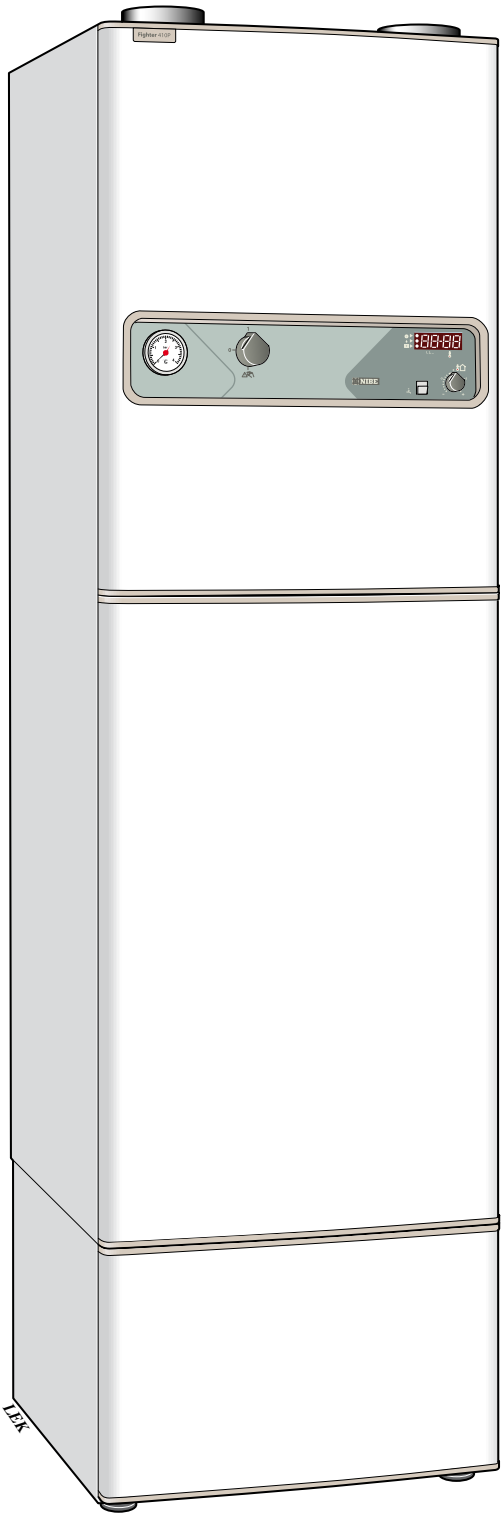
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FIGHTER 410P
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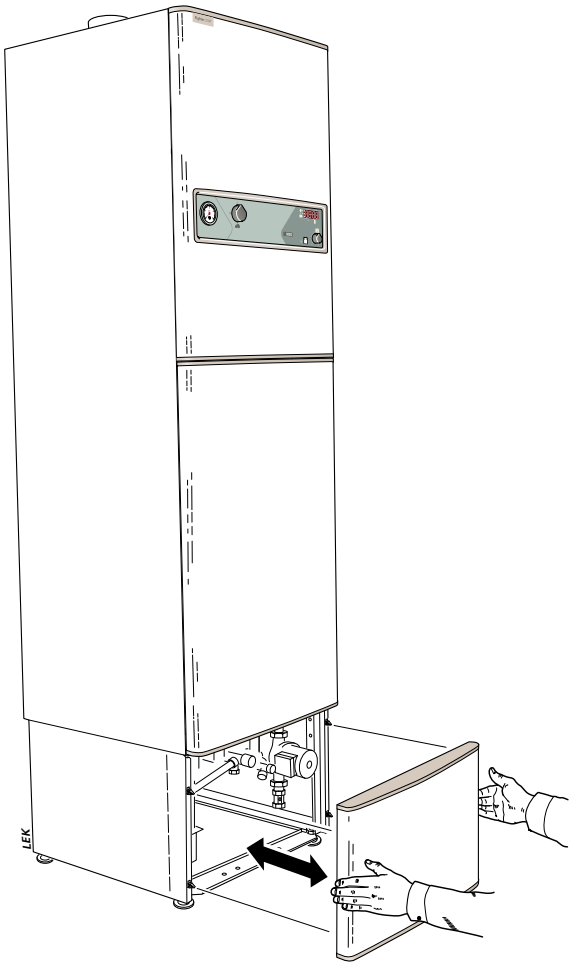
INSTALLATION AND MAINTENANCE INSTRUCTION

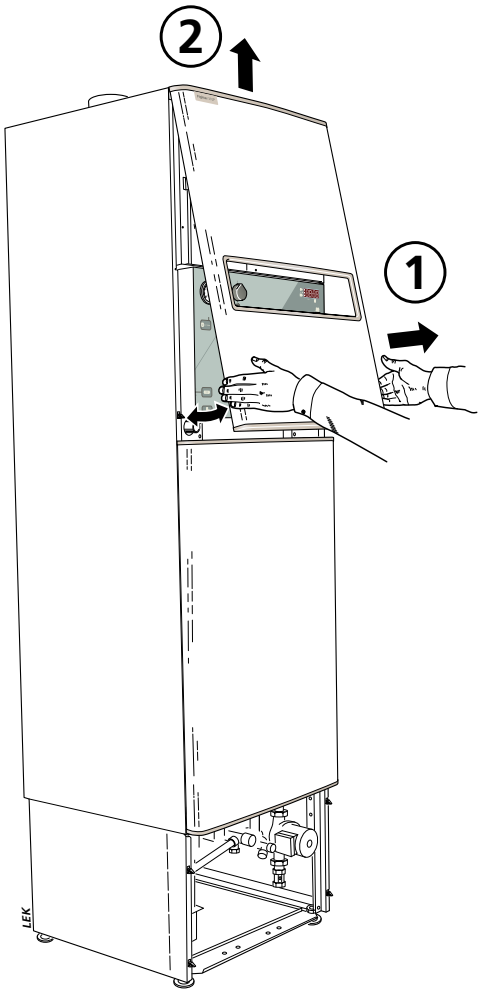
FIGHTER 410P

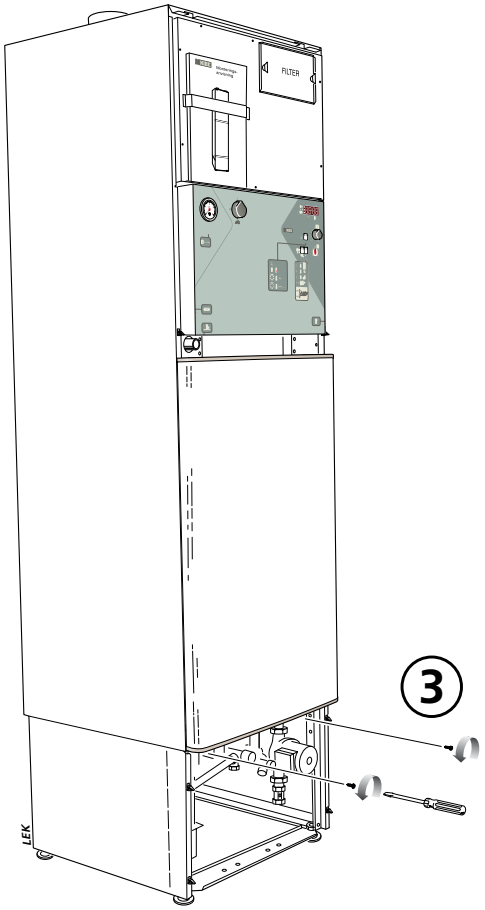
230V

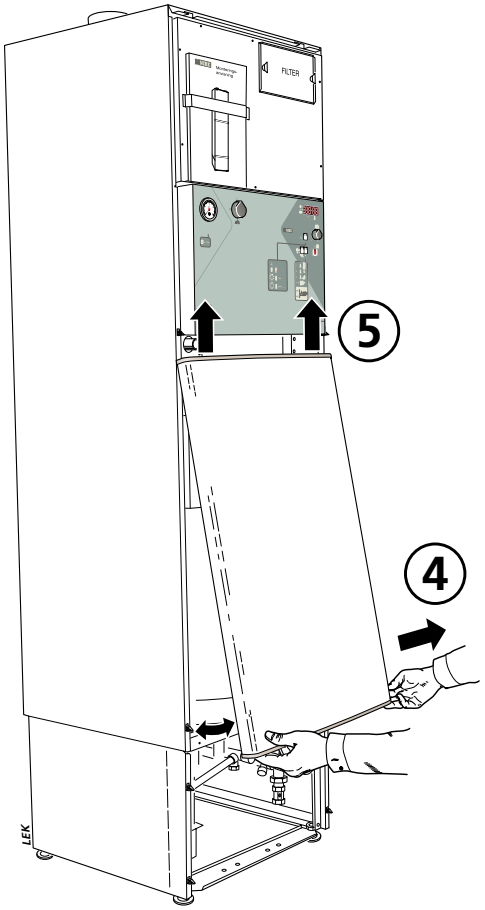


NIBE


LEK


2
1
LEK


FILTER
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LEK


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2 General

In order to get the ultimate benefit from your heat pump FIGHTER 410P you should read through the For Home Owners section in this Installation and Maintenance Instruction.

FIGHTER 410P is an exhaust air heat pump with preheated supply air . This means that it collects the energy in the ventilation air and uses it for hot water and room heating.

A microprocessor ensures that the heat pump always works efficiently.

FIGHTER 410P is a Swedish-made quality product which will last a long time and run reliably without unpleasant surprises.

For the installation engineer: Please, hand over to the home owner his manual after finalised installation.

To be filled in when the heat pump has been installed

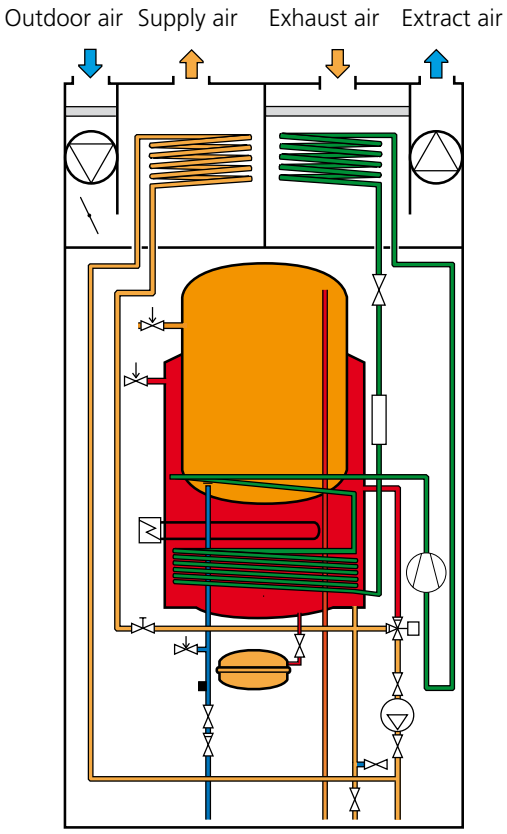
The serial number (103), should always be stated with all correspondence with NIBE. _ _ _ _ _ _ _ _ _ _ _ _ _ _		
Installation date		
Installer		
Chosen output, immersion heater		
Circulation pump setting		
Setting, trim valve		
Fan rating		
Switch	Selected position on terminal block (22) for this cable (1 – 10)	Measured total exhaust air flow □l/s □m³/h
Position A (reduced)	Black cable 094 (supply air) White cable 095 (exhaust air)	Supply air Exhaust air
Position B (normal)	Black cable 096 (supply air) White cable 097 (exhaust air)	Supply air Exhaust air
Position C (forced)	Black cable 098 (supply air) White cable 099 (exhaust air)	Supply air Exhaust air
Setting damper (where applicable)		
Setting Heating curve selection		
Setting Offset heating curve		
Date_____ Signed_____		

Manufacter: NIBE AB Box 14 Järnvägsgatan 40 285 21 MARKARYD SWEDEN	
Maxiumum water supply pressure	16 bar
Immersion heater	R50 / 8000W / 230 V
Operating pressure, tap water	6 bar
Expansion vessel, tap water, charge pressure	3,5 bar
Expansion vessel, heating water, charge pressure	0,5 bar
Pressure reduction valve, setting	3,5 bar
Volume, water heater	170 litres
Mass, unit, filled with water	440 kg
Maximum primary working pressure (heating side)	2,5 bar
Set opening pressure of temperature and pressure valve	7 bar
Set opening pressure relief valve	6 bar
Set opening, temerature limiter, immersion heater	88 °C
Set opening, temerature limiter, compressor	88 °C
Heating up time from 15 °C to stop temperature for compressor	5 h 41 min
Re-heating time, 70 % of total volume (only compressor working)	3 h 46 min

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance. Rights to make any design or technical modifications are reserved. ©NIBE 2010.

System description 3

Principle of operation



FIGHTER 410P comprises an electric boiler with a copper lined water heater and a heat pump which recovers energy from the ventilation air. The recovered energy is supplied to the boiler. The heat pump must be installed in a ventilation system intended for mechanical exhaust and supply air.

The output of the immersion heater is max 8.0 kW (Supplied output of 6.0 kW).

When the exhaust air at room temperature passes through the evaporator, the refrigerant evaporates because of its low boiling point. In this way the heat in the room air is transferred to the refrigerant. The refrigerant is then compressed in a compressor, causing the temperature to rise considerably. The warm refrigerant is fed to the condenser, which is in the boiler water. Here the refrigerant gives off its heat to the boiler water, so that the temperature of the refrigerant drops and the refrigerant changes state from gas to liquid. The refrigerant then goes via filters to the expansion valve, where the pressure and temperature are further reduced.

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

A frost protection damper precedes the supply air side's heating battery. This closes automatically when the supply air temperature after the battery drops below +5 °C

System diagram

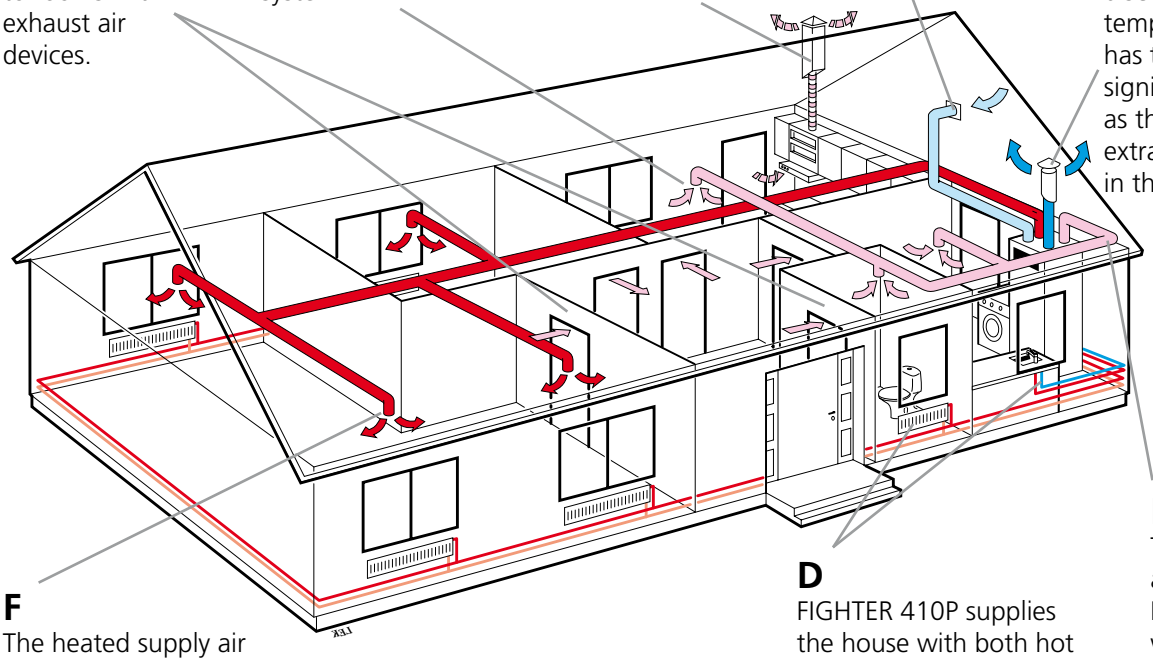
G
Air is transported from rooms with supply air devices to rooms with exhaust air devices.

A
The heated room air is drawn into the air duct system.

The air from the kitchen fan goes directly out into a separate duct.

E
The outdoor air is taken into FIGHTER 410P where it is heated.

C
When the room air has passed through the heat pump it is discharged. The temperature of the air has then been significantly reduced as the heat pump has extracted the energy in the room air.



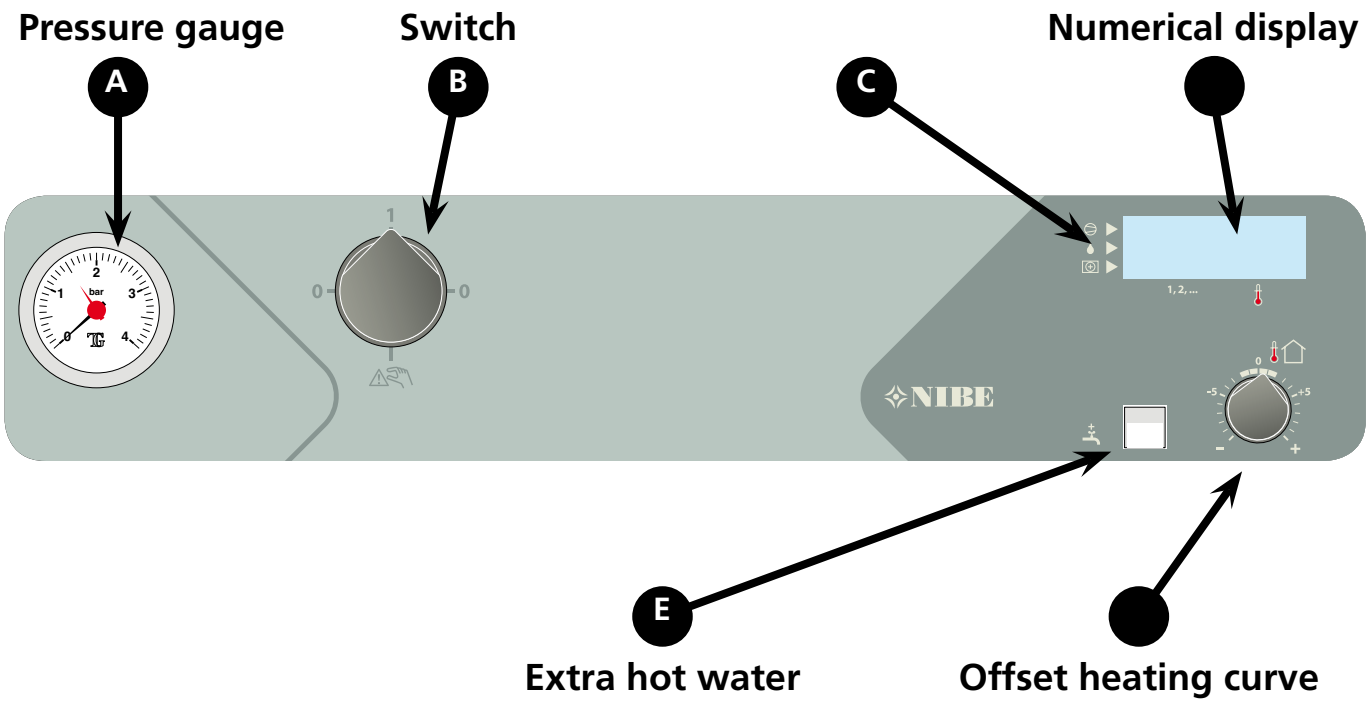
F
The heated supply air enters the room

D
FIGHTER 410P supplies the house with both hot water and room heating.

B
The warm room air is fed to FIGHTER 410P where the energy is recovered.

4 Front panel

Upper (visible) part of the front panel



Visible functions

A Pressure gauge

The radiator circuit pressure is displayed here. Gauge graduation is 0 – 4 bar. Normal pressure is 0.5 – 1.5 bar.

B Switch

with 3 positions 0 - 1 - ⚠ :

0 The heat pump completely switched off.

1 Normal mode. All control functions connected.

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

C Indicator lamps



Upper lamp

Lit	Compressor is operational.
Flashing	–
Not lit	Compressor is not operational.

Centre lamp

Lit	Automatic defrosting.
Flashing	–
Not lit	Normal mode.

Lower lamp

Lit	Immersion heater is operational.
Flashing	Parts of the immersion heater are disabled by external controllers (load monitor, etc).
Not lit	Immersion heater is not operational.

D Numerical display

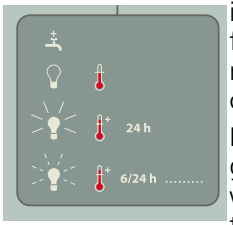
In normal mode the boiler temperature is displayed here. The two digits on the left indicate the channel number and the two on the right the reading/setting of that channel.

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.

NOTE! When switching from Standby mode "⚠" to normal mode "1" the numerical display can remain dimmed for a brief period. This can also occur at extremely low outdoor temperatures.

E Extra hot water

Pressing the Extra hot water button raises the boiler temperature to about 60 °C, giving increased water capacity for about 24 hours. In this mode, the built-in lamp is constantly lit.



Pressing the button again gives a permanent function, which raises temperature of the hot water during 6 hours / day. The integrated lamp flashes in this mode,

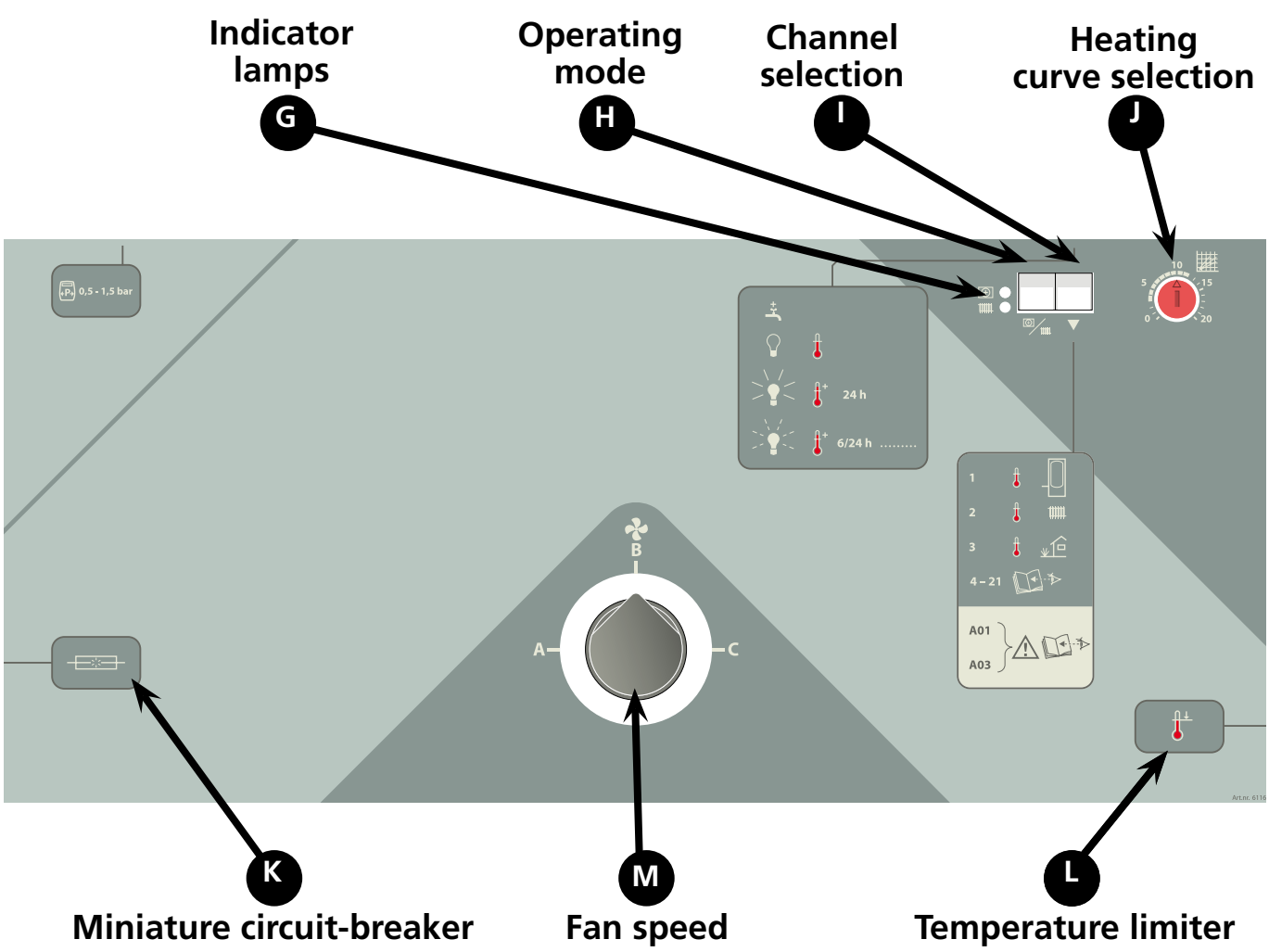
Pressing the button again resets the above functions.

F Heating curve offset

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

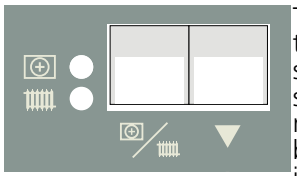
6 Front panel

Lower (hidden) part of the front panel



Hidden functions

G 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.

Uppermost lamp — Immersion heater

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.

Bottom lamp — Circulation pump

Lit	The circulation pump is operational.
Not lit	The circulation pump is not operational. The shunt valve is also closed in this position.

H Operating mode



When the heat pump is started, all functions (immersion heater, circulation pump and automatic heating control system) are running.

Pressing the Operating mode button once disables the immersion heater. Pressing it once more stops the circulation pump as well. Only hot water production is then obtained.

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

I Channel selection

Use the Channel selection button to browse forward through the display window channels to see the required reading or setting.

Available readings/settings include:



1 Boiler temperature
2 Supply temperature
3 Outside temperature
5 Extract air temperature

Normally the display always shows channel **1**. When you have browsed through the channels; channel **1** returns after a while.

J Heating curve selection



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

K Miniature circuit-breaker



Resetting the miniature circuit breakers.

L Temperature limiter



Resetting the temperature limiter.

M Fan speed



This switch is used for changing the fan speed.

It is possible to switch between three different speeds:

Position A: Reduced ventilation

Position B: Normal ventilation

Position C: Forced ventilation

Position B is normally used.

Position A is used on occasions when a lower ventilation flow is acceptable in the house, for example, when no one is in the house. This position should not be used over long periods. Otherwise there is a risk of an inferior indoor climate as well as damage due to dampness in the house.

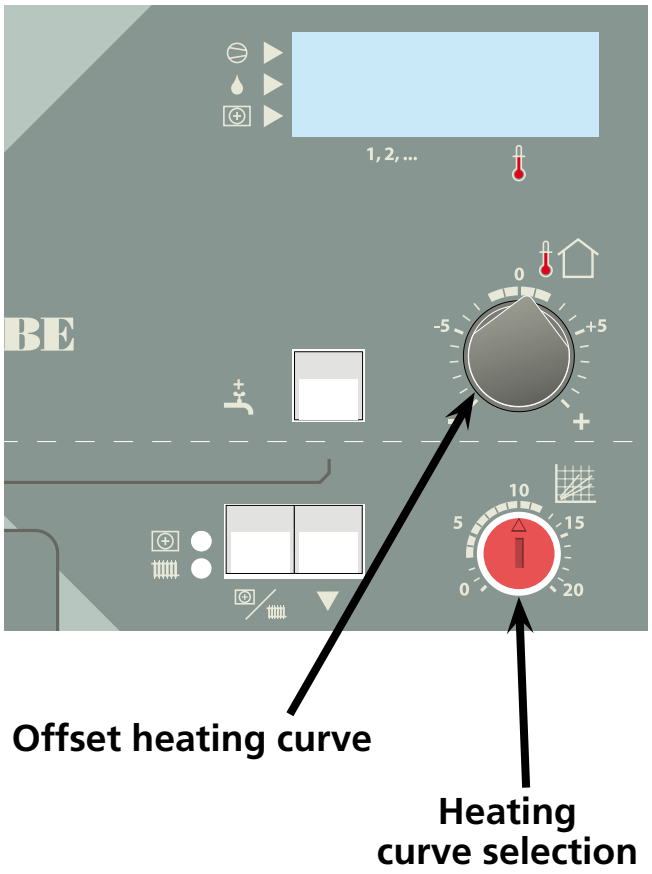
Position C is used on occasions when a higher ventilation flow is sought in the house, for example, when there are many people in the house. This position should not be used over long periods. Otherwise this will increase energy consumption and with that operating costs.

8 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 it is outside the warmer the water circulating in the heating system must be.

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



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 of basic 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.

Changing the room temperature

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. One line approximately represents a 1 degree change in room temperature.

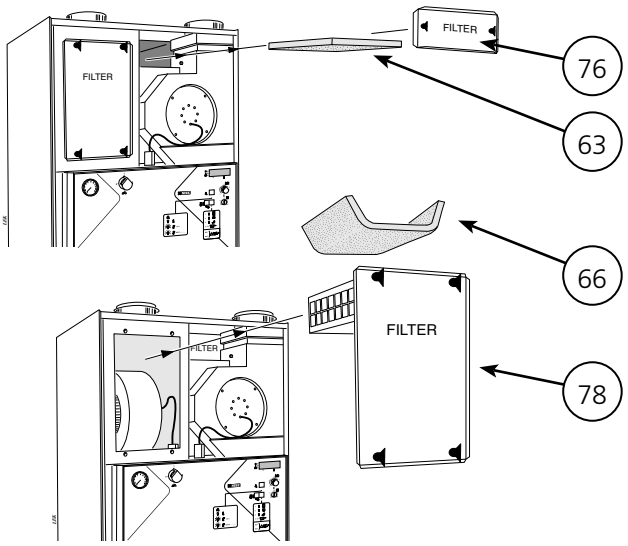
An increase in the room temperature may be inhibited by the radiator or floor heating thermostats, if so these must be turned up.

Maintenance routines 9

Cleaning the air filter

The heat pump's air filter (63) needs to be cleaned regularly (approximately 4 times per year). The interval between cleaning operations varies and depends on the amount of dust in the exhaust air.

- Set the switch to "**0**".
- Open the upper front cover by pulling it out by the lower edge, then lifting it up.
- Release the filter holder by turning the black knobs a quarter of a turn anticlockwise.
- Pull out the holder. Take out the filter and shake/ vacuum off any dirt. Do not use water or other liquids for cleaning.
- Check that the filter is not damaged. New original filters can be ordered from NIBE.
- Assembly takes place in the reverse order.



Every third month a reminder for cleaning the filter is shown in the display as "A-01". Note that the time will be set to zero by setting the switch to "0".

Miscellaneous

When the exhaust air filter (63) has been severely clogged or broken the evaporator may also need to be cleaned. However, this should only be done in exceptional cases. Remove the plastic hose for waste condensation water from its mounting before cleaning. The hose is straightened and the condensation water will run out. The evaporator is cleaned with water; a mild soap solution can be applied with a sponge, if necessary. The hose is then reattached in its original position, so that a water seal is formed.

The installation is checked with regard to abnormal noise or leakage.

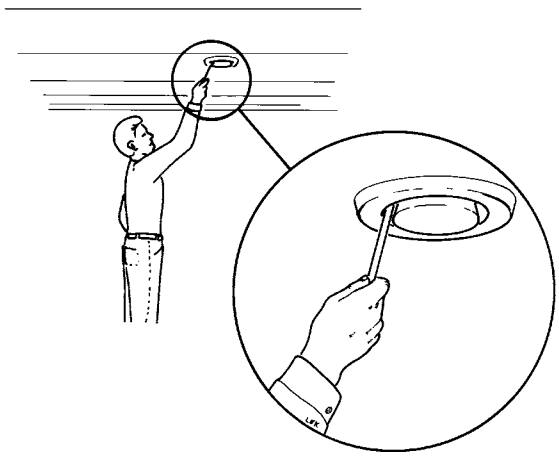
Cleaning the ventilation devices

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.

Also check the outdoor air's intake grille (on the house facade). Clean if necessary.



NOTE!

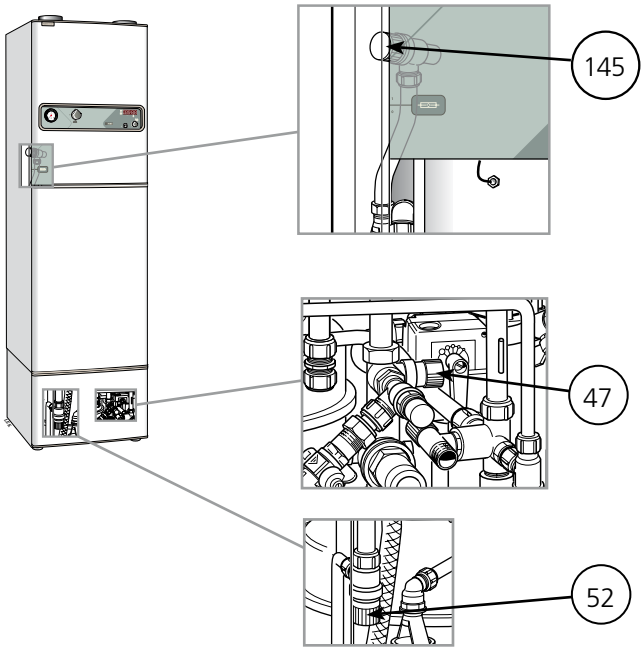
If this unvented water heater develops a fault, such as a flow of hot water from the discharge pipe, switch the heater off and contact the installer.

NOTE!

Do not remove or adjust any component part of this unvented water heater: Contact the installer.

10 Maintenance routines

Checking the safety valves

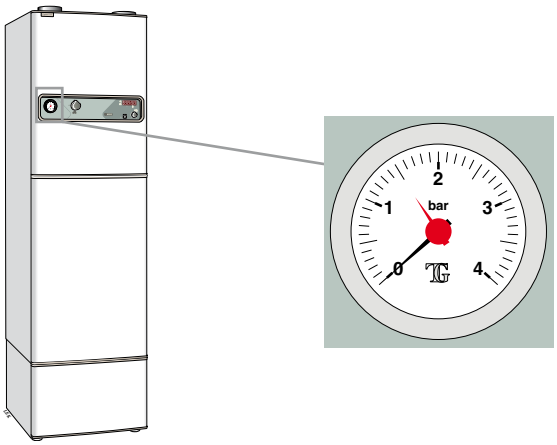


FIGHTER 410P has three safety valves, one for the heating system and two for the water heater.

The safety valves must be checked regularly. 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



The pressure gauge (42) 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 the section Dealing with malfunctions - High extract air temperature. It is normal that the extract air temperature varies.

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.

Erecting the heat pump

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.

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

An area of approximately 15 cm is required on the left side of the heat pump, at the temperature and pressure valve (145) to enable access to the valve.

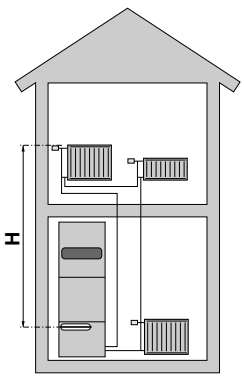
NOTE! Since a waterfilled FIGHTER 410P weighs roughly 440 kilos, the floor must stand such a weight.

Hard water areas

Normally it is no problem to install FIGHTER 410P in hard water areas since the maxing working temperature is 60 °C.

Maximum boiler and radiator volumes

The volume of the expansion vessel (85) is 12 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.

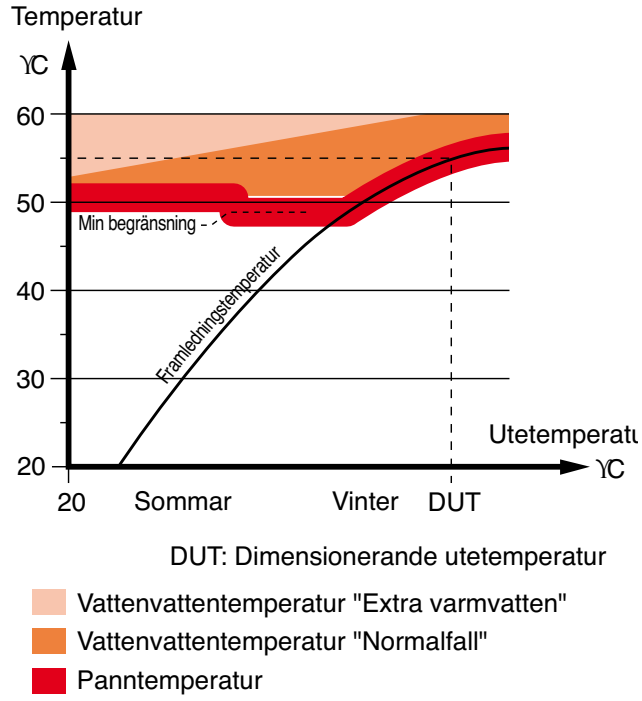
Any change in the initial pressure affects the ability of the expansion vessel to handle the expansion of the water. The maximum system volume excluding the boiler is 285 litres at the above initial pressure.

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. If the heat pump or the expansion vessel is replaced, the installation must be inspected again.

Temperatures in FIGHTER 410P

Normal temperature levels in boiler or water heater.



DUT: Dimensionerande utetemperatur

Vattenvattentemperatur "Extra varmvatten"

Vattenvattentemperatur "Normalfall"

Panntemperatur

The temperature of the hot water in the water heater may vary between about 50 and 65 °C.

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

12 Pipe connections

General

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

The system requires a low-temperature dimensioning 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.

The total volume is 240 litres, with 170 litres in the water heater and 70 litres in the boiler section.

The pressure vessel in the FIGHTER 410P is approved for max 9.0 bar (0.9 MPa) in the water heater and 2.5 bar (0.25 MPa) in the double shell 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. These non-pressurised collecting pipes shall not be used for anything else. A discharge pipe from the tundish (108) connected to the expansion relief valve (47) (safety valve) shall also be connected to a drain in the same way.

No valve should be fitted between the pressure reduction valve (expansion valve) and the storage cylinder.

NOTE!

Do not use collection funnel (99) to discharge pipes from tundish (108).

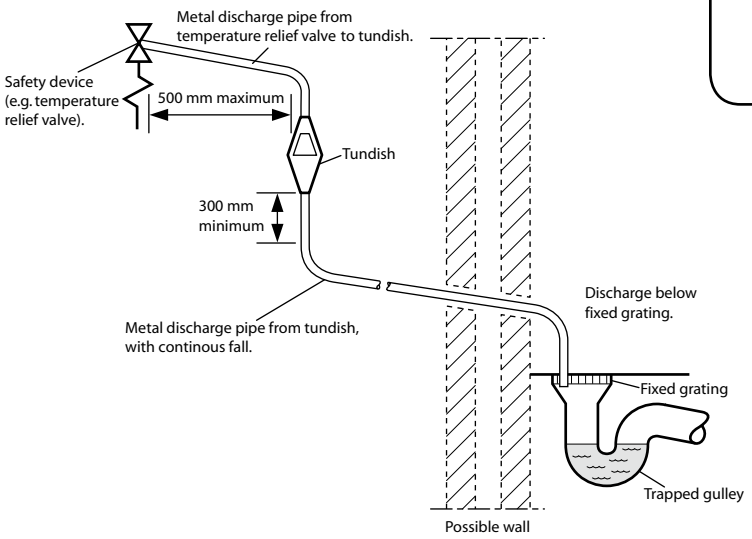
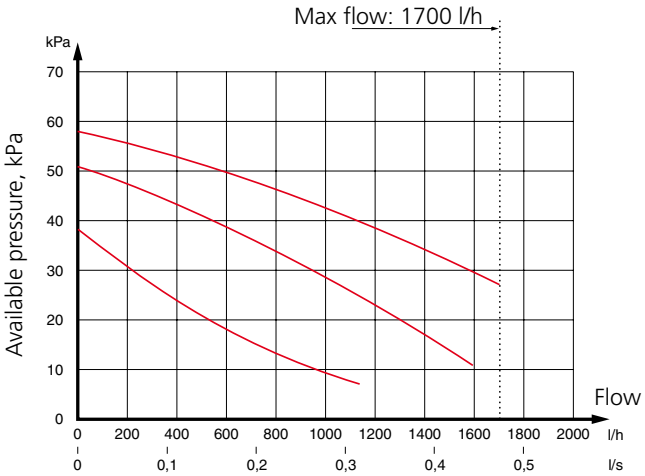


Table sizing of copper discharge pipe for common temperature relief valve outlet sizes.

Valve outlet size	Minimum size of discharge pipe	Minimum size of discharge pipe from tundish	Maximum resistance allowed, expressed as a lenght of straight pipe (i.e. no elbows or bends)	Resistance created by each elbow or bend
G1 / 2	15 mm	22 mm	up to 9 m	0,8 m
G1 / 2	15 mm	28 mm	up to 18 m	1,0 m
G1 / 2	15 mm	35 mm	up to 27 m	1,4 m
<G3> / 4	22 mm	28 mm	up to 9 m	1,0 m
<G3> / 4	22 mm	35 mm	up to 18 m	1,4 m
<G3> / 4	22 mm	42 mm	up to 27 m	1,7 m
G1	28 mm	35 mm	up to 9 m	1,4 m
G1	28 mm	42 mm	up to 18 m	1,7 m
G1	28 mm	54 mm	up to 27 m	2,3 m

Pipe connections

Pump and pressure drop diagrams



Expansion vessel, tap water

The enclosed expansion vessel (106) for tap water shall be installed in the tap water circuit after the pressure reduction valve.

NOTE!

This installation is subject to building regulation approval, notify the Local Authority of intention to install.

NOTE!

Use only manufacturer's recommended replacement parts.

Tap water connection

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

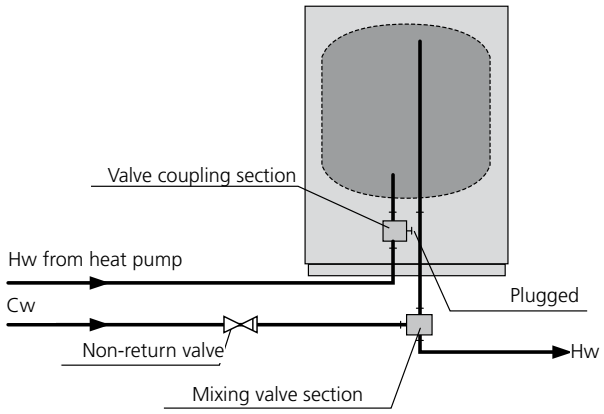
The attendant expansion vessel (107) must be connected to the hot water system.

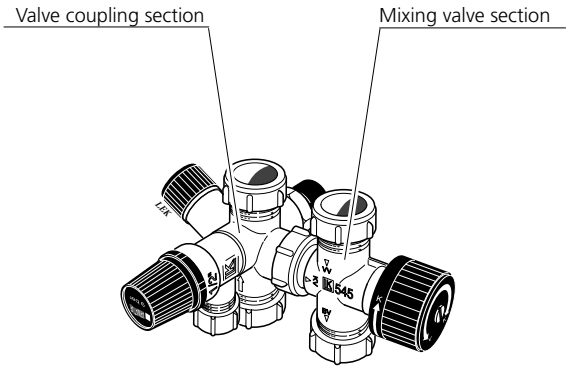
The heat pump should be supplemented with an electric water heater if a bubble pool or other significant consumer of hot water is installed.

If the heater is equipped with a valve connection Ø of 15 mm, this should be replaced with an equivalent (split) Ø 22 mm coupling.

Appropriate heaters are COMPACT 100-300 for floor-mounting and EMINENT 35-100 for wall-mounting.

1. Split the valve coupling.
2. Attach the valve coupling section to the heater's incoming cold water.
3. Attach the mixing valve section to the heater's outgoing hot water.
4. Plug the split on the valve coupling section.





14 Pipe connections

Supply air battery

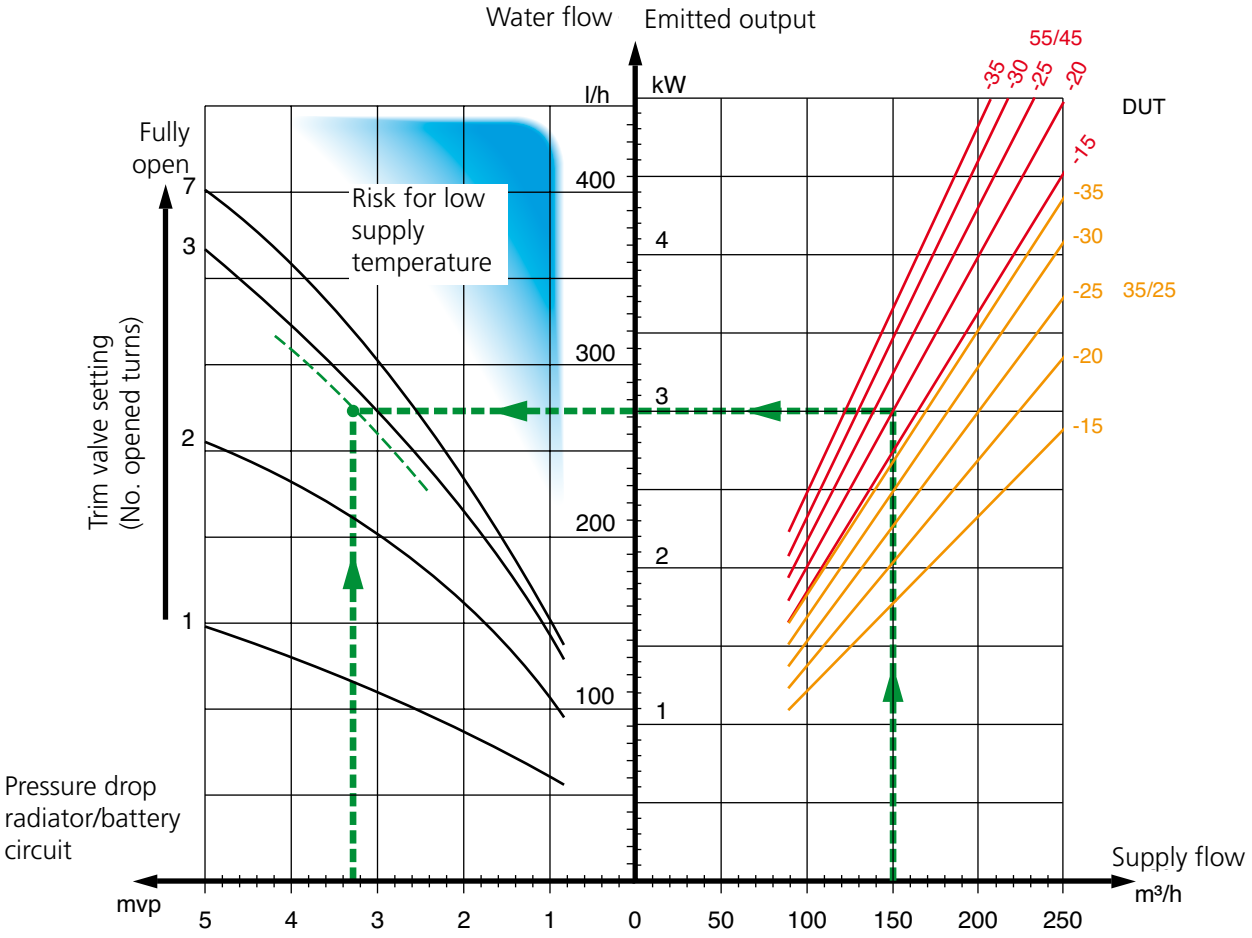
The supply air battery is connected in parallel with the radiator circuit and heats the house's supply air. The additional output is determined according to the diagram.

The water flow through the supply air battery is set by means of a trim valve (81).

When, for example, the supply air flow rate is set to 150 m^3/h and DUT is -20 °C a setting is obtained, at a pump pressure (= pressure drop battery circuit) of 3.3 mvp (33 kPa), of 2.8 on the trim valve.

This means the trim valve should be opened 2.8 turns from the closed position. At the same time it can be read that the battery supplies the supply air with approximately 3.0 kW of additional output at -20 °C

NOTE! Vent the battery using the venting screw (5) repeatedly in order to ensure the circulation through the battery.



The delivered output in the diagram is calculated when dimensioning the heating system 55/45 °C respective 35/25 °C (floor heating).

Ventilation connection 15

Ventilation flow

FIGHTER 410P 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 the ventilation flow should not be less than 110 m^3/h. (31 l/s).

The heat pump's installation area should be ventilated by at least 36 m^3/h (10 l/s).

FIGHTER 410P is equipped with an internal ventilation opening (84). As a result, an air flow of about 5 m^3/h (1.4 l/s) is taken directly at floor level from the room where the heat pump is installed.

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

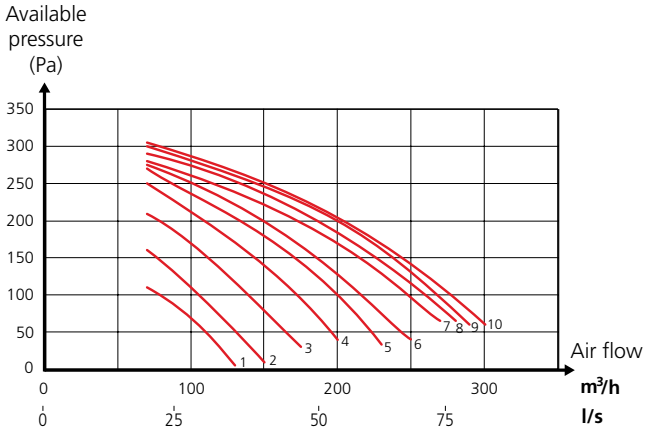
The choice of position and with that the fan speed is made according to the following criteria:

- The supply air flow should be 80 % of the exhaust air flow to avoid overpressure in the house.
- In position B (normal position) the planned exhaust air respective supply air flow should be obtained in the house. Fine adjustment is made using the terminals in the different rooms. After which the position of the terminal should not be changed.
- In position A (reduced position) a low exhaust air respective supply air flow should be obtained. How low is determined in each specific case. NOTE! The exhaust air flow must never drop below 110 m^3/h (31 l/s). Otherwise the heat pump's function may be jeopardized. Tip: Select a position so that the exhaust air flow is as close to 110 m^3/h as possible without falling below this value.
- In position C (forced position) a high exhaust air flow respective supply air flow should be obtained. How high is determined in each specific case. Tip: Select as high a position as possible without the sound level from the terminal in the house becoming troublesome.

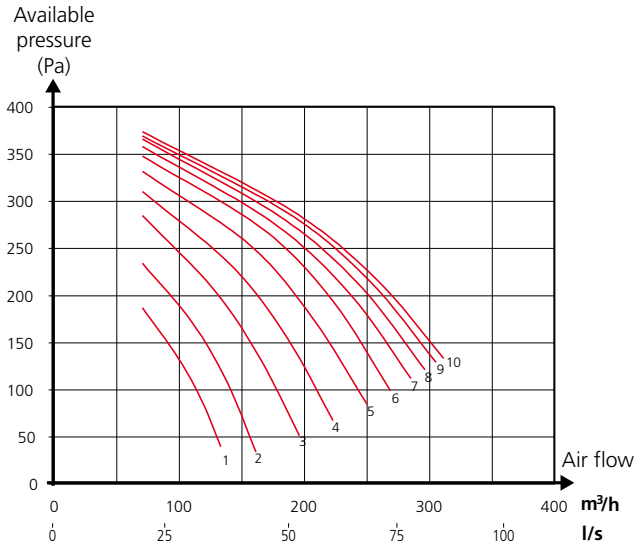
Fan diagram

The diagram below show the available ventilation capacity.

Supply air fan



Exhaust air fan



16 Ventilation connection

Duct installation

To prevent fan noise being transferred to the exhaust and supply air devices, it may be a good idea to install a silencer in the duct.

As the heat pump contains a flammable refrigerant (propane R290), the air ducting system must be earthed. This is done by making a sound electrical connection to the four ventilation ducts using the four earthing cables supplied. The cables must then be connected to the earthing studs on top of the top cover.

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. 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.

The air duct system should, at a minimum, be of air tightness class B and in general designed according to applicable building standards.

Kitchen duct

The kitchen duct must not be connected to FIGHTER 410P.

Adjustment

To obtain the necessary air exchange in every room of the house, the exhaust and supply air devices must be correctly positioned and adjusted. The supply air flow is adjusted to correspond to approximately 80 % of the exhaust air flow. A defective ventilation installation may lead to reduced heat pump efficiency and thus poorer operating economy, and may result in damage to the house.

NOTE!

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

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. The temperature limiter, thermostat, compressor and the immersion heater can otherwise 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 88 °C; it can be manually reset by pressing the button on the temperature limiter.
The temperature limiter (169) for the compressor cuts off the supply to the compressor if the temperature rises to 88 °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) and its cabling, are internally fuse protected with a miniature circuit breaker (7).

NOTE!

The electrical installation, wiring and any service work must be done in strict conformity to current regulations under the supervision of a qualified electrician.

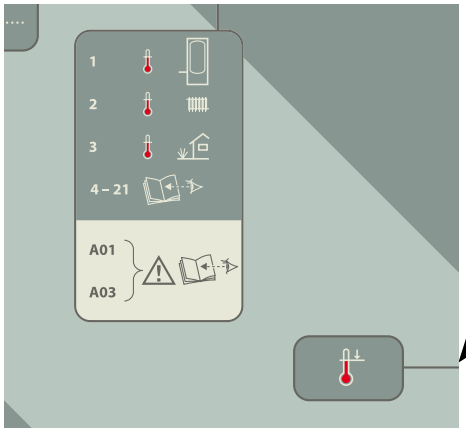
Power rating as set at the factory

As standard the output power of the immersion heater is 8.0 kW. The supplied output is 6.0 kW.

Switching between different power outputs is done by opening the front panel (see under Service — Opening the front panel), and moving certain cables as described under Electrical diagram — Changing the output.

Resetting the temperature limiter

The temperature limiters are accessible behind the top front cover and are positioned to the right of the panel.
The temperature limiters are reset by firmly pressing in its buttons.
The temperature limiter may only be reset under the supervision of a qualified installer.



Max current

Immersion heater output (kW)	Max current (A)	Breaker (A)
6,0	30,3	32
8,0	39,0	40

Immersion heater

FIGHTER 410P is delivered with a 8 kW immersion heater (1). It is started and stopped via the microproessor card (34). If a failure occurs there is a temperature limiter (6) (thermal cut-out) that is stopping the immersion heater. An immersion heater without a temperature limiter is not allowed to be mounted.

18 Electrical connections

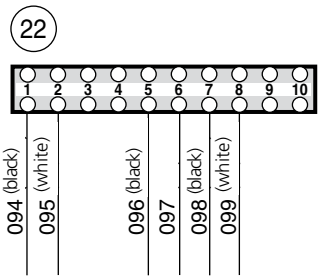
Setting the fan capacity

Selection of the ventilation capacity is carried out in connection with ventilation adjustment by connecting the three white cables from the exhaust air fan respective the three black cables from the supply air fan to the appropriate outlets on the terminal block (22). See the illustration Ventilation connection — Fan diagram.

The cables correspond to fan and position as follows:

Black cable 094: Supply air fan, position A (reduced)
Black cable 096: Supply air fan, position B (normal)
Black cable 098: Supply air fan, position C (forced)
White cable 095: Exhaust air fan, position A (reduced)
White cable 097: Exhaust air fan, position B (normal)
White cable 099: Exhaust air fan, position C (forced)

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



NOTE!

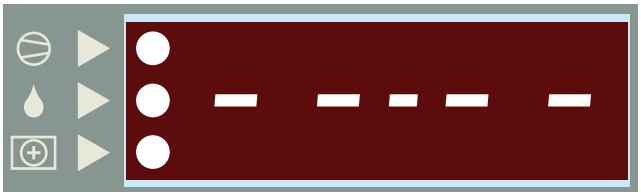
The same outlet must never be used for both fans.

Blocking immersion heater operation

Normally the immersion heater is permitted to run even if the compressor has switched of because its stop temperature has been reached (under the condition that the immersion heater is connected via the operating mode selector). Furthermore, the flow temperature is permitted to be as high as 65 °C.

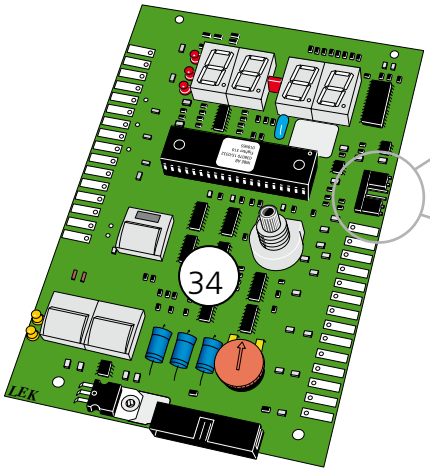
These functions can be deactivated by moving the strap from pins 1 and 2 to pins 2 and 3 as illustrated.

The numerical display will now show horizontal lines, otherwise vertical.

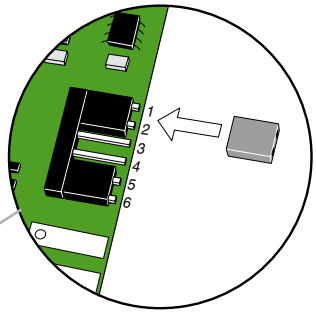


Once the strap is in position on pins 2 and 3 the immersion heater is only permitted to run when the compressor is operational (except in defrosting mode).

In addition, the flow temperature is limited to maximum 60 °C.

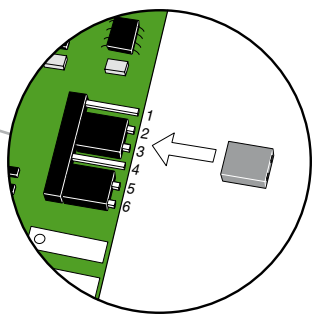


Pins 1 and 2 are strapped



Immersion heater operation (connection on delivery)

Pins 2 and 3 are strapped



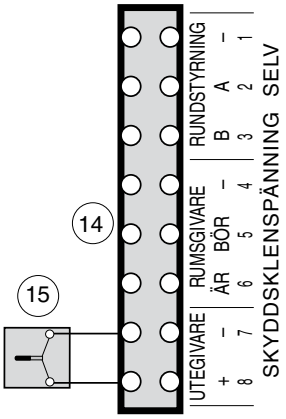
Limited immersion heater operation

Electrical connections

Connecting the outside sensor

The outside sensor (15) must be installed in a shaded location on a wall facing north or north-west, where it will not be affected for example by the morning sun. The sensor is connected with a two-wire cable to terminal (14) positions "7" and "8".

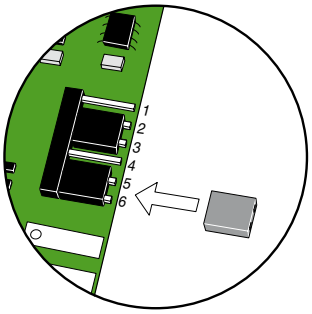
If a conduit is used it must be sealed to prevent condensation in the sensor capsule.



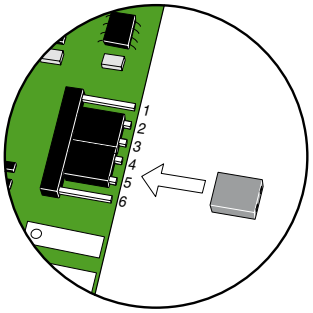
Centralised load control and load monitor

The output steps of the immersion heater can be disconnected by means of a load sensor or a centralised load control relay. This can be done either with floating make or break contacts, connected to terminal block (14). The required contact function is chosen with a jumper on the PCB behind the front panel (see below). The heat pump is delivered with a strap on pins 5 and 6, which gives a make (NO) contact function. With this arrangement, an open external contact does not cause power disabling.

For break (NC) contact function, move the strap to pins 4 and 5.



Make (NO) contact function (connection on delivery)



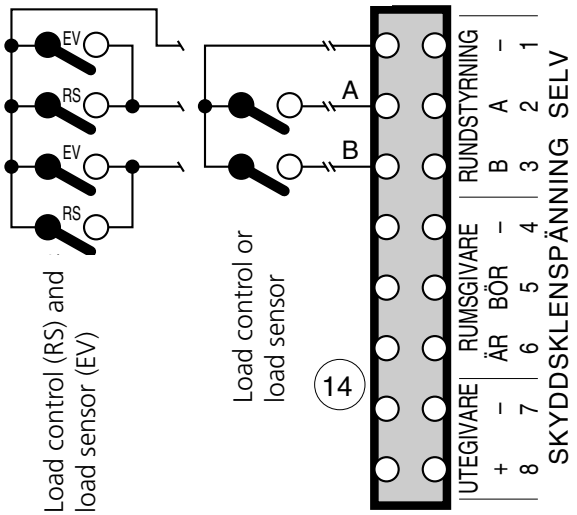
Break (NC) contact function

The table below describes power disabling.

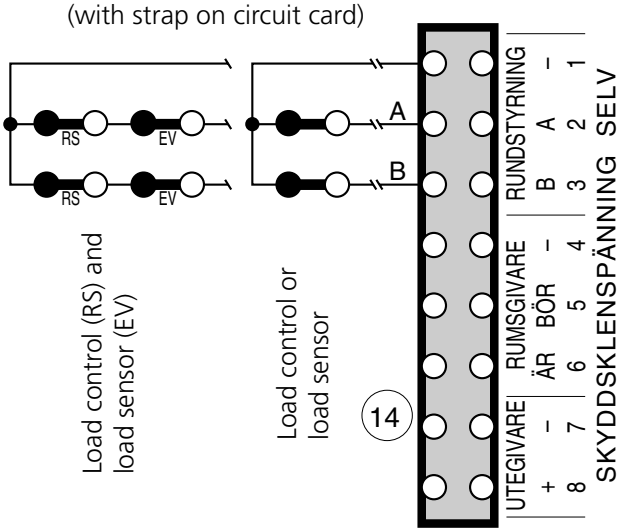
Operated external contact	Disconnected power step
A *	Contactor 69 (Black group)
B	Contactors 67 and 69 (White and black group)
A + B	Contactors 10, 67 and 69 (Brown, white and black group)

* Only with 13.5 kW immersion heater output

Make contact function
(without strap on circuit card)



Breaking contact function
(with strap on circuit card)



If both a load sensor and centralised load control are to be used, the contact functions must be the same for both (both make or both break). The contacts must be connected in parallel for make contact function and in series for break contact function.

20 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 button firmly).

Filling the water heater and the heating system

- The water heater is filled by opening a hot water tap. When water comes out of the hot water tap this can be closed.
- Connect enclosed flexible hose (147) between connection (149) and connection (150) (the hose is mounted at the unit when this is delivered). Open filling valves (151) and (49). The boiler part of the heat pump and the radiator system are now filled with water.
- After a while the pressure gauge (42) will show rising pressure. When the pressure reaches 2.5 (bar) (approx. 25 mvp) a mixture of air and water starts to emerge from the safety valve (52). The filling valves (151) and (49) are then closed.
- Turn the safety valve (52) until the boiler pressure reaches the normal working range (0.5 - 1.5 bar).
- When the filling procedure is finished the flexible hose (147) shall be removed.

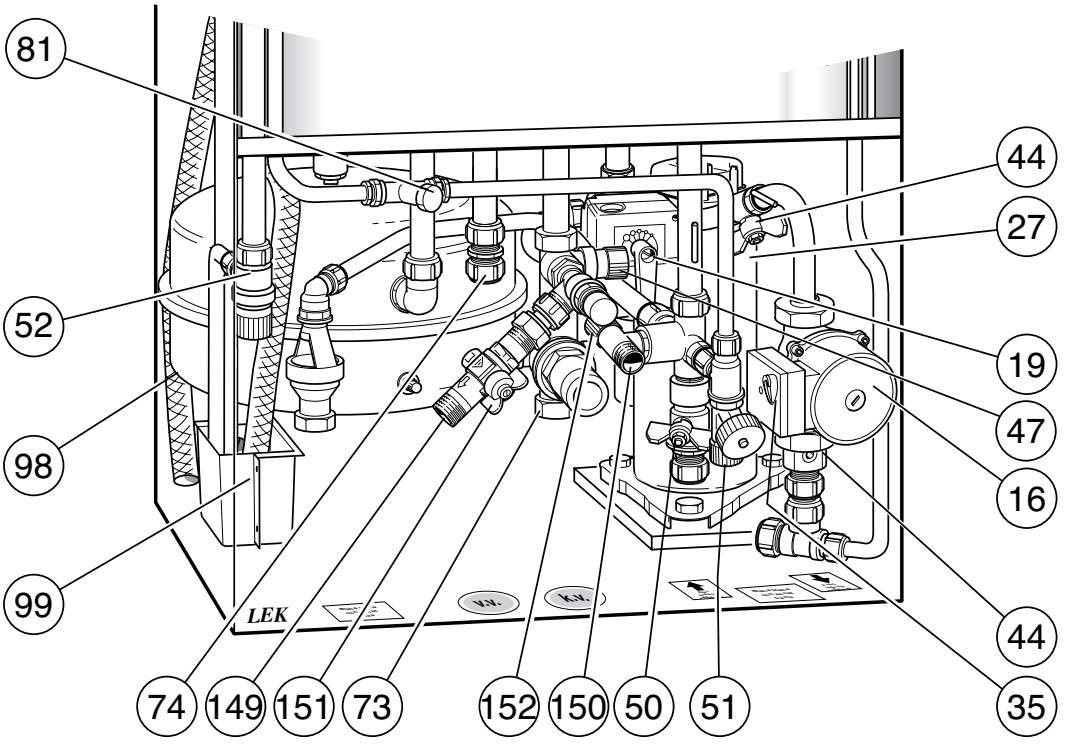
Venting the heating system

NOTE! The pipe from the container must be drained of water before the air can be removed. This means that the system is not necessarily vented, despite water emerging from the safety valve (52) when it is opened for the first time.

- Vent the FIGHTER through the safety valve (52). Other heating systems are vented using their respective venting screws.
- Keep topping up and venting until all air has been removed and the pressure is correct.

Starting

- Set the switch (8) to "⚠". In this mode the electronics are disconnected, so the display window is not lit. The thermostat (3) opens at 68 °C in this mode.
- Set the shunt (19) by hand (turn the adjuster screw to manual mode and then turn the shunt lever to the required position).
- When the room temperature exceeds 16 °C set switch (8) to "1". NOTE! The display may still not be lit, this comes on automatically when the boiler temperature has dropped a few degrees. The compressor has a start delay of at least 20 minutes.
- Reset the shunt (19) by hand (turn the adjuster screw to "A").
- Set the design capacity (35) on the circulation pump's switch (16). See the section Pipe connections - Pump and pressure drop diagram. Make sure that the switch is not in an intermediate position.



Setting the ventilation

Ventilation flows and fan transformer settings are given on the ventilation drawing.

- Change the fan capacity by moving the exhaust and supply air fans' connection cables on terminal block (22). To ensure the lowest possible noise level, set the fans for the lowest possible capacity.
- Set the correct ventilation flow on the house's exhaust and supply air devices.

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. Also vent through the supply air battery's venting screw (5). 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 hot water can be drained off through drain valve (51) using an R15 (1/2") hose coupling. Remove the cover (80) from the valve. Now screw on the hose coupling and open valve (51).

Open safety valve (52) to let air into the system.

Setting the supply air battery's water flow

The supply air battery is connected in parallel with the house's heating system. The trim valve (81) may need to be adjusted to attain the correct flow in the battery and heating system. See the section Pipe connection – Supply air battery

Emptying the water heater

To empty the water heater proceed as follows:

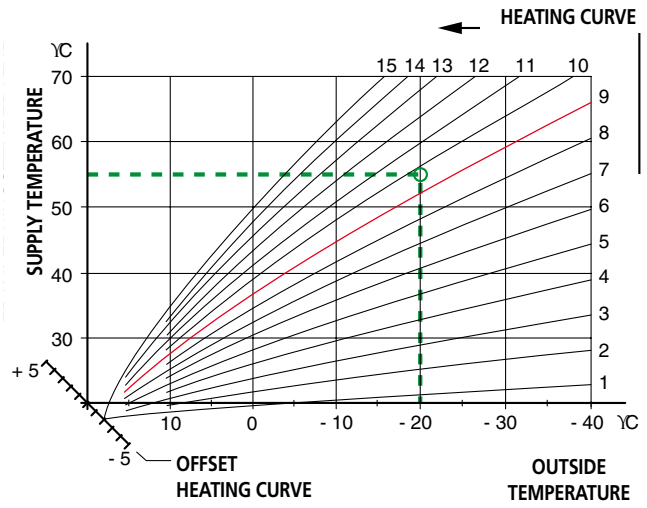
- Disconnect the overflow pipe from the drain connection (79) and connect a hose to a draining pump instead. Where no draining pump is available, the water can be released into the overflow funnel (99).
- Open the safety valve (47).
- Open a hot water tap to let air into the system. If this is not enough, undo a pipe coupling (74) on the hot water side and pull out the pipe.

Cleaning the system / Flushing out of the hot water and central heating system

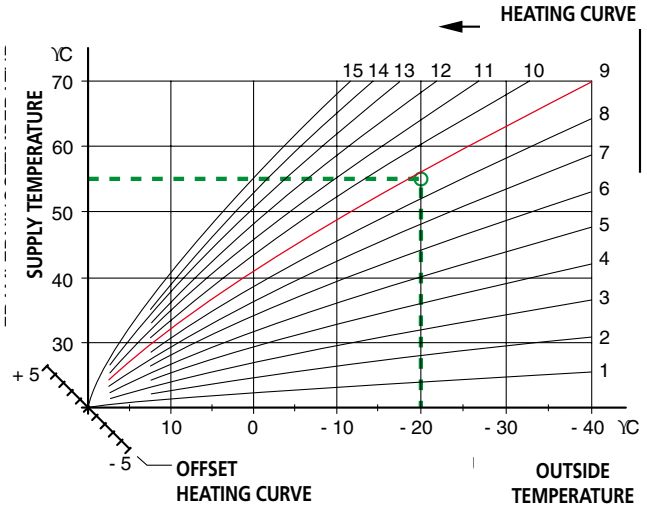
When the tap water and the central heating system have been filled up, the unit shall be running at maximal, normal temperature during minimum one hour. After that the systems shall be flushed out and re-filled again.

22 Setting the automatic heating control system

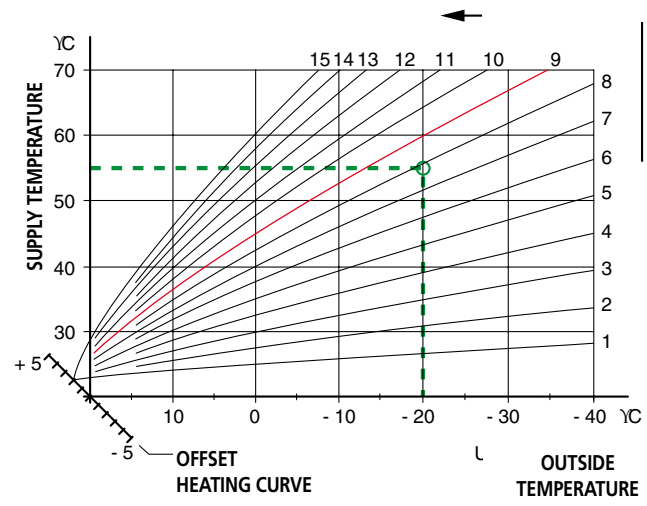
Heating curve offset -2



Heating curve offset 0



Heating curve offset +2



Setting with diagrams

FIGHTER 410P is equipped with outdoor temperature controlled automatic controls. This means the supply 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 Heating curve offset knobs.

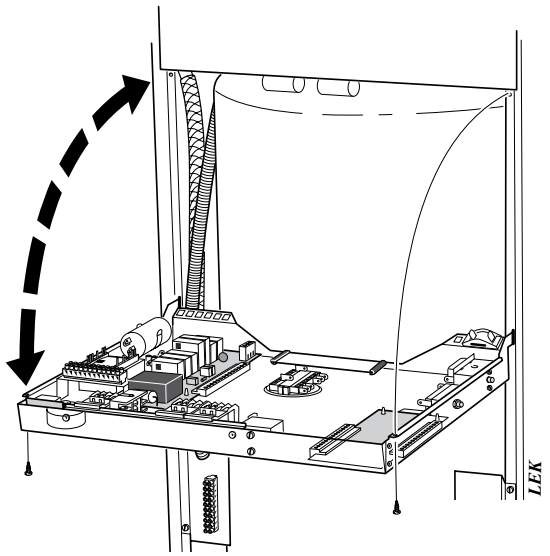
The diagram is based on the dimensioned outdoor temperature in the area and the dimensioned supply temperature of the heating system. When these two values meet, the heating control's curve slope can be read.

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

Also see the section Room temperature.

Opening the front panel

To lower the front panel, unscrew the two screws at the top of the panel. The panel can then be lowered to the horizontal position (where it rests on stops on either side of the front panel).



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.

Channel description

01 Boiler temperature
Actual value

02 Supply temperature
Actual value

03 Outside temperature
Actual value

04 Evaporation temperature
Actual value.

05 Extract air temperature
Actual value.

06 Curve slope (Heating curve selection)

07 Offset (Heating curve offset)

08 Temperature, compressor sensor
Actual value.

09 Supply air temperature
Actual value.

10 Calculated flow
Set point.

Service ducts

11 Deviation flow
Set point

12 No function

13 No function

14 Operating mode
01 = Circulation pump in operation. Compressor respective immersion heater is connected if necessary.
02 = Circulation pump in operation. Compressor is connected if necessary. Immersion heater blocked.
03 = Immersion heater and circulation pump blocked. Compressor is connected if necessary.

15 Room sensor
Set point. Shows the set room temperature. Shows – – when the room sensor is not connected.

16 Room sensor
Actual value. Shows the true room temperature. Shows – – when the room sensor is not connected.

17– 21 No function

24 Dealing with malfunctions

In the event of malfunctions 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 the 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 Dealing with malfunctions — Resetting the miniature circuit breakers.
- Tripped temperature limiter (6). (May only be carried out under the supervision of a qualified installer.)
- Wrong operating mode selected with button (25).
- Closed or throttled filler valve (46) on the water heater.

Low or a lack of ventilation

- Defrosting position, lamp (31) lights continuously, see the section Indications on the display.
- Filter (63) and (66) clogged (possible replacement).
- 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 Dealing with malfunctions — Resetting the miniature circuit breakers.
- Clogged intake grill for the outdoor air.

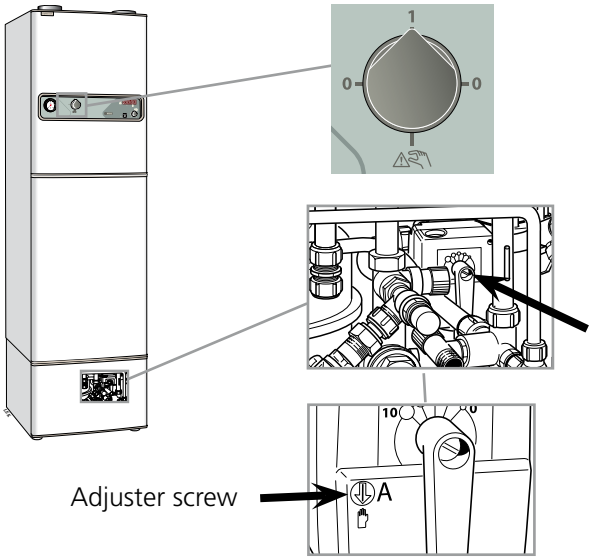
Low room temperature

- Circuit or main MCB tripped.
- Possible earth circuit-breaker tripped.
- MCB (7) tripped. See the section Dealing with malfunctions — Resetting the miniature circuit breakers.
- Tripped temperature limiter (6). (May only be carried out under the supervision of a qualified installer).
- Incorrect values set on the automatic heating control system.
- Circulation pump (16) stopped. See the section Dealing with malfunctions — Starting the pump.
- Air in boiler or system.
- Close valves (44) and (50) in the radiator circuit.
- Incorrect initial pressure in the expansion vessel, indicated by large pressure variations on the pressure gauge (42), contact the installer.
- Wrong operating mode selected with button (25).

High room temperature

- Automatic heating control system settings not correct.

Switch position "⚠"



In the "⚠" position the heat pump's compressor and electronic control are disabled. The fans are not operational to prevent the risk of freezing in the supply air battery.

The numerical display is off The automatic heating control system is not operational, so manual shunt operation is required. This is done by turning the adjuster screw to manual mode and then turning the shunt lever to the required position.

The immersion heater is controlled by a separate thermostat, which is activated by the contactors (10) and (67). The thermostat's breaking value is approximately 68 °C

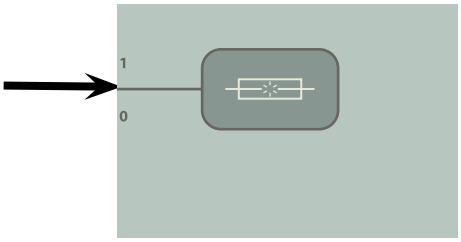
NOTE!

When returning to normal mode, do not forget to reset the shunt lever to the original position by turning the adjuster screw to A.

The display can remain unlit when returning to normal mode. This is due to the boiler temperature being above the heat pump's normal working area. The display comes on when the boiler temperature drops once again to normal.

If the operating disturbance cannot be rectified by means of the above an installation engineer should be called.
If necessary set the Switch to "⚠" (manual shunt operation necessary).

Resetting the miniature circuit breakers



The miniature circuit-breaker (7) is accessible behind the upper front access panel and is located to the left of the panel.
Normal mode of the miniature circuit-breaker is **1** (up).

Indications on the display



Fault code A-01 on the numerical display

- 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.



Fault code A-02 on the numerical display

Frost guard tripped due to a too low supply air temperature. Risk for freezing of the supply air battery.

- Incorrect setting on the curve slope and offset.
- Air in the supply air battery (see the section Supply air battery).
- Low availability on the supplementary power (e.g. block immersion heater), see the section, Functions on the front panel.

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



Fault code A-03 on the numerical display

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

- **High pressure pressostat (33):** Settings for Heating curve selection (37) and Heating curve offset (38) too high (can also be seen on Channels 6 and 7 on the numerical display). Also see section Room temperature.
- **Low pressure pressostat (41):** The fan is not running or too little refrigerant.

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



Middle 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 filters. See the section, Maintenance routines — Cleaning the air filter.



Fault code A-11

When codes A-03 and A-01 are active at the same time, this code is displayed.

NOTE!

This fault state must not be repeatedly reset, this will bring about a risk for freezing of the supply air battery.

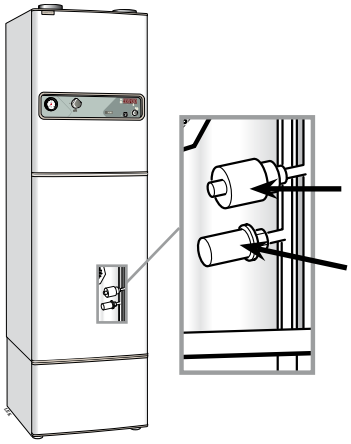
26 Dealing with malfunctions

Resetting pressostats

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

The pressostat may only be reset under the supervision of a qualified installer.

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



High pressure pressostat (33)

Low pressure pressostat (41):Normally this switch resets automatically so it does not have a reset button.

NOTE!

The serial number should always be stated with all correspondence with NIBE.

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.



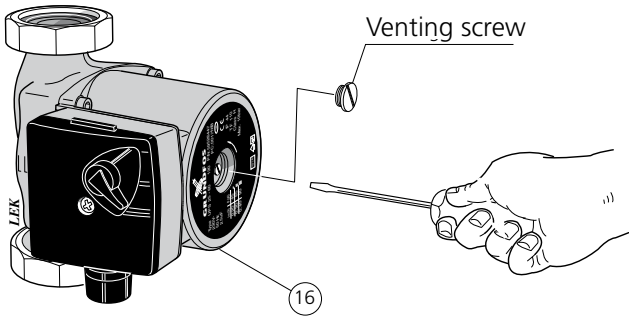
Cleaning the fan

Should abnormal noise come from the fan, this may need cleaning. Contact your installer.

Help starting the circulation pump

- Shut down FIGHTER 410P by turning the switch (8) to "**0**".
- Remove the lower front cover.
- 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 venting screw.
- Start FIGHTER 410P and check whether the circulation pump runs.

It is usually easier to start the circulation pump with FIGHTER 410P running, switch (8) set to "**1**". If helping the circulation pump to start is performed with FIGHTER 410P running, be prepared for the screwdriver to jerk when the pump starts.



NOTE!

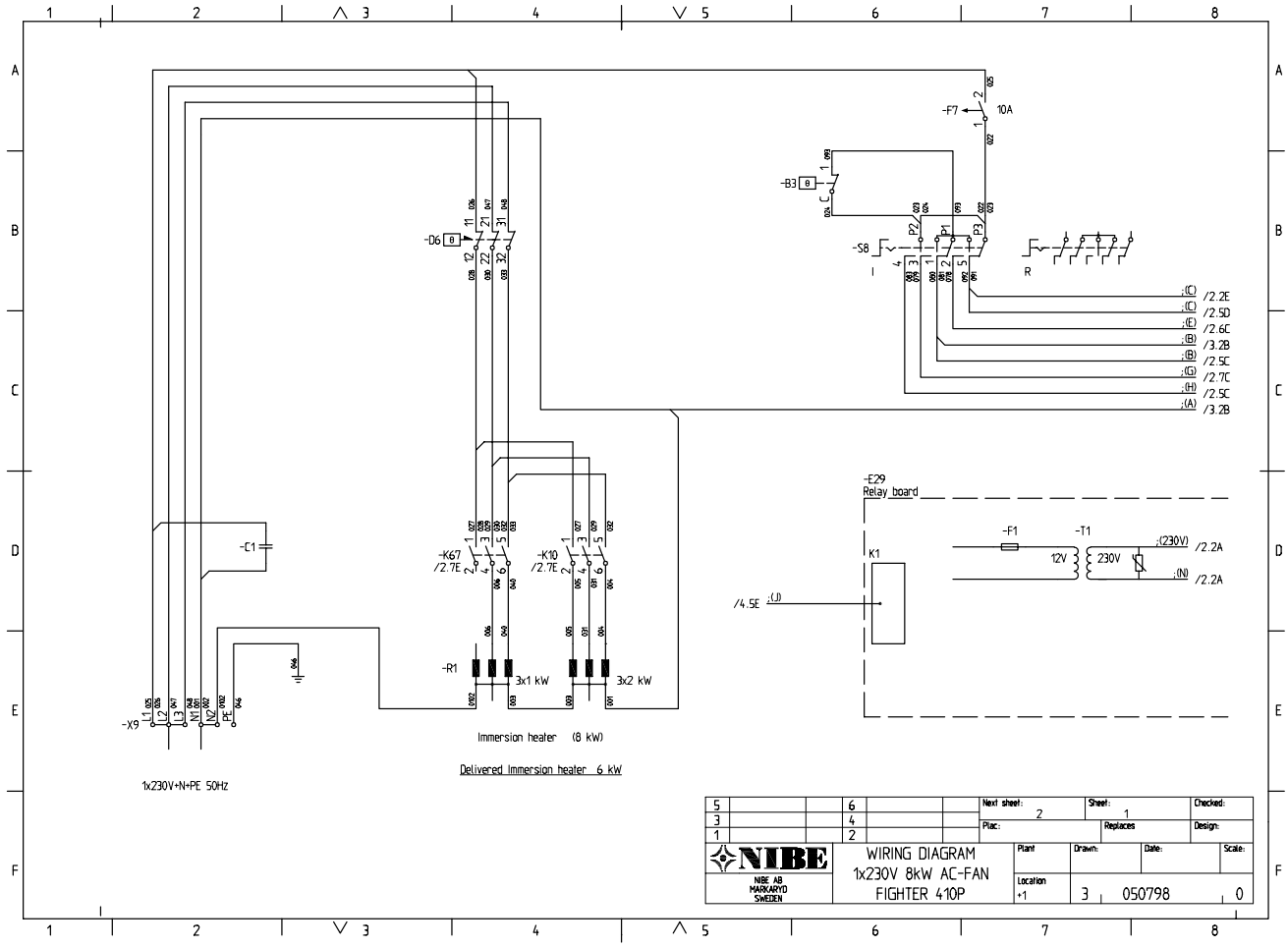
The serial number should always be stated with all correspondence with NIBE.

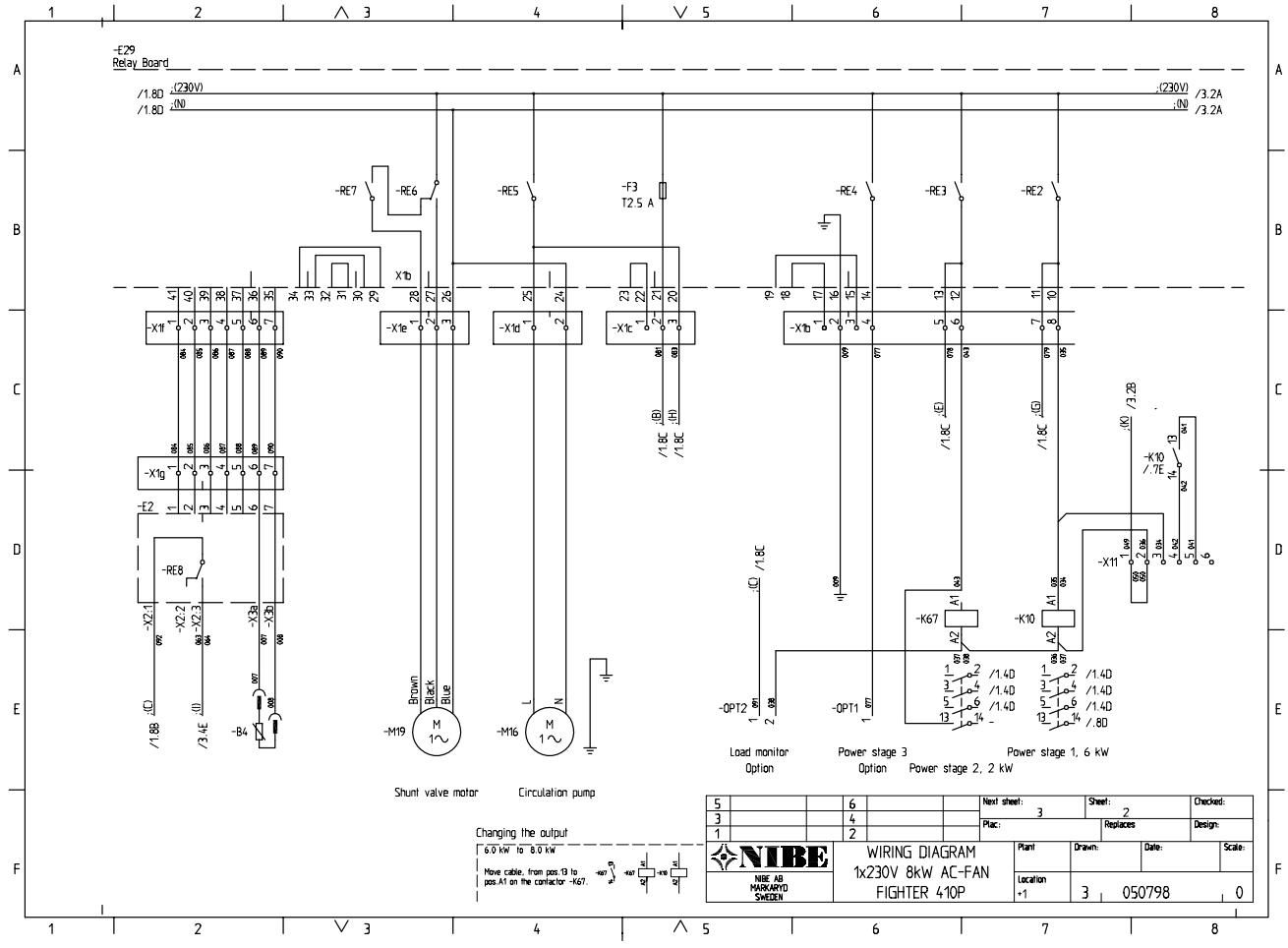
Changing the output

6.0 kW to 8.0 kW

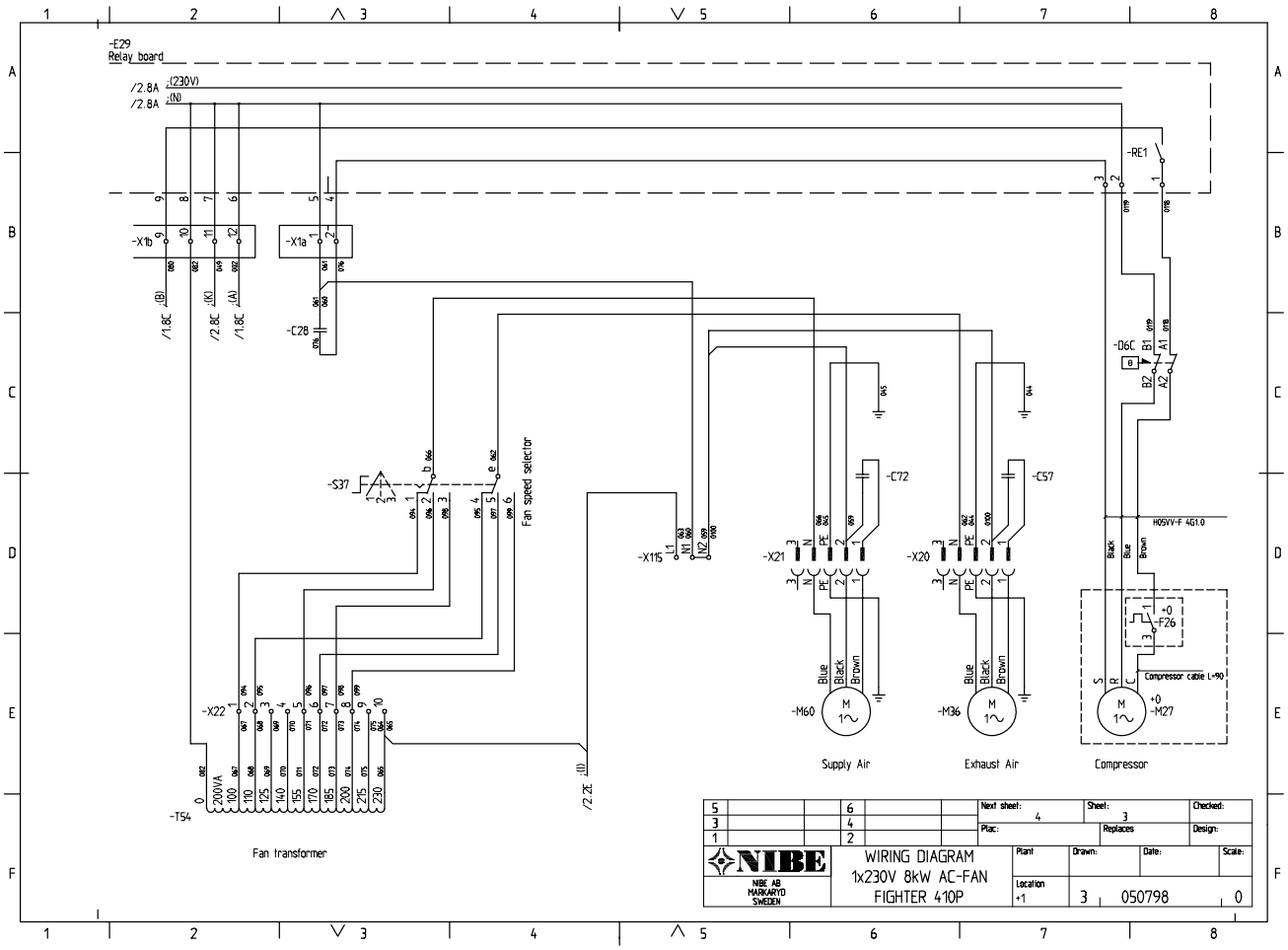
Move cable "67A1-12" from the parked position, position "14" on contactor (67) to position "A1" on the same contactor, see output option "8 kW".

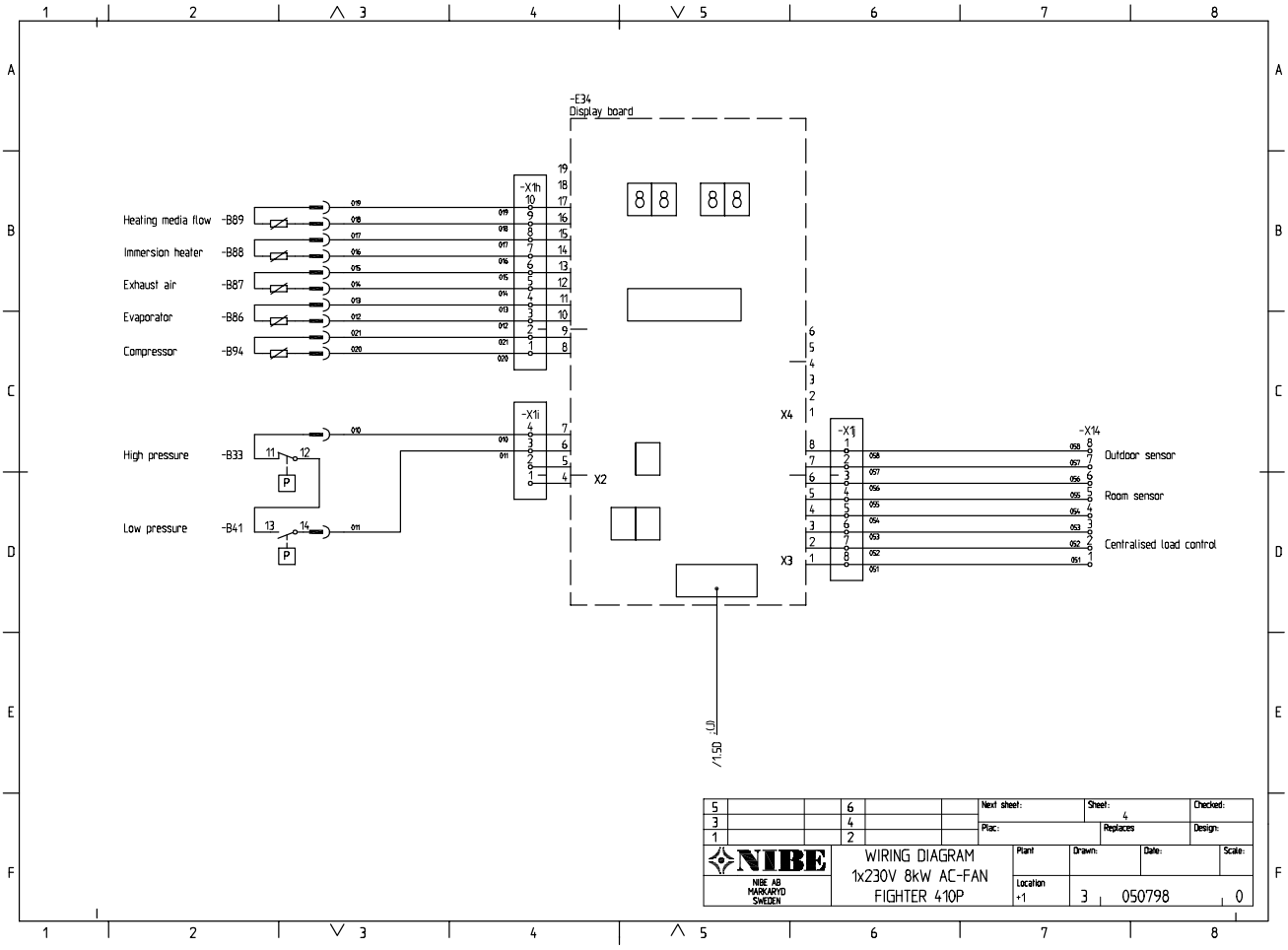
Electrical circuit diagram



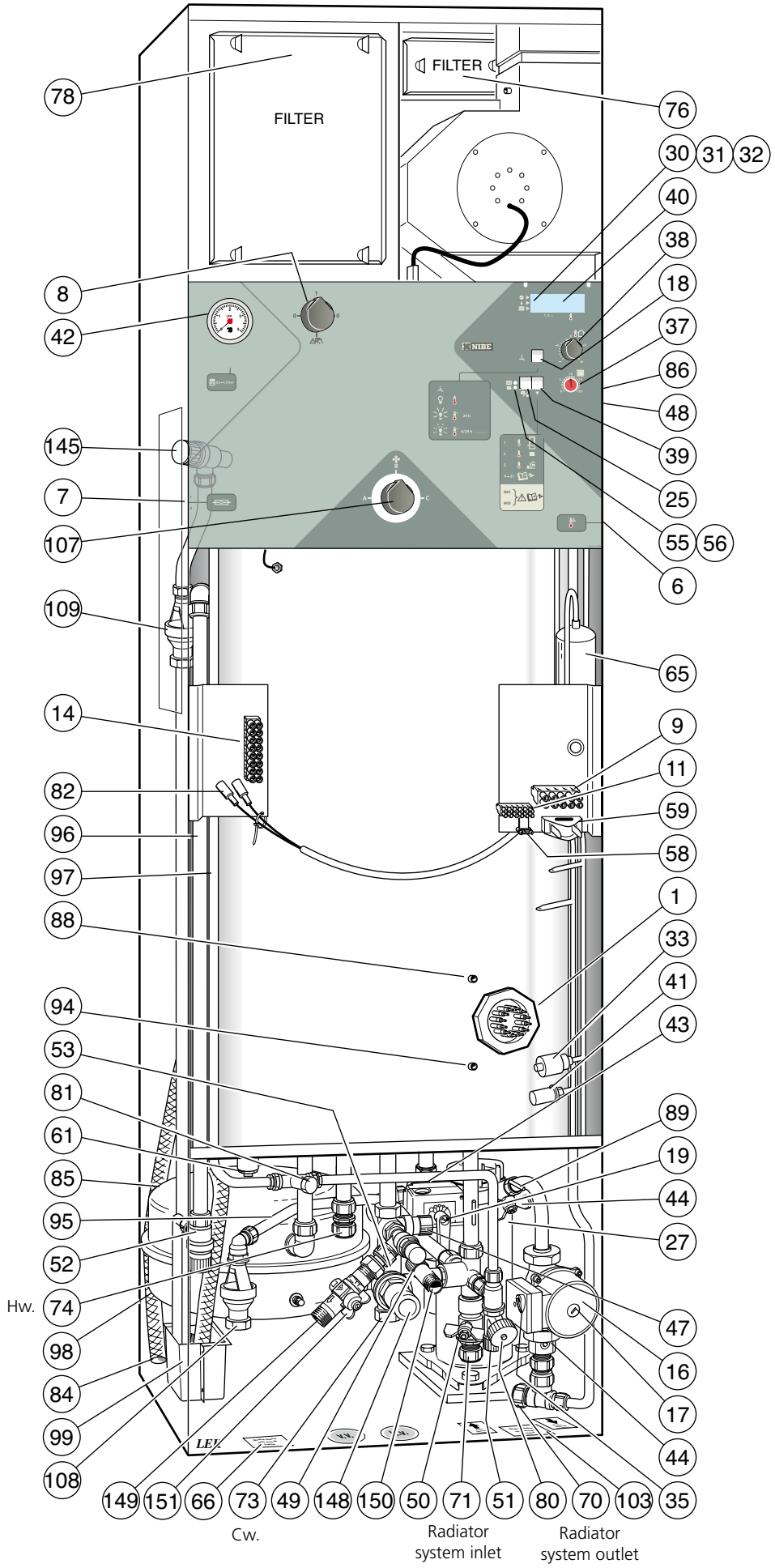


Electrical circuit diagram





30 Component positions



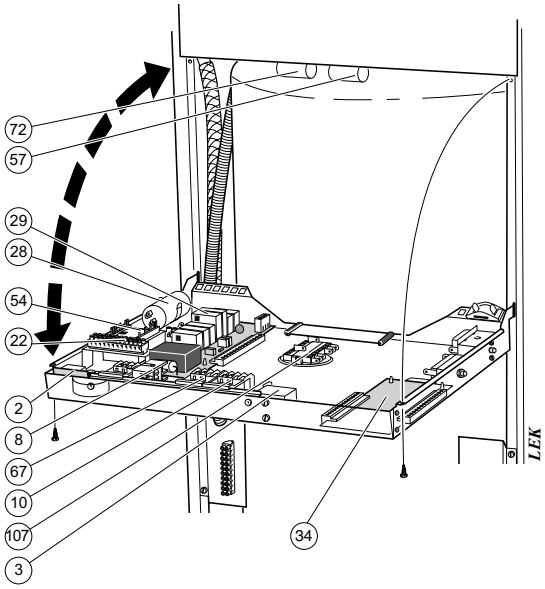
List of components

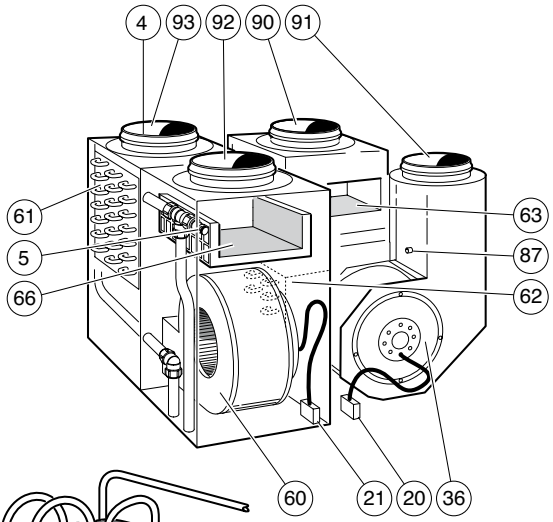
1 Immersion heater 8 kW
2 Relay card, ventilation control
3 Operating thermostat, backup heating
4 Supply air sensor
5 Venting screw, supply air battery
6 Temperature limiter, immersion heater
7 Miniature circuit-breaker for the circulation pump, automatic heating control system and the compressor
8 Switch, position 0 -1 - ⚠
9 Terminal block, power supply
10 Contactor step 1
11 Terminal block, docking
14 Terminal block
15 Outside sensor
16 Circulation pump
17 Air screw, circulation pump
18 Pushbutton, Extra hot water
19 Shunt motor with handwheel
20 Connector, exhaust air fan
21 Connector, supply air fan
22 Terminal block, fan speed
25 Push button for the operating mode
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, exhaust air
37 Knob, Heating curve selection
38 Knob, Offset heating curve
39 Pushbutton, Channel selection
40 Numerical display with control card behind
41 Low pressure pressostat
42 Pressure gauge, boiler
43 Shunt valve
44 Shutoff valve, pump and supply heating system
46 Filler valve, water heater
47 Safety valve, water heater
48 Expansion valve (hidden)
49 Filling valve, heating system
50 Shutoff valve, return line heating system
51 Drain valve, heating system
52 Safety valve, heating system
53 Vacuum valve (hidden)
54 Fan transformer
55 Control lamp, immersion heater
56 Indicator lamp, Circulation pump
57 Start condenser, exhaust air fan
58 Strain relief
59 Strain relief, supply cable
60 Fan, supply air
61 Docking connection, requires special pipe from NIB
62 Evaporator
63 Air filter, exhaust air (Filter type G2)
65 Drying filter with tank
66 Type plate
67 Contactor, step 2

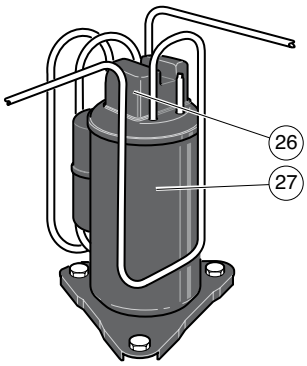
	Connection	Setting out dimensions A	B	C
70 Supply line, heating system	Compression ring Ø 22 mm	30	465	90
71 Return line, heating system	Compression ring Ø 22 mm	130	465	190
72 Start capacitor, supply air fan				
73 Cold water connection	Compression ring Ø 22 mm	180	465	290
74 Hot water outlet from water heater	Compression ring Ø 22 mm	290	465	345
76 Filter cover, exhaust air				
77 Side access panel, valve coupling				
78 Filter cover, supply air				
80 Drain connection, heating system	R 15 male			
81 Trim valve, supply air battery				
82 Electrical supply for load monitor (accessories)				
84 Ventilation opening				
85 Expansion vessel				
86 Temperature sensor, evaporator (hidden)				
87 Temperature sensor, extract air (hidden)				
88 Temperature sensor, immersion heater operation				
89 Temperature sensor, supply line				
90 Ventilation connection exhaust air	Ø 125 mm	2095	295	160
91 Ventilation connection extract air	Ø 125 mm	2095	295	485
92 Ventilation connection, outdoor air	Ø 125 mm	2140	190	435
93 Ventilation connection, supply air	Ø 125 mm	2140	470	350
94 Temperature sensor, compressor operation				
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				

103 Serial number sign
106 Expansion vessel, tap water
107 Switch, "Fan speed"
108 Tundish from safety valve
109 Tundish from temperature relief valve
115 Terminal block
145 Temperature and pressure valve
147 Filling hose
148 Pressure reduction valve
149 Connection for flexible hose to CW-side
150 Connection for flexible hose to heating-side
151 Filling valve, heating system (CW-side)
169 Temperature limiter, compressor
170 Supply air battery
171 Air filter, supply air (Filter type G2)

32 Component positions

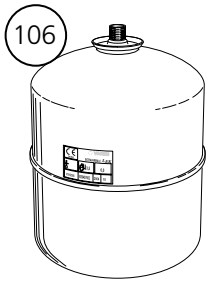




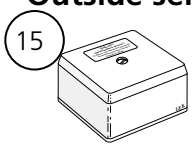


Enclosed kit

Expansion vessel, tap water
(is delivered separately)

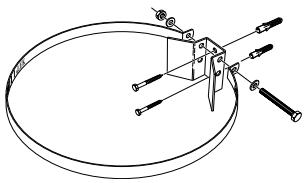


Outside sensor

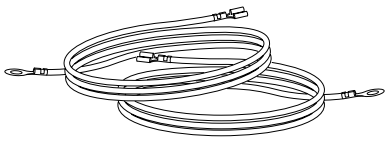


Part no. 518 177

Bracket
(is delivered separately)



Earth cable

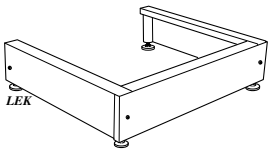


Part no. 418 172

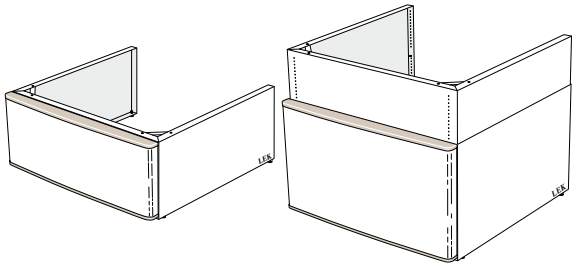
Accessories

Heightening console
Height: 125 mm

Part no 089 195



Top cabinet
A top cabinet is available as an accessory to conceal the ventilation ducts above the heat pump.

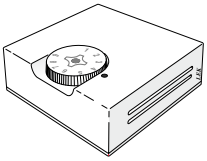


Top cabinet 245 mm. Part no 089 424

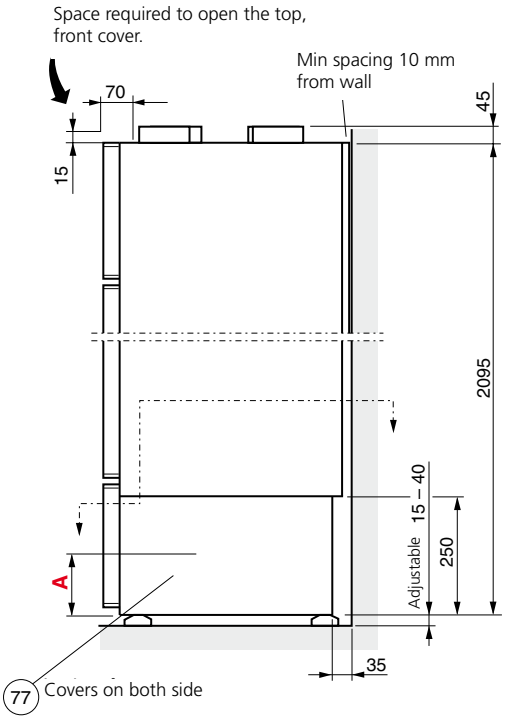
Top cabinet 345 mm. Part no 089 426

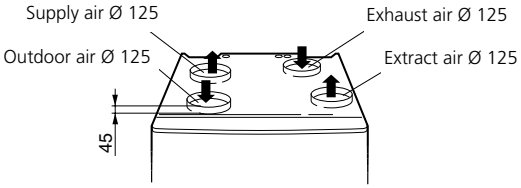
Top cabinet 385 — 535 mm. Part no 089 428

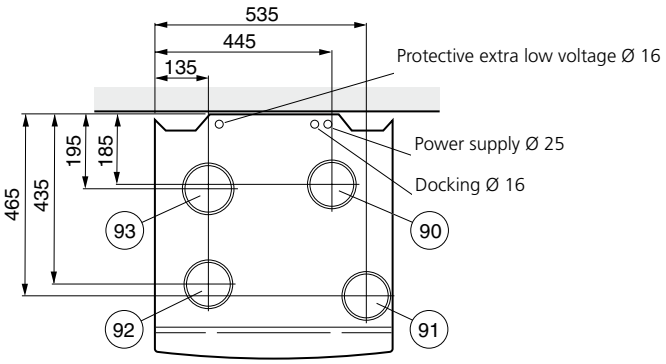
Room sensor RG 10
In some cases a room sensor can be used as a supplement to the ordinary automatic control system.

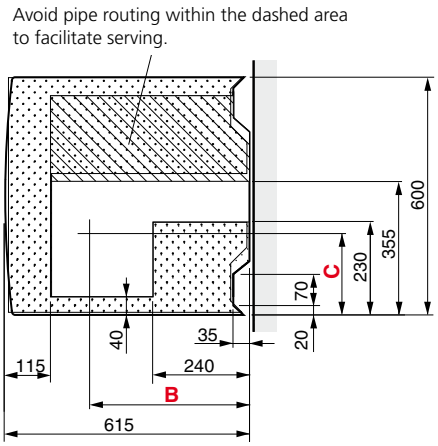


Dimensions and setting-out coordinates









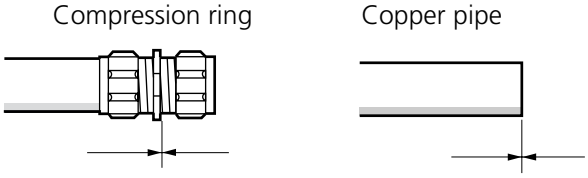
A free space of 500 mm is required in front of the heat pump for servicing.

, and : See Connection in List of components.

Pipes must not be run from the floor in the area indicated by dots.

Pipes should be routed a maximum of 100 mm above the floor in order to facilitate compressor replacement in the future.

Measuring principle



34 Technical specifications

CE IP 21

Height (excl. foot: 15 – 40 mm)	2 095	mm
Required headroom	2 185	mm
Width	600	mm
Depth	615	mm
Weight	200	kg
Volume total	240	litres
Volume double jacket	70	litres
Volume water heater	170	litres
Supply voltage	230	V~ 1-phase + N
Output immersion heater	8,0	kW (switchable)
Rated output, circulation pump	100	W
Rated output exhaust air fan	170	W
Rated output supply air fan	170	W
Rated output, compressor	650	W
Enclosure class	IP 21	
Max pressure in storage heater	0,9	MPa (9 (bar)
Breaking value, high pressure pressostat	2,45	MPa (24.5 (bar)
Breaking value, low pressure pressostat	0,15	MPa (1.5 (bar)
Max pressure in double jacket volume	0,25	MPa (2.5 (bar)
Design pressure in double jacket volume	0,25	MPa (2.5 (bar)
Refrigerant volume	495	g
Refrigerant type	R290	(propane)
Cut-in temperature compressor	51	°C (Controlled by separate sensor)
Cut-out temperature compressor	54	°C
Cut-in temperature immersion heater	49 – 62	°C *(49 – 57)
Cut-out temperature, temperature limiter for immersion heater	88	°C
Cut-out temperature, temperature limiter for compressor	88	°C
Cut-out temperature immersion heater	52 – 65	°C *(52 – 60)
Sound level in room where installed	47 – 50	dBA

See the section Electrical connection — Blocking immersion heater operation

COP and heating capacity according to EN 14511-2:2004		
COP	2,60	
Heating capacity	1,75	kW
Total Power input	0,715	kW
Current	3,6	A
Rating condition:		
Exhaust air:		
Air flow	150	m^3/h
Inlet dry bulb temperature	20	°C
Inlet wet bulb temperature	12	°C
Water:		
Inlet temperature	40	°C
Outlet temperature	45	°C

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