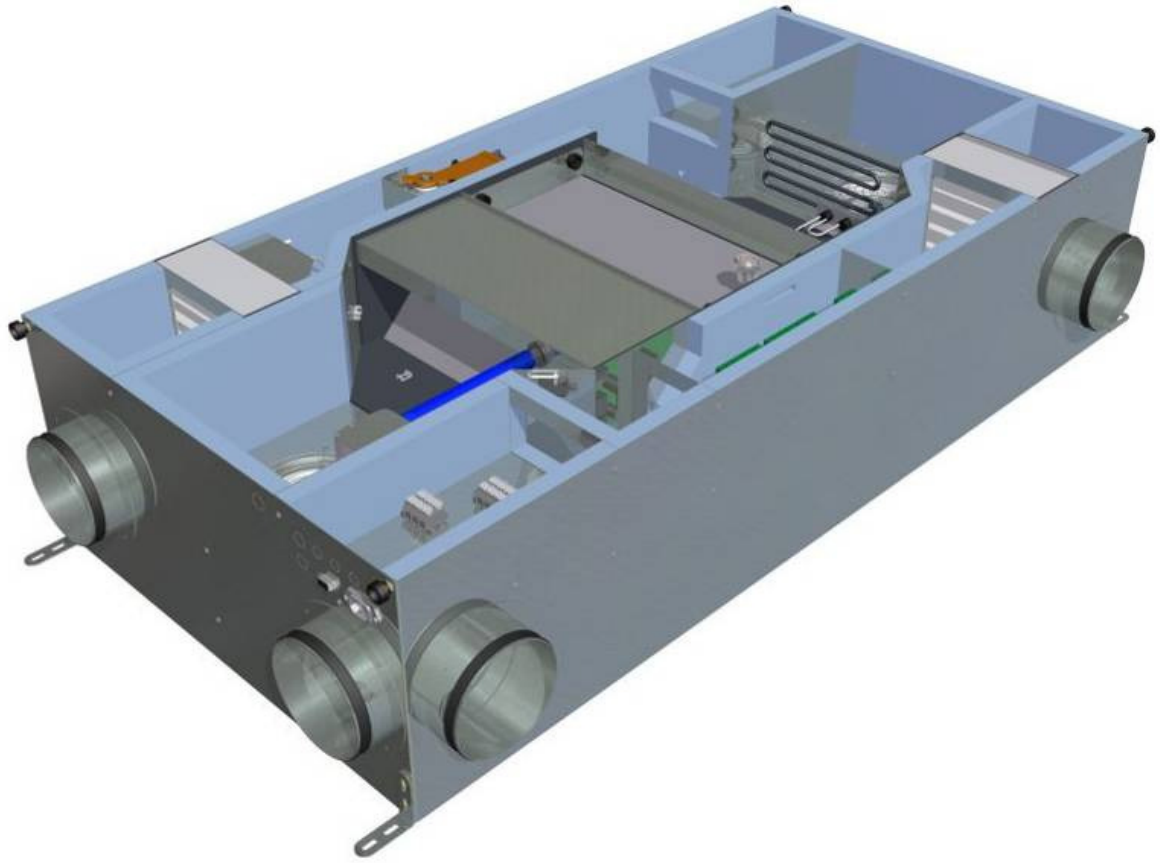
Operation and maintenance instructions



TX HomeVex

Revision 2014.08.19

Table Of Content

1.0.0 Unit Description

1.1.0 Application

The purpose of TX HomeVex is to provide balanced ventilation with heat recovery by means of mechanical supply and exhaust air.

1.2.0 Supply Area

TX HomeVex is a decentralized ventilation unit to supply a single housing or every housing unit of an apartment block.

1.3.0 Unit Principle

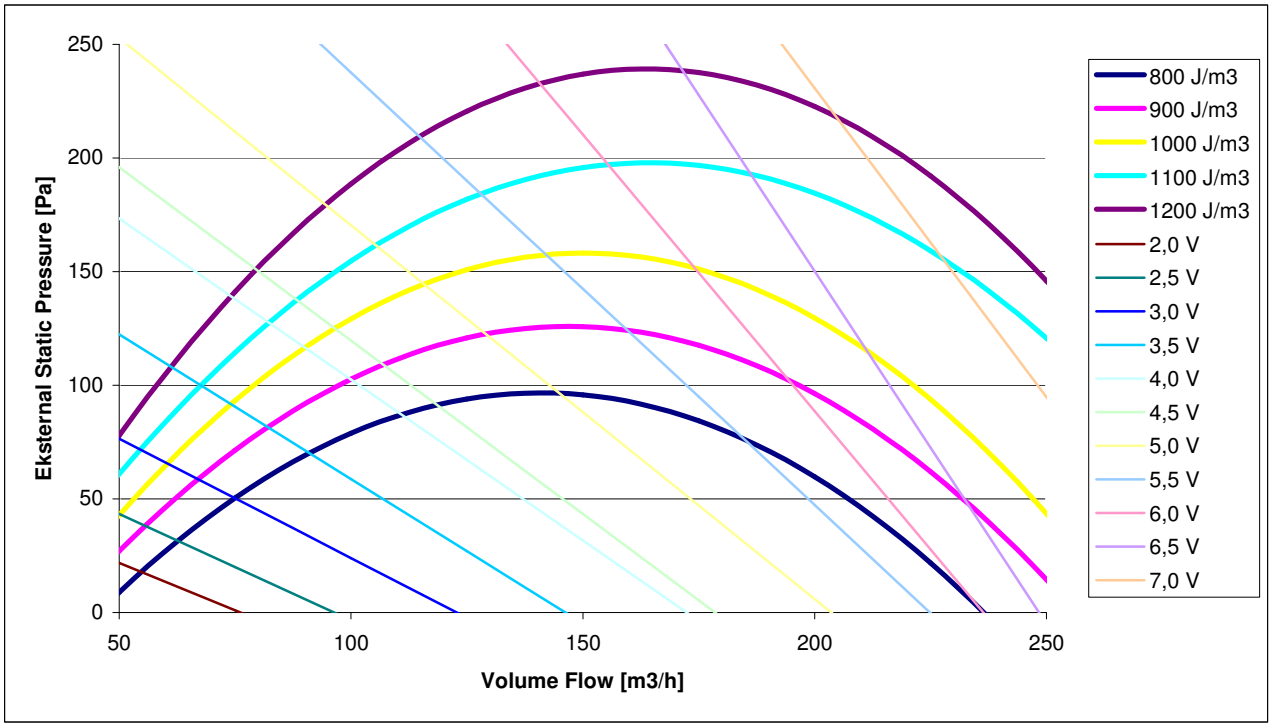
TX HomeVex is a ventilation unit for balanced, mechanical ventilation, where the drivers are electrically powered fans. The unit consists of mechanical supply and exhaust air and a heat recovery part. Included for air treatment are filters, dampers and optionally heating surfaces.
The unit can minimize overheating during hot summer periods by directing the air around the heat exchanger.

1.4.0 The Manufacturer's Trade Name And Full Address

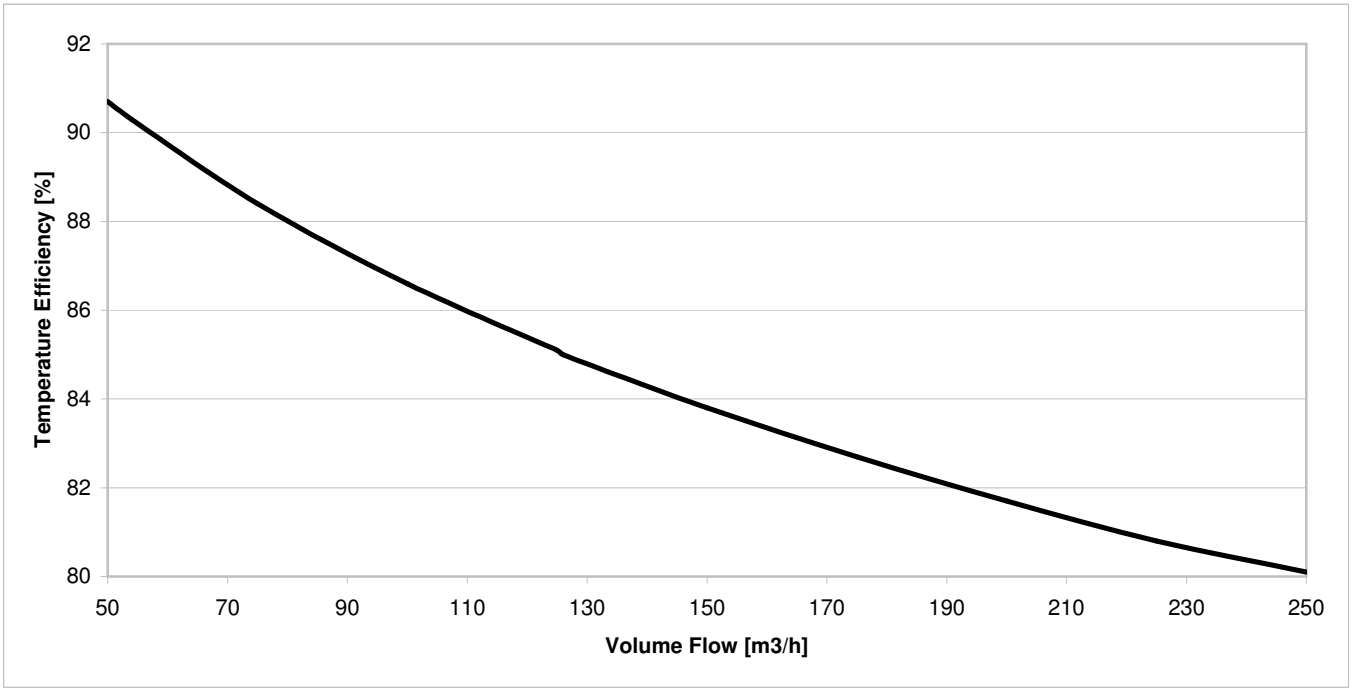
Turbovex A/S
Industrivej 45
9600 Aars
Tel. +45 96 98 14 62
Fax +45 98 62 42 24
www.turbovex.dk

1.5.0 Energy Consumption

1.5.1 SEL values



1.5.2 Heat Recovery



1.5.3 Annual Energy Consumption

Annual Energy Consumption:	**204,8 kWh**
EC Fans:	144,7 kWh
Automatics:	59,7 kWh
Condensate Pump:	0,6 kWh
Damper Motors:	0 kWh
Heating Surfaces:	0 kWh

1.5.3.1 Basis Of Calculation

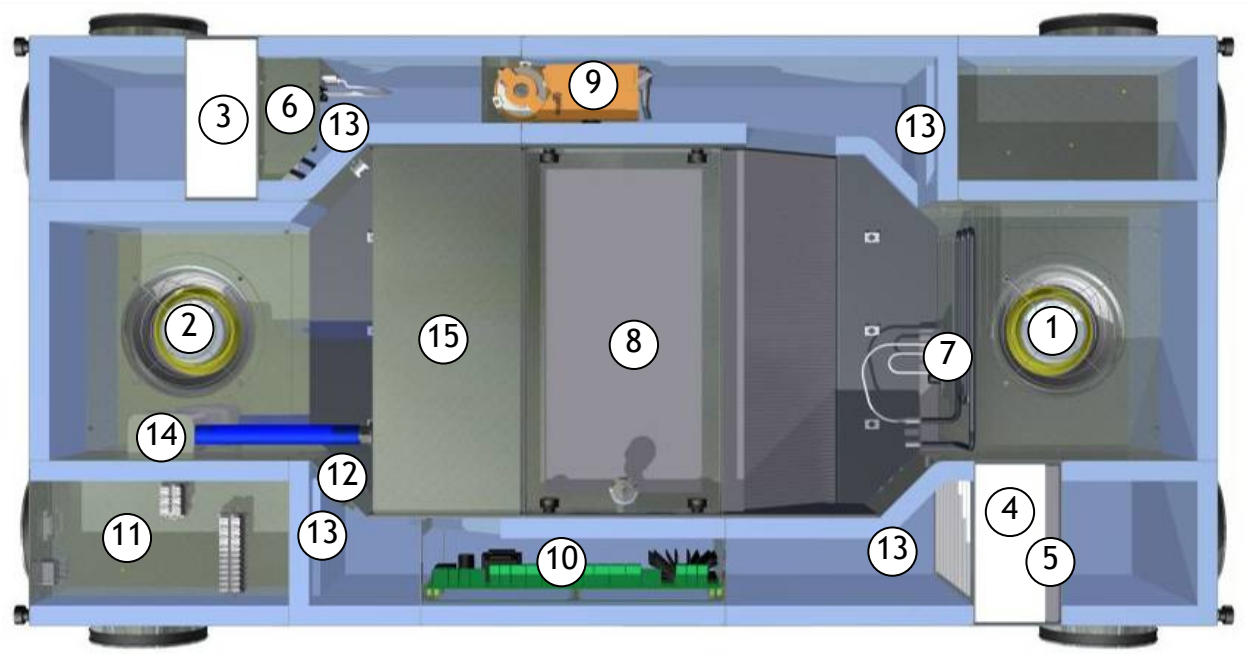
Living space:	100 m^2
Family size:	2 persons
Hydration per day:	8 liters
Indoor temperature:	20 °C
Inlet temperature:	minimum 17 °C
Condensation:	866,1 liters/year
Automatics/standby:	6,8 W (Including TX Controller)

Ventilation	V	ESP	SEL	η_t (dry)	Hours/year
Basic ventilation:	108 m^3/h	85 Pa	800 J/m^3	86,1%	8030
Forced ventilation:	126 m^3/h	121 Pa	900 J/m^3	85%	730

Outdoor climate:

	Outdoor air		Inlet air		
DRY	T [°C]	RH	T [°C]	RH	RH @ 20°C
January	0,6	89%	17,3	28,8%	24,3%
February	0,5	89%	17,3	28,6%	24,2%
March	-0,9	86%	17,1	25,3%	21,1%
April	6,6	77%	18,2	36,0%	32,2%
May	11,4	75%	18,9	46,4%	43,3%
June	13,8	80%	19,2	56,8%	54,1%
July	16,3	75%	19,5	61,3%	59,4%
August	16,7	78%	19,6	65,1%	63,5%
September	13,4	83%	19,1	57,6%	54,5%
October	8,8	90%	18,5	47,9%	43,6%
November	1,9	93%	17,5	32,6%	27,9%
December	0,1	95%	17,2	29,8%	25,0%

2.0.0 Components Overview And Component Data



1. Supply air fan
2. Exhaust air fan
3. Filter (Air intake)
4. Filter (Extract air)
5. Grease filter (Option)
6. Preheater (option)
7. Reheater (option)
8. Counterflow heat exchanger
9. Bypass damper
10. Main circuit board
11. Electrical connections
12. Door switch
13. Temperature sensors
14. Condensate pump
15. Condensate tray

2.1.0 General

This section provides a description of the main components for operation and maintenance of these.

Installation and maintenance instructions of components which are not described in the manual can be found in section 9.0.0 Data Sheets And Specifications On Main Components. For guidance on retrofitting parts, please refer to the unit's installation instruction.

2.2.0 Air Inlet and Outlet

Outside air intake and exhaust should be placed in accordance with the locally applicable regulations.

2.3.0 Fans and motors

The unit contains two Ø 190 mm EC fans consisting of motor, control and wings. The EC motor has built-in control electronics using a 0-10 V control signal to set the desired speed without loss of energy. The blades are aerodynamically optimized to achieve minimal air resistance, providing energy savings and lower noise.

2.4.0 Filters

2.4.1 Air Filters

The air filters clean the air before it is blown into the room and also protects internal parts from dust and dirt.
The system comes with standard M5/F5 filters on supply and extract air, but can be delivered with a G4 filter on the exhaust air side and a F7 filter on the supply air side.
Dimensions: 288 x 158 x 70 mm.

2.4.2 Grease FIlter (Option)

The grease filter should be used when connecting extractor hood to protect the ventilation unit's internal components.
Dimensions: 288 x 158 x 20 mm.

2.4.3 Filter Alarm

If the unit is used without a TX Controller it is possible to connect an external lamp for visual alarm for filter change.
Use a 230V lamp mounted on the unit's main circuit board. The lamp is supplied via terminals 15 (L) and 17 (N) through the option relay terminals 18 and 19. (See wiring diagram section 8.0.0)

2.5.0 Electrical Heating Coils

We recommend the installation of an electrical preheater if the unit is installed in low-energy buildings where the outside temperature for extended periods of time will be below -3 °C.

When operating without heating coil the unit uses unbalanced operation as frost protection of the heat recovery unit, which can cause negative pressure in the building.

A built in preheater will frost ensure the unit components and the balanced ventilation can be maintained.

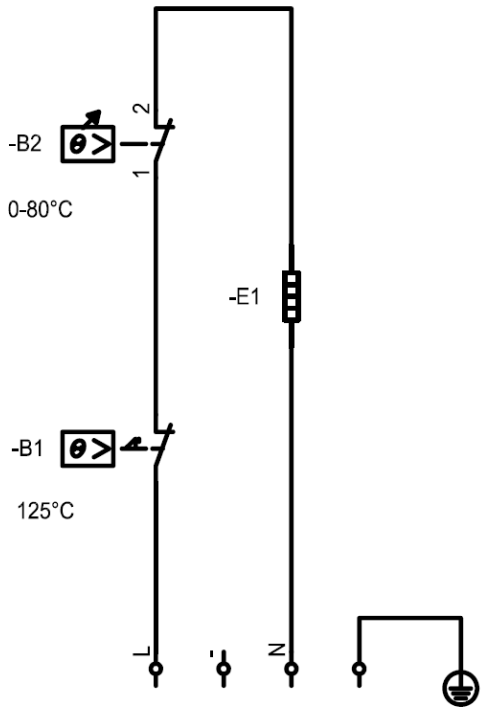
The electric heater is used for comfort ventilation, which - even at very low outdoor temperatures - requires a constant supply air temperature as well as balanced ventilation.

2.5.1 Preheater (Optional)

Conditions of use:	
Material:	AISI 304
Dimension (coil):	6,25 x 2500 mm
Current:	230 VAC
Power:	833 W
Min. air velocity:	0,4 m/s

2.5.2 Reheater (Optional)

Conditions of use:	
Material:	AISI 304
Dimension (coil):	
Current:	230 VAC
Power:	400 W
Min. air velocity:	0,4 m/s



B1: Thermo trigger without automatic reset

B2: Temperature limiter

Note: Retrofit of electric heaters must be performed by an authorized electrician!

2.6.0 Heat Recovery Component

RECUTECH s.r.o. | Staré Hradiště 402 - Areál Fáblovka | 533 52 Staré Hradiště | Czech Republic
Tel.: +420 466 769 221 | Fax: +420 466 265 442
info@recutech.com | www.recutech.com

RESULT OF EXCHANGE

SELECTED TYPE OF EXCHANGER **REK+23-370-22**

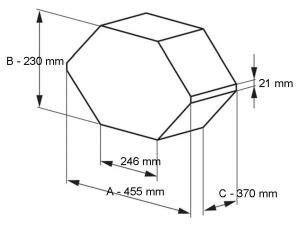
INLET CONDITIONS		Supply	Exhaust	Supply	Exhaust
Standard airflow	m3/h	112,1	104,5	130,8	121,9
Actual airflow	m3/h	108	108	126	126
Temperature in front of heat exchanger	°C	5	25	5	25
Relative humidity in front of heat exchanger	%	72	28	72	28
Water content in front of heat exchanger	g/kg	3,9	5,6	3,9	5,6
Face air velocity	m/s	0,6	0,6	0,7	0,7
Mass flow	kg/h	135	125,9	157,5	146,8
Enthalpy in front of heat exchanger	kJ/kg	14,9	39,3	14,9	39,3
Temp. condens.	°C	0,4	5,2	0,4	5,2
OUTLET CONDITIONS					
Standard pressure drop	Pa	25,2	22,9	31,2	28,3
Pressure drop	Pa	24	24	29,6	29,6
Actual airflow	m3/h	114,7	101,5	133,7	118,5
Temperature behind heat exchanger	°C	22,2	7,1	22	7,3
Relative humidity behind heat exchanger	%	23,4	88,2	23,7	86,9
Water content behind heat exchanger	g/kg	3,9	5,6	3,9	5,6
Face air velocity	m/s	0,6	0,6	0,8	0,7
Enthalpy behind heat exchangers	kJ/kg	32,3	21,1	32,1	21,3
Exchangers efficiency	%	86,1	89,7	85	88,6
Exchangers efficiency, dry	%	86,1	89,7	85	88,6
Heat recovery	kW	0,6	-0,7	0,7	-0,8
Condensation	l/h	0	0	0	0

THE BAROMETRIC PRESSURE USED **100066,3** **Pa**

WEIGHT **5,76** **kg**

DIMENSION

A = 455 mm
B = 230 mm
C = 370 mm



rSelect 3.3.7.
21-10-2013 08:13:14

2.7.0 Duct System

The duct system should be placed in accordance with the locally applicable regulations.

2.8.0 Dampers

Avoid touching the unit's closing and bypass damper. When servicing the dampers supply voltage must be switched off!

2.8.1 Bypass dampers

By default, the system is equipped with a bypass damper with a modulating 24V actuator. If the outdoor temperature is lower than the indoor temperature and there is need for cooling in the premises, the bypass damper will automatically find a position where the desired supply air temperature is achieved.

2.8.2 Closing Damper (Optional)

The system is prepared for external motorized closing dampers to be mounted on the outside- and exhaust side. 230 V on/off dampers with 1-wire control must be used.
When the system is turned off or goes into standby, the dampers will automatically close and open again when the system is started. If shutter dampers with spring return is used, we recommend Lindab DTBCU 125 TF 230 or the like.

2.9.0 Supply And Exhaust Air Diffusers

Supply- and exhaust air diffusers and air transfer valves must be sized and placed in accordance with the locally applicable regulations.

2.9.1 Extractor Hood (option)

We can supply an extractor hood without motor with adjustment damper and spigots for pressure drop measurement. When the damper is opened, a signal is sent to the ventilation system which automatically increases ventilation. The damper is controlled by a timer with a 5-60 minute period of time before the damper closes. It has washable filter and an 11 W fluorescent lamp (G23 base).
Sound level: 27 dB(A) @ 72 m^3/h
Dimensions: (HxWxD) 80 x 598 x 480 mm

2.10.0 Regulating

TX HomeVex is provided with a regulating system with which it can maintain the requirements for indoor climate in relation to air quality and thermal climate.

2.10.1 Demand Controlled Ventilation

TX HomeVex is working by the ventilation strategy of continuous airflow for background ventilation, supplemented by increased air flow as needed in rooms with activity. The increased air flow can be controlled manually or by means of relevant sensors.

2.11.0 Sensors

2.11.1 Temperature Sensors

The unit is fitted as standard with four sensors measuring the temperature of outside air, return air, supply air and exhaust air.

2.11.2 CO_2 Sensor

The unit is available with a CO2 sensor that is placed in the occupied zone, by which the ventilation is demand controlled. This improves comfort and reduces operating and energy costs.
We provide a sensor that has a built-in function for calibration.

2.11.3 Humidity Sensor

The unit is available with a humidistat which is placed in the room where you want dehumidification.
This sensor has a risk of growing time-dependent error in the reading and should be calibrated annually according to the product maintenance instructions.

2.11.4 PIR Sensor (Presence Sensor)

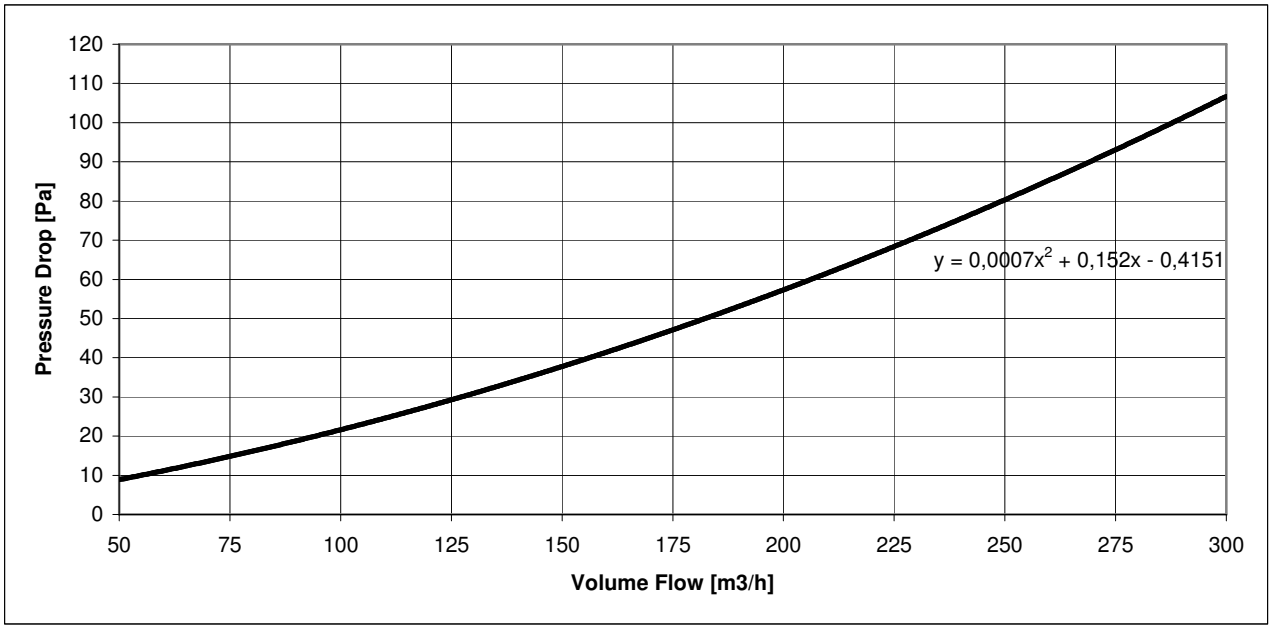
We provide a white PIR sensor in an OPUS insert. The sensor has a detection angle of 90 degrees and a range of 5 meters.
Dimensions (HxWxD): 33x85x85 mm.

2.12.0 Operational Control

It is possible to perform an operational check of the system via the measuring points and the corresponding tables. For location of measuring point see Section 7.0.0.
Connection fitting for pressure measurement are positioned so that they measure the pressure drop across the heat recovery unit.

2.12.1 Main Air Streams

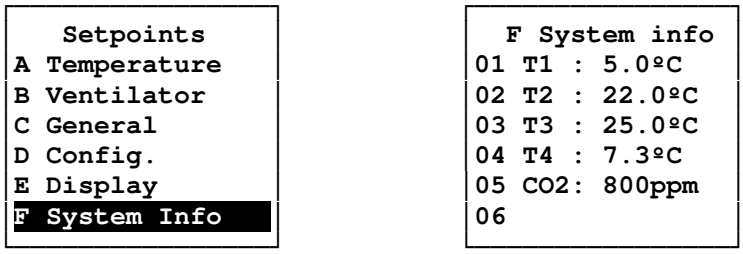
The main air flows can be determined from the chart below. The pressure drop across respectively supply and extract air are measured, after which the air flows are read from the chart or calculated by the formula.
The heat recovery unit must be clean and dry!



Volume flow [m^3/h]	54	108	126	144	200
Pressure Drop [Pa]	9,8	24,2	29,9	36,0	58,0

2.12.2 Air Temperatures

In the TX Controller menu ”F system info”, it is possible to view the actual air temperatures



To access this information go to ”Control Menu”, “Settings” and select ”F System Info”. Flip page using [⇧] and [⇩]. Press [ESC] to return to the Control Menu.

2.12.2.1 Temperature Efficiency

The temperature efficiency can be calculated by the following formula:

$$\eta_t = \frac{t_2 - t_1}{t_3 - t_1}$$

where η_t is the temperature efficiency

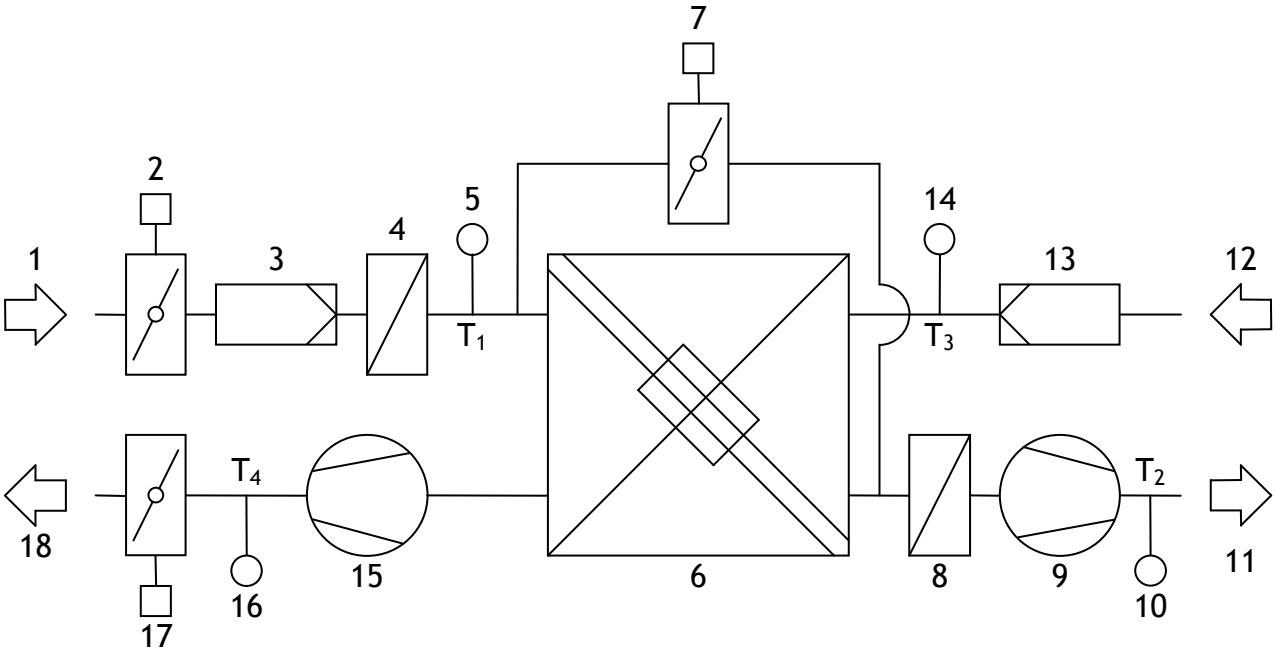
t_1 is the outdoor air temperature

t_2 is the inlet air temperature

t_3 is teh extract air temperature

3.0.0 Control System

3.1.0 Functional Diagram



1. Outdoor air
2. Closing damper (Optional)
3. Supply Air Filter
4. Preheater (Optional)
5. Temperature sensor T_1
6. Counterflow heat exchanger
7. Bypass damper
8. Afterheater (Optional)
9. Supply air fan
10. Temperature sensor T_2
11. Supply Air
12. Extract Air
13. Extract Air Filter
14. Temperature sensor T_3
15. Exhaust air fan
16. Temperature sensor T_4
17. Shutter damper (Optional)
18. Exhaust Air

3.2.0 Functional Description

The supply air fan [9] draws in outside air [1] through the supply air filter [3] and the heat recovery unit [6] after which the supply air blows [11] into the home. The extract air fan [15] draws extract air [12] from the house through extract air filter [13] and the heat recovery unit after which it blows the exhaust air [18] to the outside.

In the heat recovery unit, heat is transferred from the exhaust air to the supply air, and in summer the air can be diverted around the bypass damper [7] to minimize overheating. The external damper [2 & 17] closes when the system goes into standby or off, whereby drafts or external pollution can be avoided.

3.3.0 TX Controller

For use and adjustment of the TX HomeVex controller, please refer to the "TX Controller Manual".

3.4.0 Network

TX HomeVex is offering three different types of networks. When operating on a network, which recquires a plug-in print, it is not possible to use two types of network at the same time. For example it is not possible to connect a master/slave system to a LON network.

3.4.1 Master/slave

In master/slave mode, it is possible for one master unit to communicate with up to 5 slave units, which means that up to six units can be linked and run the same operation.
For more information, please refer to our "Master/slave Guide".

3.4.2 LON

With the expansion module Turbovex TX LON it is possible to use TX HomeVex on a LON network.
For further information contact your Turbovex dealer.

3.4.3 MODBUS

Using the Turbovex TX MODBUS expansion board, it is possible to control the devices through an existing RS485 network or through our PC software.
For more information, please refer to our "MODBUS Configuration Guide".

4.0.0 Maintenance Instructions

WARNING!

Before the unit is maintained, the supply voltage must be disconnected. Switch the device to standby mode and wait a few minutes, as the system has a delay time where the heating coils are cooled down before the fans are stopped. Then disconnect the unit.

4.1.0 Cleaning

Failure to clean the system may lead to decreased performance and increased energy consumption. It is recommended that the system is checked for dirt and dust at least once a year.

4.1.1 Exterior Cleaning

The unit's exterior parts are made of galvanized steel which is maintenance free. Cleaning can be done with a damp cloth with water which may have a little detergent added.

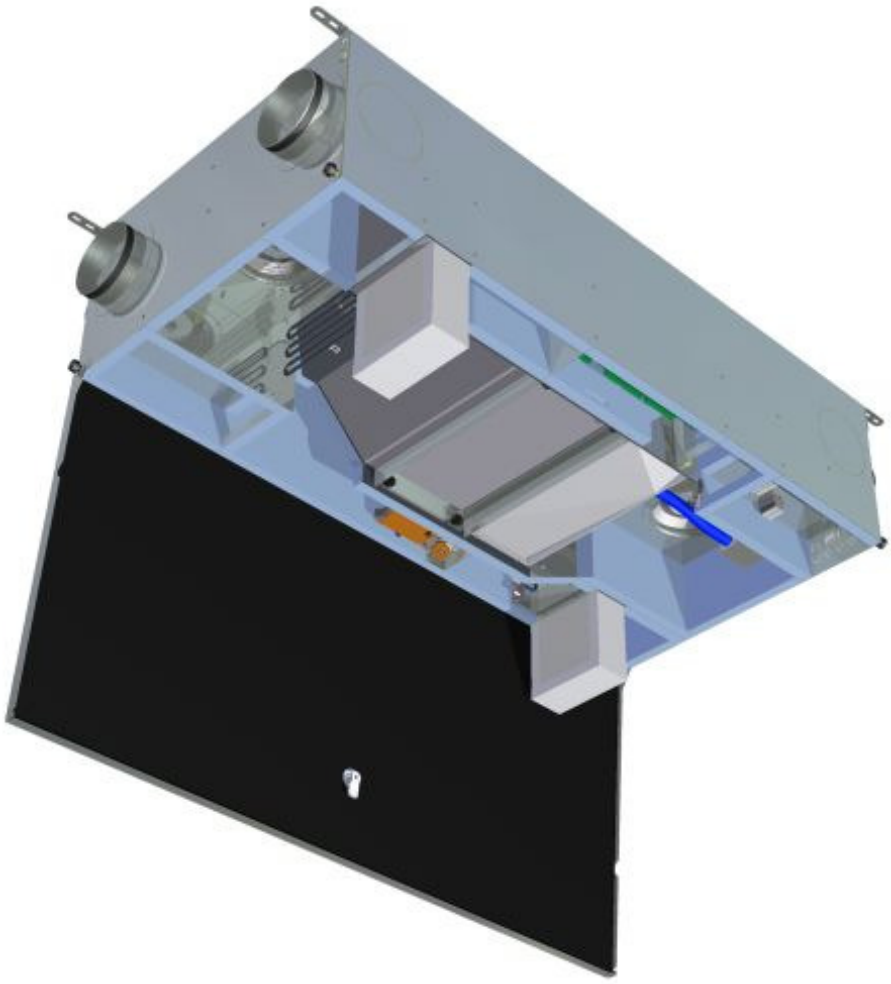
4.1.2 Interior Cleaning

Internal parts are - using the filters - protected against dust and dirt. Cleaning can be done by carefully using a vacuum cleaner or duster.

4.2.0 Filter change

When changing filters loosen the four thumb screws located at each corner. The service door is unlocked using a 6 mm Allen key and tilted down. The filters are pulled down and replaced with new ones. If the filters are marked "Staubenluft Seite / Dust Air Side" this side should be facing the duct connection.

If equipped with extractor hood and grease filter, remove the grease filter and clean it by putting it in the dishwasher.



When the filters are changed the service door is closed again and locked. Make sure the door is pushed up in place before the thumb screws are tightened again.

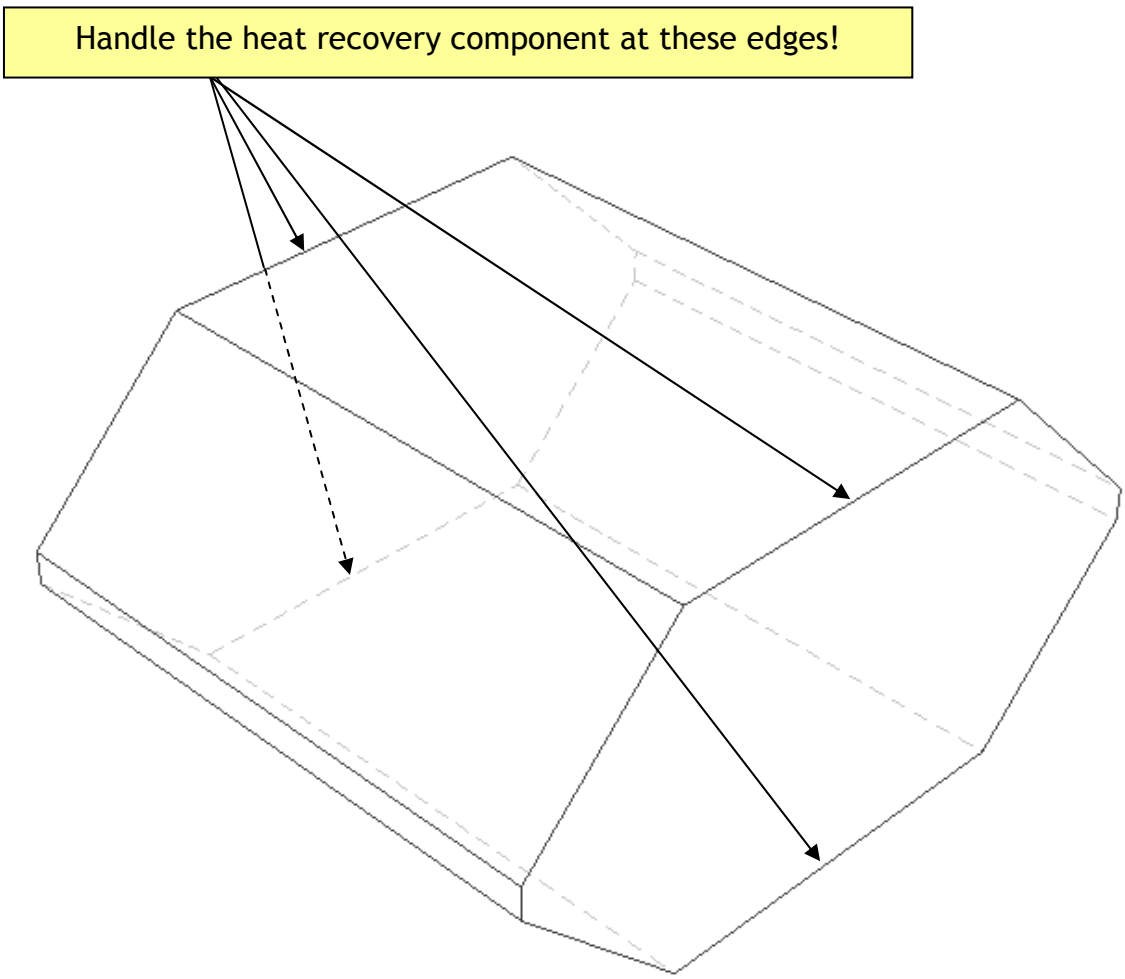
4.3.0 Condensate Tray And Pump

It is recommended that the condensate tray and pump are cleaned when changing filters. The condensation tray cleaned using a shower head and a neutral detergent. The condensate pump is cleaned with a chlorine solution with 95% water and 5% chlorine.

4.4.0 Heat Recovery Component

When changing filters it should be checked that the heat recovery unit is clean. Dust can be removed using a vacuum cleaner with a soft brush head and the heat recovery component can be cleaned with a handheld shower head and a neutral detergent. It does not tolerate cleaning with a pressure washer.

When handling the heat recovery component it must not touched in the slat end surfaces but should preferably be handled only at the edges as marked below.



5.0.0 Leak Testing, Initial Adjustment And Handover

5.1.0 Leak Testing

It must be documented by a leakage test, the ventilation unit meets the necessary tightness requirements.

5.2.0 Initial Adjustment

The ventilation unit must be adjusted so that the system provides the nominal air flows within the specified tolerances.
The adjustment must be carried so the pressure loss in the system is minimal.

5.2.1 Initial Adjustment Report

Building	
Name	
Address	
Postal Code	

Builder	
Name	
Address	
Postal Code	

Advisory Engineer	
Name	
Address	
Postal Code	

Ventilation Contractor	
Name	
Address	
Postal Code	
Installer	

Ventilation Unit	
Fabrikant	Turbovex A/S
Model	TX HomeVex
Serial Number	
Installation Date	

Settings	
B1 Fixed Speed Day Inlet Air [%]	
B2 Fixed Speed Day Extract Air [%]	
B7 Balance/max Inlet Air [%]	
B8 Balance/max Extract Air [%]	

Initial Adjustment	
Date And Time	
Adjustment Method	
Measuring Method	
Probalbe Reading Error	
Instrument Type	
Instrument Number	
Calibration Date	

Other	
Energy Consumption [W]	
SEL value [J/m³]	
Ext. Static Pressure [Pa]	
Outdoor Temp. [ºC]	
Wind Conditions [m/s]	
Window & Door positions	
Any other conditions	

Measurements Inlet Air							
Room		Design Airflow [m³/h]	1st measure [m³/h]	2nd measure [m³/h]	3rd measure [m³/h]	Measured airflow [m³/h]	Deviation / comment
1	Kitchen						
2	Showers / WC						
3							
4							
5							
6							
Total							

Measurements Extract Air							
Room		Design Airflow [m³/h]	1st measure [m³/h]	2nd measure [m³/h]	3rd measure [m³/h]	Measured airflow [m³/h]	Deviation / comment
1	Kitchen						
2	Showers / WC						
3							
4							
5							
6							
Total							

Place and date:_____ Signature:_____

5.3.0 Handover

The ventilation unit must be handed over clean and in working condition, including clean filters.

5.3.1 Test Report

Upon delivery, it must be demonstrated that the unit is constructed and operating in accordance with the requirements applicable at time of handover, including the unit energy efficiency.

Measurements of air flow must be done in a reference state.

A test report must be drawn up including the measured values, indicating the methods of measurement, measuring instruments and probable reading errors. All setpoints must be included in the test report.

Fan Settings	
B1 Fast hastighed dag indblæs [%]	
B2 Fast hastighed dag udsug [%]	
B3 Fast hastighed nat indblæs (%)	
B4 Fast hastighed nat udsug (%)	
B5 Fast hastighed forcer indblæs (%)	
B6 Fast hastighed forcer udsug (%)	
B7 Balance/max indblæs [%]	
B8 Balance/max udsug [%]	
Expected operating hours at different states	
Day mode	
Night mode	
Forced mode	
Estimated annual energy use [kWh]	

Measured Ratios	
SEL value day mode [J/m^3]	
SEL value night mode [J/m^3]	
SEL value forced mode [J/m^3]	
Temperature efficiency [%]	
Iinlet Air	
Main airflow day mode	
Main airflow night mode	
Main airflow forced mode	
Extract Air	
Main airflow day mode	
Main airflow night mode	
Main airflow forced mode	

5.3.2 Function Test

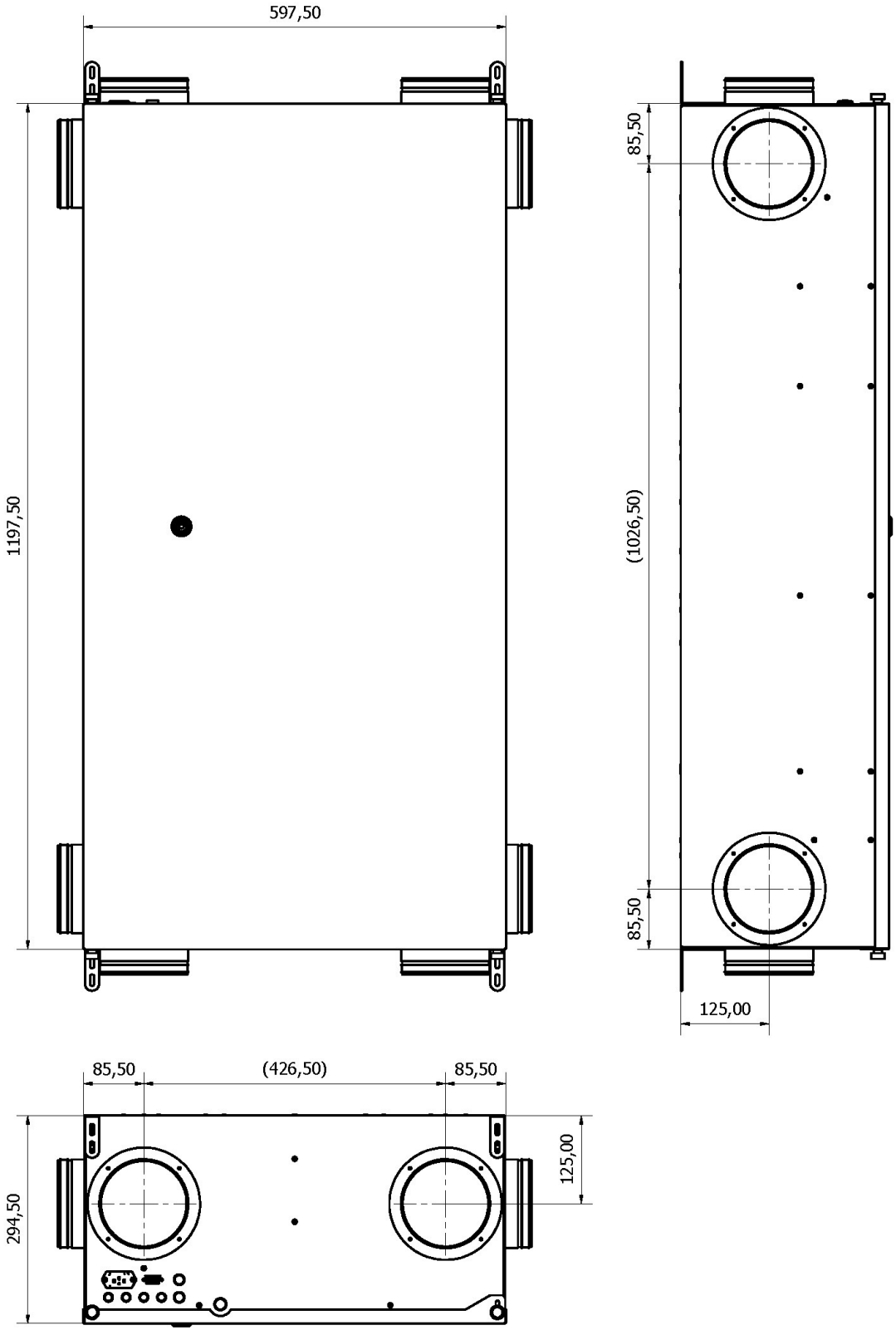
Ventilation Unit	
Manufacturer	Turbovex A/S
Model	TX HomeVex
Serial number	
Software Edition (Controller/Unit)	
Test Date	

Accessories	Yes	No
Preheater		
Afterheater		
Air Pressure Switch		
Shutter Damper Intake		
Shutter Damper Exhaust		
PIR (Prescense sensor)		
CO_2 sensor		
Humidistat		
Extractor hood		

Test Subject	Test Desciption	OK
Sikkerhedsanordninger		✓
Door Switch	Check that the unit goes into standby when deactivating the switch. The door switch is activated during the rest of the test.	
Condensate Pump	Make sure the pump is working and that unit will switch to standby mode at a water level in the condensate pump over 21 mm.	
Temperaturfølere	*The temperatures be monitored in the TX controller, go to "System Info" under "Settings" menu.*	✓
Temperature sensor T1 (Outdoor)	Heat the sensor and check that the temperature T1 rises.	
Temperature sensor T2 (Supply)	Heat the sensor and check that the temperature T2 rises.	
Temperature sensor T3 (Extract)	Heat the sensor and check that the temperature T3 rises.	
Temperature sensor T4 (Exhaust)	Heat the sensor and check that the temperature T4 rises.	
Damper motors		✓
Bypass	Check that the bypass damper opens when the temperature sensor T3 is heated.	
Shutter (Inlet)	Check that the damper opens when the system is operating and closes when the system enters standby mode.	
Shutter (Outlet)	Check that the damper opens when the system is operating and closes when the system enters standby mode.	
Fans		✓
Indblæsningsventilator	The fan starts and stops when switching off and on standby.	
Udsugningsventilator	The fan starts and stops when switching off and on standby.	
Heating coils		✓
Forvarmeflade		
Eftervarmeflade		
Accessories		✓
Air Pressure Switch	When the differential pressure exceeds the set value display will show "Alarm B".	
PIR sensor	By activating PIR sensor the unit switches from night to day mode.	
CO_2 sensor	When the CO2 levels rise, the fan control voltage increases. (Values can be found on the TX controller under "System Info")	
Humidistat	By activating the humidistat, unit will change to forced mode.	
Extractor hood	By activating the hood, unit will change to forced mode.	

Sted og dato:_____ Kvittering:_____

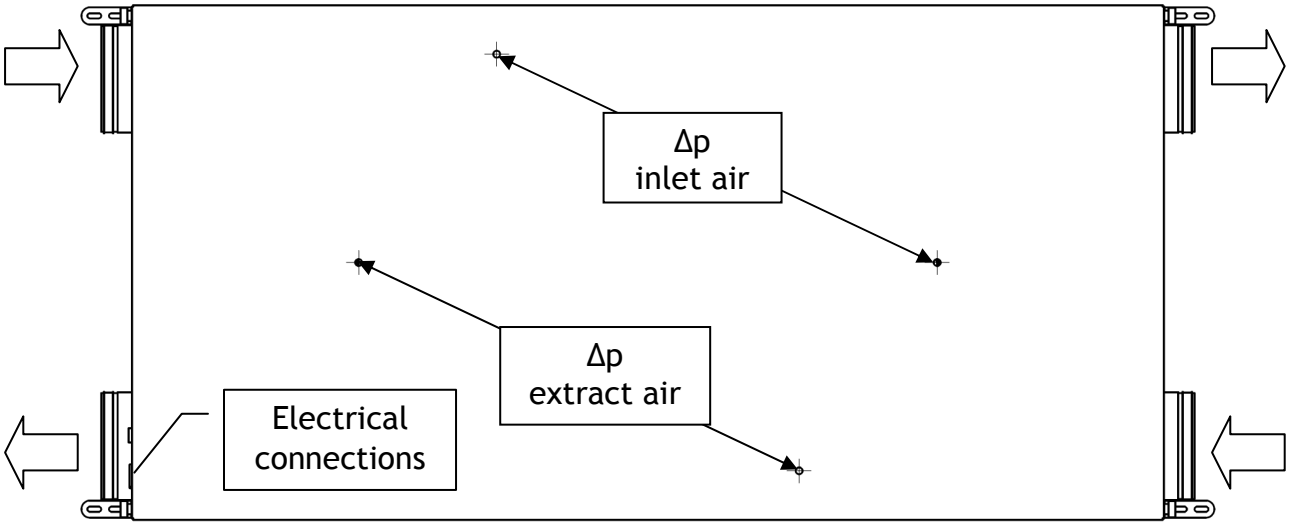
6.0.0 Construction Drawings



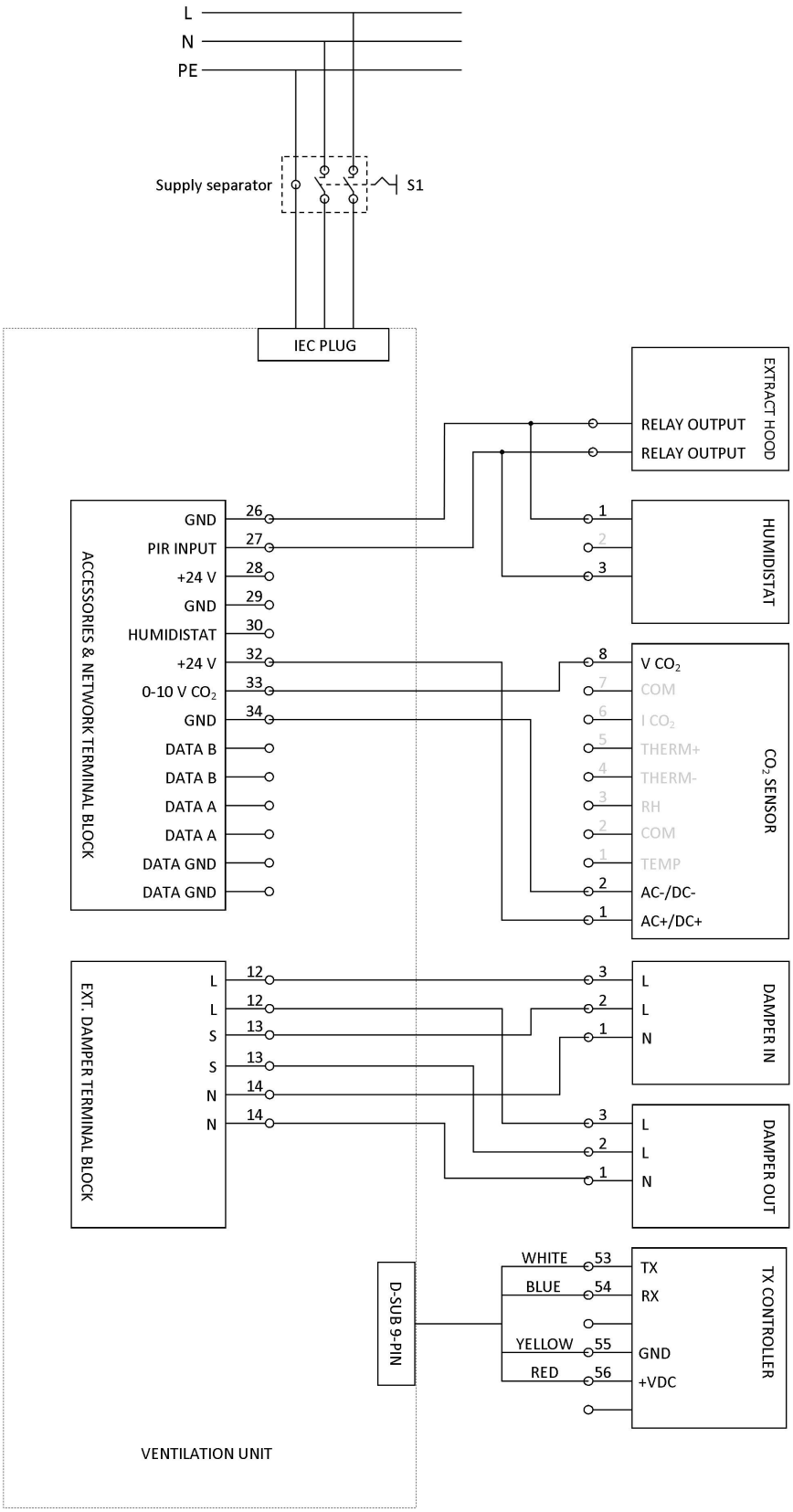
7.0.0 Main Drawings With Measurement And Control Points

7.1.0 Measuring The Main Airflow

The drawing shows the unit seen from the down side. The service door is turnable, so the measuring points are shown relative to the electrical connections.



8.0.0 Electrical Schematic



9.0.0 Data Sheets And Specifications Of Main Components

Fans and motors:
http://img.ebmpapst.com/products/manuals/R3G190RG0701-BA-ENG.pdf

Heat Exchanger:
http://www.recutech.com/download.php?group=stranky3_soubory&id=175

Condensate Pump:
http://www.sauermannpumps.us/uploads/tx_guidepompe/US_Si-10_SI1000SIUS23_01.pdf

Damper Motor:
http://www.belimo.ch/pdf/i/CM24-SR-.._1_1_en.pdf

Inlet pipes:
http://itsolution.lindab.com/lindabwebproductsdoc/pdf/documentation/ads/dk/technical/ilu.pdf

Door Switch (D3V-166M-1C25):
http://www.components.omron.com/components/web/pdflib.nsf/0/66E054EBA076F6BD85257201007DD6B0/$file/D3V_1110.pdf

Spring return shutter dampers (Optional):
http://itsolution.lindab.com/lindabwebproductsdoc/pdf/documentation/ads/dk/technical/dtbcu.pdf
http://itsolution.lindab.com/lindabwebproductsdoc/pdf/documentation/ads/dk/technical/sealeddampers.pdf

Extractro Hood (Optional):
http://static.thermex.dk/upload/Products-2013/Central-Line_Plan-250-Volume-251/Central-Line_Plan-250-Volume-251_Datablad.pdf
http://static.thermex.dk/upload/Manualer-Reservedelslister%202013/Plan%20250-Volume%20251/Manual%20Thermex%20PLAN%20250%20-%20251.pdf

10.0.0 Declaration Of Conformity

TURBOVEX
Industrivej 45, DK-9600 Aars
Tlf. +45 98 62 14 62
Fax. +45 98 62 42 24
E-mail: info@turbovex.dk
Web: www.turbovex.dk

CE

DECLARATION OF CONFORMITY

The undersigned, representing
Turbovex A/S

at production site
Industrivej 45
DK-9600 Aars

hereby declares that the product
TX HomeVex

Is in conformity with
Maskindirektivet 2006/42/EC af 17. maj 2006
Lavspændingsdirektivet 2014/35/EU af 26. februar 2006
EMC-direktivet 2014/30/EU af 26. februar 2014

And the following standards and specifications have been used:
DS 447:2013
(Ventilation i bygninger - Mekaniske, naturlige og hybride ventilationssystemer)
DS 428:2011
(Norm for brandtekniske foranstaltninger ved ventilationsanlæg)
DS 452:2013
(Termisk isolering af tekniske installationer)

This declaration is only valid provided that no changes are made to the unit.

Aars, 2014.08.19

Erik Toelberg

Erik Toelberg, Product Manager, Turbovex A/S