HOMEOWNER HANDBOOK
INSTALLATION & COMISSIONING MANUAL

Energy Smart Water
Solar PV Hot Water System
ROSC40 Series

Important notice for installers

This manual is intended for licensed installers who have prior knowledge, experience, relevant training and comply with relevant Plumber's Code in the installation and maintenance of hot water storage tanks.

Installation of solar array and electrical connection and commissioning to the ROSC40 PCE device is to be carried out by licensed installers.

When commissioning is complete, please leave this document with the owner, drawing their attention to the sections:" Maintenance and Periodic Inspection" and "Troubleshooting".

ROSC40 System Model Number: .....

Date of Manufacture: .....

Serial Number:.....

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Table of contents

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Contact Details

Energy Smart Water Pty Ltd

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Email: esw@esw.net.au

Website: www.esw.net.au

Safety Precautions

Please read these precautions carefully.

DANGER SHOCK HAZARD: Do not set up this product or make any electrical or cabling connections, such as the power cord, during a lightning storm.

DANGER Do not exceed the maximum input voltage of 360 VDC per input.

DANGER The electronic circuit contains capacitors that may keep voltage even if the unit is not supplied with power. Authorised installer must wait a minimum of 10 minutes after isolating both DC and AC supplies before opening the my-PV SC20 enclosure or commencing work on this equipment.

CAUTION This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision of instruction concerning use of the appliance by a person responsible for their safety.

CAUTION Children should be supervised to ensure that they do not play with the appliance.

CAUTION If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified person.

CAUTION To be installed and serviced only by an authorised person.

CAUTION The storage tank should not be exposed to constant sun/weather conditions.

CAUTION Only install in vertical position.

CAUTION Avoid exposure and operation in extreme ambient heat (<0 °C) or (>50 °C) and protect the my-PV SC20 housing from direct sunlight.

CAUTION Do not touch the power plug on the water heater with wet hands.

WARNING This water heater is to be connected directly to the water mains and not by a hose set.

WARNING For continued safety of this appliance, it must be operated and maintained in accordance with the manufacturer’s instructions.

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WARNING THIS APPLIANCE MAY DELIVER WATER AT HIGH TEMPERATURE, REFER TO THE PLUMBING CODE OF AUSTRALIA (PCA), LOCAL REQUIREMENTS AND INSTALLATION INSTRUCTIONS TO DETERMINE IF ADDITIONAL DELIVERY TEMPERATURE CONTROL IS REQUIRED.

The installation shall conform to the Plumbing Code of Australia (PCA). In accordance with AS/NZS 3500.4 a temperature limiting device is required to be fitted by the installing plumber

WARNING Check the tank water level every three months and ensure that the water level is within the range of the water level indicator.

WARNING Ensure all sources of electricity are disconnected from the unit before removing any of the electrical covers.

WARNING The storage tank plastic wall on the Enermax SMARTcube tank can melt under the effects of eternal heat (>85°C) and, in the extreme case, can catch fire.

WARNING Do not expose to ammonia, chlorine, or other hazardous chemicals.

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About this manual

This manual contains information for installation, commissioning, and maintenance of supplied Solar PV Hot Water System ROSC40. It includes information describing the product, its operation, and settings.

Installers are to read the manual before assembly, installation, operation, and maintenance of this system.

This manual is split into several parts to guide you through the installation process:

- Introduction
- Key points before installation of the ROSC40 system
- Installation guide
- Commissioning Instructions
- Operation Procedures
- Maintenance and Inspection
- Warranty

Standards

The ROSC40 Series complies with the following Standards:

- AS/NZS 60335.2.21:2013+A1
- AS/NZS 60335.1:2011+
- IEC 62109-1:2010

Regulatory information for installers

Installation and services must be performed by authorised personnel only. This water heater must be installed in according with:

1. Manufacturers installation instruction
2. AS/NZS 3500.4 “National Plumbing & Drainage Code”
3. AS/NZS 3498 “Authorization Requirements for Plumbing Products”
4. AS/NZS 5601.1 “Gas Installation General Installation”
5. AS/NZS 3000 “Wiring Rules”
6. AS/NZS 5033 Installation of photovoltaic (PV) arrays
7. AS 1768 Lightning Protection
8. AS/NZS 1170.2 Wind Loads
9. AS 4509 Stand-alone power systems
10. Municipal Building Codes
11. Occupational Health, Safety & Welfare Regulations
12. Any other States or Federal Statutory Regulations

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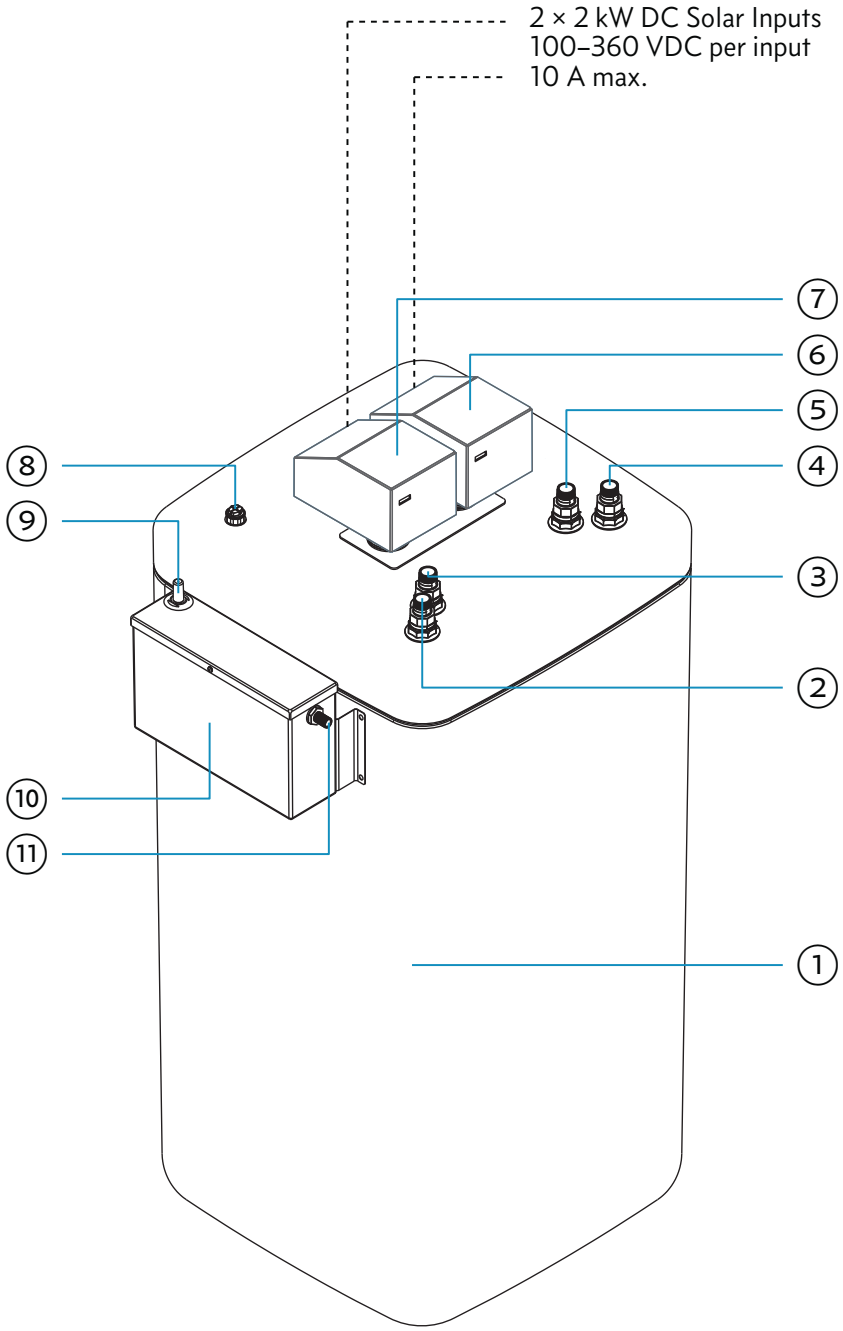
Product introduction

Overview of how the ROSC40 system works

① Enermax SMARTcube Tank
② Hot water outlet 1
③ Cold water inlet 1
④ Hot water outlet 2 (if applicable)
⑤ Cold water inlet 2 (if applicable)
⑥ SC20 DC electric heating element 1
⑦ SC20 DC electric heating element 2
⑧ Tank fill plug
⑨ Water level indicator
⑩ Make-up tank
⑪ Make-up tank cold water connection



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1. The solar photovoltaic (PV) panels absorb the sun's energy and convert it into direct current (DC) power.
2. The DC current from the PV panels is controlled with an MPP-tracker, for maximum power output to the DC heating element located in the tank. NO GRID CONNECTION is required.
3. The solar DC heating elements can heat the tank water to a maximum of 85°C at which point they switch off. Once the temperature drops, the solar elements will re-activate if solar is still available.
4. On occasions when the solar energy gain is insufficient to heat the water to its minimum temperature of 55°C, the AC boost heating elements, either powered by grid and/or battery storage, simultaneously heat the tank water to 65°C. Alternatively a gas backup is available. (Note: System model numbers ending in E indicate AC electric boost configuration, System model numbers ending in A indicate gas boost configuration)
5. Mains pressure fresh cold potable water runs through the stainless-steel heat exchange coil inside the tank separated from the heated thermal storage water. The potable water absorbs energy via the coil from the heated storage water which heats the usable water to its final temperature.
6. To prevent scalding, a high-performance thermostatic mixing valve, or tempering valve ensures that water for your personal use is delivered at the required temperature. (To be supplied by installing plumber in accordance with AS/NZS 3500.4)

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Technical specifications

	ROSC40-544E ROSC40-544A	ROSC40-54443E ROSC40-54443A
Storage capacity	500 L	
Empty weight	80 kg	93 kg
Filled weight	580 kg	593 kg
Height	1658 mm	
Width	790 mm	
Depth	790 mm	
Hot water delivery	—	
Standing heat loss	1.4 kWh	
Number of heat exchange coils	1	2
Material of heat exchange coils	Stainless steel	
Length of heat exchange coils	44 m	44 m/43 m
Maximum storage temperature	85°C	
Maximum water pressure	600 kPa (inlet), 1 MPa (heating element), atmospheric (tank storage volume)	
Inlet & outlet connection diameter	25 mm, external thread	
Inner & outer shell material	Polypropylene	
WaterMark license	WM-020095	
ELECTRICAL		
Total efficiency	>99%	
AC	Two heating units. Per heating unit: 220–240 V, 8.7 A, 2000 W max, 50–60 Hz	
Heating capacity	4000 W for models ending in 'E'. Power relay for external heat source for models ending in 'A'.	
Fuse	16 A (per heating unit)	
Stand-by power	0 W in DC operation, 2 W in AC operation (per heating unit)	
DC (Solar PV)	Two heating units. Per heating unit: 100–360 V, 10 A max, 3600 W max	
Connectors	Original MC4, 2 strings (one per heating unit)	
Max short circuit current	15 A (per heating unit)	
Number of MPP trackers	2 (one per heating unit)	
Power rating	2000 W per heating unit at 25°C ambient temperature, derating when overheating	
Recommended PV array	4–8 polycrystalline PV panels with 60 cells in a string array, per heating unit	
MPP-matching efficiency	99.80%	
Topology	Transformerless	
Over-voltage category for each input	Category 2	
Earth fault alarm	Yes, built-in	
ENVIRONMENTAL		
Ambient operating temperature	0–50°C (not suitable for heavy frost)	
Type of protection	IP54	
Environmental category	Outdoor	
Pollution degree	2	
Relative humidity rating	0–99% (not condensing)	
Cooling	Convection	
Maximum altitude	600 m above sea level	
Element housing	Element housing should not be exposed to constant sun/weather conditions	
Water quality	*Suitable for use with potable water only within the following maximum allowable conditions:* pH(6.5–8.0), TDS (600 mg/L), total hardness (200 mg/L), chlorides (150 mg/L, magnesium (10 mg/L), calcium (20 mg/L), sodium (150 mg/L), iron (1 mg/L)	
OTHER		
Warranty	10 years (tank), 3 years (heat-exchange coils), 2 years (heating unit), 1 year (other parts/labour)	
PCE device	STCs on the PV array installation may be available	
Product standards	AS/NZS 60335.2.21:2013+A1, AS/NZS 60335.1:2011+A1+A2+A3, IEC 62109-1:2010	
Country of manufacture	Germany (tank), Austria (heating element and electrical). Assembled in Australia.	

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About your system

The ESW ROSC40 Solar PV Water Heating System combines the Enermax SMARTcube tank with two of the my-PV SC20 Solar Photovoltaic electric water heaters with AC boost or alternative boost solution such as an instantaneous water heater. The pressure-less storage water tank serves as a heat storage medium. Domestic (potable water) flows through a spiral corrosion resistant Stainless Steel heat exchanger coil which is completely immersed in the storage tank water. Cold water which flows in through the coil when water is drawn off is heated by the storage tank water.

Electric boosting

Water stored in the storage tank is heated automatically by two electric booster heating units (or alternate boost source such as a gas booster). The boosters heat the water during very cloudy or rainy weather, during the winter months, or during periods of unusually high demand. The booster heating elements are controlled by an electric thermostat. The thermostat and heating elements are mounted into the storage tank inside the IP54 water resistant enclosure. The boost water temperature is automatically controlled by the thermostat setting when the booster heating unit is energized.

The AC boost thermostat is not adjustable. It has a minimum temperature setting of 55°C and a maximum temperature setting of 65°C. Automatic safety controls are fitted to the water heater to provide safe and efficient operation.

Gas boosting

Where gas boosting is used, the AC electric element of the tank is not connected. The water from the tank is pumped through the booster, if the sensor inside the gas booster detects the water temperature is lower than the pre-set temperature of the booster, the booster will turn on and heat the water.

Water temperature

For domestic use, the system outlet temperature is controlled by a high-performance tempering valve or high-performance thermostatic mixing valve to be supplied and installed by your installing plumber in accordance with AS/NZS 3400.4 to deliver 50°C. During periods of low solar energy gain, the water temperature is boosted by the thermostatically controlled electric booster heating element or the gas booster for gas boosted systems. An alternative boost heat source can also be used.

The water heater features a non-adjustable thermostat which is located inside the tank (The tank thermostat is factory set to a maximum tank temperature of 85°C for Solar and 65°C for Boost). Tank temperatures above 55°C are required to protect your installation from the potential of Legionella.

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Before installation

Please take note of the following points before installation

Intended use

The ROSC40 Solar PV Hot Water System is designed to operate using direct PV input, up to 5 kW, in Enermax SMARTcube 500L heat exchange tanks. This system is designed to have the PV connected directly to the SC20 heating device. It is not intended or approved to be connected to the grid in any way. Any other use is not permitted as it could result in electrical short circuit, fire or electrical shocks. The safety instructions, together with the handling and installation information need to be strictly followed.

Not for pool heating.

Safety check

Warning!

- The storage tank plastic wall on the Enermax SMARTcube tank can melt under the effects of external heat (>85 °C) and, in the extreme case, can catch fire.
- Locate the Enermax SMARTcube tank at a minimum distance of 1 m from other heat sources (>85 °C) (e.g. electric heater, gas heater, chimney, flue) and flammable materials.
- Locate the Enermax SMARTcube tank on a firm level base. Where located indoors, ensure adequate drainage is provided.
- This appliance may deliver water at high temperature, refer to the Plumbing Code of Australia (PCA), local requirements and installation instructions to determine if additional delivery temperature control is required.
- Hot water outlet can **exceed 50°C**. Tempering valve or thermostatic mixing valve needs to be installed in accordance to AS 3500.4 by your installing plumber.
- Ensure all sources of electricity are disconnected from the unit before removing any of the electrical covers

Electrical

- Electrical installation must be carried out by a qualified and licensed installer, observing the technical electrical guidelines and regulations according to Australian Standards AS/NZ 3000, AS/NZS 5033, AS 1768, AS/NZS 1170.2, AS 4509 and other regulatory authorities.
- The two 2kW PV array when connected to this device may be eligible for STCs
- Both mains supplies must be switched off and isolated before starting any work on Enermax SMARTcube tank. Ensure no possibility of unintentional live electricity at work space.
- Compliant electrical devices, leads and power distribution equipment must be used with intact labels and tamper-proof seals.

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- This water heater is not intended to be operated, adjusted or tampered with by young children or infirm persons. Young children should be supervised to ensure they do not play with the water heater.

Earth fault alarms

Earth fault alarm indicates that a short circuit has formed between the DC circuitry of the PV system and earth. As the PV system owner, please be aware of the alarm system in use.

Refer to Earth Fault Alarms on page 40 for actions to take if alarm is triggered.

Bore water

- The water heater is not recommended for connection to a bore water supply. Many such sources contain contaminants harmful to the components of the hot water system.
- If the system is connected to bore supply against our recommendation, warranty does not apply. See details on warranty page.

Water quality

- To comply with warranty conditions and ensure long life of the unit, ensure the water condition complies with water quality specified in warranty conditions.
- Domestic hot water flows through stainless steel heat exchange coils only.

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Installation location

- Ensure the location is firm, levelled and capable of supporting the overall unit weight once it is filled with water.
    - 1 x Enermax SMARTcube 500 litre tank = 650 kg filled weight
- Ensure suitable means of capturing and managing any overflow is available at the installed location as per AS 3500.4.
- Ensure the size of the door frames are large enough to allow equipment to pass through.
- Ensure reasonable access for installation, servicing and removal of all components of hot water / heating system.
- Tanks and free-standing frames must be installed on solid, level base capable of supporting the weight when filled with water and that membranes remain intact after any fasteners are installed.
- Ensure that installed equipment will not stand in water
- Whether located outdoor or indoor, the water storage tank should be installed close to the most frequently used hot water outlet/s (typically the shower in domestic applications and kitchens in commercial applications) and its position chosen with safety and service in mind.
- As close as possible to the solar panels
- Locate the Enermax SMARTcube tank at a minimum distance of 1 m from other heat sources (>85 °C) (e.g. electric heater, gas heater, chimney, flue) and flammable materials.
- Locate the Enermax SMARTcube tank on a firm level base. Where located indoors, ensure adequate drainage is provided.
- Ensure the tank location is not exposed to frost, harsh weather condition and direct sun light and above 85°C ambient temperature. Appropriate enclosure needs to be installed to protect the hot water system
- The system is not suitable for installation in areas that experience sub-zero temperatures; Areas of known heavy frost or altitudes higher than 600 m above sea level are not suitable for this system. (System can be installed indoors in these colder climates where the temperature is more moderate) gas booster location based on appliance type and approval
- Do not expose to ammonia, chlorine or other hazardous chemicals.

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Clearances

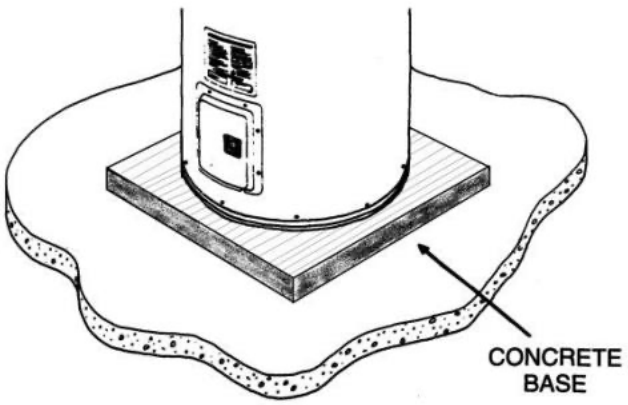
- Allow adequate room to work with tools.
- A minimum of 250mm clearance around the water heater is required.
- 800mm for access cover removal
- 1400mm above for element/control removal.
- You should be able to read the information on the rating plate and all informative labelling.
- Adequate provision must be made to dispose of any water escaping from heater or adjacent plumbing that might result in damage to property (floor waste located in indoor installations)
- 1 metre away from any heated surfaces.

The water heater tank must be connected in such a way that:

- Electrical covers are accessible to a service agent.
- Space is allowed for the removal of the heating elements and control box.
- The booster & pump is accessible for servicing or complete removal of the unit if necessary.

Foundation

- To ensure adequate tank support, position the unit on an approved support base such as a concrete slab (see figure below).



- Alternative forms of water heater bases are acceptable providing they allow for adequate support.
- Ensure the base and footings installed can adequately carry the load of the filled tank
    - 1 x Enermax SMARTcube 300 litre tank = 450 kg filled weight

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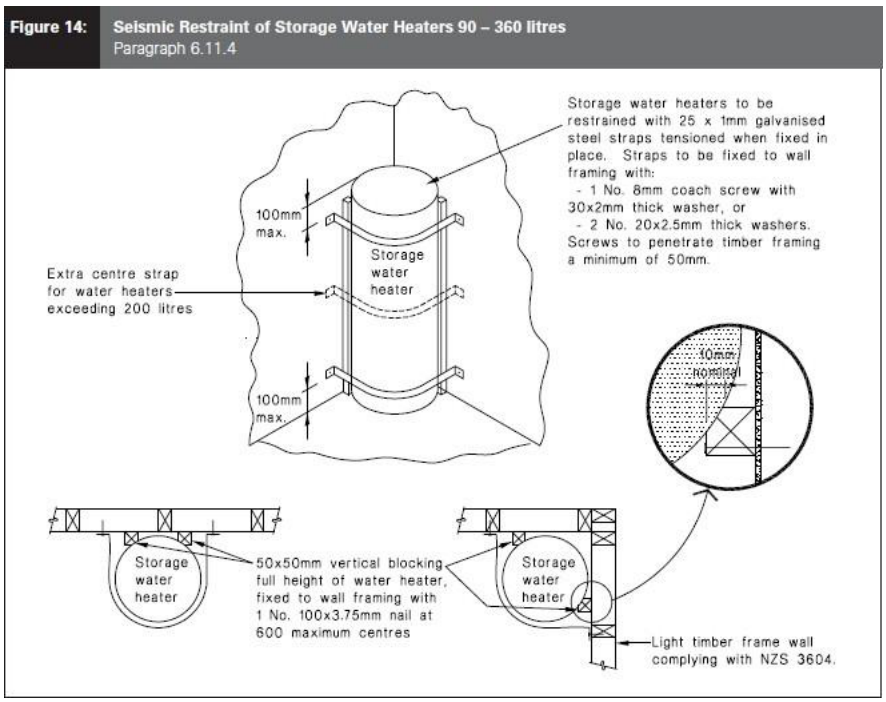
Seismic restraint

- Where seismic restraint is required in your building code, (i.e. NZBC G12 Building code), please install hot water tanks with seismic straps as shown:



Safe tray

- It is a requirement of the National Plumbing Code AS/NZS3500.4.2 that new water heaters be installed in a safe tray where in the event of a leak, property may be damaged (i.e. internal installations).
- Installation of such trays must comply with Clause 4.4 and Sub-Clauses 1 to 5 of the abovementioned Code.
- Safe tray should covers the foot print of the Enermax SMARTcube hot water system, including all the attached equipment (pump, top up tank) on the tank.

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Inspection and unpacking

- The ROSC40 Solar PV water heater is to be inspected upon delivery for possible external damage or missing components.
- If damage or short delivery is evident it is to be noted on the freight docket and Energy Smart Water office contacted immediately. A claim should be lodged with the shipping company within three (3) days if shipment is damaged or incomplete.
- If major damage is apparent, do not lift package on to site without prior approval from Energy Smart Water.
- Your hot water system is supplied with the following components:

Parts list

Item no	Quantity	Description
1	1	Enermax SMARTcube Thermal Store Energy Storage Tank with two my-PV SC20 Electric Photovoltaic Powered Heating element and makeup tank
2	1	Expansion Control Valve
3	1	Two pairs MC4 plugs and earth cables
4	1	Installation and Owner's Manual
5	0	Gas Booster & Pump (with Alternate boost option only)

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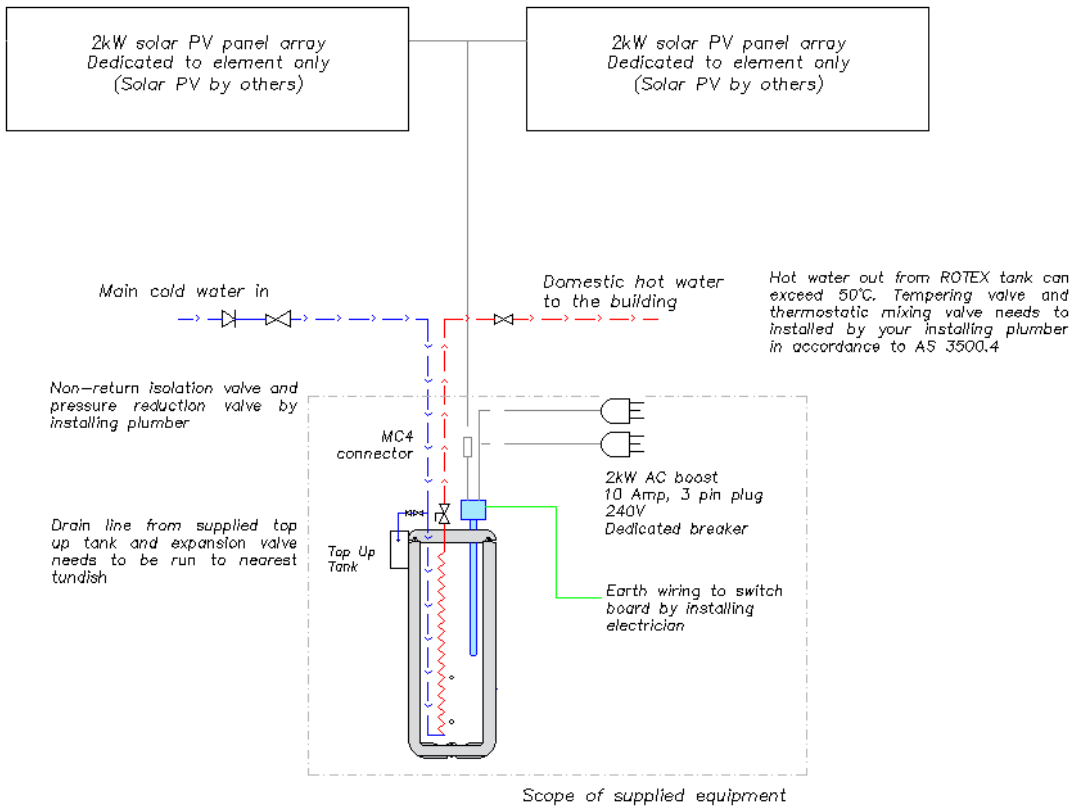
Hot water system schematics

Please familiarize with the appropriate hot water variant before installation. Below schematic drawings will provide an overview for your hot water installation.

Electric boosted only installation



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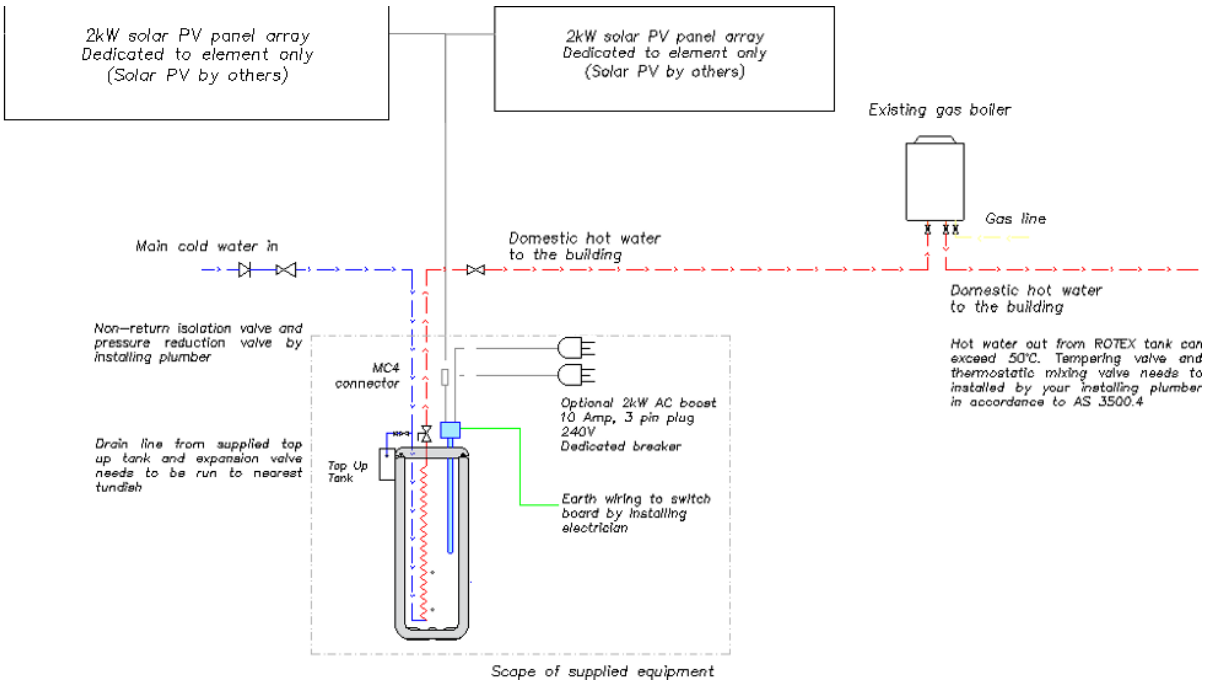
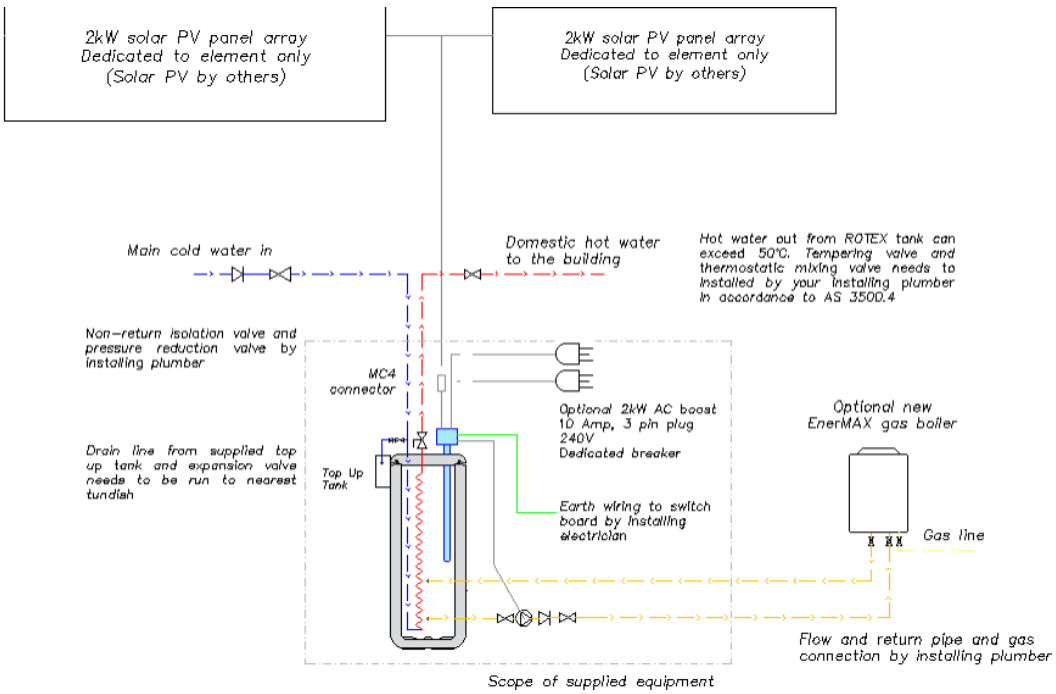
Post gas boost installation



Gas boost installation



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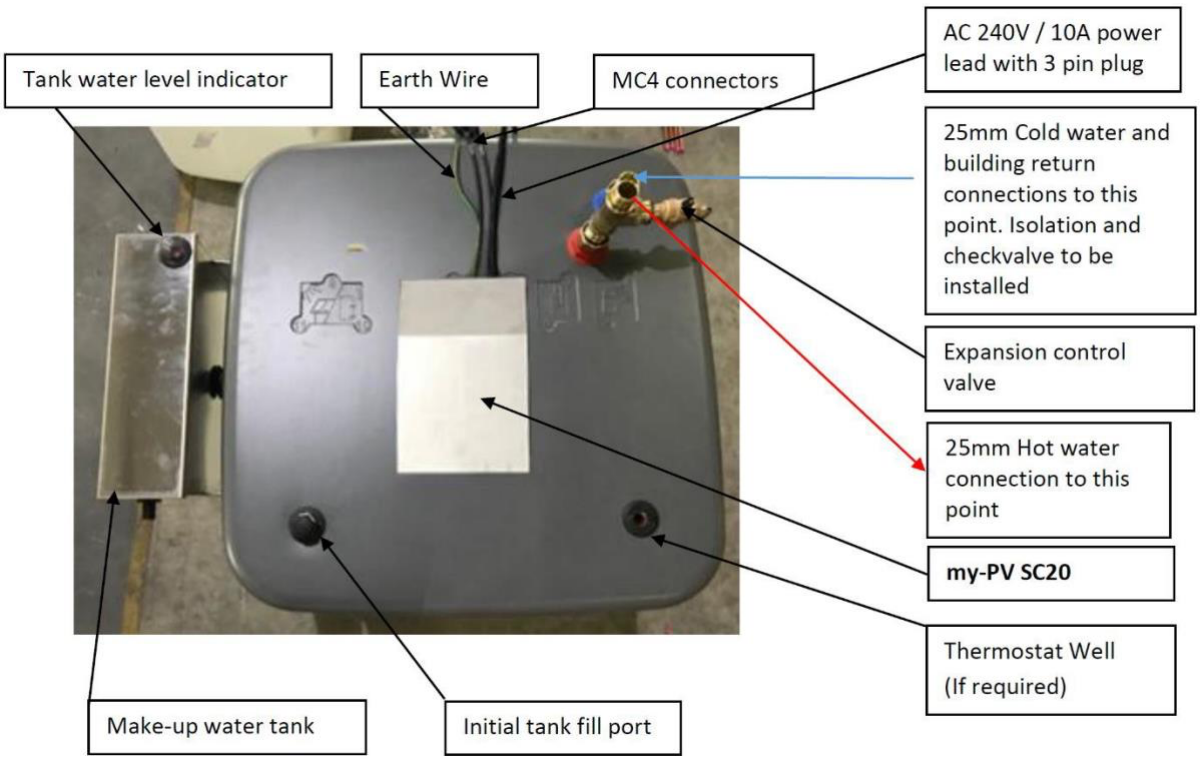
Installation—Plumbing

Before Installation of a ROSC40 System, please refer to the schematics and other documentation describing the product. If more details are required, please contact Energy Smart Water before installation.

- Enermax SMARTcube tanks are pre-fabricated in the workshop.
- The hot water package is a Plug and Play pre-packaged. Refer to the pictures below.
- Ensure the level surface that can support filled weight of Enermax SMARTcube hot water system, platform and any attached accessories and pipework.
    - 1 x Enermax SMARTcube 500 litre tank = 650 kg filled weight
- Ensure a water drain is placed near the hot water system.
- Ensure that the lid of the Enermax SMARTcube tank is sitting squarely on top of body of tank.

Domestic cold and hot water connections



NOTE: To avoid damage to internal coils, fill coils prior to filling tank.

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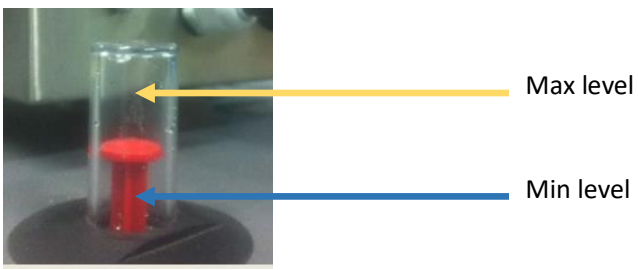
WARNING Do not remove any equipment or pipework from the Enermax SMARTcube tank.

WARNING Do not attach any external equipment and saddles on the Enermax SMARTcube tank.

WARNING Do not use any screws to pierce the skin of Enermax SMARTcube tank.

- Connect cold water pipework to 25mm 'Cold Water' connection marked on top of tank with blue identifying ring.
    - Your installer must supply and install appropriate isolation, pressure and backflow control as per local regulations. Ring main / building return also connects to this point, entering pipework after backflow control (check valve).
- Connect hot water pipework to 25mm 'Hot Water' connection marked on top of tank with red identifying ring.
    - At hot water outlet, your installer must supply and install appropriate isolation and temperature control valves as per local regulation.
    - Hot water outlet from Enermax SMARTcube tank can exceed 50°C. Tempering valve or thermostatic mixing valve needs to be installed in accordance to AS 3500.4 by your installing plumber.
- To allow for disconnection of the water heater a mechanical union and ball/isolation valves must always be provided at the cold water inlets and hot water outlets to allow for disconnection. The pipe work must be cleared of foreign matter before connection. All pipe fittings must be assembled using two spanners – do not exert excessive amounts of torque on the pipes or water heater fittings.
- After all the plumbing fittings are installed as per AS 3500, open the ball/isolation valves to fill the coil with mains pressure water
    - Coil/s must be filled before storage/jacket of Enermax SMARTcube tank is filled.
    - Mains pressurised water and domestic water flows through the internal heat exchange coil/s.
- Fill the Enermax SMARTcube tank with water manually
    - Storage/jacket water sits in the tank and unpressurised
    - To speed up the process, a garden hose can be used to fill the tank
    - **Warning:** Enermax SMARTcube tank needs to be filled to appropriate level before switching on the hot water tank



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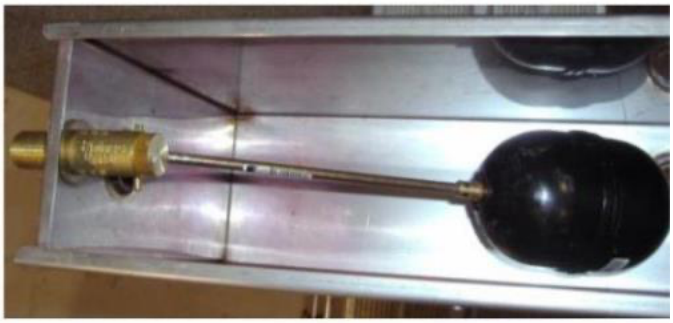
- Above red float indicator needs to be visible and sits between max and min level labelled on the glass.
- Tank water level can be adjusted through ball float arm in the metal automatic top up tank, attached on the Enermax SMARTcube tank.

- Check pipework for leaks and pressure retention.

Top-up tank

- Top up tank maintains water level in storage water of Enermax SMARTcube tank and heat source.
- Mains water suppled from via duo valve and pipework.



Top-up tank view from above

- After mains pressure coil/s are filled and all primary pipework is complete, the jacket of the Enermax SMARTcube tank can be filled with water.
- This is carried out through the top up tank.
- Ensure all pumps are OFF.
- Make up water will stop flowing when water reaches level of float. To set level, see commissioning instructions later in this document.
- Connect overflow port to suitable tundish.

Drains

- Drain required for the following:
  - Cold expansion valve
  - Top-up tank overflow

Hot water delivery

- This appliance may deliver water at high temperature. Refer to the Plumbing Code of Australia (PCA), local requirements and installation instructions to determine if additional delivery temperature control is required.

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- This water heater can supply water at a temperature **exceeding 50°C**. A tempering valve must remain fitted between the water heater and the outlets in ablution areas to comply with the water temperature requirements of AS 3500.4 by your installing plumber.

Water pressure

- Test incoming water pressure to the heat exchange coil with a gauge. If the pressure exceeds 600kPa, an approved pressure limiting valve is required.
    - Pressure limiting valves are not supplied with the hot water system.
- Enermax SMARTcube tank is a non-pressurised vessel and should be manually filled upon initial installation. Refer to 'Installation' steps above.

PTR valve

- The storage water in the Enermax SMARTcube tank is unpressurised. Hence, no PTR (Pressure, Temperature Relief) valve is needed for the water heater tank.

Cold water expansion valve

- A cold water expansion valve at 650 kPa is fitted to the pipework and must be extended to a tundish or adequate drain point.

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Commissioning—Plumbing & Gas

Task	Complete?
Ensure safe work environment for workers and hot water equipment.	
All work must comply to relevant codes.	
Install water heater on a flat surface.	
Plumbing	
Check for leaks.	
Ensure sufficient gas supply and pressure to gas boosters. Purge gas line.	
Drains for top up tank, cold expansion valve, gas booster.	
Domestic hot water	
Connect all domestic hot water pipework.	
Ensure cold water pressure does not exceed 600 kPa rating of cold expansion valve.	
Ensure non-return valve on cold water supply and ring main return.	
Fill domestic hot water circuit/coils before filling Enermax SMARTcube tank / primary heating circuit.	
Ensure delivered hot water pressure complies with AS/NZS 3500.	
Ensure storaege water is filled to appropriate level.	
Ensure tempering valves or thermostatic mixing vlaves are installed in accordance to AS/NZS 3500.4.	
Primary/heating circuit	
Air vent at top if any significant rises of primary pipework.	
Fill Enermax SMARTcube tank with clean water. Fill until water is permanently present in top of tank. Set level.	
Gas boosters	
Installed to gas code by licensed personnel.	
Static and dynamic gas pressure set and regulated to range on appliance dataplate.	
Measured gas pressure when gas boosters operating.	

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Set to correct outlet temperature—usually in the range of 75–83°C, depending on the brand and model of heater.
Water filters clean on start-up.
Water filters clean after running for a sufficient period of time.

Flueing
Flueing is installed to gas code and manufacturers installation instructions.
Ventialte plant room for gas boosters that draw combustion air from location of appliance.

Start-up
Confirm electricity is available (DC and AC).
Check and confirm earthing of all components and assemblies.
Turn on all GPOs and breakers.
my-PV SC20 will start heating the tank.
Bleed primary pumps of air (if applicable).
Check filter in gas booster for debris after start-up on several later occasions (if applicable).
When Enermax SMARTcube tank is at design temperature (thermostat preset at 65°C), gas pump and my-PV SC20 will switch off.
Note: ensure delivered hot water temperature complies with AS/NZS 3500.4.

Set top-up tank/primary water level
Set water level in top-up tank by bending arm of float valve. The red float indicator at the top of the top-up tank should be at the middle of the clear thimble. The water level in the top-up tank should be below the overflow connection point.

Commissioning must be completed by a qualified and licensed personnel in accordance with AS/NZS 3500.4, AS/NZS 3498, AS/NZS 3000; AS/NZS 5601.1, Municipal Building Codes, Occupational Health, Safety & Welfare Regulations, any other States or Federal Statutory Regulations.

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Installation—Electrical

Standards

This unit is to be installed by authorised, licensed installers in accordance with:

1. AS/NZS 3000 Wiring Rules
2. AS/NZS 5033 Installation of photovoltaic (PV) arrays
3. AS 1768 Lightning Protection
4. AS/NZS 1170.2 Wind Loads
5. AS 4509 Stand-alone power systems
6. Municipal Building Codes
7. Occupational Health, Safety & Welfare Regulations
8. Any other States or Federal Statutory Regulations

Photovoltaic (PV) array

Array configuration

PV array should not be functionally earthed. Positive and negative lines of the PV array must not be earthed at any time otherwise an earth fault error will occur. Metal frame and support structure of the PV panels shall be earthed according to AS 5033. A switch-disconnector for both strings is required adjacent to the ROSC40 PCE and within 3m and line of sight of the PCE. Additionally a switch-disconnector (DC isolator) is required adjacent to the PV array.

Note: A switch-disconnect must have: marked on/off; be lockable in the off position; be load breaking.

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PV array design rules (for each SC20 heating element)

Upper voltage limit calculation:

$$V_{oc\ \mathrm{STC}} = 37.3\,\mathrm{VDC}$$
$$V_{oc}\ \text{temp. coeff} = -0.33\,\%/^{\circ}\mathrm{C}$$
$$\Delta T\ \text{at}\ -15\,^{\circ}\mathrm{C} = -40\,^{\circ}\mathrm{C}$$
$$-40\,^{\circ}\mathrm{C} \times -0.33\,\%/^{\circ}\mathrm{C} = +13.2\,\%$$
$$V_{oc\ \max} = V_{oc\ \mathrm{STC}} + 13.2\,\% = 42.22\,\mathrm{VDC}$$
$$42.22\,\mathrm{V} \times 8\,\text{panels in series} = 337\,\mathrm{VDC} < 360\,\mathrm{VDC}$$

DC voltage is in range.

Note: Panel characteristics at lowest possible temperature are decisive. If voltage exceeds 360 VDC, unit may be damaged.

Current will be limited to 10 A.

Note: Over-current will not damage unit!

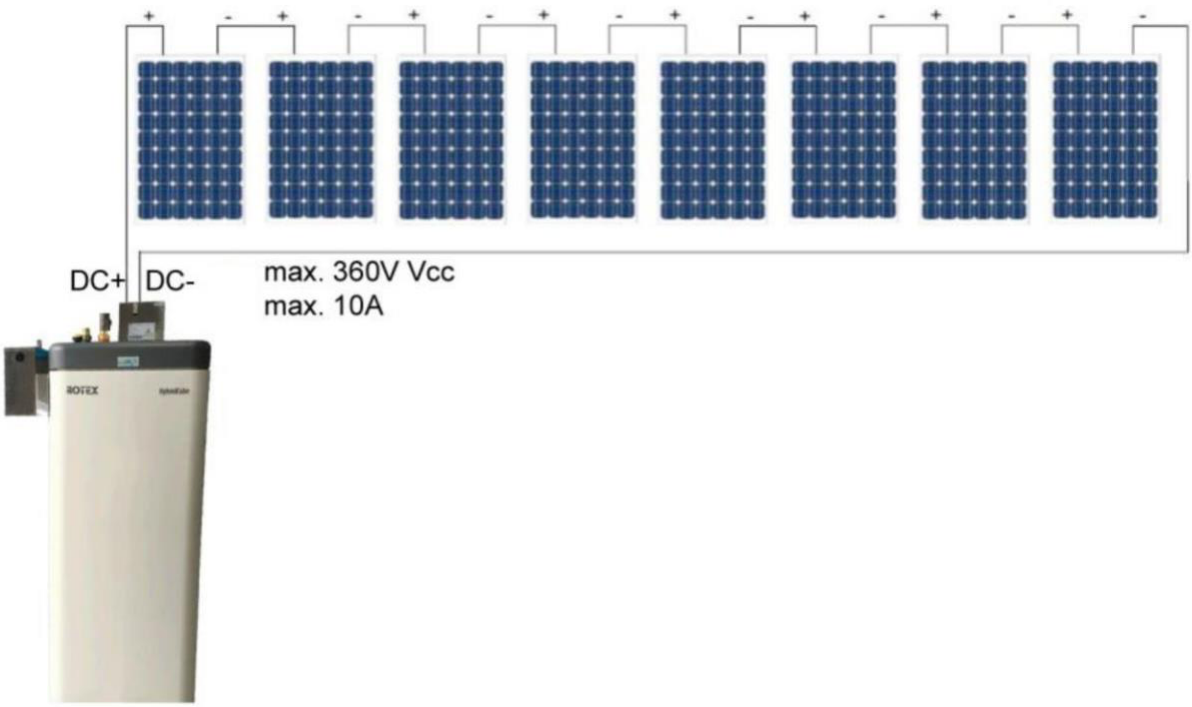
Low voltage limit calculation:

$$R_{\text{heating rod}} = 15\,\Omega$$
$$I_{mpp\ \mathrm{STC}} = 8.26\,\mathrm{ADC}$$
$$I_{sc}\ \text{temp. coeff} = +0.033\,\%/^{\circ}\mathrm{C}$$
$$\Delta T\ \text{at}\ 65\,^{\circ}\mathrm{C} = 40\,^{\circ}\mathrm{C}$$
$$40\,^{\circ}\mathrm{C} \times 0.033\,\%/^{\circ}\mathrm{C} = 1.32\,\%$$
$$I_{mpp\ \max} = I_{mpp\ \mathrm{STC}} + 1.32\,\% = 8.37\,\mathrm{ADC}$$
$$V_{mpp\ \max} = V_{mpp\ \mathrm{STC}} - 13.2\,\% = 32.4\,\mathrm{VDC}$$

$$\text{minimum voltage} = 8.37\,\mathrm{ADC} \times 15\,\Omega = 125\,\mathrm{VDC}$$
$$\text{minimum num. of panels} = 125\,\mathrm{VDC}/32.4\,\mathrm{VDC} = 4$$

Note: Panel characteristics at highest possible temperatures are decisive. MPP tracking range is 100–360 V. The higher the current, the more voltage is required to utilise the current.

If voltage is less than 100 V, the unit will not work. If the voltage/15 is less than the current, the unit will not run at MPP.



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Safety instructions

- Both SC20 heating elements have dual electrical supplies 240V 8.7A AC and 360V 10A DC
- When the photovoltaic array is exposed to light, it supplies a DC voltage to the SC20.
- In addition the SC20s may be powered from AC supply for electric or alternate boost
- The electronic circuit contains capacitors that may keep voltage even if the unit is not supplied with power. Wait a minimum of 10 minutes after isolating both DC and AC supplies before opening the myPV SC20 enclosure or commencing work on this equipment.
- Before opening the enclosure isolate both DC and AC supplies
- For the AC supply an in line circuit breaker with a rating of 10A must be installed.
- Installation and connection procedures must comply with local regulations.
- Damages resulting from non compliance with the installation/operating manual result in loss of warranty.
- Permanent earthing of the SC20 device must be provided. Even if not powered from AC. The unit is connected with an additional Earth lead to be hard wired to the Earth.
- Never switch on the system without a full tank of water, covering the element.
- Check the tank water level periodically and ensure that the water level is within the range of the water level indicator.
- Only install device in a vertical position.
- Avoid exposure and operation in extreme heat (>50 °C), or cold (<0 °C) or direct sunlight.
- Do not exceed the maximum input voltage of 360 V DC
- In commercial installations, the applicable accident prevention laws regarding use of
- electricity, must be adhered to.
- The my-PV SC20 PV heating device does not contain components which can be repaired or replaced. In case of failure please contact Energy Smart Water
- In installations where the inbuilt Earth Fault Alarm cannot reasonably be expected to be heard an audible or visual alarm should be connected to the relay and positioned in a noticeable location. Refer to pg 32.

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Electric boosting

CAUTION Power must not be turned on until the storage tank is filled with water.

The AC electric boost heating element provides boosted hot water during periods of low solar gain or high hot water use. The recommended installation is for the AC electric element to be connected to a continuous electrical tariff. Other configurations of wiring the booster element are not recommended and may affect overall system performance and warranty. Refer to electrical installation instructions below.

Booster element power

The storage tank with an electric booster element is designed for connection to a 240V AC, 10A mains power supply with an isolating switch designed to operate on a standard tariff.

Alternate boost

Gas booster

This system supports Gas Boost by instantaneous units in lieu of the electrical boost. The system can be ordered this way and setup for operation as a system ready for installation on site. Consult with Energy Smart Water for a customized solution.

Pump

The pump is connected to the ROSC40 control unit via a standard 3 pin plug connected directly to the ROSC40 controller, when the thermostat calls for booster heat the pump is powered to pump water from the tank through the gas booster and back into the tank again thus energising the tank from 55 degrees to maximum 65 degrees.

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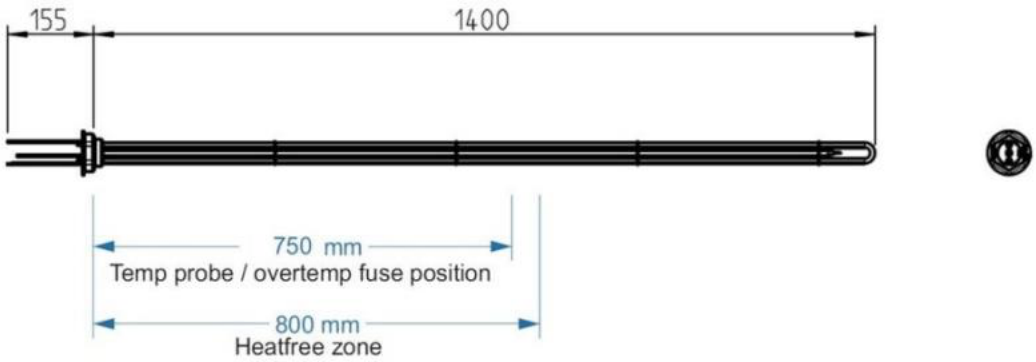
Assembly and installation

Installation only to be conducted by authorized personnel.

The tank has to be filled with water as per tank installation manual.

SC20 has to be installed vertically in the tank by screwing the 40mm thread into the lid of the Enermax SMARTcube tank. The cold zone reaches down 800mm from the sealing.



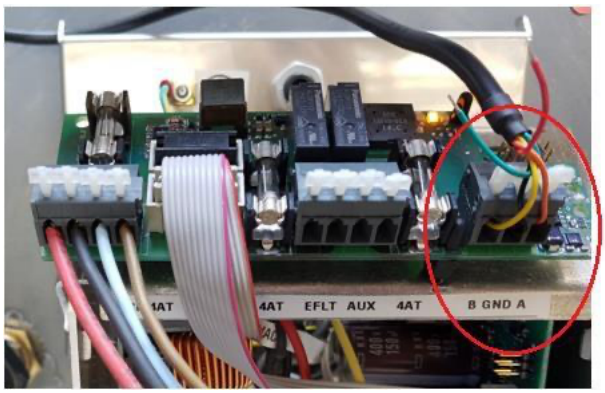
Do not use any force when screwing the element into the lid until it touches the seal. Use a 60mm spanner and apply up 80 Nm.

Electrical connection of my-PV SC20

- This unit is to be installed in accordance with AS/NZS 3000 .
- SC20 housing must be earthed.
- The unit must be connected to a 10A RCD protected circuit.
- Make sure that the main switch of the PV plant is disconnected.
- DC cables to be connected with correct polarity, to the two MC4 connections. The system will not work in the case of reverse polarity, but no damage is caused.
- Connect the AC cable for AC, gas or alternate boost support heat.

Connection of RS485

The extension board has the following connection terminals:



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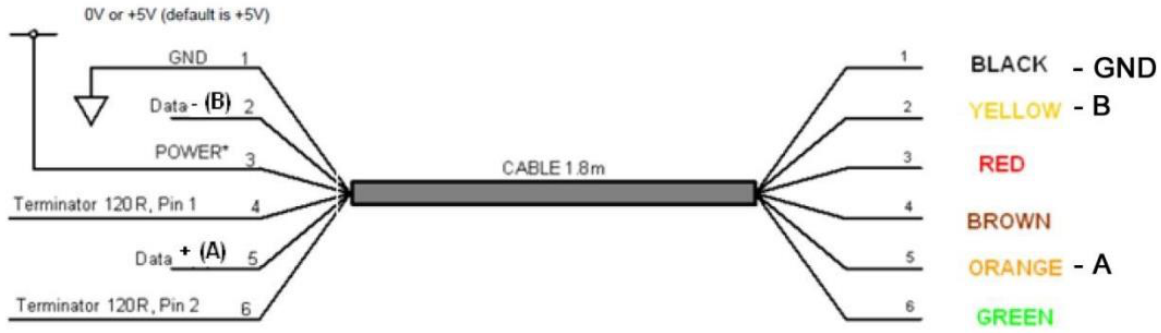
Description from the left to the right:

- Gas Boost: 240V out, 4.0A fuse
- EFLT - Earth fault alarm: potential free relay contact, 4.0A fuse Buzzer: sends audio signal simultaneous with red blinking LED of the SC20
- AUX: potential free relay contact, 4.0A fuse (also used for gas-boost switching)
- B GND A - RS485: data communication
- 3 LED: left = red, middle = yellow, right = green

The following **Figure 5.1** shows the cable signals and the wire colours for the signals on the USB-RS485-WE cable.



ROSC40 Software Download

Operating status indicator

Led colour	Description
Red, yellow, green	Startup (approximately seven seconds)
Green flashing	Standby
Yellow	Solar heating
Yellow flashing	Heating AC, gas, or alternate boost support heat
Green	Heating complete, set temperature reached
All flashing	Setup mode
Red or red flashing	Fault

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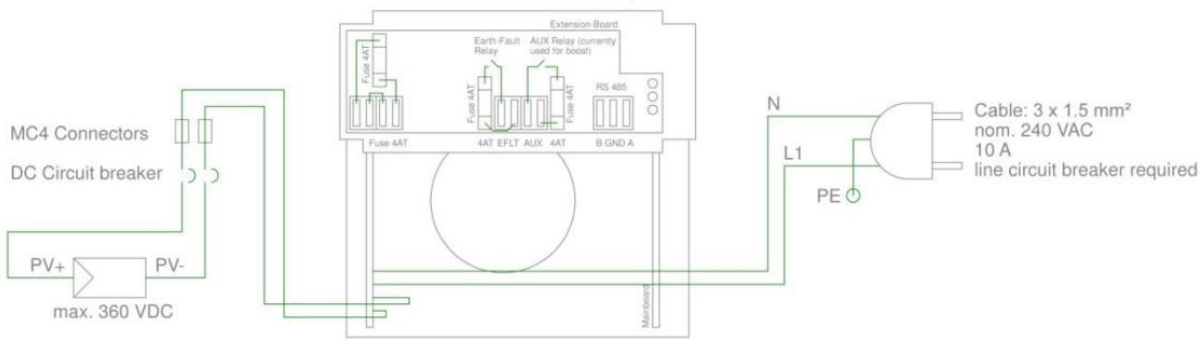
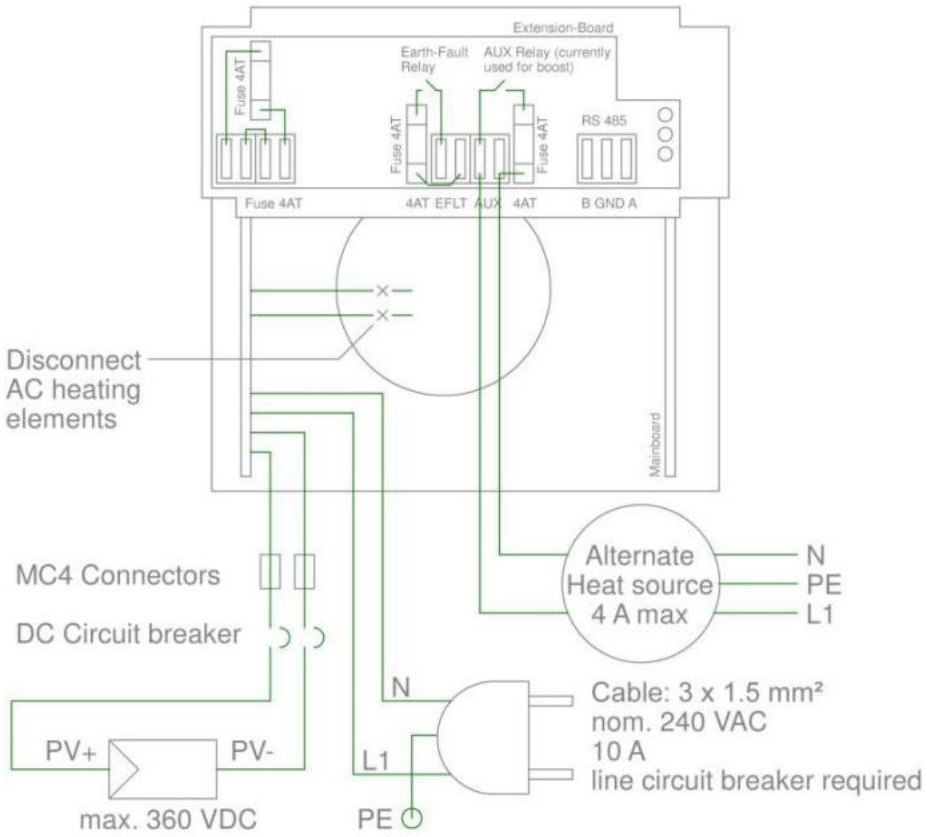
Wiring diagrams

SC20 Electric Boost



SC20 Alternate Boost—External Supply



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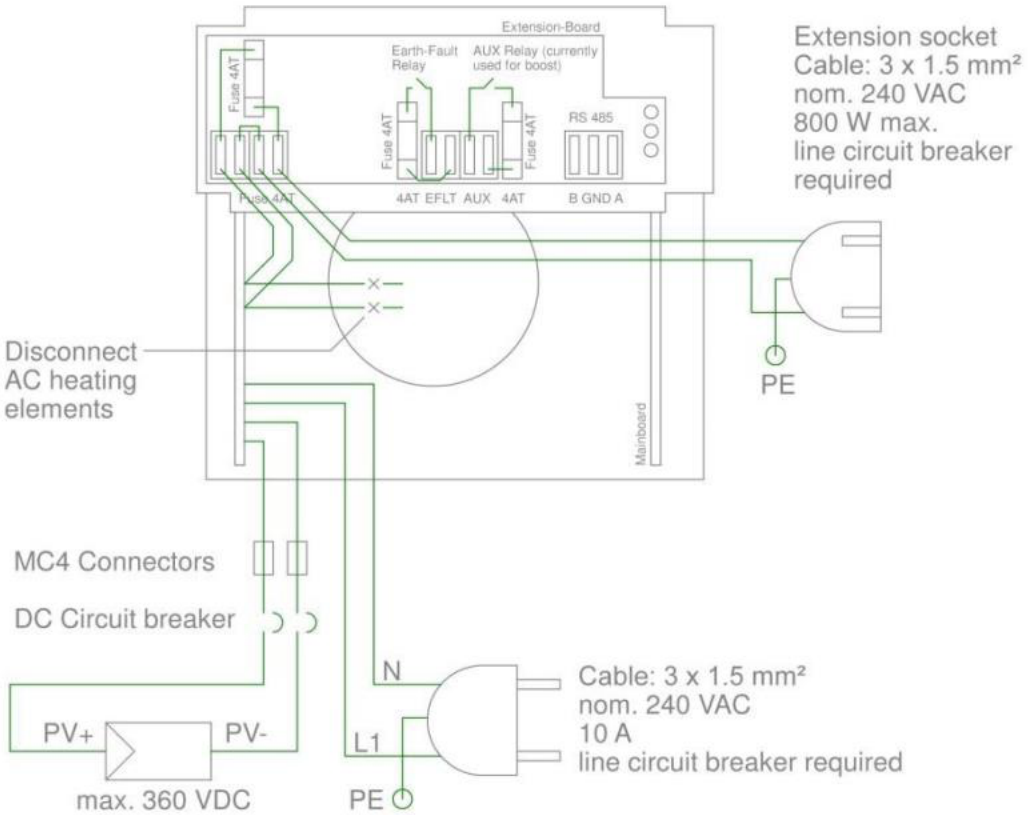
SC20 Alternate Boost—Internal Supply



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Commissioning—Electrical

Check that plumbing commissioning is complete and tank is full of water before proceeding.

Normal PV operation without AC

1. After connecting both SC20 devices to the PV arrays the DC separator needs to be switched on and it will take approximately 10 minutes for the system to operate. During this time the green LEDs will blink (standby).
2. The set temperature of 85°C is fixed.
3. Normal operation → Yellow LED on
4. After set temperature is reached → System turns off, yellow LED off, green LED on

Normal operation with AC, gas, or alternat reheating

The additional reheating using AC, Gas or Alternate support heat, ensures that the reheat temperature is reached, independent from the PV input.

The reheat temperature is factory set at 55°C cut-in and 65 °C cut-out.

Operating status indicator

Led colour	Description
Red, yellow, green	Startup (approximately seven seconds)
Green flashing	Standby
Yellow	Solar heating
Yellow flashing	Heating AC, gas, or alternate boost support heat
Green	Heating complete, set temperature reached
All flashing	Setup mode
Red or red flashing	Fault

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Fault report

Red LED flashing mode	Associated fault
1 × flash	Over-temperature cut off (98°C). System must be checked by an authorized service technician.
2 × flash	Water temperature above 90°C. System switches off and back on once temperature decreases. Remark: This temperature is close to the over temperature cut off (98°C). Ensure to set the temperature of the external source below 85°C.
3 × flash	Electronic overheating. System switches off and back on after cooling off.
4 × flash	Faulty electronic or heating element. System needs to be checked by an authorized service technician.
5 × flash	DC-insulation fault (PV collectors or electric heating element). System has to be checked by an authorized service technician.
6 × flash	Faulty temperature sensor. System needs to be checked by an authorized service technician.

Troubleshooting

The system does not contain components which can be repaired/replaced. In case of failure please contact:

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Shutdown procedure

The Enermax ROSC40 can be shut down (turned off) by turning the switch-disconnector (DC isolator) to the off position **and** switching off (or unplugging) the AC plug at the power outlet.

Technical data

DC	
DC voltage	100–360 V (max.)
MPP voltage	100–360 V
Number of MPP trackers	1
Max. input current	10 A, limited power
Power rating	2000 W at 25°C, derating when overheating
DC connection	Original MC4, one string

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Recommended module configuration	4–8 polycrystalline module with 60 cells
MPP-matching efficiency	99.8%

General data

Maximum pressure	Max. 10 bar (1 MPa)
Total efficiency	>99% power rating
IP rating	IP54
Ambient operating temperature	0°C to 50°C
Operating status display	3 LEDs
Interface	Serial RS485 interface
Dimensions (W×H×D)	175×265×1550
Length of element	1400 mm
Heating rod thread connection	40 mm
Weight	4.5 kg incl. cable, without package

Environmental

Environmental category	Outdoor
Pollution degree	2
Relative humidity rating	0–99%
Cooling	Convection
Maximum altitude	1000 m above sea level
Overvoltage category for each input	Category 2

AC

Heating capacity	2000 W
Connection	Single phase, 3-wire cable, 240 V, 50–60 Hz
Fuse	16 A
Cable	3 m
Stand-by power	0 W in DC operating, <2 W in AC operation

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Disposal

Retain packaging materials or dispose properly. At end of service life, dispose according to local disposal laws.

EU Declaration of Conformity

SC20 complies with the following standards EN60355-2-21, EN60730-2-3, EN61000-6-2

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Maintenance

Every six years—major service

By authorised personnel only.

Only genuine replacement parts are to be used on this water heater. Major service and replacement parts are not included in the warranty. A charge will be applicable.

The major service includes the following:

- Replace the temperature pressure relief valve.
- Check the electric heating unit for excessive calcium build-up or corrosion and replace if necessary.
- Visually check the unit for any potential problems
- Inspect all connections.
- If a safe tray is installed, check the drain line is clear of blockages.

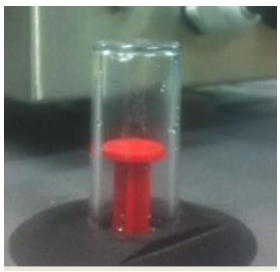
Every three months—minor maintenance check

By homeowner.

CAUTION Do not touch the power plug on the water heater with wet hands.

The minor check includes the following:

- Visual check of water level float



- Visual check for water discharge from expansion control valve
- Visual check for exposed electrical wire
- Visual check for earth wire disconnection
- Visual check for any leaks from tank, pipework, or pump
- Visual check that the SC20 housing is not in direct sunlight to extend life of unit.
- Remove any flammable materials nearby.
- Remove any chemicals nearby.
- Check that tank foundation has not sunk or moved.

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Troubleshooting

For authorised personnel only.

Cause	Remedy
Enermax SMARTcube tank overflowing	
Leaking mains pressure coil.	Isolate each tank to determine which tank is leaking. Check coil for leakage. Replace as necessary.
Top-up tank incorrectly set.	Bend float arm in top-up tank to lower water level.
Top-up tank overflowing	
Leaking mains pressure coil.	Isolate each tank to determine which tank is leaking. Check coil for leakage. Replace as necessary.
Top-up tank incorrectly set.	Bend float arm in top-up tank to lower water level.
Mains pressure expansion valve leaking	
Water pressure too high.	Check and reset/reduce inlet main pressure.
Water temperature too high.	Check and reset thermostat/solar controller.
No hot water	
No electricity.	Check electricity supply. Check that all plugs and sockets are connected.
Faulty thermostat.	Check electricity supply. If stop working, replace the thermostat with the same model number. Can plug primary pump directly into GPO for short term hot water supply. This is only applicable when using gas continuous flow water heaters as a heat source. GCF heaters will run to their present outlet temperature and automatically switch off and on. Do not use this method for more than one week. Request and authorised and certified electrician to investigate.

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my-PV SC20 failed. Red flashing light.	Request an authorised & certified electrician to investigate.

Noisy heat transfer pump (for back-up gas boiler only)

Air trapped inside pump.	Bleed pump according to manufacturer's instructions.
Poor mounting.	Mount pump on isolation pads/springs.

Heat transfer pumps are not operating (for back-up gas boiler only)

Unplugged.	Check plug and power supply.
Motor failed.	Contact Energy Smart Water to determine correct pump replacement.
Capacitor failure.	Contact Energy Smart Water for replacement parts.
Pump is not primed.	Purge air lock from pipe. Run pump until the line is full.

Check the items above before making a service call. You will be charged for attending to any condition or fault that is not related to manufacture deflect or failure of a part.

For assistance call Energy Smart Water Pty Ltd on 03 9939 6722

Actions to undertake in the event of an earth fault alarm

1. Limit access to all parts of the PV system
2. Contact ESW on 1800 433 254

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Warranty

This warranty is given by Energy Smart Water Pty. Ltd. 2/11 Dalkeith Drive, Dromana Vic 3936. ABN 65 161 756 690

Terms of warranty

This Warranty covers any defects in materials when the product is installed and operated according to Energy Smart Water written installation instructions, subject to the terms within this Limited Warranty document. Improper installation may void this Warranty. This Warranty extends to the original purchaser and subsequent owners, but only while the product remains at the site of the original installation. This Warranty only extends through the first installation of the product and terminates if the product is moved or reinstalled at a new station.

Replacement of the product may be authorized by Energy Smart Water only. Energy Smart Water does not authorize any person or company to assume for it any obligation or liability in connection with the replacement of the product. If a component or product returned to Energy Smart Water is found to be free of defects in material or workmanship, or damaged by improper installation or damaged during return shipping, the warranty claim for product, parts and labour may be denied.

Proof of purchase is required to obtain warranty service. You may show proof of purchase with a dated sales receipt, credit card statement or other proof of purchase. In the first instance, you should contact Energy Smart Water by email or telephone and point out the defect.

All Energy Smart Water water heating units are carefully checked, tested and subject to stringent quality controls.

Energy Smart Water will repair or replace the covered product or any part or component that is defective in materials or workmanship as set forth as follows:

Product (equipment only, domestic applications)	Warranty period
Enermax SMARTcube storage polypropylene container	10 years
Enermax SMARTcube fittings	1 year
Stainless-steel heat-exchanger coils for potable water	3 years
my-PV SC20 Solar Electric Device	2 years
Other parts	1 year
Labour (replace defective parts) *Limited to 50 km radius from GPO in Australian capital cities*	1 year

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Purchaser's statutory rights

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Conditions of warranty

Supplied product must only be installed, commissioned or serviced by qualified personnel.

The connection, attachment, integration or general association of other equipment or parts that are not specified by Energy Smart Water which either directly or indirectly affect the performance or operation of this equipment could void warranty.

Water quality

It is important that the ROSC40 system is installed in water conditions that are suitable for its efficient long-term use. Product warranty is limited to the following conditions:

Description	Max allowable
pH	6.5 to 8.0
TDS (total dissolved solids)	600 mg/L
Total hardness	200 mg/L
Chlorides	150 mg/L
Magnesium	10 mg/L
Calcium	20 mg/L
Sodium	150 mg/L
Iron	1 mg/L

If there is no option but to use a poorer water quality that is outside the max allowable warranty conditions, coil/s can be replaced at owner's expense. Please contact Energy Smart Water Pty Ltd. Water supply must be sourced from municipal water supply.

Please contact the local authority for more information regarding the quality of water in your area. **Water quality outside of the above recommendations will void warranty.**

Note that heat sources are separated from mains water supply, however maximum allowable limits are applicable for both applications.

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Warranty exclusions

- Where the product has not been installed, operated, maintained or serviced in accordance with the instructions supplied by Energy Smart Water Pty Ltd.
- Where the product is not used according to the project specification
- Water quality outside of the limits specified in this manual.
- Where the product is misused, damaged, neglected, abused, operated outside of instructions in this manual.
- Where damage is caused by an act of God, fire, lightning, flood, earthquake, landslide, storm, hail, frost, wind or other severe adverse weather conditions.
- Where cold water pressure level exceeds the maximum pressure specified in this manual.
- Where water hammer or water pressure spikes occur.
- Where any attempt has been made to repair the product other than by Energy Smart Water Pty Ltd Accredited Service Agent.
- Where any attempt to replace parts on product other than by parts approved by Energy Smart Water Pty Ltd.
- Where attempts to replace parts / maintain / repair without approval of Energy Smart Water Pty Ltd.
- Where the water heater is installed in a position that does not comply with the installation instructions or relevant statutory requirements
- Where the water heater is moved or reinstalled at a new location
- Where access to water heater requires dismantling or removal of cupboards, doors or walls, or use of special equipment to gain access or relocate water heater ground level or to a serviceable position.
- SUBJECT TO ANY STATUTORY PROVISIONS TO THE CONTRARY, THIS WARRANTY EXCLUDES ANY AND ALL CLAIMS FOR DAMAGE TO BUILDING, STRUCTURE, FIXURES AND FITTINGS, FURNITURE, CARPETS, WALLS, FOUNDATIONS OR ANY OTHER CONSEQUENTIAL LOSS EITHER DIRECTLY OR INDIRECTLY DUE TO LEAKAGE FROM THE WATER HEATER, OR DUE TO LEAKAGE FROM FITTINGS AND / OR PIPE WORK OF METAL, PLASTIC OR OTHER MATERIALS CAUSED BY WATER TEMPERATURE, WORKMANSHIP OR OTHER MODES OF FAILURE.
- A call out fee is chargeable where it is found there is no fault with the water heater, where the complaint is related to excessive discharge from the temperature and / or pressure relief valve due to high water pressure, where there is no flow of hot water due to faulty plumbing or cross connection, where water leaks are related to plumbing and not the water heater or water heater components, where there is a failure of gas, electricity or water supplies, where the supply of gas, electricity or water does not comply with relevant codes or acts or other issue not due to performance of water heater.

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