



## Collector Sizing Calculations:

Some up front number crunching can help you size your hot water system appropriately, saving you money from the get-go. Generally it is wise to size a system that will provide between 90-100% of your hot water requirements in summer, and a percentage throughout the year dependant on hot water usage and solar radiation levels.

If you want to increase the solar contribution during winter then your system will provide excessive amounts of hot water in summer. Therefore this option should only be chosen if you have means of using or dissipating the additional heat created in summer. One way could be by using excess heat to warm a pool or spa.

As a general rule, meeting 100% of hot water needs will provide an annual contribution of: Cold region = 50-60%; Mild region = 60-70%; Hot region = 70-80%. From the calculations below, a single collector will provide similar levels of hot water in summer for both Melbourne and Brisbane. The difference would be the contribution levels in winter – where a collector in Brisbane will provide substantially more hot water due to:

- Higher cold water temperatures
- Higher ambient temperatures
- Higher solar insolation

Below are some calculations determining the amount of hot water a single Solavis FP collector will provide in summer:

Melbourne – Metric measurements	Brisbane – Metric measurements
Single collector has an area of 1.76m <sup>2</sup> Summer cold water temperature of 20°C. Average summer insolation level of 6.75kWh/m <sup>2</sup> /day	Single collector has an area of 1.76m <sup>2</sup> Summer cold water temperature of 20.5°C. Average summer insolation level of 7.2kWh/m <sup>2</sup> /day
<u>Step 1</u> Determine energy gained by collector $6.75\text{kWh/m}^2/\text{day} \times 1.76\text{m}^2 \times 60\%$ conversion = 7.13 kWh	<u>Step 1</u> Determine energy gained by collector $7.2\text{kWh/m}^2/\text{day} \times 1.76\text{m}^2 \times 60\%$ conversion = 7.6 kWh
<u>Step 2</u> Convert energy gained from kWh to calories $7.13 \times 859800 = 6130374$ calories (1kWh = 859.8kcal)	<u>Step 2</u> Convert energy gained from kWh to calories $7.6 \times 859800 = 6534480$ calories (1kWh = 859.8kcal)
<u>Step 3</u> Determine temperature rise $45 - 19 = 26^\circ\text{C}$ temperature rise	<u>Step 3</u> Determine temperature rise $45 - 20.5 = 24.5^\circ\text{C}$ temperature rise

Step 4

Determine Volume of water heated by energy

$$26 \times 1000 \times \text{Volume} = \text{Energy Gained}$$

(1kcal raises 1L of water by 1°C)

$$\text{Volume} = \text{Energy Gained} \div (26000)$$

$$\text{Volume} = 6130374\text{cal} \div 26000\text{cal} =$$

$$\text{Volume of water @ 45°C} = 236\text{L}$$

After taking into account system losses of around 20% a single collector will provide up to 189L of hot water in summer for Melbourne Conditions.

Step 4

Determine Volume of water heated by energy

$$24.5 \times 1000 \times \text{Volume} = \text{Energy Gained}$$

(1kcal raises 1L of water by 1°C)

$$\text{Volume} = \text{Energy Gained} \div (24500)$$

$$\text{Volume} = 6534480\text{cal} \div 24500\text{cal} =$$

$$\text{Volume of water @ 45°C} = 267\text{L}$$

After taking into account system losses of around 20% a single collector will provide up to 215L of hot water in summer for Brisbane Conditions.