



Chilled beam HG1/09

# HEATING AND COOLING

## Chilled beam HG1/09

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## CHILLED BEAM HG1/09

### Application and operation

Chilled beams are applied in cooling, heating and ventilation of buildings that are designed and constructed appropriately. Their specific application is for rooms with moderate humidity. Chilled beam advantages include energy saving operation and excellent performance in combination with heat pumps. For heating purposes, chilled beams may be combined with heating bodies of other types (radiators, floor heating etc.). Chilled beams are designed for application in partitioned and open-plan offices, shops, bank offices, hospital rooms, hotel rooms, classrooms etc. They are suitable for virtually any style of modern building that is designed in accordance with guidelines for proper sealing and insulation and built with quality materials.

### Economics of operation

Chilled beams are distinguished for economic operation and energy savings, as well as being suitable for application of heating/cooling medium from heat pumps.

### Types, designs, sizes

Our production range includes chilled beams:

- for 2-pipe and 4-pipe systems
- for in-ceiling (flush) installation
- in 7 standard lengths.

### Functions

- room cooling
- room ventilation
- room heating (in combination with other heating bodies)

### Operation

A chilled beam HG1/09 is mounted above the suspended ceiling in the room to be cooled, heated or ventilated. Primary air from an air handling unit, treated to proper humidity and temperature, is blown through nozzles into the chilled beam plenum box next to a heat exchanger and is mixed with warm air from the room drawn through the heat exchanger by the primary air. Cooled mixed air is then discharged, applying the ceiling effect, underneath the ceiling. Air propagates along the ceiling and then circulates into the room. Normally, room air is cooled in a heat exchanger with 14-18°C cooling water. It is essential that water is maintained above the dew point in the system; otherwise, the valve shuts-off cold water supply to prevent condensation within the device. In heating application, water temperature is normally in the 30-40°C range.

### Characteristics

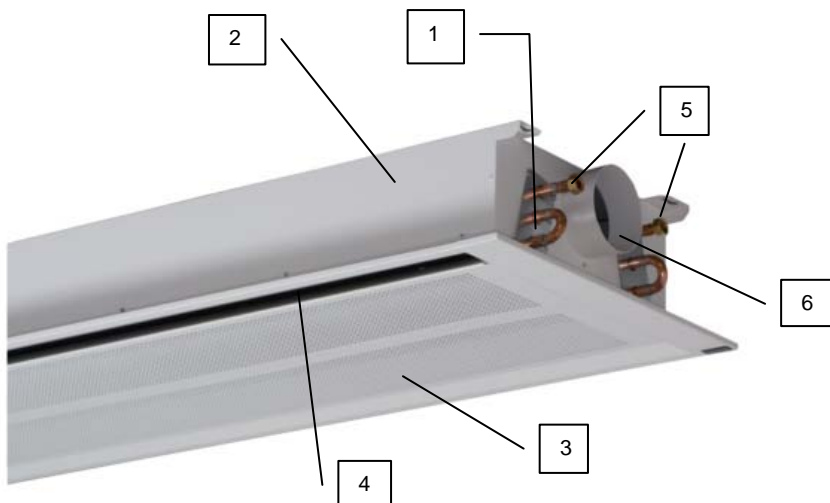
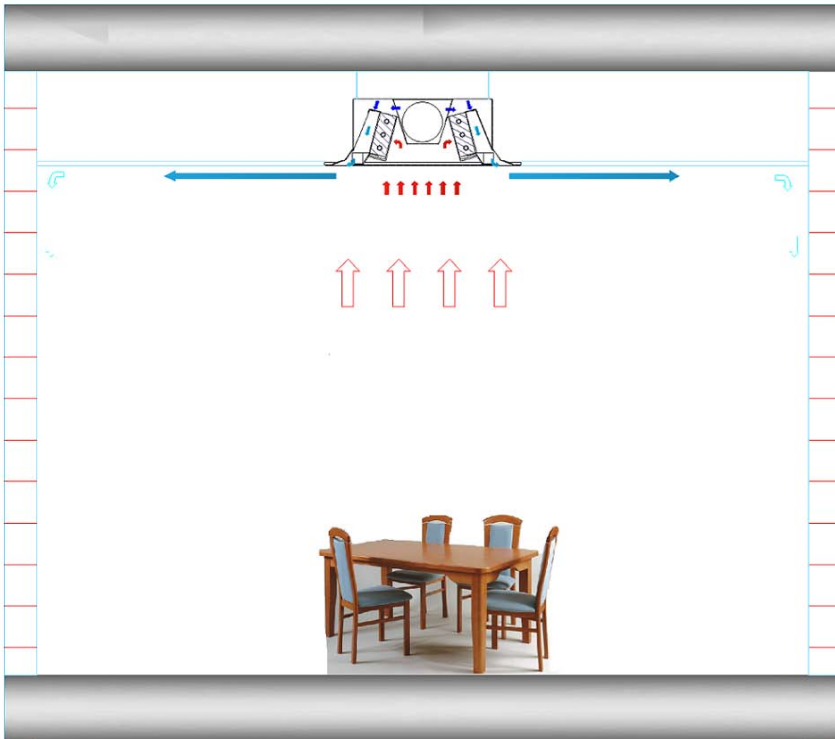
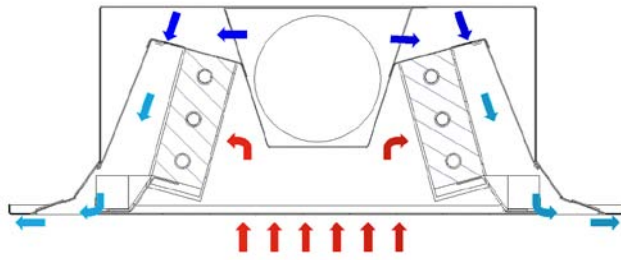
- large cooling capacity
- low noise level
- simultaneous heating and ventilation - no special accessories required
- cooling and heating by means of room air and conditioned air
- suitable for small and large air flow rates
- easy integration into the cooling/heating system
- flush mounting in the room ceiling
- optional control accessories
- operation without a fan
- visible parts of the housing painted in standard RAL 9010 colour or any specified other RAL colour
- optional variant perforation patterns
- easy installation, operation and maintenance

### Pressure and temperature limitations for the heat exchanger

- maximum operating pressure: 11 bar
- maximum allowable pressure: 16.5 bar
- maximum water temperature: 110 °C



### Principle of operation

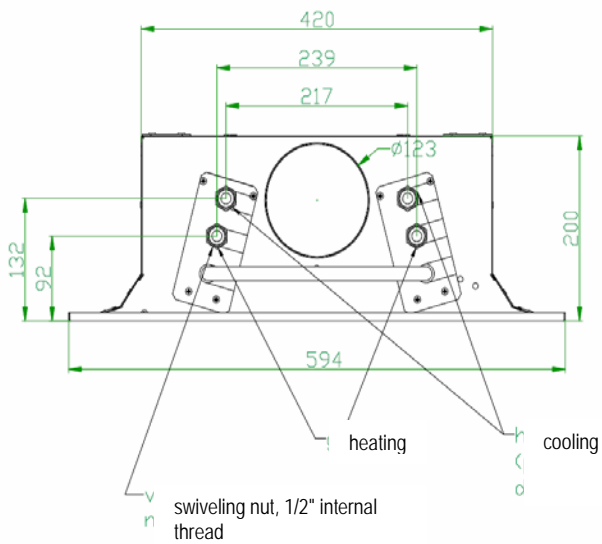


### Components:

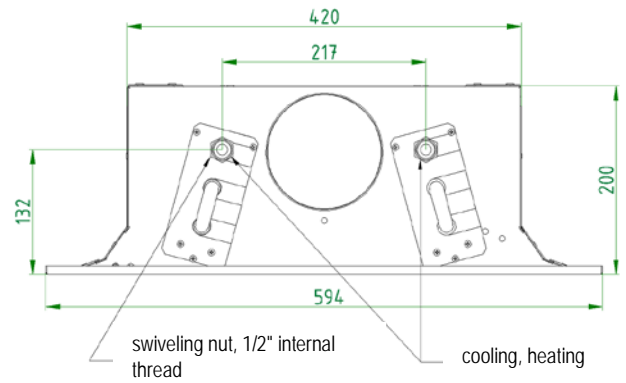
1. heat exchanger
2. housing
3. intake mask
4. air discharge
5. water connections
6. air connection

## Dimensions

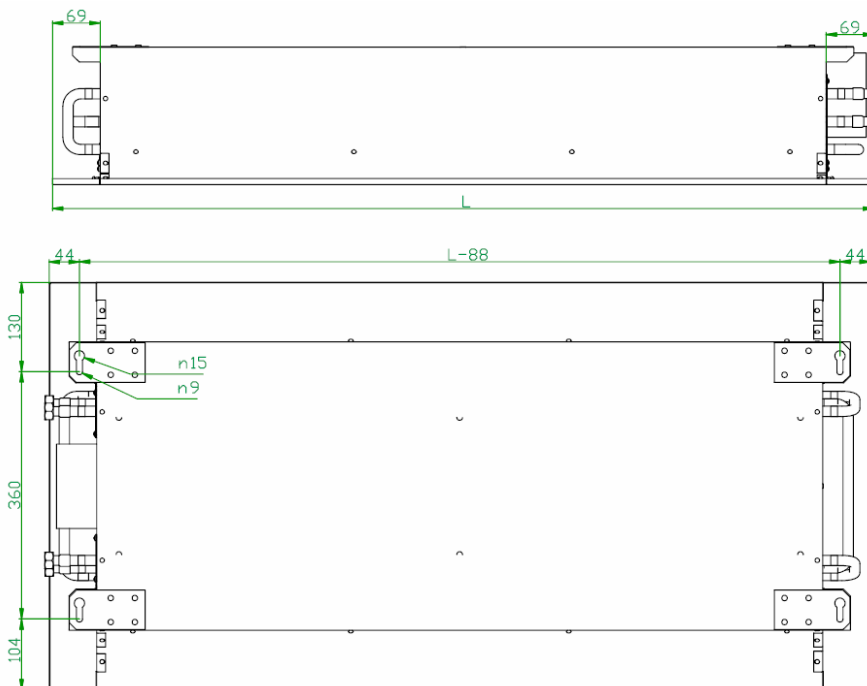
4-pipe cooling and heating system



2-pipe cooling and heating system



**Note:** accessory H10 is a designation for nominal dimension 675 mm (actual width 669 mm). Technical data is equal to the chilled beam with mask width 600 mm. The only difference between nominal width 600 mm and 675 mm is the width of mask.



Size	L (mm)
120	1194
150	1494
180	1794
210	2094
240	2394
270	2694
300	2994

HG1/09-120-2C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	29	<20	342	342	98	0,41	403	342	98	0,41	355	294	126	0,64
20	72	116	33	592	592	169	1,06	714	592	169	1,06	630	509	218	1,65
30	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	29	<20	451	451	26	0,04	510	451	26	0,04	470	411	35	0,17
20	72	116	33	779	779	45	0,10	898	779	45	0,10	830	710	61	0,18
30	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HG1/09-120-4C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	29	<20	295	295	84	0,21	355	295	84	0,21	314	253	109	0,33
20	72	116	33	509	509	146	0,56	631	509	146	0,56	559	438	188	0,87
30	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	29	<20	265	265	15	0,01	325	265	15	0,01	301	242	21	0,01
20	72	116	33	458	458	26	0,01	578	458	26	0,01	537	418	36	0,03
30	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cooling:  $\Delta T = T_{air} - (T_{water\ in} + T_{water\ out}) / 2$

$\Delta T_{pa} = T_{air} - T_{primary\ air}$

Heating:  $\Delta T = (T_{water\ in} + T_{water\ out}) / 2 - T_{air}$

$\Delta T_{pa} = T_{primary\ air} - T_{air}$

V<sub>pa</sub>: primary air volume flow

Δp<sub>plenum</sub>: air pressure drop in plenum box

L<sub>WA</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

Q<sub>c</sub> total: total cooling capacity

Q<sub>c</sub> he: cooling capacity on heat exchanger

Q<sub>h</sub> total: total heating capacity

Q<sub>h</sub> he: heating capacity on heat exchanger

m<sub>w</sub>: water mass flow

Δp<sub>w</sub>: water pressure drop

HG1/09-120-XC-N												
V <sub>pa</sub>		L <sub>WA</sub>	L <sub>pA</sub>	L <sub>pA</sub> 4dB	Sound power at octave band frequency in Hz							
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000
10	36	31	<20	<20	-	2	11	20	23	27	24	16
20	72	49	37	33	10	20	30	39	42	46	42	34
30	108	-	-	-	-	-	-	-	-	-	-	-
40	144	-	-	-	-	-	-	-	-	-	-	-
50	180	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-

L<sub>WA</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

L<sub>pA</sub>: sound pressure is determined at microphone distance of 1 m from the unit.

L<sub>pA</sub> 4dB: sound pressure values presented with room attenuation of 4 dB.

HG1/09-120-2C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				$\Delta T = 9.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 9.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 8.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA}$ 4dB	$Q_{c\ total}$	$Q_{c\ he}$	$m_w$	$\Delta p_w$	$Q_{c\ total}$	$Q_{c\ he}$	$m_w$	$\Delta p_w$	$Q_{c\ total}$	$Q_{c\ he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	7	<20	191	191	55	0,15	252	191	55	0,15	225	164	70	0,23
20	72	29	<20	379	379	108	0,49	501	379	108	0,49	447	326	140	0,76
30	108	64	25	567	567	162	0,98	749	567	162	0,98	669	487	209	1,53
40	144	115	36	753	753	215	1,62	996	753	215	1,62	890	647	277	2,52
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

HG1/09-120-4C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				$\Delta T = 9.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 9.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 8.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA}$ 4dB	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	7	<20	254	254	15	0,01	314	254	15	0,01	291	231	20	0,03
20	72	29	<20	504	504	29	0,05	624	504	29	0,05	579	460	39	0,08
30	108	64	25	753	753	43	0,10	932	753	43	0,10	866	687	59	0,17
40	144	115	36	1002	1002	57	0,16	1240	1002	57	0,16	1152	913	78	0,28
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

HG1/09-120-4C-V															
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				$\Delta T = 22.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 22.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 20.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA}$ 4dB	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	7	<20	168	168	48	0,08	229	168	48	0,08	205	144	62	0,13
20	72	29	<20	333	333	95	0,27	455	333	95	0,27	408	287	123	0,41
30	108	64	25	498	498	142	0,54	680	498	142	0,54	610	428	184	0,84
40	144	115	36	662	662	189	0,88	905	662	189	0,88	812	569	244	1,37
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

HG1/09-120-4C-V															
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				$\Delta T = 22.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 22.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 20.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA}$ 4dB	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	7	<20	153	153	9	0,00	213	153	9	0,00	199	140	12	0,00
20	72	29	<20	304	304	17	0,01	424	304	17	0,01	397	277	24	0,01
30	108	64	25	455	455	26	0,01	634	455	26	0,01	594	415	36	0,03
40	144	115	36	604	604	35	0,02	843	604	35	0,02	790	551	47	0,04
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cooling:  $\Delta T = T_{air} - (T_{water\ in} + T_{water\ out}) / 2$

$\Delta T_{pa} = T_{air} - T_{primary\ air}$

Heating:  $\Delta T = (T_{water\ in} + T_{water\ out}) / 2 - T_{air}$

$\Delta T_{pa} = T_{primary\ air} - T_{air}$

$V_{pa}$ : primary air volume flow

$\Delta p_{plenum}$ : air pressure drop in plenum box

$L_{WA}$ : sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

$Q_{c\ total}$ : total cooling capacity

$Q_{c\ he}$ : cooling capacity on heat exchanger

$Q_{h\ total}$ : total heating capacity

$Q_{h\ he}$ : heating capacity on heat exchanger

$m_w$ : water mass flow

$\Delta p_w$ : water pressure drop

HG1/09-120-XC-V												
$V_{pa}$		$L_{WA}$	$L_{pA}$	$L_{pA}$ 4dB	Sound power at octave band frequency in Hz							
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000
10	36	<20	<20	<20	-	-	5	9	8	5	2	2
20	72	28	<20	<20	3	13	19	23	22	19	17	17
30	108	41	29	25	16	26	32	36	35	32	29	30
40	144	52	40	36	27	37	43	47	46	43	40	40
50	180	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-

$L_{WA}$ : sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

$L_{pA}$ : sound pressure is determined at microphone distance of 1 m from the unit.

$L_{pA}$  4dB: sound pressure values presented with room attenuation of 4 dB.

HG1/09-150-2C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	18	<20	375	375	107	0,61	436	375	107	0,61	383	322	138	0,95
20	72	70	27	648	648	185	1,58	770	648	185	1,58	679	557	239	2,46
30	108	158	38	893	893	255	2,77	1075	893	255	2,77	950	767	329	4,31
40	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	18	<20	487	487	28	0,06	547	487	28	0,06	504	444	38	0,10
20	72	70	27	842	842	48	0,15	962	842	48	0,15	887	768	66	0,26
30	108	158	38	1160	1160	66	0,26	1339	1160	66	0,26	1237	1058	91	0,46
40	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HG1/09-150-4C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	18	<20	323	323	92	0,32	383	323	92	0,32	338	277	119	0,50
20	72	70	27	558	558	159	0,83	679	558	159	0,83	601	479	205	1,29
30	108	158	38	768	768	219	1,45	950	768	219	1,45	842	660	283	2,25
40	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	18	<20	287	287	16	0,01	346	287	16	0,01	321	261	22	0,01
20	72	70	27	495	495	28	0,02	615	495	28	0,02	571	452	39	0,04
30	108	158	38	683	683	39	0,04	862	683	39	0,04	801	622	53	0,06
40	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cooling:  $\Delta T = T_{air} - (T_{water\ in} + T_{water\ out}) / 2$

$\Delta T_{pa} = T_{air} - T_{primary\ air}$

Heating:  $\Delta T = (T_{water\ in} + T_{water\ out}) / 2 - T_{air}$

$\Delta T_{pa} = T_{primary\ air} - T_{air}$

V<sub>pa</sub>: primary air volume flow

Δp<sub>plenum</sub>: air pressure drop in plenum box

L<sub>WA</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

Q<sub>c</sub> total: total cooling capacity

Q<sub>c</sub> he: cooling capacity on heat exchanger

Q<sub>h</sub> total: total heating capacity

Q<sub>h</sub> he: heating capacity on heat exchanger

m<sub>w</sub>: water mass flow

Δp<sub>w</sub>: water pressure drop

HG1/09-150-XC-N												
V <sub>pa</sub>		L <sub>WA</sub>	L <sub>pA</sub>	L <sub>pA</sub> 4dB	Sound power at octave band frequency in Hz							
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000
10	36	26	<20	<20	-	-	6	15	19	22	19	11
20	72	43	31	27	5	15	24	33	36	40	37	28
30	108	54	42	38	15	25	35	44	47	51	47	39
40	144	-	-	-	-	-	-	-	-	-	-	-
50	180	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-

L<sub>WA</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

L<sub>pA</sub>: sound pressure is determined at microphone distance of 1 m from the unit.

L<sub>pA</sub> 4dB: sound pressure values presented with room attenuation of 4 dB.

HG1/09-150-2C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	4	<20	199	199	57	0,20	260	199	57	0,20	232	171	73	0,31
20	72	17	<20	395	395	113	0,67	516	395	113	0,67	461	339	145	1,04
30	108	39	<20	590	590	169	1,34	772	590	169	1,34	689	507	217	2,09
40	144	69	27	784	784	224	2,21	1027	784	224	2,21	917	674	289	3,44
50	180	108	35	978	978	279	3,24	1282	978	279	3,24	1144	841	360	5,05
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

HG1/09-150-4C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	4	<20	261	261	15	0,02	321	261	15	0,02	298	238	20	0,03
20	72	17	<20	519	519	30	0,06	638	519	30	0,06	592	473	41	0,11
30	108	39	<20	775	775	44	0,13	954	775	44	0,13	885	706	61	0,22
40	144	69	27	1030	1030	59	0,21	1269	1030	59	0,21	1178	939	80	0,37
50	180	108	35	1285	1285	73	0,31	1583	1285	73	0,31	1470	1171	100	0,54
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

HG1/09-150-4C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	4	<20	175	175	50	0,11	235	175	50	0,11	211	150	64	0,17
20	72	17	<20	347	347	99	0,36	469	347	99	0,36	420	298	128	0,56
30	108	39	<20	519	519	148	0,73	701	519	148	0,73	628	446	191	1,13
40	144	69	27	690	690	197	1,20	932	690	197	1,20	835	593	254	1,86
50	180	108	35	860	860	246	1,76	1164	860	246	1,76	1043	739	317	2,74
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

HG1/09-150-4C-V															
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	4	<20	158	158	9	0,00	217	158	9	0,00	203	144	12	0,00
20	72	17	<20	313	313	18	0,01	432	313	18	0,01	405	285	24	0,02
30	108	39	<20	468	468	27	0,02	647	468	27	0,02	605	426	37	0,03
40	144	69	27	622	622	36	0,03	860	622	36	0,03	805	567	49	0,05
50	180	108	35	775	775	44	0,05	1074	775	44	0,05	1005	707	61	0,08
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cooling:  $\Delta T = T_{air} - (T_{water\ in} + T_{water\ out}) / 2$

$\Delta T_{pa} = T_{air} - T_{primary\ air}$

Heating:  $\Delta T = (T_{water\ in} + T_{water\ out}) / 2 - T_{air}$

$\Delta T_{pa} = T_{primary\ air} - T_{air}$

V<sub>pa</sub>: primary air volume flow

Δp<sub>plenum</sub>: air pressure drop in plenum box

L<sub>WA</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

Q<sub>c</sub> total: total cooling capacity

Q<sub>c</sub> he: cooling capacity on heat exchanger

Q<sub>h</sub> total: total heating capacity

Q<sub>h</sub> he: heating capacity on heat exchanger

m<sub>w</sub>: water mass flow

Δp<sub>w</sub>: water pressure drop

HG1/09-150-XC-V												
V <sub>pa</sub>		L <sub>WA</sub>	L <sub>PA</sub>	L <sub>PA</sub> 4dB	Sound power at octave band frequency in Hz							
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000
10	36	<20	<20	<20	-	-	2	6	5	2	-	-
20	72	23	<20	<20	-	8	14	18	17	14	12	12
30	108	34	21	<20	9	19	25	29	28	25	22	23
40	144	43	31	27	18	28	34	38	37	34	32	32
50	180	52	39	35	27	37	43	47	46	43	40	40
60	216	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-

L<sub>WA</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

L<sub>PA</sub>: sound pressure is determined at microphone distance of 1 m from the unit.

L<sub>PA</sub> 4dB: sound pressure values presented with room attenuation of 4 dB.

HG1/09-180-2C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c total</sub>	Q <sub>c he</sub>	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c total</sub>	Q <sub>c he</sub>	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c total</sub>	Q <sub>c he</sub>	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	12	<20	406	406	116	0,85	466	406	116	0,85	409	349	149	1,32
20	72	47	22	701	701	200	2,20	823	701	200	2,20	724	603	258	3,43
30	108	106	33	966	966	276	3,85	1148	966	276	3,85	1012	830	356	6,00
40	144	188	40	1212	1212	346	5,73	1455	1212	346	5,73	1285	1042	447	8,92
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

HG1/09-180-4C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c total</sub>	Q <sub>c he</sub>	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c total</sub>	Q <sub>c he</sub>	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c total</sub>	Q <sub>c he</sub>	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	12	<20	349	349	100	0,44	410	349	100	0,44	361	300	129	0,69
20	72	47	22	603	603	172	1,15	725	603	172	1,15	640	518	222	1,79
30	108	106	33	831	831	237	2,01	1013	831	237	2,01	896	714	306	3,12
40	144	188	40	1043	1043	298	2,98	1286	1043	298	2,98	1139	896	384	4,64
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

HG1/09-180-2C-N															
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h total</sub>	Q <sub>h he</sub>	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h total</sub>	Q <sub>h he</sub>	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h total</sub>	Q <sub>h he</sub>	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	12	<20	521	521	30	0,08	581	521	30	0,08	535	475	41	0,14
20	72	47	22	901	901	51	0,21	1020	901	51	0,21	940	821	70	0,36
30	108	106	33	1241	1241	71	0,36	1420	1241	71	0,36	1310	1131	97	0,62
40	144	188	40	1557	1557	89	0,53	1796	1557	89	0,53	1659	1420	122	0,92
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

HG1/09-180-4C-N															
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h total</sub>	Q <sub>h he</sub>	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h total</sub>	Q <sub>h he</sub>	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h total</sub>	Q <sub>h he</sub>	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	12	<20	306	306	18	0,01	366	306	18	0,01	339	279	24	0,02
20	72	47	22	530	530	30	0,03	649	530	30	0,03	602	483	41	0,05
30	108	106	33	730	730	42	0,05	909	730	42	0,05	844	665	57	0,09
40	144	188	40	916	916	52	0,07	1155	916	52	0,07	1074	835	72	0,13
50	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cooling:  $\Delta T = T_{air} - (T_{water in} + T_{water out}) / 2$

$\Delta T_{pa} = T_{air} - T_{primary air}$

Heating:  $\Delta T = (T_{water in} + T_{water out}) / 2 - T_{air}$

$\Delta T_{pa} = T_{primary air} - T_{air}$

V<sub>pa</sub>: primary air volume flow

Δp<sub>plenum</sub>: air pressure drop in plenum box

L<sub>wa</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

Q<sub>c total</sub>: total cooling capacity

Q<sub>c he</sub>: cooling capacity on heat exchanger

Q<sub>h total</sub>: total heating capacity

Q<sub>h he</sub>: heating capacity on heat exchanger

m<sub>w</sub>: water mass flow

Δp<sub>w</sub>: water pressure drop

HG1/09-180-XC-N													
V <sub>pa</sub>		L <sub>wa</sub>	L <sub>pa</sub>	L <sub>pa</sub> 4dB	Sound power at octave band frequency in Hz								
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000	
10	36	23	<20	<20	-	-	3	12	15	19	16	8	
20	72	39	26	22	-	10	19	28	32	35	32	24	
30	108	50	37	33	11	21	30	39	43	46	43	35	
40	144	57	44	40	18	28	38	47	50	54	50	42	
50	180	-	-	-	-	-	-	-	-	-	-	-	
60	216	-	-	-	-	-	-	-	-	-	-	-	
70	252	-	-	-	-	-	-	-	-	-	-	-	

L<sub>wa</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

L<sub>pa</sub>: sound pressure is determined at microphone distance of 1 m from the unit.

L<sub>pa 4dB</sub>: sound pressure values presented with room attenuation of 4 dB.

HG1/09-180-2C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				$\Delta T = 9.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 9.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 8.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA}$ 4dB	$Q_{c\ total}$	$Q_{c\ he}$	$m_w$	$\Delta p_w$	$Q_{c\ total}$	$Q_{c\ he}$	$m_w$	$\Delta p_w$	$Q_{c\ total}$	$Q_{c\ he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	3	<20	207	207	59	0,26	267	207	59	0,26	238	178	76	0,41
20	72	12	<20	410	410	117	0,86	532	410	117	0,86	474	353	151	1,35
30	108	26	<20	613	613	175	1,74	795	613	175	1,74	709	527	226	2,71
40	144	46	21	815	815	233	2,86	1058	815	233	2,86	943	700	300	4,46
50	180	73	28	1016	1016	290	4,21	1320	1016	290	4,21	1177	874	374	6,56
60	216	104	35	1217	1217	348	5,77	1582	1217	348	5,77	1411	1046	448	8,99
70	252	142	41	1418	1418	405	7,53	1843	1418	405	7,53	1644	1219	522	11,73

HG1/09-180-4C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				$\Delta T = 9.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 9.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 8.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA}$ 4dB	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	3	<20	268	268	15	0,02	328	268	15	0,02	304	245	21	0,04
20	72	12	<20	533	533	30	0,08	652	533	30	0,08	605	486	42	0,14
30	108	26	<20	796	796	45	0,17	975	796	45	0,17	905	725	62	0,29
40	144	46	21	1058	1058	60	0,27	1297	1058	60	0,27	1203	965	83	0,47
50	180	73	28	1319	1319	75	0,40	1618	1319	75	0,40	1501	1203	103	0,69
60	216	104	35	1581	1581	90	0,55	1939	1581	90	0,55	1799	1441	124	0,95
70	252	142	41	1841	1841	105	0,72	2259	1841	105	0,72	2096	1679	144	1,24

HG1/09-180-4C-V															
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				$\Delta T = 22.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 22.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 20.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA}$ 4dB	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	3	<20	182	182	9	0,00	222	182	9	0,00	207	148	13	0,01
20	72	12	<20	321	321	18	0,01	441	321	18	0,01	412	293	25	0,02
30	108	26	<20	480	480	27	0,02	659	480	27	0,02	617	438	38	0,04
40	144	46	21	638	638	36	0,04	877	638	36	0,04	821	582	50	0,07
50	180	73	28	796	796	46	0,06	1095	796	46	0,06	1024	726	62	0,10
60	216	104	35	954	954	55	0,08	1312	954	55	0,08	1228	870	75	0,14
70	252	142	41	1111	1111	63	0,10	1529	1111	63	0,10	1431	1013	87	0,18

Cooling:  $\Delta T = T_{air} - (T_{water\ in} + T_{water\ out}) / 2$

$\Delta T_{pa} = T_{air} - T_{primary\ air}$

Heating:  $\Delta T = (T_{water\ in} + T_{water\ out}) / 2 - T_{air}$

$\Delta T_{pa} = T_{primary\ air} - T_{air}$

$V_{pa}$ : primary air volume flow

$\Delta p_{plenum}$ : air pressure drop in plenum box

$L_{WA}$ : sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

$Q_{c\ total}$ : total cooling capacity

$Q_{c\ he}$ : cooling capacity on heat exchanger

$Q_{h\ total}$ : total heating capacity

$Q_{h\ he}$ : heating capacity on heat exchanger

$m_w$ : water mass flow

$\Delta p_w$ : water pressure drop

HG1/09-180-XC-V												
$V_{pa}$		$L_{WA}$	$L_{pA}$	$L_{pA}$ 4dB	Sound power at octave band frequency in Hz							
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000
10	36	<20	<20	<20	-	-	1	5	4	1	-	-
20	72	20	<20	<20	-	5	11	15	14	11	8	9
30	108	29	<20	<20	4	14	20	24	23	20	18	18
40	144	37	25	21	12	22	28	32	31	28	26	26
50	180	45	32	28	20	30	36	40	39	36	33	34
60	216	52	39	35	27	37	43	47	46	43	40	40
70	252	58	45	41	33	43	49	53	52	49	46	47

$L_{WA}$ : sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

$L_{pA}$ : sound pressure is determined at microphone distance of 1 m from the unit.

$L_{pA}$  4dB: sound pressure values presented with room attenuation of 4 dB.

HG1/09-210-2C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	8	<20	435	435	124	1,13	496	435	124	1,13	435	374	160	1,75
20	72	34	<20	752	752	215	2,93	874	752	215	2,93	768	646	277	4,56
30	108	76	29	1036	1036	296	5,12	1218	1036	296	5,12	1073	890	382	7,98
40	144	134	37	1300	1300	372	7,61	1543	1300	372	7,61	1361	1118	479	11,86
50	180	210	42	1551	1551	443	10,36	1855	1551	443	10,36	1637	1333	571	16,13
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	8	<20	553	553	32	0,10	612	553	32	0,10	564	504	43	0,18
20	72	34	<20	956	956	55	0,27	1075	956	55	0,27	991	871	75	0,46
30	108	76	29	1316	1316	75	0,47	1495	1316	75	0,47	1379	1200	103	0,81
40	144	134	37	1652	1652	94	0,70	1891	1652	94	0,70	1745	1506	129	1,20
50	180	210	42	1971	1971	113	0,95	2269	1971	113	0,95	2095	1797	154	1,64
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HG1/09-210-4C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	8	<20	374	374	107	0,59	435	374	107	0,59	382	322	138	0,91
20	72	34	<20	647	647	185	1,52	768	647	185	1,52	678	556	238	2,37
30	108	76	29	891	891	255	2,66	1074	891	255	2,66	948	766	328	4,14
40	144	134	37	1119	1119	320	3,96	1362	1119	320	3,96	1204	962	412	6,16
50	180	210	42	1335	1335	381	5,38	1638	1335	381	5,38	1450	1147	492	8,38
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	8	<20	325	325	19	0,01	385	325	19	0,01	356	296	25	0,02
20	72	34	<20	562	562	32	0,04	681	562	32	0,04	632	512	44	0,06
30	108	76	29	774	774	44	0,07	953	774	44	0,07	885	706	61	0,11
40	144	134	37	972	972	56	0,10	1211	972	56	0,10	1125	886	76	0,17
50	180	210	42	1159	1159	66	0,13	1458	1159	66	0,13	1355	1057	91	0,23
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cooling:  $\Delta T = T_{air} - (T_{water\ in} + T_{water\ out}) / 2$

$\Delta T_{pa} = T_{air} - T_{primary\ air}$

Heating:  $\Delta T = (T_{water\ in} + T_{water\ out}) / 2 - T_{air}$

$\Delta T_{pa} = T_{primary\ air} - T_{air}$

V<sub>pa</sub>: primary air volume flow

Δp<sub>plenum</sub>: air pressure drop in plenum box

L<sub>wa</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

Q<sub>c</sub> total: total cooling capacity

Q<sub>c</sub> he: cooling capacity on heat exchanger

Q<sub>h</sub> total: total heating capacity

Q<sub>h</sub> he: heating capacity on heat exchanger

m<sub>w</sub>: water mass flow

Δp<sub>w</sub>: water pressure drop

HG1/09-210-XC-N												
V <sub>pa</sub>		L <sub>wa</sub>	L <sub>pa</sub>	L <sub>pa</sub> 4dB	Sound power at octave band frequency in Hz							
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000
10	36	20	<20	<20	-	-	1	10	13	17	13	5
20	72	35	22	<20	-	6	16	25	28	32	28	20
30	108	46	33	29	7	17	26	35	39	42	39	31
40	144	54	41	37	15	25	34	43	46	50	47	39
50	180	59	46	42	20	30	40	49	52	56	52	44
60	216	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-

L<sub>wa</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

L<sub>pa</sub>: sound pressure is determined at microphone distance of 1 m from the unit.

L<sub>pa</sub> 4dB: sound pressure values presented with room attenuation of 4 dB.

HG1/09-210-2C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				$\Delta T = 9.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 9.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 8.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA}$ 4dB	$Q_{c\ total}$	$Q_{c\ he}$	$m_w$	$\Delta p_w$	$Q_{c\ total}$	$Q_{c\ he}$	$m_w$	$\Delta p_w$	$Q_{c\ total}$	$Q_{c\ he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	2	<20	214	214	61	0,33	275	214	61	0,33	245	184	79	0,51
20	72	8	<20	426	426	122	1,08	547	426	122	1,08	487	366	157	1,69
30	108	19	<20	636	636	182	2,19	818	636	182	2,19	729	547	234	3,40
40	144	33	<20	845	845	242	3,59	1088	845	242	3,59	969	727	311	5,60
50	180	52	23	1054	1054	301	5,28	1358	1054	301	5,28	1210	906	388	8,23
60	216	75	29	1263	1263	361	7,24	1627	1263	361	7,24	1450	1086	465	11,27
70	252	102	35	1471	1471	420	9,44	1896	1471	420	9,44	1689	1264	542	14,71

HG1/09-210-4C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				$\Delta T = 9.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 9.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 8.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA}$ 4dB	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$	$Q_{h\ total}$	$Q_{h\ he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	2	<20	275	275	16	0,03	335	275	16	0,03	311	251	22	0,05
20	72	8	<20	547	547	31	0,10	666	547	31	0,10	618	498	43	0,17
30	108	19	<20	817	817	47	0,20	996	817	47	0,20	924	744	64	0,35
40	144	33	<20	1086	1086	62	0,34	1324	1086	62	0,34	1229	990	85	0,58
50	180	52	23	1354	1354	77	0,49	1652	1354	77	0,49	1533	1235	106	0,85
60	216	75	29	1622	1622	93	0,68	1980	1622	93	0,68	1837	1479	127	1,17
70	252	102	35	1889	1889	108	0,88	2307	1889	108	0,88	2140	1723	148	1,52

Cooling:  $\Delta T = T_{air} - (T_{water\ in} + T_{water\ out}) / 2$   
 $\Delta T_{pa} = T_{air} - T_{primary\ air}$   
 Heating:  $\Delta T = (T_{water\ in} + T_{water\ out}) / 2 - T_{air}$   
 $\Delta T_{pa} = T_{primary\ air} - T_{air}$

- $V_{pa}$ : primary air volume flow
- $\Delta p_{plenum}$ : air pressure drop in plenum box
- $L_{WA}$ : sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.
- $Q_{c\ total}$ : total cooling capacity
- $Q_{c\ he}$ : cooling capacity on heat exchanger
- $Q_{h\ total}$ : total heating capacity
- $Q_{h\ he}$ : heating capacity on heat exchanger
- $m_w$ : water mass flow
- $\Delta p_w$ : water pressure drop

HG1/09-210-XC-V												
$V_{pa}$		$L_{WA}$	$L_{pA}$	$L_{pA}$ 4dB	Sound power at octave band frequency in Hz							
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000
10	36	<20	<20	<20	-	-	-	4	3	-	-	-
20	72	<20	<20	<20	-	3	9	13	12	9	6	6
30	108	26	<20	<20	1	11	17	21	20	17	14	14
40	144	33	20	<20	8	18	24	28	27	24	22	22
50	180	40	27	23	15	25	31	35	34	31	28	29
60	216	46	33	29	21	31	37	41	40	37	35	35
70	252	52	39	35	27	37	43	47	46	43	40	41

- $L_{WA}$ : sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.
- $L_{pA}$ : sound pressure is determined at microphone distance of 1 m from the unit.
- $L_{pA\ 4dB}$ : sound pressure values presented with room attenuation of 4 dB.

HG1/09-240-2C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	6	<20	464	464	132	1,45	524	464	132	1,45	459	399	171	2,26
20	72	25	<20	802	802	229	3,77	923	802	229	3,77	811	689	295	5,87
30	108	57	25	1105	1105	316	6,59	1287	1105	316	6,59	1131	949	407	10,26
40	144	101	33	1386	1386	396	9,79	1629	1386	396	9,79	1434	1192	511	15,25
50	180	158	39	1654	1654	472	13,32	1957	1654	472	13,32	1725	1421	609	20,74
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

HG1/09-240-4C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	6	<20	583	583	33	0,13	643	583	33	0,13	591	532	46	0,22
20	72	25	<20	1008	1008	58	0,34	1128	1008	58	0,34	1039	919	79	0,58
30	108	57	25	1389	1389	79	0,59	1568	1389	79	0,59	1445	1266	109	1,02
40	144	101	33	1743	1743	100	0,88	1982	1743	100	0,88	1828	1590	136	1,52
50	180	158	39	2080	2080	119	1,20	2378	2080	119	1,20	2194	1896	163	2,07
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

HG1/09-240-4C-N															
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	6	<20	399	399	114	0,75	460	399	114	0,75	404	343	147	1,17
20	72	25	<20	690	690	197	1,95	811	690	197	1,95	714	593	254	3,04
30	108	57	25	950	950	272	3,41	1132	950	272	3,41	999	817	350	5,32
40	144	101	33	1193	1193	341	5,08	1436	1193	341	5,08	1268	1025	439	7,91
50	180	158	39	1423	1423	406	6,90	1726	1423	406	6,90	1526	1223	524	10,75
60	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cooling:  $\Delta T = T_{air} - (T_{water\ in} + T_{water\ out}) / 2$

$\Delta T_{pa} = T_{air} - T_{primary\ air}$

Heating:  $\Delta T = (T_{water\ in} + T_{water\ out}) / 2 - T_{air}$

$\Delta T_{pa} = T_{primary\ air} - T_{air}$

V<sub>pa</sub>: primary air volume flow

Δp<sub>plenum</sub>: air pressure drop in plenum box

L<sub>wa</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

Q<sub>c</sub> total: total cooling capacity

Q<sub>c</sub> he: cooling capacity on heat exchanger

Q<sub>h</sub> total: total heating capacity

Q<sub>h</sub> he: heating capacity on heat exchanger

m<sub>w</sub>: water mass flow

Δp<sub>w</sub>: water pressure drop

HG1/09-240-XC-N												
V <sub>pa</sub>		L <sub>wa</sub>	L <sub>pa</sub>	L <sub>pa</sub> 4dB	Sound power at octave band frequency in Hz							
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000
10	36	<20	<20	<20	-	-	-	8	11	15	12	4
20	72	32	<20	<20	-	3	13	22	25	29	26	17
30	108	43	29	25	4	14	23	32	35	39	36	28
40	144	50	37	33	12	22	31	40	43	47	44	36
50	180	56	43	39	18	28	37	46	49	53	50	42
60	216	-	-	-	-	-	-	-	-	-	-	-
70	252	-	-	-	-	-	-	-	-	-	-	-

L<sub>wa</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

L<sub>pa</sub>: sound pressure is determined at microphone distance of 1 m from the unit.

L<sub>pa</sub> 4dB: sound pressure values presented with room attenuation of 4 dB.

HG1/09-240-2C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		ΔP <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	2	<20	222	222	63	0,40	283	222	63	0,40	252	191	82	0,62
20	72	6	<20	441	441	126	1,33	562	441	126	1,33	500	379	162	2,07
30	108	14	<20	659	659	188	2,67	841	659	188	2,67	748	566	243	4,16
40	144	25	<20	876	876	250	4,39	1119	876	250	4,39	996	753	323	6,84
50	180	39	<20	1092	1092	312	6,46	1396	1092	312	6,46	1242	939	402	10,06
60	216	56	25	1308	1308	374	8,85	1673	1308	374	8,85	1489	1125	482	13,79
70	252	76	30	1524	1524	435	11,55	1949	1524	435	11,55	1735	1310	561	17,99

HG1/09-240-4C-V															
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		ΔP <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	2	<20	282	282	16	0,04	342	282	16	0,04	317	257	22	0,06
20	72	6	<20	560	560	32	0,12	680	560	32	0,12	630	511	44	0,21
30	108	14	<20	837	837	48	0,24	1016	837	48	0,24	942	763	65	0,42
40	144	25	<20	1113	1113	64	0,40	1352	1113	64	0,40	1254	1015	87	0,70
50	180	39	<20	1388	1388	79	0,59	1687	1388	79	0,59	1564	1266	108	1,02
60	216	56	25	1663	1663	95	0,81	2021	1663	95	0,81	1874	1516	130	1,40
70	252	76	30	1937	1937	111	1,06	2355	1937	111	1,06	2184	1766	151	1,83

HG1/09-240-4C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		ΔP <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	2	<20	195	195	56	0,22	256	195	56	0,22	228	168	72	0,34
20	72	6	<20	388	388	111	0,71	509	388	111	0,71	455	333	143	1,11
30	108	14	<20	579	579	165	1,44	761	579	165	1,44	680	498	213	2,24
40	144	25	<20	770	770	220	2,37	1013	770	220	2,37	905	662	284	3,69
50	180	39	<20	960	960	274	3,48	1264	960	274	3,48	1129	825	354	5,42
60	216	56	25	1150	1150	329	4,77	1515	1150	329	4,77	1353	989	424	7,42
70	252	76	30	1340	1340	383	6,22	1765	1340	383	6,22	1577	1152	494	9,69

HG1/09-240-4C-V															
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		ΔP <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	2	<20	170	170	10	0,01	230	170	10	0,01	215	155	13	0,01
20	72	6	<20	338	338	19	0,02	458	338	19	0,02	428	308	26	0,03
30	108	14	<20	505	505	29	0,04	684	505	29	0,04	640	461	39	0,06
40	144	25	<20	672	672	38	0,06	911	672	38	0,06	851	613	53	0,10
50	180	39	<20	838	838	48	0,09	1136	838	48	0,09	1062	764	65	0,15
60	216	56	25	1004	1004	57	0,12	1362	1004	57	0,12	1273	915	78	0,20
70	252	76	30	1169	1169	67	0,15	1587	1169	67	0,15	1484	1066	91	0,26

Cooling:  $\Delta T = T_{air} - (T_{water\ in} + T_{water\ out}) / 2$

$\Delta T_{pa} = T_{air} - T_{primary\ air}$

Heating:  $\Delta T = (T_{water\ in} + T_{water\ out}) / 2 - T_{air}$

$\Delta T_{pa} = T_{primary\ air} - T_{air}$

V<sub>pa</sub>: primary air volume flow

ΔP<sub>plenum</sub>: air pressure drop in plenum box

L<sub>WA</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

Q<sub>c</sub> total: total cooling capacity

Q<sub>c</sub> he: cooling capacity on heat exchanger

Q<sub>h</sub> total: total heating capacity

Q<sub>h</sub> he: heating capacity on heat exchanger

m<sub>w</sub>: water mass flow

Δp<sub>w</sub>: water pressure drop

HG1/09-240-XC-V												
V <sub>pa</sub>		L <sub>WA</sub>	L <sub>PA</sub>	L <sub>PA</sub> 4dB	Sound power at octave band frequency in Hz							
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000
10	36	<20	<20	<20	-	-	-	3	2	-	-	-
20	72	<20	<20	<20	-	1	7	11	10	7	4	5
30	108	23	<20	<20	-	8	14	18	17	14	12	12
40	144	30	<20	<20	5	15	21	25	24	21	18	19
50	180	36	23	<20	11	21	27	31	30	27	24	25
60	216	42	29	25	17	27	33	37	36	33	30	31
70	252	47	34	30	22	32	38	42	41	38	36	36

L<sub>WA</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

L<sub>PA</sub>: sound pressure is determined at microphone distance of 1 m from the unit.

L<sub>PA</sub> 4dB: sound pressure values presented with room attenuation of 4 dB.

HG1/09-270-2C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	5	<20	492	492	141	1,81	553	492	141	1,81	484	423	181	2,83
20	72	20	<20	851	851	243	4,72	972	851	243	4,72	852	731	313	7,35
30	108	44	22	1172	1172	335	8,25	1354	1172	335	8,25	1189	1007	432	12,85
40	144	79	30	1471	1471	420	12,27	1714	1471	420	12,27	1507	1264	542	19,11
50	180	123	36	1754	1754	501	16,69	2058	1754	501	16,69	1811	1508	646	25,99
60	216	177	41	2026	2026	579	21,45	2390	2026	579	21,45	2106	1741	746	33,42
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

HG1/09-270-4C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	5	<20	613	613	35	0,16	672	613	35	0,16	618	559	48	0,28
20	72	20	<20	1059	1059	61	0,42	1179	1059	61	0,42	1085	966	83	0,72
30	108	44	22	1459	1459	83	0,73	1638	1459	83	0,73	1509	1330	114	1,26
40	144	79	30	1832	1832	105	1,09	2070	1832	105	1,09	1909	1670	143	1,87
50	180	123	36	2185	2185	125	1,48	2483	2185	125	1,48	2290	1992	171	2,55
60	216	177	41	2523	2523	144	1,90	2881	2523	144	1,90	2659	2300	197	3,28
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

HG1/09-270-4C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	5	<20	423	423	121	0,94	484	423	121	0,94	424	364	156	1,46
20	72	20	<20	732	732	209	2,44	853	732	209	2,44	750	629	270	3,81
30	108	44	22	1008	1008	288	4,27	1190	1008	288	4,27	1049	866	371	6,66
40	144	79	30	1265	1265	362	6,35	1508	1265	362	6,35	1330	1087	466	9,90
50	180	123	36	1509	1509	431	8,64	1813	1509	431	8,64	1601	1297	556	13,46
60	216	177	41	1743	1743	498	11,11	2107	1743	498	11,11	1862	1498	642	17,30
70	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cooling:  $\Delta T = T_{air} - (T_{water\ in} + T_{water\ out}) / 2$

$\Delta T_{pa} = T_{air} - T_{primary\ air}$

Heating:  $\Delta T = (T_{water\ in} + T_{water\ out}) / 2 - T_{air}$

$\Delta T_{pa} = T_{primary\ air} - T_{air}$

V<sub>pa</sub>: primary air volume flow

Δp<sub>plenum</sub>: air pressure drop in plenum box

L<sub>wa</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

Q<sub>c</sub> total: total cooling capacity

Q<sub>c</sub> he: cooling capacity on heat exchanger

Q<sub>h</sub> total: total heating capacity

Q<sub>h</sub> he: heating capacity on heat exchanger

m<sub>w</sub>: water mass flow

Δp<sub>w</sub>: water pressure drop

HG1/09-270-XC-N												
V <sub>pa</sub>		L <sub>wa</sub>	L <sub>pa</sub>	L <sub>pa</sub> 4dB	Sound power at octave band frequency in Hz							
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000
10	36	<20	<20	<20	-	-	-	7	10	14	10	2
20	72	30	<20	<20	-	1	10	19	23	26	23	15
30	108	40	26	22	1	11	20	29	33	36	33	25
40	144	48	34	30	9	19	28	37	40	44	41	33
50	180	54	40	36	15	25	34	43	46	50	47	39
60	216	58	45	41	20	30	39	48	51	55	52	44
70	252	-	-	-	-	-	-	-	-	-	-	-

L<sub>wa</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

L<sub>pa</sub>: sound pressure is determined at microphone distance of 1 m from the unit.

L<sub>pa</sub> 4dB: sound pressure values presented with room attenuation of 4 dB.

HG1/09-270-2C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				$\Delta T = 9.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 9.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 8.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA} 4dB$	$Q_{c total}$	$Q_{c he}$	$m_w$	$\Delta p_w$	$Q_{c total}$	$Q_{c he}$	$m_w$	$\Delta p_w$	$Q_{c total}$	$Q_{c he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	1	<20	230	230	66	0,48	290	230	66	0,48	258	197	85	0,75
20	72	5	<20	456	456	130	1,59	578	456	130	1,59	514	392	168	2,48
30	108	11	<20	682	682	195	3,21	864	682	195	3,21	768	586	251	4,99
40	144	19	<20	906	906	259	5,27	1149	906	259	5,27	1022	779	334	8,21
50	180	30	<20	1130	1130	323	7,75	1434	1130	323	7,75	1275	971	416	12,07
60	216	44	21	1354	1354	387	10,62	1718	1354	387	10,62	1528	1163	499	16,54
70	252	60	26	1577	1577	451	13,85	2002	1577	451	13,85	1780	1355	581	21,58
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				$\Delta T = 22.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 22.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 20.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA} 4dB$	$Q_{h total}$	$Q_{h he}$	$m_w$	$\Delta p_w$	$Q_{h total}$	$Q_{h he}$	$m_w$	$\Delta p_w$	$Q_{h total}$	$Q_{h he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	1	<20	289	289	17	0,04	349	289	17	0,04	323	264	23	0,07
20	72	5	<20	574	574	33	0,14	694	574	33	0,14	643	524	45	0,25
30	108	11	<20	858	858	49	0,29	1037	858	49	0,29	961	782	67	0,50
40	144	19	<20	1141	1141	65	0,47	1379	1141	65	0,47	1279	1040	89	0,82
50	180	30	<20	1423	1423	81	0,70	1721	1423	81	0,70	1595	1297	111	1,21
60	216	44	21	1704	1704	97	0,96	2062	1704	97	0,96	1912	1554	133	1,65
70	252	60	26	1985	1985	113	1,25	2403	1985	113	1,25	2227	1810	155	2,16
HG1/09-270-4C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				$\Delta T = 9.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 9.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 8.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA} 4dB$	$Q_{c total}$	$Q_{c he}$	$m_w$	$\Delta p_w$	$Q_{c total}$	$Q_{c he}$	$m_w$	$\Delta p_w$	$Q_{c total}$	$Q_{c he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	1	<20	202	202	58	0,26	263	202	58	0,26	234	174	74	0,40
20	72	5	<20	401	401	115	0,86	523	401	115	0,86	466	345	148	1,33
30	108	11	<20	599	599	171	1,72	781	599	171	1,72	697	515	221	2,69
40	144	19	<20	797	797	228	2,83	1040	797	228	2,83	928	685	293	4,42
50	180	30	<20	994	994	284	4,17	1297	994	284	4,17	1158	854	366	6,49
60	216	44	21	1190	1190	340	5,71	1555	1190	340	5,71	1387	1023	438	8,89
70	252	60	26	1387	1387	396	7,45	1811	1387	396	7,45	1617	1192	511	11,61
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				$\Delta T = 22.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 22.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 20.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA} 4dB$	$Q_{h total}$	$Q_{h he}$	$m_w$	$\Delta p_w$	$Q_{h total}$	$Q_{h he}$	$m_w$	$\Delta p_w$	$Q_{h total}$	$Q_{h he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	1	<20	174	174	10	0,01	234	174	10	0,01	219	159	14	0,01
20	72	5	<20	347	347	20	0,02	466	347	20	0,02	435	316	27	0,04
30	108	11	<20	518	518	30	0,04	697	518	30	0,04	651	472	40	0,07
40	144	19	<20	688	688	39	0,07	927	688	39	0,07	866	628	54	0,12
50	180	30	<20	859	859	49	0,10	1157	859	49	0,10	1081	783	67	0,17
60	216	44	21	1028	1028	59	0,14	1386	1028	59	0,14	1296	938	80	0,24
70	252	60	26	1198	1198	68	0,18	1616	1198	68	0,18	1510	1092	94	0,31

Cooling:  $\Delta T = T_{air} - (T_{water in} + T_{water out}) / 2$

$\Delta T_{pa} = T_{air} - T_{primary air}$

Heating:  $\Delta T = (T_{water in} + T_{water out}) / 2 - T_{air}$

$\Delta T_{pa} = T_{primary air} - T_{air}$

$V_{pa}$ : primary air volume flow

$\Delta p_{plenum}$ : air pressure drop in plenum box

$L_{WA}$ : sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

$Q_{c total}$ : total cooling capacity

$Q_{c he}$ : cooling capacity on heat exchanger

$Q_{h total}$ : total heating capacity

$Q_{h he}$ : heating capacity on heat exchanger

$m_w$ : water mass flow

$\Delta p_w$ : water pressure drop

HG1/09-270-XC-V												
$V_{pa}$		$L_{WA}$	$L_{pA}$	$L_{pA} 4dB$	Sound power at octave band frequency in Hz							
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000
10	36	<20	<20	<20	-	-	-	3	2	-	-	-
20	72	<20	<20	<20	-	-	6	10	9	6	3	3
30	108	21	<20	<20	-	6	12	16	15	12	10	10
40	144	27	<20	<20	2	12	18	22	21	18	16	16
50	180	33	20	<20	8	18	24	28	27	24	21	22
60	216	38	25	21	13	23	29	33	32	29	27	27
70	252	43	30	26	18	28	34	38	37	34	32	32

$L_{WA}$ : sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

$L_{pA}$ : sound pressure is determined at microphone distance of 1 m from the unit.

$L_{pA} 4dB$ : sound pressure values presented with room attenuation of 4 dB.

HG1/09-300-2C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 9.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 9.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 8.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>c</sub> total	Q <sub>c</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	4	<20	520	520	149	2,23	581	520	149	2,23	507	447	191	3,47
20	72	16	<20	899	899	257	5,79	1020	899	257	5,79	894	772	331	9,02
30	108	35	20	1238	1238	354	10,13	1420	1238	354	10,13	1246	1064	456	15,78
40	144	63	27	1554	1554	444	15,06	1797	1554	444	15,06	1578	1336	572	23,46
50	180	98	33	1854	1854	530	20,49	2157	1854	530	20,49	1897	1593	683	31,91
60	216	141	38	2141	2141	612	26,34	2505	2141	612	26,34	2204	1840	789	41,03
70	252	193	42	2418	2418	691	32,58	2843	2418	691	32,58	2503	2078	891	50,74

HG1/09-300-4C-N															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	4	<20	641	641	37	0,19	701	641	37	0,19	644	585	50	0,33
20	72	16	<20	1109	1109	63	0,50	1228	1109	63	0,50	1131	1011	87	0,87
30	108	35	20	1528	1528	87	0,88	1707	1528	87	0,88	1572	1393	119	1,52
40	144	63	27	1918	1918	110	1,31	2156	1918	110	1,31	1987	1748	150	2,26
50	180	98	33	2287	2287	131	1,78	2586	2287	131	1,78	2384	2085	179	3,08
60	216	141	38	2642	2642	151	2,29	3000	2642	151	2,29	2767	2408	206	3,96
70	252	193	42	2984	2984	171	2,84	3402	2984	171	2,84	3138	2720	233	4,90

HG1/09-300-4C-N															
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				ΔT= 22.5K		ΔT <sub>pa</sub> = 0.0K		ΔT= 22.5K		ΔT <sub>pa</sub> = 5.0K		ΔT= 20.0K		ΔT <sub>pa</sub> = 5.0K	
V <sub>pa</sub>		Δp <sub>plenum</sub>	L <sub>pA</sub> 4dB	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>	Q <sub>h</sub> total	Q <sub>h</sub> he	m <sub>w</sub>	Δp <sub>w</sub>
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	4	<20	377	377	22	0,03	437	377	22	0,03	404	344	29	0,05
20	72	16	<20	652	652	37	0,07	772	652	37	0,07	714	595	51	0,12
30	108	35	20	899	899	51	0,12	1078	899	51	0,12	998	819	70	0,21
40	144	63	27	1128	1128	64	0,18	1367	1128	64	0,18	1267	1028	88	0,31
50	180	98	33	1345	1345	77	0,24	1644	1345	77	0,24	1525	1227	105	0,42
60	216	141	38	1554	1554	89	0,31	1912	1554	89	0,31	1775	1417	121	0,54
70	252	193	42	1755	1755	100	0,39	2173	1755	100	0,39	2018	1600	137	0,67

Cooling:  $\Delta T = T_{air} - (T_{water\ in} + T_{water\ out}) / 2$

$$\Delta T_{pa} = T_{air} - T_{primary\ air}$$

Heating:  $\Delta T = (T_{water\ in} + T_{water\ out}) / 2 - T_{air}$

$$\Delta T_{pa} = T_{primary\ air} - T_{air}$$

V<sub>pa</sub>: primary air volume flow

Δp<sub>plenum</sub>: air pressure drop in plenum box

L<sub>wa</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

Q<sub>c</sub> total: total cooling capacity

Q<sub>c</sub> he: cooling capacity on heat exchanger

Q<sub>h</sub> total: total heating capacity

Q<sub>h</sub> he: heating capacity on heat exchanger

m<sub>w</sub>: water mass flow

Δp<sub>w</sub>: water pressure drop

HG1/09-300-XC-N												
V <sub>pa</sub>		L <sub>wa</sub>	L <sub>pa</sub>	L <sub>pa</sub> 4dB	Sound power at octave band frequency in Hz							
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000
10	36	<20	<20	<20	-	-	-	6	9	13	9	1
20	72	28	<20	<20	-	-	8	17	21	24	21	13
30	108	37	24	20	-	9	18	27	30	34	31	23
40	144	45	31	27	6	16	26	35	38	42	38	30
50	180	51	37	33	12	22	32	41	44	48	44	36
60	216	56	42	38	17	27	36	46	49	53	49	41
70	252	60	46	42	21	31	40	49	53	56	53	45

L<sub>wa</sub>: sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

L<sub>pa</sub>: sound pressure is determined at microphone distance of 1 m from the unit.

L<sub>pa</sub> 4dB: sound pressure values presented with room attenuation of 4 dB.

HG1/09-300-2C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				$\Delta T = 9.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 9.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 8.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA} 4dB$	$Q_{c total}$	$Q_{c he}$	$m_w$	$\Delta p_w$	$Q_{c total}$	$Q_{c he}$	$m_w$	$\Delta p_w$	$Q_{c total}$	$Q_{c he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	1	<20	237	237	68	0,57	298	237	68	0,57	265	204	87	0,88
20	72	4	<20	471	471	135	1,88	593	471	135	1,88	527	405	174	2,93
30	108	9	<20	704	704	201	3,79	886	704	201	3,79	787	605	259	5,90
40	144	16	<20	936	936	268	6,22	1179	936	268	6,22	1048	805	345	9,69
50	180	24	<20	1168	1168	334	9,15	1471	1168	334	9,15	1307	1004	430	14,25
60	216	35	<20	1399	1399	400	12,54	1763	1399	400	12,54	1567	1202	515	19,53
70	252	48	22	1630	1630	466	16,36	2055	1630	466	16,36	1826	1401	600	25,49

HG1/09-300-4C-V															
				14.0C/17.0C/25.0C/50%				14.0C/17.0C/25.0C/50%				16.0C/18.0C/25.0C/50%			
				$\Delta T = 22.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 22.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 20.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA} 4dB$	$Q_{h total}$	$Q_{h he}$	$m_w$	$\Delta p_w$	$Q_{h total}$	$Q_{h he}$	$m_w$	$\Delta p_w$	$Q_{h total}$	$Q_{h he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	1	<20	296	296	17	0,05	356	296	17	0,05	330	270	23	0,09
20	72	4	<20	588	588	34	0,17	707	588	34	0,17	655	536	46	0,29
30	108	9	<20	878	878	50	0,34	1057	878	50	0,34	980	801	69	0,58
40	144	16	<20	1168	1168	67	0,55	1407	1168	67	0,55	1304	1065	91	0,95
50	180	24	<20	1457	1457	83	0,81	1755	1457	83	0,81	1626	1328	114	1,40
60	216	35	<20	1745	1745	100	1,11	2103	1745	100	1,11	1949	1591	136	1,92
70	252	48	22	2032	2032	116	1,45	2450	2032	116	1,45	2271	1853	159	2,51

HG1/09-300-4C-V															
				50.0C/35.0C/20.0C/50%				50.0C/35.0C/20.0C/50%				45.0C/35.0C/20.0C/50%			
				$\Delta T = 22.5K$		$\Delta T_{pa} = 0.0K$		$\Delta T = 22.5K$		$\Delta T_{pa} = 5.0K$		$\Delta T = 20.0K$		$\Delta T_{pa} = 5.0K$	
$V_{pa}$		$\Delta p_{plenum}$	$L_{pA} 4dB$	$Q_{h total}$	$Q_{h he}$	$m_w$	$\Delta p_w$	$Q_{h total}$	$Q_{h he}$	$m_w$	$\Delta p_w$	$Q_{h total}$	$Q_{h he}$	$m_w$	$\Delta p_w$
l/s	m <sup>3</sup> /h	Pa	dB(A)	W	W	kg/h	kPa	W	W	kg/h	kPa	W	W	kg/h	kPa
10	36	1	<20	179	179	10	0,01	238	179	10	0,01	223	163	14	0,01
20	72	4	<20	355	355	20	0,02	474	355	20	0,02	443	324	28	0,04
30	108	9	<20	530	530	30	0,05	709	530	30	0,05	662	483	41	0,08
40	144	16	<20	705	705	40	0,08	944	705	40	0,08	881	643	55	0,14
50	180	24	<20	879	879	50	0,12	1177	879	50	0,12	1100	801	69	0,20
60	216	35	<20	1053	1053	60	0,16	1411	1053	60	0,16	1318	960	82	0,27
70	252	48	22	1227	1227	70	0,21	1644	1227	70	0,21	1536	1118	96	0,36

Cooling:  $\Delta T = T_{air} - (T_{water in} + T_{water out}) / 2$

$\Delta T_{pa} = T_{air} - T_{primary air}$

Heating:  $\Delta T = (T_{water in} + T_{water out}) / 2 - T_{air}$

$\Delta T_{pa} = T_{primary air} - T_{air}$

$V_{pa}$ : primary air volume flow

$\Delta p_{plenum}$ : air pressure drop in plenum box

$L_{WA}$ : sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

$Q_{c total}$ : total cooling capacity

$Q_{c he}$ : cooling capacity on heat exchanger

$Q_{h total}$ : total heating capacity

$Q_{h he}$ : heating capacity on heat exchanger

$m_w$ : water mass flow

$\Delta p_w$ : water pressure drop

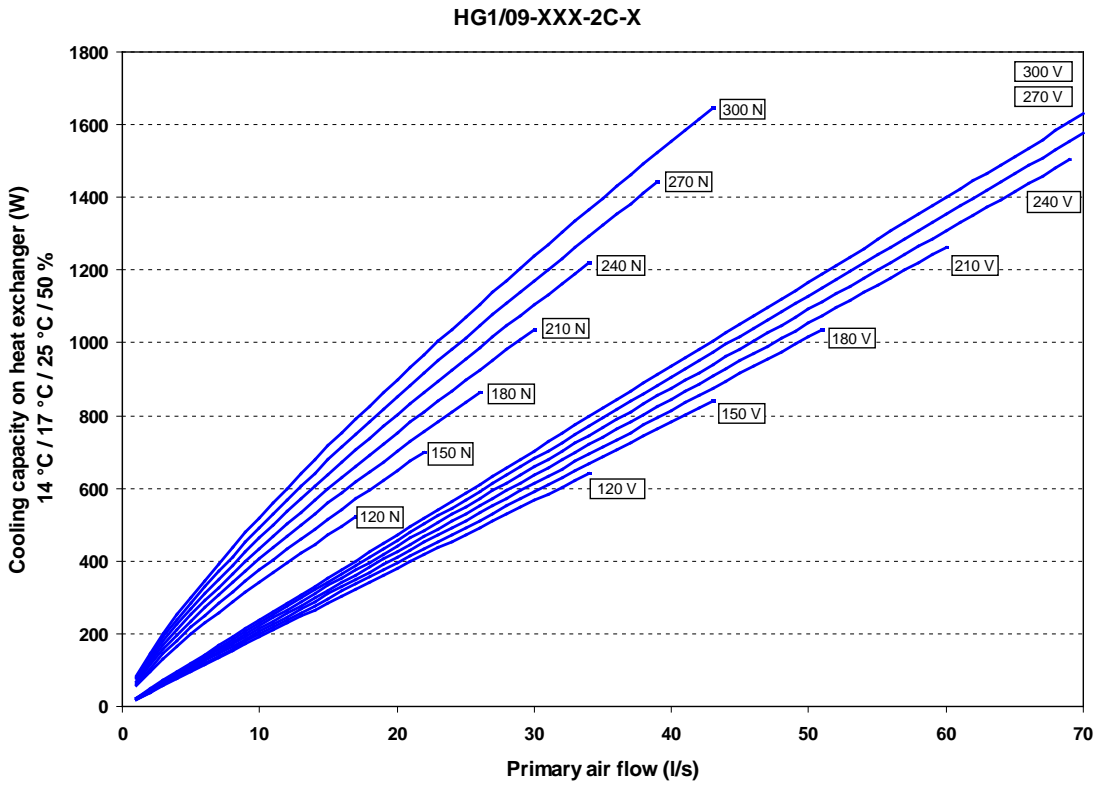
HG1/09-300-XC-V												
$V_{pa}$		$L_{WA}$	$L_{pA}$	$L_{pA} 4dB$	Sound power at octave band frequency in Hz							
l/s	m <sup>3</sup> /h	dB(A)	dB(A)	dB(A)	63	125	250	500	1000	2000	4000	8000
10	36	<20	<20	<20	-	-	-	3	2	-	-	-
20	72	<20	<20	<20	-	-	5	9	8	5	2	3
30	108	20	<20	<20	-	5	11	15	14	11	8	8
40	144	25	<20	<20	-	10	16	20	19	16	14	14
50	180	31	<20	<20	6	16	22	26	25	21	19	19
60	216	35	22	<20	10	20	27	30	30	26	24	24
70	252	40	26	22	15	25	31	35	34	31	29	29

$L_{WA}$ : sound power measurements are carried out in reverberation chamber in accordance with the ISO 3741 standard.

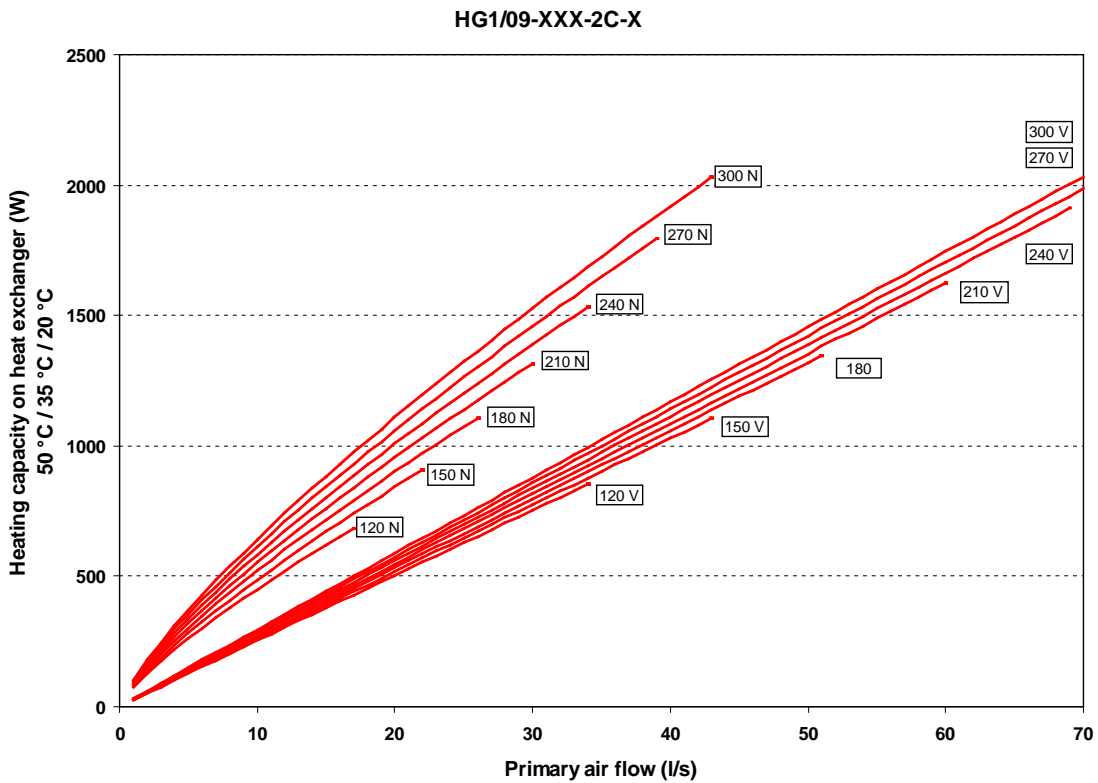
$L_{pA}$ : sound pressure is determined at microphone distance of 1 m from the unit.

$L_{pA} 4dB$ : sound pressure values presented with room attenuation of 4 dB.

Fast selection diagrams

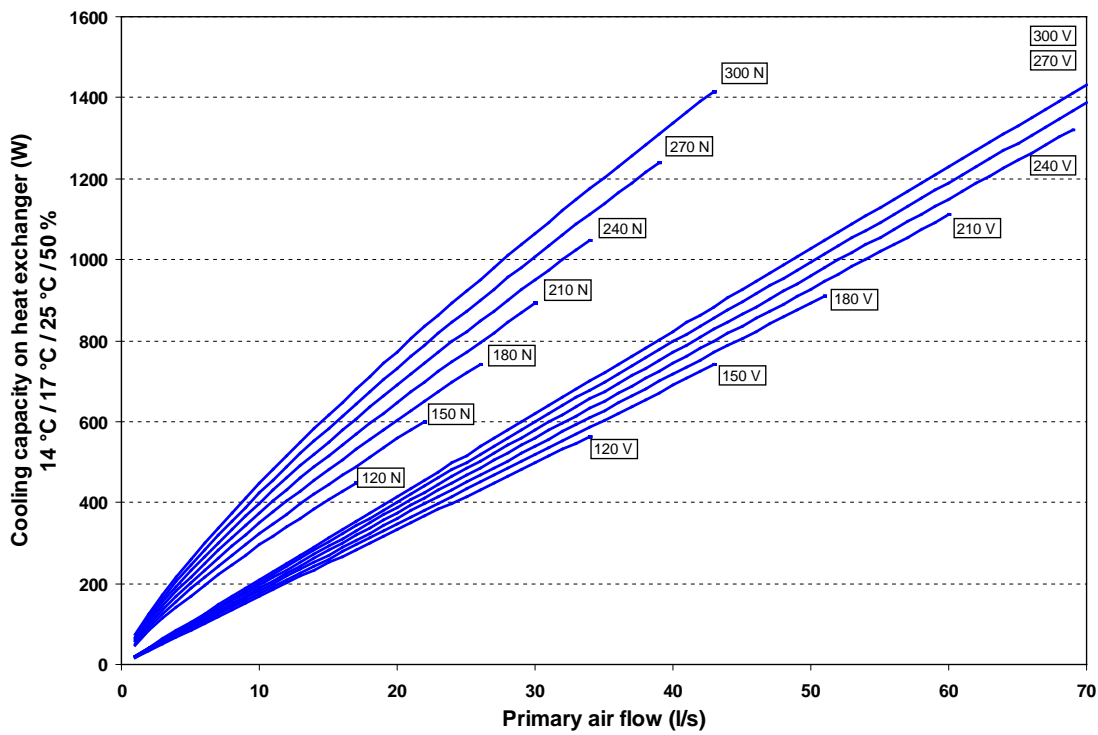


Max. pressure drop 300 Pa, Max. noise pressure  $L_{pA4dB}$  30 db(A)



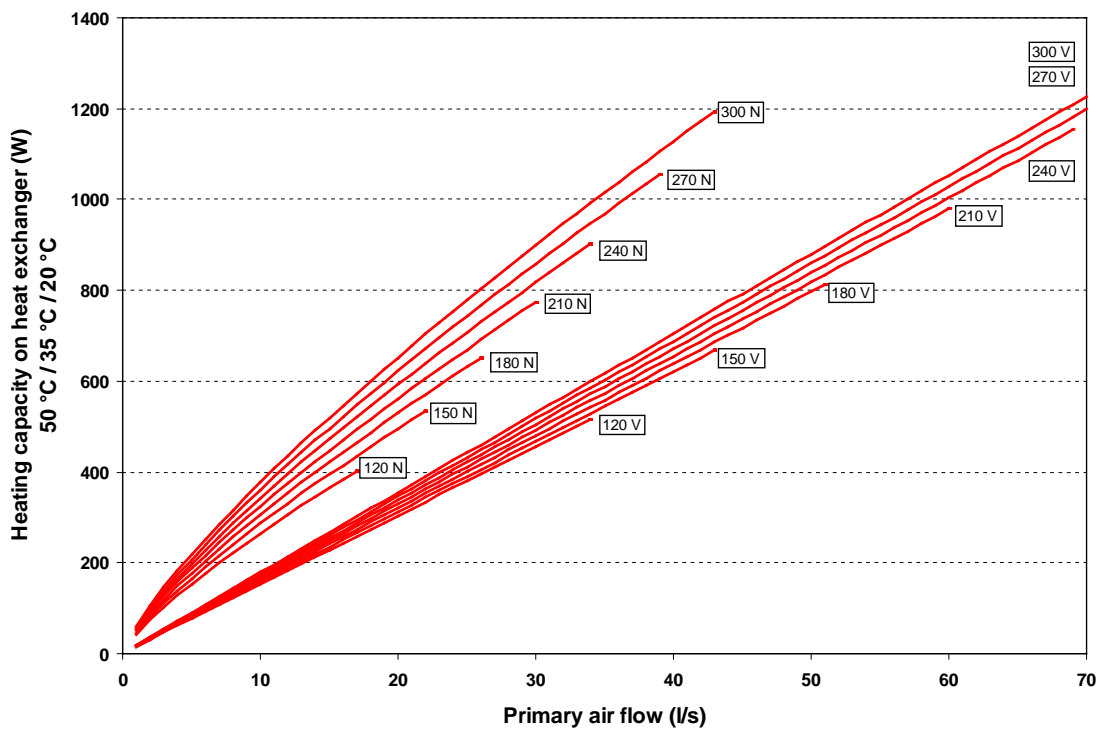
Max. pressure drop 300 Pa, Max. noise pressure  $L_{pA4dB}$  30 db(A)

HG1/09-XXX-4C-X



Max. pressure drop 300 Pa, Max. noise pressure  $L_{pA4dB}$  30 db(A)

HG1/09-XXX-4C-X



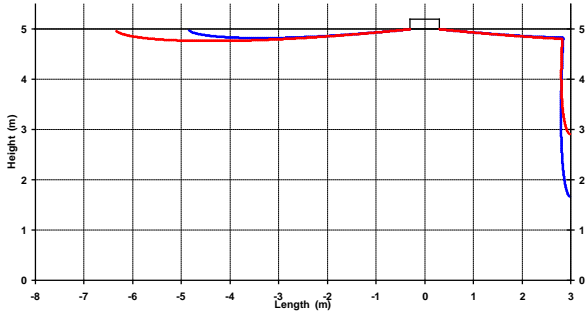
Max. pressure drop 300 Pa, Max. noise pressure  $L_{pA4dB}$  30 db(A)

## Sample of envelope velocities

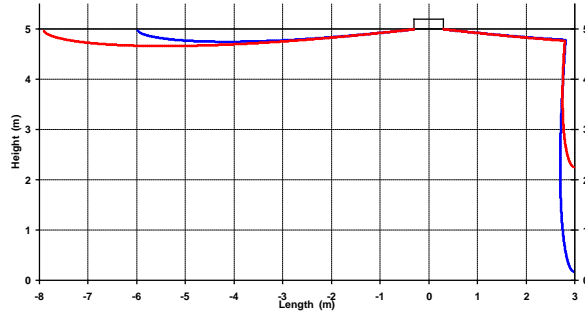
Envelope velocity cooling 0,2 m/s-14°C/17 °C/25 °C/50% Tprimary air cooling 20°C  
 Envelope velocity heating 0,2 m/s-50°C/35 °C/20 °C Tprimary air heating 25°C

----- cooling  
 ----- heating

### HG1-120-2C-N

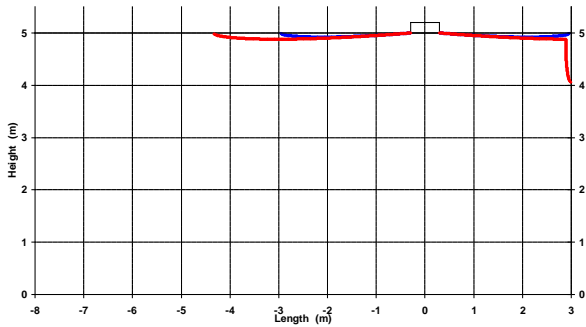


Air flow primary air cooling 20 l/s

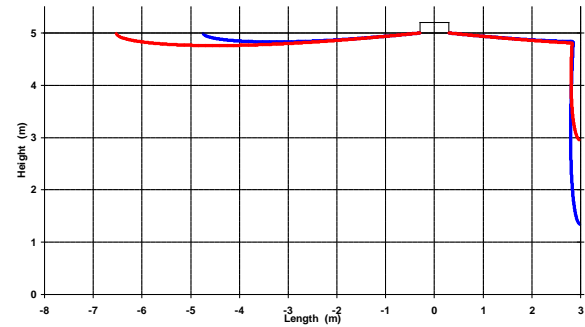


Air flow primary air cooling 40 l/s

### HG1-180-2C-N

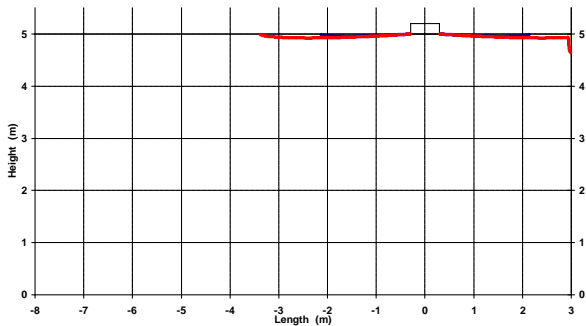


Air flow primary air cooling 20 l/s

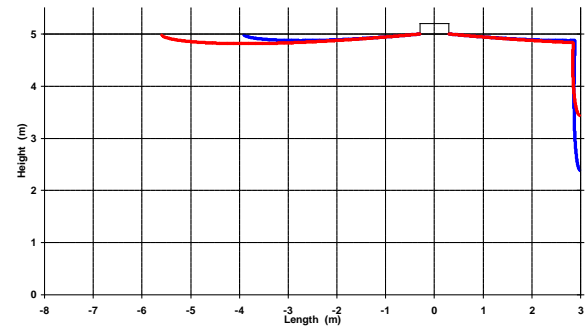


Air flow primary air cooling 40 l/s

### HG1-240-2C-N

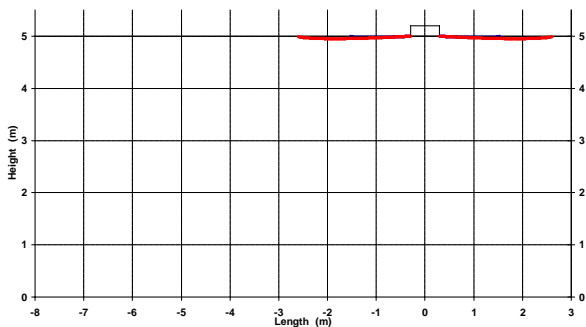


Air flow primary air cooling 20 l/s

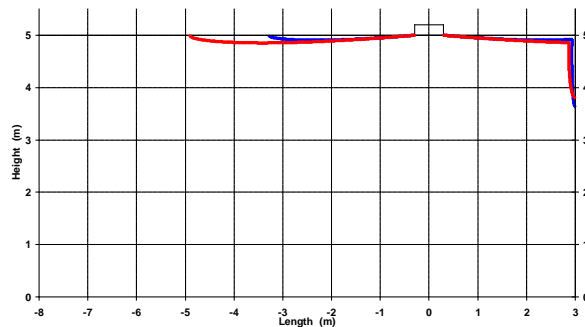


Air flow primary air cooling 40 l/s

### HG1-300-2C-N



Air flow primary air cooling 20 l/s



Air flow primary air cooling 40 l/s

H01 Shut-off cock R1/2", straight



H02 Shut-off cock R1/2", angular



H05 Accessory for nominal size (width) 675

H07 Transformer 230/24V, 1.6A



H08 Transformer 230/24V, 2.5A



H09 Transformer 230/24V, 5A



H10 Room thermostat R102-01.032 for 2-pipe systems



H11 Room thermostat R102-01.000 for 4-pipe systems



H15 In-line two-position valve R1/2", for 2-pipe systems. The valve is operated with an electric thermal actuator (ON/OFF, 24 Vac).



H16 In-line two-position valve R1/2", for 4-pipe systems. The valve is operated with an electric-thermal actuator (ON/OFF, 24 Vac).



H19 Condensate detector



H20 Room thermostat RDF 300 for 2- and 4-pipe systems



H25 In-line two-position valve R1/2", allowing easy connection to a 2-pipe system. The valve is operated with an electric-thermal actuator (ON/OFF control, 230 Vac).



H26 In-line two-position valve R1/2", allowing easy connection to a 4-pipe system. The valve is operated with an electric-thermal actuator (ON/OFF control, 230 Vac).



**Note:** In case of controlling the chilled beam with the thermostats H10 and H11 beneath the accessories from H01 to H09 also accessories H12 to H19 can be applied.

**Note:** In case of controlling the chilled beam with the thermostat H20 beneath the accessories from H01 to H09 also accessories H25 to H29 can be applied.

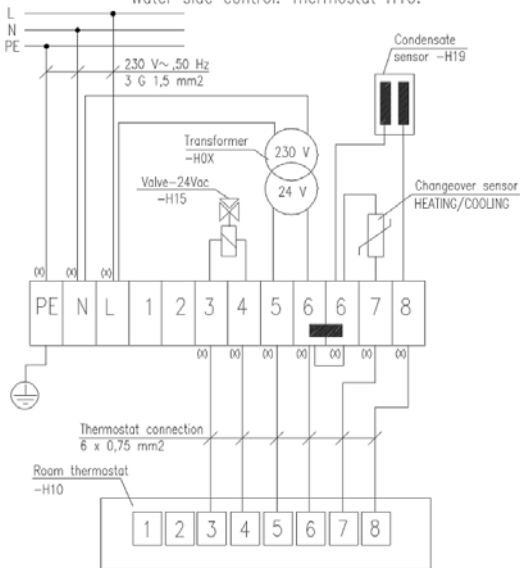
H28 Dew point sensor QXA200



H29 Extension modul (transformer) AQX2000

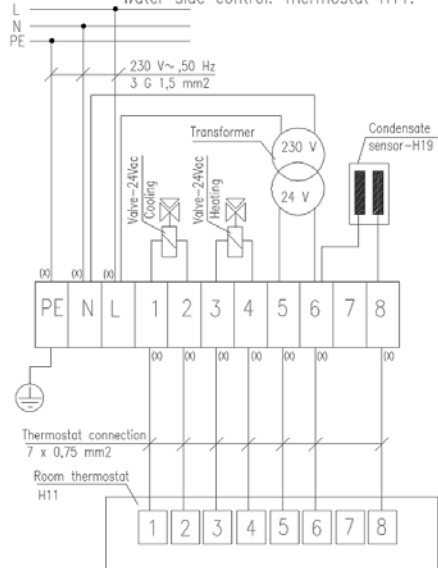


HG-2.10.15.19. Heating and cooling -2 pipe system.  
Water side control. Thermostat H10.



NOTE: Connections marked with (x) are to be done by the customer!

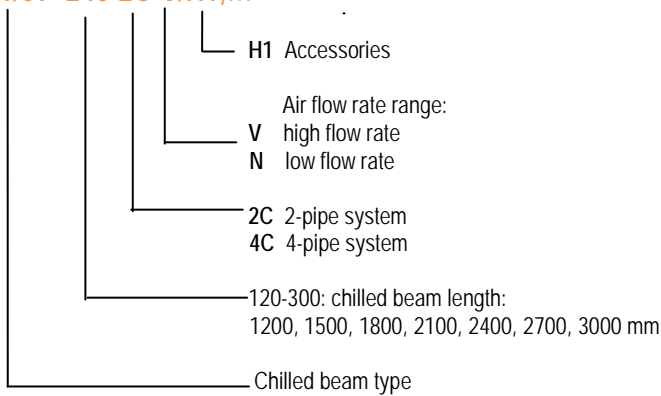
HG-4.11.16.19. Heating and cooling -4 pipe system.  
Water side control. Thermostat H11.



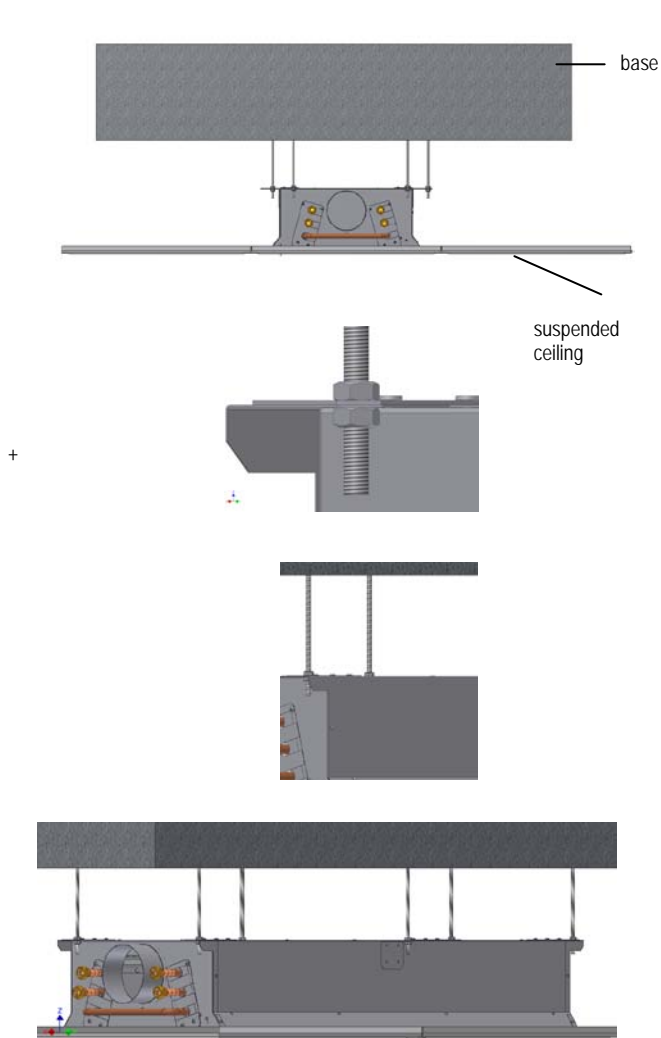
NOTE: Connections marked with (x) are to be done by the customer!

### Ordering key:

#### HG1/09- 240-2C-V/H1,...



## Chilled beam HG1/09 installation instructions

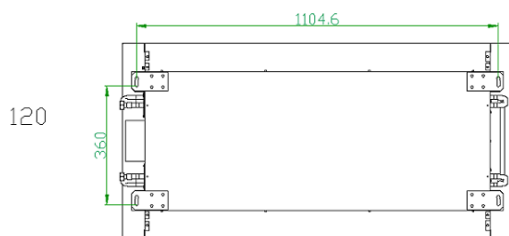


Chilled beam installation, connection and maintenance should be performed by a qualified person only.

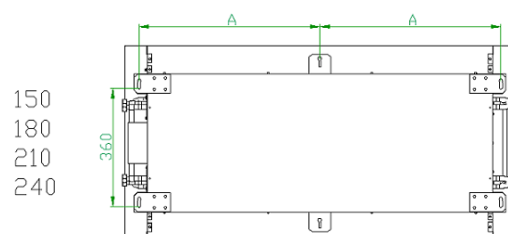
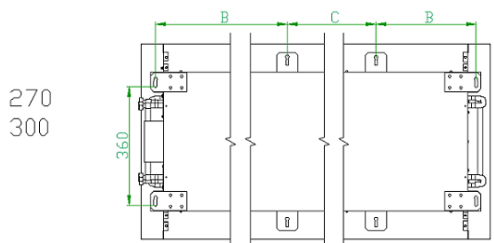
Fix support elements (such as  $\Phi$  8 mm threaded bars) into the ceiling structure. Make sure the support elements' load bearing capacity is adequate. Screw the top nuts onto the support elements. Position the chilled beam up onto the support elements, applying the through-holes. Shift the chilled beam horizontally to bring the support elements to the narrow end of the through-holes. Adjust the chilled beam elevation by means of bottom nuts, and level it in a horizontal position; tighten the top nuts in this position.

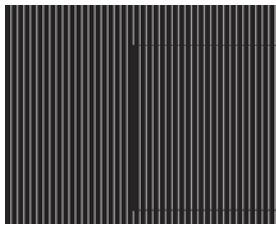
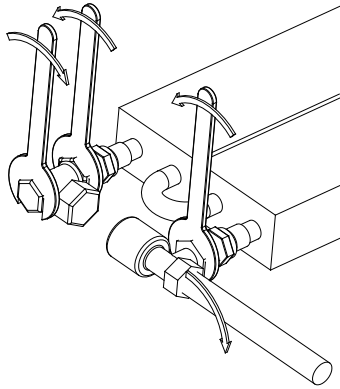
Adjust the chilled beam elevation so as to bring it flush with the suspended ceiling face; this alignment affects both appearance and function of the device.

The number of through-holes provided for support elements depends on the chilled beam size.



Unit size	A	B	C
120			
150	702		
180	852		
210	1002		
240	1152		
270		902	800
300		952	1000





For proper operation, the chilled beam needs to be correctly connected to the supplies of chilled water and fresh conditioned air.

When connecting the water supply to the convector, be careful not to damage the chilled beam internal heat exchanger or the valve assembly, if integrated; to prevent damage, always apply a counter-spanner to compensate for the tightening force.

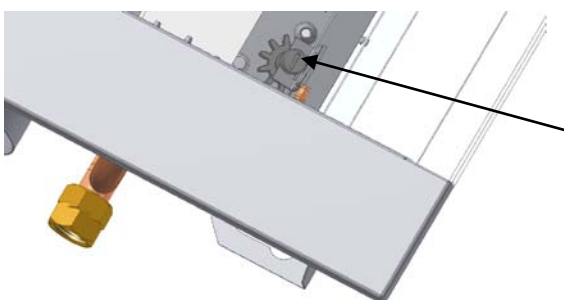
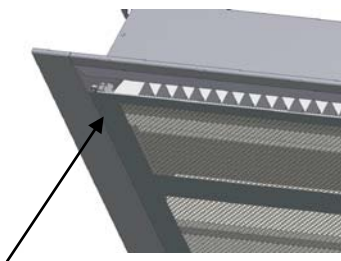
Cooling units delivered with the valve assembly installed are pressure tested to 6 bar. This value is also the maximum recommendable operating pressure. Otherwise:

### Pressure and temperature limitations for heat exchanger:

- maximum operating pressure: 11 bar
- maximum allowable pressure: 16.5 bar
- maximum water temperature: 110°C

The outside diameter of the fresh conditioned air inlet connector is  $\Phi 123$  mm.

- Chilled beams are intended for space cooling, heating and ventilation purposes only.
- Never hoist the unit using its water connectors or integrated valves.
- When ordering accessories, observe the relevant connection scheme in the catalogue/operating instructions.
- Any intervention exceeding standard installation is considered an intervention into the device and is subject to the manufacturer's approval.
- Never block the intake/discharge area of a chilled beam in operation.
- The chilled beam shall not be located immediately below a mains power socket.
- Use protective gloves to handle the chilled beam.
- Lift the chilled beam slowly and do not drop it.
- Always use original spare parts only.
- The temperature of the room with the chilled beam installed and the fresh air temperature shall not be less than 5°C.
- Mount the chilled beam at an elevation at least 2.5 m above the floor.



### Maintenance and cleaning

- wipe the visible surfaces with a moist cloth
- regularly vacuum clean the chilled beam interior (vacuuming interval depends on the concentration of dust/dirt in the room). To access the interior for cleaning, press the mask along one side edge to release the hook securing the mask in position, then slowly open the mask on the hinge at the opposite side edge. To close the mask, push it back into position.
- To detain the nozzles and thus reduce the air flow through them on each side of the chilled beam separately, use an ordinary screwdriver to turn the gear, so the lower steel sheet plate will detain the nozzle.