

Installation/operating/maintenance instructions

LTG Air-Water Systems

LTG FanPower

VKE Fan coil units



Installation in ceilings



Read these instructions and keep them in a safe place!

These original operating instructions are an important part of the unit. This document must be handed over when the unit is sold or rented. Archive for future use!

Installation, removal, and maintenance must be performed by trained personnel in order to ensure reliability, safety, and the best results.

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LTG Comfort Air Technology
Air-Water Systems
Air Diffusers
Air Distribution

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maintenance intervals / maintenance log	

Notes

The dimensions in this document are given in mm.

The general tolerances according to DIN ISO 2768-vL apply to the dimensions specified in this document. Any additional information can be found in the drawings.

Straightness/warping tolerances according to DIN EN 12020-2.

EC Declaration of conformity

Let's realize
the potential of air
for a sustainable world



EC declaration of conformity
As defined by the EC Council Directive on Machinery 2006/42/EC, Annex II, Nr. 1A

We herewith declare that the machine described in the following conforms to all relevant provisions of the EC Machinery Directive 2006/42/EC.

Manufacturer:	LTG Aktiengesellschaft, Grenzstr. 7, 70435 Stuttgart
Designation of machinery:	Fan Coil Unit
Machinery type:	VKE all sizes
Relevant EC Council Directives:	Low Voltage Directive 2014/35/EC Regulation (EU) 2024/178
Applied harmonized standards, in particular:	DIN EN ISO 12100:2011, DIN EN ISO 13857:2020, DIN EN ISO 13854:2020, DIN EN IEC 60335-2-40 (VDE 0700-40):2025
Other standards:	VDI 6022

Stuttgart, den 21.09.2026

Signature of manufacturer

Position of signatory:


p.p. Mr. Dehlwes

Seite: 1 - 1

LTG Aktiengesellschaft Grenzstr.7 70435 Stuttgart +49 711 8201 0 info@LTG.de www.LTG.de	Landesbank Baden-Württemberg, Stuttgart IBAN: DE34 6005 0101 0002 5756 67 BIC: SOLADEST600 Commerzbank AG, Stuttgart IBAN: DE44 6004 0071 0755 0031 00 BIC: COBADEFFXXX	Finanzamt Stuttgart USt.-IdNr. / VAT-ID: DE 812753932 Handelsregister Amtsgericht Stuttgart HRB 20451 D-U-N-S Nr.: 49-829-4685	Executive board: Dipl.-Ing. Andreas Egelseder CEO & Chairman of the Executive Board Supervisory board: Dr. Franz Wimpffen Chairman of supervisory board
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Let's realise
the potential of air
for a sustainable world



Manufacturer's declaration

in accordance with VDI Guideline 6022

We hereby declare that the products, components and units specified below comply with the hygiene requirements of VDI 6022 Part 1 (Edition 2018-01) and Part 1.1 (Edition 2024-07).

VDI 6022 Part 1: Comfort Air Technology, indoor air quality – Hygiene requirements for comfort air technology systems and units (VDI Ventilation Regulations)

Manufacturer:	LTG Aktiengesellschaft, Grenzstr. 7, 0-70435 Stuttgart
Designation/Equipment name:	Fan coil unit VKE
Product group/type:	LTG FanPower

This declaration confirms, in particular, compliance with the requirements set out in Table 3 of VDI 6022 Part 1.1 (Edition 2024-07) with the following serial numbers:

- 2.0 Full compliance with the requirements set out in Section 4
- 2.1 Compliance with the requirements regarding materials used as set out in Part 1
- 2.5 Characteristics of all air-carrying surfaces
- 2.11 Suitability for operating below the dew point

Tested in accordance with VDI 6022 Sheet 2, Category A!

Stuttgart, 17.09.26

i.A. Wolfgang Schneider
Head of Design

Details of the signatory:
The signatory holds a Category A qualification in accordance with VDI 6022 Part 4.

Page: 1-1

LTG Aktiengesellschaft Grenzstr. 7 70435 Stuttgart	Landesbank Baden-Württemberg, Stuttgart IBAN: DE34 6005 010100025756 67 BIC: SOLADEST600	Stuttgart Tax Office VAT No.: DE 812753932	Executive Board: Dipl.-Ing. Andreas Egelsederl, CEO and Chairman of the Executive Board
+49 71182010 info@LTG.de www.LTG.de	Commerzbank AG, Stuttgart IBAN: DE44 6004 007 10755 003100 BIC: COBADEFFXXX	Commercial Register, Stuttgart Local Court HRB 20451 D-U-N-S No. 49-829-4685	

As at: March 2026

Manufacturer's Declaration VDI 6022.docx

1. Safety



Installation, removal, and maintenance must be carried out by trained personnel in order to ensure reliability, safety, and the best results.

1.1 Symbol and instruction explanation

Work safety symbol



This symbol is used for all occupational safety instructions in this operating manual that involve a risk to life and limb. Observe these instructions and exercise particular caution in these cases. Pass on all occupational safety instructions to other users. In addition to the instructions in this operating manual, the generally applicable safety and accident prevention regulations must be observed.

Warning of electrical voltage



Danger to life due to electric shock! Live parts may be touched. Therefore, installation, maintenance, and repair may only be carried out by trained personnel.

Information note



This information symbol appears in this operating manual at points that require special attention in order to comply with guidelines, regulations, instructions, and the correct sequence of work, as well as to prevent damage and destruction of the unit and/or other system components.



These mandatory signs are linked to the occupational safety instructions and indicate which protective measures must be observed at the relevant workstations and therefore prescribe a certain behavior; as shown here, for example: Use hand protection.



These prohibition signs are linked to occupational safety instructions that prohibit dangerous or hazardous behavior, such as shown here: Do not touch.

1.2 Safety instructions

LTG fan coil units may only be operated after careful study of these instructions!

The safety instructions must be observed at all times!

The unit complies with all relevant safety regulations.



Installation and maintenance of air conditioning units can be dangerous due to high pressures and live electrical parts. For these reasons, installation, maintenance, and repair may only be carried out by trained personnel.

In particular, electrical connections may only be made, removed, or modified by authorized personnel in accordance with local safety regulations.

Safety instructions in the technical documentation and on labels on the unit must be observed.

The unit may only be opened for cleaning, maintenance, and repair purposes, and the covers and panels (air outlet) may only be removed if all live connections are disconnected from the mains on all poles.

Electrical work may only be carried out by trained personnel. The mains connection and the protective earth connection must be carried out in accordance with the information in the electrical diagram.

The electrical operation of the unit in a partially dismantled state or of individual components is not permitted, as this can interrupt ground connections.



The water temperature can reach 80 °C during heating. The water-carrying parts are hot and must not be touched with your hands, as this can lead to burns.



During continuous operation, the motor can heat up to approx. 65 °C. Allow the motor to cool down if necessary or wear gloves.

Continued 1.2 Safety instructions



The heat exchangers are approved for operation at 10 bar (test pressure 16 bar) in their standard version. High water pressure can be dangerous. Therefore, higher pressures are only permitted with the approval of LTG Aktiengesellschaft. Wear safety goggles.





Exercise caution when working on the heat exchangers. The heat exchanger fins and housing parts have sharp edges. Wear gloves when working and transporting.





When working overhead, take protective measures against falling parts.





The protective grille covering the fan impeller and the protective cover for the motor must not be removed during operation.



No objects or dirt may enter the impeller. A damaged impeller or objects being thrown out by the impeller can endanger people.



The on-site housing also serves as a protective device and may only be removed for maintenance and cleaning work.

The units and mountings must not be subjected to additional loads, as otherwise they may not be sufficiently strong

If

- the unit has been mechanically damaged or has suffered water damage,
- the fan is damaged (imbalance, bearing damage, motor damage),
- the suspension or cladding shows significant corrosion or aging damage,

the unit may only be operated again after it has been checked and thoroughly repaired by trained personnel.

Until it has been inspected and repaired by trained personnel, the unit must be switched off and disconnected from the electrical network at all poles, even if this means that undamaged units cannot be operated temporarily.



The unit must be switched off before maintenance or repair work.
Before opening, the unit must be disconnected from the mains at all poles.

Delivery/transport/storage, use

2. Delivery, transport, storage

The unit must always be transported, stored, installed, and operated in dry and dust-free environmental conditions.

2.1 Delivery

The unit is delivered in corrugated cardboard boxes secured with straps.

The units are stacked on Euro or disposable pallets and secured with straps. The pallets can be transported using forklifts and cranes.

The packaging is disposable and cannot be returned to LTG.

The packaging is not weather-resistant.

To prevent contamination or damage to the unit, the packaging must not be removed until immediately before installation on the construction site.



LTG Aktiengesellschaft is not liable for contamination or damage to the unit.

2.2 Transport instructions

The units must be handled properly during transport. They must not be thrown, placed abruptly on the ground, or knocked against other objects or walls.

Ensure that the units are securely fastened during transport and cannot be damaged by other objects.

When transporting by hand, individual devices should be carried by at least 2 people.

2.3 Storage

The boxes must be stored upright, as indicated by the arrow on the box.

During storage, the units must be completely protected against weather conditions, moisture, and other influences that could cause damage.

The storage location must meet the following climatic conditions:

Temperature between +5 °C and +55 °C with max. 90 % relative humidity (non-condensing).

3. Intended use

The VKH fan coil unit is intended for indoor use.

It is approved for ambient conditions of +5...+40 °C with a maximum relative humidity of 90 % (non-condensing).

To ensure the long-term reliable operation of the motor unit, it must be ensured that the ambient temperature does not exceed +40 °C when installed.

The maximum permissible flow temperature is therefore limited to +80 °C.



Any use of the unit other than that described in these instructions is considered improper.

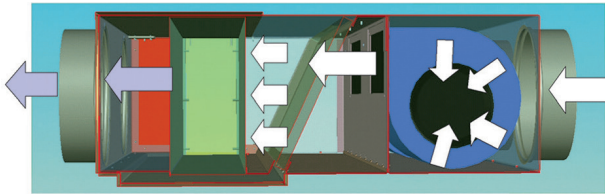
LTG Aktiengesellschaft is not liable for damage resulting from improper use.

Function

4. Function

The VKE ceiling fan coil unit was developed for versatile use in hotels and office buildings. It is designed for installation in a ceiling box. It can be used to easily implement various systems for air distribution in the room.

The fan draws air from the room. It flows through a heat exchanger and is returned to the room. Cold water flows through the heat exchanger for cooling, and hot water for heating. The water connection can be selected on the right or left.



Functional diagram of the VKE ceiling fan coil unit

If, during cooling, the cold water temperature falls below the dew point temperature, a condensate tray with a possible spigot is used to collect the condensate. For hygienic reasons, however, the system should be designed in such a way that condensation does not occur during normal operation.

Valve control (water-side control)

The heating or cooling output delivered by the heat exchanger is regulated by changing the water flow. This is done using a straight-through or three-way valve, whose stroke is regulated by a servomotor (accessory).

The servomotors can be controlled either continuously (0...10 V DC), 3-point, PWM, or 2-point (open/close).

The speed of the economical EC fan motor is controlled by an EC control signal (0...10 V DC).

An optional air filter must be replaced regularly as part of maintenance.

4.1 Decentralized control LTG Connected Intelligence

Application

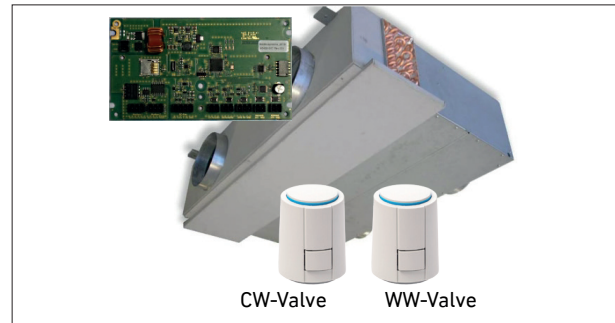
„Connected Intelligence“ (CI) is a control concept for the decentralized control of air-water systems from LTG Aktiengesellschaft. At its heart is the individually configurable CI circuit board, which is installed in every unit (decentralized ventilation unit, fan coil unit, or induction unit).

Connected Intelligence communicates via Modbus RTU and functions as a slave field device, but can also take on master functions. This allows both standalone solutions and zone solutions with a higher-level building management system to be implemented in the building.

How it works

The CI board controls the room temperature and air quality. The only input it requires is information about the desired operating mode and the setpoint and actual values in the control zone. The CI board independently controls the fan, cycle time, heating and cooling valves at the decentralized device level. Depending on the building management system (BMS) concept implemented, it communicates with other bus participants or higher-level instances via Modbus RTU.

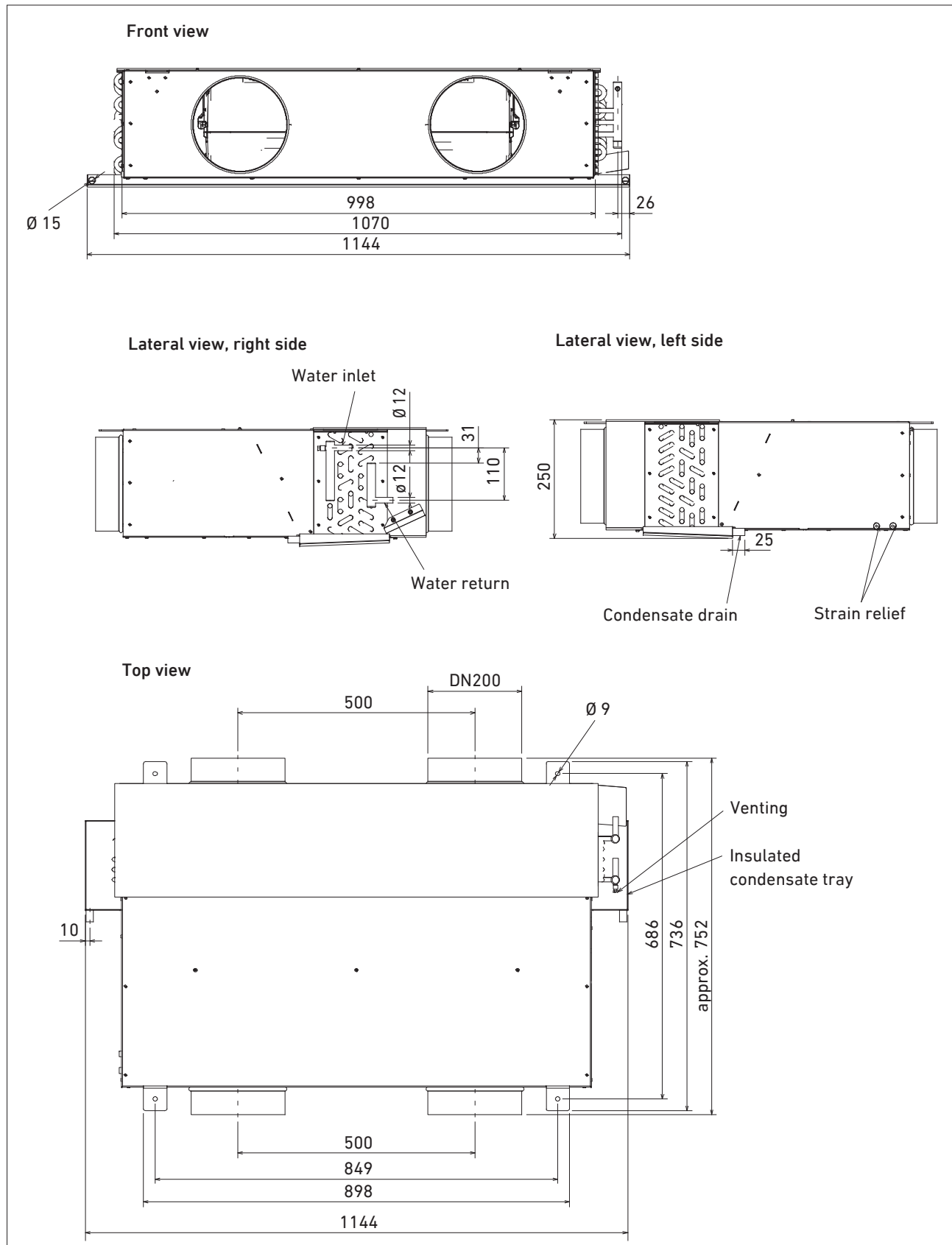
The unit, CI circuit board, and valves form a single unit and are completely wired together at the factory.



Technical data

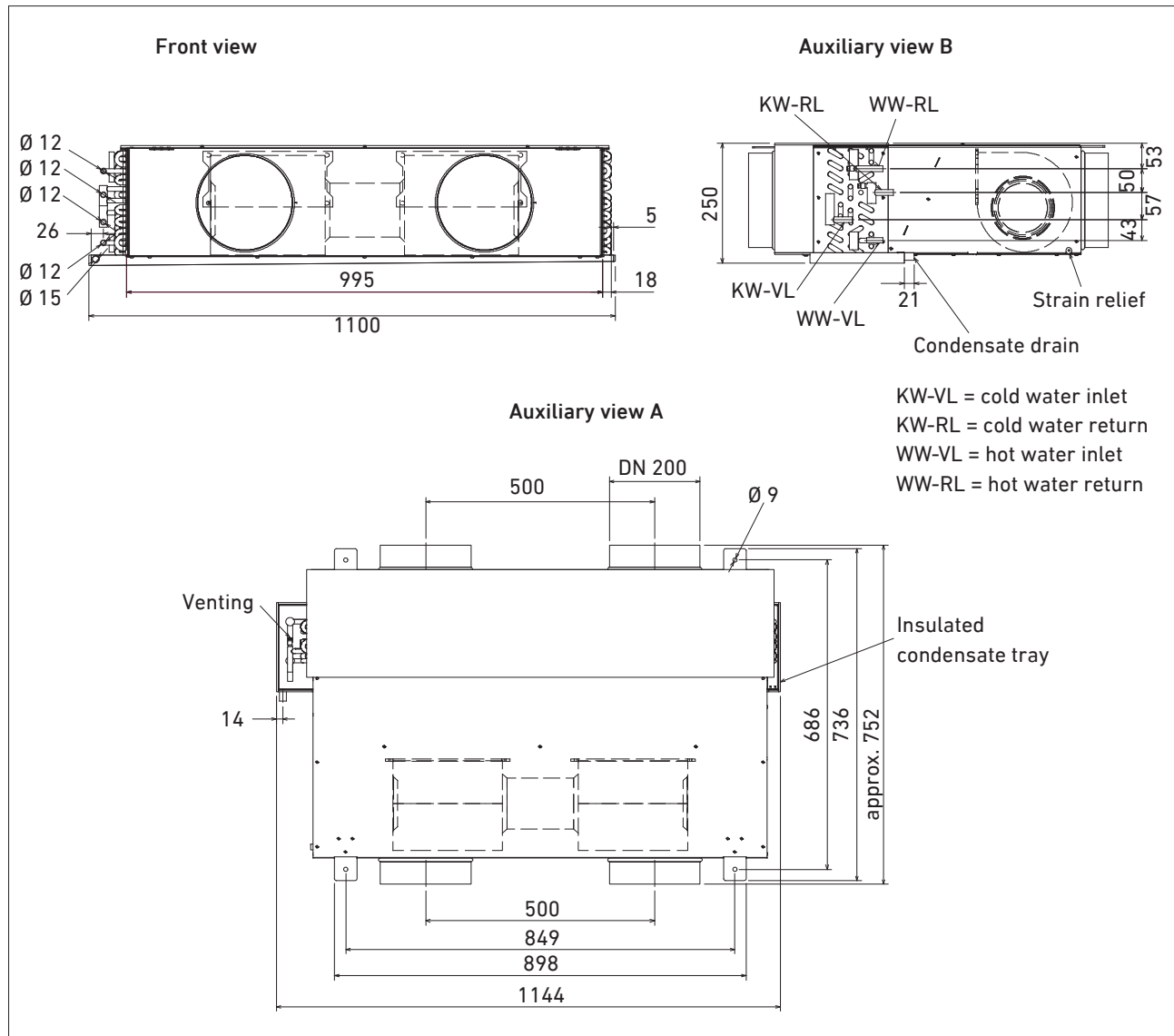
5. Technical Data

5.1 Dimensions, 2-pipe system, water connection on the right



Technical data

Dimensions 4-pipe system, water connection on the left



Weight

Size	2- and 4-pipe unit [kg]	Water content [l]	
		Circuit	Condensate tray
1100	47 *	12.4	2.1

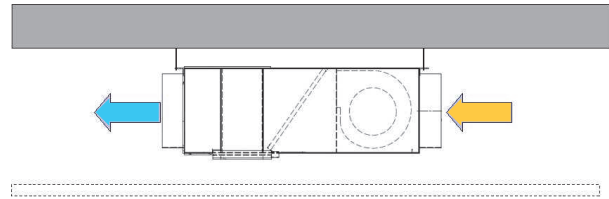
* Approx. weight without packaging.
 Without control, the units weigh approx. 1 kg less

Technical data

5.2 Acoustic, calorific data for various applications

Application: free suction/blowing

Acoustic data without the influence of a ceiling, incl. insertion loss of the diffusers, with flow noise of the diffusers (improvement of the sound level depending on the position of the openings in the ceiling and the attenuation properties of the ceiling). Weight 42 kg.



4-pipe system, non-condensing operation*

U_{control} (EC) [V]	Δp_{ext} [Pa]	V [m ³ /h]	L_{WA} [dB(A)]	L_{A18} [dB(A)]	$Q_k/\Delta t$ [W/K]	$Q_h/\Delta t$ [W/K]	$w_{\text{ok}}/\Delta p_w$ [kg/h]/[kPa]	$w_{\text{oh}}/\Delta p_w$ [kg/h]/[kPa]	P_{el} (EC) [W]
2	0	221	27	21	66	43	300/18	100/7	3
3		291	32	26	85	53			6
5		412	41	34	115	67			12
8		569	50	43	149	77			28
10		653	52	46	176	78			56
2	10	136	32	25	42	28	300/18	100/7	3
3		224	35	29	67	44			6
5		357	42	35	102	61			12
8		518	49	42	139	75			28
10		602	51	45	168	77			56
2	20	49	37	30	16	11	300/18	100/7	3
3		155	39	32	48	32			6
5		296	43	37	86	54			12
8		462	49	42	126	71			28
10		546	51	45	158	75			56
3	30	84	42	35	27	18	300/18	100/7	6
5		231	45	39	69	45			12
8		400	49	43	112	66			28
10		483	52	45	146	72			56
3	40	11	44	38	3	2	300/18	100/7	6
5		160	47	40	49	33			12
8		332	50	44	96	58			28
10		415	52	45	132	66			56
5	0	84	48	42	27	18	300/18	100/7	12
8		258	51	44	76	49			28
10		342	52	46	116	58			56
5	60	4	50	43	1	1	300/18	100/7	12
8		179	52	45	54	36			28
10		262	53	46	97	48			56
8	70	93	53	46	29	20	300/18	100/7	28
10		177	53	47	51	35			56
8	80	2	54	47	1	1	300/18	100/7	28
10		87	54	47	24	18			56

See page 12 for legend

*) Note type VKE -2, 2-pipe system:

The specific output $Q_k/\Delta t$ (8th column in this and the following table) increases by approx. 3% for the 2-pipe version.

This value $Q_k/\Delta t$ (corr.) can be used as the basis for calculating the cooling and heating capacity for the 2-pipe version.

$$Q_{\text{corr}} = 1.03 \times Q_k/\Delta t \times (t_{\text{inlet}} - t_{\text{suction}})$$

Technical data

Application: free suction/exhaust, condensing operation, 4-pipe system (cold water inlet +6 °C)

U_{control} (EC) [V]	Δp_{ext} [Pa]	V [m ³ /h]	L_{WA} [dB(A)]	L_{A18} [dB(A)]	$Q_{\text{k total}}$ [W]	$Q_{\text{k sens}}$ [W]	$Q_{\text{k}}/\Delta t$ [W/K]	$T_{\text{supply air}}$ [°C]	$Q_{\text{h}}/\Delta t$ [W/K]	$w_{\text{ok}}/\Delta p_{\text{w}}$ [kg/h]/[kPa]	$w_{\text{oh}}/\Delta p_{\text{w}}$ [kg/h]/[kPa]	P_{el} (EC) [W]
2	0	221	27	21	1975	1258	66.4	8.9	43	300/18	100/7	3
3		291	32	26	2379	1549	85.0	10.0	53			6
5		412	41	34	2873	1973	115.0	11.6	67			12
8		569	50	43	3294	2451	149.1	13.1	77			28
10		653	52	46	3459	2692	165	14	78			56
2	10	136	32	25	1330	834	42.0	7.6	28	300/18	100/7	3
3		224	35	29	1994	1271	67.2	9.0	44			6
5		357	42	35	2675	1790	101.7	10.9	61			12
8		518	49	42	3173	2300	138.7	12.7	75			28
10		602	51	45	3358	2547	155	13	77			56
2	20	49	37	30	514	323	15.7	6.4	11	300/18	100/7	3
3		155	39	32	1492	937	47.7	7.9	32			6
5		296	43	37	2406	1570	86.4	10.1	54			12
8		462	49	42	3024	2130	126.4	12.2	71			28
10		546	51	45	3227	2380	144	13	75			56
3	30	84	42	35	860	538	26.5	6.8	18	300/18	100/7	6
5		231	45	39	2036	1300	69.0	9.1	45			12
8		400	49	43	2833	1934	112.1	11.5	66			28
10		483	52	45	3063	2190	131	12	72			56
3	40	11	44	38	115	72	3	6.0	2	300/18	100/7	6
5		160	47	40	1530	962	49	8.0	33			12
8		332	50	44	2572	1702	96	10.6	58			28
10		415	52	45	2851	1973	115	12	66			56
5	50	84	48	42	862	539	26.6	6.8	18	300/18	100/7	12
8		258	51	44	2202	1417	76.4	9.5	49			28
10		342	52	46	2564	1719	97	11	58			56
5	60	4	50	43	38	24	1.2	6.0	1	300/18	100/7	12
8		179	52	45	1674	1056	54.4	8.3	36			28
10		262	53	46	2160	1407	76.4	10	48			56
8	70	93	53	46	947	592	29.3	7.0	20	300/18	100/7	28
10		177	53	47	1592	1015	54.4	8	35			56
8	80	2	54	47	24	15	0.7	6.0	1	300/18	100/7	28
10		87	54	47	827	520	27	7	18			56

Legend

n - Speed level

Δp_{ext} - External pressure loss without filter and air connection boxes

V - Flow rate (approx. values, deviation $\pm 10\%$)

L_{A18} - Sound pressure level, 18 m² Sabine

L_{WA} - Sound power level ± 3 dB(A)
incl. suction-side sound, pressure-side sound and structure-borne noise

$Q_{\text{k total}}$ - Total cooling capacity (sensible and latent)

$Q_{\text{k sens}}$ - Sensible cooling capacity at +26 °C / 50 % rel. humidity and +6 °C cold water inlet temp.

$T_{\text{supply air}}$ - Supply air temperature [°C]

Q_{h} - Total heating capacity

Δt - Temperature difference between air intake temp. before heat exchanger and water inlet

w_{ok} - Nominal water flow rate at cooling capacity

w_{oh} - Nominal water flow rate at heating capacity

Δp_{w} - Water-side pressure loss

P_{el} - Electrical power consumption ($\pm 20\%$)

Technical data

5.3 Data with linear diffuser LDB

The following pages show the technical data of the VKE fan coil unit in various combinations with the LDB 20*classic* linear diffuser in 2-, 3- or 4-row versions, each with a nominal length of 1200 mm and 2 x DN200 connections.

The linear diffusers must be connected on site with 2 x DN200 Aluflex pipes or spiral ducts.

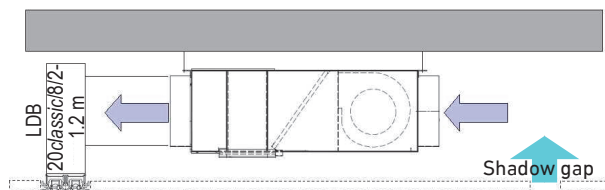
This allows the diffusers to be positioned flexibly according to space requirements.

All acoustic data are as follows:

- without ceiling influence
- incl. insertion loss of the diffusers
- with airflow noise of the diffusers

When air is drawn in via a shadow gap in a suspended ceiling, the sound level is additionally reduced by approx. 2 dB, depending on the position of the openings in the ceiling and the damping properties of the ceiling.

5.3.1 Standard application, pressure-side LDB 20*classic*/2 (2 rows)

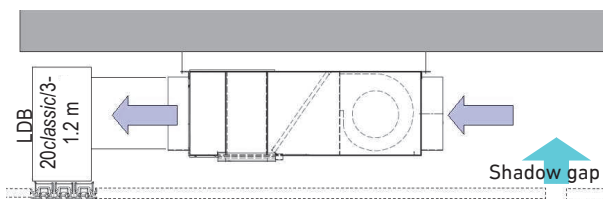


Pressure side: LDB 20*classic*/2/.../1200

Suction side: open, via shadow gap in suspended ceiling

U _C	Pressure loss		Pressure increase Δp	L _{WA}	V	P _{el} (EC)	Q _K	Q _H
	Exhaust air	Supply air						
[V]	[Pa]		[Pa]	[dB(A)]	[m³/h]	[W]	[W/K]	
2	0	5.0	5.0	28.9	179	3.4	54.5	36.1
3	0	8.5	8.5	34.8	234	5.7	70	45.1
5	0	16.8	16.8	43.6	316	12.3	91.6	56.5
8	0	28.3	28.3	50.9	411	28.2	114.7	66.8
10	0	37.4	37.4	56.7	485	56.0	133.1	74.9

5.3.2 Standard application, pressure-side LDB 20*classic*/3 (3 rows)



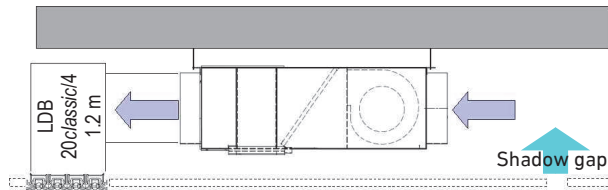
Pressure side: LDB 20*classic*/3/.../1200

Suction side: open, via shadow gap in suspended ceiling

U _C	Pressure loss		Pressure increase Δp	L _{WA}	V	P _{el} (EC)	Q _K	Q _H
	Exhaust air	Supply air						
	[Pa]							
2	0	2.6	2.6	27.9	199	3.4	60.2	39.5
3	0	4.9	4.9	33.2	258	5.7	76.5	48.7
5	0	9.5	9.5	42.1	359	12.3	102.4	61.6
8	0	17.3	17.3	49.3	478	28.2	130	72.2
10	0	23.5	23.5	55.0	571	56.0	151.7	80.7

Technical data

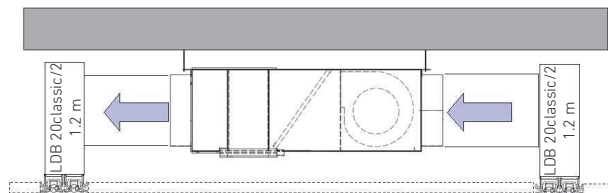
5.3.3 Standard application, pressure-side LDB 20*classic*/4 (4 rows)


Pressure side: LDB 20*classic*/4/.../1200

Suction side: open, via shadow gap in suspended ceiling

U _C	Pressure loss		Pressure increase Δp	L _{WA}	V	P _{el} (EC)	Q _K	Q _H
	Exhaust air	Supply air						
[V]	[Pa]		[Pa]	[dB(A)]	[m³/h]	[W]	[W/K]	
2	0	1.7	1.7	27.8	207	3.4	62.4	40.8
3	0	3.2	3.2	32.9	270	5.7	79.5	50.3
5	0	5.9	5.9	43.5	380	12.3	107.4	63.8
8	0	10.9	10.9	49.3	513	28.2	137.7	74.5
10	0	14.9	14.9	53.9	619	56.0	161.6	83.1

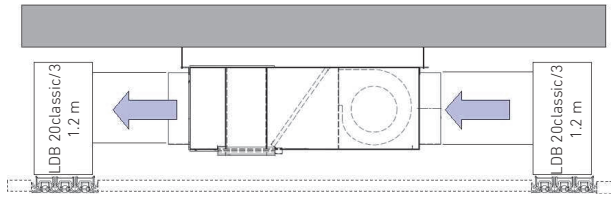
5.3.4 Standard application, pressure-side LDB 20*classic*/2, suction-side LDB 20*classic*/2



U _C	Pressure loss		Pressure increase Δp	L _{WA}	V	P _{el} (EC)	Q _K	Q _H
	Exhaust air	Supply air						
[V]	[Pa]		[Pa]	[dB(A)]	[m³/h]	[W]	[W/K]	
2	-7.7	3.1	10.8	30.9	129	3.4	40.0	27.6
3	-12.9	6.1	19.0	37.1	162	5.7	49.7	33.2
5	-22.9	10.4	33.3	46.1	208	12.3	62.7	41.0
8	-36.1	16.8	52.9	51.3	236	28.2	70.3	45.3
10	-46.6	21.9	68.4	55.4	257	56.0	76.3	48.7

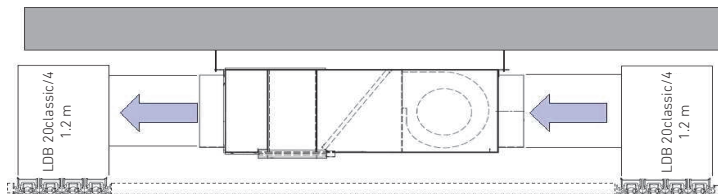
Technical data

5.3.5 Standard application, pressure-side LDB 20classic/3, suction-side LDB 20classic/3



U _C	Pressure loss		Pressure increase Δp	L _{WA}	V	P _{el} (EC)	Q _K	Q _H
	Exhaust air	Supply air						
[V]	[Pa]		[Pa]	[dB(A)]	[m³/h]	[W]	[W/K]	
2	-5.3	2.3	7.6	29.3	157	3.4	48.1	32.2
3	-8.5	3.6	12.1	35.1	210	5.7	63.2	41.3
5	-16.6	6.3	22.9	44.3	278	12.3	81.6	51.4
8	-28.0	11.3	39.3	50.0	337	28.2	96.8	59
10	-37.0	15.3	52.3	54.5	383	56.0	108.8	65

5.3.6 Standard application, pressure-side LDB 20classic/4, suction-side LDB 20classic/4

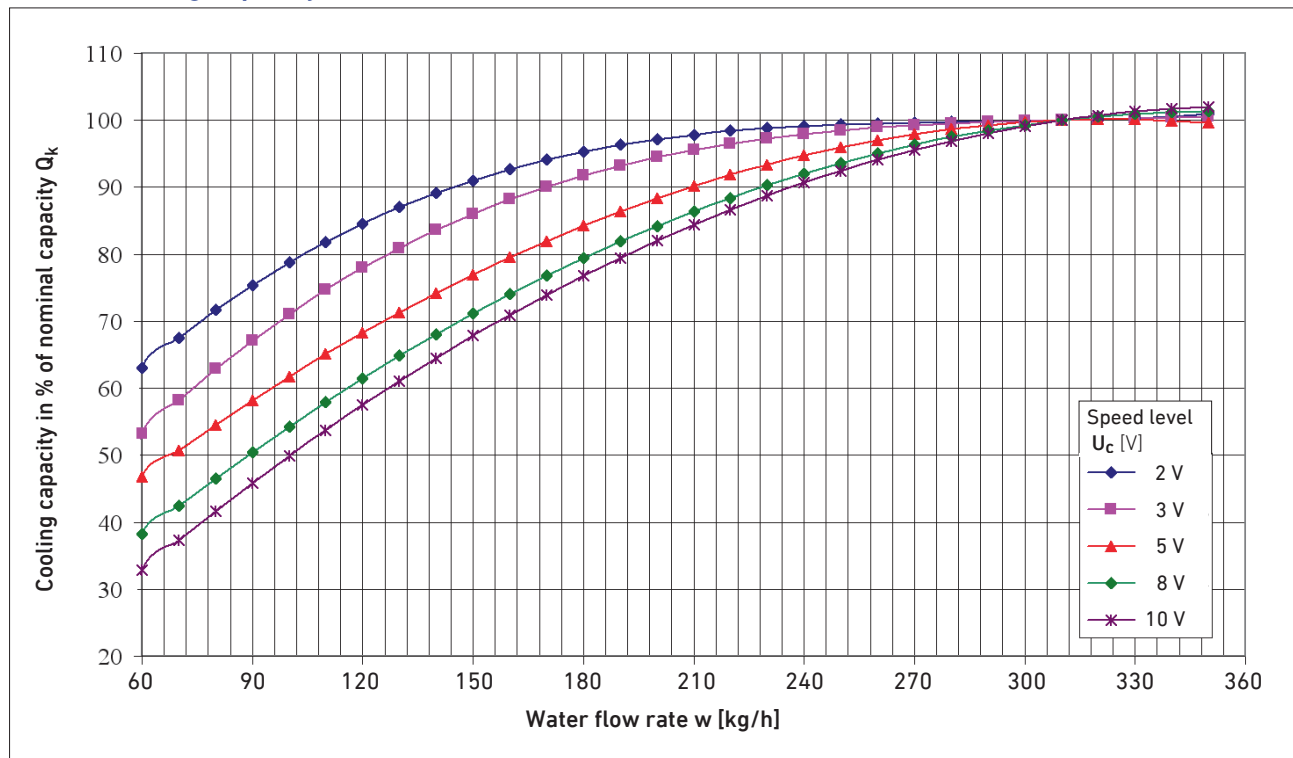


U _C	Pressure loss		Pressure increase Δp	L _{WA}	V	P _{el} (EC)	Q _K	Q _H
	Exhaust air	Supply air						
[V]	[Pa]		[Pa]	[dB(A)]	[m³/h]	[W]	[W/K]	
2	-4.4	1.7	6.1	27.8	169	3.4	51.8	34.5
3	-6.9	2.7	9.6	33.3	227	5.7	67.9	44.0
5	-13.0	5.2	18.2	42.9	307	12.3	89.4	55.4
8	-22.9	9.1	32.0	49.5	387	28.2	109.0	64.4
10	-30.7	12.2	42.9	54.7	449	56.0	124.6	71.6

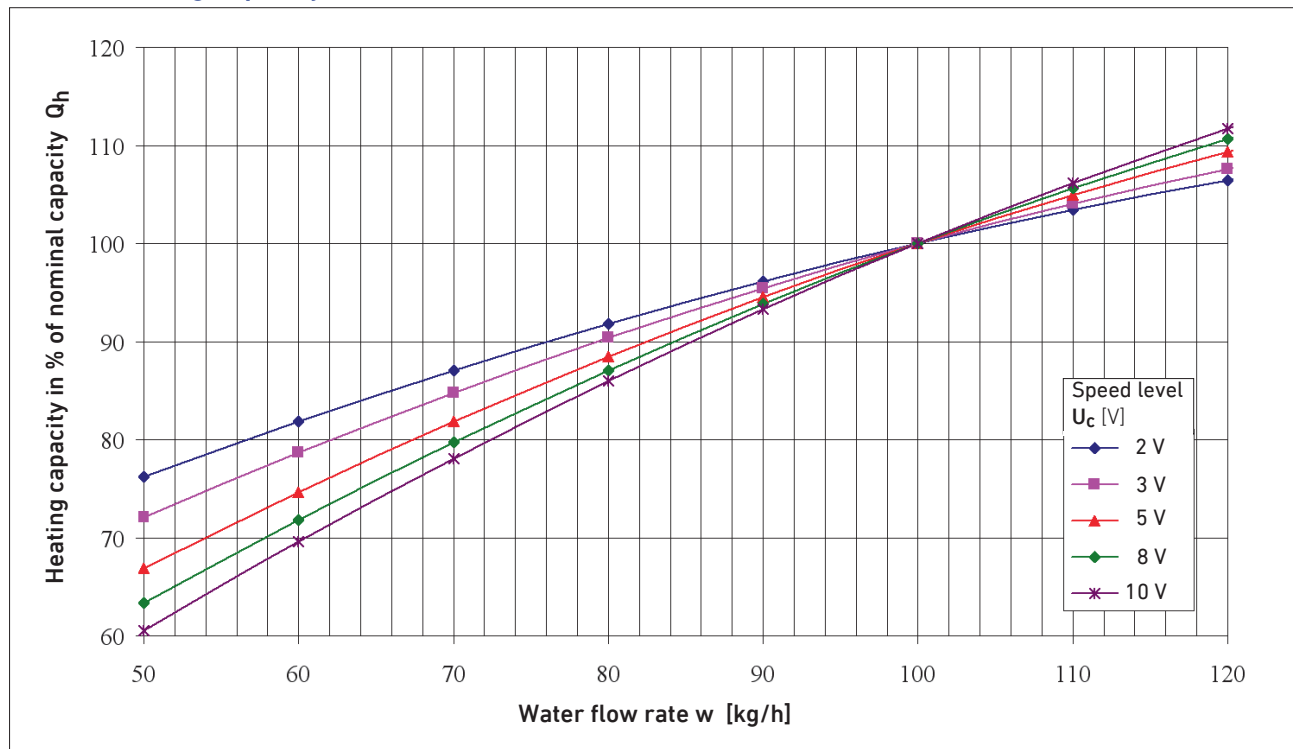
Technical data

5.4 Performance charts

5.4.1 Cooling capacity at different water flow rates

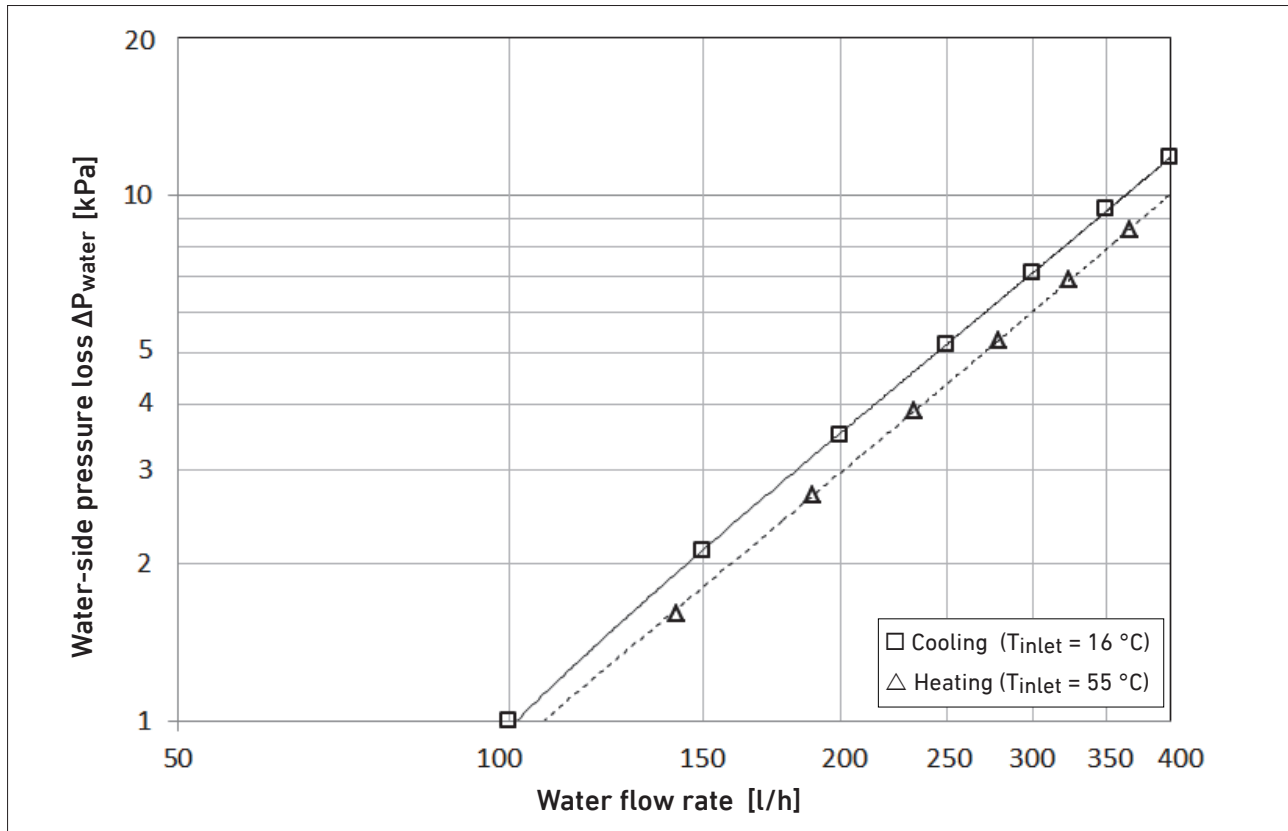


5.4.2 Heating capacity with different water flow rates



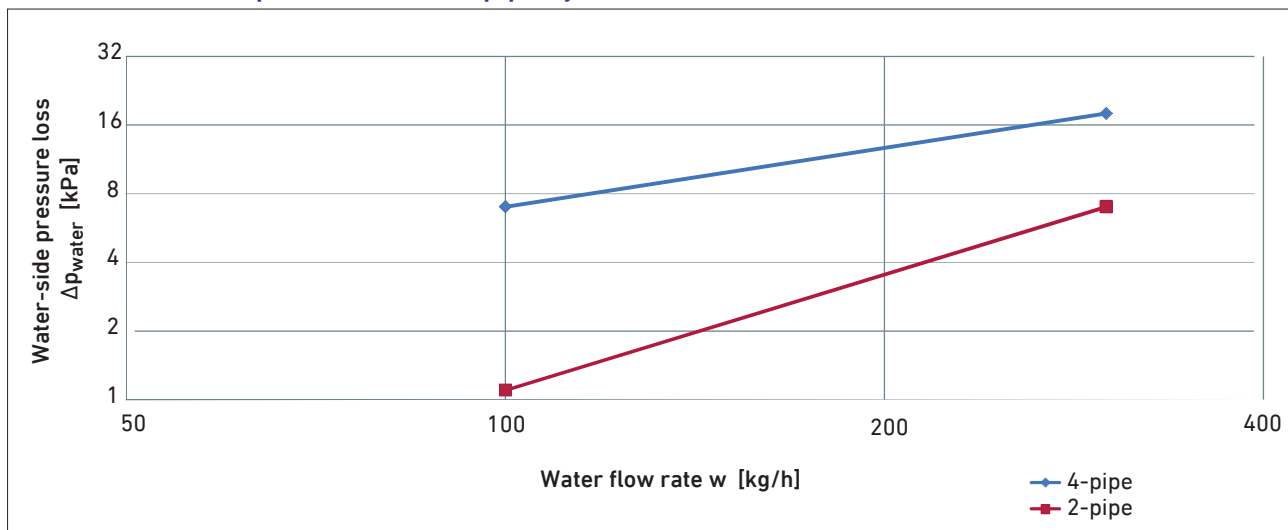
Technical data

5.4.3 Water-side pressure loss, 2-pipe system



The values apply with pipes, without transition pieces or collectors.

5.4.4 Water-side pressure loss, 4-pipe system



Notes on the performance diagrams:

The values were determined on a test bench in the laboratory. They apply under the following conditions:

- No condensation (no dew formation) during cooling
- Drinking water quality water (without ethylene glycol)
- Flow temperatures of 12...16°C for cooling and 50...60°C for heating

For ease of transferability, the specific calorific outputs are specified, i.e., the absolute calorific outputs based on the temperature difference between the water inlet and the intake temperature before the heat exchanger, with variation in the fan speed.

The mass flows were calculated and have a deviation of approx. 10%.

Installation

5.5 Hydraulic data

The heat exchangers are approved for a maximum operating pressure of 10 bar (test pressure 16 bar).

Pressures above 10 bar are only possible by special agreement.

The water-side pressure loss was measured directly at the heat exchanger connections. Additional resistances must be added.

The measurement accuracy is $\pm 10\%$.

5.6 Electrical data

Power supply	230 V AC (+ 10...15 %, 50...60 Hz)
Power consumption control	max. 25 W (24V DC)*
Switching capacity fan relay	max. 2000 W/10 A

*) Power specification without use of additional universal inputs, Terminal X600 / 601 / 603



The unit must be connected to a residual current device (RCD).

It must be possible to disconnect the units from the mains on all poles.

Electrical systems must be installed by a qualified electrician using suitable materials in accordance with the latest technical standards..

For accessory components (e.g., room control units, valve actuators, etc.) that are connected to and operated with LTG units, the specifications of the respective manufacturer must be observed and implemented.

5.7 Temperature ranges

Storage temperature	5...+55 °C
Operating temperature	5...+40 °C
Relative ambient humidity	max. 90 %

6. Installation

6.1 Unit suspension



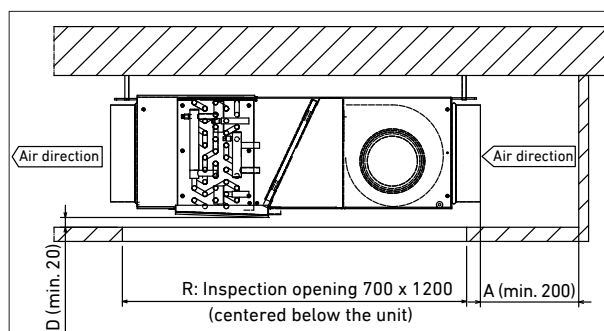
Operation is only permitted after proper fastening and complete installation!



When working overhead, measures must be taken to prevent falling parts!

The following instructions for installing the air conditioning units must be observed:

- The unit must be mounted with at least 4 fasteners (e.g., threaded rods) in the designated holes (at least 2 on each side of the unit), see drawings in Chapter 5.
- The weights of the units are specified in Chapter 5. The fasteners must comply with at least strength class M6 (4.6) in order to ensure sufficient strength and stability. The fasteners are not included in the scope of delivery.
- The fastening must be carried out with vibration dampers for structure-borne sound insulation.
- The unit must not come into direct contact with ceiling elements due to structure-borne noise transmission.
- The fan coil units must not be used as load-bearing elements for other components or subjected to any additional loads.



A: Intake chamber min. 200 mm

D: Distance to false ceiling min. 20 mm

R: An inspection opening for access to the unit (especially to electrical and water connections) must be provided for maintenance and installation work.
VKE 1100: 700 x 1200 mm

6.2 Water connections



The sealing plugs on the heat exchanger must be removed before connecting the water!

The units have heat exchangers with copper pipes and aluminum fins for 4-pipe operation with separate heating and cooling circuits or for 2-pipe operation. They are approved for pressures up to 10 bar (other pressures on request).

Depending on the unit type, the water connections are available in the following versions:

1. Copper connection with 12 mm outer diameter. This connection is only suitable for flexible connections with quick couplings.
2. Connection 1/2" female thread with conical seal.

Standard valves can be used as control valves and shut-off valves.

In order to be able to set the water flow specified in the unit design, a control option or a throttle cone must generally be provided. Only in the case of identical units with identical water flows and identical pressure drops can the Tichelmann system dispense with control on each individual unit. In this case, control by string is sufficient. Otherwise, a control option must be provided for each heat exchanger.

To enable a heat exchanger to be removed without draining the network or a strand, 2 or 4 shut-off devices must be provided per unit. Standard shut-off valves can be used for this purpose.

Ventilation in the screw connection on the unit is only provided on special request. Experience has shown that the water velocity in the heat exchanger is sufficient to carry away air bubbles. Ventilation by section is normally sufficient. In an emergency, ventilation can be achieved by slightly loosening the normal screw connection.

Due to possible condensation, the connections to the heat exchanger for cooling should be insulated, e.g., with Armaflex insulation..



The connections must be made without tension.

There must be expansion possibilities for the connection lines.

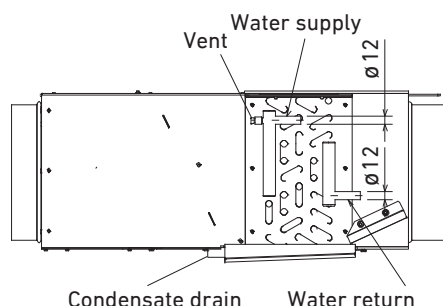
Caution:

Before water is fed into the unit, it is essential to check that the flexible water connection hoses are correctly and tightly fitted, even if the hoses are already pre-assembled on the heat exchanger. The hoses could have become loose during transport or during installation of the unit on site, for example.

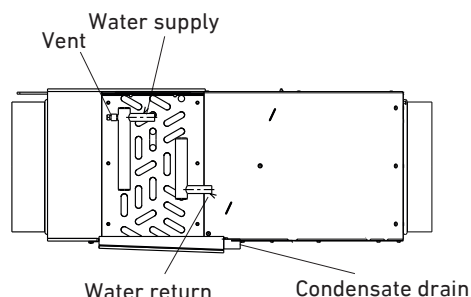
When connecting, ensure that the heat exchanger pipes are not damaged by kinking, twisting, etc. The connecting pipe sections must be precisely aligned for this purpose.

Installation

2-pipe,
Water connection on the right

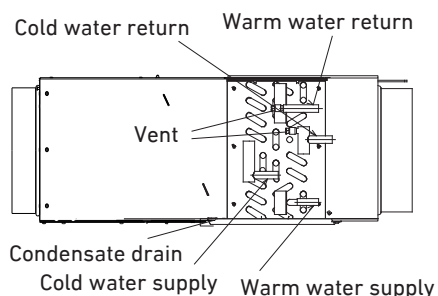


Water connection on the left

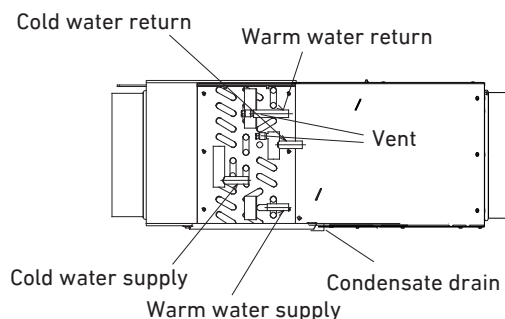


Entlüftung

4-pipe,
Water connection on the right

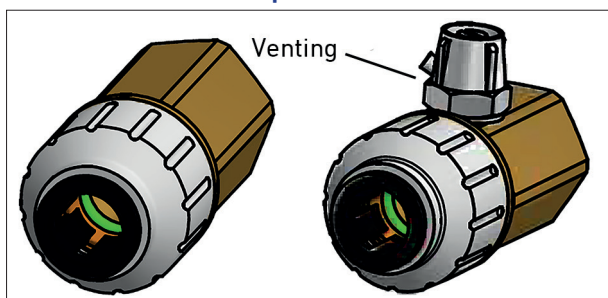


Water connection on the left



The side of the water connection must be specified when ordering the units. On some units, the connections can still be changed during installation if necessary by loosening 4 screws.

6.2.1 John-Guest quick connector



The John Guest JG12PEM connector, with or without a venting valve for G1/2" female thread connection, is suitable for connection to the heat exchanger pipes.

Suitable for the following pressure and temperature ranges:

20 bar / +20 °C,

10 bar / 70 °C,

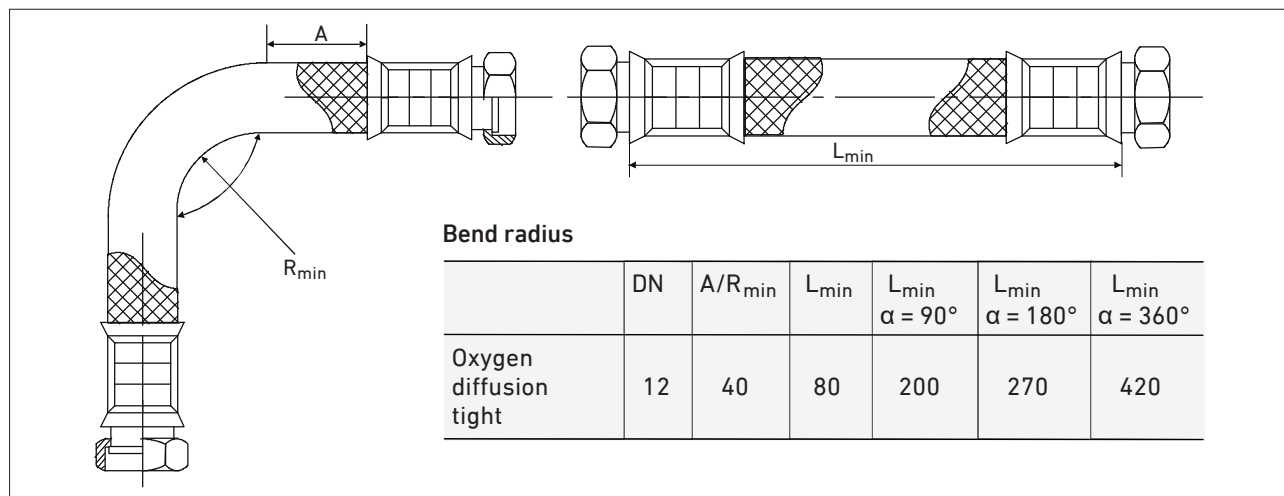
6 bar / 90 °C

$T_{min} = 1\text{ °C}$

Installation

6.2.2 Flexible water connection hoses

Type	Oxygen diffusion tight. Free of halogens, plasticizers, and heavy metals. Tested according to DIN 4726.
Braiding	Stainless steel wire according to AISI 304
Press sleeve	Stainless steel according to AISI 304
Temperature range	up to +80 °C
Max. operating pressure	15 bar
Internal diameter DN	12 mm

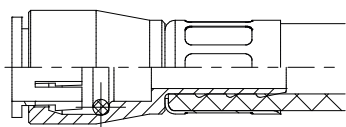


Connection variants

Connection to heat exchanger

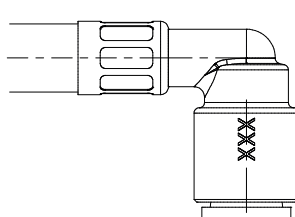
JG (John Guest)

Quick-connect coupling 12 mm



JG+W

Quick-connect coupling 12 mm

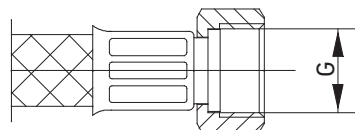


Connection variants on the pipe network side

ÜFD

Union nut, flat seal

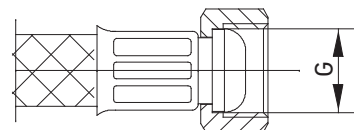
G: 1/2" or 3/4"



ÜKD

Union nut, cone sealing

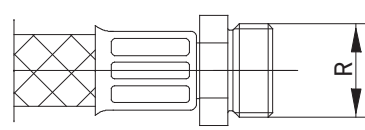
(Eurocone), G: 1/2" or 3/4"



AGK

External thread, conical

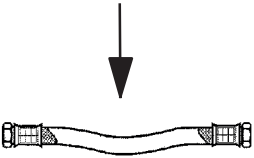
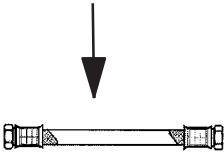
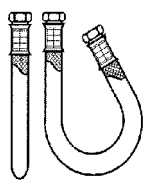
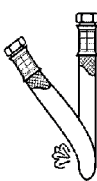
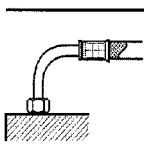
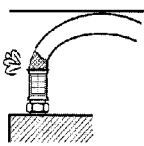
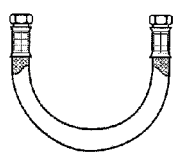
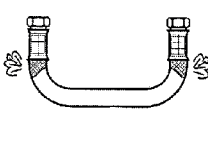
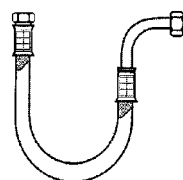
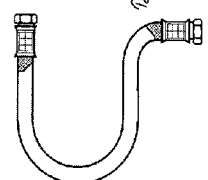
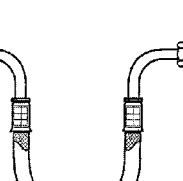
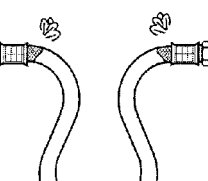
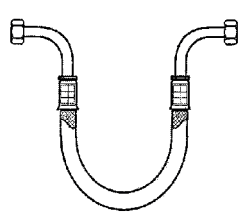
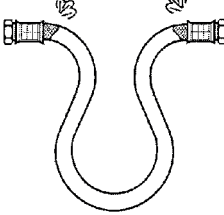
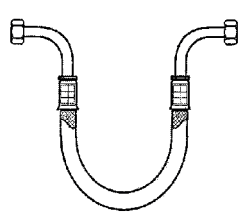
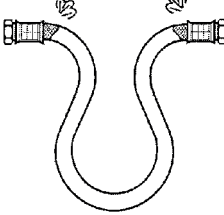
R: 3/8" or 1/2"



Hose with insulation on request, made of 9 mm Armaflex® (standard)

Installation

6.2.3 Installation instructions for flexible water connection hoses

correct	incorrect	
		- Under pressure or when exposed to heat, the hose may undergo a slight change in length. Straight hose lines must therefore be installed in such a way that these changes in length are accommodated.
		- The minimum permissible bending radius R_{min} (see table) must not be exceeded, whether during transport, installation, or once the product is installed. If the bending radius cannot be maintained, the installation method must be changed.
		- When laying the hose in a curved position, there must be sufficient hose length to form an open bend, otherwise the hose will kink at the connections and be destroyed.
		- The flexible connection must not be twisted or kinked under any circumstances.
		- The hose must not be subjected to external tensile or compressive stress during installation or operation.
		- Rigid connections (male threads) must not be tightened further after the second connection has been secured, as this will twist the hose and may cause damage.
		- The installer of the hoses is always responsible for the tightness of the connection (hose/connection).
		- The installer must check the suitability of the supplied sealing material, as the hose manufacturer is not familiar with the material or geometry of the connections.

Installation

6.3 Condensate connection

Condensation occurs when the cold water temperature is below the dew point temperature of the ambient air. LTG induction units and LTG fan coil units are not designed for condensate operation as standard, so care must be taken when setting the water supply temperature to ensure that it does not fall below the dew point. If necessary, the water temperature must be regulated in accordance with the outside air humidity. The units are available in an insulated version for condensing operation as a special design (please note when planning and ordering). In any case, the following instructions must be observed:

■ Air conditioning system with central cooling and dehumidification (water temperature > 13 °C)

At a certain water supply temperature, condensation forms because the temperature falls below the dew point of the room air. This dew point depends on the humidity content of the room air. However, the water supply temperature can be 1...2 K below the dew point of the air, as the air temperature at the pipes is higher than the water temperature.

If the rooms are ventilated with a maximum supply air humidity of, for example, 8.5 g/kg Ltr, the water flow temperature can be reduced to 15 °C without condensation forming.

For possible solutions in the case of increased air humidity, two cases must be distinguished:

Case A: Condensate tray not connected (plug on condensate connection!)

- If the outdoor air has a high moisture content, the windows must remain closed.
- Alternatively: If windows are opened, the cooling valves must be closed via a window contact and reopened with a time delay after the window is closed.
- Alternatively: When windows are opened, the water supply temperature is regulated centrally according to the humidity content of outdoor air, i.e., the water supply temperature is increased when the humidity content is high. However, it should be noted that this reduces the cooling capacity.

Case B: Condensate tray connected

- Window contacts and central increase of the cold water temperature at high outdoor air humidity can be dispensed with.
- If increased room humidity is expected for a short period of time (unit in false ceiling above wet room, e.g., hotel), it is recommended to thermally insulate the condensate tray
- When installing the on-site condensate connection, the provisions of the VDI 6022 standard must always be observed!

■ Ventilation without dehumidification or window ventilation (water temperature > 16 °C)

When ventilating without dehumidification, the water temperature must be at least 16 °C. If the supply air is not dehumidified or if ventilation is achieved by opening the windows, the moisture content of the air can be very high and the following must be taken into account:

A condensate tray must be connected

- Central cold water control and weather-controlled increase of the cold water supply temperature is recommended, as opening the windows allows outdoor air with high humidity to enter the room, which can cause the air temperature to fall below the dew point.



In all cases, care must be taken to ensure that all water-carrying pipes and fittings outside the collection area of the condensate tray are insulated.

When connecting a condensate network, ensure that there is a sufficient gradient; the drainage of the condensate must be ensured on site.

Condensate trays and the condensate drainage system must be cleaned regularly and inspected for hygienic condition in accordance with VDI 6022.

Installation

6.4 Electrical connection

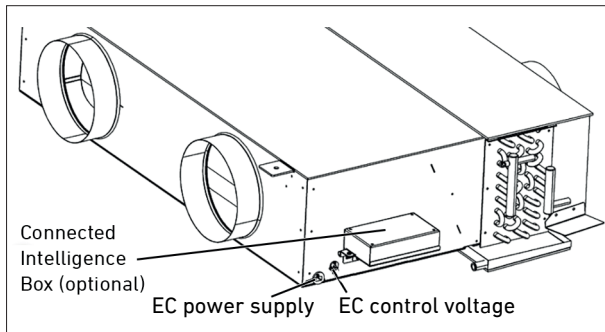


The unit must be connected to a residual current device (RCD).

Electrical systems must be installed by a qualified electrician using suitable materials in accordance with the current state of the art.

For **accessory components** (e.g., room control units, valve actuators, etc.) that are connected to and operated with LTG units, the specifications of the respective manufacturer must be observed and implemented.

The Connected Intelligence Box must **not** be used on site as a junction box or for sub-distribution to other devices.



Approx. 1.5 m long connection cables for mains voltage and speed control are located on the left side of the unit..

Wiring diagram speed control for EC motor

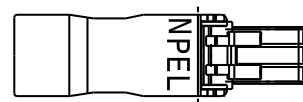
Two connections are required for the electrical connection of the fan coil unit.

Note: We are generally not aware of the full scope of the ventilation, air conditioning, and control systems. Therefore, all designs, drawings, and circuit proposals only show the systems that are relevant for the basic functions. Units or components that are necessary, for example, for the overall control function and/or VDE-compliant design are neither taken into account nor explicitly mentioned!

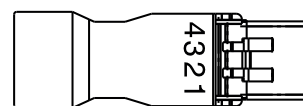
Please note additional assembly and installation instructions in the original documentation.

The controllers must be parameterized for this application on site.

3-pin



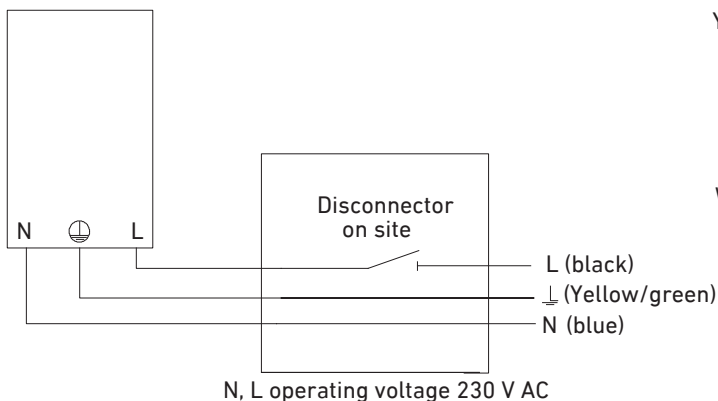
4-pin



3-pin plug: N = neutral conductor (black)
PE = protective conductor (yellow/green)
L = phase, 230 V AC (black)

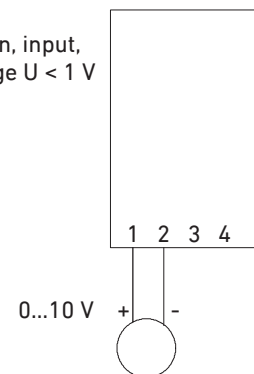
4-pin plug:
4 = 10 V DC continuous signal (red), output
3 = Tacho signal (white), output
2 = GND, 0 V DC (blue), input
1 = 0...10 V DC (yellow), speed setting, input

230 V AC mains voltage supply, 3-pin cable



Speed control 0...10 V DC, 4-pin cable

Yellow = 0...10 V DC, speed specification, input, with control voltage $U < 1$ V is speed $n = 0$
Blue = GND, 0 V DC, input
White = Tacho signal, output
Red = 10 V steady signal output

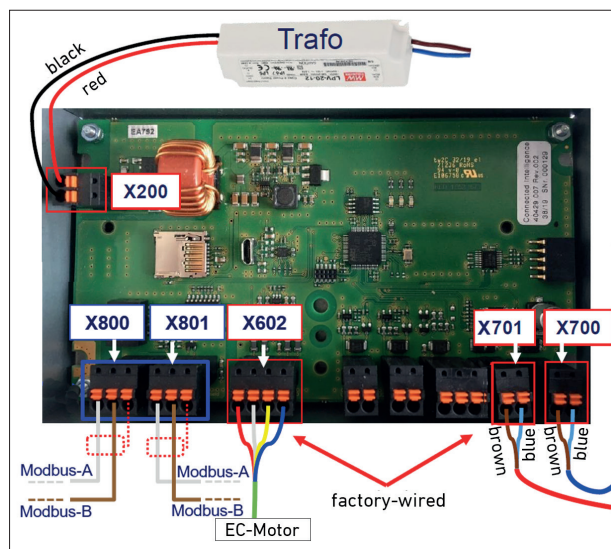


Installation

6.4.1 Electrical connection CI circuit board (optional)

Terminal assignment LTG CI circuit board

To access the CI board, unscrew the screws on the CI box from below using a Torx TX20 screwdriver and remove the cover.



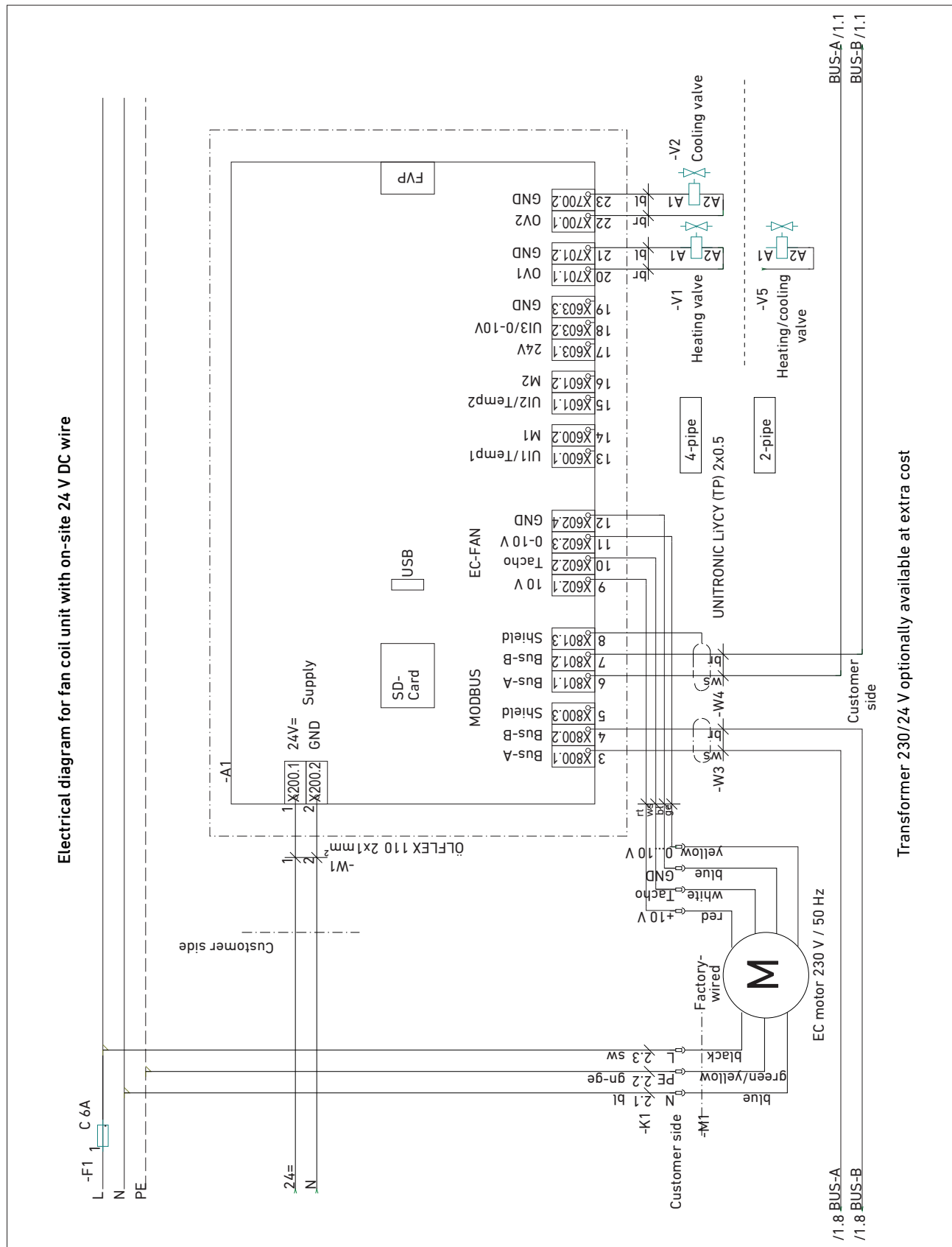
CI circuit board			
Terminal	Name	Colour	Description
X200	24 V =	red	Supply 24 V DC
	GND	black	Supply GND
X602	1	red	Fan 10 V Out
	2	white	Fan Tacho OK
	3	yellow	Fan 0..10 V
	4	blue	Fan GND
X700	OUT1	brown	Cooling valve PWM 24 V
	GND	blue	Cooling valve GND
X701*	OUT2	brown	Heating valve * PWM 24 V
	GND	blue	Heating valve * GND
X800, X801	A		Modbus A
	B		Modbus B
	Shield		Shield

* 2-pipe heat exchanger: cooling/heating valve

Optionally, the unit can be equipped with an integrated 230/24 V transformer, eliminating the need for a separate 24 V DC cable.

Installation

Wiring diagram fan coil unit with on-site 24 V DC cable



6.5 Post-installation testing



Check that the unit is connected to a residual current device (RCD).

Mechanical inspection

After completing the installation, check the unit for mechanical damage. Remove any packaging residue or dirt from the unit.

The following must be checked:

- the water connections (including the heat exchanger connections) for leaks,
- the insulation of all cold water-carrying components up to the heat exchanger for careful workmanship,
- the condensate drain (optional) for permeability and sufficient slope,
- Check that the mounting screws are tight,
- the suspension for rigidity and sufficient load-bearing capacity (ceiling devices),
- the mains voltage and frequency for compliance with the information on the type plate,
- the electrical connections for proper execution and compliance with relevant regulations,
- the function of the control (optional),
- that the outlet area/outlet grille of the unit is not obstructed,
- horizontal and dimensionally accurate alignment,
- sufficient water hose lengths and tension-free installation.

Check media supply

- Check that there is sufficient primary air, cold water, and hot water.
- Check that the voltage and mains frequency match the specifications on the type plate. Under no circumstances should the units be operated with the wrong voltage or frequency, as this can destroy the units and endanger people.

Control equipment

The control devices are only supplied as an option by LTG Aktiengesellschaft. The control valves are often factory-fitted.

Function check

Slowly move the temperature control dial from one end position to the other while observing the valves. The valves must move smoothly and without rattling noises from one end position to the other. The electric servomotors must not emit any unusual noises. If the units are damaged, have them repaired properly by a specialist.

Start of normal operation

The temperature controller must then be set to the desired temperature. After a short time, the room temperature should reach the temperature set on the temperature controller.

7. Commissioning

Commissioning may only take place after complete installation and all tests have been carried out.

The presence of water and power supply must be checked.

After switching on the unit, air must flow from the outlet grille. Only quiet air flow noises and quiet motor noises should be audible. If grinding or knocking noises are audible, this indicates damage during transport or installation.

Operation/Maintenance/Repair

8. Operation, maintenance, repair

The units are low-maintenance, but a few points should be noted.



Maintenance and repair work may only be carried out by trained personnel.



Before carrying out maintenance or repair work, the unit must be switched off and disconnected from the mains at all poles.

Note: For maintenance intervals and logs, see Chapter 12.

8.1 Heat exchanger, water connections, condensate tray

The heat exchanger and the dry condensate tray should be cleaned regularly with a vacuum cleaner.



Risk of injury from sharp-edged heat exchanger fins! Wear gloves!



The water connections and heat exchanger must be checked for leaks and corrosion damage. If internal corrosion of the heat exchanger occurs, trained personnel must check the water treatment.

If condensation occurs and a condensate line is present, the condensate tray must be wet cleaned at regular intervals in accordance with the provisions of VDI 6022 and checked for contamination.

8.2 Filter

Unit with filter

If a recirculation filter is present, this filter must be replaced approximately 2...3 months after initial commissioning, as it will then be contaminated with carpet fluff and any remaining construction dust.

The exact time depends on local conditions.

Furthermore, depending on the amount of dust, the filter must be replaced approximately every 6 months to a maximum of 2 years.

A six-month filter replacement interval will be necessary if the unit is operated in areas with heavy public traffic, in environments with high dust levels, and with only minimum filter quality in the primary air system.

The filter in front of the heat exchanger is easy to replace, as it is only attached to the unit with adhesive tape.

Unit without filter

The heat exchanger(s) should be vacuumed approximately 2...3 months after initial commissioning. By this time, the heat exchangers will already be noticeably dirty with carpet fluff and any remaining construction dust. The exact time depends on local conditions.

Furthermore, depending on the amount of dust, the heat exchangers must be vacuumed approximately every 6 months to a maximum of 2 years. This is particularly important if condensate forms on the cooler during operation, as this results in dust deposits that are difficult to clean.

A six-month vacuuming interval will be necessary if the unit is operated in areas with heavy public traffic, in highly dusty environments, and with only minimum filter quality of the primary air system; if condensation forms on the cooler, vacuuming may be necessary more frequently.

8.3 Fan

The fan is virtually maintenance-free. After approximately 20,000 operating hours, the fan may fail. The fan must be checked for free running and possible imbalance and bearing damage. The fan must be checked regularly, every 6 to 12 months, for contamination and foreign objects in the impeller. Heavy contamination or foreign objects can lead to premature wear of the bearings and the fan.

8.4 Remove parts and clean/repair

Unless there is obvious „sheet metal damage“ e.g. on the condensate tray or outlet, defective units should be completely replaced and checked at the factory.

In the event of fan defects, it is also possible to replace the fan unit without having to disconnect the unit from the water supply.



The replacement of control devices should only be carried out by trained personnel or at the factory.

Replacing individual defective components, e.g., bearings on the fan, is not advisable, as many settings can only be made accurately at the factory using special equipment.

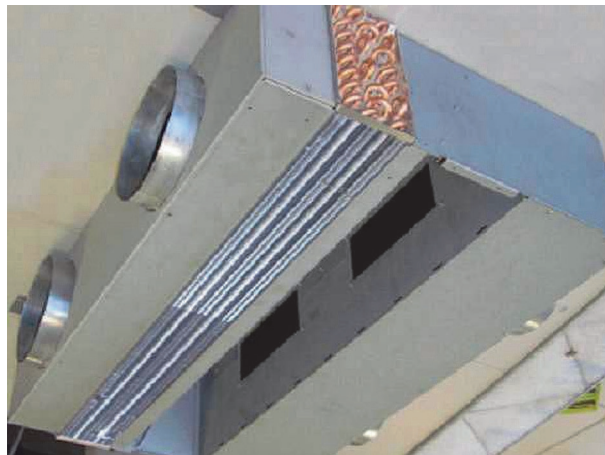
The warranty only covers complete fans.

Operation/Maintenance/Repair

1. Removing the condensate tray / cleaning



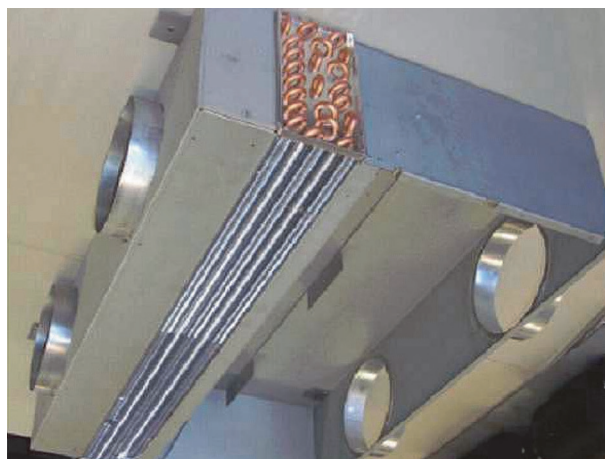
3. Removing the base plate / Vacuuming the heat exchanger on the pressure side



2. Replacing the filter



4. Removing the fan unit, including mounting flange



Troubleshooting and repairs

9. Troubleshooting and repairs

Fault	Cause	Solution
Unit does not cool or heat, but fan is running	Cold water or hot water supply not working Heat exchanger and water supply pipes are at room temperature	Restore cold or hot water supply, rectify any faults, check shut-off valves to the fan coil unit
No air movement at the fan outlet grille	Fan of the unit is not in operation	Switch on the fan, if necessary switch to maximum speed to force it to start Check the fan's power supply, replace fuses if necessary, or switch on the main switch Replace the drive unit
There is no control signal at the actuator (valve), or not the signal expected for the set position	Control system defective	Have the system checked by a control technician and have defective parts replaced or repaired
Valve spindle does not move even though the control signal at the servomotor is changed	Actuator is stuck	Set the temperature selector alternately to „max. warm“ and „max. cold“; this may release the actuator. Otherwise, remove and clean or replace the actuator
The unit heats or cools, but the desired temperature is not reached	Window open	Close the window
Even at maximum speed, only weak air movement at the fan outlet	Filter or heat exchanger dirty Intake or outlet opening blocked or dirty	Replace filter Clean heat exchanger Remove objects in front of the outlet and protective grille Move obstructions at least 10 cm away from the cover
Measured cold water supply temperature is lower than specified (ask installer for value), resulting in unusually cold blow-out temperatures	Cold water temperature to the units too low	Check cold water control including valve and actuator, if necessary, reset parameters correctly, replace or repair defective parts
Some of the condensate trays overflow despite the presence of a drainage system	Condensate drainage system clogged	Clear the blockage; until then, increase the flow temperature or switch off the unit if necessary
Unit is dripping	Condensate tray leaking or overflowing Supply temperature too low Dew point undershoot during window ventilation, even at relatively high supply temperatures	Replace leaking tray, check condensate pump Check the drainage system Increase the supply temperature Close windows and increase supply temperatures if necessary
Noticeable increase in humidity in the room	Unusually large sources of humidity in the room	Remove sources of moisture. If this is not possible, temporarily switch off water-side units

Troubleshooting and repairs

Continued 9. troubleshooting and repairs

Fault	Cause	Solution
Temperature difference between supply and return too low	Water flow possibly too high	Check water flow balance
	Fan not running or delivering insufficient air	Check fan and connections, speed may be too low, heat exchanger and filter dirty
	Flow temperature too high in cooling mode	Check temperature and cooling circuit
Audible knocking noises	Bearing damage on fan	Replace fan unit (only from LTG Aktiengesellschaft)
	Foreign objects in fan	Remove foreign objects from impeller (only when unit is switched off)
Audible humming	Start-up voltage too low	Increase starting voltage
	Fan running unevenly	Check balance and concentricity
Vibration noises	Structure-borne noise transmission due to: - Rigid mounting - Contact between housing parts of the outlet boxes and ceiling elements	Check suspension and check for contact between housing parts and ceiling elements

10. Spare parts

The following spare parts can be ordered from LTG Aktiengesellschaft by specifying the unit type and name:

Ident-Nr.	Designation	Minimum order quantity
1035458	2-pipe heat exchanger	1
1035461	4-pipe heat exchanger	1
1052980	EC radial fan K3G146AC1501 without cable	1
1058391	Power cable 1.5 m for EC radial fan	1
1058392	Cable control EC motor	1
1035520	Filter + filter frame 983x245x10	1
1060623	Filter mat cut to size (filter class according to DIN EN779: G3)	

*) For heat exchangers, please specify the connection (1/2", smooth copper pipe)

11. Decommissioning, disposal

If the unit is taken out of service, no longer used, and disposed of as waste, please note:

- All steel parts are waste for recycling
- All plastic parts are waste for recycling
- All auxiliary and lubricating materials must be disposed of in accordance with the EAK (European Waste Catalogue) classification
- Silencers are waste for recycling
- Heat exchangers are waste for recycling (copper, aluminum)

Appendix: Maintenance log

12. Appendix: Maintenance intervals / Maintenance log

Note: For maintenance instructions, see Chapter 8.

Component	Activity	Intervals		Performed	
		Months	as needed	Yes	No
Unit in general	Check for contamination, damage, corrosion, correct fit, and fastening	12			
	Check for contamination, damage, and odors.	3			
Filter	Check filter support for correct fit	3			
	Replace filter medium (document)	12 *	x		
	Check hygienic condition	3			
	Check for contamination, damage, and corrosion	3			
	Functional cleaning	6	x		
	Checking the water connections	12			
	Check function of supply and return pipes	12			
	Venting		x		
	Check hygienic condition	6			
	Check for contamination, damage, leaks, and corrosion	3			
Dirt and condensate tray	Functional cleaning		x		
	Check hygienic condition	6			
	Check thermal insulation for damage (visual inspection)		x		
	Check drain and siphon for proper functioning		x		
	Check for contamination, damage, corrosion, and fastening	6			
Fan	Function-preserving cleaning		x		
	Check impeller for imbalance	12			
	Check bearings for noise	12			
	Check vibration dampers for proper functioning	12			
	Check protective device for proper functioning	12			
	Clean the inside of the chambers		x		
	Check hygienic condition	6			

* If the outside air or recirculated air is exceptionally dirty, the replacement interval must be shortened.

As a general rule, the provisions of VDI 6022 regarding hygiene requirements must be observed.



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