Greenline D14-D40
Greenline E14-E25

Guide to installation, commissioning and maintenance

Article nr: 290430-9

Version: 4.0

IVT HEAT PUMPS

Important information

This guide is designed to describe the operation, installation and maintenance of the heat pump as comprehensively as possible. The description has been written as far as possible so that it can be followed step by step.

Please note that the guide consists of three separate parts, therefore it is especially ***important that the installation contractor reads the entire*** manual before commencing installation.

The guide is in two parts, one for the user and one for the installer. The table of contents sets out clearly the various sections of the manual.

Warning! The Rego 600 control unit contains an advanced settings level which should only be accessed by the installer. The end user should never change any settings on this level, since this might cause problems with the operation of the heat pump.

- Before the heat pump is commissioned, the heating system and the heat pump must be filled and vented.
- Hot and cold connections might need checking after delivery.
- If the heat pump has to be carried down steps or stairs it can be tilted temporarily with the compressor downwards, but never for long periods.
- The heat transfer fluid system must be in operation when venting the system. See chapter on refilling the heat transfer circuit.
- Three phase heat pumps incorporate an alarm if the phasesare incorrectly wired.

IVT Industrier AB

October 2003

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PAGES FOR THE INSTALLER

This is how your heat pump works

Heat pump technology

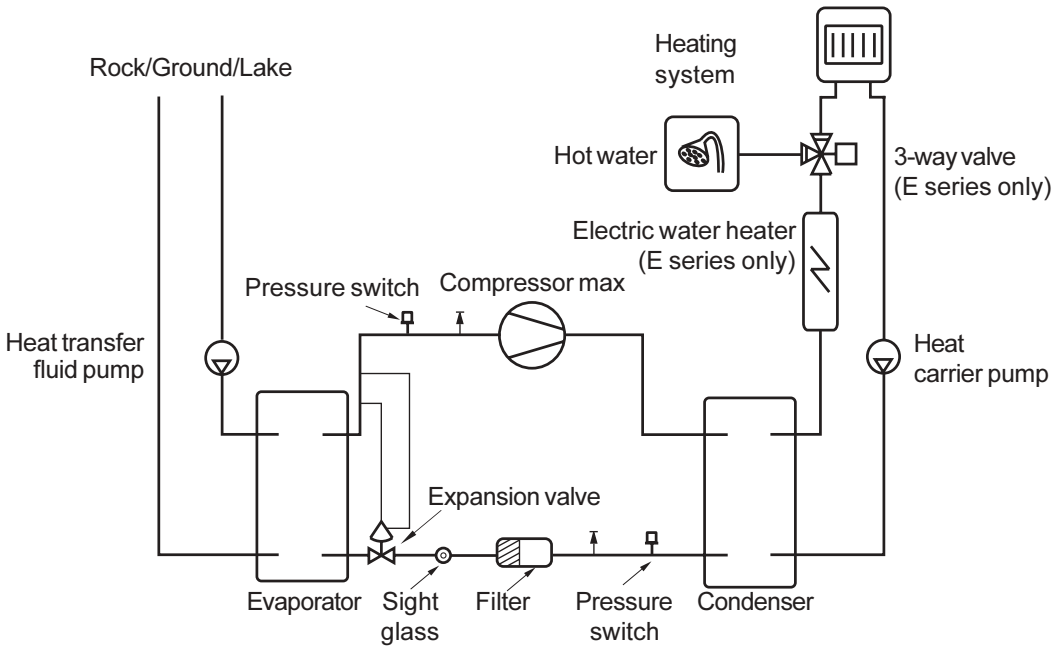
The compressor, which is driven by an electric motor, forces the heat transfer fluid into the heat pump condenser as a gas at about 100°C. The gas and the water from the radiator system pass through the condenser, which is a fully-welded stainless steel heat exchanger. When the hot gas is cooled by the circulating water, it condenses (changes to liquid). As it does so, it provides energy for the heating system or the hot water. After the condenser, the refrigerant, which is now in liquid form, continues through a drying filter and a tank. The filtercollects any moisture in the system and the tank is used as an expansion vessel for the heat transfer fluid to ensure there is always the correct amount in the condenser.

After the filter, the heat transfer fluid passes through a sight glass. The sight glass is used to check the amount of heat transfer fluid in the system. In normal operation there should be no bubbles in the sight glass. However, bubbles may appear for short periods, mainly on rapid changes between hot water and radiator operation and when the heat pump starts or stops.

After the sight glass the heat transfer fluid goes to an expansion valve. The valve acts as a flow restrictor between the high and low pressure sides of the system. The valve, which has a sensor (bulb) just before the compressor, releases the right amount of liquid into the next heat exchanger, the evaporator. In the evaporator, the liquid meets the circulating heat transfer fluid coming from the energy source in the ground or bore hole. In this process, the liquid turns to gas (evaporates) under low pressure, which uses heat. The heat is extracted from the outside air free of charge.

After passing through the evaporator, the heat transfer fluid is once more in the form of a gas (vapour). The expansion valve sensor constantly checks that the evaporator is performing optimally, in order to use as much free energy as possible. The gaseous refrigerant then goes to the suction side of the compressor, where it is compressed again. This completes the heat transfer fluid circuit.

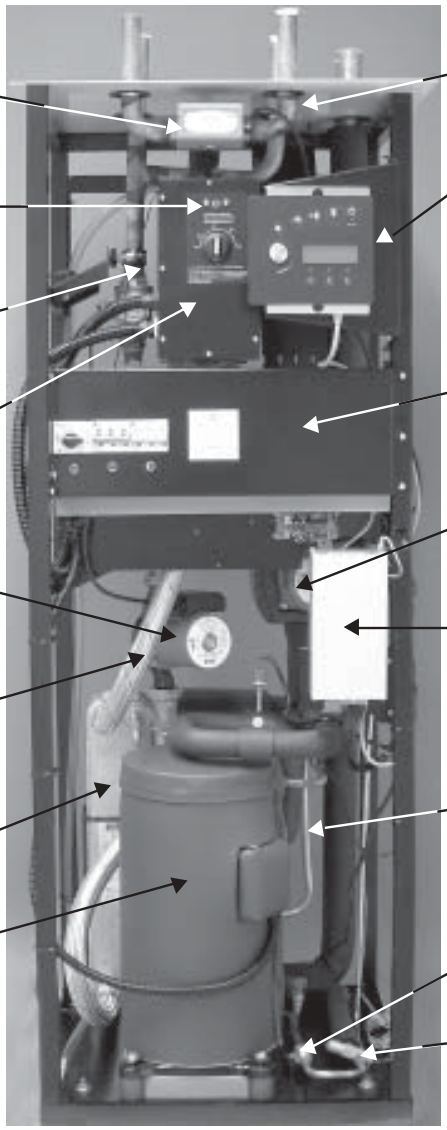
Pressure switches are fitted on the high and low-pressure sides of the system to protect the heat pump. These shut down the heat pump if the pressure in the system reaches an abnormal value. This is dealt with in more detail in the section on troubleshooting.



Greenline 14 and 16 components

NOTE: The picture is of the E series

The D series has two connections on the hot side and does not include a 3-way valve and electric water heater. The particle filter is supplied separately and is mounted outside the heat pump.



3- way valve that alternates between heating and hot water.

Reset buttonfor over-heat protectionon the electric heater.

Cleanable particle filter with cut-off.

Electric boiler.

Circulation pump on the hot side (G2 (P2)).

Flexible hoses on the hot side for vibration free operation.

Condenser.

Compressor with frequency adapted soundproof cover.

Electrical connections.

Control panel with large display.

Sealed electrical box with resetting of the motor cutout and circuit breaker for heat pump and electric heater.

Circulation pump on the cold side (G3 (P3)).

Control unit Rego 600.

Evaporator.

Sight glass.

Expansion valve.

Greenline 20 – 40 components

NOTE: The picture is of the E series

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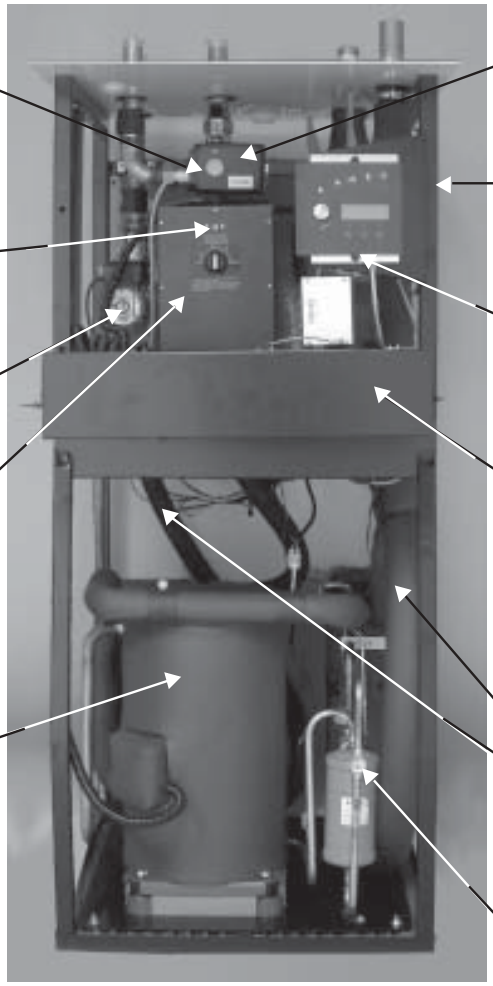


3- way valve that alternates between heating and hot water.

Reset button for overheat protection on the electric water heater.

Circulation pump (G2 (P2)) on the hot side.

Electric boiler.

Frequency adapted sound-proof cover.

Electrical connections.

Control panel with large display.

Circulation pump on the cold side (G3 (P3)).

Sealed electrical box with resetting of the motor cutout and circuit breaker for heat pump and electric heater (the box is shown folded up).

Flexible hoses on the hot and cold sides for vibration free operation.

Sight glass.

Principle

Principle of heating and hot water control

Your heat pump is fitted with a Rego 600 control unit to guarantee you maximum savings and many years of service. The unit, which has advanced monitoring functions, controls the heating and hot water in your home. This ensures that all vital functions are monitored and that, if problems arise, the heat pump is shut down before it is damaged.

When the heat pump is not able to meet the heating requirements, supplementary heat is connected that together with the heat pump provides the required temperature. The Greenline E series has a built-in electric heater that can be connected in three steps. The supplementary heat only provides the output that the heat pump cannot generate and in this way can never take over heating the house completely. When the heat pump is once more able to meet the heating demand, the supplementary heat is automatically switched off. An oil-fired boiler is normally used to provide supplementary heat for the Greenline D series. In which case Rego 600 controls the oil-fired boiler and the existing mixer valve.

The heat pump is connected to the return line of the heating system so that it always receives the coldest water. The water is heated in the heat pump and is then fed back to the heating system. While the heat pump is heating the domestic hot water by using the electric water heater, the heating system is disconnected temporarily through the three-way valve. A sensor in the hot water cylinder makes sure that priority is always given to heating the hot water. When the water in the cylinder reaches the required temperature, heat is once more supplied to the heating system.

Power failures

If the power supply fails, the control unit remembers all its settings and re-starts the heat pump when the power returns.

Three different operating modes

The control unit can be used for three different operating modes: A, B and C. The three operating modes are described schematically in the Installer chapter.

Operating mode A (D and E series)

This is the factory setting, based on an outdoor sensor and controls the heating temperature through an adjustable control curve. Water heating takes priority over space heating. As well as operating the heat pump, Rego 600 can also regulate other heat curves with a mixing valve, e.g. through a combination of radiator and floor heating systems. An electric water heater is used for additional heat.

Operating mode B (D series only)

Used when additional heat is from an oil-fired boiler. Operation is the same as for operating mode A. Rego 600 cannot control other heat curves in this operating mode.

Operating mode C (D series only)

Used in exceptional cases, it does not provide optimal operation for the heat pump because it always works with a high temperature, or “Fixed Temperature”. This is often used in operation with one or more accumulator tanks. The tank is always kept at a high temperature and the hot water is often heated in one or more coils.

Controls

The control unit operates the heat pump in three ways. We call them Curve Control, Room Sensor and Fixed Temperature. Below follows a brief description.

Curve control (operating modes A and B)

This is the most common mode and is also the factory setting. With curve control, the heat pump adapts the heating inside the house on the basis of the outside temperature. An outside sensor sends signals to the control unit, which automatically adjusts the supply of heat to the heating system. This maximises savings, since the heat pump never needs to work at a higher temperature than necessary. The heat pump only delivers the maximum temperature when heating the hot water. Normally, hot water heating accounts for 20% of the total annual energy requirement.

Room sensor (operational modes A and B)

A room sensor can be connected to the heat pump. It sends signals to the control unit and in this way affects the curve control. The sensor influences the curve control and the amount of influence can be set on the control panel. Normally, room sensors are only used when a fan-assisted radiator is used in a house with direct electric heating or when a wood-burning stove is used in the house or where the house is effected by wind chill or solar gain.

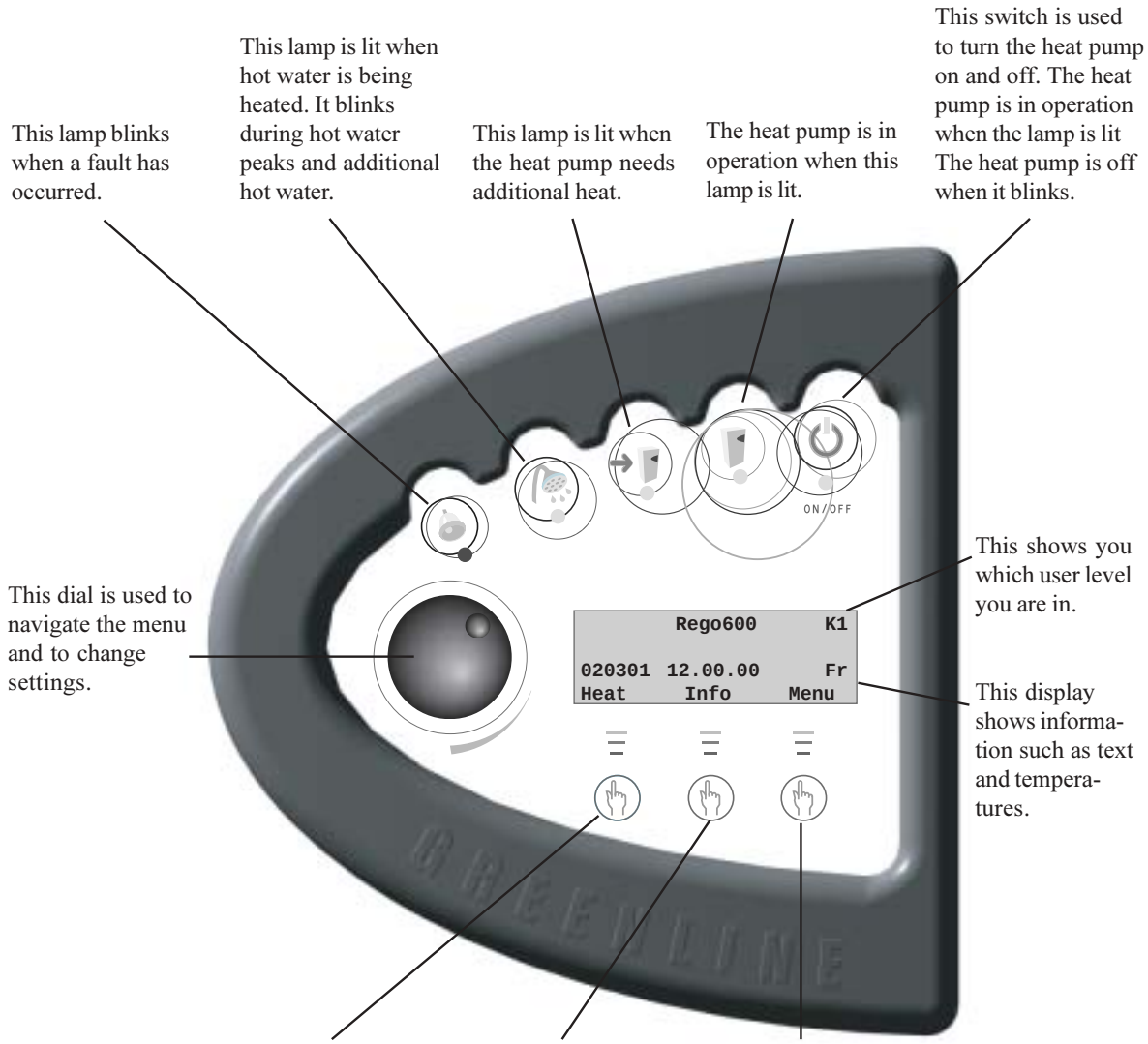
Fixed temperature (operating mode C only)

This control technique is rarely used, and does not offer optimum savings from the heat pump. The principle is that the heat pump is switched on and off by the built-in return sensor and always works up to its maximum working temperature. The normal area of use for this is together with existing accumulator tanks.

Control panel

Control panel buttons and displays

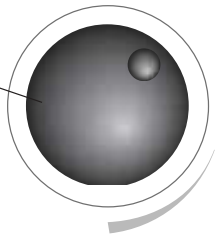
The control panel is the heart of your heat pump installation. From the control panel, instructions are sent to the Rego 600 control unit, which ensures that the house is uniformly heated. All settings are carried out here and the display shows the settings that have been set.



How to use the control panel

With the help of three buttons and a dial you can navigate to the various displays for settings and readings. The last line at the bottom of the display contains information about the functions of the buttons in the current display. If you choose "Heat" or "Info" the display you have chosen to stay in will always remain.

With the dial you navigate up and down between the displays or change the settings.



Press "Heat" once more and you come to the shortcut for heat settings. You can choose to stay in which display you want.

Press "Menu" once and you come to the main menu for settings or temperature readings.

Press "Info" once and you receive continuous information about what the heat pump is doing and at which temperature it stops at. You can choose to remain in this display and always receive this information. Press the middle button again to return to the first display.

Examples of scrolling information

Here are some of the displays you see if you choose scrolling information with the "Info" button:

```
      STANDBY
No rad heat required
No hot water
required
```

Heat pump is not operating.

```
  HOTWATER MODE
Heat pump only
Stop temp       47.5°
Present temp      42°
```

The heat pump is producing hot water and you see the current temperature and the temperature it stops at.

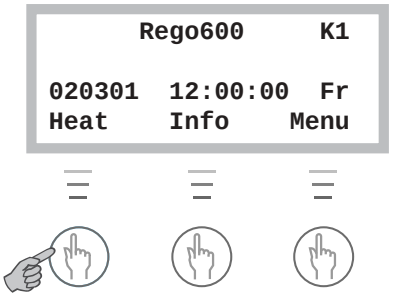
```
     HEAT RAD MODE
Compr. + Add. heat
Stop temp         45°
Present temp      44°
```

The heat pump and additional heat is in operation.

```
    HEAT RAD REQUIRED
Heat pump starts
in  320 seconds
```

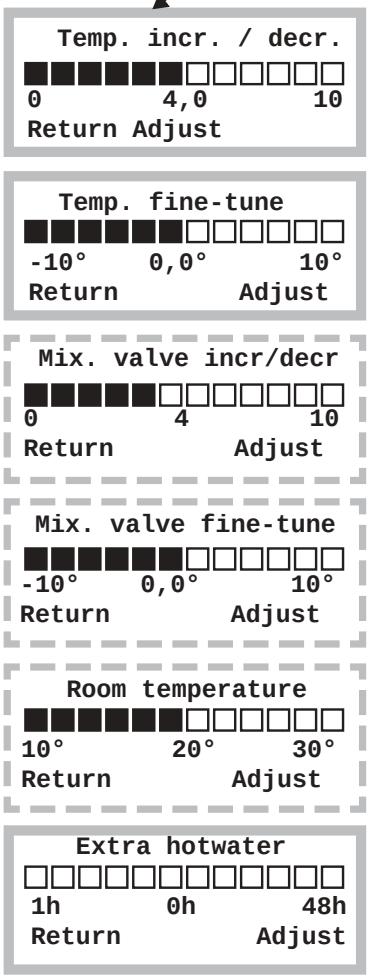
A need for heat has arisen and the heat pump is waiting for the reset time to count down to zero.

Basic functions (customer level 1)



Heating and extra hot water

Press "Heat" to come to the short cut to the heat settings. These displays are then available.



House heating settings in areas 0 to 10. See more detailed description in "Heat Settings" chapter.

Fine adjustment settings in areas -10°C to 10°C. See more detailed description in "Heat Settings" chapter.

Here you can set the heat in areas 0 to 10 if you use an extra heat curve with a mixing valve.

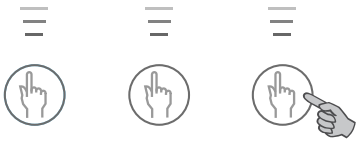
Here you set the fine adjustment of the mixing valve curve in –10°C to 10°C.

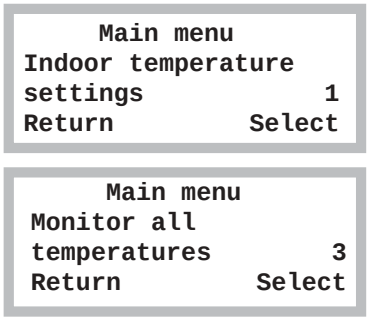
If a room sensor is connected you can set the required room temperature here. On customer level 2 you can set how much you want the sensor to affect the heating system.

You can temporarily increase the hot water temperature with the electric water heater here. The heat pump first increases it to around 50°C and then the electric water heater to around 65°C. The electric heater starts again at 60°C and increases the temperature to 65°C in the set time. The area is 1-48 hours and when the set time has elapsed the settings must be repeated in order to receive extra hotwater.

Temperatures

Press "Menu" to come to the main menu. Where you can also carry out heat settings and see the temperatures. These displays are then available.



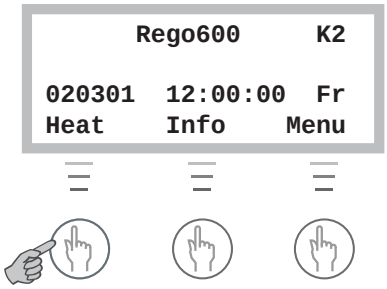


The radiator temperature settings you make in the short cut to "Heat" can also be made on row 1 and for the hot water setting on row 2.

In row 3 you can see all the temperatures where sensors are connected.

Enhanced functions

As a user you have access to enhanced functions. Keep the "Heat" button pressed down for five seconds and go into "Menu" to gain access to these displays. You will automatically return to level 1 again after 30 seconds.



Keep the button pressed down for 5 seconds.

Line 1

```
     Main menu
Indoor temperature
settings            1
Return         Select
```

You have pressed "Menu" and are on row 1. Press "Select" and turn the dial and the display will scroll. You can then choose to enter the display you require. Each display has a number.

```
Temperature settings
Setting of room
sensor infl.    1.11
Return        Select
```

With extra sensor only

With a room sensor installed you can set the value here how much you want it to affect the outdoor sensor. A high value gives more effect from the room sensor. *Please note the room sensor only* ***fine tunes*** *the heat curve. It is therefore important that you set the basic settings for the heat curve and fine tuning from the start.*

```
Temperature settings
Setting of holiday
function        1.12
Return        Select
```

With extra sensor and in operating mode A only

If a room sensor is installed you can utilise the holiday mode function, you can set the number of days that the room temperature is lowered to 15°C here. The temperature is not adjustable and it does not affect the hot water. Normal operation is resumed when the period is over.

```
Temperature settings
Remote control
temperature     1.13
Return        Select
```

With extra sensor, remote control and in operating mode A only

If a room sensor and remote control is installed you can set the required room temperature here. You can then use the telephone to increase the temperature to normal.
This equipment is available as an accessory.

```
Temperature settings
Setting of summer
disconnection   1.14
Return        Select
```

Operating mode A and B only

At this set temperature the heat pump only produces hot water.

Line 2

```
     Main menu
Adjusting the hot
water settings     2
Return        Select
```

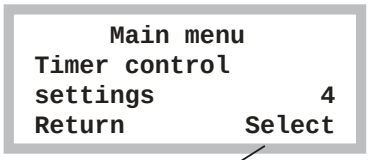
Using the dial you have moved to the hot water settings in row 2.

```
  Hot water setting
Interval for
hot water peak   2.2
Return        Select
```

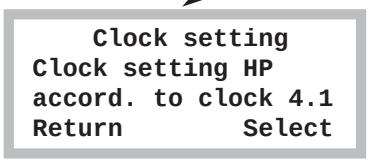
Operating mode A only

Setting intervals for the continual raising of the hot water temperature. If you choose for example 7 days, the temperature is raised using the electric water heater once a week to around 65°C (Operating mode A with electric water heater only).

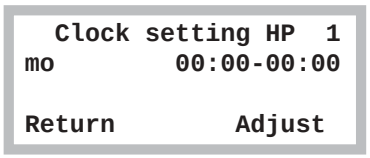
Line 4



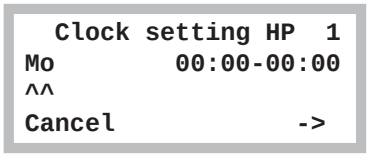
You have now moved to timer control settings line 4.



Here you can set the times, day for day, that you want to utilise the clock settings. You can set all the weekdays independently of each other. Press “Select”.



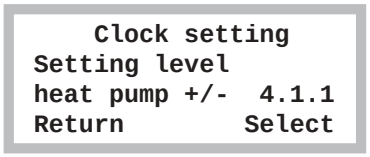
The example describes how you set Monday between 22:00 and 06:00. Press “Adjust”.



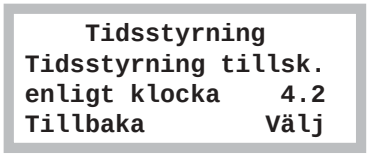
There is now a cursor under Monday. Turn the dial and mo becomes Mo. Monday is now activated.

Now set the clock setting to between 22:00 and 06:00 in the morning. Press the right arrow button until the cursor is under the first 00. Turn the dial until 22:00 appears. Press the button twice more (the cursor moves two steps to the right) and turn the dial until 06:00 appears. Press the ”right arrow” button once more and the arrow is replaced by “Save”. Press “Save” to set the timer controls.

You can now do the same for all the other days of the week you want to timer control. Use the dial in this display to access other days.



In display 4.1.1 you set how much you want the temperature to be raised or lowered in the above time zone settings. If you choose, for example, –5°C the heating system temperature is lowered by 5°C.



Not operating mode C

In display 4.3 you can disconnect the hot water completely during e.g. peak rate times. This is done in the same way as with the heat pump time controls.

Line 7

```
     Main menu
Op. time readings on
HP and add. heat   7
Return        Select
```

In line 7 you can read the running times for the heat pump and additional heat. Press “Select” to enter these menus.

```
 Op. time readings
Heat pump in operat.
number of hours? 7.1
Return        Select
```

Here you can see how many hours the heat pump has been in operation.

```
 Op. time readings
Distribution HP
DHW-Rad in %     7.2
Return        Select
```

Not operating mode C

This shows the distribution of the heat pump between hot water and heating as percentages.

```
 Op. time readings
Add. heat in operat.
number of hours? 7.3
Return        Select
```

Here you can see how many hours the additional heat has been in operation.

```
 Op. time readings
Distribut. add. heat
DHW-Rad in %     7.4
Return        Select
```

Not operating mode C

This shows the distribution of the additional heat between hot water and heating as percentages.

Line 10

```
     Main menu
Clock, setting
time and date     10
Return        Select
```

You can set the heat pump’s clock to the correct time if it is wrong on line 10.

Line 11

```
     Main menu
Alarm logging
of all alarms     11
Return        Select
```

Line 11 shows a record of the alarms that may have occurred on your heat pump. You can see the type of alarm and when it occurred. An * in the display means the alarm is still active.

Line 12

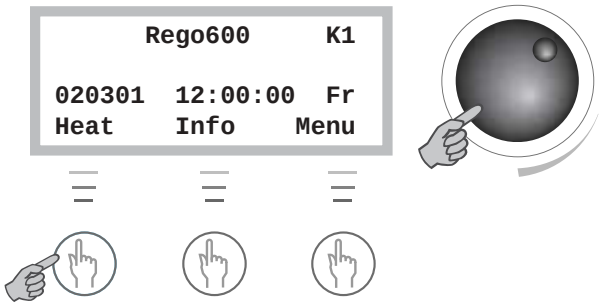
```
     Main menu
Return to
factory settings  12
Return        Select
```

If you want to change your settings at customer levels 1 and 2 you can return to factory settings on line 12.

Please note: If you are on the installer/service level when you choose factory settings, the installer must carry out a new start-up of the plant with the new settings. The installer/service level is for installer only. As an end-user you should never go into this level!

Setting the heating

In the Temperature "increase/decrease" display you use the dial to change the heat curve. The lines show how the return temperature varies with the outside temperature for different settings. The colder the weather the warmer the heating system. Curve 4 is the factory setting and in the example you can see that this gives a return temperature of around 35°C at an outdoor temperature of 0°C.

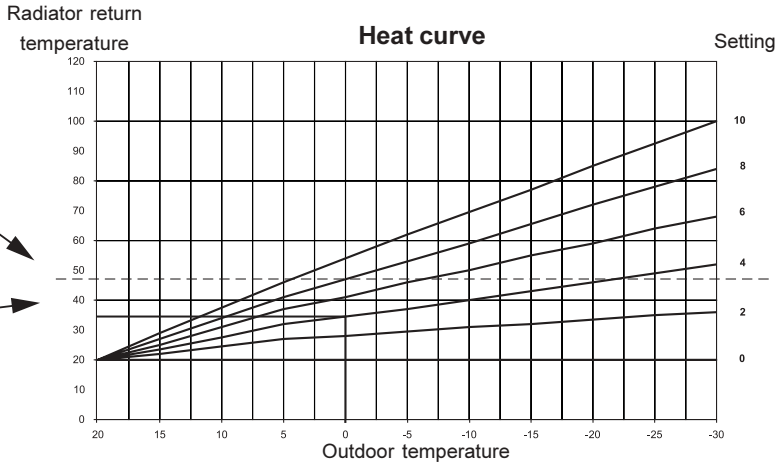


Please note that the flow temperature is then around 7-10°C warmer. During the first winter, the heating curve must be set up so that the temperature in the house is pleasant whatever the weather. You should adjust the heating curve when the outdoor temperature is around 0ºC. You should wait two days after adjusting before carrying out any readjustments.

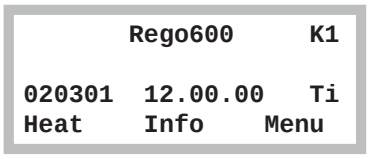
The appearance of the heat curve

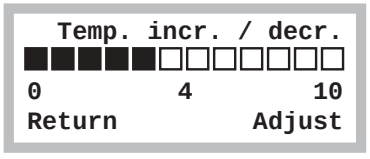
The limit when the heat pump stops for a too high a return temperature.

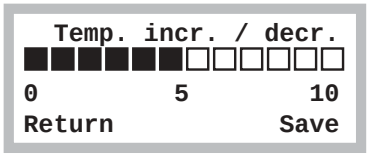
The line shows that if heat curve 4 is chosen, the heat pump stops at around 35°C when the outdoor temperature is 0°C.



The example describes how to change the "heat curve" in the Heating increase/decrease menu.
Please note that a high value could cause the heat pump to stop if the return temperature is too high.





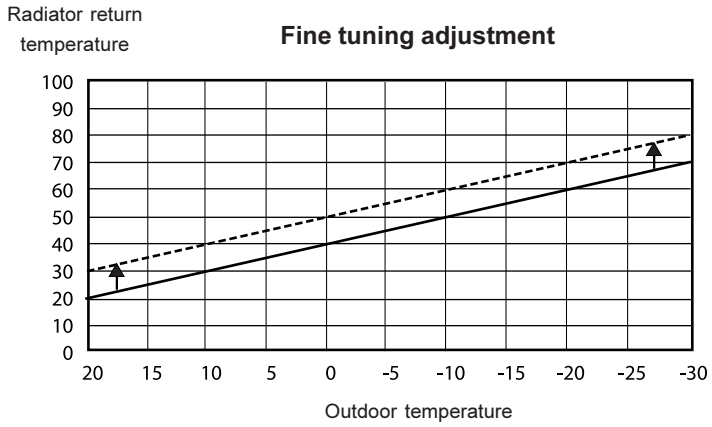


Cold weather:
If the indoor temperature is too low or too high during cold weather, you use Temp. incr./decr. to change it.
Press "Heat".

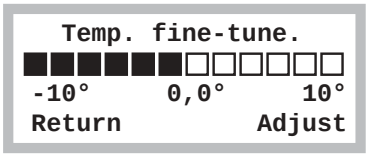
The set value is shown on the display; in the shape of a bar but also as a digit. The range is between 0 and 10. Press "Adjust".

Turn the dial to the right to increase, to the left to decrease. The example shows how you increase the value to 5. Turn the dial until 5 appears on the display. The new value now appears on the display. Press "Save" to save the new value.

The heat curve can also be fine tuned. You do this in the "Temp. fine tune" display. The dotted line illustrates how the parallel offset has been turned towards plus. ***The entire curve*** moves upwards, in contrast to increasing the slope, when only the slope changes.



The dotted line illustrates how the fine tuning adjustment has been turned towards plus.

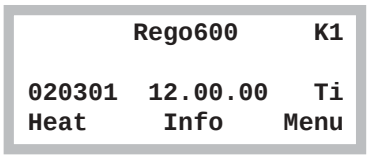


Warm weather (above +5ºC)**:**
If the indoor temperature is too low or too high during warm weather, you use fine tuning to change it. You come to Temp. Fine Tuning by pressing "Heat" and turning the dial to the right.

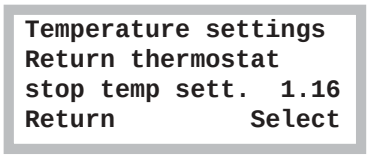
Fine tuning can be set in areas –10°C to 10°C. You change the fine tuning in the same way as "Temp. increase/decrease" as described on the previous page.

Fixed temperature (D series only)

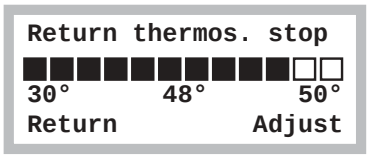
If the heat pump is set at operating mode C with a fixed temperature, then it can only be engaged and disengaged by the built-in return sensor. There are two displays available for this mode. Please note that if a mixing valve is connected to the heat pump, the "Temp. incr/decre" and "Temp. fine tune" displays control the settings for the mixing valve opening to the heating system.



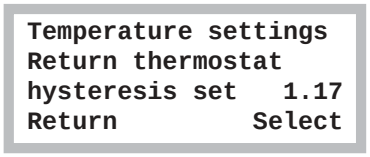
To adjust the engaging and disengaging temperature, press "Menu" followed by "Select". You are now in line 1.



Use the dial to navigate to display 1.16 and press "Select".



The factory setting is 48°. Please note that this concerns the engaging temperature to the heat pump. The temperature from the pump is normally 5-10°C higher. Settings above 48°C *are not recommended* for technical reasons.



You can also set the difference between engaging and disengaging the heat pump in display 1.17. The factory setting is 5ºC. A lower setting results in the heat pump starting and stopping more frequently. Press "Select" to adjust.

Simple tips for saving

The lower you can keep the temperature of the heating system in the house, the better your heating economy will be. So make sure not to set your heat curve too high. It is important that the heating system is carefully balanced so that all parts or the heat emitters (radiators or underfloor) are at the same temperature.

Thermostatic valves on your radiators or floor heating may have a negative effect on your heating system because they restrict the flow so that the system has to compensate with a higher water temperature. If thermostat valves are fitted, they should be fully opened, except in bedrooms, where they can be turned down slightly.

All sensor temperatures

Below are the various sensor temperatures that are visible under line 3 in the control panel. Note that not all the sensors are standard but are available as accessories for different areas of use. To get there press “Menu” in the control panel and then turn the dial to line 3. Then press “Select”.

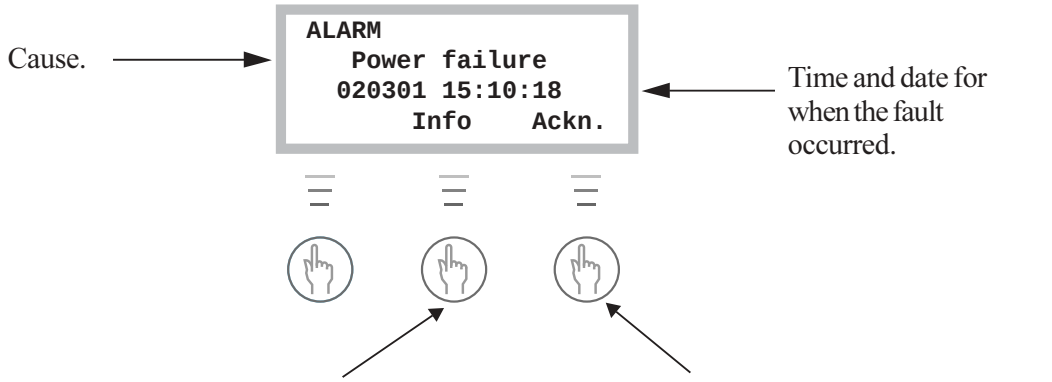
Line 3

Temperature readings Return radiator GT1 Off ##,#° Now ##,#° Return	Standard	Shows the heating system return temperature. This varies depending on the outdoor temperature.
Temperature readings Out GT2 ###,#° Return	Standard	Shows the outdoor temperature.
Temperature readings Hot water GT3 Off ##,#° Now ##,#° Return	Included with the C series	Shows the temperature in the outer container of the electric water heater’s bottom part. This temperature is around 5°C lower than the temperature in the hot water tank.
Temperature readings Shunt, flow GT4 Tgt ##,#° Now ##,#° Return	Accessories	If an extra mixing valve is used for e.g. floor heating then the flow pipe is visible on the circuit. It varies with the outdoor temperature.
Temperature readings Room GT5 Tgt ##,#° Now ##,#° Return	Accessories	If a room sensor is used, you will see the temperature of the room where the sensor is located.
Temperature readings Compressor GT6 ###,#° Return	Standard	The sensor shows the working temperature of the compressor. It varies between around 70°C and 135°C.
Temperature readings Heat tr fluid out GT8 ###,#° Return	Standard	The sensor shows the outgoing temperature from the heat pump. It varies depending on the outdoor temperature and whether the heat pump is in hot water production mode.
Temperature readings Heat tr fluid in GT9 ###,#° Return	Standard	The sensor shows the incoming temperature to the heat pump. It varies as mentioned above. Please note that for safety reasons the heat pump stops when this shows a temperature of more than 48°C.
Temperature readings Ht tr fld(coll)inGT10 ###,#° Return	Standard	The sensor shows the temperature from the bore hole or the ground. It normally varies between -5°C and 8°C throughout the year.
Temperature readings Httrfld(coll)outGT11 ###,#° Return	Standard	The sensor shows the temperature to the bore hole or the ground. It is normally 1.5°C to 5°C lower than heat transfer in.

If something is wrong

The control unit provides a lot of information about faults and how to remedy them. Rego 600 incorporates advanced functions to monitor and protect your heat pump. This means there is no risk involved in resetting an alarm. If a fault persists, you should contact the installer.

Alarm examples and what to do



If you press "Info" and then turn the dial you will see information about the possible causes and how you can remedy the fault yourself.

Press "Ackn" when the fault is remedied, the alarm lamp goes off and the heat pump starts again within 15 minutes. If the lamp is lit with a steady glow then the alarm is remedied, but the fault remains. If several alarms have triggered, use the dial to navigate to them.

If the control panel is dark

Possible faults:

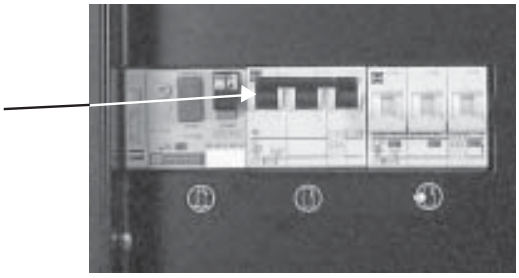
- The fuses or MCBs (miniature circuit-breakers) in your fuse box.

This is what to do:
Check the fuse (or MCB) for your heat pump. If the small plate at the bottom of the fuse has come off, the fuse has blown and must be replaced. If you have MCBs, and they have tripped, move the switch to the up position.

Note that the heat pump cannot restart until after 15 minutes. This delay is needed for technical reasons!

- The heat pump MCB has tripped

This is what to do:
Reset the MCB by pushing the switch upwards.



All alarms

Below is a description of the alarms that can appear in the menu display. The description gives an idea of what the fault is and what you yourself can check and remedy. An alarm can sometimes occur temporarily so there is never any risk with resetting it. If a fault persists, you should contact the installer.

The description sometimes refers to a heat pump component. Pages 28 and 29 have details of where to find the components. Page 28 is for models 14-16 and page 29 is for models 20-40.

COMPRESSOR MOTOR CUTOUT SWITCH ALARM

To reset the alarm: Reset the motor cutout by pressing in the black button (position 2). Then press "Ackn." *Note:* The lamp goes out even if the motor cutout has not been reset. (Models 25-40 have built-in temperature protection in the compressor that resets automatically when the temperature has reduced).

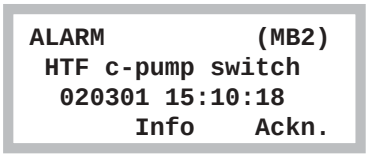
Probable causes and actions:

- Sporadic fault or overloading of the power supply.
  Action: Reset the motor cutout and wait and see.

- The current setting on the motor cutout is too low. The compressor's current intensity varies during summer/winter operation.
  Action: Contact the installer.

- Contactor or cutout faulty, or loose electrical connections to the compressor.
  Action: Contact the installer.

- Compressor faulty.
  Action: Contact the installer.



HEAT TRANSFER FLUID CIRCULATION PUMP SWITCH ALARM

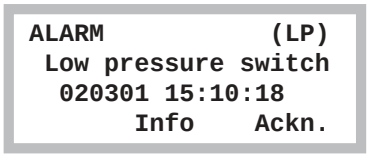
To reset the alarm: *Greenline 14-16*. Press "Ackn." (Models 14-16 have built-in motor cutout in the pump that resets automatically after a period of time). *Greenline 20-40*. Reset the circuit breakers (pos 3) or the pump built-in motor cutout (pos 9) and press Confirm. *Note* that the lamp goes out even if the motor cutout has not been reset.

Probable causes and actions:

- The pump has stopped because of contaminants.
  Action: If the pump has an air vent screw it can be loosened and the pump restarted with a screwdriver

- Fault in the pump's electric motor.
  Action: Contact the installer.

- Temporary fault.
  Action: If the fault persists, contact the installer.



LOW PRESSURE SWITCH ALARM

To reset the alarm:
Press "Ackn."

Probable causes and actions:

- Air in the heating system.
  Action: Check the expansion vessel and fill if required. If air is heard continuously in the system, contact the installer.

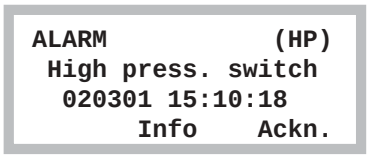
- Heat transfer pump has stopped or is set at too low a speed.
  Action: Check the pump has not stopped or is set at the wrong speed.

- Particle filter on the cold side is clogged.
  Action: Check the particle filter and clean if necessary.

- Not enough refrigerant in the circuit.
  Action: Check that bubbles do not appear continuously in the sight glass. Contact the installer.

- Not enough antifreeze in the heat transfer circuit creating ice in the heat exchanger.
  Action: Contact the installer.

- Expansion valve faulty (alarms occur at long intervals, about every three or four weeks).
  Action: Contact the installer.



HIGH PRESSURE SWITCH ALARM

To reset the alarm:
Press "Ackn."

Probable causes and actions:

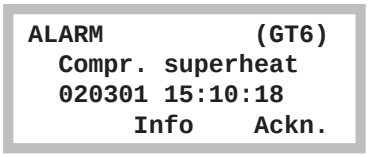
- Air in the heating system.
  Action: Check the system and vent the radiators if necessary.

- Not enough flow over the heat pump.
  Action: Check that the circulation pump has not stopped and that a valve in the system is not closed.

- Particle filter on the hot side is clogged.
  Action: Check the particle filter and clean if necessary.

- Heat transfer fluid circuit over-filled.
  Action: Contact the installer.

- Drying filter clogged.
  Action: Contact the installer.



ALARM ON COMPRESSOR SUPERHEAT

To reset the alarm:
Press "Ackn."

Probable causes and actions:

- The working temperature of the compressor is too high.
  Action: If the fault persists, contact the installer.

- Sporadic temperature rise due to abnormal operating conditions.
  Action: Wait and see.

PHASE SEQUENCE FAULT ALARM

To reset the alarm: The alarm does not reset until the phase sequence has been changed. Then the heat pump starts automatically.

Probable causes and actions:

- Phase sequence to the heat pump is incorrect.
  Action: The phase sequence to the incoming supply must be changed.

POWER FAILURE ALARM

To reset the alarm: The alarm resets itself and the heat pump starts automatically when the fault has been corrected.

Probable causes and actions:

- One or two phases are missing to the heat pump.
  Action: Check the fuse (or MCB) for your heat pump. If the bottom plate is loose then the fuse has blown and must be changed. If you have MCBs, and they have tripped, move the switch to the up position.

- The emergency thermostat is not in the 0 position.
  Action: Check that the emergency thermostat wheel is turned to the anti-clockwise end position.

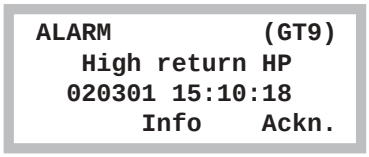
ELECTRIC WATER HEATER ALARM

To reset the alarm: Reset the water heater's MCB (pos 4) or overheat protection (pos 5). Press Ackn.

Probable causes and actions:

- The electric water heater MCB has tripped.
  Action: Reset the MCB by pushing the switch upwards. If the fuse blows again then the heater could be faulty, contact your installer.

- The overheat protection on the electric water heater has tripped.
  Action: Reset by pressing the button on heater's protective cover until it "clicks". It could depend on a bad flow over the heater caused by the circulation pump standing still or a clogged particle filter. Check the circulation pump and particle filter.

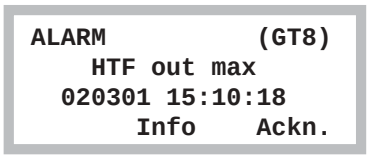


ALARM, HIGH RETURN TO THE HEAT PUMP

To reset the alarm: The alarm resets itself and the heat pump starts automatically when the temperature has dropped.

Probable causes and actions:
The heat pump has a sensor that stops the heat pump for safety reasons when the return temperature is too high, about 48°C

- The temp. incr/decr dial is set so high that the heating system return temperature is too high.
  Action: Reduce the temp. setting.
- The hot water temperature is set too high.
  Action: Contact the installer.
- The radiator valves or the underfloor heating system are closed.
  Action: Open the valves.
- The flow across the heat pump is greater than the flow in the heating system.
  Action: Reduce the speed of the heat pump circulation pump or increase the speed of the main pump in the heating system. Contact the installer.

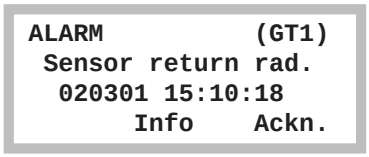


HEAT TRANSFER FLUID SYSTEM OUT MAX ALARM

To reset the alarm: The alarm resets itself and the heat pump starts automatically when the temperature has dropped.

Probable causes and actions:
The heat pump has a sensor that stops the pump for safety reasons when the outgoing temperature is too high at around 75°C.

- Not enough flow over the heat pump
  Action: Check that the circulation pump has not stopped and that a valve in the system is not closed.
- Particle filter on the hot side is clogged.
  Action: Check the particle filter and clean if necessary.



SENSOR ALARM

To reset the alarm: The alarm resets itself and the heat pump starts automatically when the fault has been corrected.

Probable causes and actions:
Alarm if a sensor fault can be indicated for all sensors that are connected to the heat pump. The example shows the alarm for the Return radiator, GT1 sensor. The principle is the same for all sensor alarms.

- Short circuit or broken cable to sensor.
  Action: If you have an instrument that can measure resistance, you can check the resistance of the circuit and compare with the table for sensors in Technical spec. Or contact your installer.
- Faulty sensor.
  Action: Contact the installer.
- Faulty connection.
  Action: Contact the installer.
- Temporary fault.
  Action: Wait and see.

Emergency operation, E series

If a fault occurs that you cannot remedy, the plant can operate in emergency mode. In this mode the circulation pump and electric heater are started manually by turning the thermostat wheel on the electric heater. To get both heating and hot water, the 3-way valve must be set at intermediate position (the 3-way valve is built-in in the E series) **WARNING!** Must not be activated during normal operation.

To reset the alarm: Turn the electric heater thermostat wheel to the required temperature (see following pages, pos 6). Reset the 3-way valve to manual operation in an intermediate position so that the electric boiler can heat both the heating system and the immersion heater.
PLEASE NOTE: The control panel alarms for a power failure in emergency operations.

Maintaining your heat pump

Your heat pump normally requires little maintenance, but we recommend occasional checking to ensure that your heating installation is giving the best possible performance. The description sometimes refers to a heat pump component. You will find these on page 28 for models 14-16 and page 29 for models 20-40.

Working on the heat pump

- Switch off the electrical supply before commencing work on the heat pump. Usually there is an isolating switch on the wall before the heat pump.

- Only an accredited refrigeration company is permitted to work on the heat transfer fluid circuit. The installation contains gases that may form toxic fumes when combined with discharges and naked flames. The gas that forms may cause choking even at low concentrations. If it should leak, evacuate the room until it has been thoroughly aired.

Normal maintenance

Points to check a few times a year:

- **Sight glass** (pos 7): When the heat pump starts, and during rapid temperature changes, you can sometimes see bubbles in the liquid in the heat transfer fluid circuit for a minute or so. This is normal.
  If there are always bubbles in the sight glass: Contact the installer.

Sight glass →

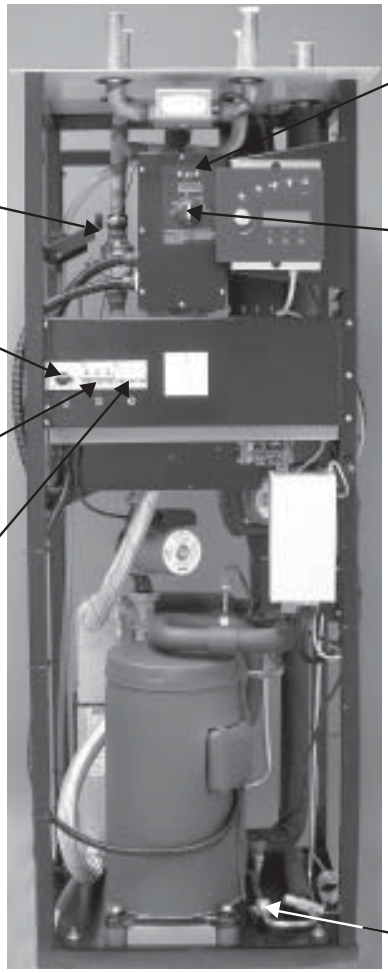
- **Expansion vessel:** If the heat pump has a plastic expansion vessel connected to the heat transfer circuit the level must not fall below 1/3 (the vessel is mounted outside the heat pump).
  For low fluid level: With the pump working, remove the lid to the valve at the top of the vessel and open the valve. Fill with antifreeze or clean water (simplest with a watering can). Shut the valve again and screw on the lid.

Ball valve with lid →

- **Particle filter:** The particle filters, which are connected on both the hot and cold sides of the heat pump, protect the heat exchangers from dirt. Sometimes these filters may get clogged and cause malfunctions.
  Do this when checking: Shut down the heat pump with the on/off button on the control panel. Close the valve and unscrew the sealing cover. Check for dirt in the filter. If necessary, remove the circlip that retains the filter. The simplest way to do this is by using pliers. Remove the filter and flush it clean with water. Refit the filter, circlip and cover. Open the valve and start the heat pump. Note that the particle filters in the E14 and E16 series are mounted inside the heat pump (pos 1). On the cold side the filter is mounted outside the heat pump.

Where the various components are situated (models 14-16)

The pages, If something goes wrong and Maintaining your heat pump, show various positions in your heat pump. The picture shows the location of the various components.
The picture is of the E series.



Pos 1
Cleanable particle filter with shut off lever valve.

Pos 2
Reset, motor cutout compressor.

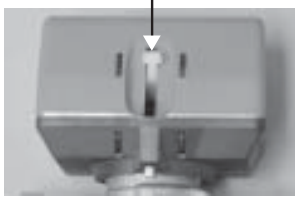
Pos 3
Reset circuit breaker heat pump.

Pos 4
Reset circuit breaker electric water heater.

Pos 5
Reset button for overheat protection on the electric heater elements.

Pos 6 (Emergency op, E series)
Turn the thermostat wheel to the right to manually activate the electric boiler.

Set the 3-way valve to the intermediate position by pushing the grey switch downwards at the same time as it is pressed inwards.



WARNING! Must not be activated during normal operation.

Pos 7
Sight glass

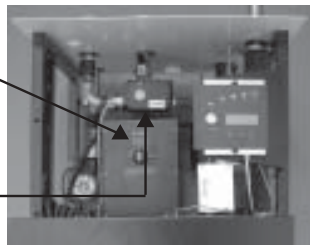
Where the various components are situated (models 20-40)

These pages identify the various parts contained in the heat pump. The picture shows the location of the various components. *The picture shows the E series.*

Pos 6 (Emergency operation, E series)

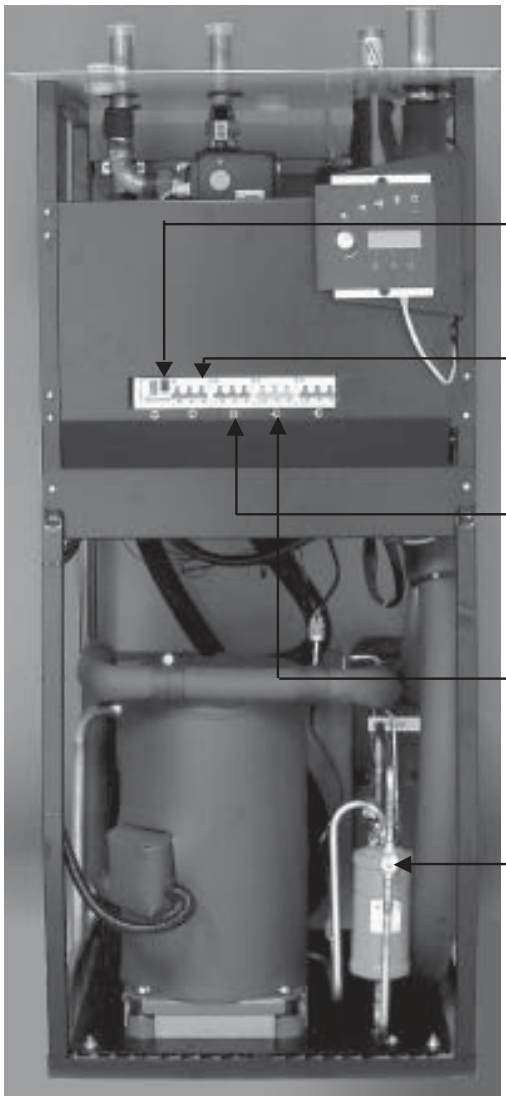
This is what to do:

- Set the 3-way valve to the intermediate position by turning the wheel to the side half a turn. Then turn the large wheel to an intermediate position. Turn the small wheel back to its original position to return to normal position again.
- Turn the thermostat wheel to the right to manually activate the electric boiler.
- **WARNING!** Must not be activated during normal operation.



Pos 5
Reset button for overheat protection on the electric boiler.

Pos 9
Resetting the motor cutout on the heat transfer pump.



Pos 2
Reset, motor cutout compressor.

Pos 3
Reset circuit breaker heat pump.

Pos 8
Reset, motor cutout heat transfer fluid pump.

Pos 4
Reset circuit breaker electric water heater. (Model E20 has one less circuit breaker.)

Pos 7
Sight glass.

What the shipment includes

Standard components

- Heat pump unit with the necessary safety functions and electrical components.
- Factory fitted control unit Rego 600. Rego 600 can be used for simultaneous operation together with an electric boiler or oil-fired/electric boiler with mixing valve.
- Sensor radiator return, T1 (GT1) (packed separately).
- Sensor out, T2 (GT2) (packed separately).
- Sensor, compressor, T6 (GT6).
- Sensor heat transfer fluid out, T8 (GT8) and sensor heat transfer fluid in, T9 (GT9).
- Sensor heat transfer fluid (collector) in, T10 (GT10) and sensor heat transfer fluid (collector) out, T11 (GT11).
- Pump for heat transfer out and in and built-in flexible hoses on the heat transfer circuit.
- Particle filter with shut off for heating and heat transfer fluid side (packed separately in D series).
- Expansion vessel and safety valve for heat transfer fluid circuit, only 14-16 (packed separately).

Accessories

- Sensor hot water, T3 (GT3).
- Sensor flow duct mixing curve, T4 (GT4).
- Room sensor, T5 (GT5).
- Expansion vessel for the heat transfer circuit.

General

Temperatures

Note that the heat pump can work to a maximum return temperature of around 48°C. Anything over this and the heat pump stops for safety reasons. The maximum outgoing temperature from the heat pump is around 55°C. A higher temperature can be achieved using an electric water heater.

Particle filter

The particle filter supplied must *always* be fitted in the input pipe of the hot side as close as possible to the heat pump, and horizontally. For E14 and E16, the filter is mounted on the heat transfer side. The filters are packed separately on the heat transfer fluid side.

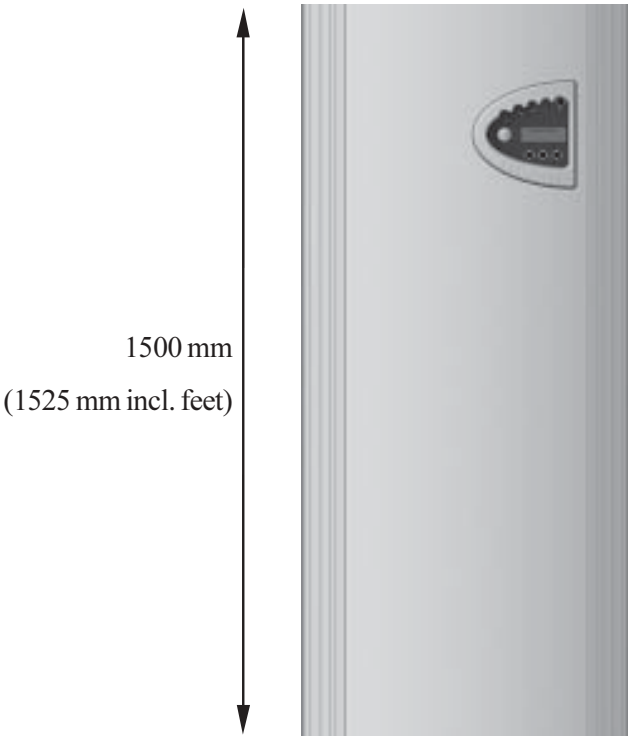
Transportation

The heat pump must always be transported and stored upright and dry. The heat pump can be placed on its back temporarily when moving to the installation site.

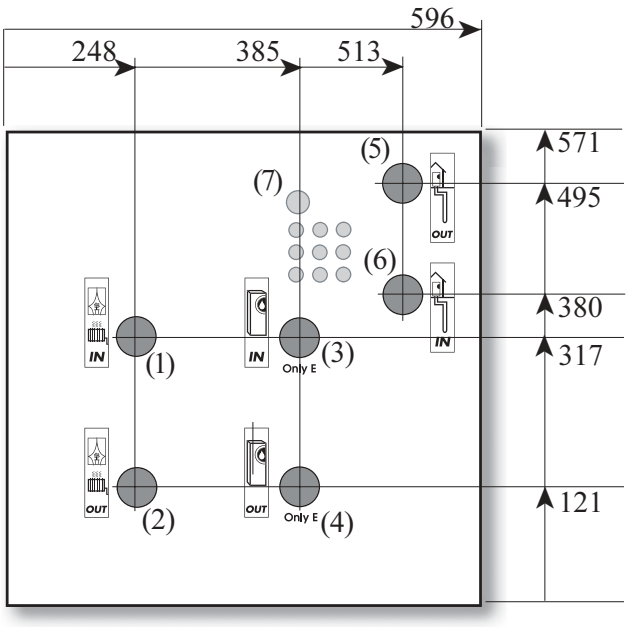
Positioning

Place the heat pump on a flat base and adjust the rubber feet until it is level. Avoid installing the heat pump close to sensitive walls such as bedroom walls, since the pump produces a certain amount of noise when running. The room must have a floor drain. Installation must comply with local construction regulations.

Dimensions and connections (models DE14-16)

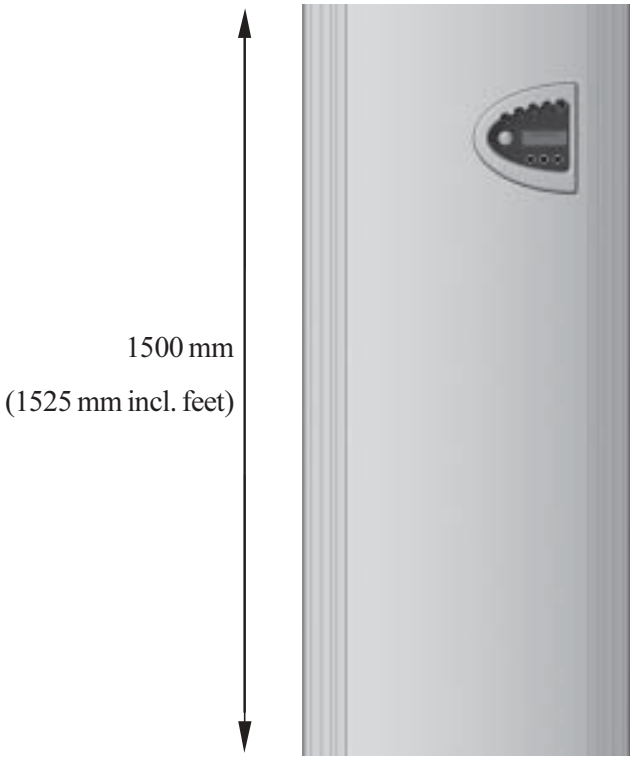


(1) Return radiator
(2) Riser radiator
(3) Return electric water heater (only E)
(4) Riser electric water heater (only E)
(5) Heat transfer fluid out
(6) Heat transfer fluid in
(7) Electrical connections

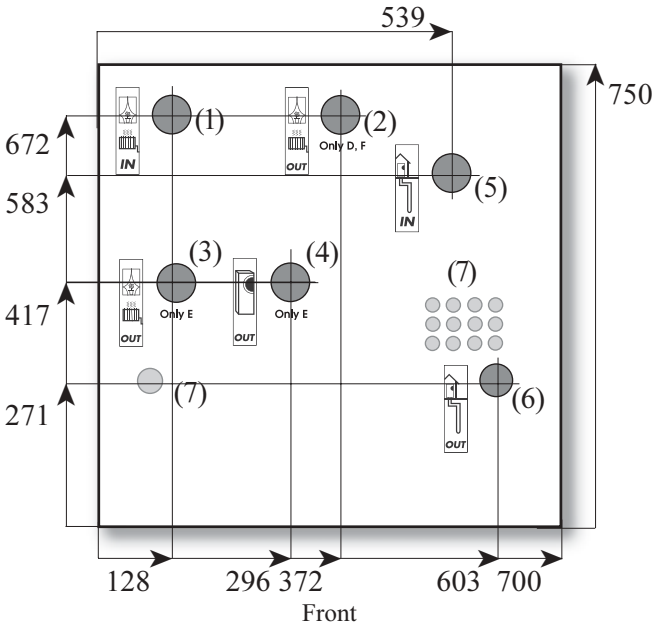


Front

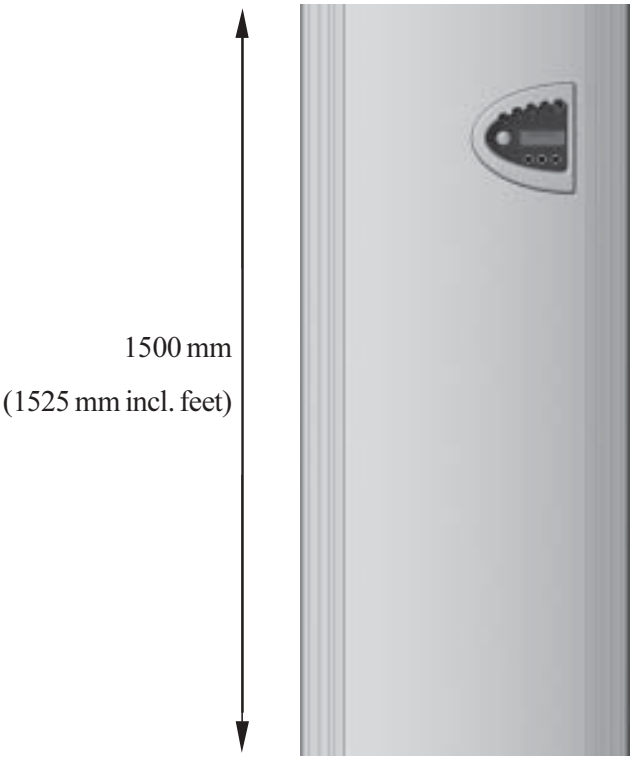
Dimensions and connections (models E20-E25)



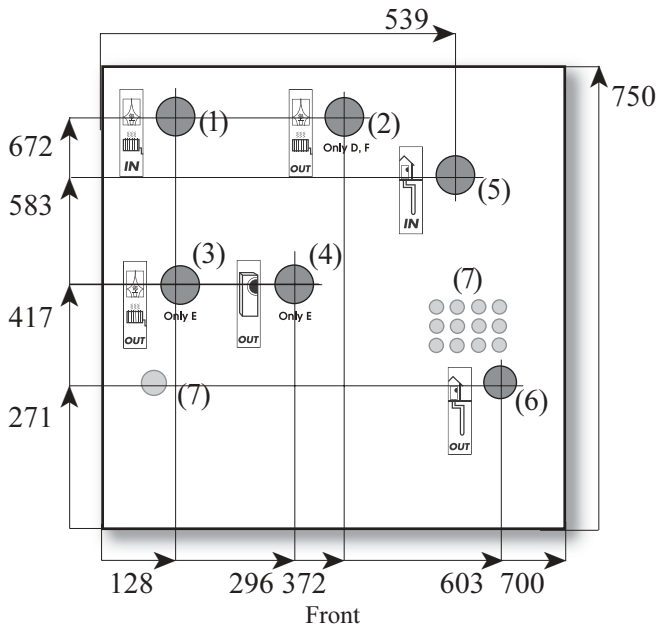
(1) Return radiator
(2) Plug
(3) Radiator out
(4) Riser DHWH
(5) Heat transfer fluid in
(6) Heat transfer fluid out
(7) Electrical connections



Dimensions and connections (models D20-D40)



(1) Return radiator
(2) Riser radiator
(3) Plug
(4) Plug
(5) Heat transfer fluid in
(6) Heat transfer fluid out
(7) Electrical connections



Collector

Collector hose

The collector hose consists of a thin-walled plastic hose of make Pem 40 x 2.4 DN 6.3. Length and depth as in IVT's dimensioning program.

Install the hose rising towards the heat pump to avoid air pockets.

It is vitally important that the filling around the ground coil does not contain stones or other objects that could damage the coil. The final filling is best carried out after the ground collector has been pressure tested. Avoid chips or dirt getting into the coil when cutting.

Installation and filling around the collector hose must comply with local regulations. Mark AMA is a general material and work description issued by Svensk Byggtjänst.

Bending diameter

Minimum bending diameter permitted is 1 metre. Always use an elbow coupling for sharper bends. If you damage the hose by bending it too sharply you can repair it with a straight connector.

Maximum lengths

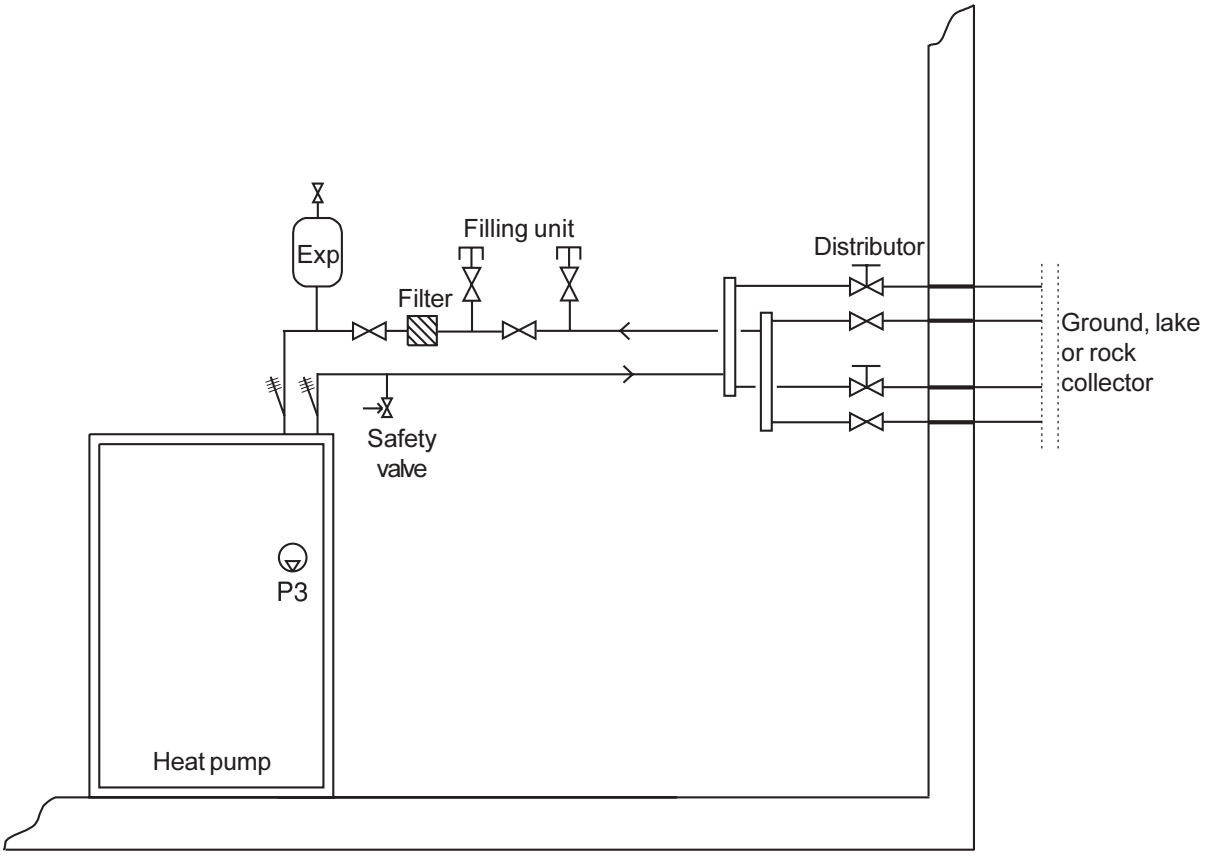
Specified pressure falls and hose lengths are based on heat transfer fluid containing ethanol 30% by volume. Other heat transfer fluids are not recommended because they are sluggish at low temperatures. The table shows the maximum hose length for each heat pump model. The coils can be parallel connected if the collector's length exceeds that permitted for a circuit. Note that maximum hose length per coil is specified for parallel connecting. The table specifies that e.g. a Greenline 14 has a maximum coil length of 200 metres and for 2 parallel coils the length is 800 metres a coil, a total of 1,600 metres.

Heat pump	Max. Hose length with one loop	Max. hose length per coil with two loops
Greenline 14	200 metres	800 metres
Greenline 16	120 metres	650 metres
Greenline 20	*Contact IVT*	
Greenline 25		
Greenline 35		
Greenline 40		

Connecting the collector to the heat pump

The sketch shows the connection of a collector with two parallel coils. Both coils are connected to two distributors. Each coil should have a gate valve and a control valve. The control valve is adjusted so that the flow rate is the same in both coils.

The common pipe to the heat pump is fitted with a filling unit, a particle filter and an expansion vessel. A safety valve is fitted to the outgoing pipe. When filling the heat transfer fluid circuit, one coil at a time is filled by using these valves.



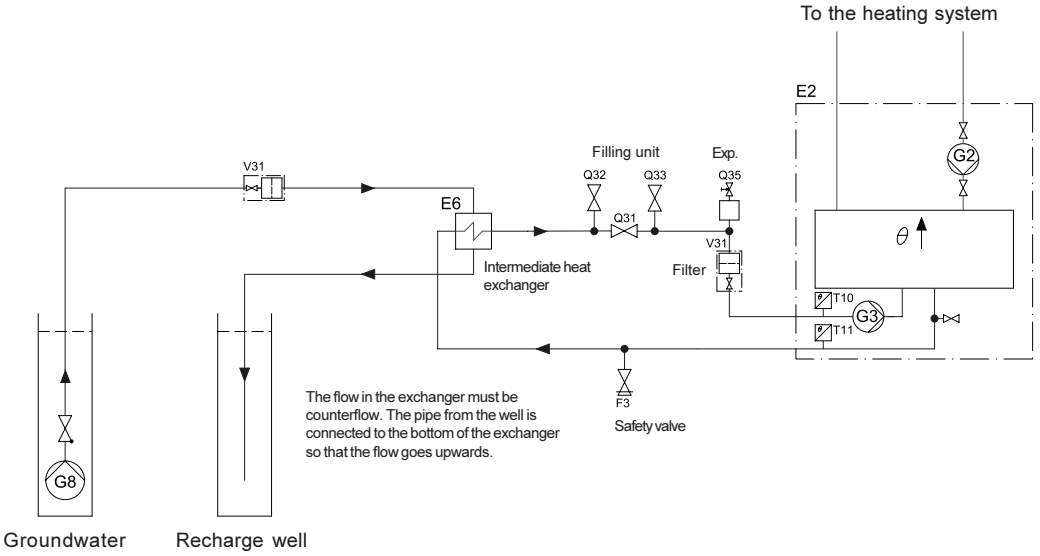
Ground water system

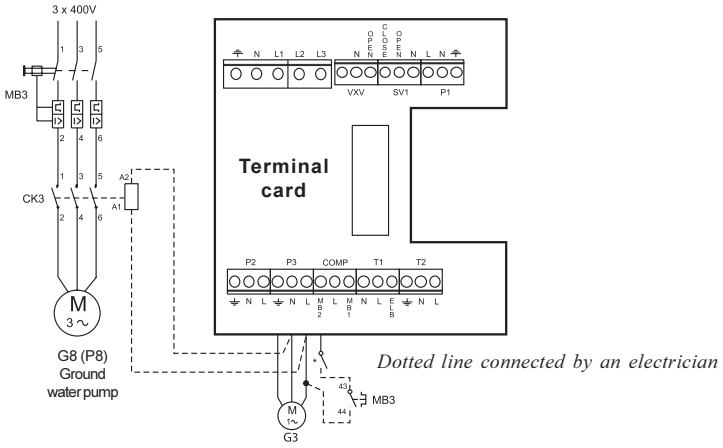
Application:

Systems using ground water are equipped with an intermediate heat exchanger to eliminate the risk of freezing. A pump with a non-return valve is placed in the bore hole that via a hose pumps the water to the intermediate exchanger and then back to an injection well. The circuit to the heat pump is installed in the normal way with a filling unit and safety valve. The circuit should contain around 30% by volume antifreeze which corresponds to around -15°C.

Electrical connections:

The ground water pump is connected to 3 x 400 volt with a motor cutout and a contactor. Power to contactor CK3(230V) is taken from terminals L and N (P3) in the heat pump. The auxiliary contact for motor cutout MB3 is series connected with the "MB2" alarm. In this way the ground water pump starts and stops with the heat pump's heat transfer fluid pump and during motor cutout MB3, the heat pump stops and the heat transfer fluid pump alarm shows in the alarm display. ***NOTE: A single-phase pump should always be connected with a contactor.*** It should never be connected to the P3 outlet on the heat pump.





Connecting to the heating system

General

Installation must be carried out by an authorised installer and must follow the current regulations and recommendations of IVT. The pipework must be flushed before the heat pump is connected to protect the heat pump from contaminants.

Please note that the connecting instructions are only outlined sketches. For more detailed descriptions please see IVT's system manual for properties. See IVT's homepage http://www.ivt.se/.

Function E14-E25, work tank and coil tank

Overview
The heating system is mainly heated by the heat pump, which creates the required temperature through intermittent operation (liquid condensing). If the heat pump is not sufficient then the built-in electric boiler provides supplementary heat in three steps.

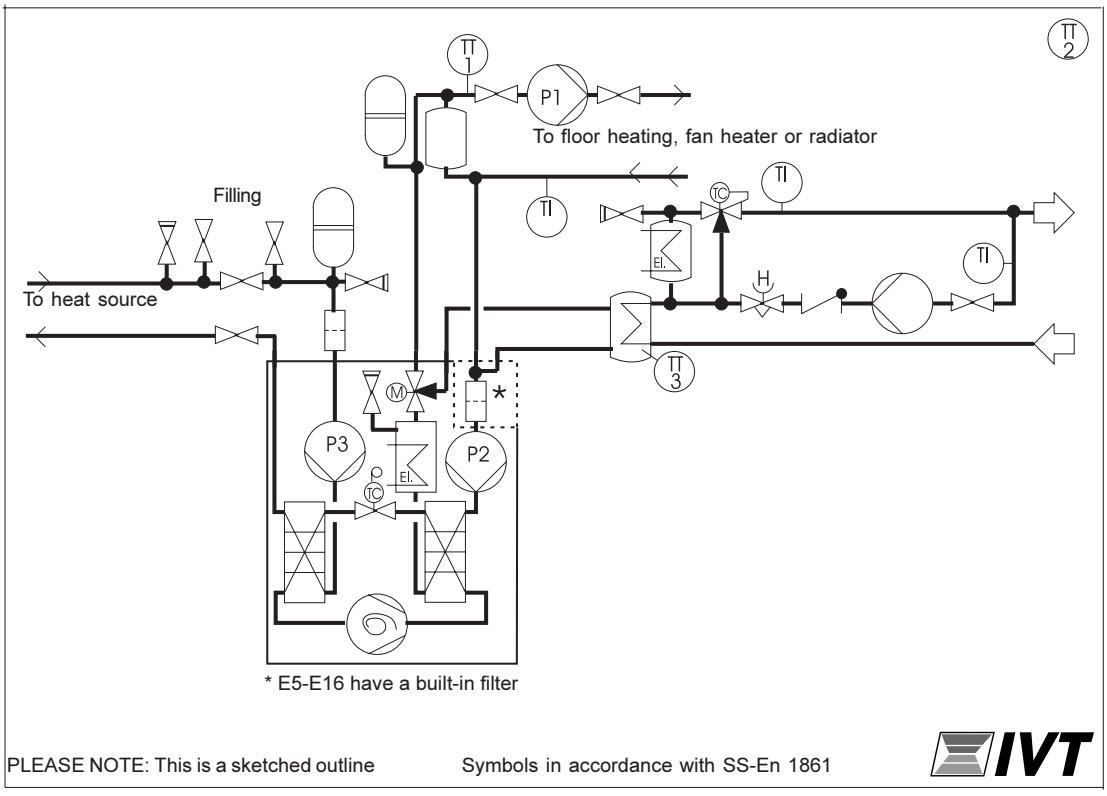
Heat from the heat pump
The required temperature for the heating system (TT1) is set on the heat pump as an outdoor curve.
The heat pump starts when TT1 falls below the set temperature by 2.5°C and stops when TT1 exceeds the set temperature by 2.5°C (adjustable).
The temperature to the heating system can be controlled by either the heating system flow or return.
The best function is available when TT1 is mounted on the flow pipe, which requires that the heat pump hysteresis is increased from 5°C to 10°C (Menu 1.4).

Hot water
If the temperature is too low in the coil tank (TT3) the mixing valve changes over to the coil tank and changes back to the heating system when the coil tank has become warm.
The heat pump is allowed to work for max 30 minutes to the coil tank if there is a heating demand. After which the heat pump must work at least 20 minutes to the heating system or until the heating demand is met.

Electric water heater
If the heating system temperature (TT1) falls under the set temperature by more than half hysteresis (2.5°C) of set time (60 minutes) the electric water heater is activated.
When the heater is active and TT1 falls below the set temperature, the heater output is increased in 3 steps in 20 minute intervals. If TT1 exceeds the set temperature, the heater output is reduced in 3 steps in 3 minutes. The electric water heater is blocked at the same time as the heat pump stops when the heating demand is met.

Summer disconnection
The heating system and circulation pump G1 (P1) stop when the outdoor temperature exceeds 18°C (between 10°C and 30°C). The circulation pump is exercised for 3 minutes every third day.

For information regarding other controls see description of Rego 600.



Function E14-E25, radiators and double shelled electric water heater

Overview
The radiators are first heated by the heat pump, which creates the required temperature through intermittent operation (liquid condensation). If the heat pump is not sufficient the built-in electric boiler provides supplementary heat in three steps.

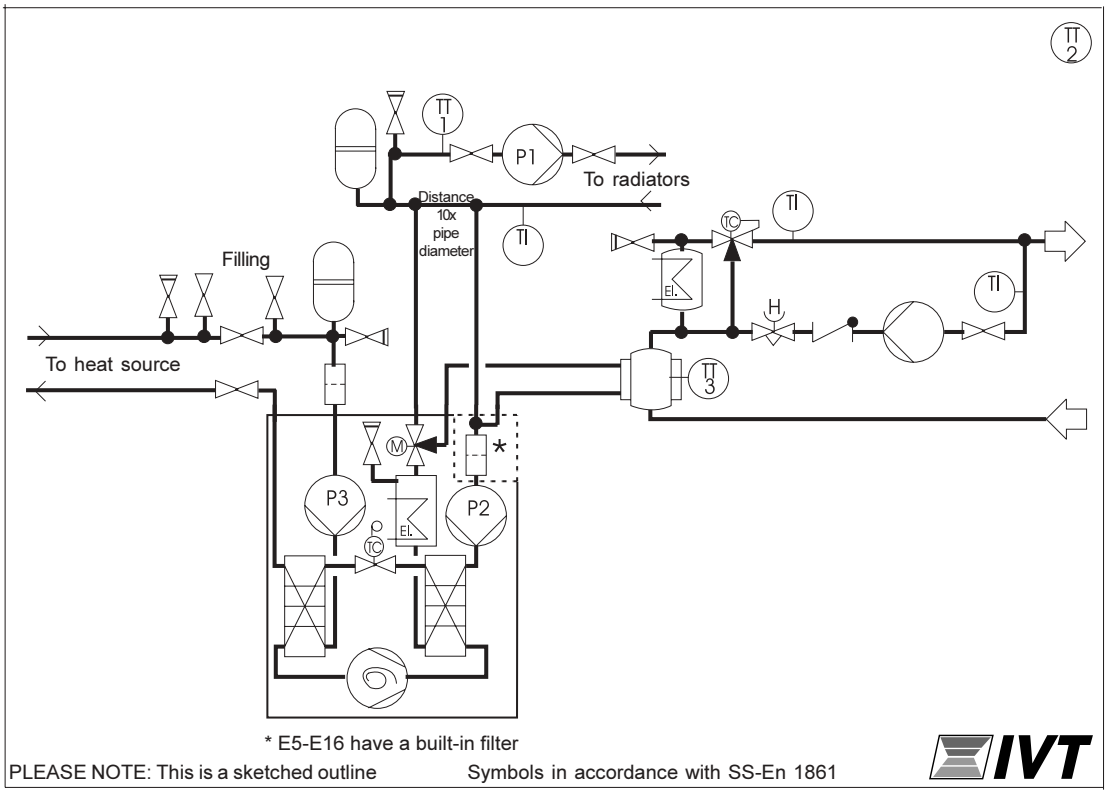
Heat from the heat pump
The required temperature for the heating system (TT1) is set on the heat pump as an outdoor curve.
The heat pump starts when TT1 falls below the set temperature by 2.5°C and stops when TT1 exceeds the set temperature by 2.5°C (adjustable).
The temperature to the heating system can be controlled by either the heating system flow or return.
The best function is available when TT1 is mounted on the flow pipe, which requires that the heat pump hysteresis is increased from 5°C to 10°C (Menu 1.4).

Hot water
At a low temperature in the coil tank (TT3), the 3-way valve changes over to the coil tank and changes back to the heating system when the coil tank is warm again.
The heat pump is allowed to work for max 30 minutes to the coil tank if there is a heating demand. After which the heat pump must work at least 20 minutes to the heating system or until the heating demand is met.
The temperature in the water heater increases by set intervals to 65°C.

Electric water heater
If the heating system temperature (TT1) falls under the set temperature by more than half hysteresis (2.5°C) of set time (60 minutes) the electric water heater is activated.
When the heater is active and TT1 falls below the set temperature, the heater output is increased in 3 steps at 20 minute intervals. If TT1 exceeds the set temperature, the heater output is reduced in 3 steps in 3 minutes. The electric water heater is blocked at the same time as the heat pump stops when the heating demand is met.

Summer disconnection
The heating system and circulation pump G1 (P1) stop when the outdoor temperature exceeds 18°C (between 10°C and 30°C). The circulation pump is exercised for 3 minutes every third day.

For information regarding other controls see description of Rego 600.



Function D14-D40, oil-fired boiler, radiators and coil tank

Overview
The radiators are first heated by the heat pump, which creates the required temperature through intermittent operation (liquid condensation). If the heat pump is not sufficient the oil-fired boiler provides supplementary heat.

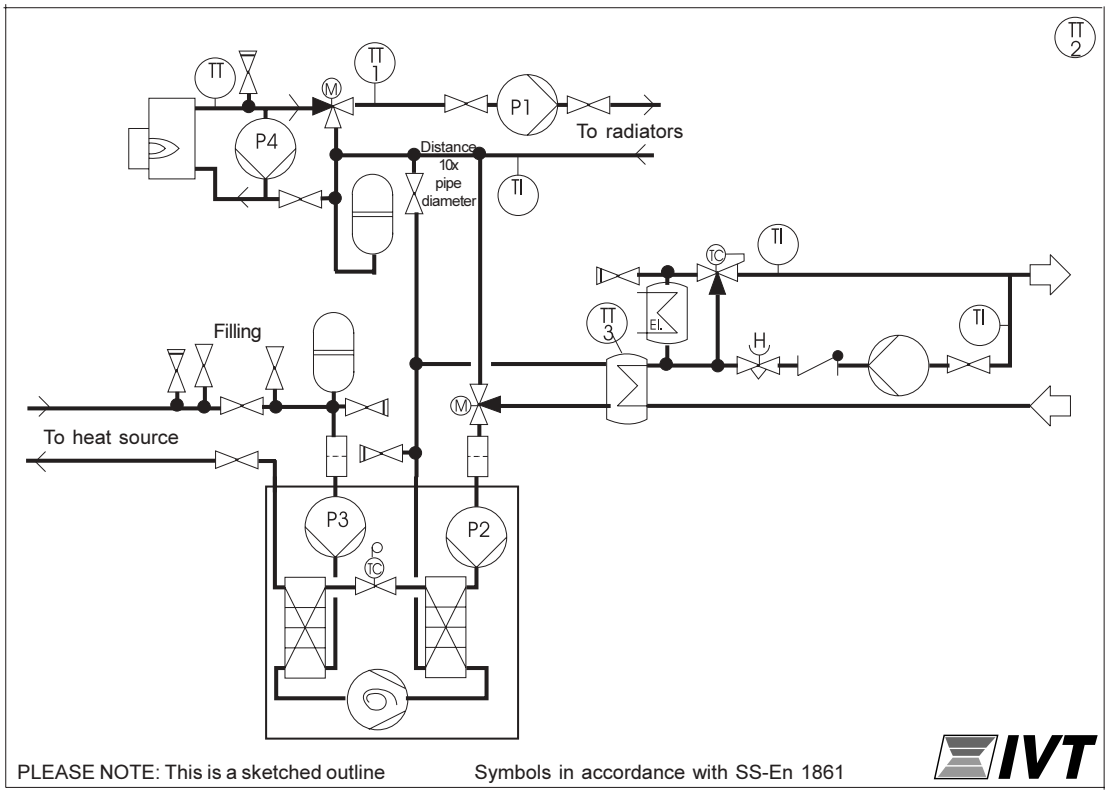
Heat from the heat pump
The required temperature for the heating system (TT1) is set on the heat pump as an outdoor curve.
The heat pump starts when TT1 falls below the set temperature by 2.5°C and stops when TT1 exceeds the set temperature by 2.5°C (adjustable).
The temperature to the heating system can be controlled by either the heating system flow or return.
The best function is available when TT1 is mounted on the flow pipe, which requires the heat pump hysteresis to be increased from 5°C to 10°C (Menu 1.4).

Hot water
If the temperature is too low in the coil tank (TT3) the mixing valve changes over to the coil tank and changes back to the heating system when the coil tank has become warm.
The heat pump is allowed to work for max 30 minutes to the coil tank if there is a heating demand. Then the heat pump must work at least 20 minutes to the radiators or until the heating demand is met.

Oil-fired boiler
If the heating system temperature (TT1) falls under the set temperature by more than half hysteresis (2.5°C) of set time (60 minutes), the oil-fired boiler is activated.
When the oil-fired boiler has been on for 30 minutes and TT1 falls below the set temperature, the mixing valve SV1 opens from shut to fully open in twenty minutes. If TT1 falls below the set temperature, SV1 closes from fully open to closed in 3 minutes. The oil-fired boiler is blocked again when SV1 has not opened anything for 60 minutes.

Summer disconnection
The heating system and circulation pump G1 (P1) stop when the outdoor temperature exceeds 18°C (between 10°C and 30°C). The circulation pump is exercised for 3 minutes every third day.

For information regarding other controls see description of Rego 600.



Function D14-D40, new electric boiler, radiators and coil tank

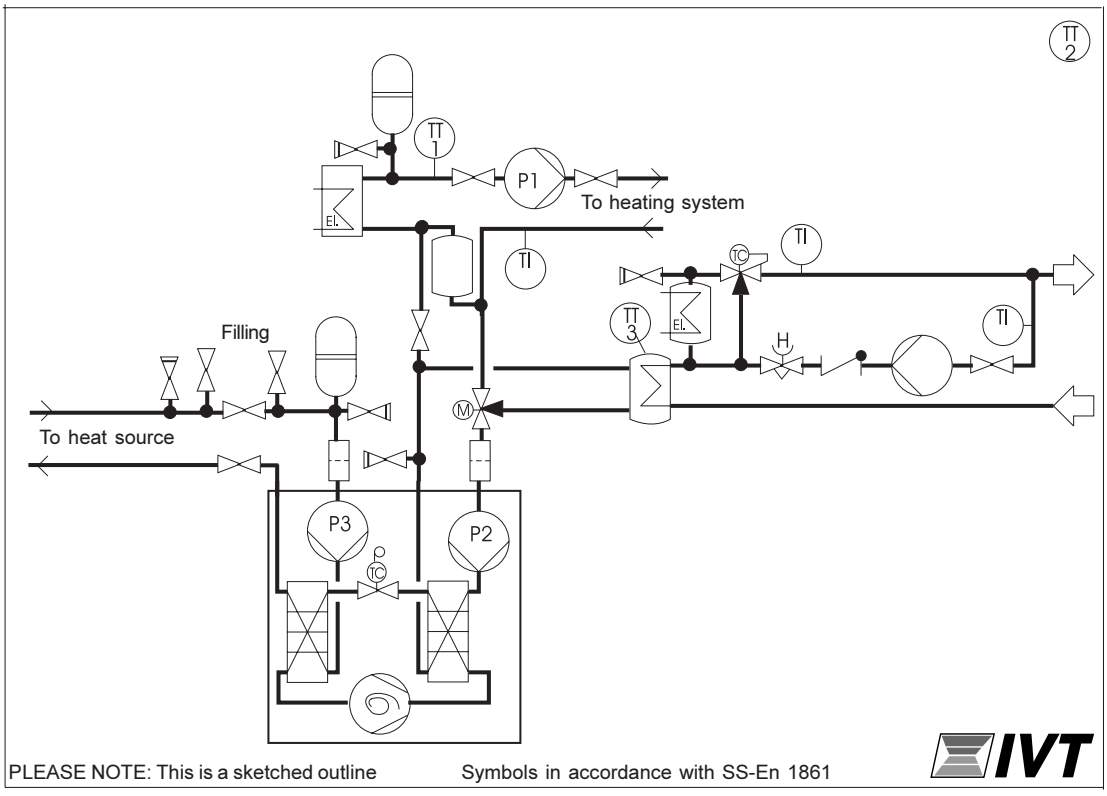
Heat from the heat pump
The required temperature for the heating system (TT1) is set on the heat pump as an outdoor curve.
The heat pump starts when TT1 falls below the set temperature by 2.5°C and stops when TT1 exceeds the set temperature by 2.5°C (adjustable).
The temperature to the heating system can be controlled by either the heating system flow or return.
The best function is available when TT1 is mounted on the flow pipe, which requires that the heat pump hysteresis is increased from 5°C to 10°C (Menu 1.4).

Hot water
If the temperature is too low in the coil tank (TT3) the mixing valve changes over to the coil tank and changes back to the heating system when the coil tank has become warm.
The heat pump is allowed to work for max 30 minutes to the coil tank if there is a heating demand. After which the heat pump must work at least 20 minutes to the heating system or until the heating demand is met.

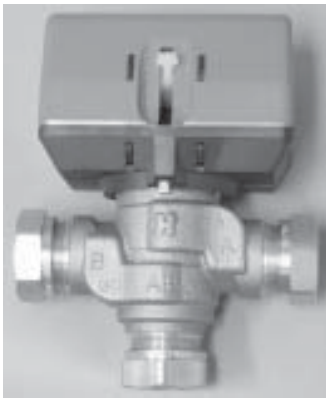
Electric boiler
If the heating system temperature (TT1) falls under the set temperature by more than half hysteresis (2.5°C) of set time (60 minutes) the electric boiler is activated.
When the electric boiler is active and TT1 falls below the set temperature, the boiler output increases from zero to full output in 20 minutes. If TT1 exceeds the set temperature, the output is reduced from full output to zero in 3 minutes.
The electric boiler is blocked at the same time as the heat pump stops when the heating demand is met.

Summer disconnection
The heating system and circulation pump G1 (P1) stop when the outdoor temperature exceeds 18°C (between 10°C and 30°C). The circulation pump is exercised for 3 minutes every third day.

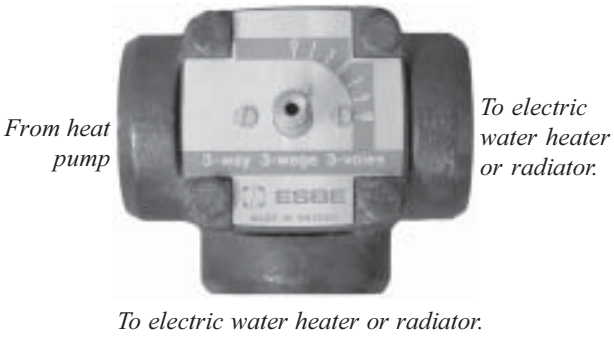
For information regarding other controls see description of Rego 600.



3-way valve, connection



Connecting a Honeywell 3-way valve.



Connecting a ESBE 3-way valve.

Filling the radiator system

Note that the radiator system must have its own expansion vessel. Open the valve between the cold water system and the heating system in short bursts and then close it and note the pressure gauge reading. When the system is full or the right pressure has been reached, vent the system and top it up if necessary.

Filling of heat transfer fluid

The ground coil or well coils must be filled with a mixture of water and heat transfer fluid until a freeze protection level of around -15°C is reached as shown in the following table.

The procedure when filling is: (compare the picture on the next page)

- Connect two one inch hoses to both filling valves 1 and 2. One hose has a submersible pump (min 6 m^3/h) connected at the other end.
- Both hoses are placed in a barrel with a volume of at least 100 litres. The barrel is filled with a mixture of antifreeze and water. The mixture as shown in the table on the next page.
  Always fill water before antifreeze.
- Open valves 1 and 2, shut valve 3. Start the submersible pump (that is equipped with a particle filter!), and the system fills with liquid. Note that the first litres in the return pipe are usually contaminated. So collect the first litres in a separate vessel.
- Open the expansion vessel valve until the vessel fills to around 2/3.
- When the level in the barrel has sunk to 25% the submergible pump stops and the barrel fills with the antifreeze mixture.
- When the system is full and air is no longer coming from the return pipe the system is run for at least 30 minutes. You can also start the heat transfer fluid pump to speed up the air venting. Go into manual operation in window 5.3 and start pump G3 (P3).
- When venting is ready open valve 3, shut valve 2, and shortly after valve 1. Disconnect the hoses and the transfer fluid side is ready for operation. Note that a little overpressure in the transfer fluid circuit is beneficial.

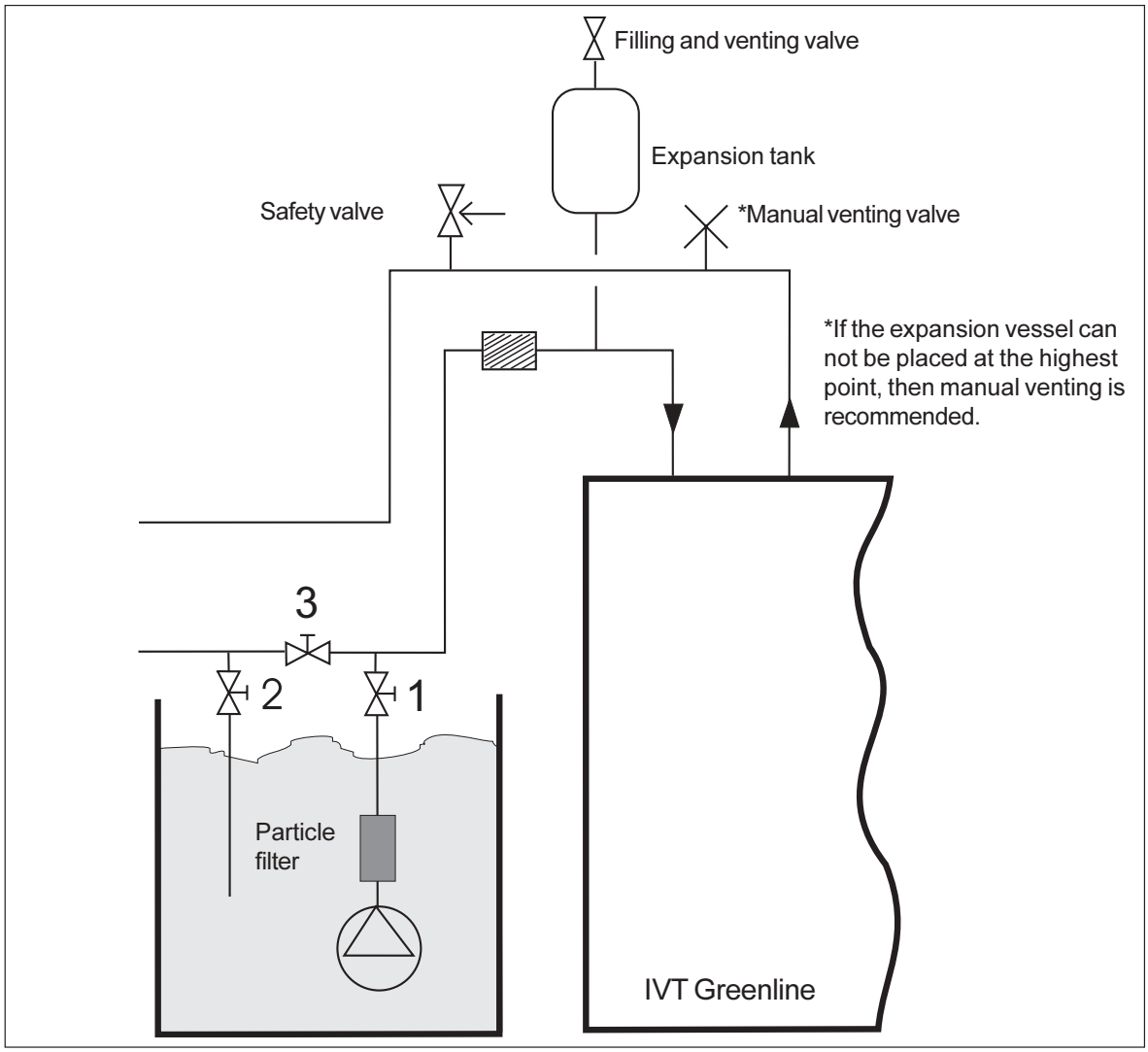
The table shows the mixture in volume litre/ metre

Hose type / Anti-freeze type	40/35		32/28	
	Litres of water	Litres of antifreeze	Litres of water	Litres of antifreeze
Ethanol	0.71	0.29	0.42	0.18
Propylene glycol	0.65	0.35	0.39	0.21

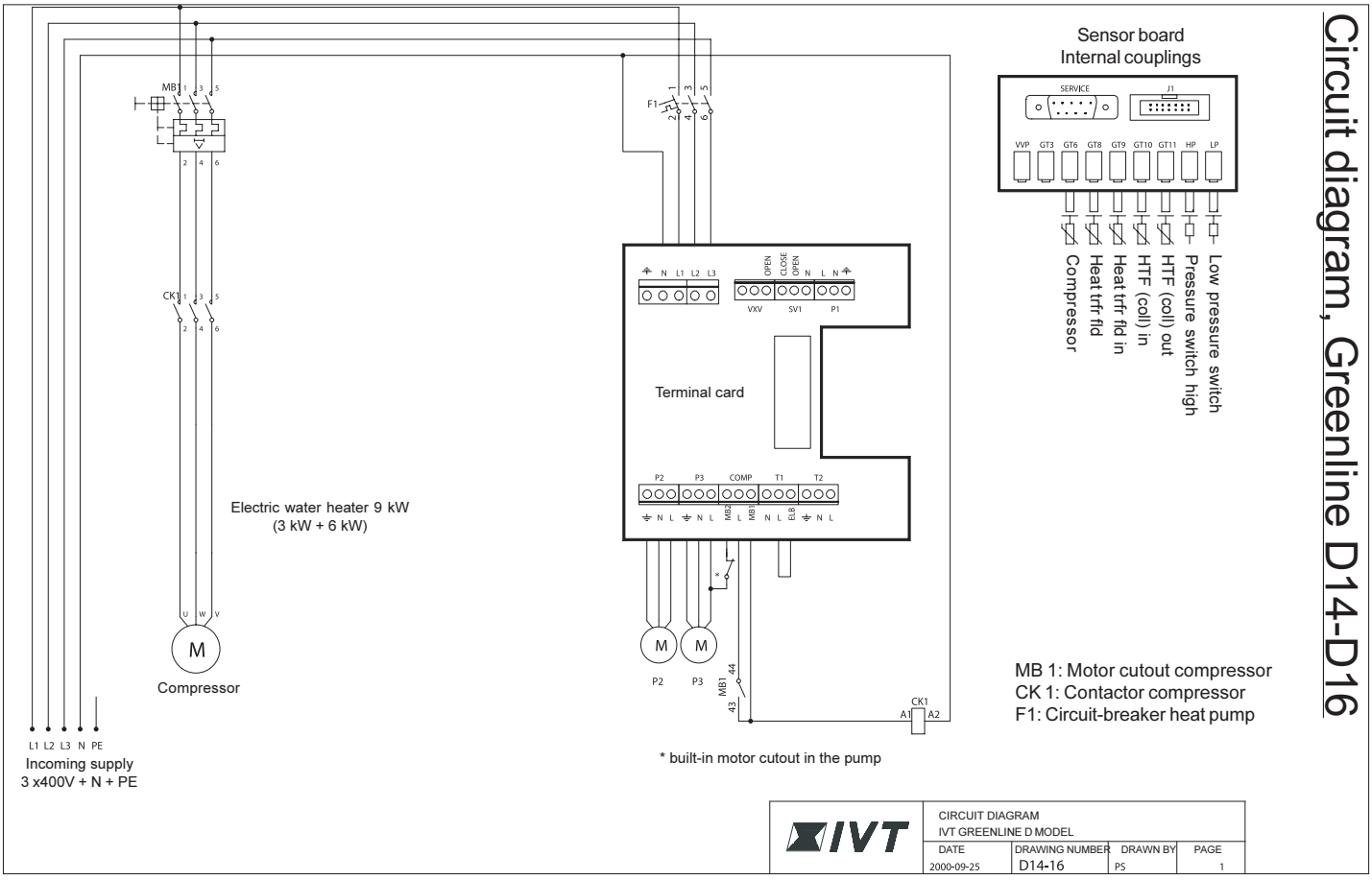
The table shows the mixture in weight percent

Hose type	40/35	32/28
Ethanol	25%	
Propylene glycol	35%	

Example: 200 metres of hose type 40/35 with Brinol gives 200 x 0.29 litres Brinol/ meter = 58 litres Brinol and 200 x 0.71 litres water/ metres = 142 litres water.



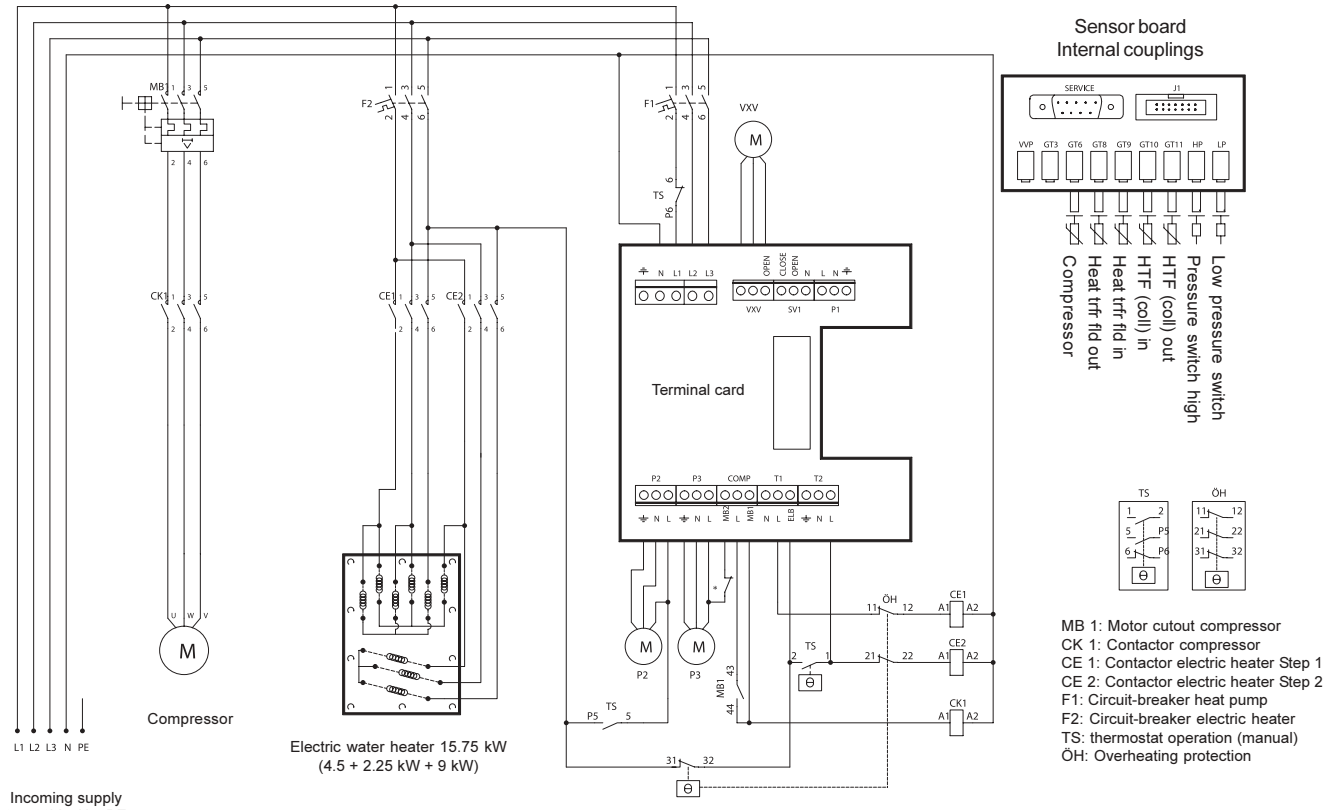
Circuit diagram, Greenline D14-D16



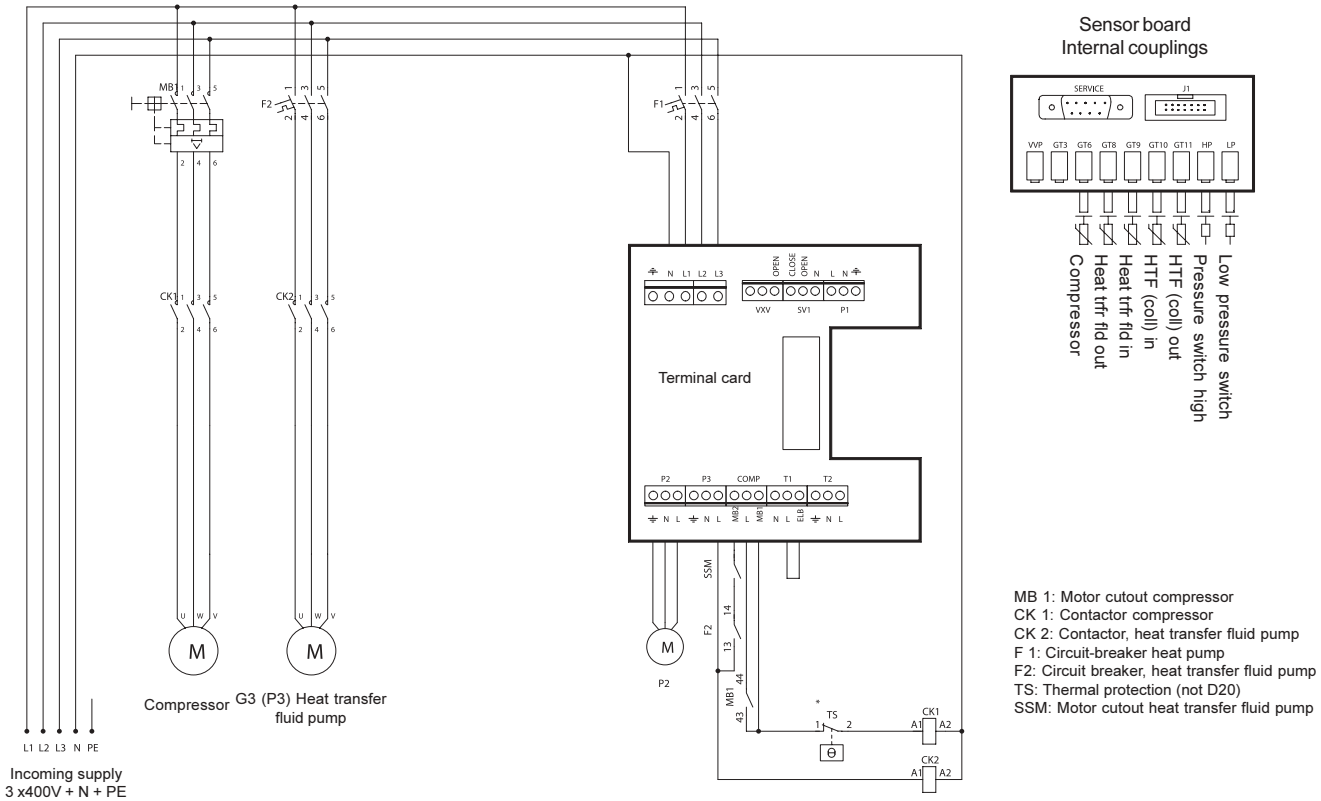
MB 1: Motor cutout compressor
CK 1: Contactor compressor
F1: Circuit-breaker heat pump

IVT	CIRCUIT DIAGRAM IVT GREENLINE D MODEL			
	DATE	DRAWING NUMBER	DRAWN BY	PAGE
	2000-09-25	D14-16	PS	1

Circuit diagram, Greenline E14-E16



Circuit diagram, Greenline D20-D40

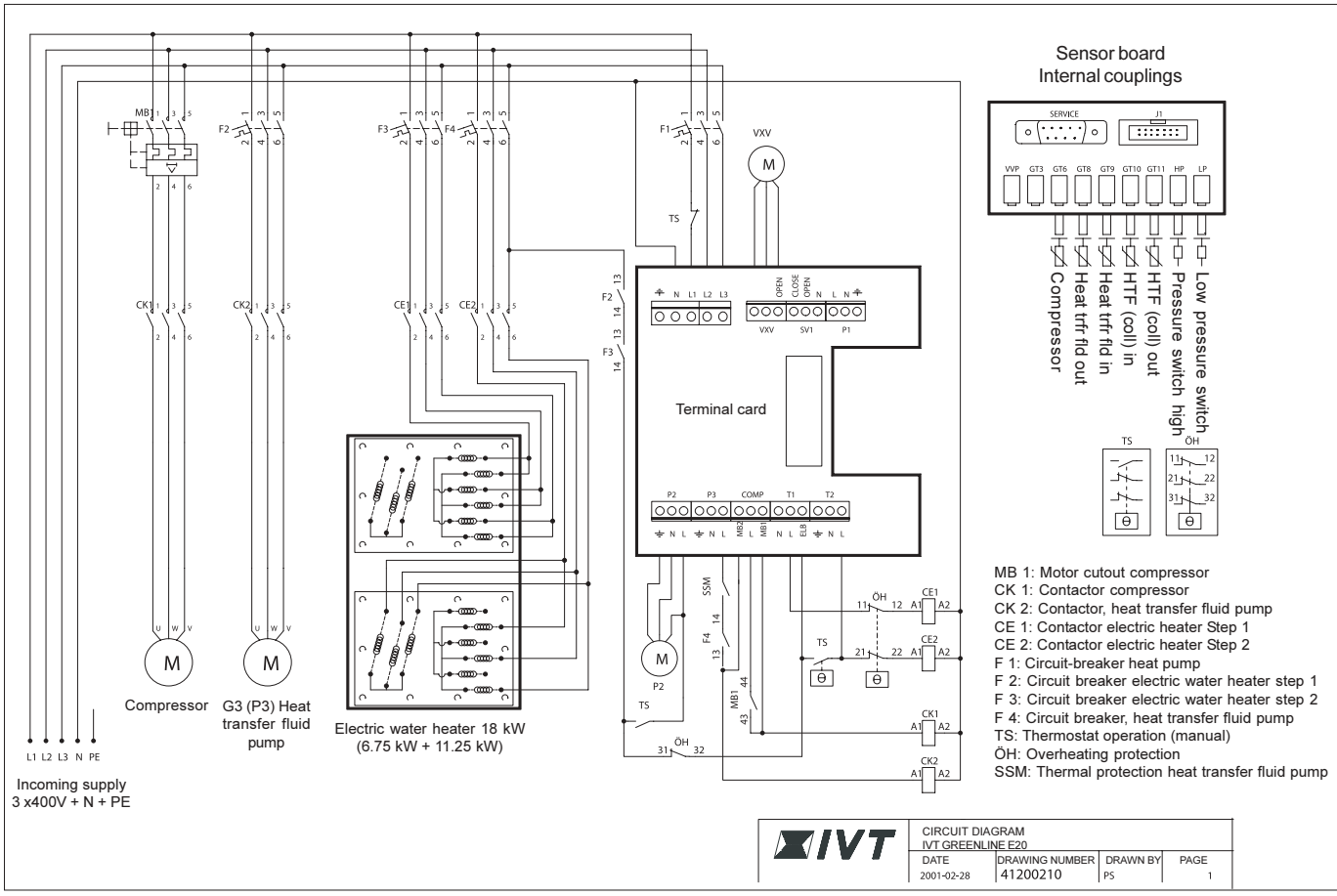


Sensor board
Internal couplings

MB 1: Motor cutout compressor
CK 1: Contactor compressor
CK 2: Contactor, heat transfer fluid pump
F 1: Circuit-breaker heat pump
F2: Circuit breaker, heat transfer fluid pump
TS: Thermal protection (not D20)
SSM: Motor cutout heat transfer fluid pump

IVT	CIRCUIT DIAGRAM IVT GREENLINE D20-D40			
	DATE	DRAWING NUMBER	DRAWN BY	PAGE
	2001-02-28	3120(-40)0210	PS	1

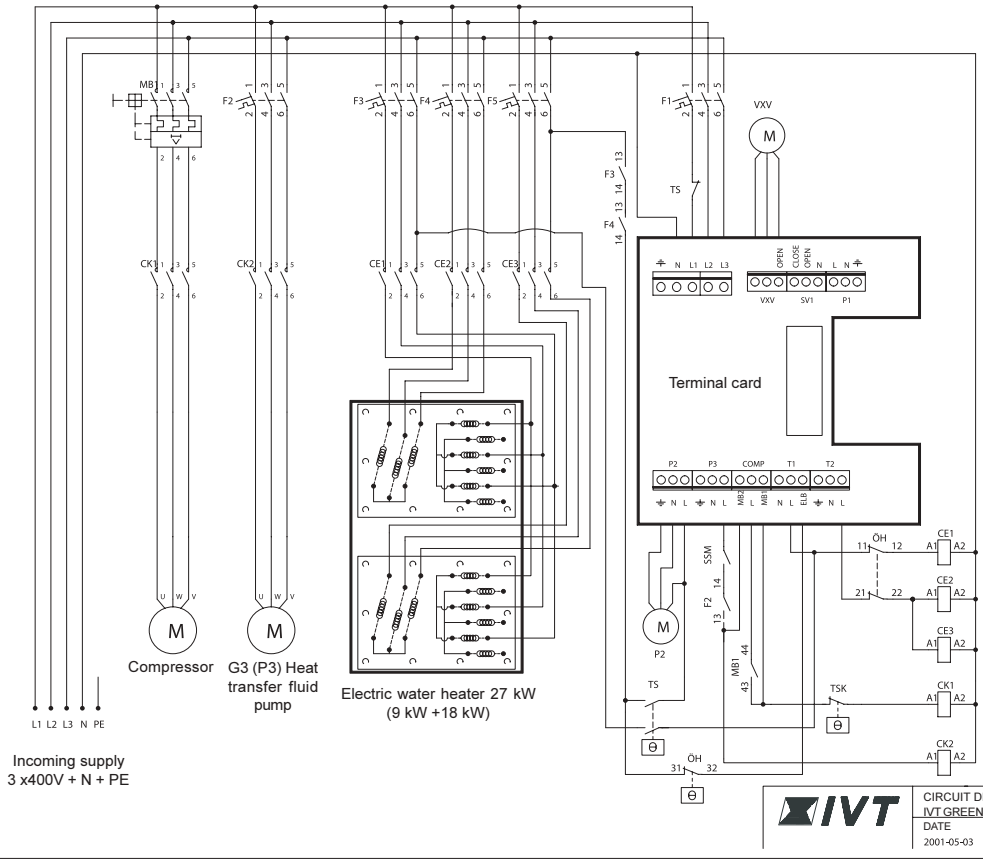
Circuit diagram, Greenline E20



MB 1: Motor cutout compressor
CK 1: Contactor compressor
CK 2: Contactor, heat transfer fluid pump
CE 1: Contactor electric heater Step 1
CE 2: Contactor electric heater Step 2
F 1: Circuit-breaker heat pump
F 2: Circuit breaker electric water heater step 1
F 3: Circuit breaker electric water heater step 2
F 4: Circuit breaker, heat transfer fluid pump
TS: Thermostat operation (manual)
ÖH: Overheating protection
SSM: Thermal protection heat transfer fluid pump

IVT	CIRCUIT DIAGRAM IVT GREENLINE E20			
	DATE	DRAWING NUMBER	DRAWN BY	PAGE
	2001-02-28	41200210	PS	1

Circuit diagram, Greenline E25



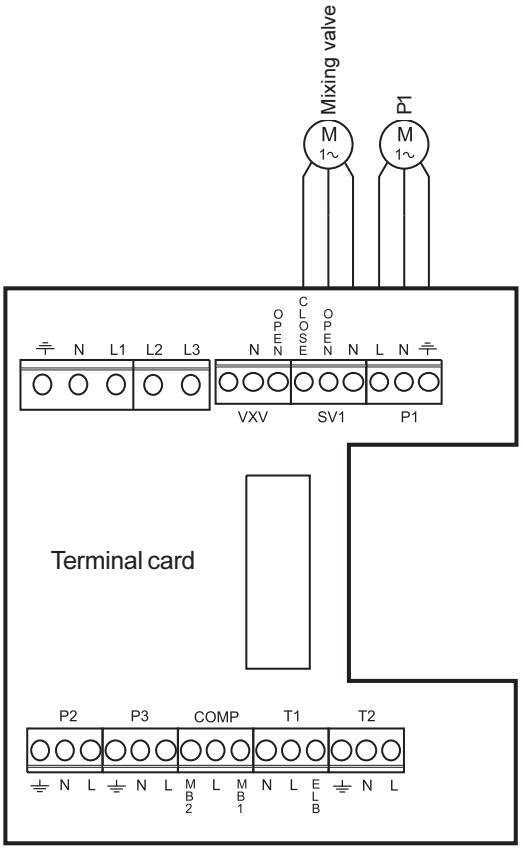
MB 1: Motor cutout compressor
CK 1: Contactor compressor
CK 2: Contactor, heat transfer fluid pump
CE 1: Contactor electric heater Step 1
CE 2: Contactor electric heater Step 2
CE 3: Contactor electric heater Step 2
F 1: Circuit-breaker heat pump
F 2: Circuit breaker electric water heater step 1
F 3: Circuit breaker electric water heater step 2
F 4: Circuit breaker electric water heater step 2
F 5: Circuit breaker, heat transfer fluid pump
TS: Thermostat operation (manual)
ÖH: Overheating protection
SSM: Thermal protection heat transfer fluid pump
TSK: Thermal protection heat transfer fluid pump

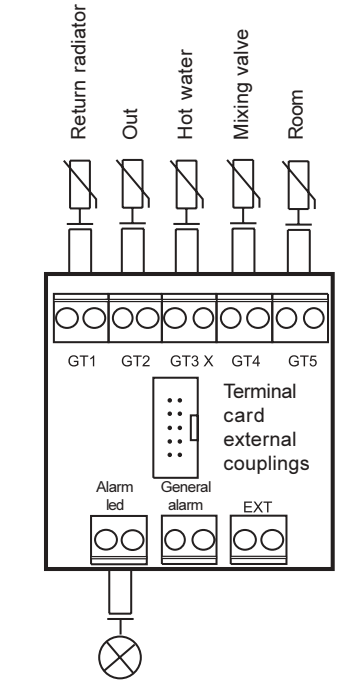
IVT	CIRCUIT DIAGRAM IVT GREENLINE E25			
	DATE	DRAWING NUMBER	DRAWN BY	PAGE
	2001-05-03	41250210	PS	1

External connections in the E series

External connections that can be connected to the Greenline E series:

- **Power supply**: Connect to terminals L1, L2, L3, N and PE. Alarm triggers if phases connected wrongly.
- **Heating circuit with mixing valve:** If a second heat curve with mixing valve is to be used, the mixing valve is connected to terminals SV1.
- **G1 (P1), external main pump in the heating system**: Must always be connected. Connected to terminals P1.
- **Return sensor radiator T1** (GT1): Must always be connected. Connected to terminals GT1.
- **Outdoor sensor T2** (GT2): Must always be connected. Connected to terminals GT2.
- **Hot water sensor T3** (GT3): Connected if the heat pump is to produce hot water. Connected to terminals GT3 X
- **Mixing valve sensor T4** (GT4): Connected if the mixing valve for the second heat curve is used. Connected to terminals GT4.
- **Room sensor T5** (GT5): Connected if room sensor influence required. Connected to terminals GT5. If room sensor alarm is required it is connected to terminals ALARM LED.

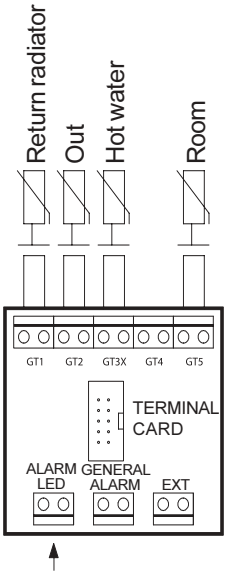




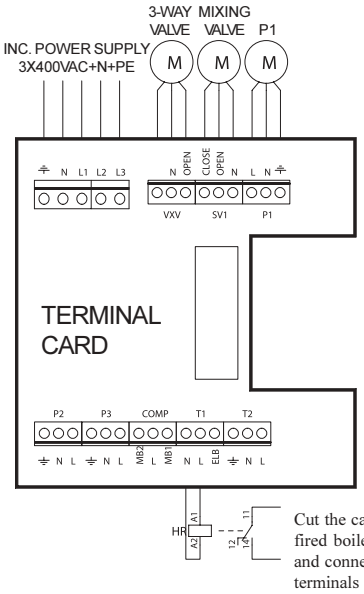
Alarm lamp, room sensor.

External connections in the D series

- **Power supply**: Connect to terminals L1, L2, L3, N and PE. Alarm triggers if phases connected wrongly.
- **3-way valve**: Connected if the heat pump is to produce hot water. Connected to terminals VXV.
- **Mixing valve for oil-fired boiler**: If a mixing valve is required for the oil-fired boiler then it is connected to terminals SV1.
- **G1 (P1), external main pump in the heating system:** Must always be connected. Connected to terminals P1.
- **Return sensor radiator T1 (GT1)**: Must always be connected. Connected to terminals GT1.
- **Outdoor sensor T2** (GT2): Must always be connected. Connected to terminals GT2.
- **Hot water sensor T3** (GT3): Connected if the heat pump is to produce hot water. Connected to terminals GT3 X
- **Room sensor T5** (GT5): Connected if room sensor influence required. Connected to terminals GT5. If room sensor alarm is required it is connected to terminals ALARM LED.



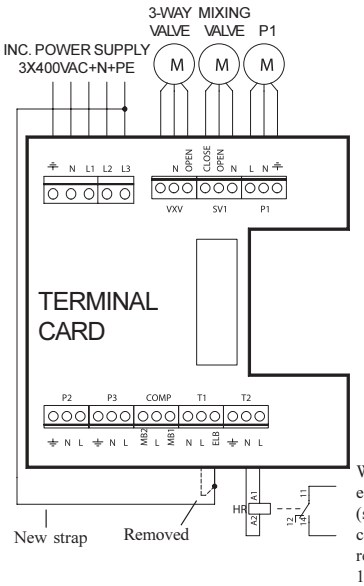
Alarm lamp, room sensor.



Cut the cable to the oil-fired boiler/electric boiler and connect to relay terminals 11 and 14.

Connection of additional heat to oil and electric boiler, operating mode B

When additional heat is from an oil-fired or electric boiler with a mixing valve the wiring to the burner or contactor is connected to terminals N and L on contact T1 via a help relay HR. L1 provides 230Vac.
If the electric boiler has an inlet for telecontrol it is connected to the help relay.



Wiring to the electric heater, (starting) is connected to relay terminals 11 and 14.

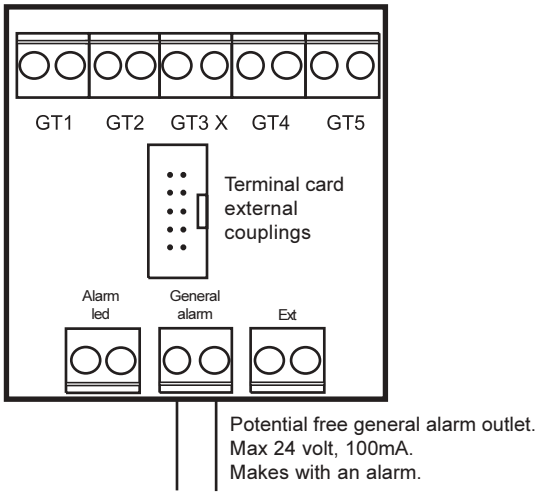
Connecting additional heat to electric heater, operating modes A and C

If the additional heat is an electric heater it is connected in the following way: Remove the strap between L and ELB on contact T1. Fit a new strap between terminal L3 and ELB on contact T1. Fit the coil on help relay HR to N and L on contact T2. The electric heater's on/off is connected to the help relay terminals 11 and 14. Concerns both contactors and telecontrol function in the electric heater.
Connecting power is set at 2/3 in the 5.2 menu display

If the alarm function for the electric heater's overheat protection is required the strap between L3 and ELB should not be fitted and the strap between L and ELB is removed. Instead a strap is fitted to ELB from the overheat protection, PLEASE NOTE! Must be phase L3. (see circuit diagram E series)

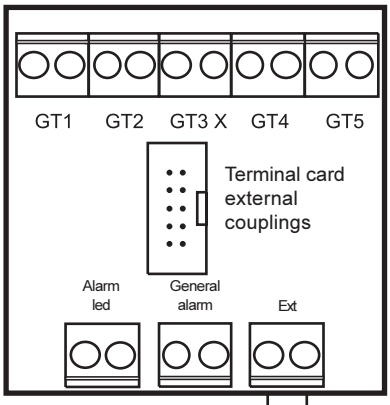
Connecting the general alarm

A general alarm is connected according to the sketch. The contact for the general alarm outlet is potential free. Max 24 volt, 100mA. The contact makes with a common alarm.



Connecting the external input

The heat pump can be controlled externally and be the inputs can be programmed in Rego 600 for different functions. Function choice is available in menu display 1.13 (remote control heating) and menu display 5.7 (select external controls). The input is short-circuited to activate the function. You can choose between more than one alternative in display 5.7 or 1.13.



Inlet for external control of the heat pump. The inlet is short-circuited to activate the function.
PLEASE NOTE: The contact must be potential free.

Connecting the load guard

A load guard can be connected to the external control input and in this way break the additional heat. You programme function 3 in menu display 5.7. When the external input is short circuited the additional heat is broken. Heat pump operation is not affected. Connection as above. When this function is chosen no other external controls can be used.

Control unit Rego 600

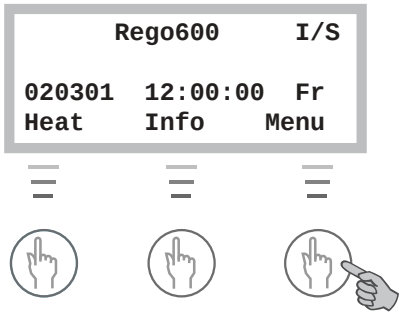
If you are an installer, note that you can find certain information about the operation of the control unit in the sections intended for the end user. It is therefore important for installers to read the *entire* guide before putting the heat pump into service.

Installer/service settings

As the installer, "Installer / Service" gives you access to all the menu displays that the end user has at customer levels 1 and 2. Note that the menu display is connected to the selected operating mode. You will never see displays that concern anything else but the selected operating mode.

Installer/Service menu

By holding down the "Menu" button for 10 seconds and then enter "Menu" you will come to settings for installers or service companies. The Menu display is divided into lines and each display has a number to make it easy to find. You will automatically return to level 1 again after 30 seconds.



WARNING!
Installer only. As an end-user you must never go into this level!

Joint displays for operating modes A, B and C

Line 1

```
Temperature settings
Heat curve
adjust. (break)  1.3
Return        Select
```

Here you can "break" the heat curve up or down for each fifth degree of outdoor temperature. You can e.g. do a temporary increase on the curve at 0°C outdoor temperature.

Line 4

```
   Clock setting
Clock sett. add heat
accord. to clock 4.2
Return        Select
```

You can block the additional heat totally during certain times of day. Instructions are found in the chapter on clock controls in the increased customer level.

Line 5

```
  Commiss./Service
Select operation
mode  A B C      5.1
Return        Select
```

Here you choose the operational mode you require. Continuous operation is the factory setting.

```
  Commiss./Service
Manual operation of
all functions    5.3
Return        Select
```

When controlling functions you can manually start and stop pumps and valves etc here.

Commiss./Service Fast restart of heat pump 5.6 Return Select	You can shorten the time for restarting the heatpump here. If there is a need for heating or hot water the heat pump starts within 20 seconds. The settings must be repeated each time you requirequick restart.
Commiss./Service Select external controls 5.7 Return Select	Selecting external control of heat pump, additional heat and hot water charging. When the external inlet on Rego 600 is short-circuited you can make the following choices: 0: No effect (factory setting). 1: HP, additional heat and hot water stop. 2: HP no effect, additional and hot water stop (this position must not be chosen in operating mode C). 3: HP and hot water no effect, additional heat stops. 4: HP and additional heat no effect, hot water stops (this position must not be chosen in operating mode C). Note that if you choose any of the above alternatives you cannot use any of the functions in 1.13 (remote control heating).
Commiss./Service Selection of language meny 5.8 Return Select	You choose language in display 5.8. Svenska is the factory setting.
Commiss./Service Select operation alt. for P2 5.10 Return Select	Here you can choose to always have the heat transfer fluid pump in operation or start and stop with compressor. Continuous operation is the factory setting. This choice is not available in operating mode C for technical reasons.
Commiss./Service Select operation alt. for P3 5.11 Return Select	The heat transfer fluid pump should normally always start and stop with the compressor. 5.11 you can choose to let it go in continuous operation or during e.g. use of natural cooling. Factory setting is start and stop with compressor.
Commiss./Service Display software version number 5.12 Return Select	Display 5.12 shows you the version number of Rego 600.
Commiss./Service Connected extra sensor in op. 5.13 Return Select	In display 5.13 you Ackn the extra sensors T3 (GT3), T4 (GT4) and T5 (GT5) that are connected externally. Using Confirm, Rego 600 memorises the sensors used and the heat pump then produces hot water when T3 (GT3) is selected.

If an accumulator tank is installed in the system, the heat transfer fluid pump G2 (P2) starts and stops with the compressor. (Menu 5.10) Also see page. 56.

Line 6

To help you when checking the installation, line 6 allows you to read the timer status.

```
   Timer readings
Read
DHW peak timer   6.1
Return        Select
```

Only in operating mode A.

If hot water peak is selected you can see this in status. When it reaches zero seconds the peak is activated with the next hotwater requirement.

```
   Timer readings
Read
add. heat timer  6.2
Return        Select
```

Shows time remaining before additional heat is activated. If it is not counting downward there is no need for additional heat.

```
   Timer readings
Read
alarm timer      6.3
Return        Select
```

If an alarm is generated an alarm timer is activated. Additional heatis activated at 0 seconds. The timer starts at 3,600 seconds.

```
   Timer readings
Read
start delay      6.4
Return        Select
```

Shows the time remaining before the heat pump restarts after previous stop. The heat pump does not start unless there is a need.

```
   Timer readings
Read delayed mixing
valve opening    6.5
Return        Select
```

Only in operating mode B.

Shows time remaining before the mixing valve opens after the boiler has started.

```
   Timer readings
View delayed
OP stop          6.6
Return        Select
```

Only in operating mode B.

Shows time remaining before the oil-fired boiler stops after a need for its use expires. When the boiler has been taken out of operation completely the additional timer must be restarted.

Line 8

```
   Additional heat
Setting additional
heat timer       8.1
Return        Select
```

Setting the time before additional heat is allowed to start when the heat pump no longer copes with the demand. One hour is the factory setting. If electricity is used as additional heat 1 hour is recommended and 2-3 hours for oil-fired boiler operation.

Line 12

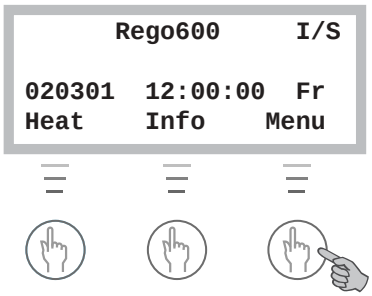
```
     Main menu
Return to
factory settings  12
Return        Select
```

You can always reset to factory settings. If you are at customer levels 1 or 2 when resetting factory settings, only the settings in the displays available at customer levels 1 and 2 are reset. If you are at Installer/Service level, only the displays available for Installer/Service are reset.

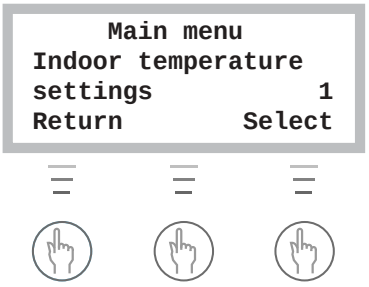
Commissioning the heat pump

Navigating the menu list

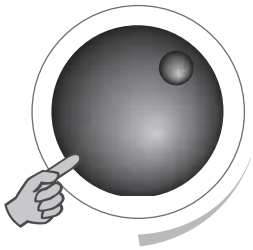
The example shows you how to navigate menu display 5.13.



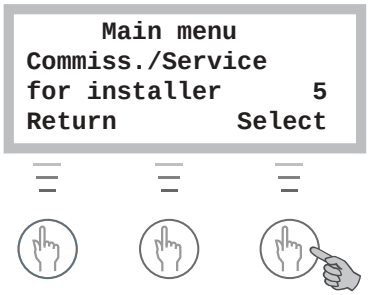
Keep the "Menu" button pressed down for 10 seconds until I/S appears in the top right hand corner. Press "Menu" again...



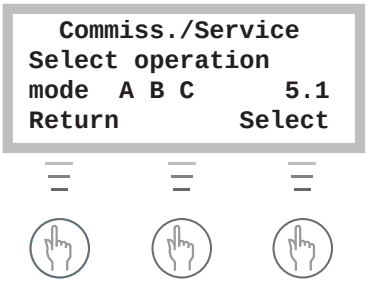
... to arrive at line 1, this is about heating settings. Then turn...



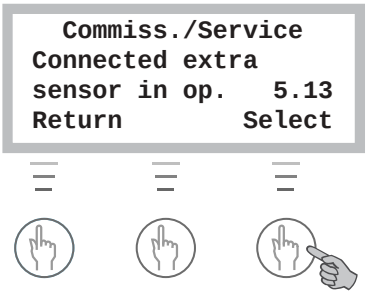
... the dial to the right to go down in the menu to line 5. It should



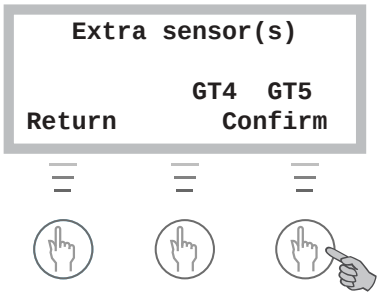
... look like this when you move to line 5. Press "Select" to come into the Commiss./Service menu,...



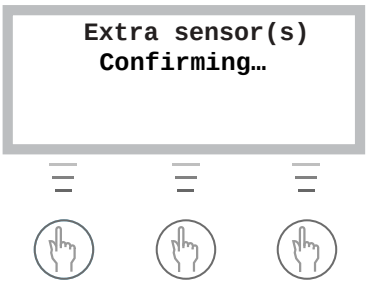
... you then see this display. Now turn the dial to the right until you come down to display 5.13...



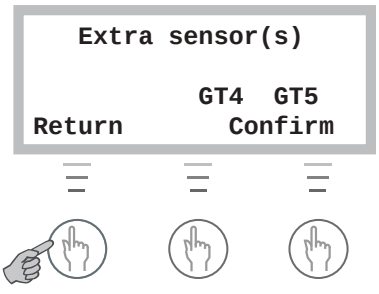
... it should look like this. Press "Select" to enter these menus. You can now...



... confirm the extra sensors you have connected by pressing "Confirm". After a short time...



... "Confirming" appears in the display so you know your settings have been registered. You then see this display...



... again. Press "Return" ***twice*** to return to the main display again.

General

The heating and heat transfer fluid collector systems must be filled and vented before commissioning the heat pump. Check also that there are no leaks in the systems.

When connecting to an existing water system, check that at least two of the radiators are always open. With underfloor heating, at least two of the circuits must be open. When connecting a fan radiator system, start the fans in the radiators and fully open the valves to the fan radiators.

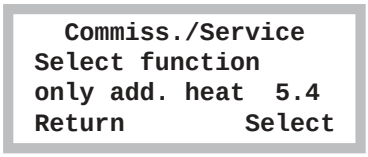
If the pump stops during testing, refer to the section headed "If something goes wrong".

Manual testing

You can manually test pumps, valves etc. by going into display 5.3 and choosing manual operation for each function. The heat pump returns to normal operation as soon as you leave display 5.3.

Operation with additional heat only

You may want to use the additional heat in the heat pump before with the heat transfer fluid system is ready. If the heating system is filled and vented you can activate the operation with additional heat only. Go into display 5.4 and select "On" and the additional heat will now heat both the hot water and heating system. Do not forget to restore this function to normal operation.



Go into display 5.4 to choose operation with additional heat only. *Note* that this is not available in operating mode B with oil-fired boiler.

Commissioning operating mode A (D and E series)

Connect the mains voltage to the heat pump and press the ON/OFF button on the control panel. Rego 600 measures the phase sequence so that the compressor does not run in the wrong direction, so if you receive an phase sequence alarm the main supply is cut to the heat pump and two of the phases are shifted.

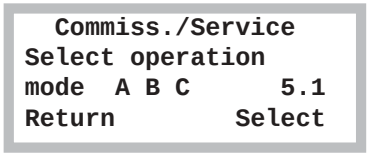
Press "Menu" for 10 seconds to come into the Installer / service menu. I/S should be visible at the top right hand corner.

Heat setting Heat incr/decr can temporarily be set to max. To avoid having to wait for the heat pump restart menu you can go to display 5.6 and quick start the heat pump. If the pump does not start, press "Info" to see what the reason is. When the heat pump starts, check the sight glass in the heat pump. When starting there may be bubbles in the sight glass for a minute or so, after which they should disappear. If there are bubbles present all the time the heat pump is running, this is a fault symptom. They are probably due to air in the collector hose or insufficient heat transfer fluid.

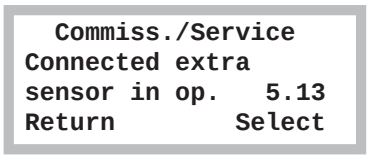
Check that the operational condition of the heat pump corresponds to the information supplied in the Info menu.

Operating mode A is the factory setting so most settings are already preset so there are not many you need to check or adjust. The *only* settings you need to make are Ackning the extra sensors in display 5.13 and choosing the output of the electric heater you have fused protected the heat pump for.

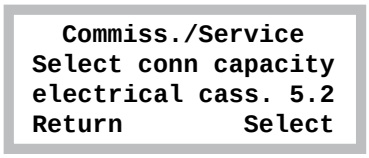
Displays you must always check



Always check that operating mode A is set.

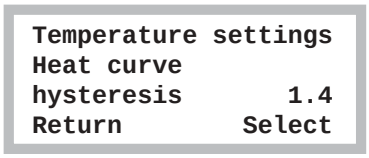


If you have connected any of the external sensors T3 (GT3), T4 (GT4) or T5 (GT5) you must acknowledge them so that Rego 600 memorises them.

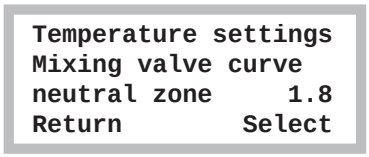


Setting maximum output to be used by the electric heater. You can choose 1/3, 2/3 or 3/3. **NOTE!** The heat pump must be fused protected for the set ouput. Factory setting is 2/3.
See the description below in technical specifications.

Displays you might need to adjust or check settings



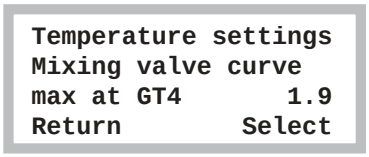
Setting the hysteresis for the heat pump on and off switching on the return sensor radiator T1 (GT1). A low value gives closer intervals between start and stop.



Only with T4 (GT4)

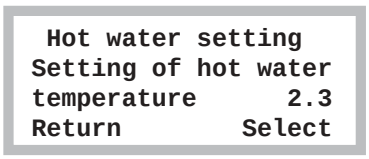
If you use a second heat curve with a mixing valve you can set the neutral zone for the mixing valve. In the neutral zone nobody can open or shut the signal.

If an accumulator tank is installed in the heating system,T1 (GT1) is mounted on the flow pipe and the hysteresis is changed to 10°C. (menu 1.4) Also see page 52.



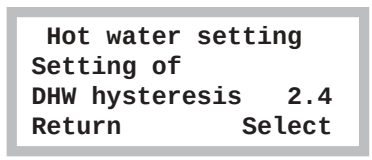
Only with T4 (GT4)

Setting the maximum temperature in the mixing valve circuit. You can set e.g. a max temperature for the floor heating system. Factory setting is 60ºC.



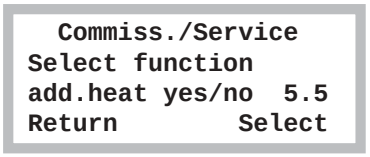
Only with T3 (GT3)

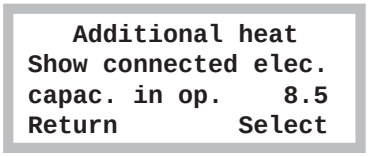
Setting the temperatures in the hot water cylinder's outer shell. Note that the temperature does not correspond to the temperature in the hot water cylinder itself. Set too high and the heat pump can shut down on a high return or high pressure switching.



Only with T3 (GT3)

Setting of hysteresis for the hot water temperature. The value measures under and over the set value in 2.3





Factory setting allows the additional heat to engage when required. In systems with only fan-assisted radiators the additional heat can be turned off, in all other cases the settings should be "Yes". If you choose "No", the additional heat only engages during alarms, extra hot water and hot water peaks.

This shows you the additional steps in and out in %. See the description below in technical specifications.

Commissioning operating mode B (D series only)

Connect the mains voltage to the heat pump and press the ON/OFF button on the control panel. Rego 600 measures the phase sequence so that the compressor does not run in the wrong direction, so if you receive an phase sequence alarm the main supply is cut to the heat pump and two of the phases are shifted.

Press "Menu" for 10 seconds to come into the Installer / service menu. I/S should be visible at the top right hand corner.

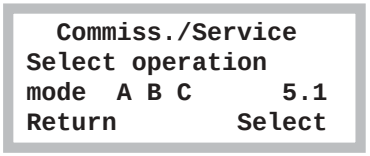
Go into display 5.1 and choose operating mode B. This is described further down in the text.

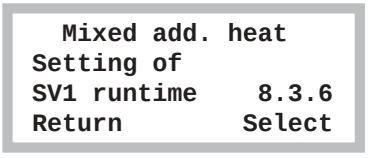
Heat setting Heat incr/decr can temporarily be set to max. To avoid having to wait for the heat pump restart menu you can go to display 5.6 and quick start the heat pump. If the pump does not start, press Info to see what the reason is. When the heat pump starts, check the sight glass in the heat pump. When starting there may be bubbles in the sight glass for a minute or so, after which they should disappear. If there are bubbles present all the time the heat pump is running, this is a fault symptom. They are probably due to air in the collector hose or insufficient heat transfer fluid.

Check that the operational condition of the heat pump corresponds to the information supplied in the Info menu.

There are always some settings you *have* to check or adjust and some you might need to change if they require another setting than the factory setting.

Displays you must always check



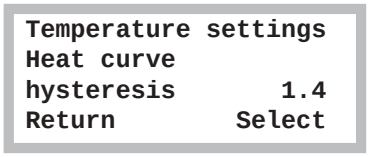


Choose operating mode B so that Rego 600 memorises the operation with oil-fired boiler and mixing valve.

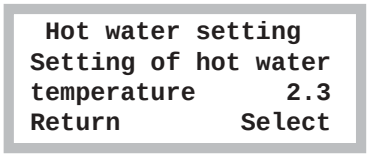
If you have connected any of the external sensors T3 (GT3) or T5 (GT5) you must Ackn them so that Rego 600 memorises them.

When you use a mixing valve to the oil-fired boiler it is important to set the running time of the motor. The time it takes for the mixing valve to go from closed to fully open. It is often marked on the mixing valve motor.

Displays you might need to adjust or check settings

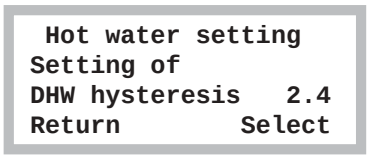


Setting the hysteresis for the heat pump on and off switching on the return sensor radiator T1 (GT1). A low value gives closer intervals between start and stop.



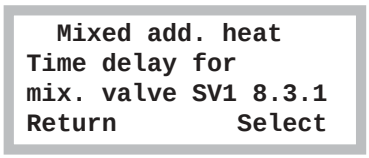
Only with T3 (GT3)

Setting the temperatures in the hot water cylinder's outer shell. Note that the temperature does not correspond to the temperature in the hot water cylinder itself. Set too high and the heat pump can shut down on a high return or high pressure switch.



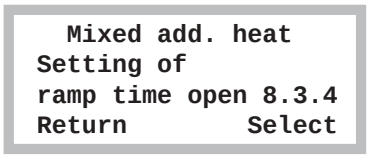
Only with T3 (GT3)

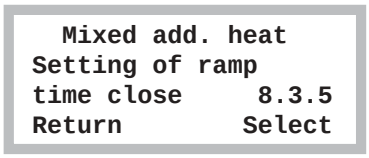
Setting of hysteresis for the hot water temperature. The value measures under and over the set value in 2.3



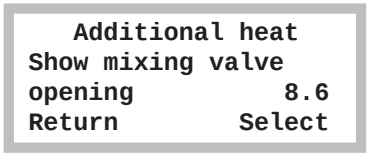
Mixing valve's opening is delayed after the boiler starts so that cold water is mixed into the system before the boiler has heated up. You can change the time here.

For safety reasons on the boiler, there is a time delay from the mixing valve not receiving an open signal and the boiler closing down completely. When the boiler closes down completely the additional timer must go down to zero again.





Ramp time open and close is the time the mixing valve takes to go from closed to fully open and from fully open to closed. In some cases the ramp time can open, 8.3.4 needs to be adjusted to eliminate overexciting the system.



Here you can see if the mixing valve to the oil-fired boiler opens or shuts.

Commissioning operating mode C (D series only)

Connect the mains voltage to the heat pump and press the ON/OFF button on the control panel. Rego 600 measures the phase sequence so that the compressor does not run in the wrong direction, so if you receive an phase sequence alarm the main supply is cut to the heat pump and two of the phases are shifted.

Press "Menu" for 10 seconds to come into the Installer / service menu. I/S should be visible at the top right hand corner.

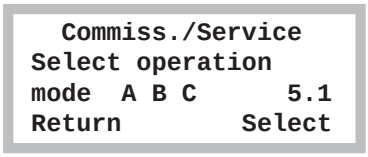
Go into display 5.1 and choose operating mode C.

Heat setting Heat incr/decr can temporarily be set on max. To avoid having to wait for the heat pump restart menu you can go to display 5.6 and quick start the heat pump. If the pump does not start, press "Info" to see what the reason is. When the heat pump starts, check the sight glass in the heat pump. When starting there may be bubbles in the sight glass for a minute or so, after which they should disappear. If there are bubbles present all the time the heat pump is running, this is a fault symptom. They are probably due to air in the collector hose or insufficient heat transfer fluid.

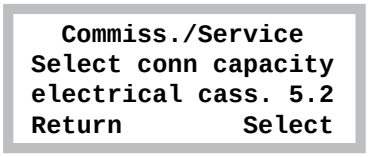
Check that the operational condition of the heat pump corresponds to the information supplied in the Info menu.

There are always some settings you *have* to check or adjust and some you might need to change if they require another setting than the factory setting.

Displays you must always check



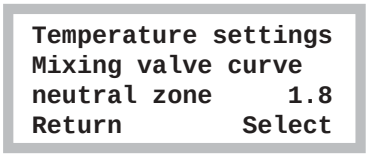
Choose operating mode C so that Rego 600 memorises the operation with a fixed temperature.



Setting maximum output to be used by the electric heater. You can choose 1/3, 2/3 or 3/3. **NOTE!** The heat pump must be fused protected for the set ouput. Factory setting is 2/3. See description below in technical specifications.

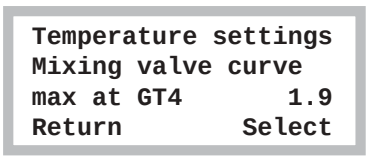
If you have connected any of the external sensors T4 (GT4) or T5 (GT5) you must Ackn them so that Rego 600 memorises them.

Displays you might need to adjust or check settings



Only with T4 (GT4)

If you use a mixing valve you can set the neutral zone for the mixing valve. In the neutral zone nobody can open or shut the signal.



Only with T4 (GT4)

Setting the maximum temperature in the mixing valve circuit. Factory setting is 60ºC.

Important points to check

During the first period after commissioning you should pay special attention to the pressure levels in the heating system and heat transfer circuit. It might need filling up.

The factory setting of the motor cutout is based on a value during hot water charging and a stable voltage. Because of the fluctuating voltages on the mains supply the recommended settings are not always suitable and can therefore need adjusting from time to time. This is best achieved using a clip-on ammeter during hot water operation.

For the heat pump to perform at its best, it is important to check the flow on the hot and cold side of the heat pump. Usually, the heat transfer fluid pumps each have a speed selector switch. These must be set correctly for the pressure drop in the systems. A recommended temperature difference over the heat pump on the cold side is between 2-3°C and on the hot side between 7-10°C. You can check this with the help of the sensor temperatures in line three of the control panel.

It is also important that the flow in the radiator system exceeds the flow across the heat pump. If this is not the case, the heat pump flow goes back via the bypass to the heat pump return, which may cause the heat pump to trip for high return temperature. The flow through the radiator system must be high enough to ensure that the *entire* surface of the radiators is kept hot. This maximises the heat-radiating surface and so keeps down the flow temperature from the heat pump.

After testing, vent the system again and top up with cold water if necessary.

Technical information

Table of factory settings

The table shows the factory settings of all the settings that can be changed by the installer.

Position	Setting of	Factory setting
P1.1	Temp. incr. / decr.	4
P1.2	Temp. fine-tune	0ºC
P1.3	Heat curve adjustm.	0ºC
P1.4	Heat curve. hysteresis	5ºC
P1.5	Mix. valve incr/decr	4
P1.6	Mix. valve fine-tune	0ºC
P1.7	Mix. valve curve adjustm.	0ºC
P1.8	Mix. valve curve neut. zone	3ºC
P1.9	Mix. valve curve max. temp.	60ºC
P1.10	Room temperature	20ºC
P1.11	Room sensor influence	5
P1.12	Holiday function	0 days
P1.13	Remote control temperature	not active
P1.14	Summer disconnection	18ºC
P1.16	Return thermostat stop	48ºC
P1.17	Return thermostat hyster.	5ºC
P2.1	Extra DHW	0 hours
P2.2	DHW peak interval	not active

Position	Setting of	Factory setting
P2.3	DHW-temperature	45ºC
P2.4	DHW hysteresis	5ºC
P4.1	Clock setting HP	not active
P4.1.1	Setting level HP	0ºC
P4.2	Clock setting add. heat	not active
P4.3	Clock setting DHW	not active
P5.1	Select operation mode	A
P5.2	Conn. cap. electrical cass.	2/3
P5.4	Only add. heat	Off
P5.5	Add. heat yes/no	yes
P5.7	External controls	0
P5.10	Operation alt., P2	On
P5.11	Operation alt., P3	Off
P8.1	Add. heat timer	60 minutes
P8.3.1	Time delay SV1	30 minutes
P8.3.2	Time delay for stop boiler	60 minutes
P8.3.6	Setting of SV1 runtime	1 minute

Technical information

Model Greenline		D14-E14	D16-E16	D20-E20	D25-25	D35	D40
Emitted /Supplied output at 0/35ºC (¹)	kW	13,8/3,2	15,8/3,6	21/5,1	25,5/6,3	35,2/8,6	41,5/10,4
Emitted /Supplied output at 0/50ºC (¹)	kW	13,5/4,6	15,4/5,2	20/7,1	24,8/8,7	34,7/12	40,9/14,3
Nominal flow distr. system	l/s	0,46	0,53	0,69	0,85	1,19	1,41
Nominal flow collector system	l/s	0,79	0,91	1,16	1,45	2,03	2,39
Permitted ext. press. drop distr. syst.	kPa	43	41	45	40	65	62
Permitted ext. press. drop coll. syst.	kPa	75	74	63	60	50	47
Electrical supply		400V, N3 three-phase 50 HZ					
Electric boiler in three steps **E**-model	kW	15,75 5,6 / 9,0 / 15,75	15,75 5,6 / 9,0 / 15,75	18 6,7 / 11,3 / 18,0	27 9,0 / 18,0 / 27,0	-	-
Fuse size **D**-model	AT	16	16	20	25	35	35
Fuse size **E**-model depending on the electric boiler output							
9.0 kW	AT	25	25	-	-	-	-
15.75 kW	AT	35	35	-	-	-	-
11.3 kW	AT	-	-	35	-	-	-
18.0 kW	AT	-	-	50	50	-	-
27.0 kW	AT	-	-	-	63	-	-
Recommended setting motor cutout	A	9,6	10,8	13,7	16,4	23,4	26,5
Compressor		Scroll					
Starting current (LRA)	A	59,5	70,5	98	120	175	175
Max outgoing heating transfer fluid	ºC	55					
Refrigerant quantity (R407C)	kg	1,8	2,2	3,7	4,2	7,5	8,5
Connection, heating medium	Cu	28	28	35	35	35	35
Connection, cooling medium	Cu	35	35	42	42	42	42
Dimensions (WxDxH)	mm	600x600x1500		700x750x1500		700x750x1500	
Weight	kg	180	180	210	210	230	230

(¹) Output data at 0/35ºC and 0/50ºC are stated in accordance with the European standard EN255. Additional heat not included.

Table of selected output in display 5.2

The table shows the output available for various selections in display P5.2. If e.g. you have chosen 2/3 the output is in two steps. The first step is 5.6 kW and the second is 9.0kW.

Model	Max output at 1/3	Max output at 2/3	Max output at 3/3
E14 and E16	5.6 kW	9.0 kW	15.75 kW
E20	6.7 kW	11.3 kW	18.0 kW
E25	9.0 kW	18.0 kW	27.0 kW

Sensor table

The table shows the resistance of all sensors at different temperatures.

Temperature ºC	k Ω	Temperature ºC	k Ω	Temperature ºC	k Ω
-40	154,30	5	11,90	50	1,696
-35	111,70	10	9,33	55	1,405
-30	81,70	15	7,37	60	1,170
-25	60,40	20	5,87	65	0,980
-20	45,10	25	4,70	70	0,824
-15	33,95	30	3,79	75	0,696
-10	25,80	35	3,07	80	0,590
-5	19,77	40	2,51	85	0,503
0	15,28	45	2,055	90	0,430

EU DECLARATION OF CONFORMITY

according to Machinery Directive 89/392/EEC, Annex IIA, EC Low-voltage directive 73/23/EEC, EMC Directive 89/336/EEC & 92/31/EEC, including addendum of the CE marking directive 93/68/EEC

Type of product	Electric heat pump
Commercial name:	IVT
Type:	Greenline C4-C9, D4-D16, E5-E16, F14-F16, HT C6-C9, HT E6-E11, Optima 400-700.
Name of manufacturer:	IVT Industrier AB
Address:	Box 1012 SE-573 28 Tranås Sweden
Telephone:	int. +46 140 38 41 00
Fax:	int. +46 140 17890

The manufacturer declares that the product conforms with aforementioned directives and is designed according to the following standards:

1.	EN 60 335-2-40	Electrical safety
2.	EN 50 081-1	EMC emissions
3.	EN 50 082-1	EMC-immunity

The product is manufactured under a production control system, which guarantees conformity between the manufactured products and technical data.

Installation, connection, maintenance and usage should take place in accordance with the product's instructions and design, which are described in the manufacturer's technical documentation as well as according to practice.

In accordance with the EU declaration of conformity, the product must not be modified without the manufacturer's permission. If this occurs, this documented EU declaration ceases to apply and the product's owner is considered to be the manufacturer and must verify and draw up an addendum to the EU declaration and file technical data for the inspection authority.

The product is CE-marked.

2003-03-28

Johnny Wärnelöv
MD

EU DECLARATION OF CONFORMITY

according to Machinery Directive 89/392/EEC, Annex IIA, EC Low-voltage directive 73/23/EEC, EMC Directive 89/336/EEC & 92/31/EEC, Pressure Equipment Directive PED 97/23 EEC, including addendum of the CE marking directive 93/68/EEC

Type of product	Electric heat pump
Commercial name:	IVT
Type:	Greenline D20-D40, E20-E25, F20-F65, G13-G43, Optima 1000-1300
Name of manufacturer:	IVT Industrier AB
Address:	Box 1012 SE-573 28 Tranås Sweden
Telephone:	int. +46 140 38 41 00
Fax:	int. +46 140 178 90

The above heat pumps contain pressure carrying devices and operating fluid as set out below:

- Fluid group 2
- Category II
- Module selection with CE-marking A1

The manufacturer declares that the product conforms with aforementioned directives and are designed according to the following standards:

1.	EN 60 335-2-40	Electrical safety
2.	EN 50 081-1	EMC-emissions
3.	EN 50 082-1	EMC-immunity
4.	The Swedish Refrigeration Code	PED
5.	SS 065251	Competence qualification of brazing operators

The product is manufactured under a production control system, which guarantees conformity between the manufactured products and technical data.

Installation, connection, maintenance and usage should take place in accordance with the product's instructions and design, which are described in the manufacturer's technical documentation as well as according to practice.

In accordance with the EU declaration of conformity, the product must not be modified without the manufacturer's permission. If this occurs, this documented EU declaration ceases to apply and the product's owner is considered to be the manufacturer and must verify and draw up an addendum to the EU declaration and file technical data for the inspection authority.

The product is CE-marked.

2003-10-14

Johnny Wärnelöv
MD

Service log

Only to be filled in by an authorised person

Date	Work done	Company	Initials

Notes

IVT Industrier AB, Sweden
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