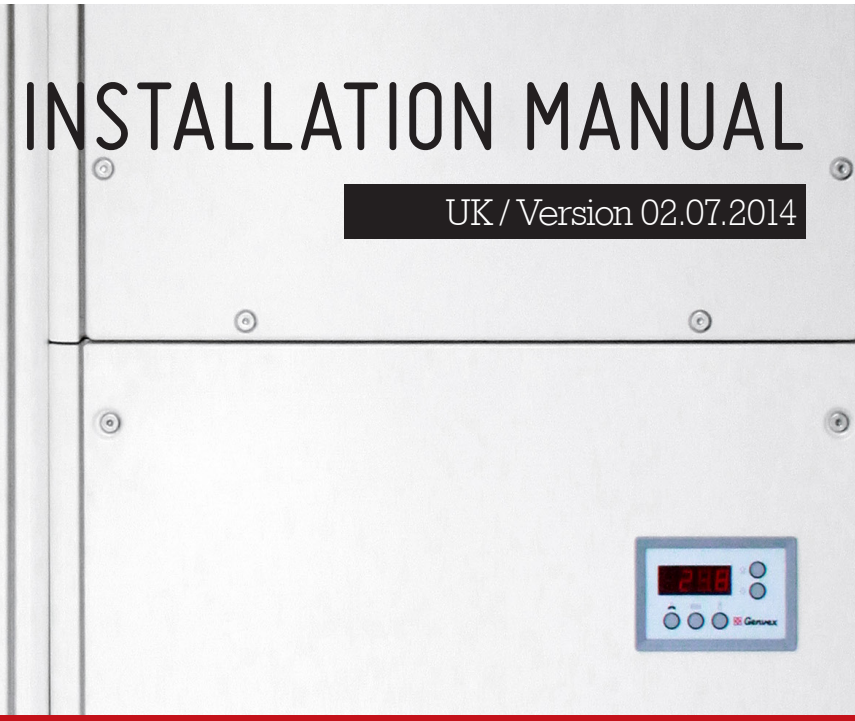
COMBI 185 S/LS

VENTILATION HEAT PUMP AND SANITARY HOT WATER WITH ELECTRIC DIAGRAM FOR OPTIMA 311

INSTALLATION MANUAL

UK / Version 02.07.2014



Genvex®

Genvex A/S • Sverigesvej 6 • DK-6100 Haderslev • Tel.: +45 73 53 27 00 • salg@genvex.dk • genvex.dk

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Directions/ Safety Regulations

- The construction of the unit is in accordance with all EU regulations. (also see the CE certificate).
- Before installation of the system, it is required that a technical expert ensures that safety measures are met with regards to the parts which contain coolant, and that the coolant is kept at a safe distance so that the work can be carried out with no problems.
- When maintenance work is conducted and where the coolant circuits are opened, and especially when there is work involving fire (soldering, welding, etc.) it is required that measures are taken against the danger of fire.
- Before working on the unit, always remember to disconnect all electrical hook-ups.
- When hooking up the unit, all current laws and regulations must be observed.
- Water must be potable. A reduction valve must be installed if the water pressure is increased.
- All connections for potable water must be certified.

Work should only be performed by a certified contractor.

Product Description

Use

The Combi 185 is a combined ventilation unit and service-water heat-exchanger which can be used for: Heating hot service-water. Ventilating the dwelling. Act as a supplement to heating the dwelling with heated atmosphere which is injected when hot service-water is not being produced by the heat exchanger.

Description

The Combi 185 is a unit which is ready to install, and where the most important components are: cabinet, tank, components for coolant, atmosphere and water circulation as well as a control, regulating and monitoring unit. The unit can be connected to an internal heat- exchanger with a surface of 0,8 m2, so that it can be connected to an external boiler, a solar powered heating installation, etc.
In the heat-exchanger, the Combi 185 utilizes the residual heat in the exhausted atmosphere to either heat the atmosphere which is injected or to produce hot service-water.
The Combi 185 Unit can heat service-water corresponding to the annual hot water consumption of a family. The used and cooled atmosphere is expelled outside via the relief duct. The tank has a built-in immersion stem so that temperature regulation of the tank is controlled by a sensor which is placed physically at the centre of the tank.
The Combi 185 has an electric heating element installed in the tank which acts as a backup.

Effect

In 24 hours, the Combi 185 can heat 380 litres of service-water to a temperature of 55 °C. This may of course vary depending on the temperature of the heat source, the cold water temperature as well as the drainage pattern. The integrated electric power-cartridge which has an effect of 1 kW can be engaged at peak loads. The Combi 185 uses only about 30% of the electric energy which a directly heated tank would consume.

Coolant Circulation

Coolant circulation takes place within a self-contained circuit where the HFCKW-free coolant R134a acts as energy carrier.

Heating Module

The heat in the atmosphere is removed by the condenser at low evaporating temperatures and transferred to the coolant. The coolant is drawn out as steam by a compressor and compressed at a higher pressure/temperature level and then transported either to the service-water heater of the condenser, or its induction pipe. Here, the energy which the compressor has added to the coolant and that part of the energy which comes from the condenser will be transferred to either the water or the atmosphere which is being heated. In this way, the coolant will condensate and revert to a fluid state. Subsequently, the high pressure in the coolant will be put through an expansion valve where pressure is reduced and the coolant is once again able to absorb heat from the exhausted atmosphere via the evaporator.

Process

The control unit (Optima 311) will start up the compressor shortly after hot water has been used and as soon as a temperature drop has been sensed in the tank. The compressor will be engaged until the entire tank has once again reached the set temperature. The Combi 185 will normally be able to satisfy the hot water needs of an entire family.

The power-cartridge in the tank can be activated manually via the control unit, should a situation occur where the Combi 185 is unable to produce sufficient hot water. It will then be possible to produce double the amount of hot water. The power-cartridge can be set to the temperature which it is desired that the water in the upper section of the tank be heated to. (Use the power-cartridge only at peak loads as it consumes more energy than the compressor).

Defrosting

When the temperature difference between the temperature prior to the cooling surface and the temperature of the cooling surface itself becomes too great, which will occur when ice has formed on the cooling surface, then the unit will commence to defrost. The Supply air ventilator and the electric heating surfaces will disengage. The discharge ventilator will continue to run along with the compressor which will send hot gas directly into the evaporator until the ice has melted, and the cooling surface has reached a temperature of around 10 °C, depending on the temperature which has been set in section 50.The Supply air ventilator and the electric heat surface will then re-engage.

Scope of Delivery

- One combined ventilation unit and heat-exchanger for service- water with a control unit.
- Instructions for Installation and Instructions for Use.

Accessories

- Exchange filters
- Temperature sensor for solar cells, central furnace, geothermal pipes
- Electric pre-heating surface
- Electric or Water-based post-heating surface
- Anode

Transportation and storage

As a rule, the unit must be stored packaged in an upright position, without water.
Transported with care, and over short distances, the unit may be tilted at up to 45 °.
Transportation and storage may take place at temperatures between -20 and +70 C°.

Moving with a fork lift

The unit must be placed on the provided base mount when moved with a fork lift. Lifting must be conducted slowly.
As the unit has a high centre of gravity, it must be secured in such a manner that it will not topple when handled.

Moving with a sack trolley

The unit must be secured against slippage on the sack trolley. Pipe connections may not be used when transporting. It must be checked that the sack trolley will not damage the cabinet and connectors.

Offloading

The unit must be offloaded on a level surface to avoid damage.

Mounting

The unit may only be set up in a frost free locality.

This locality should fulfil the following requirements:

- A room temperature between 8 and 35 °C when operation uses room atmosphere.
- A room temperature between - 20 and + 35 °C when operation uses outside atmosphere.
- Good insulation to adjoining facilities.
- Drainage for condensed water.
- No abnormal dust levels in the atmosphere.
- A load carrying foundation (about. 500 kg/m²)

In order to achieve a non-problematic operation of the unit and to ensure access for repairs and maintenance, it is recommended to keep 0,6 m clear in front of the unit.

When mounting:

1. Remove the packaging material from the pallet.
2. Remove the corner protectors.
3. Dismantle the transport- mounts on the pallet.
4. Lift the unit off the pallet and place it.
5. Align the unit by turning the adjustable support legs.

Connecting to a water pipe

During set up, pipe dimensions must be taken into consideration in relation to existing water pressure and pressure loss in order to ensure that there is sufficient pressure and water where this is drawn. Those aspects of the installation which concern water must be performed in accordance with local HWS regulations.
Water pipes can either be made hard or flexible. However, they must be approved for potable water. The corrosive properties of the pipes must be taken into consideration in order to avoid damage. As with all containers under pressure, the tank of the unit must also be provided with an approved safety valve and an approved check valve on the supply side (always check local requirements).
The inflow of fresh cold water and the outflow of hot water take place under the tank (¾" RG-connection).
Maximum operating pressure is 10 bar and maximum operating temperature is 65 C°.

If necessary, the supply pipe must be fitted with a pressure reduction valve and possibly a filter.

When fitting the piping system in a dwelling, contamination of the pipes must be avoided.
(If required, flush the piping system with clean water before the unit is connected).

When fitting pipes, it must be ensured that the pipe connections are not twisted. Use a pipe wrench to apply counter pressure.

If recirculation is not utilized, it must be ensured that the recirculation pipe connection has been tightened properly.

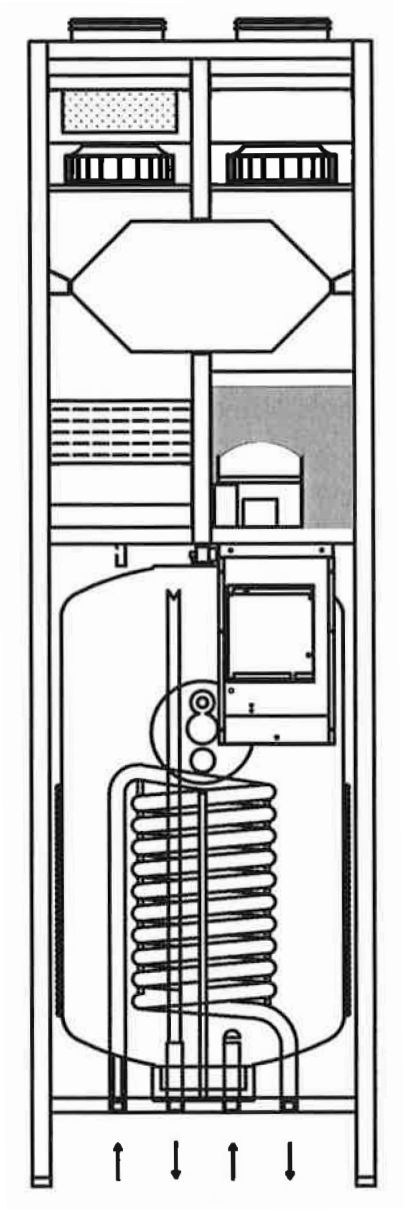
Connecting drainage for condensation

Due to the cooling of the atmosphere which passes through the heat-exchanger, quite a lot of condensed water will be generated. The condensation drainage is equipped with a hose which conducts the water to a proper drain. Depending on the humidity, as much as 0,5 l/h can be generated.
It is a requirement that the drain is equipped with a sealed water trap with a minimum water gauge of 100 mm so that water can drain from the unit without impediment.

If the unit is not equipped with such a water trap, the water will not be able to drain from the tray due to negative pressure, and water damage may result.

Air may also be drawn in via the drain and since the drain will contain ammonia vapours, the cooling system will be damaged in a short period of time.

The warranty is void
if the water trap is not correctly fitted.

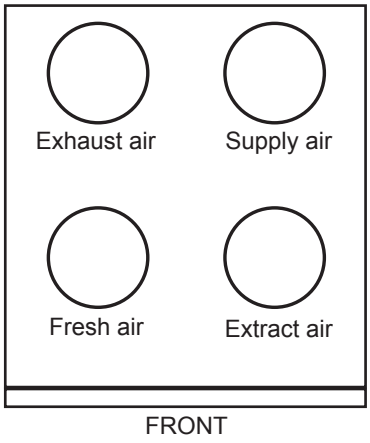


Fresh air

Fresh air may not be polluted with aggressive substances (such as ammonia, sulphur, chlorine) as these can damage the components of the cooling system.

Connecting of ducts

All duct connectors carry a yellow sticker which specifies which ventilation duct is to be connected to the various connectors.



Connect air – Supply air

The ducting system leading from the unit to air injected into the living quarters.

Connect air – exhaust

The ducting system leading from damp spaces to the unit.

Connect fresh-air

The ducting system leading from the fresh-air roof-cowl/ fresh-air grating from the outside to the unit.

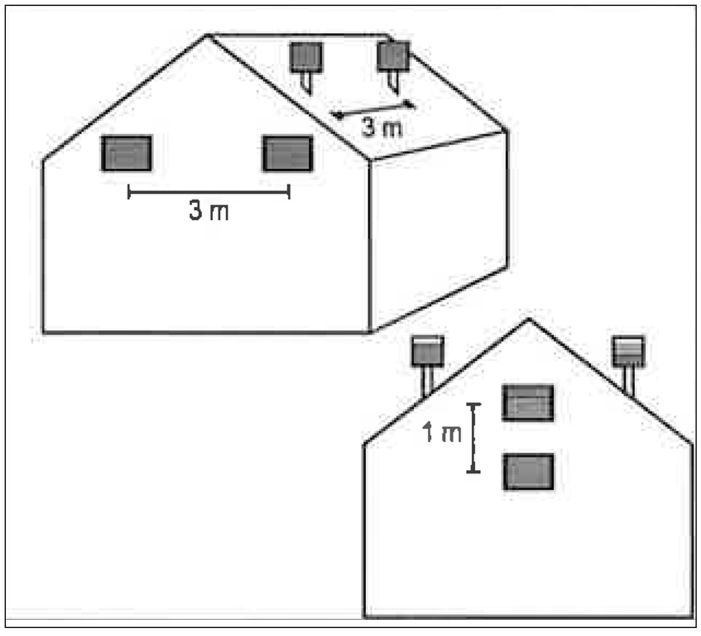
Connect discharge

The ducting system leading from the discharge air roof-cowl/discharge air grating to the outside.

Ducting system

It is recommended that the ducting system is made from spirally flanged pipes using fittings with a rubber ring seal so that an airtight and durable ducting system is achieved. In order to achieve a noise level from the unit which satisfactorily low, silencers should always be mounted on the supply air and exhaust air ducting systems between the unit and the first air intake and exhaust valves.

It is recommended that air speeds in the ducting are kept sufficiently low so that noise is not generated by the air intake and exhaust valves.
When air roof-cowls/air gratings for air discharged to the outside are established, it must be avoided that the two air streams short circuit so that the discharged air is drawn back in.
It is recommended to place roof-cowls/ air gratings on the northern or eastern side of a building in order to achieve maximum comfort in the dwelling.
Minimum distance between roof-cowls/air gratings is 3 metres.



Insulation of ducts in cold spaces

In order to exploit the unit's high recovery potential (efficiency), it is necessary to insulate the ducts correctly.

Genvex recommends as follows:

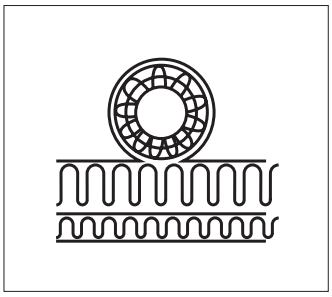
Supply air and extract air ducts

To minimise heat losses from the duct system in cold loft spaces, the supply and extract ducts must be insulated with a minimum of 100 mm insulation. If insulation form alternative A is used, it is recommended that it is executed with two layers of 50 mm lamella mats with paper or foil externally and with staggered joints between the two layers. If the ducts are laid on the rafter foot, alternative B may be used. The insulation must always be tightly packed round the ducts.

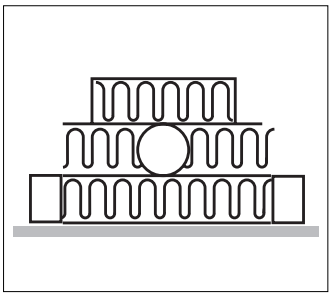
Fresh air and exhaust air ducts

It is recommended that fresh air and escaping ducts are insulated with a minimum of 50 mm insulation. The fresh air duct is insulated to prevent warm air in the loft in summer from heating up the fresh air. Take care to seal the termination where the escaping duct is led through the roof or through the gable end, in order to avoid condensation damage.

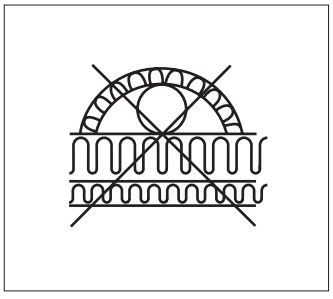
Refer to your local distributor for guidance on national insulation directives.



Duct insulation, alt. A



Duct insulation, alt. B



Faulty duct insulation

Insulation of ducts in heated spaces

Genvex recommends as follows:

Supply air and extract air ducts

In warm loft spaces the supply and extract channels must be insulated with 50 mm insulation.
Supply and extract air ducts led through heated spaces in dwellings do not require insulation. If the supply air duct has cooling, bypass or earth heat exchanger installed it must be insulated.

Fresh-air and discharge ducts

In warm loft spaces and warm rooms in dwellings the fresh and exthaust air ducts must be insulated with minimum 50 mm insulation. In addition, the insulation must be covered externally with plastic film or aluminium foil in order to avoid condensate in the insulation.
We recommend an insulation of 100 mm on the fresh air duct when installing a earth heat exchanger.
Refer to your local distributor for guidance on national insulation directives.

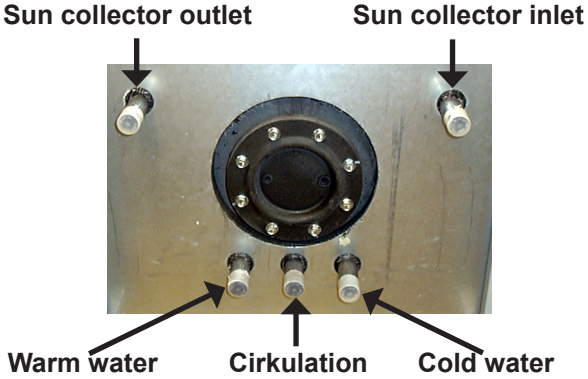
Optional connection of a heat-exchanger

The S-models have a heat-exchanger of 0,8 m² mounted in the tank. A sensor which controls external connections, such as solar cells, an oil burner or a wood burning boiler can also be mounted in the sensor pocket. Maximum diameter of the sensor is 6 mm.

When fitting the piping system in a dwelling, contamination of the pipes must be avoided. (If required, flush the piping system with clean water before the unit is connected). When fitting pipes, it must be ensured that the pipe connections are not twisted.
Use a pipe wrench to apply counter pressure. If recirculation is not utilized, it must be ensured that the recirculation pipe connection has been tightened properly.

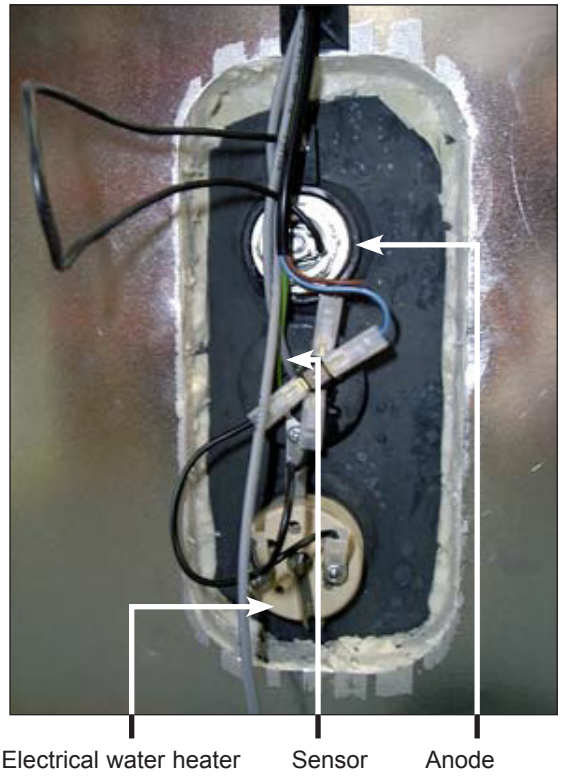
Water connection

The following connectors are placed under the unit:
Condensation drainage hose
¾" RG branch pipe for: Cold water / Recirculation / Hot water
¾" RG branch pipe (2 units) for an extra spiral (S-models only)



Electrical water heater / sensor / anode

In the center on the front, behind a steel plate.



Electrical installation

The hook-up to electrical power must be performed by a certified electrician. (See the enclosed electrical diagram).

The cable connecting the unit to the Design control panel must be a 4-conductor, 0,25 mm cable with a maximum length of 50 m.

The unit may only be operated with a full tank.

The unit must always be disconnected from the electrical power source before the front hatch is dismantled.

Once the unit has been disconnected from the power main, you must wait until the fan has come to a standstill before the hatch is opened.

Holes may not be drilled in the unit.

Check and initial adjustment of the system

In order to achieve optimal operation of the system, an initial adjustment must be performed using professional equipment for measuring the atmosphere.
The following items must be checked, although the system can be put into operation before the initial adjustment has been performed:

1. Check that the system has been correctly installed, and that all ducting has been insulated in accordance with directions.
2. Check that various hatches can be opened so that it is possible to perform service and maintenance on the unit.
3. Check that filters are clean (they can be dirty after installation), and replace as necessary before running initial adjustments.
4. Check that the condensation drainage is correctly installed with an appropriate water trap, and that this is protected against frost.
5. Pour 1 l of water into the condensation tray, and check that it flows away without impediment via the condensation drainage hose.

Default setting if the system is started up prior to initial adjustment:
Adjust all Supply air valves so that the valve which is closest to the unit is open at 3 turns from the closed position, while the one furthest away is open at 8 turns from the closed position.
The valves in between are to be open at 4-7 turns depending on how close they are to the unit.

Optimal initial adjustment of the system

Professional equipment for measuring the atmosphere must be used. Check that all 5 items in the section above have been performed before the initial adjustment is conducted. Subsequently, the system can be put into operation.

The system should be adjusted initially for basic ventilation which is speed 2. In order to reduce energy consumption as much as possible, the overall atmospheric volume should first be adjusted to the desired level by changing the speed settings in the Service Menu.

Then the initial adjustment is performed on the Supply air and exhaust valves using measuring equipment. (Remember to lock the valves when performing the initial adjustment, and that the conducting plate on the Supply air valves is turned so that air is blown in the right direction)

Finally, the overall atmospheric volume should be re-checked and fine-tuned by adjusting the speeds for Step 2in the Service Menu. Step 1 and Step 3 should then be adjusted to an appropriate interval in relation to Step 2.

Requirements for the hot water circuit

For the hot water installation, the following materials may be used:

- Copper
- Stainless steel
- Brass
- Synthetic materials

This is naturally dependent upon the materials which have already been used in the water circuit (of the dwelling). Incorrect combinations of materials may result in damage from corrosion.

This requires special attention when galvanised components and components containing aluminium are used.

Using the water circuit

Fill the tank at the connector spigot and air out the tank by letting one of the uppermost hot water spigots remain open until no more air comes out.
Re-check the entire water circuit for any leaks. .

After start-up, it is necessary to check all connections for leaks.

The cooling circuit

The unit has been delivered ready to run. No work needs to be performed on the cooling circuit. The control unit will automatically assume control of all functions and start up the compressor, ventilator fan, etc. in order to maintain the set water temperature.

Heat-exchanger operation

(S-model only)

1) Hot boiler

Heat exchanger operation is used if it is desired to heat water only via an external hot boiler (an oil burning furnace for example). The unit is set to the lowest acceptable water temperature and will then function as an emergency back-up. Thereafter, it will be the thermostat on the oil burner which will determine the heating of the water.

In this operational mode an extra sensor is mounted in the tank in order to control the boiler. See the section: Optional connection of a heat-exchanger.
Maximum water temperature must be set at 65 °C.
This can be exceeded for short periods, in connection with disinfection for example.
If the boiler must function as an extra heat source for the unit, it is recommended that the temperature of the thermostat of the boiler is set about 5 °C lower than the thermostat of the unit itself.
This will secure that the boiler is only operating when water consumption cannot be fulfilled by the unit.
When the unit is made operational, it is necessary to ensure that sensor values are set as desired.

2) Wood burner or solar cells

This optional operational connection can be utilized if a wood burning furnace or a solar cell installation is to support the function of the unit. Via sensor T9 (see the diagram), the temperature in the wood burning furnace or the solar cell installation is measured. If the temperature is higher than the water temperature in the tank, it is possible for the control unit to activate an accelerator pump which will circulate water through the spiral in the tank, and thereby heat the water. Hysteresis can be adjusted to 0-5 °C. Maximum temperature is 70 °C. Above this level, the control unit will disengage the pump in order to protect the tank.

Energy saving tips

Do not set the water temperature higher than necessary. The lower the temperature, the higher the efficiency of the unit. Only use high temperatures when necessary.

Tips for operating the fans

Do not ventilate more than necessary. Over-ventilation will often result in very low humidity in the atmosphere in the dwelling which will result in discomfort. In addition, it is a waste of energy to over-ventilate.
However, always be aware of the required minimum atmospheric volume and that this is adhered to.

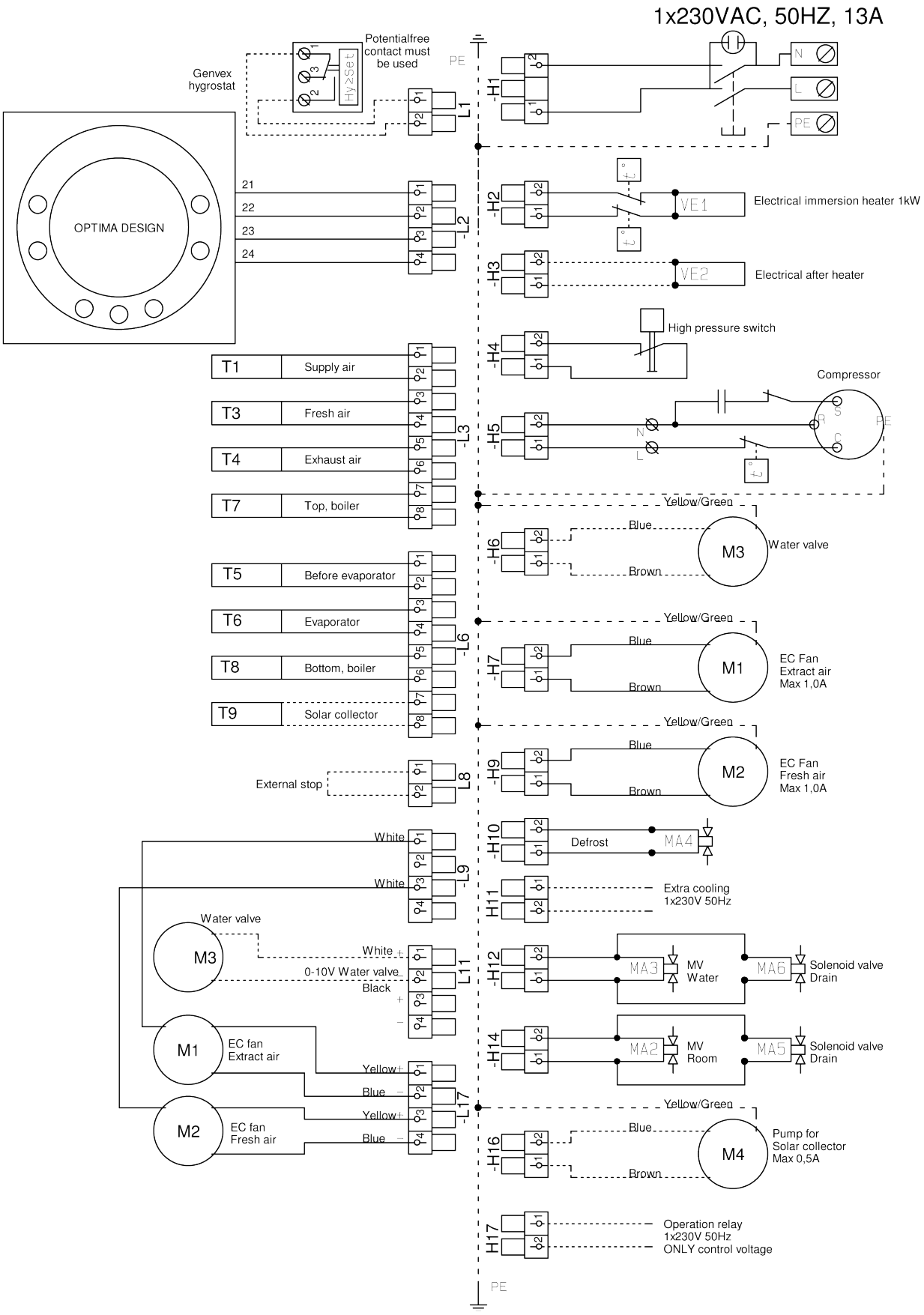
Re-checking

After the installation has been completed, it is recommended to check once again that all connections are water- and airtight and that condensed water will flow off without hindrance.

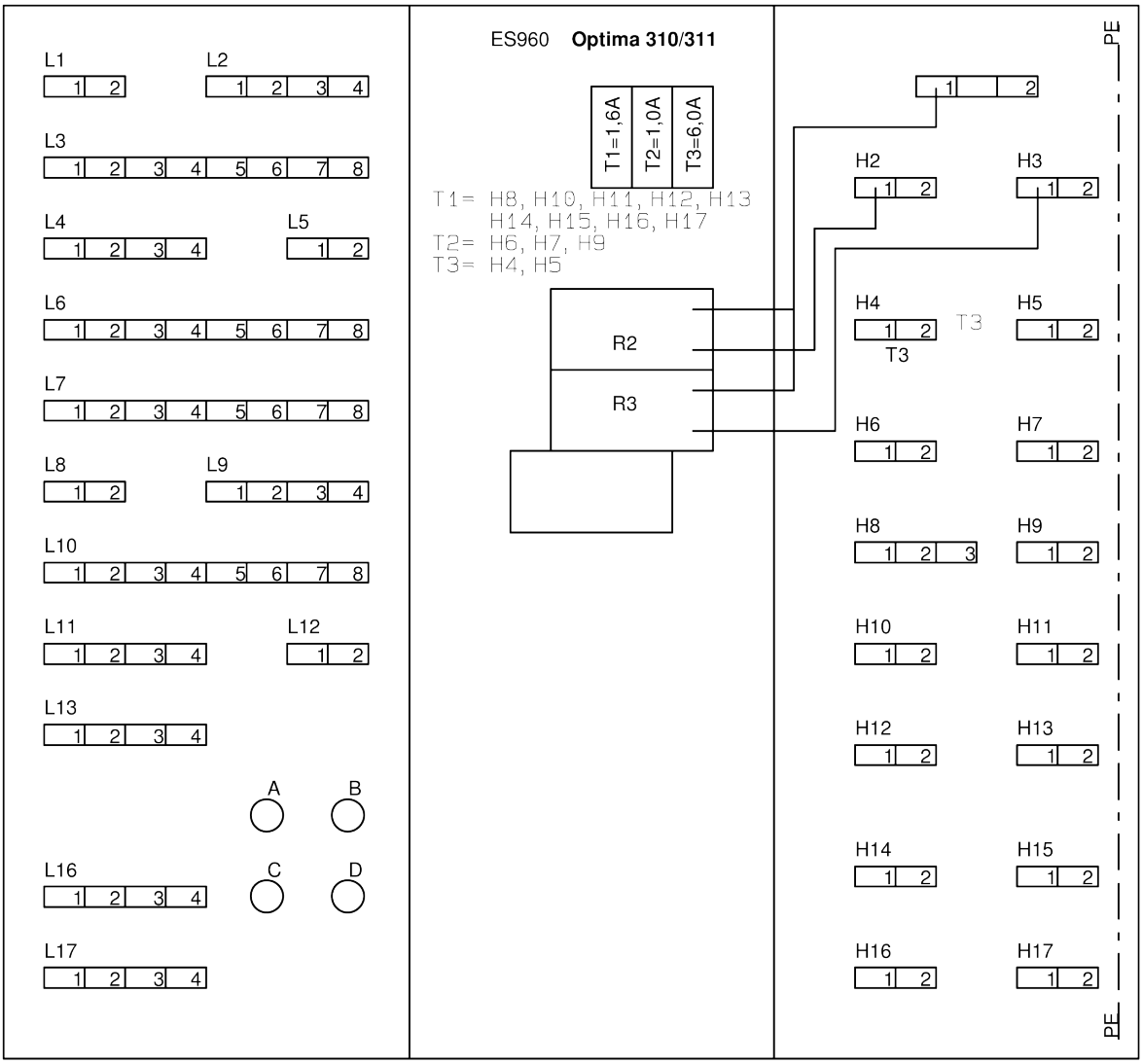
For maintenance, see the instruction manual.

For trouble -shooting, see the instruction manual.

Electric diagram Optima 311 with ES 960 PCB



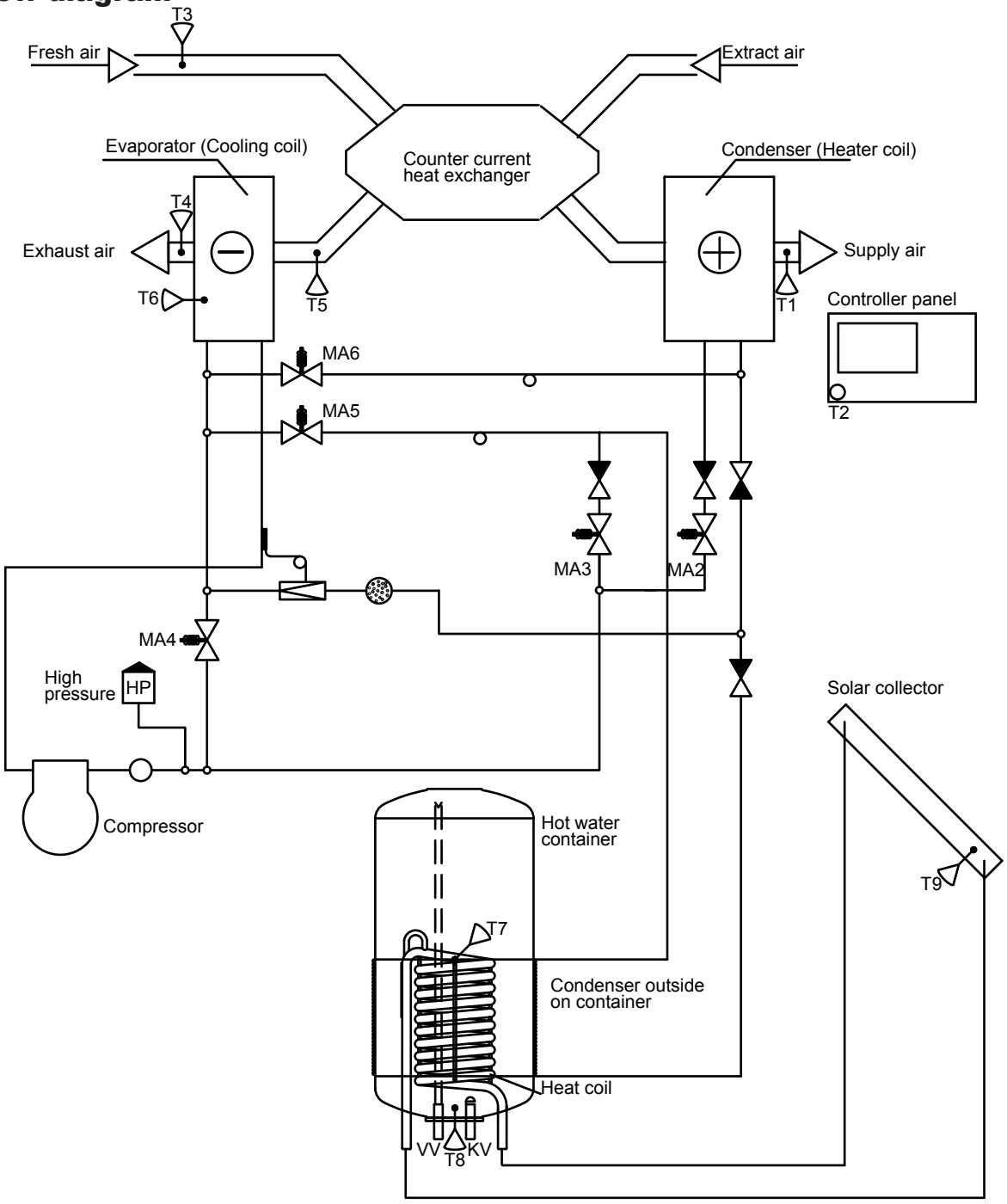
PCB ES 960 for Optima 311



L1=Genvex hygrostat
L2=Display
L3=Sensors T1,T3,T4 and T7
L6=Sensors T5, T6 and T8
L8=External stop
L9=Tacho signal from fans
L11=Water valve
L17=Speed EC fans

H1=Mains connection 230VAC
H2=Electrical immersion heater 1kW
H3=Electrical after heating
H4=High pressure switch
H5=Compressor
H6=Water valve 230VAC
H7=Fan 230VAC
H8=No connection
H9=Fan 230VAC
H10=Solenoid valve defrost 230VAC
H11=Extra cooling 230VAC
H12=Solenoid valve water and drain 230VAC
H13=No connection
H14=Solenoid valve room and drain 230VAC
H15=No connection
H16=Pump for solar collector 230VAC
H17=Operation relay 230VAC

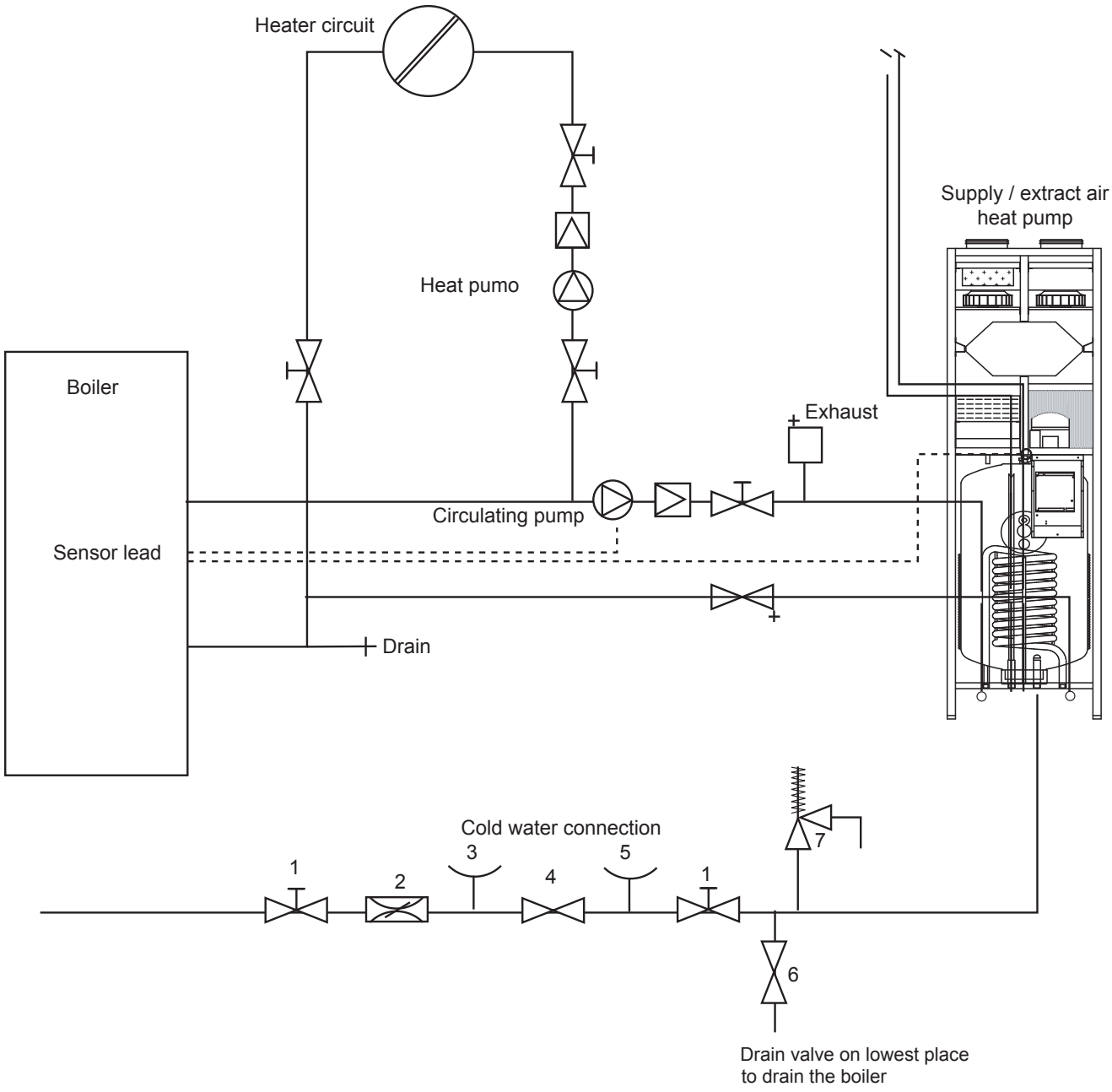
Flow diagram



Sensors:
T1: Supply air
T2: Room
T3: Fresh air
T4: Exhaust air
T5: Before cooling coil
T6: Cooling coil
T7: Container top
T8: Container bottom
T9: Solar collector

Magnetic valve	MA2	MA3	MA4	MA5	MA6
Heating water		ON			ON
Heating room	ON			ON	
No need of heating					
Defrosting			ON		

Hydraulic connections



1: Non-return valve
2: Pressure reducing valve
3: Check valve
4: Back pressure valve
5: Manometer connection piece
6: Drain valve
7: Safety valve up to 6.0 bar

Please assure if you assemble your heat pump with a heating-boiler or a solid fuel kettle the maximum temperature of the sanitary hot water does not transgress 65°C and the pressure in the accessory heat exchanger is not more than 3 bar!

CE

EF - Overenstemmelseserklæring
EC - Declaration of Conformity
EG - Konformitätserklärung

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Erklærer hermed, at følgende produkt / hereby certifies that the following product / bestätigt, da das nachfolgend bezeichnete Gerät:

B. Benævnelse : **Combi 185S/LS** **Vandvarmepumpe med brugsvand**
Type : **Combi 185S/LS** **Sanitary Water heat pump**
Typ: : **Combi 185S/LS** **Brauchwasser Wärmepumpe**

C. Hoved Nr : 012956, 012957, 012958, 012959, 012962, 012964, 012968, 012969, 012971, 012973,
Serie No. : 012974, 012975, 012976, 012978, 012988, 620323, 620358, 620358, 620359, 620200, 620317, 620356, 620357

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Er fremstillet i overensstemmelse med / is made according to /
über Einstimmung von nachfolgend bezeichnete EG-Sicherheitsstandards hergestellt:

Directive:

a)	2006/42/EF of 17. May 2006	Machinery
b)	2006/95/EF of 12. december 2006	Low Voltage.
c)	2004/108/EC 15. december 2004	EMC
d)	99/5/EF af 9. marts 1999	Radio and telecommunications equipment
e)	97/23 EF of 29. maj 1997	Pressure equipment.
f)	2011/65/EU of 8. june 2011	RoHS

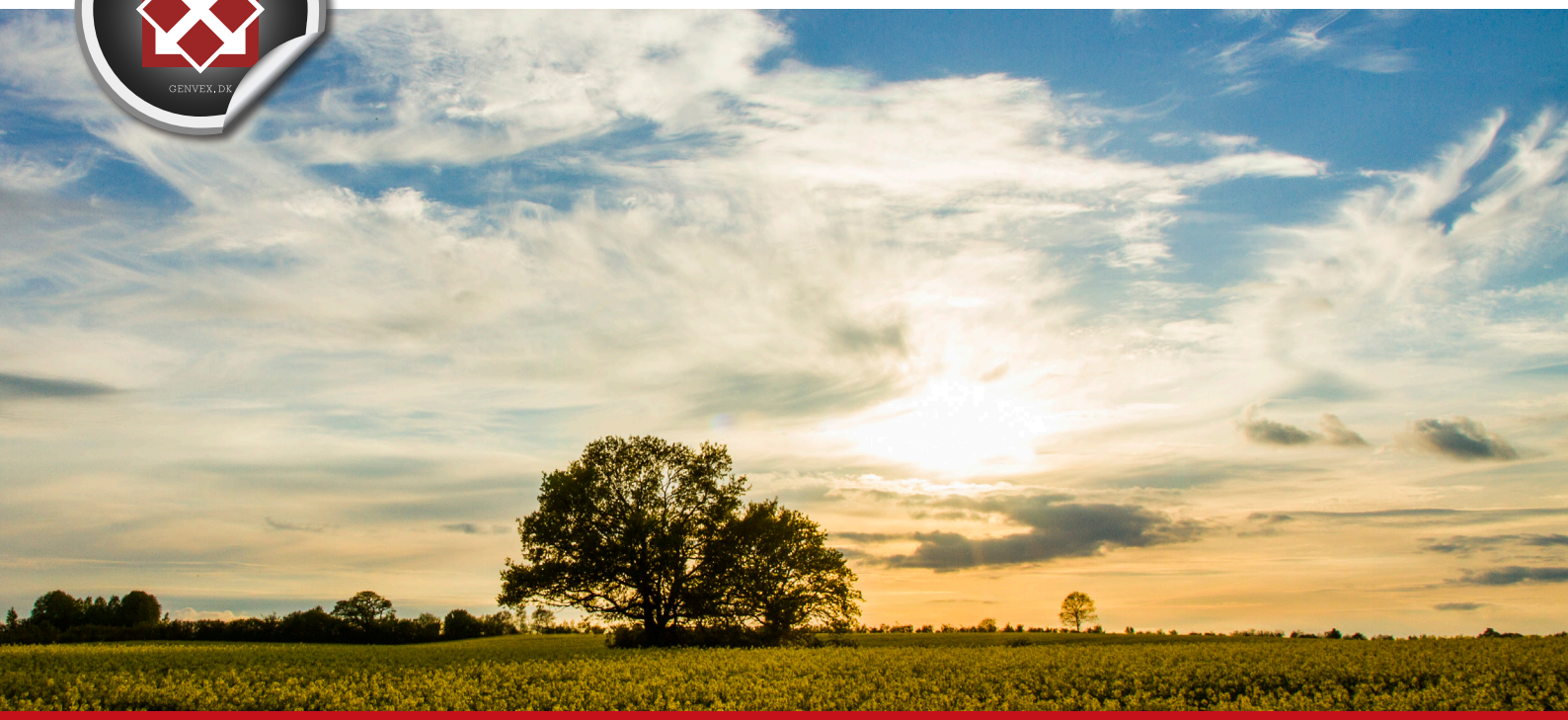
Departmental order:

g) LBK No. 823 af 3. juli 2007
h) BEK 743 af 23. september 1999
i) AT-BEK nr. 612 af 25. juni 2008.

DS/EN

a) 60335-1	Safety of household and similar electrical appliances
b) 60335 -2-34	motor-compressors
c) 60335-2-40	Electrical heat pumps air-conditioners and dehumidifiers
d) 55014-1	Electromagnetic compabillity part 1: Emission
e) 55014-2	Electromagnetic compabillity part 1: Immunity

Virksomhed: Company: Firma:	Sted og dato: Place and date: Ort und Datum:	Underskrift: Signature: Unterschrift:	
Genvex A/S Sverigesvej 6 DK-6100 Haderslev	Haderslev, 01. August 2013	Torben Thomsen (R&D Manager)	Johann P. Nicolaisen (Quality Assurance)



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