

It is important for safety reasons, that you read and observe these instructions fully before proceeding.

## ■ RECEIPT

The consignment contains one of the following units including a three speed controller and a summer-heat exchanger:  
KWLC 650

- SEH vertical installation (electric after heating), Ref. No.: 0176.001
- LEH horizontal installation (electric after heating), Ref. No.: 0178.001
- SWW vertical installation (after heating WW), Ref. No.: 0167.001
- SWW horizontal installation (after heating WW), Ref. No.: 0170.001

Please check delivery immediately on receipt for accuracy or damage, please notify carrier immediately of any damage. In case of delayed notification, any possible claim may be void.

## ■ STORAGE

When storing for a prolonged time the following steps are to be taken to avoid damaging influences: protection by dry air and dustproof packing (plastic bags with drying agent and moisture indicators). The storage area must be free of water, vibration and temperature variations.

When storing for years or non rotation of motor an inspection of the bearings with possible replacement and an installation inspection in accordance with VDE 0530 are necessary before starting using the unit. Damage caused by incorrect storage, transportation or installation are not valid warranty claims.

## ■ OPERATION / USE

The unit is designed to ventilate a combination of living rooms, bathrooms and kitchens in a single dwelling. The unit is equipped with a heat recovery cube. It must not be connected to kitchen hoods or laboratory extract systems. The standard equipment has a working temperature range from -20°C up to 40°C. The ambient temperature where the unit is installed must not be below 0°C. For operation under unusual conditions, e.g. high humidity, long periods of standstill, high air pollution, extreme climatic conditions (e.g. operating temperature over 40°C), technical or electronic inputs other than standard operation may affect the units performance. For this reason please enquire and obtain a quotation for a suitable unit, if available.

## ■ UNIT OPERATION

In the heat exchanger the cold outside air and the warm extracted air "cross over" and the temperature of the incoming air is raised. Through this method up to 80% of the energy of the warm air is transferred to the incoming air (Pic. 1). In addition a thermostatically controlled heating element warms up the supply air, in extreme cold weather conditions, to the required temperature. Frost conditions are detected by a Thermo-Humidity sensor which is positioned in the heat exchanger. The after heater warms up the supply air and the pre heating element is used as an additional heater to avoid frost in the heat exchanger. The inlet air is directed to the living rooms and bedrooms through ducts and dampers. The stale air is extracted from the bathrooms, toilets and kitchens and flows back to the heat exchanger via the ducting system and fan, transferring heat before being discharge into the open air.

## ■ PERFORMANCE DATA

To achieve the given performance, the unit must be correctly installed. The duct system must be designed to be within the units pressure capabilities and have good flow into and out of the unit otherwise there will be a reduction in the units performance. Noise figures are stated as sound power levels  $L_{WA}$  in dB(A) (confor-

ming to DIN 45635 Pt.1). Sound pressure levels  $L_{PA}$  depend on room specific conditions.

## ■ INSTALLATION-ASSEMBLY

(picture. 3, page 4)

The KWLC 650 S is suitable for "vertical" installation wherever desired usually in the loft space. As a base to mount the unit on we recommend chipboard on a secure mineral wool board (approx. 60 x 140 cm) to prevent vibration transmission or use a commercial anti vibration pad (approx. 60 x 140 cm). The mounting surface must be level, flat and even. The KWLC 650 L is suitable for "horizontal" installation. **For effective condensate removal from the unit, the unit should slope down in the direction of the drain pipe by 5° the unit has differing height feet to achieve this.** The ducting should be as short as possible and tight bends should be avoided as they can lead to a high pressure loss and airflow noise. The ductwork joints should be fully sealed to prevent air loss. The supply and extract ducting should be insulated to gain the best thermal efficiency. For maintenance and installation work, instal the unit in an accesible position. When installed in areas with low ambient temperature (e.g. roof space) the unit may require additional insulation.

**The summer-heat exchanger and operating switch are supplied inside the unit these must be removed before installation. It is essential that the installed unit tray has a drop in the direction of the condensate water flow.**

## General recommendation

The use of oil or gas burning devices e.g. boilers, gas heaters gas hobs and ovens require a free flow of air. Used in combination with a heat recovery unit all national regulations must be followed. A separate air inlet may have to be provided for.

## – CONDENSATION RUN-OFF

picture 4/5

The condensation pipe (4) is to be connected to the water run off by means of a flexible pipe of 15mm diameter. If it is not in a room which is heated, it must be insulated. A suitable drain trap is to be provided with a minimum height of 100 mm, otherwise water could be drawn back through the fan.

**Fill the drain trap with water before putting into operation to avoid smells from the drain system. The regulations of the water board and other legislation must be observed.**

**NOTE: When connecting the condensation pipe by (cold) pressing avoid any axial or radial forces on the unit drain pipe. The use of a flexible pipe is recommended.**

## – AIR DUCTING, VENTILATION CIRCUIT

(picture 4.)

When designing the ductwork, try to achieve the shortest possible runs. Use smooth pipes (rigid plastic or steel ducting), **to avoid high pressure loss, noise** etc. For the main ducting (outside air, extract air, inlet air, discharge collection) a diameter 250 mm is recommended, for branch pipes a diameter 150 mm to 200 mm. To reduce condensation in the extract pipes, the ducting has to be insulated where appropriate. Also if inlet and extract ductwork cross unheated rooms insulation must be provided to reduce heat loss.

Fresh air should be taken into living- and bedrooms, extraction from bathrooms, toilets and kitchens. To regulate the whole system use adjustable Helios valves. The extract from the kitchen needs to be filtered. A kitchen hood must not be connected up to the unit (danger of grease carried into the heat exchanger). There must be a good air flow (e.g. using door grilles) within the building between intake rooms and extract rooms.

**Important: all fire protection regulations - where applicable- must be followed.**

## – Thermo-humidity sensor

(picture 5)

The electronic thermo humidity sensor (3) is in the heat exchanger in order to detect the humidity level of the fresh and extract air. This allows a more precise detection of the risk of frost in the heat exchanger.

## – ELECTRICAL CONNECTIONS

(pic. 5/6)

Electrical connection may only be carried out by a qualified person. All electrical work must only be carried out with the power supply off. A lockable isolator is required isolate from the mains with a minimum of 3 mm contact opening of each pole.

**All relevant safety and installation regulations (for example DIN VDE 0100 and IEE regulations) are to be adhered.**

Electrical connections are to be made according to wiring diagrams provided in these instructions. The connection to the control panel are of plug in type using the cables provided. The unit is designed for continuous running and cannot be switched off as a standard. To switch off please use an isolating switch in the power supply. The time clock in the KWL-WSU will continue as it has a battery back up. ( see note in speeds and settings section). The installation of the intake air temperature sensor (21) should be fitted inside the intake air duct (approx. 1-1,5 meters from the unit). The sensor is prewired as standard.



# Heat recovery unit KWLC 650

## OPERATION – ADJUSTMENT

PICTURE 5

Three fan speeds are possible with the KWLC 650 S/L using the 3 step switch, which should be installed in a place easy to reach within the house.

MIN	speed step 1	Basic air flow, for less intake air needs
NORMAL	speed step 2	Normal air flow
MAX	speed step 3	Full R.P.M., for maximum intake air.

In addition the control panel offers the following functions:

- **Left button (+ Symbol)** activates/deactivates the after heater (in relation to the dip switch settings). If the after heating is activated it turns on automatically if the set temperature is not reached through the heat exchanger.

<b>Red light (!)</b>	slow flashing	Change filter! (if the DDS pressure sensor is fitted)
	fast flashing	One of the safety temperature cut outs (2) of the pre or after heater has tripped .
<b>Green light (+)</b>	constant light	both cut outs tripped.
	Lights up, when the after heater is activated.*	
<b>Yellow light (°C)</b>	Lights up if the after heater is in use.	

\*) The switch control light operates when the heating coil is on. For units with a water heater battery this control light can be switched via a remote signal.

### Regulating the additional heating for units with electric heater battery (Type KWLC 650..EH):

The thermostat for the additional heating (Pic.5, no.1) is on the top of the unit sensing the extract air after the heat exchanger. The thermostat is factory set at 15°C, but can be adjusted as required.

The heater is protected against overheating by a thermal overload thermostat that switches off automatically when a temperature of 55°C has been reached. As an additional safety control, a second thermostat switches off the whole unit if a temperature of 80°C is exceeded. The thermostat can be manually reset by pressing the red push button, which is accessible by removing the white plastic lid.

## SPEEDS AND SETTINGS

Speed step 2 of the unit can be set to the size of the dwelling by opening up the unit and changing the marked speed step 2 wire at the transformer in the unit according to the internal wiring diagram. Isolate the unit from the power supply before opening.

Note: if the power supply of the unit is cut it will restart afterwards in NORMAL speed (speed 2) and the electric after heater is activated.

**Attention:** For good room conditions and to reduce condensation water damage, the unit should not be completely switched off, except when servicing / maintenance or in case of breakdown.

### DIP-Switch setting

**Important:** When putting the unit into operation the dip-switch settings and the temperatures settings must be checked. It is recommended to carry out customer specific setting on site.

Switch No.	Recommend. setting	Function
1	ON	ON = After heater switched off in case of Frost
		OFF = After heater not switched off in case of frost
2	OFF	ON = After heater switched off on MIN speed
		OFF = After heater always on
3 only with KWL-WSU	OFF	ON = Inlet air night set back of 3 °C (if S2 is in OFF position)
		OFF= No temp. night set back
4 only with KWL-WSU	ON	ON = Air flow set to MIN during night only with KWL-WSU
		OFF = no function
5	OFF	ON = Pre heater is used as frost protection and additional (after) heating. Pre- and after heater both work if set inlet temp. is not reached (more KW)
		OFF= Pre heating is only used as frost protection

6	OFF	ON = Frost sensor with Phono plug
		OFF = Frost sensor with ISDN- plug

### Notes and recommendation for settings: (see table above)

#### Switch No. 1

As the frost protection will reduce the speed of the intake air fan to speed MIN the pre heater will provide the following delta temperature:

KWLC 650  $\dot{V} = 200 \text{ m}^3/\text{h}$  results in a  $\Delta T$  of 21K

+ the heat of the heat exchanger. Therefore after heating is not required.

#### Switch No. 2

As the after heater is regulated by a temp. sensor it may also be used for speed step „MIN“ (position OFF), in order to achieve the desired inlet temperature.

#### Switch No. 3

When using a KWL-WSU switch clock, if S2 is in OFF position, a temperature night setback of 3°C can be achieved when setting S3 is in the ON position.

#### Switch No. 4

When using a KWL-WSU switch clock, if S2 is in the OFF position, the air flow may be set to MIN during the night if S4 is set to ON.

#### Switch No. 5

Under normal wheather condition the output of the after heater is sufficient. An additional pre heating reduces the efficiency of the heat exchanger as the delta temperature drops. The pre heater is only used for frost protection when S5 is set to OFF.

#### Switch No. 6

(!) do not touch! see plug = ISDN - RJ 45 plug.

### Regulating the additional heating for units with electric heater battery (Type KWLC 650...EH): (picture 5.)

The thermostat for the additional heating (1) is on top of the unit sensing the extract air after the heat exchanger. The thermostat is factory set at 15°C, but can be adjusted as required.

The heater is protected from overheating by a thermal overload thermostat (2). It switches off automatically when the temperature of 65°C has been reached. This will reset automatically after having cooled down. As an additional safety control, a second thermostat switches off the whole unit if a temperature of 80°C is exceeded (2.1). The thermostat can be manually reset by pressing the red push button, which is accessible by removing the white plastic lid.

### Regulating the additional heating for units with water heater battery (Type KWLC 650..WW): (picture 5, version WW)

The after heating is provided by a build-in water heater battery (7a). Intake and extract duct-work must be insulated to avoid ice build up on the water heater battery and the pipes. For regulation, a thermostat is positioned in the intake air duct, which works as a closing contact. The volt free contact can be used to regulate a valve.

**Attention:** The temperature sensor is located in the intake spigot. When intake ductwork goes through cold areas, heat loss on the way to the valve must be considered.

### Frost protection of the Water Heater Battery (picture 5, version WW)

Intake and extract ductwork must be insulated to avoid ice build up on the water heater battery. Directly in front of the water heater battery a frost protection thermostat is positioned which closes at +5°C. The volt free contact of the thermostat is to be connected with the heater control in a way, that the shunt valve opens as soon as heater and circulating pump are switched off. This forced control avoids the ice build up on the water heater battery. When switching off the heater be sure that the water heater battery will be drained. Otherwise avoiding ice build up cannot be guaranteed.

### Frost Protection of the Heat Exchanger Unit (picture. 5)

The sensor (3) for the frost protection thermostat is mounted where the extract air leaves the heat exchanger. This sensor controls the intake air fan to avoid ice build up. Warm air (e.g. from the bathroom) contains high humidity and therefore it is very likely that condensation will occur. Thus the temperature in the heat exchanger must not drop so low that the water in it freezes. With the drop of the outside temperature the heat exchanger temperature drops as well. When the heat exchanger temperature drops to +2°C the intake air fan switches off until the heat exchanger has warmed up sufficiently. The frost protection thermostat (3) is factory set and normally needs no adjustment. Note: the use of the pre heating element will avoid ice build up to much lower outside temperatures.

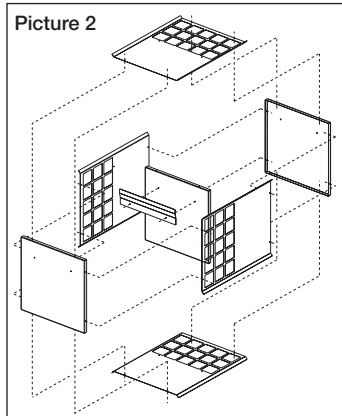
## - Summer Service

During the warmer summer months when it is not necessary to recover heat, the heat exchanger can be replaced with a summer insert. Then outside air comes directly into the house without being warmed up. Make sure that the temperature sensor is set to a low temperature (e.g. +18°C) in order to avoid unwanted heating up inside the building. In the autumn, the summer kit must be replaced with the heat exchanger and the temperature sensor should be adjusted accordingly.

### Note:

Before first use, the summer insert has to be assembled as shown in picture 2.

Remember to reset the thermostat the following autumn and to mount the heat exchanger unit again.



## ■ MAINTENANCE:

The unit should be isolated from the mains before any servicing starts.

### □ Opening of access doors (pic. 5)

Open the clamps (14). Then remove the access door completely (12/13). To replace the door - fit back into the frame and clamp in place.

**Attention:** The unit has an access door on both sides so that entry can be made through the side required.

### □ Filter

The unit comes complete with filters (DIN EN 1946, T.2):

- Outside air: pre filter G3 and fine filter F5  
(also available: optional pollen filter F7)
- Extract air: pre filter G3

Spare filter set 2x G3 + 1x F5	ELF-KWL 650/3/3/5	Ref.-No. 0026
Spare filter set 2x G3 + 1x F7	ELF-KWL 650/3/3/7*	Ref.-No. 0027

The outside and the extract prefilter are to be changed or cleaned at least every three months. The fine filter should be replaced at least once a year of use for hygienic reasons. When replacing the filter the correct air flow direction through the filter has to be observed. When the outside air is very dirty an air filter box (LFBR 250, ref.-no. 8580) should be fitted in the ductwork and the filter should be cleaned or replaced frequently.

### □ Filter control (pict. 5)

To monitor the filter, a differential pressure switch (accessory DDS switch, Ref.-no. 0445) can be connected to the KWLC. The knock outs for the pressure hoses (18) are already drilled and connected with duct adapters. Remove link "FI" on the electrical terminal board. Then if the filter is dirty, the lamp on the control panel will light up.

## - Fans

The fans are to be maintained and cleaned once a year at least. For cleaning use a small brush and an oil free cleaning fluid. Make sure that no water gets into the motor. Fan must be completely dry before re-using. **To remove the fan, unplug the electrical plug-socket facility.** Loosen the four screws (16) and remove it carefully by pulling. To remove the right fan loosen the two side screws (15) and pull the fan towards you. Then the fan can be removed like the other one. Ensure that the balancing clips are not removed from the impeller.

### □ Heat exchanger battery

Must be cleaned at least twice a year. Pull out the unit carefully. For cleaning put in warm soapy water (do not use cleaning fluid containing Natriumcarbonate) and finally clean with warm water. When re-assembling ensure correct installation and take care not to damage the seals.

□ **Room grilles:** To be cleaned at least annually.

□ **Outside grilles:** Check yearly that grilles are free from leaves etc.

## ■ SOURCES OF MALFUNCTIONING

(picture 5)

**Before working on the unit make sure that it is fully isolated from the supply.**

### - No air flow

- Check electrical connection / fuses

### - Inlet air is cold

- Set heater thermostat (1) to a higher temperature
- Ductwork in cold areas need extra insulation.
- Make sure that summer-insert was changed for the heater exchanger.
- The overheating thermostat (2) may have tripped. Remove white plastic cap and press red button.

### - Substantially reduced air flow

- Filters (5 and 6) could be dirty. Change or clean them (see maintenance)

If any of the above points do not help please contact HELIOS.

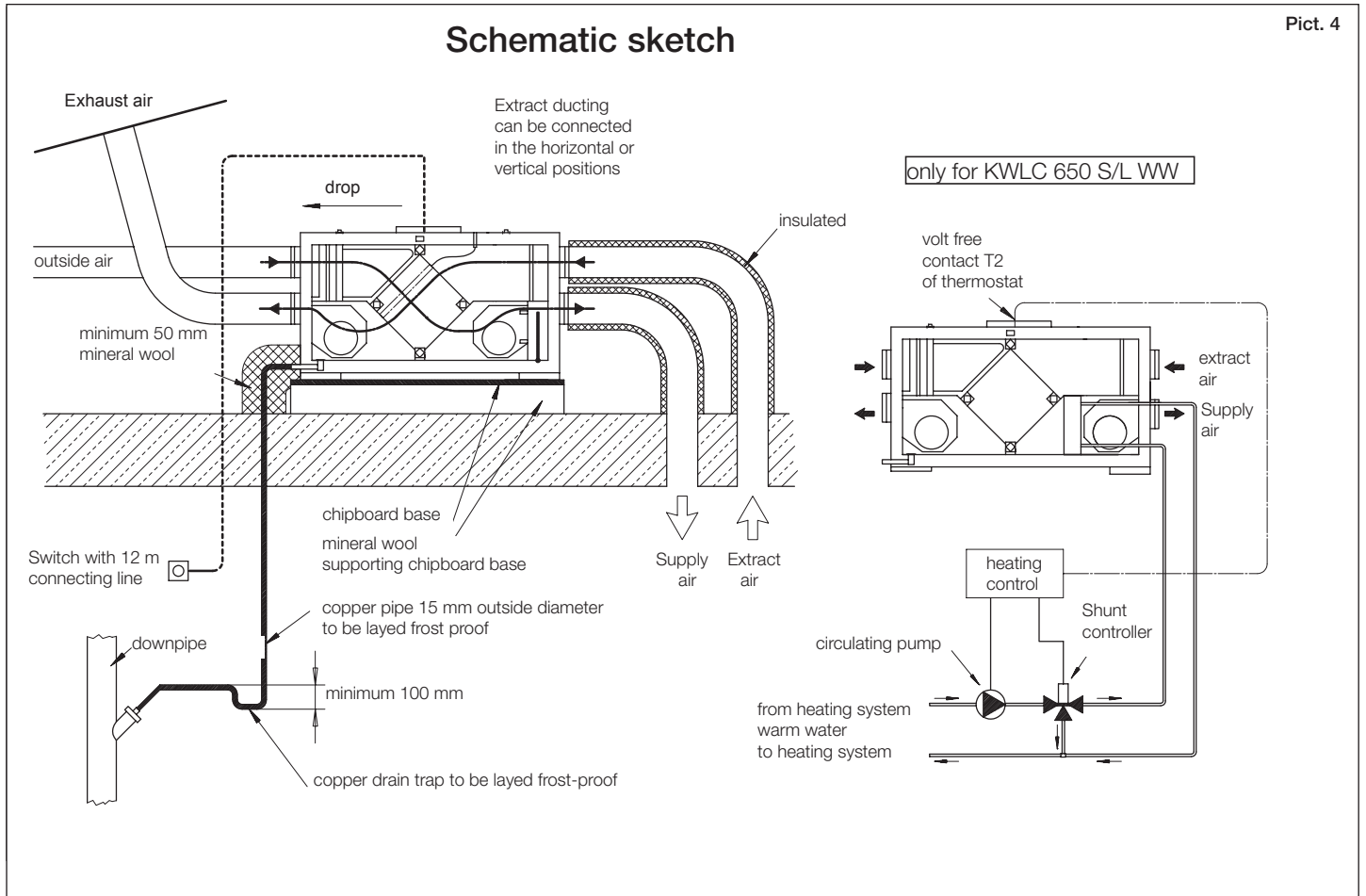
Please state serial number given on the rating plate which is near the thermostat of the heating coil.

**Do not try to repair the unit yourself.**



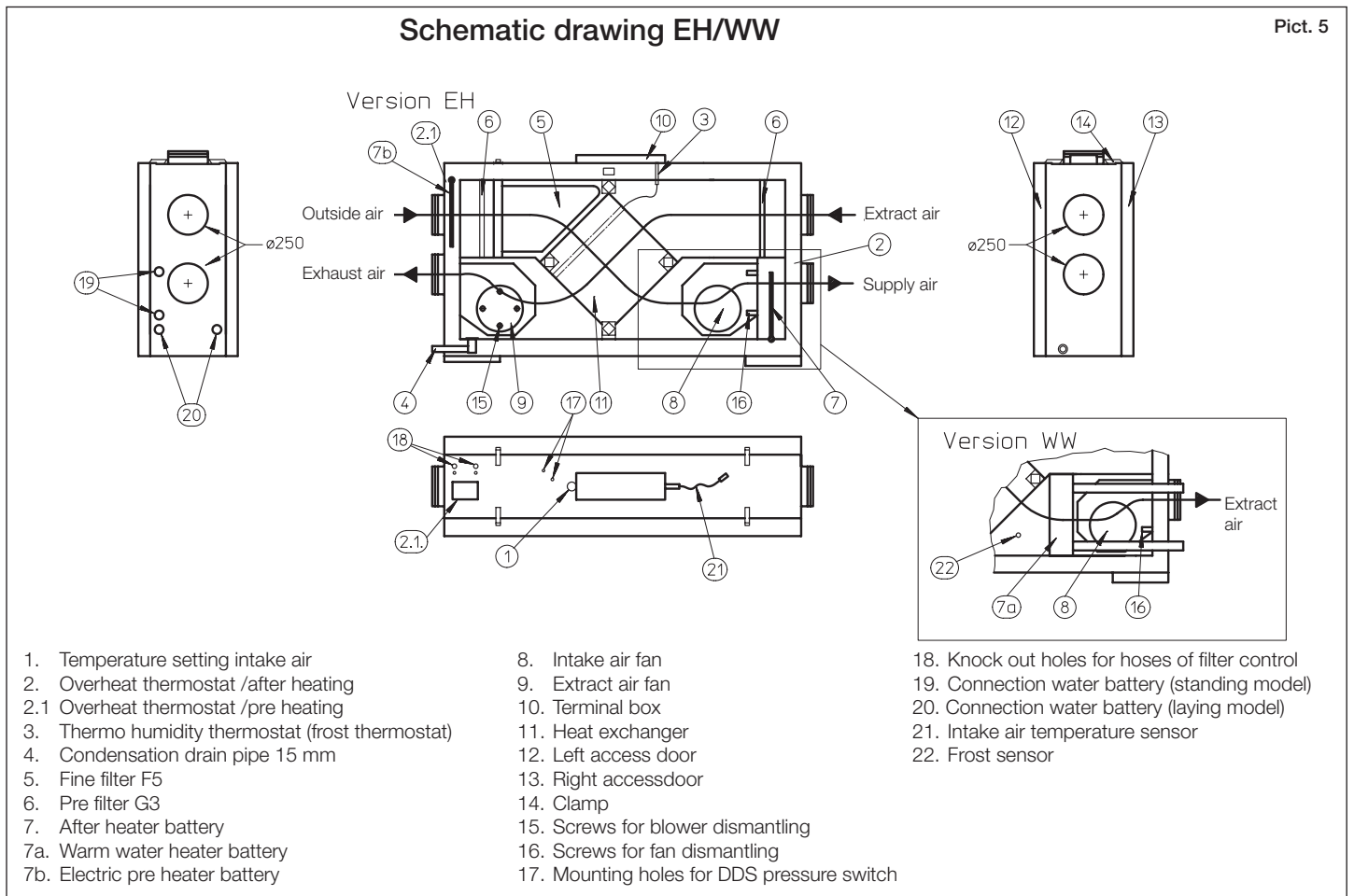
**Schematic sketch**

Pict. 4

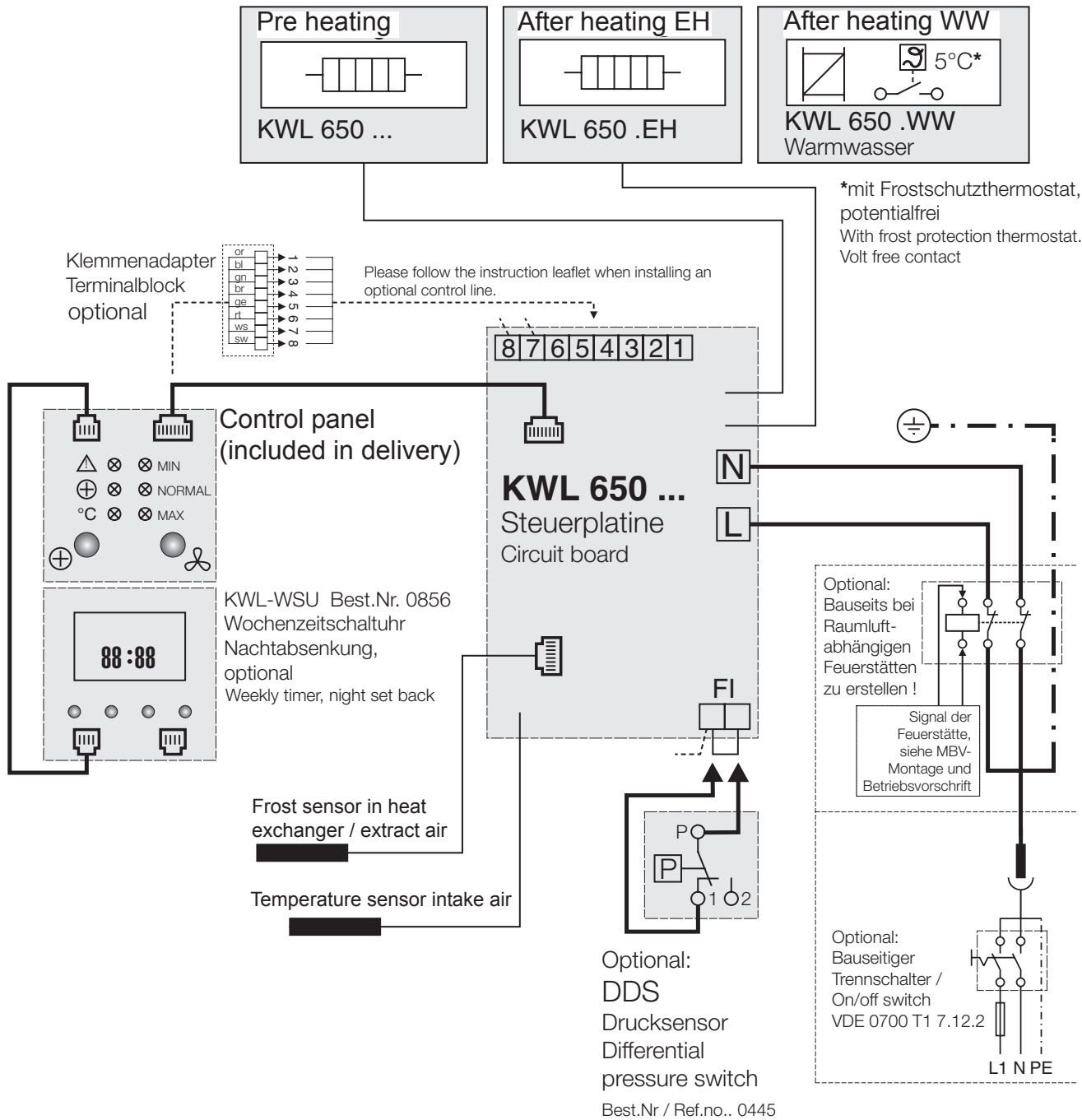


**Schematic drawing EH/WW**

Pict. 5



**KWLC 650**  
with control panel  
Wiring diagram No. SS-832



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