

HOW TO ADD AN AIR SOURCE HEAT PUMP TO YOUR HOT TUB



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FOREWORD

FOREWARD

With the increase in electricity prices all over the world, we're all looking for alternative ways to heat our hot tubs. Air Source Heat Pumps are a great way to reduce the cost of your hot tub and allow you to keep using them even after the utility price hikes.

Don't decommission your hot tub because of the fuel price rise, make it "price hike proof" with an Air Source Heat Pump.

In this ebook, I will go through step by step the things you need to do in order to fit an air source to your own hot tub.

Hope you find it useful and don't forget to get in touch for your Air Source Heat Pump Supply and Connection kits too

Just putting this out there at this stage, you will get an ROI in 12 months or so. Also, I personally benefitted from 65% reduced costs and 8x heat up time. All my customers have reported savings of 50% or more on their electricity builds post fitting of an air source heat pump. You can read about that here

<https://buildahottub.com/reduced-hot-tub-costs/> or scan the QR code below to read the article on your device.



Have a good read through this ebook. Just as a final comment, if I am supplying you the Air Source Heat Pump and Connection Kit, then I will of course be on hand to help and advise during your install.

Whether this is a phone call, email with some pictures so I can help with a location or where to cut the pipes, or even having a chat with your electrician or plumber that is doing this for you – I am here to help – it is what I do.

Happy “cheaper” Hot Tubbin’

Andi



INVALIDATE HOT TUB WARRANTY

INVALIDATE HOT TUB WARRANTY

The first thing that I must stress is that you are going to invalidate any manufacturer's warranty on your hot tub in doing this.

That said, to be honest, if you can fit one of these yourself, you don't need your manufacturer's warranty as you can service it yourself!

There are not a lot of parts that need to be serviced on a Hot Tub so if you are comfortable fitting an Air Source Heat Pump then you are going to have no problem servicing your tub if anything breaks.

THE MYTHS AROUND HOT TUBS AND AIR SOURCE HEAT PUMPS

THE MYTHS AROUND HOT TUBS AND AIR SOURCE HEAT PUMPS



I want to deal with some of the myths surrounding air source heat pumps and the use on hot tubs:

Myth number 1 – they don't work and it is not possible. Wrong! I have fitted one to my own tub and it 100% works and supplied dozens and dozens of customers who have fitted them too.

Myth number 2 – they don't get up to 40C or 102F – Wrong again! They certainly do!

Myth number 3 – you have to buy the air source to match your Spa Pack manufacturer – wrong! I have a Balboa system on my own and a Comfortline Heat Pump. I also fitted a Comfortline to my friend's Gecko system so that is two of the top manufacturers that I know work 100%

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Myth number 4 – you get an error code on your Topside control unit. Wrong! The topside has no idea you are fitting an air source unless you are using the one from the same manufacturer (which are expensive!)

Myth number 5 – you can't power the Air Source from the Spa Pack. Wrong! Whilst you do not take power from the Spa Pack, you can easily tap into the main power block on your Spa Pack to provide a loop out to power the Air Source.

Myth number 6 – you need new electrics. Wrong! If you are removing the electrical heater (just unplug it from the spa pack, takes 5 seconds) then you don't need new electrics as the air source will not draw more than the Spa Pack heater. If you are not sure, you can check with an electrician.

With the myths out of the way, let's get started on how we fit these.

SELECTING THE RIGHT AIR SOURCE HEAT PUMP

SELECTING THE RIGHT AIR SOURCE HEAT PUMP

There are lots of models available for Air Source Heat Pumps – personally, I have a Comfortline on my own Hot Tub. I bought it because it was cheap. I could have got an “all singing all dancing” heat pump but this fitted my needs, it was cheap and it is fantastic. Saves me a whole bunch of money too.

You can also see other models in my store – really well priced too!

WHAT SIZE AIR SOURCE HEAT PUMP DO I NEED?

The size of the Air Source Heat Pump that you need is really determined by the volume of water you are looking to heat. As a general rule, my recommendations are as follows.

Less than 1200 litres – 7KW (Usually 4 person tubs)

1200 litres to 1800 Litres – 9KW (Usually 4-6 person tubs)

This covers most hot tubs. For Swim Spas, it is probably worth having a conversation as some require two different sources of heat.

If you put a larger Air Source on a tub from the same range, e.g. the Comfortline and you opt for a 12.8KW instead of the 7KW – you will gain in heat up time but the unit will be no more efficient.

So, in short, the larger the air source, the quicker it will help with your heat up times, but it will also perform better in lower temperatures in terms of the heat output as it will take longer to get to parity – where you are getting the same heat out as the electrical current you are drawing in.



I chose the Comfortline Heat Pump for my own DIY Hot Tub. I have also supplied this unit to customers too. In this article, I will review the specifications as well as tell you the good and the bad about the unit.

WHAT IS THE COMFORTLINE HEAT PUMP?

WHAT IS THE COMFORTLINE HEAT PUMP?

Firstly, this is the model that I selected for my own DIY Hot Tub.
Check it out here.



The Comfortline Heat Pump is powered by DC inverter compressor, it can adjust heating capacity from 20% to 100% intelligently according to different heating demands.

When season starts and heating demand is high, the Inverter Comfortline runs at 100% compressor & fan speed for fast heating.

When maintaining the pool temperature, the Comfortline Heat Pump runs at low speed for energy saving with higher COP (Coefficient of Performance)

HEAT PUMP FEATURES

- Steel Body.
- GMMC AC Inverter Compressor.
- Simple to use control panel gives an easy, informative user interface.
- Silence mode for night time running, even quieter.
- Auto Defrost, allowing the unit to be run down to 0 degrees.
- With 30% greater surface area on the Titanium Spiral heat exchanger & HP Booster Technology the Aqua-Inverter Mini is at least 20% more efficient than a standard heat pump.
- Comes with 1.5 female plain socket
- Salt Water Safe – up to 3.5% : 35g in 1000g water
- Fully variable compressor and a stepped variable fan.

MANUFACTURER'S WARRANTY – PARTS ONLY AFTER 12 MONTHS

Heat Exchanger – 5 Years

Compressor – 2 Years

All other parts – 2 Years

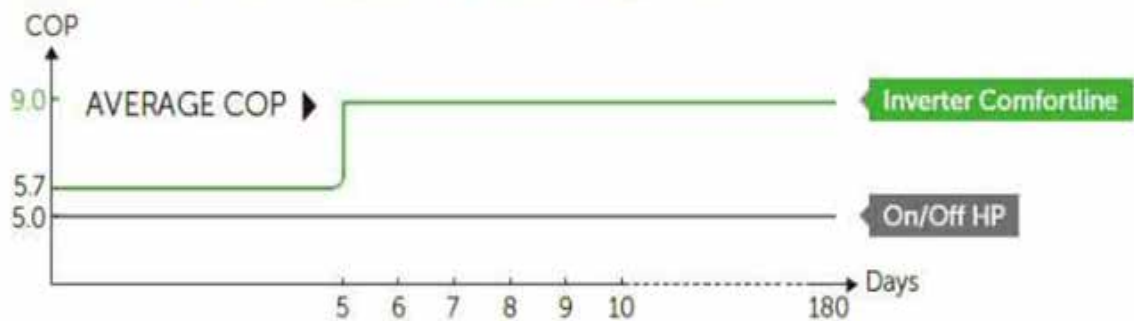
Casing – 2 years

HOW EFFICIENT IS THE COMFORTLINE HEAT PUMP?

The Comfortline Heat Pump has an AVERAGE COP of 9 at Air 26°C/ Water 26°C/ Humidity 80%, which means 1kW electricity consumption can provide up to 9kW heat in return. While On/Off heat pump can only provide 5kW heat as its COP is just around 5.

Capacity \ Model	AMIR07	AMIR09	AMIR13	AMIR17	AMIR21	AMIR24
20% capacity	10.3	10.6	11.6	11.2	11.8	11.8
AVERAGE 50% capacity	9.3	9.6	10.1	9.7	10.2	10.2
100% capacity	6.6	6.8	7.0	7.1	6.5	6.5

Inverter Comfortline vs On/Off HP (in 180 days pool season)



◆ AVERAGE power consumption (in 180 days pool season)
(e.g. 12.5kW at Air 26°C/ Water 26°C/ Humidity 80%)

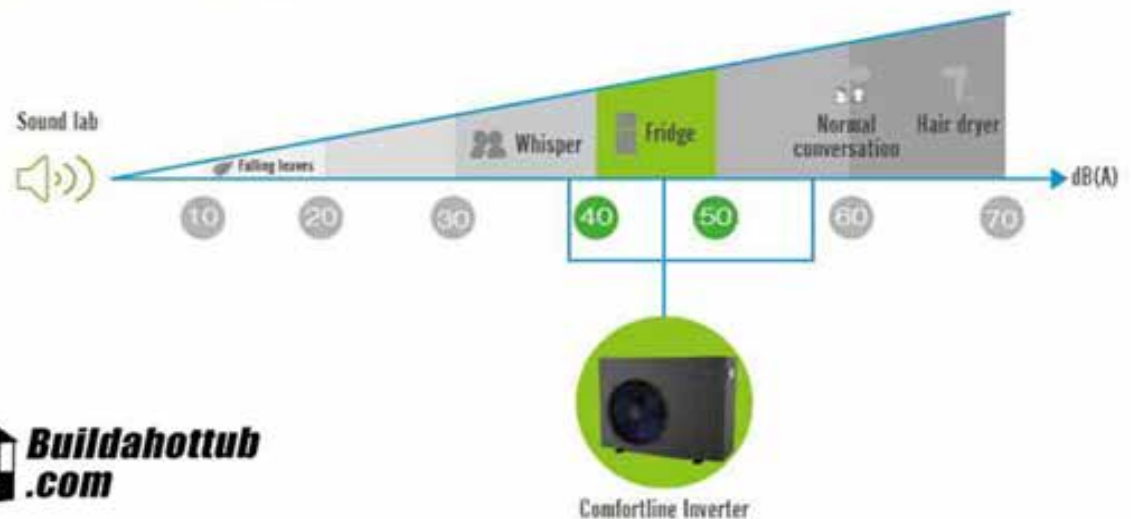


HOW QUIET IS THE COMFORT-LINE HEAT PUMP?

Thanks to quiet DC inverter compressor, low-speed running of the compressor & fan motor, the Comfortline Heat Pump can offer you super quiet operation by 7dB(A) lower sound pressure at AVERAGE 50% capacity.

7 Times Quieter

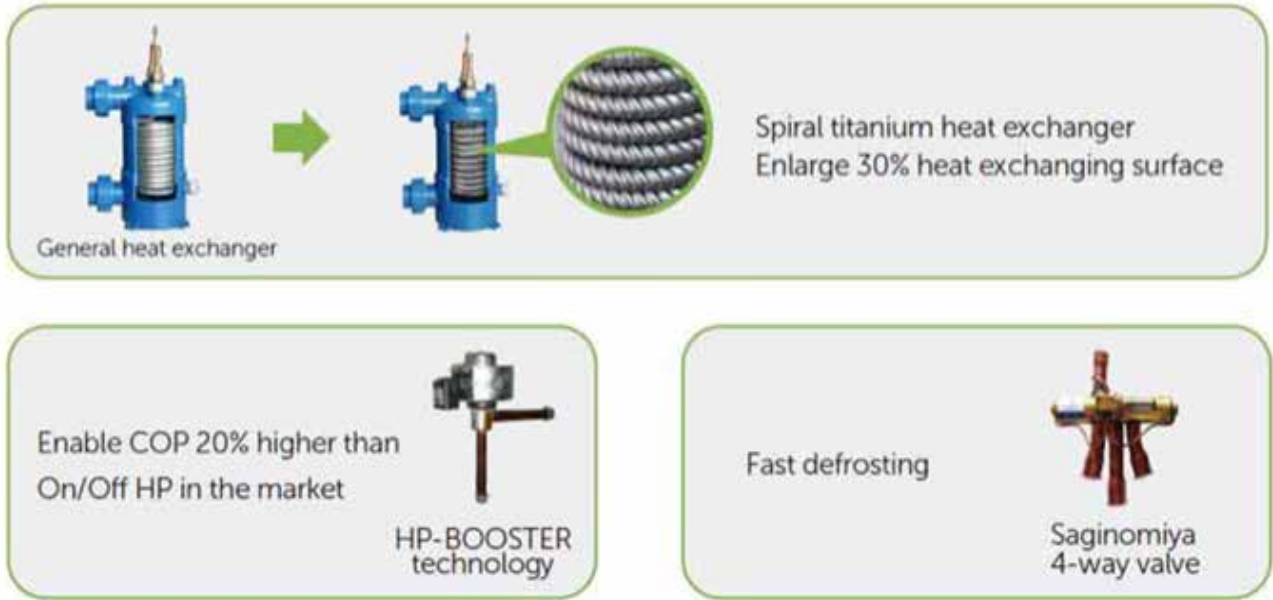
Thanks to quiet DC inverter compressor, low-speed running philosophy of compressor & fan motor, Inverter Comfortline can offer you super quiet operation by 7dB(A) lower sound pressure at AVERAGE 50% capacity.



Comfortline Inverter

WHAT ARE THE OTHER ADVANTAGES OF THE COMFORTLINE HEAT PUMP?

The unit has a spiral titanium heat exchanger which can enlarge the heating surface by 30% when compared to a normal heat exchanger.



WHAT ABOUT “ALL SEASON” USE?

In my opinion, this has become somewhat of a marketing term. The Comfortline is rated to 0C or 32F – what does this mean? It means that the manufacturer can guarantee the COPs that it is stating are reachable at these temperatures?

So what happens if the temperature drops below this? Well, it is certainly not a case that the heat pump will just stop working. What will happen is that the efficiency will drop – but that is the case of any heat pump, even if they are rated to -15C!

For me, this was not something I was bothered about in the slightest when I made my decision of what heat pump to purchase for my own tub. Remember, I have access to all the models sold and I chose this one!

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If you want to watch a video on how the Comfortline Performed at -4C then scan the QR code below.



WHAT ARE THE SPECIFICATIONS OF THE COMFORTLINE INVERTOR HEAT PUMP?

WHAT IS MY VERDICT?

For me, the cost savings that I have made with this model (I have the 20KW model) have been huge – 66% cheaper on my Hot Tub running costs and 8x faster on the heat up times versus my old 3KW electric heater. I love the simplicity of the unit. The simple controls, the almost lack of complicated features means it is a case of turning it on and setting a temperature, that is all. For the price, I think you will struggle to find a better unit. And it performed for me really well in sub-zero conditions too!

**SELECT THE RIGHT
“CONNECTION
KIT” FOR YOUR
AIR SOURCE**

SELECT THE RIGHT "CONNECTION KIT" FOR YOUR AIR SOURCE.

To make things easy, I have put together connection kits to enable you to have all the parts you need to connect an air source to your existing tub. I have three size options so measure up the pipes you need as detailed in this article, then you can select the one that meets your needs. There are 2" and 1.5" kits available. Then, select either "regular", "large" or Extra Large" connection kits. The difference is the amount of pipe and connections you will need.



Visit – <https://shop.buildahottub.com> for more information.

 <p>Sale!</p> <p>AIR SOURCE HEAT PUMPS Onda Mini Heatpump 7KW £1,265.00 £699.00</p>	 <p>Sale!</p> <p>AIR SOURCE HEAT PUMPS Onda Mini Heatpump 5KW £1,125.00 £599.00</p>	 <p>Sale!</p> <p>AIR SOURCE HEAT PUMPS Onda Mini Heatpump 3.5KW £798.00 £499.00</p>
 <p>Sale!</p>  <p>AIR SOURCE HEAT PUMPS Comfortline Inverter Heat Pump 12.8 kW £3,000.00 £1,850.00</p>	 <p>Sale!</p>  <p>AIR SOURCE HEAT PUMPS Comfortline Inverter Heat Pump 9 kW £2,340.00 £1,300.00</p>	 <p>Sale!</p>  <p>AIR SOURCE HEAT PUMPS Comfortline Inverter Heat Pump 7 kW £2,100.00 £950.00</p>

Visit – <https://shop.buildahottub.com> for more information.

SELECTING A SUITABLE LOCATION FOR YOUR AIR SOURCE

Now, you need to choose a location for your Air Source. It needs to have good air flow all around it so it cannot be encased, covered, underground or up against a wall. It needs roughly 20-30cm all the way around and 2m in front of the fan. Different manufacturers have different guidelines, but this is a rough idea for you.

They are not particularly noisy units in general.

You also do not want to be too far away from your tub. Remember, you are adding lengths of pipe to your pump so the flow rates will drop on your circulation. I would try and keep within 5m of your tub if at all possible. Any further, you may need to upgrade your circulation pump to a larger one.



DECIDING ON A PIPE RUN

The next step is to decide on the route the pipe is going to take to and from the hot tub. If you are not laying your pipes on the ground, make sure you support them. Also, try and keep the number of bends and twists to a minimum.

When you are making a joint, I have a great video below on how to make the perfect pipe joint. Scan the QR Code to watch the video.



HOW TO MAKE THE PERFECT PVC SOLVENT WELD JOINT FOR HOT TUB PLUMBING

HOT TUB PLUMBING

Whether you opt for rigid pipe or indeed semi-flexible (as it is not that flexible in reality) pipe, you are going to need to make some solvent weld joints. This is true whether you are building a new hot tub from scratch, adding and air source heat pump to your existing hot tub, or just doing some repairs. Below I cover all of the steps needed to ensure that you have a perfect joint, each time, every time.

CUTTING THE PIPE

The first step to getting a perfect PVC solvent weld joint is cutting the pipe correctly. By correctly, I mean cleanly and I mean perpendicular to the pipe itself. Your cut should be straight and as perfect as you can get it. A good test for this is if you stand the pipe up on its end, is it vertical or is it tilting to one side? If it is tilting, it is not a perfect cut.

CLEANING THE PIPE

The second step to a perfect PVC solvent weld joint is that the pipe is clean. By clean I don't mean it is not “dirty” what I mean is that you have removed any of the grease and residue that has been left behind from manufacturing. This is especially true if you are using the semi-flexible pipe.

To do this, you are going to take a piece of glass or sand paper and you are going to rough up the edge to about 2” or 4cm in length. This is enough for the joint that you are going to make. You know when it is “clean” and has been roughed up enough when it is no longer shiny and it is a sanded dull colour – this is perfect.

PRIMING THE PIPE

This is a somewhat optional step, but priming the pipe is the stage where you use a solvent based PVC pipe primer. This is often purple in colour. What the primer does is it too removes and dirt and grease from manufacturing process.

Personally, I tend not to use a primer and just make sure I have thoroughly roughed up the area before I apply any pipe cement to the pipe.

CLEANING THE FITTING FOR A PVC SOLVENT WELD JOINT

This next step is exactly the same step as you have just done with the pipe itself. You are going to take a piece of glass or sand paper and you are going to rough up the inside of the fitting 2” or 4cm in

length which should take you up the internal "line" inside of the fitting. The goal is to get the pipe into the fitting right up to this line on every single joint.

MARKING YOUR PIPE DEPTH

This next step is one you should not miss out. With a permanent marker or a sharpie, you are going to mark the ideal "target" depth of the pipe that you would like to get it inside of the fitting.

To do that, hold the pipe alongside the fitting and look for the internal line inside of the fitting. This is the maximum depth that the pipe can go into the fitting before it hits the small "lip".

With your marker or sharpie, mark this depth on the pipe. This is the "target" as it can get confusing very quickly with how much pipe has actually gone inside of a fitting once you have done 5 or 6 you will forget! It is also a good thing here to actually add a couple of guide marks for alignment. What I mean is put the fitting in exactly the right angle you are looking for and then put a mark on the pipe and on the fitting. This will help you align the two when you are in somewhat of a rush below.

APPLYING SOLVENT WELD

This step you do need to do quickly but don't rush. You have about 20-25 seconds before the solvent weld becomes unworkable and has dried.

Apply a good amount of solvent weld to both the pipe all the way

around and the fitting. Not too much that it is dripping everywhere but also not too little that there are dry sections. Then move onto the next step.

AVOID CHANNELLING ON A PVC SOLVENT WELD JOINT

Channelling is where you push the fitting onto the pipe and the solvent weld dries in a straight line leaving a dry patch. This channelling can lead to leaks. Therefore, what you are going to do for each of the joints is twist the pipe and the fitting when you are pushing them together. This twisting action means that you can avoid the channelling.

This is also where those guide marks that you made come into place. Firstly, you want to try and get to your target line which means that the pipe is fully inside of the connection. Next, so you don't have to worry if your joint is at the right angle, you are going to align up the two marks you made on the fitting and on the pipe itself. Easy right?

WIPE OFF THE EXCESS

There will of course be excess solvent weld on the pipe and the joint so it is good practise to use a microfiber cloth and just wipe off the excess all around the joint. It should be clean, no visible gaps and at this point, the solvent will have started to dry.

There is enough strength in the weld after 20mins for running water through under pressure and it is 4 hours until it is at its full strength.

WHAT TO DO IF IT GOES WRONG

What do you do if it all goes wrong? This step is simple. Cut it out and start again. Do not try and patch up a bad joint, it will leak. Don't try and plug a bad joint, it will leak. If the joint is not made well in the first place, you guessed it, it will leak.

PVC Solvent welds when done correctly last for almost ever. If they are not made correctly, they will leak in the future if they don't already do so now. A bit of practise and you can become very good at these quickly.



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CHOOSING WHERE TO “CUT” THE PIPES

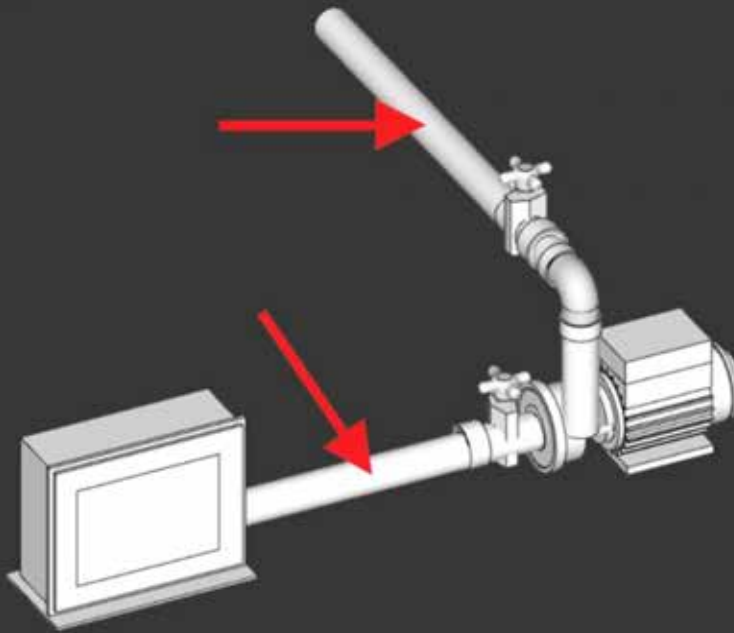
CHOOSING WHERE TO "CUT" THE PIPES

This is perhaps the part that most of you will be nervous about. Don't be. It is simple. What you are looking for is the pump that feeds the heater. That means you are looking for the pipe that comes out of the top of the pump and then goes into the Spa Pack. You can then cut this either before or after the spa pack.

From there, you are then going to use some of the 90 degree bends that are in the connection pack to take your pipework out of the hot tub case and over to the heat pump. Simple.



Heat pump Connection

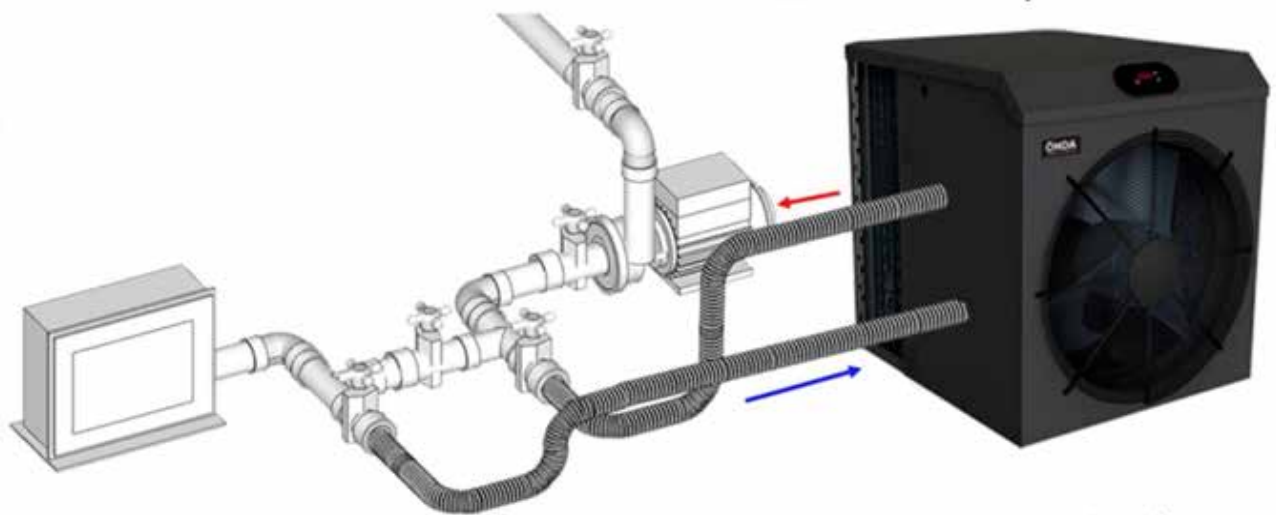


Either Just Before or Just After the circulation pump is the ideal place to "tap in" for your Air Source Heat Pump

Air Source Connection



Install the bypass inside or outside of the cabinet. Connect the Onda with the flexible tubes provided



*not drawn to scale

Onda Heat Pump Connections

**CHOOSING
WHERE TO
“EXIT” THE
TUB SHELL**

CHOOSING WHERE TO “EXIT” THE TUB SHELL

CONNECTING POWER TO THE AIR SOURCE

Contrary to popular belief, the Air Source is not powered from the Spa Pack. This is however, unless you are buying the Gecko or Balboa heat pumps to match you units (not worth the money to be honest IMHO)

Then, how are they wired? Simple, regular twin and earth from your mains supply. You can, if you are disconnecting the electric heater, take a feed off the Spa Pack’s main block or from your rotary breaker.

If you are not planning to use the electric heater, then you do not need to upgrade your fuse on the circuit as you are essentially replacing like for like.

If you are planning on using the electric too, then you will need too. You may need to consult an electrician or for those of you that just like doing, adding another 10A is usually enough.

DISCONNECTING THE ELECTRICAL HEATER

Disconnecting the electrical heater is a simple process. If you are on a Gecko or a Balboa Spa Pack, you are looking for a Molex plug in connection usually at the bottom of the spa pack near to the heating element (the tube at the bottom) It is generally black in colour and much larger than the pump connections for example. If you are not sure where this is, generally, on the back of the Spa Pack cover, there is a circuit diagram.

You simply need to unplug this from the main board. The Spa Pack will have no idea that it is unplugged.

I often get asked if you can take a power feed for the Air Source from this connection. I do not recommend this as it would mean cutting the power to the air source when it hits temperature. That would not allow the unit to shut down correctly so whilst I have no “evidence” I think that it will shorten the life of the air source if it is wired in this way.

It is also not a good idea to take a feed here in case the air source draws more current than the electrical heater would – you will blow a fuse or damage the spa pack. Much better to power the Air Source from it’s own feed as described above.

HOW DOES IT WORK?

Again, unless you are using the Gecko or Balboa units that tie into your Spa Pack, then you are looking to control you air source with flow. By flow, I mean the water that is being circulated from the circulation pump.

When the Air Source senses flow for a couple of minutes (the Comfortline is 3 mins) then the heater will kick in and start.

The Air Source has an independent temperature from the Spa Pack. Remember, the Spa Pack cannot tell that the electrical heating has been disconnected.

Therefore, it will be “calling for heat” from the electric heater that is not there. The Air Source will kick in and provide the heat.

DOWNSIDES OF INDEPENDENT TEMPERATURES?

With this “flow setup” as I like to call it, there are however some small downsides. They are not game changers themselves, but I wanted to make you aware of them.

Firstly, let’s take this scenario. You have your heat pump set at 40C / 102F. You are not using your hot tub so you have dropped it down to 30C / 86F. However, every time the spa pack pools the thermostat by running the pump or filtering the water, the heat pump will kick in.

This means that you are heating at times when you technically don’t need to. They are not huge amounts, but they will add a little to the running costs. This means that the best way to do this is to make sure that the temperature on your tub is exactly the same as the temperature on your air source. If this is the case, then you will not have a problem.

CONCLUSION AND ROI FROM AN AIR SOURCE HEAT PUMP

The addition of an air source will no doubt save you money. How much, it is difficult to say but upward of 50% – I have already shared my story and it saves me 66%.

You will get an ROI from your investment at current prices in about 12 months.

The fitting does need some DIY skills but it is pretty straight forward to do – you don't need to get someone in if you are a confident DIYer to do this.

If I can help in any way or you have any questions, please do get in touch.

Happy “cheaper” Hot Tubbin





Andi

VIDEO

LINKS

VIDEO LINKS

To make things easy, I have put together connection kits to enable you to have all the parts you need to connect an air source to your existing tub. I have three size options so measure up the pipes you need as detailed in this article, then you can select the one that meets your needs. There are 2" and 1.5" kits available. Then, select either "regular", "large" or Extra Large" connection kits. The difference is the amount of pipe and connections you will need.

What is the BEST way to heat a Hot Tub? Air Source Heat Pump!	
How to Add an Air Source Heat Pump to My Hot Tub	
How I added an Air Source Heat Pump to a Hot Tub.	
5 Considerations BEFORE you install an Air Source Heat Pump on your Hot Tub	

<p>Add an Air Source Heat Pump to a Hot Tub in 3min30s - #timelapse</p>	
<p>Onda Mini Air Source Heat Pump Review</p>	
<p>How To Install the Onda Mini Air Source Heat Pump</p>	
<p>How to Defrost a Comfortline Air Source Heat Pump</p>	
<p>Learn what happened when I ran my Air Source Heat Pump in sub zero conditions!</p>	