

Translation of Original Installation,  
Operating and Maintenance Instructions

## Active chilled beam type HDF 600

Example :  
Active chilled beam  
type HDF 600



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# Installation, operating and maintenance instructions


## Active chilled beam type HDF 600

Contents	Page
<b>1. Safety</b>	<b>3</b>
1.1 Explanation of symbols and hints	3
1.2 Operating safety directions	3
<b>2. Transportation, storage,</b>	<b>4</b>
2.1 Transport instructions	4
2.2 Storage	4
<b>3. Function</b>	<b>4</b>
<b>4. Technical data</b>	<b>5</b>
4.1 Dimensions	5
4.2 Performance data	7
4.3 Caloric output data	8
4.4 Acoustic data	9
4.5 Hydraulic data	9
4.6 Weight	9
<b>5. Installation</b>	<b>9</b>
5.1 Notes	9
5.2 Suspension	9
5.3 Water connections	12
5.4 Check after installation	18
<b>6. First use</b>	<b>19</b>
6.1 Adjustment of the nozzle band	19
<b>7. Operating, maintenance, repair</b>	<b>20</b>
7.1 Heat exchanger, water connections	20
7.2 2-pipe and 4-pipe system	20
7.3 Selecting the room temperature	20
7.4 Out-of-service times	20
7.5 Repair	20
7.6 Trouble-shooting	21
7.7 Maintenance intervals of the individual components	23
<b>8. Spare parts</b>	<b>23</b>
<b>9. Decommissioning, disposal</b>	<b>23</b>

# Installation, operating and maintenance instructions


## Active chilled beam type HDF 600

### 1. Safety


	Assembly, dismantling and maintenance must be performed by trained personnel in order to achieve reliability, safety and best results.
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#### 1.1 Explanation of symbols and hints


##### Operating safety symbol

	This symbol is placed alongside every operating safety instruction in these operating instructions, wherever there is a danger to life and limb. Observe these instructions and in such cases proceed with extreme caution. Pass on all the operating safety instructions to other users. In addition to the instructions contained in these operating instructions, the generally applicable safety and accident prevention regulations must be observed; as shown here, for example: Warning of hazard point.
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##### Information symbol

	This information symbol is placed alongside those points in the manual which must be specifically observed in order to ensure that the guidelines, regulations, instructions and correct operating sequences are observed and to prevent damage to or destruction of the unit and/or other components in the system.
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	These mandatory symbols are linked to the operating safety instructions and show which protective measures must be complied with at the appropriate workstations and therefore specifically mandate a certain action, as shown here as an example: Wear protective gloves.
---	--



	These prohibition symbols are linked to the operating safety instructions banning a dangerous or risky action, as shown here as an example: Do not touch.
---	---



### 1.2 Operating safety instructions


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


The units meet any pertinent safety standards.

	<p>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.</p> <p>Safety instructions in the technical documentation and on unit labels must be followed at all times.</p> <p>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.</p>
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	<p>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.</p>	
--	---	--

	<p>Be careful when performing work on the heat exchangers. Blades and housing parts are sharp-edged. Wear gloves during work and handling.</p>	
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	<p>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.</p>	
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	<p>Be careful when working overhead and provide protection against parts falling from above.</p>
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# Installation, operating and maintenance instructions

## Active chilled beam type HDF 600

### Continuation 1.2

	<p>The casing on site also serves as a protection and should be removed for maintenance and cleaning only.</p> <p>Avoid any additional load to the unit or the suspensions since stability might be insufficient.</p> <p>The unit must be checked by an expert immediately</p> <ul style="list-style-type: none"> <li>- if it has been mechanically damaged</li> <li>- If it is suffering from a water damage,</li> <li>- if the suspension or the casing show clear signs of corrosion or ageing.</li> </ul> <p>Do not put the unit back into operation before all necessary maintenance and repair has been performed!</p>
---	--

### 1.3 Intended use

The active chilled beam type HDF 600 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). 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.


## 2. Transport, 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.

	<p>LTG Aktiengesellschaft will not take responsibility for any pollution of or damages to the unit.</p>
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### 2.1 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.

### 2.2 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).

## 3. Function

The active chilled beam HDF is a ceiling-mounted induction unit for ventilation and individual temperature control based on the induction principle, i.e. without the use of a fan, using processed outside air.

The low construction height (200 mm) allows installation in false ceilings offering limited space. The thus resulting low difference in height between the heat exchanger and the ceiling level has been considered in the chilled beam's design which is suitable for dry cooling without dehumidification and condensate drainage.

The chilled beam is suitable for installation in grid ceilings measuring 600 x 600 mm, 600 x 1200 mm, 625 x 625 mm or 625 x 1250 mm and may be positioned in or adjacent to T-bar profiles. With grid and plasterboard ceilings, installation may be edge-to-edge or overlapping.

During operation, the primary air is 100% pretreated outside air via a central AHU. It assures the use-dependent basic ventilation using outside air, e.g. in conformity with DIN EN 13779 or DIN EN 15251 recommendations. Through uniformly arranged nozzles over the entire unit length, the primary air is led in an injector-type diffuser which induces secondary air. Depending on the room load, this secondary air is either heated or chilled in a 2-pipe or 4-pipe heat exchanger.

The supply air, a mixture of primary and secondary air, is uniformly diffused to four sides into the room via preset, divergent ceiling jets covering all four room directions.

Room air humidity is controlled through the centrally dehumidified supply air avoiding involuntary dehumidification inside the chilled beam. The 2-pipe system may be used for either cooling only or change-over operation with cooling/reheating. The 4-pipe system with independent water circuits automatically switches from cooling to heating and vice versa.

The type of construction, which provides complete separation from the ceiling cavity, suppresses sound transmission from adjacent rooms (transmission sound insulation).

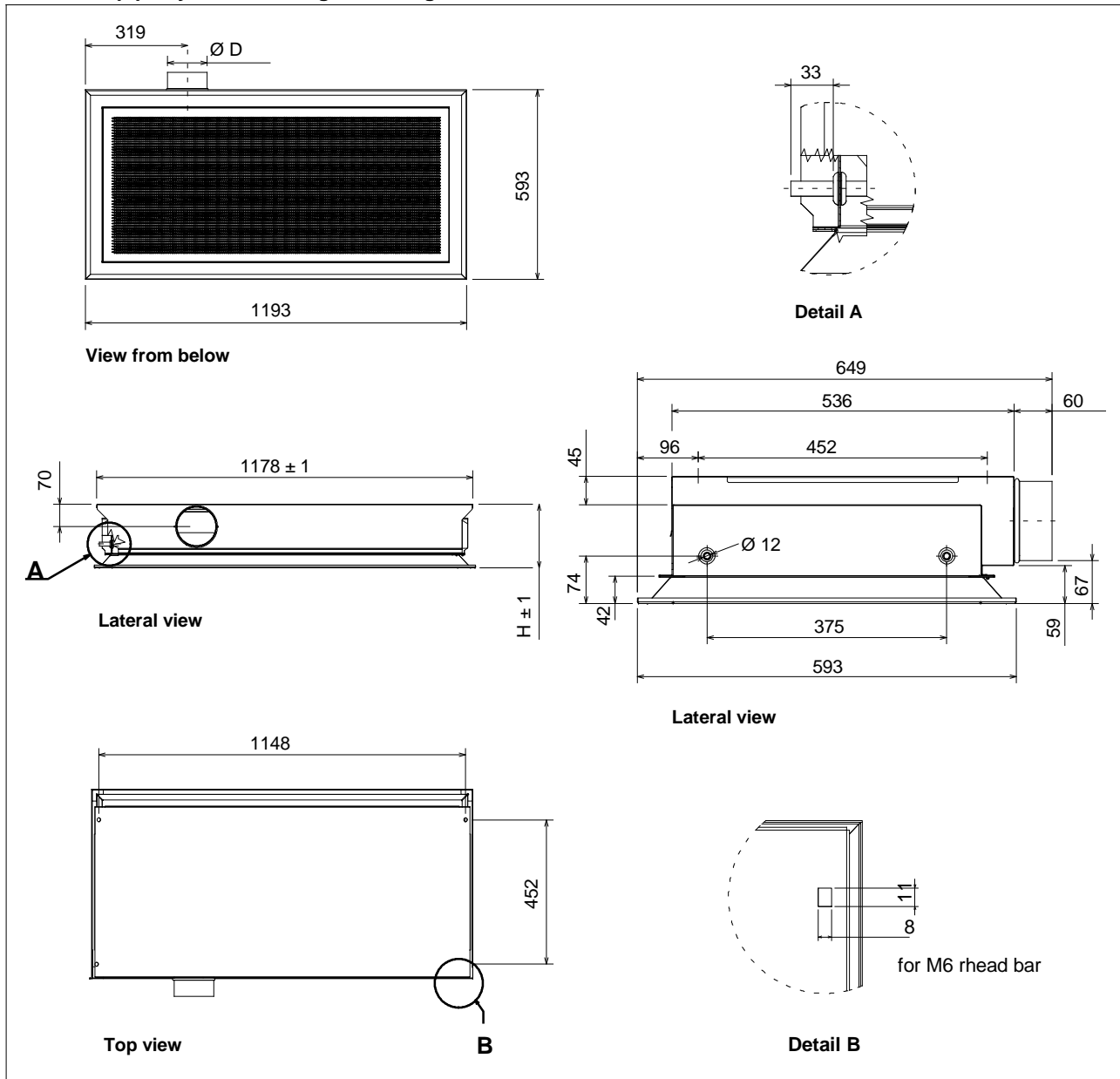
# Installation, operating and maintenance instructions

## Active chilled beam type HDF 600

### 4. Technical data

#### 4.1 Dimensions

2-pipe-system - cooling or heating



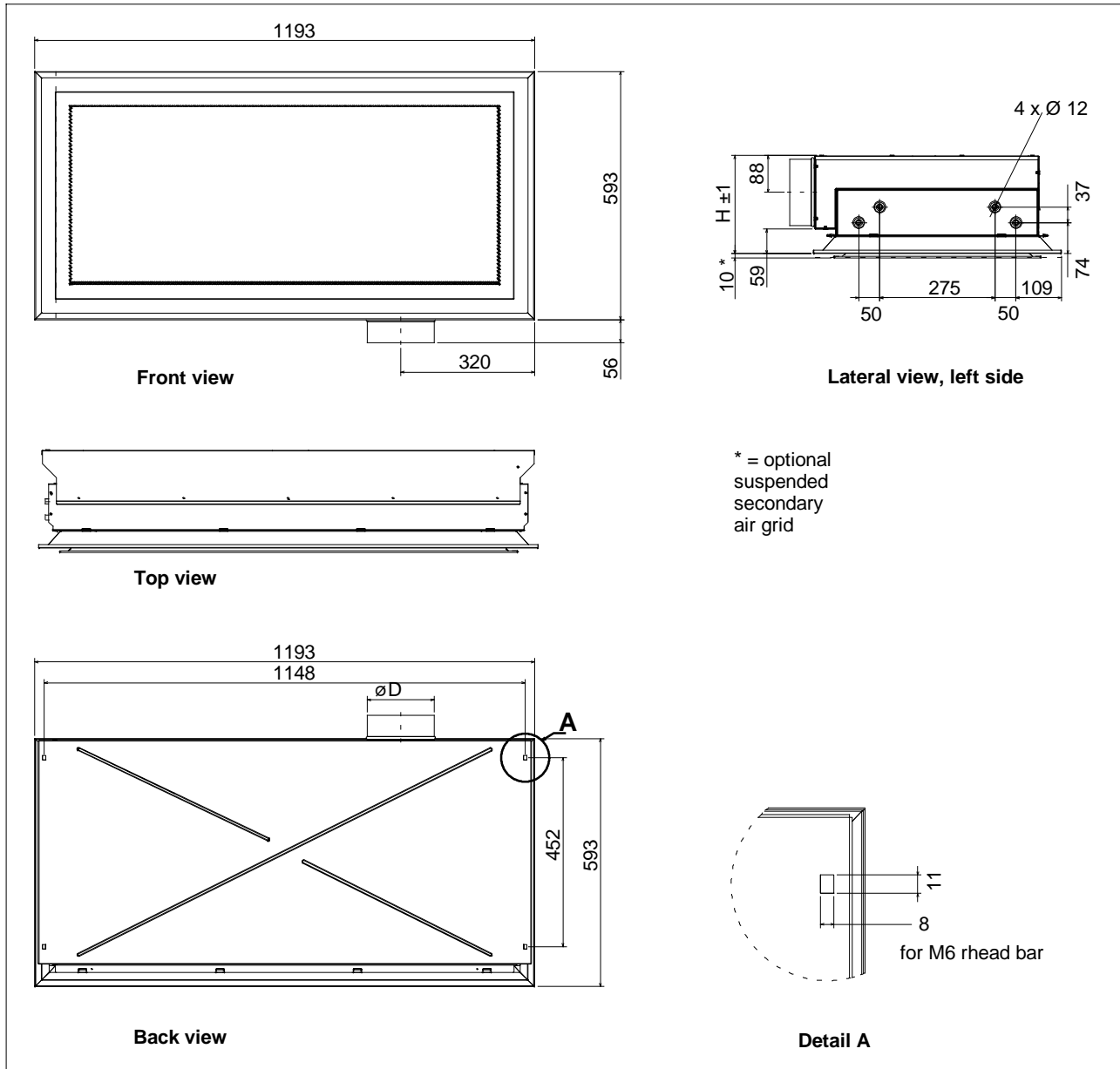
Dimensions [mm]	$\varnothing D$	H
Standard	125	199
Optional (for high air flow rates)	160	235

# Installation, operating and maintenance instructions

## Active chilled beam type HDF 600

### Continuation 4.1

4-pipe system – cooling and heating



Dimensions [mm]	$\varnothing D$	H
Standard	125	199
Optional (for high air flow rates)	160	235

# Installation, operating and maintenance instructions

## Active chilled beam type HDF 600

### 4.2 Performance data

#### Size 600 x 1200, 2-pipe-system - cooling or heating

$V_p$ [m <sup>3</sup> /h]	$\Delta p$ [Pa]	$L_{A18}$ [dB(A)]	$L_{WA}$ [dB(A)]	$Q_p / \Delta t$ [W/K]	$Q_k / \Delta t$ [W/K]	$Q_{k ges}^1)$ [W]	$w_{ok} / \Delta p_w$ [kg/h]/[kPa]	$Q_h / \Delta t$ [W/K]	$Q_{h ges}^2)$ [W]	$w_{ok} / \Delta p_w$ [kg/h]/[kPa]
54	70	12	18	18	45	628	170 / 7	40	621	110 / 3
64	100	16	23	21	53	735		47	717	
78	150	21	28	26	63	889		56	859	
67	70	16	22	22	50	717		44	667	
80	100	20	27	26	57	836		51	762	
98	150	25	32	32	69	1006		61	906	
84	70	19	26	27	54	816		48	705	
100	100	24	30	33	62	949		55	800	
122	150	29	35	40	74	1139		66	943	
105	70	23	30	34	59	929		52	736	
125	100	28	34	41	67	1079		60	828	
153	150	33	39	50	79	1293		71	969	
131	70	27	33	43	63	1059		56	756	
156	100	31	38	51	72	1228		64	844	
191	150	36	43	62	85	1470		75	979	
167	70	31	37	55	68	1229		61	764	
200	100	35	42	65	77	1425		69	843	

#### Size 600 x 1200, 4-pipe-system - cooling and heating

$V_p$ [m <sup>3</sup> /h]	$\Delta p$ [Pa]	$L_{A18}$ [dB(A)]	$L_{WA}$ [dB(A)]	$Q_p / \Delta t$ [W/K]	$Q_k / \Delta t$ [W/K]	$Q_{k ges}^1)$ [W]	$w_{ok} / \Delta p_w$ [kg/h]/[kPa]	$Q_h / \Delta t$ [W/K]	$Q_{h ges}^2)$ [W]	$w_{ok} / \Delta p_w$ [kg/h]/[kPa]
54	70	12	18	18	41	583	170 / 7	29	421	110 / 1
64	100	16	23	21	48	694		35	498	
78	150	21	28	26	60	856		43	612	
67	70	16	22	22	46	681		33	462	
80	100	20	27	26	55	807		39	539	
98	150	25	32	32	67	987		46	645	
84	70	19	26	27	52	792		37	497	
100	100	24	30	33	61	933		43	571	
122	150	29	35	40	73	1130		51	674	
105	70	23	30	34	57	916		40	520	
125	100	28	34	41	66	1071		46	584	
153	150	33	39	50	78	1284		54	667	
131	70	27	33	43	63	1052		43	525	
156	100	31	38	51	71	1219		49	568	
191	150	36	43	62	82	1442		55	614	
167	70	31	37	55	67	1217		46	493	
200	100	35	42	65	74	1394		49	497	

The chart shows examples for the unit design. A special selection program is available for other flow rates, primary pressures, temperatures and water flow rates.

Data refer to the unit including a secondary air grille  
≥ 63 % free surface

Correction for other flow rates see page 18.

- 1) Water supply temperature: 16 °C  
Air inlet temperature or return air temperature: 26 °C
- 2) Water supply temperature: 40 °C  
Air inlet temperature or return air temperature: 22 °C  
Primary air temperature: 16 °C

#### Legend

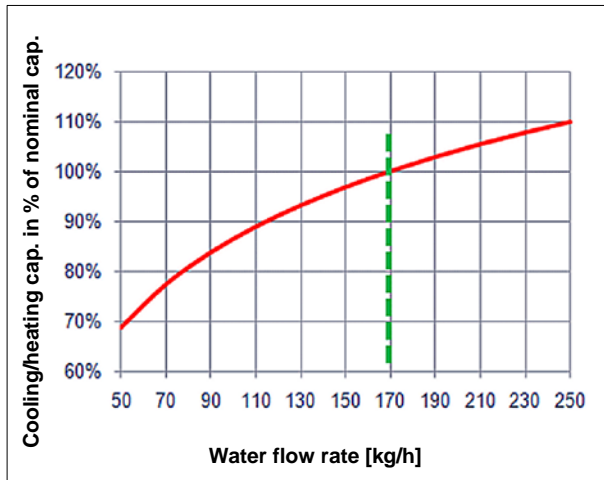
- $V_p$  - primary air flow rate (±3%)
- $\Delta p$  - static pressure at the primary air connection
- $L_{A18}$  - sound pressure level at 18 m<sup>2</sup> Sabine (±3 dB)
- $L_{WA}$  - sound power level (± 3 dB)
- $Q_p$  - air-side cooling capacity (primary air ±3%)
- $Q_k$  - water-side cooling capacity (secondary ±6%)
- $\Delta t$  - temp. difference between air inlet and water supply
- $w_{ok}$  - standard water flow rate (cooling)
- $\Delta p_w$  - water-side pressure loss
- $Q_h$  - water-side heating capacity (secondary ±6%)
- $w_{oh}$  - standard water flow rate (heating)

# Installation, operating and maintenance instructions

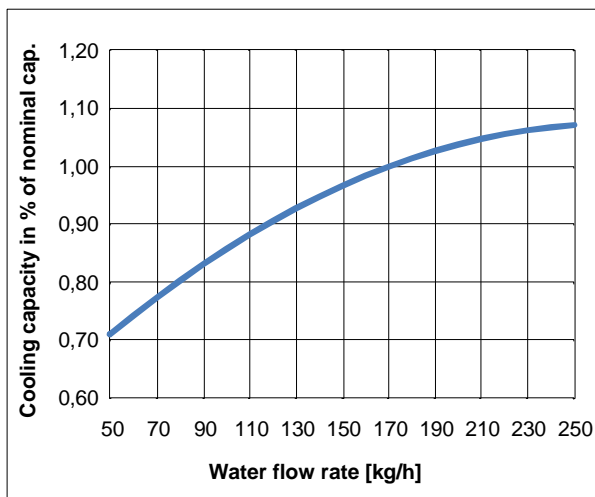
## Active chilled beam type HDF 600

### 4.3 Caloric output data

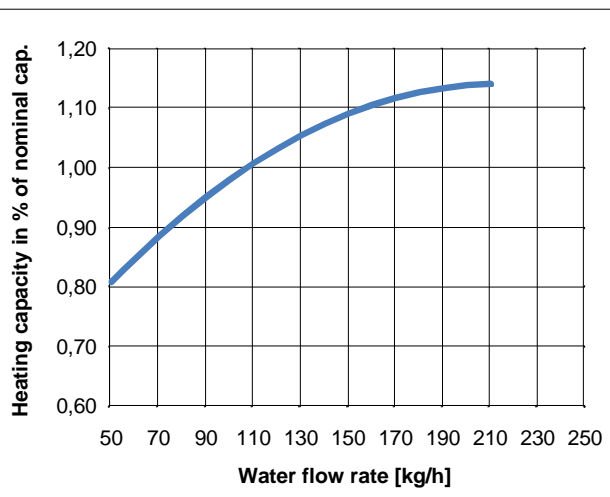
Cooling/heating capacity with different water flow rates for 2-pipe heat exchanger



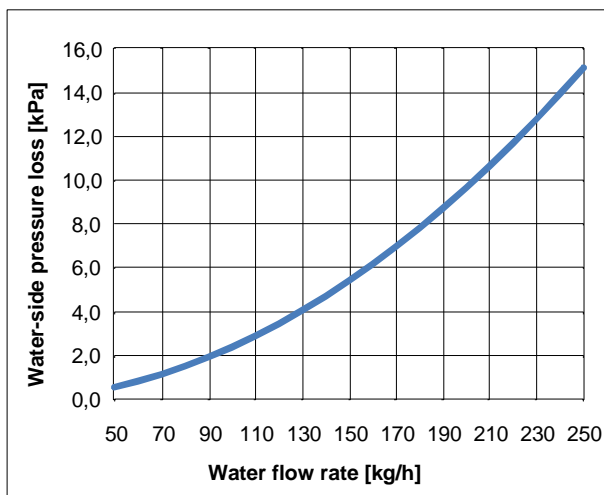
Capacity with different water flow rates for 4-pipe heat exchanger  
 Cooling capacity



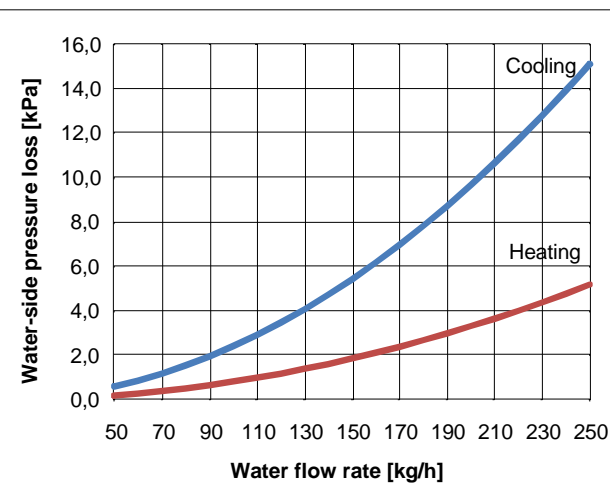
Heating capacity



Water-side pressure loss for 2-pipe heat exchanger



for 4-pipe heat exchanger





# Installation, operating and maintenance instructions

## Active chilled beam type HDF 600

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<sup>3</sup>

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.

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.

### 4.4 Acoustic Data

Acoustic data have been determined in a reverberation chamber in the LTG test lab.

The technical data sheet contains the A weighted sound pressure levels  $L_{A18}$  for different primary air flow rates/static pressures at primary air socket.

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

$$L_{WA} = L_{A18} + 6,5 \text{ dB(A)}$$

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]	0	3	5	6

Measuring accuracy is  $\pm 10\%$ .

### 4.5 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  $\pm 10\%$ .

### 4.6 Weight

Standard units (without water) ca. 34 kg.

## 5. Installation

### 5.1 Notes

#### Shipping of Unit

If not required otherwise, units are shipped in wrapping boxes which may also serve as a protection during installation. Boxes must be stored in an upright position as indicated by the arrow on the box. The packaging is disposable and not to be returned to LTG.

#### Timing of Installation

Installation of the units should not be performed unless the prefabricated floor has been finished, the window sill installed, the intermediate ceiling and any other dust producing work completed.


#### Handling of Units

Handle units with care during transport and installation. Avoid dropping to the ground.

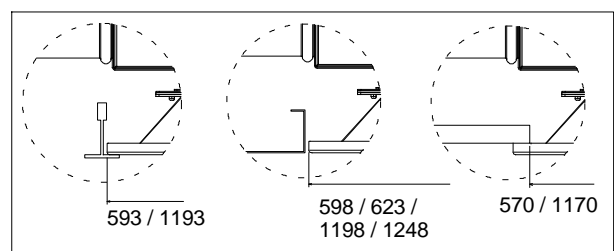
### 5.2 Suspension

**Please observe the following when installing air conditioning units:**

- For reasons of stability and rigidity, never use bolts with a property class inferior to the one indicated. Fixing elements are not included in the delivery.
- Do not use other than the holes provided for to fasten fixing elements.
- Do not use the air conditioning units as load-bearing elements for other components and avoid any other loading.



Fixing elements must be chosen in a way to ensure that any sound transmission is avoided.

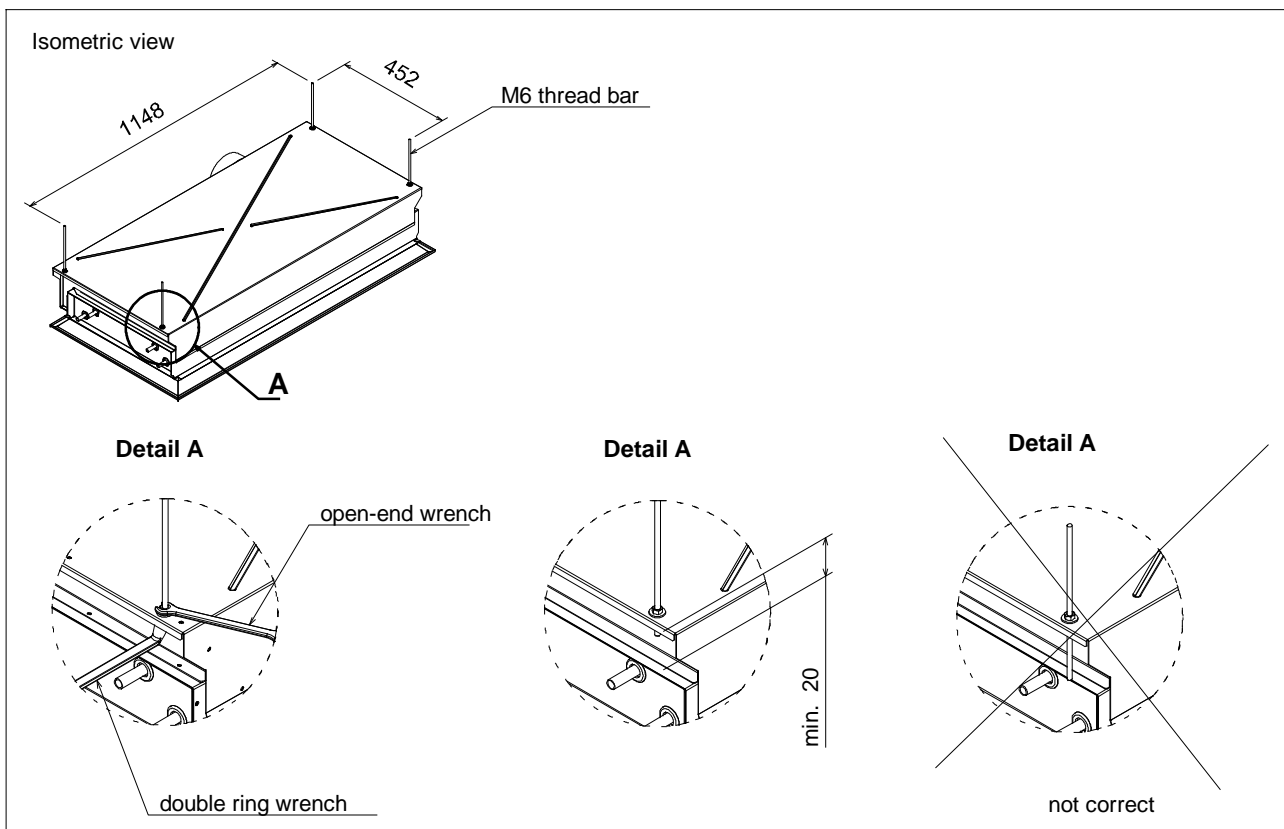
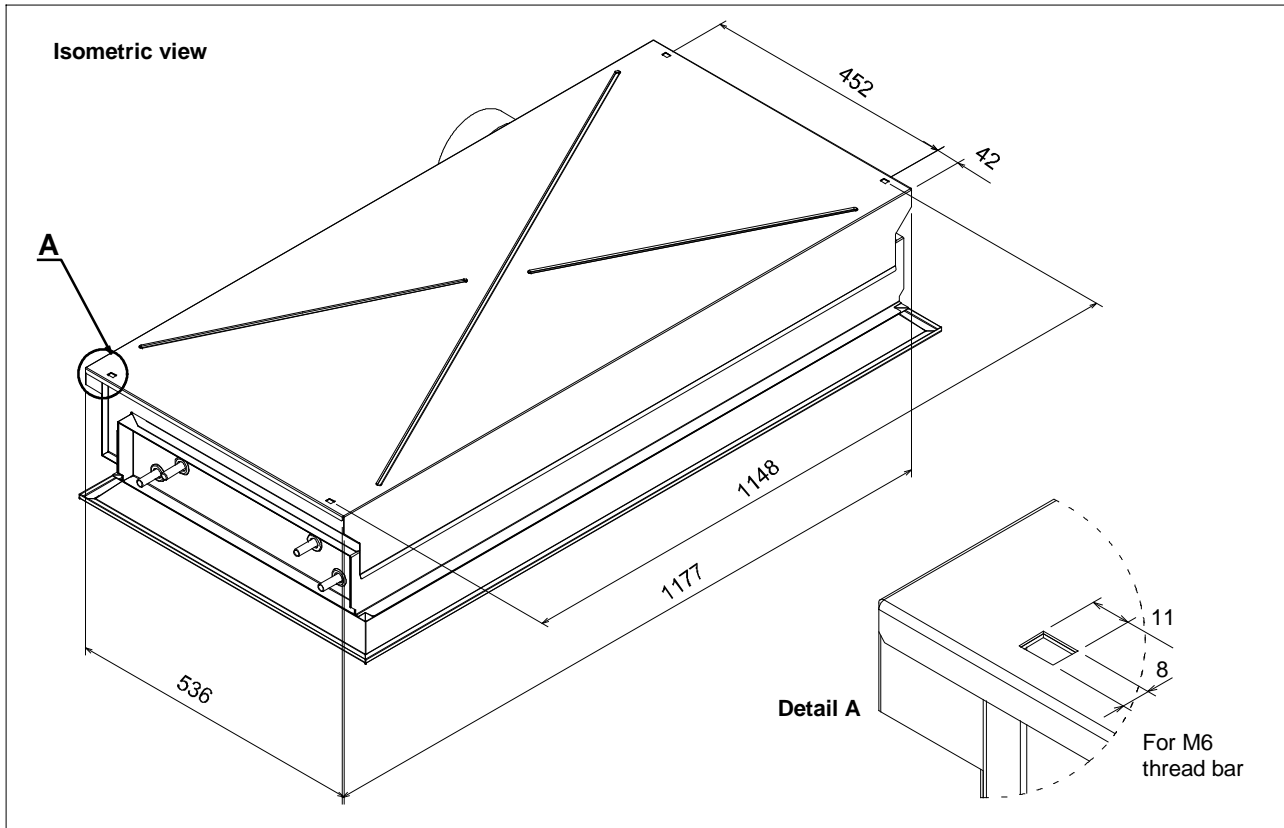


*Installation in different ceiling systems*

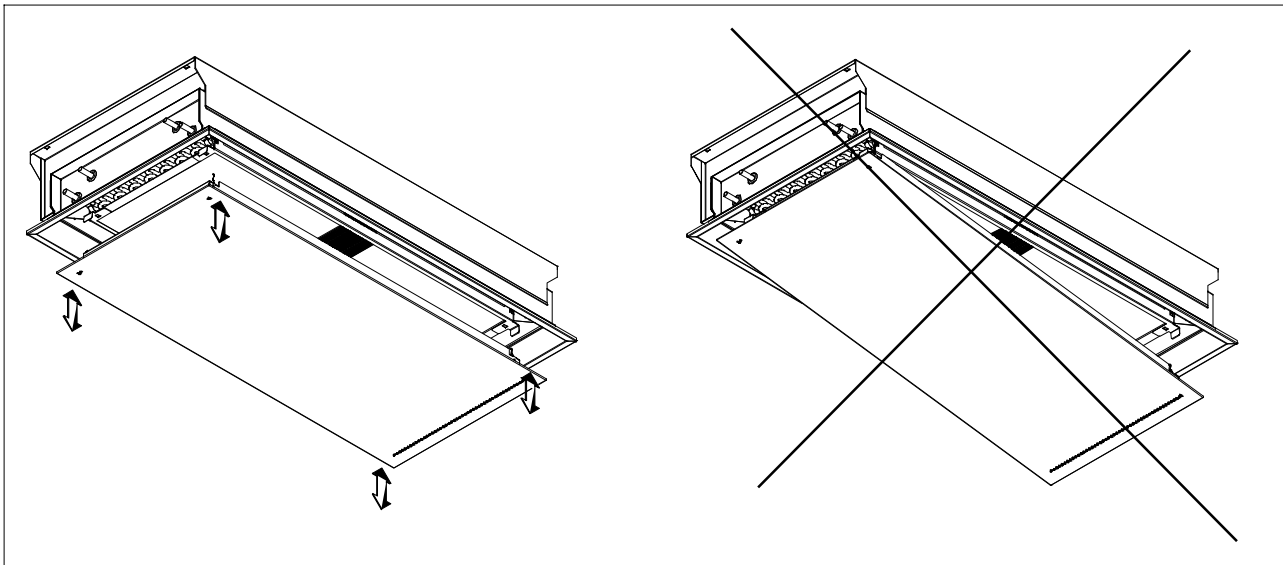
# Installation, operating and maintenance instructions

## Active chilled beam type HDF 600

### Continuation 5.2



## Installation, operating and maintenance instructions Active chilled beam type HDF 600



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

Before installing the diffuser grille check the clips for damage (being bent or crooked). If damage is visible they have to be replaced. Then center the clips in the openings.


The diffuser grille should not be tilted during installation or removal. It needs to be parallel to the chilled beam when moved upwards or downwards.

The clips need to engage with an audible clicking sound.

# Installation, operating and maintenance instructions

## Active chilled beam type HDF 600

### 5.3 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 connections with quick coupling.

	<p>Always follow the installation instructions for the water connections attached to each unit.</p> <p>Connections must be strainless.</p> <p>Connecting lines must be able to expand.</p> <p>Attention:</p> <p>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.</p>
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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.

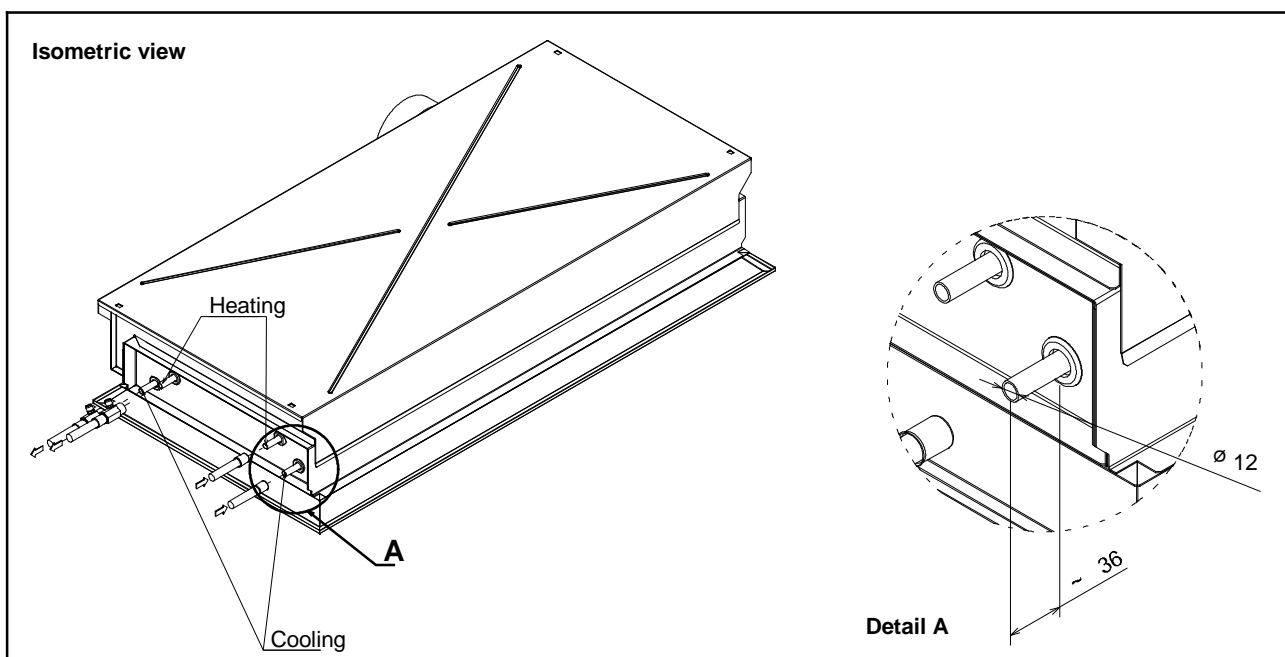
In order to adjust the water volume specified in the selection data, a regulating device or restricting olive will be required. If identical units with exactly the same water volume and pressure losses are used, an individual regulating device for each unit is superfluous. In this case, one regulating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



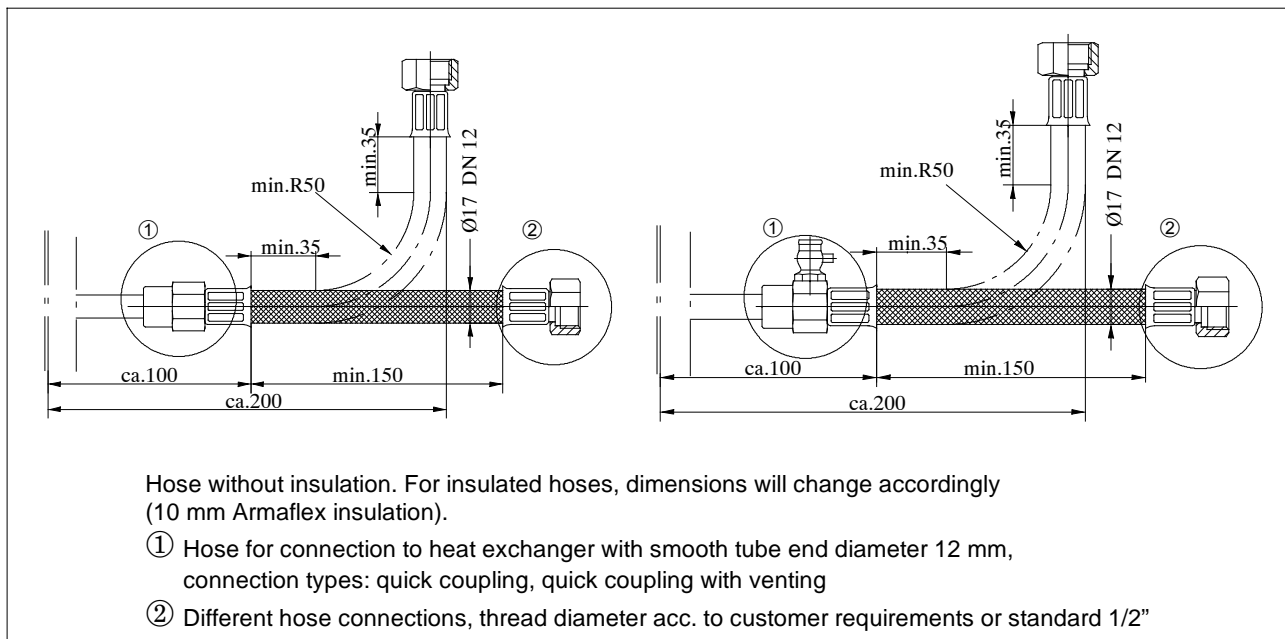
## Installation, operating and maintenance instructions Active chilled beam type HDF 600

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.

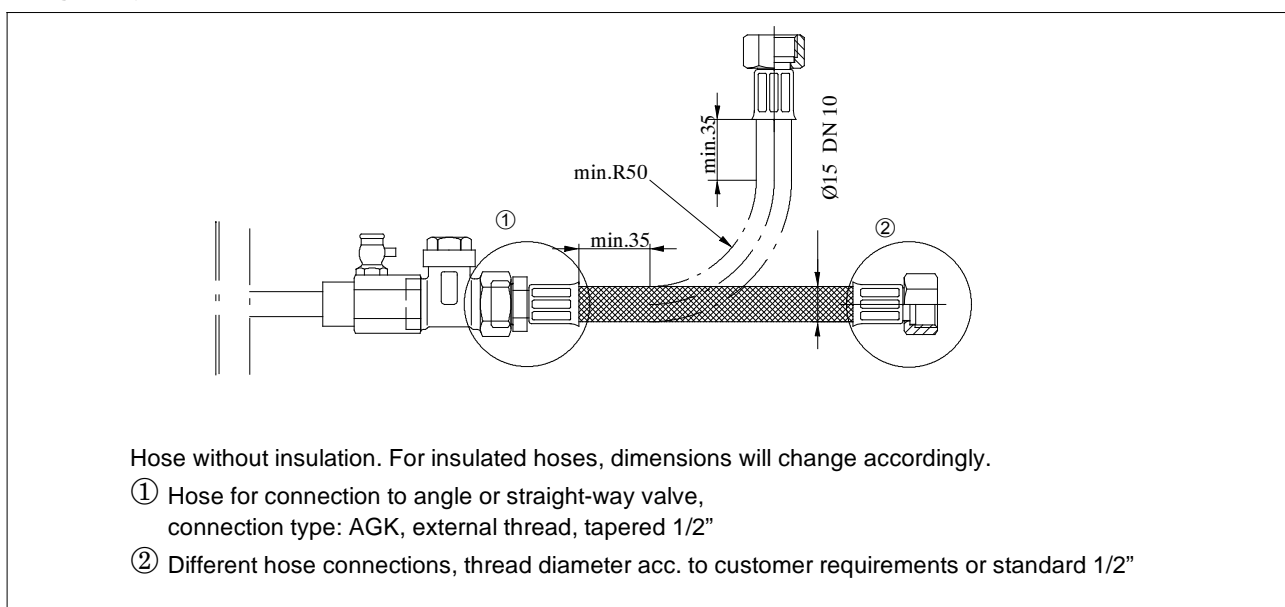
Execute the heat exchanger connection as follows:

- 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)



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



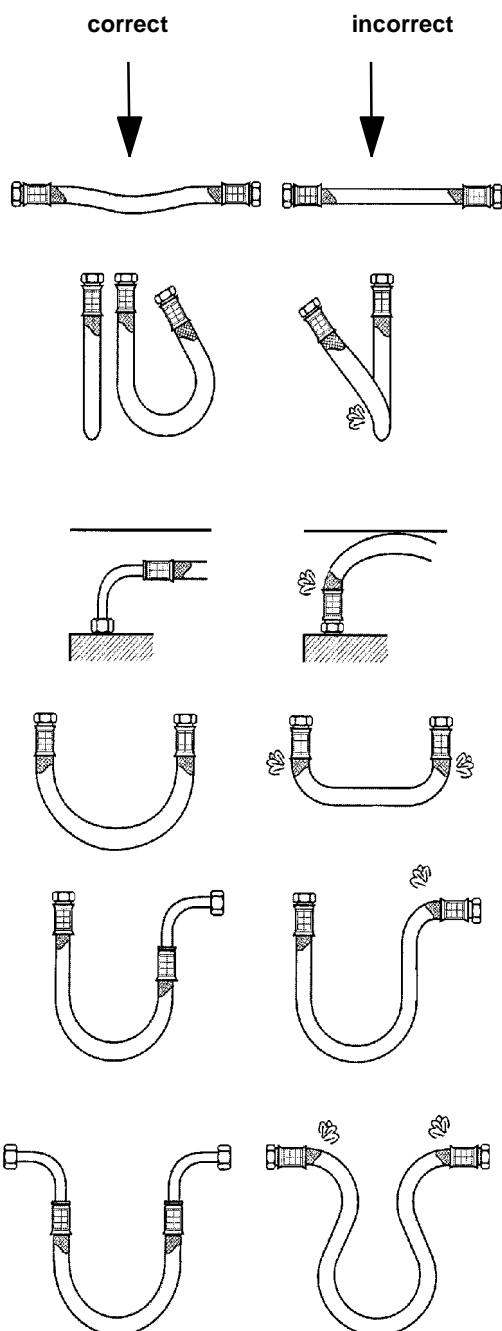
## Installation, operating and maintenance instructions

### Active chilled beam type HDF 600

#### 5.3.1 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.

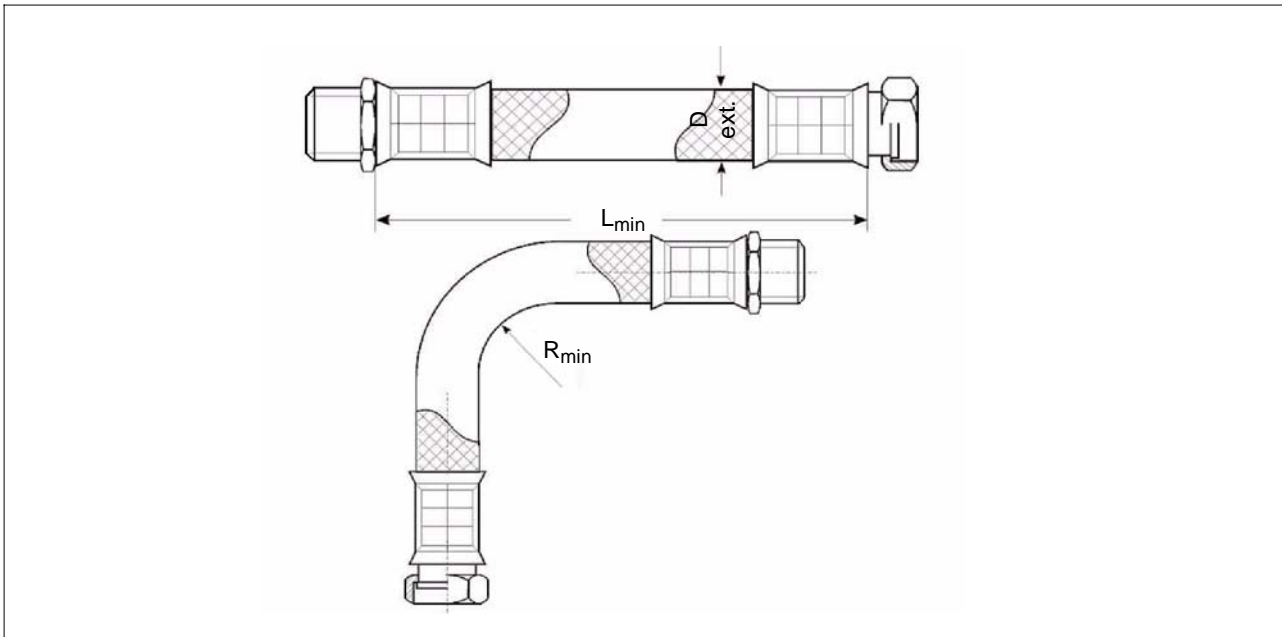


- Pressure and exposition to heat may result in slight elongation of the hose. Therefore, newly placed hoses must consider such potential elongation.
- Do not fall below the admissible bending radius  $R_{\min}$  (chart), neither during transport, nor during installation or when installed. If it should 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.

# Installation, operating and maintenance instructions

## Active chilled beam type HDF 600

### Continuation 5.3.1



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 <sub>A</sub>	PN [bar]	R <sub>min</sub>	L <sub>min</sub>	L <sub>min</sub> α = 90°	L <sub>min</sub> α = 180°	L <sub>min</sub> 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

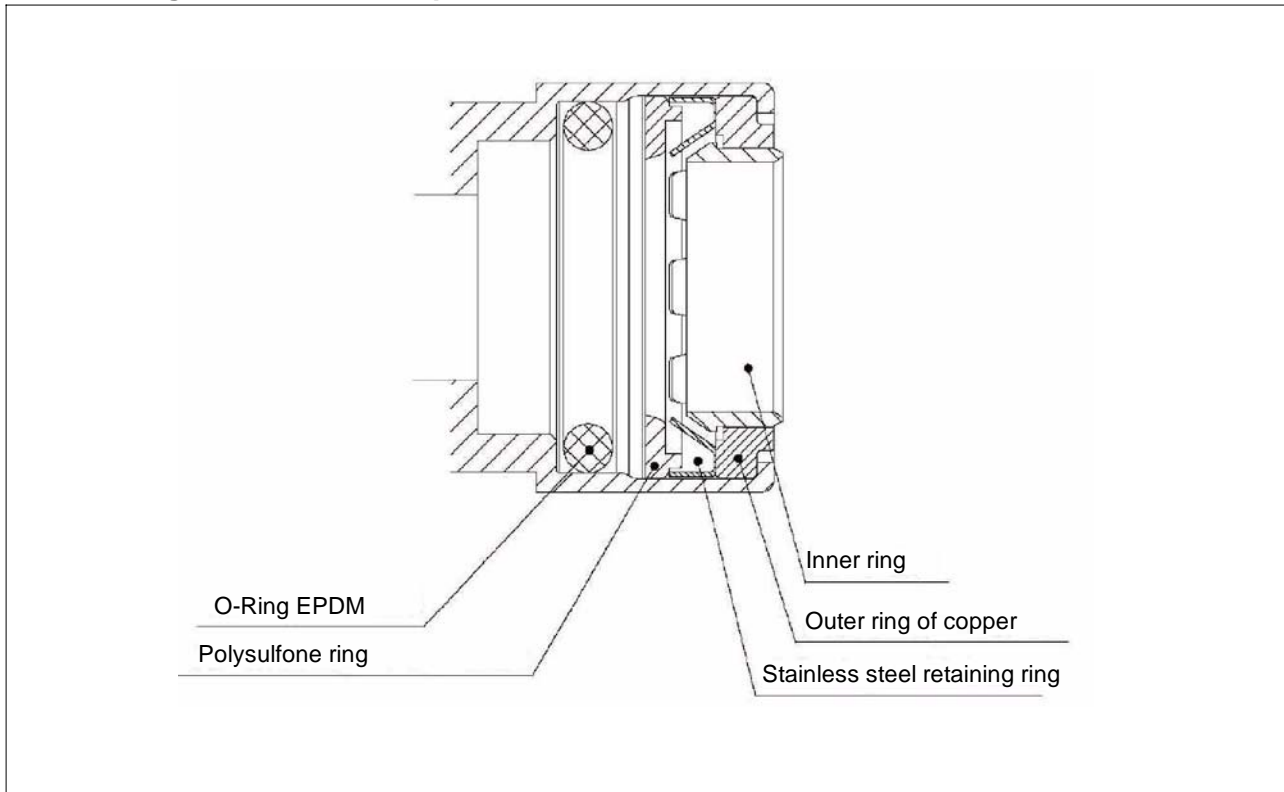
\* at + 30 °C / 10 bar at + 50 °C (vapour impermeable, marked through weaved-in blue-white strip)

ND hose	D <sub>A</sub>	PN [bar]	R <sub>min</sub>	L <sub>min</sub>	L <sub>min</sub> α = 90°	L <sub>min</sub> α = 180°	L <sub>min</sub> 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

## Installation, operating and maintenance instructions

### Active chilled beam type HDF 600

#### 5.3.2 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.



# Installation, operating and maintenance instructions

## Active chilled beam type HDF 600

### 5.4 Check after installation

#### Mechanical Check

Having completed the installation the unit is to be checked for any mechanical damages. Reminders 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 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 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.

# Installation, operating and maintenance instructions

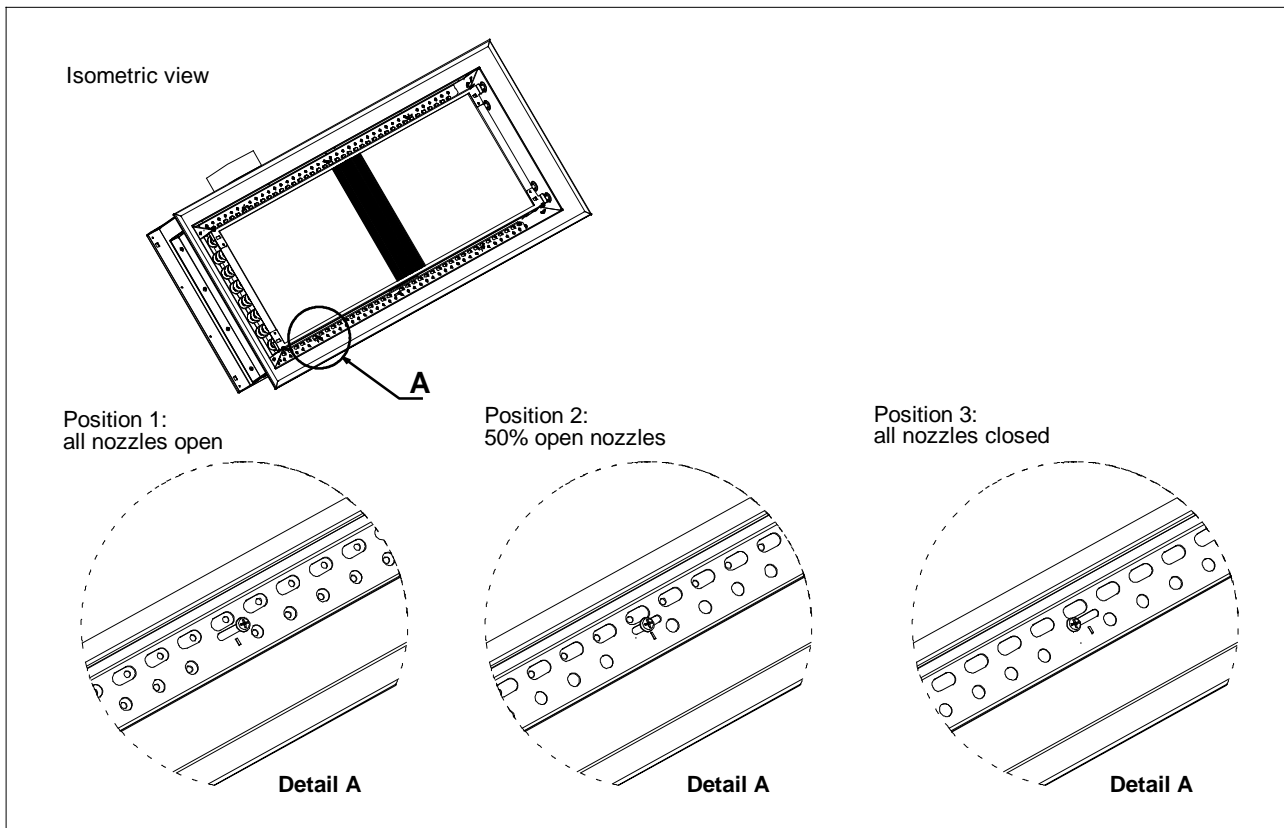
## Active chilled beam type HDF 600

### 6. First Use

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

Check for proper water and power supply.

#### 6.1 Adjustment of the nozzle band




Do not over tighten the clamping bolts.

# Installation, operating and maintenance instructions

## Active chilled beam type HDF 600



### 7. Operating, maintenance, repair

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

	<p>Any maintenance and repair work must be performed by skilled and trained staff only.</p> <p>Before starting any maintenance or repair work the unit is to be completely disconnected from the main power supply!</p>
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#### 7.1 Heat exchanger, water connections

It is recommended to vacuum clean the heat exchanger on a regular basis.

	<p>The heat exchanger blades are sharp-edged. Wear gloves for protection!</p>	
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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.

#### 7.2 2-pipe and 4-pipe system

Here a few explanations regarding **two-pipe systems** and **four-pipe systems** for easier understanding:

The **two-pipe system** has 2 water connections (supply and return) with one heat exchanger for either heating or cooling, or for heating in winter and cooling in summer.

The **four-pipe system** has 4 water connections (2 each for supply and return, one each for warm water and cold water) with 2 heat exchangers or one heat exchanger with separate water circuits, for heating and cooling.

#### 7.3 Selecting the room temperature

Set the room temperature controller to the desired value (usually in the range's center). If, after a certain time, you consider this too cold turn the knob in direction of "warmer". If considered too warm, turn the knob in direction of "cooler".

In order to find the right setting meeting your personal needs adjust in small steps and allow sufficient time for walls, ceilings, floors, furniture to adapt (about ½ to 1 hour).

There is a wide variety of temperature selectors with scales in °C, in temperature steps such as 1 to 10, or only "warmer" - "cooler" (+1-, red for warmer, blue for cooler etc.). For more information check with the installation manufacturer.


#### 7.4 Out-of-service times

If the primary air system is not to be operated for a longer period of time in summer, shut off the cold water supply to the induction units' heat exchangers to avoid condensate formation, overflow, and thus damages.

#### 7.5 Repair

If the damage is not obviously a mere "damage to the body-work", e.g. on the condensate tray or outlet, units should be completely replaced and checked by the factory.

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


	<p>Replacement of the control unit should be performed by skilled staff only or by the factory.</p> <p>Replacement of individual components, is not recommended since the greater number of settings can only be performed in the factory using special equipment.</p>
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## Installation, operating and maintenance instructions

### Active chilled beam type HDF 600

#### 7.6 Troubleshooting and corrective action

##### 7.6.1 Room temperature is not achieved

Trouble	Source	Action
No air movement at the unit's outlet grille	No primary air supply	Activate primary air supply unit, check fire protection flaps and, if necessary, open. It is imperative to investigate, find, and remedy the cause for the flaps closing. In case of shut-off flaps for entire floors and duct runs, check and, if necessary, open. Check control.
No valve spindle movement when actuator motor signal is being changed.	Actuator is stuck	Set the temperature controller from "max. hot" to "max. cold" and vice versa, may be the actuator can thus be released. If unsuccessful, remove actuator, clean resp. change it.
Unit is heating or cooling, but set temperature is not achieved	Window is open	Close window
Water supply lines to the unit and heat exchanger are at room temperature	No cold or hot water supply	Ensure cold and hot water supply, eliminate cold or hot water-related problems, open shut-off valves to supply
No control signal is applied to the (valve) actuator, or it is not the one according to setting (Actuator performs wrong or no movement). Refer to separate instructions for control	Deficient control	Have unit checked by a specialized technician replacing or repairing broken parts
Only poor air movement perceivable on the active chilled beam's diffuser	Primary air nozzles polluted and, thus, partly blocked	Clean nozzles by vacuum cleaner, use a plastic nozzle or a small brush.
		 <p>Take care of fins of heat exchanger</p>

# Installation, operating and maintenance instructions

## Active chilled beam type HDF 600

### 7.6.2 Condensate formation

LTG induction units are **not** designed for operation with condensate formation.

In all cooling modes, the entering water temperature needs to be always above the dew point temperature of the air.

If the windows can be opened local monitoring for condensation is highly recommended:

- by means of a temperature sensor close to the valve in the water supply pipe (coldest spot)
- by means of window contacts

If activated by condensation or opening of a window it needs to shut off the chilled water valve.

Another option is, to always keep the chilled water supply temperature above the dewpoint temperature of the outside air. Therefore the dewpoint of the outside air needs to be monitored.

LTG AG is not liable for water damage in the building, caused by condensation at or around the chilled beams.

Trouble	Source	Action
Increased indoor humidity, increased condensate formation	Window open	Close window, continue unit operation
No air movement at the induction unit outlets	Primary air unit failure	Switch unit back on and remove trouble, if any (see specific instructions)
Diffused air temperature at the induction unit diffuser outlets is extraordinarily high, in the primary air center no or too little water precipitation on the cooler	No or too little cooling of the primary air unit, therefore no or too little dehumidification	Check cooling system, remove trouble if any, check shut-off valves and dirt trap in the cold water ducts; if necessary, open valves and clean dirt traps; check control including valves and actuators; if necessary readjust parameter settings; repair/replace broken parts
Increased indoor air humidity perceivable	Considerable moisture sources in the room	Remove moisture sources If impossible, temporarily shut off unit water-side
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
Part of the condensate trays is overflowing despite of drainage system	Condensate drainage system clogged	

# Installation, operating and maintenance instructions

## Active chilled beam type HDF 600

### 7.7 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	
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	

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

VDI 6022 sanitation requirements must be observed.

### 8. Spare Parts

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

Qty.	Ident-No.	Description
1	1047555	Heat exchanger
1	1051037	Clips
1	1042181	Steel rope
1	1051221	Diffuser grille
1	1051226	Frame

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

### 9. 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.