The Innovation Company

LTG Aktiengesellschaft

Instructions for Installation, Use and Maintenance

Fan Coil Unit VFC

Example:
Fan coil unit for sill installation

LTG Aktiengesellschaft
D - 70435 Stuttgart, Grenzstraße 7
D – 70405 Stuttgart, Postfach 40 05 25
☎ +49 (0711) 82 01-0 Fax +49 (0711) 82 01-720
Internet: http://www.LTG-AG.de
E-Mail: info@LTG-AG.de

AG-B 201.1e (Feb. 10)

Table of contents

EC Declaration of Conformity

The Innovation Company
LTG Aktiengesellschaft

EC declaration of conformity

As defined by the EC Council Directive on Machinery 2006/42/EG, 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, D-70435 Stuttgart**
Designation of machinery:	**Fan Coil Unit**
Machinery type:	**VFC** all sizes
Relevant EC Council Directives:	Machinery Directive (2006/42/EC)
Applied harmonized standards, in particular:	DIN EN ISO 13857, DIN EN 349, DIN EN ISO 12100-1, DIN EN ISO 12100-1, DIN EN 60335-1
Other standards:	VDI 6022

Stuttgart, 29.Dezember 2009

Signature of manufactorer

Position of signatory: Dr. Schaal ppa. Dehlwes

Air technology for humans and products. Since 1924

Konformitätserklärung-GB.docx/ Seite 1 of 1

LTG Aktiengesellschaft, Grenzstraße 7, D-70435 Stuttgart
Tel. +49 / 711 / 8201-0, Fax: +49 / 711 / 8201-720
Internet: www.LTG-AG.de, E-Mail: info@LTG-AG.de
Chairman of supervisory board: Dr. Franz Wimpffen
Executive board:
Dr.-Ing. Gerd Schaal (chairm.), Dipl.-Ing. Rolf-Herbert Fichter

USt-/VAT-/TVA-/IVA-Id: DE 812753932
Trade register: district court Stuttgart, Nr. HRB 20451
Place of performance / court of jurisdiction Stuttgart
Landesbank Baden-Württemberg (600 501 01) 2 575 667
Commerzbank AG, Stuttgart (600 400 71) 7 550 031 00
HypoVereinsbank AG, Stuttgart (600 202 90) 3 887 729 64

Carefully read the safety instructions before using any LTG fan coil unit.
Always follow the safety instructions!

Safety Instructions

The units meet any pertinent safety standards.

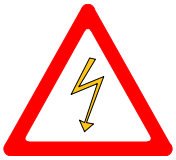
The installation and maintenance of air conditioning units may be dangerous because of high pressures and electrical components being alive. Therefore, the installation, maintenance, and repair must be performed by qualified and trained staff only.

In particular electrical connections are to be provided, removed, or modified by authorized persons only observing all relevant safety instructions.

Safety instructions in the technical documentation and on unit labels must be followed at all times.

Do not open the unit for cleaning, maintenance, or repair and do not remove covers and casings (air diffuser) unless all conducting lines have been completely disconnected. Do not connect or remove the plug-in connector when under tension.

Any work regarding the electrical equipment is to be performed by skilled and trained staff only. Connections to the main power supply and the safety earth terminal must be executed exactly as described in the wiring diagram.



Electrical operation of the unit in a partly disassembled condition or of individual components is not permitted since earth terminals might be interrupted.

The standard version of the heat exchangers is designed for an operating pressure of 10 bar (test pressure 16 bar). High water pressures may be hazardous. Higher operating pressures, therefore, require LTG's express permission. Wear safety glasses.

During continuous operation the motor may reach temperatures of up to 65 °C. If necessary, allow the motor to cool off or wear gloves.

Be careful when performing work on the heat exchangers. Blades and housing parts are sharp-edged. Wear gloves during work and handling.

Be careful when working overhead and provide protection against parts falling from above.

Never remove the protective grille of the fan impeller and the motor cover during operation.

Keep objects and dirt from entering the impeller. A damaged fan impeller or objects being ejected by the impeller may be hazardous.

The casing on site also serves as a protection and should be removed for maintenance and cleaning only.

Avoid any additional load to the unit or the suspensions since stability might be insufficient.

In the heating mode a temperature of up to 80 °C may be achieved. Water-carrying parts may be hot so do not touch with your bare hands to avoid burns.

The unit must be checked by an expert immediately

- **if it has been mechanically damaged or is suffering from a water damage,**
- **if the fan shows signs of damages (imbalance, damage to the bearing or motor),**
- **if the suspension or the casing show clear signs of corrosion or ageing.**

Do not put the unit back into operation before all necessary maintenance and repair has been performed!

Take the unit entirely off the main power supply until all repairs have been completed even if this might result in not being able to operate undamaged units

It is in any case imperative to take a damaged unit completely off the main power supply!

1. Transport and Storage

The unit requires dry and dust-free conditions during transport, storage, installation, and operation.

The unit is supplied in corrugated board boxes secured with straps.

Units are stacked on Euro or single trip pallets and secured with straps. Pallets may be moved using forklifts or cranes.

Do not remove the packaging unless immediately prior to installation on site to protect the unit from pollution and damages.

LTG Aktiengesellschaft will not take responsibility for any pollution of or damages to the unit.

1.1 Transport Instructions

Handle units appropriately and with care during transport.

Do not throw, let drop to the ground or bump into other items or walls.

Make sure that units are safely fastened during transport and avoid damage through other items.

It is recommended to always have units handled by at least two persons.

The packaging is not weather-resistant.

1.2 Storage

Make sure that units are entirely protected against weathering, humidity, and other adverse conditions that might result in damages during storage.

The storage location must meet the following climatic requirements:

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

2. Function

The fan coil unit is a recirculating air unit for cooling **or** heating (2-pipe) or for cooling **and** heating (4-pipe) the air.

These fan coil units have been designed for installation in sills and ceilings in office and conference rooms, hotel rooms, hospitals and other closed rooms for indoor air treatment.

The fan sucks in ambient air via a heat exchanger, heating or cooling the air and reintroducing it into the room.

Uniform distribution of the air across the entire fan is ensured by a cross-flow impeller extending over the entire width. The heat exchanger is usually equipped with a filter for protection.

Thermal energy transport to the heat exchanger is performed by water; water connection on the right or left.

If the cold water temperature drops in the cooling mode below dew point the condensate will be collected by a condensate tray with possible connecting socket. For reasons of hygiene, the unit should be dimensioned in a way to ensure that no condensation occurs during standard operation. For operation below dew point insulated units are available.

Output is water-side controlled by valves.

The fan speed is controlled by a five-speed capacitor motor with low energy consumption, with individual switch activation.

For group activation a total of 5 units may be connected in parallel.

Take care to connect in parallel identical speeds only, i.e. connect speed I of unit 1 to speed I of unit 2, etc.

With view to dimensioning, the most important data are the caloric output, the sound power level and the air flow rate.

The units' caloric output is determined through the fan speed, the water flow rate, and the valve setting which may be controlled by a regulating device.

The units' sound power and the air flow rate are determined through the fan speed.

The use of a filter results, at the same speed level, in a reduction of both the caloric output and the air flow rate while the sound power level of the units is higher when increasing the fan speed.

2.1 Intended Use

The LTG fan coil unit type VFCG is intended for use in closed rooms.

It is designed for ambient temperatures of +5 °C to +40 °C and a maximum relative humidity of up to 90% (non-condensing).

In order to ensure safe motor functioning the ambient temperature when installed should not exceed +40 °C.

The maximum admissible supply temperature is, therefore, limited to +80 °C.
Any other operating conditions require the express and written permission of LTG Aktiengesellschaft.

LTG Aktiengesellschaft does not assume responsibility for any damages resulting from unintended use.

3. Technical Specifications

3.1 Specifications, Dimensions

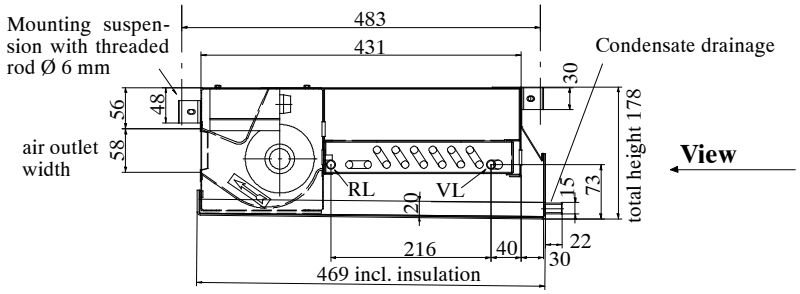
Ceiling Unit, 2-pipe System

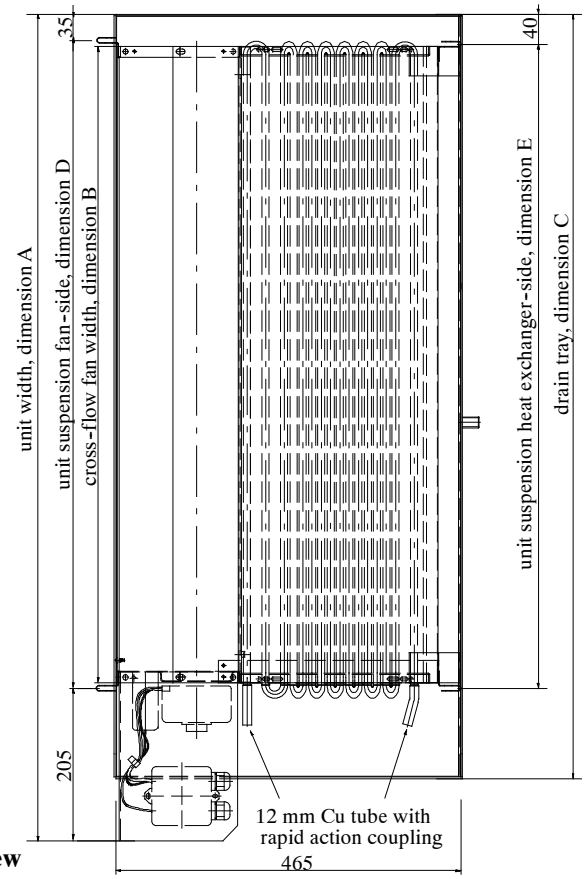
Specification

Fan coil unit with one heat exchanger for heating or cooling the ambient air. Water-side control by valves. Particularly low "built-in" depth and height, therefore especially appropriate for a room-saving installation in ceilings. For extremely low inlet temperatures an insulated drain tray is available for insertion on site. Horizontal installation (in the ceiling). Water connection on the right or left.

Dimensions

Size	A	B	C	D	E
500	784	527	725	543	538
630	884	627	870	643	638
800	1114	857	1030	873	868
1000	1314	1057	1230	1073	1068
1250	1514	1257	1470	1273	1268





Hint for Installation:
For horizontal installation, the cooler must be angled by 10° in order to allow the condensate drainage and to avoid condensate between the blades of the heat exchanger.
This special arrangement will only be required if a constant condensate formation is to be expected, i.e. if the temperature of the cold water supply will constantly remain more than 2 K below the dew point of the ambient air.

View

Water connection:

View: direction of air (arrow)
Unit as illustrated:
Water connection on the left
(or on the right, as required)
Motor always on the left

If water connection on the right,
unit width (dim. A) is extended by 80 mm

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

Technical Specifications, Ceiling Unit, 2-pipe System (legend see page 20)

Size 500

n [-]	V [m^3/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\ oF}/\Delta t^1$ [W/K]	$Q_{k\ mF}/\Delta t^1$ [W/K]	$Q_{k\ mF}{}^2$ [W]	$Q_{k\ sens\ mF}{}^2$ [W]	w_o /Δp_w [kg/h]/[kPa]	P_{el} [W]
I	160	24	30	37	36	864	720	200/18	12
II	240	29	35	49	48	1152	960		15
III	290	35	41	57	56	1265	1120		18
IV	340	38	44	64	64	1408	1280		20
V	430	45	51	73	73	1576	1460		27

Size 630

n [-]	V [m^3/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\ oF}/\Delta t^1$ [W/K]	$Q_{k\ mF}/\Delta t^1$ [W/K]	$Q_{k\ mF}{}^2$ [W]	$Q_{k\ sens\ mF}{}^2$ [W]	w_o /Δp_w [kg/h]/[kPa]	P_{el} [W]
I	170	23	29	48	43	1032	860	200/20	12
II	260	27	33	59	59	1416	1180		15
III	310	34	40	68	68	1536	1360		18
IV	370	38	44	76	76	1672	1520		20
V	480	45	51	87	87	1879	1740		27

Size 800

n [-]	V [m^3/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\ oF}/\Delta t^1$ [W/K]	$Q_{k\ mF}/\Delta t^1$ [W/K]	$Q_{k\ mF}{}^2$ [W]	$Q_{k\ sens\ mF}{}^2$ [W]	w_o /Δp_w [kg/h]/[kPa]	P_{el} [W]
I	220	23	29	52	48	1152	960	200/22	12
II	320	26	32	72	64	1536	1280		15
III	380	32	38	83	78	1762	1560		18
IV	460	36	42	95	92	2024	1840		20
V	580	43	49	105	105	2268	2100		28

Size 1000

n [-]	V [m^3/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\ oF}/\Delta t^1$ [W/K]	$Q_{k\ mF}/\Delta t^1$ [W/K]	$Q_{k\ mF}{}^2$ [W]	$Q_{k\ sens\ mF}{}^2$ [W]	w_o /Δp_w [kg/h]/[kPa]	P_{el} [W]
I	300	25	31	62	59	1488	1180	200/23	22
II	420	28	34	82	76	1968	1520		26
III	470	33	39	92	89	2079	1780		28
IV	570	37	43	104	102	2288	2040		32
V	720	45	51	114	114	2462	2280		39

Size 1250

n [-]	V [m^3/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\ oF}/\Delta t^1$ [W/K]	$Q_{k\ mF}/\Delta t^1$ [W/K]	$Q_{k\ mF}{}^2$ [W]	$Q_{k\ sens\ mF}{}^2$ [W]	w_o /Δp_w [kg/h]/[kPa]	P_{el} [W]
I	360	25	31	80	73	1752	1460	200/25	22
II	470	28	34	98	92	2208	1840		26
III	570	33	39	107	104	2350	2080		28
IV	690	37	43	116	113	2486	2260		32
V	830	44	50	128	124	2678	2480		39

[1]) Specific cooling capacity (noncondensing operation)
[2]) Cooling capacity with the following parameters: water inlet: 6°C,
induction air temperature before entering the heat exchanger: 26°C, 50% rel. humidity

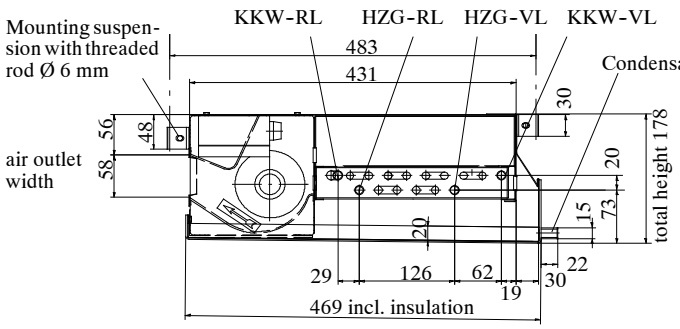
Ceiling Unit, 4-pipe System

Specification

Fan coil unit with one heat exchanger and 2 separate cycles for heating and cooling the ambient air.
Water-side control by valves. Particularly low "built-in" depth and height, therefore especially appropriate for a room-saving installation in ceilings.
For extremely low inlet temperatures an insulated drain tray is available for insertion on site. Horizontal installation (in the ceiling).
Water connection on the right or left.

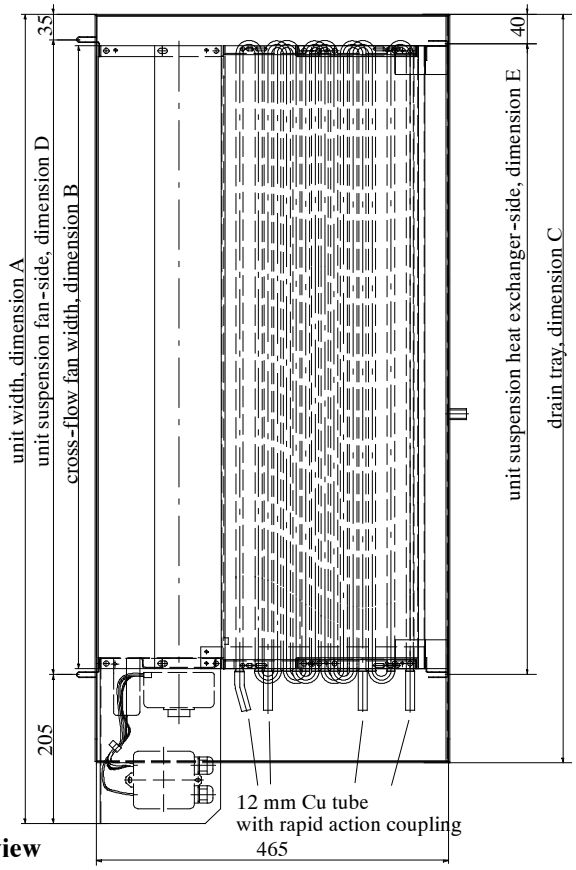
Dimensions

Size	A	B	C	D	E
500	784	527	725	543	538
630	884	627	870	643	638
800	1114	857	1030	873	868
1000	1314	1057	1230	1073	1068
1250	1514	1257	1470	1273	1268



KKW-VL = cooling - water inlet
KKW-RL = cooling - water return
HZG-VL = heating - water inlet
HZG-RL = heating - water return

View



Top view

Hint for Installation
For horizontal installation, the cooler must be angled by 10° in order to allow the condensate drainage and to avoid condensate between the blades of the heat exchanger.
This special arrangement will only be required if a constant condensate formation is to be expected, i.e. if the temperature of the cold water supply will constantly remain more than 2 K below the dew point of the ambient air.

View

Water connection:

View: direction of air (arrow)
Unit as illustrated:
Water connection on the left
(or on the right, as required)
Motor always on the left

If water connection on the right,
unit width (dim. A) is extended by 80 mm

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

Technical Specifications, Ceiling Unit, 4-pipe System (legend see page 20)

Size 500

n [-]	V [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t^1$ [W/K]	$Q_{k\,mF}/\Delta t^1$ [W/K]	$Q_{k\,mF}{}^2$ [W]	$Q_{k\,sens\,mF}{}^2$ [W]	$Q_{h\,oF}/\Delta t$ [W/K]	$Q_{h\,mF}/\Delta t$ [W/K]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]	P_{el} [W]
I	160	24	30	34	28	672	560	21	19	200 / 13	100 / 2.5	12
II	240	29	35	46	45	1080	900	28	28			15
III	290	35	41	54	54	1220	1080	32	32			18
IV	340	38	44	60	60	1320	1200	35	35			20
V	430	45	51	68	68	1468	1360	40	40			27

Size 630

n [-]	V [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t^1$ [W/K]	$Q_{k\,mF}/\Delta t^1$ [W/K]	$Q_{k\,mF}{}^2$ [W]	$Q_{k\,sens\,mF}{}^2$ [W]	$Q_{h\,oF}/\Delta t$ [W/K]	$Q_{h\,mF}/\Delta t$ [W/K]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]	P_{el} [W]
I	170	23	29	41	36	864	720	26	23	200 / 14	100 / 2.7	12
II	260	27	33	52	51	1224	1020	32	31			15
III	310	34	40	60	60	1356	1200	35	35			18
IV	370	38	44	67	67	1474	1340	39	39			20
V	480	45	51	76	76	1641	1520	43	43			27

Size 800

n [-]	V [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t^1$ [W/K]	$Q_{k\,mF}/\Delta t^1$ [W/K]	$Q_{k\,mF}{}^2$ [W]	$Q_{k\,sens\,mF}{}^2$ [W]	$Q_{h\,oF}/\Delta t$ [W/K]	$Q_{h\,mF}/\Delta t$ [W/K]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]	P_{el} [W]
I	220	23	29	47	42	1008	840	29	26	200 / 16	100 / 3.1	12
II	320	26	32	64	60	1440	1200	38	36			15
III	380	32	38	74	71	1604	1420	42	41			18
IV	460	36	42	82	81	1782	1620	47	47			20
V	580	43	49	92	91	1965	1820	51	51			28

Size 1000

n [-]	V [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t^1$ [W/K]	$Q_{k\,mF}/\Delta t^1$ [W/K]	$Q_{k\,mF}{}^2$ [W]	$Q_{k\,sens\,mF}{}^2$ [W]	$Q_{h\,oF}/\Delta t$ [W/K]	$Q_{h\,mF}/\Delta t$ [W/K]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]	P_{el} [W]
I	300	25	31	58	53	1272	1060	36	33	200 / 18	100 / 3.4	22
II	420	28	34	76	71	1704	1420	47	44			26
III	470	33	39	85	82	1853	1640	54	51			28
IV	570	37	43	95	92	2024	1840	59	57			32
V	720	45	51	107	105	2268	2100	65	65			39

Size 1250

n [-]	V [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t^1$ [W/K]	$Q_{k\,mF}/\Delta t^1$ [W/K]	$Q_{k\,mF}{}^2$ [W]	$Q_{k\,sens\,mF}{}^2$ [W]	$Q_{h\,oF}/\Delta t$ [W/K]	$Q_{h\,mF}/\Delta t$ [W/K]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]	P_{el} [W]
I	360	25	31	74	68	1632	1360	46	43	200 / 20	100 / 3.6	22
II	470	28	34	90	85	2040	1700	54	51			26
III	570	33	39	98	96	2196	1920	61	58			28
IV	690	37	43	106	104	2288	2080	63	61			32
V	830	44	50	118	116	2505	2320	69	67			39

[1]) Specific cooling capacity (noncondensing operation)
[2]) Cooling capacity with the following parameters: water inlet: 6°C,
induction air temperature before entering the heat exchanger: 26°C, 50% rel. humidity

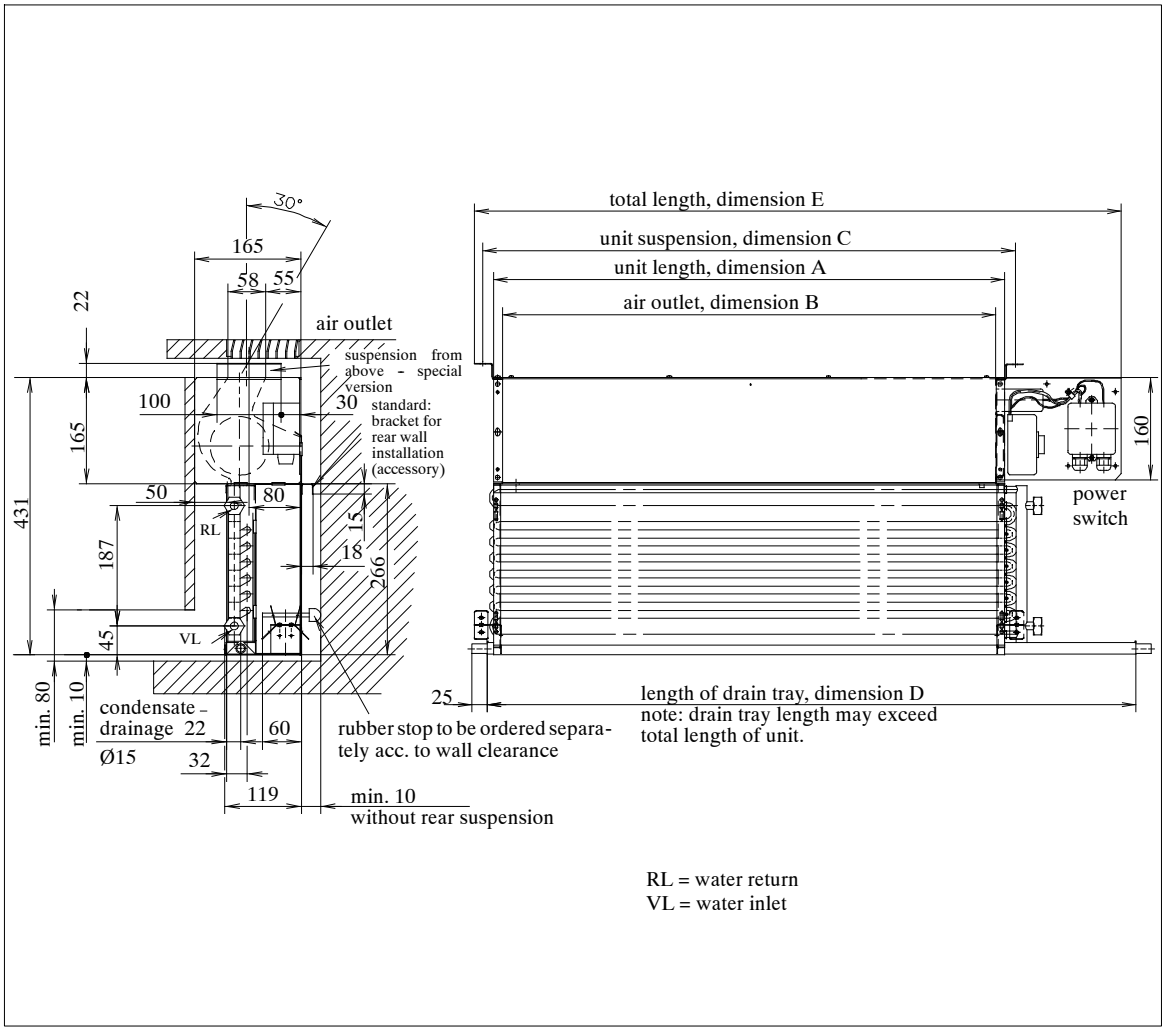
Unit for Sill Installation, 2-pipe System

Specification

Fan coil unit with one heat exchanger for heating or cooling the ambient air.
Water-side control by valves.
Particularly small built-in depth and height, therefore especially appropriate for a room-saving installation in sills.
For extremely low inlet temperatures an insulated drain tray is available for insertion on site.
Vertical installation.
Water connection on the right or left.

Dimensions

Size	A	B	C	D	E
500	527	497	563	730	755
630	627	597	663	885	855
800	857	827	893	1085	1085
1000	1057	1027	1093	1335	1285
1250	1257	1227	1293	1553	1485



The unit may be mounted using one of the following possibilities:

- suspension from above (attachment to the sill)
- wall mounting - rear suspension

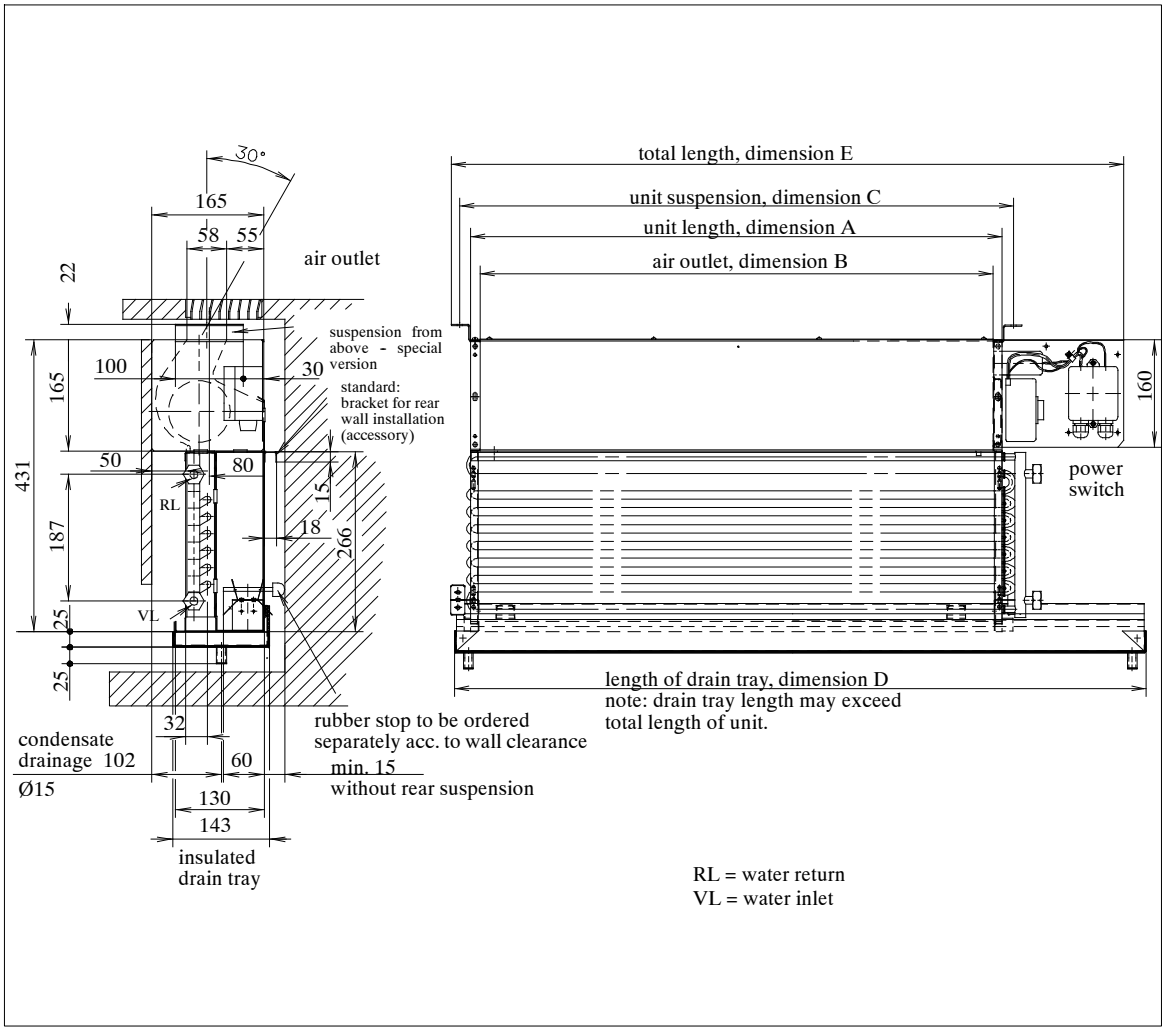
Unit for Sill Installation, 2-pipe System, for extremely low inlet temperatures

Specification

Fan coil unit with one heat exchanger for heating or cooling the ambient air.
Water-side control by valves.
Particularly small built-in depth and height, therefore especially appropriate for a room-saving installation in sills.
For extremely low inlet temperatures an insulated drain tray is available for insertion on site.
Vertical installation.
Water connection on the right or left.

Dimensions

Size	A	B	C	D	E
500	527	497	563	757	755
630	627	597	663	857	855
800	857	827	893	1087	1085
1000	1057	1027	1093	1287	1285
1250	1257	1227	1293	1487	1485



The unit may be mounted using one of the following possibilities:

- suspension from above (attachment to the sill)
- wall mounting - rear suspension

Technical Specifications, Unit for Sill Installation, 2-pipe System (legend see page 20)

Size 500

n [-]	V [m^3/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\ oF}/\Delta t^1$ [W/K]	$Q_{k\ mF}/\Delta t^1$ [W/K]	$Q_{k\ mF}{}^2$ [W]	$Q_{k\ sens\ mF}{}^2$ [W]	w_o /Δp_w [kg/h]/[kPa]	P_{el} [W]
I	160	26	32	37	36	864	720	200/18	16
II	240	30	36	49	48	1152	960		20
III	290	36	42	57	56	1265	1120		23
IV	340	40	46	64	64	1408	1280		25
V	430	46	52	73	73	1576	1460		31

Size 630

n [-]	V [m^3/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\ oF}/\Delta t^1$ [W/K]	$Q_{k\ mF}/\Delta t^1$ [W/K]	$Q_{k\ mF}{}^2$ [W]	$Q_{k\ sens\ mF}{}^2$ [W]	w_o /Δp_w [kg/h]/[kPa]	P_{el} [W]
I	170	25	31	48	43	1032	860	200/20	16
II	260	29	35	59	59	1416	1180		20
III	310	35	41	68	68	1536	1360		23
IV	370	39	45	76	76	1672	1520		25
V	480	46	52	87	87	1879	1740		31

Size 800

n [-]	V [m^3/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\ oF}/\Delta t^1$ [W/K]	$Q_{k\ mF}/\Delta t^1$ [W/K]	$Q_{k\ mF}{}^2$ [W]	$Q_{k\ sens\ mF}{}^2$ [W]	w_o /Δp_w [kg/h]/[kPa]	P_{el} [W]
I	220	25	31	52	48	1152	960	200/22	176
II	320	28	34	72	64	1536	1280		20
III	380	34	40	83	78	1762	1560		23
IV	460	38	44	95	92	2024	1840		25
V	580	45	51	105	105	2268	2100		31

Size 1000

n [-]	V [m^3/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\ oF}/\Delta t^1$ [W/K]	$Q_{k\ mF}/\Delta t^1$ [W/K]	$Q_{k\ mF}{}^2$ [W]	$Q_{k\ sens\ mF}{}^2$ [W]	w_o /Δp_w [kg/h]/[kPa]	P_{el} [W]
I	300	27	33	62	59	1488	1180	200/23	25
II	420	30	36	82	76	1968	1520		29
III	470	34	40	92	89	2079	1780		33
IV	570	38	44	104	102	2288	2040		36
V	720	46	52	114	114	2462	2280		42

Size 1250

n [-]	V [m^3/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\ oF}/\Delta t^1$ [W/K]	$Q_{k\ mF}/\Delta t^1$ [W/K]	$Q_{k\ mF}{}^2$ [W]	$Q_{k\ sens\ mF}{}^2$ [W]	w_o /Δp_w [kg/h]/[kPa]	P_{el} [W]
I	360	27	33	80	73	1752	1460	200/25	25
II	470	30	36	98	92	2208	1840		29
III	570	35	41	107	104	2350	2080		33
IV	690	38	44	116	113	2486	2260		36
V	830	46	52	128	124	2678	2480		42

[1]) Specific cooling capacity (noncondensing operation)
[2]) Cooling capacity with the following parameters: water inlet: 6°C,
induction air temperature before entering the heat exchanger: 26°C, 50% rel. humidity

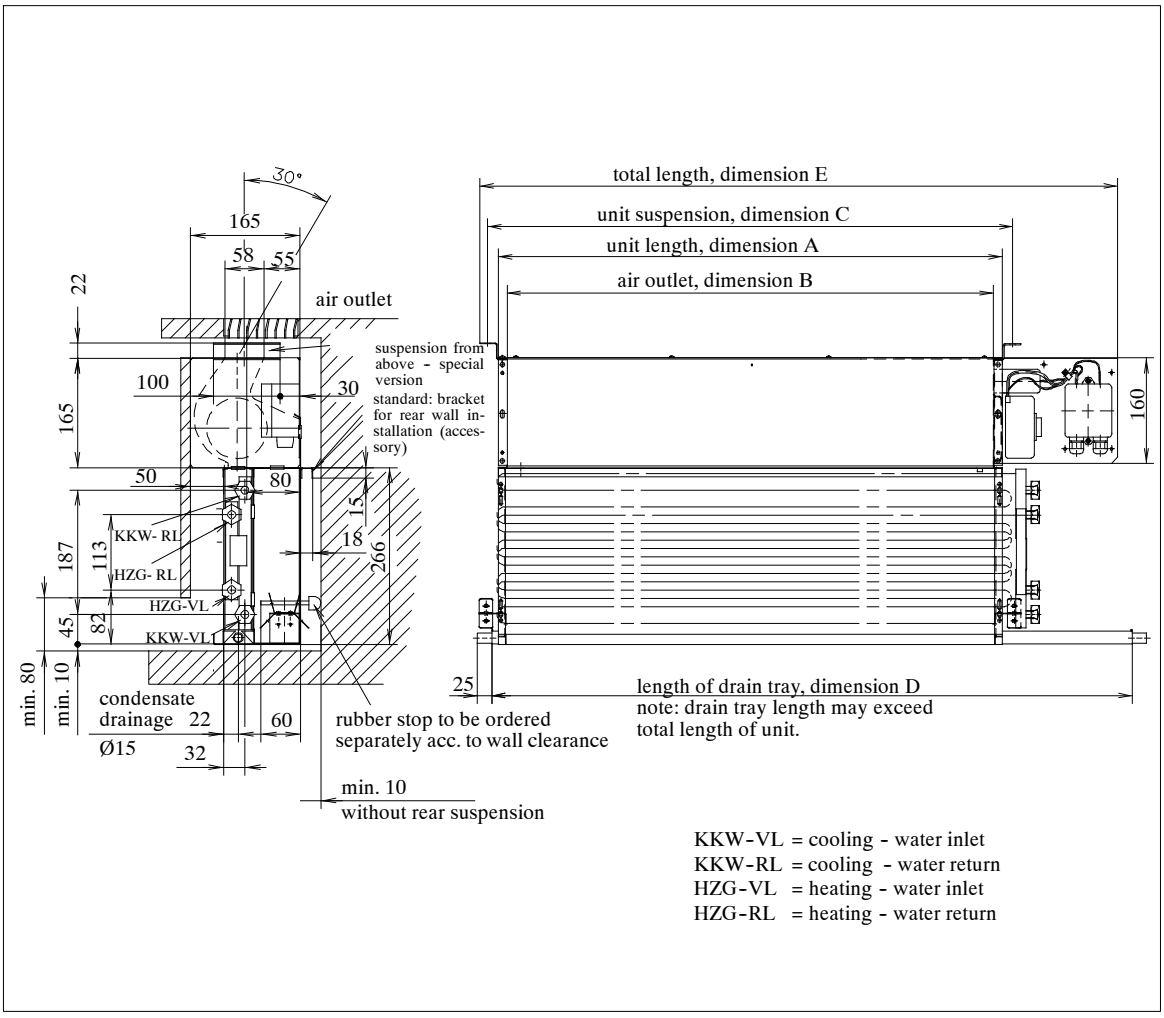
Unit for Sill Installation, 4-pipe System

Specifikation

Fan coil unit with one heat exchanger with two separate water cycles for heating and cooling the ambient air.
Water-side control by valves.
Particularly small built-in depth and height, therefore especially appropriate for a room-saving installation in
For extremely low inlet temperatures the unit is available with an insulated drain tray.
Vertical installation.
Water connection on the right or left.

Dimensions

Size	A	B	C	D	E
500	527	497	563	730	755
630	627	597	663	885	855
800	857	827	893	1085	1085
1000	1057	1027	1093	1335	1285
1250	1257	1227	1293	1553	1485



The unit may be mounted using one of the following possibilities:

- suspension from above (attachment to the sill)
- wall mounting – rear suspension

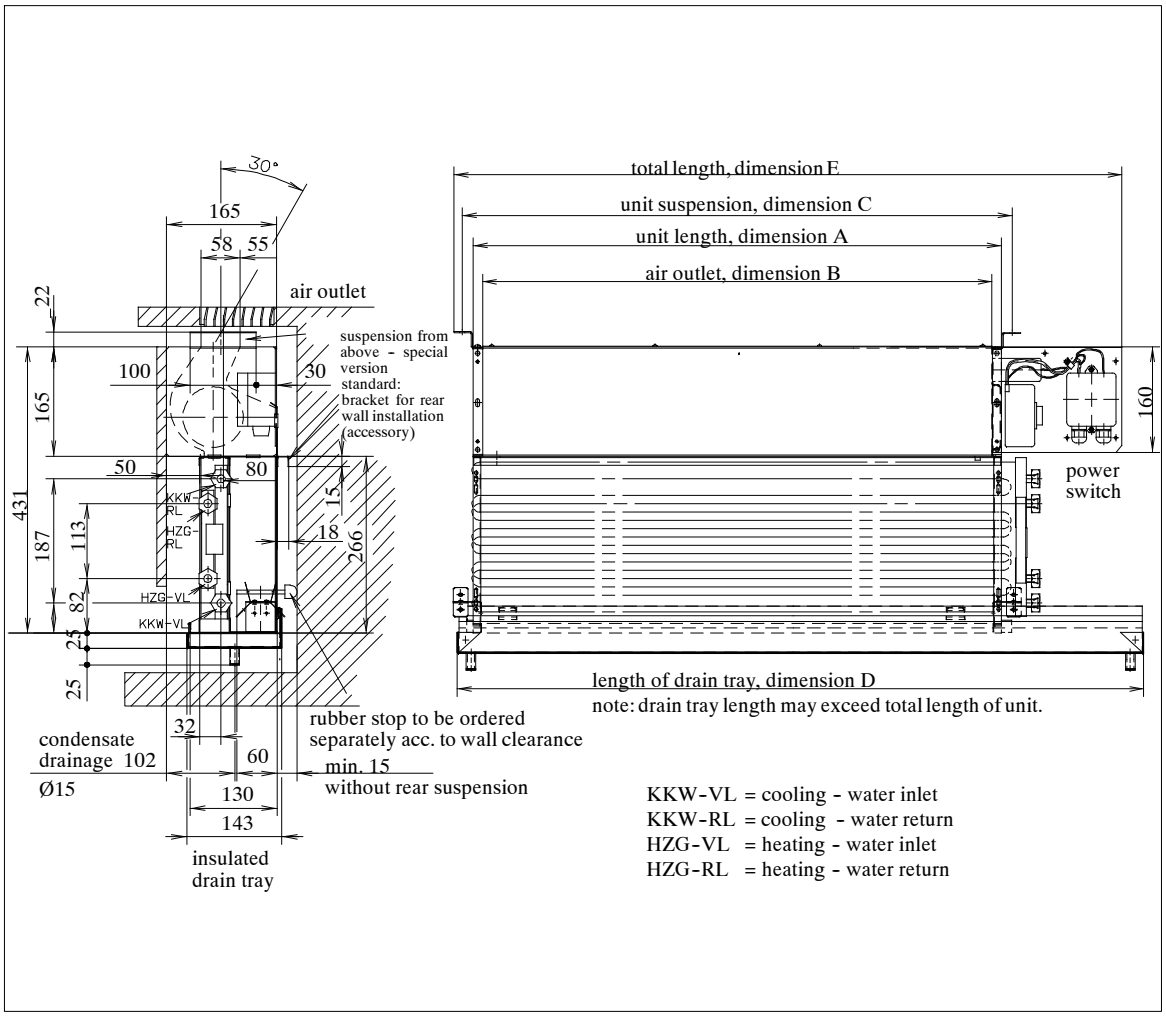
Unit for Sill Installation, 4-pipe System, for extremely low inlet temperatures

Specification

Fan coil unit with one heat exchanger and two separate cycles for heating or cooling the ambient air.
Water-side control by valves.
Particularly small built-in depth and height, therefore especially appropriate for a room-saving installation in sills.
For extremely low inlet temperatures an insulated drain tray is available for insertion on site.
Vertical installation.
Water connection on the right or left.

Dimensions

Size	A	B	C	D	E
500	527	497	563	757	755
630	627	597	663	857	855
800	857	827	893	1087	1085
1000	1057	1027	1093	1287	1285
1250	1257	1227	1293	1487	1485



The unit may be mounted using one of the following possibilities:

- suspension from above (attachment to the sill)
- wall mounting – rear suspension

Technical Specifications, Unit for Sill Installation, 4-pipe System (legend see page 20)

Size 500

n [-]	V [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t^1$ [W/K]	$Q_{k\,mF}/\Delta t^1$ [W/K]	$Q_{k\,mF}{}^2$ [W]	$Q_{k\,sens\,mF}{}^2$ [W]	$Q_{h\,oF}/\Delta t$ [W/K]	$Q_{h\,mF}/\Delta t$ [W/K]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]	P_{el} [W]
I	160	26	32	34	28	672	560	21	19	200 / 13	100 / 2.5	16
II	240	30	36	46	45	1080	900	28	28			20
III	290	36	42	54	54	1220	1080	32	32			23
IV	340	40	46	60	60	1320	1200	35	35			25
V	430	46	52	68	68	1468	1360	40	40			31

Size 630

n [-]	V [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t^1$ [W/K]	$Q_{k\,mF}/\Delta t^1$ [W/K]	$Q_{k\,mF}{}^2$ [W]	$Q_{k\,sens\,mF}{}^2$ [W]	$Q_{h\,oF}/\Delta t$ [W/K]	$Q_{h\,mF}/\Delta t$ [W/K]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]	P_{el} [W]
I	170	25	31	41	36	864	720	26	23	200 / 14	100 / 2.7	16
II	260	29	35	52	51	1224	1020	32	31			20
III	310	35	41	60	60	1356	1200	35	35			23
IV	370	39	45	67	67	1474	1340	39	39			25
V	480	46	52	76	76	1641	1520	43	43			31

Size 800

n [-]	V [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t^1$ [W/K]	$Q_{k\,mF}/\Delta t^1$ [W/K]	$Q_{k\,mF}{}^2$ [W]	$Q_{k\,sens\,mF}{}^2$ [W]	$Q_{h\,oF}/\Delta t$ [W/K]	$Q_{h\,mF}/\Delta t$ [W/K]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]	P_{el} [W]
I	220	25	31	47	42	1008	840	29	26	200 / 16	100 / 3.1	16
II	320	28	34	64	60	1440	1200	38	36			20
III	380	34	40	74	71	1604	1420	42	41			23
IV	460	38	44	82	81	1782	1620	47	47			25
V	580	45	51	92	91	1965	1820	51	51			31

Size 1000

n [-]	V [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t^1$ [W/K]	$Q_{k\,mF}/\Delta t^1$ [W/K]	$Q_{k\,mF}{}^2$ [W]	$Q_{k\,sens\,mF}{}^2$ [W]	$Q_{h\,oF}/\Delta t$ [W/K]	$Q_{h\,mF}/\Delta t$ [W/K]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]	P_{el} [W]
I	300	27	33	58	53	1272	1060	36	33	200 / 18	100 / 3.4	25
II	420	30	36	76	71	1704	1420	47	44			29
III	470	34	40	85	82	1853	1640	54	51			33
IV	570	38	44	95	92	2024	1840	59	57			36
V	720	46	52	107	105	2268	2100	65	65			42

Size 1250

n [-]	V [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_{k\,oF}/\Delta t^1$ [W/K]	$Q_{k\,mF}/\Delta t^1$ [W/K]	$Q_{k\,mF}{}^2$ [W]	$Q_{k\,sens\,mF}{}^2$ [W]	$Q_{h\,oF}/\Delta t$ [W/K]	$Q_{h\,mF}/\Delta t$ [W/K]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]	P_{el} [W]
I	360	27	33	74	68	1632	1360	46	43	200 / 20	100 / 3.6	25
II	470	30	36	90	85	2040	1700	54	51			29
III	570	35	41	98	96	2196	1920	61	58			33
IV	690	38	44	106	104	2288	2080	63	61			36
V	830	46	52	118	116	2505	2320	69	67			42

[1]) Specific cooling capacity (noncondensing operation)
[2]) Cooling capacity with the following parameters: water inlet: 6°C,
induction air temperature before entering the heat exchanger: 26°C, 50% rel. humidity

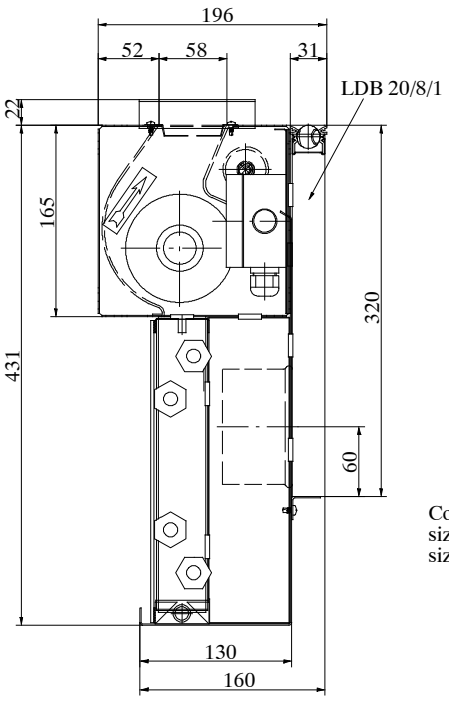
Unit for Sill Installation with Fresh Air Supply by Linear Diffuser LDB

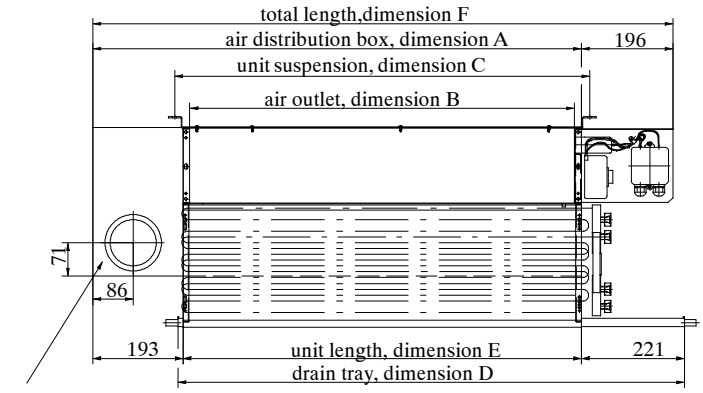
Specification

Fan coil unit special version with fresh air supply.
Through an adjustable LTG diffuser type LDB, the air is blown out in parallel to the cross-flow fan outlet.
Optimum fresh air supply is ensured even with the fan at standstill.
Fan coil unit with one heat exchanger and two separate circuits for heating or cooling the ambient air.
Water-side control by valves.
Particularly small built-in depth and height, therefore especially appropriate for a room-saving installation in sills.
Vertical installation.
Water connection on the right or left.

Dimensions

Size	A	B	C	D	E	F
500	720	497	563	730	527	916
630	820	597	663	885	627	1016
800	1050	827	893	1085	857	1246
1000	1250	1027	1093	1335	1057	1446
1250	1450	1227	1293	1553	1257	1646





Connection fresh air
size 500 and size 630: DN 100
size 800, 1000 and 1250: DN 125

Lateral view shown reduced

shown: 4-pipe-unit

Technical data see standard unit VFC-4/VFC-2

Acoustic data may vary according to fresh air rate.

Unit for Sill Installation with Fresh Air Supply by Fresh Air Box

Fan coil unit special version with fresh air supply, with lateral (left, opposite to motor) primary air box in extension to the recirculating air outlet

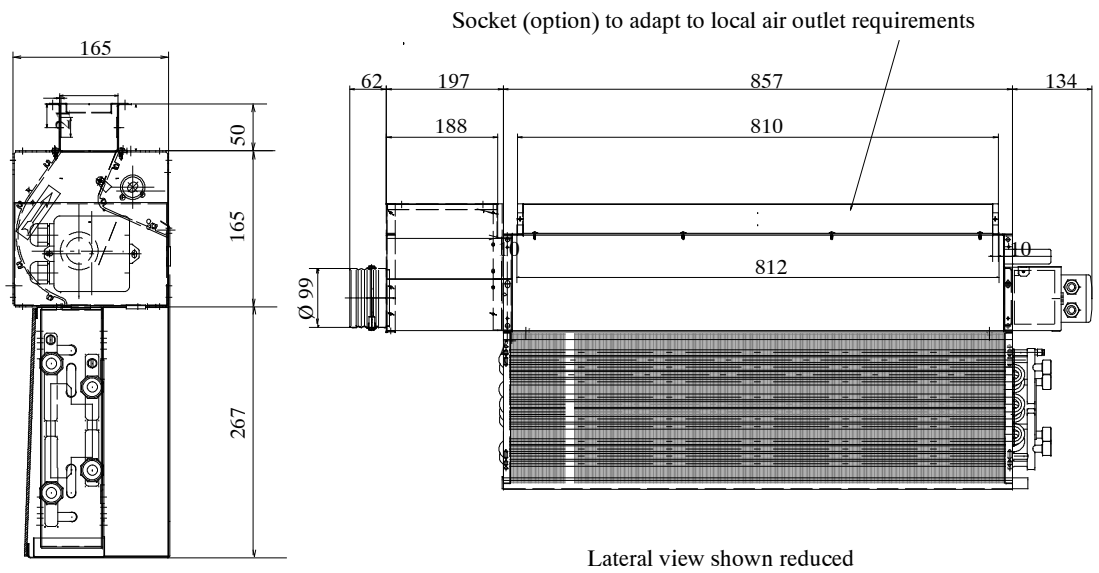
Connection is realized using a DN 100 socket, with integrated damper (option).

Optimum fresh air supply is ensured even with the fan at standstill.

Fan coil unit with one heat exchanger and two separate circuits for heating or cooling the ambient air. Water-side control by valves.

Particularly small built-in depth and height, therefore especially appropriate for a room-saving installation in sills.

Vertical installation.
Water connection on the right or left.



Type VFC (shown: 4-pipe) with fresh air supply by fresh air box

Technical data see standard unit VFC-4/VFC-2

Acoustic data may vary according to fresh air rate.

Legend to the Technical Specification

n	- speed
V	- flow rate (± 10%)
L_{A18}	- sound pressure level, 18 m^2 Sabine
L_{wA}	- sound power level ± 3 dB(A) (without casing)
$Q_{k\,oF}$	- cooling capacity (without filter)
$Q_{k\,mF}$	- cooling capacity (with filter)
$Q_{h\,oF}$	- heating capacity (without filter)
$Q_{h\,mF}$	- heating capacity (with filter)
$Q_{k\,sens\,mF}$	- sensible cooling capacity (with filter)
Δt	- temperature difference between induction air temp. before entering the heat exchanger and water supply
w_{ok}	- standard water flow rate at cooling capacity
w_{oh}	- standard water flow rate at heating capacity
$Δp_w$	- water-side pressure loss
P_{el}	- electric power consumption (± 20%)

Technical Specifications, Units for Sill Installation with Fresh Air Supply
Sound Power Values with Fresh Air

Sound power L_{wA} for size 500 with fresh air, connection Ø 100 mm

n [-]	V_P = 30 m³/h [dB(A)]	V_P = 40 m³/h [dB(A)]	V_P = 50 m³/h [dB(A)]	V_P = 60 m³/h [dB(A)]	V_P = 70 m³/h [dB(A)]
I	34	31	34	37	41
II	37	35	37	38	41
III	42	41	41	41	44
IV	45	44	44	44	45
V	52	51	51	51	51

Sound power L_{wA} for size 630 with fresh air, connection Ø 100 mm

n [-]	V_P = 40 m³/h [dB(A)]	V_P = 50 m³/h [dB(A)]	V_P = 60 m³/h [dB(A)]	V_P = 70 m³/h [dB(A)]	V_P = 80 m³/h [dB(A)]
I	32	32	35	38	41
II	35	34	36	38	41
III	42	40	40	41	44
IV	46	44	44	44	45
V	52	51	51	51	51

Sound power L_{wA} for size 800 with fresh air, connection Ø 125 mm (fresh air box: Ø 100 mm)

n [-]	V_P = 60 m³/h [dB(A)]	V_P = 70 m³/h [dB(A)]	V_P = 80 m³/h [dB(A)]	V_P = 90 m³/h [dB(A)]	V_P = 100 m³/h [dB(A)]
I	32	33	35	38	40
II	36	35	36	38	40
III	41	39	40	41	42
IV	44	43	43	43	44
V	52	51	51	51	51

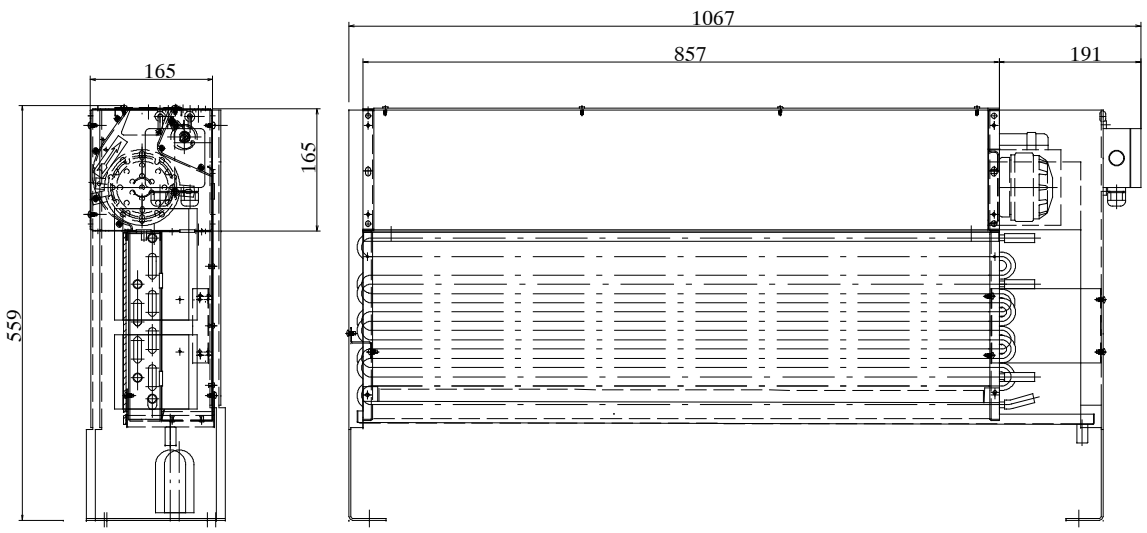
Sound power L_{wA} for size 1000 with fresh air, connection Ø 125 mm (fresh air box: Ø 100 mm)

n [-]	V_P = 70 m³/h [dB(A)]	V_P = 80 m³/h [dB(A)]	V_P = 90 m³/h [dB(A)]	V_P = 100 m³/h [dB(A)]	V_P = 120 m³/h [dB(A)]
I	33	34	34	37	41
II	36	35	37	38	41
III	41	39	39	40	42
IV	45	43	43	43	44
V	52	51	51	51	51

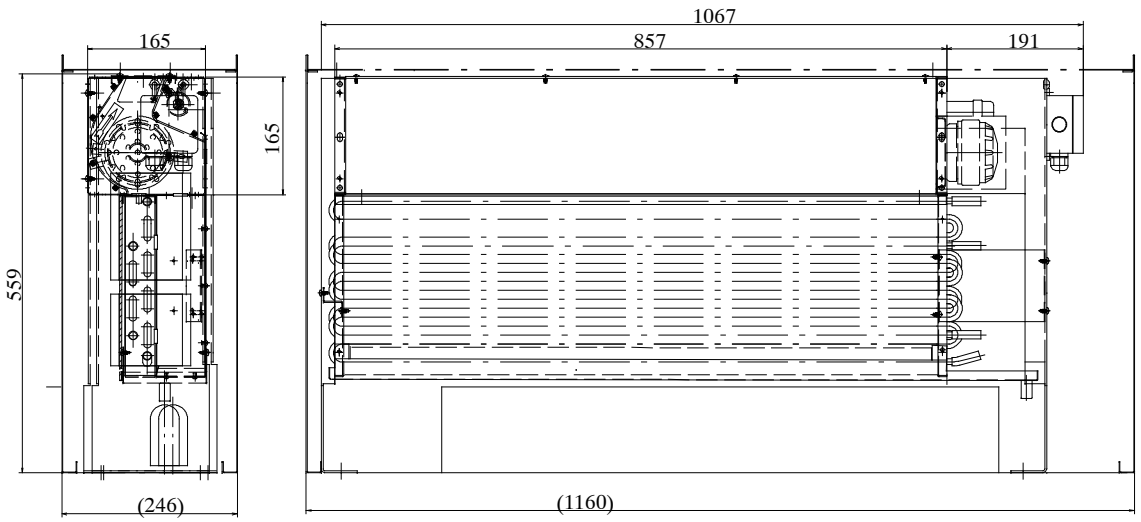
Sound power L_{wA} for size 1250 with fresh air, connection Ø 125 mm (fresh air box: Ø 100 mm)

n [-]	V_P = 80 m³/h [dB(A)]	V_P = 90 m³/h [dB(A)]	V_P = 100 m³/h [dB(A)]	V_P = 120 m³/h [dB(A)]	V_P = 140 m³/h [dB(A)]
I	33	34	35	36	38
II	36	35	37	38	38
III	41	39	39	40	42
IV	45	43	43	43	44
V	52	50	50	50	50

Upright Unit with solid Floor Fixation



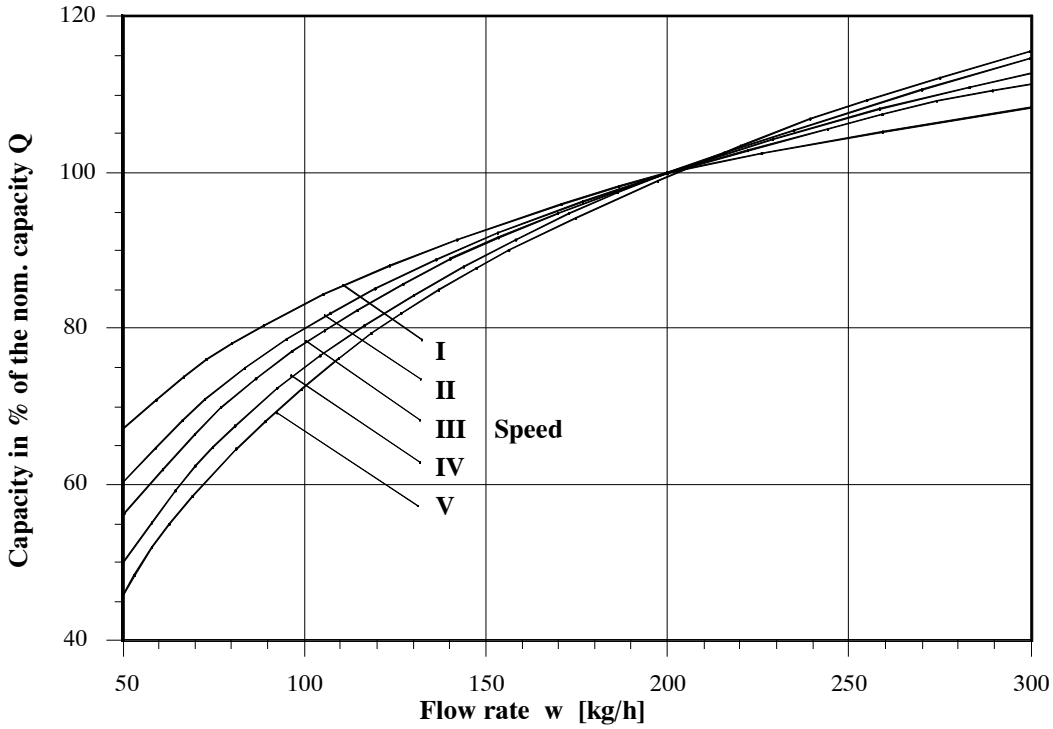
Type VFC 800 (shown: 4-pipe), upright unit with solid floor fixation without casing

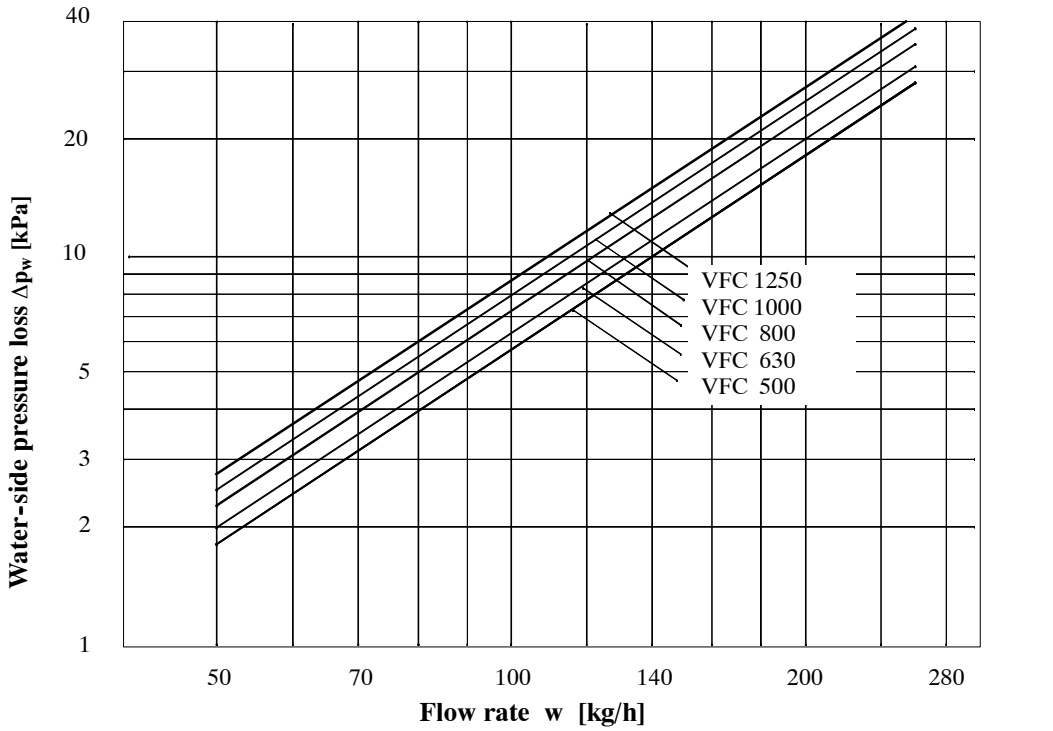


Type VFC 800 (shown: 4-pipe), upright unit with solid floor fixation with casing

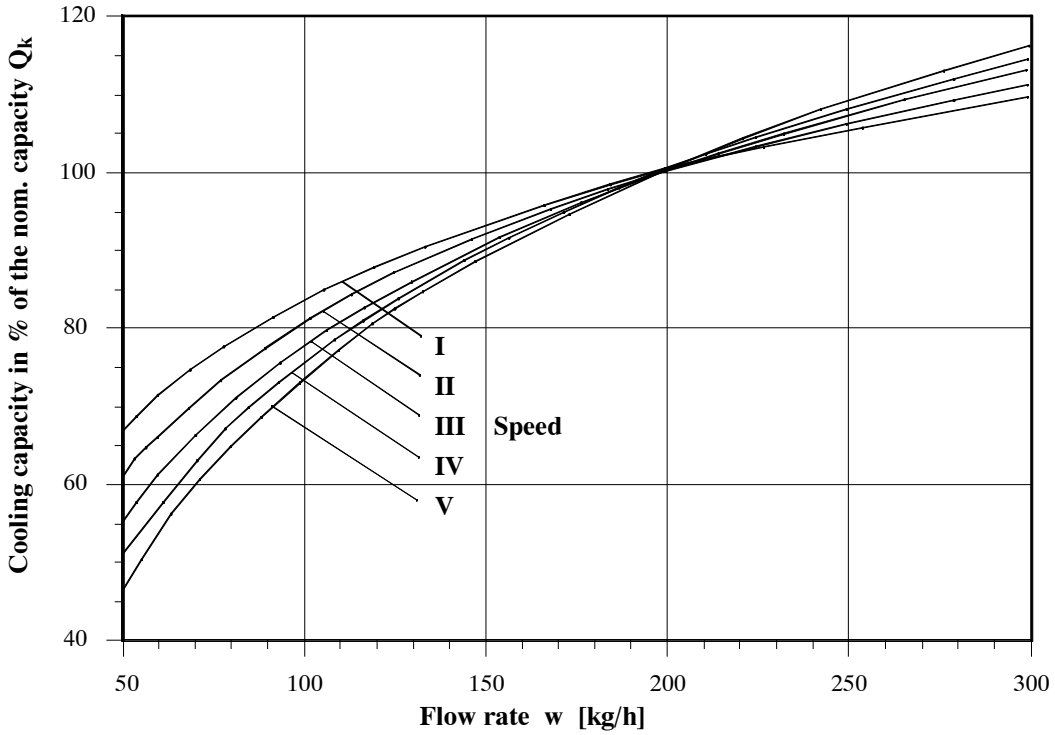
Technical data see standard unit VFC-4/VFC-2

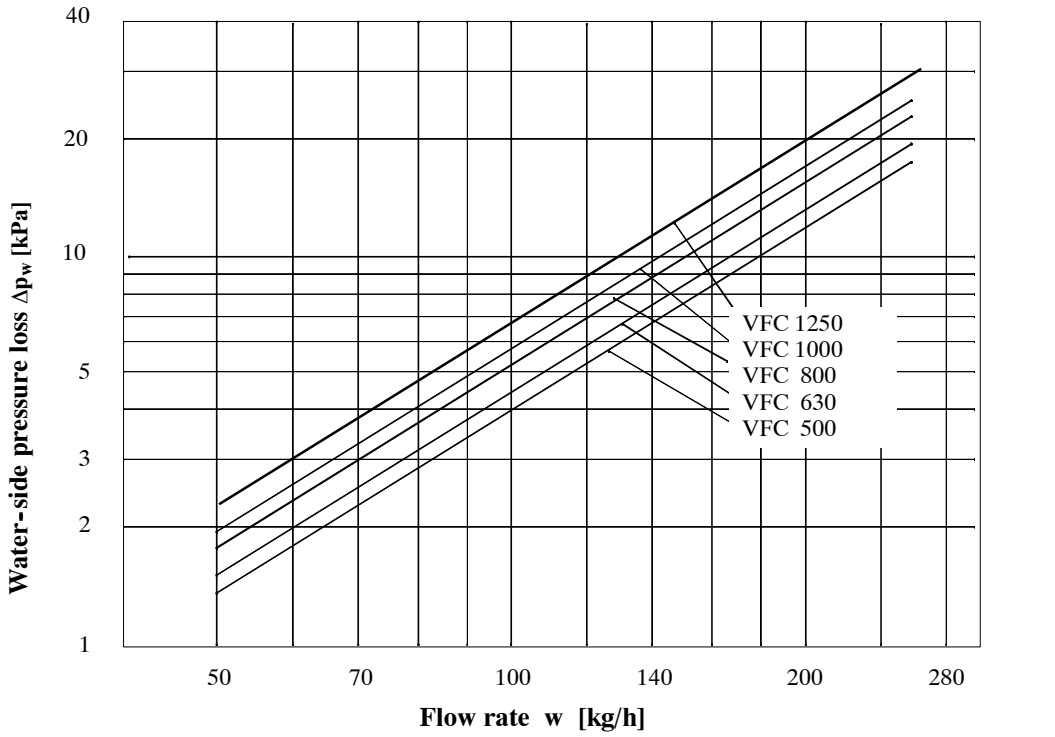
Water-side Pressure Loss and Capacity for different Flow Rates, 2-pipe System



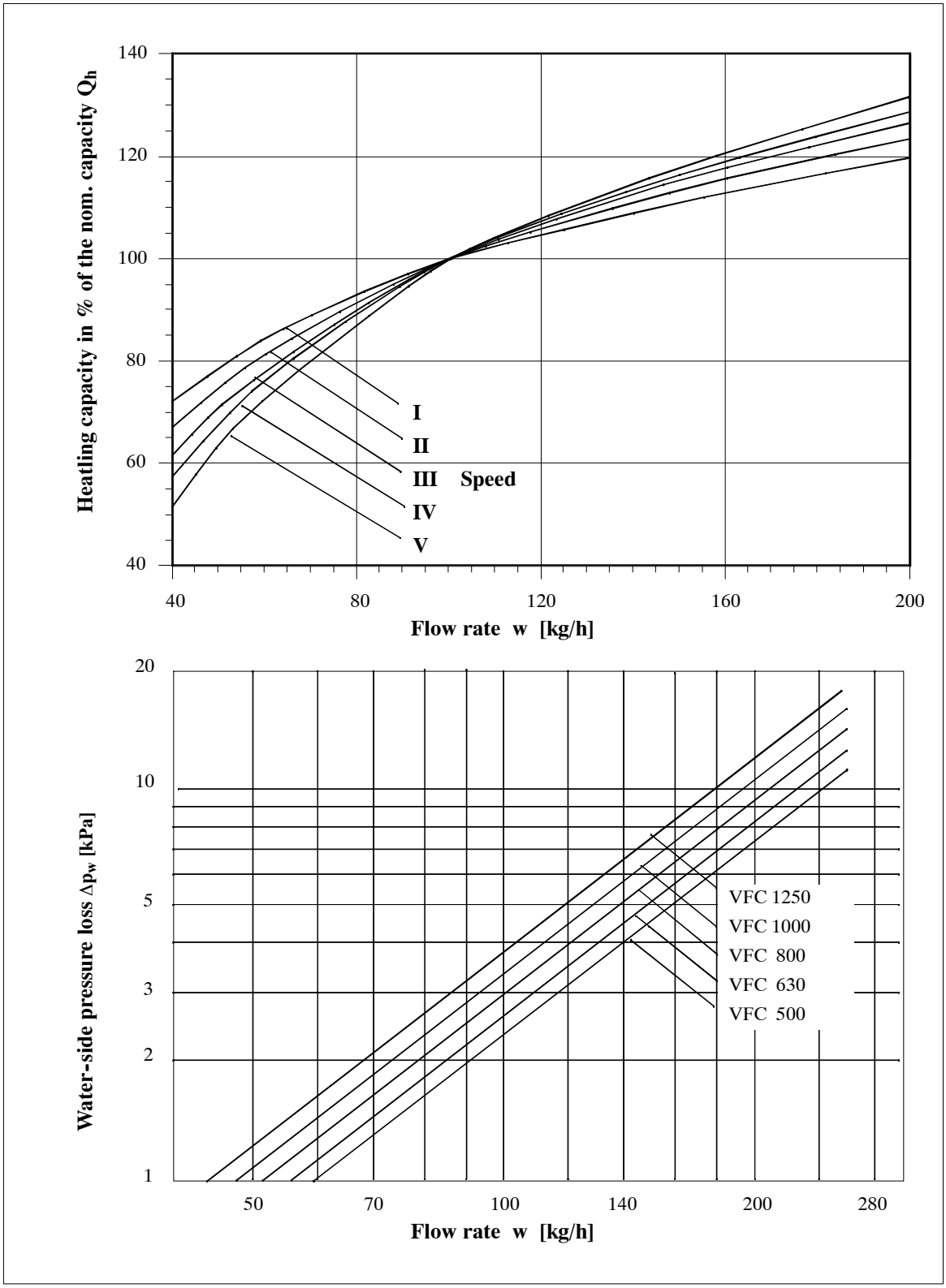


Water-side Pressure Loss and Cooling Capacity for different Flow Rates, 4-pipe System





Water-side Pressure Loss and Heating Capacity for different Flow Rates, 4-pipe System



3.2 Caloric Output Data

Caloric output data were determined at a test stand in the LTG test lab.

Data are valid if the following applies:

- unit at operating temperature, steady-state condition
- steady-state condition during measurements
- no condensation at the heat exchanger in the cooling mode
- water without additives (drinking water quality)*
- water supply temperatures from 12 °C to 16 °C in the cooling mode and 50 °C - 60 °C in the heating mode.

Parameters used:

- specific heat capacity of the water 4186 J/(kgK)
- specific heat capacity of the air 1004 J/(kgK)
- air density 1.2 kg/m^3

To ensure easy transferability, the specific caloric outputs - i.e. the absolute caloric outputs in relation to the temperature difference between water intake and induction air before entering the heat exchanger - are given with varying fan speeds.

The outputs given in the chart do apply with specific nominal flow rates only. These are stated for each type and size.

The correction charts give a graphic illustration of how outputs change with other flow rates compared to nominal flow rate output.

Flow rates have been determined through calculation and may vary by about 10%.

* **Addition of ethylene glycol to lower the freezing point:**

To lower the freezing point, cooling water is often added some ethylene glycol. The lower specific thermal capacity of the mixture reduces the unit's cooling capacity.

3.3 Acoustic Data

Acoustic data have been determined in a reverberation chamber in the LTG test lab.
The technical data sheet contain the A weighted sound pressure levels L_{A18} for different fan speedss.

Sound pressure levels apply to a room absorption surface of 18 m^2 which equals a room absorption of about 6 dB(A). Thus, sound power levels may easily be calculated.

$L_{WA} = L_{A18} + 6$ dB(A)

The data given apply to one unit, i.e. one room axle. If more than one unit is installed in the same room, the sound pressure level will rise accordingly.

Increase in sound level with several sound sources of the same type:

Number of sound sources of the same type	1	2	3	4
Sound level increase [dB]		3	5	6

Measuring accuracy is ± 10%.

3.4 Hydraulic Data

Heat exchangers are approved for an operating pressure of 10 bar max. (test pressure 16 bar).
Pressures exceeding 10 bar require the express permission of LTG.

Water-side pressure losses have been measured directly at the heat exchanger connections. Further resistances will have to be added.

Measuring accuracy is ± 10%.

3.5 Weight

Weights (without packaging) in kg

Size	Unit for sill installation	Ceiling unit Unit for sill installation with additional drain tray
VFC 500	13	15
VFC 630	15	18
VFC 800	19	23
VFC 1000	23	28
VFC 1250	28	33

3.6 Electrical Data

3.5.1 Electrical Connection (on-site control)

Connect the unit to a residual current device (RCD).

All units are provided with a terminal box installed inside the unit, degree of protection IP 44.

A total of 5 units may be connected in parallel and triggered through a single switch.

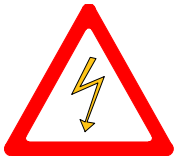
Take care to connect in parallel identical speeds only, i.e. connect speed I of unit 1 to speed I of unit 2, etc.

For a safe start of the fans it is indispensable to use speed III.

The main power supply on site is to be performed according to the wiring diagram and by skilled and trained staff only.

Electrical lines on site must be realized using the outputs on the terminal box and on the unit housing.

It is not permitted to work on the electrical equipment with the unit being alive.

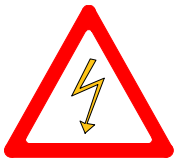


Units must be provided with a possibility to completely disconnected them from the main power supply!

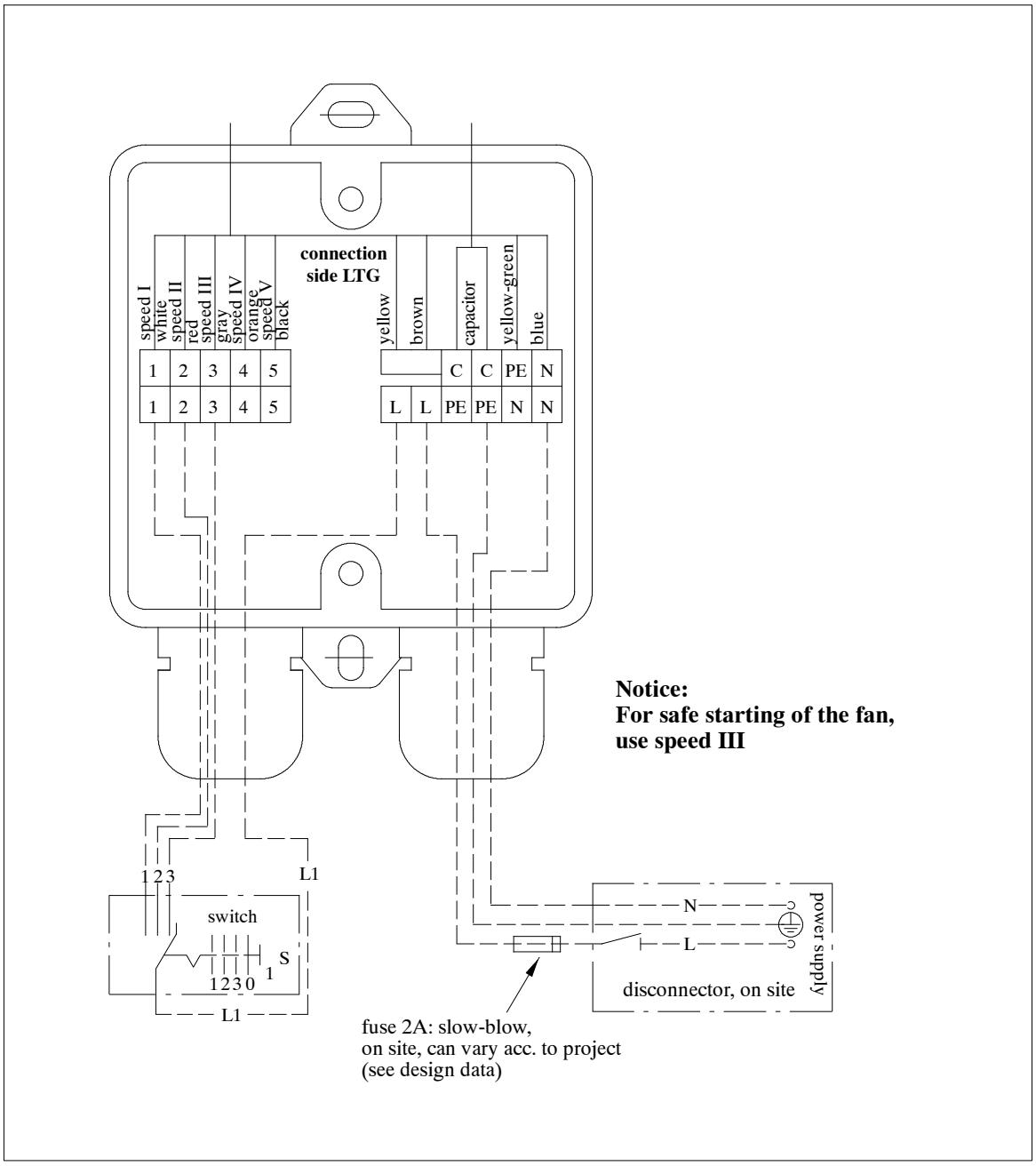
Any work must be performed in compliance with national regulations and safety instructions.

The technical specifications contain the electrical output data for the units.

For an individual activation all units are equipped with a terminal box mounted to the unit.
A total of 5 units may be connected in parallel and triggered using a single switch.



Connection to the main power supply on site is to be performed according to the wiring diagram and by skilled and trained staff only.
It is not permitted to work on the electrical equipment with the unit being alive.
Units must be provided with a possibility to completely disconnect them from the main power supply.
It is not permitted to operate the units in a partly disassembled condition.



4. Installation

4.1 Installation / Suspension

There are, in general, three ways to install or suspend the units:

- wall mounting – rear or lateral
- installation using floor stands
- ceiling installation

Please consider the following when installing the units:

- To ensure unit stability and rigidity, use screws of at least the stated property class when fixing the unit. Fixings required for installation are not included.
- Use only the existing holes on the unit for the fixing elements.
- Use only the fixing elements described on the following pages for fixing the unit to ensure sufficient stability. Always observe the installation instructions!
- **Do not use** the air conditioning units as supporting elements for other components and avoid loading them in any other way.

4.1.1 Ceiling Units

Units are installed using threaded rods M8 and the 4 brackets provided for on the unit.

The cooler must be angled by 10° in order to allow the condensate drainage and to avoid condensate between the blades of the heat exchanger (in case of constant condensate formation).

4.1.2 Units for Sill Installation

There are various possibilities to install the units (see following 2 pages):

- Units are installed using the two angle brackets on the unit's top and 4 bolts.
- Using an angle bracket on the unit's backside, the unit may be fixed to a wall or floor support.

Additionally, the unit may be secured against the wall using rubber stops.

Select fittings in a way to ensure that sound transmission is avoided.

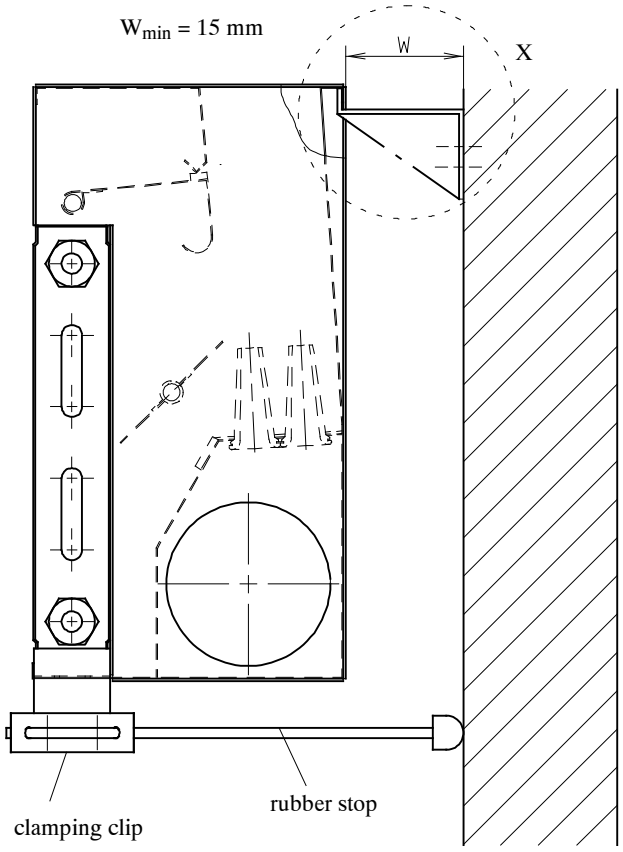
Wall mounting - Rear Suspension

For rear suspension, a Z profile is available. It offers the possibility to subsequently **adjust the unit in height by approx. 10 mm and laterally, parallel to the wall, by approx. 50 mm**.

However, the wall clearance cannot be adjusted. Therefore, always state the clearance W between the unit and the wall in your order. For stability reasons, this clearance must not exceed 200 mm when using the standard version, but for greater clearances, a reinforced version is available.

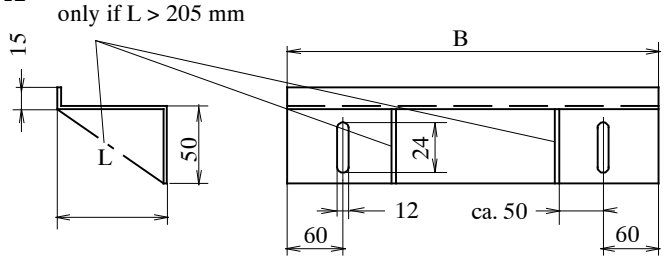
If the unit is not supported from below, use a spacer in addition to the wall bracket for safety reasons (consisting of clamping pieces or clamping brackets and rubber stops).
The unit housing can be supported in the same way on the front side

For wall mounting, screws of at least property class **M8 (8.8)** are to be used to ensure sufficient stability.



X gusset
only if L > 205 mm

wall bracket



L = W + 5 mm for version I
L = W + 55 mm for version II

Size	Dimension B in mm
500	375
630	495
800	670
1000	870
1250	1110

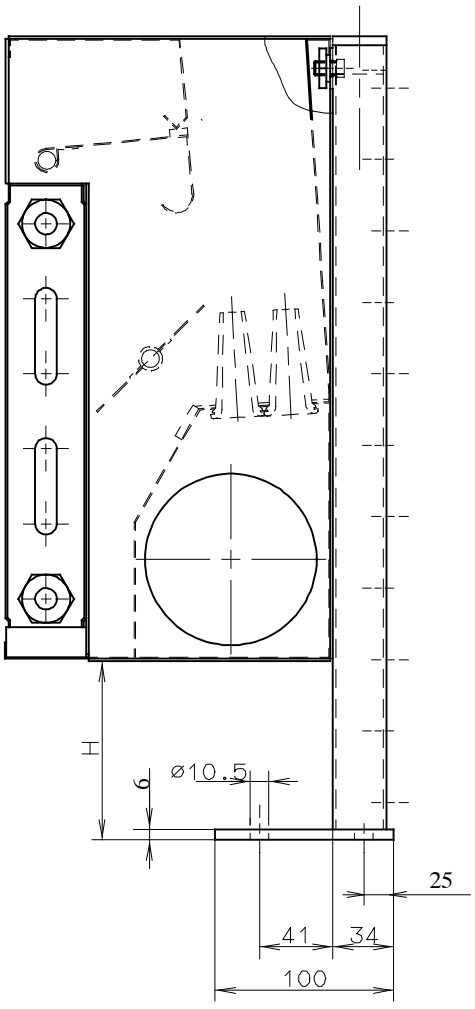
Installation using Floor Stands

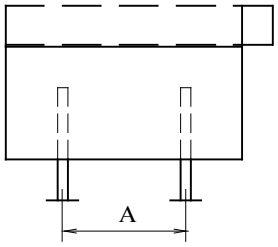
For an installation independent of the wall, galvanized floor stands with a plastic plug are available (2 floor stands required for each unit).

The floor stand height L depends on the unit type and the installation conditions. Dimension H > 20 mm may be sufficient. Please always state the unit type and dimension 'H' when ordering.
The unit is adjustable in height, upwards by approx. 5 mm, and downwards to 'H'.
However, it should be considered that the floor stand may exceed the unit height.

The unit may also be adjusted to the rear in the slots of the stand by approx. 10 mm.
The unit may furthermore be adjusted laterally, in its longitudinal axis, by approx. 50 mm, provided that the center-to-center distance of the stands is observed.

Location screws (included in the delivery) are fixed to the rails of the floor stands and the unit is inserted in this fixing device.
When fixing the unit to the floor, use screws of at least property class **M8 (8.8)**. These special screws are not included in the delivery.





Size	Center-to-center dist. A
500	370 mm
630	515 mm
800	670 mm
1000	870 mm
1250	1115 mm

Please state height H when ordering !

4.2 Water Connections

Remove the heat exchanger plugs prior to water connection!

Units are provided with heat exchangers with copper tubes and aluminum blades for 4-pipe operation with separate heating and cooling circuits or for 2-pipe operation.

The heat exchangers have been approved for a maximum operating pressure of 10 bar (other pressures on request).

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

1. copper fitting with 12 mm outer diameter.
   This connection is only suitable for flexible connection with quick coupling.
2. 1/2" internal thread fitting, conical and sealing.

Always follow the installation instructions for the water connections attached to each unit.

Connections must be strainless.

Connecting lines must be able to expand.

Attention:
Prior to allowing water to enter the unit the flexible water connection hoses will have to be checked for proper and leakproof fixation. Even though hoses to the heat exchanger are preinstalled, fixations might have loosened during transport or installation of the unit on site.

You may use off-the-shelf control valves and shut-off valves.

When tightening the fittings, avoid damaging the heat exchanger pipes through bending or twisting. Pipe fittings must always be flush.

In order to adjust the water volume specified in the selection data, a regulating device or restricting olive will be required. If identical units with exactly the same water volume and pressure losses are used, an individual regulating device for each unit is superfluous. In this case, one regulating device for the entire line may be sufficient. Otherwise, a regulating device will be required for each heat exchanger.

If removal of a heat exchanger without draining the entire system is a requirement, two or four isolation valves will have to be provided for each unit. You may use off-the-shelf shut-off valves.

The unit fitting will only be provided with an integrated vent if specifically asked for. The water speed inside the heat exchanger is usually sufficient to carry along air bubbles and one ventilation device per line is therefore appropriate. In a case of emergency, the line may be ventilated by slightly loosening the standard fitting of the unit.

Included in the unit price and also in general provided with the unit - (unless special fittings such as transitions, straight-way or angle valves or hose connections are ordered) is a complete compression fitting for unit-side water connection, appropriate to take copper pipes with a 12 mm outer diameter, wall thickness of 0.7 - 1.0 mm, suitable for connecting hoses. The union nut is fixed to the heat exchanger pipe's flared end, while olive and banjo bolt will be delivered in packs of 2 or 4 - according to type of unit - in a bag attached to the unit.

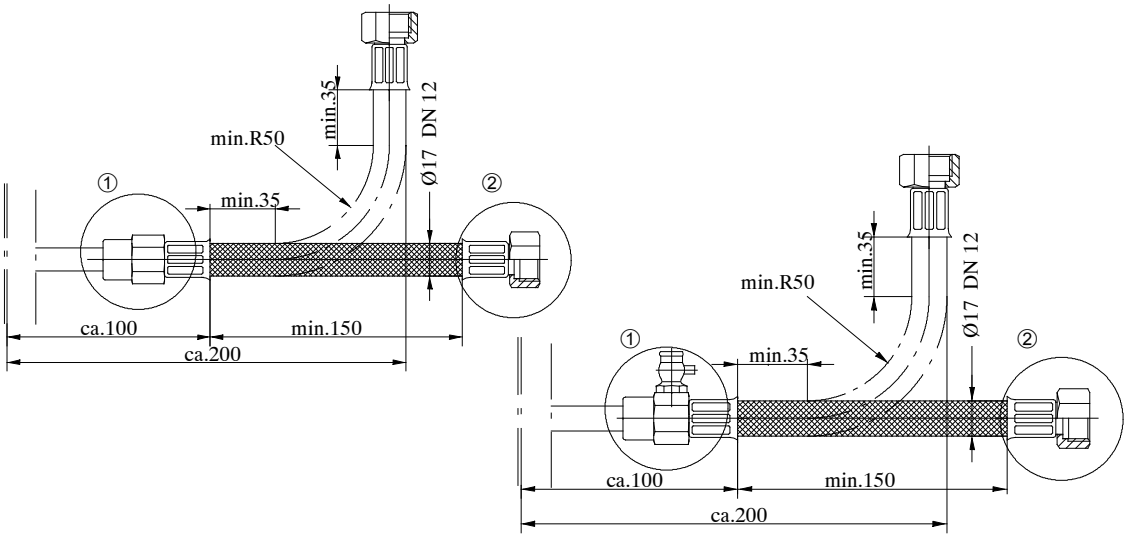
Due to possible condensation, the connections to the heat exchanger for cooling should be insulated, e.g. using Armaflex insulation.

The water connection side is to be specified when ordering the unit. Some units offer a possibility to still change the side during installation by removing 4 bolts.

Execute the heat exchanger connection as follows:

- Vertical heat exchangers: water supply below, water return above
- Horizontal heat exchangers: unit's front side: water supply, unit's back side: water return

Example for water connection using flexible hose
(Quick coupling connection to heat exchangers)

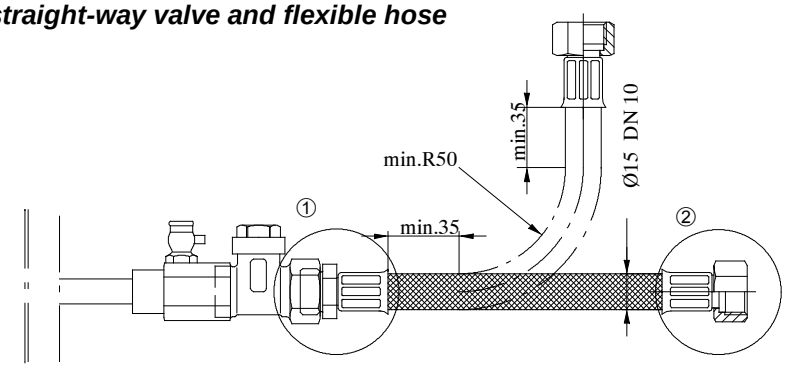


Hose without insulation. For insulated hoses, dimensions will change accordingly (10 mm Armaflex insulation).

① Hose for connection to heat exchanger with smooth tube end diameter 12 mm, connection types: quick coupling, quick coupling with venting

② Different hose connections, thread diameter acc. to customer requirements or standard 1/2"

Example for water connection using transition - LTG description VSG 10/ 2 EH (venting) -, straight-way valve and flexible hose

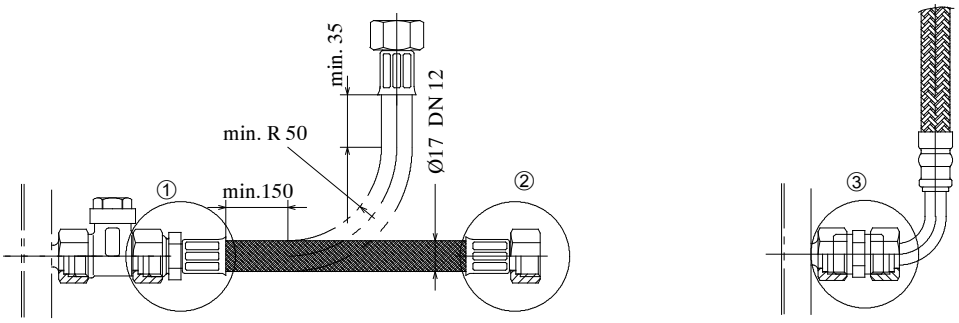


Hose without insulation. For insulated hoses, dimensions will change accordingly.

① Hose for connection to angle or straight-way valve, connection type: AGK, external thread, tapered 1/2"

② Different hose connections, thread diameter acc. to customer requirements or standard 1/2"

Example for water connection using valve and flexible hose (straight and 90 ° variant)



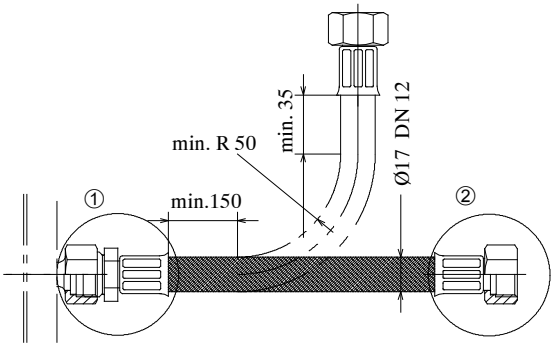
Hose without insulation. For insulated hoses, dimensions will change accordingly.
(10 mm Armaflex insulation

① Hose for connection to angle or straight-way valve,
Connection type AGK, external thread, tapered 1/2”

② Different hose connections, thread diameter acc. to customer requirements or standard 1/2”

③ Connection for direct screwing into the heat exchanger in case of angle connection,
Connection type: double nipple 1/2”-1/2”; UFD hose connection, 1/2” flat seal union nut

Example for water connection for direct screwing into the heat exchanger



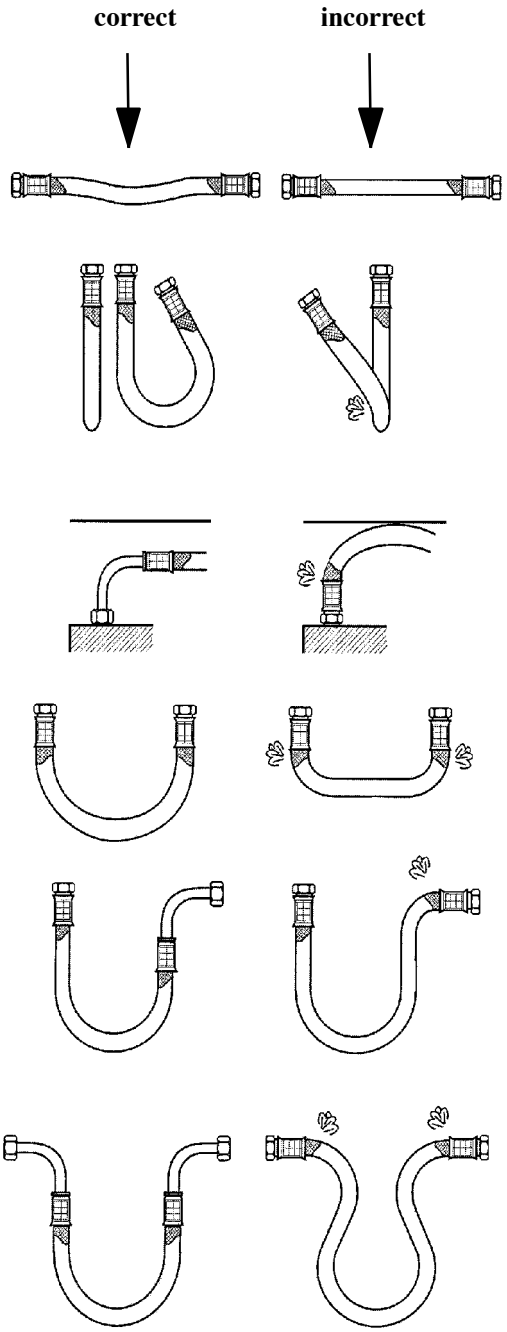
Hose without insulation. For insulated hoses, dimensions will change accordingly.

① Connection for direct screwing into the heat exchanger
Connection type: AGK, external thread, tapered 1/2”

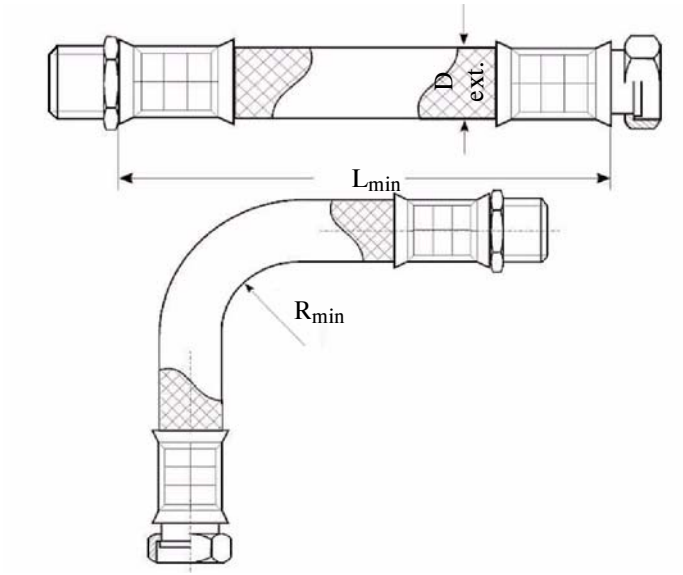
② Different hose connections, thread diameter acc. to customer requirements or standard 1/2”

4.2.1 Instructions for Installation of Water Connections Using Flexible Hoses

Warranty will only apply if the following instructions are observed and if installation is performed in compliance with DIN-EN regulations.
In particular, corrosive, electrochemical, and bacteriological charges are to be excluded taking appropriate preventive measures.



- Pressure and exposition to heat may result in slight elongation of the hose.
  Therefore, newly placed hoses must consider such potential elongation.
- Do not fall below the admissible bending radius R_{min} (chart), neither during transport, nor during installation or when installed.
  If it should turn out impossible to keep the admissible bending radius, choose a different installation type.
- For minimum length see chart below.
  If the hose is being placed by bending it, check whether there is sufficient hose length to allow for an open bow in order to avoid kinking and destruction of the hose at the connecting points.
- Absolutely avoid distorting or kinking the flexible connection.
- Do not subject the hose to any tensile or pressure loads applied from outside, neither during installation nor operation.
- Do not retighten rigid connections (outer thread) after fixing the second connection since this might result in distortion of or damage to the hose.
- In general, tightness of the connection (hose/connector) is the responsibility of the technician performing the installation.
- Any sealing material included in the delivery is to be verified by the technician for its suitability since the hose manufacturer has no information about the material or geometry of the connections.



Armoured hose Oxystop up to +70 °C (diffusion inhibiting, marked through weaved-in blue strip)
Armoured hose EPDM up to +93 °C (vapour permeable, not marked)

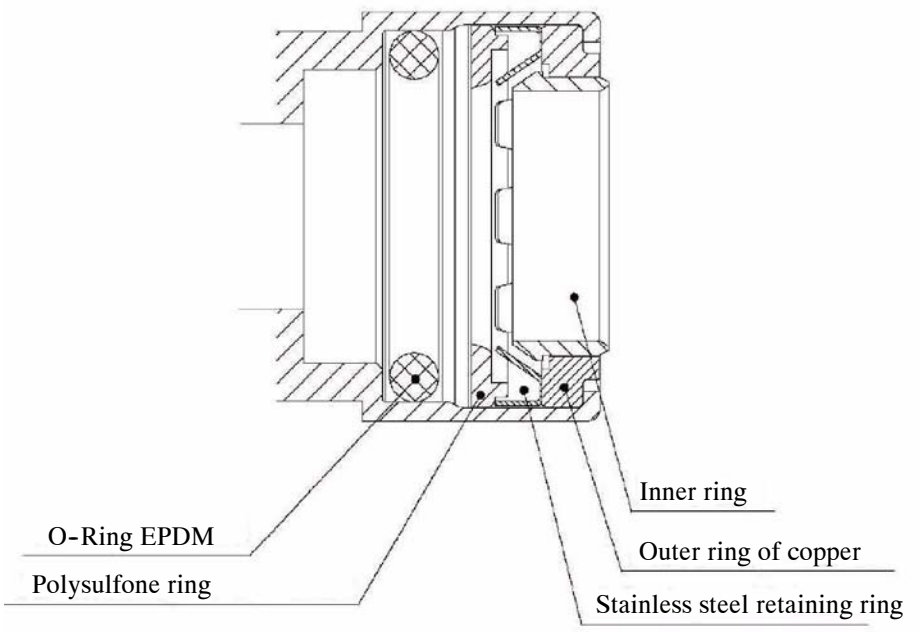
ND hose	D_A	PN [bar]	R_{min}	L_{min}	L_{min} α = 90°	L_{min} α = 180°	L_{min} α = 360°
06/08	12	15	27	60	140	180	260
10	14	15	40	60	190	250	260
12	18	15	60	80	260	360	550
15	22	12	70	95	300	420	640
19	27	10	80	100	350	480	730
25	34	10	100	125	430	590	900
32	44	10	160	140	650	900	1400
40	54	6	180	160	750	1030	1600
50	64	6	230	210	940	1300	2020

Armoured hose Oxyblock

* at + 30 °C / 10 bar at + 50 °C (vapour impermeable, marked through weaved-in blue-white strip)

ND hose	D_A	PN [bar]	R_{min}	L_{min}	L_{min} α = 90°	L_{min} α = 180°	L_{min} α = 360°
08	13,5	16 *	110	100	310	490	830
10	16	16 *	130	100	380	580	990
12	17	16 *	150	100	450	680	1150

4.4.2 Plug-in Connection Cuprofit



Tube connection of plug-in fitting and bright copper tube according to EN 1057 and RAL 641/1 or suitable brass or red brass socket.

This permanently tight connection is suitable for concealed installation.

Using special tools, this connection may be detached up to three times when not under pressure.
Prior to reconnection, check for undamaged condition of the seal.

Check every installation for tightness when completed.

Due to their specific design, Cuprofit connectors are not suitable for use as grounding conductors for electrical installations and therefore not to be considered in the compensation of potential.

Maximum operating pressure 10 bar / 93 °C. Test pressure 16 bar / 30 °C.

4.3 Condensate Connection

Remove the condensate drainage plugs before connecting the condensate lines!

Condensate formation occurs when the cold water supply temperature is below the ambient air dew point temperature. Neither LTG Induction Units nor LTG Fan Coil Units have been designed for an operation with steady condensate formation which is why special care must be taken when setting the water inlet temperature not to fall below the dew point temperature. If necessary, provide a continuous control of the water temperature based on outside air humidity.

On request, units are available in a special insulated version for condensing operation (please consider when designing and ordering). In any case, please observe the following:

- **Air conditioning with centralized cooling and dehumidification** (water temperature > 13 °C)
  A certain water supply temperature will result in condensate formation since the temperature is below the ambient air dew point. This dew point, however, depends on indoor air humidity. The water supply temperature may be 1-2 K below the dew point of the air since the air temperature on the pipes is higher than the actual water temperature.

  If rooms are ventilated with a maximum supply air humidity of e.g. 8.5 g/kg L_{tr} the water supply temperature may be lowered to 15°C without risk of condensate formation.

  In case of an increased humidity of the air, there a two solutions:

  Case A: Condensate tray not connected (condensate socket closed by plug)
  - If outside air humidity is high keep windows closed.
  - Alternative: If windows are opened use a window contact with closing/time-delayed opening system.
  - Alternative: A central system controls the water supply temperature based on the outside air humidity whenever windows are opened, i.e. in case of a high humidity of the air the water supply temperature is increased. This will, however, reduce the cooling capacity.

  Case B: Condensate tray connected
  - No need for a window contact or central cold water supply temperature raise in case of high outside air humidity.
  - If a short-term increase of the indoor air humidity is probable (unit in the intermediate ceiling above a wet room, e.g. a hotel) it is recommended to provide the tray with a thermal insulation.
  - In general, VPI 6022 requirements are to be met with the installation of any condensate drain connection on site.

- **Ventilation without dehumidification or window opening** (water temperature > 16 °C)
  In case of a ventilation without dehumidification the water supply temperature must be 16 °C or up.
  If the supply air is not dehumidified or the ventilation is realized by opening windows, the air humidity might be very high which is why the following case will have to be considered:

  The condensate tray must be connected.
  - A central cold water control and weather related cold water supply temperature raise is recommended since opening the windows might result in outside air with a high humidity entering the room and the temperature dropping below the air's dew point.

Whatever the case of application, all water carrying pipes and fittings outside the condensate tray's range must be insulated.
If a condensate drainage system is connected there must be sufficient slope and proper drainage of the condensate produced. Condensate trays and the condensate drainage system require cleaning and sanitation checks on a regular basis.

4.4 Check after Installation

Verify for the unit's proper connection to a residual current device (RCD).

Mechanical Check

Having completed the installation the unit is to be checked for any mechanical damages. Remainders of the packaging material and dust in or on the unit must be removed.

Check the following:

- leakproofness of the water connections (including heat exchanger connections),
- the insulation of all cold water carrying components to the heat exchanger for damage,
- the condensate drainage (optional) for clear passage and sufficient slope,
- the fixing screws for proper fit,
- the suspension for rigidity and sufficient load-bearing capacity (ceiling units),
- the unit for not contacting the facade and the raw floor except via the seals provided and the supporting feet (floor units),
- the line voltage and frequency to match the data given on the type plate,
- the electrical connections for proper execution and conformity to pertinent regulations,
- proper functioning of the control (optional),
- proper functioning of the motors (fan, actuators) without friction noises,
- the unit's fixation,
- the diffusion area/diffusion grille of the unit to be free of any obstructions,
- proper horizontal alignment, accurate to dimension,
- sufficient water hose lengths and strainless laying,

Check for Media Supply

- Check for proper availability of primary air, cold water, warm water, and electrical power or compressed air for the control.
- Check whether voltage and line frequency comply with the data given on the actuator's type plate. Never operate control devices with inappropriate voltage or frequency since this might result in destruction of the units and put people at risk.

Control Technical Equipment

Supply of control devices by LTG Aktiengesellschaft is optional, however it is the rule for actuators for units with dampers. Control valves are often factory-mounted.

Check for Proper Functioning

Turn the temperature control's selection knob slowly from one end position to the other while keeping an eye on the control dampers and linkage or the valves. Dampers and valves must move correspondingly quite smoothly and without rattling noises from one end position to the other. No exceptional noise must be produced by the electric actuators. In case the units show damages have them properly repaired by an expert. Damper linkages have been gauge adjusted in the factory and, therefore, require LTG Aktiengesellschaft's skilled personnel for readjustment.

Starting Standard Operation

Then set the temperature controller to the desired temperature. After a certain time the indoor air temperature should meet the setpoint.

5. First Use

Prior to first use any installation work and all checks must have been completed.

Check for proper water and power supply.

Please take special care to ensure that the starting voltage is adequate.

Having started the unit an air flow should be perceivable from the outlet grille. Only very minor air diffusion and motor sounds should be audible. Other sounds such as friction or impact might indicate damages resulting from transport or installation.

6. Operation, Maintenance and Repair

All units are virtually maintenance free, however certain things should be observed.

Any maintenance and repair work must be performed by skilled and trained staff only.

Before starting any maintenance or repair work the unit is to be completely disconnected from the main power supply!

6.1 Heat Exchanger, Water Connections and Condensate Tray

It is recommended to vacuum clean the heat exchanger and the dry condensate tray on a regular basis.

The heat exchanger blades are sharp-edged. Wear gloves for protection!

Check water connections and heat exchanger for tightness and possible corrosion damages.
If corrosion occurs inside the heat exchangers skilled staff must check the water treatment.
In case of condensation and existing condensate drainage the condensate tray will have to be wet cleaned and checked for contamination on a regular basis as required by VDI 6022.

6.2 Filter

Unit with filter

If a recirculated air filter exists it requires replacement about 2-3 months after first use of the unit. By that time, it will probably be saturated from carpet lints and construction dust residues.
Exact timing is subject to local conditions.

The filter must be replaced on a regular basis, every 6 months to 2 years depending on dust formation.

A 6-month filter change interval will be required if the unit is operated in an environment with heavy dust load, a lot of foot traffic, and only minimum primary air filter quality.

A 2-year filter change interval might be appropriate if the unit is operated under conditions without foot traffic, in a clean environment, and with a very good primary air filter quality.

Unit without filter

The exchanger(s) is/are to be vacuum cleaned about 2 to 3 months after their putting into operation. By that time, heat exchangers are usually visibly polluted from carpet lints and construction dust remainders. Exact timing is subject to local conditions.

Heat exchanges will then have to be vacuum cleaned on a regular basis, every 6 months to 2 years depending on dust formation. This gains particular importance considering that condensate formation might result in hard-to-remove dust caking.

A 6-month cleaning interval might be required if the unit is operated in an environment with heavy dust load, a lot of foot traffic, and only minimum primary air filter quality, in case of condensate formation on the cooler even sooner.

A 2-year cleaning interval might be appropriate if the unit is operated under conditions without foot traffic, in a clean environment, with a very good primary air filter quality and without condensate formation on the cooler.

6.3 Fan

The fan is virtually maintenance-free. However, after an operating time of about 20,000 hours a failure of the fan may occur. The fan must be checked for smooth and proper running, possible imbalance, and damages to the bearing. The fan must also be checked on a regular basis, every 6 to 12 months, for potential dust and foreign bodies on the impeller. Severe pollution and foreign bodies may result in premature wear of the bearing and fan.

6.4 Repair

If the damage is not obviously a mere ”damage to the bodywork”, e.g. on the condensate tray or outlet, units should be completely replaced and checked by the factory (in case of defects to the fan it might be sufficient to replace the fan unit without need to disconnect the system entirely from the water supply system).

First, the unit is to be completely disconnected from the power supply by an expert.

The filter in front of the heat exchanger is easy to replace since it is fixed to the unit with a simple adhesive strip.

Replacement of the control unit should be performed by skilled staff only or by the factory.

Replacement of individual components, e.g. a fan bearing, is not recommended since the greater number of settings can only be performed in the factory using special equipment.

Warranty applies to complete fans only.

6.5 Troubleshooting and Corrective Action

Trouble	Source	Action
No heating or cooling by the unit despite of fan running	Cold or hot water supply not operating. Heat exchanger and water supply lines have room temperature	Ensure cold or hot water supply Check and remove trouble Check fan coil unit shut-off valve
No air movement at the unit's outlet grille	The unit's fan is not operating	Put fan into operation. If necessary, force starting with highest speed level Check fan power supply. If necessary, replace fuses or switch on main power supply Replace drive unit.
No control signal is applied to the (valve) actuator, or it is not the one according to setting	Deficient control	Have unit checked by a specialized technician replacing or repairing broken parts
No valve spindle movement when actuator motor signal is being changed	Actuator is stuck	Try to release the stuck actuator by setting the temperature controller from "max. hot" to "max. cold" and vice versa. If unsuccessful, remove actuator, clean or replace
Unit is heating or cooling, but set temperature is not achieved	Window is open	Close window
Despite highest fan speed only weak air movement at the fan diffuser	Filter or heat exchanger polluted Suction or diffuser opening blocked or polluted	Replace filter Clean heat exchanger Remove objects in front of the diffuser and protective grille. Observe a minimum distance of 10 cm in front of the casing. Clear of objects
Measured cold water temperature is lower than the setting (ask technician for setting). Therefore, diffused air temperature is extremely low	Cold water temperature to the units is too low	Check cold water control including valve and actuator. If necessary, restore proper settings, replace or repair broken parts

Trouble	Source	Action
Part of the condensate trays is overflowing despite of drainage system	Condensate drainage system clogged	Remove clogging In the meantime, increase inlet temperature or shut off unit
Unit drips	Leaking or overflowing condensate tray	Replace leaking condensate tray Check condensate pump Check drainage system
Increased indoor air humidity perceivable	Considerable moisture sources in the room	Remove moisture sources If impossible, temporarily shut off unit water-side
Water inlet/return temperature difference too low	Water volume possibly too high	Check water volume balancing
	Fan not running or not conveying sufficient air	Check fan and terminals Maybe speed is too low
		Heat exchanger and filter polluted
	Inlet temperature too high in the cooling mode	Check temperature and cooling circuit
Audible impact noises	Fan bearing damage	Replace bearing or drive (only by ***LTG Aktiengesellschaft***)
	Foreign bodies in the fan	Remove foreign body from impeller (only with the unit off)
Audible grinding noises	Fan imbalanced resulting in contact to the casing	Replace drive and impeller unit
Audible knocking noises	Suspension improperly fixed Casing vibrations	Check and fix suspension

6.6 Maintenance Intervals of the Individual Components

Component	Activity	To perform	
		months	as required
Unit, in general	Check for pollution, damage, corrosion, correct positioning and fixation	**12**	
Filter	Check for pollution, damage and odours	**3**	
	Check the filter layer for tightness	**3**	
	Replace filter medium (document)	**12***	**x**
	Check for hygienic condition	**3**	
Heat exchanger	Check for pollution, damage and corrosion	**6**	
	Clean to maintain function	**6**	**x**
	Check water connections	**12**	
	Check proper function of entry and return	**12**	
	Vent		**x**
	Check for hygienic condition	**6**	
Dirt and condensate tray	Check for pollution, damage, leak tightness and corrosion	**3**	
	Clean to maintain function		**x**
	Check for hygienic condition	**3**	
	Check heat insulation for damage (visual check)		**x**
	Check drain and siphon for proper functioning		**x**
Fan	Check for pollution, damage, corrosion and proper fixation	**6**	
	Clean to maintain function		**x**
	Check impeller for imbalance	**12**	
	Check bearing for noises	**12**	
	Check vibration damper for proper functioning	**12**	
	Check safety device for proper functioning	**12**	
	Clean chambers from the inside		**x**
	Check for hygienic condition	**6**	

*Shorten replacement intervals if outside or recirculating air are extremely dust loaded.

VDI 6022 sanitation requirements must be observed.

7. Spare Parts

The following spare parts are available and may be ordered from ***LTG Aktiengesellschaft*** stating unit type and description.

Quantity	Ident No.	Description	Minimum order quantity
1		4-pipe heat exchanger size 500 for VFC	1
1		4-pipe heat exchanger size 630 for VFC	1
1		4-pipe heat exchanger size 800 for VFC	1
1		4-pipe heat exchanger size 1000 for VFC	1
1		4-pipe heat exchanger size 1250 for VFC	1
1		2-pipe heat exchanger size 500 for VFC	1
1		2-pipe heat exchanger size 630 for VFC	1
1		2-pipe heat exchanger size 800 for VFC	1
1		2-pipe heat exchanger size 1000 for VFC	1
1		2-pipe heat exchanger size 1250 for VFC	1
1	530065	Drain tray size 630 for VFC	10
1	530073	Drain tray size 800 for VFC	10
1	531170	Drain tray size 1000 for VFC	10
1	1003369	Drain tray size 1250 for VFC	10
1	1008313	Terminal box electrical connection	1
1		Fan size 500 with 5-speed motor	1
1		Fan size 630 with 5-speed motor	1
1		Fan size 800 with 5-speed motor	1
1		Fan size 1000 with 5-speed motor	1
1		Fan size 1250 with 5-speed motor	1
1		Capacitor 1 uF	5
1		Capacitor 1.5 uF	5
		Filter mats in rolls of 40 m	1 roll
		Adhesive Velcro tape	100 m

For heat exchangers please state connection (1/2”, smooth copper tube)

8. Decommissioning, disposal

When the fan is taken out of service, is no longer used and is disposed of as waste, the following must be complied with:

- all steel parts are waste for recycling
- all plastic parts are waste for recycling
- all secondary substances and lubricants must be disposed of in accordance with the provisions of the EWC (European Waste Catalogue) classification.