevant to the basic functions. Other units or components, such as those required for overall control engineering and/or design in compliance with VDE regulations, are not shown and are not explicitly mentioned.

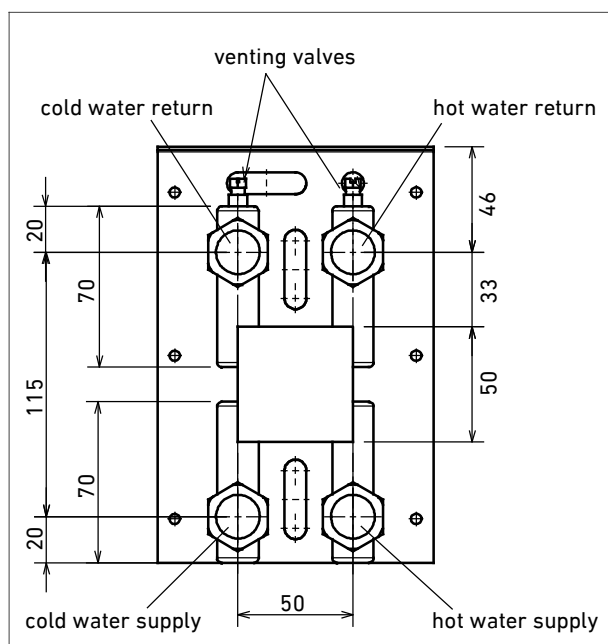
Please also note the assembly and installation instructions in the original documentation.

The controllers for this application are parametrized by others.



Water connections

According to ISO 228 G 1/2 " internal thread.



For flexible hoses, variants of connection, transitions, valves etc. see technical brochure „Accessories for LTG Air-Water Systems“.

Installation

For installation on site the units are provided with 9 mm \varnothing 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.

Service openings for scheduled maintenance such as filter change, extraction from heat exchanger, checking of drives and water connections, or cleaning of condensate tray are not needed, as this work is done via the linear diffuser.

Removal of the motor and heat exchanger is not possible via the linear diffuser.

Technical brochure • VKL Combination of fan coil unit and linear air diffuser

Nomenclature, ordering code



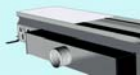





VKL - 4 / 800 / 1200 / EC / 0 / M / 11 / E6-EV1 / 1

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11)


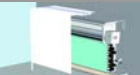
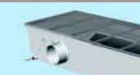



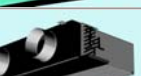

(1) Series	VKL	= VKL Combination of fan coil unit and linear air diffuser
(2) Heat exchanger	2	= 2-pipe
	4	= 4-pipe
(3) Size	630	= 630
	800	= 800
	1000	= 1000
(4) Length of linear diffuser	1000	= 1000 mm (for size 630)
	1200	= 1200 mm (for size 800)
	1400	= 1400 mm (for size 1000)
(5) Motor	EC	= EC motor
(6) 3-D flow	0	= without 3-D flow
	3D	= with 3-D flow
(7) Second Fix	M	= with Second Fix
(8) Border profile type left-right	11	= Type 11
(9) Surface	LM	= painted, mat
	LG	= painted, glossy
	E6	= anodised, unbrushed
	R	= unfinished
	SX	= special finish
(10) Colour	= RAL-colour = painted / EV1 = natural anodised
	SX	= special colour / special anodised shade
(11) End caps	1	= On both sides

Product Overview LTG Air-Water Systems





LTG Induction – Induction Units

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

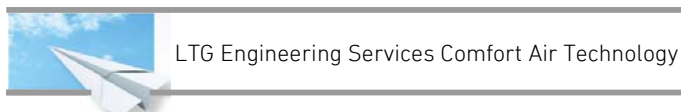
LTG FanPower– Fan Coil Units

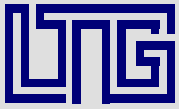
Ceiling Installation	Sill Installation	Floor Installation
 VKL System Indivent	 VFC	 VKB
 VKH	 QVC	 SKB
 VKE		
 KFA CoolWave		

LTG Decentral – Decentralised Ventilation Units

Ceiling Installation	Sill Installation	Floor Installation
 FVS Eco2School	 FVP <i>pulse</i> -V System PulseVentilation	 FVP <i>pulse</i> -B System PulseVentilation
		 FVD/FVD <i>plus</i>

Engineering Services





**AIR TECH
SYSTEMS**

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Air-Water Systems
Air Diffusers
Air Distribution

Process Air Technology

Fans
Filtration Technology
Humidification Technology

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