

# **End User Instruction Manual**

## **IHS Ground and Water Source Heat Pumps**

**Models: TERRA Standard Three Phase 15kW - 37kW**

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## Introduction

A standard system includes heat pump, Hygienik Tank, tank stat, diverter valve or twin head pump, hot water programmer and underfloor heating controls.

The heat pump is switched on or activated by either the underfloor heating or the hot water system calling for heat.

You should contact your electricity provider in order to apply for a low cost electricity tariff, eg Economy 10, Economy 7 and Eco Tariff. It's worth shopping around for utility providers to find the best deal.

Note: Economy 10 is an ideal tariff as it gives three periods of off-peak electricity spread over ten hours. These times can also be utilised to operate dishwashers, washing machines, etc.

Time periods vary from region to region but could be in the order of:

### Example Only

Cheap Tariff On	Cheap Tariff Off
*04.30 am	07.30 am
13.30 pm	16.30 pm
20.30 pm	*00.30 am

## Underfloor Heating

The heating controls should be set to match low tariff times. This will ensure the lowest possible running costs for the system.

In winter, ten hours of cheap tariff time may not be enough to keep your building up to temperature, however, the system has been designed to cope with this.

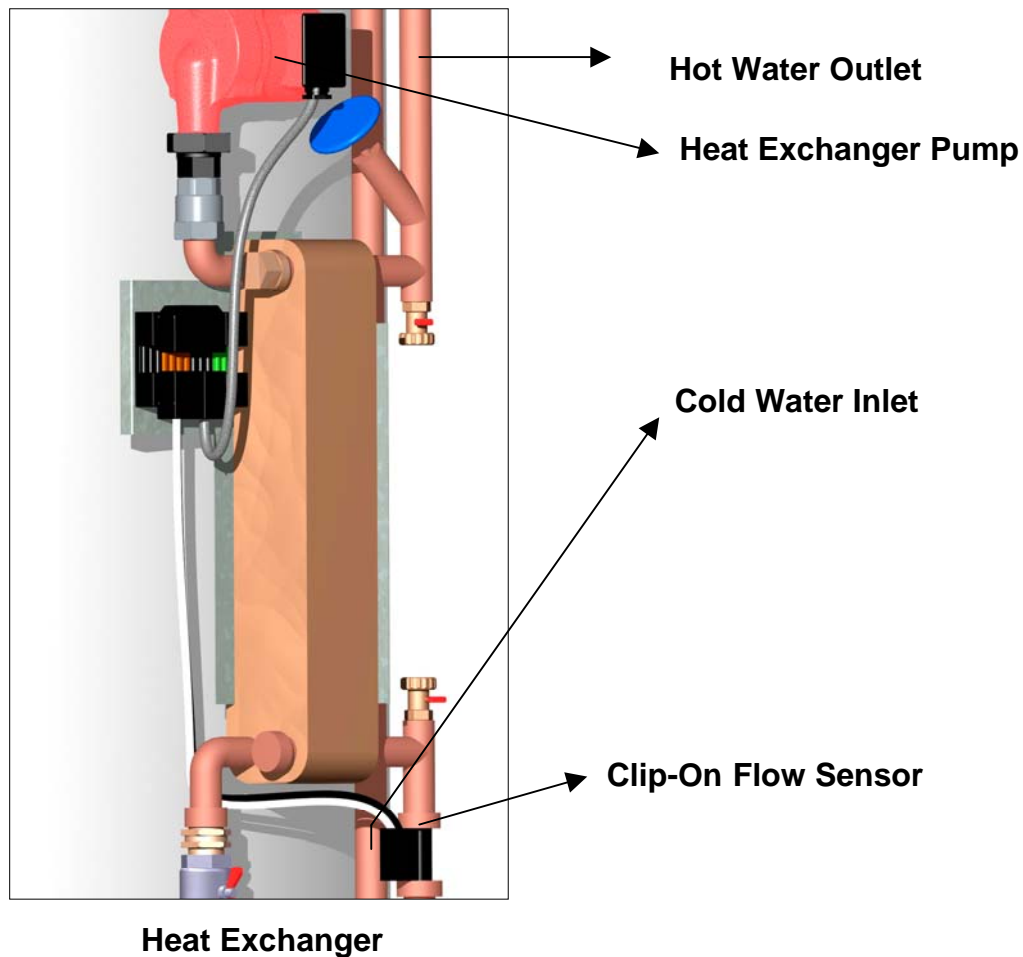
Even when the programmer is timed off, there is a setback stat which will not let the temperature fall below a pre-set minimum level.

We recommend that room stats are set at 20°C for living areas and 16°C for bedrooms.

To avoid extreme temperature variations in your underfloor heating, it is important that you don't change the room stat settings dramatically. If a room is too cold, move the stat up by 1°C. Similarly, if it's too hot, reduce the temperature by 1°C. Leave for 24 hours before adjusting again. The key to underfloor heating is to set the system for stable comfort temperatures rather than what the stat actually reads.

Naturally, the lower the temperature, the lower the running costs.

## Hot Water



The Hygienik Tank acts as a thermal store for the domestic hot water system. It is fitted with a heat exchanger. A heat pump, solar panels or other heat sources such as a wood-burning stove or a conventional boiler can be integrated and connected to it.

A heat exchanger is fitted on the side of the tank. The primary side of the heat exchanger is fed from the Hygienik tank. The other (secondary) side is connected to the domestic mains water system.

On the secondary side, once the hot water tap is turned on, the flow switch gives a signal to the heat exchanger pump to come on. It will pump the water from the top of the tank through the plate heat exchanger to the bottom of the tank, while mains cold water will flow in the opposite direction through the plate heat exchanger extracting the heat from the primary circuit.

In this way, the fresh mains water in the heat exchanger is heated instantly and is delivered straight to the tap resulting in fresh hot water that has never been stored. This avoids development of the legionella bacteria (hence the name Hygienik).

## **Flow Rates**

A label on the plate heat exchanger states the flow rate applicable to the relevant model.

Depending on the size of the plate heat exchanger, domestic water flow rates are delivered in 25 litres, 35 litres, 50 litres and 70 litres per minute (l/min).

**It is important to ensure that the amount of water drawn is no more than the stated flow rates.** This can be checked by performing a bucket test. Use a 10-litre bucket and a watch for timing purposes. Simply open the biggest tap (probably the bath tap) and time how long it takes to fill the bucket.

A modern high-pressure shower should use no more than 11 l/min; therefore a 25 l/min heat exchanger should run two showers at once. An eco-shower uses 7 l/min. These are good high-pressure showers. If your shower uses more water, you should place a restrictor on it. The shower is most likely designed around a non-pressurised system.

Shower types such as a deluge model or full body showers are not recommended for modern energy efficient heating systems.

## Programming

All Invisible Heating Systems incorporate either a dual-channel or two single-channel programmers. For correct programming instructions, please refer to the operating instructions supplied with your system.

All IHS standard heat pump systems give hot water priority. This means that when the hot water system is calling for heat, the heating is off. Care should be given to the timing of the hot water system. Ideally it should be set for three periods in each day - eg early morning, lunchtime and evening. Tank size and hot water requirements influence how long these periods need to be but generally a 1.5-hour period for each should be sufficient. In the winter, you may choose to set these periods outside the low tariff times to allow for priority to be given to the heating system. (We suggest using low tariff periods for underfloor heating). In the spring, summer and autumn it is better to time the hot water so that it is on solely in the cheaper periods.

When the hot water programmer is timed on it supplies power to the tank stat. If the temperature in the tank is below the set point of the tank stat (ie the water in the tank is cooler) the output of the heat pump is diverted to the Hygienik Tank. Once the tank temperature increases beyond the set point of the tank stat, then the output of the heat pump returns once more to the heating.

**The tank stat is set at the time of commissioning. It is essential that the end user does not adjust it. Adjusting the system or tank stat yourself may cause the heat pump output to be directed permanently to the Hygienik Tank resulting in loss of heating.**

**NB: Please check that your programmer updates automatically to reflect seasonal time changes (BST). Not all programmers do this and you may need to update this yourself.**

## Operation with Solar Panels

In the spring, summer and autumn when output from a solar system is optimal, the heat pump's hot water programming should be restricted during daytime hours so that maximum benefit can be obtained from the solar collectors. If hot water is required during the day it may be advisable to programme a short period (eg an hour of low-economy tariff time) to boost hot water capacity on dull days. For further detail, please read the above section "Programming".

## **Setting The Tank Stat**

If, however, you disregard our advice, please carry out the following steps in order to put things right:

When the tank is cool, switch the hot water programmer to "Continuous" and turn the tank stat fully up.

Check the heat pump domestic hot water temperature. Briefly press the SP1 button on the hot water flow temperature controller. This displays the current set-point temperature. We recommend you set the temperature to 53°C. You can do this by pressing the up and down arrows to get to the temperature you require. Push the "P" button once more to save the setting you chose. The first green light "warm water" mode should be on. After a short time the heat pump should start and hot water should be supplied to the tank.

Wait until the heat pump is 1°C below its set-point (52°C) then turn the tank stat down slowly until you hear it click. The heat pump warm water mode light should go out and if there is a call for heating it should go into heating mode and the heating mode light should come on.

## **Setting The Heat Pump Output Temperatures**

You may need to adjust the heat pump temperature down in order to dry out a new underfloor installation. (See Underfloor Heating Installation Manual for further details).

Gradually increase temperature over time from 30°C until the maximum desired output is reached. We recommend setting the final temperature at the lowest possible temperature required to maintain a comfortable ambient temperature in the house. We suggest you start running the system at 40°C and see how it feels. It can be adjusted up and down as required as you learn how the system operates. You normally run the heating output no higher than 50°C.

The lower you run the heating temperature and maintain a comfortable heat, the more efficient your system will be. For example, with an economy tariff such as Economy 10, it is pointless running the heat pump at too low a temperature if the system then has to run for long periods to compensate.

Briefly press the "P" button on the heat pump "heating flow" temperature controller.

It will flash between "SP1 " and the set temperature.

Use the down arrow to set the desired. Press the "P" button once more to set.

## **Heat Pump Operation**

Refer to Illustration Page 9.

On the front panel of the heat pump, there are 2 rocker switches, 5 red warning lights and 1 green light in a row.

The green rocker switch is the main on and off switch.

The black rocker switch is for the ground loop pump and has two positions: "flush" and "auto".

In flush mode, the ground loop pump will always run, even if the heat pump is off. (Providing there is power to the heat pump.)

We recommend putting the system in flush mode prior to commissioning in order to remove all the air out of the ground loop system.

In the auto position, the ground loop pump is automatically switched on shortly before the heat pump comes on. This is the normal operating position for the heat pump.

## **General Operating Functions**

### **Green and Red (Warning) Lights**

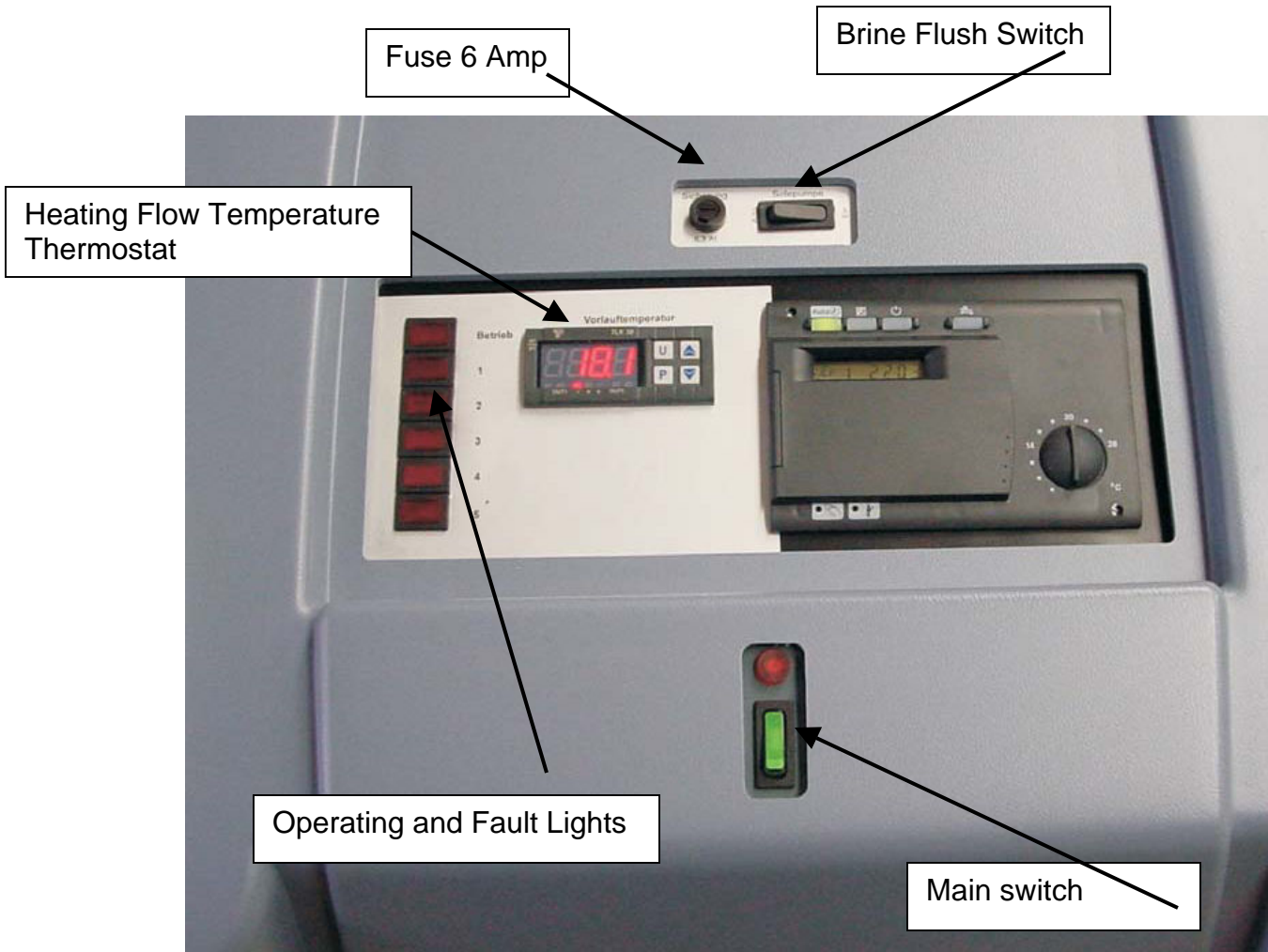
When the green light is on, it means that the heat pump is in normal operating mode and should be running.

When any of the red lights come on, it generally indicates a fault (See fault finding table page 8).

### **Temperature Read-out Function**

There is also a temperature read-out function on the heat pump. This is the temperature that the heat pump is giving to the heating system. (On well water systems, there should be a second readout; this is the discharge temperature from the heat pump.)

Once the heat pump calls for heat, there is an eight-minute delay until the heat pump runs.



## **Fault-Finding**

**Problem** No light on heat pump control panel; no temperature read-out

**Check** Are the main isolator and auxiliary spur switched on?  
 Check fuse on front panel  
 There are further circuit breakers inside the heat pump; call IHS for advice

Fault Code	Meaning	Possible Problem
<b>Error 1</b>	Heat pump high pressure fault. Usually due to poor circulation on the heat pump output.	<p><b>Blocked strainer on the return line from the Hygienik Tank</b></p> <p><b>Solution:</b> Switch pump off. Isolate with isolation valves and clean as required.</p>
		<p><b>Air in the Hygienik Tank</b></p> <p><b>Solution:</b> Put a hose on the bleed point at the top of the tank and open tap to see if any air comes out. Re-pressurise heating system to 1.5 bar as required.</p>
		<p><b>Diverter valve in wrong position</b></p> <p><b>Solution:</b> Remove actuator head and confirm that the valve is pointing to either the heating or the Hygienik tank.</p>
		<p><b>Heat pump circulating pump not running</b></p> <p>On the compact unit, the pump is inside the heat pump on the right.          On other units it is in the return line after the strainer.          Call IHS or consult your heating engineer for advice on how to check the pump.</p>

Fault Code	Meaning	Possible Problem
<p><b>Error 2</b> Ground loop or closed borehole systems</p>	<p>This is a heat pump low pressure fault. Usually caused by insufficient flow rate on input side of the heat pump</p>	<p><b>Blocked strainer on the flow from the ground loop</b></p> <p><b>Solution:</b> Switch pump off. Isolate with isolation valves and clean if necessary.</p>
		<p><b>Ground loop pump not running</b></p> <p>On the compact unit, it's inside the heat pump on the left. On other units it is in flow line after the strainer. Call IHS or consult your heating engineer for advice on how to check the pump.</p>
		<p><b>Loss of pressure</b></p> <p><b>Solution:</b> Check that the ground loop system has pressure, this is normally between 1.5 and 2 bar. Re-pressurise as necessary but if pressure loss persists, look for evidence of leaks in ground loop chain and at the ground loop manifold.</p>
<p><b>Error 2</b> Well systems</p>		<p><b>Blocked strainer on flow from well</b></p> <p><b>Solution:</b> Switch pump off. Isolate with isolation valves and clean with an old toothbrush.</p>
		<p><b>No pressure</b></p> <p><b>Solution:</b> For constant pressure systems, check that pressure is indicated on the gauge. Check that the outlet 2-port valve is open. You can see the arrow of the actuator head through the motor casing. It should be pointing in line with the pipe and not at right angles to it. Check that the fault light is not illuminated on the well controller. For variable speed units, check that the speed controller is not switched off. Is it possible that you have run out of water?</p>

<b>Fault Code</b>	<b>Meaning</b>	<b>Possible Problem</b>
<b>Error 3</b>	The thermal overload of the compressor has cut in	Is the ambient temperature of the heat pump room too high? Should be less than 35°C Is the main electricity supply to the heat pump within 220-230V? Are the cable terminals tight?
<b>Error 4</b>	The heat pump has reached its maximum preset temperature	This is perfectly normal. The heat pump will automatically reset as required
<b>Error 5</b>	The ground water temperature is too low	In ground loop systems the ground loop chain has to be thoroughly checked In well systems this is often seen when there is insufficient water in the well If the problem persists call IHS/your heating engineer for advice

## General Operating Problems

<b>Insufficient domestic hot water</b>	The most common problem is air in the Hygienik Tank. Put a hose on the bleed point at the top of the tank. Take to a sink or outside. Gently open the tap. If air is heard then wait till air stops. Re-pressurise the heating system to 1.5 bar. Get your installer to show you how to do this before leaving the job.
	Are you trying to run off too much hot water at once? The heat exchanger has a limit on the flow rate it can supply. Do the bucket test!
	Is the heat exchanger pump running when a tap is opened? Is it possible that the flow sensor has been knocked off? (The flow sensor is located on the cold water inlet pipe to heat exchanger)
	Is the strainer in the secondary side of the heat exchanger (in the main water inlet) blocked? Isolate and clean as required
	Is the timer for domestic hot water programmed for a sufficient period?
	Is the tank stat set correctly? (See instruction on page 5)
(Diverter valve systems)	Is the valve pointing to the hot water tank?  <b>Solution:</b> Turn off heating, turn hot water clock to continuous. If tank is cold, valve should point to hot water tank. (Check if the pipe going to the tank gets warmer).
(Twin pump systems)	Has the pump for the hot water tank switched on?

## No Heating

Is the tank stat set correctly? For diverter valve and twin pump systems, the pipe to the tank will always be warm. Reset the tank stat.

Is a room-stat calling for heat?

Check and see whether at least one light from zones 1-6 on the underfloor heating control box is illuminated.

Is the boiler output light on the heating control box illuminated? (Light has flame symbol)

Are the pump lights on the same control box illuminated?

Is the heating circulation pump running?

In diverter valve systems, is the diverter valve pointing to heating rather than hot water?

Twin pump systems - is the heating pump running?

Check warmth of pipe to see which direction the heat is going.

## **Routine Maintenance**

The heat pump system needs very little maintenance.

There are three main strainers (filters) to check: ground loop strainer, central heating strainer and hot water plate heat exchanger strainer.

After the heat pump has been in service for more than three months (where any initial problems should arise) they only need to be checked annually (see below). The system may need to be checked however, if the heat pump is showing error codes (see tables above).

Well systems (often referred to as open borehole systems) may require more regular checks - see below.

## **Airing the Hygienik Tank**

In the first three months of operation, regularly check for air in the Hygienik Tank. You can do this by carrying out the following steps:

- Place a hose on the bleed point at the top of the tank.
- Take the hose outside or to a sink.
- Gently open the tap. If air is heard, then wait till it stops.
- Re-pressurise the heating system to 1.5 Bar. Get your installer to show you how to do this before leaving the job.

## **Checking the groundloop Strainer**

To check the strainer:

- Switch off power to the heat pump. Flush / auto switch must be in auto.
- Find and identify the strainer, to the left and right of the strainer is an isolator valve. Close these.
- Place a small bowl under the strainer and undo the chamber head with a suitable spanner. Remove the mesh and check it has no foreign objects in it. Clean under a tap if need be. Re-fit the strainer.
- Open the valves.
- Ensure that the pressure of the groundloop system is set to 1.5 Bar.
- Re-pressurise if necessary.

## **Well System**

Switch off the power to the heat pump and switch off the well pump control unit. There is an isolator valve on either side of the filter. Close these. Locate the small red drain tap. Place a bowl under this and open the tap. When the water stops flowing, unscrew the bottom of the filter and remove the cartridge. Clean if necessary, using an old toothbrush.

Well systems should be checked every quarter or more frequently if required.

## **Checking the Heating Strainer**

The strainer is found in the return line between the Hygienik Tank and the heat pump.

To check the strainer:

- Switch off power to the heat pump.

- Find and identify the strainer, to the left and right of the strainer is an isolator valve. Close these.
- Place a small bowl under the strainer and undo the chamber head with a suitable spanner. Remove the mesh and check it has no foreign objects in it. Clean under a tap if need be. Re-fit the strainer.
- Open the valves.
- Ensure that the pressure of the heating system is set to 1.5 Bar.
- Re-pressurise if necessary.

Other than the above, check that both the heating and ground loop system is holding pressure at 1.5 Bar.

IHS recommends that all installers attend a ground source heat pump seminar prior to installations. We offer them free of charge in our head office with any system purchase.

Please ask your plumber/commissioning engineers to demonstrate how to carry out maintenance tasks.

In the case of well systems, you should learn how to check the filter yourself.

## **Guarantees**

The IDM system carries a two-year labour and parts guarantee.

In order to avail of an extra four-year guarantee on parts from IDM, an annual maintenance contract should be purchased from IHS. Under this maintenance agreement, you will be entitled to an annual system check from an IHS service engineer at a mutually suitable time. Following the visit, you will receive a comprehensive written summary highlighting any necessary action required. The engineer will perform a complete system diagnosis and will compare readings taken from the original commissioning. Additionally, they will check you still have sufficient anti-freeze protection in your ground loop system.

For more information, please contact the head office on 01854 613 161, or email [sales@invisibleheating.co.uk](mailto:sales@invisibleheating.co.uk).