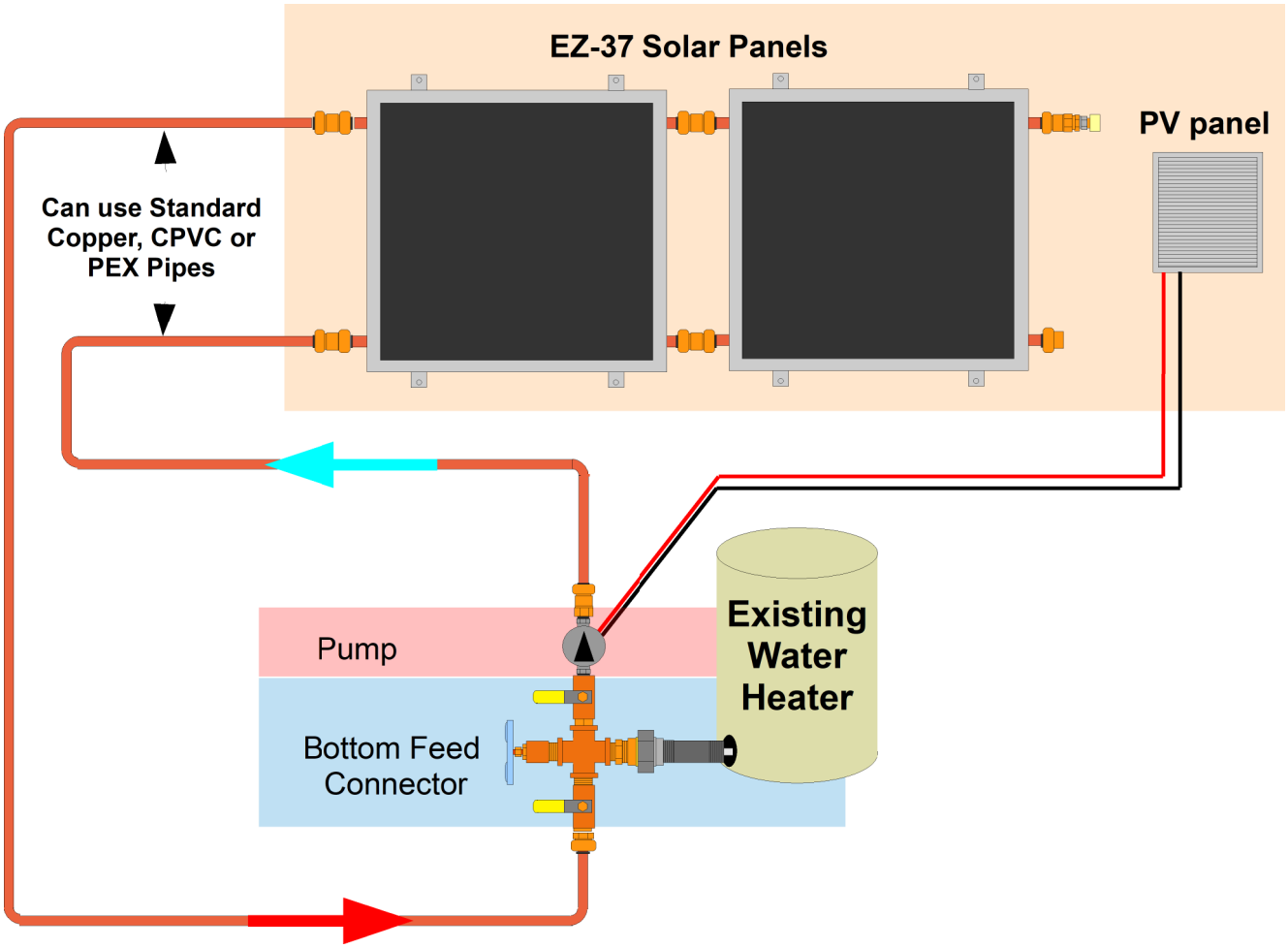
General System Layout Sketch



EZ Connect System Installation Instructions

Introduction

This document describes how to install EZ series panels. The EZ series panels are designed to be easily installed on any flat surface. They are equipped with 1/2” push-fit fittings so making reliable tight connections is easy and fast. We offer inexpensive fittings kits that make connection to standard ½" pipe of any type easy. No soldering or special tools are required.

It is the installer's responsibility to assure that the panels themselves as well as the method and place of installation are in full compliance with all applicable regulations. Please consult the datasheet for the panels you are considering and assure that they are permissible and appropriate for your location.

Site Selection

The optimal location for your solar array is a south facing surface that is tilted roughly at the angle of your latitude. This can be on the roof or on the ground next to your house. For ground mounted array a rack that tilts the panels towards the sun is usually required.

Since some heat is lost through the insulation on the pipes to and from the water heater it is important to locate the solar panel array as close to the water heater as possible. If the length of the pipe run between the panel array and the water heater exceeds 50ft each way we recommend an extra panel to overcome the losses caused by the long pipe runs.

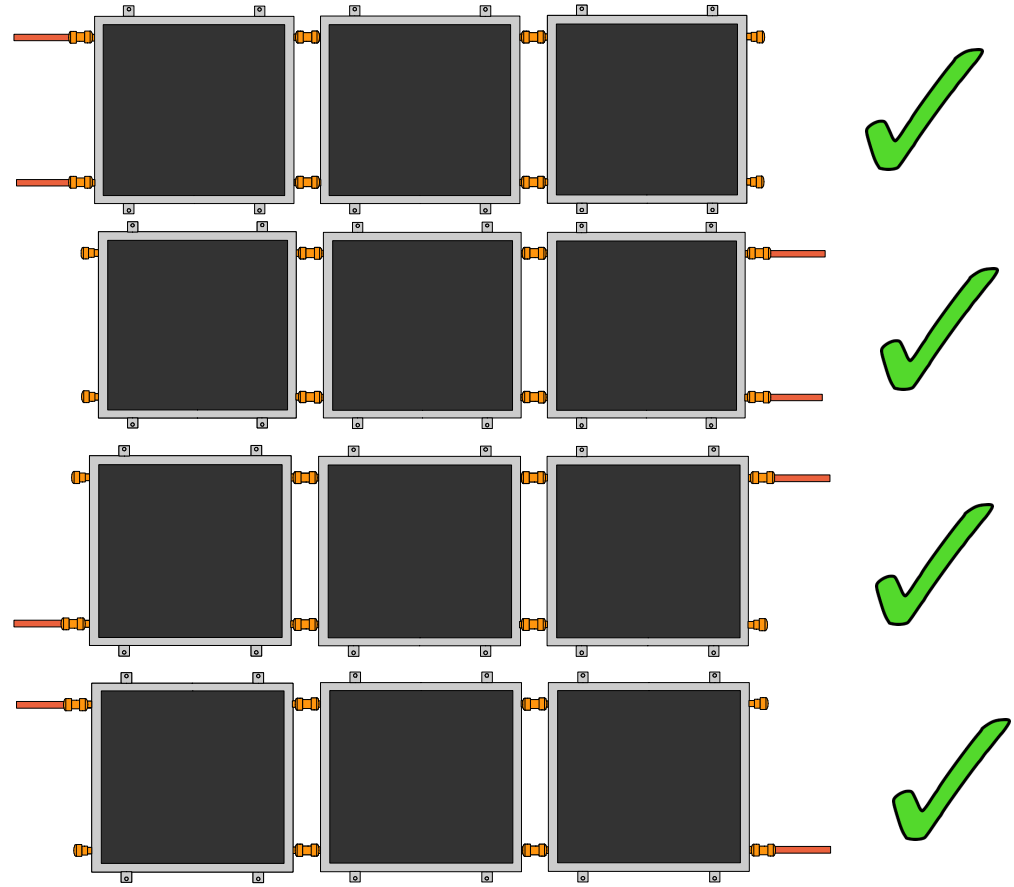
Surface Preparation

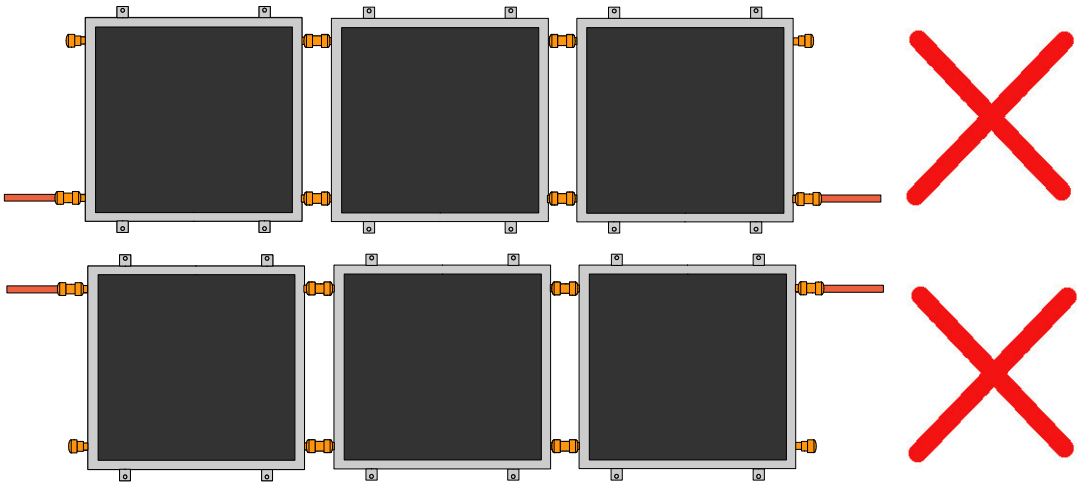
In general, the surface you are planning to use for your installation should be fairly flat. Our panels are unique in that they can accommodate a base that is up to 1/4” uneven under each panel. Because of the special polycarbonate glazing they can flex a small amount without damage. The panels are equipped with four “feet”. Each foot has a hole that is sized for a #8 deck screw. If you are mounting the panels to a surface that is suitable for using exterior deck screws, they are ready to install out of the box. However, if you require bigger bolts, you will have to enlarge the holes with a drill. Do not make the holes larger than 1/4”, as the feet will not have sufficient strength to hold the panels down.

If you are using a rack to tilt your panels towards the sun, please make sure the feet all rest flat on the surfaces of the rack and all feet are securely fastened to the rack. Rack mounted panels can be subject to large wind forces.

Connecting the Panels

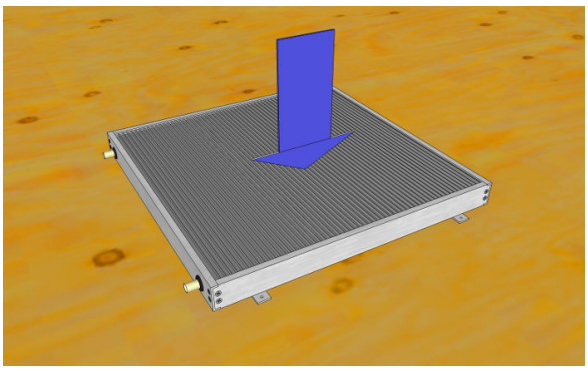
The panels have to be connected to each other and to the pipes going to the water heater or solar tank. The following diagrams show the possible ways to arrange the panels and connections.



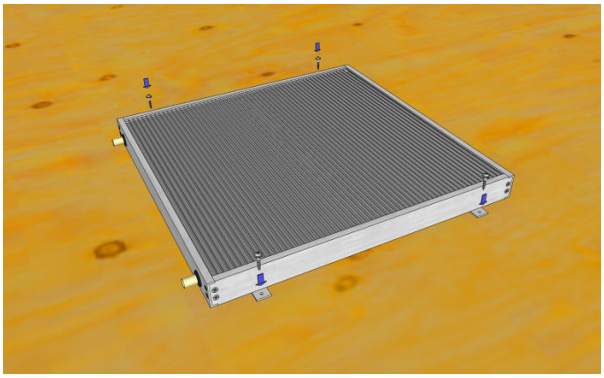


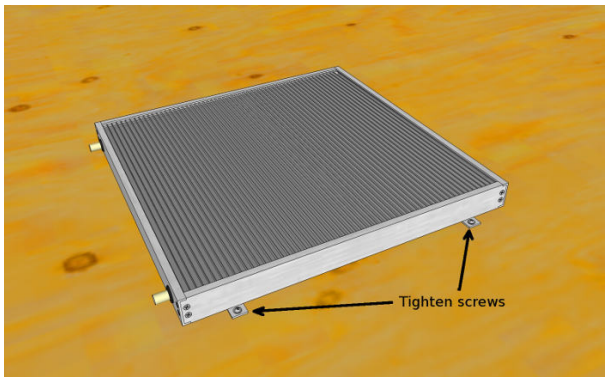
Step 1

Unpack the panels from the box(es) and lay the first one on the installation surface.



Each panel has to be securely tied down. This is especially true if it is mounted on a rack or on rails so that wind can catch the panels from below. We show a simple set of deck screws here, but depending what method you are planning to use you should follow the directions provided with your mounting hardware. Please remember that these panels are very light so that under no circumstances can you rely on their weight to hold them in place.



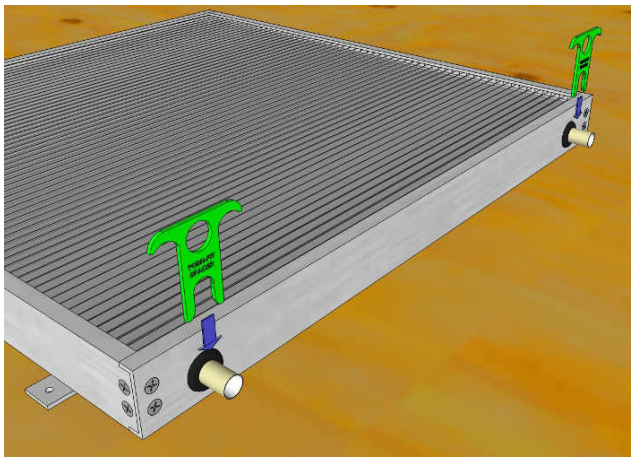


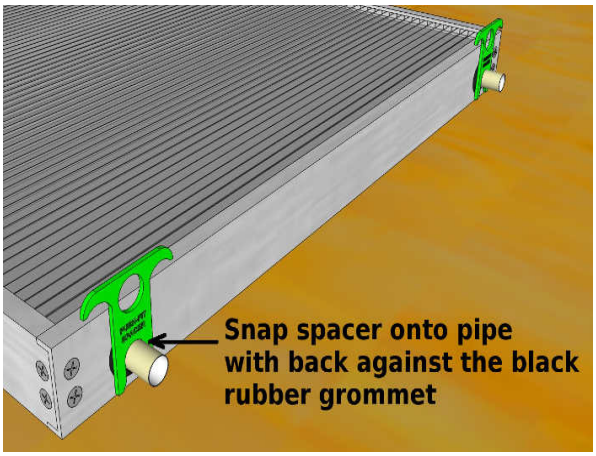
To achieve full wind loading capability it is important to attach all tabs securely to your mounting system.
The connection between consecutive panels is formed by push-fit fittings which are included with the panels. Push-fit fittings are easy to use, fast, and have almost no chance of leaking. The kit includes four push-fit spacers which are used to make sure that the push fit fittings are pushed in the right amount.

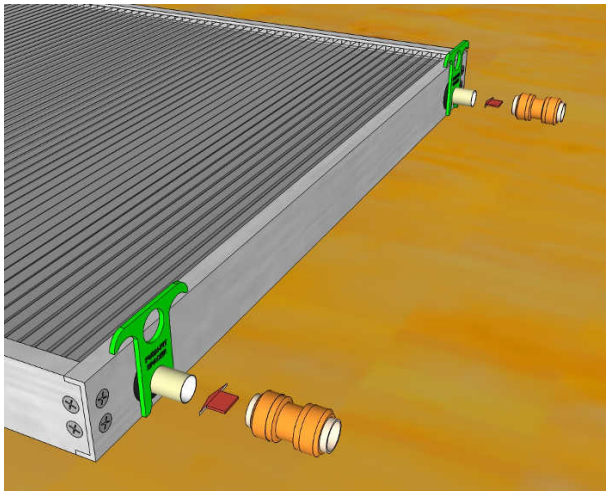
EZ Connect System Installation Instructions

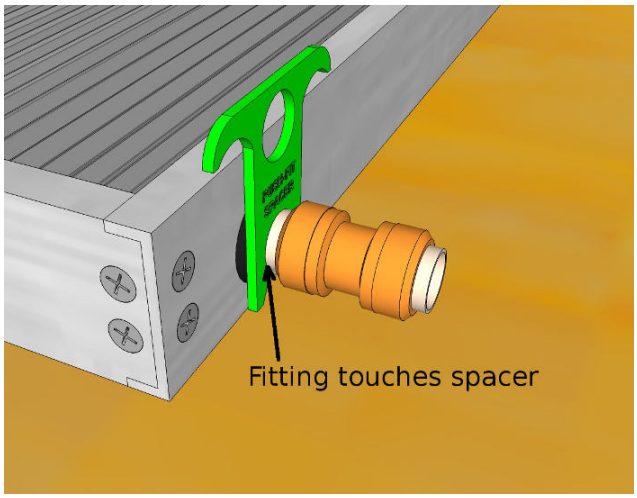
If you don't use the spacers during assembly **you will not be able to take the array apart in the future**.

The spacers snap onto the pipes as shown in these diagrams:

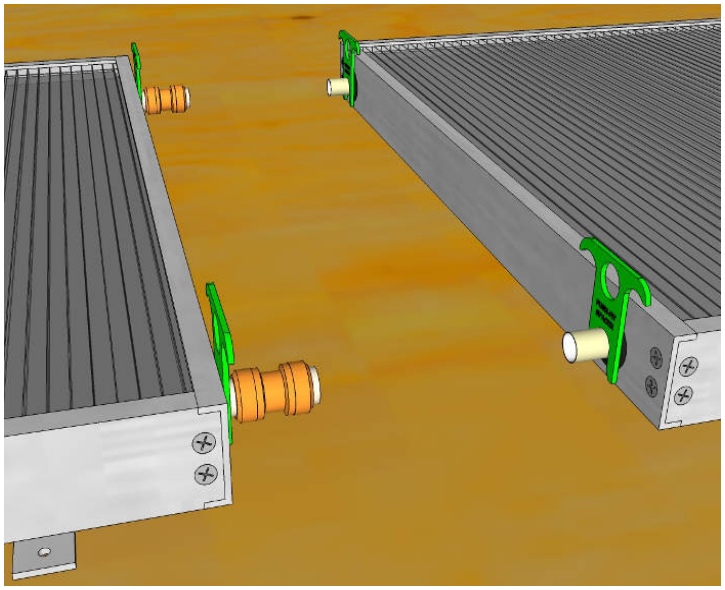


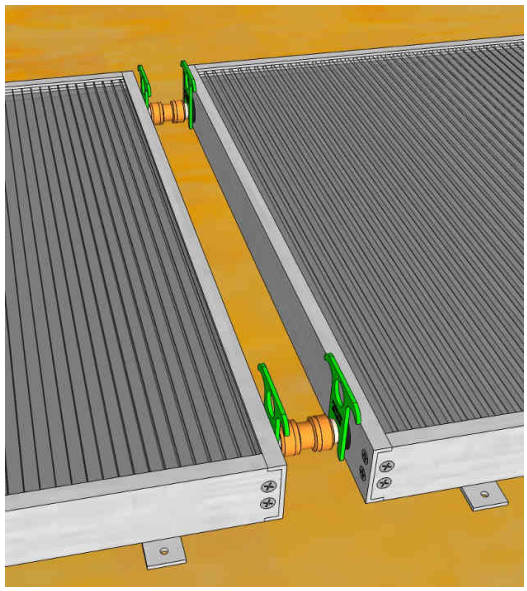






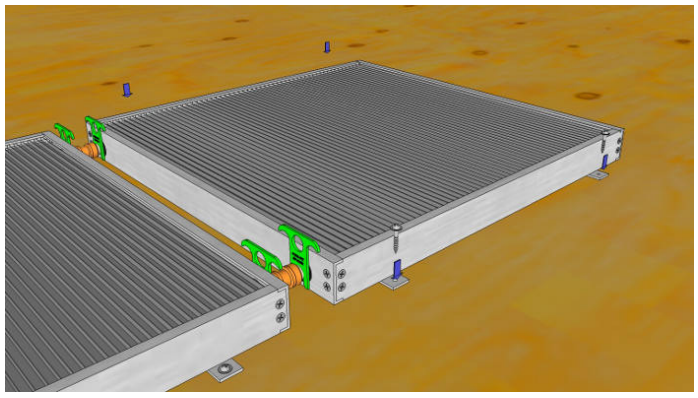
With the spacers in place push two fittings onto the pipes until they touch the spacers. Please note that the fittings will slide onto the pipe with some resistance and it is important to get them well seated.
Next spacers need to be snapped onto the pipes in the second panel. With all four spacers in place the second panel needs to be pushed into the two open ends of the previous panels push-fit fittings. The fittings can be wiggled to line the pipes of the second panel up with the opening on the fittings.

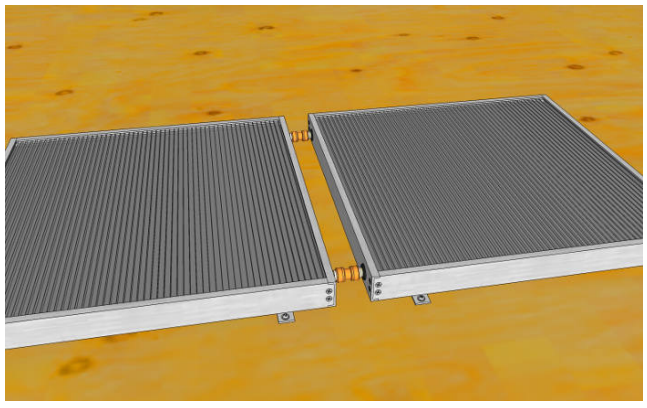




Once completely seated the fittings should be touching the spacers on both sides.

Before you remove the spacers give the second panel a slight tug away from the first to engage the push-fit locking mechanism and then fasten the second panel down. After the second panel is fastened down the spacers can be removed to be used in installing the next panel.

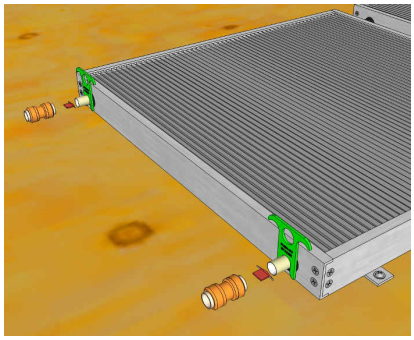


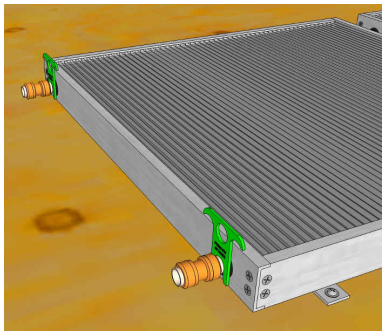


Repeat these steps for all the panels you have.

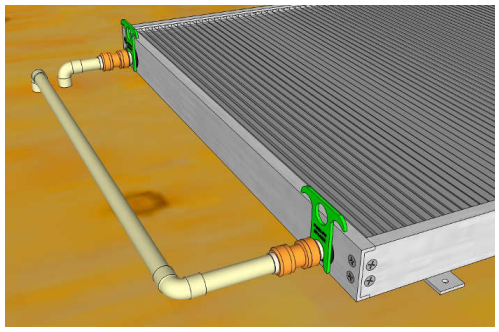
Step 2

To connect the panel array to the water heater you can use 1/2” copper or 1/2” CTS CPVC pipe or 1/2” PEX tubing. If you are using copper pipe DO NOT solder to the panels.
Regardless of the type of pipe you use, the connections are made using the same push-fit fittings that are used for connecting panels to each other.
First put two spacers onto the pipes in the panel where you will be connecting the input and output then push on two fittings until they touch the spacers.

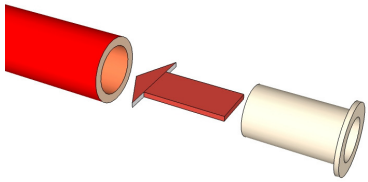


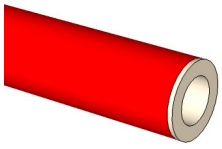


Next the connecting pipes can be pushed into the fittings. The proper insertion depth is close to 3/4”. The spacers can be removed **AFTER** the pipes have been pushed in properly.



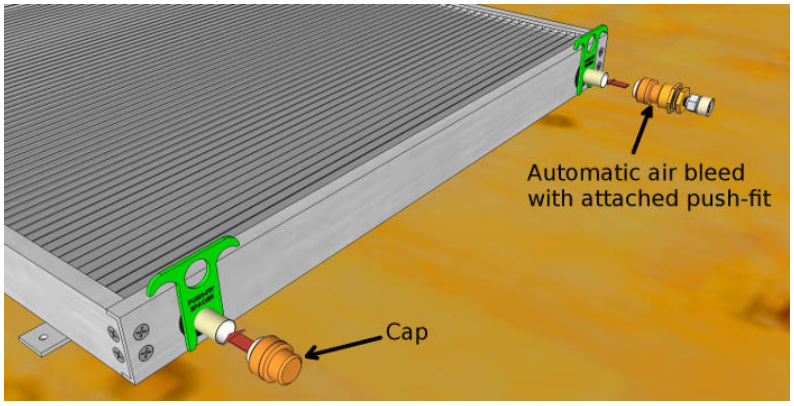
If you are using PEX tubing to connect to the panel array you need to put a plastic insert into the PEX tubing before you push it into the fitting. The plastic insert reinforces the PEX from the inside so that the push-fit fitting can hold on to the tubing securely.

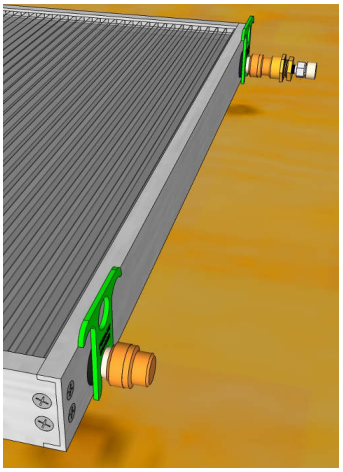




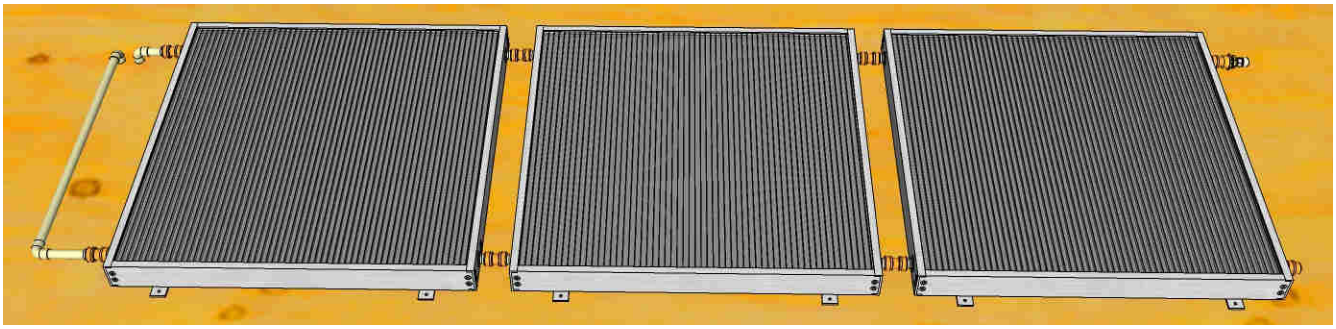
Step 3

You should have two remaining open pipes on the set of panels. The connection fittings kit includes one “automatic air vent” (hygroscopic disk type) and one “push-fit cap” that are used to close off these remaining open pipes. The automatic air vent is pre-assembled with a push-fit adapter so it can be used the same way that all other connections are made (Please consult the Automatic Air Vent Instructions in the Appendix for instructions on the vent). As before two spacers need to be put on the pipes before the fittings are pushed on.





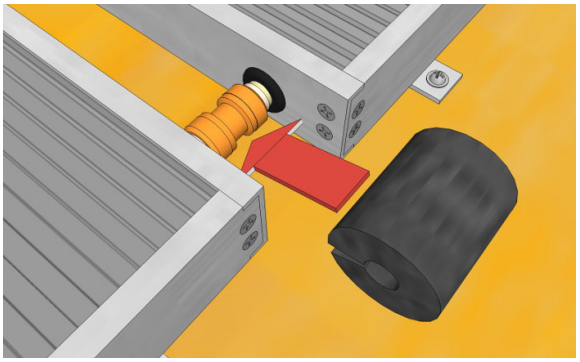
Once the end cap and automatic air vent are pushed in the spacers can be removed.

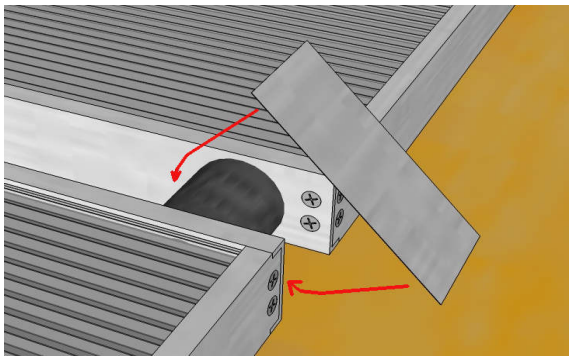


To dis-assemble the array of panels this kit includes a special tool for removing push-fit fittings from the panels. Please consult the “Push-Fit Removal Tool Instructions” in the Appendix for details.

Step 4

The exposed fittings and pipes have to be insulated next. This can be done by surrounding each joint with a foam or fiberglass sleeve. If you are using plastic foam a piece of aluminum adhesive tape should be wrapped around the foam sleeve to prevent rapid UV degradation.
Install a foam sleeve over every fitting between panels as well as at the ends of the panel array. The foam sleeve that goes over the automatic air vent should protect the vent from rain but still allow for the air vent valve to dry over time.





The pipes to and from the array need to be insulated everywhere between the tank and the panel array. The insulation prevents heat loss which will cause the system to function poorly or not at all. This is true even in very hot climates because the water will be significantly hotter than even the hottest surrounding air.

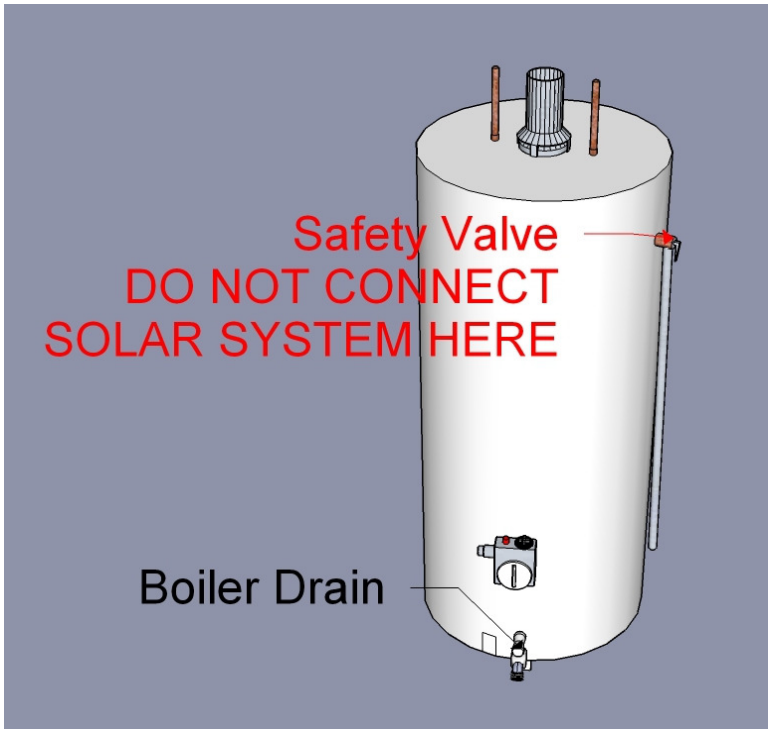
Completed Array Installation

Bottom Feed Connector Installation

The “Bottom Feed” solar water heater connector is meant to connect solar water heater panels directly to your existing standard water heater. It's main advantages are ease of installation, efficiency, and that under most circumstances it eliminates the need for check valves and the associated increased pumping power requirements.
To install this connector your water heater must be equipped with a standard “boiler drain”. Almost all water heaters have this drain. The only exceptions are extremely small point of use heaters (2.5 gals.) and some side connecting units. The connector and boiler drain have standard pipe threads, so during installation apply a generous amount of Teflon tape to the threads before installation.

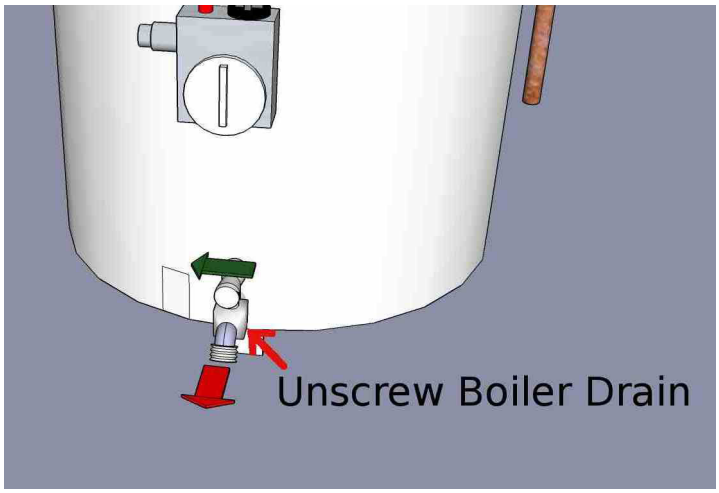
Step 1

Turn off the water heater and locate the “boiler drain”. All standard drains are located near the bottom of the water heater. Drain the water heater using a standard garden hose.



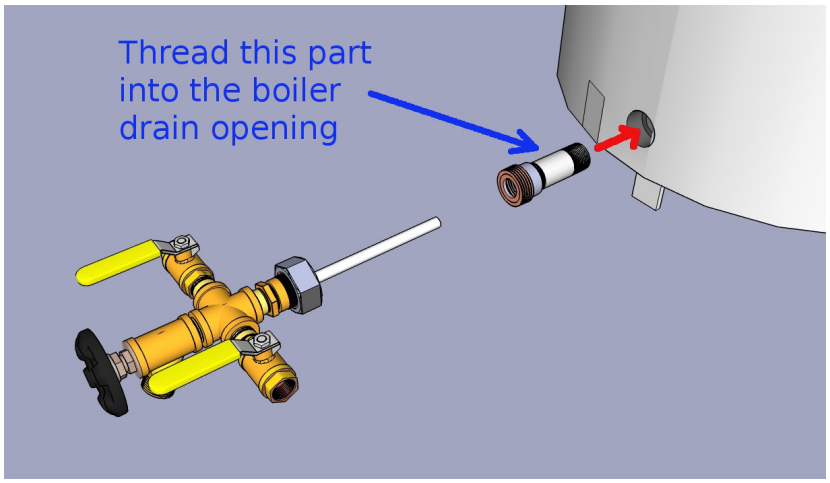
Step 2

Once the tank is empty unscrew the drain valve to remove it from the water heater tank. The Bottom Feed Connector has a built in new metal boiler drain so the existing one will not be needed any more.



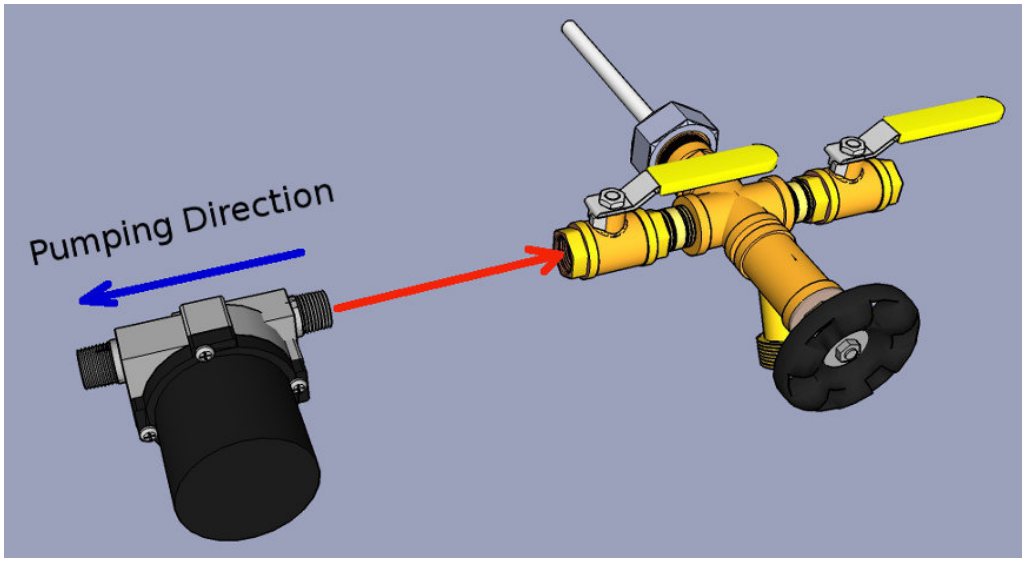
Step 3

The bottom feed connector consists of 2 main parts that are held together by the large nut in the middle. First you have to separate the two parts by unscrewing the big nut. Then thread the steel part (gray metal) into the water heater where the boiler drain used to be using a generous amount of plumbing sealant (included) on the threads.

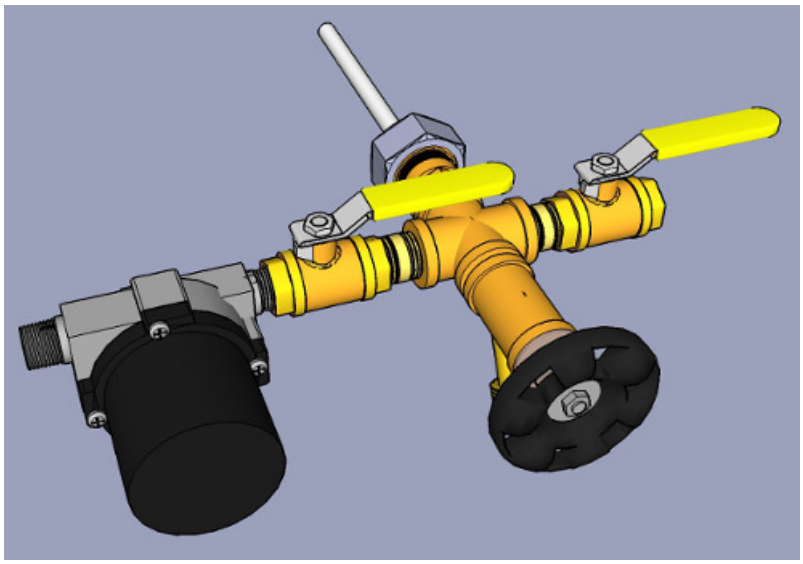


Step 4

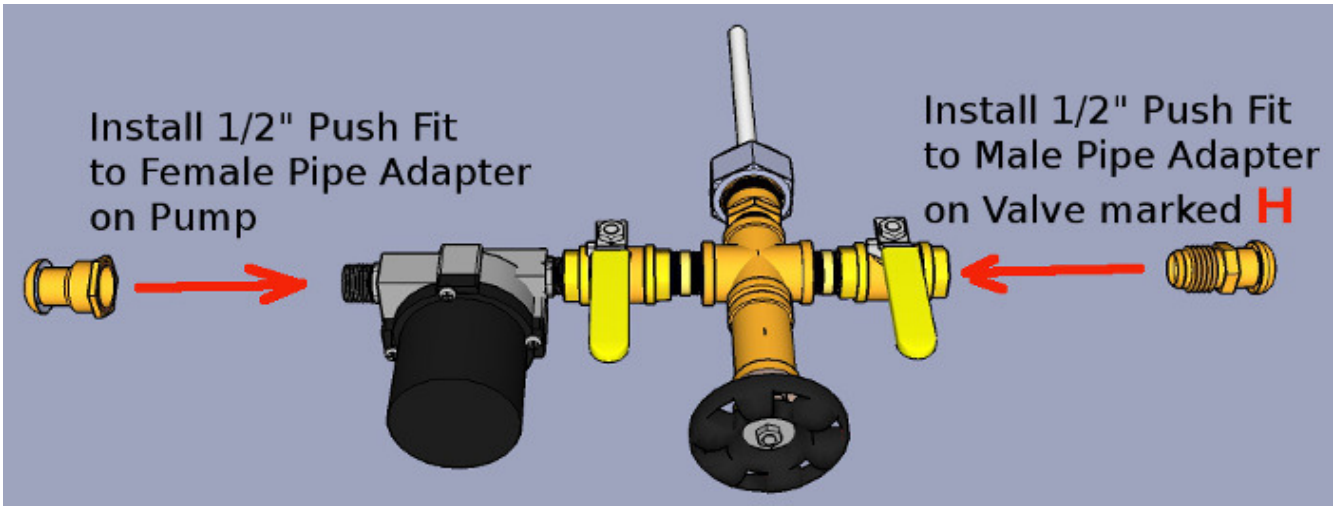
This is easiest accomplished on a workbench. Install the pump on the “cold” side of the bottom feed connector (marked with a C).



The pump should end up oriented as shown in the picture. The pumping direction is very important for the efficiency of the system. There is always a marking on pumps which indicates in which direction the pump moves the water. This must be AWAY from the bottom feed connector. You should NOT use the included blue sealant on the pump. Instead use the included Teflon tape. Use at least 7 wraps of the tape on both sides of the pump.

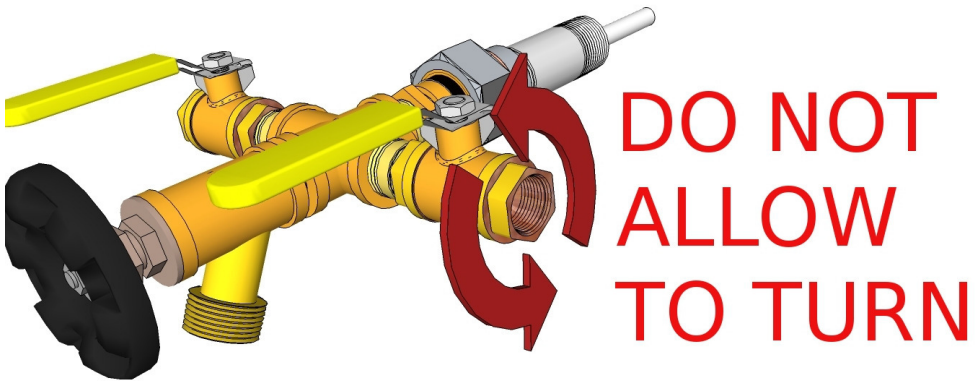


Install the supplied push fit to female adapter on the pump with Teflon tape. Then thread the push fit to male adapter on the ball valve on the hot side (marked with an H). On this you should use the blue sealant.



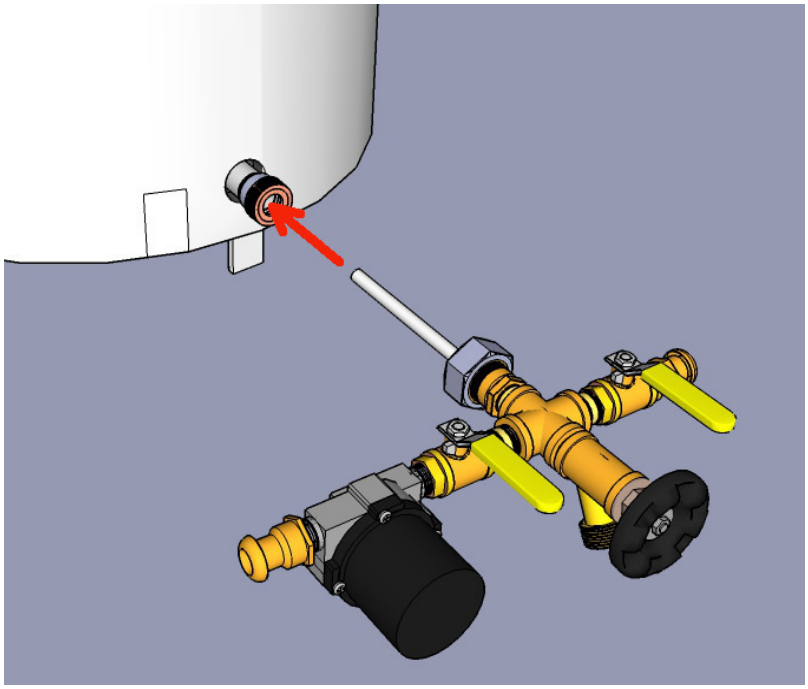
Installation Warning:

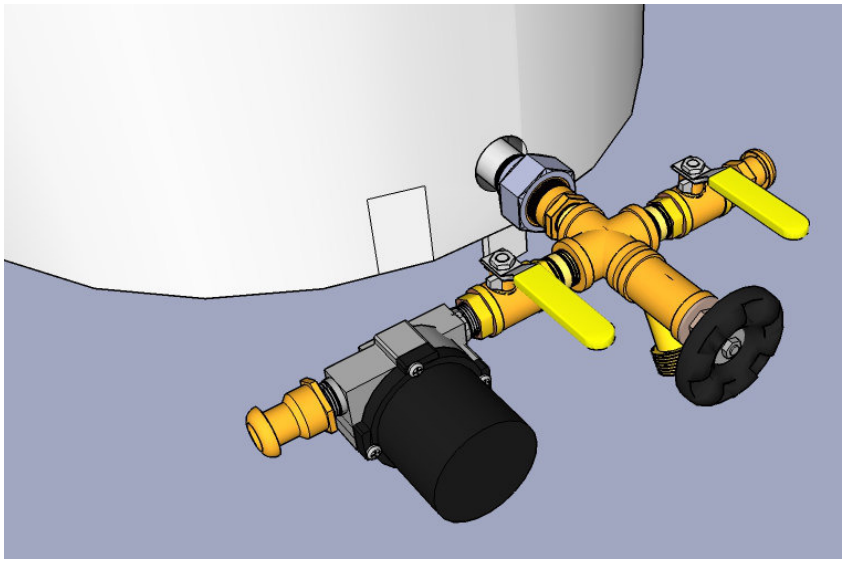
When tightening threaded fittings and adapters to the ball valve on the hot side of the Bottom Feed Connector DO NOT allow the ball valve to rotate. It is important to prevent rotation of the ball valve with a wrench while tightening fittings to it.



Step 5

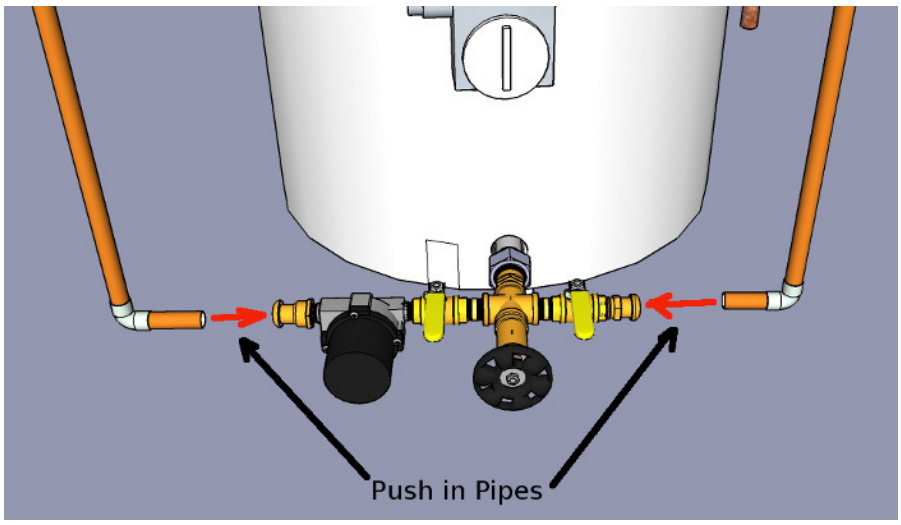
Now the pre-assembled Bottom Feed Connector main body can be re-attached to the steel section that was previously threaded into the water heater. Make sure the rubber sealing ring that was inside the big nut is in place. Do not use sealant or Teflon tape on this joint as it seals with the rubber gasket.





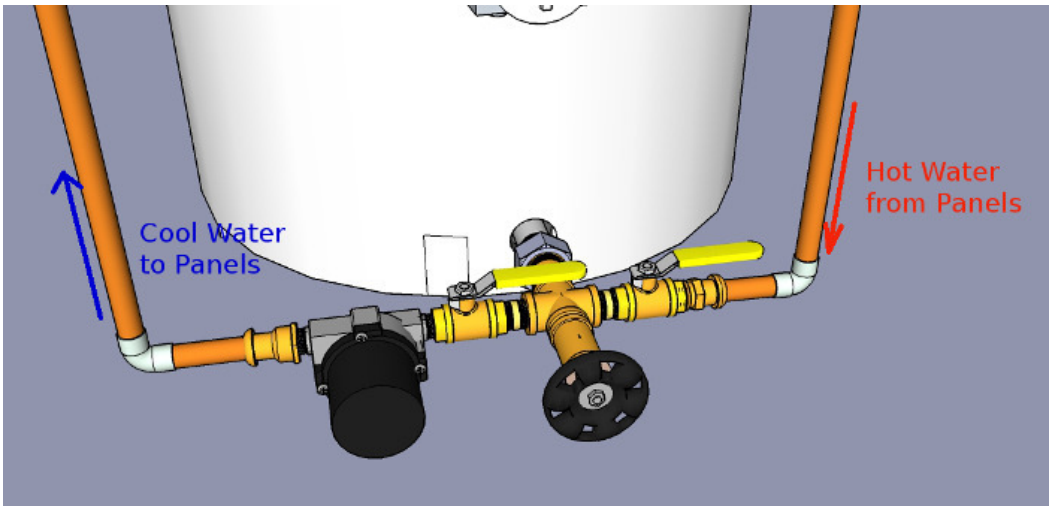
Step 6

The final step is to insert the pipes going to the panels into the push to fit adapters or the compression fittings. If you are using piping that is not flexible, especially copper please make sure that the weight of the piping does not rest on the bottom feed connector and especially not the pump. The pipe connected to the pump should go to the “cold” side of the panels. To operate the system open BOTH of the ball valves.



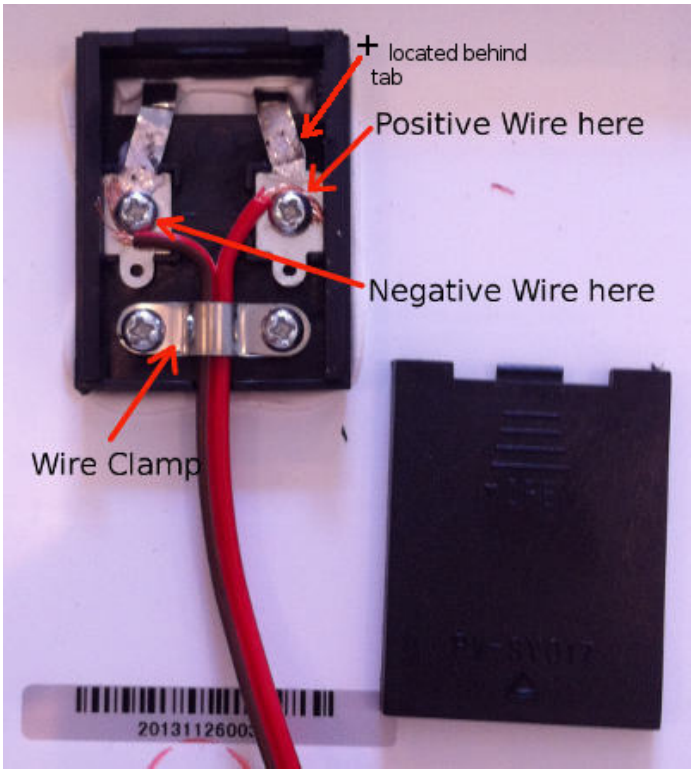
Completed Bottom Feed Connector Installation

With Ball Valves in OPEN position



Pump and PV Panel Connection

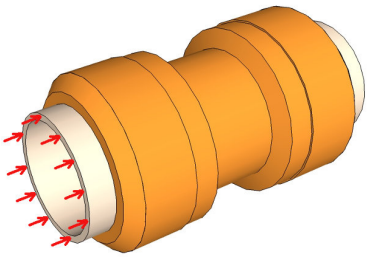
The small PV panel has to be mounted next to the water heating panel(s) and is used to power the pump. This way the pump will provide flow that is proportional to the amount of sunshine which also supplies the heat into the water heating panels.
The PV panel has a small terminal box on the back. After opening it you can connect the included wire, red to the positive terminal and brown (or black) to the negative side.
The pump comes with a red and a black wire. Connect the red wires together using the included wire nuts and connect the brown (or black) wire to the black one on the pump.
After connecting the pump you have to set the pump for direct connection to a PV panel. There is a small setting port on the back of the pump. Use the included plastic key to move the arrow in the setting port between the two 5's. If you don't set the pump the system will not operate efficiently.



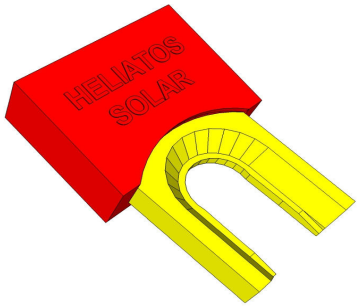
Appendix

Push-Fit Removal Tool Instructions

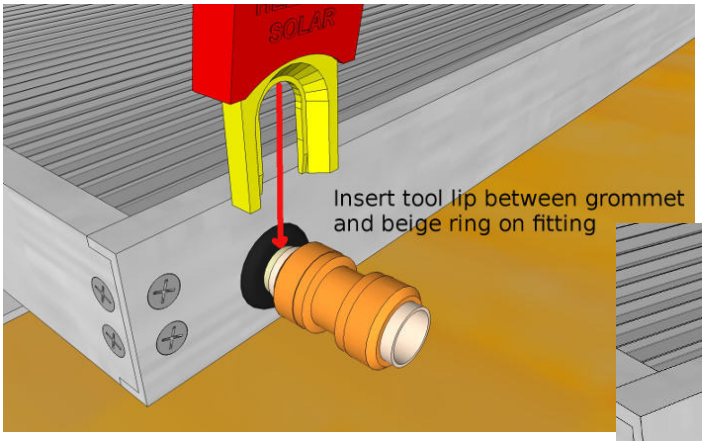
Push-fit fittings will hold on the the pipes after installation, but they contain a feature that allows them to be released and removed. To release the lock the beige plastic ring has to be pushed inward as shown in the diagram.

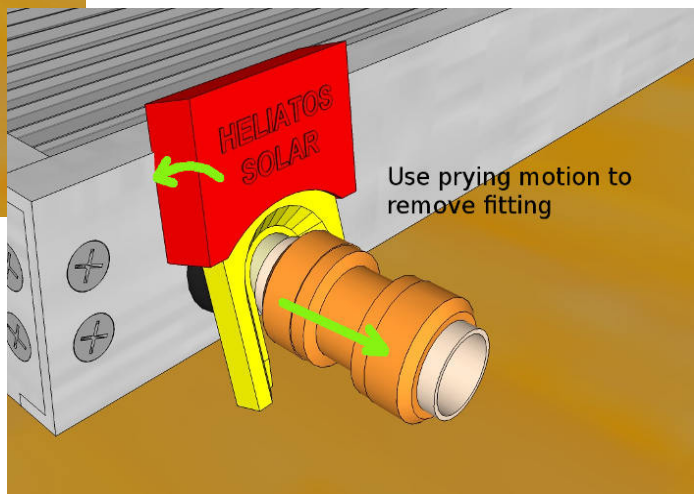


Pushing in this ring is not easy especially when the fittings are installed between two panles which is why we include a specially designed tool.



To unlock the fittings and remove them slide the tool onto the pipe so the lip in the yellow part is between the beige ring and the black rubber grommet.
Once the lip of the tool is securely between the grommet and the ring you can start prying the fitting away from the grommet

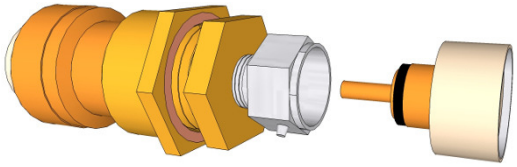




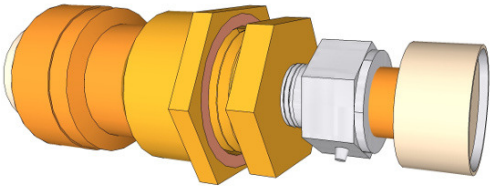
Automatic Air Vent

This system is equipped with an automatic air vent that automatically and continuously bleeds any air in the system. The air vent can be set to three different states:

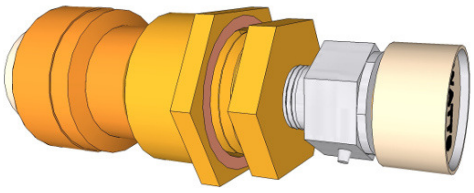
1. Completely closed - In the completely closed state the vent will not allow air or water to escape the system. If you remove the top part of the valve altogether the valve is in the “completely closed” state.



2. Manual bleed (open) – In this state the valve is open and will let air or water escape. When the top part of the valve is threaded halfway in the valve will be in this state.



3. Automatic air only bleed – When the top of the valve is threaded all the way in and finger tight (DO NOT tighten with a wrench) the valve will allow air to escape but shuts off quickly once all the air is out of the system. A few drops of water might escape initially because the valve is operated by special hygroscopic discs getting wet and expanding.



Troubleshooting

A properly sized system should be able to supply most of your normal hot water needs during sunny times. Some of the causes of insufficient heat are listed here, but if you have checked these and are still having problems please call us at (661)-7SOLAR7 (9am to 5pm pacific) or email support@heliatos.com for tech-support.

Problem	Symptom	Solution
Insufficient insuation	Fittings at the end of panel array and at bottom feed connector and in tank all at similar temperatures but water in tank does not heat up much	Install insulation on all pipes in the solar loop, no matter how warm the climate.
Air In the Loop, no circulation	Fittings at the end of panel array get very hot, but fittings at bottom feed connector don't and water in tank does not heat up	Set the automatic air vent to “manual bleed” until all the air is out of the system and water comes out.
Pump not running, no circultion	Cannot feel a slight vibration when touching the pump, no slight pump sound	Check pump polarity and selector switch setting
Pump noisy	Pump makes screeching sound and stops running	Pump noises are due to air in the pump or incorrect orientation of the pump. Make sure pump is installed horizontally and set the automatic air vent to “manual bleed” until all the air is out of the system and water comes out.
Bottom Feed Connector “Short Circuit”	Fittings at the end of panel array and at bottom feed connector get very hot but water in tank does not heat up	Contact us for a replacement unit

The lower you set the gas or electric control of the water heater the more benefit you derive from the solar heater.