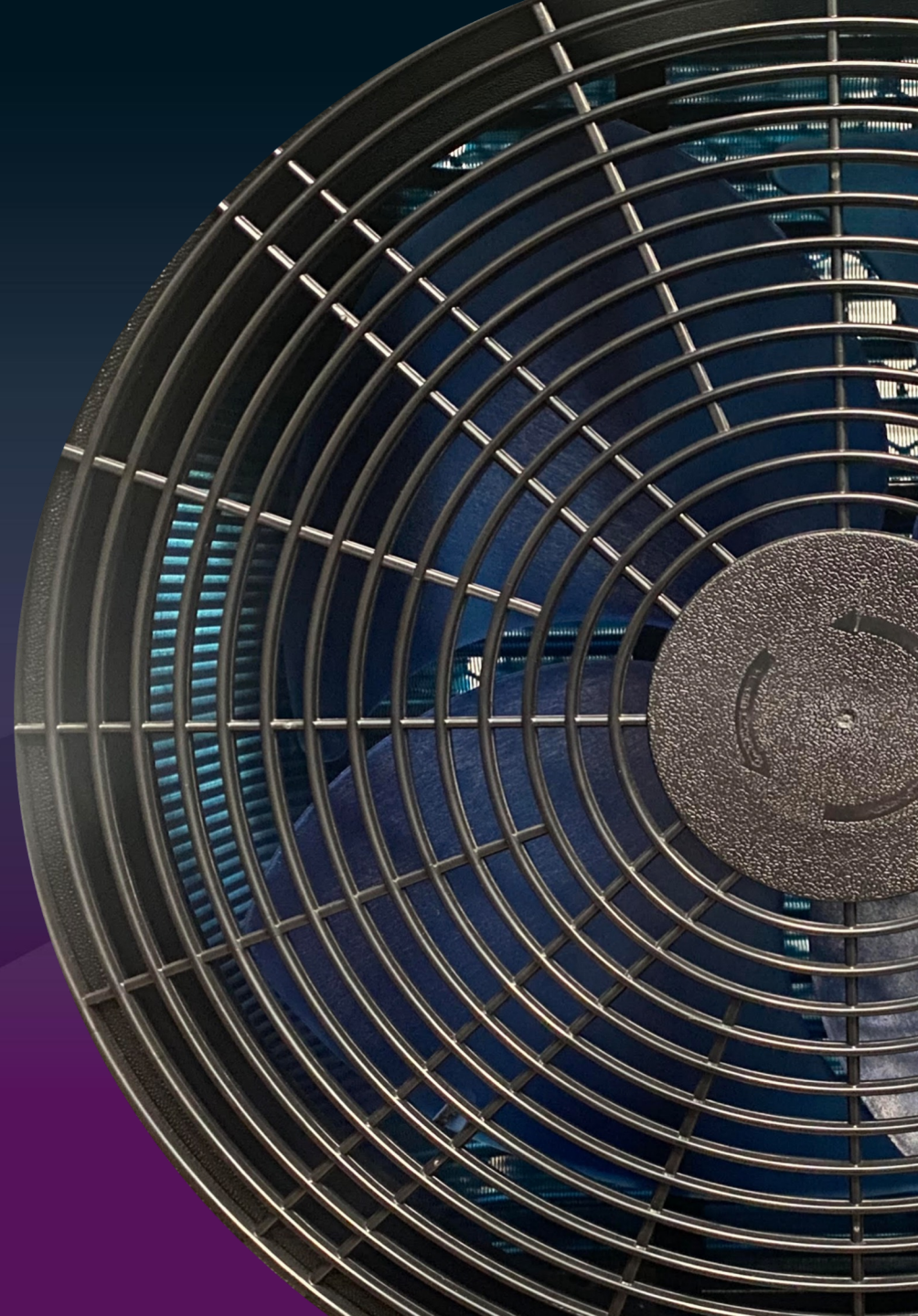




Hot Tub and Swim Spa Air Source Heat Pumps



Why are we now fitting heat pumps to hot tubs?

“because they are far more efficient than electric heating”

Simply put, an air source heat pump will output more energy than it uses to create that energy.

C.O.P – (Coefficient of Performance) is a measure of the Energy used by the heat pump vs the energy it creates (conveyed in a number value)

Example : C.O.P of 4 – This means for every 1 unit the heat pump uses then 4 are produced.
(1_{kw} in - 4_{kw} out)

In comparison, a resistance heater (electric) only has a C.O.P of 1.
(1_{kw} in - 1_{kw} out)



HOW IT WORKS



PRINCIPLES OF A HEAT PUMP

In essence a heat pump employs the same process as a fridge, but in reverse !

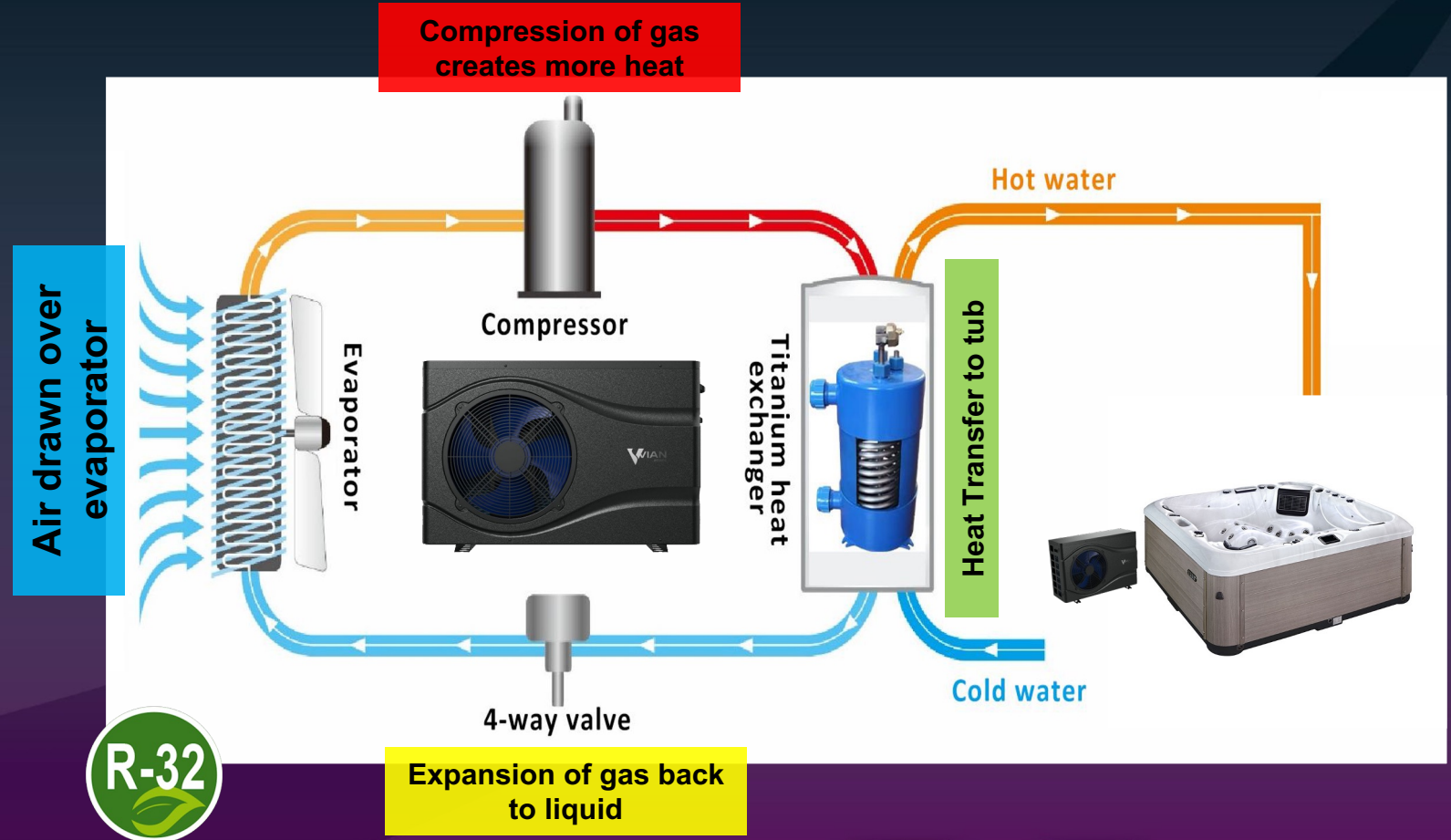
Air is drawn across the first heat exchanger (the evaporator)

There is a refrigerant liquid in the system that absorbs heat from this air causing it to rise in temperature and evaporate from a liquid into a gas.

This gas then passes through a compressor and the compression of this gas generates even more heat.

The heated gas passes through the coils inside the heat exchanger, transferring this heat to the circulation system of the Spa.

Our refrigerant gas then goes through an expansion valve turning back to liquid and returns to the evaporator to start the process again.



TYPES OF HEAT PUMPS



Different types - Vian heat pumps

ON / OFF – This type of heat pump will always be running at maximum power.

FULL INVERTER – The unit can vary its power consumption depending on the heating demand and conditions. Typically, these units are quieter and considered to be more efficient than an on/off model.

However, either type is far more efficient than a resistance (electric) heater



BRIEF MODEL OVERVIEW



Model Overview

4 models available in the range:

HP-VP-500 – 5kw on/off compact model

HP-VP-501 – 5kw Full Inverter super compact model

HP-VP-700 – 7kw Full Inverter model

HP-VP-900 – 9kw Full Inverter model



HP-VP500

Ideal Entry level Heat pump.

4.78 kw output @ 25 °C.

3.16 kw output @ 10 °C

2.12 kw output @ 0.0°C

On / Off Model

Minus 5°C operation

Simple installation process – Uses 1 inch pipework that makes installation easy.

Ideal consideration to include with new hot tubs sales.

Good starting price point to generate interest



HP-VP-501

Premium Compact Model.

5.03 kw output @ 25 °C.

3.68 kw output @ 10 °C

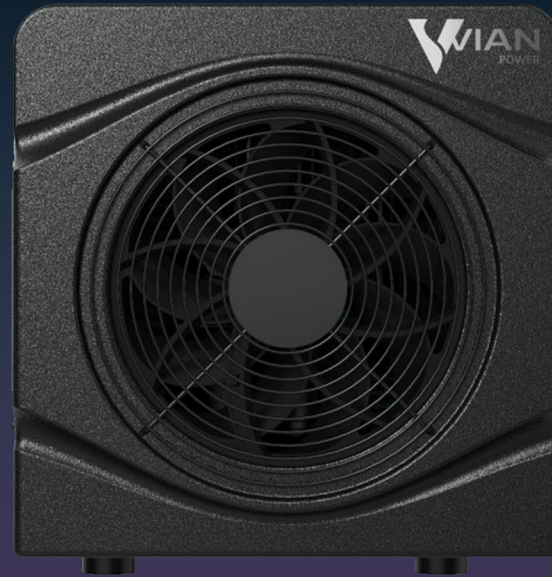
3.37 kw output @ 0.0°C

Full inverter model

Minus 10°C operation

Simple installation process – Uses 1 inch pipework that makes installation easy.

Can fit under common cover lifters at back of hot tub.



HP-VP-700

Popular Model.

7.02 kw output @ 25 °C.

4.77 kw output @ 10 °C

4.06 kw output @ 0.0°C

Full inverter model

Minus 10°C operation

Uses standard 1.5inch pipework.

Perfect crossover for hot tub or swim spa.



HP-VP-900

Suggested For Swim Spa

9.26 kw output @ 25 °C.

6.88 kw output @ 10 °C

5.76 kw output @ 0.0°C

Minus 10°C operation

Full inverter model

Uses standard 1.5inch pipework.

Popular choice for holiday let hot tub market for fast heating.



Stated kW Reality

Ambient temperature plays a big part the actual kW output of a heat pump

As a rough guideline, typically, the stated rating of heat pumps is achieved at an ambient temperature of 25 °C – 27 °C (approximately)

A far more realistic measure of kW output is to consider the actual average temperatures (scop)

The mean temperature across the 12 months of 2022 for the UK was **10.03 °C**

“The Met Office”

Current kWh £0.34

1 hour of heating

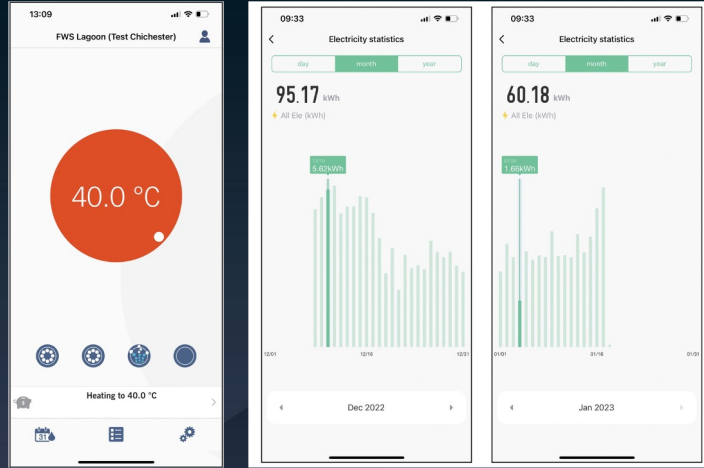
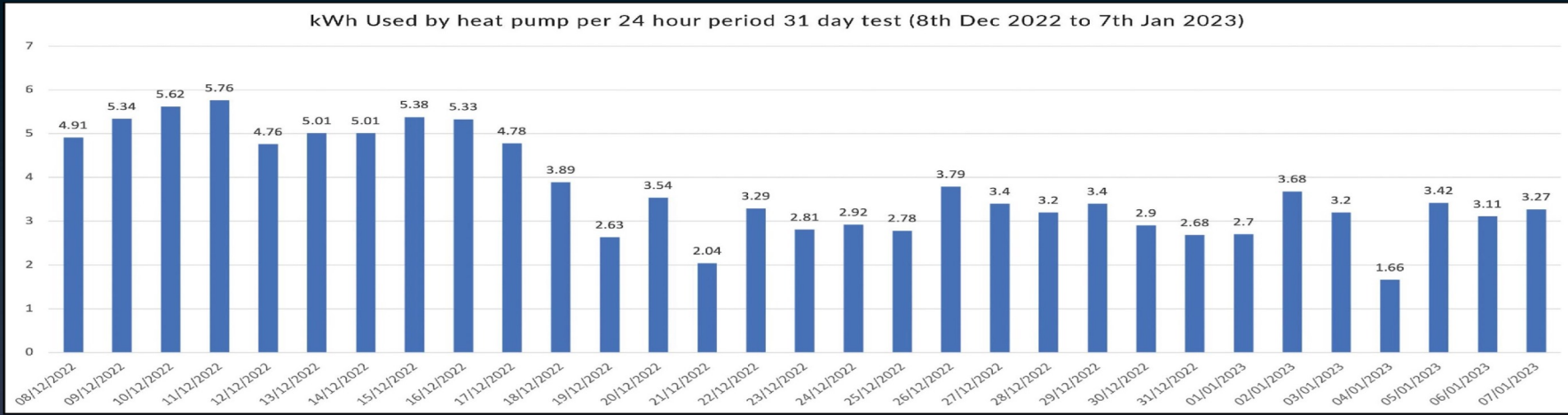
Heating Method	kW Consumed max	Cost to Run for 1 hr.	kW Output @ 10 °C	kW Value increase	kW output % increase	Cost Saving Over electric Heater
3kw Electric	3.00 kW	£1.02	3.00 kW	/	/	/
HP-VP-501	0.90 kW	£0.31	3.68 kW	0.68 kW	22.67 %	£0.71 Less
HP-VP-700	1.09 kW	£0.38	4.77 kW	1.77 kW	59.00 %	£0.65 less

Comparison of 3 kW electric heater and heat pump to show cost saving and kW output values @ 10.0 °C

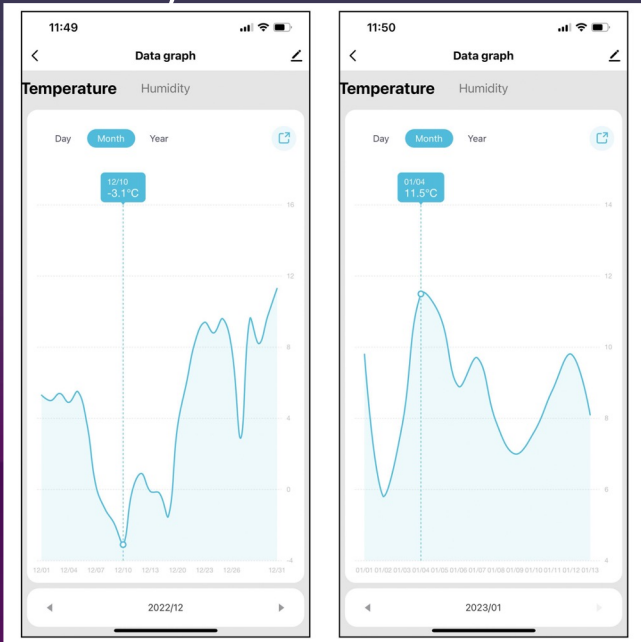


FIELD TESTING





31-day test – 08 Dec 2022 to 07 January 2023 (very cold ambient temperatures for the first week of the test)



Total kW consumed in this period to maintain 40 °C = 116.21kW

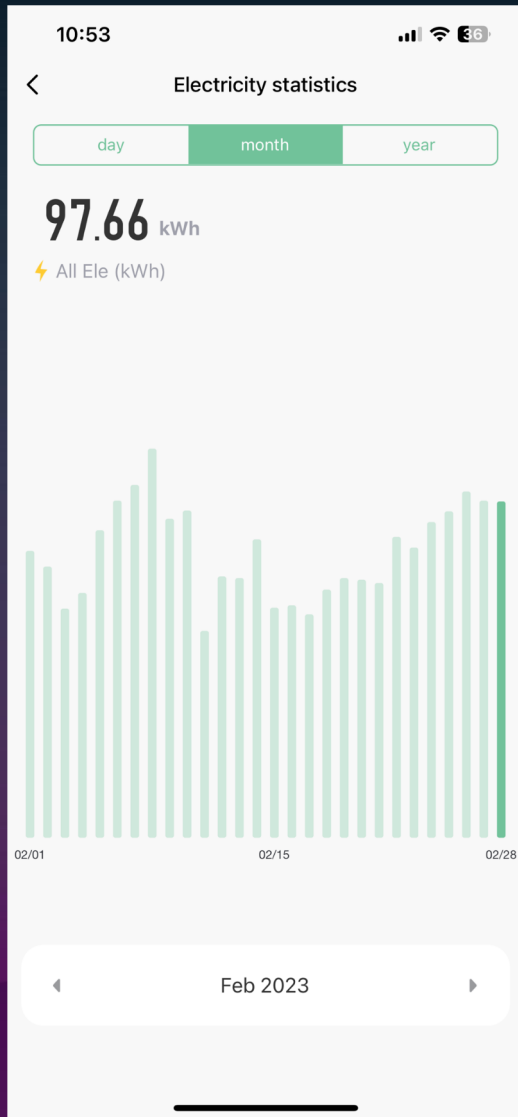
31-day cost = £39.51

Daily average 3.75_{kW} / £1.28

At the current kWh rate of £0.34



February 2023 Heat Pump Consumption



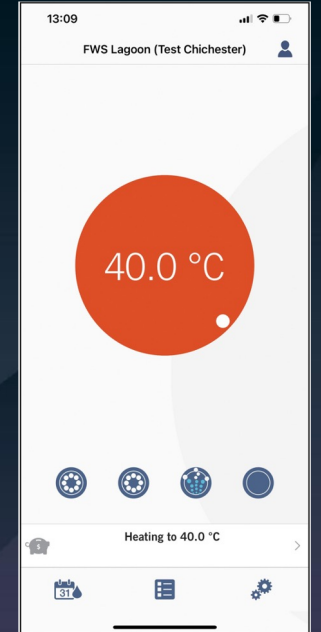
Total kW consumed by the heat pump for February 2023

97.66 kW

Daily average 3.48 kW

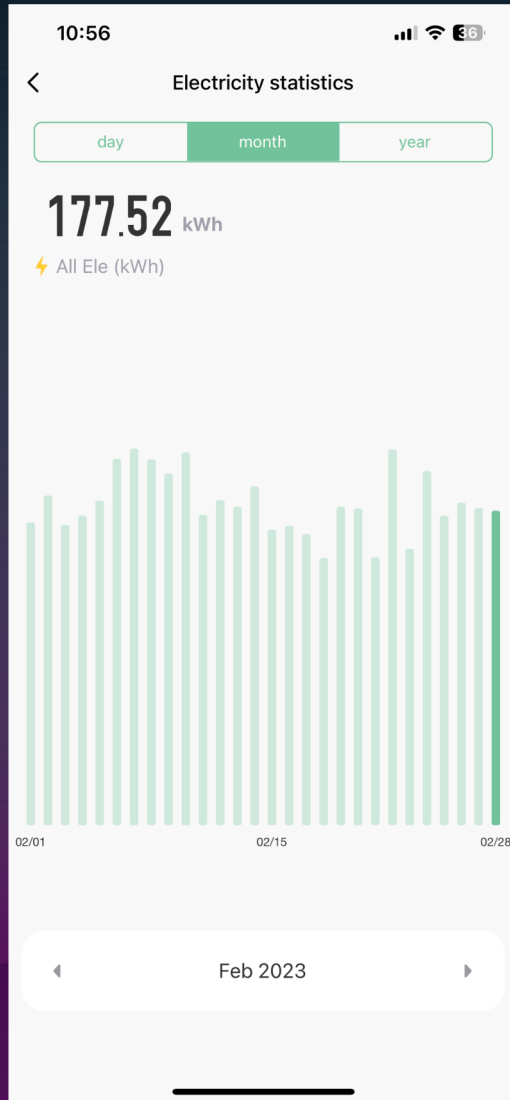
Total cost of heating £33.20

Daily average £1.19



At the current kWh rate of £0.34

February whole Hot Tub



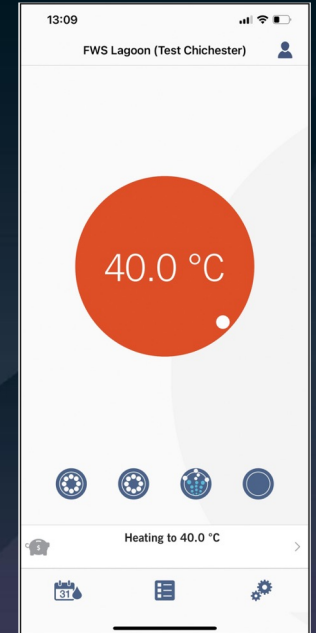
Total kW consumed by the whole hot tub for February 2023

177.52 kW

Daily average 6.34_{kW}

Total cost for month £60.35

Daily average £2.15



At the current kWh rate of £0.34

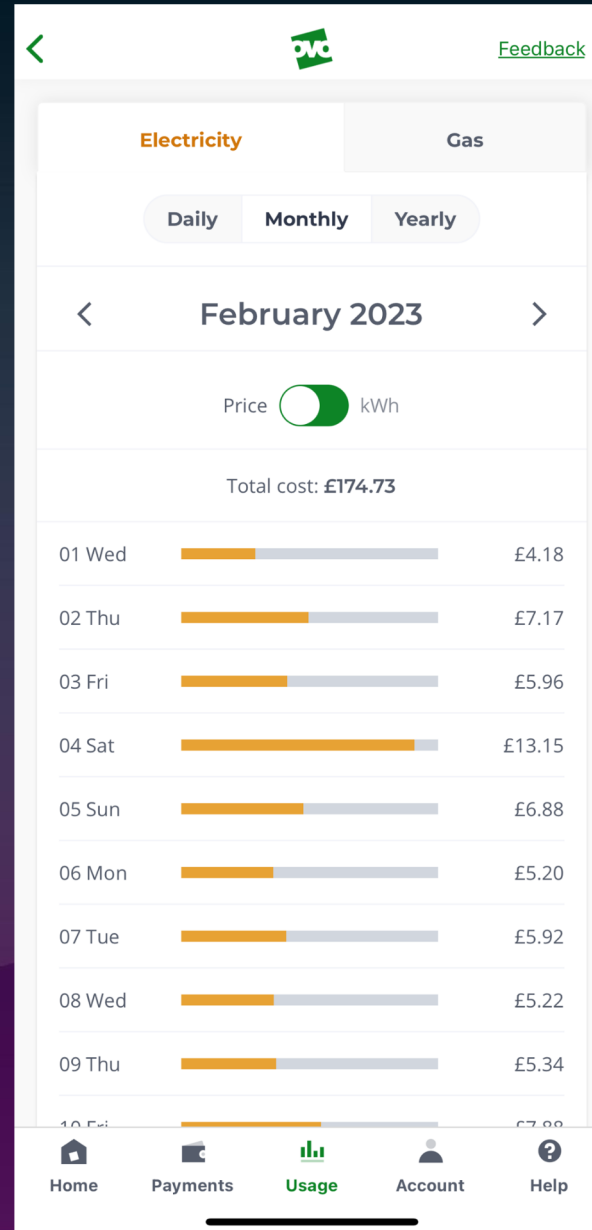
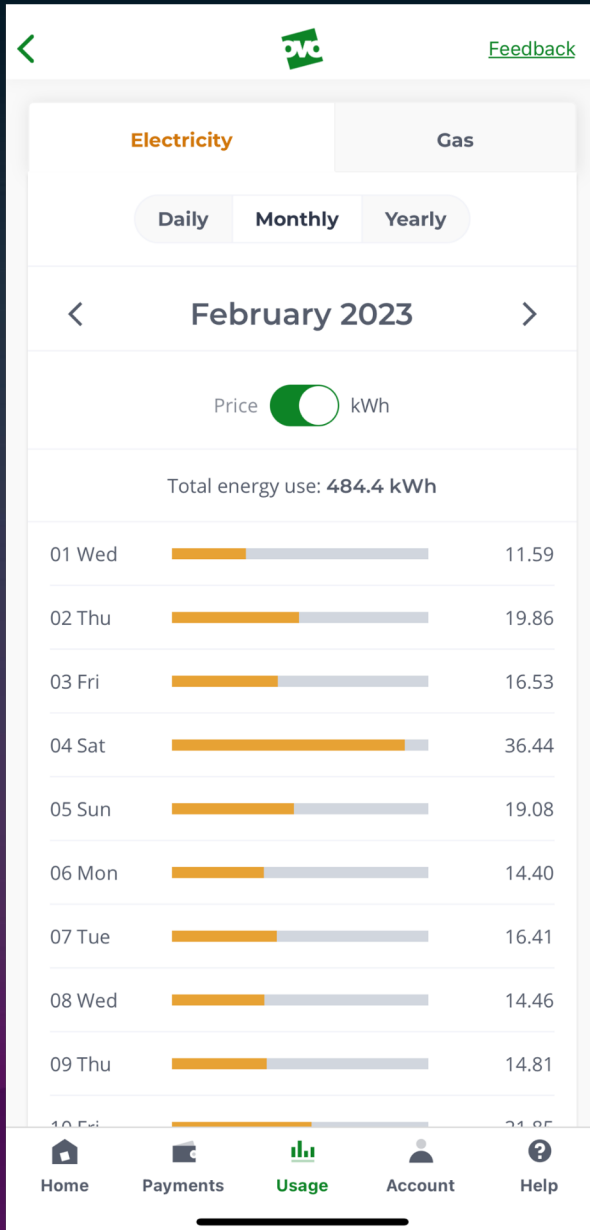
To Further back up findings

February 2023

Total electricity consumption for entire house with 3 adult occupancy (test location)

Including running a 1550-litre hot tub @ 40 °C

Total Household Electricity Usage February 2023 – £174.73



COSTS IN SUMMARY

Heating costs for 31-day period in very cold weather - £39.21 / £1.28 day average

Heating costs for February 23 - £33.20 / £1.19 day average

Total running costs for February 23 - £60.35 / £2.15 day average

BISHTA £1.50 – £2.50
per day

I believe that it would be a fair comment to state that:

“fitting a heat pump achieves running costs similar to pre-energy crisis expectations”



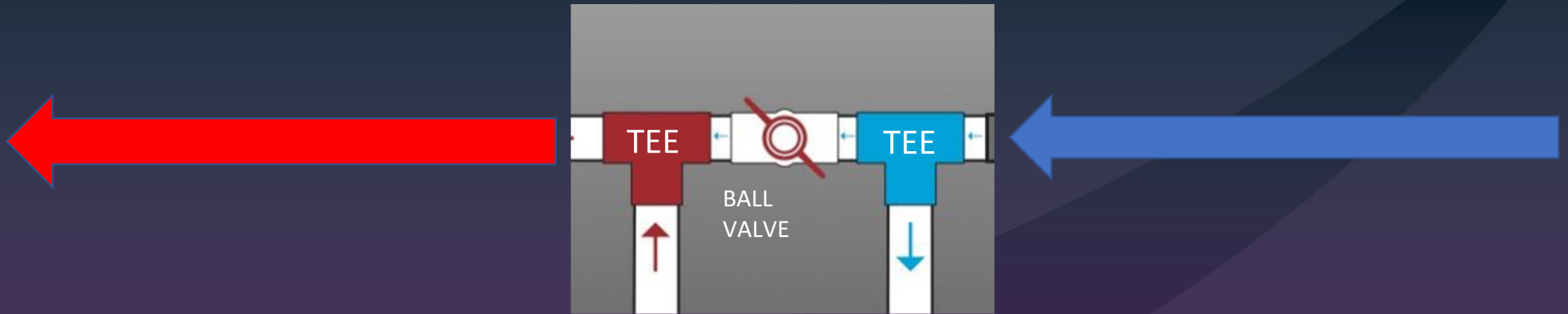
PLUMBING – ADAPTATIONS

Simon



To integrate a heat pump, we need to create a Bypass in the circulation system

Simply put, a Bypass valve creates a secondary route for water to follow within the circulation system, whilst allowing us to adjust this water flow



In its most basic form, a bypass consist of only 4 components:

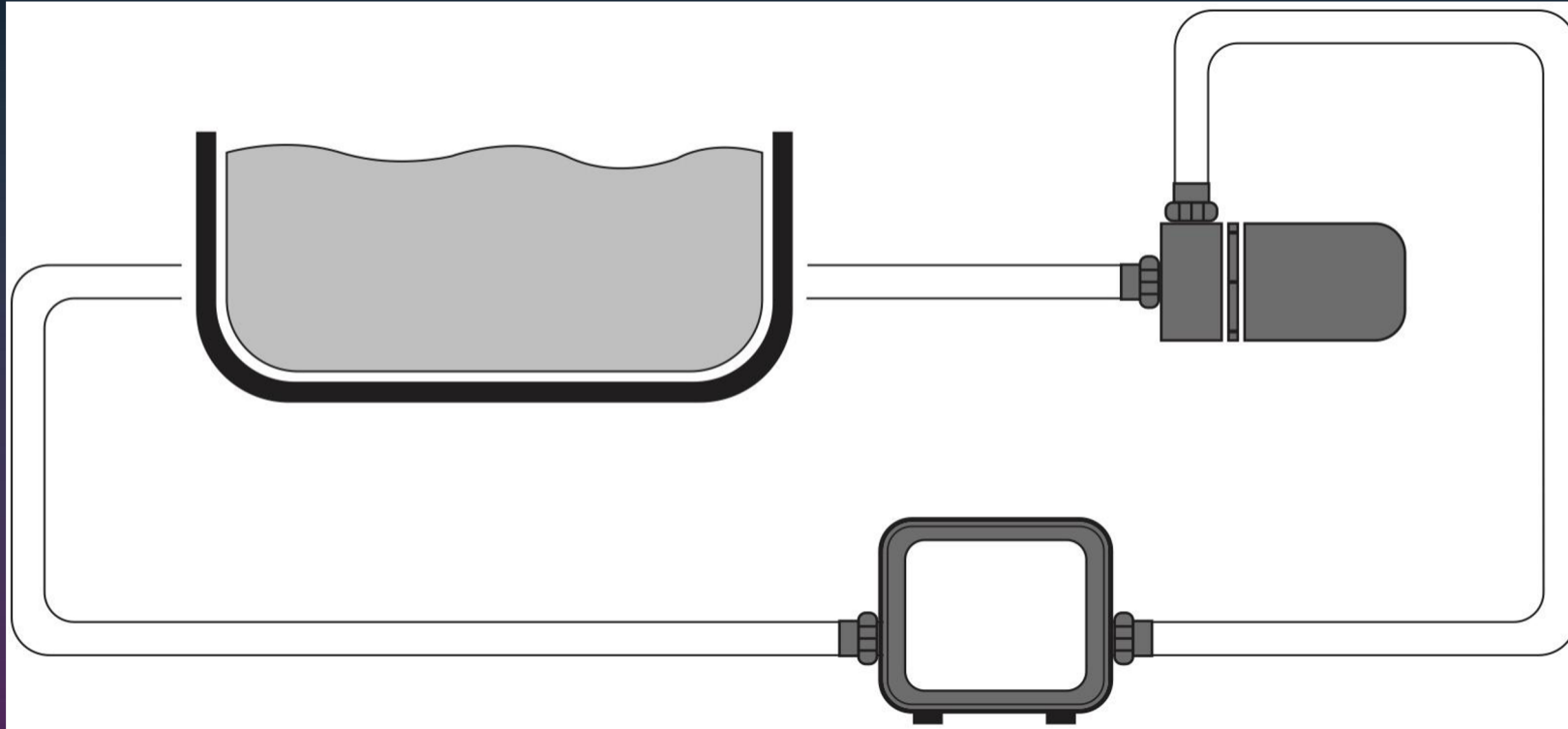
- 2 x tee type fittings
- 1 x ball or check valve
- Minimal pipe to join fittings (glue)

(additional ball valves are often used but these are just for isolation purpose)

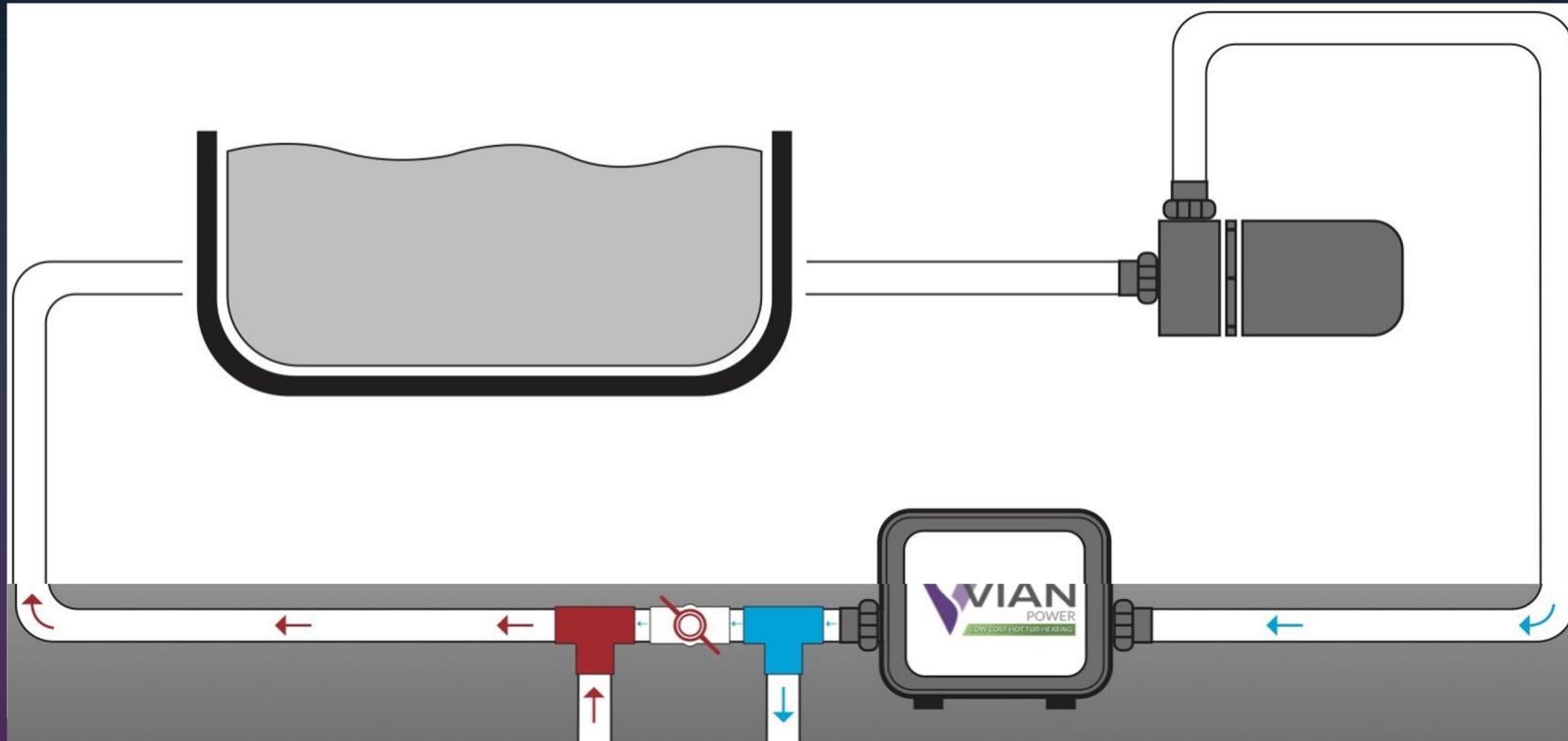
EXAMPLES OF SIMPLE BYPASS



Circulation system before bypass



Circulation system after bypass fitted



Good Practice for bypass fitting

The bypass should be fitted before inline sanitation systems with a check valve before such system

Creating the bypass on the pressure side of pump is generally the first option where possible.

Return the heated water from the heat pump after the spa temperature sensor when possible

Do not strain the circulation pump, the ball valve will allow for flow adjustment so make use of this.

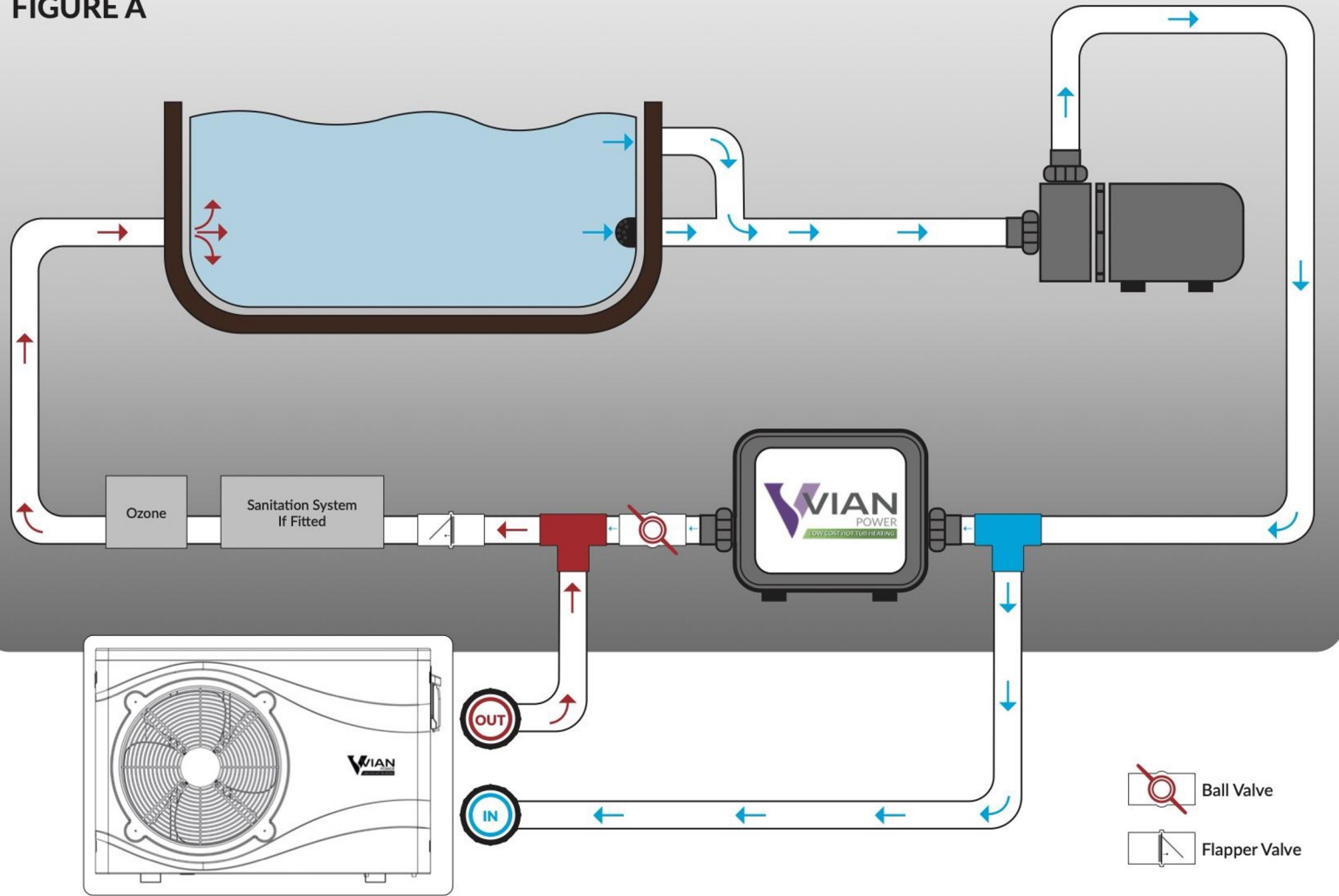
Good gluing practice – Always use plumbing cleaner – always use the correct glue and preparation for flexi to rigid joints.



DIFFERENT BYPASS SCENARIOS



FIGURE A

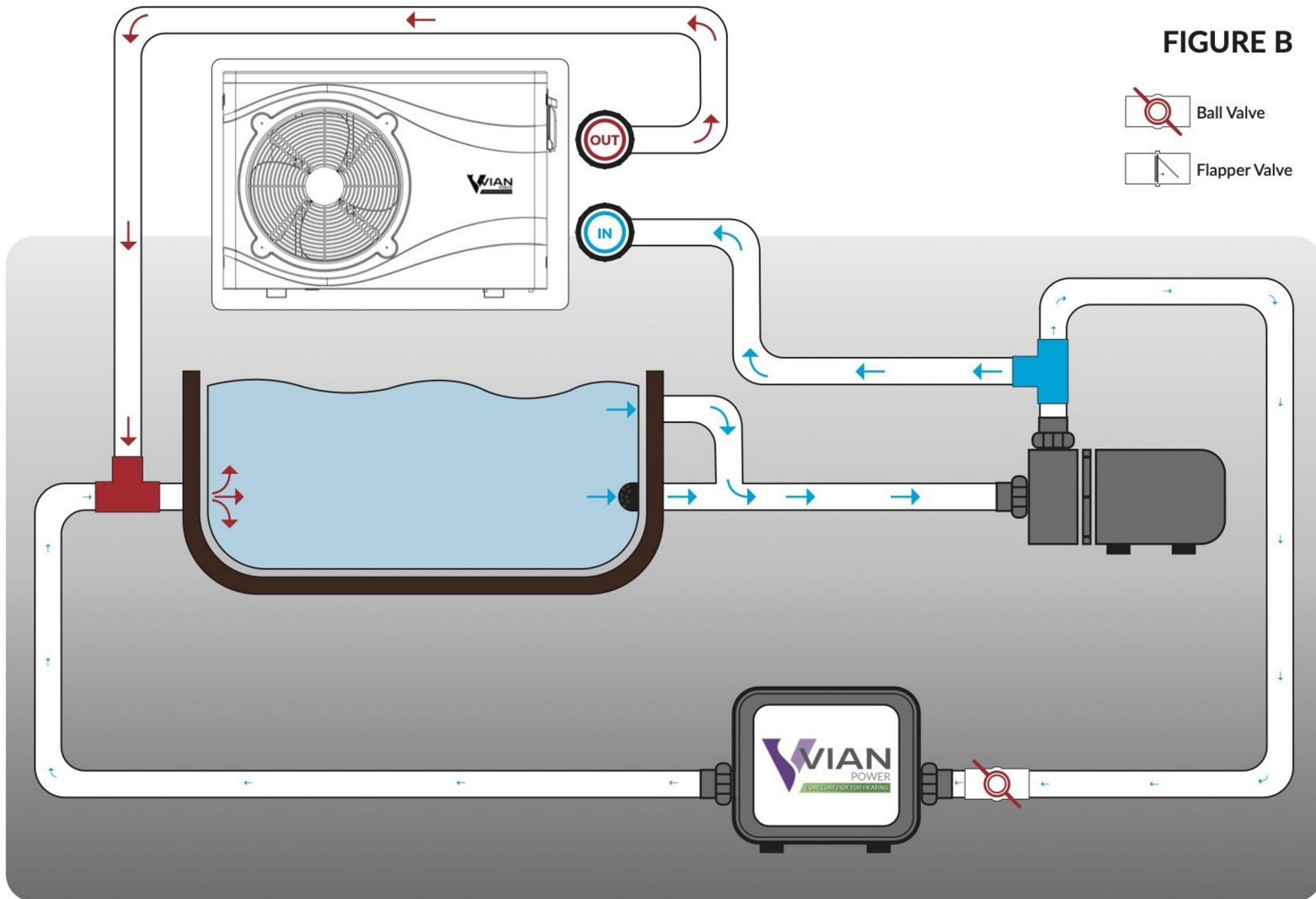
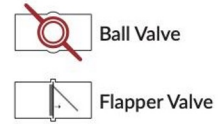


Bypass on pressure side of pump.

Returning heated water after the internal heater / sensor.

Fitted before any inline sanitation systems with check valve.

FIGURE B



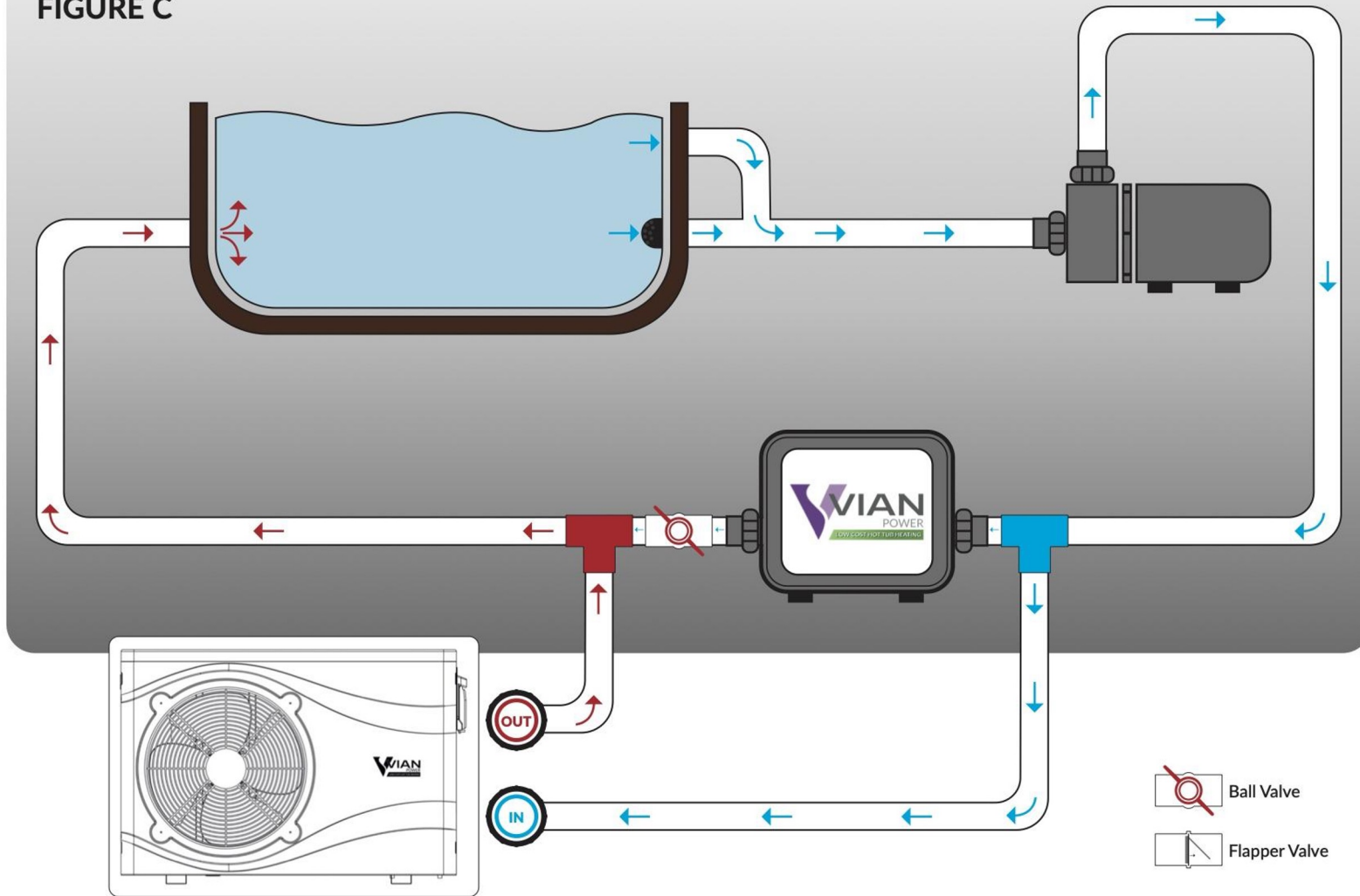
Bypass on pressure side of pump.

Returning heated water after the internal heater / sensor.

Think outside the box –

If you need to, the return can be further separated from the outlet as long as the ball valve is fitted between them

FIGURE C



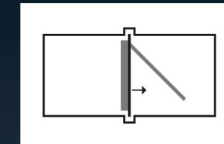
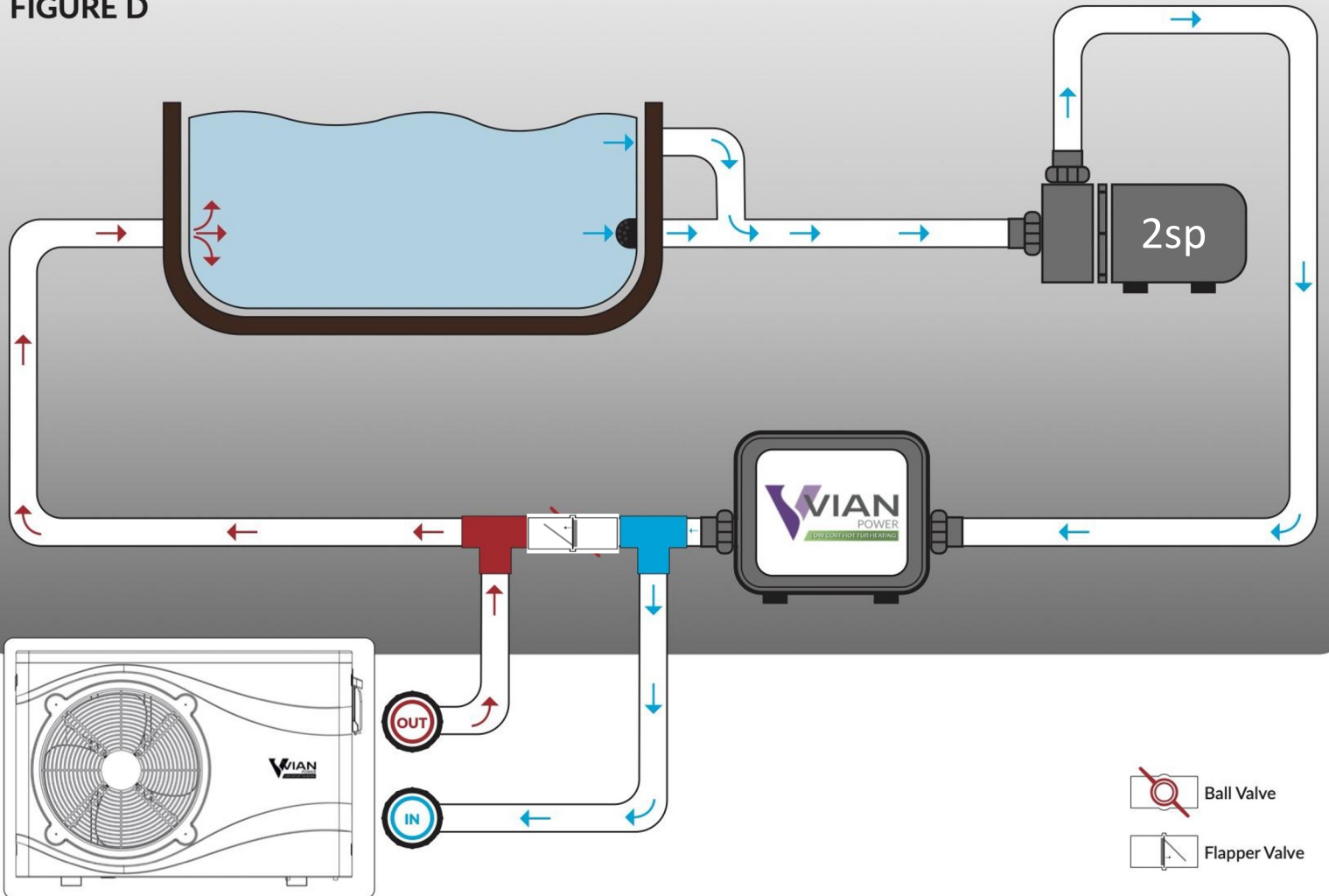
Ideally return after heater

Why try and have the return after the system heater or sensor?

It allows the system sensors to read the temperature of the actual incoming spa water rather than the hot water from the heat pump.

2 speed pump

FIGURE D



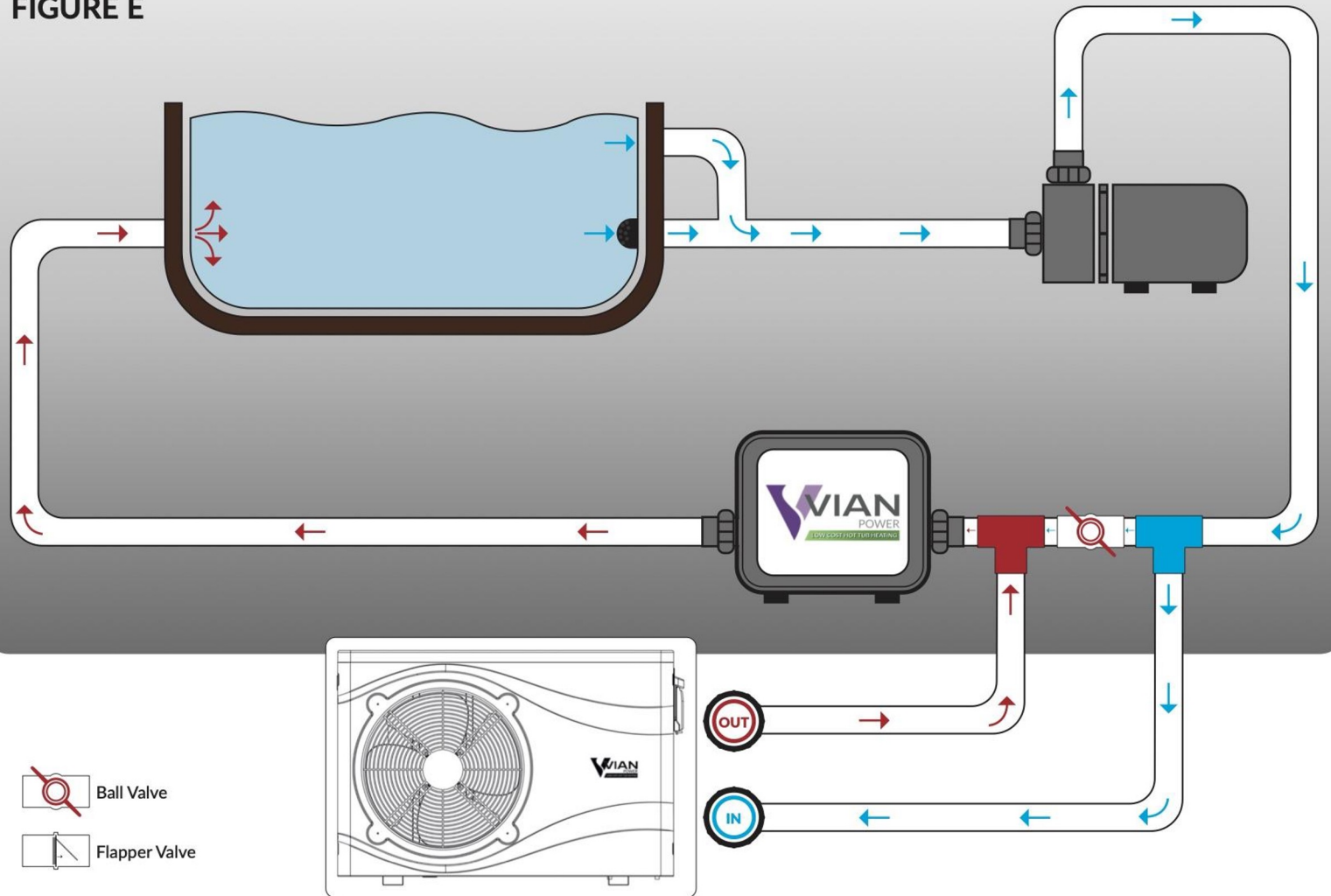
Check / Flap Valve

We suggest using a check valve rather than a ball in this scenario.

Due to the variable flow rates a ball valve is not ideal and difficult to correctly regulate.

A check valve will self regulate and is a better solution in these systems.

FIGURE E



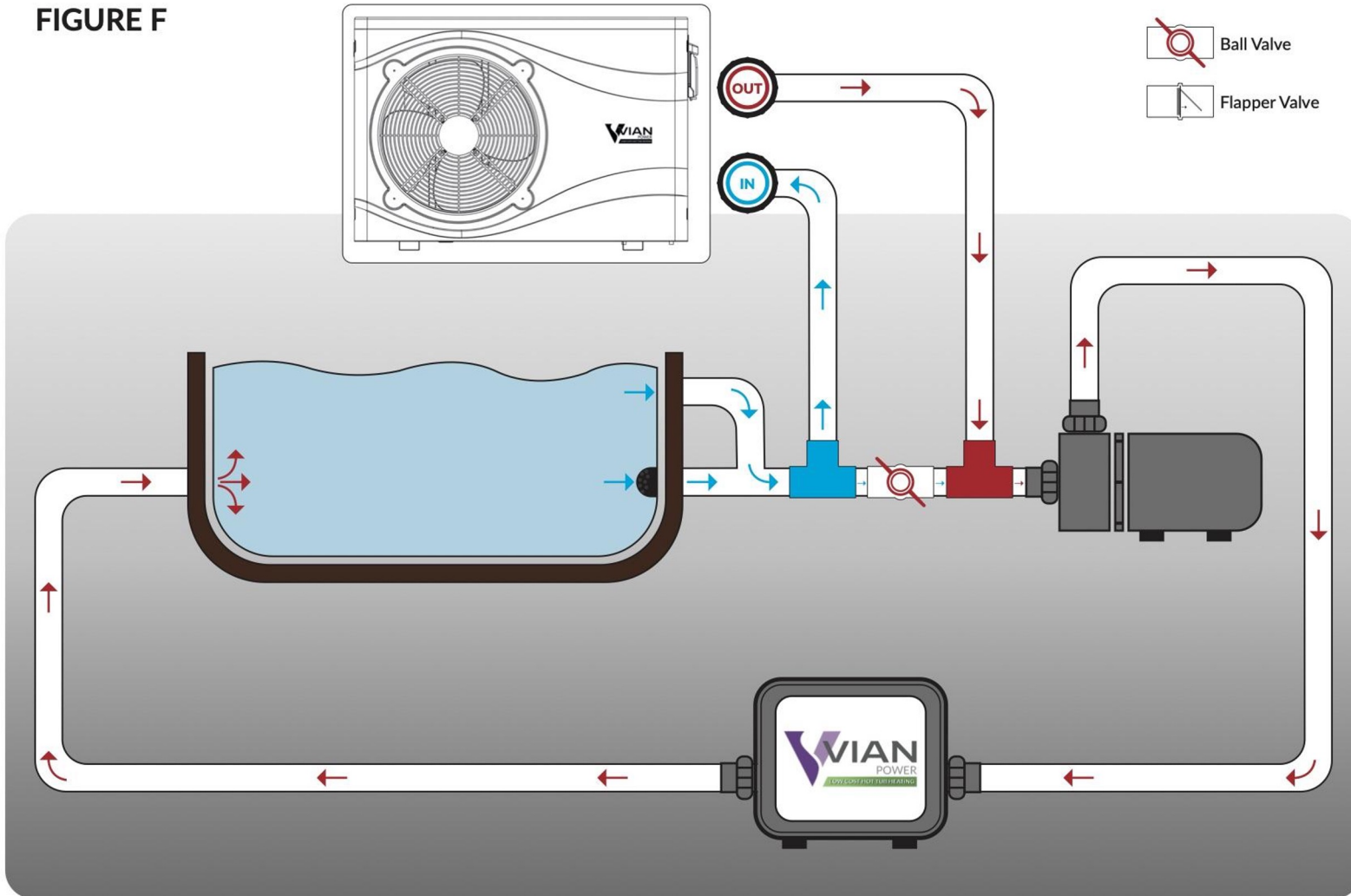
Return Before Heater

Sometimes the only option is to install the inlet return before the heater / sensors.

This will work; however, a temperature discrepancy would be seen between the heat pump and the spa read.

In our experience approximately 1 °C

FIGURE F



Suction Side

YES – The by-pass can be fitted on the suction side if that is the only option.

We have fitted many like this.

The biggest consideration is to pay attention to the inlet and outlet connection to the heat pump.

Pay attention to the flow direction.

In our experience approximately 1 °C read difference again.

PRIOR PREPARATION PREVENTS.....



Unfortunately, not all installations will be quite as straight forward as 2 tees and ball valve

Vortex has produced several kits to make being prepared as easy as possible.

Four basic bypass kits will be available that will cover most applications to create the simple bypass

An additional FULL kit is available that includes all fittings that may be required in certain circumstances. This kit is designed as a starter kit to prepare for installations and can be topped up as parts are used.

Speak to a Vortex team member for further details.

TAKE 10 FOR A COFFEE



CONNECTING / CONTROLLING



Each model is supplied with 5 metres of ho7 uv stable power cable with pre terminated ends.

Adaptation of the terminated ends may be required to suit your installation method.

Input switching is included (excludes HP-VP-500) Input switching allows for the use of Gecko IN.Grid and Balboa external heat source relay.

HP-VP501 comes complete with 5 metres of input switch cable, the HP-VP 700 & 900 require this to be supplied by the installer



4 general options for connecting the heat pump

- 1 - Utilising the heater terminal outputs to simply power on and off the heat pump as the system calls for heat.
- 2 - Direct constant power from the control system to the heat pump and using the heat pump flow switch to control the heating on and off.
- 3 - Balboa offer a relay that can be used to engage the input switching of the heat pump when the system calls for heat. (balboa systems)
- 4 - Gecko IN.Grid. Utilising the input switching this allows for smart switching and heating method choices. (dependent Gecko system type)

In most installations, we disconnect the electric heater



Using heater output

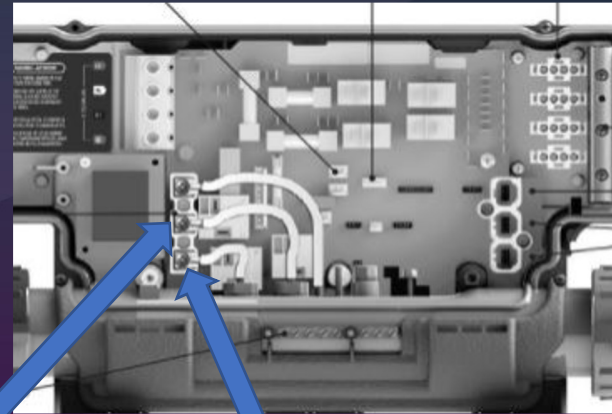
We can use the heater outputs to “power on and off” the heat pump as required.

This will simply turn the unit on and off as the system calls for heat. The Vian range has been designed to operate under this condition with memory for the settings.

Simple installation process that works on any system

This option works well as it does not create two temperature settings and will allow the use of the touchpad for temperature settings as usual.

The heat pump is set to maximum, and the temperature control is from the spa pack.



Constant power and Flow Switch control

Connect the heat pump power cable to any permanent 240 output (AV out for example) (splitters available)

Set the heat pump to maximum

Only heats when flow is detected, circ pump on.

Stops heating when no flow, the heat pump goes to low flow condition and stops heating.

Negatives

Does create a visual flow error message on the heat pump when not heating

Will heat the water during a filtration cycle, even if the hot tub set point is reached.

Example 37.5 °C - will heat if the circulation pump runs for any reason like a filter cycle.

This means the potential for the client to have to set the temperature on both systems



Balboa external heat source relay

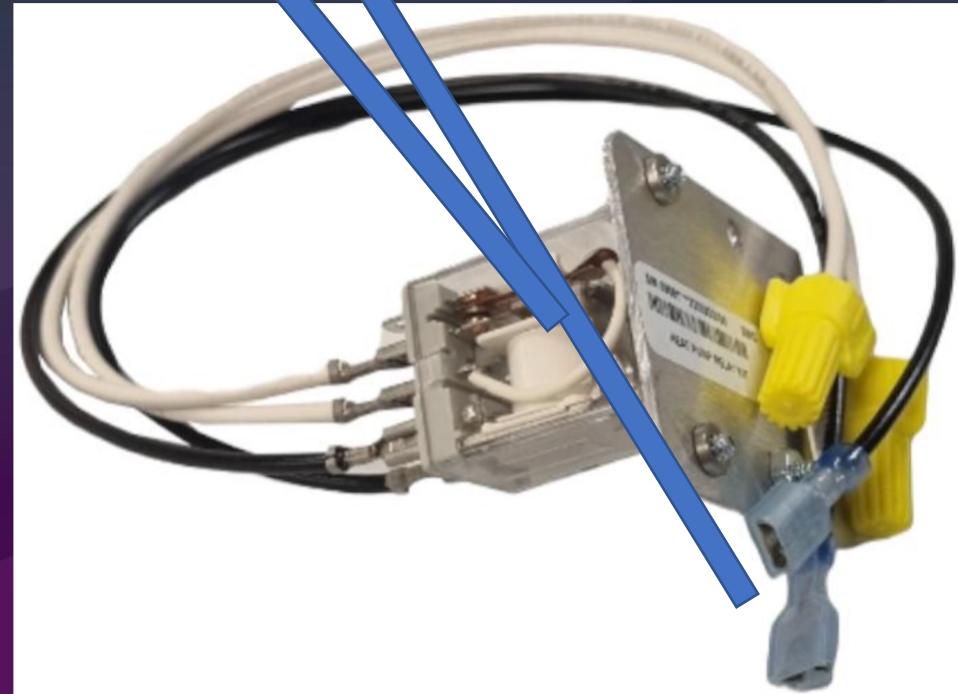
Connect to the standard auxiliary heater terminals (100 -101)

Connect the heat pump power cable to any permanent 240 output (AV out for example) (splitters available)

Connect the relay output to the input switching of the heat pump

Set the heat pump to maximum

Heat pump will start and stop heating as the spa system calls for heat. Controlled by the input switching.



Gecko IN.GRID

NOTE - Heat pump will need to be manually taken out of standby after the spa is powered off and on

Connect the heat pump power cable to any permanent 240 output (AV out for example) (splitters available)

Connect IN.GRID to Control system COM port

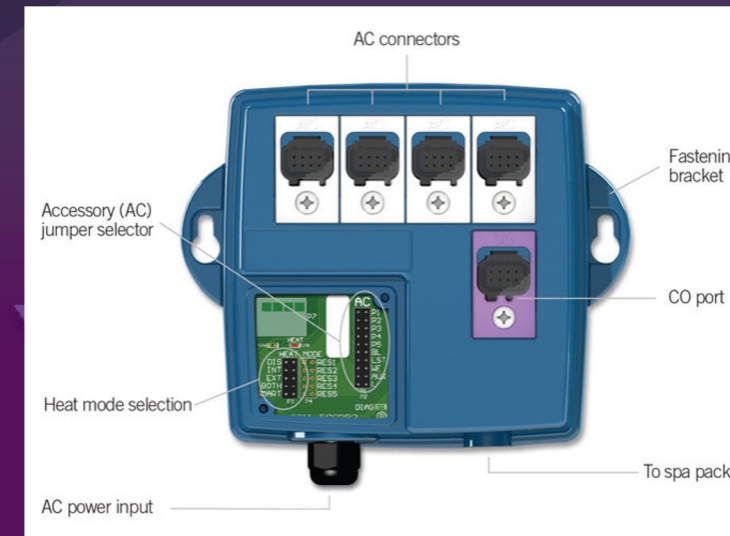
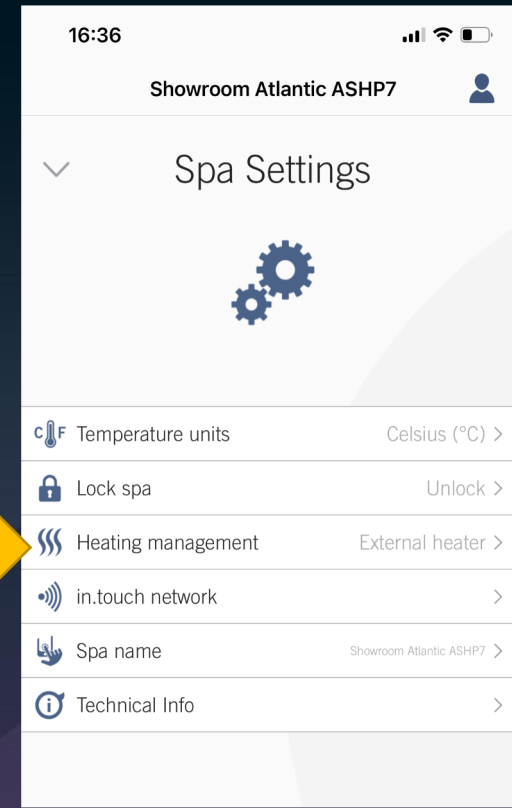
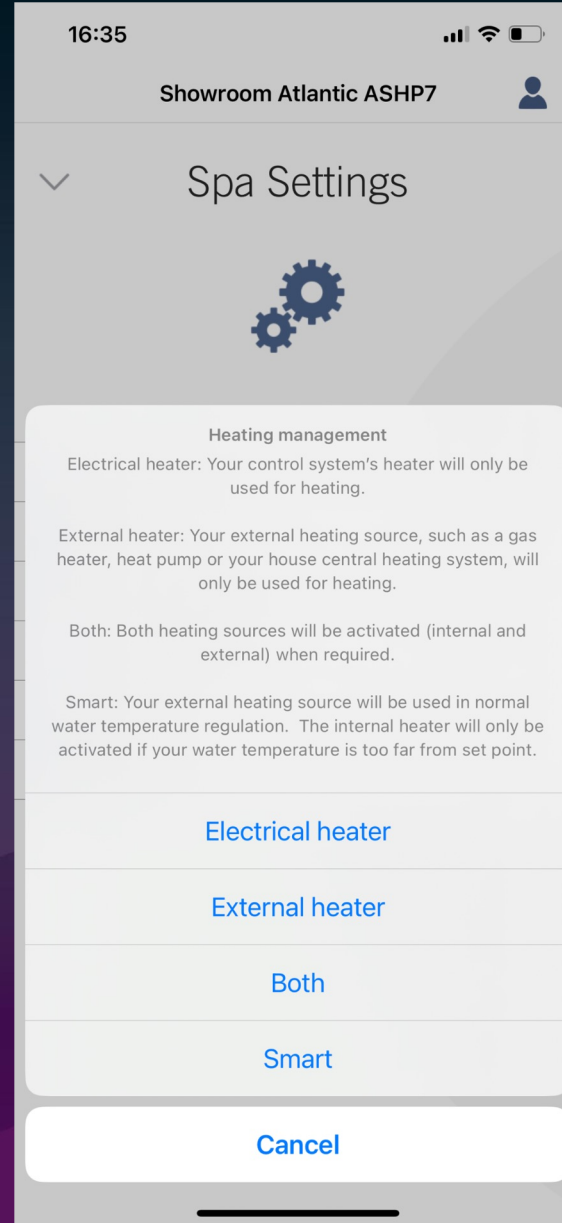
Connect the IN.GRID switching output to the input switching of the heat pump

Set the heat pump to maximum

Heat pump will start and stop heating as the spa system calls for heat. Controlled by the input switching.

Electric heater stays connected

IN.Grid allows the user to choose from several heating options either through dip switches manually or through IN.TOUCH 2 if fitted



FITTING & CONSIDERATIONS



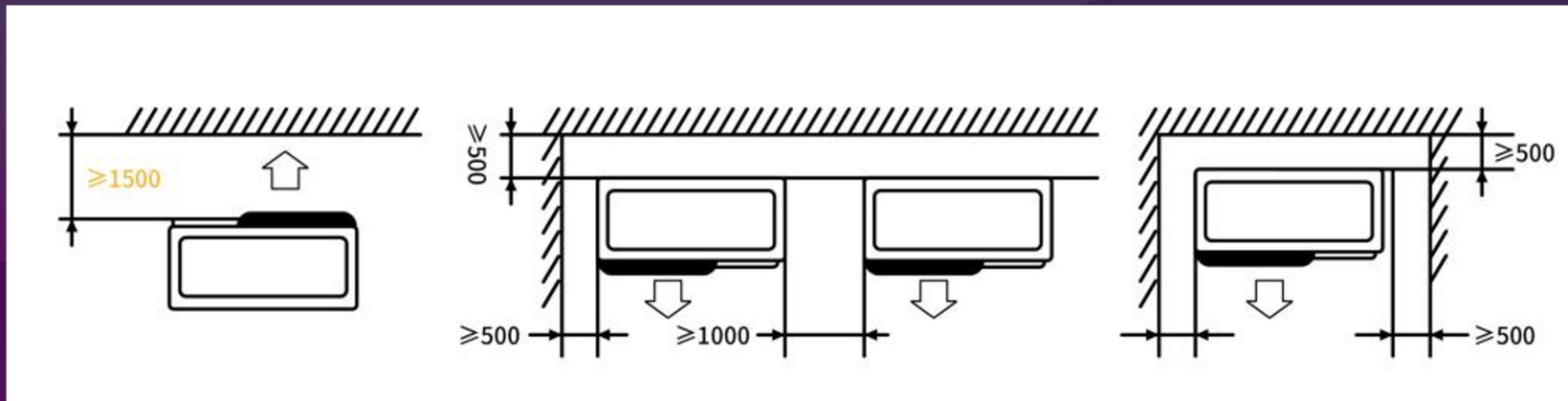
It is important to give the heat pump some space

500 mm should be given to the side and back of the heat pump

Allow 1500mm at the front for the fan to exhaust the air

When fitting two units next to each other 1000mm of space is recommended between these units. (dual temp Swim Spa for example)

Not giving the unit enough space can reduce performance and cause it to frost up more frequently.

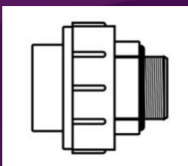


Unions for the connections

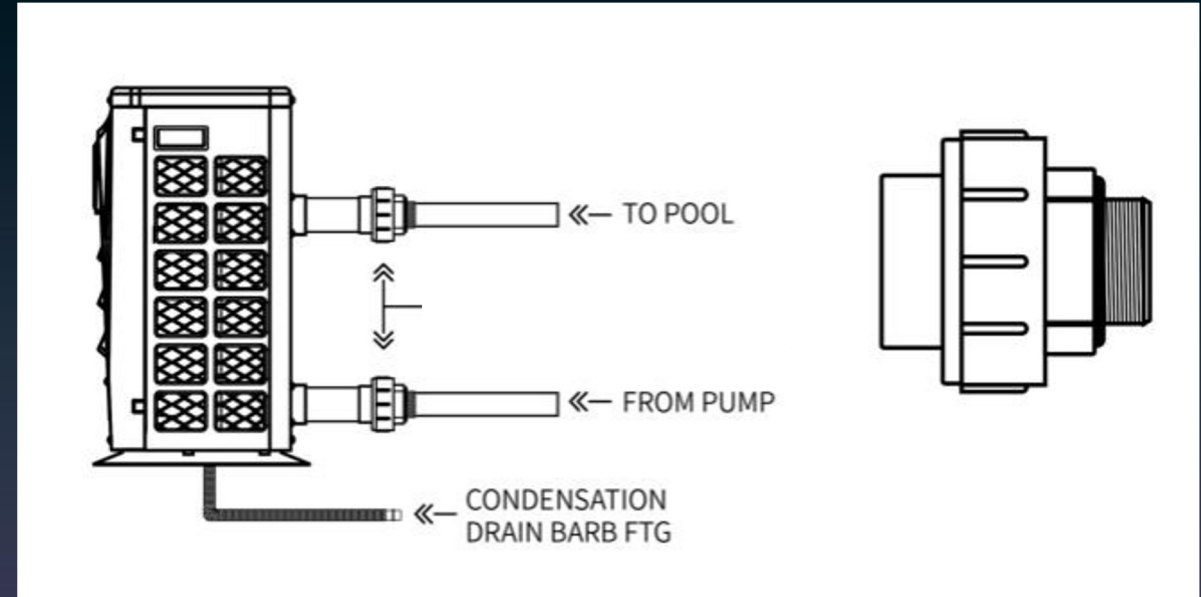
We suggest that all installations have unions for the pipework to heat pump connection.

HP-VP-700 & 900 come complete with unions
(std 1.5" pipe fitment)

HP-VP500 & 501 will require a separate union to
allowed for a glued joint. Currently available separately



If you are or have ordered 5kW models speak to Andy @ Vortex regarding these fittings.



Fitting Additions



Pipe Lagging. This is available from Vortex and is used to insulate the external pipe work from the hot tub to the heat pump. Two sizes available to fit 1- and 1.5-inch pipe

This lagging is a split and seal type so can be fitted after installation. Importantly this lagging is outdoor rated, and UV protected.

Cabinet Exit Cuff. Available for 1 - and 1.5-inch pipe these exit glands allow for a neat solution for the inlet and outlet pipework from cabinets or bases.



Raised feet / stands.

Currently not on the Vortex site but plans to include this are in discussion.



Heating schedule

Higher efficiency in warmer air

Consider the use of settings – Economy or Rest / ready settings

It makes sense to use these settings to manipulate when the heating cycles occur. It will be better to heat during the warmer hours of the day.

Solar panels?

SALES / MARKETING



Marketing

Existing Customers

Your current customers are looking for solutions to reduce their running costs You will be already be interacting with these customers

These customers already know and trust you

Use the opportunity to introduce heat pumps at every interaction

Website – If you have a website showing products and services then we can supply images and content

A5 leaflet - by far the the most successful tool we have used so far is by our technicians giving out our A5 leaflet when visiting customers on service visits

Closing heat pump sales is not difficult, the product pretty much sells itself
Customers are happy to invest in products that reduce their energy consumption and save them money



Marketing support for Vian Heat Pump trade accounts

Website – Images, content, specification

Brochure – We have produced a full brochure for the Vian range, and you are welcome to make use of this.

A5 Leaflet – We again have produced an A5 flyer that is a very useful tool to hand out to customers on site.

Showroom pull up banners for display.

Printed marketing can include your Logo and Company details should you wish. They are simply supplied at the cost to print and deliver.

Speak to Andy @ Vortex for more info



Showrooms

Displaying and running heat pumps in your showroom will certainly help convert sales.

The main concern for customers in our experience is the look & sound

Often, we will have customers come into the showroom already qualifying themselves as sold on a heat pump, but they just want to look / listen to the different models before placing the order.

If you are considering including a heat pump with new sales, having one on display helps the whole sales pitch.

VIAN POWER
ESTABLISHED 1998

AIR SOURCE HEAT PUMPS

UP TO 75% MORE ENERGY EFFICIENT THAN STANDARD HEATING OPTIONS

A Vian Power Air Source Heat Pump can be up to 75% more energy efficient than standard heating options. Simply put, they produce more heat (energy) than they use in electricity (energy).

- 812 New Refrigerant Gas**
 - COP up to 7.0
 - Titanium Heat Exchanger
 - 4°C to 48°C Ambient Temperature Range
 - On/Off Control
 - Standard BTU = 1.43 BTU
- 813 New Refrigerant Gas**
 - COP up to 12.06
 - Titanium Heat Exchanger
 - -15°C to 45°C Ambient Temperature Range
 - Full DC Inverter
 - Standard BTU = 31.43 BTU
 - 96.0
- 814 New Refrigerant Gas**
 - COP up to 16.33
 - Titanium Heat Exchanger
 - -15°C to 45°C Ambient Temperature Range
 - Full DC Inverter
 - Standard BTU = 31.43 BTU
 - 96.0
- 815 New Refrigerant Gas**
 - COP up to 20.7
 - Titanium Heat Exchanger
 - -15°C to 45°C Ambient Temperature Range
 - Full DC Inverter
 - Standard BTU = 31.43 BTU
 - 96.0

MAKE YOUR HOT TUB OR SWIM SPA MORE ENERGY EFFICIENT

Sales Figures (independent service / sales company)

01 April 2022 –
28 Feb 2023

Retail pricing is determined by you, as an example, our average installed price across the whole range is £1625.

This gives an average ex vat profit per unit of £745.00

including general costs of the additional plumbing

VP-500 x 59

VP501 x 13 (newer model)

VP-700 x 34

VP-900 x 16

122 total
units sold

Based on the single unit buy price. Pallet qty orders will see greater margins

To equate 120 heat pump sales to tub sales

Mid Spec Hot Tub – equivalent of 56

High Spec Hot Tub – equivalent of 32

Combined average – equivalent of 44

Based on our own general figures (1600/2800), figures will vary based on your own sales margins



IN SUMMARY

Significant reduction in energy consumption

Positive for our industry and products

Saves customer money

Customers are willing to spend on energy saving goods

A valuable revenue stream with good margins

Huge sales potential for the retro fit market

GREEN – far better for the planet

“With the season fast approaching, if you are considering offering heat pumps, there will not be a better time than now!”



Thanks For Listening

Questions?

