The Innovation Company

LTG Aktiengesellschaft

Technical Brochure

LTG Air-Water Systems

LTG Induction

Active chilled beams HDF

Ceiling installation

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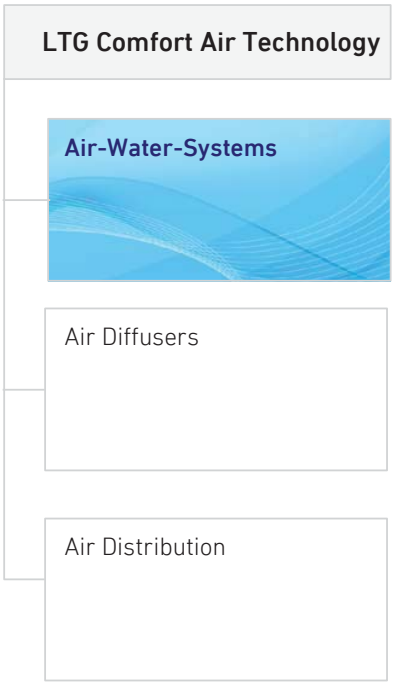
Active chilled beams HDF, ceiling installation



Content **Page**

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 are available as a word document at your local distributor or at www.LTG-AG.com.

Technical brochure
Active chilled beams HDF, ceiling installation

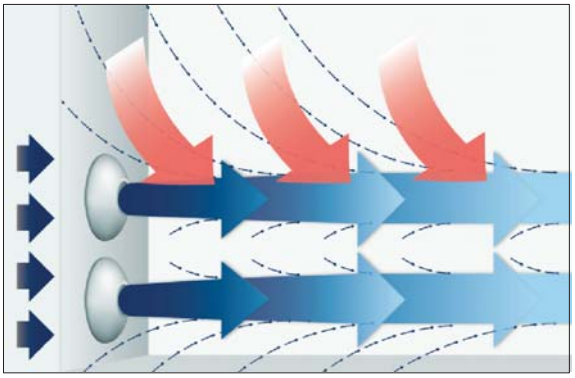
The Induction Principle

Air flowing through a nozzle forms a free jet. It induces the surrounding air layer along at its edges and thus enlarges the flowing air volume. This „induction“ takes place within the induction device. A special construction entrains room air (secondary air) through a heat exchanger, where it is cooled or heated. Together with the fresh air (primary air) the supply air then returns to the room for a comfortable climate.

LTG induction units of the latest generation are energy-efficient and can be operated and demandcontrolled with LTG SmartFlow technology.

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.



Induction Principle

Product overview

	Series HDF-300	Series HDF-600
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.	
Water system	2-pipe system, 4-pipe system	
Options	Low installation height Fresh air unit Blind diffuser	Fresh air unit Blind diffuser
Installation	In T-bar, grid and plasterboard ceilings Flanged, recessed	
Supply air pattern	2-way diffusion	2-way diffusion, 4-way diffusion

Technical brochure
Active chilled beams series HDF-300, ceiling installation

View of unit

Active chilled beam series HDF-600

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-300/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

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Active chilled beams series HDF-300, ceiling installation

Design

- 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 aluminium, either anodized or powder coated similar to RAL.

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

Accessories

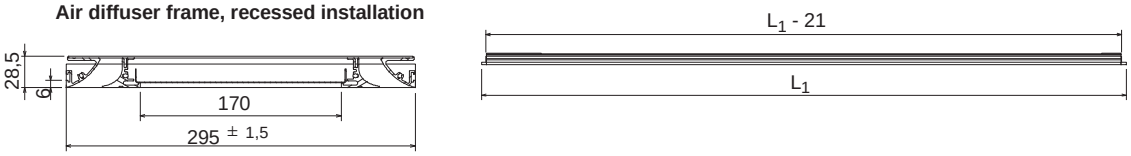
- Return air connection NW 100, integrated in the diffuser frame
- Blind unit extension, to be used to match specific lengths required on site
- Sheet metal console to mount valves on unit top-side or end side
- Thermal control valves
- Flexible water connections with 12 mm quick coupling

Dimensions

See drawings on the next pages.

Air diffuser frame, flanged installation

Air diffuser frame, recessed installation



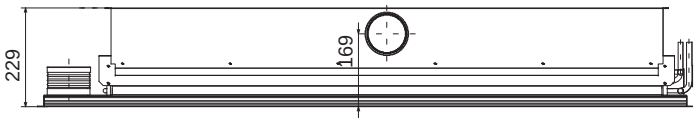
Size	L_1 recessed [mm]	L_2 flanged [mm]	L_3 [mm]	L_4 [mm]	L5 [mm]	Weight [kg]
1200	1195	1219	982	560	660	17
1500	1495	1519	1282	710	810	22
1800	1795	1819	1582	860	960	27
2100	2095	2119	1882	1010	1110	32

Technical brochure
Active chilled beams series HDF-i300, ceiling installation

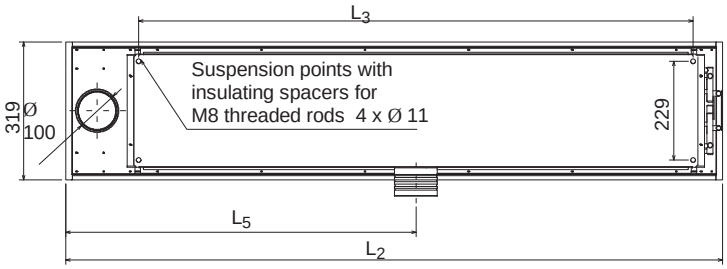
Dimensions

Model with return air connection DN 100

Front view

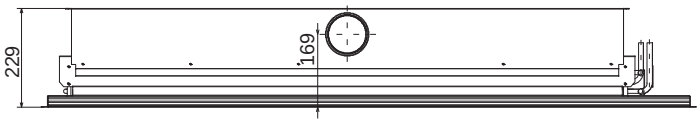


Top view

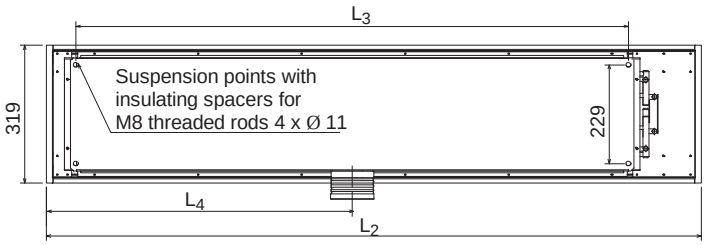


Standard model

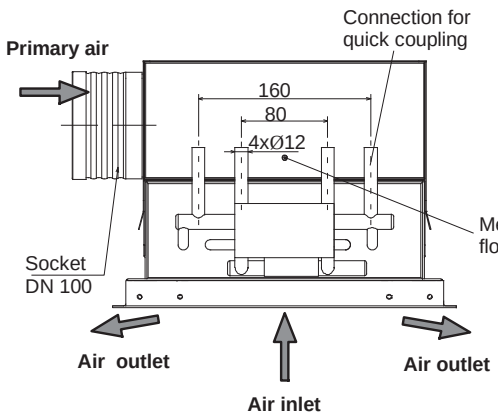
Front view



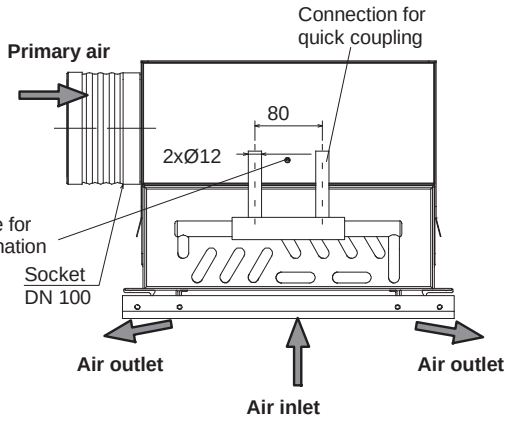
Top view



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

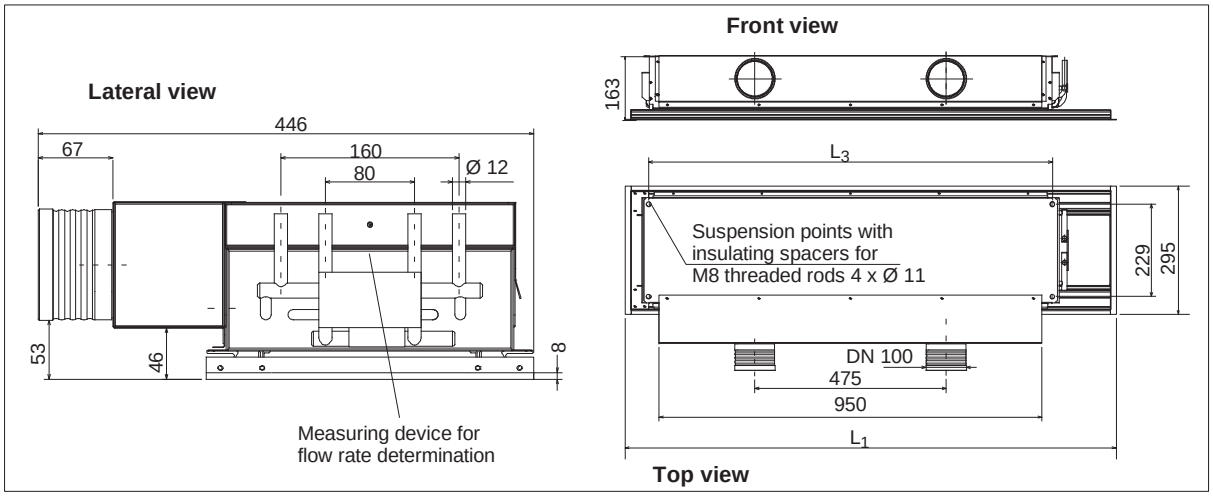


Lateral view 2-pipe-unit
shown: air diffuser frame recessed installation

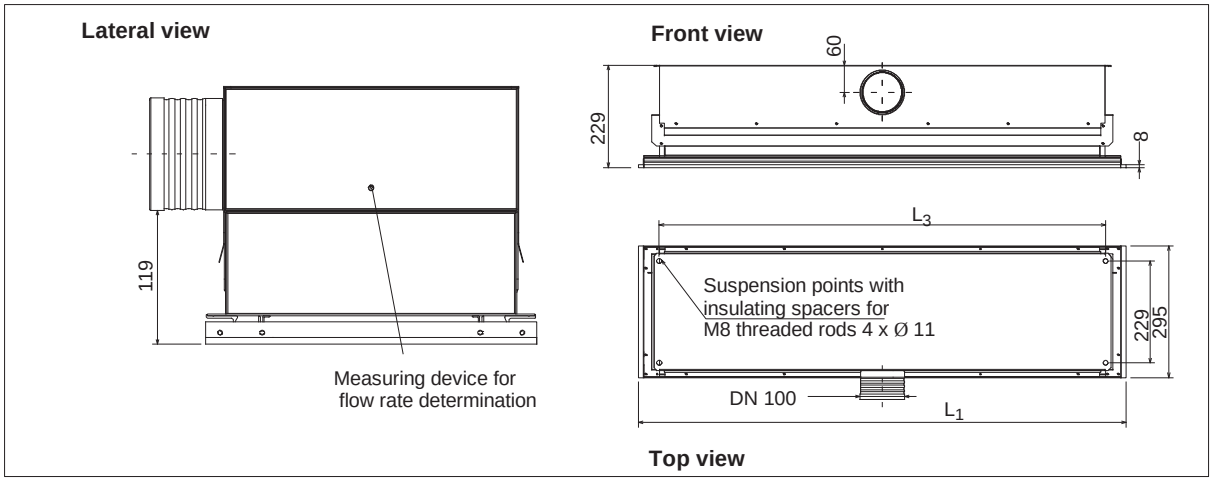


Technical brochure
Active chilled beams series HDF-300, ceiling installation

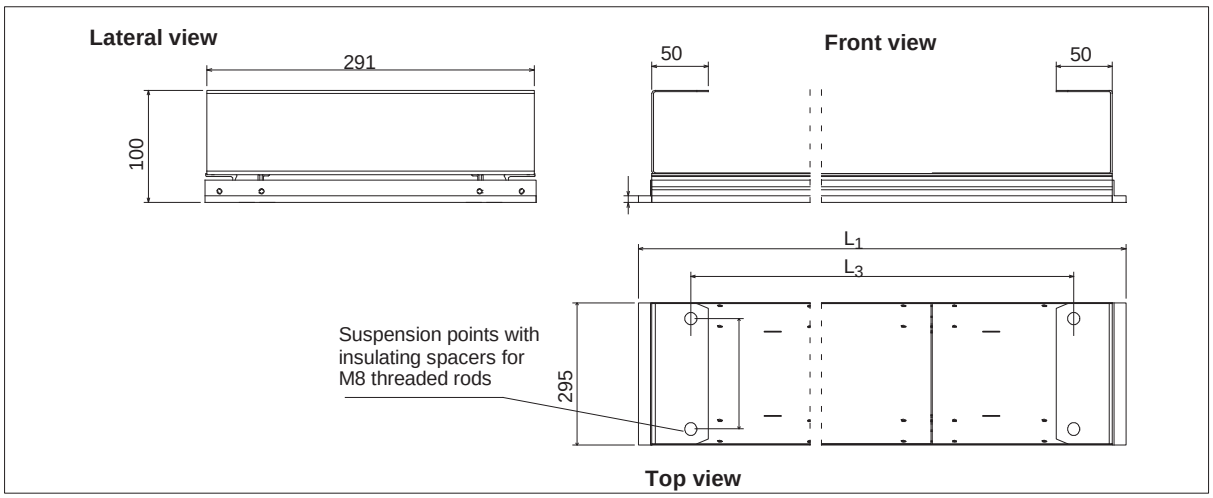
Dimensions type HDF-300/N - low installation height



Dimensions type HDF-300/L - fresh air unit



Dimensions type HDF-300/B - blind diffuser



Technical brochure
Active chilled beams series HDF-300, ceiling installation

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 / Δt [W/K]	Q_k / Δt [W/K]	Q_k [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]
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 / Δt [W/K]	Q_k / Δt [W/K]	Q_k [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]
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 / Δt [W/K]	Q_k / Δt [W/K]	Q_k [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]
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	

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Active chilled beams series HDF-300, ceiling installation

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 page 12 et sqq.

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)

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Technical brochure
Active chilled beams series HDF-300, ceiling installation

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	

Technical brochure
Active chilled beams series HDF-300, ceiling installation

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 et sqq.

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)

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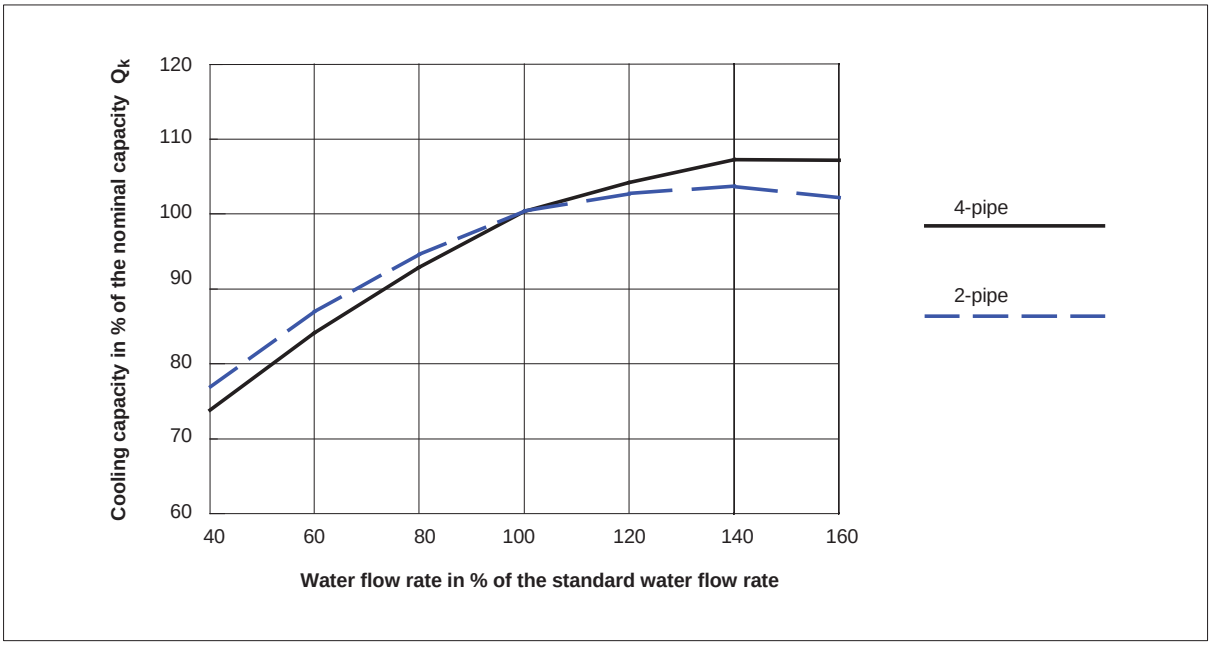
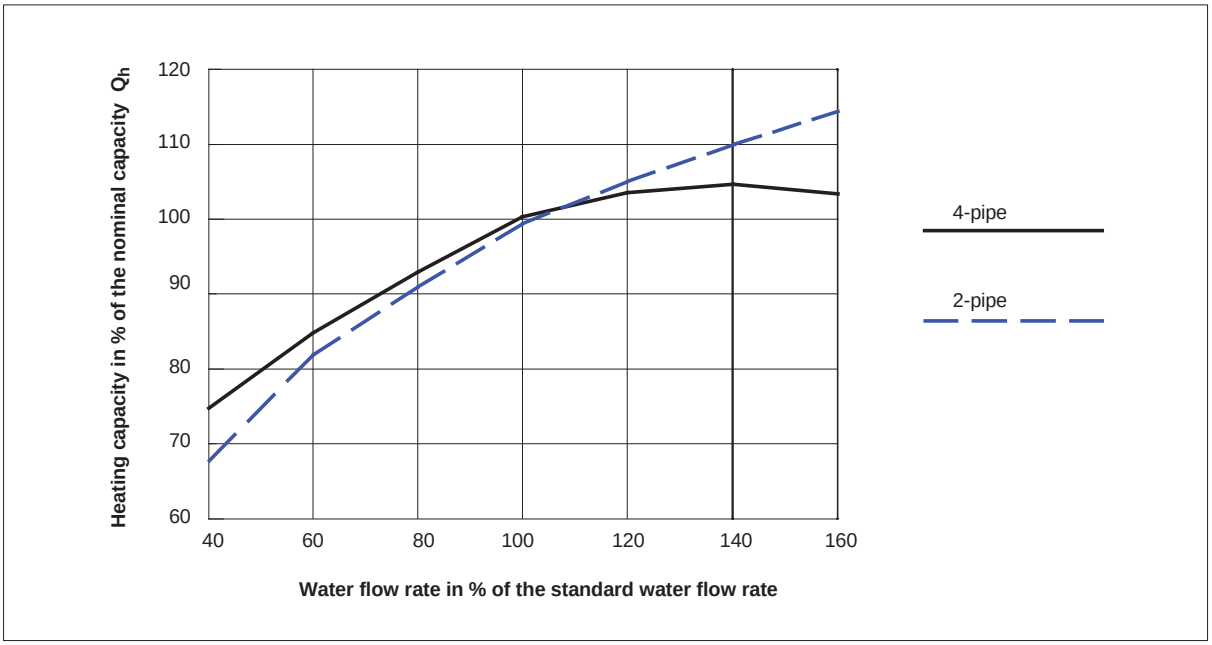
Active chilled beams series HDF-300, ceiling installation

Cooling capacity with different water flow rates

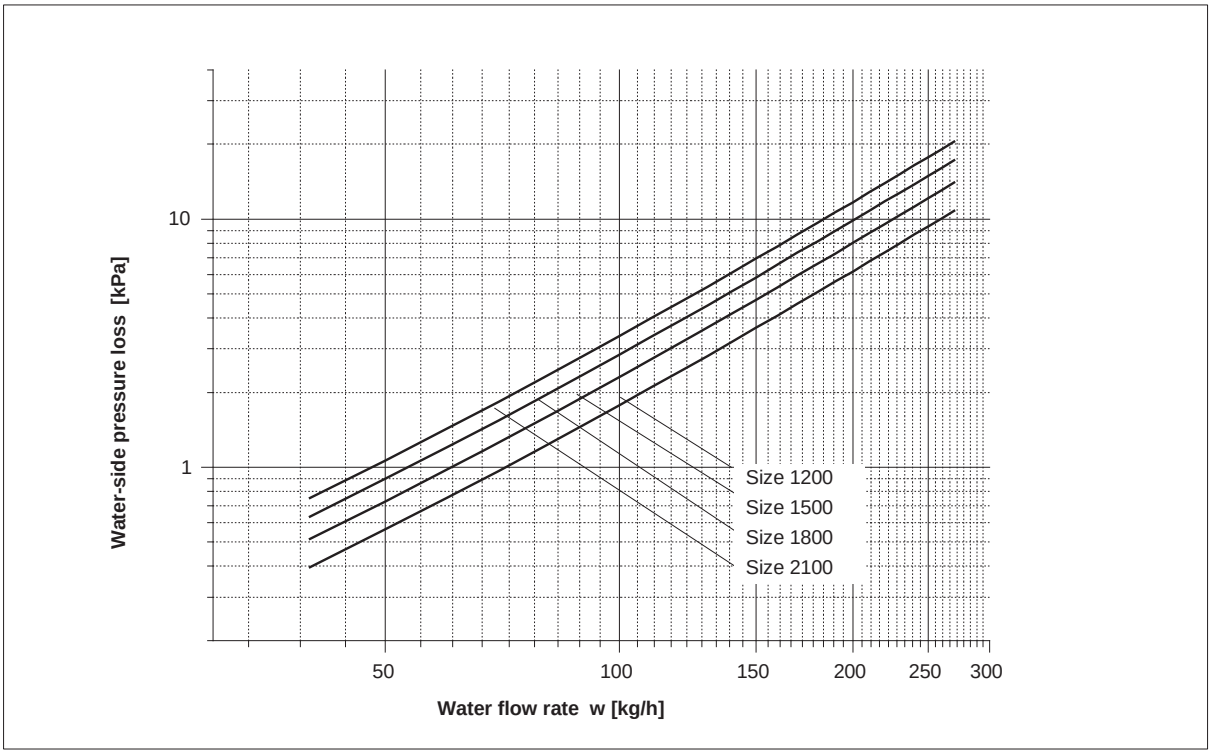


Heating capacity with different water flow rates

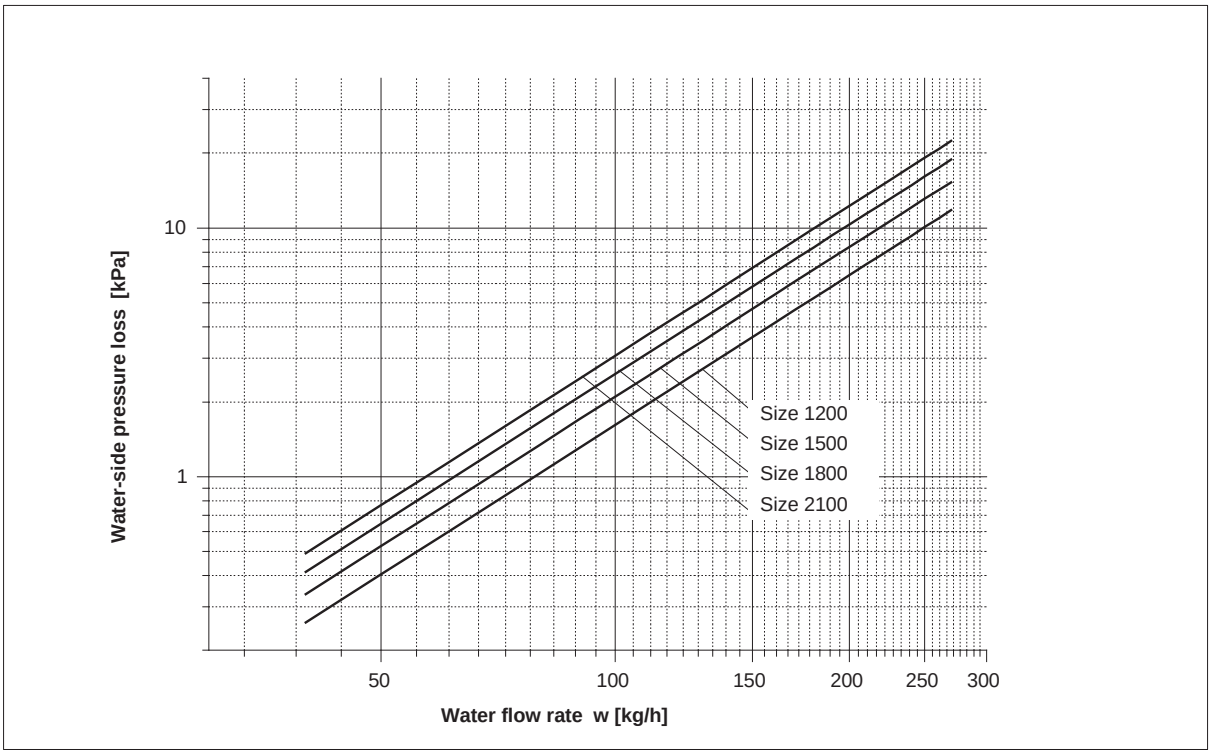


Technical brochure
Active chilled beams series HDF-300, ceiling-installation

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



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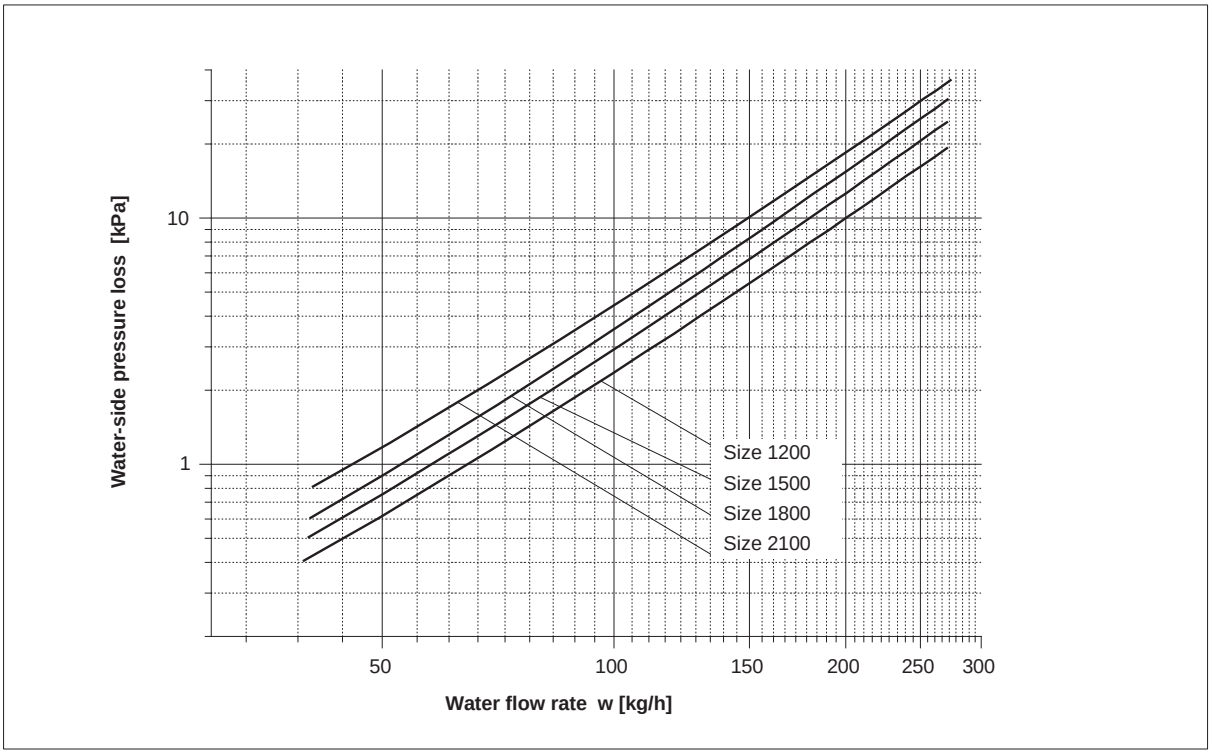
Technical brochure
Active chilled beams series HDF-300, ceiling installation

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



Technical brochure
Active chilled beams series HDF-300, ceiling installation

Nomenclature

HDF-300 / – / 2 / 1200 / 45 / 80 / A / S / 600 / RAL....

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

(1)	**Series**	**HDF-300**	=	HDF-300
(2)	**Type**	**–**	=	Standard installation height
		N	=	Low installation height
		L	=	Fresh air unit
		B	=	Blind diffuser
(3)	**Heat exchanger**	**2**	=	2-pipe system
		4	=	4-pipe system
(4)	**Size**	**1200**	=	1200
		1500	=	1500
		1800	=	1800
		2100	=	2100
		2400	=	2400
(5)	**Primary air flow rate**	**45**	=	E.g. 45 m³/h
(6)	**Primary air pressure**	**80**	=	E.g. 80 Pa
(7)	**Return air spigot**	**A**	=	With return air spigot
		O	=	Without return air spigot
(8)	**Secondary air grille**	**S**	=	Expanded metal
		L	=	Perforated sheet steel
(9)	**Ceiling grid (diffuser)**	**300**	=	300
(10)	**Surface of diffuser**	**RAL....**	=	Coated similar to RAL, indicate RAL-colour

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Technical brochure
Active chilled beams series HDF-600, ceiling installation

View of unit

Active chilled beam typ HDF-600/4A, 4-way diffusion

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)

Technical brochure
Active chilled beams type HDF-600/2A/2 and -600/2A/4, ceiling installation

Design

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

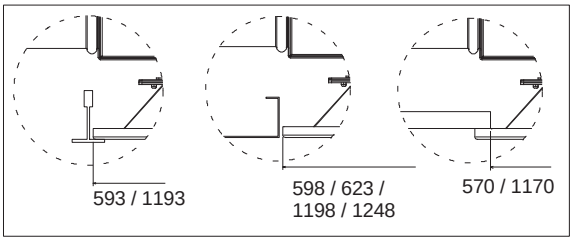
Materials and Finish

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

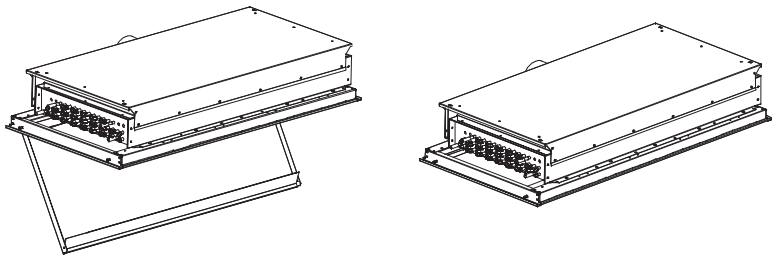
- Thermal control valves
- Flexible water connections with 12 mm quick coupling

Installation in different ceiling systems

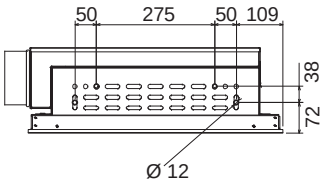


Dimensions, 2-way diffusion, 4-pipe system

Isometric views

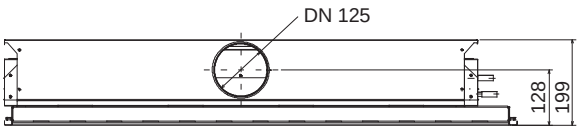


Front view



Shown with socket on the left

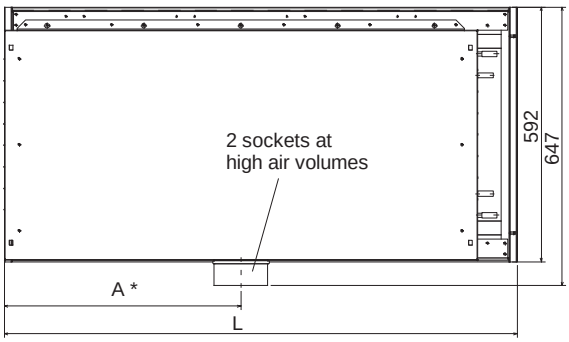
Lateral view, left side



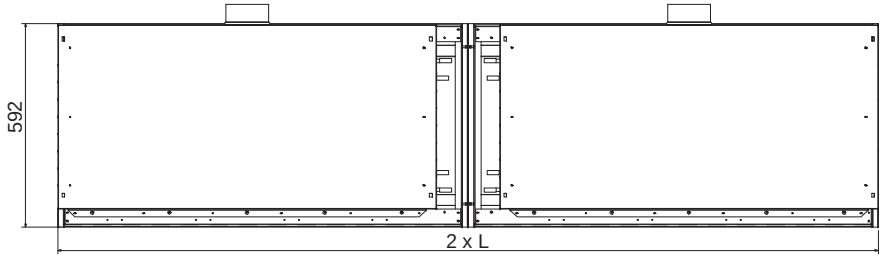
Size	L	A*
900	892	400
1200	1192	550
1800	1792	850
2400	2392	1150

* only valig with 1 socket

Top view



Beispiel Bandmontage



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Technical brochure
Active chilled beam type HDF-600/2A/2, ceiling installation

Technical data size 600 x 1200, 2-way diffusion, 2-pipe system

V_P [m^3/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]	w_{ok} / $Δp_w$ [kg/h]/[kPa]
64	70	15	21	21	50	715	170 / 3
77	100	20	26	25	60	851	
92	150	25	31	30	65	954	
80	70	19	25	26	54	806	
96	100	24	30	32	61	930	
115	150	29	35	38	69	1072	
99	70	23	29	33	56	889	
120	100	27	33	40	64	1037	
144	150	33	39	48	74	1216	
124	70	26	33	41	58	990	
151	100	31	37	50	66	1156	
180	150	36	42	60	79	1383	

Technical data size 600 x 1800, 2-way diffusion, 2-pipe system

V_P [m^3/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]	w_{ok} / $Δp_w$ [kg/h]/[kPa]
101	70	17	23	33	80	1134	170 / 4.5
122	100	19	25	40	94	1342	
146	150	24	30	48	102	1503	
126	70	18	24	42	87	1286	
153	100	23	29	50	96	1468	
183	150	28	34	60	110	1702	
158	70	22	28	52	88	1403	
191	100	27	33	63	101	1635	
229	150	32	38	76	117	1921	
197	70	26	32	65	92	1572	
239	100	30	36	79	104	1832	
286	150	35	41	94	124	2188	

Technical data size 600 x 2400, 2-way diffusion, 2-pipe system

V_P [m^3/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]	w_{ok} / $Δp_w$ [kg/h]/[kPa]
	70	15	21	46	110	1554	170 / 6
167	100	20	26	55	128	1833	
201	150	25	31	66	139	2052	
173	70	19	25	57	118	1755	
209	100	23	29	69	132	2007	
251	150	28	34	83	149	2321	
216	70	23	29	71	120	1917	
262	100	27	33	86	137	2233	
313	150	32	38	103	159	2626	
270	70	26	32	89	125	2143	
327	100	31	37	108	143	2509	
392	150	36	42	129	170	2993	

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

Measuring parameters see page 21.

Legend see page 21.

Technical brochure
Active chilled beam type HDF-600/2A/4, ceiling installation

Technical data size 600 x 1200, 2-way diffusion, 4-pipe system, line assembly

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]
64	70	15	21	21	46	670	170 / 6	33	601	110 / 7
77	100	20	26	25	54	794		39	695	
92	150	25	31	30	63	935		44	801	
80	70	19	25	26	50	763		36	648	
96	100	24	30	32	59	908		42	749	
115	150	29	35	38	68	1061		48	861	
99	70	23	29	33	54	868		38	686	
120	100	27	33	40	63	1028		44	790	
144	150	33	39	48	73	1206		50	907	
124	70	26	33	41	56	970		39	706	
151	100	31	37	50	65	1147		45	811	
180	150	36	42	60	76	1356		52	928	

Technical data size 600 x 1800, 2-way diffusion, 4-pipe system, line assembly

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]
101	70	17	23	33	73	1063	170 / 8.5	52	931	110 / 10
122	100	19	25	40	85	1253		60	1072	
146	150	24	30	48	99	1473		68	1230	
126	70	18	24	42	80	1216		56	999	
153	100	23	29	50	93	1434		64	1148	
183	150	28	34	60	108	1684		73	1314	
158	70	22	28	52	85	1370		58	1051	
191	100	27	33	63	99	1620		67	1205	
229	150	32	38	76	115	1905		76	1374	
197	70	26	32	65	89	1540		60	1075	
239	100	30	36	79	103	1818		68	1227	
286	150	35	41	94	120	2144		77	1394	

Technical data size 600 x 2400, 2-way diffusion, 4-pipe system, line assembly

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]
138	70	15	21	46	100	1456	170 / 11	69	1248	110 / 13
167	100	20	26	55	116	1712		80	1433	
201	150	25	31	66	135	2012		91	1637	
173	70	19	25	57	109	1660		74	1334	
209	100	23	29	69	127	1960		85	1527	
251	150	28	34	83	147	2297		97	1739	
216	70	23	29	71	116	1873		78	1397	
262	100	27	33	86	135	2213		88	1592	
313	150	32	38	103	157	2604		100	1805	
270	70	26	32	89	121	2101		79	1419	
327	100	31	37	108	141	2489		89	1611	
392	150	36	42	129	164	2933		101	1817	

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

Measuring parameters see page 21.

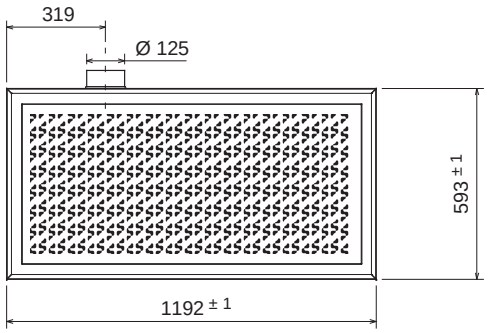
Legend see page 21.

Technical brochure

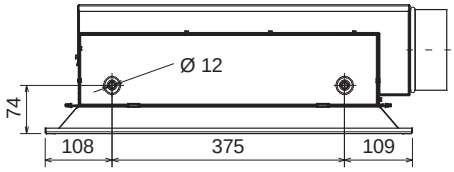
Active chilled beam type HDF-600/4A/2 and -600/4A/4, ceiling installation

Dimensions, 4-way diffusion, 2-pipe system and 4-pipe system

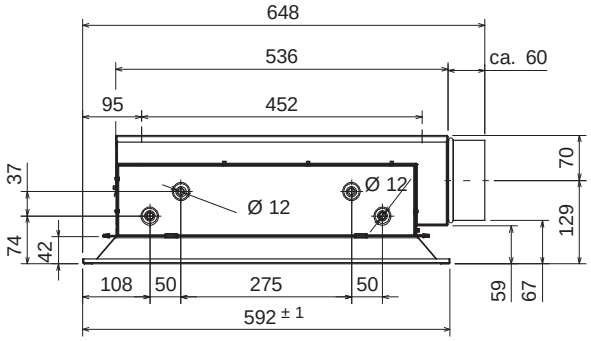
View from below



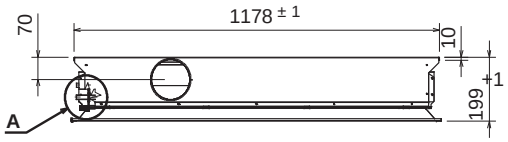
Lateral view, left side, 2-pipe system



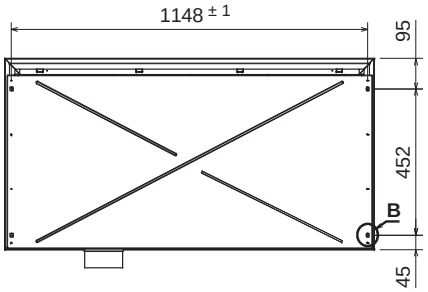
Lateral view, left side, 4-pipe system



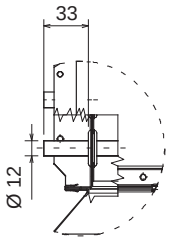
Front view



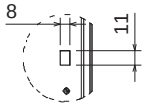
Top view



Detail A



Detail B



Technical brochure
Active chilled beam type HDF-600/4A/2 and -600/4A/4, ceiling installation

Technical data size 600 x 1200, 4-way diffusion, 2-pipe-system

V_P [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]	w_{ok} / $Δp_w$ [kg/h] / [kPa]	Q_h /Δt [W/K]	Q_h [2] [W]	w_{oh} / $Δp_w$ [kg/h]/[kPa]
54	70	12	18	18	45	628		40	720	
64	100	16	23	21	53	735		47	846	
78	150	21	28	26	63	889		56	1008	
67	70	16	22	22	50	717		44	792	
80	100	20	27	26	57	836		51	918	
98	150	25	32	32	69	1006		61	1098	
84	70	19	26	27	54	816		48	864	
100	100	24	30	33	62	949		55	990	
122	150	29	35	40	74	1139	170 / 7	66	1188	110 / 3
105	70	23	30	34	59	929		52	936	
125	100	28	34	41	67	1079		60	1080	
153	150	33	39	50	79	1293		71	1278	
131	70	27	33	43	63	1059		56	1008	
156	100	31	38	51	72	1228		64	1152	
191	150	36	43	62	85	1470		75	1350	
167	70	31	37	55	68	1229		61	1098	
200	100	35	42	65	77	1425		69	1242	

Technical data size 600 x 1200, 4-way diffusion, 4-pipe-system

V_P [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]	w_{ok} / $Δp_w$ [kg/h]/[kPa]	Q_h /Δt [W/K]	Q_h [2] [W]	w_{oh} / $Δp_w$ [kg/h]/[kPa]
54	70	12	18	18	41	583		29	522	
64	100	16	23	21	48	694		35	630	
78	150	21	28	26	60	856		43	774	
67	70	16	22	22	46	681		33	594	
80	100	20	27	26	55	807		39	702	
98	150	25	32	32	67	987		46	828	
84	70	19	26	27	52	792		37	666	
100	100	24	30	33	61	933		43	774	
122	150	29	35	40	73	1130	170 / 7	51	918	110 / 1
105	70	23	30	34	57	916		40	720	
125	100	28	34	41	66	1071		46	828	
153	150	33	39	50	78	1284		54	972	
131	70	27	33	43	63	1052		43	774	
156	100	31	38	51	71	1219		49	882	
191	150	36	43	62	82	1442		55	990	
167	70	31	37	55	67	1217		46	828	
200	100	35	42	65	74	1394		49	882	

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 page 22.

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

2) Water supply temperature: 40 °C
Air inlet temperature or return air temperature: 22 °C
Primary 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 m² 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)

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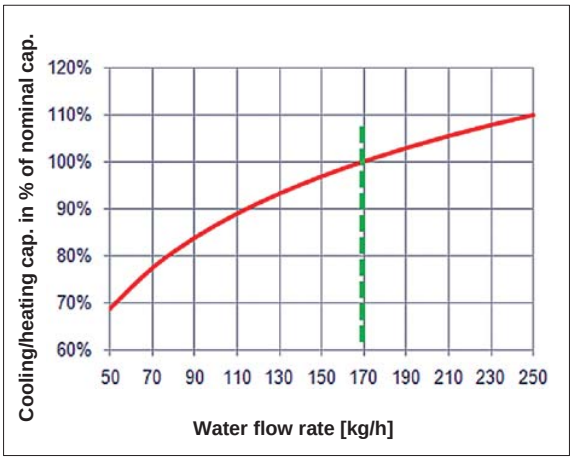
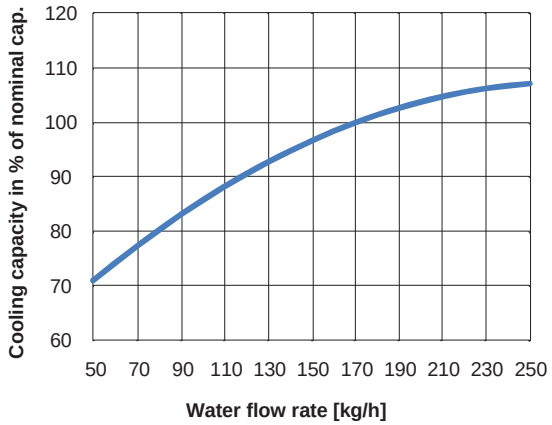
Technical brochure
Active chilled beams type HDF-600/4A/2 and -600/4A/4, ceiling installation

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

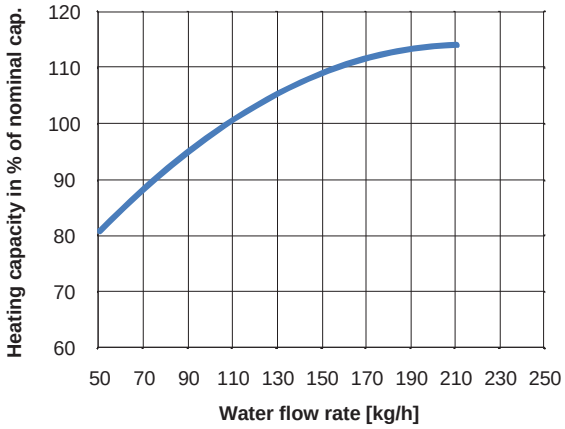


Capacity with different water flow rates for 4-pipe heat exchanger

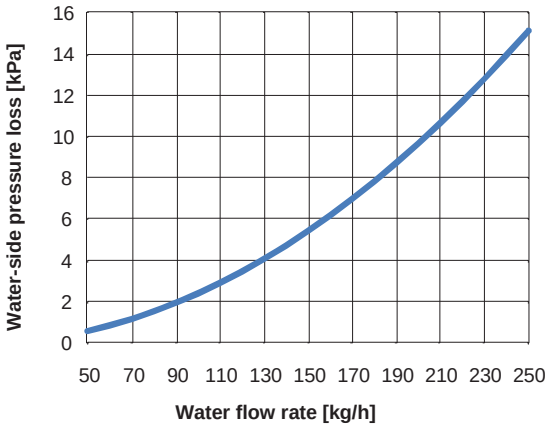
Cooling capacity

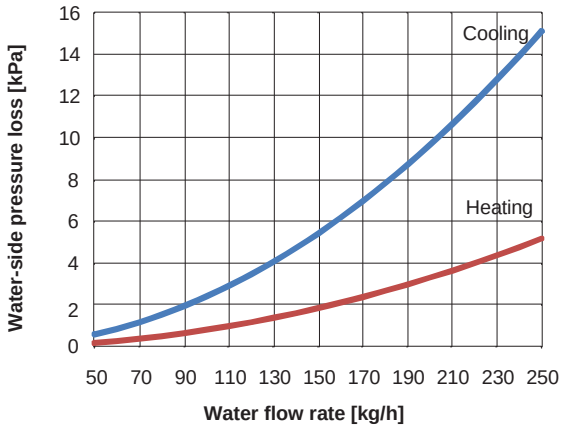


Heating capacity



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



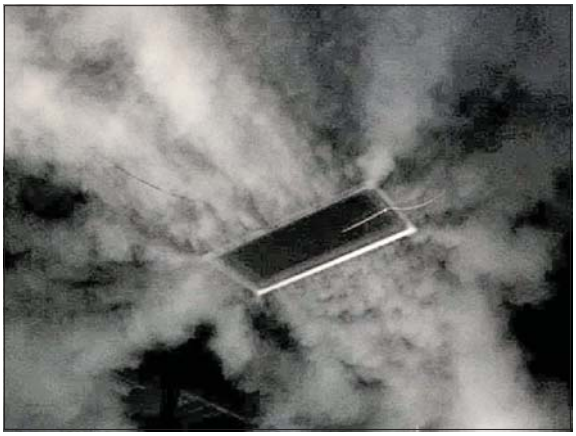


Technical brochure
Active chilled beams series HDF-600, ceiling installation

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

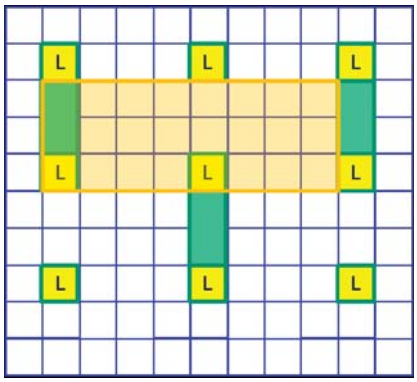
Location in the ceiling grid

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.

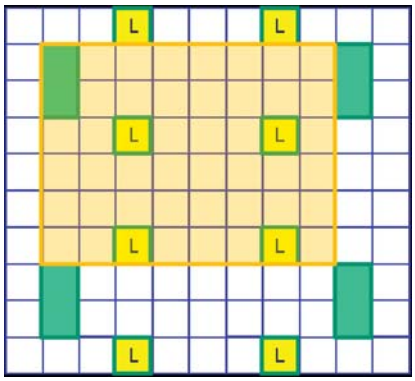
The following examples provide suggestions for a 600 mm grid ceiling with square, mirrored grid lights installed flush.

Examples apply to

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

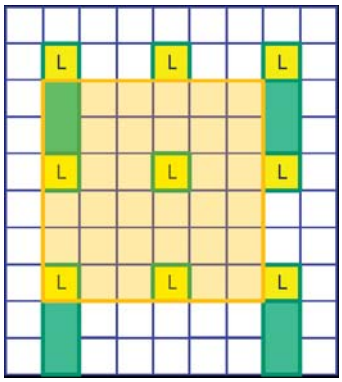


600 x 600 ceiling grid, 4 x 3 grid light
With 8.6 m²/unit and 7.5 m³/h/m²:
· 65 m³/h/unitt · 735 W · 85 W/m²



600 x 600 ceiling grid, 4 x 2 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

Technical brochure
Active chilled beams series HDF-600, ceiling installation

Nomenclature

HDF-600 / 4A / 2 / 1200 / 45 / 80 / A / S / 600 / RAL....
(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

(1)	**Series**	**HDF-600**	=	HDF-600
(2)	**Type**	**2A**	=	2-way diffusion
		4A	=	4-way diffusion
(3)	**Heat exchanger**	**2**	=	2-pipe system
		4	=	4-pipe system
(4)	**Size**	**900**	=	900
		1200	=	1200
		1800	=	1800 (only as HDF-600/2A, 2-way diffusion)
		2400	=	2400 (only as HDF-600/2A, 2-way diffusion)
(5)	**Primary air flow rate**	**45**	=	E.g. 45 m³/h
(6)	**Primary air pressure**	**80**	=	E.g. 80 Pa
(7)	**Return air spigot**	**A**	=	With return air spigot
		O	=	Without return air spigot
(8)	**Secondary air grille**	**S**	=	Expanded metal (only available for HDF-600/2A, 2-way diffusion)
		L	=	Perforated sheet steel
(9)	**Ceiling gird (diffuser)**	**600**	=	600 (diffuser length 592 mm)
		625	=	625 (diffuser length 617 mm)
(10)	**Surface of diffuser**	**RAL....**	=	Coated similar to RAL, indicate RAL-colour

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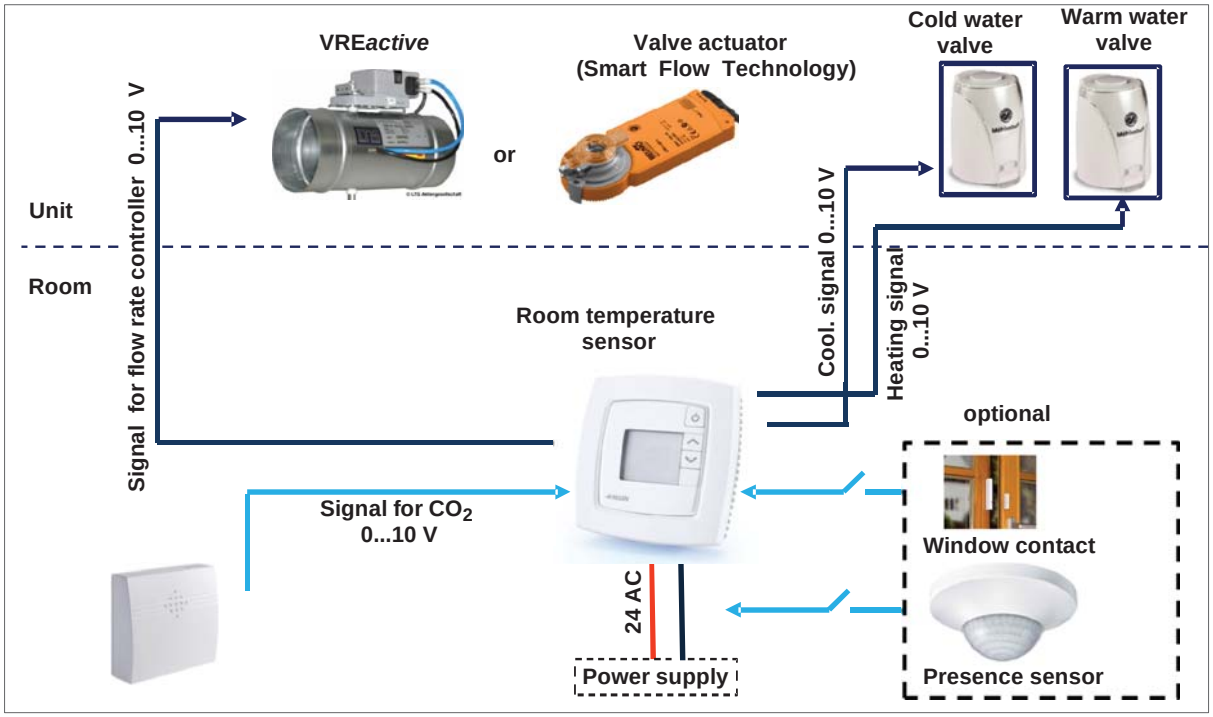
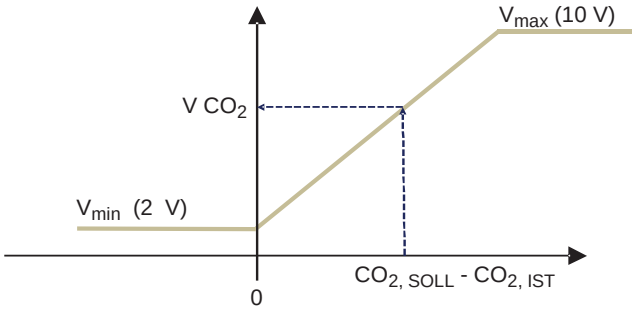
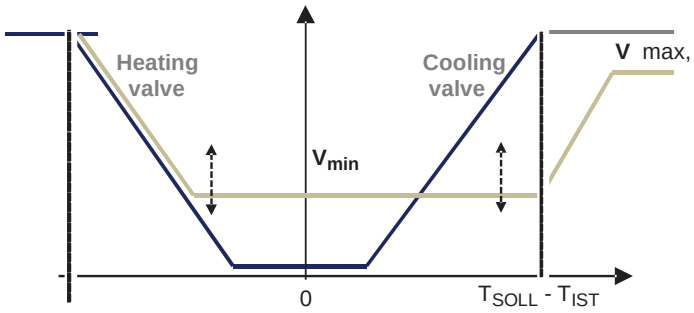
Technical brochure
Active chilled beams HDF, ceiling installation

Control system with CO_2-Sensor





SOLL = nominal value, IST = actual value



1. CO_2 control circuit

The set value for the flow rate controller depends on actual CO_2 value

Set value for flow rate controller
The highest value of the 2 control circuits is decisive. The highest value of the correcting variable of the 2 circuits (CO_2 or temperature) is chosen.

2. Temperature control circuit

- **Low cooling load**
  (0...48 % of cooling capacity) cooling valves open, $\mathbf{V_{prim}}$ remains at $\mathbf{V_{min}}$
- **increased cooling load**
  (52...100 % of cooling capacity) cooling valves are completely opened, $\mathbf{V_{prim}}$ opens to $\mathbf{V_{max}}$

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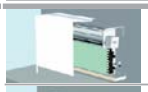
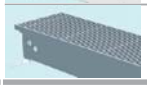
Product Overview
LTG Air-Water Systems

LTG Induction – Induction Units

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

LTG FanPower – Fan Coil Units

Ceiling Installation	Sill Installation	Floor Installation
 LVC System Indivent®	 VFC	 VKB
 VKH	 QVC	 SKB
 VKE		
 KFA cool wave®		

LTG Decentral – Decentralised Ventilation Units

Ceiling Installation	Sill Installation	Floor Installation
 FVS Univent®	 FVM	 FVD
		 FVP *pulse* System PulseVentilation

Engineering Services

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Comfort Air Technology

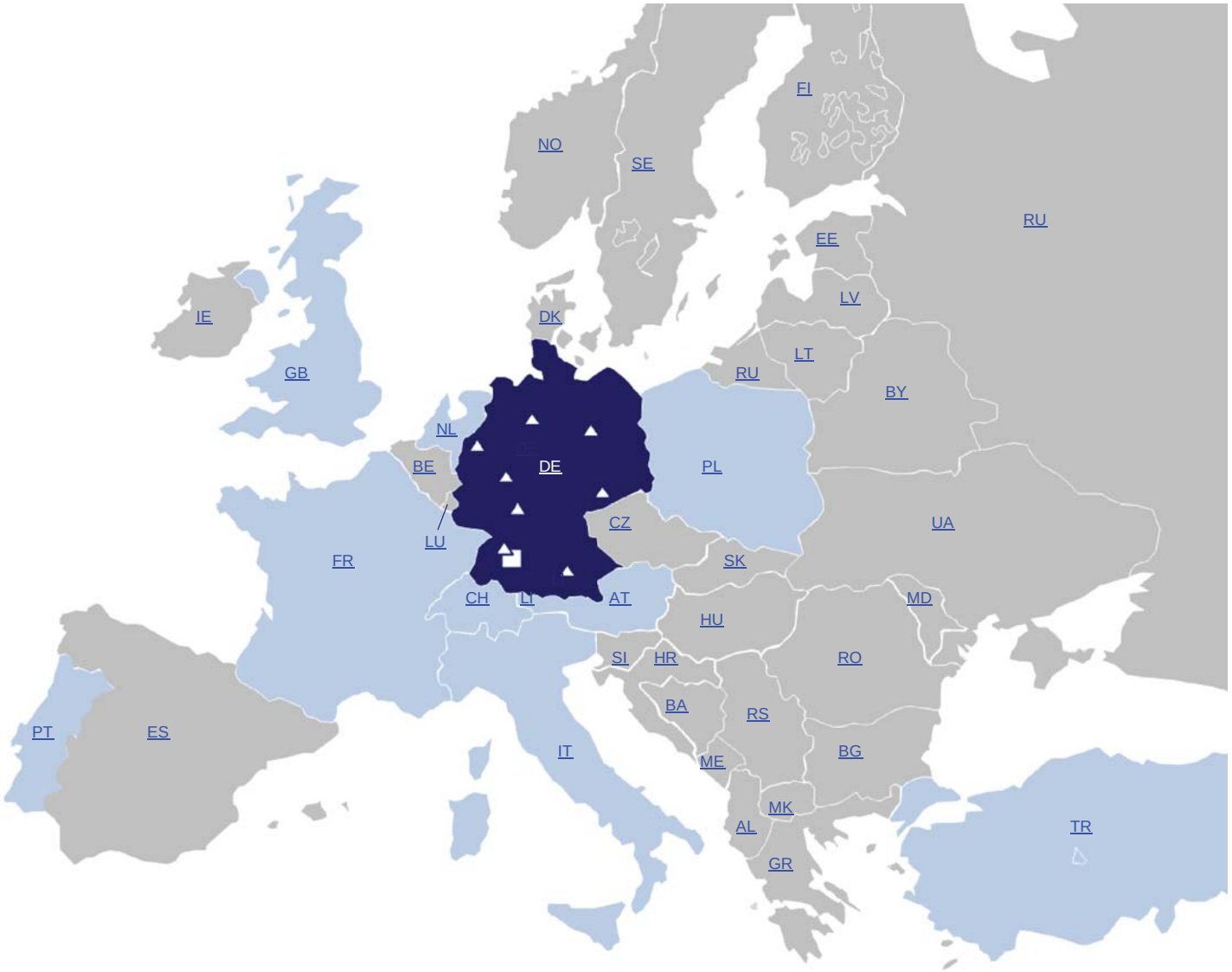
Air-Water Systems
Air Diffusers
Air Distribution

Process Air Technology

Fans
Filtration technology
Humidification Technology

Engineering Services

Air flow tests
Thermodynamics
Acoustics / Comfort
Customised solutions



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