The Innovation Company
LTG Aktiengesellschaft

Technical Documentation

Active chilled beams

for ceiling installation

Example :
Active chilled beam
type HDF 600

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Active chilled beams for ceiling installation

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Notes

Dimensions stated in this brochure are in mm.

Dimensions stated in this brochure are subject to General Tolerances according to DIN ISO 2768-vL.
For the outlet grille special tolerances stated in the drawing apply.

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

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

The actual specifications are at the end of this document. They are available as a word document at your local distributor or at www.LTG-AG.de.

Active chilled beams for ceiling installation

LTG offers active chilled beams for all room air flow patterns:

- Tangential air flow from the ceiling
- Mixed air flow from the ceiling
- Mixed/displacement air flow (Indivent flow) from the ceiling

Active chilled beams are units for induction systems.

The induction system is a combined air and water system:

- The air system ensures ventilation and room air humidity control.
- The water system, which is very economical for the transport of energy, additionally heats or cools the air using heat exchangers.

This provides the two most significant features of the induction unit: energy-saving operation and low space requirements.

Mode of Operation

The primary air (outside air required for ventilation) from the central air conditioning unit is discharged through nozzles at high speed. This pulls in secondary air from the room.

The secondary air flows into the unit through a heat exchanger being heated or cooled.

The primary air is mixed with the heated or cooled secondary air inside the unit and flows through an outlet grille or diffuser into the room.

Models

LTG offers different models and sizes for any application. The main distinctive feature of the LTG active chilled beams is the way the temperature is controlled.

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

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

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

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

Product overview active chilled beams for ceiling installation

Type	**Active chilled beam type HDF 300**	**Active chilled beam type HDF 600**	**Active chilled beam type HDC**
View of units			
Application	Modular ceiling system for ventilation using processed outside air and individual temperature control of rooms based on the induction principle, i.e. without the use of a fan. Dry cooling without dehumidification and condensate drainage.		Specifically designed for low band grid ceilings. In the cooling mode, the facade-heated air enters the unit the shortest way and is immediately cooled.
Water system	2-pipe system, 4-pipe system		
Options	Low installation height Fresh air unit Blind diffuser	Fresh air unit Blind diffuser	Blind diffuser
Installation	In T-bar, grid and plasterboard ceilings Flanged, recessed		
Supply air pattern	2-way	4-way	1-way

Active chilled beams for ceiling installation Type HDF 300

View of unit

Application

The active chilled beam type HDF has been designed as a modular ceiling unit to condition rooms with regarding humidity and temperature based on the induction principle, i.e. without the use of a fan. The active chilled beam is designed for dry cooling without dehumidification and condensate drainage.

Installation, positioning

Its low construction height allows installation in false ceilings with limited space.

The reduced width and the selectable length allow an easy integration in 300 or 312 mm grid ceilings. Unit lengths from 1200 mm to band installation (within a 300 mm grid system) may be realized.

It is designed to provide complete separation from the ceiling cavity and to suppress sound transmission from adjacent rooms (telephony sound insulation).

Functional Principle

Room air humidity is controlled through the centrally dehumidified supply air avoiding involuntary dehumidification in the active 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.

During operation, 100% of the primary air is pretreated fresh air from a central fresh air unit. 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 cooled in a 2-pipe or 4-pipe heat exchanger.

The supply air, a mixture of primary and secondary air, is distributed into the room in two directions via ceiling jets.

Advantages

- **Low primary air pressures between 50 and 100 Pa**
  - Low-noise operation; sound pressure may be selected to remain below 35 dB(A)
  - High secondary (water-side) capacity of up to 350 W/m
  - Easy air flow balance of the units within a single duct run
  - Energy-efficient operation
- **Flexible nozzle design**
  - Selection for fixed primary pressure possible
  - Primary air flow may be selected according to room use between 20 and 100 m^3/h/m
  - Non combustible metal nozzles
- **Low installation height**
  - 230 mm standard
  - 160 mm type HDF-N
- **Efficient heat exchanger**
  - High heating capacity even with low warm water supply temperatures (e.g. 30 °C)
  - High cooling capacity with high chilled water supply temperatures (e.g. 16 °C)
  - Low water flow rates, designed for a temperature difference of 3 K
- **Flexible connection of media**
  - Primary air connection with NW 100 on the long side (standard)
  - Water connections on unit top surface for convenient pipe connections from left or right
- **Designed for easy maintenance design**
  - Easily removable secondary air inlet grille
  - No protective air filter required for the heat exchanger
- **Perfect integration in false ceilings**
  - Width 295 mm, recessed installation
  - Width 319 mm, flanged installation
- **Pleasing design**
  - Air diffuser construction of aluminium profiles
  - Visible surfaces powder coated e.g. similar to RAL 9010
  - Secondary air inlet grille out of expanded metal panel (free area > 63%)
  - Secondary air grille in the form of a perforated sheet metal optional (square perforation)
- **Simplified commissioning**
  - Measuring point to determine the air flow rate (standard)
  - Pressure balancing with a perforated sheet metal balancing damper

Active chilled beams for ceiling installation
Type HDF 300

Design

Active chilled beam type HDF300 in the sizes 1200, 1500, 1800 and 2100 as:

- 4-pipe system for cooling and heating
- 2-pipe system for cooling or heating
- Flanged installation or recessed installation
- Balancing damper KLI

Options

- HDF-N - low installation height
- HDF-L - fresh air unit
- HDF-B - blind diffuser

Materials and Finish

Primary air duct of galvanized sheet steel, nozzle duct and induction nozzles of black coated sheet steel, 1 mm thick, longitudinal profiles of aluminum, either anodized or powder coated similar to RAL.

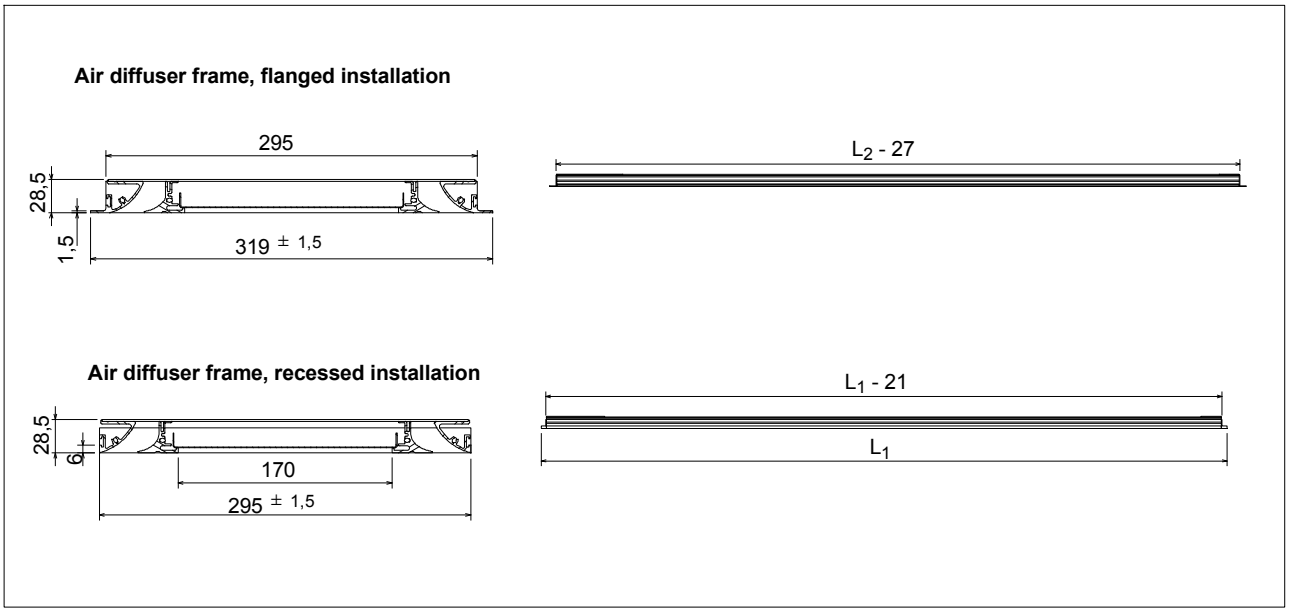
Secondary air inlet grille of galvanized sheet metal, powder coated like the air diffuser frame.

Accessories

- Return air connection NW 100, integrated in the diffuser frame
- Blind unit extension, to be used to match specific lengths required on site
- Sheet metal console to mount valves on unit top-side or end side
- Thermal control valves
- Flexible water connections with 12 mm quick coupling

Dimensions

See drawings on the next pages.



Size	L_1 recessed [mm]	L_2 flanged [mm]	L_3 [mm]	L_4 [mm]	L5 [mm]	Weight [kg]
1200	1195	1219	982	560	660	17
1500	1495	1519	1282	710	810	22
1800	1795	1819	1582	860	960	27
2100	2095	2119	1882	1010	1110	32

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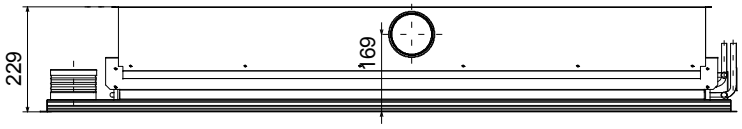
Active chilled beams for ceiling installation
Type HDF 300

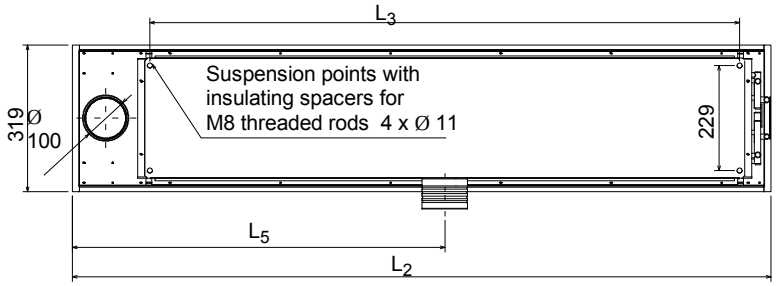
Dimensions

Model with return air connection DN 100

Front view

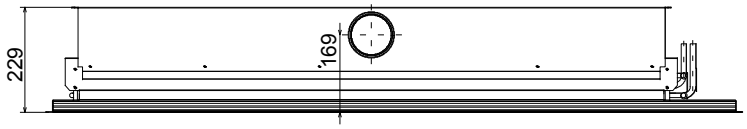


Top view

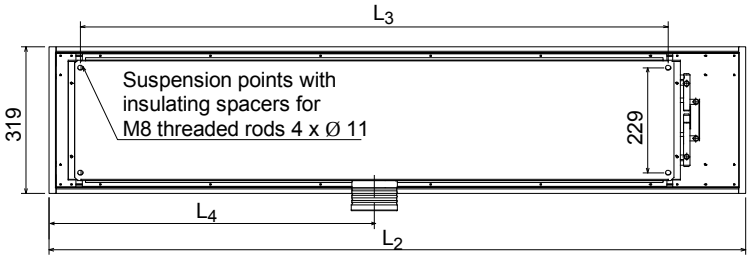


Standard model

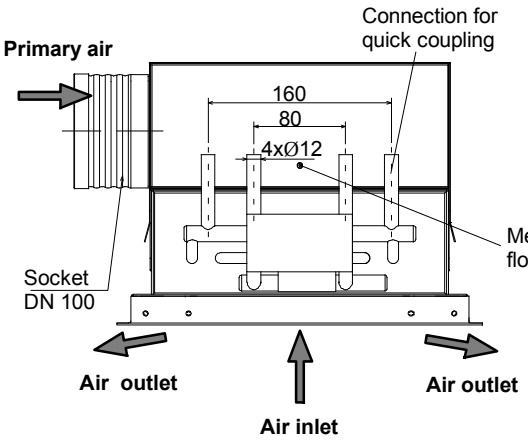
Front view



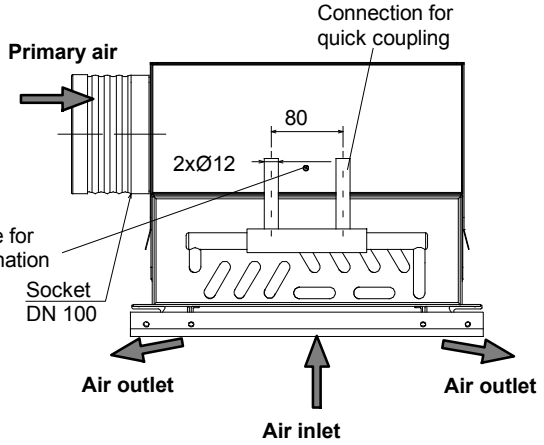
Top view



Lateral view 4-pipe-unit
shown: air diffuser frame flanged installation

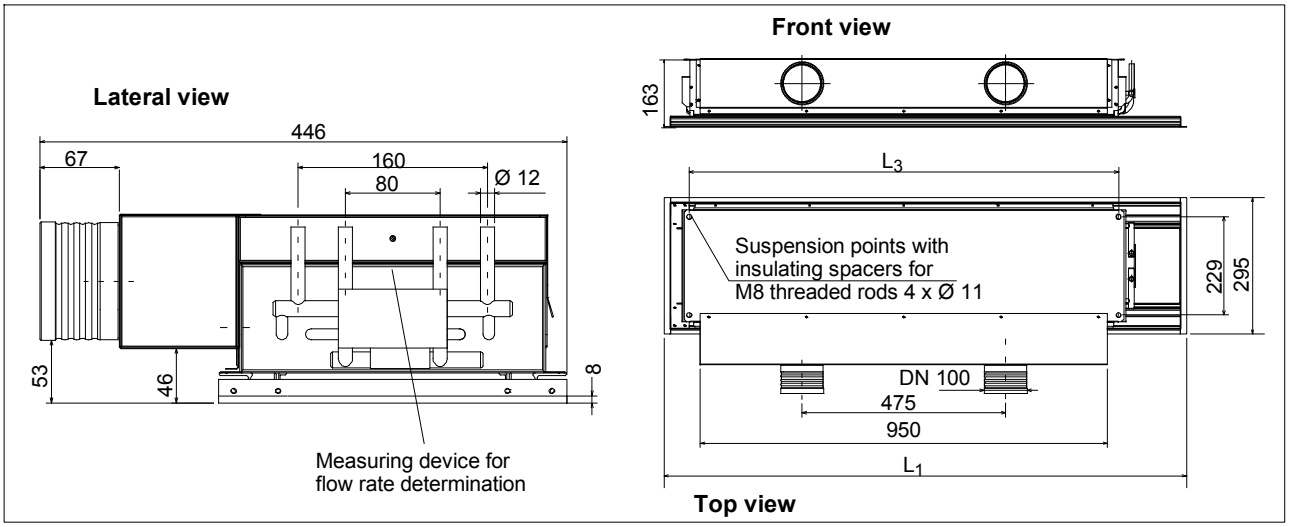


Lateral view 2-pipe-unit
shown: air diffuser frame recessed installation

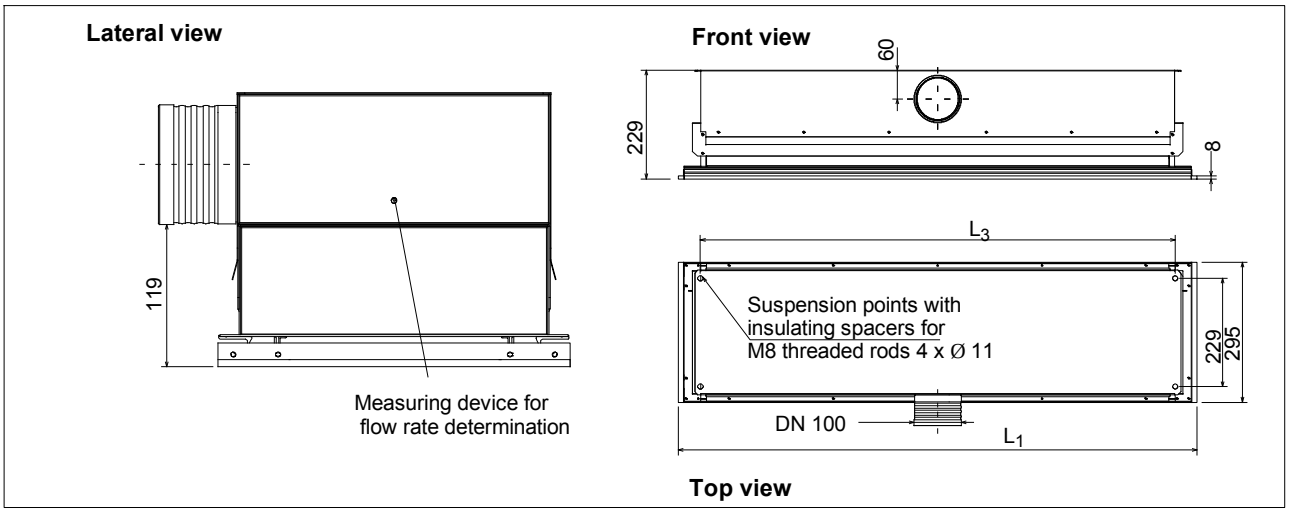


Active chilled beams for ceiling installation
Type HDF 300

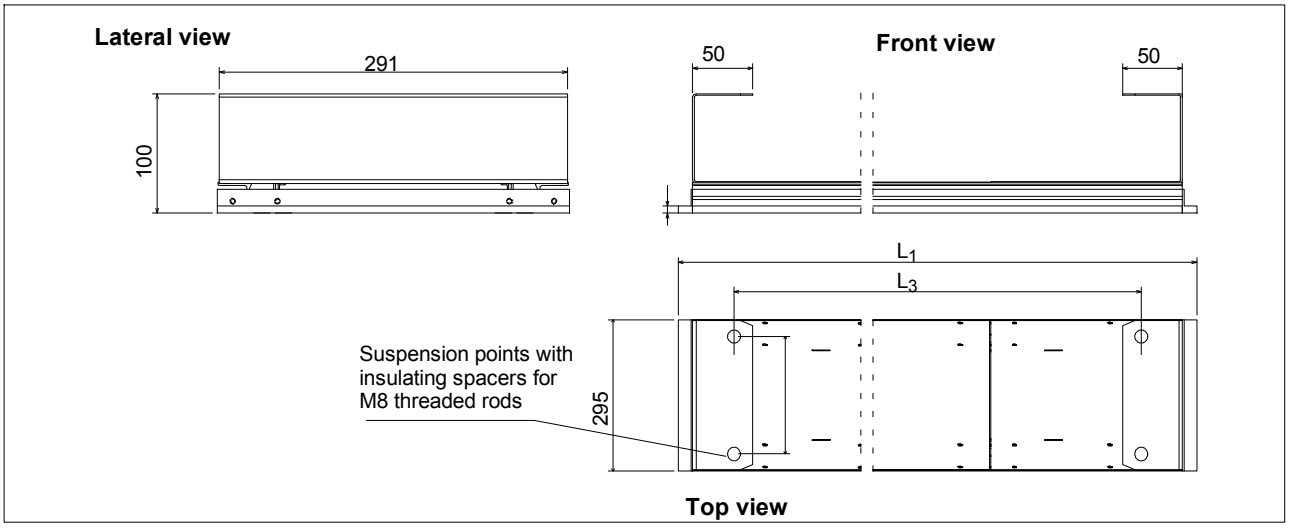
Dimensions model HDF-N - low installation height



Dimensions model HDF-L - fresh air unit



Dimensions model HDF-B - blind diffuser



Active chilled beams for ceiling installation
Type HDF 300

Technical data size 1200, 4-pipe system - cooling and heating

V_P [m^3/h]	Δp [Pa]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_P/\Delta t$ [W/K]	$Q_k/\Delta t$ [W/K]	Q_k 1) [W]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$Q_h/\Delta t$ [W/K]	Q_h 2) [W]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]
14	50	15	21	5	21	214	120 / 5.1	17	298	80 / 2.1
18	80	21	27	6	25	249		19	344	
22	120	27	33	7	28	281		22	386	
22	50	16	22	7	23	230		18	316	
28	80	22	28	9	27	271		21	371	
34	120	28	34	11	31	310		23	421	
35	50	17	23	11	25	254		19	345	
44	80	24	30	14	31	306		23	412	
53	120	30	36	18	36	357		26	476	
54	50	19	25	18	29	292		22	390	
68	80	26	32	23	36	355		26	476	
83	120	33	39	28	39	392		31	561	
84	50	21	27	28	32	320		26	460	
106	80	29	35	35	32	319		32	574	

Technical data size 1500, 4-pipe system - cooling and heating

V_P [m^3/h]	Δp [Pa]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_P/\Delta t$ [W/K]	$Q_k/\Delta t$ [W/K]	Q_k 1) [W]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$Q_h/\Delta t$ [W/K]	Q_h 2) [W]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]
18	50	16	22	6	28	278	150 / 6.0	22	387	100 / 2.5
23	80	23	29	8	32	323		25	448	
28	120	29	35	9	37	365		28	502	
29	50	17	23	10	30	298		23	411	
36	80	24	30	12	35	353		27	482	
44	120	30	36	15	40	404		30	548	
45	50	19	25	15	33	330		25	448	
57	80	26	32	19	40	398		30	535	
70	120	33	39	23	46	464		34	619	
70	50	21	27	23	38	380		28	507	
89	80	29	35	29	46	462		34	618	
108	120	36	42	36	51	509		41	730	
109	50	25	31	36	42	416		33	598	
138	80	33	39	46	42	415		42	747	

Technical data size 1800, 4-pipe system - cooling and heating

V_P [m^3/h]	Δp [Pa]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_P/\Delta t$ [W/K]	$Q_k/\Delta t$ [W/K]	Q_k 1) [W]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$Q_h/\Delta t$ [W/K]	Q_h 2) [W]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]
23	50	18	24	8	34	342	180 / 7.0	26	476	120 / 2.9
29	80	24	30	9	40	398		31	551	
35	120	30	36	12	45	449		34	618	
35	50	19	25	12	37	367		28	506	
45	80	26	32	15	43	434		33	593	
55	120	32	38	18	50	497		38	674	
55	50	21	27	18	41	407		31	552	
70	80	28	34	23	49	490		37	659	
86	120	35	41	28	57	571		42	762	
86	50	24	30	28	47	468		35	624	
109	80	32	38	36	57	569		42	761	
134	120	39	45	44	63	627		50	898	
134	50	28	34	44	51	512		41	735	
170	80	37	43	56	51	511		51	919	

Active chilled beams for ceiling installation
Type HDF 300

Technical data size 2100, 4-pipe-system - cooling and heating

V_P [m^3/h]	Δp [Pa]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_P/\Delta t$ [W/K]	$Q_k/\Delta t$ [W/K]	Q_k 1) [W]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$Q_h/\Delta t$ [W/K]	Q_h 2) [W]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]
27	50	19	25	9	41	406	200 / 7.1	41	735	130 / 3.0
34	80	26	32	11	47	473		47	851	
42	120	32	38	14	53	533		53	954	
42	50	20	26	14	44	436		43	780	
53	80	27	33	18	52	515		51	916	
65	120	34	40	22	59	590		58	1041	
66	50	22	28	22	48	483		47	852	
83	80	30	36	27	58	582		57	1017	
102	120	37	43	33	68	679		65	1176	
102	50	26	32	34	56	556		54	963	
129	80	34	40	43	68	675		65	1175	
159	120	42	48	52	74	744		77	1386	
160	50	31	37	53	61	608		63	1135	
201	80	41	47	67	61	606		79	1419	

The chart shows selection examples. Selection software is available for other flow rates, primary pressures, temperatures and water flow rates.

Data are based on a unit including a secondary air inlet grille ≥ 63 % free area.

Correction for other water flow rates see pages 12 - 14.

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

Legend

- **V_P** - primary air flow rate (±3%)
- **Δp** - static pressure at the primary air connection
- **L_{A18}** - sound pressure level at 18 m^2 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%)
- **Δt** - temperature difference between air inlet and water supply
- **w_{ok}** - standard water flow rate (cooling)
- **Δp_w** - water-side pressure loss
- **Q_h** - water-side heating capacity (secondary ±6%)
- **w_{oh}** - standard water flow rate (heating)

Active chilled beams for ceiling installation
Type HDF 300

Technical data size 1200, 2-pipe system - cooling or heating

V_P [m^3/h]	Δp [Pa]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_P/\Delta t$ [W/K]	$Q_k/\Delta t$ [W/K]	Q_k [1)] [W]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$Q_h/\Delta t$ [W/K]	Q_h [2)] [W]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]
14	50	15	21	5	14	142	120 / 5.1	20	360	80 / 2.1
18	80	21	27	6	18	178		23	421	
22	120	27	33	7	22	215		27	477	
22	50	16	22	7	18	176		22	390	
28	80	22	28	9	23	227		26	464	
34	120	28	34	11	28	281		30	534	
35	50	17	23	11	23	231		24	438	
44	80	24	30	14	31	305		30	531	
53	120	30	36	18	39	385		35	624	
54	50	19	25	18	32	316		28	511	
68	80	26	32	23	42	423		35	636	
83	120	33	39	28	47	474		42	763	
84	50	21	27	28	39	386		35	626	
106	80	29	35	35	29	285		44	798	

Technical data size 1500, 2-pipe system - cooling or heating

V_P [m^3/h]	Δp [Pa]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_P/\Delta t$ [W/K]	$Q_k/\Delta t$ [W/K]	Q_k [1)] [W]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$Q_h/\Delta t$ [W/K]	Q_h [2)] [W]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]
18	50	16	22	6	18	184	150 / 6.0	26	468	100 / 2.5
23	80	23	29	8	23	231		30	547	
28	120	29	35	9	28	280		35	620	
29	50	17	23	10	23	229		28	507	
36	80	24	30	12	30	296		34	603	
44	120	30	36	15	37	366		39	695	
45	50	19	25	15	30	300		32	569	
57	80	26	32	19	40	397		38	691	
70	120	33	39	23	50	501		45	811	
70	50	21	27	23	41	411		37	664	
89	80	29	35	29	55	550		46	826	
108	120	36	42	36	62	617		55	992	
109	50	25	31	36	50	502		45	813	
138	80	33	39	46	37	371		58	1037	

Technical data size 1800, 2-pipe system - cooling or heating

V_P [m^3/h]	Δp [Pa]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_P/\Delta t$ [W/K]	$Q_k/\Delta t$ [W/K]	Q_k [1)] [W]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$Q_h/\Delta t$ [W/K]	Q_h [2)] [W]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]
23	50	18	24	8	22	226	180 / 7.0	32	576	120 / 2.9
29	80	24	30	9	28	284		37	674	
35	120	30	36	12	34	344		42	763	
35	50	19	25	12	28	282		35	625	
45	80	26	32	15	36	364		41	742	
55	120	32	38	18	45	450		48	855	
55	50	21	27	18	37	370		39	700	
70	80	28	34	23	49	488		47	850	
86	120	35	41	28	62	616		56	998	
86	50	24	30	28	51	506		45	818	
109	80	32	38	36	68	677		57	1017	
134	120	39	45	44	76	759		68	1221	
134	50	28	34	44	62	618		56	1001	
170	80	37	43	56	46	456		71	1276	

Active chilled beams for ceiling installation
Type HDF 300

Technical data size 2100, 2-pipe system - cooling or heating

V_P [m^3/h]	Δp [Pa]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_P/\Delta t$ [W/K]	$Q_k/\Delta t$ [W/K]	Q_k 1) [W]	$w_{ok}/\Delta p_w$ [kg/h]/[kPa]	$Q_h/\Delta t$ [W/K]	Q_h 2) [W]	$w_{oh}/\Delta p_w$ [kg/h]/[kPa]
27	50	19	25	9	41	406	200 / 7.1	49	890	130 / 3.0
34	80	26	32	11	47	473		58	1040	
42	120	32	38	14	53	533		66	1178	
42	50	20	26	14	44	436		54	964	
53	80	27	33	18	52	515		64	1146	
65	120	34	40	22	59	590		73	1320	
66	50	22	28	22	48	483		60	1081	
83	80	30	36	27	58	582		73	1312	
102	120	37	43	34	68	679		86	1541	
102	50	26	32	34	56	556		70	1262	
129	80	34	40	43	68	675		87	1570	
159	120	42	48	52	74	744		105	1885	
160	50	31	37	53	61	608		86	1545	
201	80	41	47	67	61	606		109	1970	

The chart shows selection examples. Selection software is available for other flow rates, primary pressures, temperatures and water flow rates.

Data are based on the unit including a secondary air inlet grille ≥ 63 % free area.

Correction for other flow rates see pages 12 - 14.

1) Water supply temperature: 16 °C
Air inlet temperature or return air temperature: 26 °C

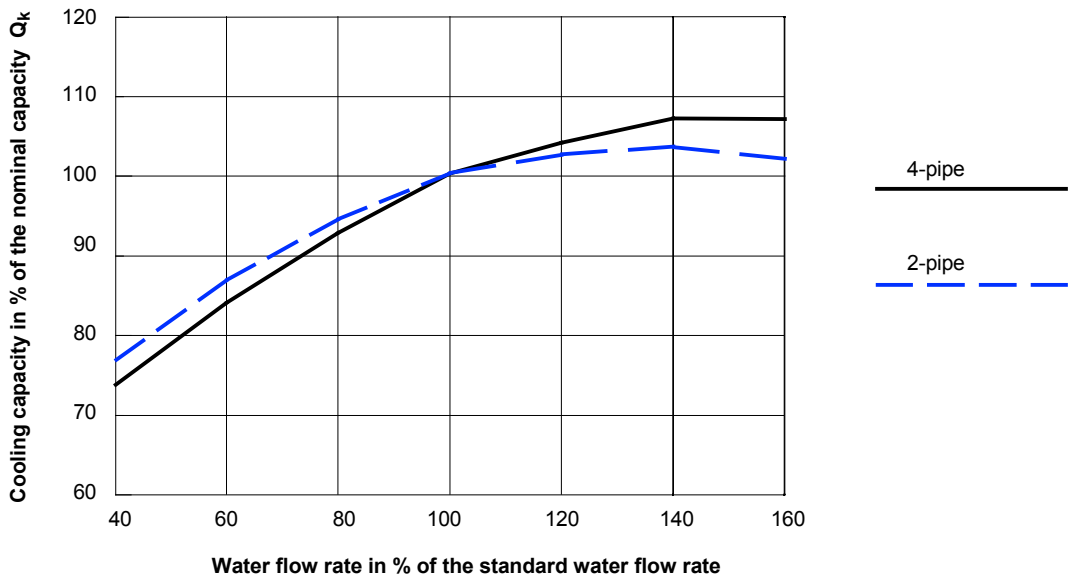
2) Water supply temperature: 40 °C
Air inlet temperature or return air temperature: 22 °C

Legend

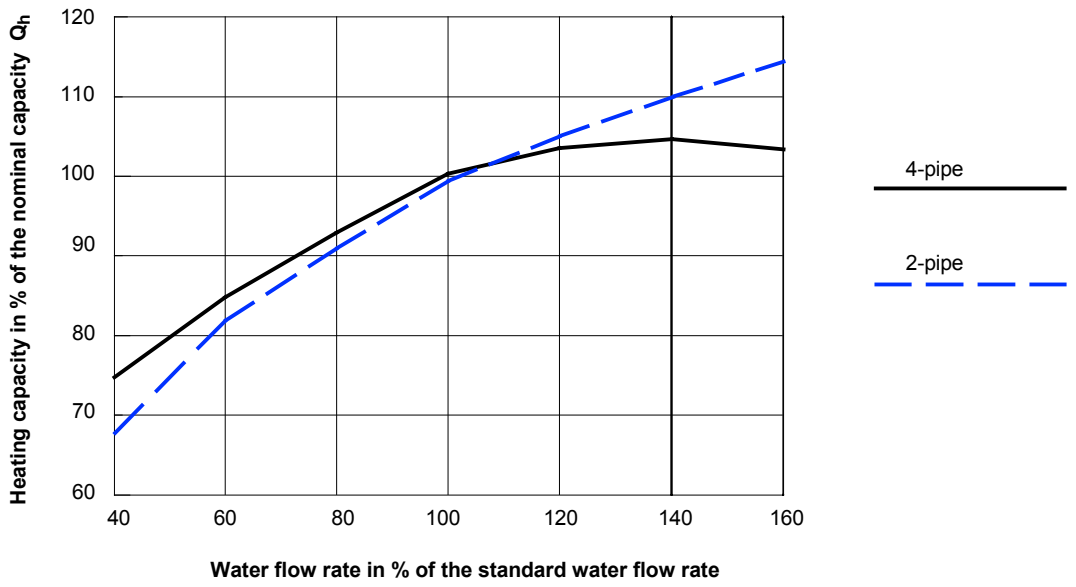
- **V_P** - primary air flow rate (±3%)
- **Δp** - static pressure at the primary air connection
- **L_{A18}** - sound pressure level at 18 m^2 Sabine (±3 dB)
- **L_{wA}** - sound power level(± 3 dB)
- **Q_P** - air-side cooling capacity (primary air ±3%)
- **Q_k** - water-side cooling capacity (secondary ±6%)
- **Δt** - temperature difference between air inlet and water supply
- **w_{ok}** - standard water flow rate (cooling)
- **Δp_w** - water-side pressure loss
- **Q_h** - water-side heating capacity (secondary ±6%)
- **w_{oh}** - standard water flow rate (heating)

Active chilled beams for ceiling installation
Type HDF 300

Cooling capacity with different water flow rates



Heating capacity with different water flow rates



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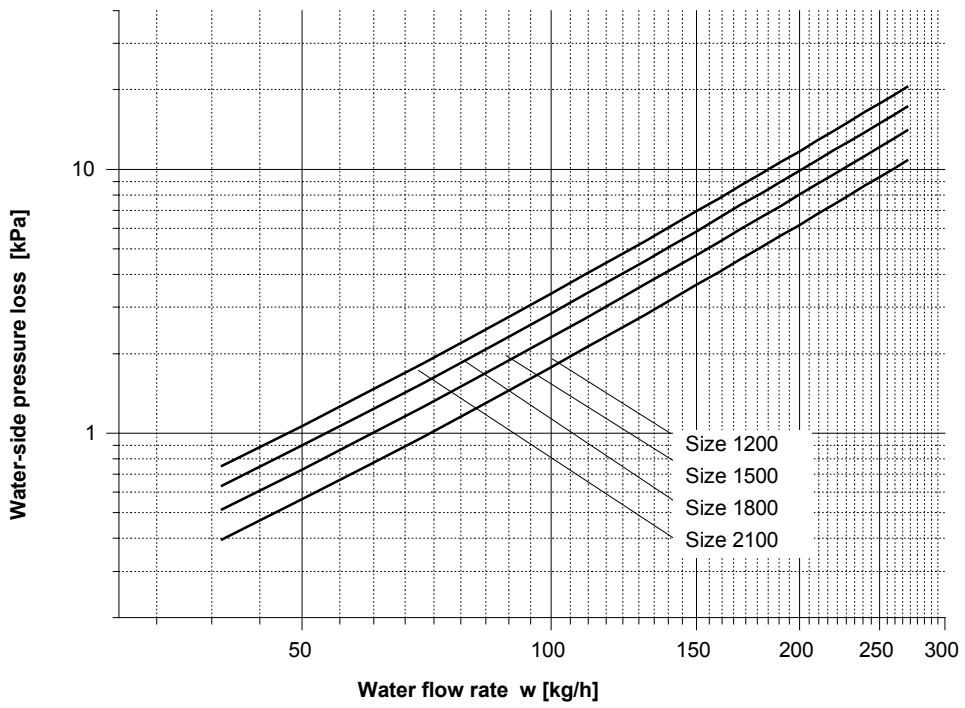
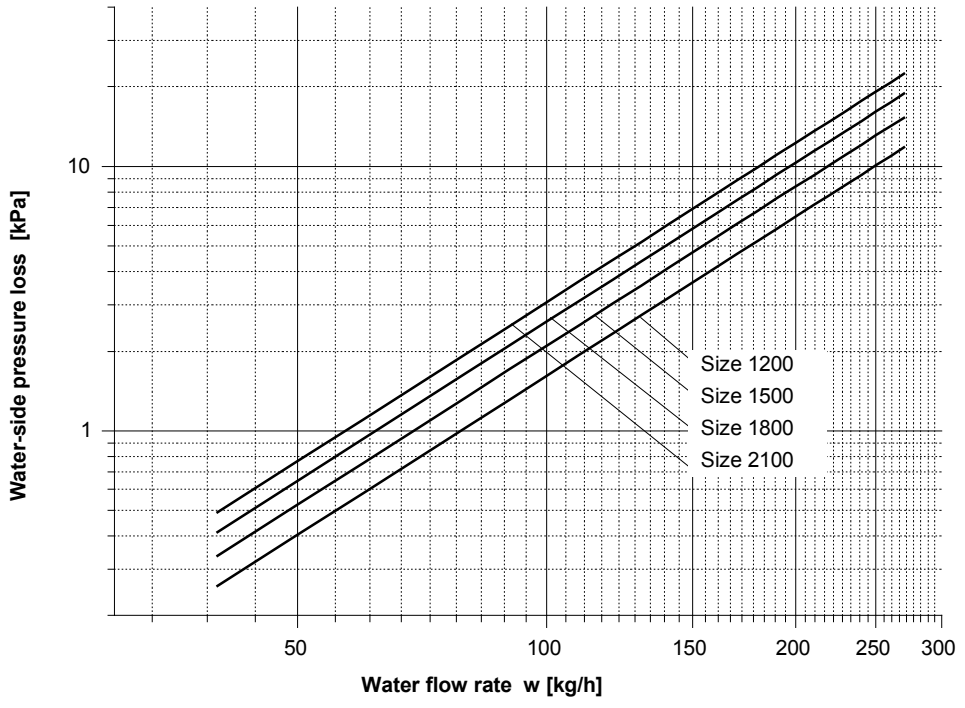
Active chilled beams for ceiling installation
Type HDF 300

Water-side pressure loss with different water flow rates, 4-pipe system - cooling

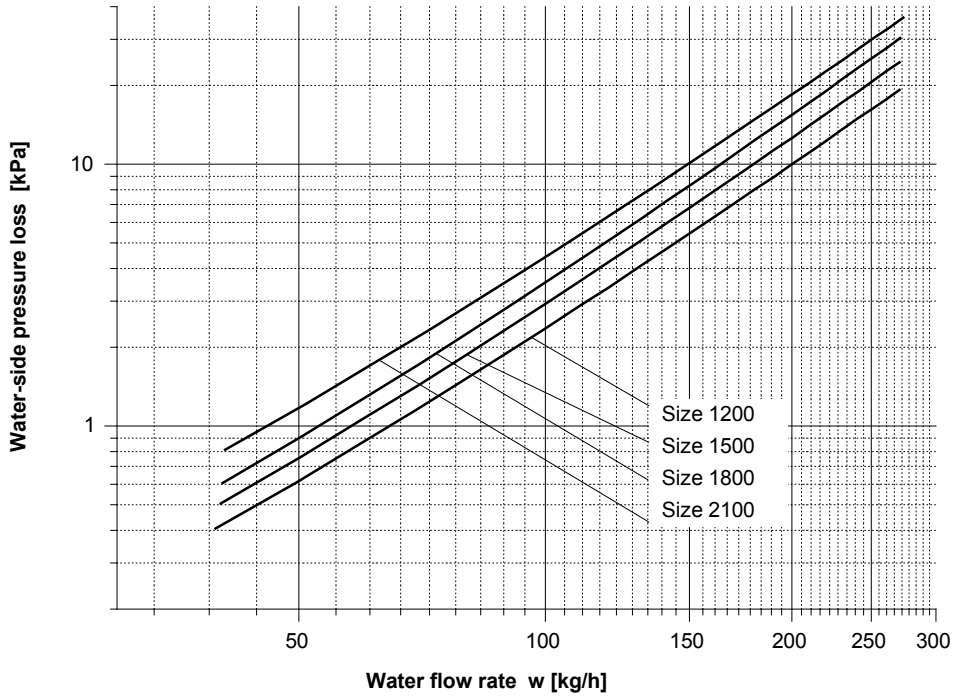


Water-side pressure loss with different water flow rates, 4-pipe system - heating



Active chilled beams for ceiling installation
Type HDF 300

Water-side pressure loss with different water flow rates, 2-pipe system - cooling or heating



Active chilled beams for ceiling installation
Type HDF 600

View of unit

Application

The active chilled beam HDF is a ceiling-mounted 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 active chilled beam is designed for dry cooling without dehumidification and condensate drainage.

Installation, positioning

The low construction height (200 mm) allows installation in false ceilings with limited space.

The active 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 recessed or flanged.

Functional Principle

During operation, the primary air is 100% pretreated outside air from a central central AHU. It assures the use-dependent basic ventilation rate 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 cooled 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 primary air avoiding involuntary dehumidification inside the active 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 design provides complete separation from the ceiling cavity and suppresses sound transmission from adjacent rooms (telephony sound insulation).

Advantages

- **Low primary air pressures between 50 and 150 Pa**
  - Low-noise operation; sound pressure may be selected to remain below 35 dB(A)
  - Very low SFP value for secondary air transport (< 0.04 kW/(m³/s)) possible
  - High secondary (water-side) output with low primary pressure
  - Excellent air flow balance of the units within a single duct run
- **Flexible nozzle design**
  - Six calibrated, well-matched nozzle combinations
  - Non combustible metal nozzles
  - Exchangeable nozzle strip, optional
- **Low installation height (200 mm)**
  - Installation possible in low height suspended ceilings
  - Facilitates the crossing of utility lines
- **Efficient injector and heat exchanger**
  - High specific secondary output even with low primary air flow rate (in certain areas > 1W/K/(m³/h))
  - High heating capacity even with low warm water supply temperatures (e.g. 30 °C)
  - Lower overtemperature in the heating mode, thus better ventilating efficiency
  - High cooling capacity with high chilled water supply temperatures (e.g. 16 °C)
  - Low water flow rates designed for a temperature difference of 3 K
- **Flexible connection of services**
  - Primary air connection with NW 125 on the longitudinal side (standard)
  - Air connection left or right, as required
  - Eccentric air connection, if desired, not conflicting with ceiling suspension parts
  - Water connections outside the unit on top in order to connect from the left or right side
- **Designed for easy maintenance**
  - Easy removal of secondary air grille, secured by metal wires
  - Easy access for cleaning of heat exchanger and nozzles
  - No protective air filter required for the heat exchanger.
- **Virtually draught-free indoor air flow**
  - Optimized air distribution with steady, preset divergent, inductive ceiling jet
- **Attractive appearance**
  - Visible surfaces powder coated e.g. sim. to RAL 9010
  - Secondary air grille in the form of a perforated sheet grille (free area > 63%)
- **Easy commissioning**
  - Measuring point to determine the air flow rate (standard)

Active chilled beams for ceiling installation
Type HDF 600

Design

Active chilled beam type HDF 600 in the size 600 x 1200 mm, as:

- 4-pipe-system for cooling and heating
- 2-pipe-system for cooling or heating
- Grid sizes 600 mm and 625 mm
- Balancing damper KLI

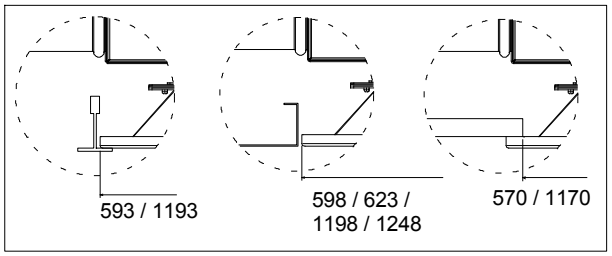
Materials and Finish

Primary air duct of galvanized sheet steel, nozzle duct and induction nozzles of black coated sheet steel, 1 mm thick; secondary air grille of galvanized sheet steel, powder coated similar to RAL.

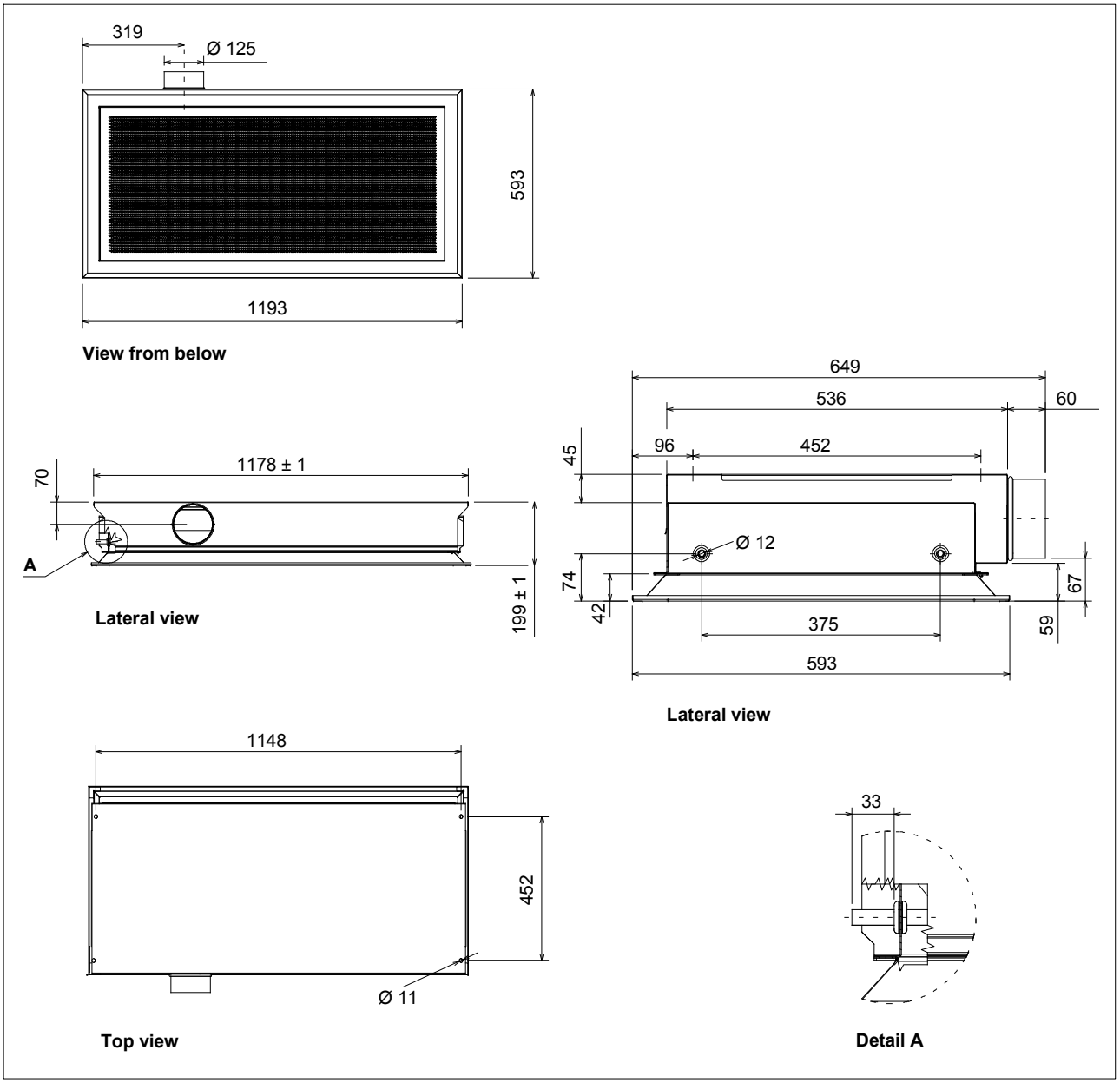
Accessories

- Thermal control valves
- Flexible water connections with 12 mm quick coupling

Installation in different ceiling systems



Dimensions (2-pipe system)



Shown: 2-pipe system

Active chilled beams for ceiling installation
Type HDF 600

Technical data size 600 x 1200, 2-pipe-system - cooling or heating

V_P [m^3/h]	Δp [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		40	621	
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	170 / 7	66	943	110 / 3
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	

Technical data size 600 x 1200, 4-pipe-system - cooling and heating

V_P [m^3/h]	Δp [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		29	421	
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	170 / 7	51	674	110 / 1
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 selection examples. Selection software is available for other flow rates, primary pressures, temperatures and water flow rates.

Data are based on the unit including a secondary air inlet grille $\geq$ 63 % free area.

Correction for other flow rates see page 18.

1) Water supply temperature: 16 °C
Air inlet temperature or return air temperature: 26 °C

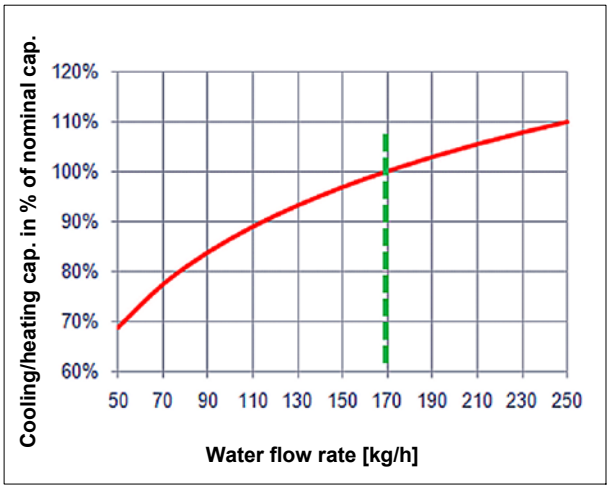
2) Water supply temperature: 40 °C
Air inlet temperature or return air temperature: 22 °C
Primary air temperature: 16 °C

Legend

V_P	-	primary air flow rate (±3%)
Δp	-	static pressure at the primary air connection
L_{A18}	-	sound pressure level at 18 m^2 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%)
Δt	-	temperature difference between air inlet and water supply
w_{ok}	-	standard water flow rate (cooling)
Δp_w	-	water-side pressure loss
Q_h	-	water-side heating capacity (secondary ±6%)
w_{oh}	-	standard water flow rate (heating)

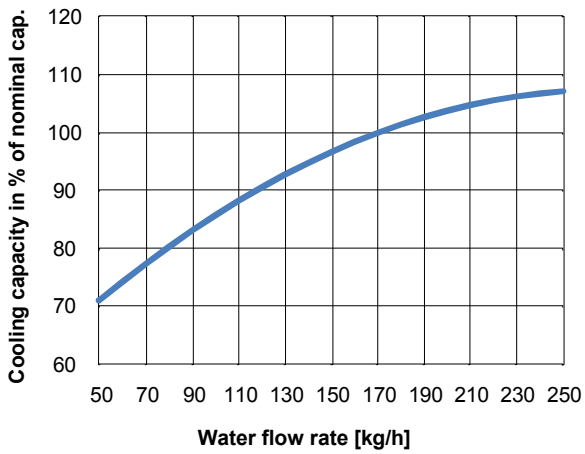
Active chilled beams for ceiling installation
Type HDF 600

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

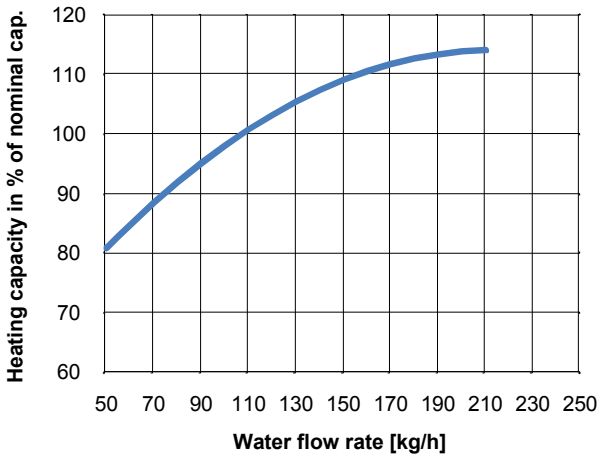


Capacity with different water flow rates for 4-pipe heat exchanger

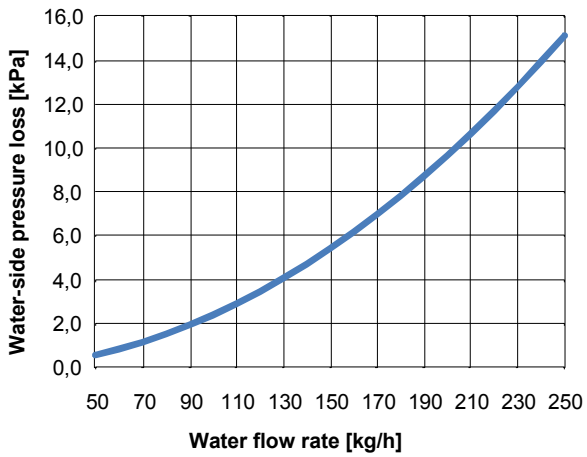
Cooling capacity

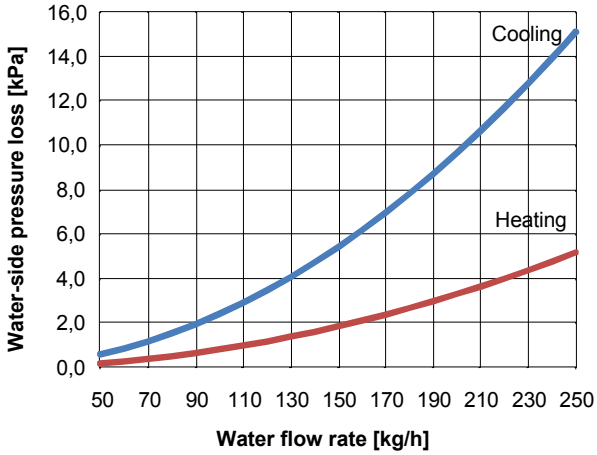


Heating capacity



Water-side pressure loss for 2-pipe heat exchanger / 4-pipe heat exchanger





Active chilled beams for ceiling installation
Type HDF 600

Selection

Induction systems are economical if operated locally using the primary air flow based on DIN EN 15251 while covering the cooling loads in the room. An occupancy rate typical for offices of 10 m² floor space/person results in a calculated specific primary air flow rate of 5m³/h/m² for a low-emission building. A “non-low-emission“ building requires an outside air flow rate of 7.5 m³/h/m². The cooling loads of offices provided with good solar protection are usually about 40 to 60 W/m².

The speciality of the HDF 600 active chilled beam is the supply air diffusion in all four directions. It requires a minimum distance between two units or between unit and wall, respectively, in order to avoid excessive downward jet deflection.

Air flow: Supply air is diffused in all four directions

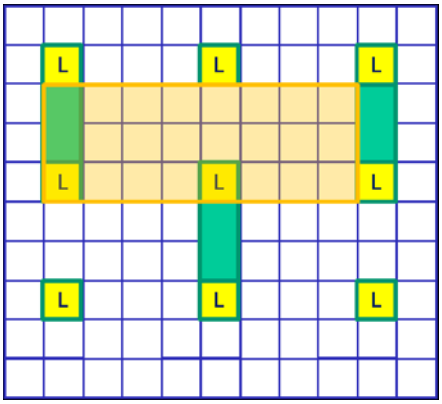
Location in the ceiling grid

Positioning of the units in the ceiling grid should harmonize with the position of the overhead lights. Avoid being too close to protruding overhead lights.

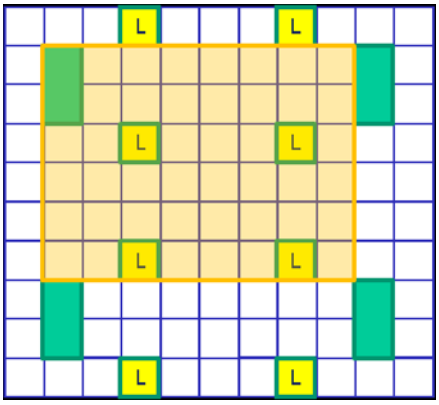
The following examples provide suggestions for a 600 mm grid ceiling with square, mirrored grid lights installed flush.

Examples apply to

- 10 m²/person
- 26 °C room temperature
- 16 °C water supply temperature
- 16 °C primary air temperature

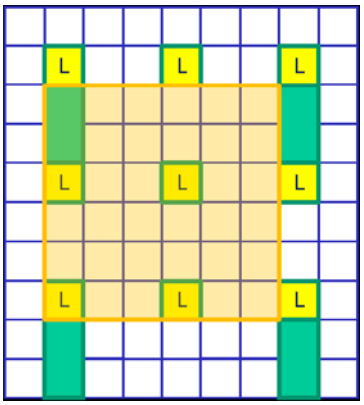


600 x 600 ceiling grid, 4 x 3 grid light
With 8.6 m²/unit and 7.5 m³/h/m²:
· 65 m³/h/unitt · 735 W · 85 W/m²



600 x 600 ceiling grid, 4 x 3 grid light
With 17.3 m²/unit and 5 m³/h/m²:
· 87 m³/h/unit · 845 W · 49 W/m²

With 17,3 m²/unit and 7.5 m³/h/m²:
· 130 m³/h/unit · 1120 W · 65 W/m²



600 x 600 ceiling grid, 3 x 3 grid light
With 13 m²/unit and 5 m³/h/m²:
· 65 m³/h/unit · 735 W · 56 W/m²

With 13 m²/unit and 7.5 m³/h/m²:
· 98 m³/h/unit · 1000 W · 77 W/m²

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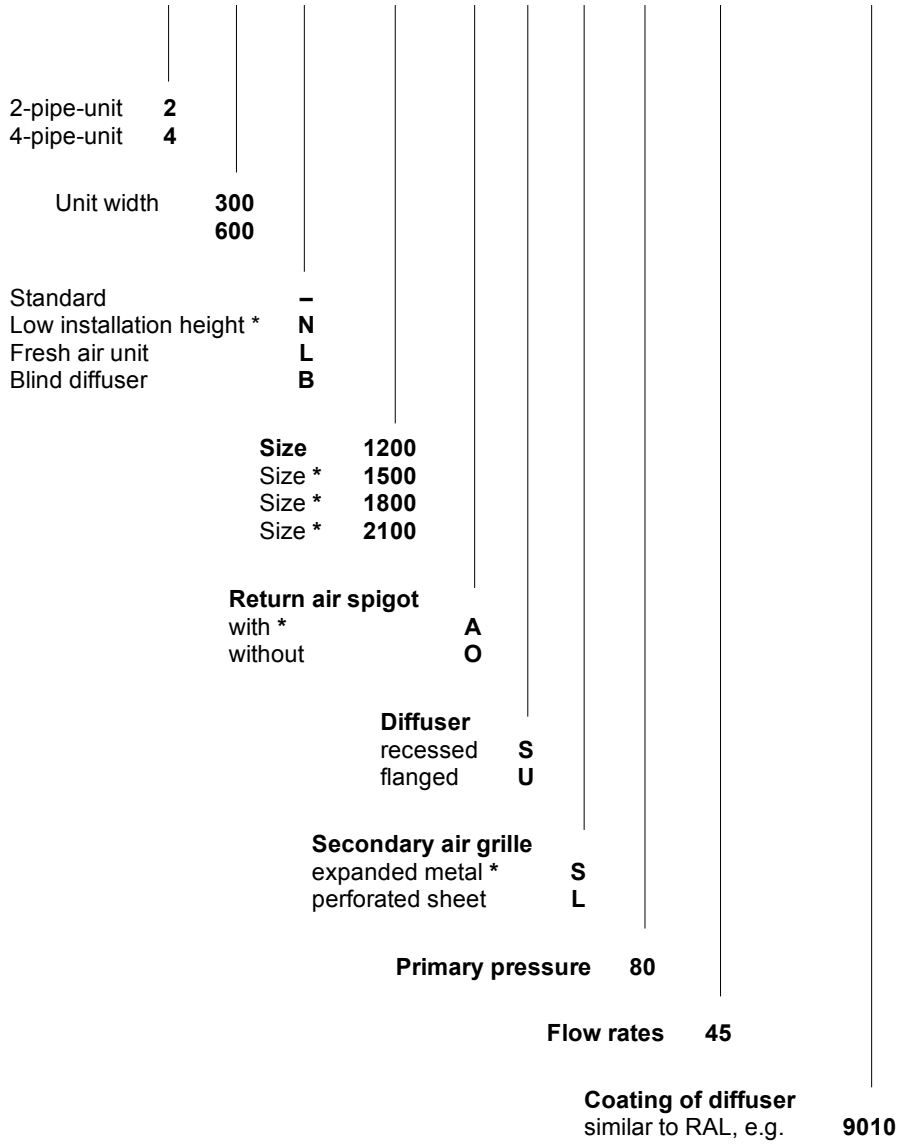
Active chilled beams for ceiling installation
Type HDF

Nomenclature

HDF-2 / 300 / N / 1200 / A / S / S / 80 / 45 / RAL ----



*** = only available for unit width 300 mm**

Active chilled beams for ceiling installation Type HDC

View of unit

Active chilled beam type HDC 1000 (4-pipe system)

Application

The active chilled beam type HDC 1000 is specifically designed for installation in false ceilings. In the cooling mode room air is heated at the facade, entrained into the unit, cooled and recirculated to the room.

Installation, positioning

Flanged or recessed frame options.

Mode of operation

Primary air is pushed through internal metal nozzles, which induces room air through a heat exchanger where it is cooled or heated. The primary air is mixed with the heated or cooled secondary air and delivered into the room.

For hygienic reasons should the unit be operated without condensation and not be used for dehumidification.

Specification

The active chilled beam type HDC 1000 is available as:

- 4-pipe system for cooling and heating
- 2-pipe system for cooling or heating

Advantages

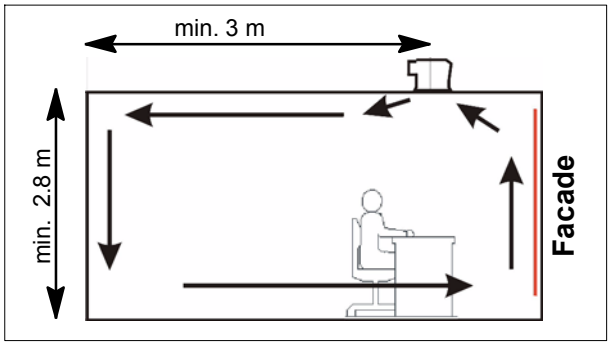
- Virtually noiseless operation
- Low installation height (240 mm)
- Pleasing, combined air inlet/outlet grille
- High thermal comfort in the occupied zone
- Condensate-free operation
- Fresh air supply to the room
- Non combustible metal housings and nozzles
- Maintenance-friendly design. Valves and heat exchanger are easily accessible by removing the grille.
- Energy efficient through use of low primary flow rates and low static pressure at the primary air duct

Indoor air flow pattern for cooling mode

Room air heated at the facade is drawn directly into the units where it is cooled. Supply air diffused along the ceiling, mixes with the ambient air to reduce air velocity and temperature difference.

High thermal comfort
up to 50 W/m^2 or 7.5 m^3/hm^2 (primary air).

Recommended installation position for 2-pipe system (cooling only)



Section through a typical office room, length = 6 m, height = 2.8 m. Schematic illustration of indoor air flow.

Active chilled beams for ceiling installation
Type HDC

Technical data size 1000, 4-pipe system - cooling and heating

V [m³/h]	**Δp** [Pa]	**L_{A18}** [dB(A)]	**L_{wA}** [dB(A)]	**Q_P /Δt** [W/K]	**Q_k/Δt** [W/K]	**Q_k** 1) [W]	**Q_P** 1) [W]	**w_{ok} /$Δp_w$** [kg/h]/[kPa]	**Q_h /Δt** [W/K]	**Q_h** 2) [W]	**w_{oh} /$Δp_w$** [kg/h]/[kPa]
40	50	22	28	13	23	230	130	100 / 6.3	18	720	100 / 2.4
50	77	23	29	17	28	280	170		22	880	
60	110	26	32	20	34	340	200		26	1040	
70	150	29	35	23	37	370	230		29	1160	
80	195	33	39	27	42	420	270		32	1280	

Technical data size 1000, 2-pipe system - cooling or heating

V [m³/h]	**Δp** [Pa]	**L_{A18}** [dB(A)]	**L_{wA}** [dB(A)]	**Q_P /Δt** [W/K]	**Q_k/Δt** [W/K]	**Q_k** 1) [W]	**Q_P** 1) [W]	**w_{ok} /$Δp_w$** [kg/h]/[kPa]	**Q_h /Δt** [W/K]	**Q_h** 2) [W]	**w_{oh} /$Δp_w$** [kg/h]/[kPa]
40	50	22	28	13	24	240	130	100 / 8.5	20	800	100 / 6.2
50	77	23	29	17	30	300	170		25	1000	
60	110	26	32	20	36	360	200		30	1200	
70	150	29	35	23	40	400	230		33	1320	
80	195	33	39	27	45	450	270		37	1480	

Data is based on the unit with the inlet/outlet grille installed.

The suction air temperature at the unit is usually 1.5 K higher than the room temperature.

Standard water flow rate for heating and cooling: 100 kg/h. Correction values for other flow rates see pages 26/27.

1) Water supply temperature: 16 °C W
Room temperature at a height of 1.1 m: 26 °C
Non-condensing operation

2) Water supply temperature: 60 °C
Air inlet temperature: 20 °C

Legend

V - flow rate (± 10%)

Δp - static pressure at primary air spigot

L_{A18} - sound pressure level (± 3 dB)

L_{wA} - sound power level (± 3 dB) (without ceiling)

Q_P - primary cooling capacity (fresh air) (± 5%)

Q_k - cooling capacity, secondary (heat exchanger) (± 5%)

Δt - temperature difference between room air and water supply

w_{ok} - standard flow rate at cooling capacity

$Δp_w$ - water-side pressure loss

Q_h - heating capacity, secondary (± 5%)

w_{oh} - standard flow rate at heating capacity

Dimensions

Flanged installation:
Size 1000 - L x W x H = approx. 1240 x 340 x 240 mm

Recessed installation:
Size 1000 - L x W x H = approx. 1198 x 298 x 240 mm
(suitable for plank tiles 300 wide x 1200 / 1250 mm long)

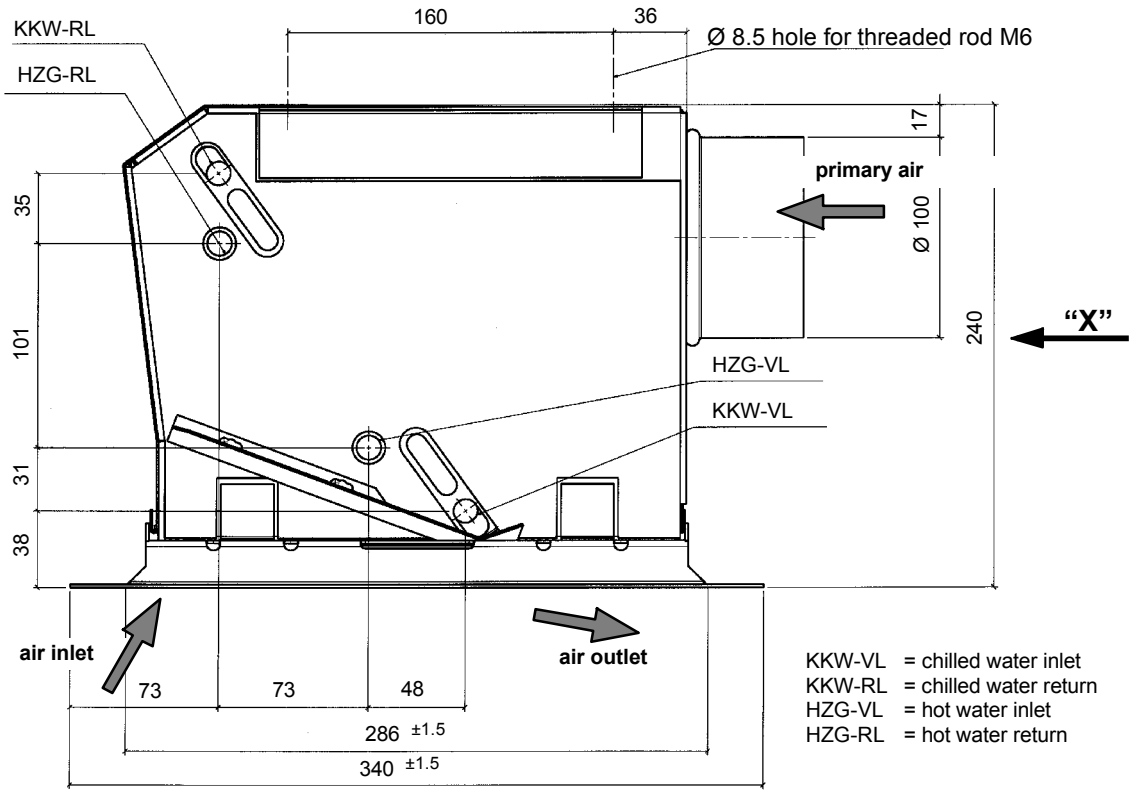
Weight: Basic unit: 17 kg without water
Inlet/outlet grille: 6 kg

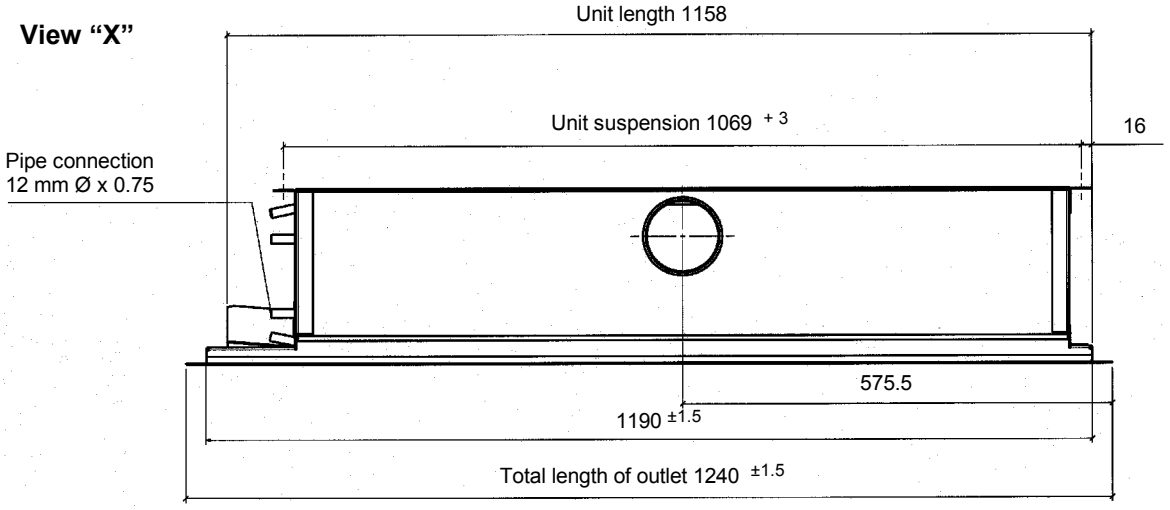
Accessories, special versions

Straight-way valves with electrothermal actuator

Active chilled beams for ceiling installation
Type HDC

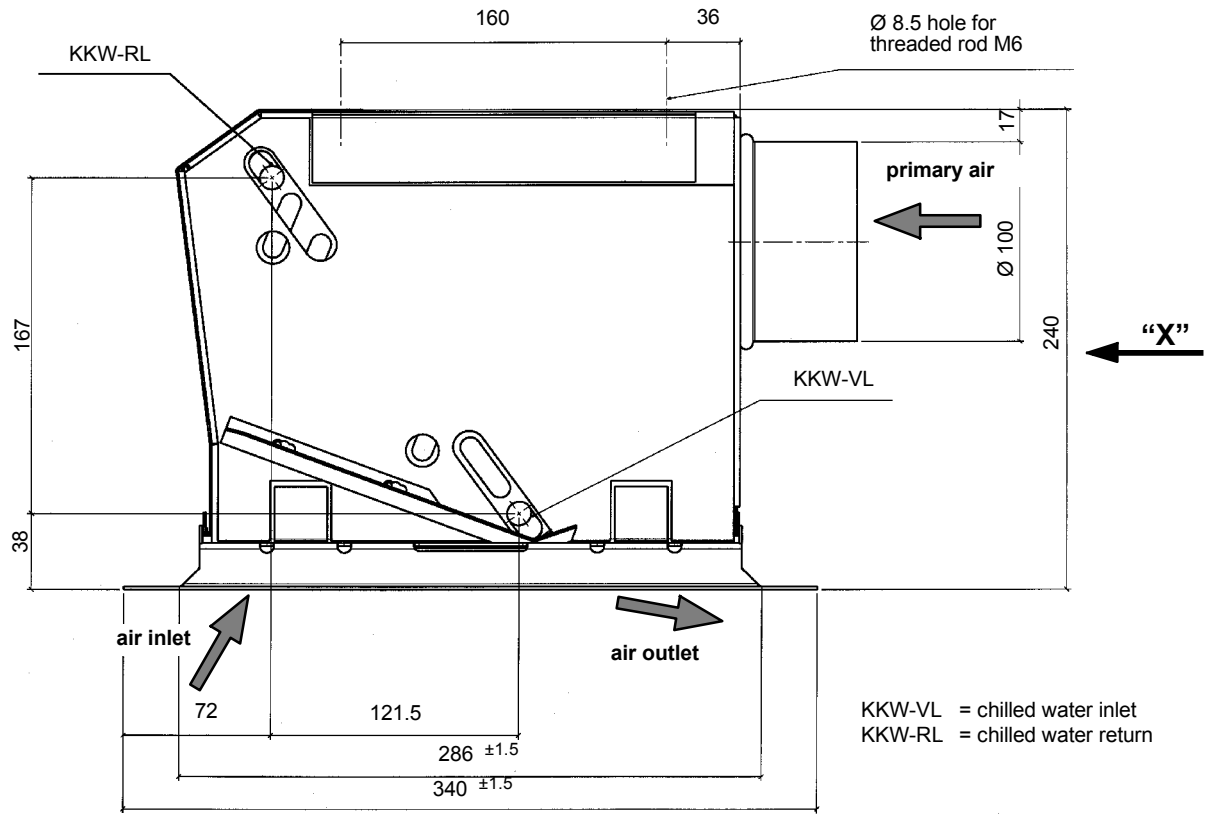
Dimensions size 1000, 4-pipe system - cooling and heating, flanged installation





Active chilled beams for ceiling installation
Type HDC

Dimensions size 1000, 2-pipe system - cooling or heating, flanged installation



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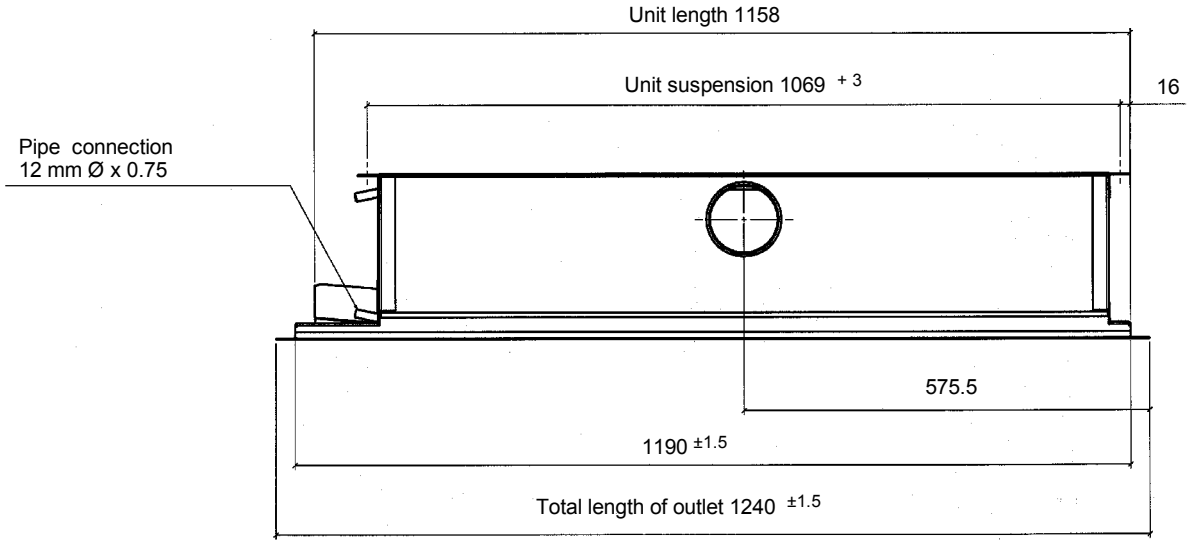

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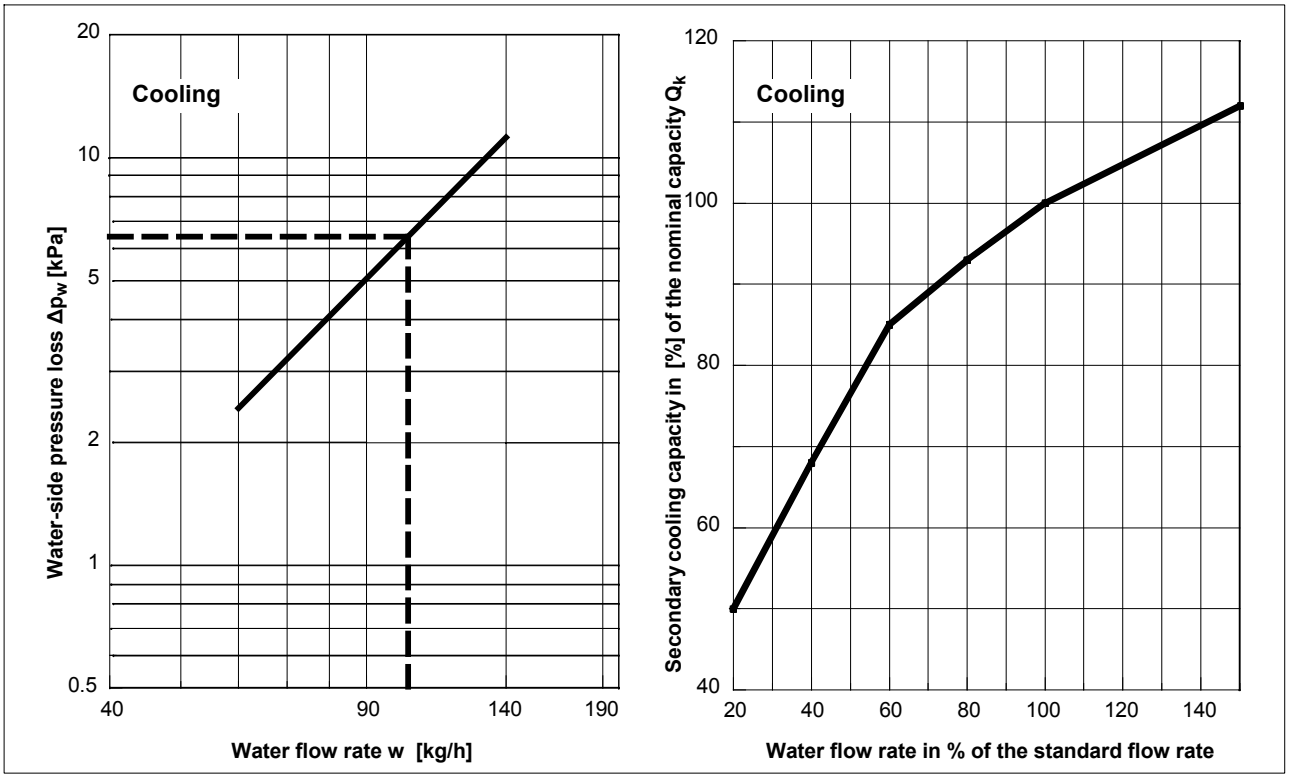
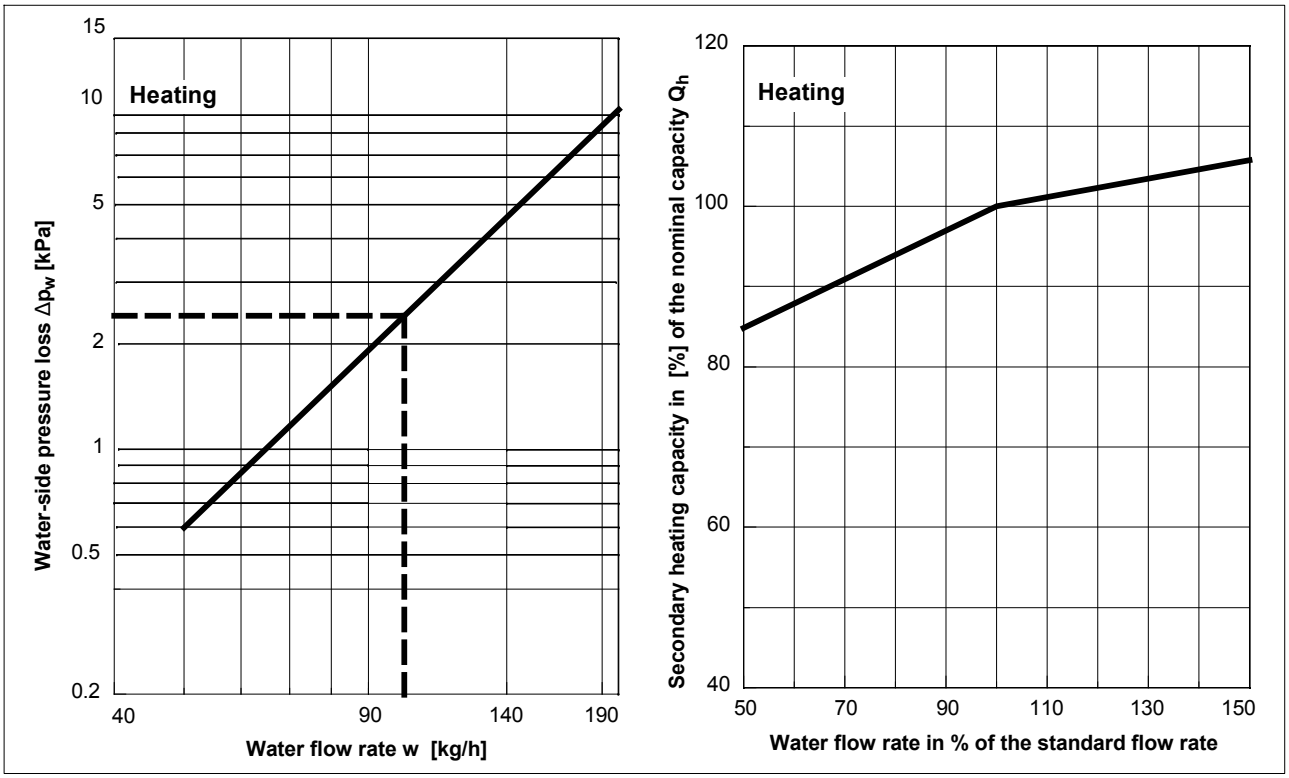
Active chilled beams for ceiling installation
Type HDC

Water-side pressure loss and cooling capacity with different water flow rates



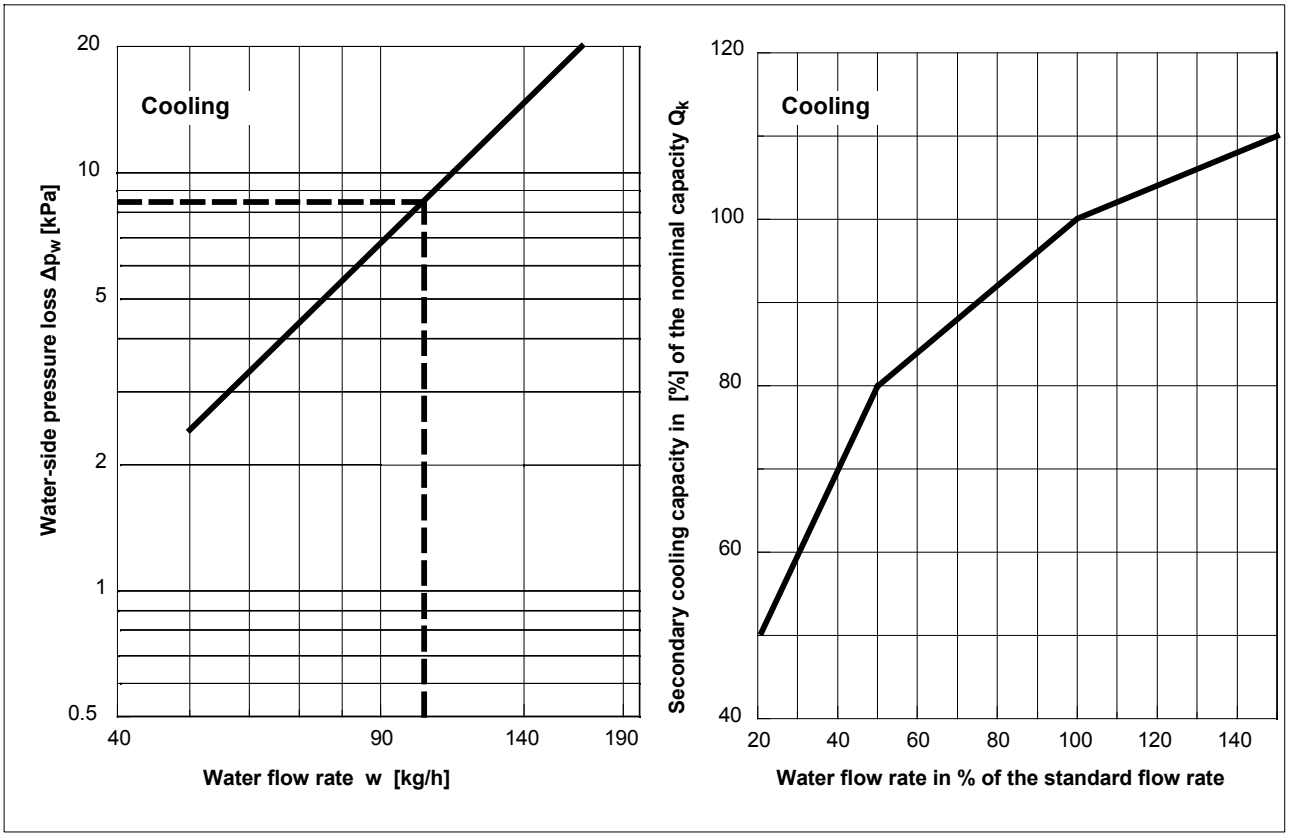
Size 1000, 4-pipe system - cooling and heating, standard flow rate 100 kg/h



Note: The minimum flow rate must be at least 20% of the standard flow rate in the cooling mode and 40% in the heating mode (to ensure water-side pressure equalization).

Active chilled beams for ceiling installation
Type HDC

Water-side pressure loss and cooling capacity for other flow rates
Size 1000, 2-pipe system - cooling or heating, standard flow rate 100 kg/h



Specification and Schedule of Prices

Active Chilled Beam Type HDF-2

Edition 10.7.2008 / page 1

Qty.	Description	Unit Price in €	Total price in €
	Active chilled beam for 2-Pipe-Systems for low intermediate ceilings Type: HDF-2 (heating or cooling) Compact chilled beam including a multi-row air/water heat exchanger, suitable for temperature control and ventilation of rooms based on the induction principle, consisting of the following components: - **Primary air box** aus verzinktem Stahlblech, of galvanized sheet steel, lateral NW 100 mm primary air socket, measuring device for flow rate determination, unit suspension via bores. - Solid, torsion resistant **nozzle box** of galvanized, black coated sheet steel including acoustically optimized non-combustible high-induction metal nozzles. - **Heat exchanger** with one water circuit, 2-pipe system, designed for cooling or heating, consisting of copper tubes with press-fitted aluminum fins; operating pressure up to 12 bar, water-side connection (12 mm diam.) via quick release coupling; visible surfaces black coated. - **Air diffuser frame** of extruded aluminum profiles for horizontal supply air diffusion; transition to suspended ceiling either overlap or non-overlap; easily removable secondary air grille, expanded metal version, secured by safety suspension; visible surfaces powder coated similar to RAL. - **Flexible nozzle design** based on the primary air flow rate and preselected primary pressure (end pressure). **Outside dimensions [WxH]:** 319 x 229 mm (flanged installation) 295 x 229 mm (recessed installation) **Sizes:** o 1200 o 1500 o 1800 o 2100 o 2400 **Manufacturer: LTG Aktiengesellschaft** **Series: Active Chilled beam** **Type: HDF-2** -2-		

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Specification and Schedule of Prices

Active Chilled Beam Type HDF-2

Qty.	Description	Unit Price in €	Total price in €
	Variants: o **Unit HDF-N** Low height installation (construction height 160 mm), remaining details as standard version o **Unit HDF-L** Fresh air connection, details as standard version, yet without heat exchanger, for fresh air supply only o **Unit HDF-B** Blind diffuser, looks like the standard version. Without any A/C functions, serves to bridge the gap between A/C units in case of an installation as a continued band **Accessories/special version** (optional, at extra charge): o Face end caps including pins for flush alignment of unit. o Return air connection DN 100 at the top o Flexible hose, **oxygen diffusion tight version** (Oxiblock, PE), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **without insulation for hot water** up to supply temperatures of 50 °C, operating pressure 10 bar o Flexible hose, **oxygen diffusion tight version** (Oxiblock, PE), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **with insulation for cold water** or standard hose: o Flexible hose, (EPDM-core), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **without insulation for hot water** o Flexible hose, (EPDM-core), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **with insulation for cold water** o Dummy grille for inactive sections or on request with return air connection o Straight-way valve with electro-thermal actuator o 3-way valve with electro-thermal actuator o Straight-way valve with 3-point actuator o 3-way valve with 3-point actuator o Throttling damper KLXG 100/1 -3-		

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Specification and Schedule of Prices

Active Chilled Beam Type HDF-2

Technical Specification

Primary air pressure	[Pa]
Primary air flow rate	[m^3/h]
Sound power L_{WA}	[dB(A)]
Sound pressure level at 18 m^2 Sabine L_{pA}	[dB(A)]

Cooling mode

Induction air temperature	[°C]	
Primary air temperature	[°C]	
Water supply temperature	[°C]	
Cooling capacity	[W]	

Heating mode

Induction air temperature	[°C]	
Water supply temperature	[°C]	
Heating capacity	[W]	

Natural convection	[W]	

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Specification and Schedule of Prices

Active Chilled Beam Type HDF-4

Edition 10.7.2008 / page 1

Qty.	Description	Unit Price in €	Total price in €
	Active chilled beam for 4-Pipe-Systems for low intermediate ceilings Type: HDF-4 (heating and cooling) Compact chilled beam including a multi-row air/water heat exchanger, suitable for temperature control and ventilation of rooms based on the induction principle, consisting of the following components: - **Primary air box** aus verzinktem Stahlblech, of galvanized sheet steel, lateral NW 100 mm primary air socket, measuring device for flow rate determination, unit suspension via bores. - Solid, torsion resistant **nozzle box** of galvanized, black coated sheet steel including acoustically optimized non-combustible high-induction metal nozzles. - **Heat exchanger** with separate water circuits, 4-pipe system, designed for cooling and heating, consisting of copper tubes with press-fitted aluminum fins; operating pressure up to 12 bar, water-side connection (12 mm diam.) via quick release coupling; visible surfaces black coated. - **Air diffuser frame** of extruded aluminum profiles for horizontal supply air diffusion; transition to suspended ceiling either overlap or non-overlap; easily removable secondary air grille, expanded metal version, secured by safety suspension; visible surfaces powder coated similar to RAL. - **Flexible nozzle design** based on the primary air flow rate and preselected primary pressure (end pressure). **Outside dimensions [WxH]:** 319 x 229 mm (flanged installation) 295 x 229 mm (recessed installation) **Sizes:** o 1200 o 1500 o 1800 o 2100 o 2400 **Manufacturer: LTG Aktiengesellschaft** **Series: Active Chilled beam** **Type: HDF-4** -2-		

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Specification and Schedule of Prices

Active Chilled Beam Type HDF-4

Qty.	Description	Unit Price in €	Total price in €
	Variants: o **Unit HDF-N** Low height installation (construction height 160 mm), remaining details as standard version o **Unit HDF-L** Fresh air connection, details as standard version, yet without heat exchanger, for fresh air supply only o **Unit HDF-B** Blind diffuser, looks like the standard version. Without any A/C functions, serves to bridge the gap between A/C units in case of an installation as a continued band **Accessories/special version** (optional, at extra charge): o Face end caps including pins for flush alignment of unit. o Return air connection DN 100 at the top o Flexible hose, **oxygen diffusion tight version** (Oxiblock, PE), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **without insulation for hot water** up to supply temperatures of 50 °C, operating pressure 10 bar o Flexible hose, **oxygen diffusion tight version** (Oxiblock, PE), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **with insulation for cold water** or standard hose: o Flexible hose, (EPDM-core), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **without insulation for hot water** o Flexible hose, (EPDM-core), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **with insulation for cold water** o Dummy grille for inactive sections or on request with return air connection o 2 x Straight-way valve with electro-thermal actuator o 2 x 3-way valve with electro-thermal actuator o 2 x Straight-way valve with 3-point actuator o 2 x 3-way valve with 3-point actuator o Throttling damper KLXG 100/1 -3-		

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Specification and Schedule of Prices

Active Chilled Beam Type HDF-4

Technical Specification

Primary air pressure	[Pa]
Primary air flow rate	[m^3/h]
Sound power L_{WA}	[dB(A)]
Sound pressure level at 18 m^2 Sabine L_{pA}	[dB(A)]

Cooling mode

Induction air temperature	[°C]	
Primary air temperature	[°C]	
Water supply temperature	[°C]	
Cooling capacity	[W]	

Heating mode

Induction air temperature	[°C]	
Water supply temperature	[°C]	
Heating capacity	[W]	

Natural convection	[W]	

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Specification and Schedule of Prices
Active Chilled Beam Type HDF-2/600

Qty.	Description	Unit price in €	Total price in €
	Active chilled beam for 2-pipe-systems **for low intermediate ceilings Type: HDF-2/600 (heating or cooling)** Compact chilled beam including a multi-row air/water heat exchanger, suitable for temperature control and ventilation of rooms based on the induction principle, blowing out air in four directions, consisting of the following components: - **Primary air box** of galvanized sheet steel, lateral NW 125 mm primary air socket, measuring device for flow rate determination, unit suspension via bores. - Solid, torsion resistant **nozzle box** of galvanized, black coated sheet steel including acoustically optimized non-combustible high-induction metal nozzles. - **Heat exchanger** with one water circuit, 2-pipe system, designed for cooling or heating, consisting of copper tubes with press-fitted aluminum fins; operating pressure up to 12 bar, water-side connection (Ø 12 mm) via quick release coupling; visible surfaces black coated. - **Air diffuser frame** of extruded aluminum profiles for horizontal supply air diffusion; transition to suspended ceiling either overlap or non-overlap; easily removable secondary air grille, expanded metal version, secured by safety suspension; visible surfaces powder coated similar to RAL. - **Flexible nozzle design** based on the primary air flow rate and preselected primary pressure (end pressure). **Outside dimensions [length x width x height]:** **600 mm grid** 598 x 1198 x 199 mm (edge-to-edge installation, grid ceiling) 593 x 1193 x 199 mm (T-bar ceiling, laid on top) 598 x 1198 x 199 mm (T-bar, concealed installation) **625 mm grid** 623 x 1248 x 199 mm (edge-to-edge installation, grid ceiling) 618 x 1243 x 199 mm (T-bar ceiling, laid on top) 623 x 1248 x 199 mm (T-bar, concealed installation) **Ceiling cut-out 570 x 1170 mm (plasterboard ceiling)** 598 x 1198 x 199 mm **Manufacturer:** **LTG Aktiengesellschaft** **Series:** **Active Chilled beam** **Type:** **HDF-2/600**		

Specification and Schedule of Prices
Active Chilled Beam Type HDF-2/600

Qty.	Description	Unit Price in €	Total price in €
	Variants: o **Unit HDF-L** Fresh air connection, details as standard version, yet without heat exchanger, for fresh air supply only o **Unit HDF-B** Blind diffuser, looks like the standard version. Without any A/C functions, serves to bridge the gap between A/C units in case of an installation as a continued band **Accessories/special version** (optional, at extra charge): o Flexible hose, **oxygen diffusion tight version** (Oxiblock, PE), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **without insulation for hot water** up to supply temperatures of +50 °C, operating pressure 10 bar o Flexible hose, **oxygen diffusion tight version** (Oxiblock, PE), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **with insulation for cold water** or standard hose: o Flexible hose, (EPDM-core), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **without insulation for hot water** o Flexible hose, (EPDM-core), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **with insulation for cold water** o Dummy grille for inactive sections or on request with return air connection o Straight-way valve with electro-thermal actuator o 3-way valve with electro-thermal actuator o Straight-way valve with 3-point actuator o 3-way valve with 3-point actuator o Throttling damper KLXG 125		

Specification and Schedule of Prices
Active Chilled Beam Type HDF-2/600

Qty.	Description			Unit Price in €	Total price in €
	Technical Specification				
	Primary air pressure	[Pa]			
	Primary air flow rate	[m^3/h]			
	Sound power L_{WA}	[dB(A)]			
	Sound pressure level at 18 m^2 Sabine L_{pA}	[dB(A)]			
	Cooling mode				
	Induction air temperature	[°C]			
	Primary air temperature	[°C]			
	Water supply temperature	[°C]			
	Cooling capacity	[W]			
	Heating mode				
	Induction air temperature	[°C]			
	Water supply temperature	[°C]			
	Heating capacity	[W]			
	Natural convection	[W]			

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Specification and Schedule of Prices

Active Chilled Beam Type HDC 1000-2

Qty.	Description	Unit Price in €	Total price in €
	Active chilled beam for 2-Pipe-Systems for low intermediate ceilings Type: HDC 1000-2 (heating or cooling) Compact chilled beam including a multi-row air/water heat exchanger, suitable for temperature control and ventilation of rooms based on the induction principle, consisting of the following components: - **Primary air box** aus verzinktem Stahlblech, of galvanized sheet steel, lateral NW 100 mm primary air socket, unit suspension via bores. - Solid, torsion resistant **nozzle box** of galvanized, black coated sheet steel including acoustically optimized non-combustible high-induction metal nozzles. - **Heat exchanger** with one water circuit, 2-pipe system, designed for cooling or heating, consisting of copper tubes with press-fitted aluminum fins; operating pressure up to 12 bar, water-side connection (12 mm diam.) via quick release coupling; visible surfaces black coated. - Combined **air inlet/outlet grille**, similar to RAL, for band grid ceilings, removable for easy nozzle and heat exchanger cleaning. Valves and electrothermal drives may be revised after removal of the air outlet grille. - **Flexible nozzle design** based on the primary air flow rate and preselected primary pressure (end pressure). **Outside dimensions** 1240 x 340 x 240 mm (flanged installation) 1198 x 298 x 240 mm (recessed installation) **Manufacturer: LTG Aktiengesellschaft** **Series: Aktiver Kühlbalken** **Type: HDC 1000-2** -2-		

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Specification and Schedule of Prices

Active Chilled Beam Type HDC 1000-2

Qty.	Description	Unit Price in €	Total price in €
	Accessories/special version (optional, at extra charge): o Flexible hose, **oxygen diffusion tight version** (Oxiblock, PE), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **without insulation for hot water** up to supply temperatures of 50 °C, operating pressure 10 bar o Flexible hose, **oxygen diffusion tight version** (Oxiblock, PE), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **with insulation for cold water** or standard hose: o Flexible hose, (EPDM-core), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **without insulation for hot water** o Flexible hose, (EPDM-core), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **with insulation for cold water** o Dummy grille for inactive sections o Straight-way valve with electro-thermal actuator o 3-way valve with electro-thermal actuator o Straight-way valve with 3-point actuator o 3-way valve with 3-point actuator o Throttling damper KLXG 100/1 -3-		

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Specification and Schedule of Prices

Active Chilled Beam Type HDC 1000-2

Technical Specification

Primary air pressure	[Pa]
Primary air flow rate	[m^3/h]
Sound power L_{WA}	[dB(A)]
Sound pressure level at 18 m^2 Sabine L_{pA}	[dB(A)]

Cooling mode

Induction air temperature	[°C]	
Primary air temperature	[°C]	
Water supply temperature	[°C]	
Cooling capacity	[W]	

Heating mode

Induction air temperature	[°C]	
Water supply temperature	[°C]	
Heating capacity	[W]	

Natural convection	[W]	

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Specification and Schedule of Prices

Active Chilled Beam Type HDC 1000-4

Qty.	Description	Unit Price in €	Total price in €
	Active chilled beam for 4-Pipe-Systems for low intermediate ceilings Type: HDC 1000-4 (heating and cooling) Compact chilled beam including a multi-row air/water heat exchanger, suitable for temperature control and ventilation of rooms based on the induction principle, consisting of the following components: - **Primary air box** aus verzinktem Stahlblech, of galvanized sheet steel, lateral NW 100 mm primary air socket, unit suspension via bores. - Solid, torsion resistant **nozzle box** of galvanized, black coated sheet steel including acoustically optimized non-combustible high-induction metal nozzles. - **Heat exchanger** with separate water circuits, 4-pipe system, designed for cooling and heating, consisting of copper tubes with press-fitted aluminum fins; operating pressure up to 12 bar, water-side connection (12 mm diam.) via quick release coupling; visible surfaces black coated. - Combined **air inlet/outlet grille**, similar to RAL, for band grid ceilings, removable for easy nozzle and heat exchanger cleaning. Valves and electrothermal drives may be revised after removal of the air outlet grille. - **Flexible nozzle design** based on the primary air flow rate and preselected primary pressure (end pressure). **Outside dimensions** 1240 x 340 x 240 mm (flanged installation) 1198 x 298 x 240 mm (recessed installation) **Manufacturer: LTG Aktiengesellschaft** **Series: Aktiver Kühlbalken** **Type: HDC 1000-4** -2-		

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Specification and Schedule of Prices

Active Chilled Beam Type HDC 1000-4

Qty.	Description	Unit Price in €	Total price in €
	Accessories/special version (optional, at extra charge): o Flexible hose, **oxygen diffusion tight version** (Oxiblock, PE), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **without insulation for hot water** up to supply temperatures of 50 °C, operating pressure 10 bar o Flexible hose, **oxygen diffusion tight version** (Oxiblock, PE), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **with insulation for cold water** or standard hose: o Flexible hose, (EPDM-core), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **without insulation for hot water** o Flexible hose, (EPDM-core), with stainless steel braiding, quick release coupling on one side, other side optional, length: 500 mm, **with insulation for cold water** o Dummy grille for inactive sections o 2 x Straight-way valve with electro-thermal actuator o 2 x 3-way valve with electro-thermal actuator o 2 x Straight-way valve with 3-point actuator o 2 x 3-way valve with 3-point actuator o Throttling damper KLXG 100/1 -3-		

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Specification and Schedule of Prices

Active Chilled Beam Type HDC 1000-4

Technical Specification

Primary air pressure	[Pa]
Primary air flow rate	[m^3/h]
Sound power L_{WA}	[dB(A)]
Sound pressure level at 18 m^2 Sabine L_{pA}	[dB(A)]

Cooling mode

Induction air temperature	[°C]	
Primary air temperature	[°C]	
Water supply temperature	[°C]	
Cooling capacity	[W]	

Heating mode

Induction air temperature	[°C]	
Water supply temperature	[°C]	
Heating capacity	[W]	

Natural convection	[W]	

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