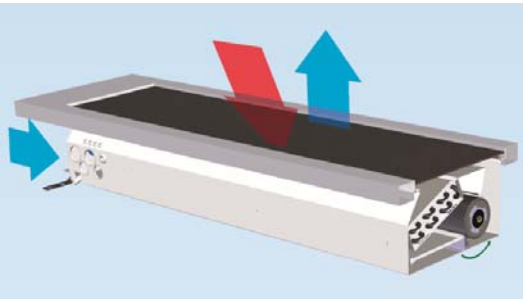
AIR TECH
SYSTEMS

Installation/Use/Maintenance Instructions

LTG Air -Water Systems

LTG FanPower

Fan Coil Units VKB



Installation in floors

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AIR TECH SYSTEMS

LTG Comfort Air Technology

Air-Water-Systems

Air Diffusers

Air Distribution

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1. Safety instructions

Assembly, dismantling and maintenance must be performed by trained personnel in order to achieve reliability, safety and best results.

1.1 Explanation of symbols and hints

Operating safety symbol

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

Information symbol

This information symbol is placed alongside those points in the manual which must be specifically observed in order to ensure that the guidelines, regulations, instructions and correct operating sequences are observed and to prevent damage to or destruction of the unit and/or other components in the system.

These mandatory symbols are linked to the operating safety instructions and show which protective measures must be complied with at the appropriate workstations and therefore specifically mandate a certain action, as shown here as an example: Wear protective gloves.

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

1.2 Operating safety instructions

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

The units meet any pertinent safety standards.

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

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

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

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

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

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

The standard version of the heat exchangers is designed for an operating pressure of 145 psi (test pressure 232 psi). High water pressures may be hazardous. Higher operating pressures, therefore, require LTG's express permission. Wear safety glasses.

Continuation 1.2 Operating safety instructions

During continuous operation the motor may reach temperatures of up to +149 °F. If necessary, allow the motor to cool off or wear gloves.

In the heating mode a water temperature up to +176 °F may be achieved.
Water-carrying parts may be hot so do not touch with your bare hands to avoid burns.

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

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

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

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

The floor grille also serves as a protection and should be removed for maintenance and cleaning only.

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

The unit must be checked by an expert immediately:

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

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

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

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

2. Transport, storage

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

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

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

The protective board (chipboard) serves to protect the unit from dust and damages. Do not remove it during construction!

In case it is indispensable to remove the protective board, e.g for installation or a check of the flexible water connection hoses, it will have to be reinstalled right afterwards in its original position (clean side to the bottom). Be careful to keep any dust from entering the unit during removal or reinstallation of the protective board.

Do not replace the protective board with the grille unless any pollution of or damage to the unit is excluded, i.e. any subsequent work or activities in the unit's vicinity have been completed.

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

2.1 Transport instructions

Handle units appropriately and with care during transport.

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

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

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

The packaging is not weather-resistant.

2.2 Storage

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

The storage location must meet the following climatic requirements:

Temperature between 41...131 °F with a relative humidity of 90 % max. (non-condensing).

2.3 Delivery

Standard units are normally delivered as follows:

- on Euro or single trip pallets, secured with straps and/or with the pallet sealed in film.
- fitting/regular accessories packaged with them in separate boxes

Disposal of the packaging material in accordance with local regulations.

3. Function

Fan coil units of type VKB are recirculating air units for cooling (2-pipe) or for cooling and heating (4-pipe) with an option for fresh air supply.

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

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

Uniform distribution of the air across the entire fan is ensured by a cross-flow impeller extending over the entire width. Usually, no filter is provided for before entering the heat exchanger.

Thermal energy transport to the heat exchanger is performed by water.

For reasons of hygiene, the unit should be dimensioned in a way to ensure that no condensation occurs during standard operation.

Cooling output is controlled water-side by valves. Fan speed control via energy-efficient EC motor, using a 1...10 V signal.

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

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

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

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

3.1. Intended use

The fan coil unit type VKB has been designed exclusively for indoor use.

The fan coil unit is designed for indoor ambient temperatures of +41...+104 °F and a maximum relative humidity up to 90 % (non-condensing).

In order to ensure safe motor functioning the ambient temperature when installed should not exceed +104 °F.

The maximum admissible water supply temperature is, therefore, limited to +176 °F.

Any other operating conditions require the express and written permission of LTG Incorporated.

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

4. Technical data

4.1 Unit configuration

① air grille
aluminum linear grille,
stainless steel linear grille,
roller grille of wood

(2) heat exchanger
2-pipe, 4-pipe

(3) mixed/displacement insert (optional)

(4) tangential fan

(5) fan motor
EC motor

(6) connecting plug for EC motor

(7) fresh air connections (pre-cut)
7a = on the face, 7b = room side

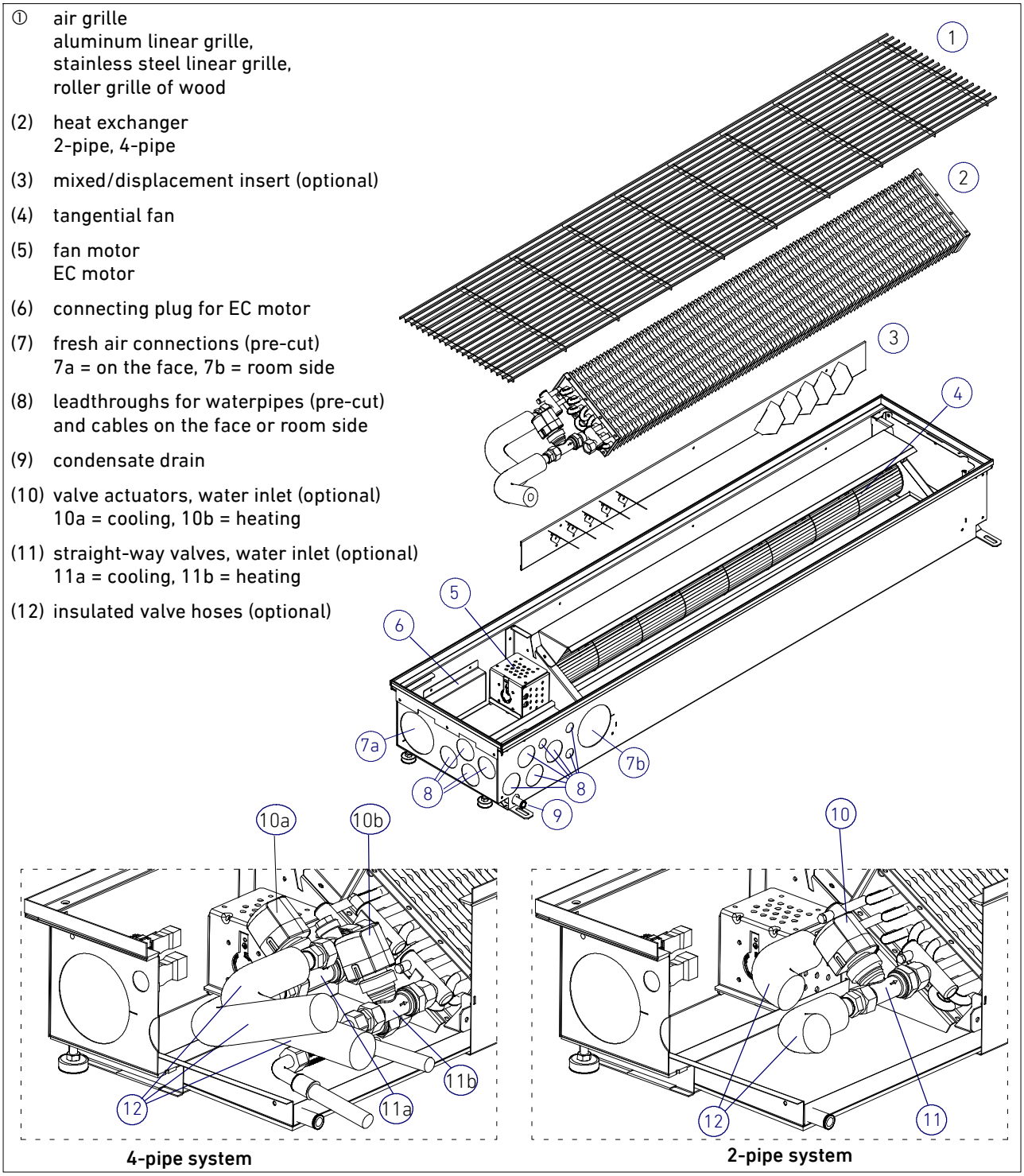
(8) leadthroughs for waterpipes (pre-cut)
and cables on the face or room side

(9) condensate drain

(10) valve actuators, water inlet (optional)
10a = cooling, 10b = heating

(11) straight-way valves, water inlet (optional)
11a = cooling, 11b = heating

(12) insulated valve hoses (optional)



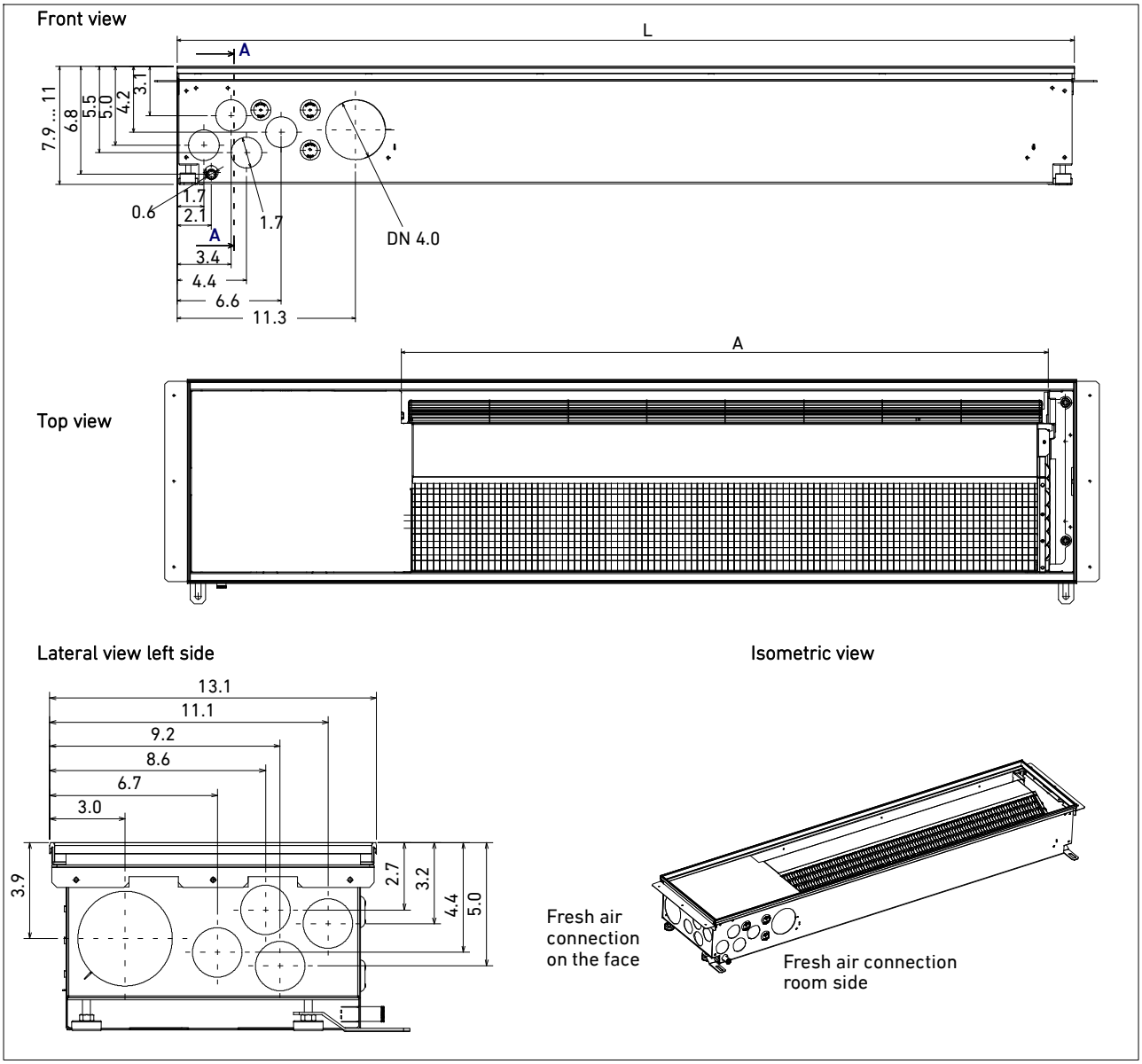
4-pipe system

2-pipe system

4.2 Technical data type VKB-0/2 and VKB-0/4

4.2.1 Dimensions, weight, acoustics

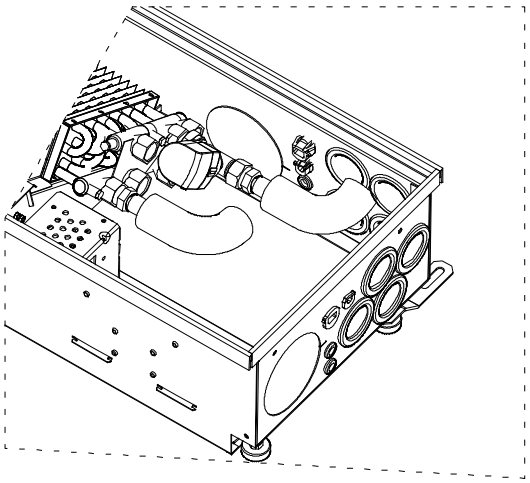
Size	Total length L [in]	Air outlet width A [in]	Weight [lb]	Water content [gal] 4-pipe Cooling circuit	4-pipe Heating circuit	2-pipe
630	40	24.6	59.5	0.16	0.045	0.21
800	49	33.6	68.3	0.21	0.055	0.29
1000	57	41.5	81.5	0.26	0.07	0.37
2000	96.4	80.0	143	0.53	0.14	0.74



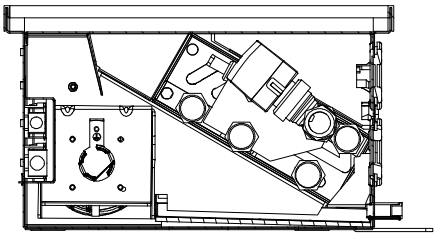
1 socket (DN 4.0), with grille The **total acoustic power level** may be calculated as follows: $L_{wA} = 10 * \log (10^{0,1*L_{wA\,P}} + 10^{0,1\,*\,L_{wA,VKB}})$	**Fresh air flow rate V_P**	[cfm/ft]	29	41.2	53	65	7.5
	Acoustic power level $L_{wA\,P}$	[dB(A)]	26	27	29	34	39
	Pressure loss	In/wg]	0.008	0.016	0.024	0.044	0.052

Continuation 4.2.1 Dimensions, weight, acoustics, type VKB-0/2 and VKB-0/4

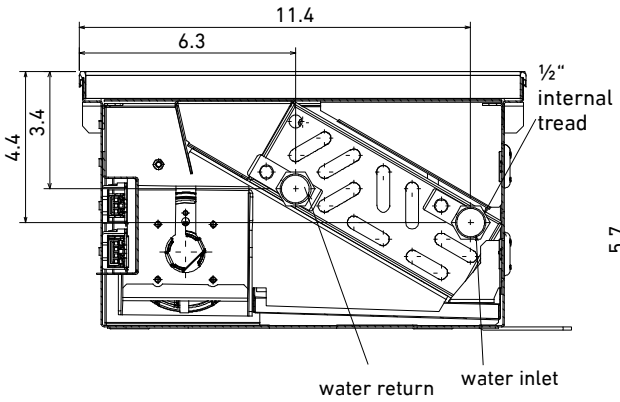
2-pipe system



Isometric view

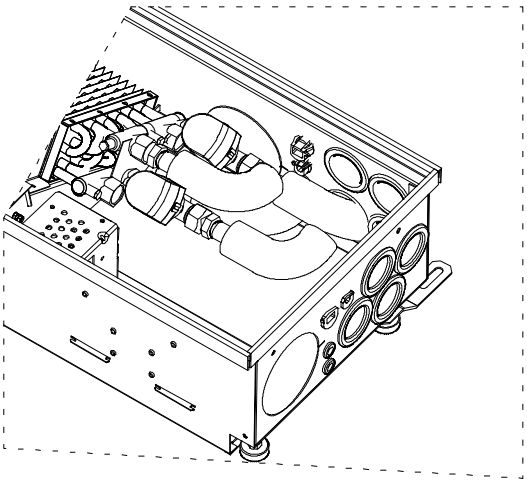


Section A-A (see previous page)

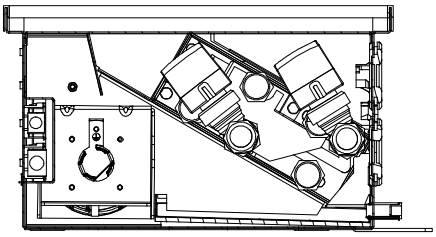


Section A-A (see previous page)

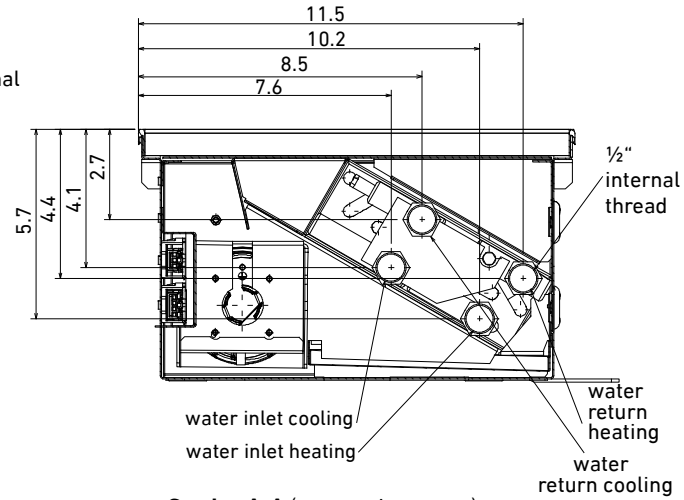
4-pipe system



Isometric view



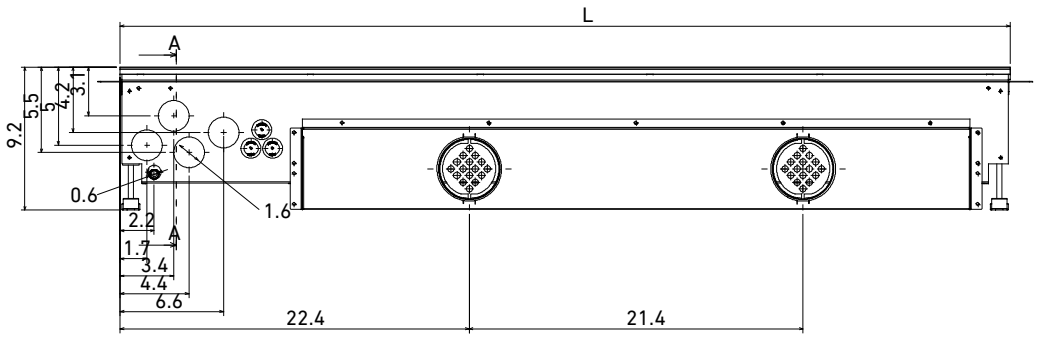
Section A-A (see previous page)



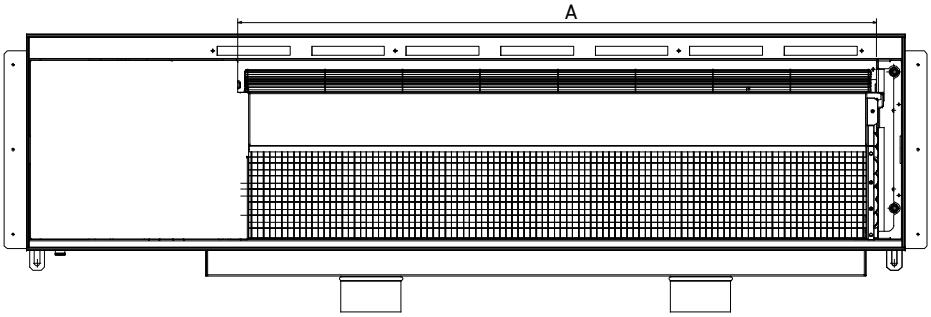
Section A-A (see previous page)

Continuation 4.2.1 Dimensions, weight, acoustics, type VKB-0/2 and VKB-0/4
With fresh air supply (in front) (type VKB-0/2/.../FL and VKB 0/4/.../FL)

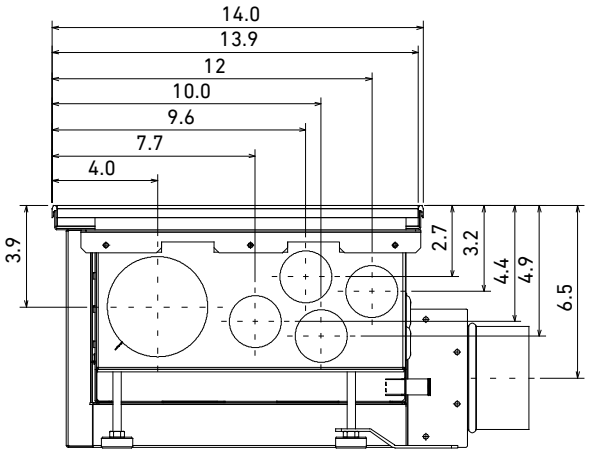
Front view



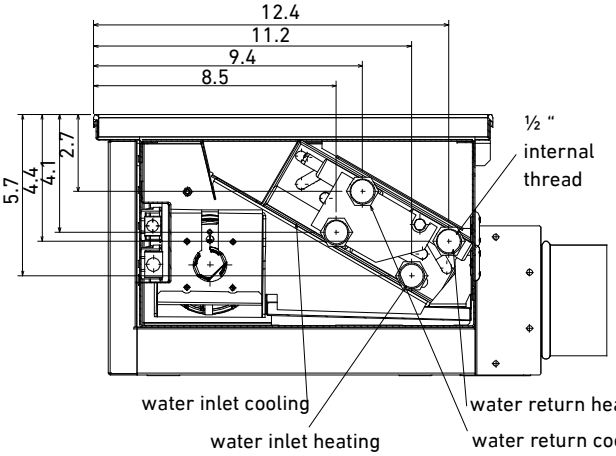
Top view



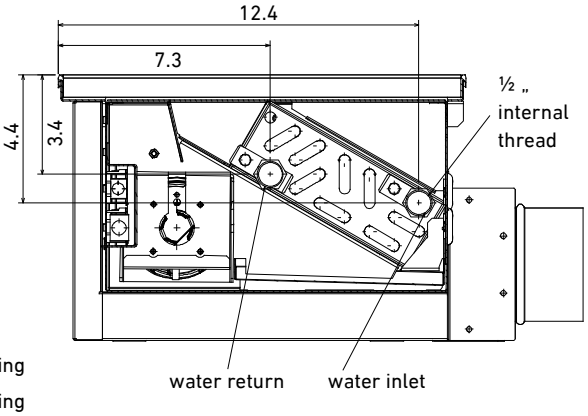
Lateral view left side



Section A-A (4-pipe system)



Section A-A (2-pipe system)



Continuation 4.2.1 Dimensions, weight, acoustics, type VKB-0/2 and VKB-0/4

With fresh air supply (in front) (type VKB-0/2/.../FL and VKB 0/4/.../FL)

Dimensions, weights

Size	Total length L	Air outlet width A	Weight	Water content [gal]		
				4-pipe		2-pipe
	[in]	[in]	[lb]	Cooling circuit	Heating circuit	
630	40	24.6	60	0.16	0.045	0.21
800	49	33.6	68.5	0.24	0.055	0.29
1000	57	41.5	82	0.29	0.07	0.37
2000	96.4	80	143	0.55	0.14	0.74

Acoustic power level for separate socket for fresh air supply

(must be added to the unit's power level)

1 socket (4 in dia.), with aluminum linear grille

	V_P	[cfm]	23.5	36	47	59
Size 630	$L_{wA\,P}$	[dB(A)]	29	38	-	-
	Pressure loss	[in H_2O]	0.004	0.012	-	-
Size 800	$L_{wA\,P}$	[dB(A)]	27	30	37	47
	Pressure loss	[in H_2O]	0.004	0.004	0.008	0.016
Size 1000	$L_{wA\,P}$	[dB(A)]	27	28	31	37
	Pressure loss	[in H_2O]	0	0.004	0.008	0.012

2 sockets (4 in dia.), with aluminum linear grille

	V_P	[cfm]	29	59	88	118	147
Size 630	$L_{wA\,P}$	[dB(A)]	27	31	41	-	-
	Pressure loss	[in H_2O]	0.008	0.028	0.064	-	-
Size 800	$L_{wA\,P}$	[dB(A)]	27	28	32	40	-
	Pressure loss	[in H_2O]	0.008	0.016	0.036	0.064	-
Size 1000	$L_{wA\,P}$	[dB(A)]	27	28	30	36	43
	Pressure loss	[in H_2O]	0.008	0.012	0.02	0.036	0.06

4 sockets (4 in dia.), with aluminium linear grille

	V_P	[cfm]	59	118	176	235
Size 2000	$L_{wA\,P}$	[dB(A)]	30	31	33	39
	Pressure loss	[in H_2O]	0.008	0.012	0.02	0.036

The total acoustic power level may be calculated as follows:

$L_{wA} = 10 * \log (10^{0,1*L_{wA\,P}} + 10^{0,1\,*\,L_{wA,VKB}})$

4.2.2 Technical data type VKB-0/4, 4-pipe system

Size 630, type VKB-0/4/.../T, non condensing

Speed [V DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	Q_h / Δt [BTU/h*Δt]	Q_{st} 2) [BTU/h]	W_{ok} [gpm]	Δp_w [Ft H_2O]	W_{oh} [gpm]	Δp_w [Ft H_2O]	P_{el} [W]
3	106	25	31	70.1	1,262	41.7						3
4	141	30	36	94.8	1,706	47.4						4
5	171	33	39	109.9	1,979	51.2	409	0.88	6.0	0.4	0.4	5
6	212	38	44	125.1	2,252	55.0						7
8	271	46	52	144.1	2,593	60.7						11

Size 800, type VKB-0/4/.../T, non condensing

Speed [V DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	Q_h / Δt [BTU/h*Δt]	Q_{st} 2) [BTU/h]	W_{ok} [gpm]	Δp_w [Ft H_2O]	W_{oh} [gpm]	Δp_w [Ft H_2O]	P_{el} [W]
3	147	25	31	98.6	1,774	56.9						3
4	194	30	36	127.0	2,286	62.5						4
5	241	33	39	147.8	2,661	68.2	546	0.88	7.7	0.4	0.5	5
6	300	38	44	166.8	3,002	73.9						8
8	376	46	52	189.5	3,412	81.5						15

Size 1000, type VKB-0/4/.../T, non condensing

Speed [V DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	Q_h / Δt [BTU/h*Δt]	Q_{st} 2) [BTU/h]	W_{ok} [gpm]	Δp_w [Ft H_2O]	W_{oh} [gpm]	Δp_w [Ft H_2O]	P_{el} [W]
3	182	27	33	121.3	2,184	70.1						3
4	241	29	35	151.6	2,729	75.8						5
5	300	34	40	176.3	3,173	81.5	682	0.88	8.7	0.4	0.6	7
6	371	39	45	195.2	3,514	87.2						10
8	465	47	53	218.0	3,924	96.7						19

Size 2000, type VKB-0/4/.../T, non condensing

Speed [V DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	Q_h / Δt [BTU/h*Δt]	Q_{st} 2) [BTU/h]	W_{ok} [gpm]	Δp_w [Ft H_2O]	W_{oh} [gpm]	Δp_w [Ft H_2O]	P_{el} [W]
3	300	27	33	189.5	3,412	128.9						8
4	400	32	38	242.6	4,367	140.3						10
5	488	37	43	291.9	5,254	147.8	1,365	1.76	9.4	0.7	2.1	13
6	512	42	48	320.3	5,766	155.4						18
8	712	51	57	384.8	6,926	174.4						32

Values are given for the unit with air outlet grille, without spreading vanes, without filter. The spreading vanes have the effect of reducing capacity by max. 10 %.

1) For 61 °F water supply temperature.
79 °F air temp. entering the heat exchanger
(may vary from the room air temp.)
non-condensing operation

2) For 131 °F water supply temperature
68 °F room air temperature.

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

Speed - control voltage fan
V - flow rate (± 10 %)
L_{A18} - sound pressure level
L_{wA} - sound power level ± 3 dB(A)
Q_k - total cooling capacity
Q_h - total heating capacity
Δt - temp. difference between air entering the heat exchanger and water supply
Q_{st} - heating capacity for natural convection
w_{ok} - standard water flow rate (cooling) *
w_{oh} - standard water flow rate (heating) *
Δp_w - water-side pressure loss
P_{el} - electric power consumption (± 10 %)

Continuation 4.2.2 Technical data type VKB-0/4, 4-pipe system

Size 630, type VKB-0/4/.../E, condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	Q_K 2) [BTU/h]	Q_{ksens} 2) [BTU/h]	w_{ok} [gpm]	Δp_w [feet]	w_{oh} [gpm]	Δp_w [feet]	Q_{st} 3) [BTU/h]	P_{el} [Watt]
3	106	25	31	68.2	41.7	1,228	3,238	2,170						3
4	141	30	36	91.0	45.5	1,638	3,975	2,893						4
5	171	33	39	106.1	49.3	1,911	4,449	3,378	0.88	6.0	0.4	0.4	409	5
6	212	38	44	121.3	53.1	2,184	4,933	3,859						7
8	271	46	52	138.4	58.8	2,491	5,295	4,401						11

Size 800, type VKB-0/4/.../E, condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	Q_K 2) [BTU/h]	Q_{ksens} 2) [BTU/h]	w_{ok} [gpm]	Δp_w [feet]	w_{oh} [gpm]	Δp_w [feet]	Q_{st} 3) [BTU/h]	P_{el} [Watt]
3	147	25	31	94.8	55.0	1,706	4,497	3,016						3
4	194	30	36	123.2	60.7	2,218	5,380	3,920						4
5	241	33	39	144.1	66.3	2,593	6,035	4,582	0.88	7.4	0.4	0.5	546	6
6	300	38	44	161.1	72.0	2,900	6,551	5,125						8
8	376	46	52	183.9	79.6	3,309	7,035	5,848						14

Size 1000, type VKB-0/4/.../E, condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	Q_K 2) [BTU/h]	Q_{ksens} 2) [BTU/h]	w_{ok} [gpm]	Δp_w [feet]	w_{oh} [gpm]	Δp_w [feet]	Q_{st} 3) [BTU/h]	P_{el} [Watt]
3	182	27	33	117.5	68.2	2,115	5,575	3,739						3
4	241	29	35	147.8	73.9	2,661	6,459	4,705						5
5	300	34	40	170.6	79.6	3,071	7,148	8,840	0.88	8.7	0.4	0.6	682	7
6	371	39	45	189.5	85.3	3,412	7,707	6,029						10
8	465	47	53	212.3	92.9	3,821	8,124	6,755						19

Size 2000, type VKB-0/4/.../E, condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	Q_K 2) [BTU/h]	Q_{ksens} 2) [BTU/h]	w_{ok} [gpm]	Δp_w [feet]	w_{oh} [gpm]	Δp_w [feet]	Q_{st} 3) [BTU/h]	P_{el} [Watt]
3	300	27	33	180.1	123.2	3,241	8,530	5,732						8
4	400	32	38	231.2	132.7	4,162	10,099	7,369						10
5	488	37	43	276.7	140.3	4,981	11,600	8,802	1.76	9.4	0.7	2.1	1,365	13
6	512	42	48	305.2	147.8	5,493	12,419	9,724						18
8	712	51	57	365.8	164.9	6,585	13,988	11,638						32

Speed - control voltage fan
V - flow rate (± 10 %)
L_{A18} - sound pressure level
L_{wA} - sound power level ± 3 dB(A)
Q_k - total cooling capacity
Q_{ksens} - sensible cooling capacity
Q_h - total heating capacity
Δt - temp. difference between air entering the heat exchanger and water supply
Q_{st} - heating capacity for natural convection
w_{ok} - standard water flow rate (cooling) *
W_{oh} - standard water flow rate (heating) *
Δp_w - water-side pressure loss
P_{el} - electric power consumption (± 10 %)

Values are given for the unit with air outlet grille, without spreading vanes, without filter. The spreading vanes have the effect of reducing capacity by max. 10 %.

1) For 61 °F water supply temperature, 79 °F air temp. entering the heat exchanger (may vary from the room air temp.), non-condensing operation

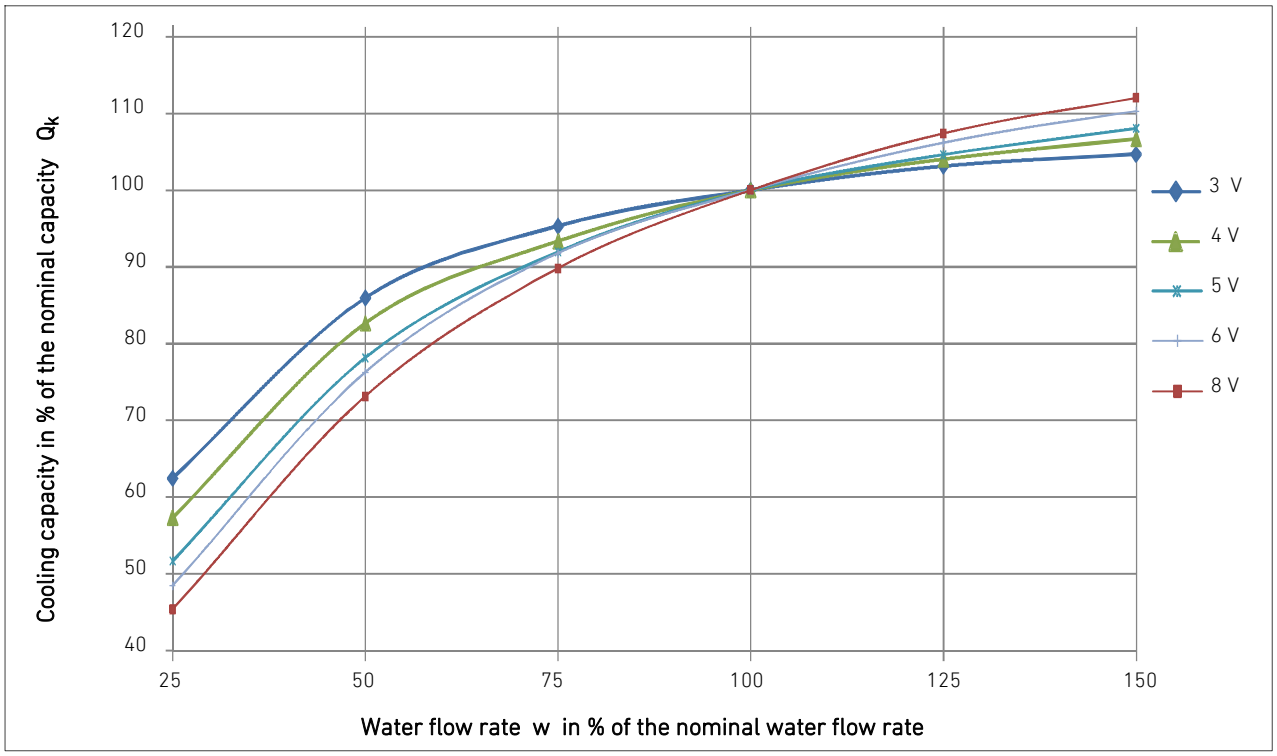
2) For 43 °F water supply temperature, 79 °F air temp. entering the heat exchanger (may vary from the room air temp.), condensing operation, 50 % R.H.

3) For 131 °F water supply temperature, 68 °F room air temperature

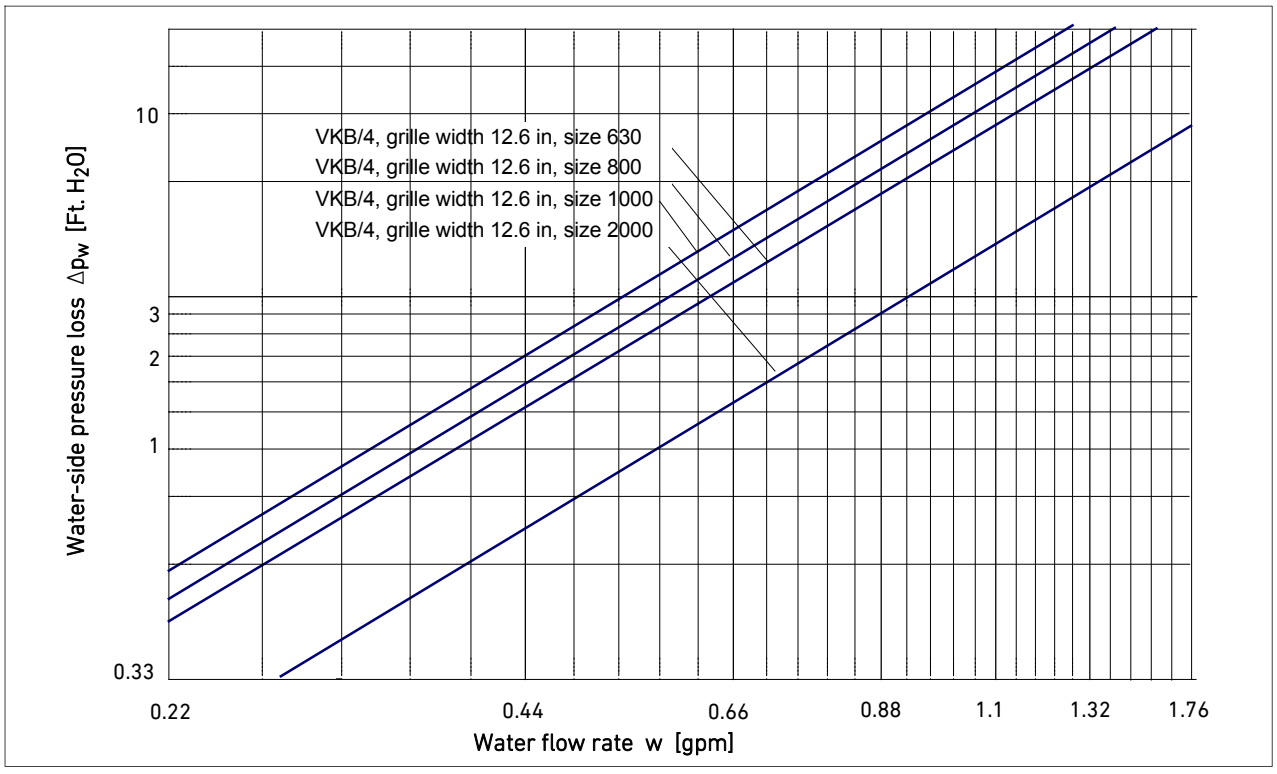
* Correction for other water flow rates see pages 14...16

4.2.3 Correction charts type VKB-0/4, 4-pipe system

Cooling capacity for different water flow rates

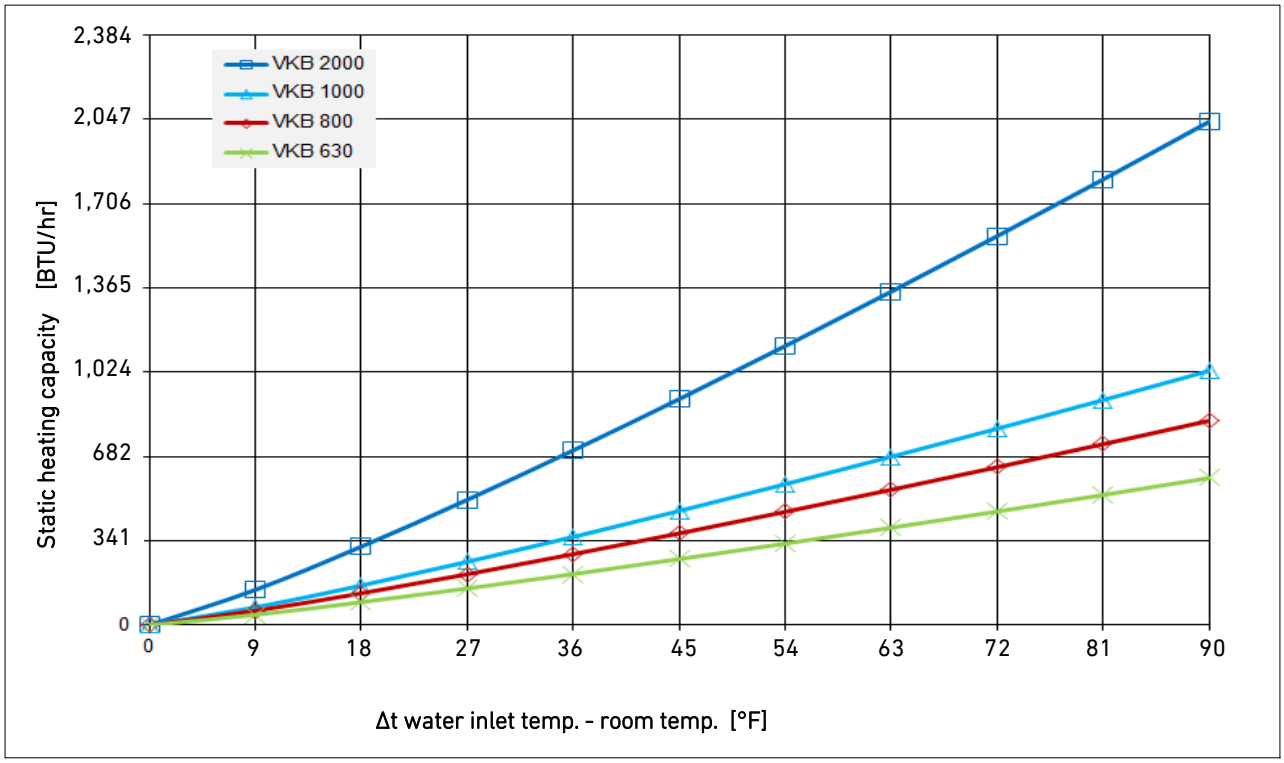


Water-side pressure loss of the cooler for different water flow rates

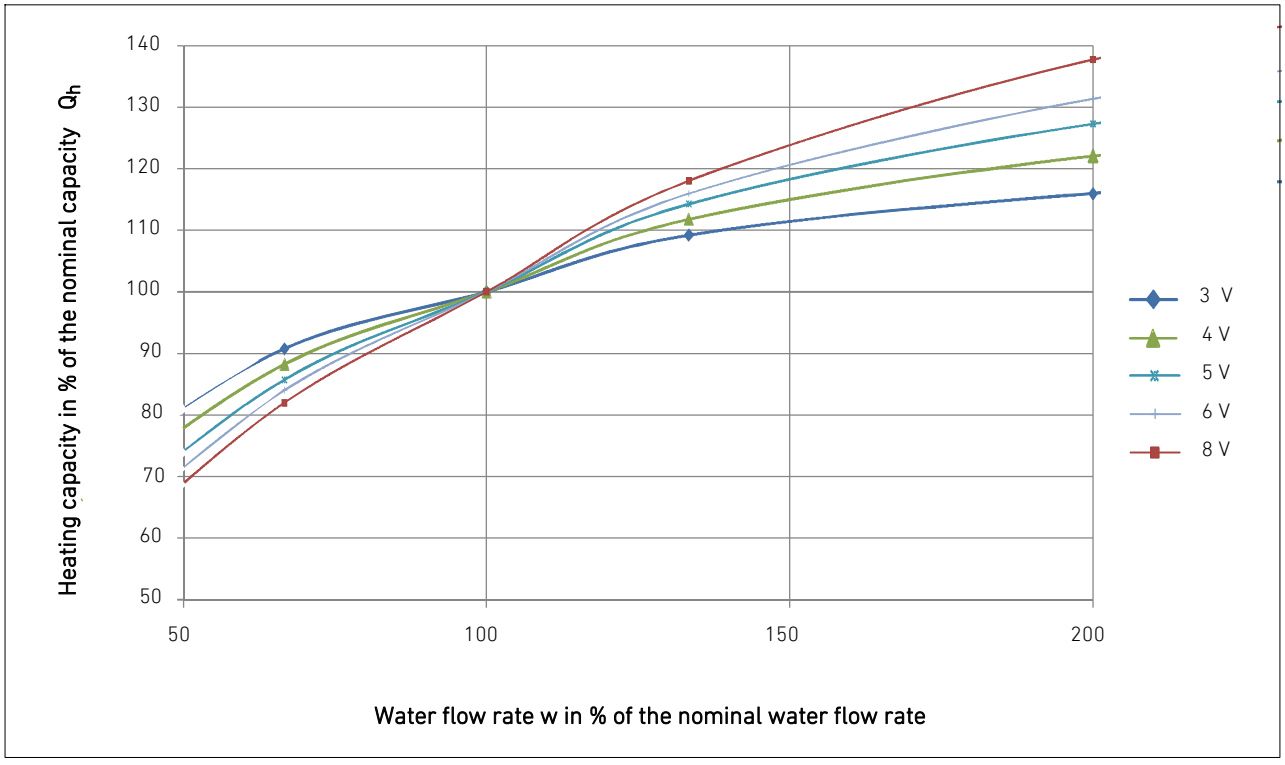


Continuation 4.2.3 Correction charts type VKB-0/4, 4-pipe system

Static heating capacity for 0.44 gpm

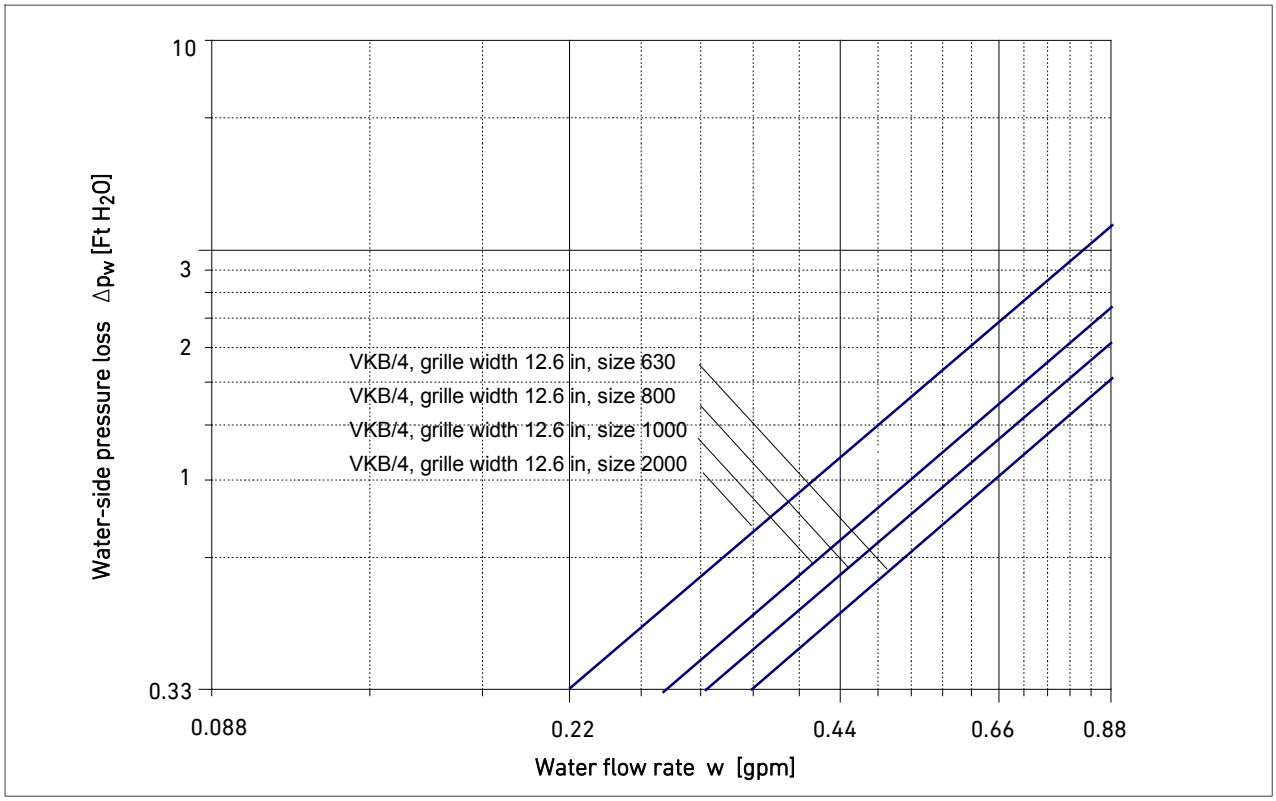


Heating capacity for different water flow rates



Continuation 4.2.3 Correction charts type VKB-0/4, 4-pipe system

Water-side pressure loss of the heater for different water flow rates



4.2.4 Technical data type VKB-0/2, 2-pipe system

Size 630, type VKB-0/2.../T, non condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	Δp_w [Ft H_2O]	w_{oh} [gpm]	Δp_w [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} [W]
3	106	25	31	79.6	70.1	1,433						3
4	141	30	36	102.4	85.3	1,842						4
5	171	33	39	121.3	96.7	2,184	1.32	2.3	0.7	0.7	409	5
6	212	38	44	140.3	108.0	2,525						7
8	271	46	52	163.0	121.3	2,934						11

Size 800, type VKB-0/2.../T, non condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	Δp_w [Ft H_2O]	w_{oh} [gpm]	Δp_w [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} [W]
3	147	25	31	102.4	89.1	1,842						3
4	194	30	36	134.6	111.8	2,422						4
5	241	33	39	163.0	130.8	2,934	1.32	2.7	0.7	0.9	546	6
6	300	38	44	187.6	145.9	3,378						8
8	376	46	52	212.3	157.3	3,821						14

Size 1000, type VKB-0/2.../T, non condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	Δp_w [Ft H_2O]	w_{oh} [gpm]	Δp_w [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} [W]
3	182	27	33	111.8	96.7	2,013						3
4	241	29	35	144.1	119.4	2,593						5
5	300	34	40	174.4	140.3	3,139	1.32	3.3	0.7	1.0	682	7
6	371	39	45	200.9	155.4	3,617						10
8	465	47	53	231.2	170.6	4,162						19

Size 2000, type VKB-0/2.../T, non condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	Δp_w [Ft H_2O]	w_{oh} [gpm]	Δp_w [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} [W]
3	300	27	33	200.9	151.6	3,617						8
4	400	32	38	259.7	174.4	4,674						10
5	488	37	43	309.0	193.3	5,561	1.76	3.0	0.7	0.5	1,365	13
6	512	42	48	339.3	212.3	6,107						18
8	712	51	57	405.6	223.7	7,301						32

Speed - control voltage fan
V - flow rate (± 10 %)
L_{A18} - sound pressure level
L_{wA} - sound power level ± 3 dB(A)
Q_k - total cooling capacity
Q_h - total heating capacity
Δt - temp. difference between air entering the heat exchanger and water supply
Q_{st} - heating capacity for natural convection
w_{ok} - standard water flow rate (cooling) *
w_{oh} - standard water flow rate (heating) *
Δp_w - water-side pressure loss
P_{el} - electric power consumption (± 10 %)

Values are given for the unit including the air outlet grille, without spreading vanes. The spreading vanes have the effect of reducing capacity by max. 10 %.

1) For 61 °F water supply temperature, 79 °F air temperature entering the heat exchanger (may vary from the room air temp.), non-condensing operation

2) For 131 °F water supply temperature 68 °F room air temperature

* Correction for other water flow rates see pages 19/20

Continuation 4.2.4 Technical data type VKB-0/2, 2-pipe system

Size 630, type VKB-0/2.../E, condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	Q_K 2) [BTU/h]	Q_{ksens} 2) [BTU/h]	w_{ok} [gpm]	Δp_w [feet]	w_{oh} [gpm]	Δp_w [feet]	Q_{st} 3) [BTU/h]	P_{el} [Watt]
3	106	25	31	75.8	66.3	1,365	3,548	2,354						3
4	141	30	36	96.7	79.6	1,740	4,401	3,071						4
5	171	33	39	115.6	92.9	2,081	4,981	3,480	1.32	2.3	0.7	0.7	409	5
6	212	38	44	132.7	104.2	2,388	5,493	4,128						7
8	271	46	52	155.4	115.6	2,798	6,175	4,947						11

Size 800, type VKB-0/2.../E, condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	Q_K 2) [BTU/h]	Q_{ksens} 2) [BTU/h]	w_{ok} [gpm]	Δp_w [feet]	w_{oh} [gpm]	Δp_w [feet]	Q_{st} 3) [BTU/h]	P_{el} [Watt]
3	147	25	31	96.7	85.3	1,740	4,538	3,002						3
4	194	30	36	128.9	108.0	2,320	5,766	4,026						4
5	241	33	39	155.4	125.1	2,798	6,687	4,811	1.32	2.7	0.7	0.9	546	6
6	300	38	44	178.2	138.4	3,207	7,369	5,527						8
8	376	46	52	200.9	149.7	3,617	7,950	6,346						14

Size 2000, type VKB-0/2.../E, condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	Q_K 2) [BTU/h]	Q_{ksens} 2) [BTU/h]	w_{ok} [gpm]	Δp_w [feet]	w_{oh} [gpm]	Δp_w [feet]	Q_{st} 3) [BTU/h]	P_{el} [Watt]
3	182	27	33	106.1	92.9	1,928	5,015	3,309						3
4	241	29	35	138.4	115.6	2,477	6,196	4,333						5
5	300	34	40	166.8	132.7	2,989	7,172	5,152	1.32	3.3	0.7	1.0	682	7
6	371	39	45	189.5	147.8	3,429	7,885	5,902						10
8	465	47	53	219.9	163.0	3,941	8,673	6,926						19

Size 1000, type VKB-0/2.../E, condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	Q_K 2) [BTU/h]	Q_{ksens} 2) [BTU/h]	w_{ok} [gpm]	Δp_w [feet]	w_{oh} [gpm]	Δp_w [feet]	Q_{st} 3) [BTU/h]	P_{el} [Watt]
3	300	27	33	191.4	140.3	3,446	9,075	6,073						8
4	400	32	38	246.4	157.3	4,435	10,764	7,847						10
5	488	37	43	293.8	168.7	5,288	12,385	9,417	1.76	3.0	0.4	0.7	1,365	13
6	512	42	48	322.2	187.6	5,800	13,101	10,235						18
8	712	51	57	384.8	191.4	6,926	14,705	12,249						32

Speed - control voltage fan
V - flow rate (± 10 %)
L_{A18} - sound pressure level
L_{wA} - sound power level ± 3 dB(A)
Q_k - total cooling capacity
Q_{ksens} - sensible cooling capacity
Q_h - total heating capacity
Δt - temp. difference between air entering the heat exchanger and water supply
Q_{st} - heating capacity for natural convection
w_{ok} - standard water flow rate (cooling) *
w_{oh} - standard water flow rate (heating) *
Δp_w - water-side pressure loss
P_{el} - electric power consumption (± 10 %)

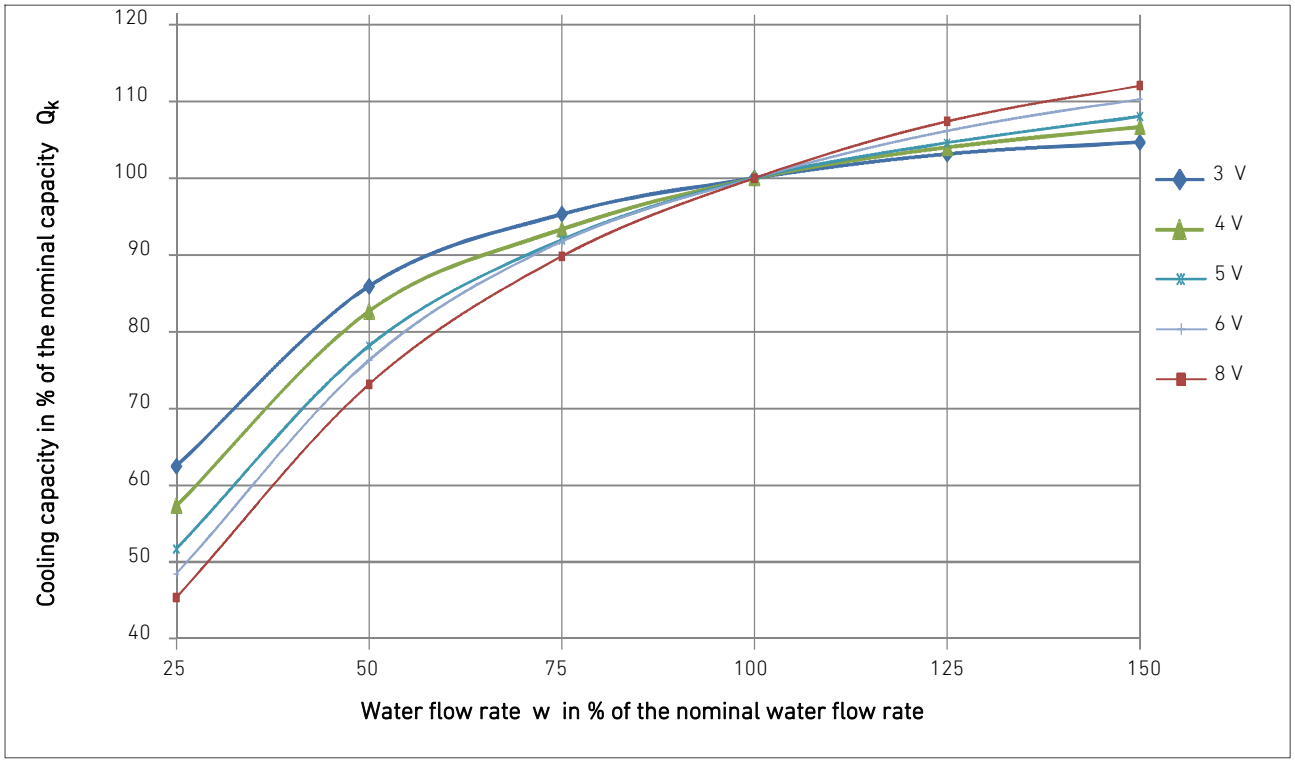
Values are given for the unit including the air outlet grille, without spreading vanes. The spreading vanes have the effect of reducing capacity by max. 10 %.

1) For 61 °F water supply temperature, 79 °F air temp. entering the heat exchanger (may vary from the room air temp.), non-condensing operation.
2) For 43 °F water supply temperature, 79 °F air temp. entering the heat exchanger (may vary from the room air temp.), condensing operation, 50 % R.H.
3) For 131 °F water supply temperature, 68 °F air temp. entering the heat exchanger (may vary from the room air temp.)

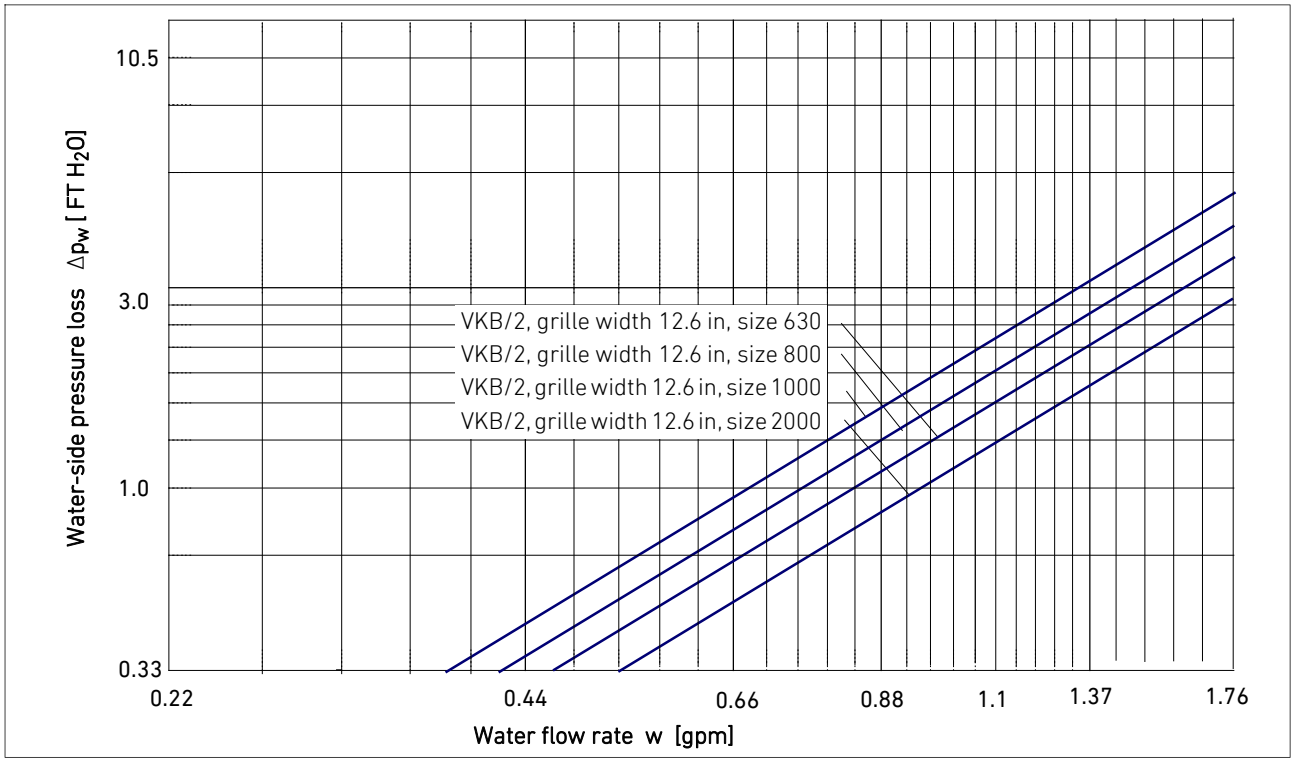
* Correction for other water flow rates see pages 19/20

4.2.5 Correction charts type VKB-0/2, 2-pipe system

Cooling capacity for different water flow rates

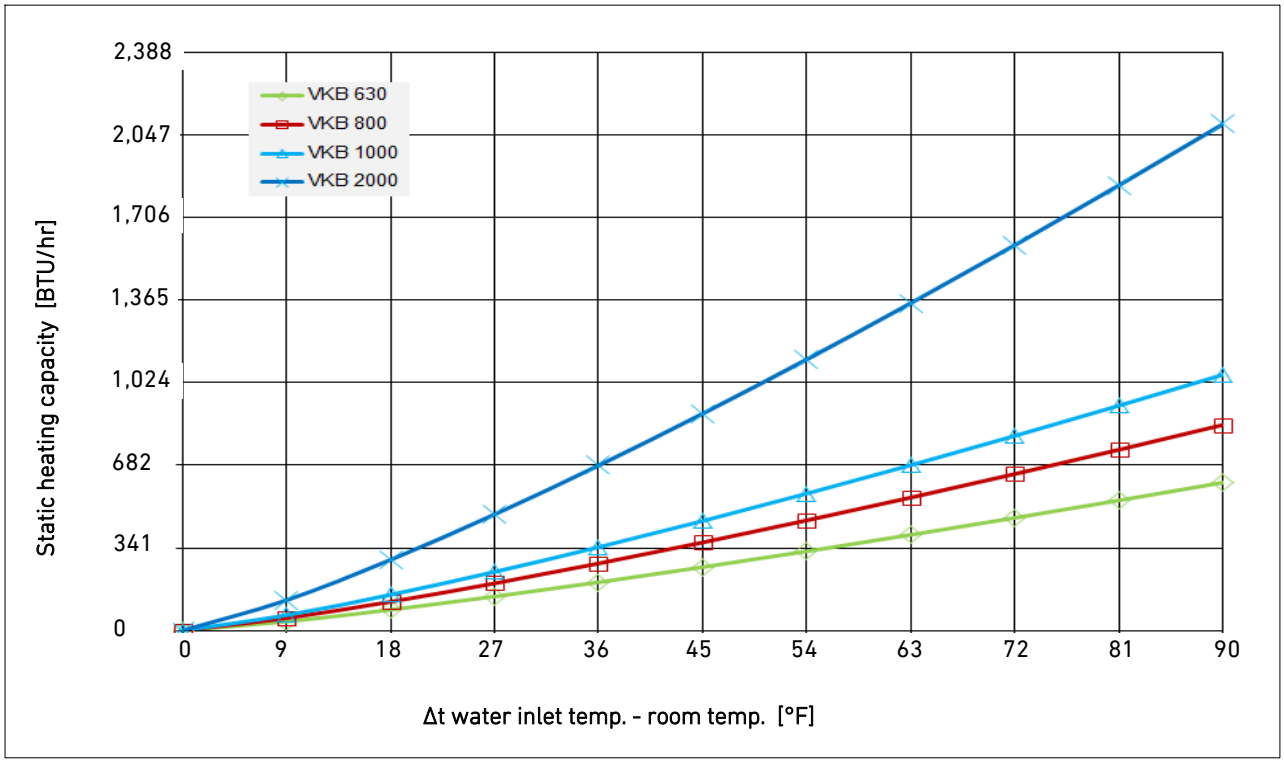


Water-side pressure loss for different water flow rates

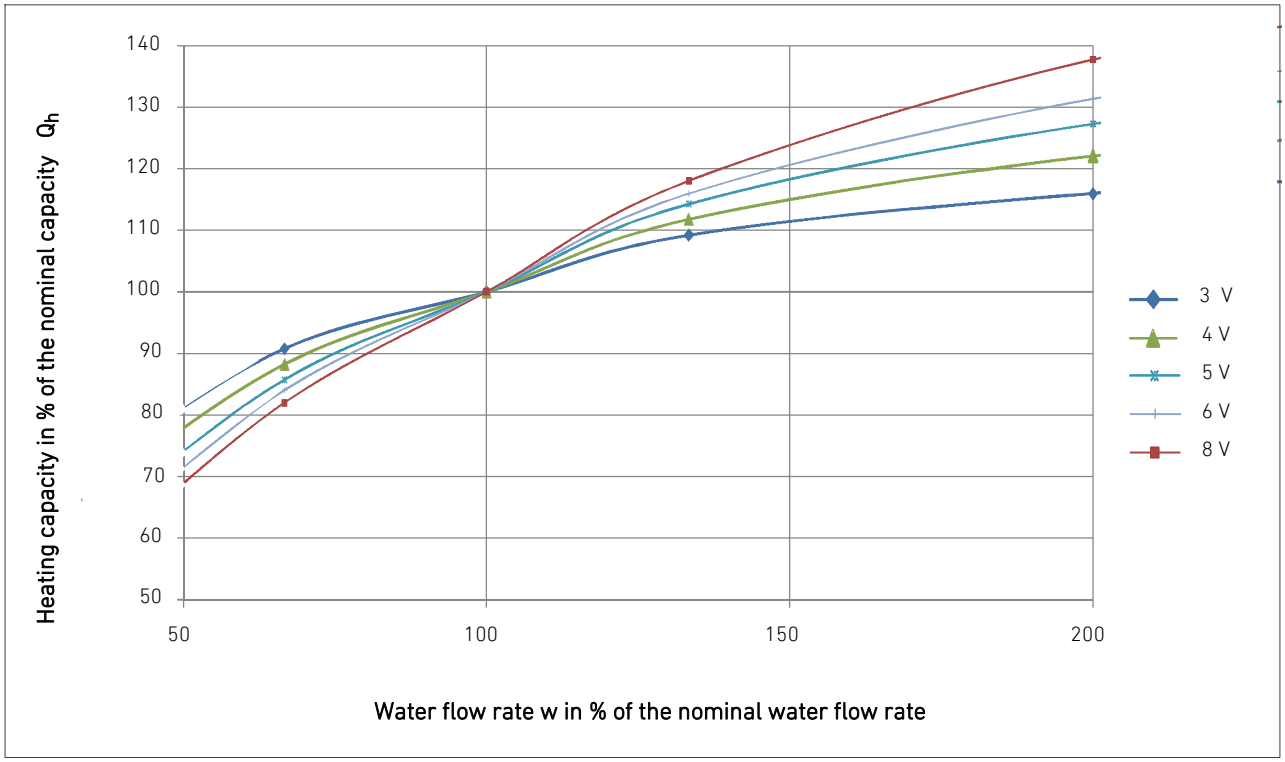


Continuation 4.2.5 Correction charts type VKB-0/2, 2-pipe system

Static heating capacity



Heating capacity for different water flow rates

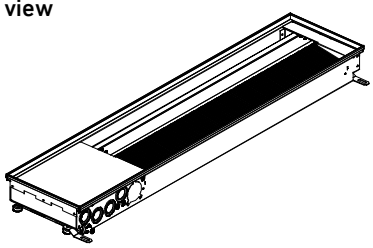


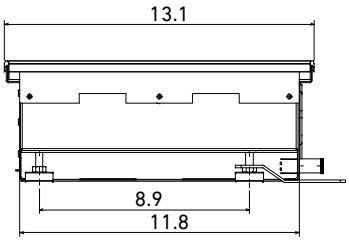
4.3 Technical data type VKB-N/., grille width 12.6 in, low height

4.3.1 Dimensions, weights, acoustics

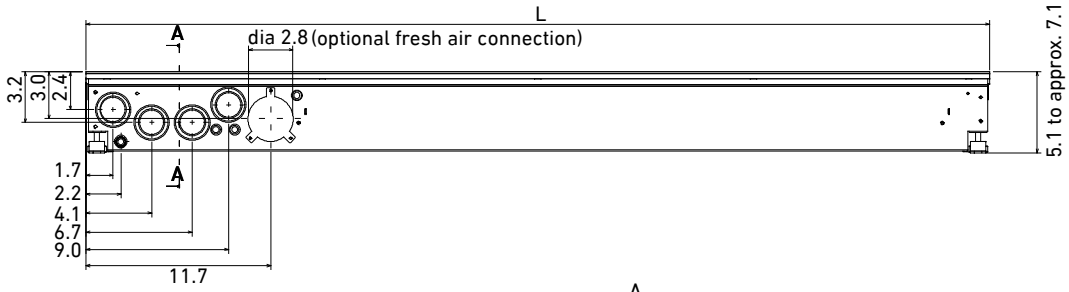
Dimensions, Weights	Size	Total length L	Air outlet width A	Weight	Water content [gal]	
		[in]	[in]	[lbs]	Heating circuit	Cooling circuit
	630	40.1	12.8	44	0.092	0.092
	800	49.2	33.7	51	0.11	0.11
	1000	57.0	41.5	52	0.13	0.13

Isometric view

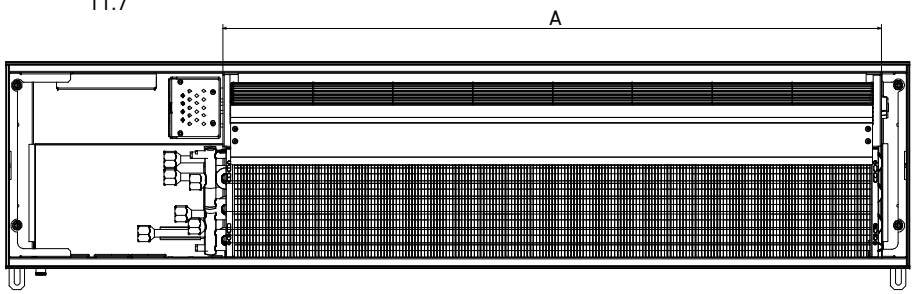




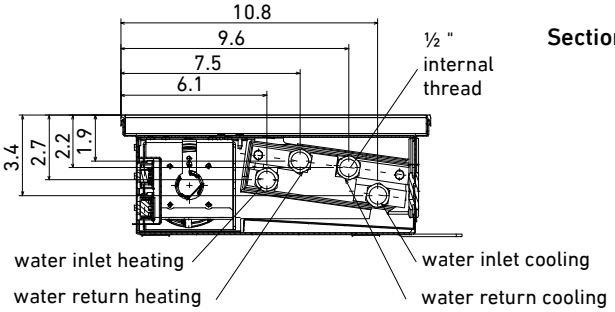
Front view



Top view

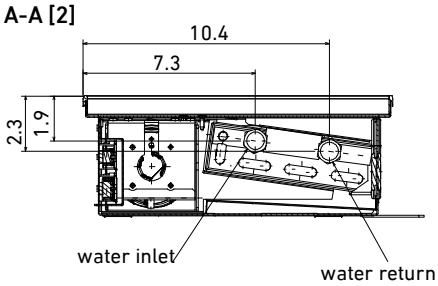


Section A-A



4-pipe heat exchanger, condensate tray

Section A-A [2]



2-pipe heat exchanger, condensate tray

Fresh air flow rate V_P	[cfm]	23	35	47	59	**1 socket (dia 2.8 “), with grille**
Sound power level $L_{wA\,P}$	[dB(A)]	<27	32	40	47	The total acoustic power level may be calculated as follows: $L_{wA} = 10 * \log (10^{0,1*L_{wA\,P}} + 10^{0,1\,*\,L_{wA,VKB}})$
Pressure loss	[in H_2O]	–	0.02	0.32	0.48	

4.3.2 Technical data type VKB-N/4, 4-pipe system

Size 630, type VKB-N/4/.../T, non condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	Δpw [Ft H_2O]	w_{oh} [gpm]	Δpw [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} (EC) [W]
3	82	25	31	37.9	34.1	921	0.88	4.3	0.4	0.6	307	3
4	100	27	33	51.2	43.6	1,058	0.88	4.3	0.4	0.6	307	4
5	129	33	39	64.4	56.9	1,262	0.88	4.3	0.4	0.6	307	5
6	147	37	43	72.0	64.4	1,399	0.88	4.3	0.4	0.6	307	7
8	194	46	52	91.0	75.8	1,638	0.88	4.3	0.4	0.6	307	11

Size 800, type VKB-N/4/.../T, non condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	Δpw [Ft H_2O]	w_{oh} [gpm]	Δpw [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} (EC) [W]
3	112	25	31	51.2	45.5	921	0.88	5.0	0.4	0.7	409	3
4	141	27	33	70.1	58.8	1,262	0.88	5.0	0.4	0.7	409	4
5	176	33	39	85.3	73.9	1,535	0.88	5.0	0.4	0.7	409	5
6	206	37	43	98.6	85.3	1,774	0.88	5.0	0.4	0.7	409	7
8	271	46	52	121.3	98.6	2,184	0.88	5.0	0.4	0.7	409	12

Size 1000, type VKB-N/4/.../T, non condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	Δpw [Ft H_2O]	w_{oh} [gpm]	Δpw [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} (EC) [W]
3	141	25	31	62.5	55.0	1,126	0.88	5.7	0.4	0.8	546	3
4	176	27	33	85.3	70.1	1,535	0.88	5.7	0.4	0.8	546	5
5	218	33	39	104.2	87.2	1,876	0.88	5.7	0.4	0.8	546	7
6	259	37	43	123.2	100.5	2,218	0.88	5.7	0.4	0.8	546	10
8	335	46	52	147.8	117.5	2,661	0.88	5.7	0.4	0.8	546	19

U - control voltage fan
V - flow rate (± 10 %)
L_{A18} - sound pressure level
L_{wA} - sound power level ± 3 dB(A)
Q_k - total cooling capacity
$Q_{k\ sens}$ - sensible cooling capacity
Q_h - total heating capacity
Δt - temperature difference between air entering the heat exchanger and water supply
Q_{st} - heating capacity for natural convection
w_{ok} - standard water flow rate (cooling) *
w_{oh} - standard water flow rate (heating) *
$Δp_w$ - water-side pressure loss
P_{el} - electric power consumption (± 10 %)

Values are given for the unit without air outlet grille, without filter.

1) For 61 °F water supply temperature, 79 °F air temperature entering the heat exchanger (may vary from room temperature), non condensing operation

2) For 131 °F water supply temperature, 68 °F room air temperature

* Correction for other water flow rates see pages 24...26

Continuation 4.3.2 Technical data type VKB-N/4, 4-pipe system

Size 630, type VKB-N/4/.../E, condensing

U	V	L_{A18}	L_{wA}	Q_k / Δt	Q_h / Δt	Q_k	Q_k 2)	Q_{ksens}	w_{ok}	Δp_w	w_{oh}	Δp_w	Q_{st}	P_{el} (EC)
[V DC]	[cfm]	[dB(A)]	[dB(A)]	[BTU/h Δt]	[BTU/h Δt]	[BTU/h]	[BTU/h]	[BTU/h]	[gpm]	[feet]	[gpm]	[feet]	[BTU/h]	[W]
3	82	25	31	32.2	30.3	580	1,604	1,058	0.88	4.3	0.4	0.6	307	3
4	100	30	36	43.6	41.7	785	2,013	1,365	0.88	4.3	0.4	0.6	307	4
5	129	33	39	55.0	51.2	989	2,456	1,740	0.88	4.3	0.4	0.6	307	5
6	147	38	44	62.5	58.8	1,126	2,729	1,945	0.88	4.3	0.4	0.6	307	7
8	194	46	52	77.7	72.0	1,399	3,207	2,422	0.88	4.3	0.4	0.6	307	11

Size 800, type VKB-N/4/.../E, condensing

U	V	L_{A18}	L_{wA}	Q_k / Δt	Q_h / Δt	Q_k	Q_k 2)	Q_{ksens}	w_{ok}	Δp_w	w_{oh}	Δp_w	Q_{st}	P_{el} (EC)
[V DC]	[cfm]	[dB(A)]	[dB(A)]	[BTU/h Δt]	[BTU/h Δt]	[BTU/h]	[BTU/h]	[BTU/h]	[gpm]	[feet]	[gpm]	[feet]	[BTU/h]	[W]
3	112	25	31	45.5	39.8	819	2,218	1,501	0.88	5.0	0.4	0.7	409	3
4	141	30	36	64.4	56.9	1,160	3,071	2,047	0.88	5.0	0.4	0.7	409	4
5	176	33	39	79.6	66.3	1,433	3,753	2,525	0.88	5.0	0.4	0.7	409	5
6	206	38	44	92.9	75.8	1,672	4,128	2,900	0.88	5.0	0.4	0.7	409	7
8	271	46	52	119.4	92.9	2,149	4,913	4,299	0.88	5.0	0.4	0.7	409	12

Size 1000, type VKB-N/4/.../E, condensing

U	V	L_{A18}	L_{wA}	Q_k / Δt	Q_h / Δt	Q_k	Q_k 2)	Q_{ksens}	w_{ok}	Δp_w	w_{oh}	Δp_w	Q_{st}	P_{el} (EC)
[V DC]	[cfm]	[dB(A)]	[dB(A)]	[BTU/h Δt]	[BTU/h Δt]	[BTU/h]	[BTU/h]	[BTU/h]	[gpm]	[feet]	[gpm]	[feet]	[BTU/h]	[W]
3	141	25	31	53.1	49.3	955	2,593	1,740	0.88	5.7	0.4	0.8	546	3
4	176	27	33	72.0	66.3	1,296	3,309	2,286	0.88	5.7	0.4	0.8	546	5
5	218	33	39	89.1	79.6	1,604	4,026	2,832	0.88	5.7	0.4	0.8	546	7
6	259	37	43	104.2	91.0	1,876	4,538	3,275	0.88	5.7	0.4	0.8	546	10
8	335	46	52	123.2	109.9	2,218	5,152	3,753	0.88	5.7	0.4	0.8	546	19

U - control voltage fan
V - flow rate (± 10 %)
L_{A18} - sound pressure level
L_{wA} - sound power level ± 3 dB(A)
Q_k - total cooling capacity
$Q_{k\ sens}$ - sensible cooling capacity
Q_h - total heating capacity
Δt - temperature difference between air entering the heat exchanger and water supply
Q_{st} - heating capacity for natural convection
w_{ok} - standard water flow rate (cooling) *
w_{oh} - standard water flow rate (heating) *
Δp_w - water-side pressure loss
P_{el} - electric power consumption (± 10 %)

Values are given for the unit including the air outlet grille, without filter.

1) For 61 °F water supply temperature
79 °F air temperature entering the heat exchanger
(may vary from the room air temp.)
non condensing operation

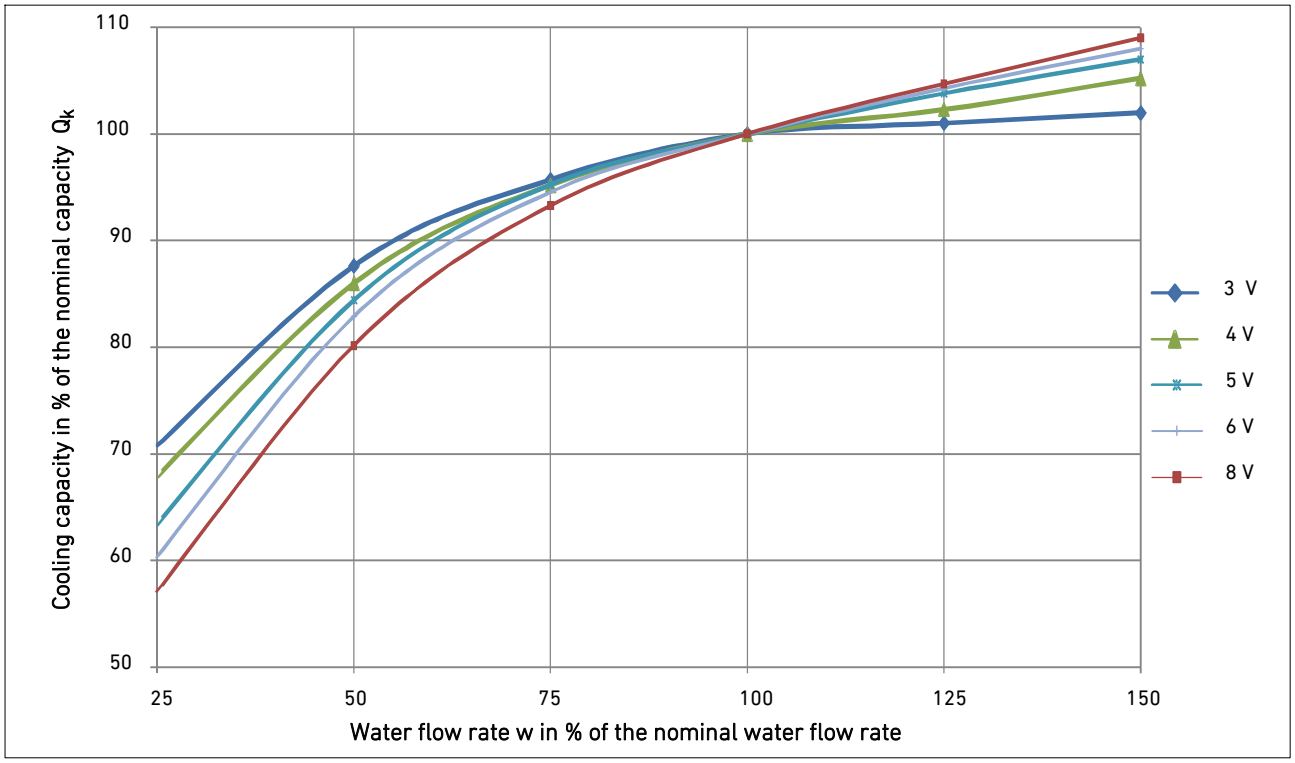
2) For 43 °F water supply temperature
79 °F air temperature entering the heat exchanger
(may vary from the room air temp.) .
non condensing operation, 50 % R.H

3) For 131 °F water supply temperature
68 °F air temperature entering the heat exchanger
(may vary from the room air temp.)

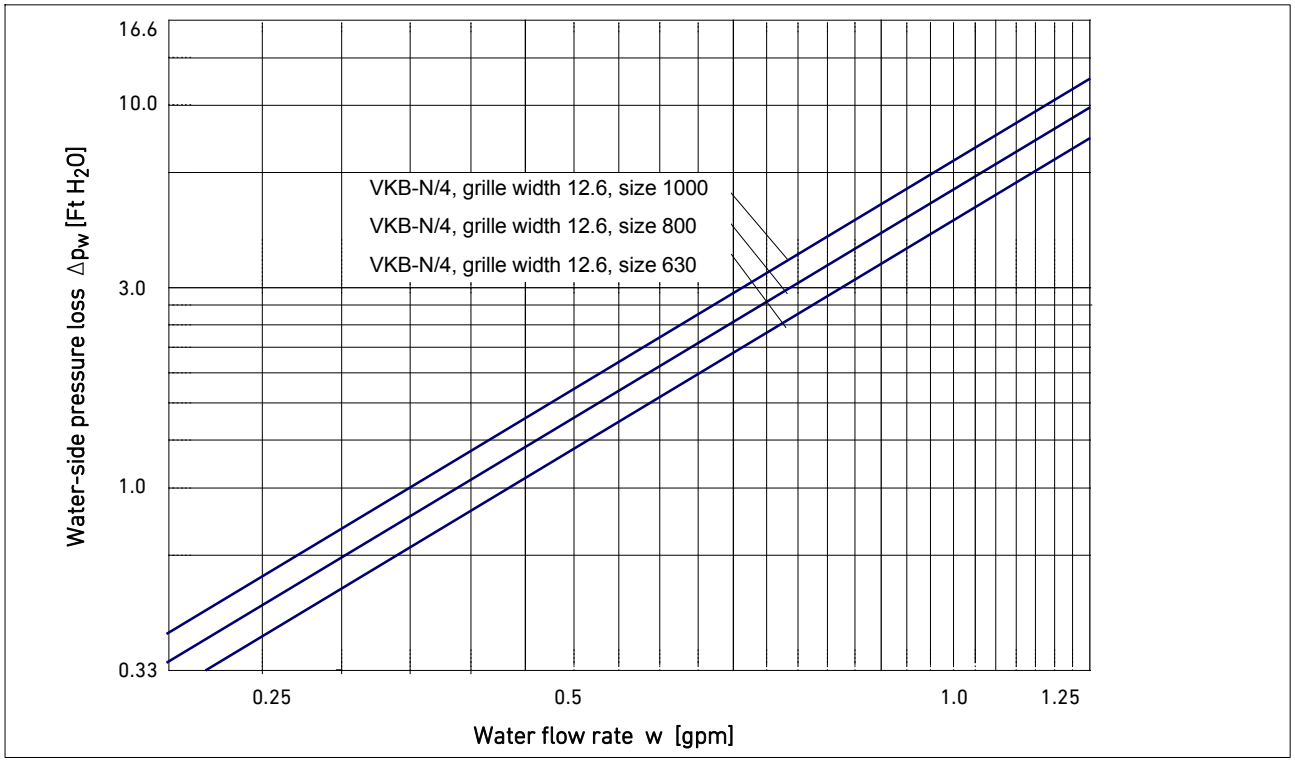
* Correction for other water flow rates see pages 24...26

4.3.3 Correction charts type VKB-N/4, 4-pipe system

Cooling capacity for different water flow rates

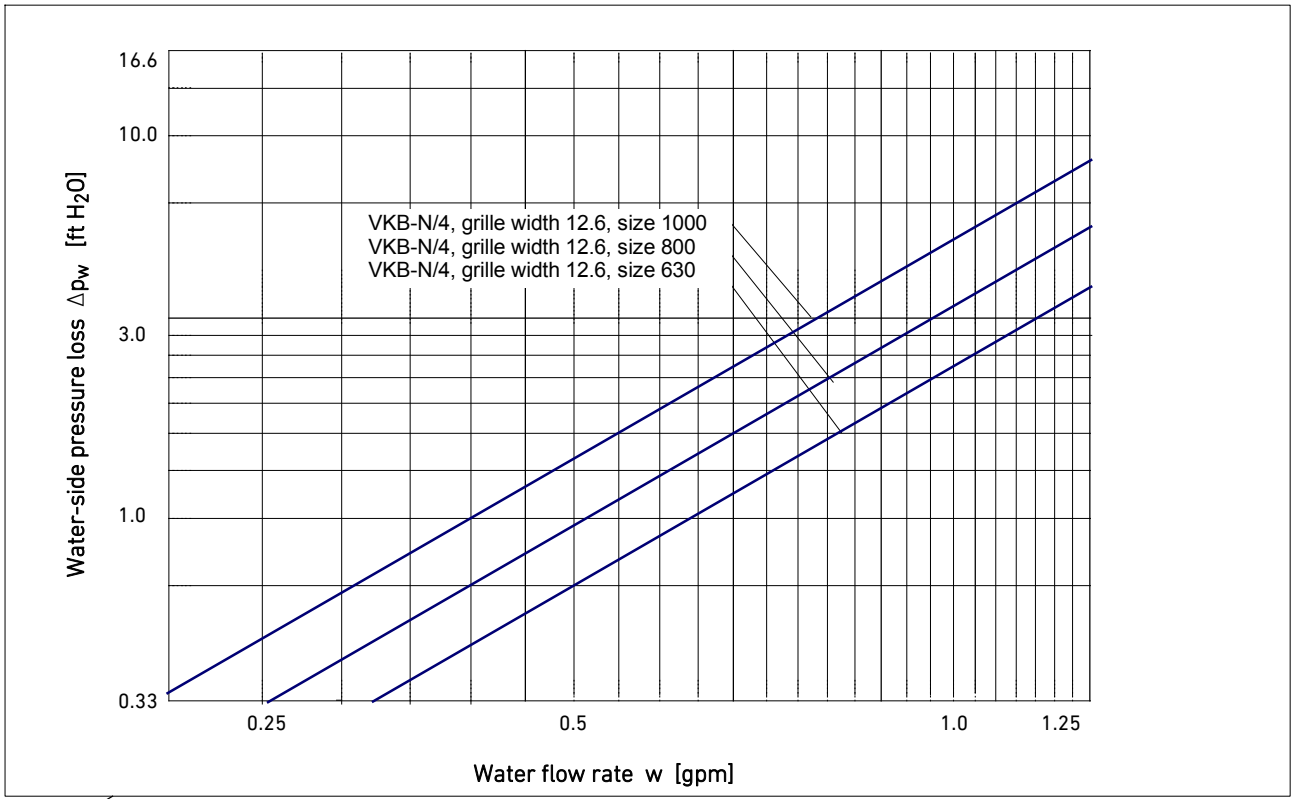


Water-side pressure loss of the cooler for different water flow rates



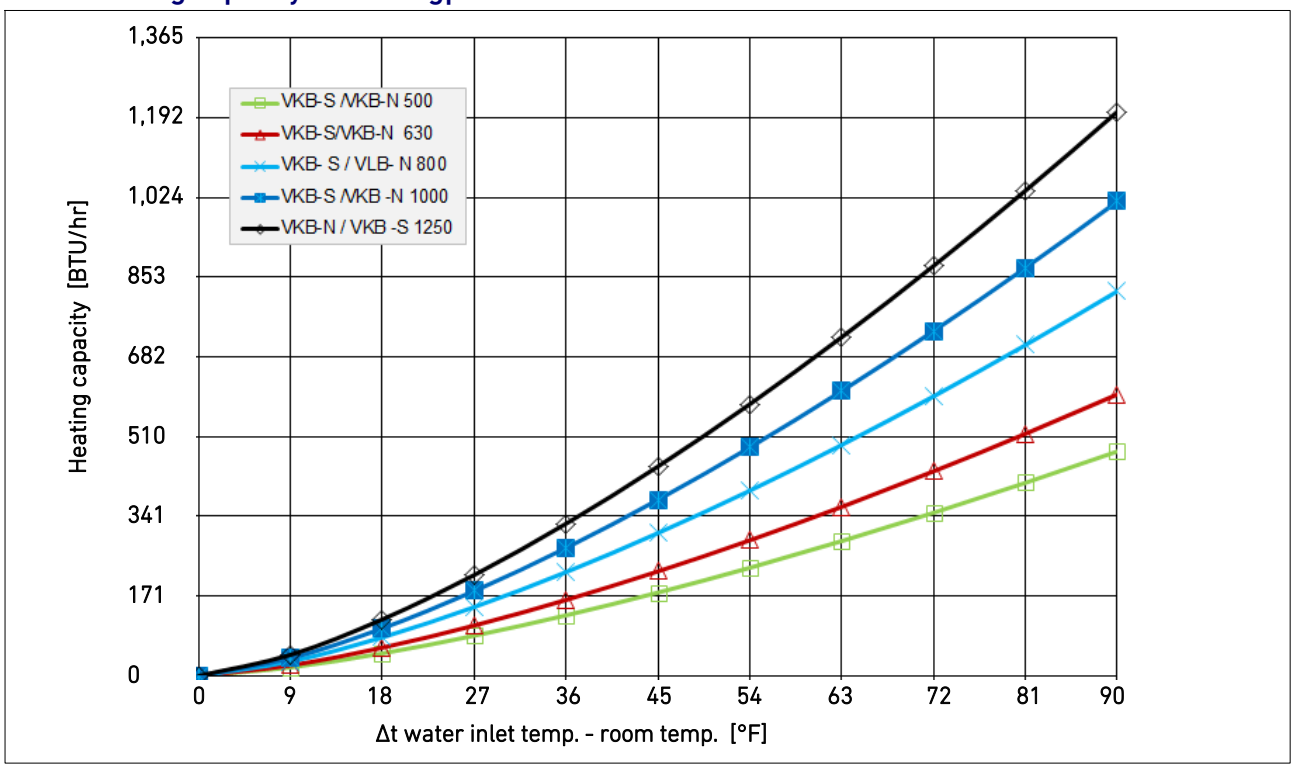
Continuation 4.3.3 Correction charts type VKB-N/4, 4-pipe system

Water-side pressure loss of the heater for different water flow rates

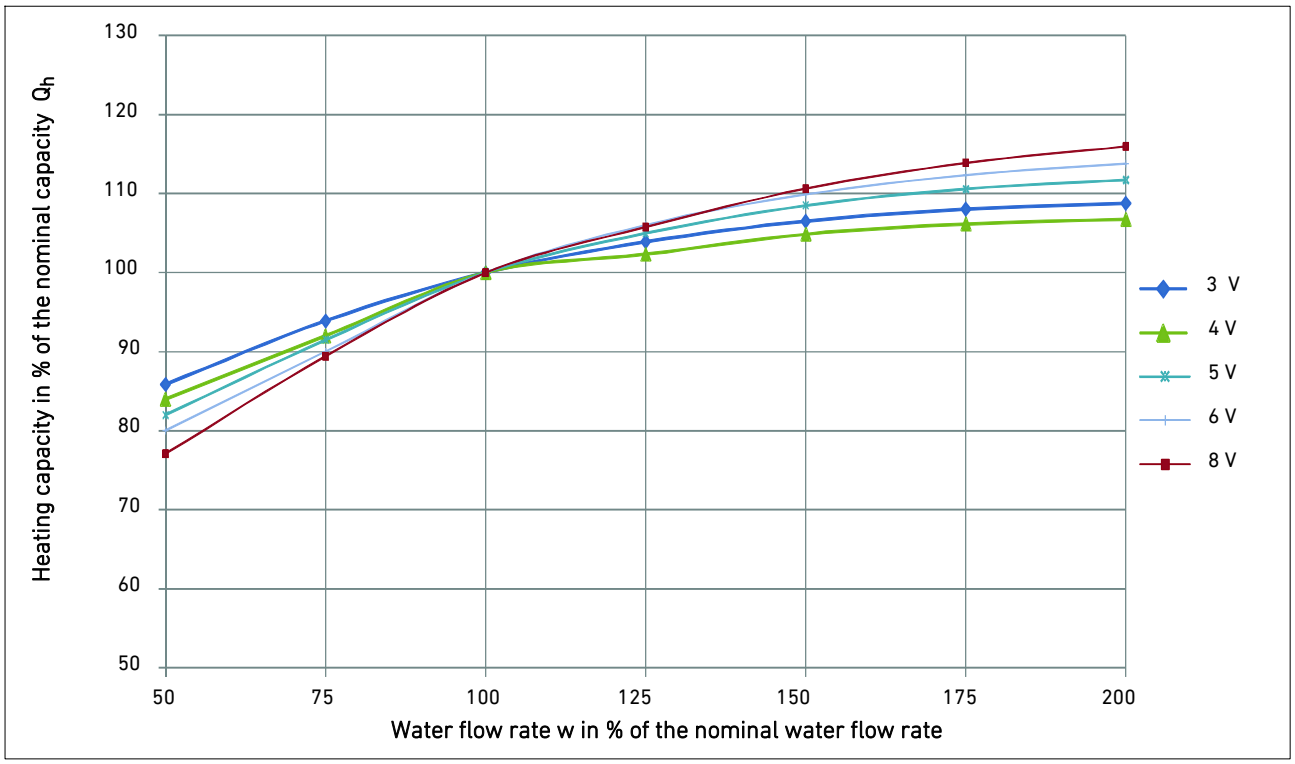


Continuation 4.3.3 Correction charts type VKB-N/4, 4-pipe system

Static heating capacity for 0.44 gpm



Heating capacity for different water flow rates



4.3.4 Technical data type VKB-N/2, 2-pipe system

Size 630, type VKB-N/2.../T, non condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	Δp_w [Ft H_2O]	w_{oh} [gpm]	Δp_w [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} (EC) [W]
3	82	25	31	41.7	36.0	921	0.88	5.4	0.4	1.7	307	3
4	100	27	33	56.9	47.4	1,058	0.88	5.4	0.4	1.7	307	4
5	129	33	39	75.8	60.7	1,262	0.88	5.4	0.4	1.7	307	5
6	147	37	43	89.1	70.1	1,399	0.88	5.4	0.4	1.7	307	7
8	194	46	52	108.0	81.5	1,945	0.88	5.4	0.4	1.7	307	11

Size 800, type VKB-N/2.../T, non condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	Δp_w [Ft H_2O]	w_{oh} [gpm]	Δp_w [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} (EC) [W]
3	112	25	31	56.9	49.3	1,024	0.88	5.0	0.4	0.7	409	3
4	141	27	33	79.6	66.3	1,433	0.88	5.0	0.4	0.7	409	4
5	176	33	39	100.5	81.5	1,808	0.88	5.0	0.4	0.7	409	5
6	206	37	43	119.4	94.8	2,149	0.88	5.0	0.4	0.7	409	7
8	271	46	52	142.2	108.0	2,559	0.88	5.0	0.4	0.7	409	12

Size 1000, type VKB-N/2.../T, non condensing

Speed [V-DC]	V [cfm]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h / Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	Δp_w [Ft H_2O]	w_{oh} [gpm]	Δp_w [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} (EC) [W]
3	141	27	33	72.0	55.0	1,296	0.88	7.0	0.4	2.0	546	3
4	176	27	33	96.7	73.9	1,740	0.88	7.0	0.4	2.0	546	4
5	218	33	39	121.3	89.1	2,184	0.88	7.0	0.4	2.0	546	5
6	259	37	43	145.9	104.2	2,627	0.88	7.0	0.4	2.0	546	7
8	335	46	52	170.6	111.8	3,071	0.88	7.0	0.4	2.0	546	19

U - control voltage fan
V - flow rate (± 10 %)
L_{A18} - sound pressure level
L_{wA} - sound power level ± 3 dB(A)
Q_k - total cooling capacity
Q_h - total heating capacity
Δt - temp. difference between air entering the heat exchanger and water supply
Q_{st} - heating capacity for natural convection
w_{ok} - standard water flow rate (cooling) *
w_{oh} - standard water flow rate (heating) *
Δp_w - water-side pressure loss
P_{el} - electric power consumption (± 10 %)

Values are given for the unit without air outlet grille, without filter. The spreading vanes have the effect of reducing capacity by max. 10 %.

1) For 61 °F water supply temperature
79 °F air temperature entering the heat exchanger (may vary from room temperature)
non condensing operation.

2) For 131 °F water supply temperature
68 °F air temperature entering the heat exchanger (may vary from room temperature)

* Correction for other water flow rates see pages 29/30

Continuation 4.3.4 Technical data type VKB-N/2, 2-pipe system

Size 630, type VKB-N/2/.../E, condensing

U	V	L_{A18}	L_{wA}	Q_k / Δt	Q_h / Δt	Q_k	Q_{kc} 2)	Q_{ksens}	w_{ok}	Δp_w	w_{oh}	Δp_w	Q_{st}	P_{el} (EC)
[V DC]	[cfm]	[dB(A)]	[dB(A)]	[BTU/h Δt]	[BTU/h Δt]	[BTU/h]	[BTU/h]	[BTU/h]	[gpm]	[feet]	[gpm]	[feet]	[BTU/h]	[W]
3	82	25	31	37.9	28.4	682	1,808	1,228	0.88	5.4	0.4	1.7	307	3
4	100	27	33	53.1	37.9	955	2,456	1,672	0.88	5.4	0.4	1.7	307	4
5	129	33	39	70.1	47.4	1,262	3,139	2,252	0.88	5.4	0.4	1.7	307	5
6	147	37	43	81.5	51.2	1,467	3,548	2,559	0.88	5.4	0.4	1.7	307	7
8	194	46	52	106.1	60.7	1,911	4,367	3,309	0.88	5.4	0.4	1.7	307	11

Size 800, type VKB-N/2/.../E, condensing

U	V	L_{A18}	L_{wA}	Q_k / Δt	Q_h / Δt	Q_k	Q_k 2)	Q_{ksens}	w_{ok}	Δp_w	w_{oh}	Δp_w	Q_{st}	P_{el} (EC)
[V DC]	[cfm]	[dB(A)]	[dB(A)]	[BTU/h Δt]	[BTU/h Δt]	[BTU/h]	[BTU/h]	[BTU/h]	[gpm]	[feet]	[gpm]	[feet]	[BTU/h]	[W]
3	112	25	31	51.2	36.0	921	2,491	1,672	0.88	5.0	0.4	2.0	409	3
4	141	27	33	72.0	41.4	1,296	3,344	2,286	0.88	5.0	0.4	2.0	409	4
5	176	33	39	92.9	53.1	1,672	4,128	2,934	0.88	5.0	0.4	2.0	409	5
6	200	39	43	111.8	58.8	2,013	4,845	3,480	0.88	5.0	0.4	2.0	409	7
8	271	46	52	138.4	66.3	2,491	5,732	4,231	0.88	5.0	0.4	2.0	409	12

Size 1000, type VKB-N/2/.../E, condensing

U	V	L_{A18}	L_{wA}	Q_k / Δt	Q_h / Δt	Q_k	Q_k 2)	Q_{ksens}	w_{ok}	Δp_w	w_{oh}	Δp_w	Q_{st}	P_{el} (EC)
[V DC]	[cfm]	[dB(A)]	[dB(A)]	[BTU/h Δt]	[BTU/h Δt]	[BTU/h]	[BTU/h]	[BTU/h]	[gpm]	[feet]	[gpm]	[feet]	[BTU/h]	[W]
3	141	25	31	64.4	43.6	1,160	2,661	2,041	0.88	5.1	0.4	2.3	546	3
4	176	27	33	89.1	56.9	1,604	4,094	2,832	0.88	5.1	0.4	2.3	546	5
5	218	33	39	113.7	66.3	2,047	4,981	3,582	0.88	5.1	0.4	2.3	546	7
6	259	37	43	134.6	72.0	2,422	5,800	4,231	0.88	5.1	0.4	2.3	546	10
8	335	46	52	166.8	19.6	3,002	6,829	5,288	0.88	5.1	0.4	2.3	546	19

U - control voltage fan
V - flow rate (± 10 %)
L_{A18} - sound pressure level
L_{wA} - sound power level ± 3 dB(A)
Q_k - total cooling capacity
$Q_{k\ sens}$ - sensible cooling capacity
Q_h - total heating capacity
Δt - temperature difference between air entering the heat exchanger and water supply
Q_{st} - heating capacity for natural convection
w_{ok} - standard water flow rate (cooling) *
w_{oh} - standard water flow rate (heating) *
Δp_w - water-side pressure loss
P_{el} - electric power consumption (± 10 %)

Values are given for the unit including the air outlet grille.

1) For 61 °F water supply temperature
79 °F air temperature entering the heat exchanger
(may vary from the room air temperature)
non condensing operation

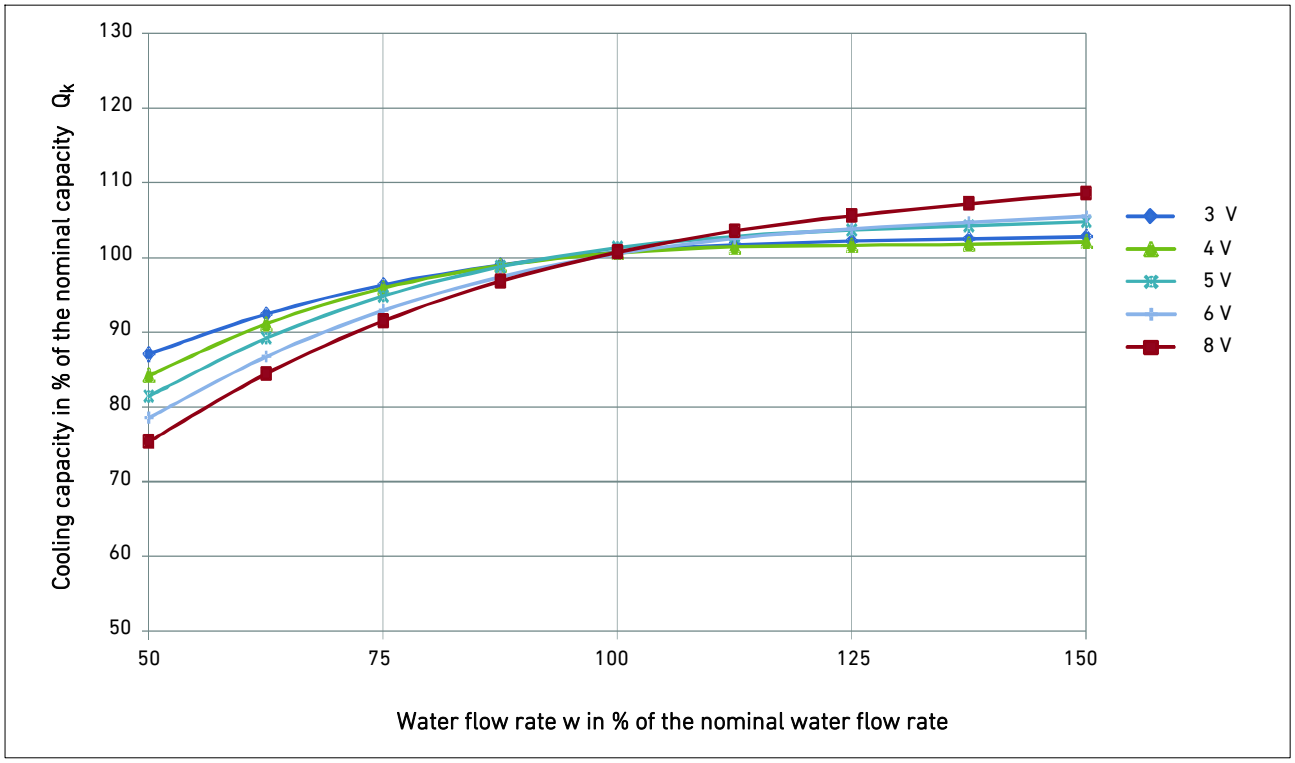
2) For 43 °F water supply temperature
79 °F air temperature entering the heat exchanger
(may vary from the room air temperature)
condensing operation

3) For 131 °F water supply temperature
68 °F room air temperature

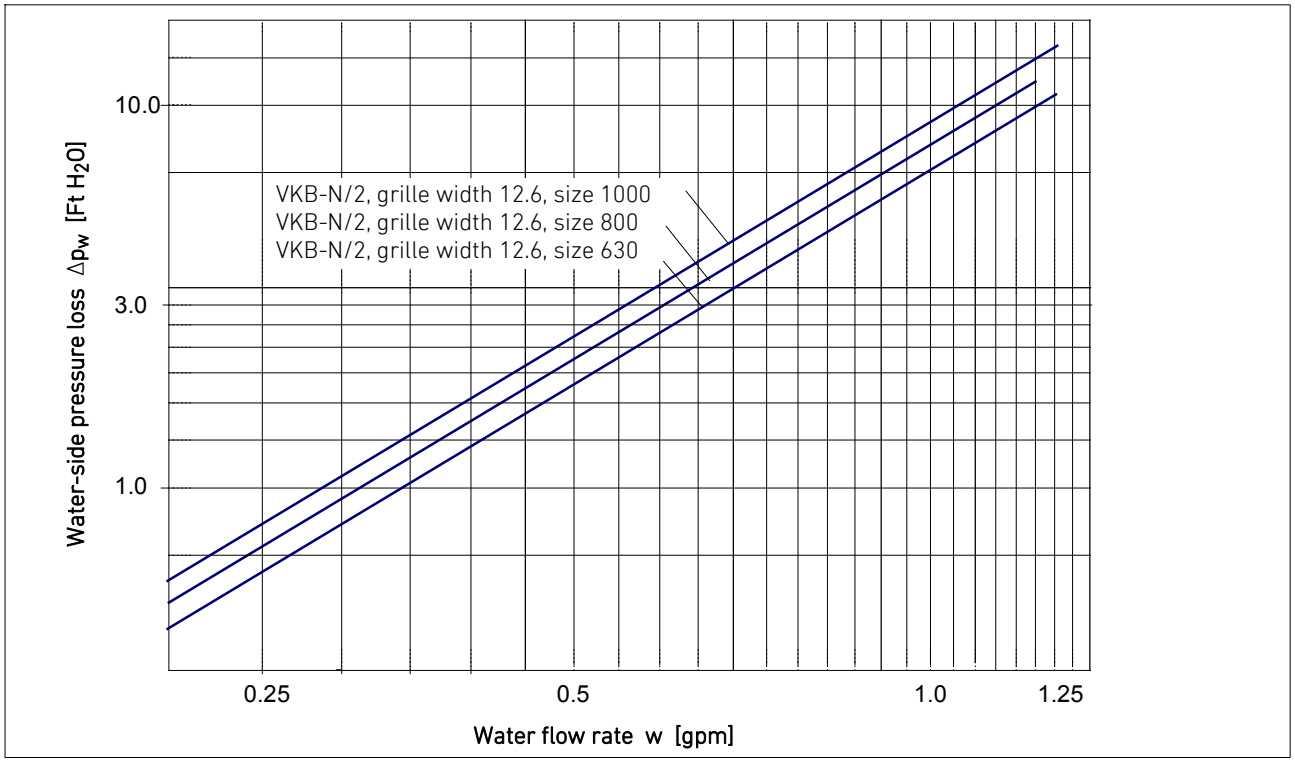
* Correction for other water flow rates see pages 29/30

4.3.5 Correction charts type VKB-N/2, 2-pipe system

Cooling capacity for different water flow rates

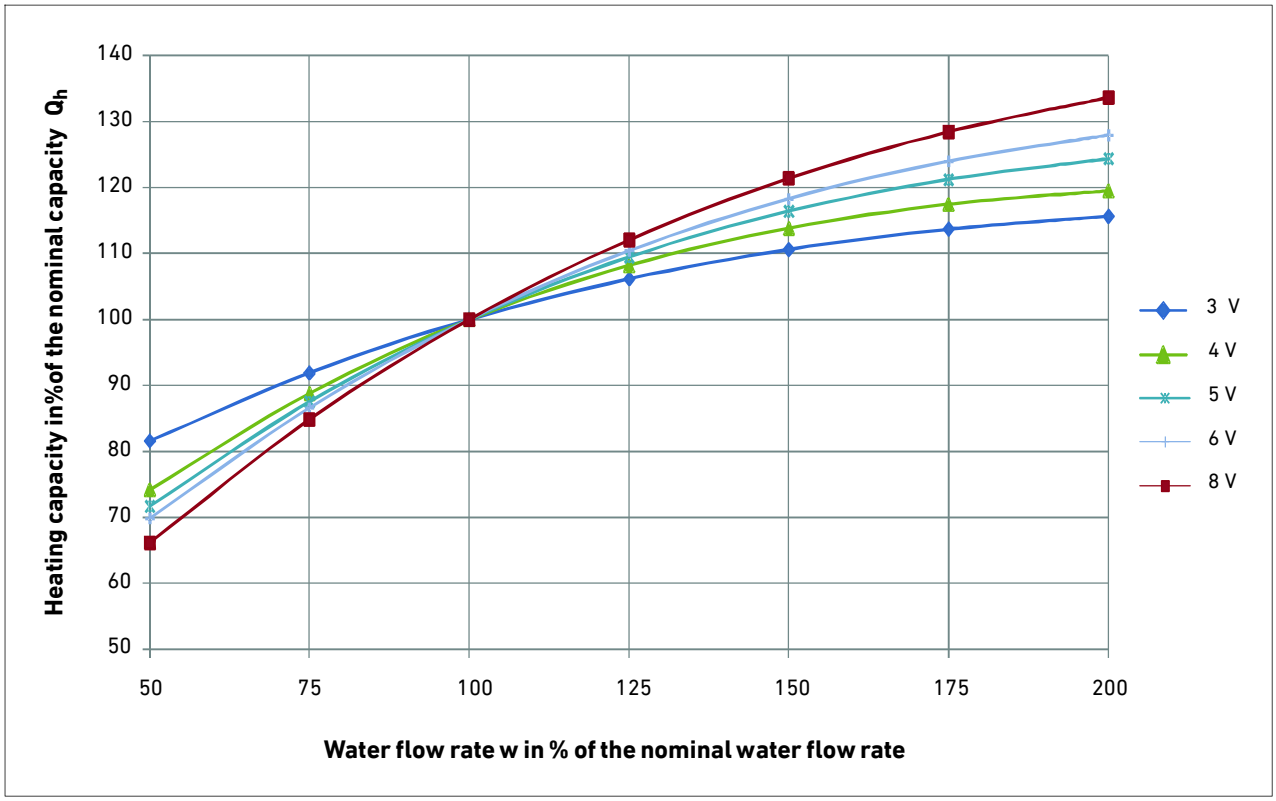


Water-side pressure loss of the cooler for different water flow rates



Continuation 4.3.5 Correction charts type VKB-N/2, 2-pipe system

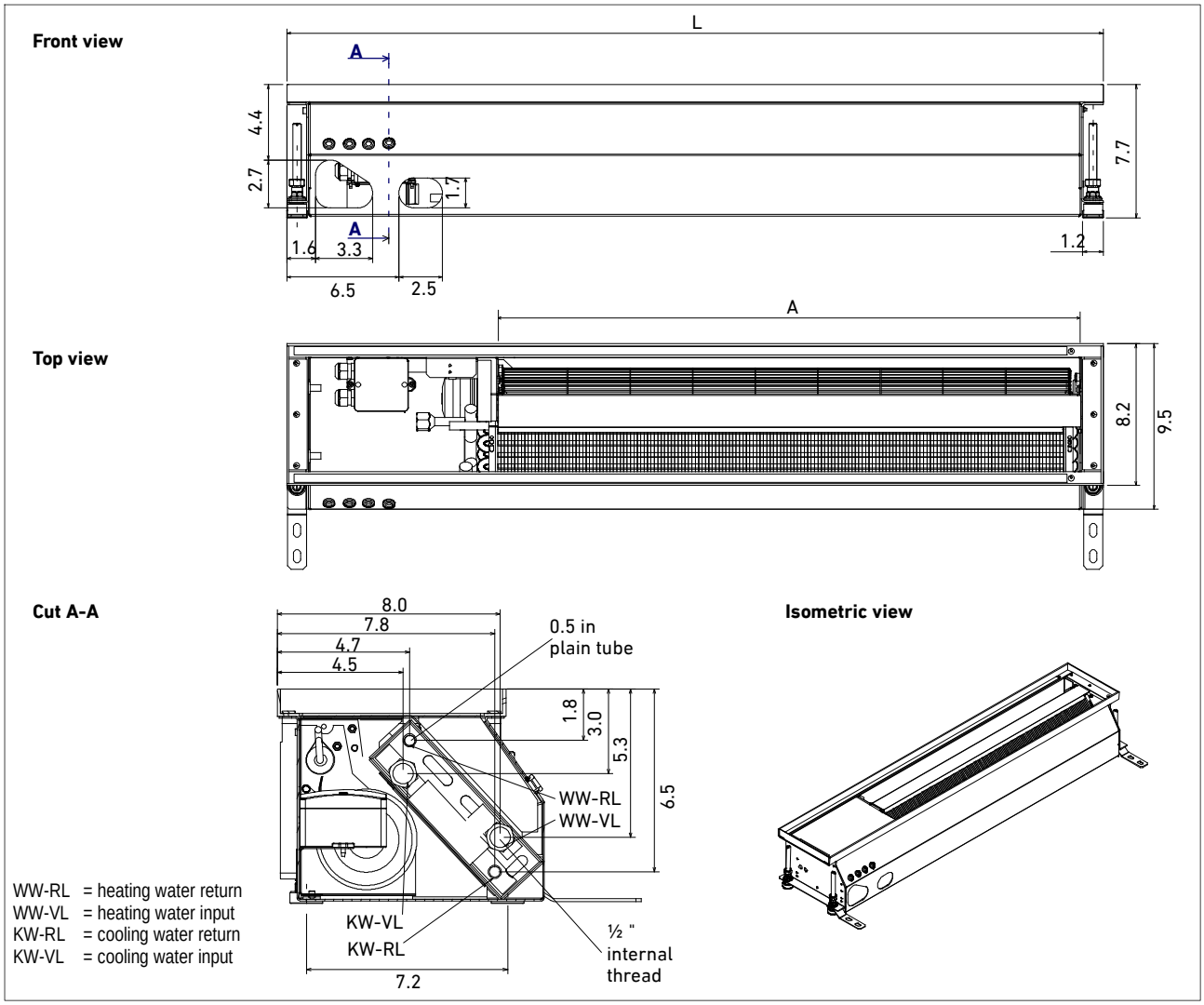
Heating capacity for different water flow rates



4.4 Technical data type VKB-S/4, 4-pipe system, grille width 7.9 in

4.4.1 Dimensions, weight, acoustics

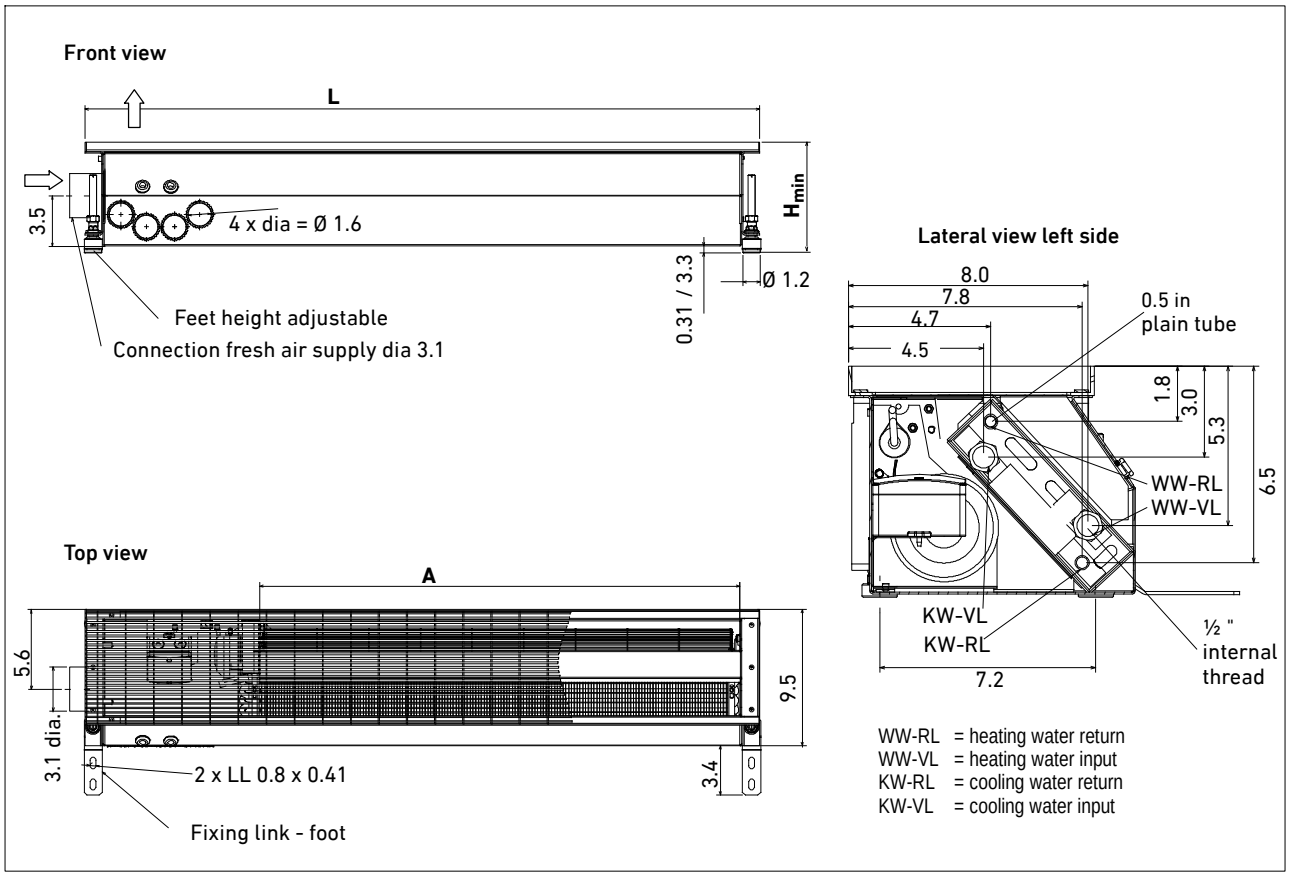
Size	Total length L [in]	Air outlet width A [in]	Minimal height H_{min} [in]	Total width B [in]	Weight [lb]	Water content [gal] Heating circuit	Water content [gal] Cooling circuit
500	35.3	20.7	With stainless steel grille: 7.6 | 8.0 With aluminum linear grille: 7.9 | 8.2		42	0.066	0.066
630	38.9	24.6			46	0.1	0.10
800	47.1	33.7			55	0.11	0.11
1000	55.0	41.6			68	0.13	0.13
1250	63.0	49.4			79	0.16	0.16



Continuation 4.4.1 Dimensions, weight, acoustics, type VKB-S/4

With fresh air supply left side 3.1“ dia

Size	L [in]	A [in]	H_{min} [in]	B [in]	Weight [lb]	Water content [gal]	
						Heating circuit	Cooling circuit
500	35.3	20.7	With stainless steel grille: 7.6 | 8.0 With aluminum linear grille: 7.9 | 8.0		42.0	0.066	0.066
630	39	24.6			46.2	0.092	0.092
800	41.1	33.7			55.0	0.11	0.11
1000	55	41.6			68.2	0.13	0.13
1250	63	49.4			79.2	0.16	0.16



Acoustic power level for separate socket for fresh air supply (must be added to the unit's power level)							
	V_P	[cfm]	29.4	35	47	59	The **total acoustic power level** may be calculated as follows:
	$L_{wA\,P}$	[dB(A)]	27	28	29	31	
	Pressure loss	[in H_2O]		0.016	0.02	0.032	$L_{wA} = 10 * \log (10^{0,1*L_{wA\,P}} + 10^{0,1\,*\,L_{wA,VKB}})$

4.4.2 Technical data type VKB-S/4, 4-pipe system, grille width 7.9”

Size 500

n (not EC) [-]	U [V]	V (cfm)	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h /Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	$\Delta p_{w(k)}$ [Ft H_2O]	w_{oh} [gpm]	$\Delta p_{w(h)}$ [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} [W]	P_{el} (EC) [W]
I	3	106	25	32	72.0	58.8	1,296	0.88	2.7	0.4	0.8	307	15	3
II	4	147	32	38	87.2	68.2	1,569	0.88	2.7	0.4	0.8	307	17	4
III	5	176	36	42	98.6	79.6	1,774	0.88	2.7	0.4	0.8	307	20	5
IV	6	200	41	47	108.0	87.2	1,945	0.88	2.7	0.4	0.8	307	22	7
V	8	235	47	53	117.5	94.8	2,115	0.88	2.7	0.4	0.8	307	27	12

Size 630

n (not EC) [-]	U [V]	V (cfm)	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h /Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	$\Delta p_{w(k)}$ [Ft H_2O]	w_{oh} [gpm]	$\Delta p_{w(h)}$ [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} [W]	P_{el} (EC) [W]
I	3	135	26	32	87.2	72.0	1,569	0.88	3.3	0.4	1.2	341	15	3
II	4	176	32	38	108.0	85.3	1,945	0.88	3.3	0.4	1.2	341	17	4
III	5	218	36	42	121.3	96.7	2,184	0.88	3.3	0.4	1.2	341	20	5
IV	6	247	41	47	130.8	104.2	2,354	0.88	3.3	0.4	1.2	341	22	7
V	8	288	47	53	142.2	113.7	2,559	0.88	3.3	0.4	1.2	341	27	13

Size 800

n (not EC) [-]	U [V]	V (cfm)	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h /Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	$\Delta p_{w(k)}$ [Ft H_2O]	w_{oh} [gpm]	$\Delta p_{w(h)}$ [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} [W]	P_{el} (EC) [W]
I	3	165	25	31	102.4	85.3	1,842	0.88	4.0	0.4	1.3	478	15	3
II	4	229	31	37	121.3	96.7	2,184	0.88	4.0	0.4	1.3	478	17	4
III	5	276	34	42	136.5	106.1	2,456	0.88	4.0	0.4	1.3	478	20	5
IV	6	306	40	46	145.9	115.6	2,627	0.88	4.0	0.4	1.3	478	22	7
V	8	353	46	52	159.2	121.3	2,866	0.88	4.0	0.4	1.3	478	27	14

Size 1000

n (not EC) [-]	U [V]	V (cfm)	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h /Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	$\Delta p_{w(k)}$ [Ft H_2O]	w_{oh} [gpm]	$\Delta p_{w(h)}$ [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} [W]	P_{el} (EC) [W]
I	3	176	25	31	113.7	83.4	2,047	0.88	5.0	0.4	1.7	583	15	3
II	4	241	32	38	132.7	106.1	2,388	0.88	5.0	0.4	1.7	583	17	4
III	5	300	36	42	149.7	119.4	2,695	0.88	5.0	0.4	1.7	583	19	5
IV	6	335	41	47	159.2	127.0	2,866	0.88	5.0	0.4	1.7	583	22	7
V	8	388	47	53	174.4	140.3	3,139	0.88	5.0	0.4	1.7	583	27	14

Size 1250

n (not EC) [-]	U [V]	V (cfm)	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_k 1) / Δt [BTU/h*Δt]	Q_h /Δt [BTU/h*Δt]	Q_k 1) [BTU/h]	w_{ok} [gpm]	$\Delta p_{w(k)}$ [Ft H_2O]	w_{oh} [gpm]	$\Delta p_{w(h)}$ [Ft H_2O]	Q_{st} 2) [BTU/h]	P_{el} [W]	P_{el} (EC) [W]
I	3	194	25	31	125.1	102.4	2,252	0.88	5.7	0.4	2.2	696	15	3
II	4	265	32	38	145.9	115.6	2,627	0.88	5.7	0.4	2.2	696	17	4
III	5	329	36	42	163.0	130.8	2,934	0.88	5.7	0.4	2.2	696	19	5
IV	6	365	41	47	174.4	138.4	3,139	0.88	5.7	0.4	2.2	696	22	8
V	8	424	47	53	191.4	153.5	3,446	0.88	5.7	0.4	2.2	696	27	14

Values are given for the unit with air outlet grille, without filter.

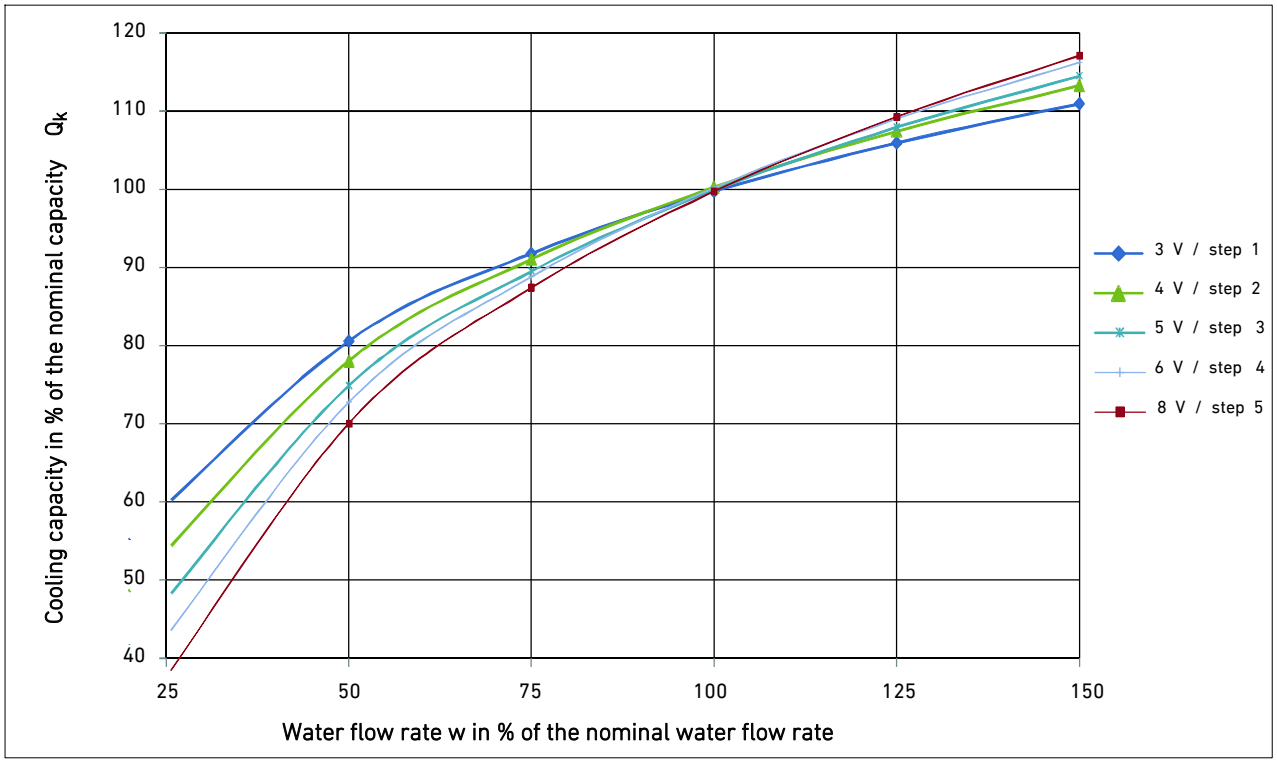
1) For 61 °F water supply temperature, 79 °F air temperature entering the heat exchanger (may vary from room temp.), non condensing operation.

2) For 131 °F water supply temperature, 68 °F suction air temperature

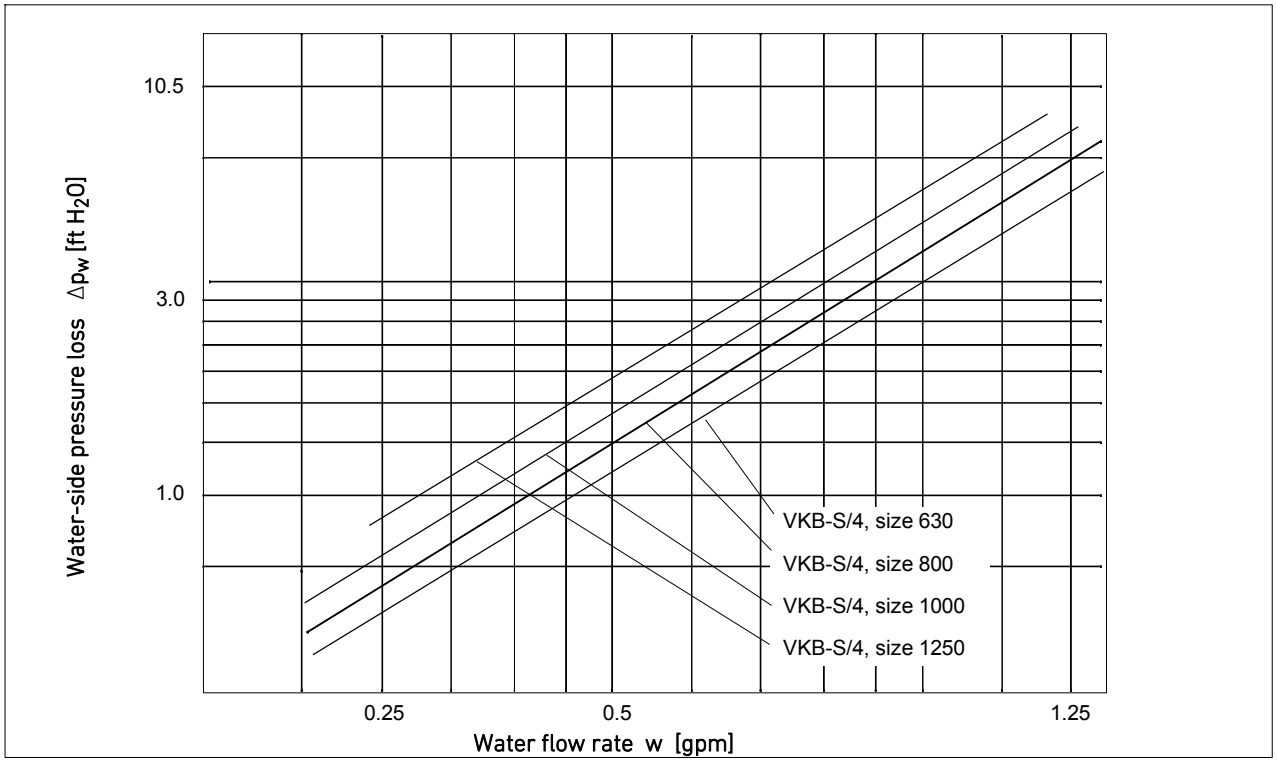
* **Correction for other water flow rates** see pages 34/35 **Legend** see page 27

4.4.3 Correction charts type VKB-S/4, 4-pipe system

Cooling capacity for different water flow rates

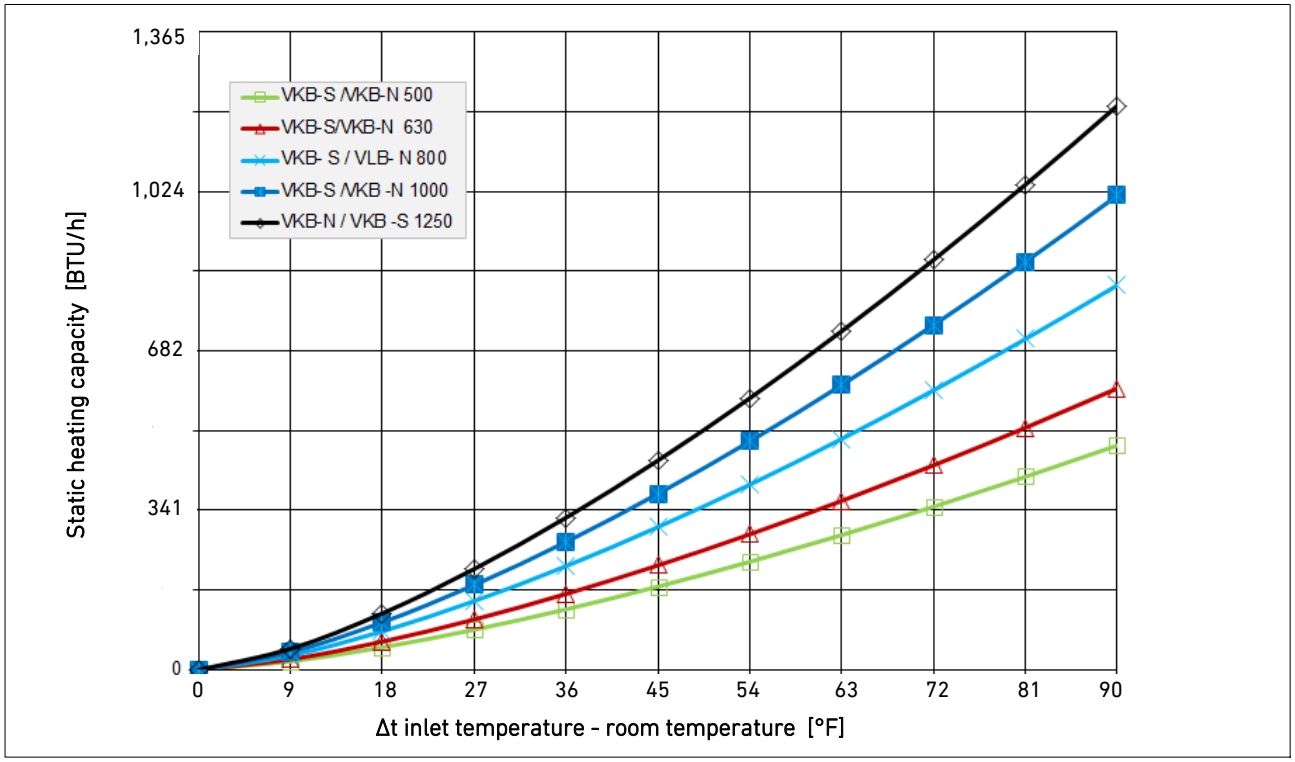


Water-side pressure loss of the cooler for different flow rates

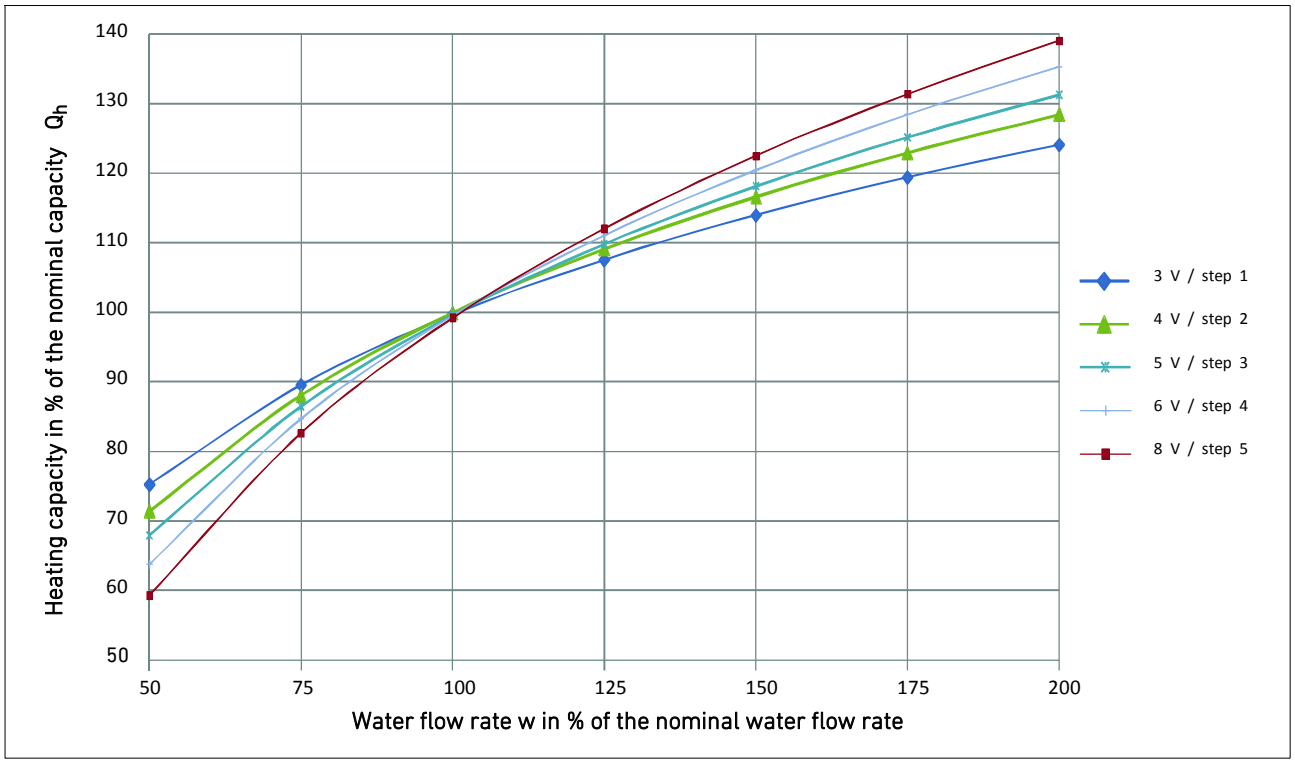


Continuation 4.4.3 Correction charts type VKB-S/4, 4-pipe system

Static heating capacity for 0.44 gpm



Heating capacity with different water flow rates



4.5 Caloric output data

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

Data are valid if the following applies:

- unit at operating temperature, steady-state condition
- steady-state condition during measurements
- no condensation at the heat exchanger in the cooling mode
- water without additives (drinking water quality) *
- water supply temperatures 54...61 °F in the cooling mode and 122...140 °F in the heating mode

Parameters used:

- specific heat capacity of the water 1.00 BTU/lb/°F
- specific heat capacity of the air 0.74 BTU/lb/°F
- air density 0.075 lb/ft^3

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

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

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

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

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

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

4.6 Acoustic data

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

Sound pressure levels apply to a room absorption surface of 194 ft^2 which equals a room absorption of about 6 dB(A). Thus, sound power levels may easily be calculated.

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

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

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

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

Measuring accuracy is ± 10 %.

4.7 Hydraulic data

Heat exchangers are approved for an operating pressure of 145 psi max. (test pressure 232 psi).
Pressures exceeding 145 psi require the express permission of LTG.

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

Measuring accuracy is ± 10 %.

5. Installation

5.1 Installation instructions

The unit is usually supplied as described in the following:

- Unit with completely retracted feet and slightly fixed counternuts and a protective board (chipboard) inserted instead of the foot traffic resistant grille.
- Required installation material and parts, if any, such as rivets, screws, bolts, junction sheets, fixing links, air duct are not included in the delivery.

The following points must always be observed when installing the unit:

Do not remove the **protective board** (chipboard) unless to execute the water and electrical connections. Reinstall the protective board until the grille is inserted into the unit to avoid damages to and pollution of the unit.

Any work in connection with the electrical equipment and the water connections is to be performed by skilled, licensed and trained staff only.

When installing the unit **on site** an **insulating strip** is to be used between the unit and the facade and between the unit and the flooring.

The **counternuts** of the supporting feet are to be fastened using a 2.2 ft lbs torque.

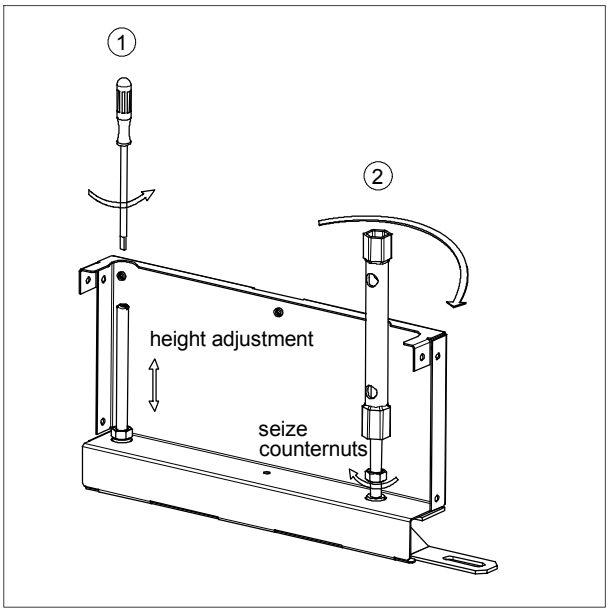
When fixing the units to the floor using the **fastening brackets** included in the delivery, a **sound insulation** is to be installed on the bottom side of the brackets to avoid sound transmission.

Before inserting the outlet grille the **protective foil** on the valve chamber's sheet steel cover is to be removed.

5.2 Unit installation

Please observe the following when installing the unit:

- Supporting feet must be preadjusted to ensure that the unit's own weight is carried by the supporting feet and not by the outside air socket.
- Tighten the supporting feet's lock nuts observing a torque of 2.2 ft lbs.
- Secure the unit against horizontal shifting, e.g. by using the fixing links available as accessories.
- Do not fix other components to the unit unless with LTG Incorporated's expressed permission and prior release
- Take care to avoid any direct contact between the unit and the raw floor except by the supporting feet to eliminate sound and foot traffic noise transmission.
- Take care to avoid any direct contact between the unit and the facade and suction duct to avoid sound transmission, except via seals designed for this purpose (hydrophobic and closed pored).



Laying the Floor

When laying the floor take special care to avoid any direct contact between the flooring and the unit, i.e. do not place flooring directly on the unit and avoid direct contact on the sides. Make sure to use a sound absorption element between the unit and the flooring or use an acoustical caulking to fill the joint between the unit and the flooring.

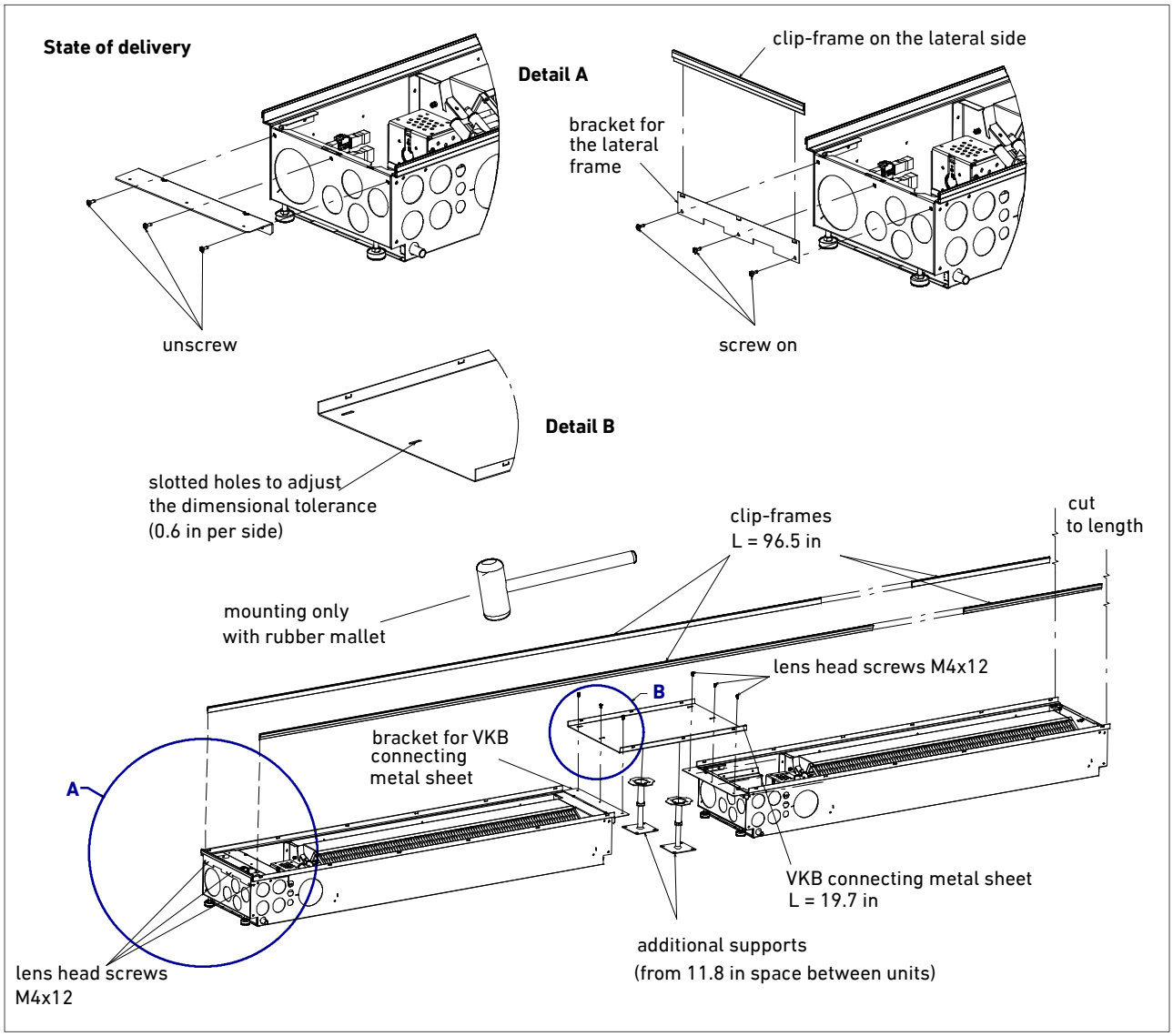
5.2.1 Installation in line

If ordered for inline installation the units are delivered by the factory with fitted
- retaining plates for end-side support frame, or
- retaining plates for VKB connecting plates.

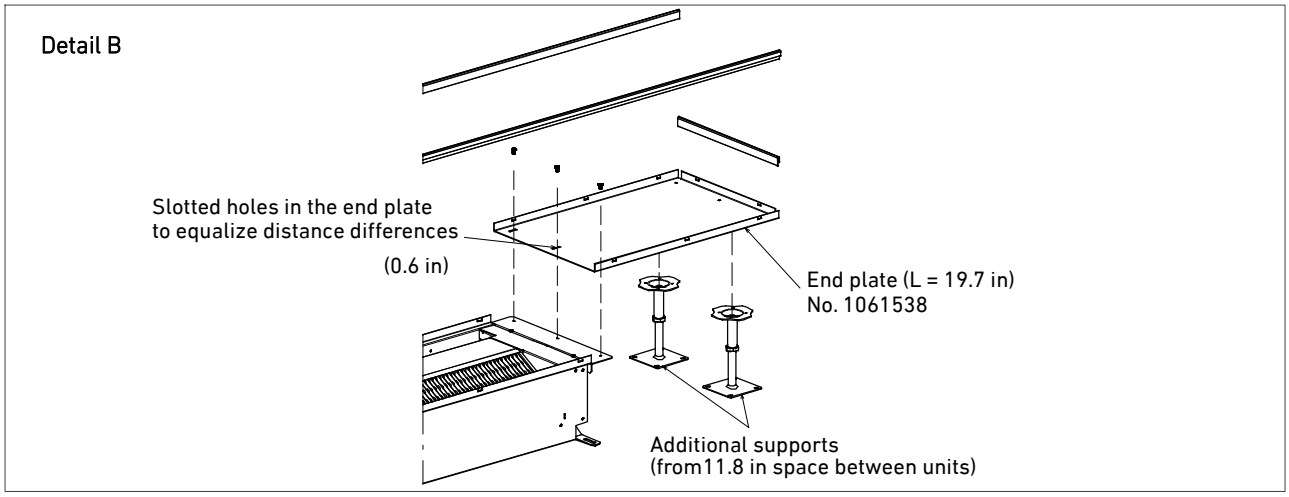
Depending on local conditions, the retaining plates must be modified by others in accordance with the following assembly drawings.

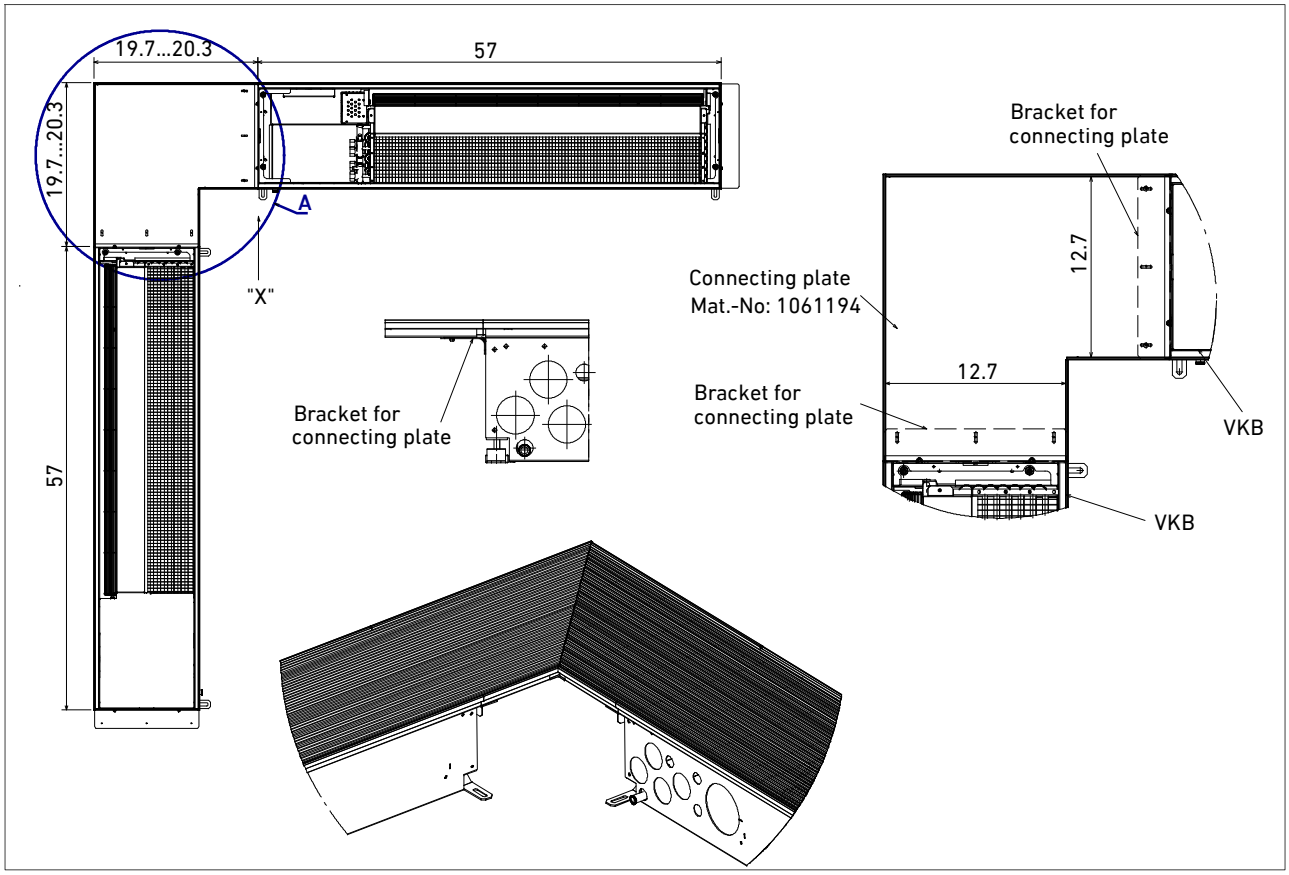
The connecting plates or support frames must be fitted by others and adapted where necessary.

In the case of a cavity of 11.8 in or above, or with end sections, double-floored supports must be additionally provided for stabilization.



Continuation 5.2.1 Installation in line

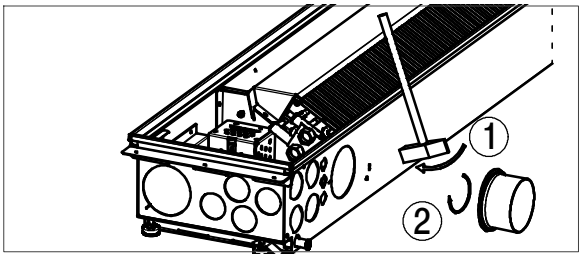




5.2.2 Fresh air connection

The fresh air connection can be attached as follows:

1. Pre-punched opening for fresh air connection is snapped out, at the room side or end side depending on requirements
2. Fresh air connection is screwed in



5.3 Electrical connection

The electrical connection is equipped with a plug connection, protection IP 21, for motors with **EC technology.** Only the supplied mating plugs have to be assembled accordingly by others.

Ensure that shielded cables are used for controlling the EC motor.

Connect the unit to a ground fault circuit interrupter (GFCI).

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

Any work must be performed in compliance with national regulation, codes and safety instructions.

Wiring, fuse and grounding of the fan coil unit have to meet local regulations, codes and safety instructions.

The main power supply on site is to be performed according to the wiring diagram and by licensed electrician only.

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

Always disconnect power before working on the unit

Operation in the disassembled state is not permissible.

All units are equipped, in the case of individual control, with a terminal box fitted on the unit.

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

Speed control wiring diagram for EC motor

Two connections are necessary for electrically connecting the fan coil unit. These are provided by plug connections, protection IP 21. The plugs are preassembled on the motor side at the factory. Only the supplied mating plugs have to be assembled by others accordingly.

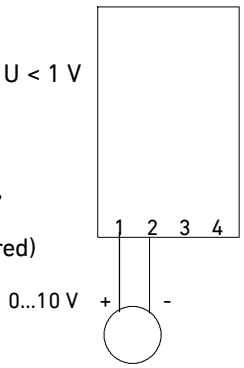
Note
As a rule, we are not familiar with the full scope of the ventilation, air-conditioning and control engineering systems. For this reason, the designs, drawings and circuit diagrams only show the systems that are relevant to the basic functions. Other units or components, such as those required for overall control engineering and/or design in compliance with regulations and codes, are not shown and are not explicitly mentioned.

Please also note the assembly and installation instructions in the original documentation.

The controllers for this application are parametrized by others.

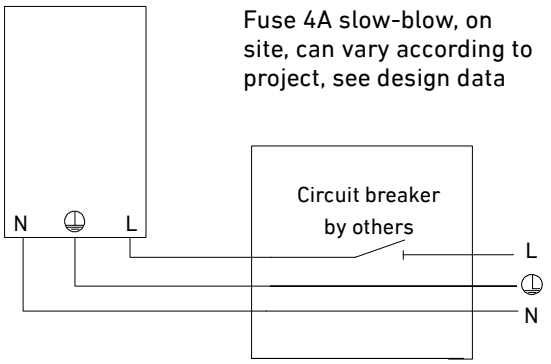
Speed control 0...10 V DC, plug 4-pin

1 = 0...10 V-DC (yellow), speed, input with control voltage U < 1 V is speed n = 0
2 = GND, 0 V-DC (blue), input
3 = Tacho signal (white), output (optional)
4 = 10 V steady signal (red) output (optional)



115 V AC main power supply - plug 3-pin

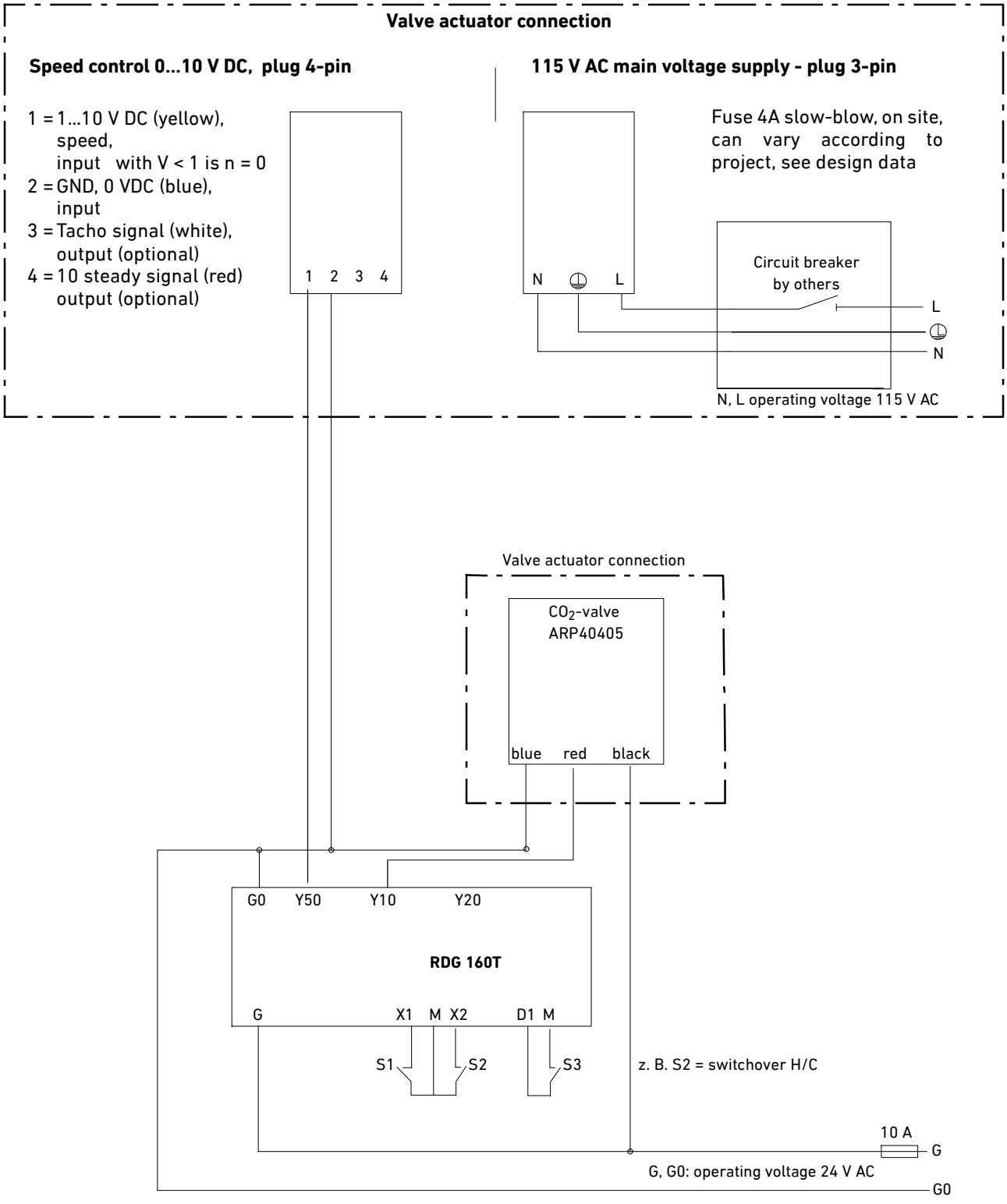
Fuse 4A slow-blow, on site, can vary according to project, see design data



N, L operating voltage 115 V-AC

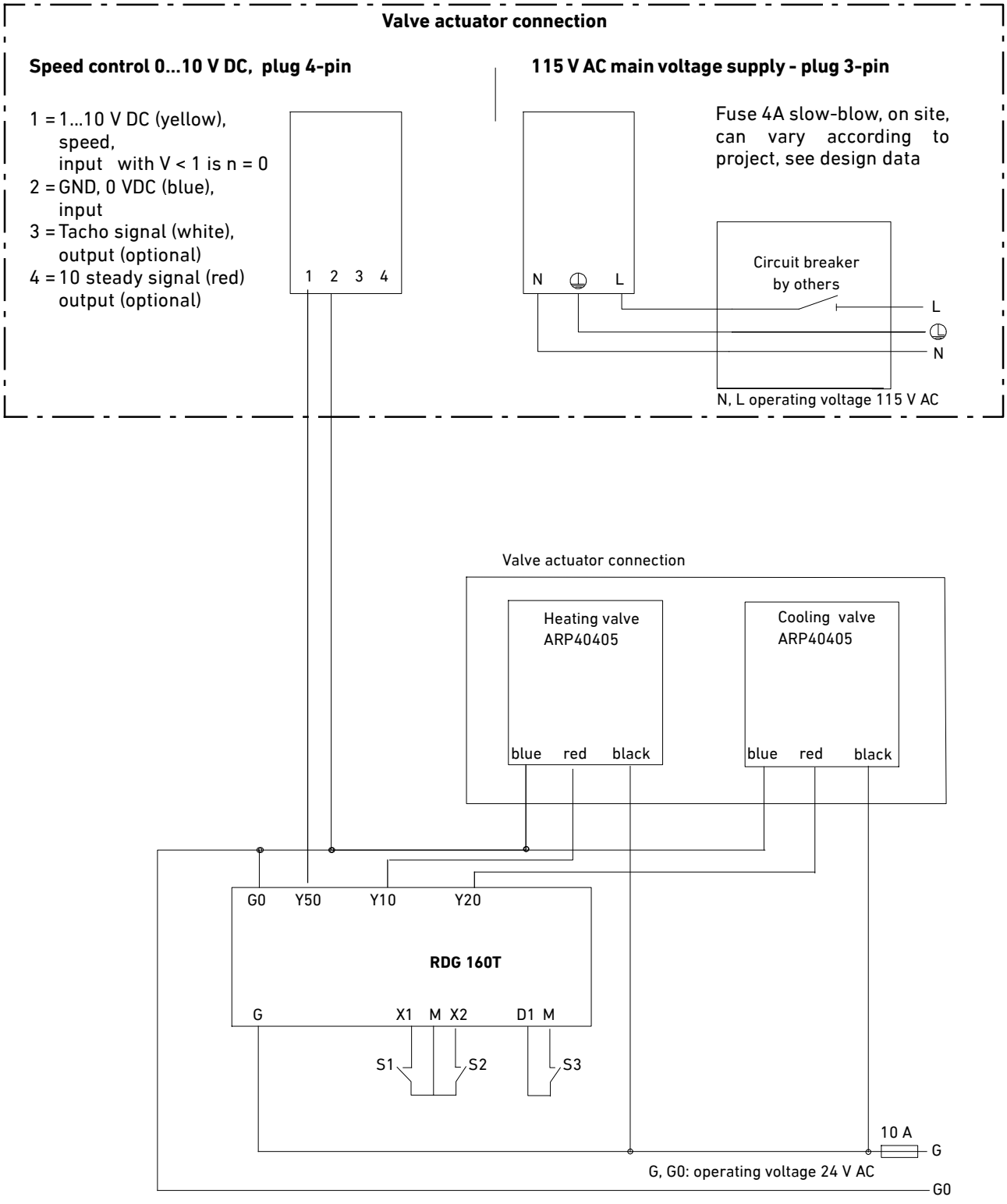
Continuation 5.3 Electrical connection

Application example: 2-pipe system with room temperature controller RDG 160T



Continuation 5.3 Electrical connection

Application example: 4-pipe system with room temperature controller RDG 160T



5.4 Water connections

Remove the heat exchanger plugs prior to water connection!

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

The heat exchangers have been approved for a maximum operating pressure of 145 psi (other pressures on request).

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

1. copper tubing with 12 mm/0.48 " outer diameter. This connection is only suitable for flexible connection with quick coupling.
2. ½" internal thread fitting, tapered.
3. fitting with special LTG olive and union nut to connect flexible hoses or copper tubes.

Always follow the installation instructions for the water connections:

Connections must be strainless.

Connecting lines must be able to expand.

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

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

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

In order to adjust the water volume specified in the selection data, a regulating device or restricting olive will be required. A regulating device for each individual unit can be used only when the units are identical, with the same water quantities and the same pressure losses, in the case of the 'Tichelmann system' (reverse return principle). In this case, one regulating device for the entire line may be sufficient. Otherwise, a regulating device will be required for each heat exchanger.

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

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

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

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

Execute the heat exchanger connection as follows:

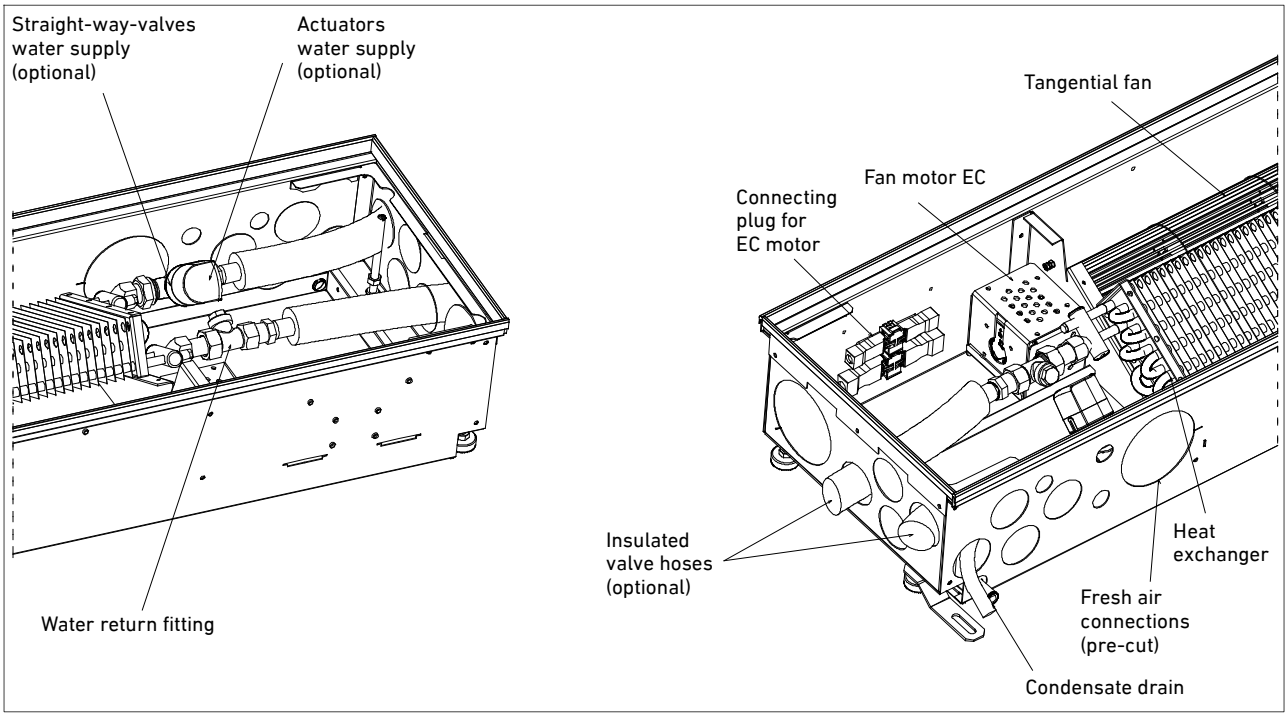
- Vertical heat exchangers:
  water supply below, water return above
- Horizontal heat exchangers:
  unit's front side: water supply,
  unit's back side: water return

Continuation 5.4 Water connections

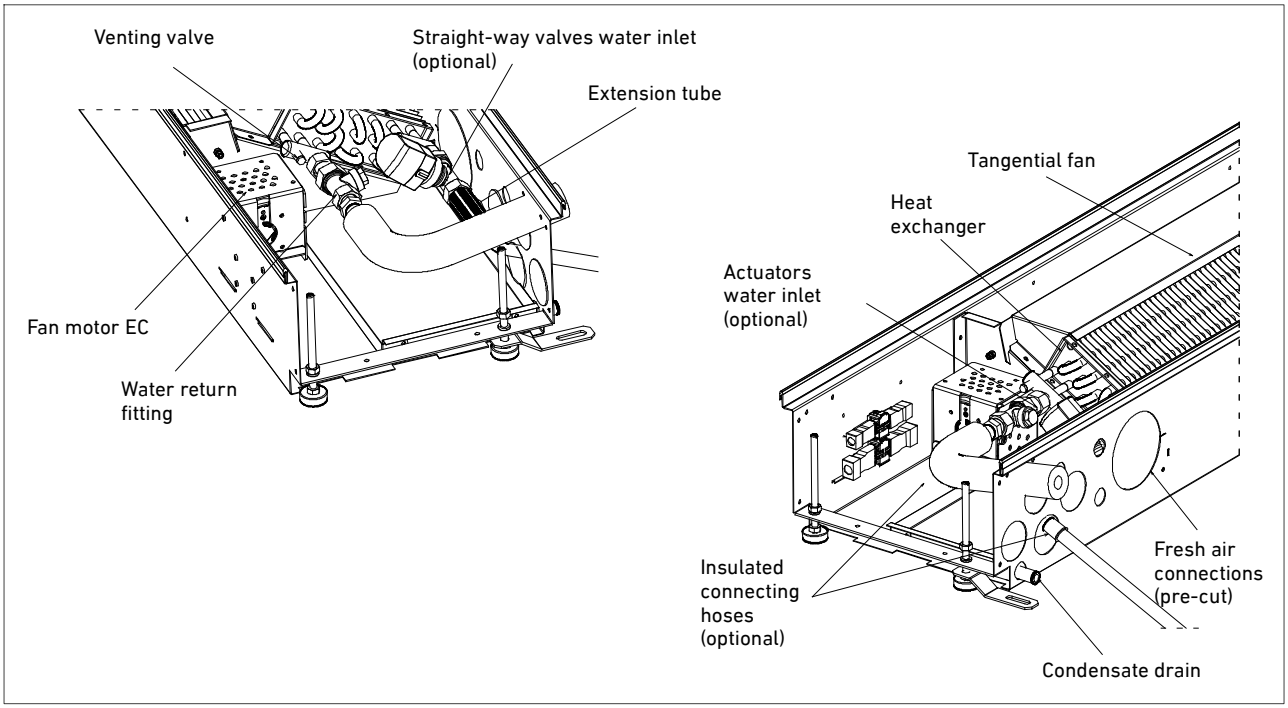
The water pipes can be passed through the casing at the end side or room side. To do so, first the pre-punched openings must be snapped out depending on the application and version.

Only snap out the needed openings! Snapped out leadthroughs can not be refitted.

Openings at the end side, type VKB-0/2, 2-pipe system

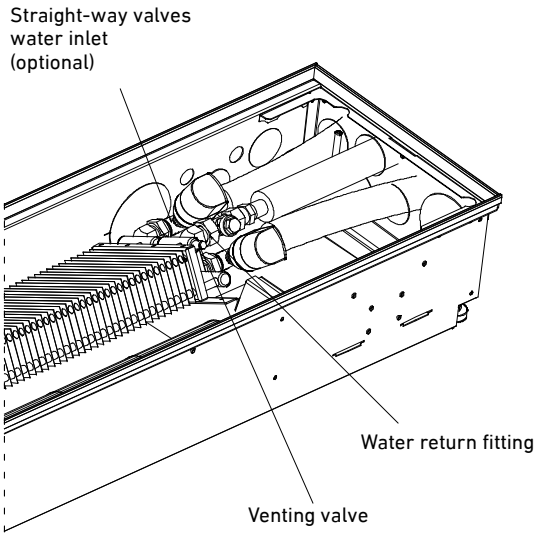


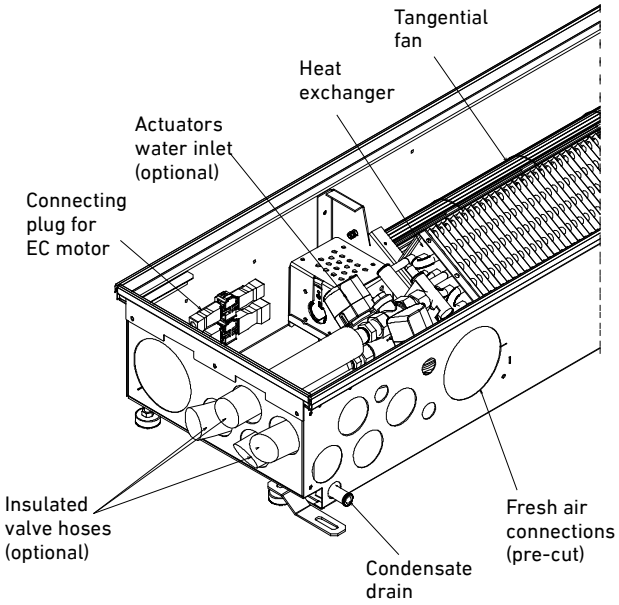
Room side openings, type VKB-0/2, 2-pipe system



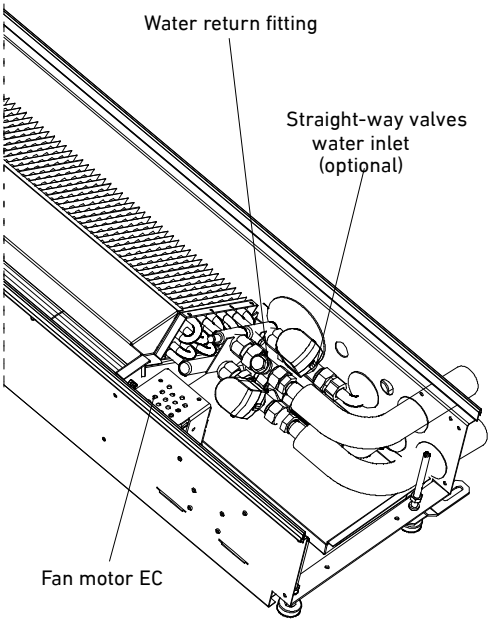
Continuation 5.4 Water connections

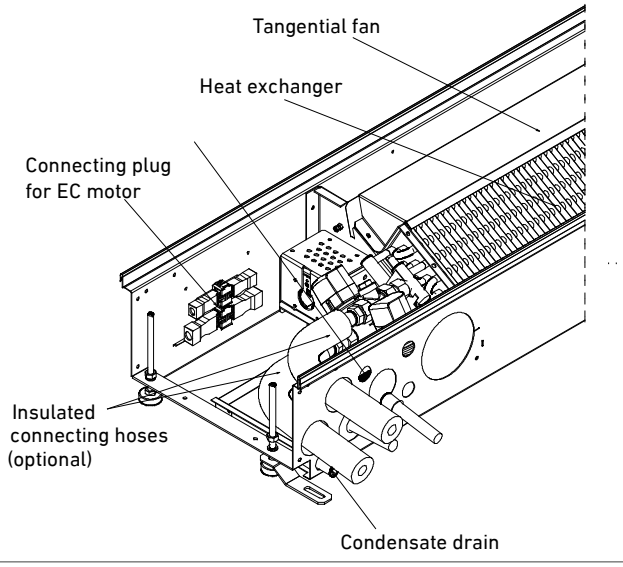
Openings at the end side, type VKB-0/4, 4-pipe system





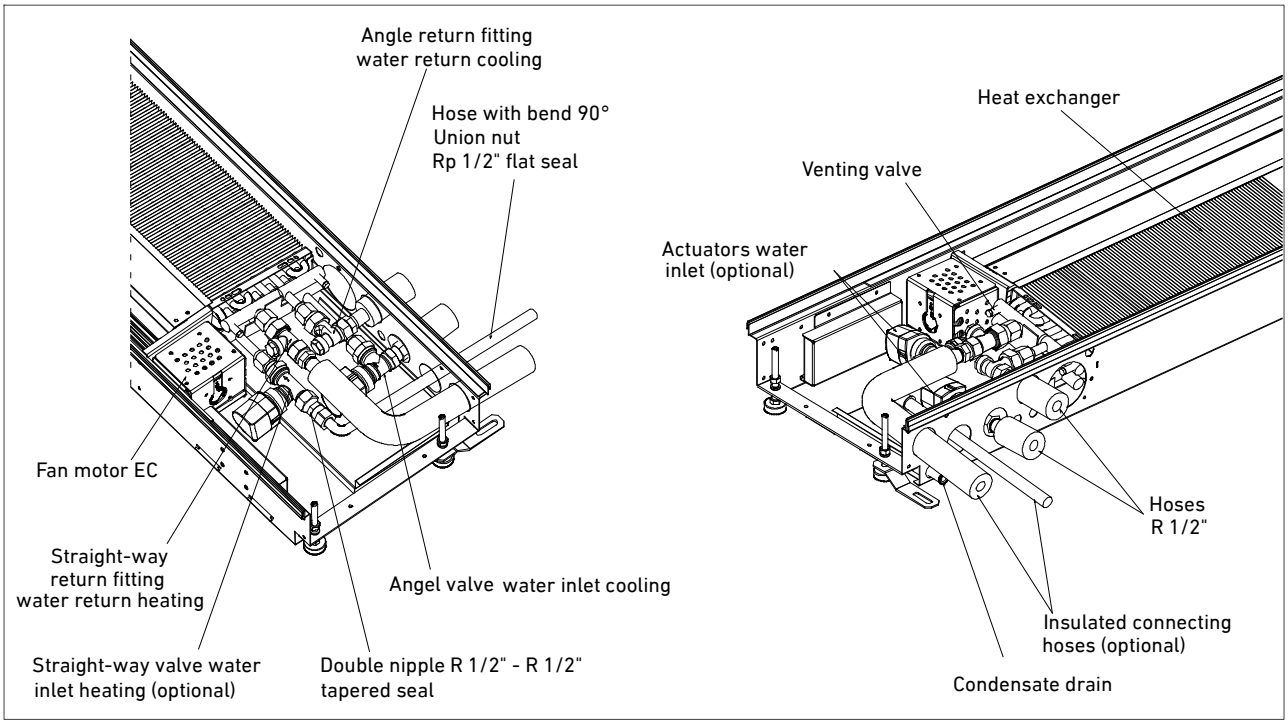
Room side openings, type VKB-0/4, 4-pipe system



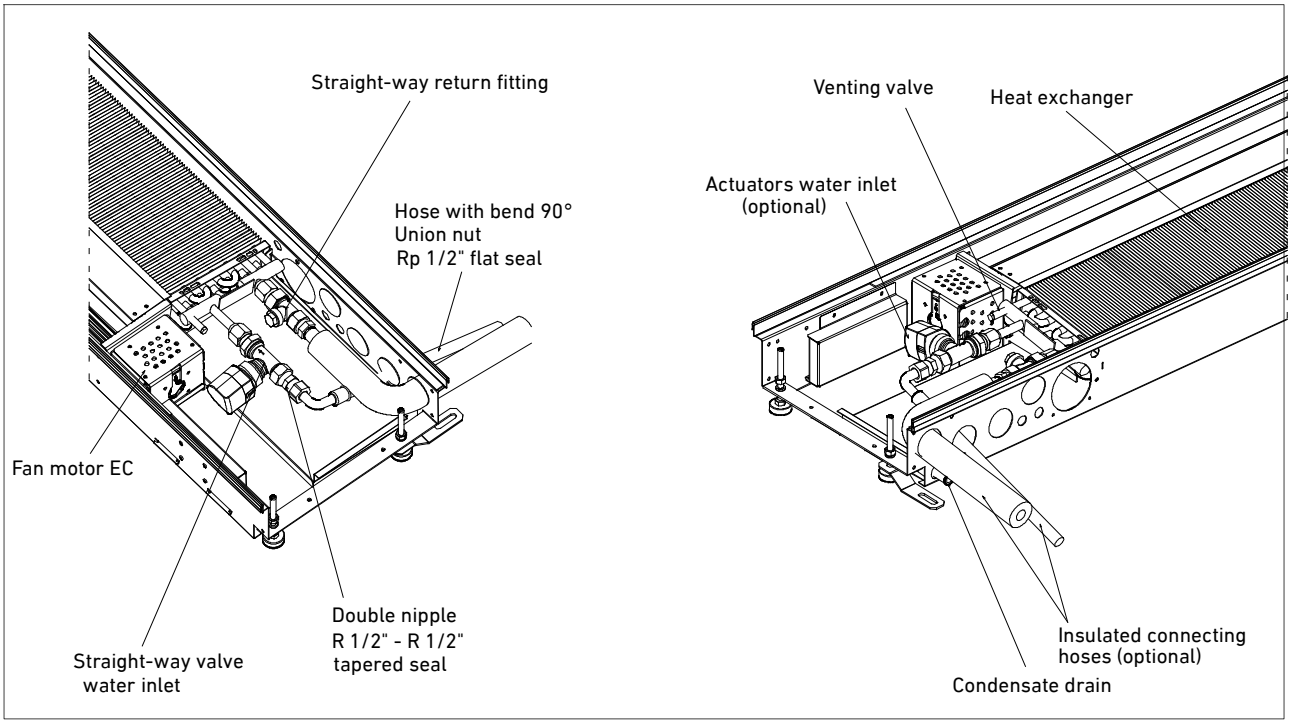


Continuation 5.4 Water connections

Room side openings, type VKB-N/4, 4-pipe system

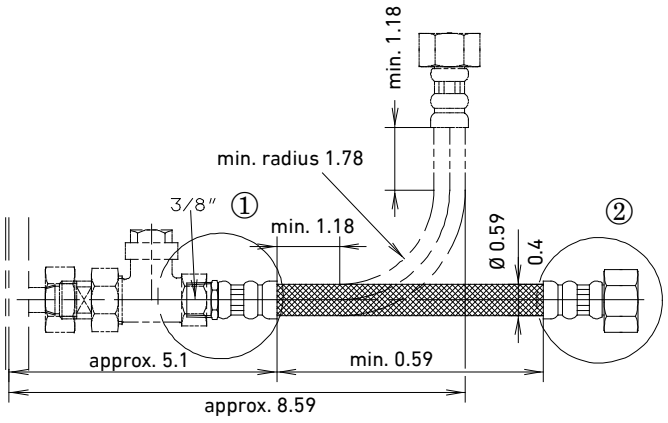


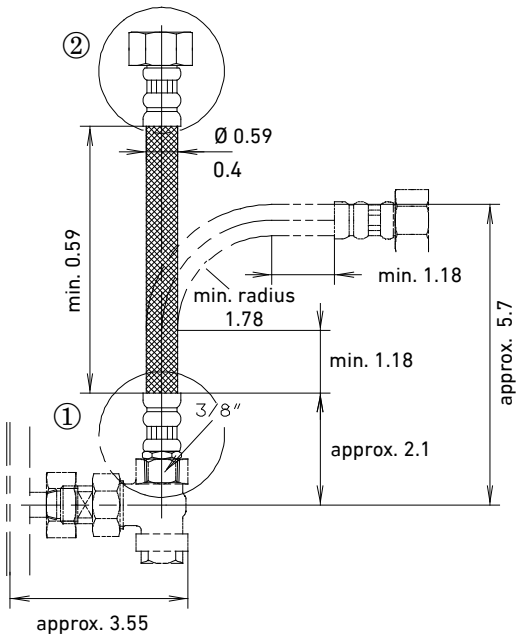
Room side openings, type VKB-N/2, 2-pipe system



Continuation 5.4 Water connections

Examples using angle valve resp. straight-way valve and flexible hose



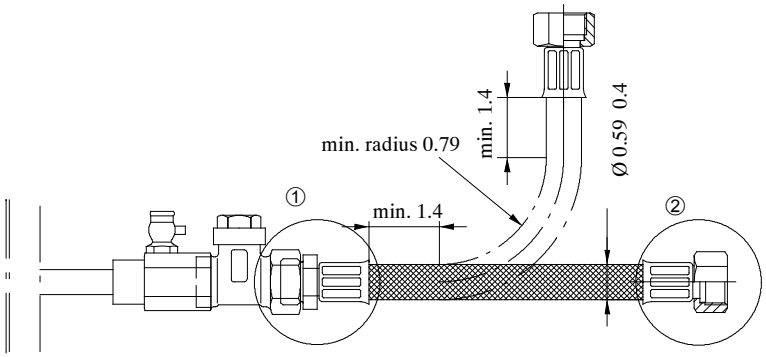


Please observe the hose manufacturer's instructions !
Hose without insulation. For insulated hoses, dimensions will change accordingly

① Hose for connection to angle or straight-way-valve connection type: AGK, external thread, tapered, ⅜"

② Different hose connections (see above), thread diameter acc. to customer requirements or standard ⅜"

Example using transition, straight-way valve and flexible hose



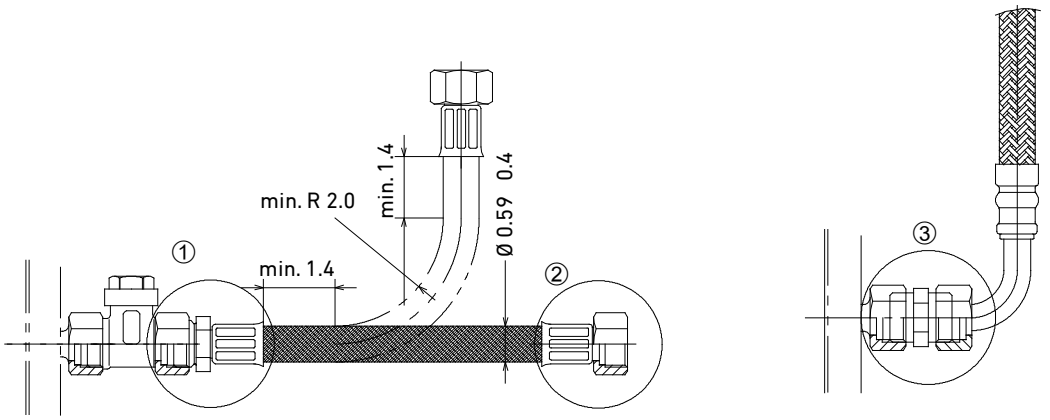
Please observe the hose manufacturer's instructions !
Hose without insulation. For insulated hoses, dimensions will change accordingly.

① Hose for connection to angle or straight-way valve, connection type: AGK, external thread, tapered ½"

② Different hose connections (see above), thread diameter acc. to customer requirements or standard ½"

Continuation 5.4 Water connections

Examples using valve and flexible hose (straight and 90° variant)



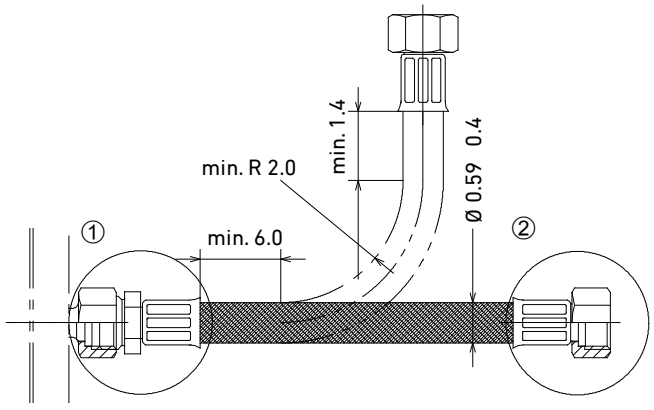
Hose without insulation. For insulated hoses, dimensions will change accordingly. (0.4 in Armaflex insulation)

① Hose for connection to angle or straight-way valve, connection type AGK, external thread tapered, ½ “

② Different hose connections, thread diameter acc. to customer requirements or standard ½”

③ Connection for direct screwing into the heat exchanger in case of angle connection,
Connection type: double nipple ½” - ½”; ÜFD hose connection, ½” flat seal union nut

Example for direct screwing into the heat exchanger



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

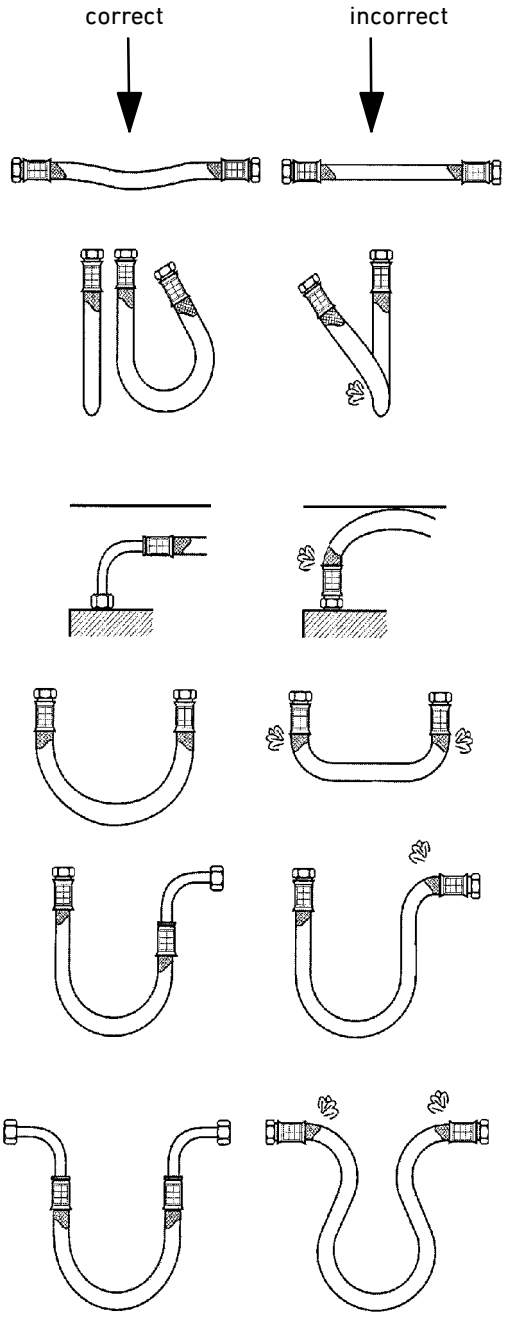
① Connection for direct screwing into the heat exchanger, connection type: AGK, external thread ½",
tapered seal

② Different hose connections, thread diameter acc. to customer requirements or standard ½”

5.4.1 Instructions for installation of water connections using flexible hoses

Warranty will only apply if the following instructions are observed and if installation is performed in compliance with DIN-EN regulations.

In particular, corrosive, electrochemical, and bacteriological charges are to be excluded taking appropriate preventive measures.



Pressure and exposition to heat may result in slight elongation of the hose.
Therefore, newly placed hoses must consider such potential elongation.

Do not fall below the admissible bending radius R_{min} (chart), neither during transport, nor during installation or when installed.
If it should turn out impossible to keep the admissible bending radius, choose a different installation type.

For minimum length see chart below.
If the hose is being placed by bending it, check whether there is sufficient hose length to allow for an open bow in order to avoid
kinking and destruction of the hose at the connecting points.

Absolutely avoid distorting or kinking the flexible connection.

Do not subject the hose to any tensile or pressure loads applied from outside, neither during installation nor operation.

Do not retighten rigid connections (outer thread) after fixing the second connection since this might result in distortion of or damage to the hose.

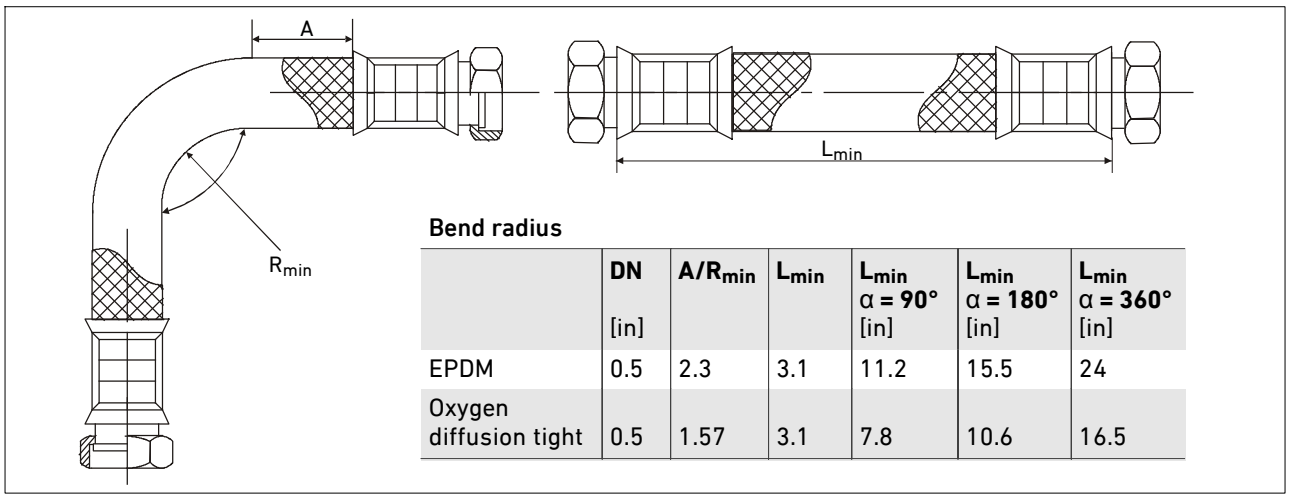
In general, tightness of the connection (hose/connector) is the responsibility of the technician performing the installation. Do not over-tighten.

Any sealing material included in the delivery is to be verified by the technician for its
suitability since the hose manufacturer has no information about the material or geometry of the connections.

Continuation 5.4.1 Instructions for installation of water connections using flexible hoses

Flexible hoses

Type	EPDM	Oxygen diffusion tight Free of halogens, plasticisers and heavy metals. Tested acc. to DIN 4726.
Braiding	Stainless steel wire acc. to AISI 304	
Ferrule	Stainless steel acc. to AISI 304	
Temperature range	-4...+212 °F	up to +176 °F
Max. operating pressure	218 psi	145 psi
Internal Ø	0.47 in	0.47 in

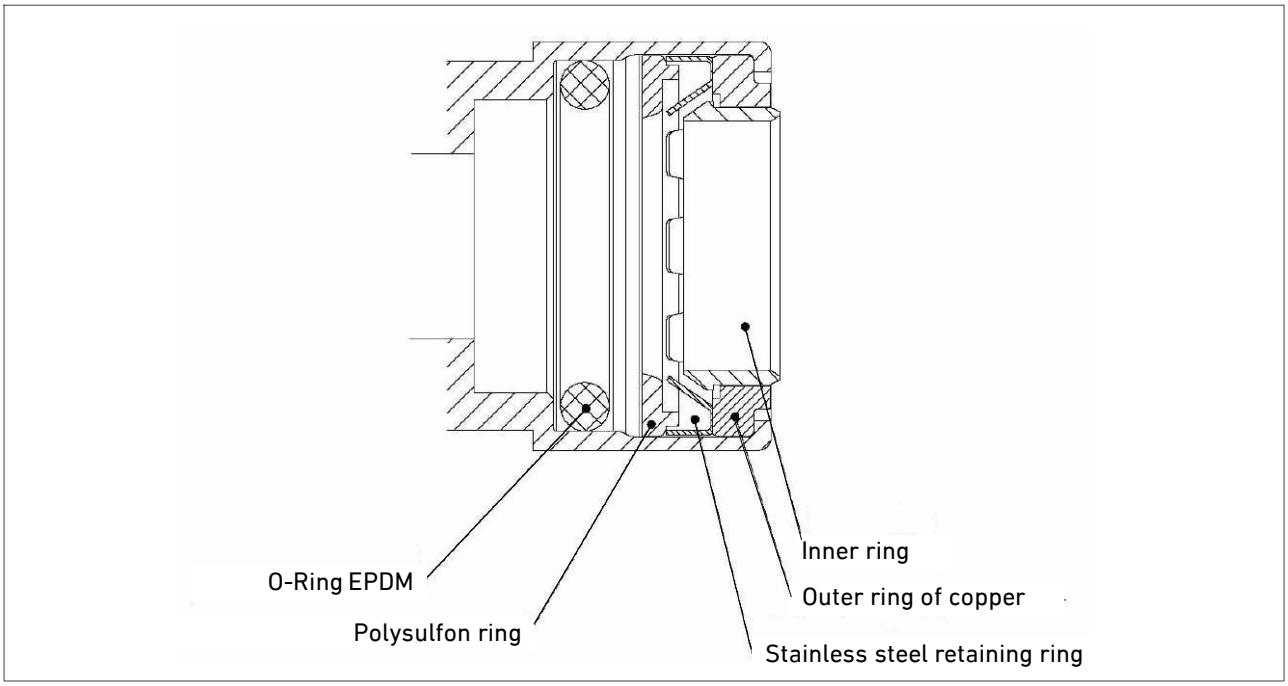


Bend radius

	DN [in]	A/R_{min}	L_{min}	L_{min} α = 90° [in]	L_{min} α = 180° [in]	L_{min} α = 360° [in]
EPDM	0.5	2.3	3.1	11.2	15.5	24
Oxygen diffusion tight	0.5	1.57	3.1	7.8	10.6	16.5

Continuation 5.4.1 Instructions for installation of water connections using flexible hoses

LTG Quick-Connect



Quick connection for copper tube or suitable brass or red brass.

This permanently tight connection is suitable for concealed installation.

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

Check after each installation to ensure the connection is really tight.

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

Maximum operating pressure	145 psi / 200 °F
Test pressure	232 psi / 86 °F

5.5 Condensate

Condensate formation occurs when the cold water supply temperature is below the ambient air dew point temperature. LTG fan coil unit have been designed in a standard version for steady operation without condensate. An option with condensate tray for operation with condensation is available. The units have to be ordered accordingly.

To operate the units without condensate tray or with a condensate tray not connected to a condensate return system the following must be observed:

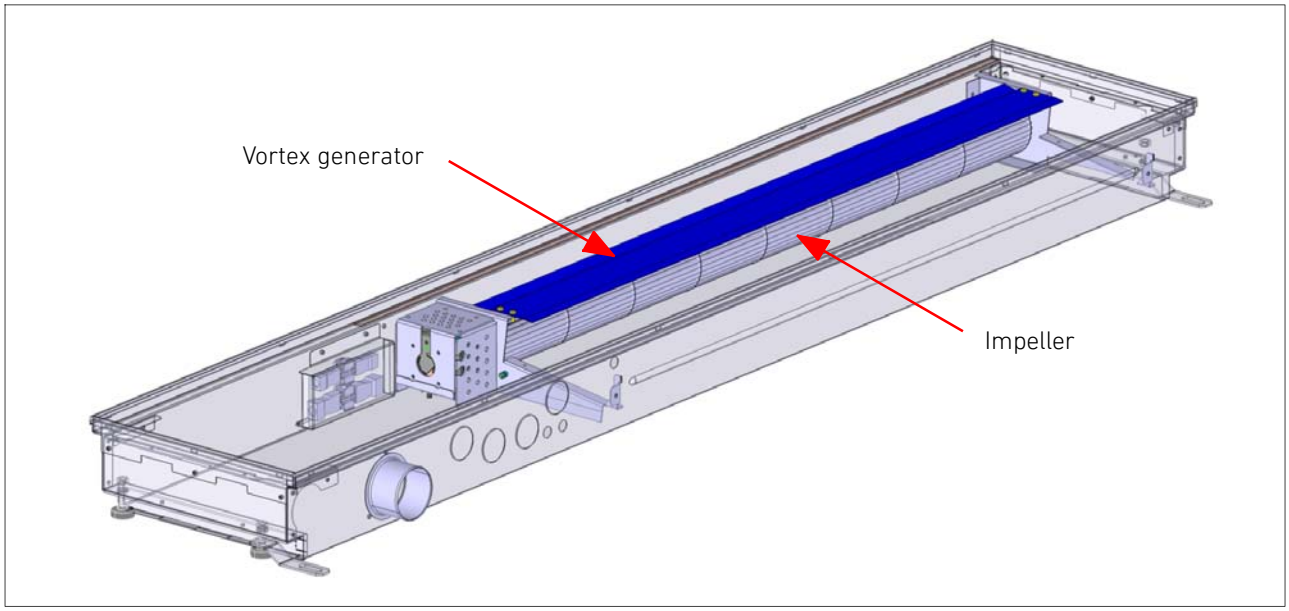
- Condensation will occur when the water temperature falls below the dewpoint temperature of the air. The dewpoint temperature of the air changes with the humidity of the air.
- If the outside humidity is high windows need to be kept close.
- If windows are opened, use a window contact to shut of the cold water supply to the units with a time delayed restart.
- If windows are opened use a central system to control the water supply temperature based on the outside air humidity. With high humidity the water temperature is increased. This will however reduce the cooling capacity.

To operate the units with a condensate tray connected to a condensate return system the following must be observed:

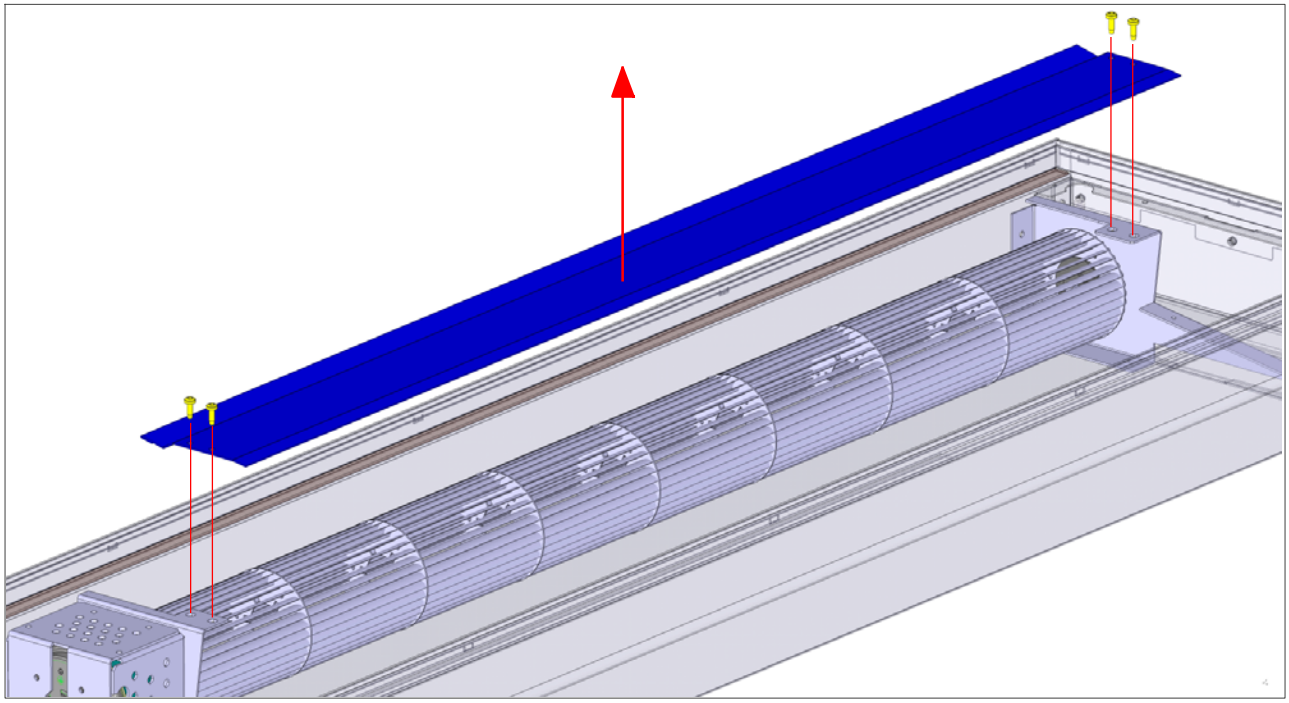
- Remove the condensate drain plugs from the tray connection.
- The condensate tray must be connected to condensate piping with enough slope or with a condensate pump to ensure removal of the condensate from the tray.
- All condensate pipes outside the condensate tray of the unit must be insulated.
- Condensate tray and condensate pipes must be cleaned and sanitized properly according to applicable rules, regulations and codes.

5.6 Installing the heat exchanger in type VKB-N

Removing the vortex generator



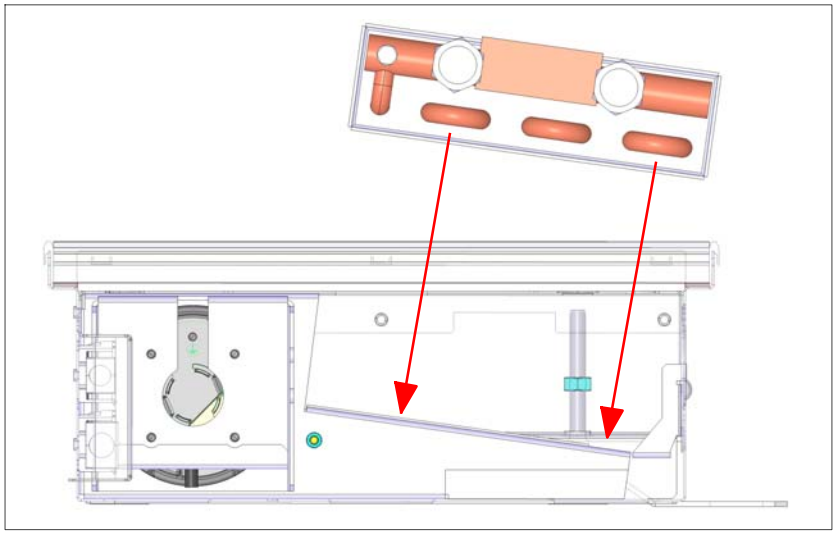
Undo the four M4x12 screws to allow removal of the vortex generator:



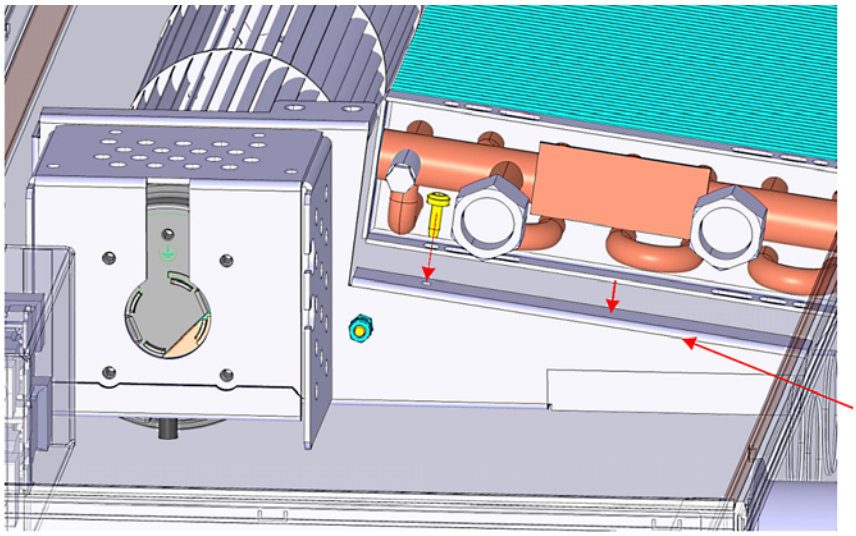
The vortex generator must not touch the impeller!
The impeller has been balanced and is very sensitive!

Continuation 5.6 Installing the heat exchanger in type VKB-N

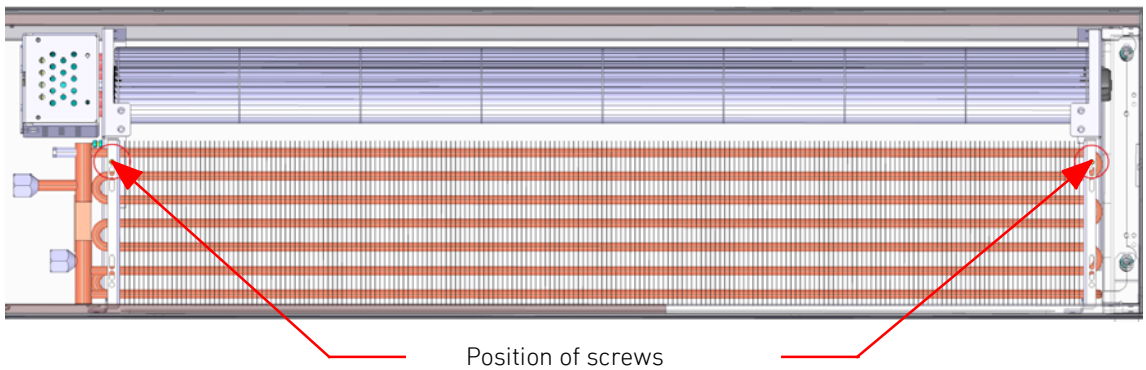
Inserting the heat exchanger



Place the heat exchanger on the two support brackets and bolt it tight, using two self-tapping screws (M4x12).

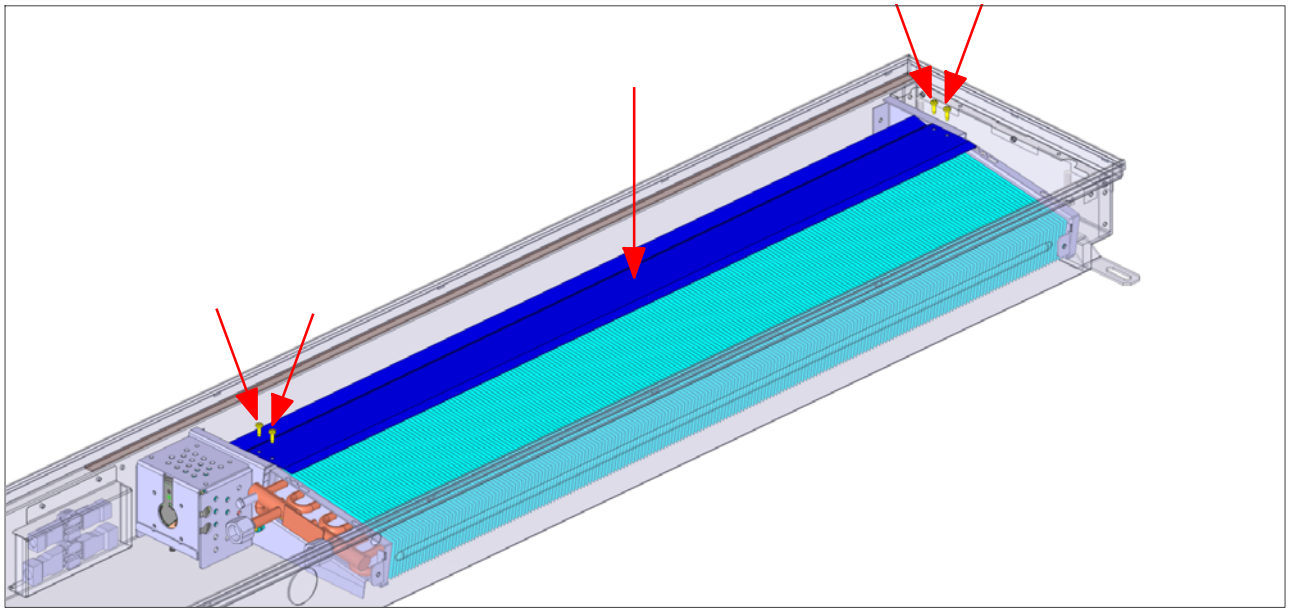


Please ensure that the heat exchanger is not touching the impeller and is fitted at a sufficient distance from it.



Continuation 5.6 Installing the heat exchanger in type VKB-N

Fitting the vortex generator



After installing the heat exchanger, bolt the vortex generator tightly back onto the support brackets.

Ensure once again that the vortex generator is not touching the impeller!

5.7 Check after installation

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

Mechanical Check

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

Check the following:

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

Check for media supply

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

Control technical equipment

Supply of control devices by LTG Incorporated is optional, however it is the rule for actuators for units with dampers.

Check for proper functioning

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

Starting standard operation

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

6. First use

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

Check for proper water and power supply.

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

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

7. Operation, maintenance, repair

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

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

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

7.1 Heat exchanger, water connections, condensate tray

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

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

Check water connections and heat exchanger for tightness and possible corrosion damages.

If corrosion occurs inside the heat exchangers skilled staff must check the water treatment.

In case of condensation and existing condensate drainage the condensate tray will have to be wet cleaned and checked for contamination on a regular basis as required by codes, rules, and regulations.

7.2 Filter

Unit with filter

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

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

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

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

Unit without filter

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

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

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

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

7.3 Fan

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

7.4 Repair

If the damage is more than sheet metal damage to the housing or the outlet grille, units should be completely replaced and checked by the factory (in case of defects to the fan it might be sufficient to replace the fan unit without the need to disconnect the system entirely from the water supply system).

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

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

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

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

Warranty applies to complete fans only.

7.5 Component maintenance schedule

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

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

VDI 6022 sanitation requirements must be observed.

8. Spare Parts

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

Spare part	Ident No.	Minimum order quantity
Heat exchanger size _____ for VKB _____		
Motor EC technology (all sizes)	1054827	1
Impeller 630	1058507	1
Impeller 800	1058508	1
Impeller 1000	1058509	1
Diaphragm for water pipes	1052117	50
Rubber support for grille NBR 12x2	1019056	32.8 ft
Accessory Connecting plug (EC motor)	1061109	1
Sleeve for cable leadthroughs	1061079	50

9. Decommissioning, disposal

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

- all steel parts are waste for recycling
- all plastic parts are waste for recycling
- all secondary substances and lubricants must be disposed of in accordance with the provisions of the codes, rules and regulations.

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