

atlantic

Experts in **Electric Heating and Hot Water**

GROUPE
ATLANTIC
UK, ROI & NORTH AMERICA DIVISIONS

CALYPSO

HEAT PUMP HOT WATER HEATER



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TOTAL ELECTRIC SOLUTIONS.

This manual is to be left with the end user as it includes instructions for maintenance, troubleshooting, after sales service, and is used as a service record. The products included in this manual have been independently confirmed to comply with BS EN 12897: 2016.

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WARNINGS

INSTALLATION:

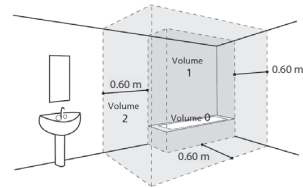
CAUTION: Heavy product, handle with care:

1/ Install the appliance in a frost-free room. The appliance is not covered by the warranty if it is permanently damaged as a result of overpressure caused by the expansion relief valve being blocked.

2/ Ensure that the floor can support the weight of the appliance filled with water.

3/ If the appliance has to be installed in a room where the ambient temperature is constantly higher than 35°C, then provide ventilation for this room.

4/ In a bathroom, do not install this product in Zone 0, Zone 1 or Zone 2 designated areas. Any low voltage equipment installed into zone 1 or zone 2 needs a minimum rating of IPX4. Electrical wiring can be routed through zone 2.



5/ This product is intended to be used at a maximum altitude of 2,000 m.

6/ Place the appliance in an accessible location.

7/ Refer to the installation drawings in the Installation chapter.

8/ The water heater must be fixed to the floor (in accordance with article 20 of EN 60335-1) using the fixing system provided for this purpose.

9/ The HPWH installation must be in accordance with the relevant requirements of the Building Regulations, IET Wiring Regulations and the Water Fitting Regulations (England and Wales) or Water Byelaws (Scotland).

10/ Calypso is covered by Section G3 of the Building Regulations (England and Wales) Technical Standard P3 (Scotland) and Building Regulation P5 (Northern Ireland). Compliance can be achieved via a Competent Person Self Certification Scheme or notification of installation to the Local Authority Building Control Department. It must be installed by a competent person as defined by the relevant regulations. Manufacturers notes must NOT be taken as over-riding statutory obligations.

11/ Calypso is factory fitted with a temperature & pressure relief valve that must not be used for any other purpose or removed.

12/ Calypso is factory fitted with an immersion heater with thermal cut outs. Immersions without thermal cut outs must not be fitted.

13/ This product has been manufactured using many recyclable materials, including the approved HCFC/CFC free polyurethane foam insulation. At the end of its useful life, it should be disposed of at a Local Authority Recycling Centre, to maximize the products full environmental benefits.

MAINTENANCE:

Modifications should not be made to this product. Replacement parts, including immersion heaters, should be purchased from Atlantic , or agents approved by them. Unvented hot water storage vessels need regular routine checks, and these are detailed below. It is for this reason that this manual must always be left with the Calypso.

It is essential that these checks be carried out at the time of heat pump maintenance by a qualified installer:

1. Manually open the relief valves in turn, and check that water is discharged from the valves and runs freely through the tundish and out at the discharge point. Ensure that the valves re-seat satisfactorily. (Note - the water may be very hot).
2. It is important to check that the discharge pipework is carrying the water away adequately. Check for blockages etc. if it is not.
3. Isolate the cold supply to the cylinder. Remove the inlet control valve. Inspect the mesh filter on the inlet side and remove any debris.
4. Check the charge pressure in the expansion vessel and re-charge if required
5. Re-fill the system and ensure that all relief valves have re-seated.
6. The Benchmark Service Record should be updated at each service.

7. Check the water pressure downstream of the combination valve is 3 bar in static condition.

The Registered Installer is responsible for the safe installation and operation of the system. The installer must also make his customer aware that periodic maintenance of the equipment is essential for safety. Maintenance periods will vary for many reasons.

Atlantic recommend a maximum of 12 months to coincide with heat pump maintenance. Experience of local water conditions may indicate that more frequent maintenance is desirable, eg, when water is particularly hard, scale-forming or where the water supply contains a high proportion of solids, eg, sand.

After servicing, complete the relevant Service Interval Record section of the Benchmark Checklist located on the inside back pages of this document.

HYDRAULIC CONNECTION:

This unit is supplied with an inlet control group. The pressure reducing valve is set at 3.0 Bar and the expansion relief valve is set at 4.5 Bar. This must be fitted to the water inlet pipe in a frost-free environment.

The Inlet control group supplied with this product will stand a maximum mains pressure of 16 Bar. We advise that if the mains pressure is consistently above 6 Bar consider fitting another pressure reducing valve (PRV), and if the mains pressure is greater than 9 Bar fit another PRV.

Adjustable PRV's are available. The additional PRV's need to be fitted upstream of the inlet control group and in multiple occupancy sites may be fitted as a whole site solution.

The expansion relief valve can be coupled with the TPRV discharge pipework prior to the tundish. This way any discharge should run away out of the building.

Discharges from the expansion relief valve usually indicate a fault which needs to be addressed. For example the expansion vessel charge pressure is too low.

If the discharge is hot and continuous, turn the power off, but do not turn off the cold water to the appliance until the discharge is cold.

Note: The discharge should stop by itself as the discharge cools.

However, in both cases you must call the registered installer/a suitably qualified, competent tradesperson, advise them that you have an unvented cylinder and request a maintenance visit.

DO NOT, at any time, tamper in any way with the safety valves or overheat thermostats.

There is a port on the inlet control group which can be used to connect the expansion vessel. In any case the expansion vessel should be fitted here or between the inlet control group and the cylinder.

The Calypso is supplied with a drain elbow. This should be fitted to the cold water supply connection to enable draining the cylinder.

IMPORTANT - DRAIN DOWN PROCEDURE:

1. Switch off the HPWH.
2. Open the nearest hot tap and run all hot water until cold, then close it.
3. Close the incoming cold main at the stop tap
4. Hold open the pressure and temperature relief valve until water stops discharging into the tundish and leave it open
5. Open the cold taps starting from the highest point and working down to the lowest tap, leaving them open
6. When the cold taps have stopped draining, open the hot taps starting from the highest and working down to the lowest tap
7. Open the drain cock and ensure the pressure and temperature relief valve is held open until the cylinder is empty


Note: The cold supply elbow c/w drain tapping must be to the cold water tapping. A flexible hose can then be connected to the drain tapping. The cylinder contents can be drained to the tapping level. This is adequate for all servicing requirements. If the cylinder is being disconnected and removed then it may be tilted to drain any water remaining in the cylinder.

ELECTRICAL CONNECTION:

WARNING: Do not attempt the electrical work unless you are competent to do so.

Before removing the cover, ensure that the power supply is switched off to avoid any risk of injury or electric shock. The electrical installation must include an all-pole cut-out device (circuit breaker, fuse) upstream of the appliance in accordance with BS 7671 Requirements for electrical installations. The appliance requires protection which can be provided by a 30mA Residual current device.

Please refer to the wiring diagrams on the back of the cover.

Connection to ground is compulsory. A special terminal, designated , is provided for this purpose. Ensure local isolation is provided within 1m (Double check with the commentor).

DESCRIPTION

1. Technical Characteristics

Product Details			
Product reference		CALYPSO FS 172L	CALYPSO FS 210L
Model Code/Number		AH876509	AH886123
Product Name		ATL CV4 STAINLESS STEEL FS 172L	ATL CV4 STAINLESS STEEL FS 210L
Heat Pump Performance			
Air operating range (ducted configuration)	°C	-5 to 43	
Air operating range (Ambient air configuration)	°C	5 to 43	
Achievable hot water temp via heat pump	°C	62	
Max. electrical power input (heat pump AND immersion)	W	650 + 1600 = 2250	
Max. Thermal power output from heat pump ONLY at 45°C	W	1345	
Air flow	m³/h	Nominal air flow 400m³/hr to 240m³/hr with associated maximum ducting pressure drop 50Pa to 150Pa.	
Sound power level	dB(A)	49	
Refrigerant	-/kg	R134a / 0,85kg	R134a / 0,86kg
Air ducting method		Separate inlet & outlet to exterior	
Coefficient of performance (M profile, 7°C)	-	2.78	2.81
Energy efficiency (ηwh)	%	117.0	118.4
Heating time from cold (10°C to 54°C)	h	5h48	7h18
Standing power input	W	19	19
Maximum usable hot water volume (V40, EN16147(2017))	litres	228.0	285.2
Pressure loss during test	Pa	60.0	54.3
Airflow during test	m³/h	387.0	402.6
Coefficient of performance (L profile, 7 °C)	-	3.15	3.02
Energy efficiency (ηwh)	%	129.40	124.35
Heating time from cold (10°C to 54°C)	h	5h44	7h27
Standing power input	W	17	20
Maximum usable hot water volume (V40, EN16147(2017))	litres	227.0	285.1
Pressure loss during test	Pa	58	57
Airflow during test	m³/h	386.0	391.6

Dimensions and Connections			
Dimensions	mm	1700 x 605 x 695	1940 x 605 x 695
Weight with packaging	kg	96.6	97.0
Weight without packaging	kg	83.6	84.0
Weight empty (full)	kg	15.5 (187.5)	18.0 (228.0)
Air duct diameter	mm	160	
Max. ducting pressure drop		50Pa @ 400 m ³ /hr >> COP=3,15 with 172L HPWH [L profile @7°C/86%RH]	
		150Pa @ 240m ³ /hr >> COP=2,81 with 172L HPWH [L profile @7°C/86%RH]	
Water connections	mm	22	
Condensate tube	mm	16 int / 20 ext	
Average condensation production at 7°C - 86% RH	L/h	0.34	
Electrical supply (nominal voltage)	V	230V 50Hz +15%/-10%	
IP rating		IPX1B	
RCBO/MCB Type C	Amp	16	
Hot Water Cylinder			
Body Material		Stainless steel	
Insulation thickness (cylinder body to case)	mm	63	
Maximum water supply pressure	bar	16	
Maximum inlet pressure (pressure regulator)	bar	3.0	
Maximum design pressure (expansion relief pressure)	bar	4.5	
Temperature and pressure relief valve (EN1490)	°C	90	
	bar	6	
Integrated electric Immersion	W	1600	
Max temperature with immersion	°C	62	
Over heat thermostat operating temperature	°C	80 +/-5	
Cylinder Capacity	litres	172	210
	W	51	58
Heat loss	kWhr/24h	1.23	1.39
	litres	22	22
Expansion vessel pre-charge	bar	3	
Approvals		KIWA Building regulations, KIWA Water regulations, WRAS. (applications in progress)	
Accessories		Cozy Touch	
Guarantee		5 years Tank, 2 years other components	

2. Declaration of conformity

This device complies with the following directives:

- 2014/35/EU with respect to low voltage
- 2014/53/EU with respect to RED (Radio Equipment Directive)
- 2014/30/EU with respect to electromagnetic compatibility (EMC)
- 2015/863/EU and 2017/2102/EU with respect to restricting hazardous substances (RoHS)
- 2013/814/UE supplementing Ecodesign directive 2009/125/EC

States that the product complies with the essential requirements of directive RED 2014/53/EU, as designated below:

Designation:	IHM BD3.2
Type :	868 MHZ RADIO TRANSMITTER - RECEIVER

States that the essential radio tests have been performed, per the following standards:

Electromagnetic compatibility:	EN 301 489-3 : 2019
Efficient use of the radioelectric spectrum:	EN 300 220-2 : 2017

Year EC marking affixed:	2023
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3. Safety instructions

Installation and commissioning work on heat pump water heaters can be hazardous due to high pressures and live parts.

Heat pump water heaters must be installed, commissioned and maintained by trained and qualified personnel only.

4. Transportation and storage



Please follow the transportation and handling recommendations shown on the water heater packaging.

We will not be liable for any product defect resulting from product transportation or handling that is not in accordance with our recommendations. Stacking this product is strictly forbidden.

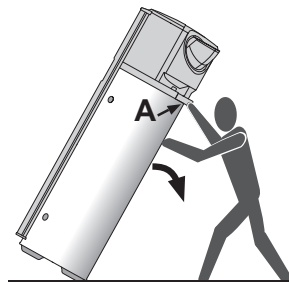
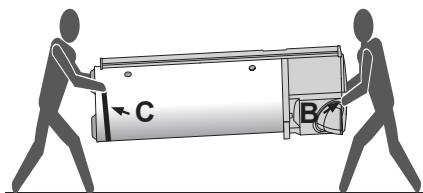
5. Packaging contents

Item	Description	Qty
1	Installation instructions	1
2	Operating instructions	1
3	160 mm Ø ducting adaptors	2
4	Cold water inlet PRV combination valve/expansion relief -Maximum inlet pressure to 16 bar -Operating pressure (PRV setting) 3 bar -Expansion relief valve setting 4.5 bar	1
5	Pressure and temperature relief valve (supplied fitted to comply with UK Building Regulation G3*) -Opening pressure of P & T Relief Valve 6 bar -Opening temperature of P & T Relief Valve 90°C	1
6	Tundish	1
7	Set (four parts packaged and cable-tied together) consisting of: 2 x compression nuts - 22 mm 2 x copper olives - 22 mm	1
8	Expansion vessel/mounting bracket -Expansion vessel charge pressure 3 bar	1
9	90 degree drain elbow	1
10	Adjustable foot (to be inserted under the water heater)	4

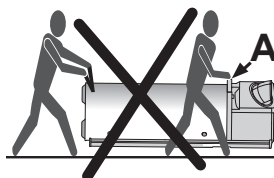
6. Handling

Use the tilt handle (A) to tilt the water heater backwards.

Use the carrying handles (B) and the carrying straps (C) to carry the water heater.



Do not lift with the tilt handle (A).



Please follow the transportation and handling recommendations shown on the water heater packaging. The front column must always remain on top when carrying horizontally.

7. Manual handling

Description

Manual handling means any transporting or supporting of a load (including lifting, putting down, pushing, pulling, carrying or moving) by hand or bodily force.

Scope

This assessment will cover the largest unit within each product range.

For specific weights and dimensions please refer to technical data section.

Main Hazards

Vision may not be clear due to the size of the products.

Adopting an incorrect method of lifting may cause injury, attempting to lift these products will require help from others. (Team lifts)

Control Measures

Manual lifting procedure

The lift, key factors in safe lifting are:

- a. **Balance**
- b. **Position of back**
- c. **Positioning of the arms and body**
- d. **The hold**
- e. **Taking the lead for team lifts**

- a. **Balance** - Since balance depends essentially upon the position of the feet, they should be apart about hip breadth with one foot advanced giving full balance sideways and forward without tension. In taking up this position, lifting is done by bending at the knees instead of the hips and the muscles that are brought into use are those of the thigh and not the back.
- b. **Position of back** - Straight - not necessary vertical. The spine must be kept rigid, this coupled with a bent knee position, allows the centre line of gravity of the body to be over the weight so reducing strain.
- c. **Positioning of arms and body** - The further arms are away from the side, the greater the strain on the shoulders, chest and back. Keep elbows close to the body arms should be straight.
- d. **The hold** - Before lifting ensure you have a good hold.

- e. **Taking the lead for team lifts**- As more than one person is required for these products ensure that one person is taking the lead. **This may be you** so ensure that each person that is helping is made aware of the weight and of the items listed within this assessment. Make sure you and any others helping know the route you intend to take that it is clear of any obstructions. Never jerk the load as this will add a little extra force and can cause severe strain to the arms, back and shoulders. If there are steps involved decide on where you will stop and take a rest period. Move smoothly and in unison taking care to look and listen to others helping with the lift. Where possible use a sack truck to move the product over long flat distances, only lift the products when necessary. If in doubt stop and get more help.

Individual capability

Individual capability plays an important part in handling these products. Persons above average build and strength will find it easier and should be in good health. Persons below average build and strength may require more rest periods during the handling process.

Pregnant women should not carry out this operation.

Persons who are not in good health should seek medical advice prior to commencing any lifting or manual handling operation.

Residual risk

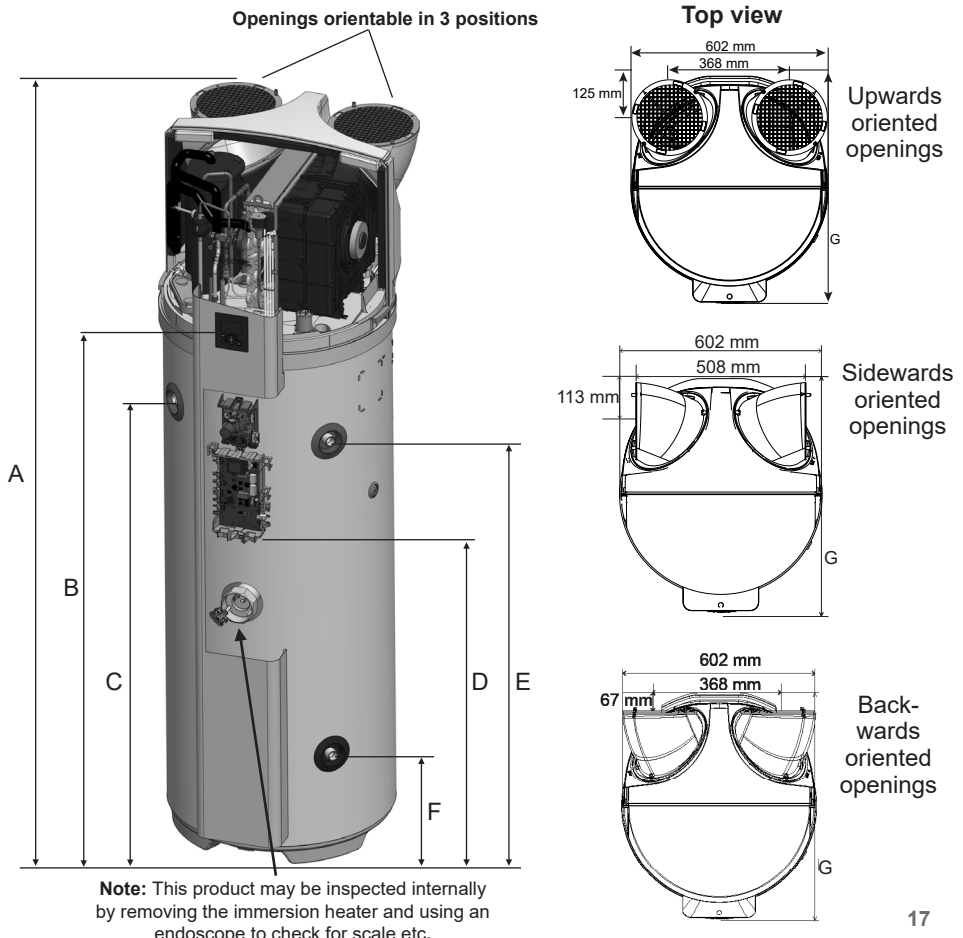
Following the guidelines given above will reduce any risk to injury.

All persons carrying out this operation must be fully trained and copies of the specific risk assessment made available for inspection and use in their training process.

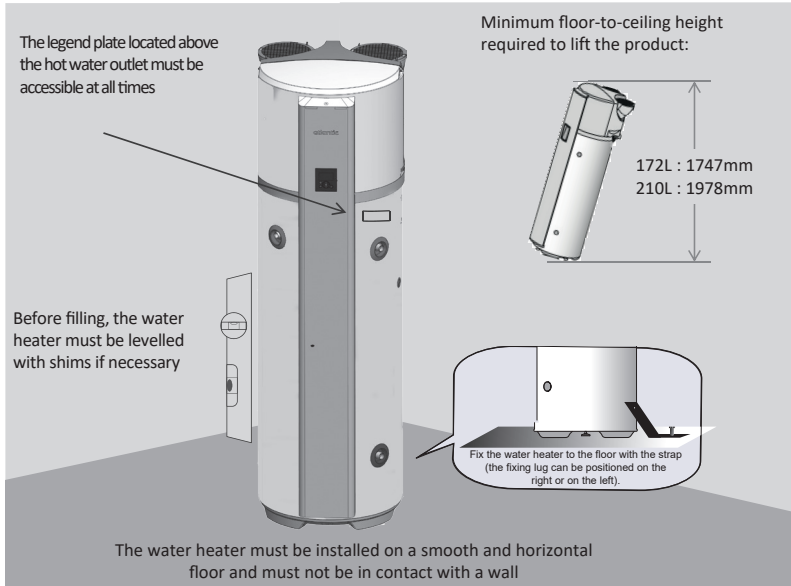
Further guidance on Manual Handling can be obtained from the Health and Safety Executive. Manual Handling Operations Regulations 1992 (amended by Health and Safety (Miscellaneous Amendments) Regulations 2002.

8. Dimensions

		172 litres	210 litres
A	Total height irrespective of the orientation of the openings	1693 mm	1940 mm
B	Height of the control unit	1310 mm	1550 mm
C	Height of the PTRV	1010 mm	1253 mm
D	Height of the siphon condensates drain	780 mm	1020 mm
E	Height of the hot water outlet	960 mm	1200 mm
F	Height of the cold water inlet	302 mm	302 mm
G	Total depth	691 mm	691 mm



9. Installation



The water heater must be fixed to the floor (in accordance with article 20 of standard EN 60335-1) using the fixing strap provided for this purpose.

The Calypso product must be ducted to provide the necessary air inlet and air exhaust connections. Typically, the air connections are ducted to the outside of the building however it is possible to extract air from another space that must not be within the thermal envelop of the building, i.e. an insulated loft space or garage that is adequately ventilated.

Irrespective of the selected installation configuration, the installation site must comply with protection index IP X1B, in accordance with the requirements of BS 7671.

The floor must be able to support a minimum load of 400 kg (*surface area underneath the water heater*).



Failure to follow the installation recommendations may cause the system to underperform.



Leave a 500 mm space in front of the electrical equipment and a 300 mm space in front of the hydraulic equipment, in order to grant access to the water heater for periodic maintenance.




The maximum pressure drop across the appliance must be respected when designing the air inlet and air exhaust ducting routes



All ducting must be installed and insulated effectively by a component person to ensure correct operation of the appliance and that no condensation forms on the ducting routes. The appliance manufacturer will not take responsibility for poorly designed or fitted ducting installations.

10. Hydraulic connection

 **Installing a secondary circulation loop on the appliance is prohibited. If the appliance fails on an installation with looping, the warranty does not apply. For more information, please contact the after-sales service.**

The highest hot or cold water draw off point should not exceed 10 metres above the Pressure Reducing Valve.

An ascending spray type bidet or any other appliance with a Class 1 back-siphonage risk requiring a type A air gap should not be used.

If the supply to the mixer fittings (other than a dual outlet type) is not taken from the balanced supply the system will become over pressurized and cause the pressure relief valve to discharge. Over time this could also cause the premature failure of the appliance itself which will not be covered by the warranty

In larger properties with a number of bathrooms/en-suites and long pipe runs we would recommend that the balance cold supply is provided with its own pressure reducing valve and is not taken from the balanced cold connection on the combination valve. In this case it will also be necessary to fit a small expansion vessel on the balanced cold water system to accommodate the pressure rise caused by the increase in temperature of the balanced cold water.

Check the performance requirements of the terminal fittings with regard to flow/ pressure are suitable.

In relation to potable water systems, expansion vessels shall be installed in a vertical orientation and located so that the length of the connecting pipe work is kept to a minimum.

Aerated taps are recommended to prevent splashing.

Any type of shower mixing valve can be used as long as both the hot and cold supplies are mains fed. However, all mains pressure systems are subject to dynamic changes particularly when other hot and cold taps/showers are opened and closed, which will cause changes in the water temperature at mixed water outlets such as showers. For this reason and because these are now no more expensive than a manual shower we strongly recommend the use of thermostatic showers with this appliance. These must be used in 3 storey properties where the impact on pressure/temperature of opening another tap in the system is greater than normal. The shower head provided must also be suitable for mains pressure supplies.

The cold water inlet is marked with a blue collar and the hot water outlet is marked with a red collar. The cold water inlet and the hot water outlet are provided with 22mm compression fittings.

Plastic Pipework

This appliance is suitable for use with plastic pipework as long as the material is recommended for the purpose by the manufacturer and is installed fully in accordance with their recommendations.

10.1. Cold water connection

Before connecting the hydraulics, check that the mains pipes are clean.

Inlet control group 3 bar pressure reducing valve and 4.5 bar expansion relief valve. Also an expansion vessel must be fitted.

Mains Water Supply

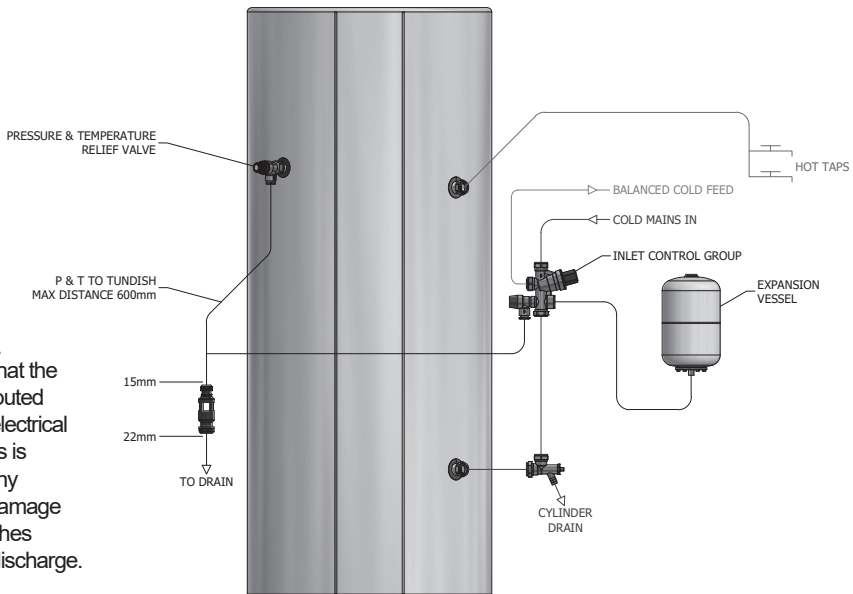
Existing properties with a 15mm supply will be satisfactory provided the local mains pressure is good, but should be confined to single bathroom properties. For new properties where simultaneous demand is required to more than one bathroom or a bathroom and one or more en-suites, the communication and service pipe into the dwelling should be a minimum of 22mm (usually in the form of a 25mm MDPE supply). The optimum performance is achieved if the inlet pressure is 3 bar dynamic. However, the Calypso will function with lower inlet pressures, but this will reduce the performance. For optimum performance, 30L per minute incoming mains flow should be present, however the Calypso will work at lower flow rates, although performance will be affected. Normally Calypso provides well in excess of 40 litres/min in most conditions. Flow rates for ALL mains pressure systems are subject to district pressures and system dynamic loss. Particularly on larger properties with more than one bathroom, the pipe sizes should be calculated in accordance with BS EN 806-3:2006 and BS 8558:2011.

The Installation of the components supplied with the Calypso should be installed as per the schematic below.

Note. The schematic shows pipework in front of the appliance. Normally pipework will be routed behind the appliance within the 120mm service space. This prevents the panel from being trapped by the pipework.



No valve must be placed between the cylinder and the inlet control group.



CAUTION:

Make sure that the Tundish is routed away from electrical devices. This is to prevent any accidental damage due to splashes during any discharge.

10.2. Hot water connection

WARNING: When showering or bathing water above 44°C increases the risk of serious injury, scalds or fatality. Reference HSE document HSI6 for further information.

WARNING: Storing hot water at temperatures below 60°C can increase the risk of Legionella bacteria growth. Reference HSE document HSG274 for further information.

Recommendation: Do a risk assessment of the installation property and choose a method of control which reduces the risks arising from the above warnings. Further guidance and recommendations can be found in the Water Regulations Guide, and Building regulation part G3.

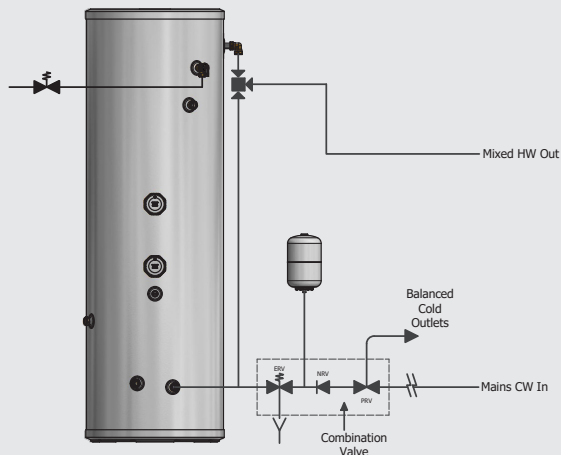
Fitting Blending Valves to the Calypso Appliances

When fitting a blending valve to the unvented appliances, it is important that the installation does not contravene the G3, WRAS and Health and Safety directives or the manufacturers recommendations. If this is the case, then the warranty should be null & void. The key requirements to comply with these regulations are:

1. Any fitting or material in contact with potable water (e.g. a blending valve) must be approved by WRAS or an equivalent body.
2. Connections or wiring arrangements must not bypass any safety devices.
3. Any expansion due to heating must not be allowed to expand back into the cold mains.
4. The settings of any safety devices must not be tampered with or adjusted.

The figure below shows the cold port of the blending valve connected to the cold water supply to the vessel after the inlet control group. It is recommended that the installer should ensure that there is no gravity circulation in the pipework connected to the cold port. If necessary, this can be achieved by fitting a non-return valve or using a thermal trap (Under sink thermostatic mixing valves and thermostatic showers are alternative approaches to control hot water outlet temperatures).

Cold port of the blending valve connected to mains supply to the vessel after the inlet control group.

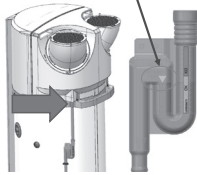


10.3. Condensates drainage

10.3.1. Implementation of the siphon

Cut the condensates drain pipe so that it does not create a loop in the pipe. Connect the end of the pipe to the waste water drain.

With the product stopped, fill the siphon with water up to the arrow via the condensates drain tube.



Please note: this operation must not be performed when installing in an ambient environment. For a ducted product, the full siphon is used to check the compliance of the ducting on the intake side.



Do not add a siphon downstream of the one already present on the product, waste water discharge must be free. Risk of condensates overflowing at the heat pump.

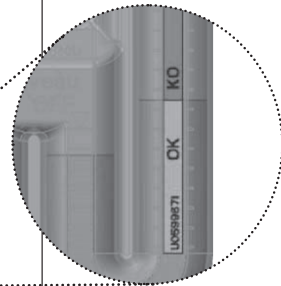
10.3.2. Use of the siphon

With the fan on, compare the water level with the strip. If the level remains in the OK zone, the intake side duct network is good.



If the water level is in the KO zone, the extracted flow is too low. The intake side duct network is:

- obstructed/crushed
- and/or too bent
- and/or too long



10.4. Tips and recommendations

If the drawing points are not equipped with thermostatic mixing valves, a temperature limiter must be installed at the outlet of the water heater to limit the risk of scalding.

Scale

In hard water areas it is recommended that an in-line scale inhibitor is fitted. Reducing the temperature of the stored water will reduce the rate at which scale forms. If the recovery rate is badly affected, this is an indication that scaling may have occurred. In this event, follow the procedures as recommended by a reputable Water Treatment Company.

Disinfection

If this appliance is to be installed in other than a single domestic dwelling i.e.. in an apartment block or student flats etc., the hot and cold water system will need to be disinfected in accordance with BS EB 806:4 2010 section 6.3 and the Water Regulations.

The Calypso is manufactured from stainless steel. Due to this, the use of chlorine as the disinfection agent can cause damage unless the appliance is adequately flushed and refilled with the mains water immediately on completion of the disinfection procedure.

Damage caused through a failure to do this adequately will not be covered by the warranty. For the reasons mentioned, we recommend the use of a non chlorine based disinfectant such as Fernox LP Sterox as manufactured by Cookson Electronics when carrying out disinfection of systems incorporating these appliances.

Benchmark

At the time of commissioning, complete all relevant sections of the Benchmark Checklist located on the inside back pages of this document.

This must be completed during commissioning and left with the product to meet the Warranty conditions offered by Atlantic.

10.5. Insulate the Pipework

In new systems, pipes should be insulated to comply with building regs, the maximum permissible heat loss is indicated in the table opposite, and labelled accordingly as follows:

- i. Primary circulation pipes for domestic hot water circuits should be insulated through their length, subject only to practical constraints imposed by the need to penetrate joists and other structural elements.
- ii. All pipes connected to hot water storage vessels, including the vent pipe, should be insulated for at least 1 metre from their points of connection to the cylinder (or they should be insulated up to the point where they become concealed).

In replacement systems, whenever a hot water storage vessel is replaced in an existing

system, any pipes that are exposed as part of the work or are otherwise accessible should be insulated as recommended for new systems, or to some lesser standard where practical constraints dictate.

Insulation of Pipework

Pipe outside diameter	Maximum heat loss
15 mm	7.89 W/m
22 mm	9.12 W/m
28 mm	10.07 W/m
35 mm	11.08 W/m

Further guidance on converting heat loss limits to insulation thickness for specific thermal conductivities is available in TIMSA "HVAC guidance for achieving compliance with Part L of the Building Regulations".

10.6. Pressure and Temperature/expansion relief valve pipework

The temperature and pressure relief valve (TPRV) should be installed to discharge in accordance with G3 of the Approved Document of the Building Regulations and should be piped to where it is visible, but will not cause danger to persons or damage to materials.

The following information is taken from Approved Document G3 of the Building Regulations and is provided to assist with the design and installation of the discharge pipework. However, the information is not exhaustive and reference should always be made to Approved Document G3 of the Building Regulations. The final decision regarding any arrangements rests with Building Control and it is recommended that their advice is sought if you have any concerns regarding this aspect of the installation.

The two safety valves will only discharge water under fault conditions. When operating normally water will not be discharged.

The tundish should be vertical, located in the same space as the unvented hot water storage system and be fitted as close as possible and within 600mm of the TPRV.

The discharge pipe (D2) from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge, be of metal and:

a) Be at least one pipe size larger than the nominal outlet size of the safety device unless its total equivalent hydraulic resistance exceeds that of a straight pipe 9m long i.e. discharge pipes between 9m and 18m equivalent resistance length should be at least two sizes larger than the nominal outlet size of the TPRV, between 18 and 27m at least 3 sizes larger, and so on. Bends must be taken into account in calculating the flow resistance. Refer to the table and the worked example.

An alternative approach for sizing discharge pipes would be to follow BS EN 806-2:2005

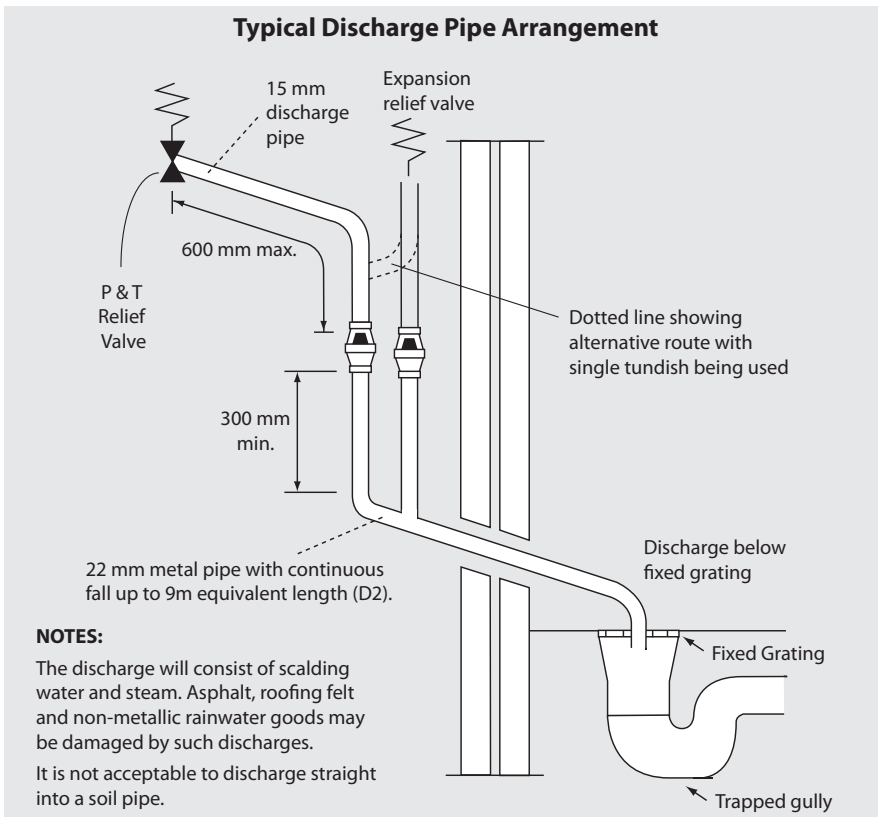
Specification for design installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.

b) Have a vertical section of pipe at least 300mm long, below the tundish before any elbows or bends in the pipe work.

c) Be installed with a continuous fall.

d) It is preferable for the discharge to be visible at both the tundish and the final point of discharge but where this is not possible or practically difficult there should be clear visibility at one or other of these locations. Examples of acceptable discharge arrangements are:

1. Ideally below the fixed grating and above the water seal in a trapped gully.
2. Downward discharges at a low level; i.e. up to 100mm above external surfaces such as car parks, hard standings, grassed areas etc are acceptable providing that where children play or otherwise come into contact with discharges, a wire cage or similar guard is positioned to prevent contact whilst maintaining visibility.



3. Discharges at a high level; e.g. into metal hopper and metal down pipe with the end of the discharge pipe clearly visible (tundish visible or not) or onto a roof capable of withstanding high temperature discharges of water and 3m from any plastic guttering systems that would collect such discharges.
4. Where a single common discharge pipe serves more than one system, it should be at least one pipe size larger than the largest individual discharge pipe (D2) to be connected.
5. If unvented hot water storage systems are installed where discharges from safety devices may not be apparent i.e. in dwellings occupied by blind, infirm or disabled people, consideration should be given to the installation of an electronically operated device to warn when discharge takes place.

Worked Example

The example below is for G1/2 temperature relief valve with a discharge pipe (D2) having 4 elbows and length of 7m from the tundish to the point of discharge. From the table below:

Maximum resistance allowed for a straight length of 22mm copper discharge pipe (D2) from a G1/2 temperature relief valve is: 9m subtract the resistance for 4 x 22mm elbows at 0.8m each = 3.2m.

Therefore the maximum permitted length equates to: 5.8m.

5.8m is less than the actual length of 7m therefore calculate the next largest size.

Maximum resistance allowed for a straight length of 28mm pipe (D2) from a G1/2 temperature relief valve equates to: 14m.

As the actual length is 7m, a 28mm (D2) copper pipe will be satisfactory.

Sizing of copper discharge pipe 'D2' for a temperature relief valve with a G1/2 outlet size (as supplied)		
Size of discharge pipework	Maximum length of straight pipe (no bends or elbows)	Deduct the figure below from the maximum length for each bend or elbow in the discharge pipe
22mm	Up to 9m	0.8m
28mm	Up to 18m	1m
35mm	Up to 27m	1.4m

11. Air connection

The energy performance capability of the heat pump water heater is linked to the temperature of the intake air. The warmer the intake air, the better the COP (Coefficient of Performance).

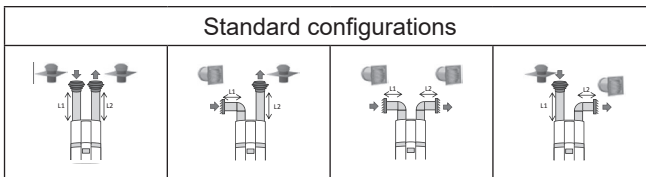
- In the case of ducting, 160 mm diameter insulated air ducts should be selected. The use of flexible ducts is by no means recommended.
- Use the template available on the water heater packaging to drill the walls.
- The accessories supplied with the thermodynamic water heater must be used.

Poor ducting (crushed ducts, excessive length or number of elbows ...) can result in reduced performance and malfunctions. **As a result, we do not recommend using flexible ducts.**



The ducting scheme must be designed and installed by a competent person.

The ducting installation can be designed and installed in various directions and configurations; some examples are shown in the below diagram.



11.1. Authorised duct lengths

The ducting plan must be designed and installed by a competent person. Appropriate insulation must be used on all ducting components to avoid condensation forming. The total length of ducting components, straights, bends, elbows, terminals, adaptors etc must be carefully considered to ensure the 150 Pa at minimum air flow of 240m³/hr maximum pressure drop of the system is respected.



The appliance manufacturer does not take responsibility for ducting plan design or installation.



The example provided is for reference and a guide only. When selecting the exact ducting components to be used, please reference the technical data of the manufacturer. Always use manufacturer data for pressure drop and ensure the total pressure drop calculations are carried out by a competent person.

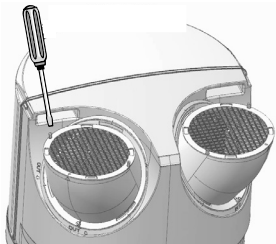
Worked example:

Air Inlet Calculations			
Component	Pressure drop [Pa]	Qty	Total [Pa]
Straight 1m	3.0	5	15.0
Elbow	10.0	2	20.0
Inlet terminal	30.0	1	30.0
Total pressure drop for air outlet duct plan			65.0

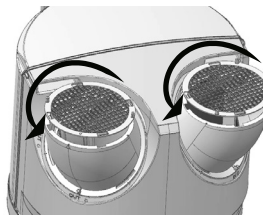
Air Outlet Calculations			
Component	Pressure drop [Pa]	Qty	Total [Pa]
Straight 1m	3.0	6	18.0
Elbow	10.0	2	20.0
Outlet terminal	30.0	1	30.0
Total pressure drop for air outlet duct plan			68.0

The total ducting calculated pressure drop is $65.0 + 68.0 = 133$ Pa

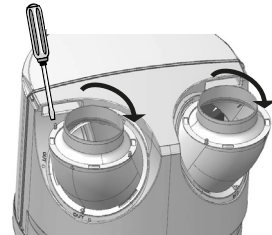
11.2. Installing the duct fitting accessory



1 Unscrew the grid locking screws.



2 Remove the grids by turning them counter-clockwise by a 1/4 turn.

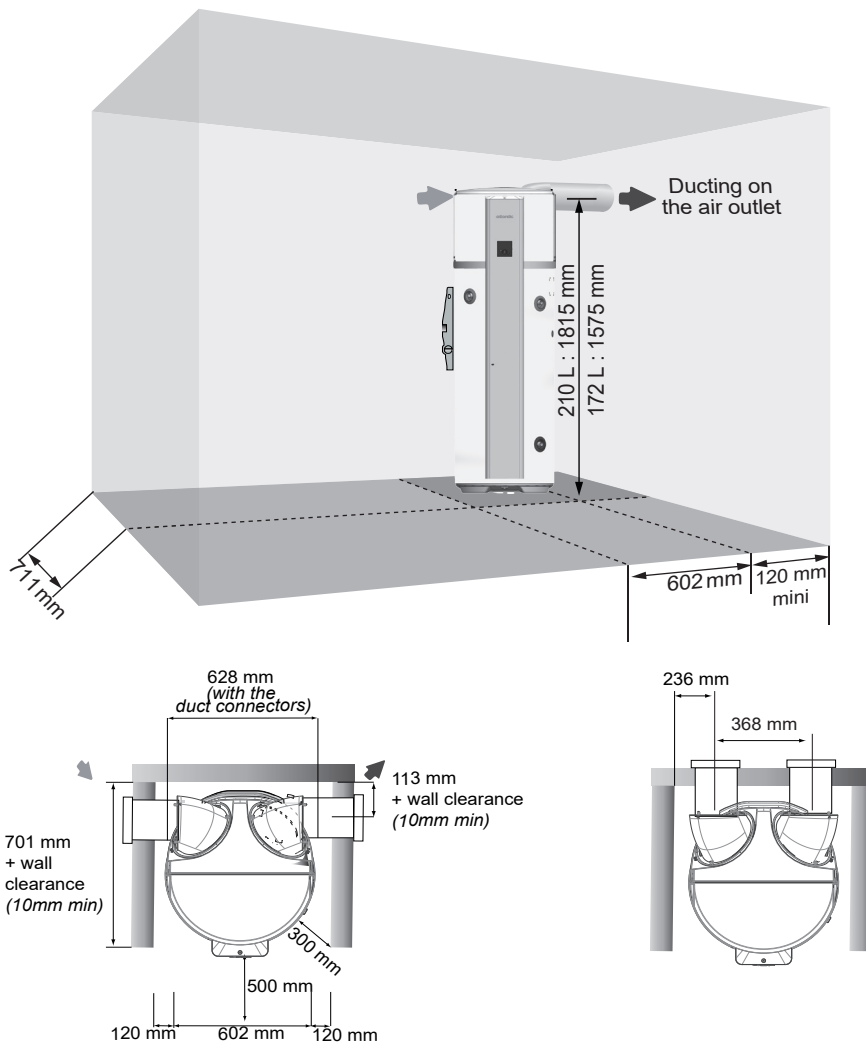


3 Mount the duct connectors by turning them clockwise by a 1/4 turn and retighten.



This operation must be performed by a qualified person with the power off (*only if ducts are used, otherwise do not dismantle the grids*).

11.3. Installing the ducting connections



The wall grids must orient downwards to prevent any water ingress in the pipes.

- ✓ **At least a frost-free room ($T > 1^{\circ}\text{C}$)**

- ✓ Selected installation parameter:  Outside/Outside (see chapter «13. Installation parameters», page <?>)

- ✓ Recommended room: living space (heat loss from the water heater is not lost), close to the outside walls. Avoid placing the water heater and/or the pipes close to bedrooms for the sake of noise comfort.

Examples of a room:

- laundry room, basement, cupboard in the entrance.

11.4. Prohibited configurations

- Water heater drawing air from a heated room.
- Connection to the MVHR.
- Not at prohibited location unless it is heated.
- Ducting to the outside air at the intake and release of fresh air inside the room.
- Connection to a shallow geothermal system.
- Water heater that is installed in a room containing a natural draught boiler and is only ducted to the discharge on the outside.
- Pneumatic connection of the appliance to a tumble dryer.
- Installation in dusty rooms.
- Drawing air containing solvents or explosive materials.
- Connection to exhaust hoods discharging greasy or polluted air.
- Installation in a room subject to frost.
- Objects placed on top of the water heater.

12. Electrical connection

Please refer to the electrical connection diagrams on the back of the cover.



**Only switch on the water heater after it has been filled with water.
The water heater must have a constant electrical power supply.**

Qualified personnel must complete the electrical connection with the power off.

The water heater must be connected to a 230 V single phase 50Hz AC mains supply.

The electrical connection must comply with the most recent version of BS 7671 Requirements for Electrical Installations and with the current recommendations in the country of installation of the heater.

The installation must include:

- √ A 16A all-pole circuit breaker (*minimum curve C*) with a contact opening of at least 3 mm.



Never directly power the heating element.

- √ Protection by a 30 mA differential circuit breaker.

The safety thermostat fitted to the electric booster must not be repaired outside our facilities under any circumstances. Failure to comply with this clause voids the warranty.

12.1. Constant connection with programming

In this configuration, the electric booster is not allowed to operate outside the programming period; the heat pump can operate constantly or only during the programming period depending on the selected mode.

This configuration can also allow you to benefit from the PP(Peak Period)/OP(Off-Peak Period) tariff without having to connect a PP/OP cable.

Installing the water heater with a constant power supply is recommended in order to optimise the performance capabilities of the product.

12.2. Connection with PP/OP contact

In this configuration, the electric booster is not allowed to operate during Peak Hours; the heat pump can operate constantly or only during Peak Hours, depending on the selected mode.

When the product is connected as PP/OP, the photovoltaic function is not available.



Caution: Connection to ground is compulsory.

12.3. Connection to a photovoltaic station

When combined with a photovoltaic system, the surplus energy produced by the photovoltaic system can be stored as hot water in the water heater practically free of charge. Once the photovoltaic system has enough energy, the installation's inverter automatically sends a signal to the thermodynamic water heater that activates the forced operation of the heat pump (PV mode). If the inverter signal is interrupted, the thermodynamic water heater automatically returns to the previously selected operating mode after 30 minutes.

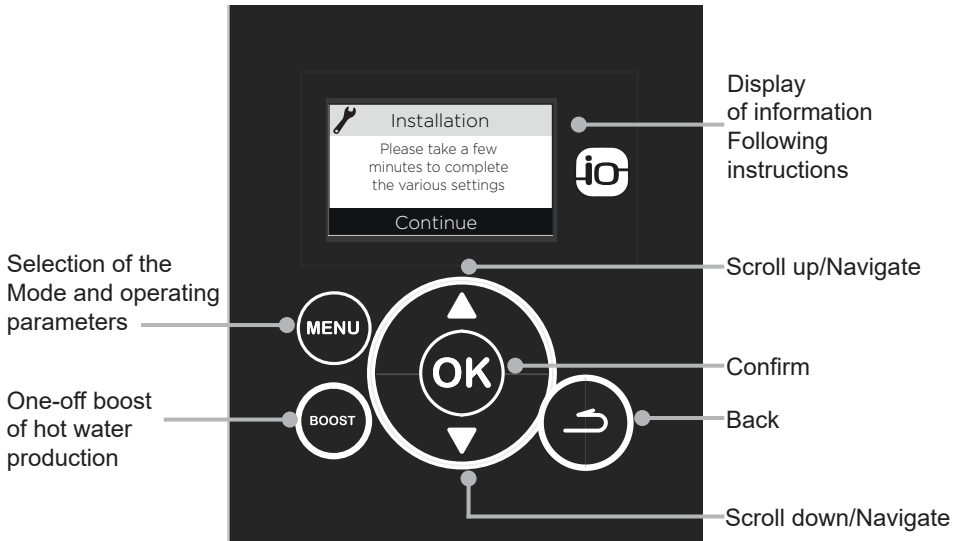
In this mode, the setpoint temperature is set to 62°C (not adjustable) and '🔌' will appear on the display.

The PP/OP cable is used for connecting to a photovoltaic station. This operating mode is not available if the product is connected to a PP/OP signal

13. Filling the water heater

1. Make sure the pressure on the air side of the expansion vessel = 3 bar. This must be done when the water in the cylinder is free to expand in atmospheric pressure or the cylinder and relevant pipe work is empty.
2. Make sure that the drain cock is closed, and open all the cold and hot water taps and other terminal fittings. Allow the system to fill with water, and to run until there is no air left in the system. Close the taps and inspect the system closely for leaks.
3. Open the Relief Valves one by one and check that water is discharged and runs freely through the tundish and out at the discharge point. The pipework should accept full bore discharge without overflowing at the tundish, and the valve should seat satisfactorily.
4. In line with good plumbing practice, use of excessive flux should be avoided. When soldering above the cylinder, ensure flux/solder does not contaminate the cylinder below, since this can cause corrosion.
5. Flushing should be done performed as per BS EN 806:4 2010 section 6.2.
6. Allow the cylinder to heat to normal working temperature, then thoroughly flush the domestic hot and cold water pipework through each tap.

14. Initial start-up



If the water heater has been tilted, wait at least 1 hour before start-up. On initial start-up, the heat pump starts with a 5 minute delay.

- ❶ Power-up the water heater.
- ❷ **On initial power-up, the set-up instructions appear on the screen: language selection, date and time set-up, ducting configuration, photovoltaic configuration, heating periods, anti-legionella mode (please refer to paragraph "15. Installation parameters", page 34). Carefully follow the on-screen instructions to adjust the parameters.**
- ❸ When the parameters are set, check the operation of the water heater (see paragraph "16. Verification of correct operation", page 37).



To review the settings, please refer to paragraph "15. Installation parameters", page 34. For the initial heating, activate the BOOST irrespective of the defined operating period.

The compressor starts after 1 to 5 minutes of ventilation, only if the following conditions are met:

- water temperature above 5°C;
- air temperature ranging between -5°C and 43°C.

15. Installation parameters

Re-access the various installation settings:

 +  for 5 seconds, then **Configurations**

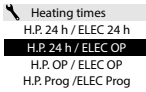
- **Locking**

The operating modes and heating periods are not accessible.

- **Hot water - Heating periods** (also accessible via the User menu if locking is not activated)

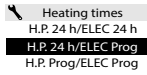
This parameter defines the start-up authorisation periods for the heat pump and the electric booster depending on the hot water requirement.

Water heater not connected to a photovoltaic signal



Heating times
H.P. 24 h / ELEC 24 h
H.P. 24 h / ELEC OP
H.P. OP / ELEC OP
H.P. Prog / ELEC Prog

Water heater connected to a photovoltaic signal



Heating times
H.P. 24 h/ELEC 24 h
H.P. 24 h/ELEC Prog
H.P. Prog/ELEC Prog

Operating period	Installation conditions <i>(see wiring diagram on the inside of back cover)</i>	Start-up of Pump A Heat and electric booster
HEAT PUMP 24 hr / ELEC 24 hr	<ul style="list-style-type: none"> • Wiring according to the wiring diagram. • Signal wire L1 is not required to be connected. 	At any time of the day depending on the hot water requirement.
HEAT PUMP 24 hr / ELEC OP	<ul style="list-style-type: none"> • Signal wire L1 to be connected to Off-Peak signal. • Energy supplier contract with Off-Peak option. 	Heat pump at any time of the day and electric booster only during Off-Peak periods. Mode not available if there is a photovoltaic connection.
HEAT PUMP OP / ELEC OP	<ul style="list-style-type: none"> • Signal wire L1 to be connected to Off-Peak signal. • Energy supplier contract with Off-Peak option. 	Switched on only during Off-Peak periods. Mode not available if there is a photovoltaic connection.
HEAT PUMP Prog / ELEC Prog	<ul style="list-style-type: none"> • Signal wire L1 not connected. • Programming of one or two operating periods of at least 8 hours in total. The programmed times can be changed. 	Switched on during the programmed period. Setting the 1st period: from 4 a.m. to 12 p.m.; Setting the periods: 8 hrs minimum in total.
HEAT PUMP 24h / ELEC Prog (If the water heater is connected to a photovoltaic signal).	<ul style="list-style-type: none"> • Signal wire L1 connected to PV signal. • Programming of one or two operating periods of at least 8 hours in total. The programmed times can be changed. 	Heat pump at any time of the day and electric booster during the programmed period. Setting the 1st period: from 4 a.m. to 12 p.m.; Setting the periods: 8 hrs minimum in total.



Setting the programming periods is subject to certain rules:

- The resolution of the program is 15 minutes;
- The sum of the durations of the 2 periods must be greater than or equal to 8 hours;
- The duration of the first programming period must be between 4 hrs and 12 hrs;
- The duration of programming period 2 can be zero if period 1 is greater than or equal to 8 hours;
- If the second programming period is not zero, it must be at least 2 hours.

- **Hot water - Anti-legionella**

When the anti-legionella mode is activated, the product heats to a setpoint of 62°C during an active operating period. This mode degrades the overall performance capability of the product and must be set up so that the heat pump water heater is sterilized on a regular basis.

- **Hot water - installation options - Photovoltaic**

This parameter activates the coupling of the product with a photovoltaic system. This operating mode means that the heat pump is forced to switch on when a signal from the photovoltaic system is received by the water heater. Control automatically returns to the previously selected mode after 30 minutes if the signal from the photovoltaic station is lost.

While the signal is being received, the setpoint temperature is automatically set to 62°C (not adjustable).

- **Hot water - Advanced mode - Backup mode**

Activating this mode allows constant operation with the electric booster only.

- **Hot water - Advanced mode - Electric booster**

Allows activation or deactivation of assistance by the electric booster. If it is deactivated, the product will never use the electric booster. A lack of hot water is then possible in case of low temperatures.

- **Ducting** (air operation)

This parameter defines the type of air connection that is provided.



Outside/Outside

Intake and discharge of the heat pump connected with 2 pipes

Outside intake from ventilated loft space and ventilated garage is also acceptable.

Warnings

Description

Installation

Maintenance


- **Date and time** (accessible after the initial start-up via the main menu)

Set the day, then **confirm**. Repeat for the month, year, hour, minutes.


- **Language** (accessible after the initial start-up via the main menu)

Set the language of your choice.

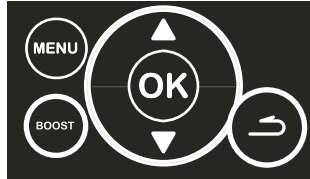
- **Connectivities** (accessible after the initial start-up via the main menu if the lock is not activated)

The water heater can be combined with equipment using the  protocol and can be managed remotely.

16. Verification of correct operation

Verification of operation is accessible in INSTALLER MODE .

Simultaneously press MENU and the up arrow for 5 seconds.

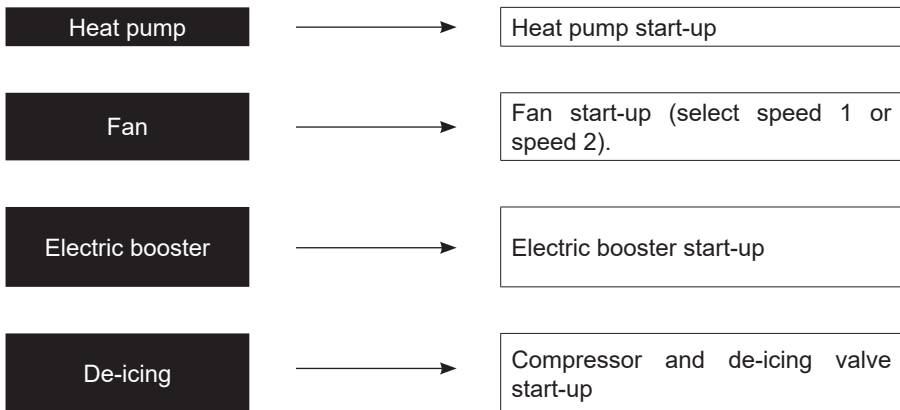


Complete the verifications →



 Test

To exit, return to the MENU. Simultaneously press MENU and the up arrow (*or wait 10 minutes*).



The compressor starts after 30 seconds of ventilation, if the following conditions are met:

- water temperature ranging between 5°C and 62°C;
- air temperature ranging between -5°C and 43°C.

17. Commissioning checklist

This Commissioning Checklist is to be completed in full by the competent person who commissioned the storage system as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference. Failure to install and commission this equipment to the manufacturer's instructions may invalidate the warranty but does not affect statutory rights.

Customer name:										Telephone number:										
Address:																				
Cylinder Make and Model																				
Cylinder Serial Number																				
Commissioned by (PRINT NAME):										Registered Operative ID Number										
Company name:										Telephone number:										
Company address:																				
										Commissioning date:										
To be completed by the customer on receipt of a Building Regulations Compliance Certificate*:																				
Building Regulations Notification Number (if applicable)																				
ALL SYSTEMS PRIMARY SETTINGS (indirect heating only)																				
Is the primary circuit a sealed or open vented system?										Sealed					Open					
What is the maximum primary flow temperature?																				°C
ALL SYSTEMS																				
What is the incoming static cold water pressure at the inlet to the system?															bar					
Has a strainer been cleaned of installation debris (if fitted)?															Yes			No		
Is the installation in a hard water area (above 200ppm)?															Yes			No		
If yes, has a water scale reducer been fitted?															Yes			No		
What type of scale reducer has been fitted?																				
What is the hot water thermostat set temperature?															°C					
What is the maximum hot water flow rate at set thermostat temperature (measured at high flow outlet)?															l/min					
Time and temperature controls have been fitted in compliance with Part L of the Building Regulations?																		Yes		
Type of control system (if applicable)										Y Plan			S Plan			Other				
Is the cylinder solar (or other renewable) compatible?															Yes			No		
What is the hot water temperature at the nearest outlet?															°C					
All appropriate pipes have been insulated up to 1 metre or the point where they become concealed																		Yes		
UNVENTED SYSTEMS ONLY																				
Where is the pressure reducing valve situated (if fitted)?																				
What is the pressure reducing valve setting?															bar					
Has a combined temperature and pressure relief valve and expansion valve been fitted and discharge tested?															Yes			No		
The tundish and discharge pipework have been connected and terminated to Part G of the Building Regulations																		Yes		
Are all energy sources fitted with a cut out device?															Yes			No		
Has the expansion vessel or internal air space been checked?															Yes			No		
THERMAL STORES ONLY																				
What store temperature is achievable?															°C					
What is the maximum hot water temperature?															°C					
ALL INSTALLATIONS																				
The hot water system complies with the appropriate Building Regulations																		Yes		
The system has been installed and commissioned in accordance with the manufacturer's instructions																		Yes		
The system controls have been demonstrated to and understood by the customer																		Yes		
The manufacturer's literature, including Benchmark Checklist and Service Record, has been explained and left with the customer																		Yes		
Commissioning Engineer's Signature																				
Customer's Signature																				
(To confirm satisfactory demonstration and receipt of manufacturer's literature)																				

*All installations in England and Wales must be notified to Local Authority Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer.



SERVICE RECORD

It is recommended that your hot water system is serviced regularly and that the appropriate Service Record is completed.

Service Provider

Before completing the appropriate Service Record below, please ensure you have carried out the service described in the manufacturer's instructions.

SERVICE 01	Date:	SERVICE 02	Date:
Engineer name:		Engineer name:	
Company name:		Company name:	
Telephone No:		Telephone No:	
Comments:		Comments:	
Signature		Signature	

SERVICE 03	Date:	SERVICE 04	Date:
Engineer name:		Engineer name:	
Company name:		Company name:	
Telephone No:		Telephone No:	
Comments:		Comments:	
Signature		Signature	

SERVICE 05	Date:	SERVICE 06	Date:
Engineer name:		Engineer name:	
Company name:		Company name:	
Telephone No:		Telephone No:	
Comments:		Comments:	
Signature		Signature	

SERVICE 07	Date:	SERVICE 08	Date:
Engineer name:		Engineer name:	
Company name:		Company name:	
Telephone No:		Telephone No:	
Comments:		Comments:	
Signature		Signature	

SERVICE 09	Date:	SERVICE 10	Date:
Engineer name:		Engineer name:	
Company name:		Company name:	
Telephone No:		Telephone No:	
Comments:		Comments:	
Signature		Signature	

MAINTENANCE

19. User instructions

The water heater must be drained if the absence mode cannot be used or when the appliance is switched off. Proceed as follows:

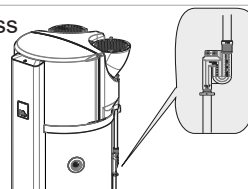
- ❶ Switch off the power supply.
- ❷ Close the cold water supply to the safety unit.
- ❸ Open a hot water tap.
- ❹ Open the safety unit drain valve.

20. Maintenance

In order to maintain the performance capabilities of your water heater, performing regular maintenance is recommended.

20.1. User maintenance

What?	When?	How?
<u>General condition:</u>	Once a month	Check the general condition of your appliance (<i>no Err code displayed, no water leaking from the connections, etc.</i>).
<u>Flow of condensates:</u>	Once a year	Check the cleanliness of the condensates discharge tube.

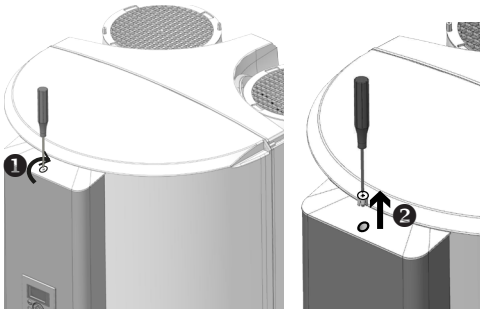


20.2. Professional maintenance

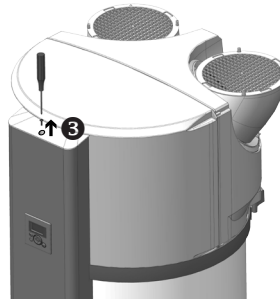


The appliance must be switched off before opening the covers.

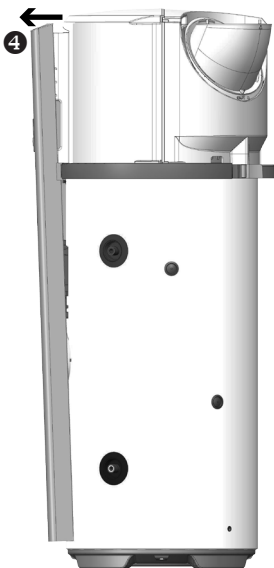
20.2.1. Access to the water heater elements



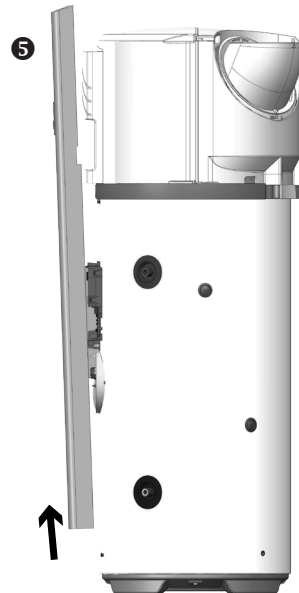
- 1 Turn the screw cap by 1/2 turn.
- 2 Remove the screw cap.



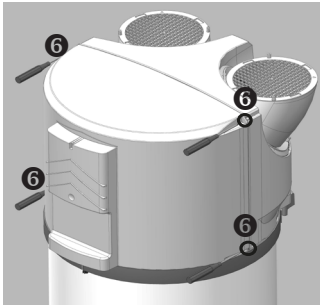
- 3 Remove the locking screw from the column.



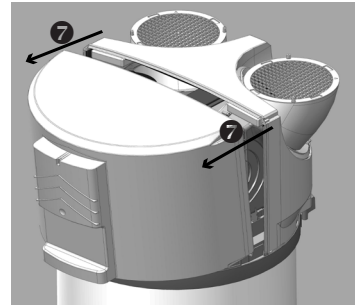
- 4 Tilt the column slightly forwards.



- 5 Lift the column to detach it from the bottom inserts, exercising caution with respect to the control cable and the earth cable.

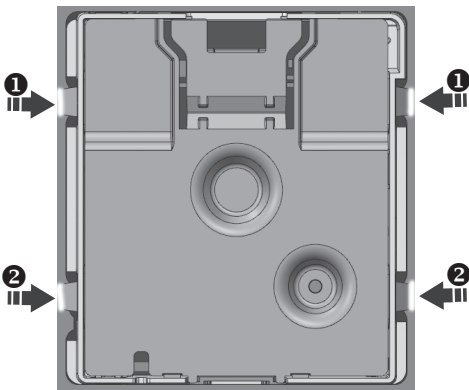


⑥ Unscrew the 4 screws on the front cover of the heat pump.



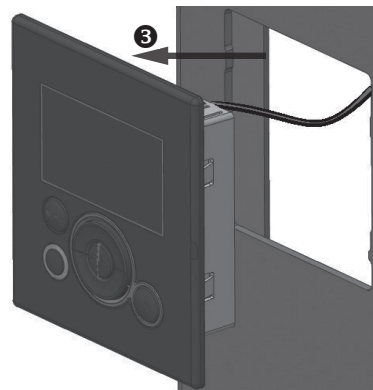
⑦ Tilt the front cover of the heat pump forwards.

To remove the control unit



rear view

- ① Hold the front cover and remove the top of the control unit by pressing the 2 clips at the back.
- ② Press the 2 clips located lower down.



- ③ Remove the control unit.

20.2.2. Operations to be performed by the installer

What?	When?	How?
Ducting	Once a year	Check that the ducts are properly in place and not crushed.
Condensates flow	Once a year	Check that the condensates drain pipe is clean.
Electrical connections	Once a year	Check that there are no loose wires on the wiring and that all the connectors are in place.
The electric booster	Once a year	Check that the electric booster is working properly by measuring the power.
Scaling	Every 2 years	If scale has built up in the water heater water supply, perform a descaling operation.

20.2.3. Operations to be performed by a refrigeration engineer

What?	When?	How?
Heat pump heat exchange	Every 2 years*	Check that the heat pump is exchanging heat correctly.
The heat pump elements	Every 2 years*	Check the correct operation of the fan in both speeds and the hot gas valve.
The evaporator	Every 2 years*	Clean the evaporator using a nylon brush and non-abrasive, non-corrosive products.
The refrigerant	Every 5 years*	Check the fluid load.

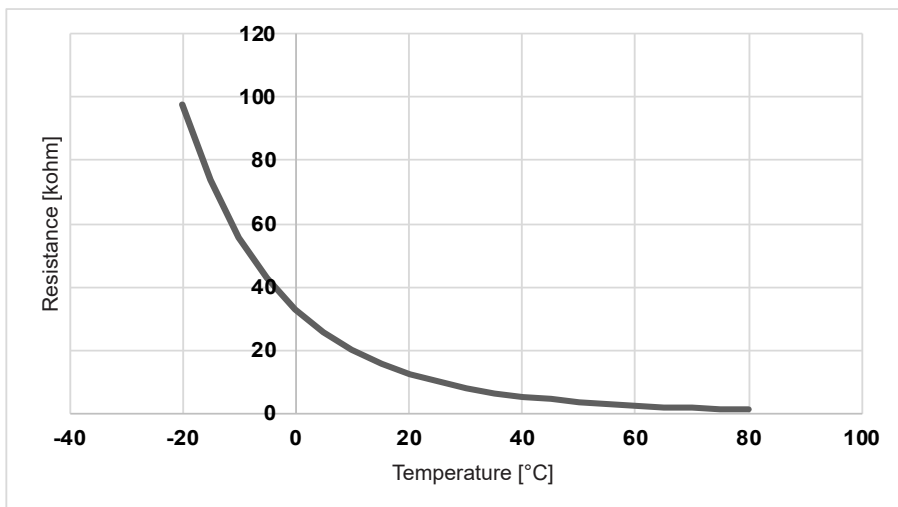
* For dusty environments, increase the maintenance frequency

20.3. Ohmic values of the probes according to temperatures

Air probe / Immersion sleeve probe / Evaporator probe

°C	Resistance K ohm
-20	97.9
-15	73.6
-10	55.8
-5	42.7
0	32.9
5	25.5
10	20
15	15.8
20	12.5
25	10
30	8

°C	Resistance K ohm
35	6.5
40	5.3
45	4.4
50	3.6
55	3
60	2.5
65	2.1
70	1.8
75	1.5
80	1.3



21. Troubleshooting

In the event of an anomaly, lack of heating or the release of steam when bleeding, switch off the power supply and notify the installer.



Troubleshooting operations should only be performed by a professional.

21.1. Error code display

The alarm beep can be turned off by pressing OK.

Displayed code	Cause	Consequences	Diagnostic and repair
Err W.3	Immersion sleeve probe (<i>water T°</i>) defective or outside measuring range (<i>temperature <0° C or > 85°C</i>).	Cannot read water temperature: No heating.	Check the connections and the correct positioning of the probe. Check the resistance. If clear, replace the probe.
Err W.9	Water temperature too hot. (<i>T03 > 80°</i>).	Risk of triggering the mechanical safety device: no heating.	Check the connections, the positioning of the immersion sleeve probe and that the water temperature at the tap is > 80°C. Compare the value read by the probe and the water temperature. Check that the electric booster is not constantly controlled. Reset the mechanical safety device if necessary.
Err W.11	No detection of the Off-Peak signal.	Heats irrespective of the Off-Peak signal.	Check the wiring and the transmission of the Off-Peak signal. Change the configuration for start-up permissions.
Err W.12	Water temperature too cold (<i>T < 5°C</i>).	Stop heat pump. Heat electrically.	Automatic reset as soon as <i>T > 10°C</i> . Check the compliance of the installation (frost-free room).
Err W.15	Date/time not set.	Stop Heat Pump if Programming.	Re-enter the date and time.
Err W.21	Faulty outdoor air temperature probe. (<i>measures <-20°C or >70°C</i>).	Stop the heat pump. Heating using the electric booster at the programmed setpoint.	Check the connections and the correct positioning of the probe. Check the resistance. If clear, replace the probe.

Displayed code	Cause	Consequences	Diagnostic and repair
Err W.22.1	Lower evaporator temperature probe defective. Problem with probe or icy. (temp < -20° or > 110°).	Stop the heat pump. De-icing function compromised. • AUTOmode: electricbooster heating at setpoint. • MANUAL mode: electric booster heating.	Check the connections and that the probe is properly seated on its tube. Check that the fan is working and that it turns freely and without stopping.
Err W.22.2	Upper evaporator temperature probe defective. Problem with probe or icy. (temp <-20° or > 110°).	Stop the heat pump. De-icing function compromised. • AUTO mode: electric booster heating at setpoint. • MANUAL mode: electric booster heating.	Check the connections and that the probe is properly seated on its tube. Check that the fan is working and that it turns freely and without stopping.
Err W.25	HP pressure switch or Klixon compressor open 30 sec after compressor start-up test.	Compressor not starting / Heat pump stopped. • AUTO mode: electric booster heating at setpoint. • MANUAL mode: electric booster heating at setpoint.	Check that the air temperature has not exceeded 35°C. Check that there are no traces of oil on the heat pump circuit and that there are no water leaks (joints or connections). If the air temperature is OK: check the load and connections + condenser + hot gas valve operation.
Err W.28	De-icing malfunction.	• Stop the heat pump. • AUTO mode: electric booster heating at setpoint. • MANUAL mode: electric booster heating.	Check that the configuration matches the ducting settings. Check for proper condensates drainage. Check the operation of the fan. Check that the evaporator is clean. Check the load (<i>appliance de-iced</i>).

Displayed code	Cause	Consequences	Diagnostic and repair
Err W.30.1	No heat exchange or Heat pump has been operating for 20 hours without reaching the temperature setpoint.	Stop the heat pump. Heating using the electric booster at the programmed setpoint.	Overconsumption or recycling loop or leak on the hot water network. Check the load, overheating value, de-icing operation. Check the position of the probes.
Err W.30.2	Heat pump heating ineffective.	Heat pump stopped. Heating in ELEC. mode.	Check the operation of the fan. Check the load.
Err W.30.3	Defective pressure regulator.	Heat pump stopped. Heating in ELEC. mode.	Check the load. If fully loaded, replace the pressure regulator.
Err W.30.4	Heat pump drift.	Heat pump stopped. Heating in ELEC. mode.	Check the load.
Err W.30.5	Probe clearance drift.	Heat pump stopped. Heating in ELEC. mode.	Check the connections and the positioning of the air probe and the evaporator probe. If necessary, replace the probe harness.

21.2. Other faults without error codes displayed

Fault found	Possible cause	Diagnostic and repair
No more heating. No hot water.	<ul style="list-style-type: none"> • No power supply to the water heater: fuses, wiring, etc. • Heater or heater wiring out of order. 	<ul style="list-style-type: none"> • Check for voltage on the water heater power wires. • Check that the heater is electrically powered.
No hot water	<ul style="list-style-type: none"> • Mains water stop valve is closed. • The line strainer/filter in the inlet control group is blocked. • The inlet control group is piped incorrectly 	<ul style="list-style-type: none"> • Open it • Remove valve and washed the dirt from the line strainer/ filter. • Check for correct orientation.
Discharge from expansion Relief Valve on inlet control group.	<ul style="list-style-type: none"> • Expansion vessel has a reduced static air pressure due to air loss. 	<ul style="list-style-type: none"> • Isolate the expansion vessel from the plumbing system, check the pressure and use an air pump to raise the pressure to the charge pressure shown on the data label.
TPRV discharging very hot water	<ul style="list-style-type: none"> • Overheating from Immersion heater. 	<ul style="list-style-type: none"> • Turn off the heat source, but not the water supply. • When the TPRV stops discharging, check thermostat(s) and energy cut-out on the HPWH and immersion heater and replace the faulty component(s).
Insufficient amount of hot water.	<ul style="list-style-type: none"> • Under-sizing of the water heater. • Operation in Manual mode. • Leak in the hot water network. • Recirculation loop 	<ul style="list-style-type: none"> • Select AUTO mode or deactivate the ECO function in MANUAL mode. • There is no recirculation port on the Calypso. Therefore a recirculation loop will need to feed back into the cylinder via the cold feed pipework downstream of the inlet control group. If this is not controlled effectively it will impact on the DHWH capacity and reheat time.

Fault found	Possible cause	Diagnostic and repair
Low flow rate at hot water tap.	<ul style="list-style-type: none"> • Line strainer/filter blocked. • Build-up of scale in the water heater. 	<ul style="list-style-type: none"> • Clean the filter. • Descale the water heater.
Water not hot enough.	<ul style="list-style-type: none"> • Main power supply to the water heater is not constant. • MANUAL mode and ECO function selected and low air temperatures. • Heating element or its wiring partially out of order. • Cold water return in the hot water circuit. • Sanitary loop on the installation. 	<ul style="list-style-type: none"> • Check that the power supply to the appliance is constant. • Select AUTO mode or deactivate the ECO function. • Check the ohmic value of the Immersion heater and the good condition of the wiring harness. • Reverse flow can occur if the cold water pipework is connected to the hot water pipe work; or, mixer taps are fitted to an unbalanced supply. This can be cured by the use of the balanced cold feed port on the inlet control group; or, the use of single check valves on the supply pipes to the mixer valves. • Remove the loop.
Continuous loss of water from the safety unit outside the heating period.	<ul style="list-style-type: none"> • Expansion relief valve damaged or clogged. • Pressure relief valve not working effectively. 	<ul style="list-style-type: none"> • Replace the expansion relief valve. • Release the water pressure due to expansion and then measure the water pressure downstream of the inlet control group. If the pressure is above 0.3MPa 3.5 Bar the inlet control group should be replaced.
The electric booster does not work.	<ul style="list-style-type: none"> • Overheat manual reset thermostat has operated. • Defective immersion heater. 	<ul style="list-style-type: none"> • Reset the thermostat safeguard on the heating element. • Replace the heating element.
Overflow of condensates.	<ul style="list-style-type: none"> • Blocked flow of condensates. 	<ul style="list-style-type: none"> • Clear blockage.

Fault found	Possible cause	Diagnostic and repair
Smell	<ul style="list-style-type: none"> • No siphon on the safety unit. • No water in the siphon of the safety unit. 	<ul style="list-style-type: none"> • Install a siphon. • Fill the siphon.
Steam is released when bleeding.	<ul style="list-style-type: none"> • Electric booster constantly on. 	<ul style="list-style-type: none"> • Switch off the power supply and notify the installer.
The heat pump is operating outside Off-Peak hours.	<ul style="list-style-type: none"> • Temperature setpoint not reached. • Evaporator heavily clogged. 	<ul style="list-style-type: none"> • Please refer to the operation of the modes: AUTO mode allows operation outside Off-Peak hours. • Clean the evaporator.
The heat pump operates for a short time, the electric booster operates practically constantly.	<ul style="list-style-type: none"> • Air temperature outside the permissible ranges. • Evaporator heavily clogged. 	<ul style="list-style-type: none"> • Wait for the temperatures to return to within the permissible ranges. • Clean the evaporator.

22. After-sales service

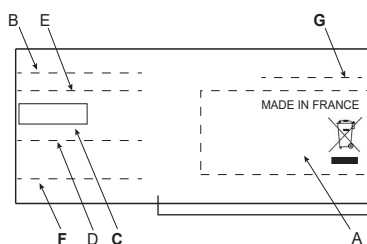


Only use original manufacturer's spare parts.

Any work undertaken on the electrical parts must be performed by a specialist.

When ordering from a company distributor, please state the exact type of water heater and its serial number as found on the legend plate.

The address of the after-sales service is shown on the back of these instructions.

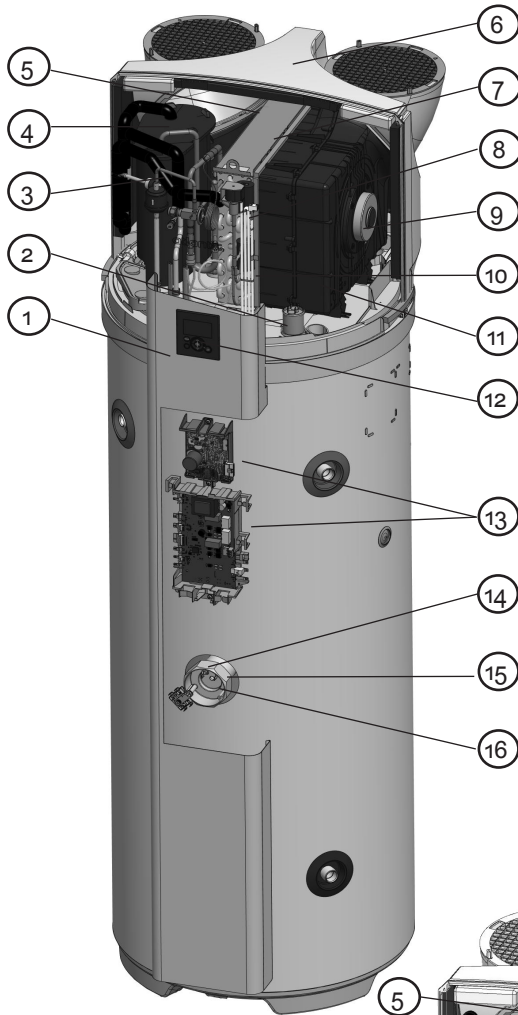


- A Standards, quality label
- B Commercial name
- C **Commercial code**
- D Manufacturing reference
- E Commercial name
- F **Serial No.**
- G **Manufacturer's No.**

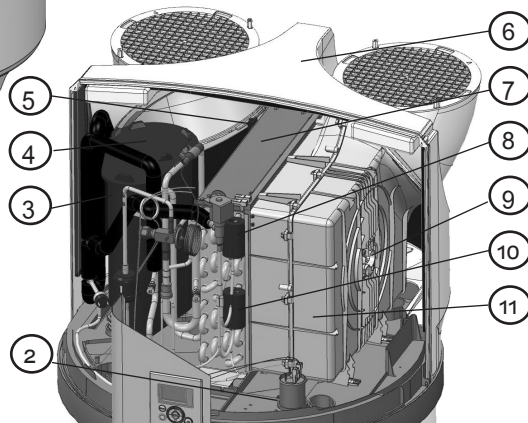


The appliance must be switched off before opening the cover (to open the cover, please refer to the "Maintenance" paragraph).

A professional can order spare parts directly on the Services Platform accessible on the company's website.



1	Front cover
2	Compressor condenser
3	Compressor insulation jacket
4	Compressor
5	Air inlet probe
6	Fitted rear housing
7	Evaporator
8	Upper evaporator probe
9	Fan
10	Lower evaporator probe
11	Volute assembly
12	Control panel
13	Electronic regulation (1 or 2 boards depending on the product)
14	ECS regulation probe
15	Thermal safety
16	Heating element
17	Plastic housing (not shown)



Atlantic

AMD, SEP 2023

CONDITIONS OF SALE & GUARANTEE TERMS

1. **Atlantic** ("We" or "Ideal") only do business upon the Conditions which appear below and no other. Unless we so agree in writing these Conditions shall apply in full to any supply of goods by us to the exclusion of any Conditions or terms sought to be imposed by any purchaser. These Conditions of Sale and Warranty Terms override those which are contained on the Invoice Forms and all Sales are now subject to these Conditions of Sale and Warranty terms only.

The warranty is provided by Ideal Boilers Limited, National avenue, Hull, HU5 4JB.

2. PRICE

Once an order or call off has been accepted the price will be held for three months but if delivery is extended beyond that period at the customer's request, then we reserve the right to amend the price when necessary. The company reviews its pricing annually to adjust for changes in our cost base. We reserve the right to alter prices at any time for severe movements in raw materials (mainly copper and steel). If there is to be a change we will give customers at least four weeks notice but anything delivered after that date will be at the revised price. An order may not be cancelled or varied after acceptance without the written consent of the company. Such cancellation or variation shall be subject to such reasonable charges as may be appropriate.

3. SPECIFICATION

The goods are supplied in accordance with the Specifications (if any) submitted to the Purchaser and any additions and alterations shall be the subject of an extra charge. Any goods not so specified shall be in accordance with our printed literature or the literature of any of our component suppliers (subject to any modifications made since publication). If we adopt any changes in construction or design of the goods, or in the specification printed in our literature, the Purchaser shall accept the goods so changed in fulfilment of the order.

4. PAYMENT

The buyer shall make payment in full within thirty days from the end of the month in which the invoice is dated. If we receive payment in full on or before the due date we will allow an appropriate settlement discount except where we have quoted a special net price. If payment is not received in full on or before the due date we shall be entitled in addition to the invoice price to:

- payment of a sum equal to any increase in the copper price supplement applicable to the particular goods sold between the date of receipt of order and the date of receipt of payment in full; and
- interest on any part of the invoice price unpaid after the due date at the rate of 3% per annum over the base rate for the time being of HSBC Bank plc.

5. TIME

We give estimates of delivery dates in good faith and time of delivery is not nor shall be made of the essence of any contract nor shall we be liable for any loss or damage occasioned by delay in delivery.

6. DELIVERY

Standard delivery is free of charge on normal lead times to mainland UK. We reserve the right to make delivery of goods contained in one order by more than one consignment and at different times. Where a period is agreed for delivery and such period is not extended by our Agreement, the Purchaser shall take delivery within that period. If the Purchaser fails to take delivery, we shall be entitled at the Purchaser's risk and expense to store the goods at the Purchaser's premises or elsewhere and to demand payment as if they had been despatched. Off loading at point of delivery shall be the responsibility of and be undertaken by the Purchaser.

7. SHORTAGES OR DAMAGE

Goods must be inspected before signature of delivery note and any damage, shortage or discrepancy noted on the delivery note and the goods returned on the same vehicle. The buyer must also give us immediate written notice of the damage, shortage or discrepancy so that we may prompt investigation.

8. RETURN OF GOODS

Goods may not be returned to the Company except by prior written permission of an authorised officer of the Company and such return shall be subject to payment by the Purchaser of handling and re-stocking charges, transport and all other costs incurred by the Company.

9. COMPANY LIABILITY AND GUARANTEE

9.1. Subject to the terms of these Conditions of Sale and Guarantee Terms Ideal provide Guarantees in respect of specific products as set out in this clause.

9.2. Each Guarantee is strictly conditional upon the following:-

9.2.1. Complaints must be given to us immediately, before any action is taken, as responsibility cannot be accepted if repairs or renewals are attempted on site without our written approval.

9.2.2. The unit has been installed in accordance with our installation and service instructions and all relevant codes of practice and regulations in force at the time of installation.

9.2.3. All necessary inlet controls and safety valves have been fitted correctly.

9.2.4. The unit has only been used for the storage of potable water supplied from the public mains. The water quality shall be in accordance with European Council Directive 98/83 EC, or revised version at the date of installation, and is not fed with water from a private supply. Particular:

Chloride content:	Max. 200 mg/l
Sulphate content:	Max. 200 mg/l
Combination chloride/sulphate:	Max. 300 mg/l (in total)

(a) Domestic and Commercial Open Vented Cylinders and Tanks

The storage vessel is guaranteed for ten years and if it proves to be defective either in materials or workmanship, we reserve the right to either repair or supply replacement at our option with the closest substitute in the case of any obsolete product to any address in England, Wales and Scotland (excluding all Scottish Islands).

(b) Domestic Mains Fed Products (Primary Stores)

The storage vessel is guaranteed for five years and if it or any integral pipework as part of the storage vessel assembly proves to be defective either in materials or workmanship, reserve the right to either repair or supply replacement at our option with the closest substitute in the case of any obsolete product to any address in England, Wales and Scotland (excluding all Scottish Islands).

(c) Unvented Cylinders

Ideal guarantee the components including controls, valves and electrical parts for two years from the date of purchase. IT SHOULD BE NOTED THAT THE FACTORY FITTED TEMPERATURE AND PRESSURE RELIEF VALVE MUST NOT BE REMOVED OR ALTERED IN ANY WAY OR THE GUARANTEE WILL NOT BE VALID. IDEAL WILL NOT BE RESPONSIBLE FOR ANY CONSEQUENTIAL LOSS OR DAMAGE HOWEVER IT IS CAUSED.

The guarantee for the stainless steel vessel is for twenty five years against material defect or manufacturing faults if the original unit is returned to us AND PROVIDED THAT:

- It has not been modified, other than by Ideal.
- It has not been subjected to wrong or improper use or left uncared for.
- It has only been used for the storage of potable water supplied from the public mains, max 200mg/litre chloride.
- (iv) It has not been subjected to frost damage.
- The benchmark service record is completed after each annual service.
- The unit has been serviced annually.
- Any disinfection has been carried out strictly in accordance with BS6700.

If the stainless steel vessel proves to be defective either in materials or workmanship we reserve the right to either repair or supply replacement at our option with the closest substitute in the case of any obsolete product to any address in England, Wales and Scotland (excluding all Scottish Islands).

ACTION IN THE EVENT OF FAILURE

We will require the return of a cylinder which develops a leak for inspection. If our examination confirms a failure then an appropriate level of credit against the cost of the original cylinder will be issued in line with the terms of our warranty.

Please note:

- Installation must have been carried out by a licensed specialized company (heating contractor or plumber) following the version of installation instructions in force.
- Ideal or its representative was given the opportunity to check complaints on site immediately after any defect occurred.
- Confirmation exists that the system was commissioned properly and that the system was checked and maintenance was performed annually by a specialised company licensed for this purpose.

(d) Heat Pump Water Heater Cylinders

The scope and conditions of the guarantee are in line with those set out for Unvented Cylinders in paragraph (c) above, with the exception that the guarantee for the stainless steel vessel is five years against material defect or manufacturing faults.

(e) Components of our products other than Storage Vessels and Integral Pipework.

We will either extend to the purchaser the same terms of warranty as we are given by the manufacturer of the component or if the manufacturer does not give any warranty, replace free of charge any component which becomes defective within two years after the date of the delivery by us and is returned to us at the purchaser's expense but we shall not meet the cost of removal or shipping or return of the component or any other cost charges or damages incurred by the purchaser.

9.4. In respect of goods supplied by us and in respect of any installation work carried out by or on our behalf, our entire liability and the purchaser's sole remedies (subject to the Guarantees) shall be as follows:-

- We accept liability for death or personal injury to the extent that it results from our negligence or that of our employees
- Subject to the other provisions of this clause 9 we accept liability for direct physical damage to tangible property to the extent that such damage is caused by our negligence or that of our employees, agents or subcontractors.
- Our total liability to the purchaser over and above any liability to replace under the Guarantees (whether in contract or in tort including negligence) in respect of any one cause of loss or damage claimed to result from any breach of our obligations hereunder shall be limited to actual monetary damages which shall not exceed £20,000 provided that such monetary limit shall not apply to any liability on the part of ourselves referred to in paragraph (a) above
- Except as provided in paragraph (a) above but otherwise not withstanding any provision herein contained in no event shall we be liable for the following loss or damage howsoever

caused and even if foreseeable by us or in our contemplation:-

- (i) economic loss which shall include loss of profits, business revenue, goodwill or anticipated savings
 - (ii) damages in respect of special indirect or consequential loss or damage (other than death, injury and damage to tangible property)
 - (iii) any claim made against the purchaser by any other party (save as expressly provided in paragraph (b) above)
- (e) Except in respect of our liability referred to in paragraph (a) above no claim may be made or action brought (whether in contract or in tort including negligence) by the purchaser in respect of any goods supplied by us more than one year after the date of the invoice for the relevant goods.
- (f) Without prejudice to any other term we shall not be liable for any water damage caused directly or indirectly as a result of any leak or other defect in the goods. We cannot control the conditions of use of the goods or the time or manner or location in which they will be installed and the purchaser agrees to be fully responsible for testing and checking all works which include the goods at all relevant times (up to, including and after commissioning) and for taking all necessary steps to identify any leaks and prevent any damage being caused thereby.
- (g) Nothing in these Conditions shall confer on the purchaser any rights or remedies to which the purchaser would not otherwise be legally entitled.

10. LOSS OR INJURY

Notwithstanding any other provision contained herein the purchaser's hereby agree to fully indemnify us against any damages losses costs claims or expenses incurred by us in respect of any claim brought against us by any third party for:-

- (a) any loss injury or damage wholly or partly caused by any goods supplied by us or their use.
- (b) any loss injury or damage wholly or partly caused by the defective installation or substandard workmanship or materials used in the installation of any goods supplied by us.
- (c) any loss injury or damage in any way connected with the performance of this contract.
- (d) any loss resulting from any failure by the purchaser to comply with its obligations under these terms as to install and/or check works correctly.

PROVIDED that this paragraph will not require the purchaser to indemnify us against any liability for our own acts of negligence or those of our employees agents or sub-contractors

FURTHER in the case of goods supplied by us which are re-sold and installed by a third party by the purchaser it will be the sole responsibility of the purchaser to test the goods immediately after their installation to ensure that interalia they are correctly installed and in proper working order free from leaks and are not likely to cause any loss injurious damage to any person or property.

11. VARIATION OF WARRANTY AND EXCLUSION

Should our warranty and exclusion be unacceptable we are prepared to negotiate for variation in their terms but only on the basis of an increase in the price to allow for any additional liability or risk which may result from the variation. Purchasers are advised to insure against any risk or liability which they may incur and which is not covered by our warranty.

12. ADVICE

Any advice or assistance given by the Company is provided without charge and is in good faith without undertaking, representation or warranty, and we will not accept any liability, whether consequential or compensatory, for advice or assistance given.

13. ADVICE RISK AND RETENTION OF TITLE

- (a) goods supplied by us shall be at the Purchaser's risk immediately upon delivery to the Purchaser or into custody on the Purchaser's behalf or to the Purchaser's Order. The Purchaser shall effect adequate insurance of the goods against all risks to the full invoice value of the goods, such insurance to be effective from the time of delivery until property in the goods shall pass to the Purchaser as hereinafter provided.
- (b) property in the goods supplied hereunder will pass to the Purchaser when full payment has been made by the Purchaser to us for :-
 - (i) the goods of the subject of this contract
 - (ii) all other goods the subject to of any other contract between the Purchaser and us which, at the time of payment of the full price of the goods sold under this contract, have been delivered to the Purchaser but not paid for in full.
- (c) until property in the goods supplied hereunder passes to the Purchaser in accordance with paragraph (2) above.
 - (i) the Purchaser shall hold the goods in a fiduciary capacity for us and shall store the same separately from any other goods in the Purchaser's possession and in a manner which enables them to be identified as our goods.
 - (ii) the Purchaser shall immediately return the goods to us should our authorised representative so request. All the necessary incidents associated with a fiduciary relationship shall apply.
- (d) the Purchaser's right to possess the goods shall cease forthwith upon the happening of any of the following events, namely :-
 - (i) if the Purchaser fails to make payment in full for the goods within the time stipulated in clause 4 hereof.
 - (ii) if the Purchaser, not being a company, commits any act of bankruptcy, makes a proposal to his or her creditors for a compromise or does anything which would entitle a petition for a Bankruptcy Order to be presented.
 - (iii) if the Purchaser, being a company, does anything or fails to do anything which would entitle an administrator or an administrative receiver or a receiver to take possession of any assets or which would entitle any person to present a petition for winding up or to apply for an administration order.
- (e) Purchaser hereby grants to us an irrevocable licence to enter at any time any vehicle or premises owned or occupied by the Purchaser or in the possession of the Purchaser for the purposes of repossessing and recovering any such goods the property in which has remained in us under paragraph (2) above. We shall not be responsible for and the Purchaser will indemnify us against liability in respect of damage caused to any vehicle or premises in such repossession and removal being damaged which it was not reasonably practicable to avoid.
- (f) notwithstanding paragraph (3) hereof and subject to paragraph (7) hereof, the Purchaser shall be permitted to sell the goods to third parties in the normal course of business. In this respect the Purchaser shall act in the capacity of our commission agent and the proceeds of such sale :-

(i) shall be held in trust for us in a manner which enables such proceeds to be identified as such, and.

(ii) if shall not be mixed with other monies nor paid into an overdrawn bank account.

We, as principal, shall remunerate the Purchaser as commission agent a commission depending upon the surplus which the Purchaser can obtain over and above the sum, stipulated in this contract of supply which will satisfy us.

(g) in the event that the Purchaser shall sell any of the goods have been sold.

(h) if, before property in the goods passes to the Purchaser under paragraph (2) above the goods are or become affixed to any land or building owned by the Purchaser it is hereby agreed and declared that such affixation shall not have the effect of passing property in the goods to the Purchaser. Furthermore if, before property in the goods shall pass to the Purchaser under paragraph (2) hereof, the goods are or become affixed to any land or building (whether or not owned by the Purchaser), the Purchaser shall:-

(i) in the event that, before property in the goods has passed to the Purchaser under paragraph (2) hereof, the goods or any of them are lost, stolen, damaged or destroyed :-

(ii) the Purchaser shall forthwith inform us in writing of the fact and circumstances of such loss, theft, damage or destruction.

(iii) the Purchaser shall assign to us the benefit of any insurance claim in respect of the goods so lost, stolen, damaged or destroyed.

14. NON PAYMENT

If the Purchaser shall fail to make full payment for the goods supplied hereunder within the time stipulated in clause 4 hereof or be in default of payment for any other reason then, without prejudice to any of our other rights hereunder, we shall be entitled to stop all deliveries of goods and materials to the Purchaser, including deliveries or further deliveries of goods under this contract. In addition we shall be entitled to terminate all outstanding orders.

15. VALUE ADDED TAX

All prices quoted are exclusive of Value Added Tax which will be charged at the rate ruling at the date of despatch of invoice.

16. TRADE SALES ONLY

We are only prepared to deal with those who are not consumers within the terms of the Unfair Contract Terms Act 1977, the Sale of Goods Act 1979 and the Supply of Goods and Services Act 1982. Accordingly any person who purchases from us shall be deemed to have represented that he is not a consumer by so purchasing.

17. JURISDICTION

The agreement is subject to English law for products delivered in England and Scottish law for products delivered in Scotland and any dispute hereunder shall be settled in accordance therewith dependent upon the location.

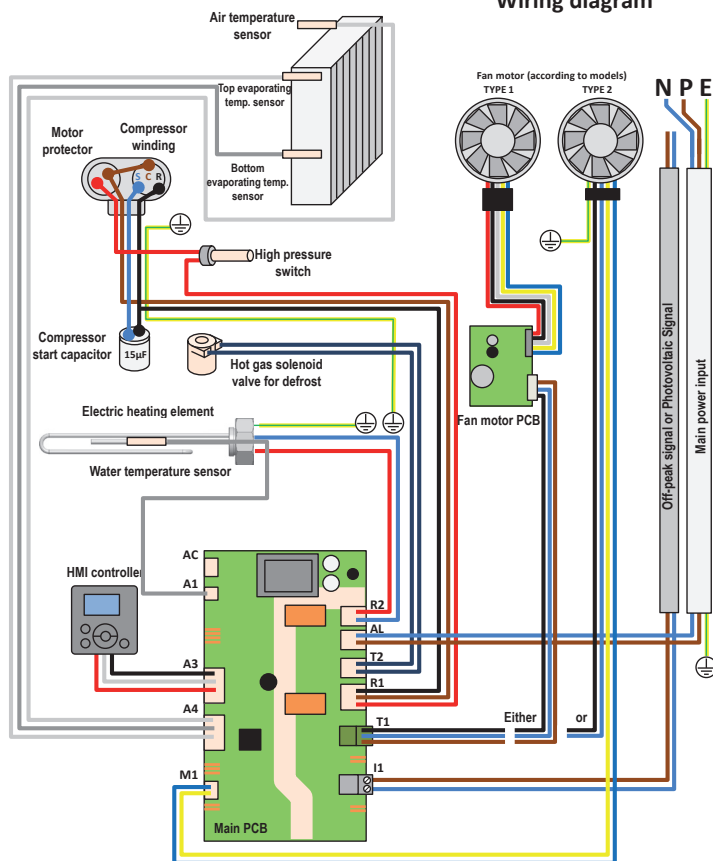
18. PRODUCT DEVELOPMENT






Ideal have a policy of continuous product development and may introduce product modifications from time to time.

WIRING DIAGRAM

For your heat pump
water heater maintenance

Wiring diagram



Compressor winding  Resistance RC = 5 Ω, Resistance CS = 6 Ω, Resistance SR = 11 Ω	Compressor's connectors  Resistance MR = 0 Ω Resistance NM = 5 Ω Resistance NR = 5 Ω	Low speed fan motor  Voltage NB ≈ 230 V	High speed fan motor  Voltage NB ≈ 230 V Voltage NM ≈ 230 V
Hot gas solenoid valve Resistance = 1,3 kΩ	Heating element Resistance = 31.5Ω to 36.75 Ω	HMI connector  Voltage NR ≈ 5 V	Temperature sensors R = 12 kΩ (à 20°C)

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