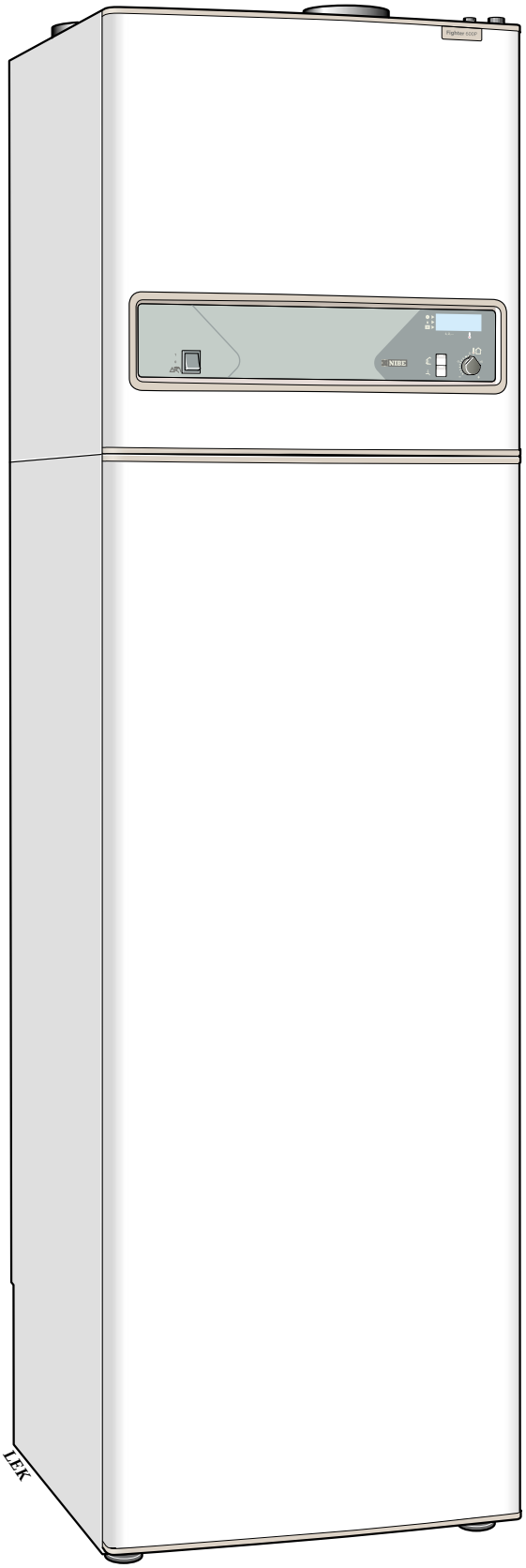
NIBE®

MOS GB 0413-2 611424
FIGHTER 600P

INSTALLATION AND MAINTENANCE INSTRUCTIONS

FIGHTER 600P



Contents 1

For Home Owners

For the Installer

2 General

In order to get the ultimate benefit from your heat pump FIGHTER 600P you should read through the For Home Owners section in this Installation and Maintenance Instruction.

FIGHTER 600P is a combined exhaust air and outdoor air heat pump. This means it utilises energy in ventilation air and outdoor air when this does not fall below -5 °C. This energy is used for hot water and heating the house.

A microprocessor ensures that the heat pump always works efficiently.

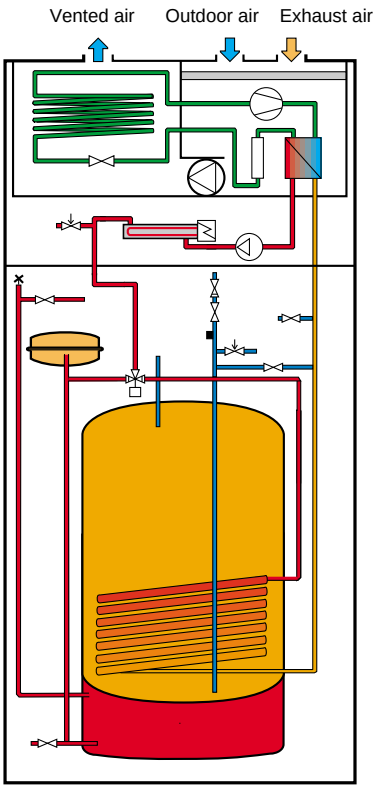
FIGHTER 600P uses R290 (Propane) environmental heat transfer fluid.

To be filled in when the heat pump has been installed

Installation date
Manufacturing number
Installation engineers
Chosen output, immersion heater
Circulation pump setting
Fan rating
Selected fan curve
Set damper angle, exhaust air
Set damper angle, outdoor air
Setting Heating curve selection
Setting Heating curve offset
Setting Blocking temperature immersion heater
Pre-pressure expansion vessel (0.5 bar on delivery)

System description 3

Principle of operation



FIGHTER 600P consists of an electric boiler with enamelled water heater and a heat pump that recovers energy from ventilation air and outdoor air when this is - 5 °C or warmer. If the outdoor temperature is colder than - 5 °C a damper closes so that only ventilation air is used as the heat source. The recovered energy is supplied to the heat pump. The heat pump must be installed in a ventilation system intended for mechanical exhaust air.

When the exhaust air at room temperature together with the outdoor air passes through the evaporator, the refrigerant evaporates because of its low boiling point. In this way the heat in the air is transferred to the refrigerant.

The refrigerant is then compressed in a compressor, causing the temperature to rise considerably.

The warm refrigerant is led to the condenser (plate heat exchanger). Here the refrigerant gives off its heat to the boiler water, so that its temperature drops and the refrigerant changes state from gas to liquid.

The refrigerant then goes via filters to the expansion valve, where the pressure drops and the temperature is lowered further.

The refrigerant has now completed its circulation and returns to the evaporator.

When the heat pump's output is not solely sufficient an integrated immersion heater is connected in. The output of the immersion heater is 9.0 kW.

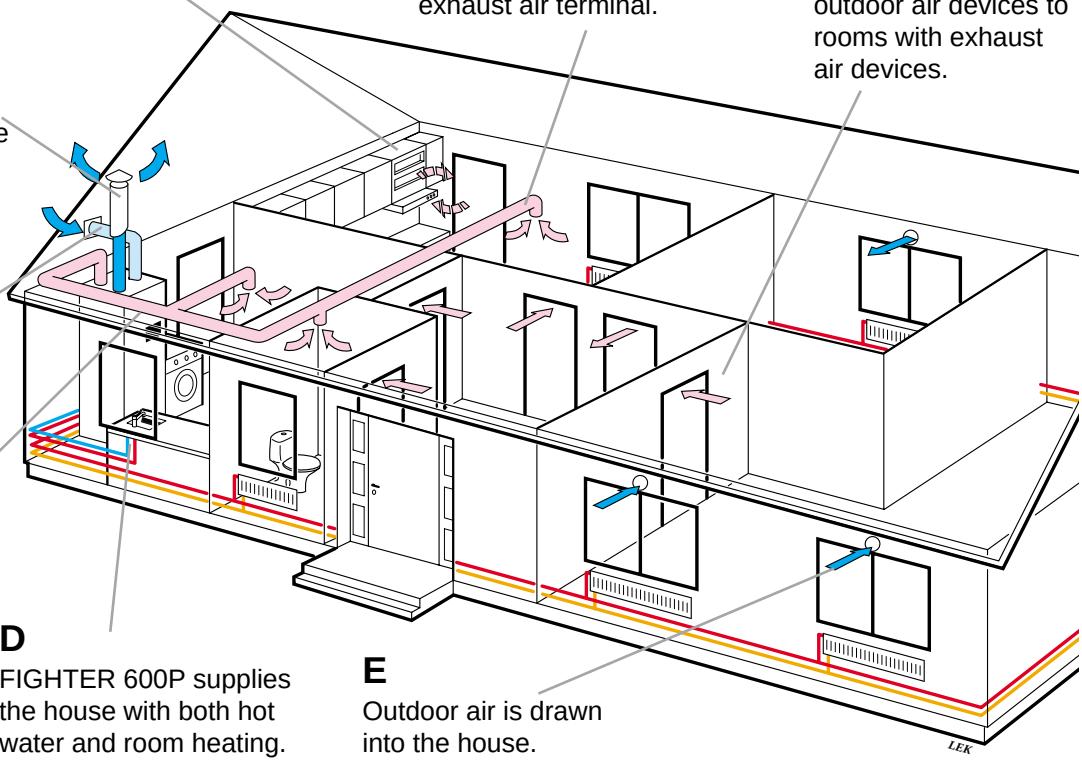
System diagram

C
When the room air and any outdoor air has passed the heat pump the temperature has dropped significantly as the heat pump has utilised the energy in the air.

G
Recirculating kitchen fans.

A
The warm room air is drawn into the duct system via the exhaust air terminal.

F
Air is transported from rooms with outdoor air devices to rooms with exhaust air devices.



H
When the outdoor air is -5 °C or warmer it is led into the heat pump.

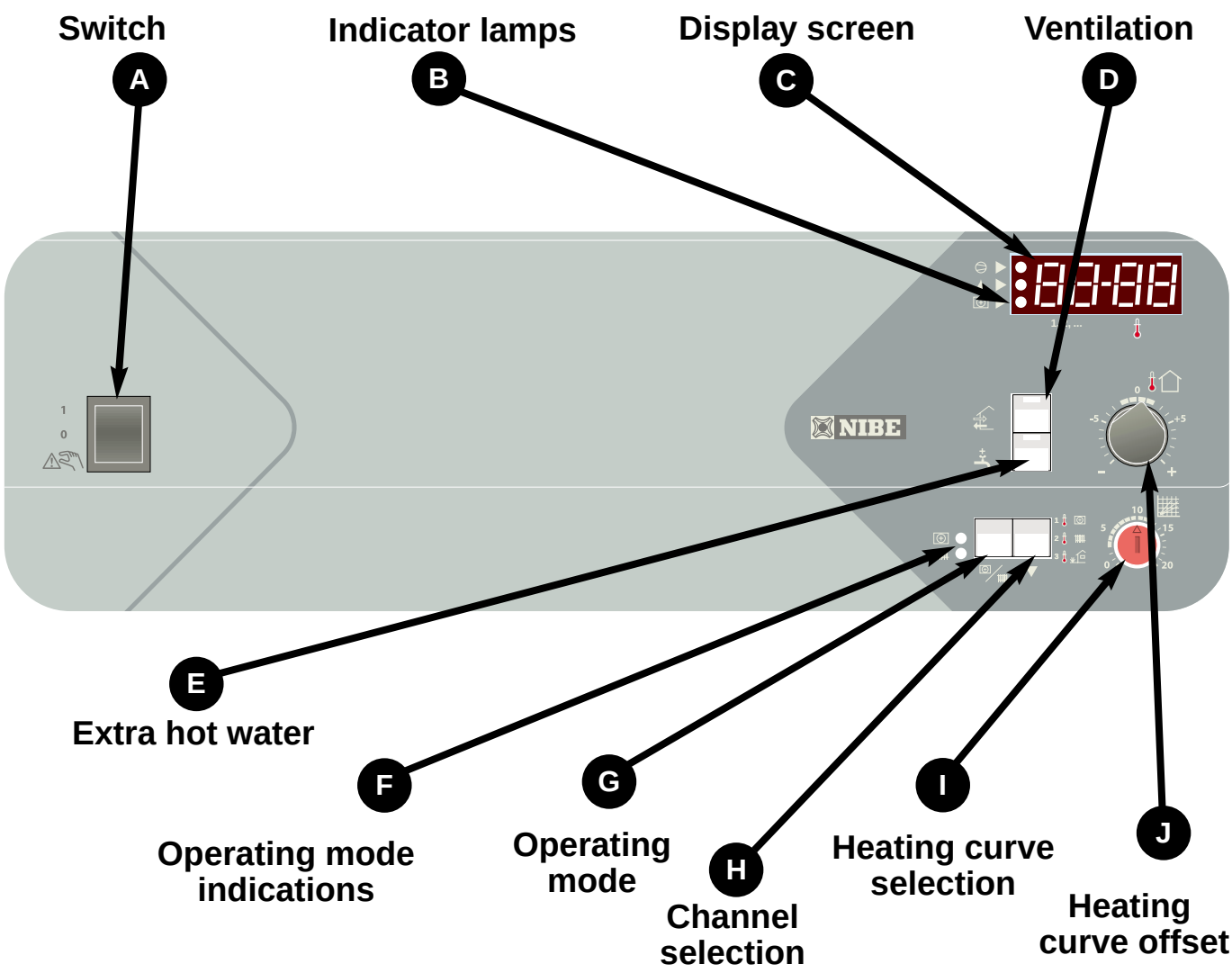
B
The warm room air is fed via the duct system to FIGHTER 600P.

D
FIGHTER 600P supplies the house with both hot water and room heating.

E
Outdoor air is drawn into the house.

4 Front panel

Front panel



Functions on the front panel

A Switch

with 3 positions 0 - 1 - ⚠:

0 Heat pump off.

1 Normal mode. All control operations connected.

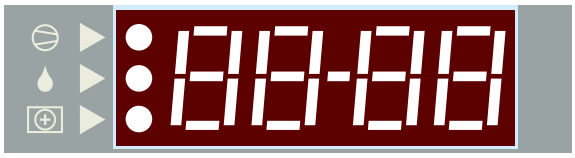
⚠ Standby. This mode is used during start up and with any operating disruptions.

NOTE!

Check that there is water in the system before turning the switch to 1 or ⚠.

When ⚠ is selected, the maximum boiler and flow temperature are set with the standby mode thermostat. This is important in order to prevent any damage due to a too high temperature with, for example, a floor heating system.

B Indicator lamps



Top lamp

Lit	Compressor is running.
Not lit	Compressor is not running.

Midmost lamp

Lit	Automatic defrosting.
Not lit	Normal mode.

Lower lamp

Lit	Immersion heater is in operation.
Not lit	Immersion heater is not in operation.
Flashing	Immersion heater or part of the immersion heater blocked via centralised load control/tariff control or due to a 2 hour delay with start of FIGHTER 600P.

Functions on the front panel

C Numerical display

In normal mode the boiler temperature is displayed here. The two digits on the left indicate the channel number and the two on the right the reading/setting of that channel.

In the event of a malfunction, an error message is displayed alternately with channel number and value. See Dealing with malfunctions — Indications on the numerical display.

D Ventilation

Ventilation is increased for 6 hours (party mode) if the Ventilation button is pressed in. The integrated lamp flashes in this operating mode. FIGHTER 600P then reverts to normal mode.

Pressing the button again reconnects the ventilation to normal mode. The integrated lamp goes out in this operating mode.

NOTE! If FIGHTER 600P is installed in a large house so that no outdoor air is utilised only exhaust air, the ventilation will not be increased in party mode.

E Extra hot water

Pressing the Extra hot water button increases the hot water temperature to approximately 60 °C, providing a rise in the hot water capacity for approximately 24 hours. The integrated lamp is lit in this mode. FIGHTER 600P then reverts to normal mode.

Pressing the button once again enables an ongoing function where the hot water temperature is increased for 6 hours once a day. The integrated lamp flashes in this mode,

Pressing the button yet again engages to normal mode.

F Operating mode indications

The two lamps next to the operating mode selector indicate the selected operating mode. This should not be confused with the indicating lamps in the numerical display.

Top lamp Supplement

Lit	The immersion heater may be connected if necessary, i.e. when the compressor cannot single handed cover the heating requirement.
Not lit	The immersion heater is disabled.
Flashing	The outdoor temperature is higher than the set blocking temperature for the immersion heater (however, not when immersion heater is blocked via the operating mode selector).

Lower lamp Circulation pump

Lit	The circulation pump is operational.
Not lit	Circulation pump only operational during hot water heating.

The top lamp Supplement is lit and the lower lamp Circulation pump flashes.

Time/temperature programme for the drying process regarding floor heating is operational. This function is normally only used during installation

G Operating mode

When the heat pump is started, all functions (immersion heater, circulation pump and automatic heating control system) are running. When the operating mode is changed, the changes are saved in memory so that the heat pump starts in this chosen operating mode in the event of a restart, for example, after a power failure.

Pressing the Operating mode button once disables the immersion heater.

Pressing it once more stops the circulation pump as well. However, note that the circulation pump is operational during hot water heating.

Pressing it yet again reconnects the immersion heater and the circulation pump.

H Channel selection

Use the Channel selection button to scroll forward through the numerical display's channels to see the required reading or setting

Available readings/settings include:

1 Boiler temperature
2 Flow temperature.
3 Outdoor temperature
4 Evaporation temperature
5 Extract air temperature
6 Heating curve
7 Heating curve offset
8 Hot water temperature
9 Blocking temperature, immersion heater (outdoor temperature)
10 Calculated flow temperature
11 Service mode
12 - 27 Service channels, **Note! Only for professionals**

Channel **1** is shown automatically after approximately 4 hours.

I Heating curve selection

Use the Heating curve selection knob to set the automatic heating control system; see under Room temperature.

J Heating curve offset

With the Heating curve offset button you can change the offset of the heating curve and thus the room temperature.

6 Room temperature

Automatic heating control system

The indoor temperature depends on several factors. During the hot season, solar radiation and heat given off by people and equipment are sufficient to keep the house warm. When it gets colder outside, the heating system must be started. The colder its gets, the hotter the radiators must be.

Default setting

The basic heating is set with the Heating curve selection knob and with the Heating curve offset knob.

If you do not know the correct settings use the basic data from the map opposite.

If the required room temperature is not obtained, readjustment may be necessary.

NOTE! Wait one day between settings so that the temperatures have time to stabilise.

Readjustment the default settings

Cold weather conditions

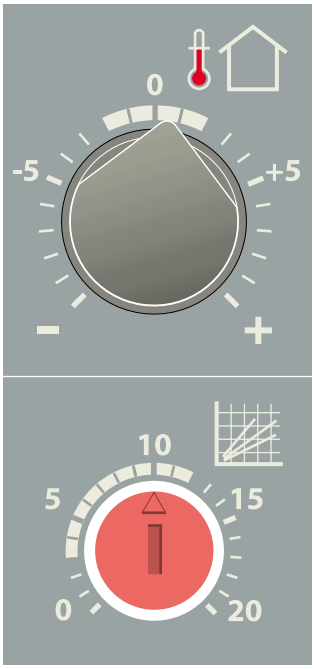
If the room temperature is low, increase the heating curve selection setting by one step.

If the room temperature is high, reduce the heating curve selection setting by one step.

Warm weather conditions

If the room temperature is low, increase the heating curve offset setting by one step.

If the room temperature is high, reduce the heating curve offset setting by one step.



This adjustment is made automatically, however the basic settings must first be made on the boiler, see the section Room temperature - Default setting.

Changing the room temperature

Changing the room temperature manually

If you want to temporarily or permanently lower or raise the indoor temperature relative to the previously set temperature, turn the Heating curve offset knob anticlockwise or clockwise respectively. One scale marking corresponds to a change of about one degree in the room temperature.

NOTE! An increase in the room temperature may be inhibited by the radiator or floor heating thermostats, if so these must be turned up.

Blocking the immersion heater

FIGHTER 600P offers the possibility to block immersion heater operations as a function of the outdoor temperature.

This means that when the outdoor temperature is above a set value the immersion heater is not connected despite compliance with the normal control conditions. The set temperature should be selected so that the heating requirement and the hot water requirement are lower than the heat pump's capacity above this outdoor temperature. This temperature is dependent on the size of the house, degree of insulation, required room temperature and hot water usage.

Setting this temperature takes place according to the following:

Scroll to channel 9 using the Channel selection button. The set value is then shown on the numerical display. To change the value, press the Ventilation button (increase the value one step) alternatively the Extra hot water button (lowers the value one step).

The value can be set between +1 and +25 °C. If this function is not required select +25 °C, which is also the setting on delivery.

NOTE! The immersion heater can also be blocked permanently irrespective of the outdoor temperature by using the Operating mode button, see the section Functions on the front panel - Functions on the front panel.

NOTE! However, when the Extra hot water function is activated the immersion heater is permitted to be operational irrespective of the above blocking.

Room temperature 7

Basic values for the automatic heating control system

The association between the outdoor temperature and the flow temperature is set using the Heating curve selection (37) and Increase/reduce heat buttons (38).

The design flow temperature and the design outdoor temperature are used as the input data in the adjoining diagrams to read the curve slope, which is set using the Heating curve selection knob.

The setting on the Increase/reduce heat knob determines at which outdoor temperature heating should stop. If the offset is set to 0 this means heating stops at the outdoor temperature of + 20 °C. As you normally have a degree of free heating a value below zero can be set with this knob.

The adjoining diagram shows the curve intersections at offsets - 2, ± 0 and + 2. The default setting from the factory is curve 10 on Heating curve selection and offset - 2 on Increase/reduce heat.

In those cases where the heating system's design flow temperature is not known the map below can be used as a guide for setting Heating curve selection.

The first figure applies to a radiator system and the figure in brackets applies to floor heating installed in a concrete floor structure where the max flow temperature is 35 °C. When the floor heating system is installed in a wooden floor structure you can start with the figure before brackets and reduce this value by two units.

A suitable setting on the Increase/reduce knob is - 2 for radiator systems and -1 for floor heating.

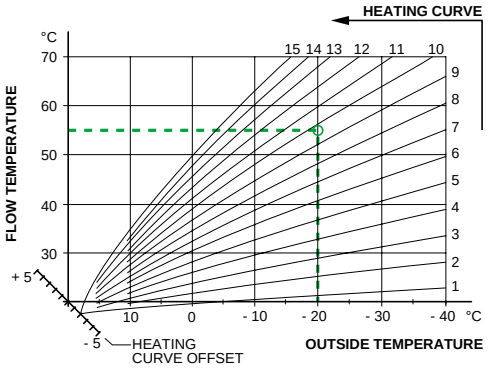


Diagram with offset - 2

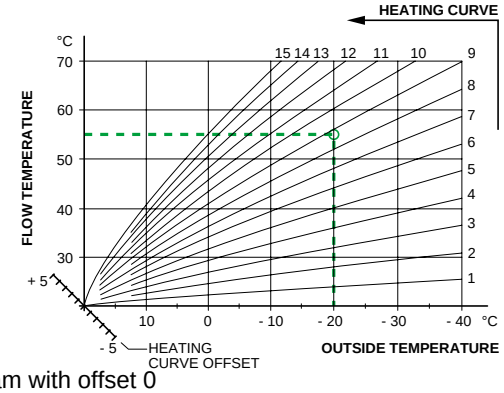


Diagram with offset 0

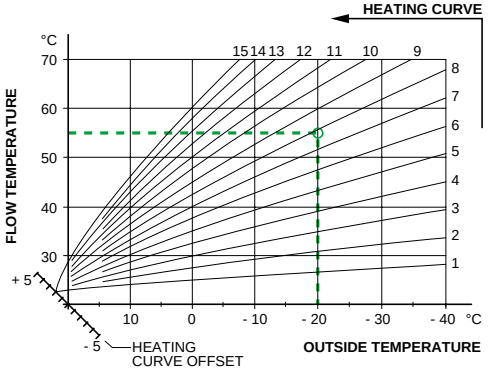


Diagram with offset +2

8 Maintenance routines

General

The heat pump and its ventilation ducting require some regular maintenance when the following points should be checked.

The numbers in brackets refer to the section Component locations.

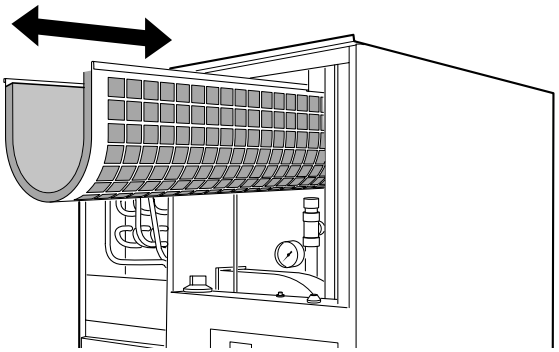
Cleaning the air filter

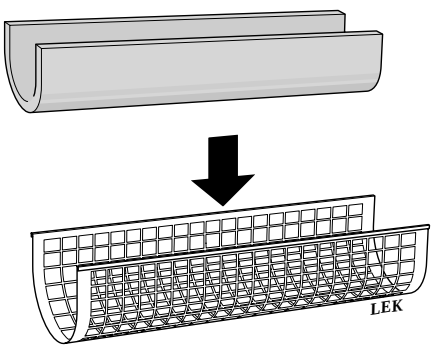
The heat pump air filter should be cleaned regularly, about four times a year. The cleaning time intervals vary depending on the amount of dust in the exhaust air and outdoor air.

- Set the switch (8) to "**0**".
- The upper service cover is opened by pulling the lower section outwards. The cover can then be lifted off.
- The inner cover is secured by a magnetic strip on the lower edge.
- Pull out the holder, take out the filter and shake off any dirt. (When the filter is very dirty, turn it upside-down and wash it carefully with water.)

  Check that the filter is not damaged. New original filters can be ordered from NIBE.
- Re-assembly takes place in the reverse order.
- When cleaning the filter also check the boiler pressure, see the section Maintenance routines Pressure gauge.

Also see "Indications on the numerical display, error code A-01"

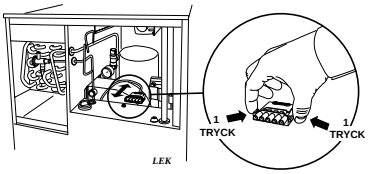


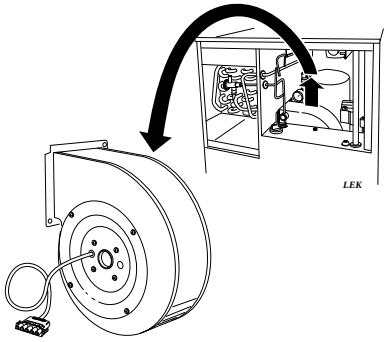


Cleaning the fan

Clean the fan once a year by taking it out of the heat pump and carefully brushing the vanes clean.

- Set the switch (8) to "**0**".
- The upper service cover is opened by pulling the lower section outwards. The cover can then be lifted off.
- The inner cover is secured by a magnetic strip on the lower edge.
- The fan is removed by lifting it upwards as illustrated and disconnecting the fan cable connector.
- Re-assemble in the reverse order.
- Also check that the drain from the rear of the condensation tray (81) is not blocked.





NOTE!

Avoid distorting the fan blades as this causes imbalance.

Do not use water or detergents.

Cleaning the outer wall grilles

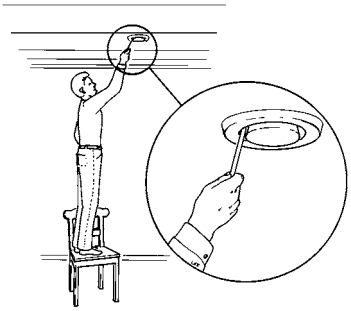
The outer grille on the outdoor air inlet should be cleaned once a year.

Cleaning the outdoor air damper

When cleaning the outer wall grille even the outdoor air damper in FIGHTER 600P should be cleaned. First switch off the heat pump. Now open the upper service cover as described in the section Maintenance routines - Cleaning the air filter. Pull out the air filter with its holder, (see the picture). The damper can now be cleaned with a brush. Hold a cloth or the like under the damper so that dust does not fall onto components in the fan enclosure.

Maintenance routines 9

Cleaning the ventilation devices

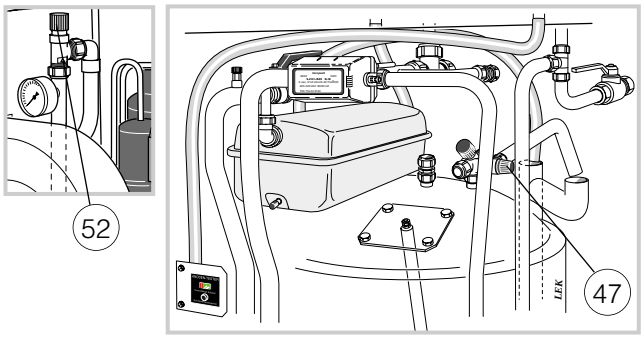


The building's ventilation devices should be cleaned regularly with a small brush to keep the correct ventilation. The device settings must not be changed.

NOTE! If you take down more than one ventilation device for cleaning, do not mix them up.

Check that the ventilation opening (84), behind the lower front cover, is not blocked. Clean if necessary.

Checking the safety valves



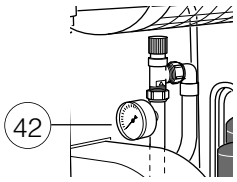
FIGHTER 600P has two safety valves, one for the heating system and one for the water heater.

The heating system safety valve (52) must be completely tight, but the hot water safety valve(47) may occasionally release some water after hot water has been used. This is because the cold water which enters the water heater to replace the hot water expands when heated, causing the pressure to rise and the safety valve to open.

Both safety valves must be checked about four times a year. Check one valve at a time as follows:

- Open the valve.
- Check that water flows through the valve.
- Close the valve.
- The heating system may need to be refilled after checking the safety valve (52), see the section Commissioning and adjustment - Filling the heating system.

Pressure gauge

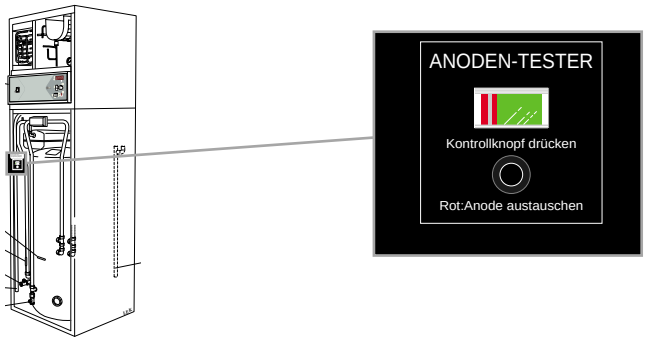


Pressure gauge (42) is located behind the upper service cover. The pressure gauge reading should be between the initial pressure of the expansion vessel (normally 0.5 bar) and 2.5 bar (25 mvp). See Commissioning and adjusting

Extract air temperature

Check that the temperature of the extract air (channel 5) is clearly lower than the room temperature when the compressor is operational, also see section Dealing with malfunctions - High extract air temperature. It is normal that the extract air temperature varies.

Sacrificial anode test



The sacrificial anode should be checked regularly (at least four times a year). This is done by pressing the sacrificial anode test button.

If the pointer remains in the red field the anode must be changed immediately as the anode is spent and can no longer fulfil its protection function.

10 Actions with operating disturbances

In the event of malfunction or operating disturbances first check the points below:

Low temperature or a lack of hot water

NOTE! The hot water capacity can be increased for 24 hours by pressing in button (18).

- Large amounts of hot water were used.
- Circuit or main MCB tripped.
- Possible earth circuit-breaker tripped.
- Switch (8) set to "**0**".
- MCB (7) tripped. See the section Service - Resetting the miniature circuit breakers.
- Closed or throttled filler valve (46) on the water heater.
- The reversing valve (43) is set to manual mode.

Low or a lack of ventilation

- Defrost mode, lamp (31) is lit.
  - Filter (63) clogged (replace if necessary).
  - Exhaust air device blocked or throttled down too much.
- Circuit or main MCB tripped.
- Possible earth circuit-breaker tripped.
- MCB (7) tripped. See the section Service - Resetting the miniature circuit breakers.

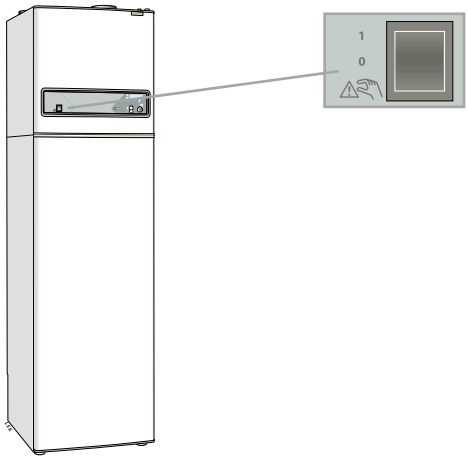
Low room temperature

- Circuit or main MCB tripped.
- Possible earth circuit-breaker tripped.
- MCB (7) tripped. See the section Service - Resetting the miniature circuit breakers.
- Tripped temperature limiter (6). (Contact service)
- Automatic heating control system settings not correct (40).
- Circulation pump (16) stopped. See the section Dealing with malfunctions - Help starting the circulation pump.
- Air in boiler or system.
- Close valve (44) and/or (50) in the radiator circuit.
- Initial pressure in expansion vessel too low. This is indicated by low pressure on the pressure gauge (42). Contact the installer.

High room temperature

- Automatic heating control system settings not correct.
- The reversing valve (43) is set to manual mode.

Switch position



The compressor and electronic controls of the heat pump are off.

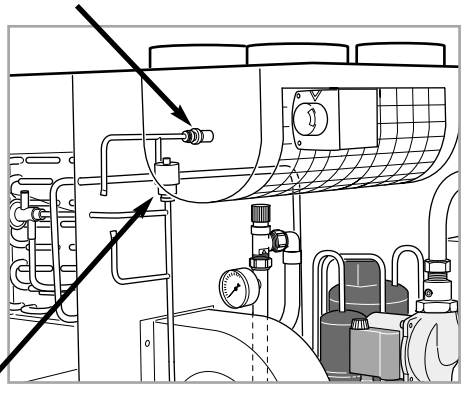
The numerical display is off, FIGHTER 600 P does not produce hot water.

The fan is operational and the immersion heater is controlled by a separate thermostat. When floor heating is installed the cut-out temperature on the thermostat should be lowered to prevent damage to the floor. The thermostat should be reset once the malfunction has been rectified.

Resetting pressostats

To reset a tripped pressure switch, press the button on the top of it; see diagram. The pressostats are located behind the upper service cover.

Low pressure pressostat
Normally this switch resets automatically so it does not have a reset button.



High pressure pressostat

If the operating disturbance cannot be rectified by means of the above an installation engineer should be called. If necessary set the switch to .

Actions with operating disturbances

Indications on the display

Error code A - 01

- Indication that the air filter needs to be cleaned (error code is shown every third month).

When the filter has been cleaned reset the fault code by turning the heat pump off and on again.

Error code A - 03

A high pressure or low pressure pressostat in the refrigerant circuit has tripped, see the section Resetting pressostats.

- **High pressure pressostat:** Settings for Heating curve selection and Heating curve offset too high (can also be seen on Channels 6 and 7 on the numerical display). Also see section Room temperature.
- **Low pressure pressostat:** Ventilation flow too low or not enough refrigerant.

When the cause of the fault has been rectified, the error code must be cleared from the display by switching the heat pump off and on again.

Midmost lamp lit

- Defrosting.

When there is too much ice on the evaporator, defrosting takes place. After this, the compressor starts automatically if heating is needed. Frequent defrosting is a sign of clogged ventilation or dirty filter. See the section Maintenance routines - Cleaning the air filter.

Error code A - 011

This code is shown when A - 03 and A - 01 are active simultaneously.

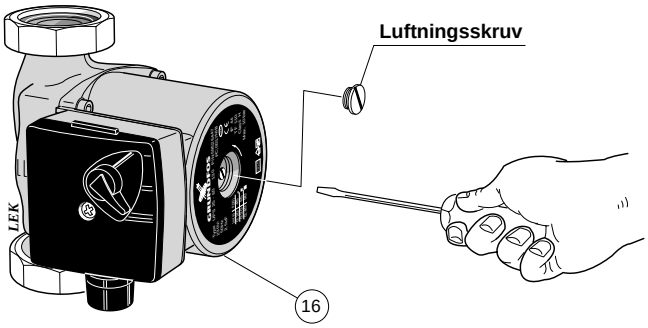
When the cause of the fault has been rectified, the error code must be cleared from the display by switching the heat pump off and on again.

High extract air temperature

If the extract air temperature (read on channel 5) is only insignificantly lower than the room temperature at the same time as the compressor is operational, this indicates a probable fault in the refrigerant circuit or its controller. Request a service.

When the compressor is not operational the extract air temperature lies at about the same level as the room temperature.

Help starting the circulation pump



- Shut down FIGHTER 600P by turning the switch (8) to "**0**".
- The upper service cover is opened by pulling the lower section outwards. The cover can then be lifted off.
- The inner cover is secured by a magnetic strip on the lower edge.
- Loosen the venting screw with a screwdriver. Hold a cloth around the screwdriver blade as a certain amount of water may run out.
- Insert a screwdriver and turn the pump rotor.
- Screw in the air screw.
- Start FIGHTER 600P and check whether the circulation pump runs.

It is usually easier to start the circulation pump with FIGHTER 600P running, switch (8) set to "**1**". If helping the circulation pump to start is performed with FIGHTER 600P running, be prepared for the screwdriver to jerk when the pump starts.

12 General information for the installer

Transport and storage

The heat pump should be transported and stored vertically in the dry.

Handling

The heat pump contains highly inflammable refrigerant. Special care should be exercised during handling, installation, service, cleaning and scrapping to avoid damage to the refrigerant system and in doing so reduce the risk of leakage.

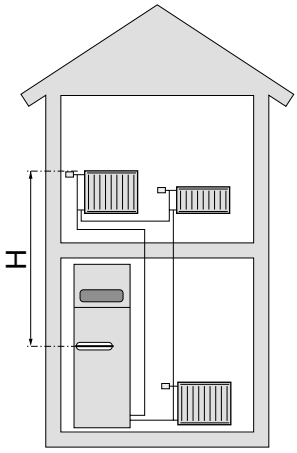
Installation

The heat pump should preferably be erected with its back about 10 mm from an outside wall in a utility room or similar, to minimise noise nuisance. If this is not possible, avoid placing it against a wall behind a bedroom or other room where noise may be a problem. Irrespective of the placement the wall should be sound insulated. **NOTE!** The distance between the heat pump and the wall should be at least 10 mm. If necessary, for example, with a low ceiling height, it is possible to position the modules individually.

Route pipes so they are not fixed to an internal wall that backs on to a bedroom or living room.

FIGHTER 600P has a venting screw located on the front edge at the top. This should be easily accessible, which should be considered during installation.

Maximum boiler and radiator volumes



The volume of the expansion vessel (85) is 10 litres and it is pressurised as standard to 0.5 bar (5 mvp). As a result, the maximum permitted height “H” between the vessel and the highest radiator is 5 metres; see figure.

If the standard initial pressure in the pressure vessel is not high enough it can be increased by adding air via the valve in the expansion vessel. The initial pressure of the expansion vessel must be stated in the inspection document.

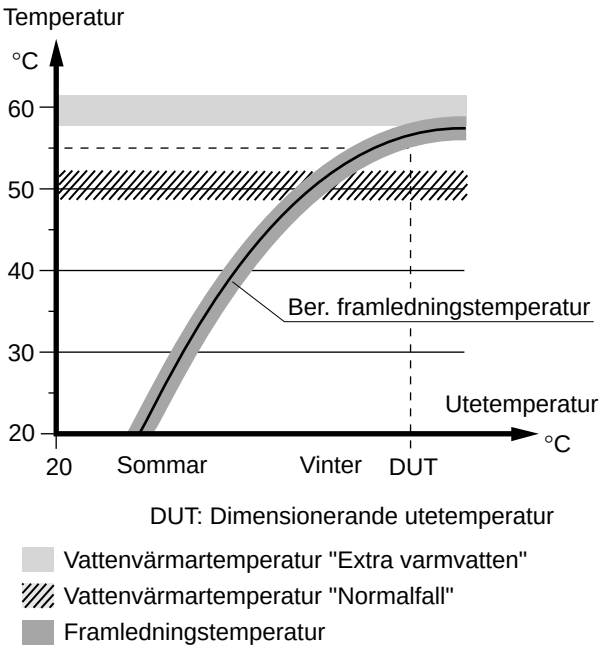
Any change in the initial pressure affects the ability of the expansion vessel to handle the expansion of the water.

The maximum system volume excluding the boiler is 217 litres at the above initial pressure.

Inspection of the installation

Current regulations require the heating installation to be inspected before it is commissioned. The inspection must be carried out by a suitably qualified person. The above applies to installations with a closed expansion vessel. A new inspection must be made when changing the heat pump or the expansion vessel.

Temperatures in FIGHTER 600P



DUT: Dimensionerande utetemperatur

Vattenvärmartemperatur "Extra varmvatten"

Vattenvärmartemperatur "Normalfall"

Framledningstemperatur

The Extra hot water knob (18) on the front panel is used to increase the hot water capacity.

Channel description

Use the Channel selection button to scroll forward through the numerical display's channels to see the required reading or setting

The significance/function of the different channels is as follows:

1 Boiler temperature

2 Flow temperature

3 Outside temperature

4 Evaporation temperature

5 Extract air temperature

6 Heating curve

7 Heating curve offset

8 Hot water temperature (at the hot water sensor, the temperature above the sensor is usually higher)

9 Set blocking temperature (outdoor temperature) for the immersion heater.

10 Calculated flow temperature

11 Service position. When the value "00" is shown a return to channel 1 will occur the next time the button is pressed. The value can be changed to "01" by pressing the Operating mode button. Channel 12 is then shown the next time the Channel selection button is pressed.

12 Deviation between the calculated and true flow

13 Non active channel. The numerical display shows "-- --".

14 Selected operating mode using the Operating mode button with the following significance:

01 Circulation pump running (for the heating system), immersion heater connection permitted

02 Circulation pump running (for the heating system), immersion heater blocked

03 Circulation pump not running (for heating system), immersion heater blocked

Pressing the Operating mode button when channel 14 is shown also resets the compressor's pressure-compensating time. This should only be carried out by a professional with expertise within refrigeration. The two hour delay concerning the immersion heater's third step, which is activated when the switch is set to "1", is also reset.

15 Shows the connected output step according to the following:

01 and **02**: compressor

03 Compressor and step 1, immersion heater (3 kW)

04 Compressor and step 2, immersion heater (6 kW)

05 and **06**: Compressor and step 3, immersion heater (9 kW)

Pressing the Operating mode button connects the next higher step irrespective of the control programme's outcome.

16 Non active channel. The numerical display shows "-- --".

17 Selected operating mode with ventilation adjustment, see Commissioning and adjustment - Setting the ventilation

00 Normal mode, ventilation adjustment not activated

01 Highest fan speed, outdoor air damper closed

02 Normal fan speed, outdoor air damper closed

03 Highest fan speed, outdoor air damper open

18 Non active channel. The numerical display shows "----".

19 Shows the current status with regard to heating/hot water production according to the following:

01 Heating required, no hot water requirement

02 No heating requirement, hot water required

05 Boiler temperature exceeding the maximum permitted

06 No heating requirement, no hot water requirement

07 No hot water requirement, summer mode (immersion heater and circulation pump blocked via the operating mode button).

09 Hot water required, summer mode (immersion heater and circulation pump blocked via the operating mode button).

11 Periodic heating production in progress

12 Periodic hot water production in progress

20 Shows the boiler temperature at previous reading (readings are made every fourth minute)

21 Shows the automatic output control's action during the previous action regarding connection and disconnection of the output step according to channel 15 (actions are taken fourth minute).

00 Neither connection nor disconnection took place

01 Connection of one output step took place

02 Disconnection of one output step took place

04 Hot water mode

05 Hot water mode in summer mode (immersion heater and circulation pump blocked via the operating mode button).

22 Shows the selected ventilation mode (selection made using the Ventilation button) according to the following:

01 Normal ventilation active

02 Forced ventilation active (party mode)

23 Shows whether correction of the Heating curve offset via an external switch is actuated, see Electrical connection - Remote/room control.

00 Correction is not activated

-3 Correction activated (Heating curve offset lowered three steps)

24 Selected number of days in step 1 regarding the drying process

25 Selected temperature in step 1 regarding the drying process

26 Selected number of days in step 2 regarding the drying process

27 Selected temperature in step 2 regarding the drying process.

■ Control reverts to only showing channels 1 to 11 after approximately 4 hours or by changing the value from 01 to 00 under channel 11.

14 Pipe connections

General

Pipe installation must be carried out in accordance with current norms and directives.

The system requires a low-temperature design of the radiator circuit. At DUT, the highest recommended temperatures are 55 °C on the flow line and 45 °C on the return line.

When the circulation pump is running, the flow in the radiator circuit must not be completely stopped. In other words, in a system where the radiator flow might stop because all thermostat valves are closed, there must be a bypass valve to protect the circulation pump.

A filter should be fitted on the return line to protect component parts. The total volume is 244 litres, with 189 litres in the water heater and 55 litres in the boiler section.

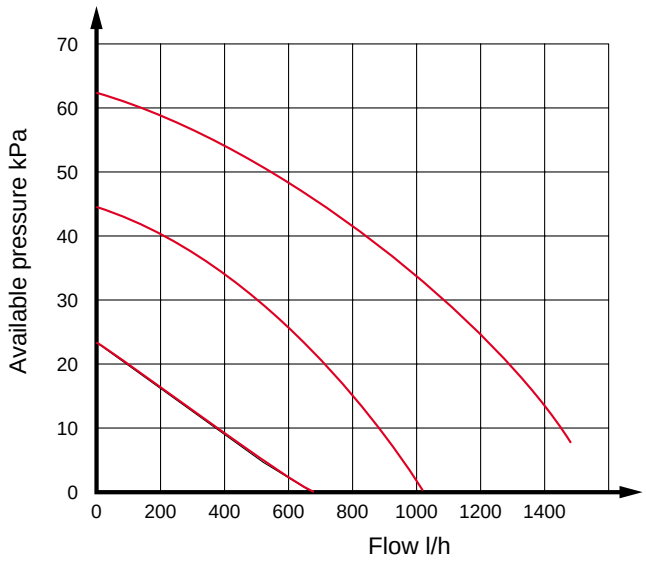
The pressure vessel in the FIGHTER 600P is approved for max 9.0 bar (0.9 MPa) in the water heater and 2.5 bar (0.25MPa) in the boiler section.

Overflow water from the evaporator collection tray and safety valves goes via non-pressurised collecting pipes to a drain so that hot water splashes cannot cause injury.

NOTE!

The pipe work must be flushed before the heat pump is connected, so that any contaminants do not damage the components parts.

Pump diagram



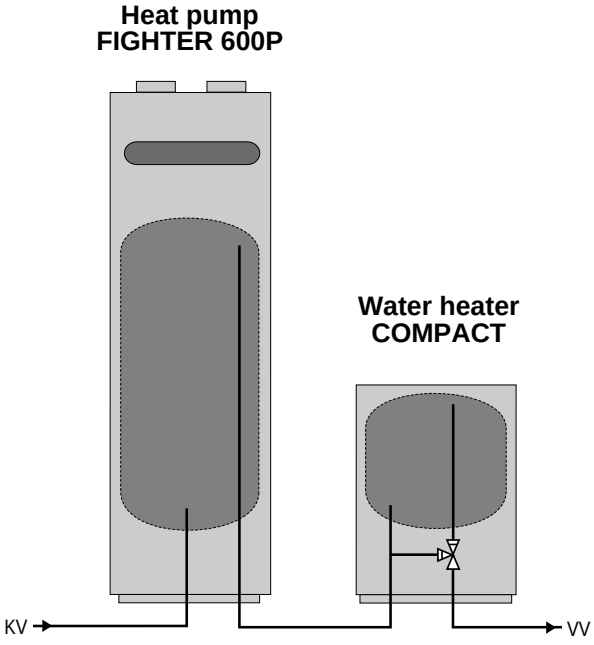
Docking

Other heat sources can be docked to FIGHTER 600P. Accessories are needed. Contact NIBE AB for information.

Tap water connection

Hot and cold water are connected to pos (74) (hot water) and (73) (cold water).

The heat pump should be supplemented with an electric water heater if a bubble pool or other significant consumer of hot water is installed.



Ventilation connection 15

General

FIGHTER 600P works in average size houses, with both exhaust air and outdoor air. This gives greater savings than by using just exhaust air. However, at outdoor temperatures below approximately - 5 °C, the outdoor air flow is closed by means of an internal damper and the heat pump now works with just the exhaust air. In larger houses only the exhaust air ducts are connected as the exhaust air here contains sufficient amounts of energy.

Ventilation flow

FIGHTER 600P is connected so that all ventilation air except the kitchen fan passes the evaporator (62) in the heat pump. The lowest ventilation flow according to current standards is 0.35 l/s per m^2 floor area. For optimum heat pump performance this ventilation flow should not be less than 120 m^3/h. (34 l/s). With exhaust air flow greater than 200 m^3/h the outdoor air duct is not connected. Accordingly FIGHTER 600P is only used as an exhaust air heat pump. In those cases the exhaust air flow falls below 200 m^3/h an outdoor air duct with adjustment damper should be connected to the heat pump. The heat pump then normally works with the fan at maximum. The maximum capacity of the fan is then distributed between the planned exhaust air and outdoor air. With outside temperatures lower than approximately - 5 °C the fan automatically slows down to the selected setting and the heat pump's internal damper shuts out the outdoor air, whereby the planned exhaust air flow is maintained.
The heat pump's installation area should be ventilated by at least 36 m^3/h (10 l/s).

FIGHTER 600P is equipped with a ventilation opening in the base. As a result, an air flow of about 5 m^3/h (1,4 l/s) is taken directly from the room where the heat pump is installed.

Changing the ventilation capacity is described under "Electrical connection - Setting the fan capacity". See also "Circuit diagram". The numbering of the curves refers to the outlets on terminal (22).

Exhaust air duct

The kitchen flue must not be connected to FIGHTER 600P.

Adjustment

See the section "Setting the ventilation".

NOTE!

A duct in a masonry chimney stack must not be used for extract air.

Duct installation

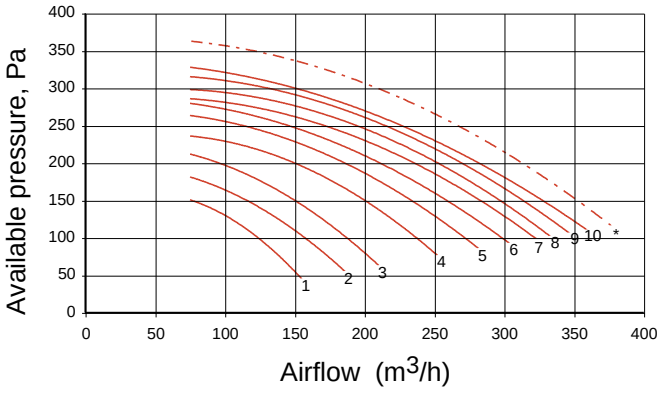
To prevent fan noise being transferred to the exhaust air devices, it may be a good idea to install a silencer in the duct. This is especially important if there are exhaust air devices in bedrooms. If a twin duct system is used for the exhaust air, each system should be fitted with a silencer. Because the heat pump contains a flammable refrigerant in the form of propane (R290), the air ducting system must be earthed. This is done by making a sound electrical connection to the exhaust air, extract air and outdoor air ducts using the three earthing cables supplied. The cables must then be connected to the earthing studs on top of the top cover.

Duct connections should be made via flexible hoses, which must be installed so that they are easy to replace. The extract air and outdoor air ducts are to be insulated using diffusion-proof material along their entire lengths. Provision must be made for inspection of the duct. The outdoor air duct should be fitted with an adjustment damper. Make sure that there are no reductions of cross-sectional area in the form of creases, tight bends etc, since this will reduce the ventilation capacity. All joins in the ducting must be sealed and pop-riveted to prevent leakage. When the exhaust air flow is so great that no outdoor air duct is fitted and the ventilation system is connected only to the exhaust air sleeve the outdoor air sleeve should be sealed. If the ventilation system is connected to both the exhaust air sleeve and the ordinary outdoor air sleeve the damper motor should be electrically disconnected. This is done by removing the damper motor's cable ends on the relay card (terminals 36, 37 and 38) from the relay card and then insulated. The damper can now be turned to the open position by hand when the damper motor's knob is pressed in.

The air duct system should, at a minimum, be of air tightness class B.

Fan diagram

The diagram below shows the available ventilation capacity.



Air intake only through the exhaust air sleeve
Air intake through both the exhaust air and supply air sleeves

16 Electrical connection

Connection

All electrical equipment except for the outdoor sensor has been connected at the factory. Disconnect the heat pump before insulation testing the house wiring.

NOTE!

The switch (8) must not be moved from "0" until the boiler has been filled with water Otherwise the temperature limiter, thermostat, compressor and the immersion heater can be damaged.

The supply to the heat pump is connected to terminal (9) via a strain relief. Connection must not be carried out without the permission of the electricity supplier and under the supervision of a qualified electrician. The cable entry conduit is dimensioned for cable with a max Ø 19 mm. The power is controlled via a contactor which is operated by a microprocessor.

The temperature limiter (6) cuts off the supply to the immersion heater if the temperature rises to between 90 and 100 °C; it can be manually reset by pressing the button on the temperature limiter.

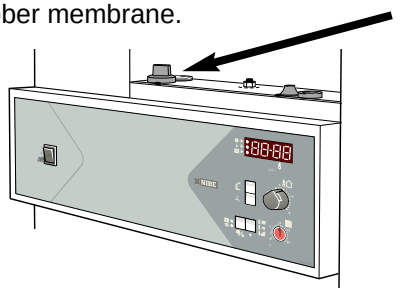
NOTE!

Reset the temperature limiter, it may have tripped during transport.

The automatic heating control system, circulation pump (16), compressor and its cabling, are internally fuse protected with a miniature circuit breaker (7).

Resetting the temperature limiter

The temperature limiter (6) is accessible behind the upper service cover, see the figure.
The temperature limiter is reset by firmly pressing in the rubber membrane.



Max phase current

Output (kW)	Max load phase (A)	Group fuse (A)
6.0	12.8	16
8.0	14.9	16
9.0	19.2	20

Output as set at the factory

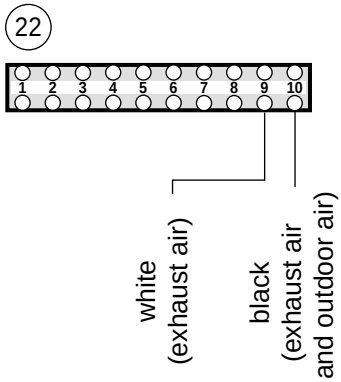
The immersion heater of 9 kW is fitted in the boiler section, and on delivery is connected for an output of 9.0 kW.

Reconnection between the different outputs is done by opening the cover on the distribution box see the section Service - Opening the cover on the distribution box, and moving specific cables as set out in the instructions in the section Wiring diagram - Changing the output.

Setting the fan capacity

The ventilation capacity is selected by connecting the white cable from the exhaust air fan to the required outlet on terminal (22). See the illustration "Ventilation connection"-"Fan diagram". On delivery the fan is connected to outlet no. 9. When no outdoor air duct is used the white cable is connected to outlet no. 10.

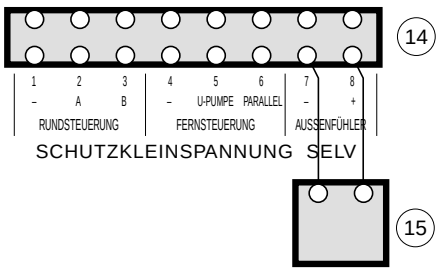
Tap	Voltage (V)
1	100
2	110
3	125
4	140
5	155
6	170
7	185
8	200
9	215
10	230



Connecting the outside sensor

Install the outside sensor in the shade on a wall facing north or north-west, so it is unaffected by the morning sun. The sensor is connected with two-wire cable to terminal (14) positions "7" and "8".

All conduits should be sealed to avoid condensation in the sensor capsule.



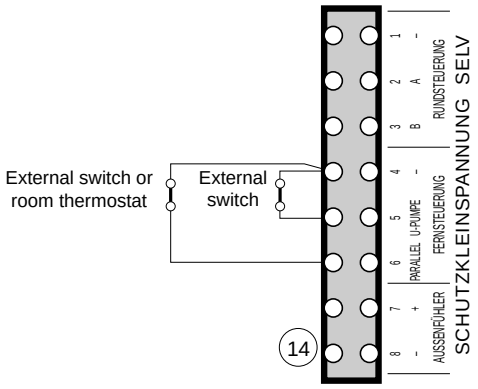
Electrical connection 17

Remote/room control

A timer for night tariff or a room thermostat (first remove the strap) can be connected to positions (4) and (6) on terminal (14). The timer or the room thermostat must have a potential free contact and have a design where the circuit opens when a lower temperature is required.

The microprocessor in FIGHTER 600P corrects the originally selected setting for Heating curve offset by three steps downwards.

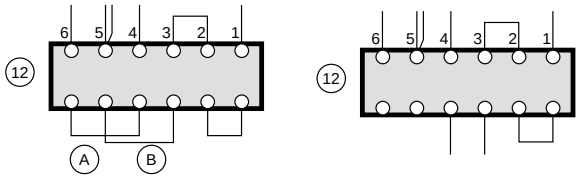
An external switch that switches off the circulation pump can be connected (first remove the strap) at positions (4) and (5) on terminal (14). For example, a thermostat can be connected that detects the flow temperature and switches off the circulation pump, if the flow temperature becomes too high. The switch or thermostat must have a potential free contact and have a design where the circuit opens when the circulation pump should be switched off.



External compressor supply

The heat pump's compressor can be externally fed if so required by removing the straps A and B from terminal (12). The separate voltage supply (230 V~, 6A, motor operation) is connected to "3" and "4".

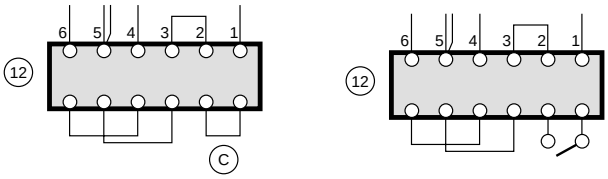
NOTE! In this position some parts of the electrical system are live, even when the power switch (8) is set to "0".



External compressor control

The heat pump's compressor can - if you wish - also be controlled by an external switch by replacing strap C on terminal (12) with a potential free switch function (230 V~, 6A, motor operation).

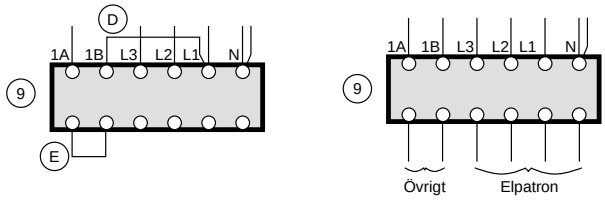
NOTE! In this position some parts of the electrical system are live, even when the power switch (8) is set to "0".



Separate supply to the immersion heater

Separate feed between the immersion heater and remainder can be obtained by making the following reconnections on terminal (9):

- Remove straps D and E.
- Move the cable between terminal 13, pos "N", and the relay card, pos "9", from terminal 13 to terminal 9, pos "1B".
- The immersion heater is now fed via terminal 9, pos "N-L1-L2-L3" and the remainder (compressor, circulation pump, fan and control) are fed via terminal 9, pos "1A-1B".



18 Commissioning and adjusting

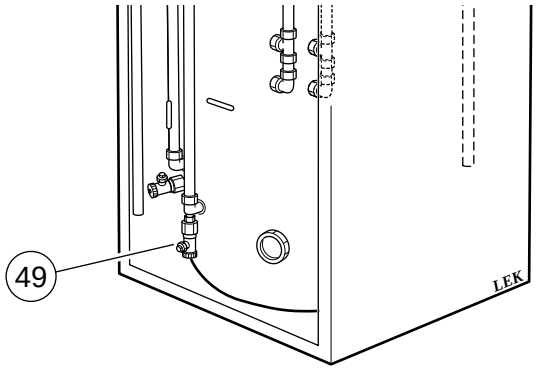
Preparations

Check that the switch (8) is set to "**0**".

Check that valves (44) and (50) are fully open and that the temperature limiter (6) has not tripped (press the firmly on the rubber membrane).

Filling the heating system

- Remove the upper service cover so the pressure gauge (42) becomes visible
- Connect a hose to the filling valve (49) and open the valve to fill the boiler and the radiator system.
- After a while the pressure gauge (42) will show rising pressure. When the pressure has reached about 2.5 bar a mix of air and water starts to emerge from the safety valve (52). Close the filling valve (49).



Venting the heating system

- Vent the electric boiler through the safety valve (52), venting screws (17), (59) and the rest of the heating system through the relevant venting valves.
- Keep topping up and venting until all air has been removed and the pressure is correct.

Starting

NOTE! As an option to the procedure set out below a drying process can be used, see the Drying process section.

- Set the switch (8) to "⚠". In this mode the electronics are disconnected, so the display window is not lit. The thermostat (3) opens at 71 °C in this mode.
- When the room temperature goes above 16 °C set switch (8) to "**1**". NOTE! The compressor has a start delay of about 20 minutes.
- Set the design capacity on the circulation pump using its switch (35). See the section Pipe connections - Pump and pressure drop diagram. Make sure that the switch is not in an intermediate position.

Readjustment

Air is initially released from the hot water and venting may be necessary. If bubbling sounds can be heard from the heat pump, the entire system requires further venting. NOTE! Safety valve (52) also acts as a manual venting valve. Operate it with care, since it opens quickly. When the system is stable (correct pressure and all air eliminated) the automatic heating control system can be set as required. See the section Room temperature - Setting the Automatic heating control system and Front panel.

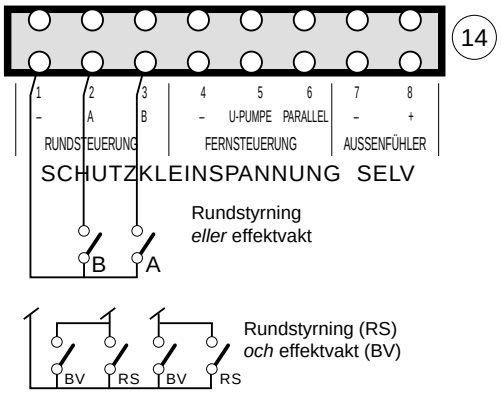
Draining the heating system

The heating system is drained through the drain valve (51). This is located behind the lower service cover. The service cover is opened by loosening both screws on the upper edge of the cover and then lift the cover up/forward.

Centralised load control and load monitor

The output steps of the immersion heater can be disconnected by means of a load sensor or a centralised load control relay. This is done with making contacts, connected to terminal (14).

If both the load monitor and centralised load control are to be used these are connected in parallel.



The table below describes output disabling:

External contact	Disconnected output step when the contact is made
A	5 and 6 (max electrical output 6 kW with standard connection)
B	4, 5, and 6 (max electrical output 3 kW with standard connection)
A and B	3, 4, 5 and 6 (no electrical output available)

Drying process

It is important with some concrete floors with floor heating to maintain the right temperature in the floor loops directly after the installation so that the floor dries at the right rate.FIGHTER 600P is equipped with this function. This means you can set a program so that a constant flow temperature is obtained during a specific number of days; followed by another constant flow temperature during another specific number of days. This is done as follows:

- Activate the drying program by pressing the Operating mode button at the same time as the switch is set to “1”. Drying mode is indicated on the heat pump by the Supplement lamp being lit and the Circulation pump lamp flashing.
- Set the required number of days and temperature in the two steps by scrolling to channel 24 with the Channel selection button. To prevent channel 1 from being shown after channel 11 the value on the numerical display for channel 11 should be 01. If this is not the case, change this by pressing the Operating mode button. For channel 24 to channel 27 values can be changed by pressing the Ventilation button (the value is increased by one step) alternatively the Extra hot water button (the value is decreased by one step). The significance of the numerical value for each channel is as follows:

Channel 24 number of days in step 1 (preset at three days)

Channel 25 flow temperature in step 1 (preset at 25 °C)

Channel 26 number of days in step 2 (preset to one day)

Channel 27 flow temperature in step 2 (preset at 40 °C)

The setting options for the number of days is one to five and for the temperature 15 to 50 °C.

Once the set number of days have elapsed FIGHTER 600P automatically reverts to normal functionality. If the power is cut, for example, by the power switch being turned to “0” the drying process is stopped and the set values return to the preset values as above. This means that if a power failure occurs before the set time has elapsed, the program must be reactivated and the values possibly reset.

NOTE! During the drying process the compressor is not operational. Hot water production does not occur.

Setting the ventilation

If the outdoor air duct is not connected (large house):

- Ensure that the damper motor is electrically disconnected, see the section Ventilation connection - Duct installation.
- Move the white conductor from the fan to tap 15 on the fan transformer as set out in the Electrical connections - Setting the fan capacity.
- Start the heat pump.
- Make sure that all outdoor air devices are fully open. Adjust the house’s exhaust air device and possibly adjust the damper in the exhaust air system so that the planned exhaust air flow is obtained.

If the outdoor air duct is connected:

- Start FIGHTER 600P and select channel 17 using the Channel selection button. Channel 17 becomes accessible by changing the value from 00 to 01 under channel 11. Channel 12 up to channel 27 are the service channels and may only be managed by a professional. When you continue pressing the channel button you move over to channel 12 and subsequent channels.
- Press the Operating mode button twice so the display changes from “00” to “02”. The internal outdoor air damper is now closed and the fan runs at a speed equivalent to the value on the fan transformer (to obtain the lowest noise levels the fan should be connected for the requisite capacity). Make sure that all outdoor air devices are fully open. Adjust the house’s exhaust air device and possibly adjust the damper in the exhaust air system so that the planned exhaust air flow is obtained.
- Press the Operating mode button once so the display changes from “02” to “03”. The internal outdoor air damper is now open and the fan runs at the highest speed. Adjust the external outdoor air damper in the exhaust air duct so that the exhaust air flow is the same as under the previous point.
- Measurement of the exhaust air flow when Party-mode is selected can be performed by pressing the Operating mode button once more so that “01” is displayed. The internal outdoor air damper is now closed and the fan runs at the highest speed. The exhaust air flow now obtained corresponds to that obtained when Party-mode is activated.
- Control reverts to only showing channels 1 to 11 after approximately 4 hours or by changing the value from 01 to 00 under channel 11.
- Press the Operating mode button yet again so that the display shows “00” and FIGHTER 600P will revert to normal mode (return also happens automatically after 4 hours).

Filling the water heater

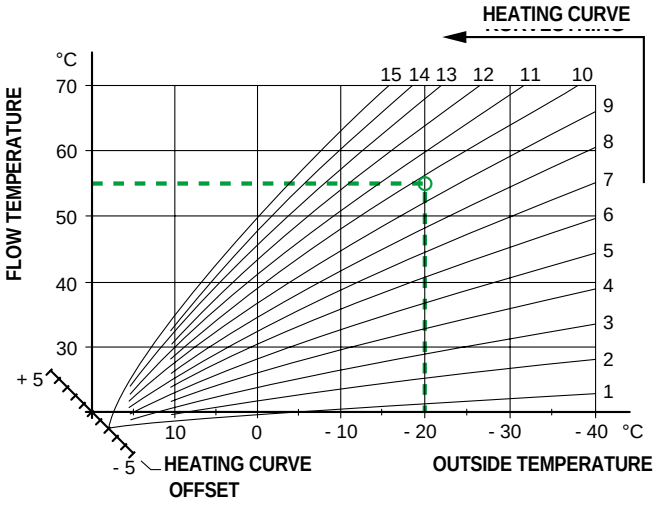
The water heater is filled by first opening a hot water tap and then opening the filling valve (46) fully. This valve should then be fully open during operations. When water comes out of the hot water tap this can be closed.

Emptying the water heater

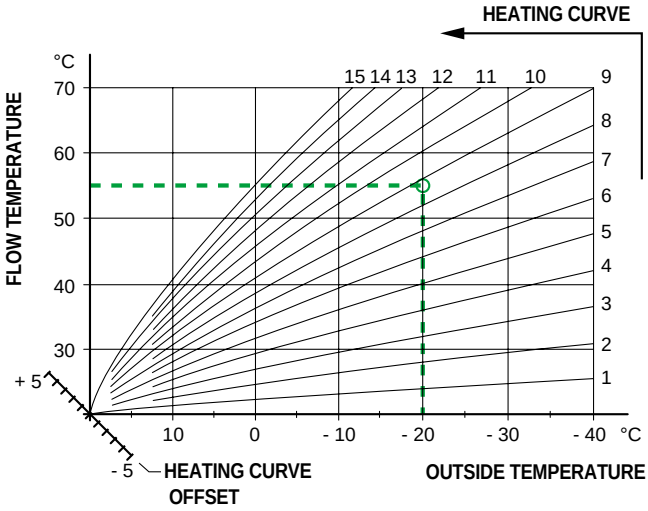
The water heater is emptied through the drain valve (51). Connect a 3/4" hose that runs into the floor drain and close the filler valve (46). Open the drain valve’s tap and arrange an air supply by opening the hot water tap. If this is not sufficient, loosen a pipe coupling on the hot water side.

20 Setting the automatic heating control system

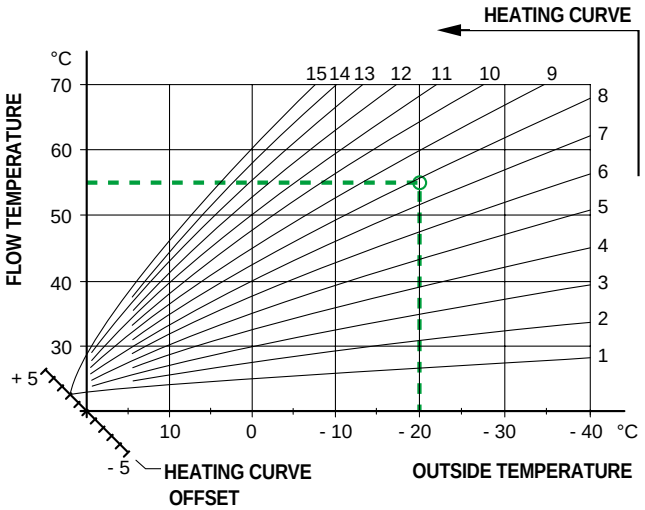
Heating curve offset -2



Heating curve offset 0



Heating curve offset +2



Setting using diagrams

FIGHTER 600P is equipped with outdoor temperature controlled automatic controls. This means the flow temperature is regulated in relation to the current outdoor temperature.

The relationship between outside temperature and flow temperature is set with the Heating curve selection and Offset, heating curve knobs.

The diagram is based on the dimensioned outdoor temperature in the area and the dimensioned flow temperature of the heating system. When these two values meet, the heating control's curve slope can be read.

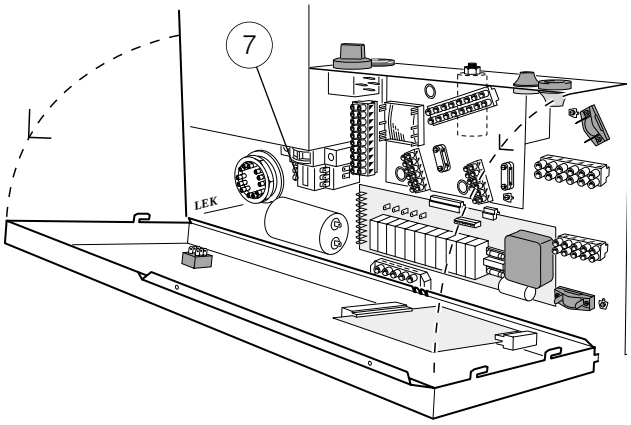
Set the Offset, heating curve accordingly. A suitable value for floor heating is -1 and for radiator systems -2.

To read the calculated flow temperature, go to channel selection 10.

Also see section Room temperature.

Opening the cover on the distribution box

First lift off the upper service cover as described in the section Maintenance routines - Cleaning the air filter. The cover on the distribution box can then be opened to the horizontal position by loosening the screws on the top edge of the cover.



Refrigerant system

Work on the refrigerant system must be done by authorised personnel in accordance with the relevant legislation on refrigerants, supplemented by additional requirements for flammable gas, for example, product knowledge as well as service instruction on gas systems with flammable gases.

Resetting the miniature circuit breakers

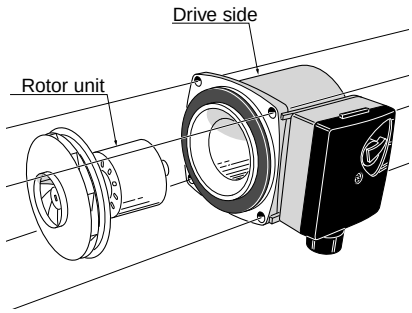
The miniature circuit breaker (7) is accessible in the distribution box behind the upper service cover. See the section Service - Opening the cover to the distribution box.

The normal position on the miniature circuit-breaker (7) is "**1**" (left). The above may only be carried out by persons with the relevant expertise. Note the distribution box contains live parts.

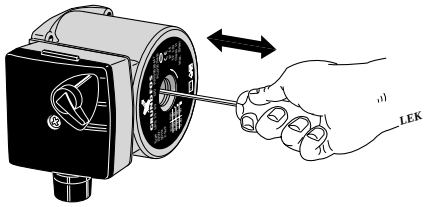
Cleaning the circulation pump

- Set the switch (8) to "**0**".
- Close the shut-off valves before and after the circulation pump
- Loosen the venting screw.
- Remove the connection cover.
- Loosen the power cable.
- Remove the drive side from pump housing by loosening the screws. Now dismantle the drive side (fig. A).
- Remove the rotor unit (including pump housing) by carefully pulling the pump rotor. If it sits firmly, it can be loosened by knocking the rear of the shaft (fig. B).
- Clean inside the stator can using a cleaning agent (fig. C).
- Also clean the rotor unit using the cleaning agent and lubricate the O-ring with, for example, a soap solution (fig. D).
- Refit the rotor unit.
- Re-assemble the drive side (the flat packing is best placed on the pump housing).
- Connect the power cable.
- Open the shut-off valves.
- Set the switch (8) to "**1**".

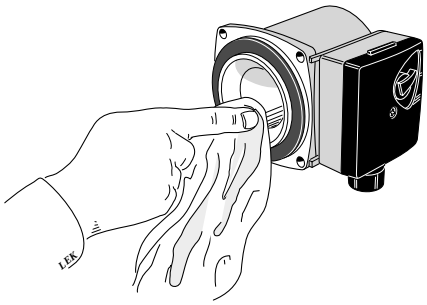
A



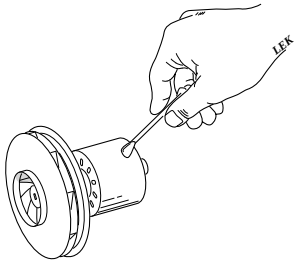
B



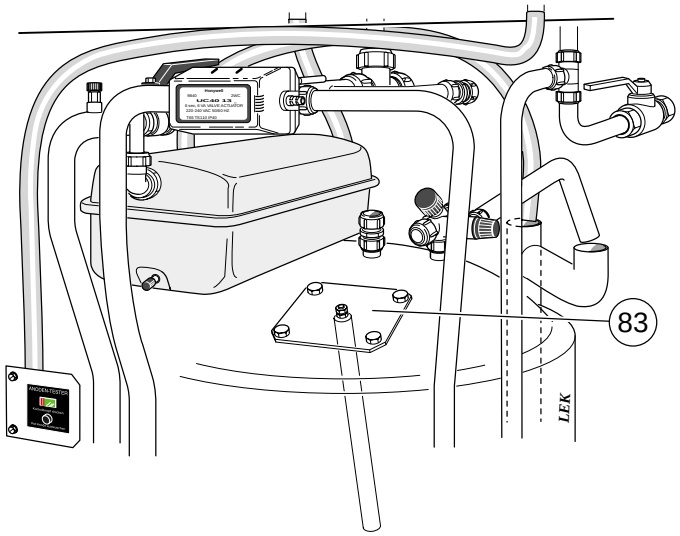
C



D



Sacrificial anode replacement



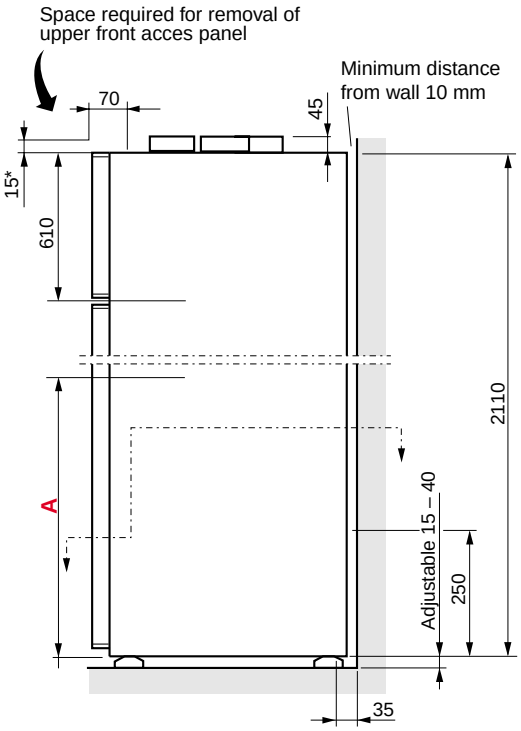
There is a sacrificial anode mounted on an inspection cover (58) at the top of the hot water heater. Anode replacement takes place as follows:

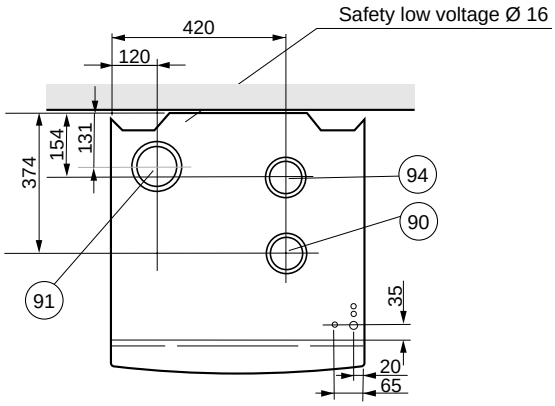
- Remove the heat pump's circuit fuses in the distribution cabinet.
- Empty the water heater, see the section Commissioning and setting - Emptying the water heater.
- Dismantle the inspection cover (58).
- Replace the sacrificial anode in the inspection cover.
- Re-assemble in the reverse order.

Sacrificial anode replacement can be eliminated if a direct current anode is fitted.

Dimensions 23

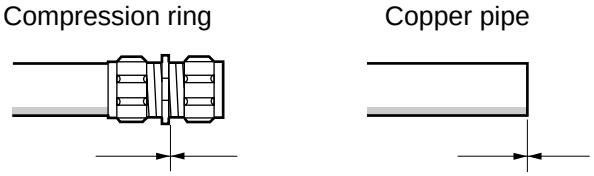
Dimensions and setting-out coordinates





A clear space of 500 mm is needed in front of the heat pump for servicing.

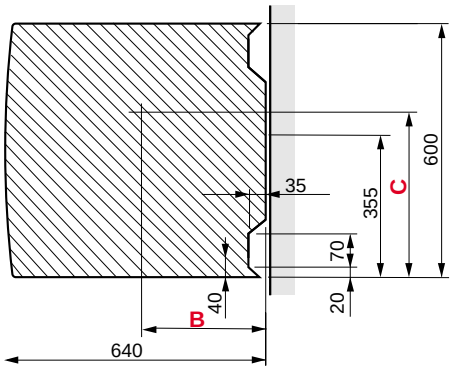
Measuring principle



A, **B** and **C**:

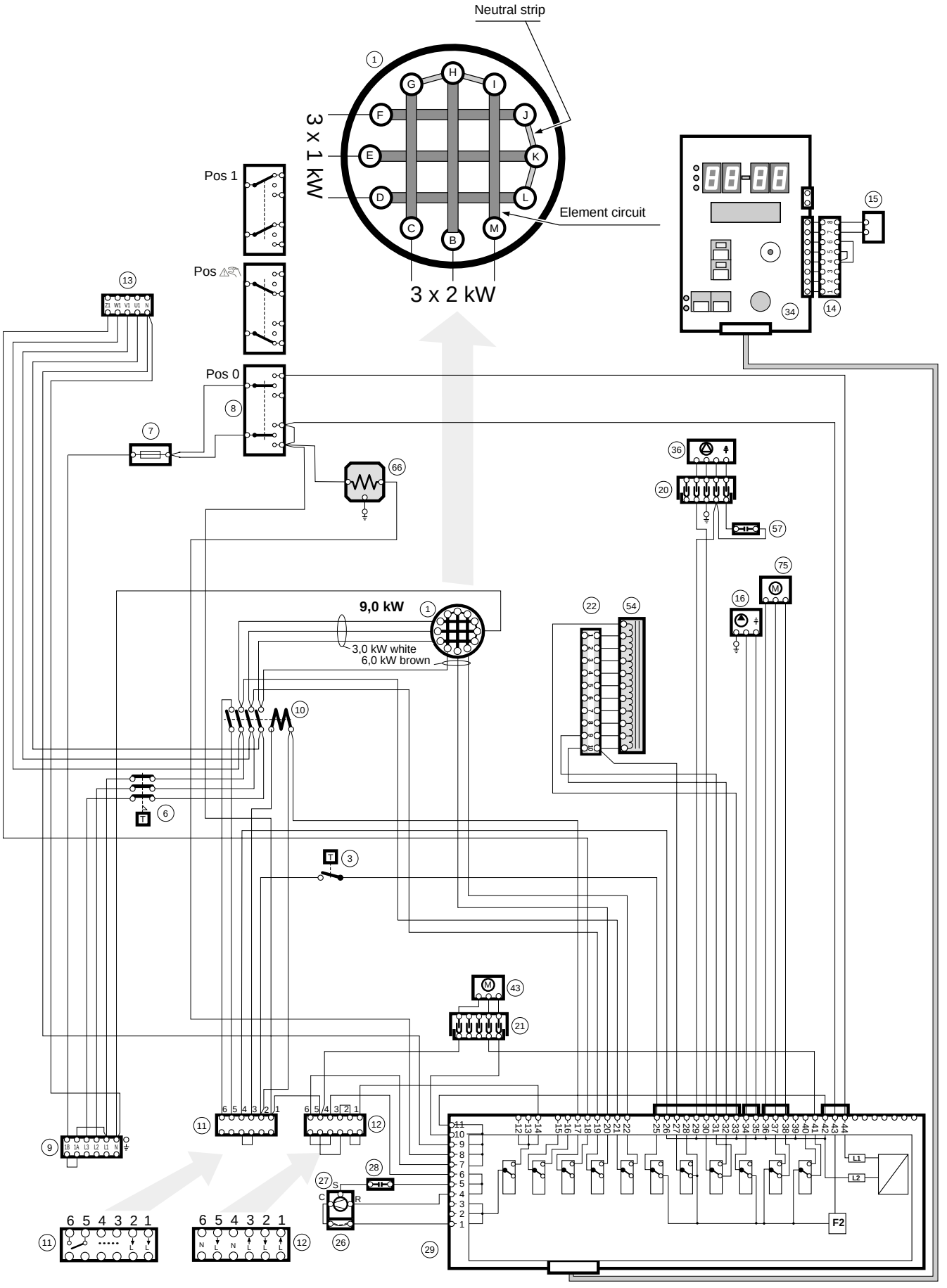
See “Connection” in the “List of components”.

When running pipes in the hatched area, make sure there is space to change the expansion vessel.



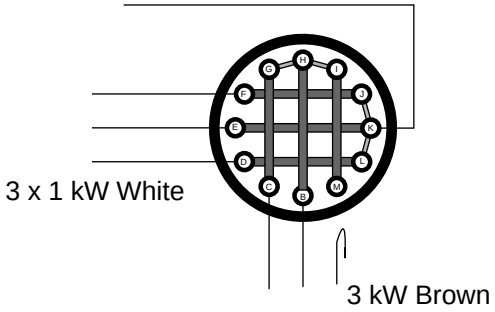
24 Electrical circuit diagram

Electrical circuit diagram



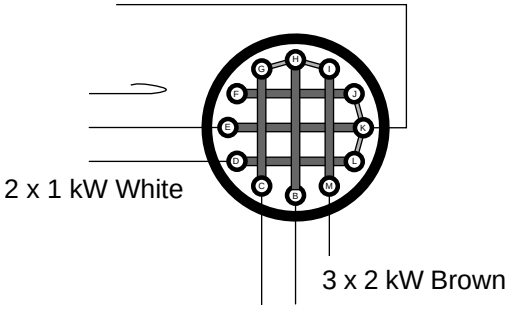
Electrical circuit diagram

6.0 kW



The brown cable from terminal “22” on the relay card is disconnected from the immersion heater.

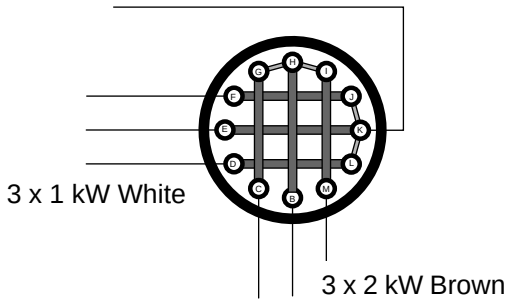
8.0 kW



The white cable from terminal 6 on the connector is disconnected from the immersion heater.

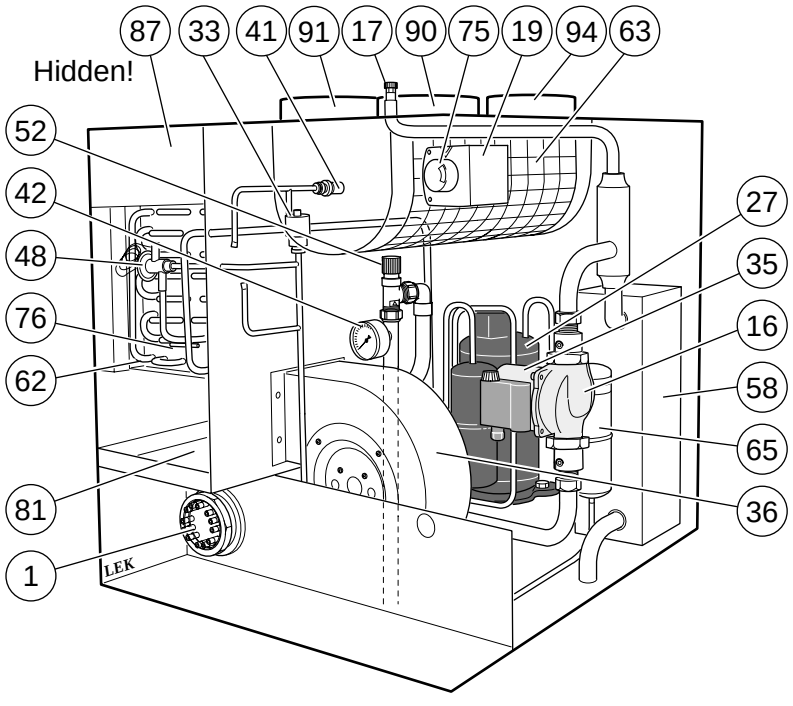
NOTE! In this output step only 2 kW is obtained in standby mode.

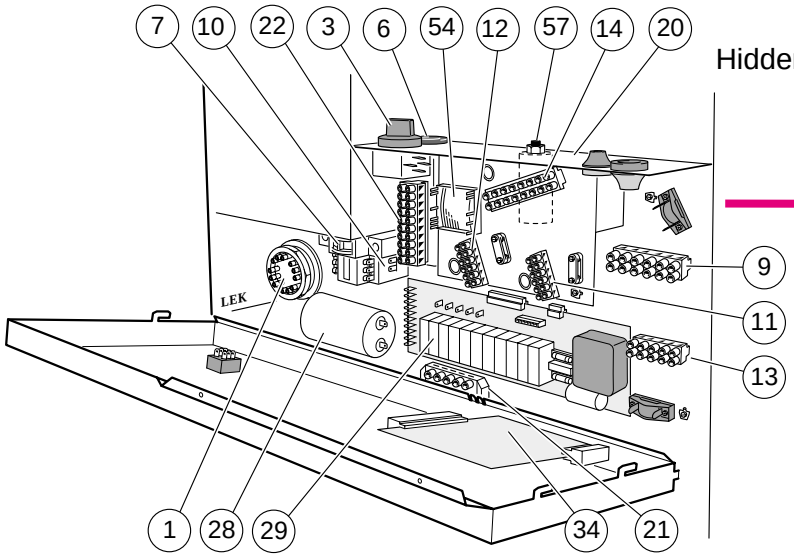
9.0 kW (delivery output)

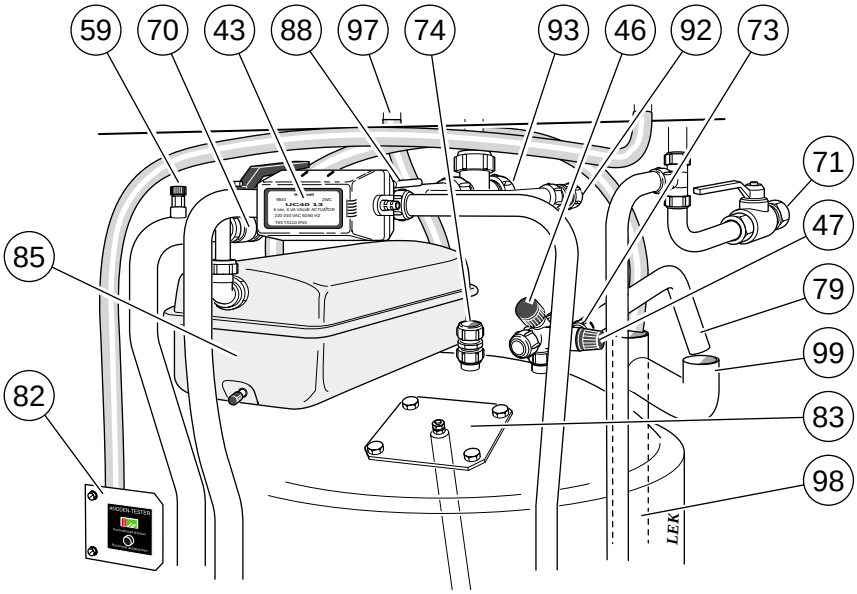


All cables are connected to the immersion heater.

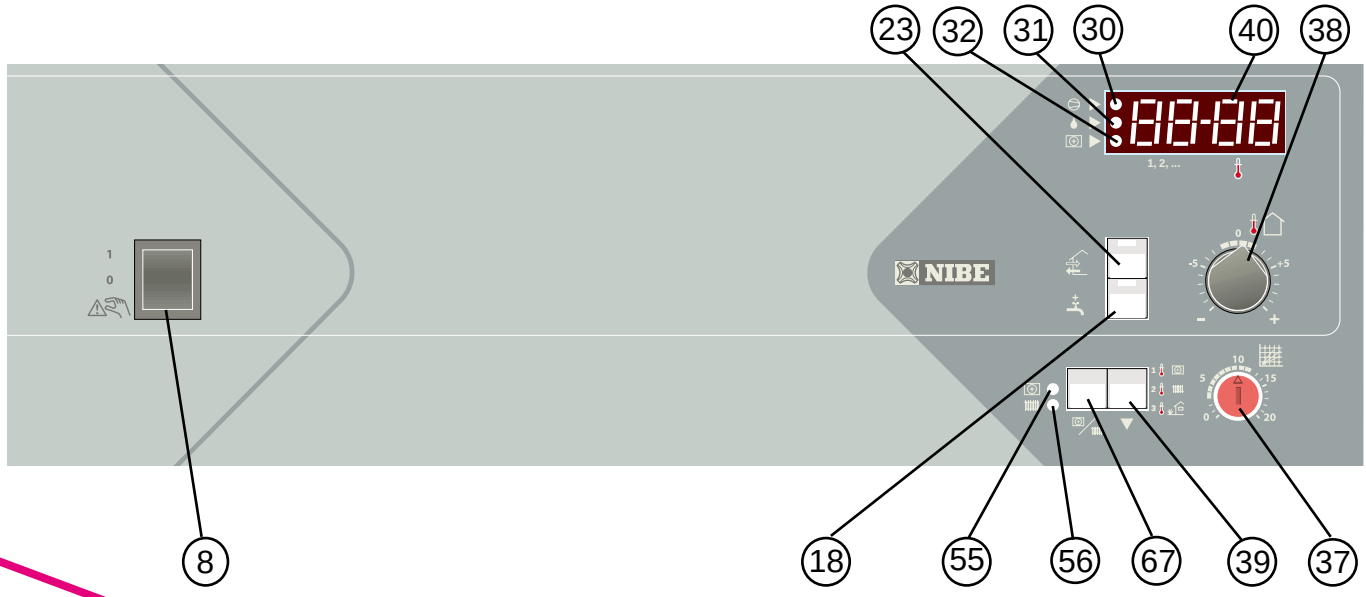
26 Component placement

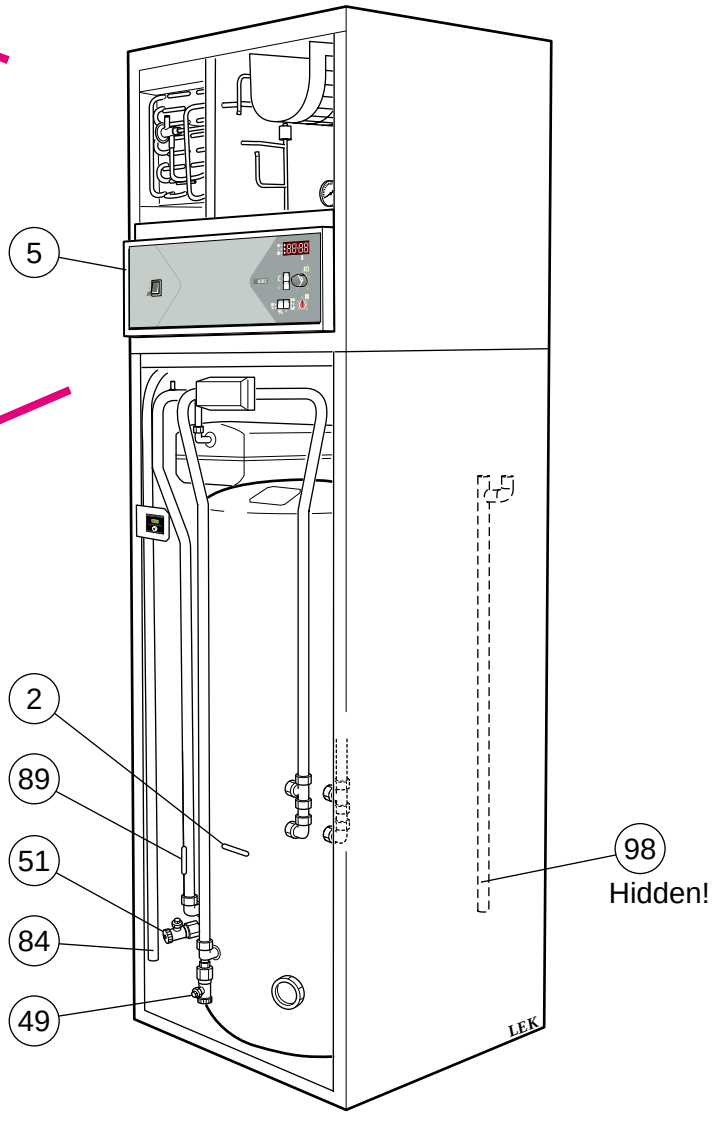






Component placement





28 List of components

1 Immersion heater 9 kW
2 Hot water sensor
3 Operating thermostat, backup heating
5 Rating plate
6 Temperature limiter
7 Miniature circuit-breaker for the circulation pump, automatic heating control system, fan and compressor
8 Switch, positions 0 – 1 – 
9 Terminal block, power supply
10 Connector, immersion heater
11 Terminal block, docking
12 Terminal block, compressor
13 Terminal block
14 Terminal block
15 Outside sensor
16 Circulation pump
17 Venting screw
18 Pushbutton, “Extra hot water”
19 Outdoor air damper
20 Connector, fan
21 Connector, reversing valve
22 Terminal block, fan speed
23 Push button Ventilation
24 Blinding plate
26 Motor protection, compressor
27 Compressor
28 Operating capacitor, compressor
29 Relay card with power supply unit
30 Indicator lamp, “Compressor”
31 Indicator lamp, “Defrosting”
32 Indicator lamp, “Immersion heater”
33 High pressure pressostat
34 Microprocessor card
35 Capacity setting, circulation pump
36 Fan
37 Knob, “Heating curve selection”
38 Knob, “Heating curve offset”
39 Pushbutton, “Channel selection”
40 Numerical display with control card behind
41 Low pressure pressostat
42 Pressure gauge, boiler
43 Shuttle valve
44 Shutoff valve, flow radiator circuit
46 Filling/shutoff valve, water heater
47 Safety valve, water heater
48 Expansion valve
49 Filling / drain valve, heating system R20 male
50 Shutoff valve, return line radiator circuit
51 Drain valve, water heater R 20 male.
52 Safety valve, heating system
54 Fan transformer
55 Indicator lamp, “Immersion heater”
56 Indicator lamp “Circulation pump”
57 Start condenser, exhaust air fan
58 Condenser
59 Venting screw
62 Evaporator
63 Air filter (Filter type G2)
65 Drying filter with tank
66 Compressor heater
67 Push button Operating mode

Connection **Setting out dimensions**

		A	B	C
70 Flow line, radiator circuit	Compression ring Ø 22 mm	1393	306	55
71 Return line, radiator circuit	Compression ring Ø 22 mm	1319	239	548
73 Cold water connection	Compression ring Ø 22 mm	1265	252	405
74 Hot water outlet from water heater	Compression ring Ø 22 mm	1277	295	300
75 Motor for outdoor air damper				
76 Temperature sensor, evaporation				
79 Overflow connection, water heater				
81 Condensation tray				
82 Anode tester				
83 Inspection cover with anode				
84 Ventilation opening				
85 Expansion vessel				
87 Temperature sensor, extract air (concealed)				
88 Temperature sensor, boiler				
89 Temperature sensor, supply line				
90 Ventilation connection exhaust air	Ø 125 mm	2109	374	420
91 Ventilation connection extract air	Ø 160 mm	2109	131	120
92 Connection, docking, in compression ring Ø 15				
93 Connection, docking, out compression ring Ø 15				
94 Ventilation connection outdoor air	Ø 125 mm	2109	154	420
95 Overflow pipe, safety valve water heater				
96 Overflow pipe, safety valve heating				
97 Condensation water outlet, fan box				
98 Overflow water discharge	PVC-pipe Ø 32 mm (outside diameter)			
99 Collection funnel, waste water				

Technical specifications

CE **IP 21**

Height	2 110	mm
Required ceiling height	2 197	mm
Width	600	mm
Depth	640	mm
Net weight	210	kg
Volume total	244	litres
Volume boiler section	55	litres
Volume water heater	189	litres
Volume, expansion vessel	10	litres
Supply voltage	400	V~ 3-phase + N
Output immersion heater	9.0	kW (reconnectable)
Rated output circulation pump	100	W (adjustable)
Rated output fan	170	W (adjustable)
Rated output, compressor	1.0	kW
Enclosure class	IP	21
Max pressure in storage heater	0.9	MPa (9 (bar)
Max pressure in boiler section	0.25	MPa (2.5 (bar)
Breaking value, high pressure pressostat	2,45	MPa (24.5 (bar)
Breaking value, low pressure pressostat	0,15	MPa (1.5 (bar)
Fuse pressure in boiler section	0.25	MPa (2.5 (bar)
Refrigerant volume	380	g
Refrigerant type	R290	(propane)
Sound level in the boiler house	40 – 45	dBA

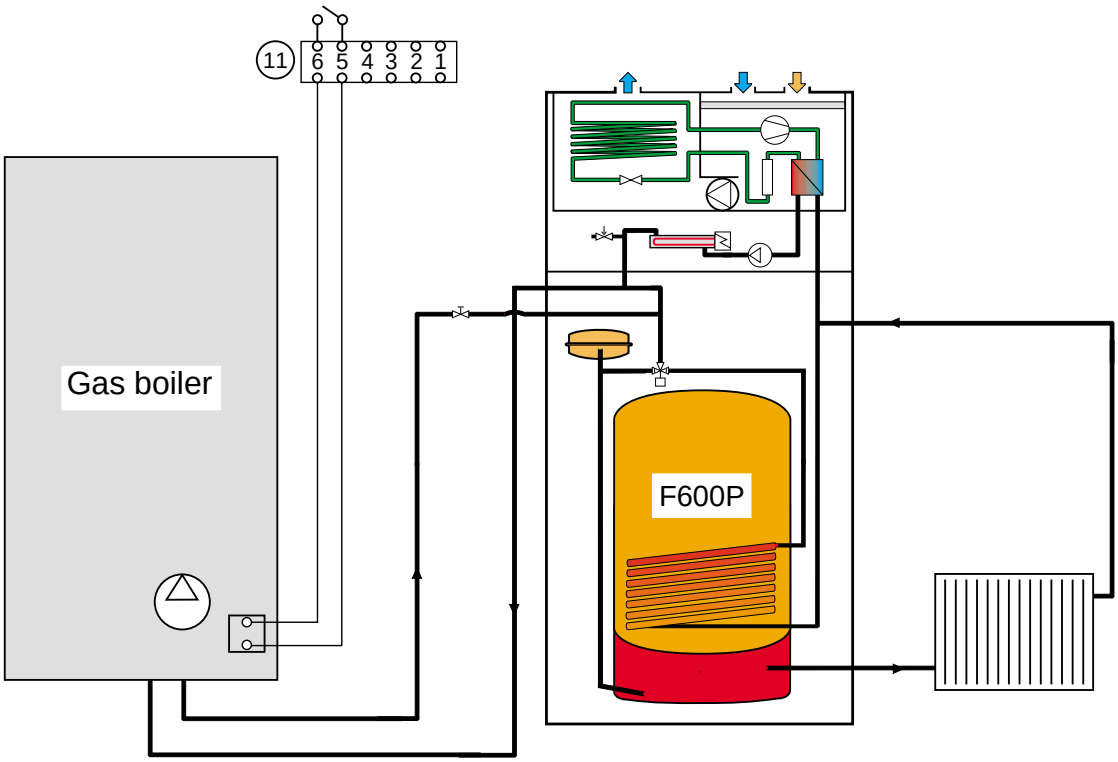
Docking to a gas boiler

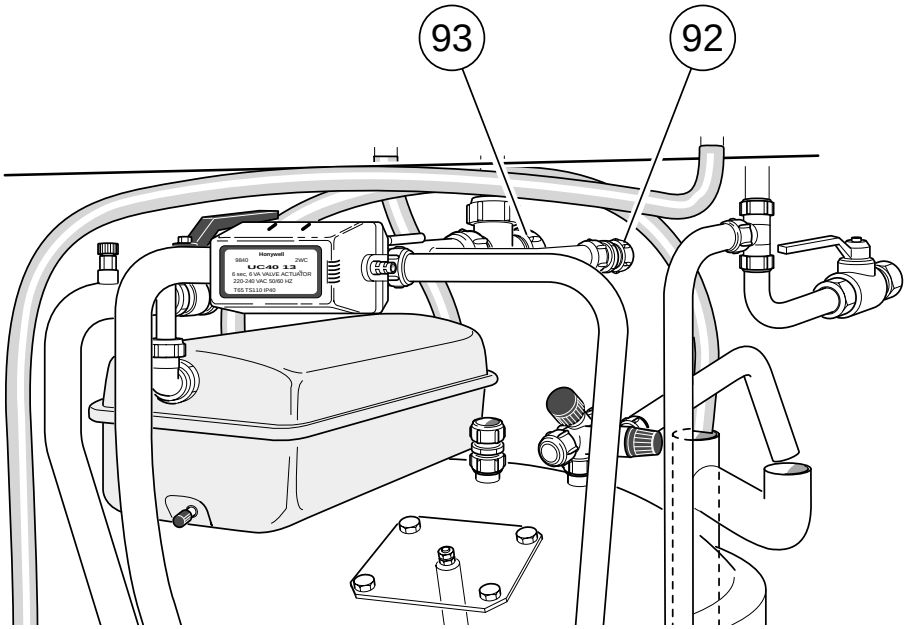
FIGHTER 600P is suitable for docking to a gas boiler. This then replaces the immersion heater in the heat pump.

The output of the gas boiler should not be greater than the immersion heater output that FIGHTER 600P can provide, i.e. 9 kW. The gas boiler is connected to connections (92) and (93).

The charging flow should be adjusted so that it is about the same as the radiator flow. The water temperature out of the gas boiler ought to be approximately 65 °C.

The electrical connection between the gas boiler and the heat pump is made via a two-pole cable. When the heat pump's contactor relay makes, the gas boiler and its circulation pump start, and when the relay breaks the gas boiler and even its circulation pump stop. The cable is connected to terminal (11). See the wiring diagram. The cables to the immersion heater in the FIGHTER are removed and insulated.





Docking to the accumulator tank

In order to utilise special tariffs the FIGHTER 600P can be supplemented with an accumulator tank (with immersion heater), which supplies a heat supplement during off peak times. Energy is supplied when a circulation pump starts and pumps the externally heated water to the FIGHTER's heating circuit. This takes place until there is no longer a need of the energy supplement.

An appropriate size of accumulator tank must be chosen according to individual needs.

Low tariff

During low tariff, FIGHTER 600P now provides, functionally separate from the accumulator tank without external help, ventilation, radiator heating and hot tap water. If additional energy is required this is provided by the immersion heater in FIGHTER 600P.

The accumulator tanks are charged independent of the FIGHTER 600P until the preferred tank temperature has been reached.

High tariff

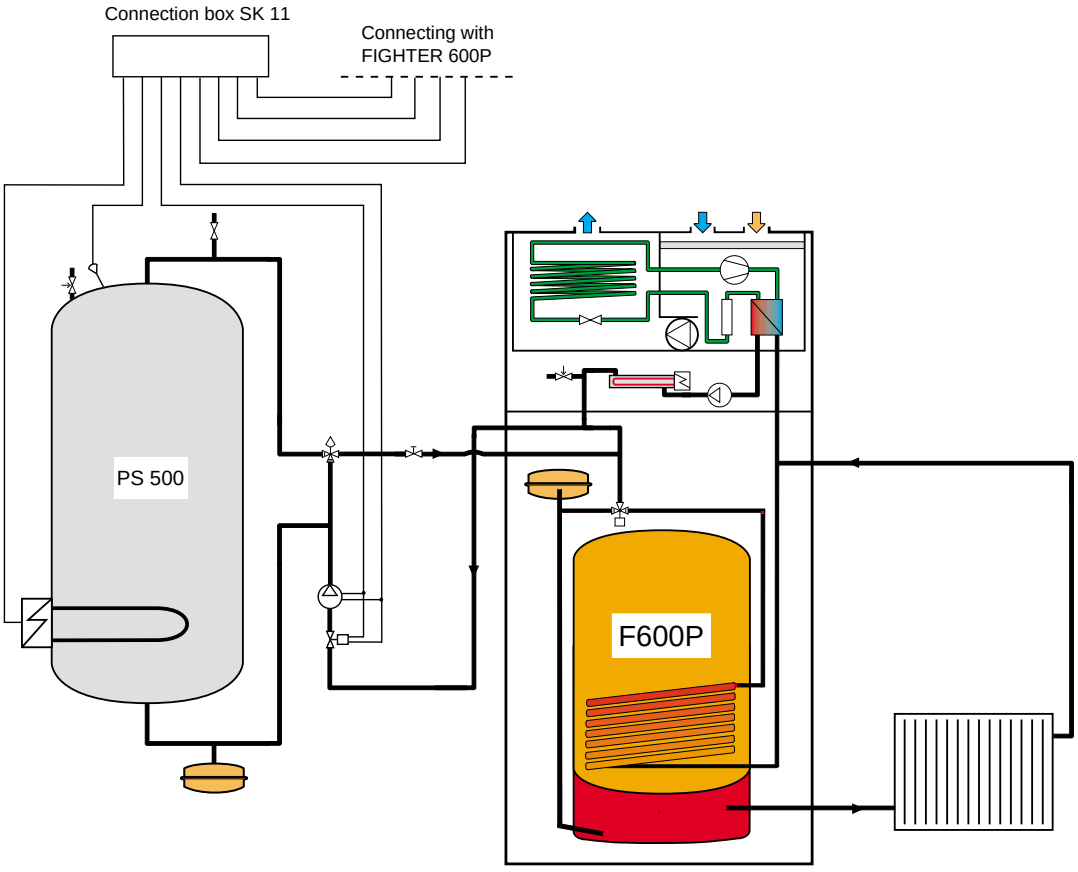
The fan, circulation pump and compressor in FIGHTER 600P work as before. If supplementary energy is required this is taken from the accumulator tanks. If the stored energy is not sufficient in cold weather conditions or with abnormally high hot water consumption, the immersion heater in FIGHTER can be connected to cover the energy requirement.

Equipment

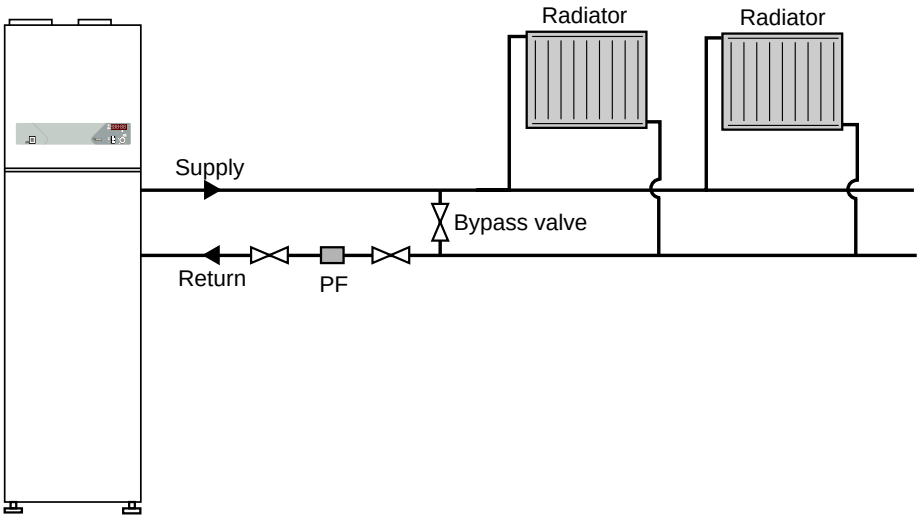
In addition to FIGHTER 600P the system consists of one (or more) accumulator tank (s) PS 500 and a docking kit PSP 11 (for one accumulator tank) or PSP 21 (for two accumulator tanks). The connection kit consists of a connection box SK11, a Laddomat LGT 10, a trim valve, one or two immersion heaters, a thermostat, which is placed high up in the accumulator tank as well as connection instructions.

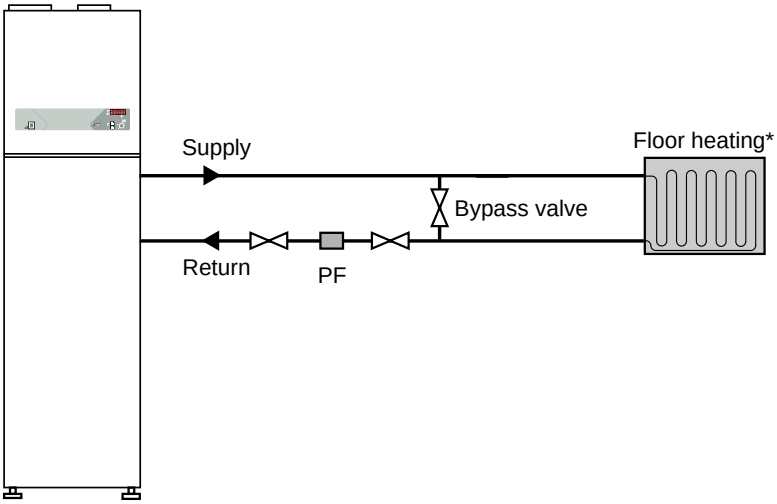
NOTE!

SK11 is not approved for more than 16 A, which means the total output of the accumulator tanks' electrical supplement combined must not exceed 11 kW



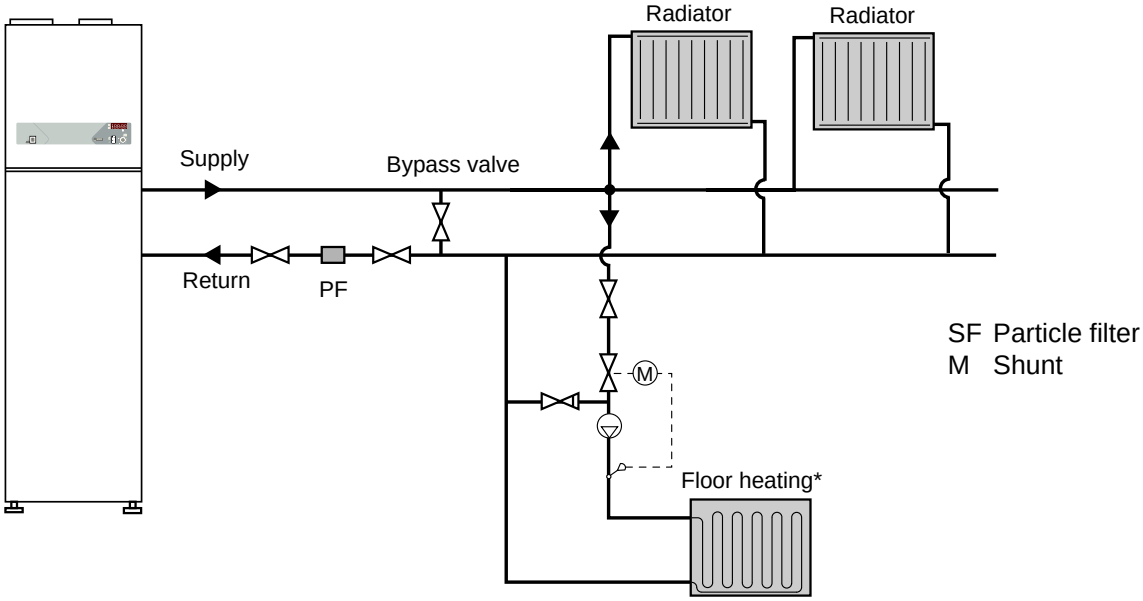
32 Installation method





Wooden floors with floor heating should be protected from a too high temperature, according to the floor supplier's instructions

* Including any distribution fittings



SF Particle filter
M Shunt

NIBE AB
SWEDEN