USER'S MANUAL

VUT 350 PE EC
VUT 600 PE EC
VUT 1000 PE EC

HEAT RECOVERY AIR HANDLING UNIT

CONTENTS

SAFETY REQUIREMENTS

- Please read the user's manual carefully prior to installing and operating the unit.
- All user's manual requirements as well as the provisions of all the applicable local and national construction, electrical, and technical norms and standards must be observed when installing and operating the unit.
- The warnings contained in the user's manual must be considered most seriously since they contain vital personal safety information.
- Failure to follow the rules and safety precautions noted in this user's manual may result in an injury or unit damage.
- After a careful reading of the manual, keep it for the entire service life of the unit.
- While transferring the unit control, the user's manual must be turned over to the receiving operator.

UNIT INSTALLATION AND OPERATION SAFETY PRECAUTIONS

- Disconnect the unit from power mains prior to any installation operations.

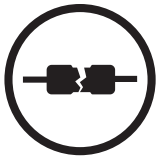
- Unpack the unit with care.

- The unit must be grounded!

- While installing the unit, follow the safety regulations specific to the use of electric tools.

- Do not change the power cable length at your own discretion. Do not bend the power cable. Avoid damaging the power cable. Do not put any foreign objects on the power cable.

- Do not lay the power cable of the unit in close proximity to heating equipment.



- Do not use damaged equipment or cables when connecting the unit to power mains.

- Do not operate the unit outside the temperature range stated in the user's manual. Do not operate the unit in aggressive or explosive environments.

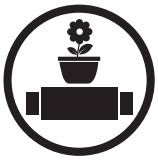
- Do not touch the unit controls with wet hands. Do not carry out the installation and maintenance operations with wet hands.

- Do not allow children to operate the unit.

- Do not store any explosive or highly flammable substances in close proximity to the unit.

- Do not open the unit during operation.

- Do not block the air duct when the unit is switched on.



- Do not sit on the unit and avoid placing foreign objects on it.

- Do not wash the unit with water. Protect the electric parts of the unit against ingress of water.

- Disconnect the unit from power mains prior to any technical maintenance.

- When the unit generates unusual sounds, odour, or emits smoke, disconnect it from power supply and contact the Seller.

- Do not direct the air flow produced by the unit towards open flame or ignition sources.

- In case of continuous operation of the unit, periodically check the security of mounting.

- Use the unit only for its intended purpose.

THE PRODUCT MUST BE DISPOSED SEPARATELY AT THE END OF ITS SERVICE LIFE.
DO NOT DISPOSE THE UNIT AS UNSORTED DOMESTIC WASTE.

INTRODUCTION

This user's manual includes technical description, operation, installation and mounting guidelines, technical data for the heat recovery air handling unit VUT PE EC, hereinafter referred as the unit.

USE

The unit is designed to ensure continuous mechanical air exchange in houses, offices, hotels, cafés, conference halls, and other utility and public spaces as well as to recover the heat energy contained in the air extracted from the premises to warm up the filtered stream of supply air.
The unit is not intended for organizing ventilation in swimming pools, saunas, greenhouses, summer gardens, and other spaces with high humidity.
Due to the ability to save heating energy by means of energy recovery, the unit is an important element of energy-efficient premises.
The unit is a component part and is not designed for stand-alone operation.
It is rated for continuous operation.
Transported air must not contain any flammable or explosive mixtures, evaporation of chemicals, sticky substances, fibrous materials, coarse dust, soot and oil particles or environments favourable for the formation of hazardous substances (toxic substances, dust, pathogenic germs).
Relative humidity of transported air must not exceed 80 % at an ambient temperature of +20 °C.

THE UNIT SHOULD NOT BE OPERATED BY CHILDREN OR PERSONS WITH REDUCED PHYSICAL, MENTAL, OR SENSORY CAPACITIES, OR THOSE WITHOUT THE APPROPRIATE TRAINING.

THE UNIT MUST BE INSTALLED AND CONNECTED ONLY BY PROPERLY QUALIFIED PERSONNEL AFTER THE APPROPRIATE BRIEFING.

THE CHOICE OF UNIT INSTALLATION LOCATION MUST PREVENT UNAUTHORIZED ACCESS BY UNATTENDED CHILDREN.

DELIVERY SET

Unit - 1 item
Control panel - 1 item
User's manual for the air handling unit - 1 item
User's manual for the control panel - 1 item
Packing box 1 item
Outdoor temperature sensor - 1 item.

DESIGNATION KEY

VUT XXX PE EC X X

Unit type
VUT - heat recovery ventilation
Air capacity [m³/h]
Mounting option
P - suspended mounting
Heater type
E - electric heater
Motor type
EC - electronically commutated motor
Service side
L - left service side
R - right service side
Control panel
____ — PU SENS 01 with a sensor display
A7 — PU JK 01 with LCD display

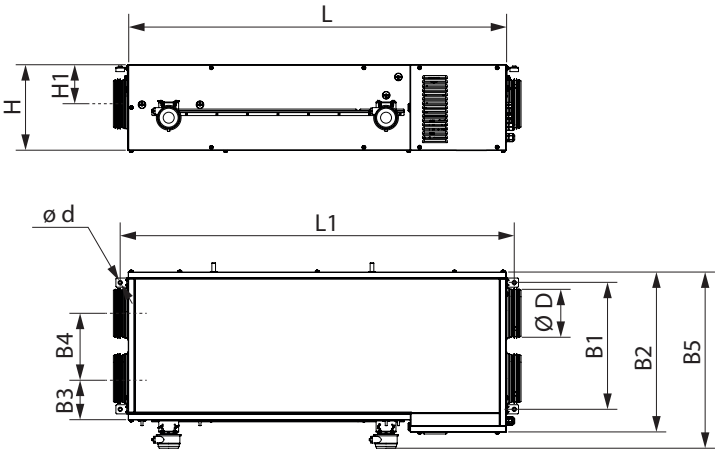
The unit is designed for indoor application with the ambient temperature ranging from +1 °C up to +40 °C and relative humidity up to 80 %.
In order to prevent condensation on the internal walls of the units, it is necessary that the surface temperature of the casing is 2-3 °C higher than the dew point temperature of the transported air.
The unit is rated as a Class I electrical appliance.
Hazardous parts access and water ingress protection rating:

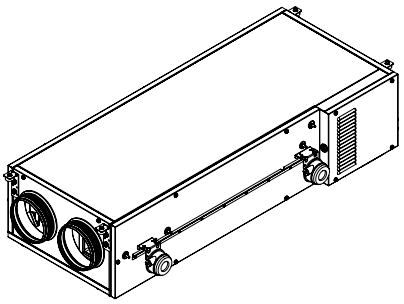
- IP22 for the unit connected to the air ducts
- IP44 for the unit motors

The unit design is constantly being improved, thus some models may be slightly different from those described in this manual.

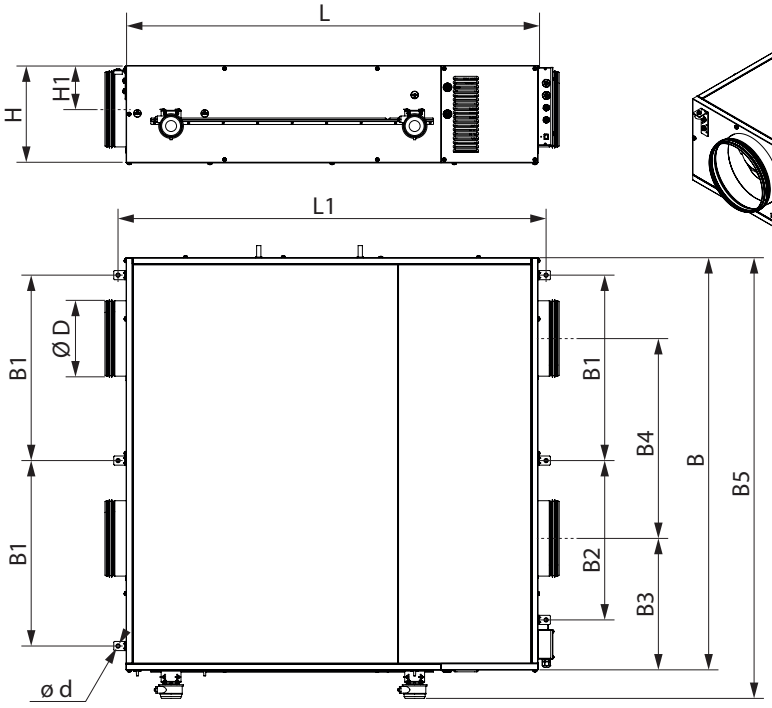
UNIT TECHNICAL DATA				
Voltage, 50/60 Hz [V]		1 ~ 230		
Max. fan power [W]		200	270	400
Max. fan current [A]		1,62	1,6	2,26
Electric heater power [kW]		1,5	2	3,3
Electric heater current [A]		6,5	8,7	14,3
Total unit power [kW]		1,7	2,27	3,7
Total unit current [A]		8,12	10,3	16,56
Air capacity [m^3/h]		400	700	1100
Rotation speed [min^{-1}]		3560	3060	2780
Noise level, 3 m [dBA]		48	53	52
Transported air temperature [°C]		-25 ... +40	-25 ... +60	
Casing material		Aluzinc		
Insulation		20 mm mineral wool		
Filter:	extract	G4		
	supply	G4 (F7)		
Connecting air duct dia. [mm]		Ø160 (Ø150)*	Ø200	Ø250
Weight [kg]		67	75	95
Heat recovery efficiency		up to 90%		
Heat exchanger type		Counter-flow		
Heat exchanger material		Polystyrene		
* in case of using a Ø 160 to Ø 150 mm air duct. Not included into the delivery set.				

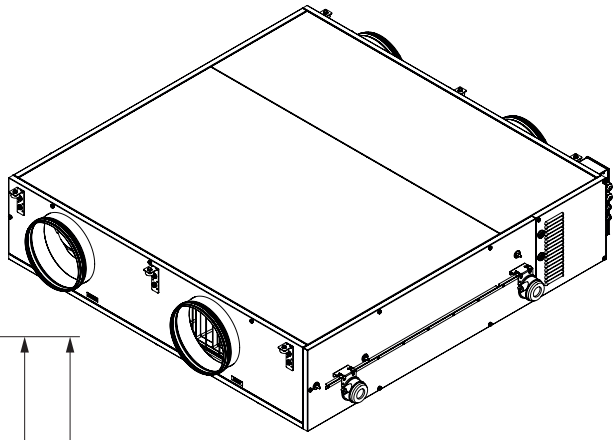
VUT 350 PE EC





VUT 600 PE EC, VUT 1000 PE EC





OVERALL DIMENSIONS OF THE UNIT, MM

Modell	Ø D	B	B1	B2	B3	B4	B5	H	H1	L	L1
VUT 350 PE EC	160	485	415	554	135,5	214	577	281	152	1238	1291
VUT 600 PE EC	200	827	713	723	294	345	920	280	120	1238	1291
VUT 1000 PE EC	250	1351	608	522	431	655	1444	318	143	1349	1402

The unit operates as follows:

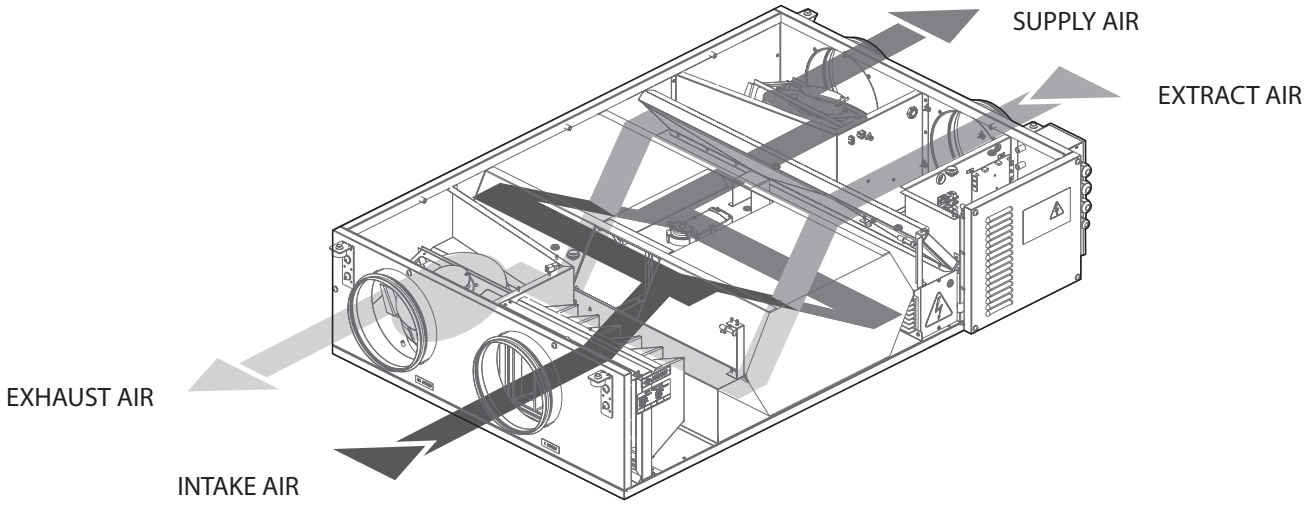
Warm stale extract air from the room flows through the air ducts to the unit, where it is filtered, then air flows through the heat exchanger and is exhausted outside by the extract fan through the air ducts.

Clean cold air from outside is moved by the supply fan to the unit, where from it is directed to the supply filter. Then filtered air flows through the heat exchanger and moves to the room through the air ducts.

Heat energy of warm extract air is transferred to clean intake fresh air from outside and warms it up. Heat recovery minimizes thermal energy losses, energy demand and operating costs for air heating accordingly.

The unit is equipped with a detachable service panel for repair works and preventive maintenance and a cover enabling access to the control system components.

UNIT OPERATING LOGIC
based on VUT 600 PE EC unit example



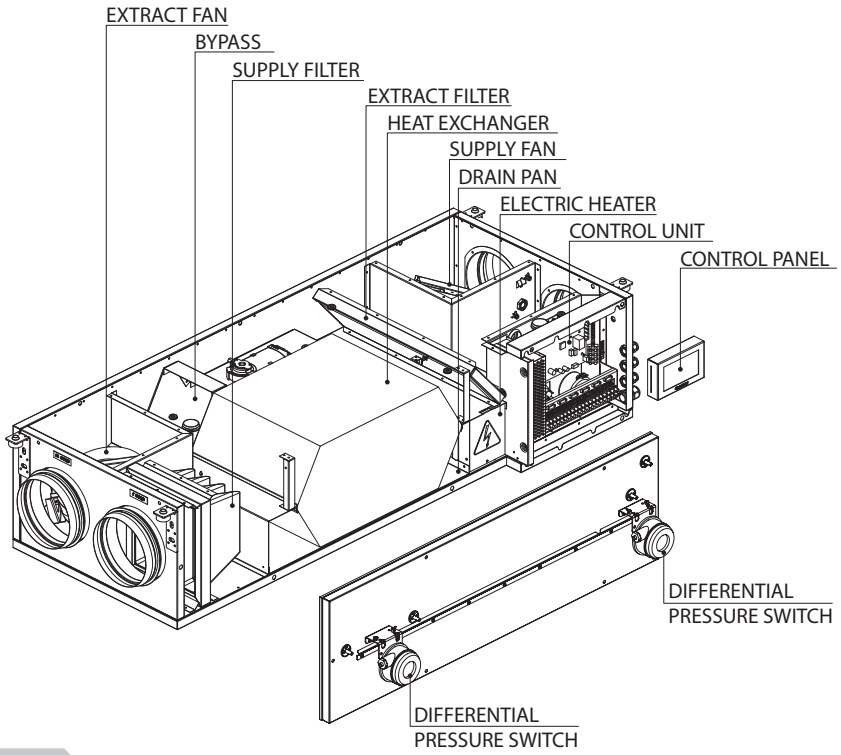
The basic unit delivery set includes a remote control panel for connection to the control system inside the unit casing.

The unit comprises a supply and an extract centrifugal single-inlet fan with forward curved blades and maintenance-free EC motors with external rotor and built-in overheat protection, a plate counterflow heat exchanger and an electric heater.

The supply G4 filter cleans supply air flow and prevents contamination of the unit parts. The extract G4 filter prevents contamination of the unit components.

Some condensate may be generated during heat recovery. The condensed fluid is collected in the drain pan and is removed from the unit through the drain hoses.

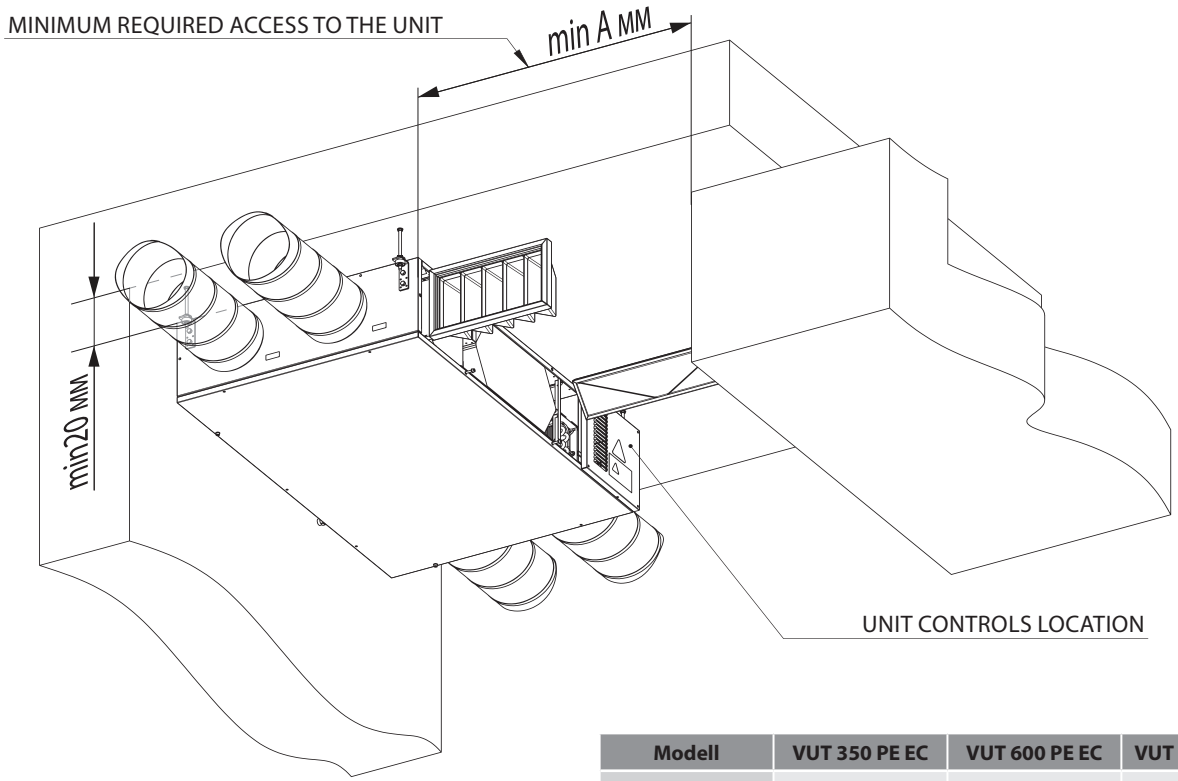
UNIT DESIGN BASED
on VUT 350 PE EC



MOUNTING AND START-UP

MINIMUM ACCESS TO THE UNIT

While mounting the unit provide enough space for its servicing and maintenance.

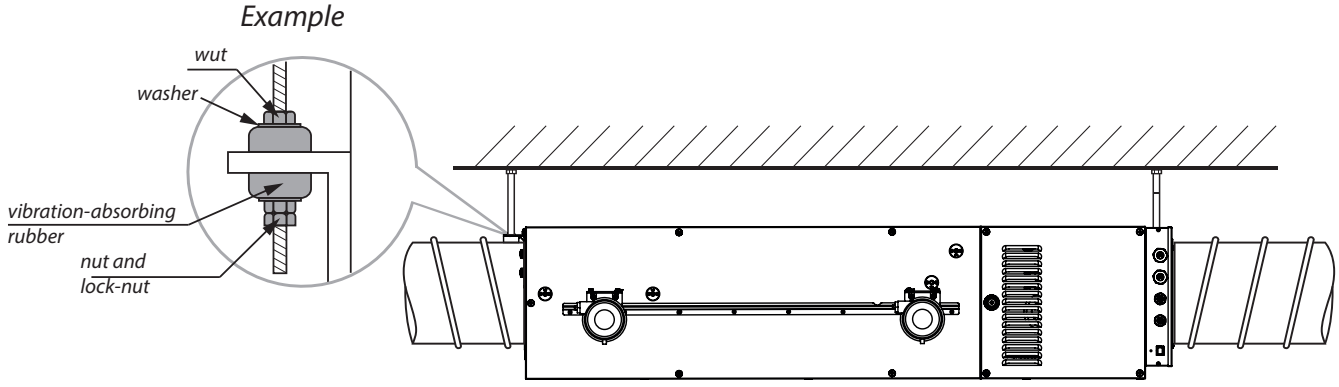


Modell	VUT 350 PE EC	VUT 600 PE EC	VUT 1000 PE EC
min A, mm	500	850	800

min A depends on the filter
VUT 350 PE EC - 441 mm;
VUT 600 PE EC - 784 mm;
VUT 1000 PE EC - 650 mm (less than VUT 600 PE EC).

UNIT MOUNTING

The unit is designed for suspended mounting by means of the threaded rod fixed in the threaded dowel pin.



To attain the best performance of the unit and to minimise turbulence-induced air pressure losses while mounting connect a straight air duct section on both sides of the unit.

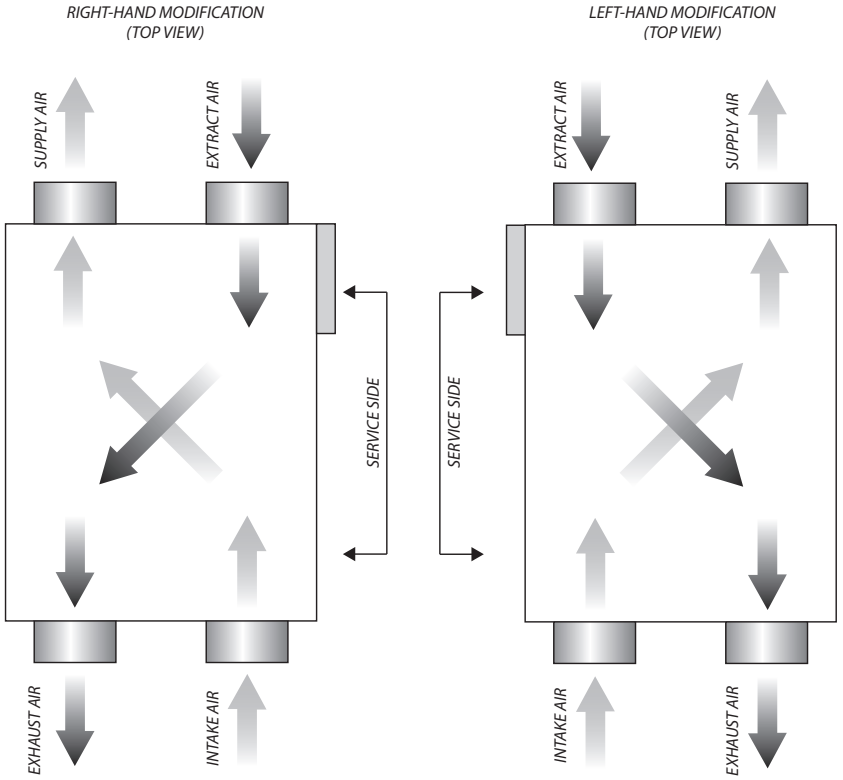
Minimum straight air duct length:

- equal to 1 air duct diameter on intake side.
- equal to 3 air duct diameters on outlet side.

If the air ducts are not connected or the connected air ducts are too short, protect the unit parts from ingress of foreign objects by covering the spigots with a protecting grille or other protecting device with mesh width not more than 12.5 mm to prevent uncontrollable access to the fans.

UNIT MODIFICATIONS

The unit is available with the service side located on the left and on the right of the unit to facilitate mounting and provide minimum service access.



Safety precautions

The unit is designed for mounting on a rigid and stable structure.

The unit is mounted with anchor bolts. Make sure that a mounting construction has sufficient load capacity matching the unit weight. Otherwise reinforce an installation place by beams, etc.

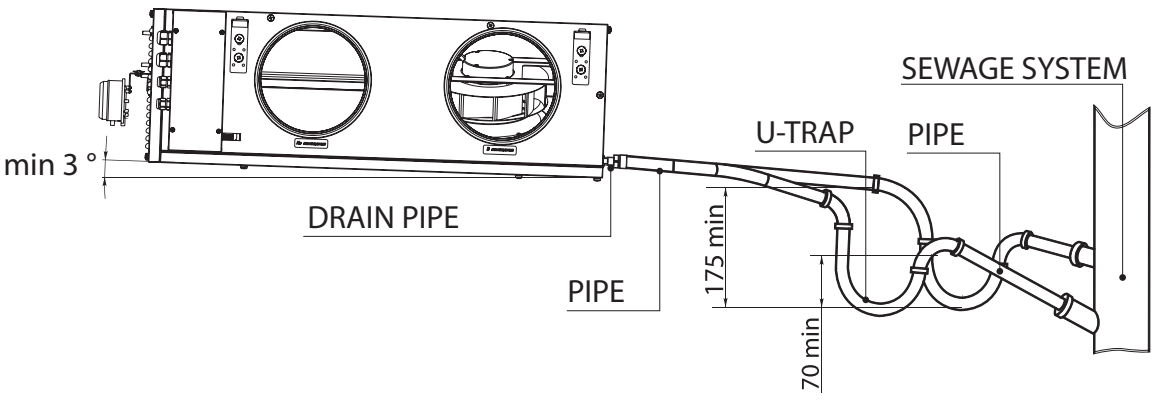
If the threaded bolts used for the unit mounting are too short, the unit can generate abnormal noise and resonate with the ceiling. The suspended bolts must be long enough to prevent resonating.

If the unit connection place to the spiral seam duct is supposed to be the source of abnormal noise, replace the spiral seam air duct with the flexible one. Optionally the flexible connectors may be used to prevent resonating.

CONDENSATE DRAINAGE

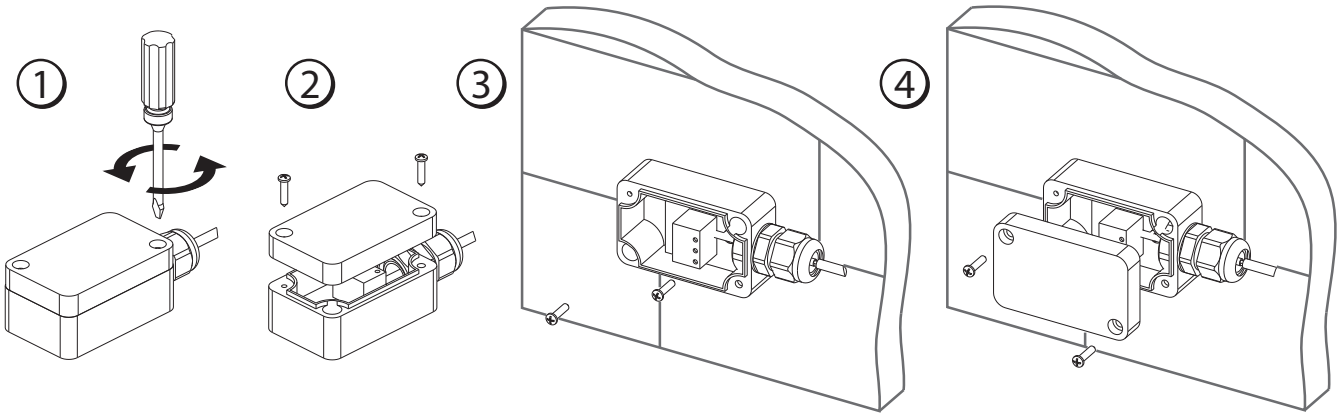
The condensate drain pan in the heat recovery section is equipped with two hoses for extracting the condensed fluid outside the unit. Connect the pipe, U-trap (not included in delivery package) and sewage collection system with metal, plastic or rubber connecting pipes. The pipe slope downwards must be at least 3°. Fill up the system with water before connecting the unit to the power mains! The U-trap must always be filled with water during the unit operation. Make sure that the water flows freely into the sewage collection system or otherwise condensed water may build up in the unit during the heat exchanger operation and cause equipment failure and condensed water outflow into the premises.

The condensate drainage system is designed for normal operation in premises with air temperatures above 0 °C. If the expected ambient air temperatures are below 0 °C the condensate drainage system must be equipped with heat insulation and pre-heating facilities.



OUTDOOR TEMPERATURE SENSOR INSTALLATION AND CONNECTION

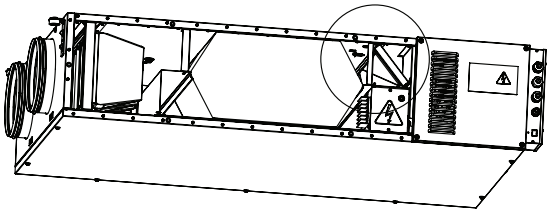
The air handling unit is equipped with an outdoor temperature sensor.
Mounting of the outdoor temperature sensor:
1. Remove two screws from the sensor cover.
2. Take off the cover from the sensor.
3. Install the sensor on the outside wall. The wall must not be exposed to direct sunlight.
4. Install the sensor cover back.
5. Connect the sensor to the terminal block X1 in compliance with the external wiring diagram at page 12.

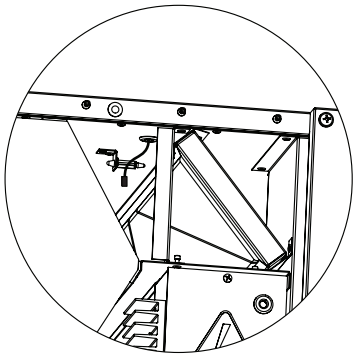


DUCT HUMIDITY SENSOR INSTALLATION AND CONNECTION

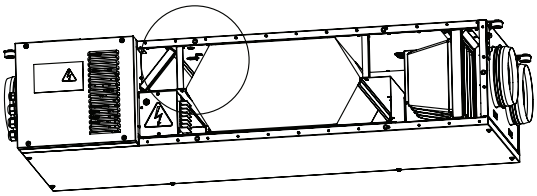
HV1 duct humidity sensor is a special accessory that is not included into the delivery set. To install the sensor connect the humidity sensor socket connector to the socket connector inside the unit. Then fix the sensor with the clamp and the holder in the extract air duct upstream of the heat exchanger.

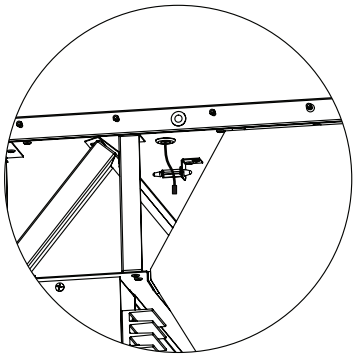
Duct humidity sensor installation place
VUT 350 PE EC



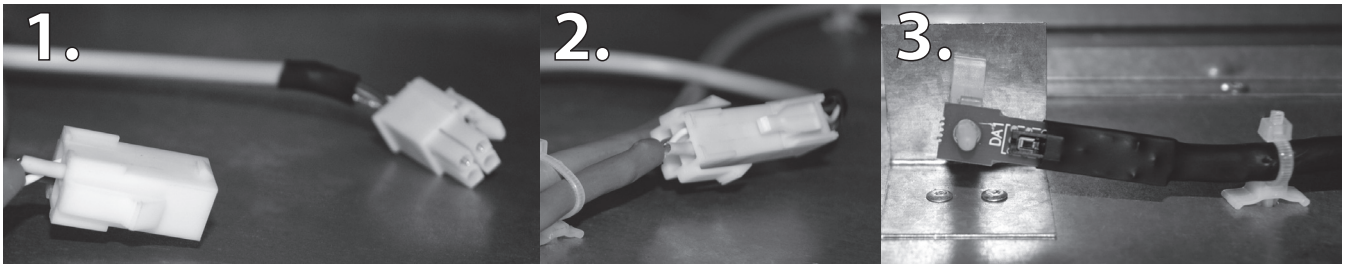


Duct humidity sensor installation place
VUT 600(1000) PE EC





Duct humidity sensor connection



DISCONNECT THE POWER SUPPLY PRIOR TO ANY OPERATIONS WITH THE UNIT.

CONNECTION OF THE UNIT TO POWER MAINS IS ALLOWED BY A QUALIFIED ELECTRICIAN WITH A WORK PERMIT FOR THE ELECTRIC UNITS UP TO 1000 V AFTER CAREFUL READING OF THE PRESENT USER'S MANUAL. THE RATED ELECTRICAL PARAMETERS OF THE UNIT ARE GIVEN ON THE MANUFACTURER'S LABEL.

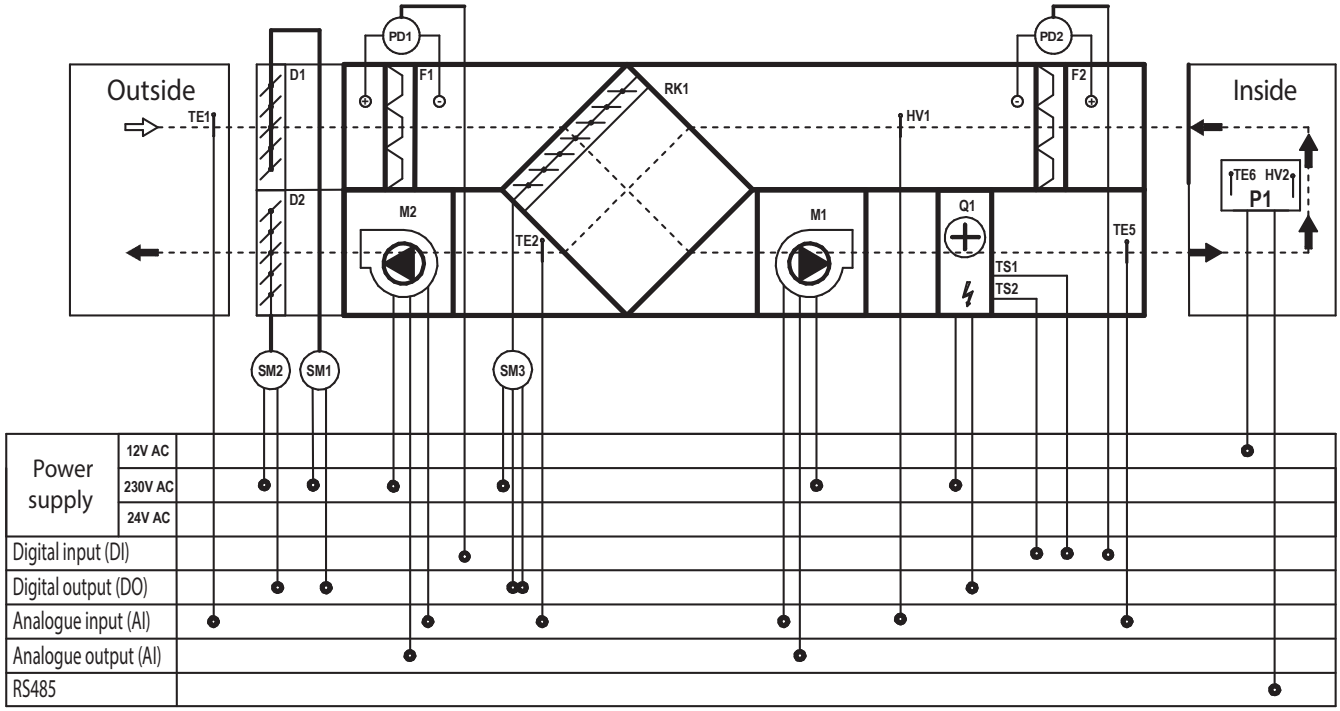
ANY TAMPERING WITH THE INTERNAL CONNECTIONS IS PROHIBITED AND WILL VOID THE WARRANTY.

The unit is rated for connection to single-phase ac 230 V/ 50-60 Hz power mains. For electric installations use insulated durable heat-resistant conductors (cables, wires) with the minimum wire cross section 2.5 mm^2.The above conductor cross section value is tentative and in practice must be based on the wire type, maximum permissible heating temperature, insulation, length and installation method.

Connect the unit to power mains through the external automatic circuit breaker with magnetic trip integrated into the fixed wiring system with the rated current not below the rated current consumption (refer to page 6).

The terminal block with the prewired control unit is located inside the control unit compartment. To connect the power and the ground cable route the cables through the airtight electric lead-in in the unit casing and connect these to the terminal block. The wiring diagram for connection of the air handling unit to power supply is on back side of the lid.

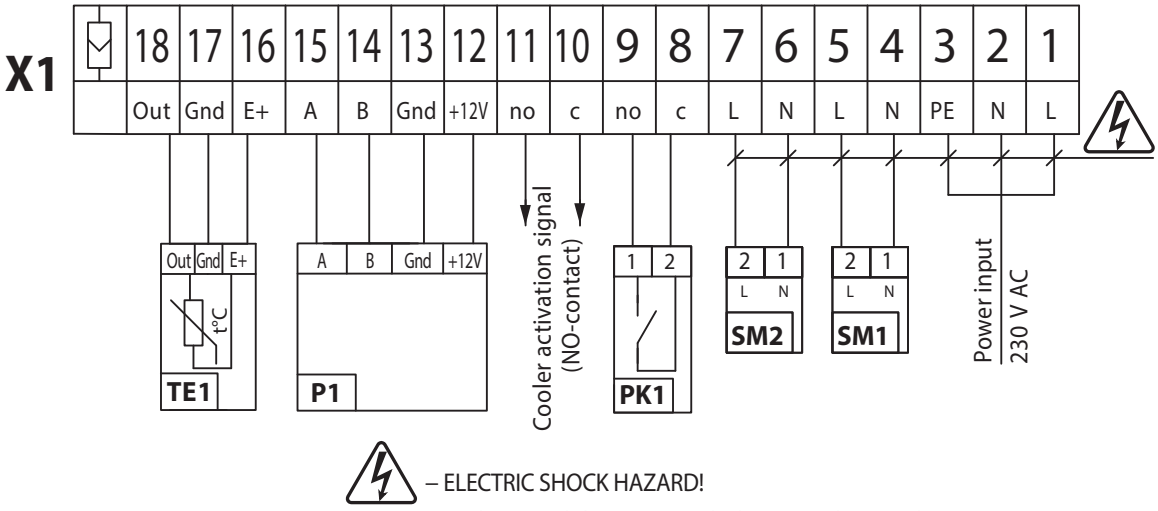
FUNCTIONAL DIAGRAM



Designation	Name	Designation	Name
D1*	Supply air damper	**RK1**	Plate heat exchanger
D2*	Extract air damper	**SM1***	Supply damper actuator
F1	Supply filter	**SM2***	Extract damper actuator
F2	Extract filter	**SM3**	Bypass damper electric actuator
M1	Supply fan	**TE1**	Outer air temperature sensor
M2	Exhaust fan	**TE2**	Temperature sensor at heat exchanger outlet
P1	Control panel	**TE5**	Duct temperature sensor
Q1	Electric air heater	**TE6**	Room air temperature sensor
HV1*	Duct humidity sensor	**TS1**	Overheat protection thermostat actuated at +50 °C with automatic reset
HV2	Indoor humidity sensor	**TS2**	Overheat protection thermostat actuated at +90 °C with manual reset
		PD1	Differential pressure switch supply filter clogging control
		PD2	Differential pressure switch extract filter clogging control

* Not included into the delivery set, available on separate order.

EXTERNAL WIRING DIAGRAM



– ELECTRIC SHOCK HAZARD!

1. The unit delivery set includes P1 and TE1 only.
2. ** Maximum connecting cable length is 20 m!

Design.	Name	Type	Wire**
Cooler	DX cooler	N0	2x0,75 mm²
SM1	Supply air damper actuator	LF 230	2x0,75 mm²
SM2	Extract air damper actuator	LF 230	2x0,75 mm²
PK1	Contact from fire alarm panel	NO	2x0,75 mm²
P1	Remote control		4x0,75 mm²
TE1	Outdoor temperature sensor		3x0,75 mm²

UNIT CONTROL

The unit is operated with the control panel. For detailed information, read the user's manual for the control panel. The remote control is not included into the delivery set.

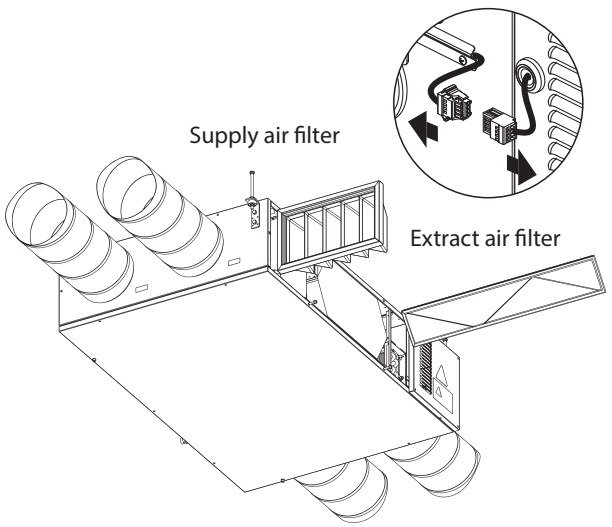
MAINTENANCE

The recommended maintenance periodicity is 3-4 times per year. The maintenance and servicing routines include regular cleaning and the following operations:

1. Filter maintenance.

Contaminated filters increase air resistance thus impairing supply air volume into the premises.

Clean the filters as these get dirty, but at least 3-4 times a year. Use a vacuum cleaner to remove the contamination or use new filters. Change the filters after the second cleaning. New filters can be purchased from the unit seller.

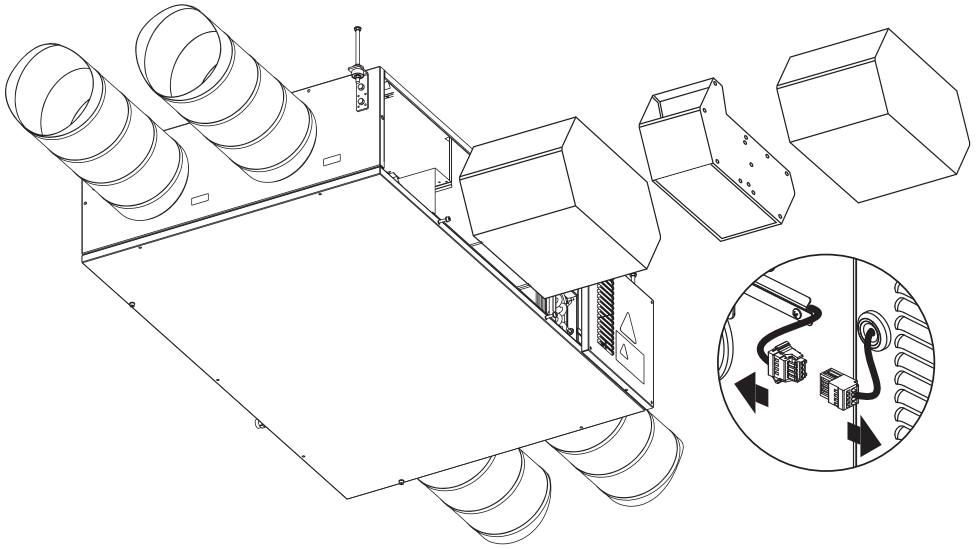


Filter removing

- Disconnect the socket connector of the differential pressure switches.
- Remove the front panel.
- Pull the filters until they disengage the guide bars.
- Install the unit in the reverse order.

2. Heat exchanger maintenance (once a year).

Even regular filter technical maintenance may not completely prevent dirt accumulation on the heat exchanger unit. Clean the heat exchanger on a regular basis to ensure its high heat recovery efficiency. To clean the heat exchanger remove it from the unit and wash it with warm neutral detergent solution. Re-install the dry heat exchanger back into the unit.



Removing the heat exchangers

- Disconnect the socket connector of the differential pressure switches.
- Take off the front cover.
- Pull the heat exchanger and withdraw it from the unit.
- Disconnect the socket connector on the bypass wall and remove the bypass.
- For VUT 600 PE EC and VUT 1000 PE EC: remove the second heat exchanger in the same way as the first one.
- Install the unit in the reverse order.

3. Fan inspection (once a year).

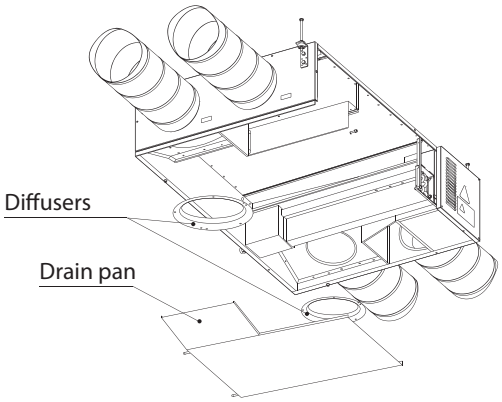
Even regular technical maintenance of the filters and heat exchangers may not completely prevent dust accumulation in the fans which reduces the fan capacity and impairs supply air volume into the premises.

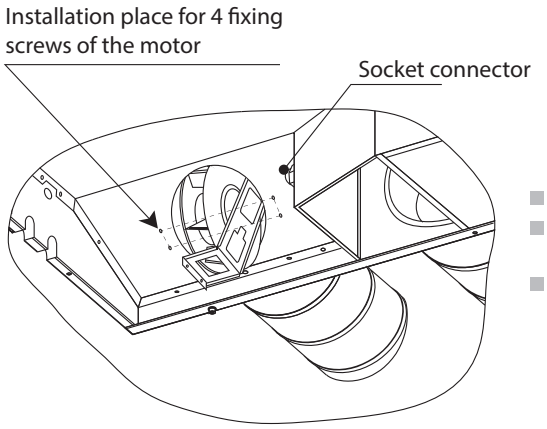
Clean the fans with a cloth or a soft brush. Do not use water, aggressive solvents, sharp objects etc. for cleaning not to damage the impeller.

Access to the fan motors:

Step 1

- Remove the bottom panel.
- Disconnect the drain hoses and remove the drain pan.
- Remove the screws and intake diffusers.





Step 2

- Unscrew fixing screws of the electric motor.
- Push the motor inside the unit through the fan inlet and disconnect the socket connector to enable access to the motor socket connector.
- Turn the motor as shown in the picture, then remove it from the unit.

4. Condensate drain maintenance (once a year).

The drain pipes may get clogged with the extracted particles. Pour some water inside the drain pan and check the pipe for clogging. Clean the U-trap and drain pipe if required.

5. Extract and supply diffuser maintenance (as required).

Remove the diffusers and louver shutters and wash these with warm mild detergent solution.

6. Air intake maintenance (twice a year).

Leaves and other pollutions can clog the supply air grille and reduce the unit performance and supply air volume. Check the supply grille twice per year and clean it as required.

7. Duct system maintenance (every 5 years).

Even regular fulfilling of all the prescribed above maintenance operations may not completely prevent dust accumulation in the air ducts which reduces the unit performance. The air duct maintenance includes regular cleaning or replacement.

TROUBLESHOOTING

Fault	Possible reasons	Fault handling
The fan does not start up during the unit start-up.	No power supply.	Make sure the unit is properly connected to power mains, otherwise troubleshoot a connection error.
	Motor is jammed, the impeller are clogged.	Turn the unit off. Troubleshoot the motor jam and the impeller clogging. Clean the blades. Restart the unit.
	System alarm.	Turn the unit off. Contact the service centre.
Circuit breaker tripping following the unit turning on.	Overcurrent as a result of short circuit in the electric circuit.	Set higher speed.
Low air flow.	Low set fan speed.	Set higher speed.
	The filters, the fans or the heat exchanger are contaminated.	Clean or replace the filters, clean the fans and the heat exchanger.
	The air ducts, diffusers, louver shutters, grilles are clogged or contaminated.	Clean or replace air ducts, diffusers, louver shutters, grilles.
	The air dampers, diffusers or louver shutters are closed.	Make sure the air dampers, diffusers or louver shutters are fully opened.
Low supply air temperature.	The extract filter is soiled.	Clean or replace the extract filter.
	The heat exchanger is frozen.	Check the heat exchanger condition. Turn the unit off and restart it after the heat exchanger freezing danger is no longer imminent.
	Electric heater malfunction.	Contact the unit seller for troubleshooting.
High noise, vibration.	The impeller is soiled.	Clean the impeller.
	The fan or casing screw connection is loose.	Tighten the screw connection in the fan or the casing against stop.
	No anti-vibration dampers.	Install anti-vibration rubber mounts.
Condensate leakage.	The drain line is clogged, damaged or wrong mounted.	Clean the drain line, if necessary. Check the drain line slant, inspect the U-trap and make sure the drain line is equipped with frost protection.

STORAGE AND TRANSPORTATION RULES

- Store the unit in the manufacturer's original packaging box in a dry closed ventilated premise with temperature range from + 5˚C to + 40˚C and relative humidity up to 70 %.
- Storage environment must not contain aggressive vapors and chemical mixtures provoking corrosion, insulation, and sealing deformation.
- Use suitable hoist machinery for handling and storage operations to prevent possible damage to the unit.
- Follow the handling requirements applicable for the particular type of cargo.
- The unit can be carried in the original packaging by any mode of transport provided proper protection against precipitation and mechanical damage. The unit must be transported only in the working position.
- Avoid sharp blows, scratches, or rough handling during loading and unloading.
- Prior to the initial power-up after transportation at low temperatures allow the unit to warm up at operation temperature for at least 3-4 hours.

The product is in compliance with EU norms and standards on low voltage guidelines and electromagnetic compatibility. We hereby declare that the product complies with the provisions of Electromagnetic Council Directive 2014/30/EU, Low Voltage Directive 2014/35/EU and CE-marking Directive 93/68/EEC. This certificate is issued following test carried out on samples of the product referred to above.
The manufacturer hereby warrants normal operation of the unit for 24 months after the retail sale date provided the user's observance of the transportation, storage, installation, and operation regulations. Should any malfunctions occur in the course of the unit operation through the Manufacturer's fault during the guaranteed period of operation, the user is entitled to get all the faults eliminated by the manufacturer by means of warranty repair at the factory free of charge. The warranty repair includes work specific to elimination of faults in the unit operation to ensure its intended use by the user within the guaranteed period of operation. The faults are eliminated by means of replacement or repair of the unit components or a specific part of such unit component.

The warranty repair does not include:
- routine technical maintenance
- unit installation/dismantling
- unit setup

To benefit from warranty repair, the user must provide the unit, the user's manual with the purchase date stamp, and the payment paperwork certifying the purchase. The unit model must comply with the one stated in the user's manual. Contact the Seller for warranty service.

The manufacturer's warranty does not apply to the following cases:
- User's failure to submit the unit with the entire delivery package as stated in the user's manual including submission with missing component parts previously dismounted by the user.
- Mismatch of the unit model and the brand name with the information stated on the unit packaging and in the user's manual.
- User's failure to ensure timely technical maintenance of the unit.
- External damage to the unit casing (excluding external modifications as required for installation) and internal components caused by the user.
- Redesign or engineering changes to the unit.
- Replacement and use of any assemblies, parts and components not approved by the manufacturer.
- Unit misuse.
- Violation of the unit installation regulations by the user.
- Violation of the unit control regulations by the user.
- Unit connection to power mains with a voltage different from the one stated in the user's manual.
- Unit breakdown due to voltage surges in power mains.
- Discretionary repair of the unit by the user.
- Unit repair by any persons without the manufacturer's authorization.
- Expiration of the unit warranty period.
- Violation of the unit transportation regulations by the user.
- Violation of the unit storage regulations by the user.
- Wrongful actions against the unit committed by third parties.
- Unit breakdown due to circumstances of insuperable force (fire, flood, earthquake, war, hostilities of any kind, blockades).
- Missing seals if provided by the user's manual.
- Failure to submit the user's manual with the unit purchase date stamp.
- Missing payment paperwork certifying the unit purchase.

FOLLOWING THE REGULATIONS STIPULATED HEREIN WILL ENSURE A LONG AND TROUBLE-FREE OPERATION OF THE UNIT.

USER'S WARRANTY CLAIMS SHALL BE SUBJECT TO REVIEW ONLY UPON PRESENTATION OF THE UNIT, THE PAYMENT DOCUMENT AND THE USER'S MANUAL WITH THE PURCHASE DATE STAMP.

ACCEPTANCE CERTIFICATE

Unit Type	Heat recovery air handling unit
Model	VUT _____ PE EC
Serial Number	
Manufacture Date	
Quality Inspector's Stamp	

SELLER'S INFORMATION

Seller	
Address	
Phone Number	
E-mail	
Purchase Date	
This is to certify acceptance of the complete unit delivery with the user's manual. The warranty terms are acknowledged and accepted.	
Customer's Signature	

Seller's Stamp

MOUNTING CERTIFICATE

The VUT _____ PE EC unit has been connected to power mains pursuant to the requirements stated in the present user's manual.		
Seller		
Address		
Phone Number		
Installation Technician's Full Name		
Installation Date:	**Signature:**	
The unit has been installed in accordance with the provisions of all the applicable local and national construction, electrical and technical codes and standards. The unit operates normally as intended by the manufacturer.		
Signature:		

Installation Stamp

WARRANTY CARD

Unit Type	Heat recovery air handling unit
Model	VUT _____ PE EC
Serial Number	
Manufacture Date	
Purchase Date	
Warranty Period	
Seller	

Seller's Stamp