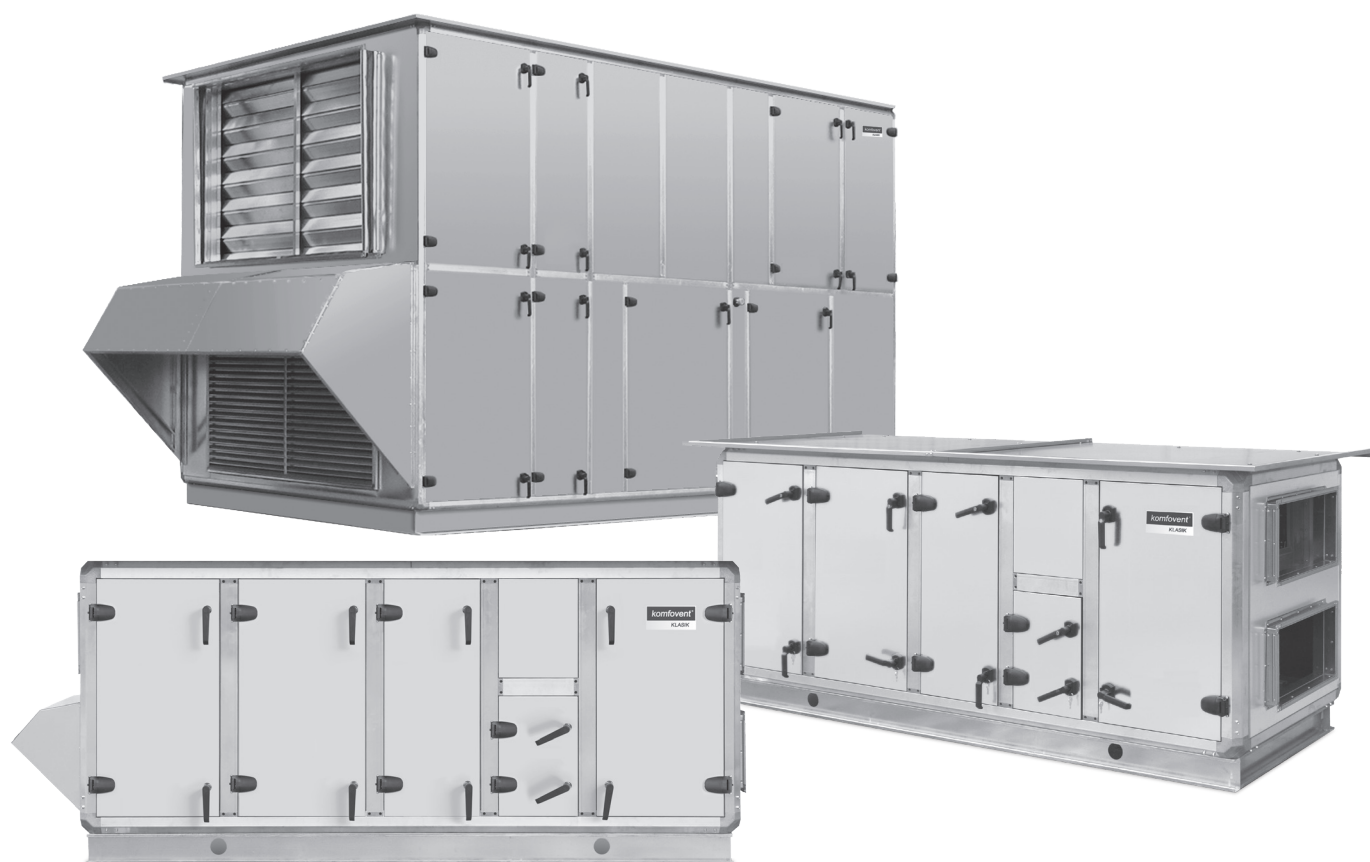


TECHNICAL PASSPORT AND INSTALLATION GUIDE OF KLASIK AIR HANDLING UNITS



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This symbol indicates that this product is not to be disposed of with your household waste, according to the WEEE Directive (2002/96/EC) and your national law. This product should be handed over to a designated collection point, or to an authorised collection site for recycling waste electrical and electronic equipment (EEE). Improper handling of this type of waste could have a possible negative impact on the environment and human health due to potentially hazardous substances that are generally associated with EEE. At the same time, your cooperation in the correct disposal of this product will contribute to the effective usage of natural resources. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, waste authority, approved WEEE scheme or your household waste disposal service.

1. EQUIPMENT SERIES

KLASIK R

Ventilation units with rotary heat exchanger. Temperature efficiency up to 85%.

KLASIK P

Ventilation units with plate heat exchanger. Temperature efficiency up to 70%.

KLASIK CF

Ventilation units with counter flow plate heat exchanger. Temperature efficiency up to 92%.

KLASIK S

Air supply or exhaust units.

KLASIK RA

Ventilation units with liquid coupled heat exchanger. Temperature efficiency up to 63%.

KLASIK Hg, RA Hg, P Hg

Ventilation equipment for hygienic purposes.

S Hg, RA Hg, P Hg series of ventilation equipment for operation in clean rooms are subject to more stringent sanitary requirements. Inner surfaces of S Hg, RA Hg, P Hg series equipment are straight-lined, have no thresholds and bumps to harbour contamination and pathogens. All connections are additionally sealed with dust-tight sealant.

The bottom of these devices (and, as the case may be, all internal walls) are made of stainless steel, which allows to clean the interior surface with disinfectants.

2. CONSTRUCTION

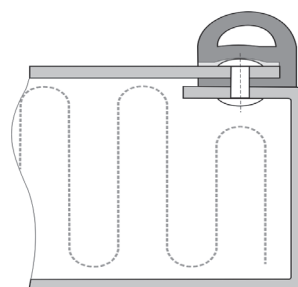
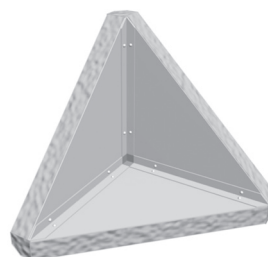
Walls in KLASIK units are made of two galvanized steel sheets filled with heat and sound insulating non-combustible material. Mineral wool is used for thermal insulation ($\lambda = 0.036 \text{ W/mK}$; $\rho = 32 \text{ kg/m}^3$). Ventilation units are available with 45 mm or 50 mm thick walls, and tin sheets coated with zinc (275 g/m^2). Ventilation unit walls can be:

- Galvanized sheet steel – a standard option
- Galvanized sheet steel, external/internal spray painted powder
- Stainless steel plate on the inside (the whole inside or just the bottom). In this case, the ventilation unit is designed for the ventilation of clean premises.

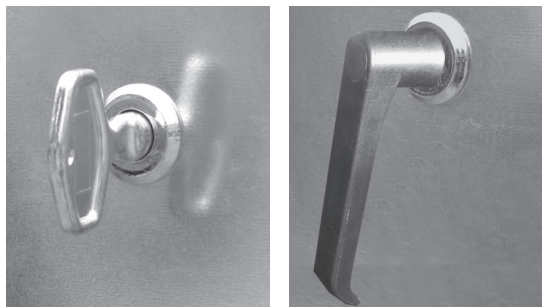
The housing design reduces the «heat bridge» effect.

All ventilation unit doors are sealed with a special profile rubber gasket with an air gap. It is attached mechanically, and additionally bonded with hygienic glue. This leak-proof design is leak-proof and durable. Based on the standard CEN preEN 1886, the housing of KLASIK units meets the tightness class A and its total heat transfer is T3 class.

Easy to use door locks and handles ensure safe unit maintenance.

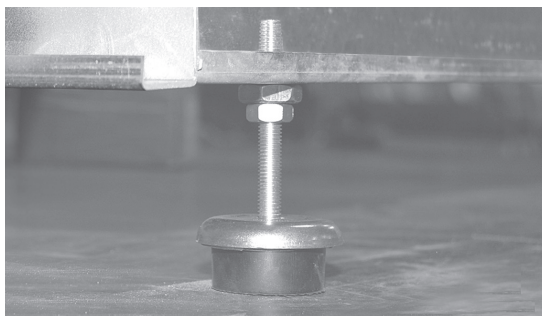


Easy to use door locks and handles ensure safe unit maintenance.



Height adjustable feet

If you order the ventilation unit construction frame with the height adjustable feet, it will be much easier to build the unit at the site.



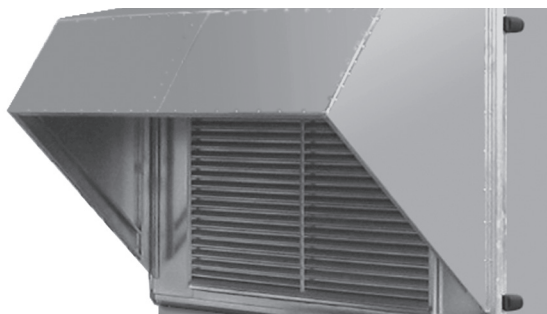
Roof

Ventilation units that operate outdoors can be additionally equipped with a roof with water drainage to the opposite side of inspection.



Hoods and outdoor grille

Ventilation units operated outdoors can be additionally equipped with hoods and outdoor grille on the air supply and exhaust openings or nets.



Air dampers

Air shutters in ventilation units are made of aluminium blades provided with a rubber seal, to ensure tightness.



2.1. Filter section

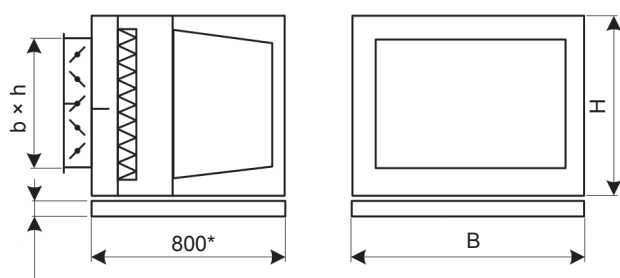
Air is cleaned of various origin and size particles of dust in the ventilation units with synthetic and glass fiber filters. 99.9% (by number) of outdoor airborne particles are smaller than 1 mm. By mass, the said particles make up 30% of the airborne dust. Thus, if the air from the city is supplied to public and residential buildings, M5-F7 class filters are sufficient to achieve the hygiene standards of air cleanliness. In areas where dust content is low (e.g. forested places, areas away from

roads, industry, etc.) air supplied to the rooms should be cleaned less extensively.

G3, G4, or M5 prefilters should be used upstream F8, or at higher-end filters.

Air supplied to industrial facilities usually only has to be cleaned slightly (G3, G4 class – if there are no special technological requirements)

Air filtering protects ventilation equipment against contamination, and prolongs the service life.



* 11, 12 size L = 840 mm.



KLASIK size	B	H	b	h	L ₁	L ₂	L ₃	L ₄
	mm							
1	1015	555	700	300	400	600	700	500
2	1155	655	900	400	400	600	700	500
3	1305	710	1000	500	400	600	700	500
4	1505	810	1200	600	400	600	700	500
5	1745	955	1400	700	500	600	700	500
6	1905	1010	1600	800	500	600	700	500
7	2140	1130	1800	900	500	600	700	500
8	2310	1265	2000	1000	500	600	700	500
9	2310	1490	2000	1200	500	600	700	500
10	2310	1570	2000	1300	500	600	700	500
11	2590	1650	2200	1400	540	640	740	540
12	2890	1830	2500	1600	540	640	740	540

1 – Filters section with compact filter, 2 – Filters section with pocket filter, 3 – Filters section with carbon filter, 4 – Filters section with HEPA filter.

Unit weight is indicated in the technical offer, attached to the passport of the unit.

FILTERS USE IN THE FILTER SECTIONS

Filters section with compact/pocket filter:

KLASIK size	Quantity psc.	Dimensions width × height –pockets quantity × length of pockets		
		G4 Pre-filter	G4	M5; M6; F7; F9
1	1	792×392×46	792×392-10×360	792×392-10×500
2	2	490×490×46	490×490-6×360	490×490-6×500
3	2	490×490×46	490×490-6×360	490×490-6×500
4	2	592×592×46	592×592-8×360	592×592-8×500
5	4	392×792×46	392×792-4×360	392×792-4×500
6	4	392×792×46	392×792-4×360	392×792-4×500
7	4	490×892×46	490×892-5×360	490×892-6×500
8	4 + 4	490×592×46 490×490×46	490×592-6×360 490×490-6×360	490×592-6×500 490×490-6×500
9	8	490×592×46	490×592-6×360	490×592-6×500
10	4 + 4	490×892×46 490×490×46	490×892-5×360 490×490-6×360	490×892-6×500 490×490-6×500
11	4 + 4 + 4	592×592×46 592×490×46 592×287×46	592×592-8×360 592×490-8×360 592×287-8×360	592×592-8×500 592×490-8×500 592×287-8×500
12	9	892×490×46	892×490-12×360	892×490-14×500

Filters section with a HEPA filter:

KLASIK size	Quantity psc.	Dimensions width × height × length
		H12; H13; H14
1	1	610×305×292
2	1 + 1	610×305×292 305×305×292
3	2	457×457×292
4	2	610×610×292
5	2 + 1	610×610×292 305×610×292
6	2 + 1	610×610×292 305×610×292
7	3 + 3	610×610×292 610×305×292
8	3 + 3	610×610×292 610×305×292
9	6	610×610×292
10	6	610×610×292
11	6 + 2	610×610×292 305×610×292
12	8 + 4	610×610×292 610×305×292

Filters section with a carbon filter:

KLASIK size	Quantity psc.	Dimensions width × height × length
		ACF
1	1	613×308×457
2	1	613×458×457
3	1	613×458×457
4	2	613×613×457
5	2 + 1	613×613×457 308×613×457
6	2 + 1	613×613×457 458×613×457
7	3 + 3	613×613×457 613×308×457
8	3 + 3 + 1	613×613×457 613×458×457 308×613×457
9	6 + 2	613×613×457 308×613×457
10	6 + 2	613×613×457 308×613×457
11	3 + 3 + 3	613×613×457 613×458×457 613×308×457
12	8 + 4	613×613×457 613×308×457

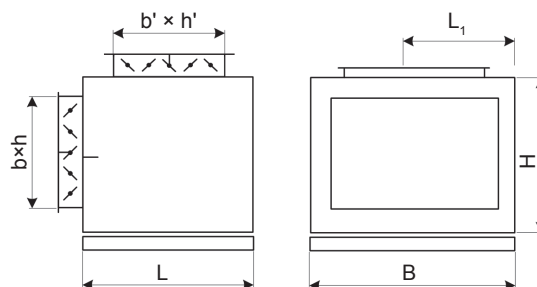
2.2. Recirculation section

Recirculation section is a chamber with two air inlets and dampers intended for controlling ratio of the supply and exhaust air.

Thermal energy is incorporated by mixing part of the indoor exhaust air with the air supplied to the premises.

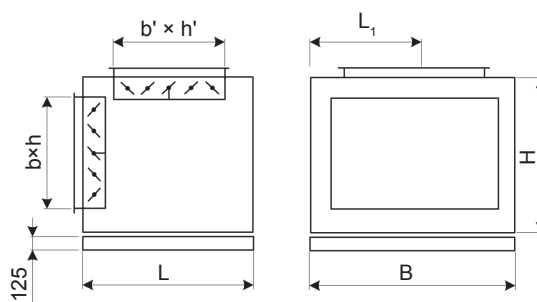
Recirculation section with dampers on the outside:

KLASIK size	B	H	b	h	b'	h'	L	L ₁
mm								
1	1015	555	700	300	700	300	600	507,5
2	1155	655	900	400	900	300	600	577,5
3	1305	710	1000	500	1000	400	700	652,5
4	1505	810	1200	600	1200	400	700	752,5
5	1745	955	1400	700	1400	400	700	872,5
6	1905	1010	1600	800	1600	500	850	952,5
7	2140	1130	1800	900	1800	600	950	1070
8	2310	1265	2000	1000	2000	600	950	1155
9	2310	1490	2000	1200	2000	700	1050	1155
10	2310	1570	2000	1300	2000	700	1050	1155
11	2590	1650	2200	1400	2200	800	1190	1295
12	2890	1830	2500	1600	2500	800	1190	1445



Recirculation section with dampers inside the section:

KLASIK size	B	H	b	h	b'	h'	L	L ₁
mm								
1	1015	555	700	300	700	300	600	535
2	1155	655	900	400	900	300	600	595
3	1305	710	1000	500	1000	400	700	685
4	1505	810	1200	600	1200	400	700	785
5	1745	955	1400	700	1400	400	700	895
6	1905	1010	1600	800	1600	500	850	985
7	2140	1130	1800	900	1800	600	950	1080
8	2310	1265	2000	1000	2000	600	950	1185
9	2310	1490	2000	1200	2000	700	1050	1185
10	2310	1570	2000	1300	2000	700	1050	1185
11	2590	1650	2200	1400	2200	800	1190	1295
12	2890	1830	2500	1600	2500	800	1190	1445



2.3. Fan section

Depending on the required air flow and static pressure, plug type fans or double inlet centrifugal fans with belt drive are used in KLASIK series units. Fans are balanced statically and dynamically, based on ISO 1940 standard and correspond to class G2.5/6,3 (at maximum revs). Thus, even at maximum fan speed, vibration is minimal and is within all requirements.

Plug fans with EC motor

Highly efficient in all operating areas, EC motors are available in all types of KLASIK units and correspond to the IE4 premium efficiency level. High efficiency is determined by low energy consumption, high efficiency factor and the best values of the SFP factor. By using EC fans in Klasik units the following advantages are achieved:

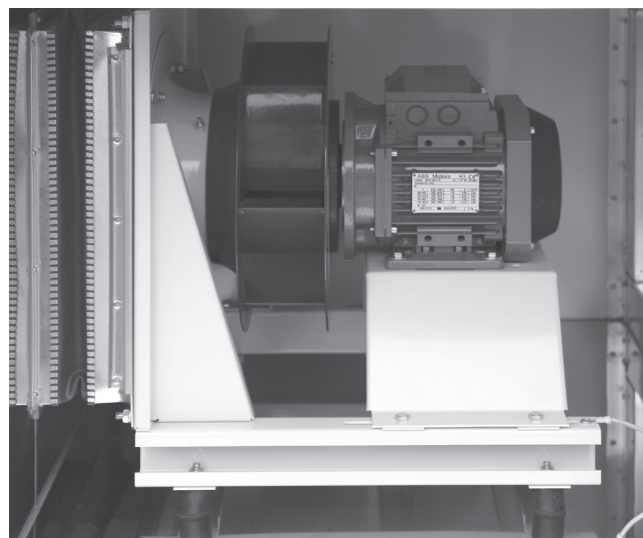
- extremely high efficiency up to 92%;
- valuable energy saving up to 30% comparing with AC in some applications;
- integrated motor controller, no need for a frequency converter;
- very smooth and silent operation;
- long-life;
- compact construction.

Plug fans with AC motor

Main advantages:

- high efficiency,
- smoothly adjustable productivity,
- good acoustic characteristics,
- durability.

The laminar stream after the fan wheel allows to lower losses of pressure in a network; there is an opportunity to connect the device for measurement of a stream of air.

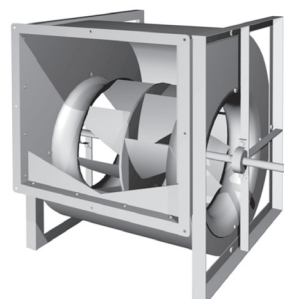
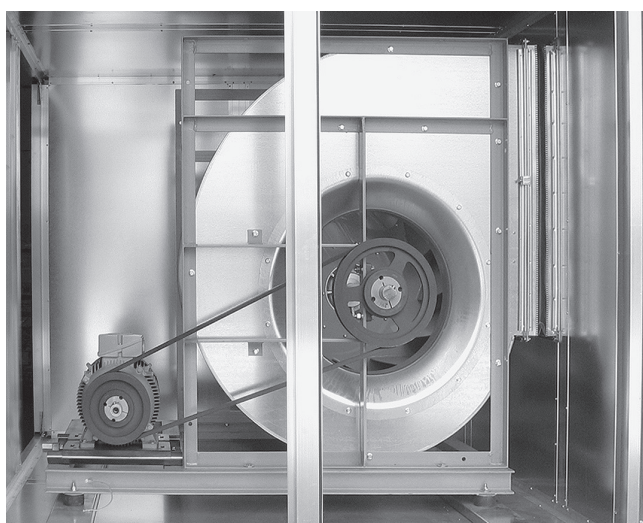


The fan is connected to the casing by frame with vibroisolators. AC three-phase fan motors (400 V, 50 Hz) are controlled by frequency converters.

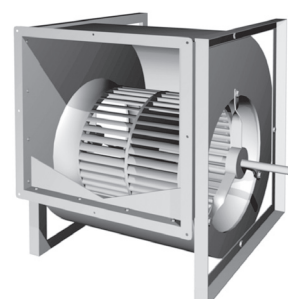
Class of safety IP55 on IEC 34-5, windings of motors has isolation of a category "F". Working temperature up to 40°C.

Double-inlet centrifugal fans with belt drive and with backward curved blades feature particularly high operational stability, ensure high pressure, and their efficiency ratio is 85%.

Fans with forward curved blades running at low speed, have a low noise level and the efficiency to 70%.

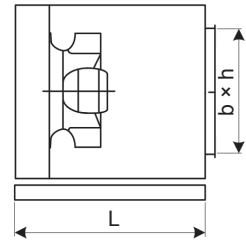
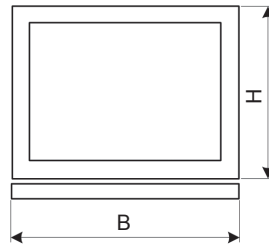


Fans with forward curved blades



Fans with backward curved blades

KLASIK size	B	H	b	h	L	L*
mm						
1	1015	555	700	300	600	800
2	1155	655	900	400	650	900
3	1305	710	1000	500	750	900
4	1505	810	1200	600	800	1000
5	1745	955	1400	700	900	1300
6	1905	1010	1600	800	1000	1300
7	2140	1130	1800	900	1050	1300
8	2310	1265	2000	1000	1300	1490
9	2310	1490	2000	1200	1300	1490
10	2310	1570	2000	1300	1300	1490
11	2590	1650	2200	1400	1340	1840
12	2890	1830	2500	1600	1340	2240



* Fan section with belt drive



At particular frequency, smaller than rated, vibration is possible. At frequencies, when vibration starts, the air handling unit can't be exploitable.



The unit must be grounded according to the grounding installation rules consistent with EN61557 BS 7671!

2.4. Rotary heat exchanger section

Rotary heat exchanger

Used in KLASIK R series units.

Temperature efficiency factor – up to 86%.

Possible wave heights: 1,35 mm; 1.5 mm; 1.65 mm.

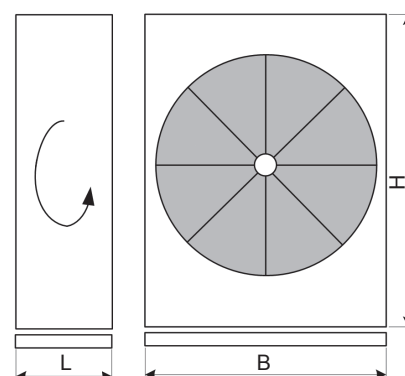
Rotors may be offered of four types:

- aluminium;
- aluminium with a hygroscopic covering;
- aluminium with an epoxy paint covering on embossed rotor edges;
- aluminium with deep epoxy coating.

Rotary heat exchanger speed is controlled by frequency converter, depending on the air temperature.
Rotation speed: for condensation rotors up to 12 rpm.,
for sorption – up to 20 rpm.



KLASIK size	B	H	L	L*
	mm			
1	1015	1110	480	530
2	1155	1310	480	530
3	1305	1420	480	530
4	1505	1620	500	560
5	1745	1910	500	560
6	1905	2020	500	560
7	2140	2260	500	560
8	2310	2530	500	560
9	2610	2980	620	580
10	2810	3140	620	580
11	3115	3300	620	620
12	3220	3660	620	620



* Outdoor version of device



Recommended ratio between the supply and exhaust air volume is between: 0.66 ... 1.5.

2.5. Plate heat exchanger section

Plate-type heat exchanger

Used in KLASIK P series units.

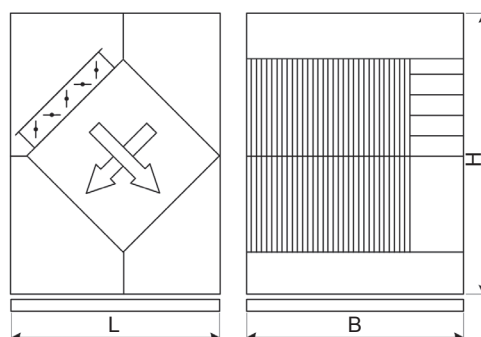
Temperature efficiency factor – up to 70% (in wet conditions). The heat exchanger is sealed, the two air streams are separated, contaminated air heat recovery is optional.

Aluminium plate heat exchangers are used in the units.

For recuperated heat regulation and protection of frost, the heat exchanger is provided with the air bypass valve. Each unit with a plate heat exchanger is equipped with a steel drip pan for condensate collection and drainage.



KLASIK size	B	H	L	L*
	mm			
1	1015	1110	850	1000
2	1155	1310	1140	1250
3	1305	1420	1140	1250
4	1505	1620	1140	1250
5	1745	1910	1440	1600
6	1905	2020	1740	1850
7	2140	2260	1740	1850
8	2310	2530	1740	1850
9	2310	2980	2290	2150
10	2310	3140	2300	2420
11	2590	3300	2350	2420
12	2890	3660	2650	2750



* with the drip pan on the top



Recommended ratio between the supply and exhaust air volume is between: 0.66 ... 1.5.



When temperature of exhaust air after the heat exchanger is $\leq 0^{\circ}\text{C}$, in the AHU without integrated automation control, it is necessary to provide protection from freezing, for example, electric heater upstream the heat exchanger.



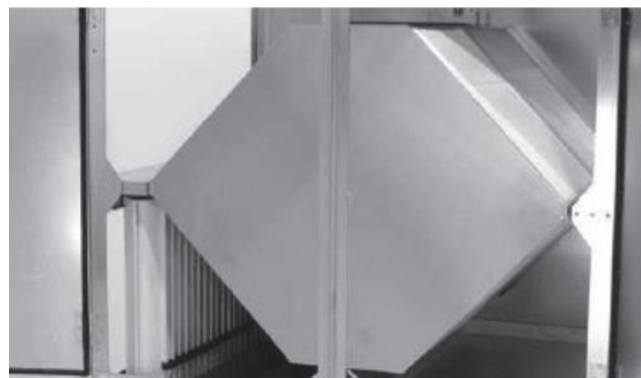
When extract air speed in the section exceeds 2.5 m/s, the drop eliminator is recommended!

2.6. Counter-flow plate heat exchanger section

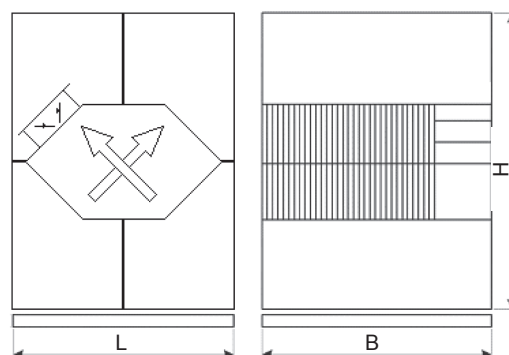
Counter-flow plate heat exchanger

Used in KLASIK CF series units.

Temperature efficiency factor – up to 92% in wet conditions. The plate heat exchanger is equipped with automatic by-pass. Aluminium plates are made of an aluminium alloy resistant to sea water.



KLASIK size	B	H	L
	mm		
1	1015	1110	1220
2	1155	1310	1360
3	1305	1420	1510
4	1505	1620	1640
5	1745	1910	1640
6	1905	2020	1920
7	2140	2260	2210
8	2310	2530	2490
9	2620	2980	2490
10	2620	2980	2490
11	2960	3140	2850
12	3350	3660	3120



Recommended ratio between the supply and exhaust air volume is between: 0.66 ... 1.5.



When temperature of exhaust air after the heat exchanger is $\leq 0^{\circ}\text{C}$, in the AHU without integrated automation control, it is necessary to provide protection from freezing, for example, electric heater upstream the heat exchanger.

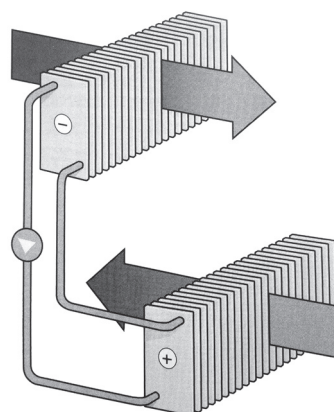


When extract air speed in the section exceeds 2.5 m/s, the drop eliminator is recommended!

2.7. Liquid coupled heat exchanger section

Temperature efficiency – up to 70%. In this system, the warming part of heat exchanger is in the supply air stream and the cooling part – in the exhaust stream. Both parts of the heat exchanger are connected with pipes to a common circuit, which circulates a mixture of water and glycol. This type of equipment is used only where air flows must be completely separated from each other, as well as when, taking into account the characteristics of the project, or other requirements, they must be on different floors.

Heat exchangers are made of copper tubing and aluminium fins.



2.8. Water-heater section

Water air heaters

Normally are used with aluminium fins and copper pipes. Can be equipped with thread joint to connect freezing sensor.

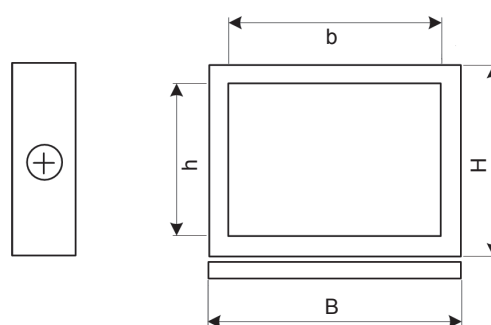
The heater can be removed from the inspection side, by disconnecting the coolant pipes and unscrewing the panel mounting screws.

All heaters are mounted on rails, therefore they are easy to remove.

- Maximum pressure – 21 bar.
- Maximum water temperature +100°C.
(by special order up to + 130°C).
- Heated air temperature up to +40°C.



KLASIK size	B	H	b	h
	mm			
1	1015	555	700	300
2	1155	655	900	400
3	1305	710	1000	500
4	1505	810	1200	600
5	1745	955	1400	700
6	1905	1010	1600	800
7	2140	1130	1800	900
8	2310	1265	2000	1000
9	2310	1490	2000	1200
10	2310	1570	2000	1300
11	2590	1650	2200	1400
12	2890	1830	2500	1600



For ventilation units operated outdoors when the ambient air temperature $< 0^{\circ}\text{C}$, it is necessary to use water-ethylene glycol mixture to prevent freezing of water and damage to the heat exchanger.

2.9. Cooler section

Water air coolers

As a standard, are used with aluminium fins and copper pipes.

Maximum pressure – 21 bars.

Air cooler section is equipped with a drain outlet and a siphon.

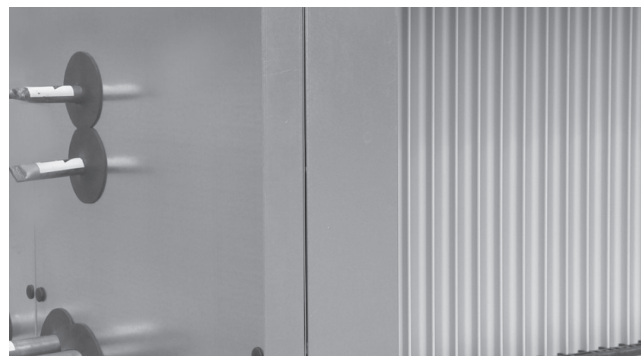
Direct evaporation air coolers

Normally are used with aluminium fins and copper pipes.

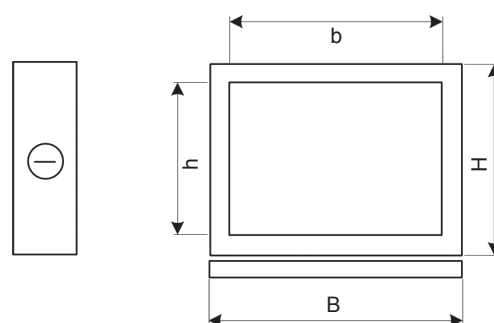
Maximum pressure – 42 bars.

The cooler section is equipped with a drain outlet and a siphon. Direct evaporation air cooler capacity can be divided into steps.

The cooler along with the drainage outlet and the drip tray can be removed from the inspection side, by disconnecting the pipes and unscrewing the panel mounting screws. All coolers in the devices are mounted on rails, so they are easy to remove.



KLASIK size	B	H	b	h
	mm			
1	1015	555	700	300
2	1155	655	900	400
3	1305	710	1000	500
4	1505	810	1200	600
5	1745	955	1400	700
6	1905	1010	1600	800
7	2140	1130	1800	900
8	2310	1265	2000	1000
9	2310	1490	2000	1200
10	2310	1570	2000	1300
11	2590	1650	2200	1400
12	2890	1830	2500	1600



For ventilation units operated outdoors when the ambient air temperature $< 0^{\circ}\text{C}$, it is necessary to use water-ethylene glycol mixture to prevent freezing of water and damage to the heat exchanger



When supply air speed in the section exceeds 2.5 m/s, the drop eliminator is recommended!

2.10. Electric heater section

Electric air heaters

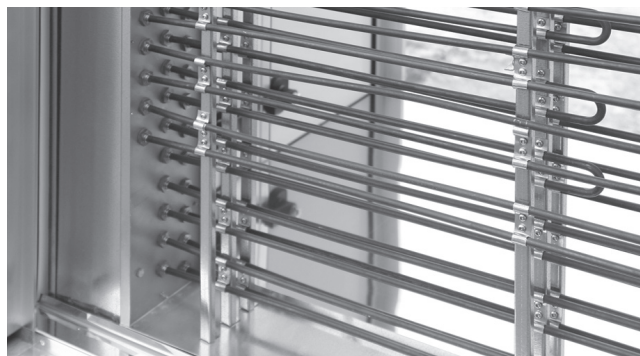
In manufacture, three-phase (400 V/50 Hz) stainless steel heating elements are used.

There is two-stage protection against overheating.

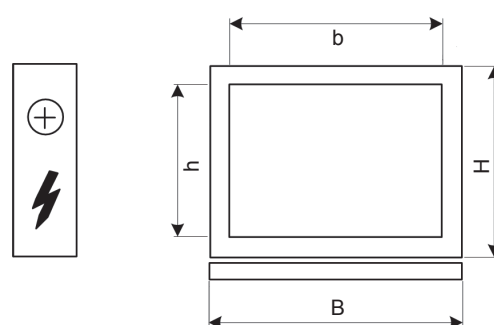
Safety class IP54 according to IEC 335.

Heated air temperature – up to +40°C.

Remark: accurate measurements and other data of electric air heater in KLASIK ventilation equipment section program.



KLASIK size	B	H	b	h
	mm			
1	1015	555	700	300
2	1155	655	900	400
3	1305	710	1000	500
4	1505	810	1200	600
5	1745	955	1400	700
6	1905	1010	1600	800
7	2140	1130	1800	900
8	2310	1265	2000	1000
9	2310	1490	2000	1200
10	2310	1570	2000	1300
11	2590	1650	2200	1400
12	2890	1830	2500	1600



2.11. Inspection access

The inspection access is mounted between various elements of the ventilation unit. It is used for the ventilation equipment maintenance, equipment element cleaning and working process monitoring.

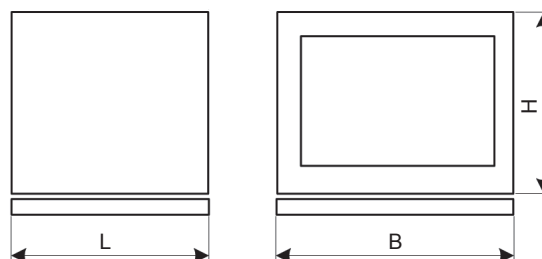
The inspection access door is made in two types:

1. Opened door with handles and hinges.

2. Removable panels, fixed with spins.

The door can be equipped with locks and inspection windows

KLASIK size	B	H
	mm	
1	1015	555
2	1155	655
3	1305	710
4	1505	810
5	1745	955
6	1905	1010
7	2140	1130
8	2310	1265
9	2310	1490
10	2310	1570
11	2590	1650
12	2890	1830



The inspection access length can be 300, 400, 500, 700, 800 mm.

2.12. Sound attenuator section

Where a ventilated room is subject to extremely high demands on noise levels, UAB KOMFOVENT makes ventilation units with integrated noise suppression sections. The housing of sound suppression sections is the same as in ventilation units – with full insulation and a high level of noise suppression.

The suppression section is equipped with partitions filled with noise absorbing loose mineral wool panels, which are overlaid with a thin layer of polypropylene fibers (to prevent dust), and perforated galvanized steel sheets.

Partition number and size depends on the requirements of the noise reduction level.

Noise suppression of 45 mm thick walls of ventilation units

Frequency (Hz)	63	125	250	250	1000	2000	4000	8000
Suppression (dB)	11	13	17	28	30	34	42	46



Noise suppression of 50 mm thick walls of ventilation units

Frequency (Hz)	63	125	250	250	1000	2000	4000	8000
Suppression (dB)	13	15	20	28	28	25	29	30

2.13. Humidification section

Air humidification with low pressure water steam is a cost effective, hygienic and accurate method for air humidification. Relative air humidity may be up to 90 %.

Humidification section shall be equipped with a stainless steel tray and pipe for drainage; inner walls of the section are painted. The humidification section is also equipped with lighting, inspection doors and windows. Humidifier components, pumps, pipeline and steam generator must be installed following the installation instruction of the humidifier and only when the entire humidification section is assembled and the unit is installed in its final location.

Low pressure steam humidifier or atomizing humidifier may be used for humidification as well. Using a humidifier, moisture remains in the air in the form of steam. Special structure of the unit prevents from transferring water drops - every humidification section is equipped with polypropylene drip trays.

Two types of atomizing humidifiers are available:



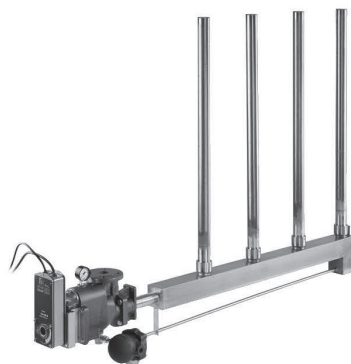
Atomizing humidifier



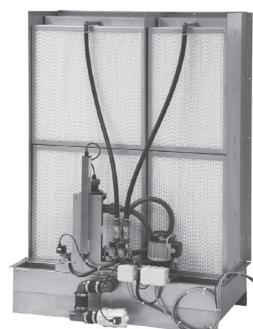
When water is used for humidification, a water treatment system must be installed!



Water supplied to the humidifier must meet the microbiological requirements for drinking water. Any return of used water to the drinking water pipeline is not allowed.



Air humidification with low pressure water steam

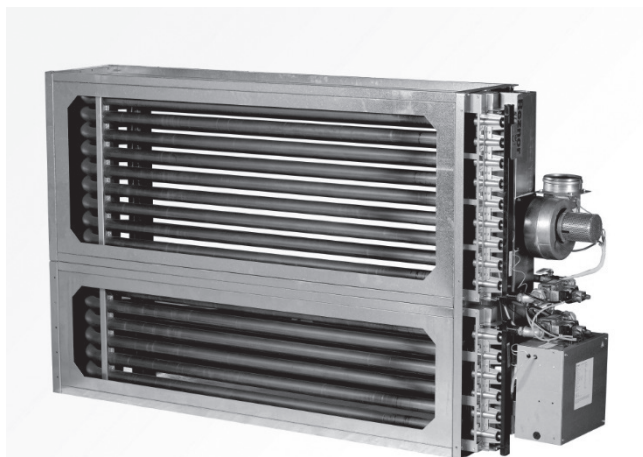


Air humidifier after using a porous material

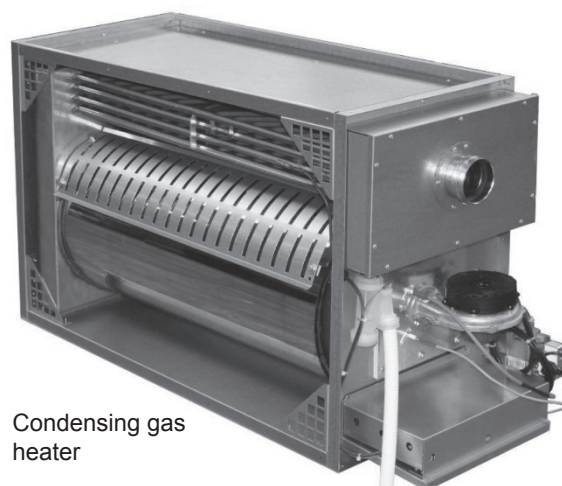
2.14. Gas heater section

Gas heaters may be installed in ventilation units instead of water or electrical heaters. Gas heaters produce heat by burning various types of gas. Gas heater components are designed to ensure safe operation in ventilation systems - combustion chamber is completely separated from the air flow, and flue gas is removed

via a separate flue pipe. Gas heaters are equipped with a control system that regulates their temperature and ensures safe operation. Heater automation may be connected to the unit's control system or used separately.



Non-condensing
gas heater

















Condensing gas
heater

Gas heater shall be installed in a way to ensure sufficient working space around it for maintenance. Exhaust systems for combustion air and flue gas removal shall be installed.



Gas heater installation and connection shall be carried out strictly according to the manufacturer's instructions.

3. INSTALLATION GUIDE

- | | |
|---|---|
|  | Ventilation units may only be installed by qualified personnel with sufficient professional expertise and knowledge about ventilation systems, their installation as well as electrical safety requirements, and able to work without endangering themselves and others. |
|  | Each drain outlet of the condensate bath must be equipped with a siphon so that condensate is completely removed from the ventilation unit and unpleasant odours from sewerage have no access to the ventilation system. |
|  | For ventilation units operated outdoors, the siphon and condensate drainage pipes must be heated with an electric heating cable (when the ambient air temperature $t_{amb} < 0^{\circ}\text{C}$). The siphon and the condensate drain pipes must be insulated with insulation. |
|  | Do not switch on an ungrounded air handling unit! |
|  | Before switching on the unit, all doors must be closed and locked, protective caps must be on. |
|  | Before turning on the unit, it's sections should be firmly connected to each other. |
|  | Ventilation device is pressurised, and is therefore prohibited to open the door without turning off the machine. |
|  | Before performing any inspection work inside the unit, make sure that the unit is disconnected from the mains, and there are no rotating parts. |
|  | Before opening the door, turn off the unit and the circuit breaker, and wait (for 1–2 min.) until the fan stops rotating. |
|  | Before switching on the ventilation unit, be sure to activate all security functions. |
|  | The ventilation unit can be turned on and off only according to the procedure described in the management automation. |
|  | Be careful during water heater installation and repairs – the coolant temperature can reach 130°C ! |
|  | <p>Protection areas of moving parts</p> <p>Moving parts in installations include the impeller fan, the belt drive of the rotary heat exchanger (if any), and the closing and bypass valves of the plate heat exchanger (if any).</p> <p>The lockable inspection door protects against direct contact with moving parts. If the fan section outlets are not connected to the ducts, the connections must be covered with a safety net.</p> |
|  | If the ventilation unit has no factory automation control, the company installing the unit is responsible for its operation and reliability of guards. |

3.1. VERSO Air Handling Units marking

Unit sections are marked with the following signs:

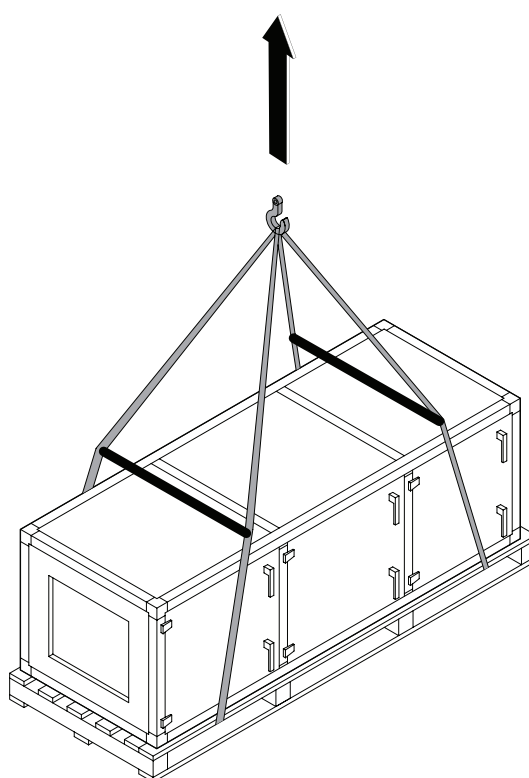
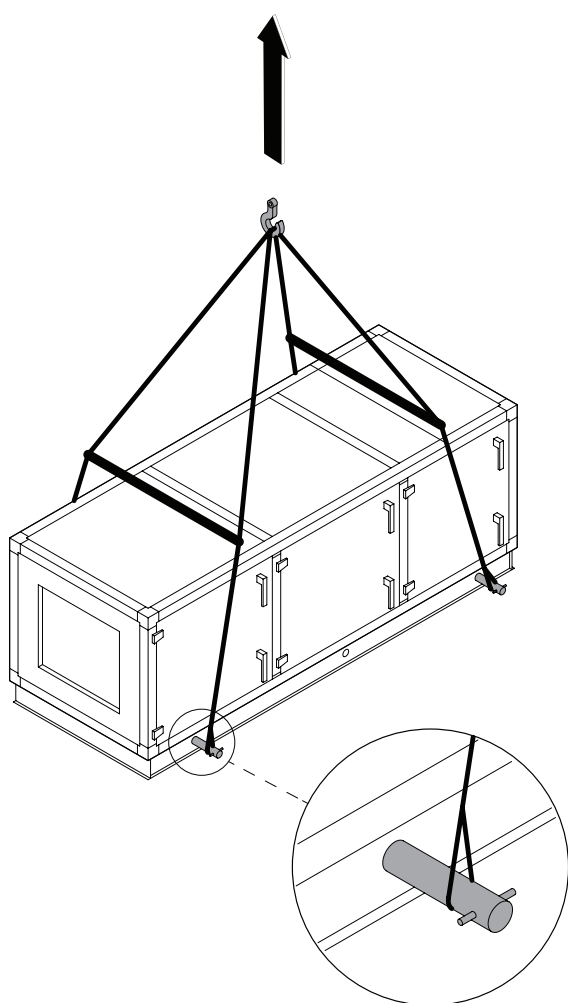
Note! Important information in the instruction manual.		Caution! Rotating parts!	
Place for siphon.		Note! Before performing any in- spection work inside the unit, be sure the unit's electric power supply is disconnected.	
Air damper		Fan	
Air filter		Air cooler	
Rotary heat exchanger		Compressor	
Plate heat exchanger		Noise attenuator	
Water air heater Electrical air heater		Inspection	

3.2. Unit transportation

On arrival of the ventilation unit, carefully inspect the packaging for any damage. If any mechanical or other defects are visible (e.g. wet cardboard packaging), immediately notify the carrier. If damage is significant, do not accept the goods. Notify the Seller or KOMFOVENT UAB representative¹ about any transportation damage within three working days.

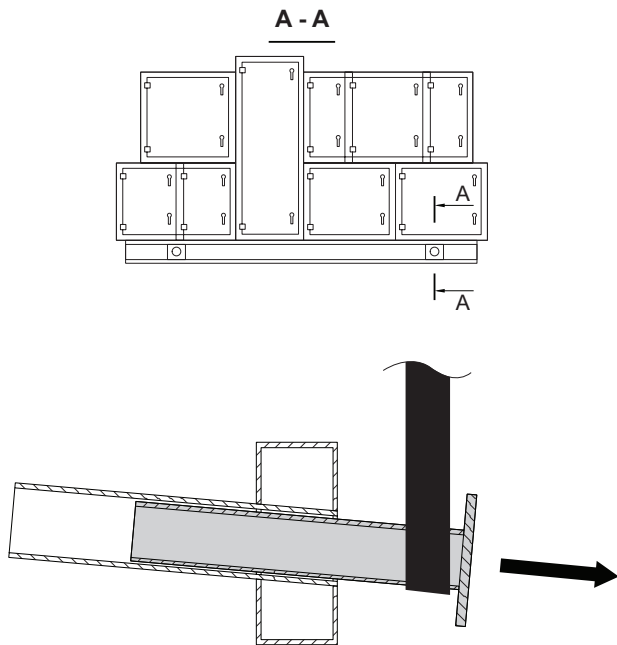
Devices must be stored in clean and dry premises, at 0–40°C temperature. Stored unit must be protected against any accidental damage as well as dust and dirt entering the unit. Other heavy items shall not be loaded on top of the stored device.

Transported units must be properly fixed and additionally protected from possible mechanical damage, rain or snow. Units shall be loaded and unloaded using a forklift or a crane. When lifting with a crane, special straps or ropes, fixed in designated areas, must be used. It must be ensured that the casing is not crushed or otherwise damaged by straps or ropes during lifting operations. Use of special supporting structures (traverses) is recommended. Individual sections of the unit shall be lifted together with an installation frame or a wooden pallet.

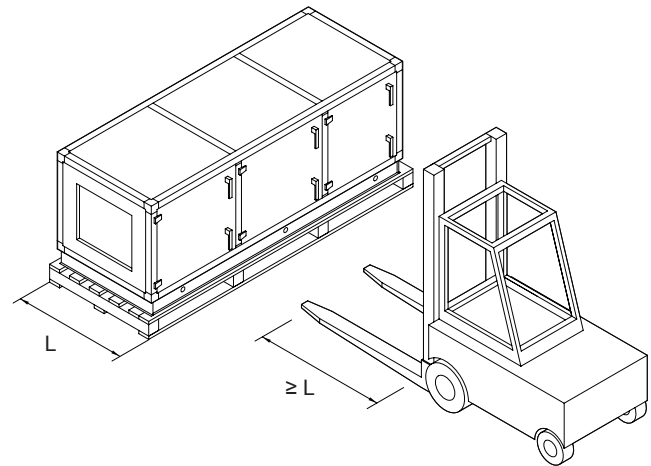


¹ KOMFOVENT UAB shall not be held liable for any damages caused by the carrier during transportation or unloading.

Special retractable holders are foreseen for lifting bulky equipment assembled on solid installation frames. These holders are placed in special openings of the installation frame; their design prevents straps from slipping out of place.



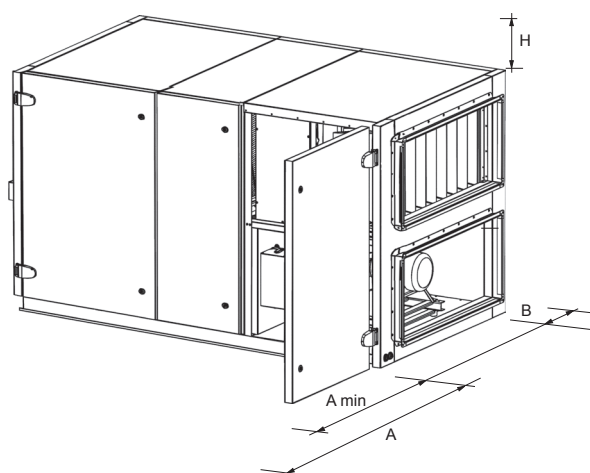
When a forklift is used for lifting or transporting the unit, its forks must be long enough to prevent the device from tipping over or to avoid mechanical damage to its bottom part. Ventilation units are heavy, therefore care must be taken during lifting, carrying or moving operations. Use personal protection equipment.



3.3. Selection of mounting location

The ventilation unit, depending on its type, may be installed both indoors or outdoors. Some of the devices can be ceiling mounted. When selecting an installation or mounting location, it is mandatory to foresee sufficient and security compliant access space for repair and maintenance operations. The unit must be installed in a way so that it may be partially or fully disassembled, if needed (e.g. in case of heavy repairs).

Minimum service space A_{min} defines an area which may not contain any stand-alone or immovable devices, equipment, partitions, structure or furniture. This space is sufficient for service and filter replacement works. For repair and replacement of components, access space A , equal to the width of the device, shall be ensured in front of the device.



- A recommended space for the unit maintenance
- A_{min} minimal necessary space for the unit operation
- H free space over the installed air handling unit
- B recommended space behind the air handling unit

Unit size	A, mm	A min, mm	B, mm	H, mm
1	1015	800	500	500
2	1155	800	500	500
3	1305	800	500	500
4	1505	900	500	500
5	1745	900	500	500
6	1905	900	500	500
7	2140	1000	500	500
8	2310	1150	500	500
9	2310	1150	500	500
10	2310	1350	500	500
11	2590	1350	500	500
12	2890	1500	500	500

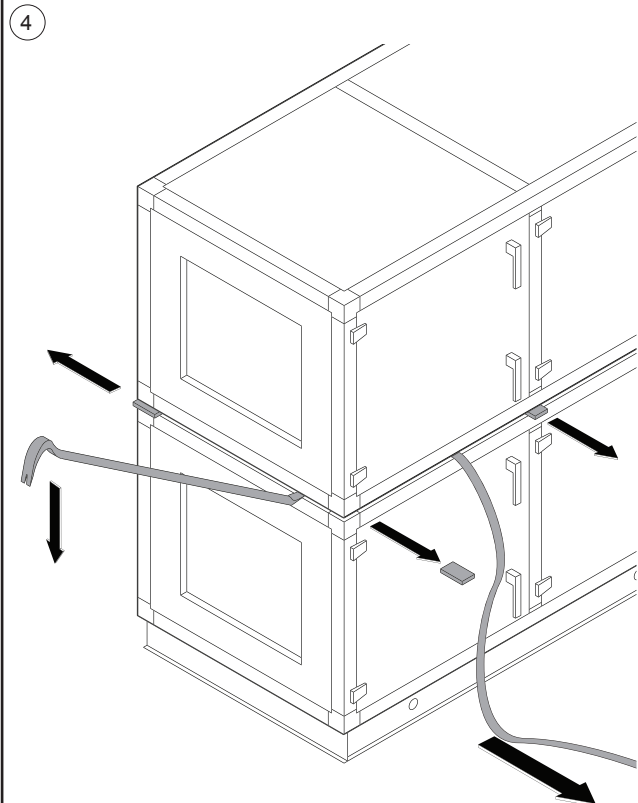
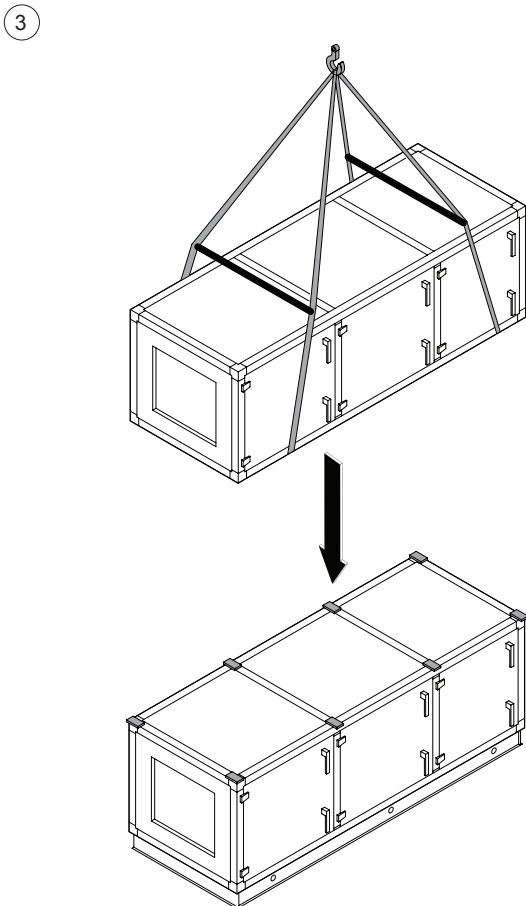
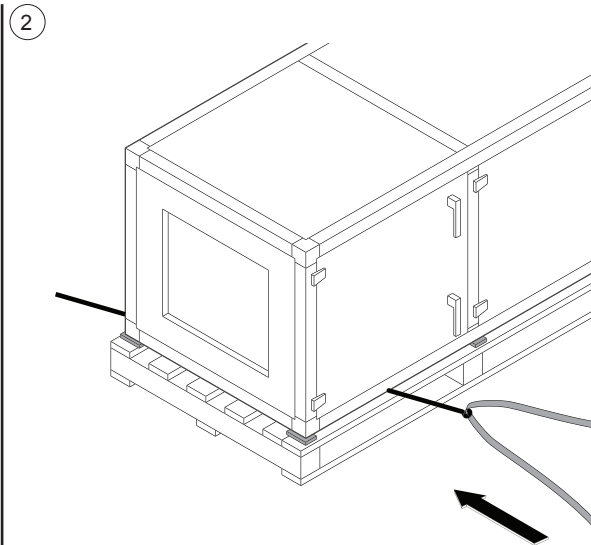
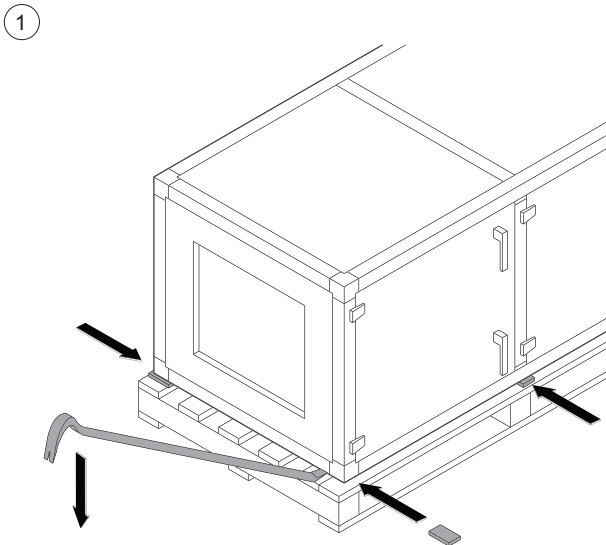
If the device is not equipped with height adjustable feet, it must be installed on a flat base. The base can be made from poured reinforced concrete or from pre-fabricated metal structures. Vibration dampening gaskets must be installed between the unit and its installation base. When the unit is not equipped with an installation frame or height adjustable feet, it should be fixed to the base using metal angle brackets and rubber vibration dampening gaskets. Units mounted to ceilings or other special structures must be fixed using threaded bars and vibration dampening holders. During installation, both suspended and stationary units must be levelled in respect to the horizon. Deviations shall not exceed 0.3mm for 1m in the longitudinal direction and 0.5mm for 1m in the transverse direction.



If ventilation unit is not intended to be installed right away, it must be stored in dry and clean environment, in the original packaging. If unit is installed, but will not be used yet, all duct connection openings must be closed and additional protection from the surrounding conditions (dust, rain, cold, etc.) must be made.

Mounting of separate ventilation units in stacks is not allowed unless these devices are intended for such installation. Two-tier sections are placed on top of each other with a crane in the following procedure::

1. Lift corners of the section one after another using a long crowbar to place wooden battens (10-15 mm) between the sections. When sections are in large dimensions, battens shall also be placed under every strut.
2. Place lifting straps under the section with a long bar or a hook.
3. Place wooden battens on upper corners and struts of the first-tier section and then lift the second-tier section on top of it with a crane. Observe all lifting rules and ensure that straps do not slip or move when using a crane for lifting operations. Lifting traverses are recommended.
4. Once sections are placed on top of each other, pull out the straps. Lift corners with a long crowbar to remove inserted battens.



3.4. Electrical installation

Installation works may be performed only by duly qualified personnel. The following requirements must be fulfilled during installation.



It is recommended to lay control circuit cables separately from power cables or to use shielded cables. In this case, the cable shielding must be grounded!

After unit parts have been connected together, the connecting cables and wires of the sections of the unit are connected.



Connector connection is performed strictly according to numeration given in wiring diagram, or adequate markings (see unit electric scheme).



When disconnecting sections of the unit, do not pull connecting wires and cables!

Electric power supply (400 V AC; 50 Hz voltage) is connected to the main switch, which is envisaged in the heat exchanger (middle) section of the air handling unit. Prior to connecting to the power supply, the main switch must be installed near the unit in the intended place or directly on its wall. It is necessary to connect earthing!



All units must be connected through circuit breaker with 300 mA current leakage protection (type B or B+).



Earth must be installed according EN61557, BS 7671.

When the unit is equipped with an electric heater, every switch of the heater section must be additionally powered.

Power supply cable for the unit and an electric heater is selected according to the maximum current strength indicated in the technical data sheet.

When the ventilation unit is equipped with integrated automatics, external connection terminals, corresponding to the ones located in a controller box, are foreseen inside the unit. All external automation components must be connected to these terminals (follow the "Electrical Installation and Operating Instructions" provided with the automation).



If the device is not equipped with factory installed control automation, the company which installed the automation is responsible for proper operation of the device as well as safety guards.

3.4.1. Connection of a water heater

Depending on the order, a water heater may be supplied with/without a control system. If the electrical heater is ordered with a factory installed control system, its electrical connection must be performed following the specific automation instructions and electrical diagrams. If the electrical heater is ordered without a factory installed control system, the company that later installs the control system shall be responsible for operation of the electrical heater and protection against overheating.

- Electrical heater section shall be fixed to the supply air opening of the unit.
- Electrical heater capacity, operating voltage and overheat protection is indicated in a circuit diagram located on the inner side of the heater cover as well as in the technical documentation. Make sure that all specified values correspond to the power supply and control equipment parameters.
- The heater shall be connected to the power supply network using a stationary cable which shall be inserted through rubber seals. Connect the heater to a proper power supply source with protective earth complying with to all electrical safety requirements.
- Power supply cable must be equipped with a separate circuit breaker if not foreseen in the control system.
- Power supply design must ensure that the electric current is supplied only when a respective fan is actuated in advance or simultaneously. While the supply air fan is not operating, power supply to the electrical heater must be stopped.
- Design and control system of the power supply source shall not allow the supply air fan to be switched off without firstly switching off the electrical heater.
- Control system (if there is no factory installed automation) of the electrical heater must be equipped with a multi-level switch with a contact gap of at least 3 mm.
- Electrical heater has a two stage protection against overheating:
 1. Automatic thermostat 70 °C. Prevents heating elements from overheating when the air flow speed is too low. Protective device resets automatically as soon as temperature of a thermostat reduces.
 2. Manual reset thermostat 100 °C. In case of overheating, power supply for the heater is stopped. Protection may be reset by pressing the RESET button on a thermostat.



Reset the emergency overheating protection using the RESET button only after clarifying the cause of the overheating and eliminating it.

3.5. Connection of sections

Depending on unit dimensions, separate sections may be interconnected with external tightening elements (see Fig. A.) or internal tightening corners (see Fig. B), using the supplied screws. Sealing gaskets must be attached on connection points before joining the sections (supplied with the unit). Screws must be tightened so

that the gasket is fully compressed and distance between the sections does not exceed 2–3 mm. In case of the outdoor installed unit, connection between the sections must be additionally sealed with silicone or other sealant.

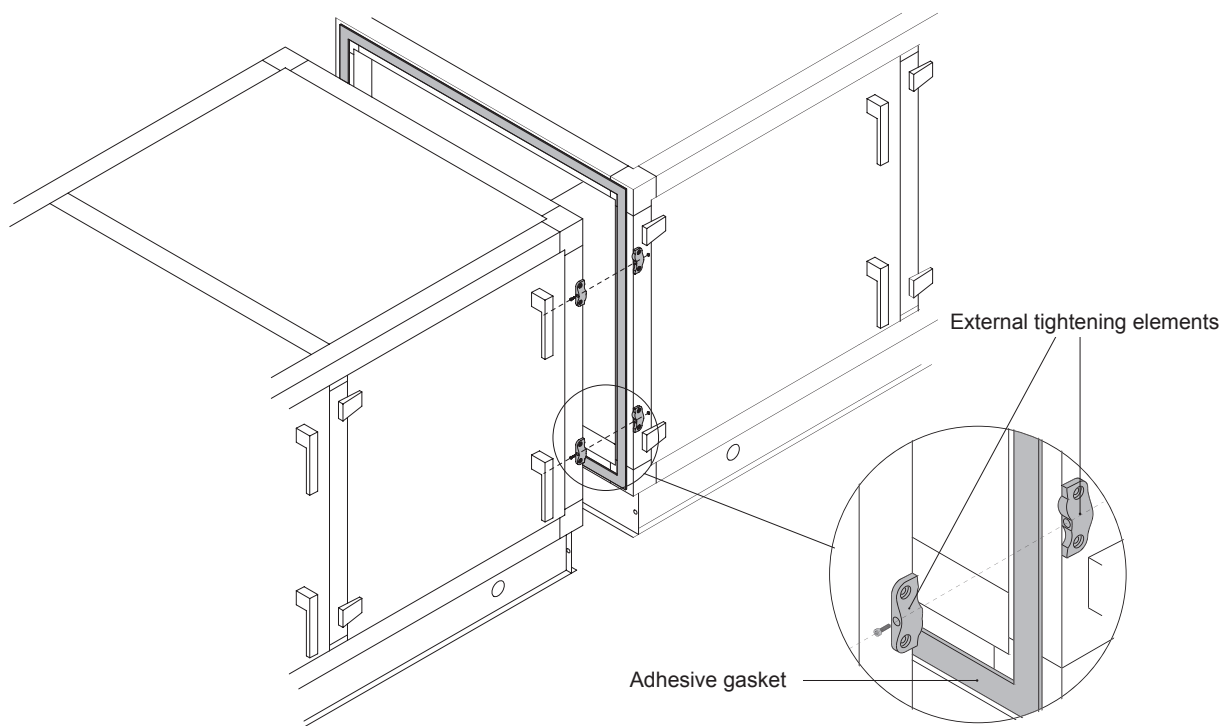


Fig. A

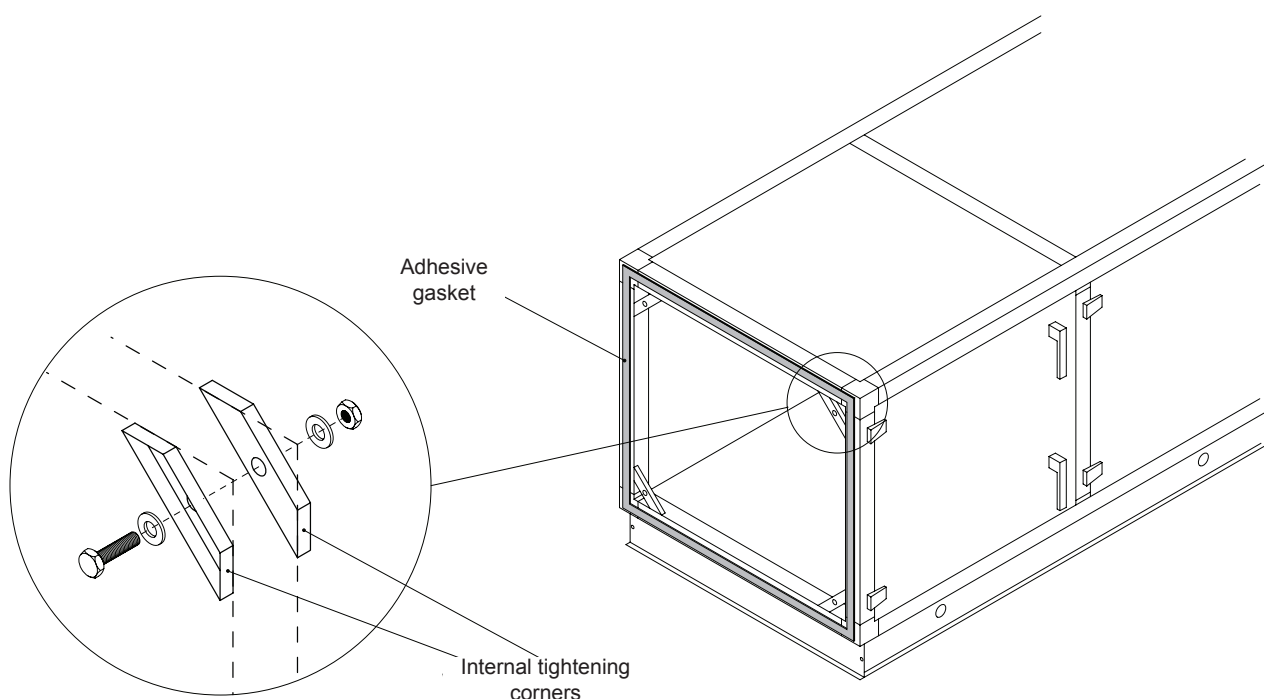


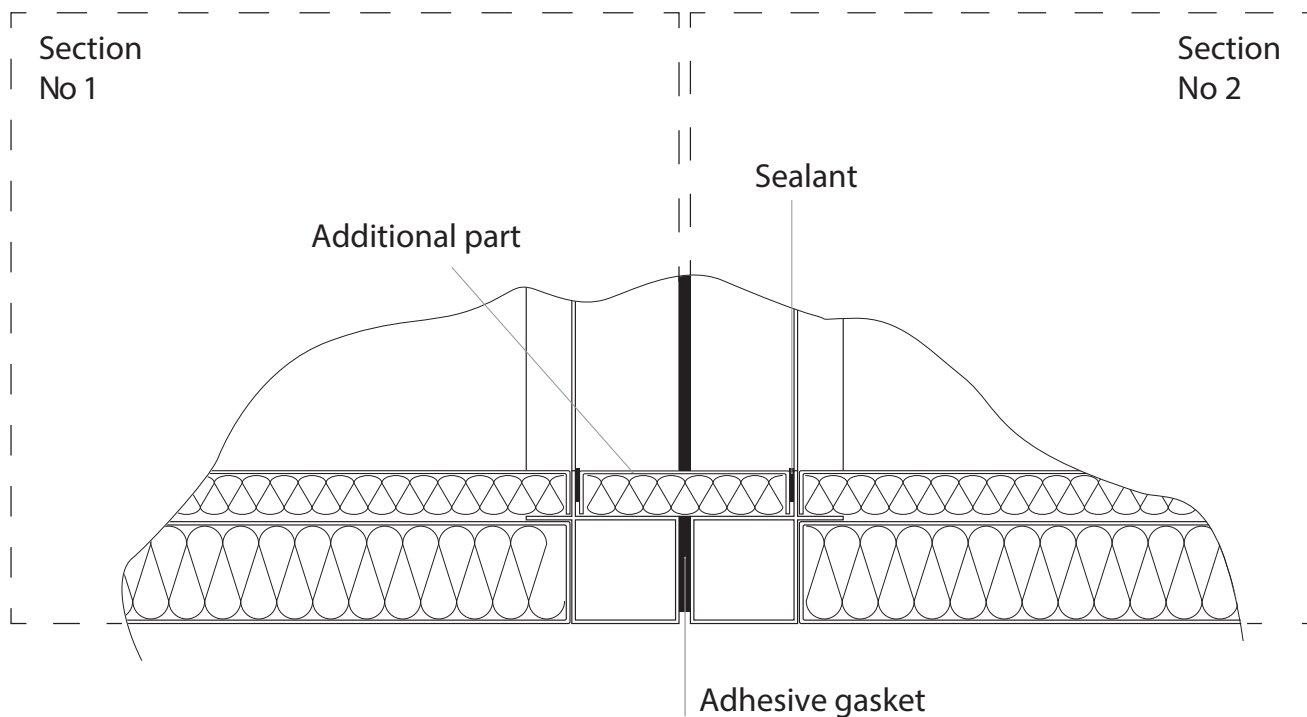
Fig. B

3.5.1. Connection of sanitary appliances

Bottom (or all inner walls) of the sanitary appliances is made of stainless steel. Bottom of the interconnected sections must be smooth, therefore additional gaskets and parts delivered with the device shall be installed between the sections.



All internal connections must be additionally sealed with neutral sealant intended for use in clean premises.



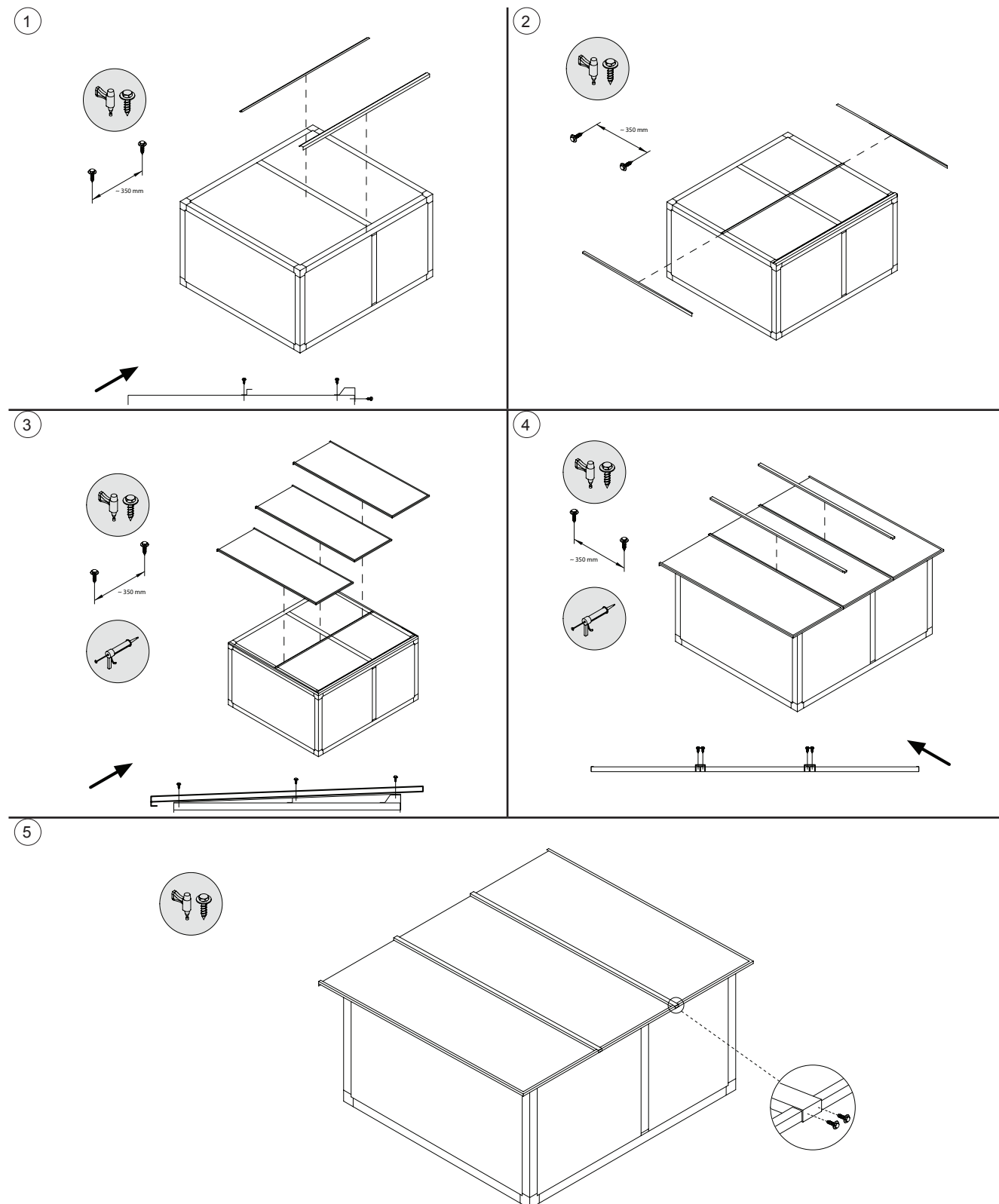
3.6. Roof installation

Outdoor facilities must be installed on the installation frame; air duct connections must be equipped with dampers. The device must be additionally protected

against environmental damage by installing a special roof and exhaust flow hoods.

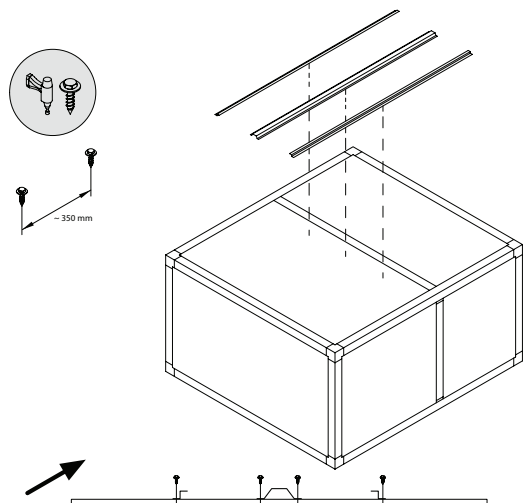
Ventilation devices, when possible, should be installed near the walls so that they are protected from wind loads.

Klasik 1-7 size

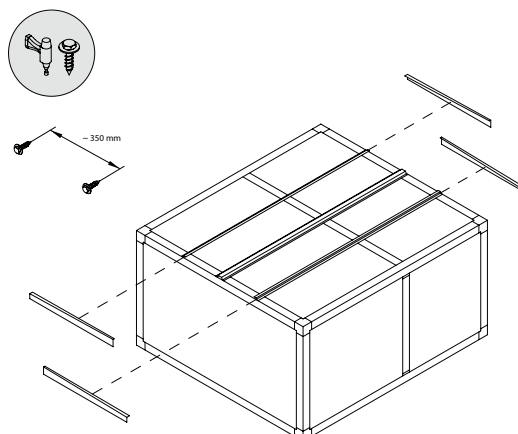


Klasik 8-14 size

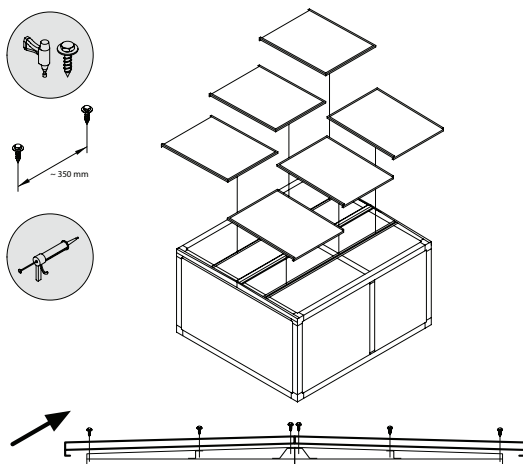
1



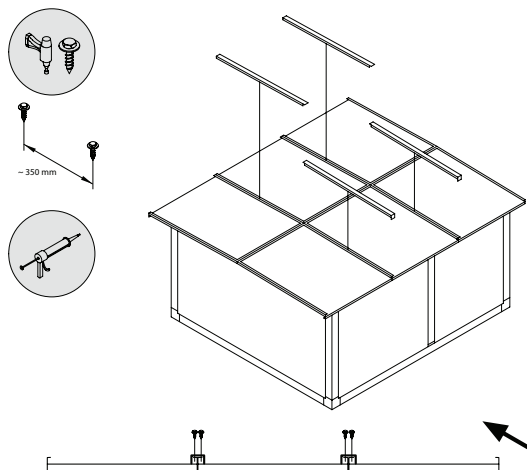
2



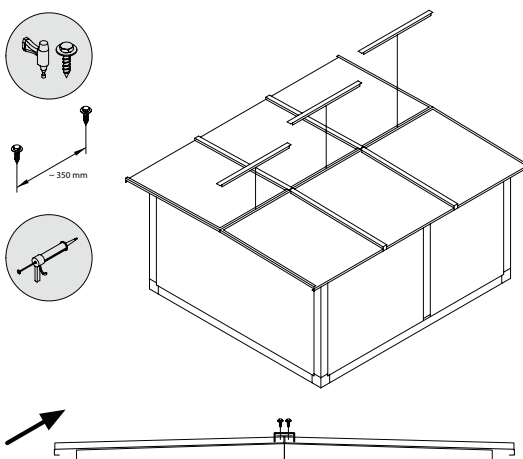
3



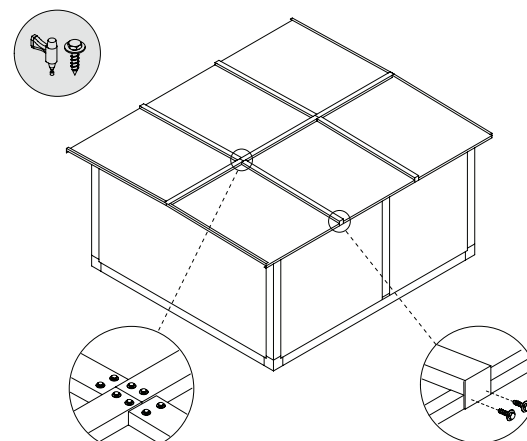
4



5



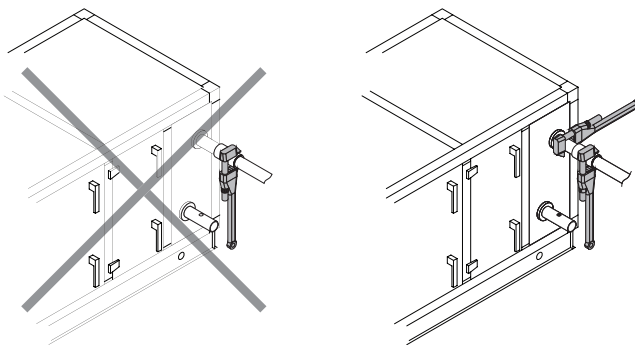
6



Pictures are for information only. Exact amounts and dimensions of roof parts are provided in the installation drawings.

3.7. Connection of water heat exchangers

When connecting tubes for heaters/coolers, tubes must be held with a pipe wrench; otherwise these tubes will be damaged.



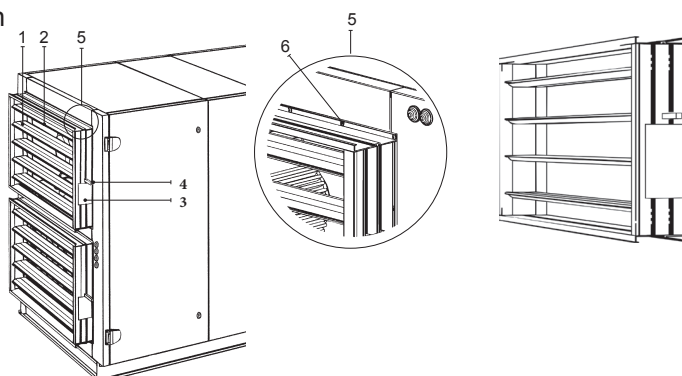
3.8. Air Dampers

Closing air dampers with aluminium or galvanized steel blades are used in the units.

Air damper is fixed to the air handling unit with screws.



If outdoor mounted ventilation unit will be stopped in cold temperatures, it is needed to install additional air closing dampers in the supply and extract ducts (room side). It must not allow the warm air from the premises circulate inside of the unit when it is stopped, otherwise condensate may appear and could damage electronic components.



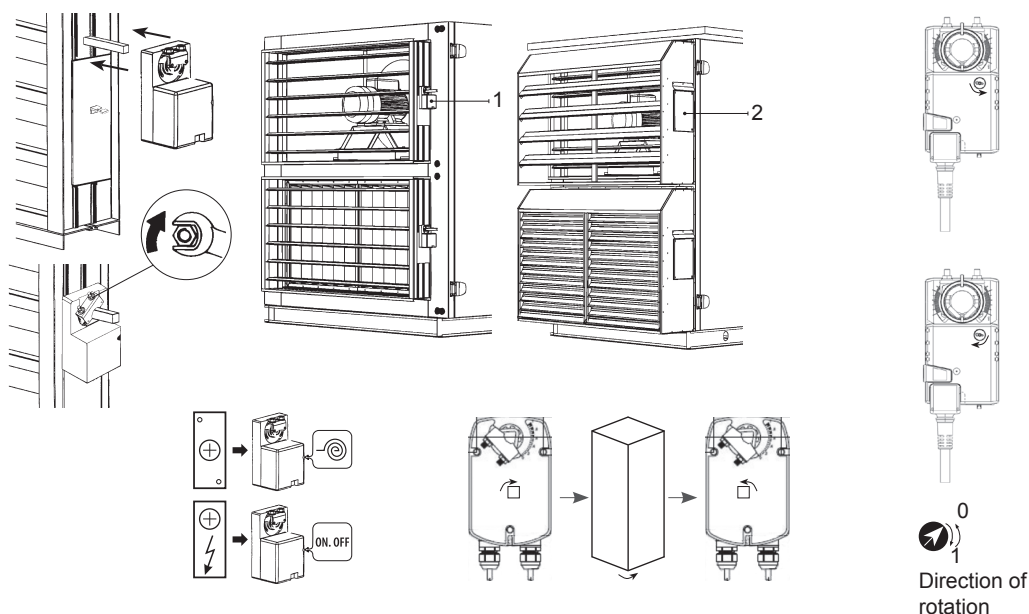
1. Aluminum or galvanized steel blades
2. Rubber sealing
3. Plate shaft for the actuator
4. Shaft for bypass damper closing/opening
5. Fastening bend
6. Screw

Installing Electrical Drives on the Air Dampers.

Electrical Dampers Safety

The electrical actuators control air dampers of the air handling unit.

If air handling unit is installed outside, then all the drives outside have to be protected from moisture and dust.

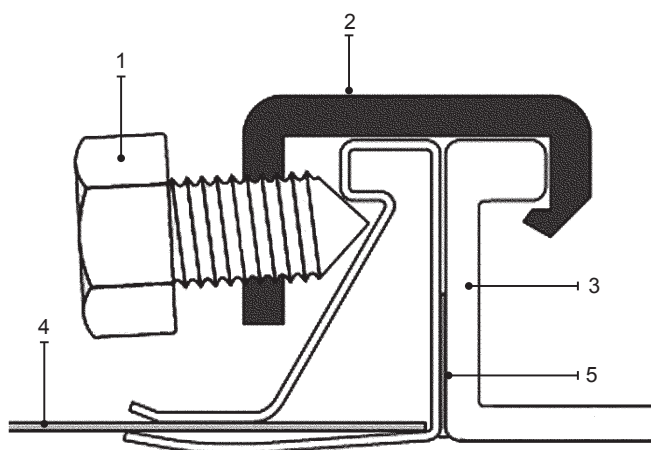


1. Electric drive fixed to the air handling unit installed in a building
2. Electric drive fixed, under the cap, to the air handling unit installed outdoors

3.9. Connection to the air duct

Ventilation unit shall be connected to the air duct with a flexible connection, L-20 or L-30 flanges. M8x20 bolts are screwed in the corners. Special gasket must be attached to a flange for a tight connection.

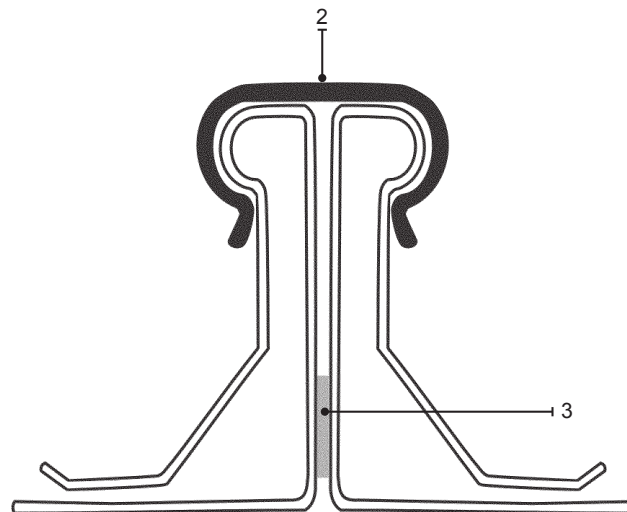
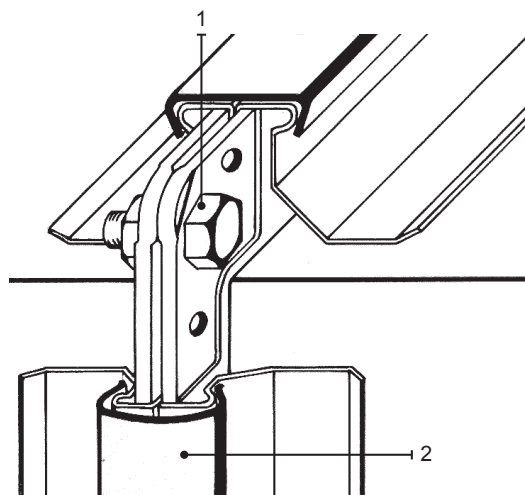
Air damper connection to the air duct



- 1. Bolt
- 2. Connector
- 3. Flange
- 4. Air duct
- 5. Single-sided adhesive gasket

Flange connection to the air duct

Screwed bolts M8x20 in the corners. Special adhesive gasket ensures tightness.



- 1. Bolt
- 2. C profile for flange connection
- 3. Single-sided adhesive gasket

3.10. Water trap installation

Water siphon direction can be changed by rotating the siphon pipe to the left or to the right. The siphon must be installed so as not to damage the adjacent equipment and building elements. If drainage is installed and will be led through the cold rooms or areas, the drainage pipe must be insulated and equipped with the antifreeze system (a heating cable). Any drainage system cannot be directly connected to a common wastewater system in order to protect supply air against contamination with bacteria and odours. Condensate from the ventilation device drainage system shall be collected into a separate container or should be lead to a sewage grille without any direct contact. Condensate collection location must be easy to access for cleaning and disinfection.

3.10.1. Water trap installation for a unit section mounted on the suction side

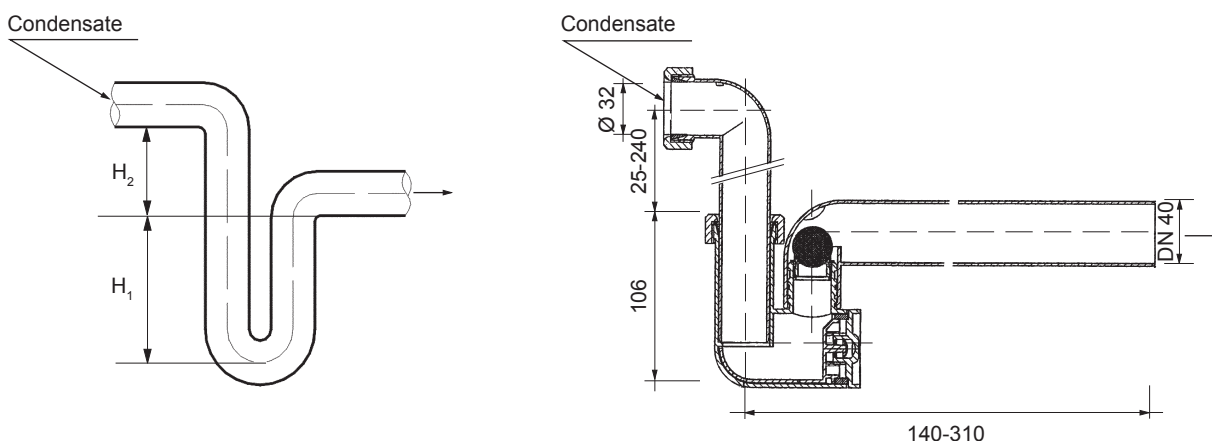
When the fan is installed last in the circuit of the functional elements of the ventilation unit, it creates lower

than atmospheric pressure in the cooling system. For this reason, it can be difficult to remove condensate from the ventilation unit, resulting in condensate spills in the technical area. Therefore, it is very important to install the condensate drainage. Height H_1 must be equivalent in mm to half a negative pressure in the ventilation unit. Height H_2 must be equivalent in mm to the negative pressure inside the device.

3.10.2. Water trap installation for a unit section mounted on the pressure side

When the fan is not last in the circuit of the functional elements of the ventilation unit, it creates higher than atmospheric pressure in the cooling system. The resulting condensation in this case is easily removed from the ventilation unit and there are no strict requirements for the siphon installation. It is enough to install the drain siphon with minimal water drain slope.

RECOMMENDATION: The drain siphon must be installed by connecting at least equal diameter pipelines.



4. PERIODIC MAINTENANCE

The following table provides recommended regular maintenance intervals for the unit. Actual frequency of maintenance works depends on operating conditions, amount of dust and impurities in the supply air as well as environment in which the unit is installed. Maintenance intervals for sanitary appliances may be shorter,

following the national hygiene norms and requirements for indoor air.



Maintenance works shall be carried out only after making sure that the unit is stopped and disconnected from the power supply network.

Task	Frequency			
	Commis- sioning	3 months	6 months	12 months
4.1. Housing				
Mechanical damage	X			X
Air-tightness and gaskets of the sections	X			X
Horizontality of the sections	X			X
Air-tightness and gaskets of doors and locks	X			X
Air damper operation	X		X	
Condensate drainage	X		X	
4.2. Filters				
Visual inspection of filters	X	X		
Inspection of differential pressure sensors	X	X		
Filter replacement			X	
4.3. Fans				
Extraneous noise and vibrations	X		X	
Fan operation, speed adjustment	X		X	
Cleaning of the impeller				X
Motor overheat protection	X		X	
4.4. Rotary heat exchanger				
Belt inspection	X		X	
Motor operation	X		X	
Drum brushes and seals				X
Free rotation and bearings of the drum			X	
Drum cleaning				X
4.5. Plate or counter-flow heat exchanger				
Air bypass valve operation	X		X	
Tightness and gaskets of the heat exchanger				X
4.6. Heat exchanger with intermediate heat carrier				
Fluid leakage	X		X	
Operation of piping components	X		X	
Cleaning of the heat exchanger				X
4.7. Water heater/cooler				
Fluid leakage	X		X	
Operation of valves, gears, pumps	X		X	
Protection from freezing	X		X	
Cleaning of the heat exchanger				X
4.8. Direct evaporation air cooler/heater				
Refrigerant leakage	X		X	
Heat exchanger cleaning				X
Operation of an external unit	X		X	
4.9. Electrical heater				
Electrical installation	X		X	
Operation of overheat protection	X	X		
Cleaning of heating elements				X

Task	Frequency			
	Commis- sioning	3 months	6 months	12 months
4.10. Gas heater				
Gas leaks	X	X		
Gas leakage protection (if installed)	X		X	
Burner operation	X			X
Burner cleaning				X
Air supply and flue gas removal	X			X
4.11. Humidifier				
Operation of a water treatment system	X	X		
Inspection of humidifier components		X		
Cleaning of the humidifier			X	
4.12. Noise suppressors				
Inspection of a noise suppressor			X	
Cleaning of a noise suppressor				X
4.13. Additional works on sanitary appliances				
Cleaning and disinfection of inner surfaces after installation	X			
Cleaning and disinfection of outer surfaces after installation			X	
Disinfection of condensate trays and drainage		X		
Cleaning and disinfection of drip trays			X	
Cleaning and disinfection of heat exchangers			X	
Cleaning and disinfection of a rotary heat exchanger			X	
Cleaning and disinfection of a plate heat exchanger			X	
Cleaning and disinfection of an impeller			X	

4.1. Housing

After installing the unit, check whether there are no foreign objects, debris or tools inside the unit. This check shall be performed regularly. Inner and outer surfaces shall be cleaned with a damp cloth or a vacuum cleaner. Also check the housing for mechanical damage or signs of corrosion which could affect normal operation of the unit. As building stability may change over time (e.g., settling of foundations), regular unit horizontality checks using a level gauge are recommended; levelling shall be performed, if needed. Deviations must not exceed 0.3 mm for 1 m in the longitudinal direction and 0.5 mm for 1 m in the transverse direction; otherwise the sections may warp and loosen their connections. Check the unit doors for tightness and if all gaskets or sealant joints are intact. Replace gaskets and re-seal joints, if needed. Inspect air collection/exhaust dampers and grilles. Remove accumulated dirt; check dampers for proper opening and tight closing. Check operation of electric actuators of dampers and wiring contacts. Check whether condensate is being freely removed from drip trays; check siphons for proper operation; check drainage pipeline components for damage/blockage.

4.2. Filters

Check if filters are not damaged, torn or dampened. Filter change intervals depend on the environment pollution conditions as well as time of year, for example, during spring and summer filters may be contaminated with pollen, fluffs or insects, therefore change intervals are shorter. Replace filters if they are visibly dirty even though it is not time yet or differential pressure has not reached a critical limit yet. Contaminated filters increase pressure loss of the unit, reduce purification efficiency and increase electricity consumption of electric fans. If differential pressure sensors are installed, check them for proper operation; whether their pressure tubes are clean/intact.

4.3. Fans

Check whether fans rotate freely without any obstructions, extraneous noise and vibrations. Check whether the frame dampers and a motor belt (in fans with a belt drive) are not worn out. Replace worn out or damaged components if needed. Dirt, grease or dust may unbalance the impeller and cause additional vibrations as well as shorten the motor service life. Impeller shall be cleaned with a damp cloth. Motor surfaces shall be cleaned with a dry cloth or a vacuum cleaner. Check motor connecting cables; check for corrosion on contacts; clean contacts with special agents if need-

ed. Check operation of a motor overheat protection if installed. Turn on the ventilation device and check whether the fans are rotating to the desired direction and the rotation speed alternates depending on the automation settings.

4.4. Rotary heat exchanger

Check whether the rotor drum rotates freely, is not touching any metal parts of the housing, and its bearings are intact. Check the drive and motor. Rotary heat exchanger shall rotate at approx. 12 rpm. Check if the drum brushes are not worn out. Replace, if needed. If the rotary heat exchanger is equipped with a V-belt with holes, belt tensioning inspection shall be carried out. New belts may elongate over time causing them to slide without turning the drum. The belt shall be shortened when the drive bracket nearly touches the bottom of the section. The belt shall be shortened so that there is at least a 30 mm gap between the drive motor and the drum. Round polyurethane belts are fitted with high tension and do not require shortening. Worn or torn belts must be replaced.

Air ducts of the rotary heat exchanger may be contaminated with grease, oils, limescale and other dirt over time. It shall be cleaned with compressed air (~6 bar).

4.5. Plate heat exchanger

Check the bypass valve and its drive for proper operation, proper opening and tight closing. Check differential pressure sensors and tubes of the heat exchanger, if installed. Inspect gaskets and sealed connection joints. Replace gaskets and reseal joints if needed. Air ducts of the heat exchanger may be contaminated with grease, oils, limescale and other dirt over time. It shall be cleaned with compressed air (~6 bar).

4.6. Heat exchanger with intermediate heat carrier

Check for fluid leaks; check for proper operation of a check valve and a pump. Check threaded connections for tightness. Dirt from the heat exchanger surfaces shall be removed with compressed air. Be careful not to damage the heat exchanger plates while cleaning.

4.7. Water heater/cooler

Check for fluid leaks; check for proper operation of a check valve and a pump. Check threaded connections for tightness. Check operation of an antifreeze protection system. Check whether the return water temperature sensor is installed and isolated correctly. Check a capillary thermostat, if installed, for proper operation.

Dirt from the heat exchanger surfaces shall be removed with compressed air. Be careful not to damage the heat exchanger plates while cleaning.

4.8. Direct evaporation cooler/heater

Check refrigerant for leaks. Using a humidity indicator, check whether the refrigerant is moisture free; check for sufficient amount of refrigerant. Check operation of the external unit and temperature sensors. Perform regular maintenance works of a direct evaporation cooler/heater in accordance with the manufacturer's documentation.

Dirt from the heat exchanger surfaces shall be removed with compressed air. Be careful not to damage the heat exchanger plates while cleaning.

4.9. Electrical heater

Check operation of overheat thermostats and automation. Inspect power supply installation, contacts and automatic switches.

Heating tubes of the electrical heater may get contaminated with dust and other dirt that may ignite under excessive heat, therefore they must be cleaned. Tubes must be cleaned with a damp cloth or compressed air. Wait for the tubes to dry completely before turning on the device.

4.10. Gas heater

Check for gas leaks; check whether all threaded connections are tight. Gas leakage is checked by smearing gas pipeline connections with soapy water. Check temperature sensors and burners for proper operation. Remove the gas burner and clean it with compressed air. Check burner gaskets and replace, if needed. Inspect the combustion chamber and remove any sediment using a vacuum cleaner. Clean a condensate drainage system, air supply duct and flue gas pipe. Check whether the flue gas pipe is tight and flue gas does not enter into the air flow.

Perform regular gas heater maintenance in accordance with the manufacturer's documentation.

4.11. Humidifier

Regular cleaning is required for normal operation of the humidifier. Cleaning intervals depend on water quality. Humidifier must be inspected at least every three months and cleaned every six months. If water contains high levels of calcium and salts, the humidifier inspection intervals must be shorter. Automatic periodic washing function of the humidifier section must be foreseen for sanitary purposes. Air supply to the ventilation system must be stopped during washing of the section. After washing, the water must be completely removed from the drainage tray.

Perform regular humidifier maintenance in accordance with the manufacturer's documentation.

4.12. Noise suppressors

Noise suppressors shall be disassembled for cleaning. Metal parts can be cleaned with a damp cloth. Noise suppression elements shall be cleaned with a vacuum cleaner. Washing or cleaning with damp products is not allowed.

4.13. Additional works on sanitary appliances

- Once installed, all unit sections must be cleaned with a cloth and/or a vacuum cleaner. Inner surfaces must be disinfected.
- Most of the unit components (heat exchanger, drip trays, fan units) are designed to allow easy removal for cleaning and disinfection of inner surfaces. This allows accessing and cleaning of hard to reach places of the unit.
- Drip trays can be removed and disassembled. They can be cleaned with a damp cloth. Disinfectants must be of neutral pH. Make sure that the drip tray is correctly reassembled before inserting it to the unit.
- Heat exchangers are cleaned with compressed air. If the heat exchanger is removable, it also may be

cleaned with high-pressure washers using washing and disinfecting agents. Washing agents must be harmless to the environment, shall not damage aluminium foil and shall be intended for use with high-pressure washers. Be careful not to damage the heat exchanger plates while cleaning.

- Rotary and plate heat exchangers are cleaned with high-pressure washers (pressure up to 10 bar). Before washing, the heat exchanger shall be removed from the unit section; the actuator and electronics shall be protected against moisture or disassembled. Neutral or mild alkaline detergents and disinfection agents must be used for washing. Washing agents must be harmless to the environment, shall not damage aluminium foil and shall be intended for use with high-pressure washers.
- Impeller shall be cleaned with a damp cloth. Protect the fan motor against moisture before cleaning the impeller. The impeller is factory balanced, therefore it should not be removed from the motor axis.



After washing, all components must be completely dried before turning on the unit.

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