

# Compact Heat Pump User Manual



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# 1. Introduction—a message from the Managing Director



Thank you for choosing a Kensa Compact ground source heat pump for your project. [Kensa Heat Pumps](#) has been manufacturing ground source heat pumps since 1999 and have significant experience in providing these systems in domestic and commercial applications.

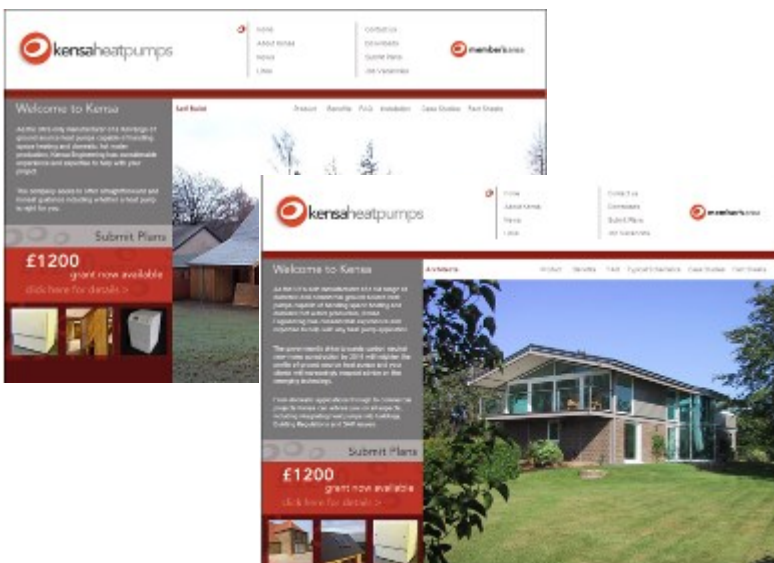
Your Kensa heat pump will provide you with many years of low energy bills and maintenance free running while also reducing your carbon footprint.

Kensa Compact heat pumps are designed for ease of operation and once set by your installer to provide the optimum flow temperature for your heating system should not require adjusting.

The purpose of this manual is to guide you through the operational aspects of living with a heat pump.

Finally, please feel free to contact Kensa should you have any questions, wish to consider ground source heat pumps for any future projects or even just to share your experiences of using a ground source heat pump with us.

Simon Lomax  
Managing director  
Kensa Heat Pumps Ltd



For further information on ground source heat pumps and their application, please refer to [www.kensaheatpumps.com](http://www.kensaheatpumps.com)

## 2. Safety information

Safe operation of this unit can only be guaranteed if it is properly installed and commissioned in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

Manufacturer:-  
Kensa Heat Pumps  
Mount Wellington  
Chacewater  
Truro  
Cornwall  
TR4 8RJ  
Tel 01872 862140  
[www.kensaheatpumps.com](http://www.kensaheatpumps.com)

The product is designed and constructed to withstand the forces encountered during normal use. Use of the product for any other purpose, or failure to install the product in accordance with these Installation and Operation Instructions, could cause damage to the product, will invalidate the warranty, and may cause injury or fatality to personnel.

### 2.1 Disposal/Decommissioning

Kensa offer a life time decommissioning service for this product. This is available on a return to base basis (carriage at users cost).

Disposal of any antifreeze water mix should follow the disposal instructions as laid out on the COSH Safety Data Sheet in the Installation Manual.

### 2.2 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Kensa Heat Pumps they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

### 3. General Product Information

This manual explains how to install, commission and operate a [Kensa ground source heat pump](#).

#### 3.1 Kensa Heat Pumps

Kensa Heat Pumps is the leading UK manufacturer of a full range of ground source heat pumps. Kensa provides exceptional levels of expertise and advice on the use, design and application of heat pumps. Kensa have been active in the heat pump market since 1999 and remains a well-respected company, not only in the industry but also with all our customers and stakeholders.

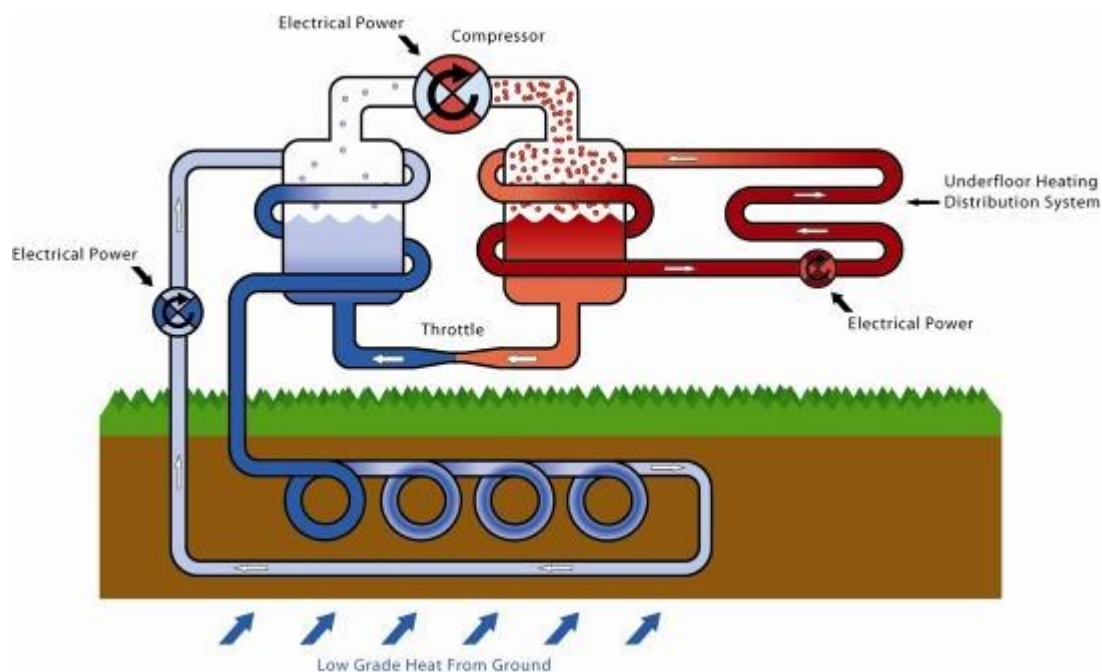
Since 1999 the company has manufactured and installed over a thousand heat pumps of various types throughout Europe and manufacture ranges suitable for the domestic market and specifically designed for commercial applications.

Kensa are ISO9001 approved for the design and manufacture of heat pumps and hold an unique status as being accredited by Microgeneration Certification Scheme for both the manufacture and installation of ground source heat pumps. Kensa were also a founding member of the Ground Source Heat Pump Association and play a major role in helping to raise the profile of heat pumps and formulate Industry Standards.

Kensa's aim has always been to take the mystery and complexity out of heat pumps, designing systems that can be easily installed without any specialist training, making the product available to a larger market and helping to reduce CO2 emissions while reducing client's energy bills.

#### 3.2 Product description

Heat pumps basically extract solar energy stored in the ground, water courses and in the air and convert this to a higher temperature to use in a building's heating distribution system. They work in a similar manner to a fridge in reverse, where the inside of the fridge is the heat source and the grill at the back of the fridge is the heating system.



**Fig 1. Heat pump Schematic**

A ground source heat pump (GSHP) extracts heat from the ground by circulating a cold solution of water and [antifreeze](#) (brine) around pipes buried in the ground. As these pipes are buried below 1m in depth, where the temperature of the ground remains pretty constant (8 to 10°C), heat is absorbed from the ground into the fluid (approximately 5°C). This brine is then passed through one side of a heat exchanger (called the evaporator) and a refrigerant through the other. The refrigerant has a very low boiling point and by absorbing the energy in the brine this causes the refrigerant to evaporate.

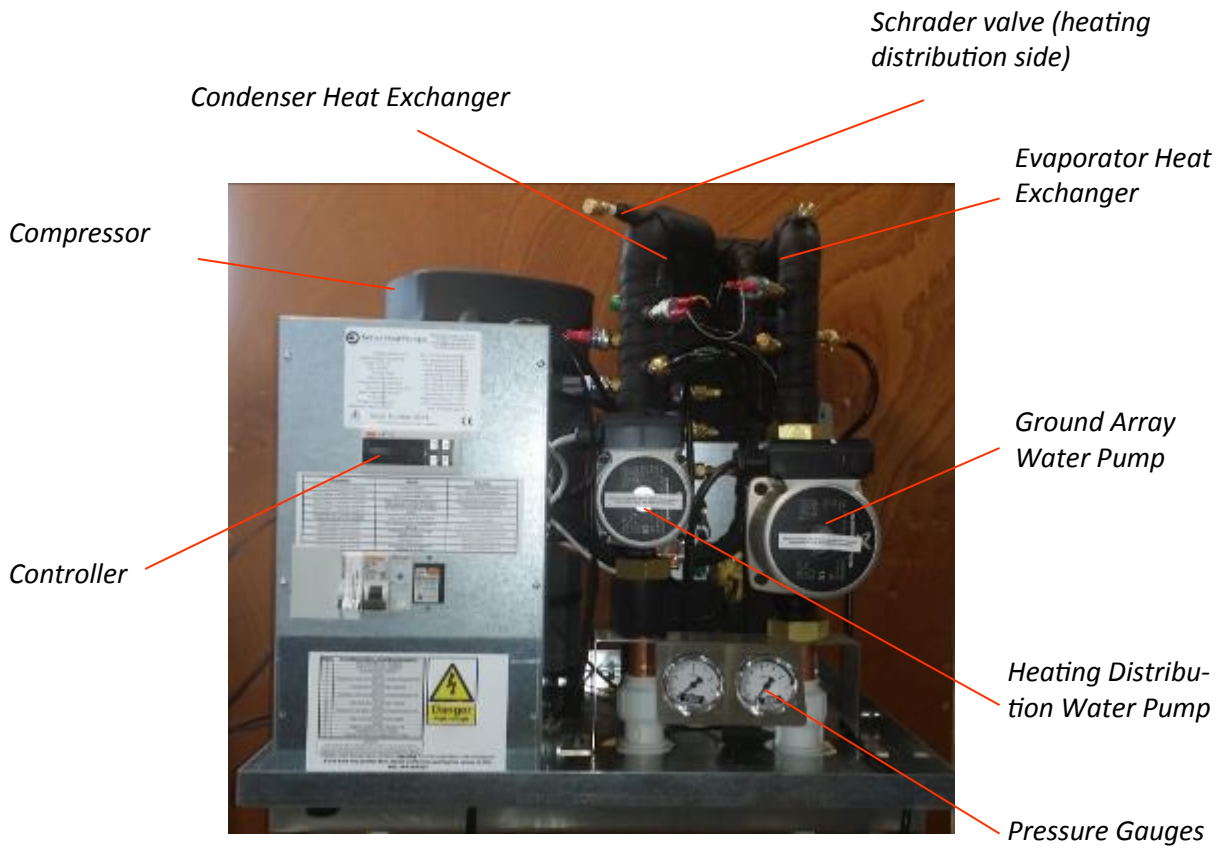
The refrigerant gas is then passed through a compressor where its pressure is increased which in turn increases its temperature. This high pressure hot gas then flows around a second heat exchanger (called a condenser) with the heating distribution fluid passing through the other side of the heat exchanger. Energy is then transferred from the refrigerant into the heating distribution system; this in turn causes the refrigerant to condense.

This high pressure cold refrigerant is then passed through an expansion valve (or throttle) and the pressure is reduced. The whole cycle is then repeated.

GSHPs are an extremely energy efficient technology, with every unit of electricity used (to drive the pumps and compressor) producing between 3 and 4 units of heat.

The Kensa Compact Heat Pump is designed to provide a low cost renewable heat source for a buildings heating system. In addition, and if required, the Kensa Compact can also provide domestic hot water. Heat pumps can provide lower running costs and will generate significantly lower carbon emissions compared with traditional fossil fuels.

**Fig 2. A single compressor heat pump**



**Fig 3. The internals of a single compressor heat pump**

**Fig 4. A twin compressor heat pump**



Schrader valve (heating distribution side)

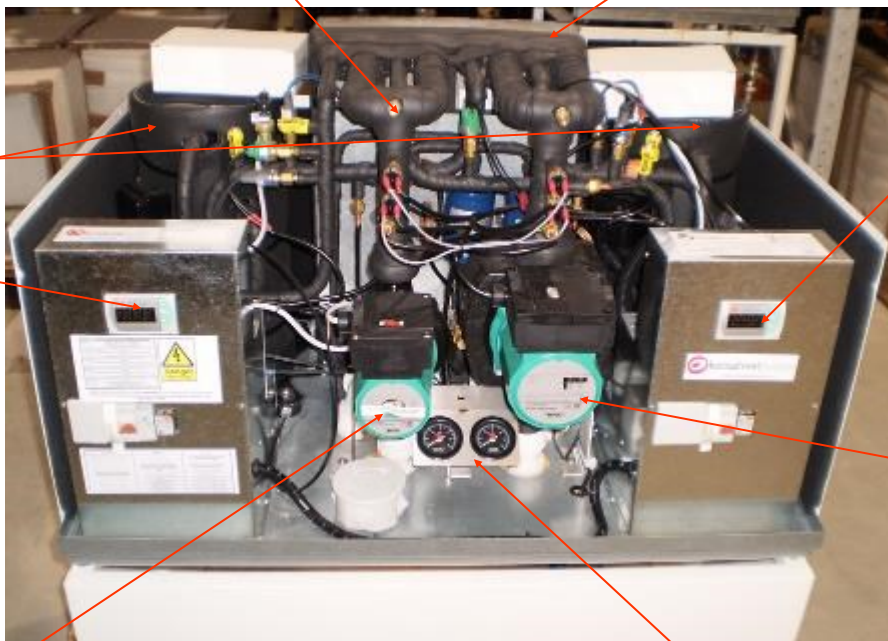
Heat Exchangers

Compressors

Compressor 2 Controller

Compressor 1 Controller

Ground Array Water Pump



Heating Distribution Water Pump

Pressure Gauges

**Fig 5. The internals of a twin compressor heat pump**



### 3. 3 Kensa Compact Technical Details

Thermal Output	Power supply rating	Max running Current	Typical running current	Typical starting current	Power input*	Nominal dry weight	Compressors	Dimensions	Connection size
kW	Amps	Amps	Amps	Amps	kW	Kg	Number	HxWxD	mm OD
Single Phase— 230 Volts AC 50 Hz									
6	25	18	10 (12)	30	2.1 (2.5)	90	Single	900x550x570	28
8	25	22	14 (16)	30	2.6 (3.3)	95	Single	900x550x570	28
10	32	26	14 (18)	30	2.9 (3.8)	100	Single	900x550x570	28
12	32	33	18 (22)	40	3.6 (4.5)	110	Single	900x550x570	28
16	63	44	27 (32)	44	5.2 (6.6)	167	Twin	900x900x570	50
20	63	53	28 (35)	44	5.8 (7.6)	170	Twin	900x900x570	50
24	65	61	35 (44)	48	7.2 (9.2)	180	Twin	900x900x570	50
Three Phase— 400 Volts AC 50 Hz									
20	25	19	12 (14)	55	5.2 (7.4)	170	Twin	900x900x570	50
24	32	24	15 (18)	68	6.9 (9.0)	180	Twin	900x900x570	50
30	32	27	18 (21)	79	8.1 (10.6)	185	Twin	900x900x570	50



The figures in the table are based on a rating to BS EN14511, 0 deg C from the ground, 35 deg C flow to underfloor. The figures in parentheses are values obtained to BS EN14511, 0 deg C from the ground, 50 deg C flow to radiators.

\* This figure includes the power consumption of the inbuilt water pumps.

For clarification of starting currents and details on how these figures are calculated please contact Kensa.

3.4 Kensa High Temperature Compact Technical Details—Single Compressor									
Nominal Thermal Output	Power supply rating	Max running Current	Typical running current	Typical starting current	Power input*	Nominal dry weight	Compressors	Dimensions	Connection size
Single Phase—230 Volts AC 50 Hz									
4.3	25	19	9.5 (10)	30	1.4 (2.3)	90	Single	900x550x570	28
6.2	25	22	13 (14)	30	1.8 (3.0)	95	Single	900x550x570	28
7	32	26	12 (14)	30	2.0 (3.1)	100	Single	900x550x570	28
8.5	32	27	12 (14)	30	2.3 (3.7)	105	Single	900x550x570	28

The figures above are based on a rating to BS EN14511, 0 deg C from the ground, 35 deg C flow to underfloor. The figures in parentheses are values obtained to BS EN14511, 0 deg C from the ground, 65 deg C flow to the heating distribution system.  
 \* This figure includes the power consumption of the inbuilt water pumps

For clarification of starting currents and details on how these figures are calculated please contact Kensa.

3.5 Kensa High Temperature Compact Technical Details—Twin Compressor										
Thermal Output	Power supply rating	Max running Current	Typical running current	Typical starting current	Power input*	Nominal dry weight	Compressors	Dimensions	Connection size	
kW	Amps	Amps	Amps	Amps	kW	Kg	Number	HxWxD	mm OD	
Single Phase—230 Volts AC 50 Hz										
12	50	43	24 (30)	42	3.4(5.8)	165	Twin	900x900x570	28	
17	50	48	23 (28)	42	4.7(7.2)	167	Twin	900x900x570	50	1.7

The figures above are based on a rating to BS EN14511, 0 deg C from the ground, 35 deg C flow to underfloor. The figures in parentheses are values obtained to BS EN14511, 0 deg C from the ground, 65 deg C flow to the heat distribution system.

\*Includes the power consumption of both inbuilt water pumps.

For clarification of starting currents and details on how these figures are calculated please contact Kensa.

## 4. Operational Instructions

Always ensure that individuals using the appliance have read and fully understood the Operation instructions.

Do not operate the appliance with the cover removed.

Do not operate the appliance in anything other than dry conditions.

Do not exert any strain on electrical or pipe connections to the appliance.

Do not put any foreign object into the appliance.

Do not spill water or any other substance onto the appliance.

### 4.1. Maximising the efficiency of the heat pump.

In order to increase the efficiency of the heat pump and lower the overall energy costs of the building there are a number of simple steps that can be taken.

1. Insulate the property as much as possible. This will reduce the heat loss from the building, which in turn will reduce running time of the heat pump and hence energy costs.
2. The lower the flow temperature from the heat pump the higher the efficiency so consider a heating system with a large heat emitting area such as underfloor.
3. If in a well insulated building with underfloor mounted in screed throughout, consider running your heat pump on off-peak electricity tariffs such as Economy 10.
4. With underfloor systems, avoid the use of insulative coverings such as thick carpets and wooden floors.
5. Consider the use of Solar Thermal for the production of the majority of DHW.

### 4.2 Display

Each heat pump has a dedicated display which can be interrogated to view various parameters and indicate faults/alarms. Twin compressor units have two displays, one for each compressor where as single compressor unit only has one.



n.b. the numbers above refer to the points over.

**Fig 6 Heat Pump Display**

The display normally reads the temperature of the water returning from the heating distribution system. The controller will turn the heat pump off once a pre-set temperature of water returning from the heating system has been achieved. This setting is normally 30°C for underfloor applications, which is a typical return temperature for an underfloor application. (In twin compressor units the left hand controller is set at 30°C the right hand at 31°C). For radiators this is generally set during commissioning at 45°C for standard units and 55°C for high temperature models. In DHW mode, the display shows the return temperature from the DHW circuit and the light(s) to the right of the controller(s) will be lit.

The Kensa Compact Range of heat pumps are delivered with the software pre-configured for a typical underfloor mounted in screed application.

1. The display on the controller indicates the return temperature of the underfloor circuit.
2. The left hand symbols, sun, (top left) and frost, (bottom left) indicate heating & cooling respectively (Heating only heat pumps will only use the sun symbol and cooling heat pumps only the frost symbol. Reverse cycle machines will use both symbols, the one being displayed being dependant on the operating mode selected at the time.)



Sun symbol—heating mode



Frost symbol—cooling mode

3. A number “1” will appear top right of controller this is to indicate compressor number, if the number “1” is flashing the internal timer is activated and compressor is waiting to run. When the compressor is running the number “1” and the compressor run symbol will be on.



Compressor running

A flashing error code may appear if there is a fault with the heat pump, the most common will be: -

Alarm	Description
<b>TP</b>	Low water pressure (ground or heating distribution)
<b>HP</b>	High gas pressure, caused by low or no flow on the heating distribution circuit.
<b>LP</b>	Low gas pressure fault (can occur temporarily on first start up). Call Kensa Technical Department.
<b>A1</b>	Anti freeze alarm, ground getting to cold / insufficient anti freeze/ unit not commissioned correctly / low flow around ground arrays.

(See Fault Finding Section 5 for further details)

#### 4.2.1 To read flow temperatures and refrigerant pressures

Using the display it is possible to interrogate the heat pump to read temperatures and refrigerant pressures. For twin compressor units the left hand unit reads temperatures and pressures in compressor one and the right hand controller compressor two).

To read temperatures and refrigerant pressures: -

- 1 Press and hold SEL until -/- is displayed
- 2 Press the UP arrow until -b- is displayed
- 3 Press SEL and b01 is displayed
- 4 Press SEL
- 5 Temperature of water returning from the underfloor is displayed = b01
- 6 Press SEL
- 7 Press the UP arrow once until b02 is displayed
- 8 Press SEL
- 9 Temperature of water returning from ground arrays is displayed = b02
- 10 Press SEL
- 11 Press the UP arrow once until b03 is displayed
- 12 Press SEL
- 13 Temperature of water going out to the ground arrays is displayed = b03
- 14 Press SEL
- 15 Press the UP arrow once until b04 is displayed
- 16 Press SEL
- 17 Refrigerant pressure (in Bar) is displayed = b04
- 18 Press SEL

#### 4.2.2 To change the heat pump return flow temperatures.

Heat pumps are generally controlled on the return temperature from the heating distribution system and work on a temperature differential of approximately 5 degrees, i.e. if the return temperature set point is 29°C to 30°C the actual flow temperature out of the heat pump is approximately 35°C.

The outlet flow temperature of the heat pump determines the efficiency of the heat pump and should have been set for your particular heating system and application at commissioning. This is passcode protected to avoid unauthorised changes.

If for any reason that the heat pump return flow needs to be changed, please contact Kensa Heat Pumps's Technical Department on 01872 862140.

#### 4.3 DHW Production (Needs to be specified at time of order)

The most efficient way of producing [Domestic Hot Water \(DHW\) is](#) by using Solar Thermal, however DHW can be provided by most heat pumps. The installation and operation of a heat pump in DHW mode is more complex than space heating and needs careful design and installation.

To simplify the production of DHW using a heat pump, Kensa has designed an industry leading and straightforward DHW option. The heat pump is designed to operate at the optimum temperature that provides DHW, at the maximum efficiency, without using any inbuilt direct electric heaters. The system does not need a tank thermostat or a software temperature setpoint.

Warning - when a heat pump is used for heating domestic hot water, it may not get the water hot enough to kill the dangerous Legionella that can breed in hot water cylinders. Alternative arrangements should therefore be made to ensure the cylinder is pasteurised regularly.

### 4.3.1 DHW Operation

To get the most cost effective production of DHW (and space heating), it is advised that the system is used in conjunction with an off-peak electricity tariff, for example Economy 10.

Economy 10 will provide three periods of off-peak electricity throughout a 24 hour period. The majority of the off-peak period should be used for space heating and the settings on the DHW timeclock should reflect this. DHW production takes priority over the space heating so it is important that sufficient time is allocated to the space heating to ensure that the building is warm.

Using the in-built controls the heat pump will continue to produce DHW until the timeclock ceases to call for DHW or the controls automatically stop the heat pump. If the controls stop the production of DHW the heat pump will not restart for a period of approximately two hours as the number of compressor starts are limited in DHW mode for a given period of time.

#### *Standard Compact Units*

The maximum temperature that the heat pump can produce depends on the ground temperature and hence the time of year. The heat pump will achieve a DHW temperature of approximately 50-55°C. In summer, it could be higher, due to the warmer ground conditions. If 65°C is required all year round it is recommended that an immersion heater is linked to a second channel on the DHW timeclock and this is programmed to operate for a period immediately following the DHW production. This means that the majority of the heating load for the DHW is produced at a lower cost using the heat pump, as opposed to using only the direct immersion heater.

If 50°C water is acceptable, then it is recommended that the immersion heater is programmed to raise the temperature to above 60°C once a week.

#### *High Temperature Compact Units*

These are designed to provide higher outlet temperatures so will produce DHW at 60-65°C, however as with all heat pumps increasing the outlet temperature decreases the efficiency .

## 4.4 Cooling

This option needs to be specified at time of order. Cooling is simply operated by means of a volt free contact (as indicated on the wiring diagrams), however its effectiveness depends on the delivery system. All the settings for cooling are factory set. Please contact Kensa Heat Pumps for further details.

## 4.5 Maintenance

While there are no real maintenance requirements for a Kensa Ground Source Heat Pump, it is wise to run some pre-heating season checks to ensure everything is running smoothly. These are minor checks and can easily be carried by the owner of the system.

1. **Remove Front Cover.** Use a 3mm Allan key to remove the 4 screws (2 each side). Depending on the space around the heat pump, you may also want to remove the lower side panel (again using a 3mm Allan key) or lift the top cover (by removing the 4 Allan screws and lifting). If you have to completely remove the top cover, then unplug the cable to the remote display.

2. **Turn off the heat pump off internally.** Turn the compressor(s) off using the 25/32 Amp MCB(s) and turn the controls off using the 4 Amp MCB(s).

3. **Check fluid pressure.** Both the ground side and the heating side pressures should read higher than 1.8 Bar. You can top up the ground pressure side using the built-in filling valve which is on the right hand side towards the back or underneath the heat pump. The heating fluid pressure will be topped up by whatever system the original installer used. Typically there will be a filling loop somewhere near the expansion vessel.

4. **Bleed air.** Two bleed ports are built into the heat pump – one for the ground side and one for the heating. The bleed ports are located at the highest point which means they are often easier to access if you remove or lift up the top cover (see above). Unscrew the cap (finger tight) and then depress the Schrader valve using a small screwdriver until the fluid runs air free. Be ready to catch the fluid in a container to prevent it flowing over the heat pump. Also bleed the heating side using any valves that may have been installed by the original plumber (e.g. radiator valves, underfloor heating valve or air vents at high points in the pipework). You may need to top the pressure up again (see above) once the system has been bled.

5. **Check pumps.** Undo the large plug on the front of the heating-side water pump (using a container underneath to catch any fluid that may dribble out). Spin the pump using a smaller screwdriver to make sure it rotates freely. Turn the heating system on (using the heating system timer and/or thermostats) and turn on the 4 Amp MCB(s). The display should light up and the heating system pump should start running. Check the motor shaft is actually spinning. Replace the plug back into the front of the pump and repeat the process for the ground side pump. Note: the ground side pump switches on a few seconds after the 4 Amp MCB(s) have been turned on – you can often hear a small “clunk” as the contactor engages. You may need to bleed air and/or top up the system pressures again after checking the pump operation.

6. **Test anti-freeze.** When the system was installed, the antifreeze concentration should have been checked but if that wasn't done or if large amounts of mains water have been added into the system since installation the antifreeze may not have enough concentration. If you suspect this then you should check the concentration. Take a sample using the ground side Schrader valve and test with a refractometer to ensure the system is protected down to  $-10^{\circ}\text{C}$  or lower. If you do not have a refractometer then we will be happy to test your anti-freeze sample and can provide sample tubes on request.

7. **Run compressor.** Once you confirm that the system has enough pressure, is air free and the pumps run correctly, turn the 25/32 Amp compressor MCB(s) on to run the compressor(s).

8. **Check B readings.** B02 is the temperature of the flow from the ground to the heat pump, B03 is the temperature of the return from the heat pump to the ground. There should be a difference of  $5-7^{\circ}\text{C}$  between B02 and B03 and the difference should not be higher than  $10^{\circ}\text{C}$ . Both temperatures should stabilise after around a few minutes of running. If B03 continues to drop it indicates that there is no or very little flow through the ground side. This will need investigating and correcting for the heat pump to operate correctly.

9. **Re-assemble unit.** Check that the pump front plugs and the Schrader valve covers are replaced. Fit the top cover first (replacing the cable to the remote display if it was removed) and replace 3mm Allan screws. Then fit the side cover and finally the front cover.



If further help is required then telephone our helpline on 01872 862140 or send an email to [technical@kensaheatpumps.com](mailto:technical@kensaheatpumps.com)

Before cleaning, always switch off the appliance at the electrical isolator.  
Use only soap and a damp cloth; do not use solvents.

Introduction

Safety information

General product information

Operational Instructions

Fault Finding

Warranty

## 5. Fault Finding

Many faults which occur on commissioning are found to be due to incorrect wiring or setting up, therefore it is recommended that a thorough check is carried out should there be a problem.

Symptom	Possible Cause	Action
Blank display on software controller	No power supply	Check wall mounted electrical isolator switch or call electrician
	Controls MCB tripped	Call electrician to investigate cause
	There is no call from the time-clock or thermostat for heat pump operation	Programme time-clock according to manufacturer's instructions
Compressor not running but display reading temperature near setpoint	Heat pump is up to temperature	No fault
Display flashes fault code tP	Low water pressure in the ground or heating system side due to pipe relaxation or other pressure loss.	Check the pressure gauges below the two water pumps. The pressures should be between 1 and 2 bar. If below this, the pressure needs to be increased above 1.8 bar To increase the pressure in either circuit, the cold fill valve will need to be opened. The Ground cold fill is provided with every Kensa heat pump, and is found on the right hand side of the heat pump, underneath. The heating distribution system should have it's own fill point.
Display flashes fault code HP	Overheat warning. No or low flow around heating distribution circuit because of air in water pump, or stuck water pump impellor, or heating distribution system valves/ actuators closed.	Bleed the heating distribution system pump within the heat pump, using the schrader valve above the pump. (See Fig 3 and 4) Check that the water pumps are operational and spin the impellors (see section 4.3of the Installation Manual)
	HP can also be temporarily displayed when the heat pump reverts from DHW to space heating mode.	No action
Display flashes fault code LP	Low gas pressure in machine. Can occur simultaneously with an A1 alarm.	Check that the water pumps are operational and spin the impellors (see section 4.3of the Installation Manual) If symptom persists outside of the two listed circumstances, contact Kensa Technical department.
	Can occur temporarily on first start up when unit is new or after a long period out of use.	No action
Display flashes fault code A1	Freeze protection system activated. Low or no water flow on the ground (cold) side of the machine. Can also occur after many months of running in very cold weather.	Check antifreeze has been added and unit commissioned correctly. Check that the water pumps are operational and spin the impellors (see section 4.3 of the Installation Manual)  Ensure no flow restrictions and wait approximately 4 hours (with the machine turned off) for automatic reset.
Display flashes fault code E1, E2, E3 or E4	Loss of contact with probes inside heat pump. E4 could be loss of contact with weather compensation sensor	Refer to Kensa Technical department

## 6. Complaint Procedure

The expertise of members and the assurance provided by the RECC Code make sure that micro renewable technology supplied and installed under the scheme are free from manufacturing or installation faults. Occasionally, however, problems can develop.

If you want to complain about the quality of the equipment, the installation, the advice given, the standard of service or any other aspect of the contract between Kensa and yourself, the following procedure should be used.

Any complaint should be notified to Kensa Heat Pumps within three months of first noticing the problem.

- a. If the complaint cannot be rectified remotely, Kensa or a representative on its behalf will arrange to inspect the system, within 20 working days from receiving the complaint.
- b. If the complaint is about under-performance, you should make evidence available to Kensa.
- c. Kensa will consider the details of the complaint and report the findings clearly to the consumer within seven working days from any inspection.
- d. Kensa will try to find an agreed course of action to solve the complaint to the consumer's satisfaction.
- e. Kensa will co-operate fully with local consumer advisers or any other person that you consult when making a complaint.
- f. If a complaint cannot be sorted out through the above procedure, you or Kensa can use the conciliation service offered by the Real Assurance scheme. (Please see [www.recc.org.uk](http://www.recc.org.uk))

## 7. Warranty

The Kensa Compact Ground Source heat pump is designed and built to the highest standard and as such is guaranteed for 5 years for parts from the date of commissioning or 5 ½ years from the date of manufacture (excluding the internal water pumps and electrical components), whichever is shorter. Internal water pumps (ground and load side) and electrical components are guaranteed for 2 years for parts from the date of commissioning or 2 ½ years from the date of manufacturer, whichever is shorter.

### 7.1 Terms and Conditions.

#### 7.1.1 Persons covered by the Warranty

The Warranty applies to the original purchaser and any subsequent owner of the item.

#### 7.1.2 Validity period of the Warranty

The guarantee period (excluding the water pumps and electrical components) is five years calculated from the commissioning date stated on the commissioning certificate or 5 ½ years from the date of manufacture, whichever is shorter. For the water pumps and electrical components it is 2 years from the commissioning date stated on the commissioning certificate or 2 ½ years from the date of manufacture, whichever is shorter.

#### 7.1.3 Scope

Kensa Heat Pumps Ltd warrants to the original purchaser (“Buyer”) that all parts (“Parts”) of the Kensa Compact Ground Source Heat Pump, excluding accessories, shall be merchantable and free from defects in materials and workmanship appearing under normal working conditions.

Kensa Heat Pumps Ltd will, at its option and without charge to the Buyer, replace or repair any Parts which cause the Kensa Compact Ground Source Heat Pump to be inoperable; however, if Kensa Heat Pumps Ltd elects to provide replacement Parts, it shall not be obligated to install such replacement Parts and the Buyer shall be responsible for all other costs, including, but not limited to, shipping fees and expenses.

The warranty applies to faults originating inside the item.

#### 7.1.4 General exceptions

Compensation is not provided for:

- consequential losses
- damage caused by normal wear and tear, inadequate maintenance or care
- damage caused by freezing
- damage of the unit due to non-approved or incorrect quantities of antifreeze being used in the ground side, incorrect flowrates or air in the system
- damage caused by power surges, incorrect supply voltage or lightning strikes.
- cost of inspecting, adjusting or cleaning the item, unless this relates to damage that is eligible for compensation
- minor damage (e.g. scratches and marks) that does not affect the operation of the item
- damage covered by insurance
- indirect damage
- loss or damage caused by gross negligence or intent, misappropriation, fraud or similar crime against property, breach of trust or fraudulent conversion.
- products that have been: altered; subject to misuse, negligence, accidental damage, abnormal use or service; operated or installed in a manner contrary to Kensa Heat Pumps Ltd published or written instructions.
- products subjected to abrasion or corrosion
- products operated in connection with any liquid source that contains impurities which are corrosive to copper

-products operated in a temperature range inconsistent with Kensa Heat Pumps Ltd's published or written recommendations

#### **7.1.5 Care of Duty**

The product must be handled with normal care and attention to minimise the risk of damage or loss.

#### **7.1.6 In the event of Damage**

The installing contractor ("Contractor"), or, if the installing Contractor is not available, Kensa Heat Pumps Ltd must be notified of any damage immediately and no later than six months after you first became aware of the damage. The commissioning certificate received on installation should be appended to the claim. If a claim for compensation is made after the deadline specified above or if a commissioning certificate cannot be produced, the guarantee shall not apply.

#### **7.1.7 Replacement Parts**

Kensa Heat Pumps Ltd's warranty obligations with respect to replacement parts are identical to those with respect to original parts; provided, however, in no event shall the warranty term for such replacement parts extend beyond the term established by the commencement date (i.e. commissioning date) of the warranty under which Kensa Heat Pumps Ltd was obligated to provide such replacement parts. Kensa Heat Pumps Ltd shall have the right to retain possession or dispose of any parts replaced by it.

