Retrofit an evacuated tube collector to an existing cylinder

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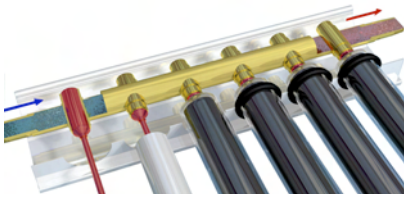
Reducing electricity bills:



A “Sydney Tube” heat pipe collector connected to an existing hot water tank can save thousands of dollars when compared to buying a complete new solar water heater.
All you need is a hot water cylinder in reasonable condition.

Converting or replacing an electric water heater with solar hot water would be the single biggest energy saving most families could make. This can be an expensive project to undertake, the lowest cost solution is to add a retrofit “Sydney tube” solar collector to your existing water heater.

It is a simple process; the evacuated tube collector goes onto a roof or onto the ground and connects to the cold water inlet of your existing hot water heater using a clever but simple venture connector, two new methods are now shown in this info pack.

A low energy 240-volt or 12-volt pump is used to circulate the water between the hot water tank and the evacuated tube collector.

The pump is connected to an automatic controller that has two heat sensors; one sensor measures the temperature of the water inside the solar collector and the other sensor measures the temperature of the water inside your hot water heater.

When the water inside the solar collector rises in temperature and becomes 12-degC hotter than the water in your hot water cylinder, the pump starts automatically and pushes the hotter water from the solar collector to your tank, the pump stops when the temperature differential between your hot water cylinder and the solar collector drops to 6-degC.

The pump cycle lasts about 3 minutes, it then rests until the water in the solar collector rises in temperature and the process is repeated until the water inside the hot water tank reaches 66-degC. After this the pump will not start again until the water inside your hot water tank drops to 64-degC. This temperature control protects your hot water cylinder from overheating, which would damage the cylinder.

The water inside a 300-litre hot water cylinder can be heated to 70-degC in one full sunny day using a “Run On Sun” 30 tube solar collector.

Run On Sun Australia stocks various evacuated tube collectors with different amounts of tubes to suite any size hot water cylinder.

We also have a DC circulation pump and controller that is powered by a solar panel, this solves the problems of constant power outages and off-grid living.

Simple explanation of how the Run On Sun evacuated tubes with copper heat-pipes work.

Each “Sydney tube” is made by fusing together two glass tubes inside a vacuum, the outer tube is clear and the inner tube has three coatings applied to the outside of it, a technique patented by “Sydney University”.

A spiral red copper coating is the first to be applied and can be seen when looking into the tube exactly like in the pictures bellow. The second and third coatings are applied over the copper coating to create high light absorption with low reflection. This allows the light that is absorbed by the outer coatings to be turned into heat energy on the copper inner coating. The heat energy that is generated can’t escape back through the vacuum that exists between the inner and outer tube.
(You can see the dark blue solar absorption coatings in the picture below)

The copper steam pipe often referred to has a heat pipe runs inside the full length of the “Sydney tube”, it absorbs all of this heat energy and it contains a very small amount of distilled water sealed inside under a tremendous amount of vacuum allowing steam production at 25-DegC.

The “Sydney tube” will become continually hotter whilst been exposed to light; the steam inside the copper heat pipe will continue to rise in temperature, up to 200-degC.

This steam will rise to the top of the copper condenser bulb. You can see the copper condenser bulbs protruding from the evacuated tubes in the picture bellow.

This condenser bulb direct plugs into a pressure-bearing sleeve inside the solar manifold; this heat energy is then transferred to the water that surrounds this sleeve.

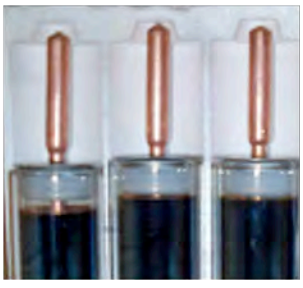
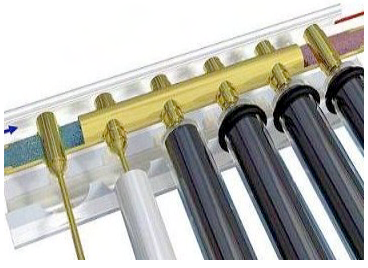
Once the water absorbs this heat energy, the steam turns back to water and runs back down the heat pipe, condensing back to steam again and repeating the process until the water inside the solar manifold becomes hot.

This heating reaction inside the heat pipe takes place at the speed of sound according to one of the professors who helped in the development of this technology.

This technology is why hot water can be generated even in low light conditions.
The great advantage is every tube becomes an individual heating element, which can be plugged in or taken out without affecting the other tubes or the plumbing.

Even in the rare event that a tube should break, it will not stop these systems generating hot water.



Quality control is the most important factor for the longevity of any solar collector:

The “Run On Sun” heat pipe solar collectors are a long life solar water heater with a 10-year warranty on the evacuated tubes, copper heat pipes and solar manifold.

There are two kinds of evacuated tubes on the Australian market. Both these tubes were patented by “Sydney University”.
The first patent was on an aluminium heat absorption coating, the second and latest patent is on a copper heat absorption coating, which is 14% more efficient. It is easy to identify the difference between the two tubes, the aluminium coated tubes have a black appearance and the copper coated tubes have a dark blue appearance.

All Run On Sun evacuated tubes are made using the more efficient copper coating, on top of that all Run On Sun tubes are made with thicker glass than standard tubes, the glass thickness of a standard tube is 1.5 to 1.7-mm.
The glass thickness on Run On Sun tubes is 1.9 to 2.1-mm which raises the hailstone impact rating from a 25-mm diameter hailstone to a 32-mm hailstone.
These tubes cost almost three times the price of standard tubes.

The Run On Sun evacuated tube collector housing is made from stainless steel instead of aluminium, this is to make sure that there are no dissimilar metals touching each other causing corrosion in coastal areas.

Run On Sun’s engineer Barrie designed the frames and optional roof mounting kits with a 4-1-safety factor built in for cyclone regions. These frames are made using 2-mm thick 304 grade stainless steel. The frames also have a metal analysis test done on each batch to make sure that what we pay for is what we get.

The same strict metal analysis is performed on the silver solder that is used to braze the copper sleeves into the copper header. The silver content must be high and the lead content must be very low to comply with the Australian standard.

Every collector must last longer than the warranty. The testing that is done makes sure that the copper and silver content in every solar collector we sell is consistent, leading to a long trouble free life.

The costs associated with manufacturing to these standards are high.
The only way we can sell these at a fair price is to avoid most distributors and shops.
Our business model is focused on selling direct to the public at a wholesale price.

Run On Sun Australia P/L

Heat pipe collectors

Quality-Certification

The Run On Sun Australia P/L heat pipe collectors have passed all Australian and New Zealand standards testing and are certified by Global Mark.
It is a requirement that all solar collectors and solar water heaters sold in Australia and New Zealand that are connected to a potable water supply must carry a Certified product identification number which can be checked on the Global Mark certified product register.

So many non-Certified low cost Chinese brands are showing up in the Australian market with no certification. The copper content and lead content are unknown, these may cost less, but low purity copper is associated with pin-hole corrosion making them false economy.

The Run On Sun heat pipe collectors are high quality and are not limited to the Australian standards. The same collectors are rebadged under different brands that have full European, Canadian, US and UK certification.

EN-12975-2: 2006 European solar keymark, mandatory for all solar collectors sold throughout Europe. Tested by TUV Rhineland and Certified by DIN CERTICO.

SRCC performance testing for the United States. Certified by SRCC.

AS/NZS-2712-2007 Design and construction. Certified by Global Mark.

AS/NZS-2535-2007 Solar collector performance testing Certified by Global Mark.

AS/NZS-4234-1994 Energy savings for Victoria prior to April 2013. Certified by Sustainability Victoria.

AS/NZS 4234-2008 Energy savings for Victoria. Mandatory for all solar water heaters and solar collectors sold in Victoria from April 2013. Certified by Sustainability Victoria.

AS/NZS-4020 Products in contact with potable water. Certified by Global Mark.

Certified Product - AS/NZS2712

Global-Mark.com.au®

ID Number: 100864

AS/NZS 2712-2007
ID No: 100864

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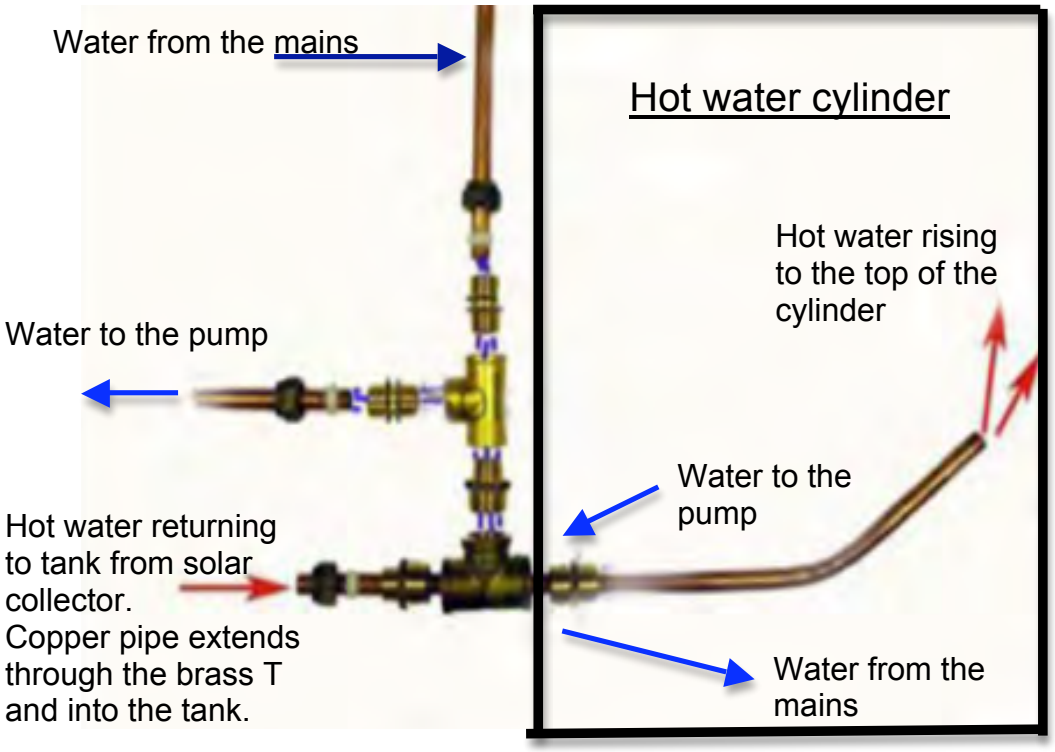
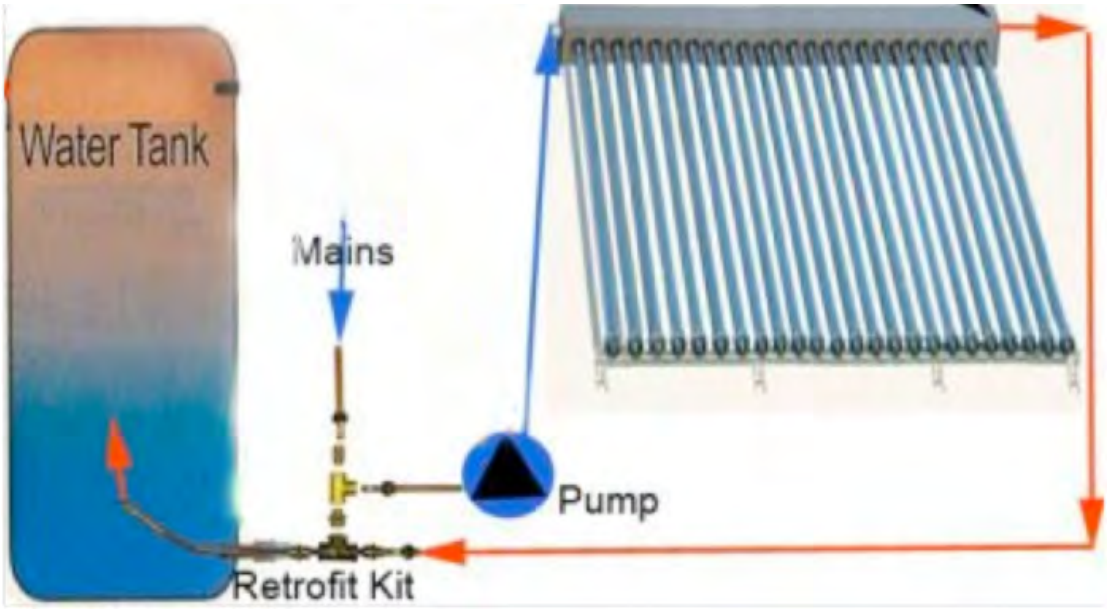
Retrofit:

Working principle of a solar venture retrofit valve.

See easier to understand methods on the following pages.





[Parts list:](#)

1. One ¾” brass “T” fitting.
2. One ½” brass “T” fitting.
3. Two ½” nuts with nylon olives.
4. One ½” nut with copper olive.
5. One brass joiner – ¾” female to ½” female.

To join the two brass “T” fittings together.

6. One brass joiner – ¾” female to extended ¾” male. To join brass “T” into the cylinder.

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Retrofit

Cylinders with two hot water outlets and two cold water inlets:

A simple retrofit by using the two spare ports for the solar flow and the solar return.

Solar return or hot water outlet.

Solar flow or cold water inlet.

Run On Sun

Retrofit

Cylinders with single inlet and outlet:

A new P/T valve incorporating a hot water outlet is now available from Run On Sun.
Incorporating this valve will leave the old hot water outlet free for the solar return.
The solar flow is achieved by adding a simple brass T fitting to the cold water inlet.

240-volt retrofit kit includes the following:

“Run On Sun” controller S1000

Controller S1000 comes standard with the retrofit kit, it is fully wired and pre-programmed, a plug for the power supply and a plug socket for the circulation pump, the T1 collector sensor is specifically designed to withstand the high temperatures of evacuated tube collectors rated at 250-DegC and comes with 12-meters of cable, the controller also comes with a T2 tank sensor. Each controller comes with a 2-year replacement warranty.

DZR Brass Pump

The Run On Sun pump comes as standard with the retrofit kit, it has a DZR brass pump body and unions. A plug and cord are connected so that it can plug directly into the Run On Sun controller.
Each pump comes with a 2-year replacement warranty.

Solar air vent with insulation gloves and a brass bush that fits into a ½” brass T .

The solar air vent comes standard with all Run On Sun retrofit kits.
Even though this is not an essential item, it is very useful for purging air from the solar loop when commissioning the system, or for any problem solving that may be needed at a later time.

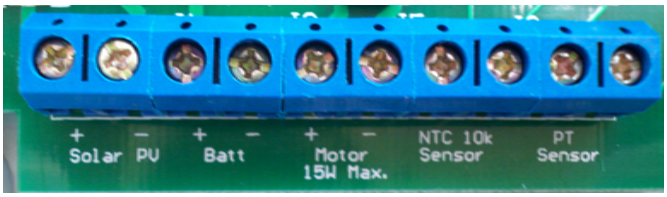
Solar high temperature one way valve.

This check valve is rated at 250-DegC to withstand the extreme temperatures created by evacuated tube collectors and comes standard with each retrofit kit.

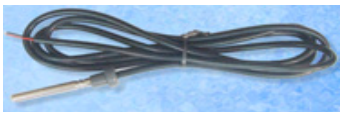
Parts included with the PV direct retrofit system:

Also includes the solar air vent and solar check valve as seen in the 240-volt retrofit kit.

Pump controller

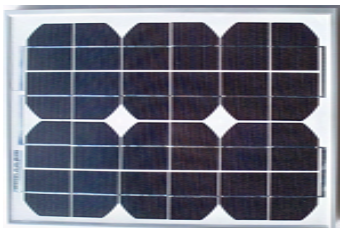


Controller connections



Black PT1000 collector sensor

Grey NTC tank sensor



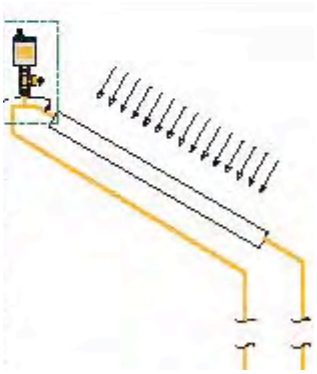
PV power source

Low energy solar pump with capacitor discharge start up for low light conditions.

Pump unions and isolation valves

Run On Sun

Prices include the essential extras:



The AVG Air vent screws into the top of the collector.
This valve evacuates the air from the collector and pipes when first commissioning the system.
It is also used as a diagnostic tool for the future that can save large plumbers fees.
Includes insulation glove and a special brass fitting, so that it can screw into the top of a half inch brass T fitting on the end of the collector

The Australian standard one-way high temperature check valve does not have enough resistance to stop the pump, but it will stop reverse thermo-siphon taking place at night from the cylinder to the collector. (Hot water naturally rises because it is lighter than cold water.)
This valve goes into the cold water line that runs to the collector.

All the collectors come with a heavy-duty 2-mm thick 304-grade stainless steel frame.

All prices below include the shrink-wrapping onto a heavy-duty custom made pallet, making these systems ready for safe transport to anywhere in Australia.

Collector for Thermosiphon. (Quantity discounts do apply)
12-tubes with a 15 or 30-degree frame. $1180
18-tubes with a 15 or 30-degree frame. $1380
24-tubes with a 15 or 30 degree frame. $1580
30-tubes with a 15 or 30-degree frame. $1780

Collector with 240-volt pump, solar controller, AVG solar air vent and an Australian standard high temperature check valve.
12-tubes with a 15 or 30-degree frame. $1580
18-tubes with a 15 or 30-degree frame. $1780
24-tubes with a 15 or 30-degree frame. $1980
30-tubes with a 15 or 30-degree frame. $2180

The PV direct pumps come with unions and isolation ball valves.
Includes the ROSA100 controller with sensors, solar panel, AVG solar air vent and an Australian standard high temperature check valve.
12-tubes with a 15 or 30-degree frame. $1650
18-tubes with a 15 or 30-degree frame. $1850
24-tubes with a 15 or 30-degree frame. $2050
30-tubes with a 15 or 30-degree frame. $2250

Warning:
PV direct must not be used in areas where pipe freeze is common during winter.

PTO For extras pricing.

Extras that can ship with the retrofit kits:

P/T valve incorporating hot water outlet:

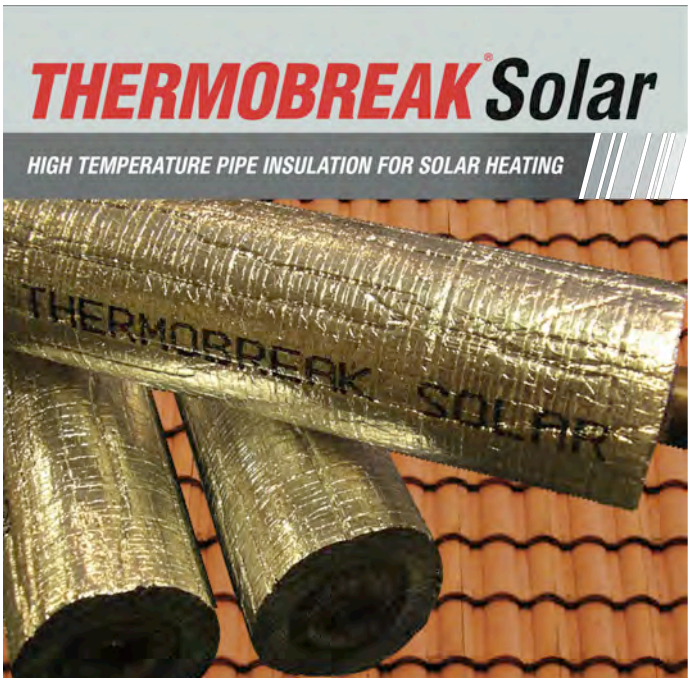
To make it simple to retrofit an evacuated tube collector to a tank with one hot water outlet.
Available in both 850-Kpa and 1400-Kpa.
(Check your existing P/T valve for pressure rating)

$80 each. This price is only with a retrofit kit purchase.

Expansion control valve:

Expansion control valves are essential for solar water heaters due to hot water expanding up to 4% as it becomes hotter, set at a lower pressure than your P/T valve, it starts to drip once this lower pressure is reached, this saves your p/t valve from opening and wasting lots of hot water.
The expansion valve hangs off a brass T fitting next to the cold-water inlet on your tank.

$50 each. This price is only with a retrofit kit purchase.



Solar insulation:

The solar flow and return (Copper pipes) between the tank and the solar collector must be insulated with a high temperature rated material. Run On Sun stocks Thermobreak solar, an Australian made product that can withstand the high temperatures and is UV resistant.
Most people purchase between 6-10 lengths and normally add a roll of aluminium tape to seal the joins.

Thermobreak 15-mm insulation per 2-meter length $14.

50-mm Aluminium tape:

High quality Thermobreak aluminium tape is available from Run On Sun for sealing the insulation joins on the Thermobreak insulation; this stops water penetration and is UV resistant.

$22 per roll.