

Efficiency Test of the Sun Flux Hot Water Controller

Conducted by:

Prof. Priyan Mendis

Tharindu Samarasinghe

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THE UNIVERSITY OF

MELBOURNE



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1.0 Scope

This document includes the summary of results of the efficiency test carried out on The Sun flux solar hot water controller designed and manufactured by 'SHARP ENERGY INVESTEMENTS Pty Ltd.' for hot water production. Results presented in this document are based on field testing carried out on an installed residential system on the Gold Coast of Australia. Efficiencies achieved in these tests can be considered as conservative as the weather conditions were moderate. In an Independent Lab Test a peak efficiency of 96.2% was achieved with higher DC input voltages up to 160volts. It must be noted that these tests were carried out to check the input and output efficiency of the controller using standard 2.4kw, 3.6kw and 4.8kw elements and standard thermostats with a standard electric hot water tank using numerous input voltages from 91.2volt to 148.8volt.

2.0 System Definition

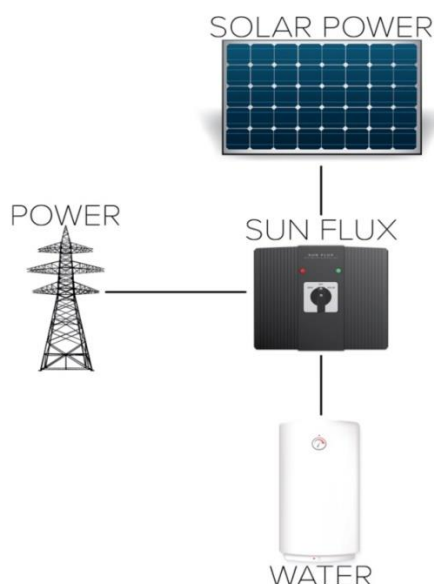
The Sun Flux Hot Water Controller has been designed to deliver DC or AC power to a standard electric hot water tank without the need for any modifications to be made.

The Sun Flux Hot Water Controller is a cost effective design that is durable and easy to use. The controller is fitted with a unique user friendly switch which allows the user to switch from PV solar power to AC grid power if there have been significant long periods of insufficient sun.

Installation of the controller can be carried out by a licenced electrician as the system does not require pumps, pipes or any plumbing modifications.

The system is capable of providing hot water even in the event of a power outage. The system is designed to store solar energy in the form of hot water using 2-6 standard PV solar panels and a standard electric hot water tank.

2.1Product Specification



Electrical data for Sun Flux Hot Water Controller

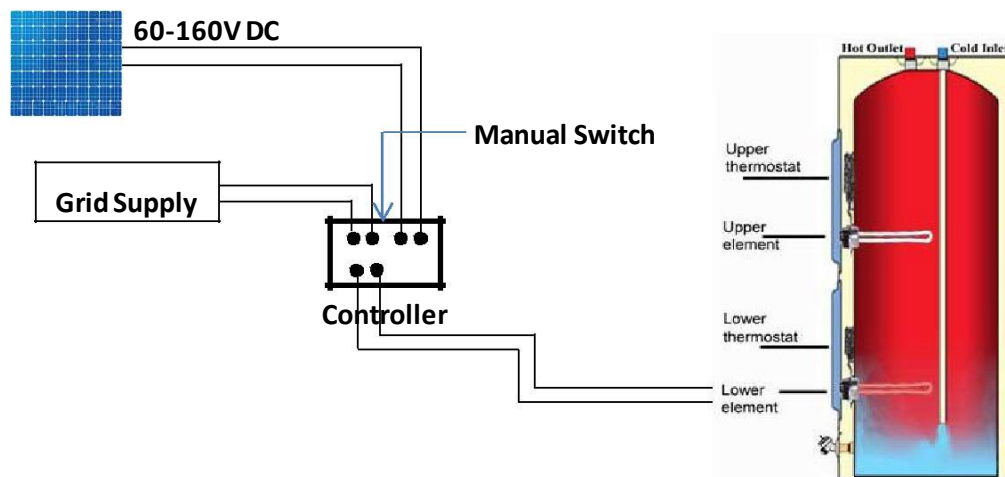
Specifications	
DC input voltage	60~160V or 200VOC
DC input amps	5~15A
DC input watts	500~1500W
DC output wave form	Modified
DC output voltage	10~160V
DC output amps	0.5~10A
DC output watts	5~1500W
DC peak efficiency	96%
Protection class	IP50
AC input voltage	110~240V
AC input amps	7.5~20A
AC input watts	1800~3600W
AC peak efficiency	100%
Dimensions	250*210*90mm
Weight	1.2Kg

3.0 Testing and Results

3.1 Equipment

- 3 to 4 x Jinkosolar JKM315PP-A, 315watt, 37.2volt, 8.48amp
- 3 x Top one solar TN250P, 250watt, 30.4volt, 8.24amp
- 1 x 4.8 KW standard (Rinnai, Rheem & Dux) Element
- 1 x 3.6 kW Standard (Rinnai, Rheem & Dux) Element
- 1 x 2.4 kW Standard (Rinnai, Rheem & Dux) Element
- 1 x (Rinnai, Rheem & Dux) Standard bottom thermostat from twin element tank
- 1 x (Rinnai, Rheem & Dux) standard top thermostat from twin element tank
- 2 x OWON B35T True RMS digital Multimeter & data logger
- Sun Flux Hot Water Controller
- AC Grid Power Supply
- Standard electric hot Water Tank

3.2 Basic Electric and Solar Hot Water System Diagram



3.3 Results

Six tests were conducted on various sizes and brands of standard AC hot water elements and standard AC thermostats with the Sun Flux Hot Water Controller manufactured by Sharp Energy Investments Pty Ltd. Elements and thermostats from Rinnai, Rheem and Dux were tested. During these tests no adverse effects were found with either the elements, thermostats or tank over numerous cycles using this unique form of DC energy.

Test No.	Solar (v)	Element (kw)	V _{in}	V _{out}	I _{in}	I _{out}	P _{in}	P _{out}	Efficiency (%)
01	148.8	2.4	134.30	127.30	5.60	5.60	752.08	712.88	94.7
02	148.8	3.6	120.23	113.22	7.51	7.50	902.92	849.15	94.1
03	91.2	4.8	63.50	57.50	5.66	5.66	359.41	325.45	90.6
04	91.2	3.6	70.80	63.90	3.93	3.91	278.24	249.85	89.8
05	111.6	2.4	108.80	101.40	5.51	5.51	599.49	558.71	93.2
06	111.6	2.4	93.60	86.50	3.63	3.63	339.77	314.00	92.4

Test 1&2 were conducted using four 315watt 37.2volt solar panels in series to achieve 148.8volts. Test 3&4 were conducted using three 250watt 30.4volt solar panels in series to achieve 91.2volts. Test 5&6 were conducted using three 315watt 37.2volt solar panels in series to achieve 111.6volts. These tests were carried out to show the average efficiency using numerous elements and panel configurations. A higher efficiency can be achieved using input voltages up to 160vdc.

4.0 Measuring equipment

