

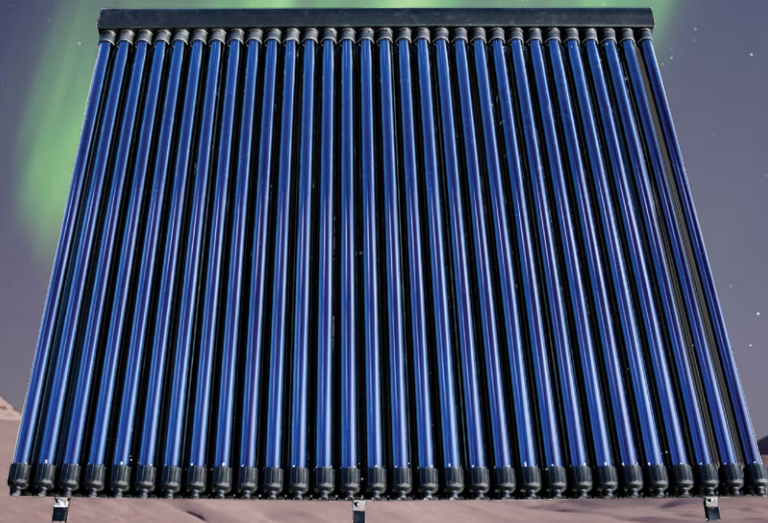
Only The Purest Energy Supplied From Above

Owners Manual

Evacuated Tube
Thermal Water Heating System



Ice Solar



Owner's Manual

Welcome to your Ice Solar System

You are now set to enjoy significant energy savings and eco friendly hot water. As a well trusted, New Zealand based company, Ice Solar is here to support you. If you have any questions about your system's installation, operation, or maintenance, please contact us.

Hot Water Heating

This user manual provides essential information and settings for operating your Ice Solar system easily and effectively. This should be read in conjunction with the Ice solar instruction manual. Only for advanced details, refer to the ICE81Q controller manual included with your system.

Reading Temperatures and Values

Use + or – buttons on the control panel to scroll through the following values:

- **T1:** Temperature of the rooftop solar collector(s).
- **T2:** Temperature at the bottom of the cylinder.
- **T3:** Temperature at the middle of the cylinder (best overall temp indicator).
- **T4:** Temperature at the top of the cylinder (temp leaving the cylinder)
- **n1%:** Solar pump speed (as a percentage).
- **hR1:** Total running time of the solar pump (in hours).
- **OTDI:** Legionella control (disinfection function to prevent bacterial growth).
- **DAYS:** Total running time of the display (in days).
- **MDAY:** Total running time of the controller (in days).
- **SW:** Software version of the system.
- **SW-M:** Controller software version.

Solar Pump

The solar pump starts when the rooftop collector temperature (T1) exceeds the cylinder bottom temperature (T2) by the set differential (e.g., 8°C). It stops when the difference falls below the reduced differential (e.g., 6°C).

Checking Hot Water Temperature

The T3 reading, taken at the cylinder's midpoint, indicates the likely temperature of water above this point. For the most accurate hot water

temperature, check T4 (top of the cylinder), which reflects the water exiting to your taps.

Note: In summer, T4 may exceed 60°C, but the temperature-reducing valve (anti-scalding device) ensures water at the taps is limited to 55°C for safety.

Holiday Mode

To activate Holiday Mode when going on vacation, press and hold the Holiday button for 3 seconds until “HDAY” appears on the display with flashing numbers. Use the + or – buttons to set the number of days you'll be away, then press the Holiday button again to confirm. A suitcase icon will appear, indicating Holiday Mode is active. To cancel, press the Holiday button once. This mode disables scheduled heating functions while maintaining essential system operations.

Important: Do not turn off the power to your solar system while you're away, as this may disrupt critical functions.

Manual Heating (boost)

If you run out of hot water, use the Manual Heating button to heat water as a one time boost. Follow these steps:

1. Press the Manual Heating button. The temperature will flash on the control panel display.
2. Use the + or – buttons to select the desired temperature (e.g., 44°C for showering or 55°C for dishwashing).
3. Press the Manual Boost button again to confirm the temperature. A hand icon and a flashing heating element icon will appear on the display, indicating the electric heating element is active. You may also hear a relay click.
4. The system will automatically turn off the heating element when the water reaches the set temperature (monitored by the T3 sensor).

Eco Mode

To disable all scheduled backup heating and smart heating features, press the Eco Mode button. A leaf icon will appear on the control panel display, indicating Eco Mode is active. In this mode, only manual heating is available. Eco Mode is ideal for solar/wetback systems, where the electric heating element is rarely needed, helping to maximize energy efficiency.



Time Heating

Time Heating (THET) activates the backup electric heating element only if the water temperature at the selected sensor (e.g., T3, mid-cylinder) is below the set temperature during specific time periods. This ensures hot water availability while maximising solar energy use.

Overview

Time Heating offers three customizable settings (THET 1, 2, and 3) to suit your hot water needs, such as ensuring 150 litres of shower temperature water by 5:30am. If the “on” and “off” times for a setting are identical (e.g., TH2o and TH2f both at 10:00), that setting is disabled.

Setting Up Time Heating

For systems with a mid element (e.g., in a 300-litre cylinder), use sensor S3 (T3, mid-cylinder). For systems with only a bottom element, use S2 (T2, bottom-cylinder). Follow these steps:

1. Press the Set button twice until THTS appears on the control panel display.
2. If S2 is displayed, press Set to change to S3 (for mid elements), then press Esc to confirm.
3. Press the + button twice to skip past SMT (Intelligent Heating) and reach THET (Time Heating settings).
4. Set TH1o (e.g., 3:30, 42°C) and TH1f (e.g., 5:30, 44°C) using the + or – buttons to ensure hot water by your desired time.
5. Repeat for TH2 and TH3 if needed.

Important: If using a top element, always set THTS to S3 (T3). Setting it to S2 (T2) with a top element will prevent the controller from shutting off the element, as lower sensors cannot detect the heated water above.

THET - Time Heating Settings

- THTS: S3 (uses T3 sensor for mid-cylinder elements)
- SMT: On (Intelligent Heating, see below)
- TH1o: 3:00, 45°C (Time Heating 1 On)
- TH1f: 5:00, 48°C (Time Heating 1 Off)

- TH2o & TH2f: 10:00 (disabled, as on/off times are identical)
- TH3o: 17:00, 50°C (Time Heating 3 On)
- TH3f: 22:00, 55°C (Time Heating 3 Off)

System Requirements

Time Heating and Manual Boost require the controller to be connected to the backup heating element via the HR output and relay (SR802 for elements over 1500W), as shown in the system schematic. If not connected, solar heating will function, but Time Heating and Manual Boost will not. Refer to the Ice Solar installation manual for setup details.

Notes

Ensure the controller’s clock is set to local time to keep Time Heating synchronised. See the ICE81Q controller manual for clock settings

Intelligent Heating

When SMT is on, the system has preset target times and temperatures to ensure the water is at least 50°C by 5:00 PM. It does this by checking every hour from 1:00 PM that the solar has lifted the temperature in the tank to the minimum temperature that would be required to reach 50°C by the end of the day (i.e., starting at 30°C with increments of 5°C every hour). This gives solar gain a chance on days with variable solar conditions due to cloud cover.

Frost Protection

The Frost Protection function (OCFR) automatically activates to prevent freezing in the rooftop solar collector. If the collector’s temperature sensor (T1) drops to 4°C, the solar pump circulates cooler water from the cylinder’s base in short cycles until T1 reaches 5°C.

Set Points

The controller’s set points are optimized for maximum energy efficiency and reliable hot water delivery with your Ice Solar system.

WARNING: Adjusting these set points may reduce system performance or safety. For assistance with advanced settings, contact Ice Solar via email.



LOAD

DTO = 8°C Differential Temperature On:

Solar Pump turns on when T1 (roof) is 8°C hotter than T2 (bottom probe in the cylinder).

DTF = 6°C Differential Temperature Off:

Solar Pump turns off when T1 (roof) is 6°C hotter than T2 (bottom probe in the cylinder).

DTS = 10°C Differential Temperature Start:

Start of incremental pump speed (initiates when 10°C differential between T1 and T2).

RIS = 1.0°C Pump increases/decreases by 10% each time temperature at T1 increases/decreases by 1°C above T2 whilst T1 is also above the DTS set point of 10°C.

SMX = 80°C Maximum operating temperature. Sun symbol appears at Solar Max and collection ceases.

SMAX = S2 Allows SMX to be read from S2 or S3 (i.e., S3 top probe, S2 bottom probe). S2 allows the whole cylinder to heat via solar.

HYST = 2°C SMX deactivated when the selected sensor drops 2°C below SMX.

COL (collector protection)

ECCEM = ON CEM = 130°C: Protects system (e.g., from water/power loss). Complete shutdown if T1 over 130°C.

ECCO = ON CMAX = 110°C Self-cooling keeps the system in check if Solar Max is reached by short cycles.

OCMI = OFF Not required for this system.

OCFR = ON Frost Protection.

CFRO = 4°C Pump on when T1 (collector) drops to this temperature.

CFRF = 5°C Pump ceases when T1 (collector) is raised to this temperature.

OTCO = OFF Not required for this system.

PUMP

ONOF = OFF

PULS = On MINI = 30%, MAXI = 100%.

PSOL = OFF Not required for this system.

PHEA = OFF Not required for this system.

0 - 10 = OFF Not required for this system.

COOL

Advanced heat transfer via a motorized valve or pump to radiator or heat exchanger.

OSYC = OFF

OSTC = OFF

OHDP = OFF

AUX

Auxiliary relay R3 for advanced use. Choice of timeclock (TIME) or thermostat (AH).

TIME = OFF Auxiliary time clock for spare R3 relay. 3 times to choose from.

AH = OFF Auxiliary thermostat. Select S2, S3, or S4 for T2, T3, or T4.

BEEP = OFF Alarm sound for system fault.

MAN

Manual diagnostic to test relays.

R1 = OFF

R2 = OFF

R3 = OFF

HR = OFF

BLPR = OFF Blocking protection for pump/s (e.g., turn ON if minerals are present in water).

OTDI = ON Legionella control.

PDIS = 7 Disinfection monitoring period (days).

DDIS = 60 Disinfection operating time (minutes).

TDIS = 60°C Temperature setting.

SDIS = 01:00 Disinfection start time.



KEEPING NEW ZEALAND GREEN

OPAR = OFF Advanced parallel relay function (R1 and R3 operate simultaneously).

INVE = OFF Inverted parallel relay function (e.g., R3 operates in lieu of R1).

OHQM = OFF Thermal measuring - requires calibration to flow & medium type.

FS Flow rate monitoring.

GFDS - VFS = OFF

FRT = OFF

UNIT Units of measure

TEMP = °C Degrees Celsius or Fahrenheit.

ENEG = 1 kWh (kilowatt hours) or Btu (British Thermal Unit).

RST Reset

RSTP Reset controller to factory settings.

CHQM Reset accumulated thermal energy.

CPT Reset accumulated pump running time.

PASS Password locking adjustment.

PWDN Set password.

PWDG Confirm password.

*If your system is retrofitted to an existing cylinder, please refer to the settings shown in the installer's manual for different types of cylinders.

Manual Circuit Button

Press the manual circuit button on the display to run the R1 pump. It runs continuously for 1 hour.

On Button

Press the On button for 3 seconds to turn off the display.

Press the On button once to manually run the R2 output. If a secondary pump is connected to R2, it will run for 3 minutes.

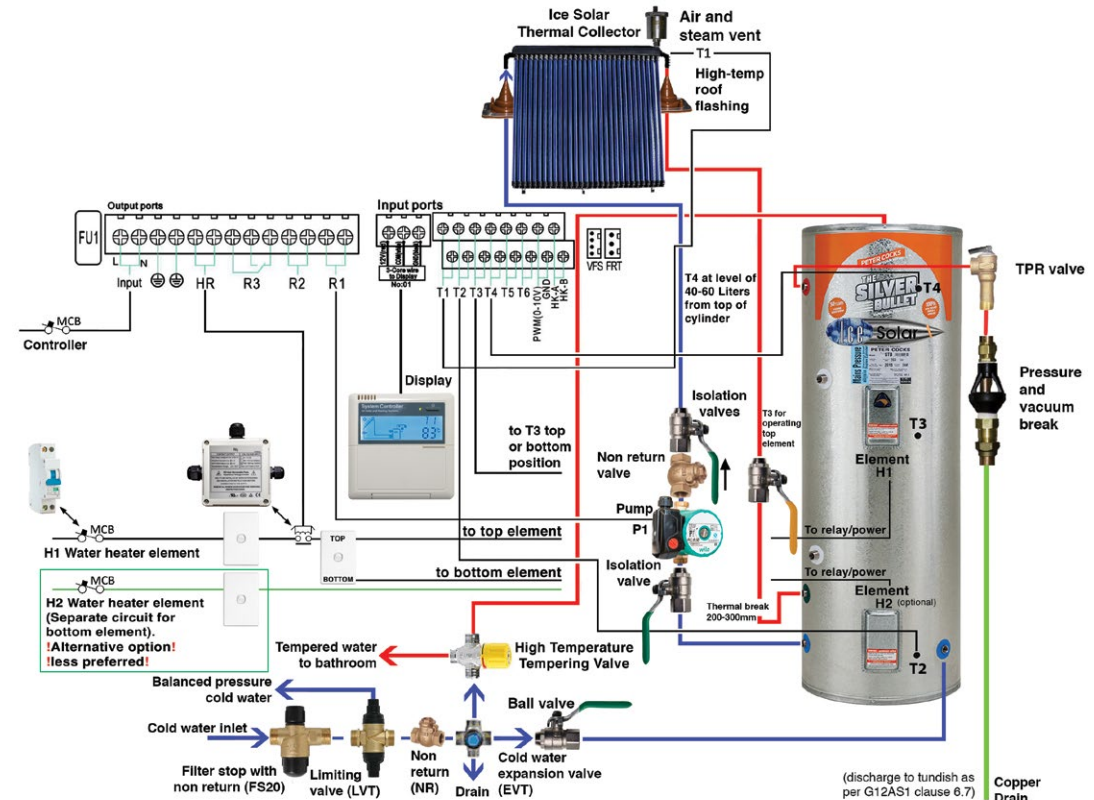
Power Failure

The controller has built-in memory protection for set points.

Troubleshooting

If an error symbol appears, check T values by pressing the + or – buttons. If T values show '---', there is a break or insecure connection in the cable. Rapid fluctuations in T values indicate heat damage or an insecure connection.

Mains Pressure Open Loop Solar System With Electricity



Electrical supply is required for effective operation of this system and for extra protection against freezing and overheating. Electricity supply should not be turned off to the controller at anytime. Use Holiday function when not in use. For extended long term periods of non use, ie. during major renovations, or extended terms of vacancy/non-use, the system should be drained before disconnecting power. If regular draining is required (very rare), a drain could be installed on the solar circuit, to accommodate this requirement.

We value your feedback and love seeing photos from our customers! At Ice Solar, we're genuinely interested in how your solar system is performing and your experience with it. Please share your thoughts, photos, or any questions with us.

Send your feedback to info@icesolar.co.nz.

Energy Star Warranty

- **Solar Thermal Collectors:** 10-year performance; 7-year manufacturing.
- **Pumps & Controllers:** 2-year manufacturing warranty.
- **Mains Pressure Hot Water Cylinders:** 7–10-year manufacturing warranty, applicable to Energy Star certified systems (as per the manufacturer's guarantee).
- **Low & Medium Pressure Hot Water Cylinders:** 5-year warranty (as per the manufacturer's guarantee). Note: These cylinders are not applicable for Energy Star systems or warranties.
- **Elements and Thermostats in Cylinders:** 1-year warranty (as per the manufacturer's guarantee).

Ice Solar products have been tested by Applied Research Ltd to meet Australian and New Zealand standards. In the unlikely event that a solar thermal collector shows a material or manufacturing defect or performance degradation within the warranty period, you can claim under the Ice Solar Ltd guarantee, in addition to your legal rights against your supplier.

This guarantee applies only to solar thermal collectors supplied by Ice Solar.

Product Guarantee

Scope of the Product Guarantee

Ice Solar Ltd guarantees product performance for 10 years, as detailed in the Performance Warranty section of this document.

If a material or manufacturing defect occurs within 7 years for solar thermal collectors (or 2 years for pumps and controllers), you can submit a claim to Ice Solar Ltd. The guarantee covers the following components: frame, glass, evacuated tubes, manifold, and other parts supplied as part of the solar thermal collector (as invoiced by Ice Solar Ltd).

The guarantee does not cover defects caused by improper handling, product modifications, incorrect installation, operational errors, or third-party influences (e.g., environmental damage).

The guarantee period begins on the date of purchase from Ice Solar Ltd. Any reimbursement or replacement under this guarantee does not extend the original guarantee period.

Poor water quality may void this warranty. If your water contains high mineral content, we recommend testing it for compatibility with copper (solar components) and stainless steel (mains pressure cylinders).

Guarantee Claim Process

Ice Solar Ltd will fulfil guarantee obligations by providing a free of charge replacement for the defective solar thermal collector, at our discretion. Costs for dismantling or reinstallation are not covered.

The guarantee excludes claims for lost profits, compensation, consequential damages, or replacement of products not covered under this guarantee.

Performance Warranty

This performance warranty covers only degradation losses in the solar thermal collector and does not apply to other defects.

Scope of the performance warranty

If the performance of the solar thermal collector falls below 80% of the minimum output value specified in the Performance Data within 10 years from the date of purchase from Ice Solar Ltd, we will, at our sole discretion and insofar as we determine the degradation affects the evacuated tubes, glass, or film, validate the heat loss using standard measurement devices under standard test conditions (e.g., AS/NZS standards). If confirmed, Ice Solar Ltd will repair or replace the collector or provide additional evacuated tube heat pipes to compensate for the loss in heat generation. This warranty applies only to fixed installations and excludes mobile applications (e.g., on vehicles or boats).

Exclusions from the warranty

This performance warranty does not cover losses caused by improper handling, operational errors, or third-party influences. Specifically, it excludes:

- Faulty system components, mounting systems, fittings, or accessories supplied or installed by others.
- Damage to controllers from water, external electromagnetic interference, power surges, or similar events beyond the controller's reasonable capacity.
- Installation by untrained or unqualified personnel.
- Pairing Ice Solar collectors with incompatible components.
- Incorrect system design, configuration, or mounting.
- Faulty connections, installation, or handling during setup.
- Operation in unsuitable environments or methods that deviate from specifications, operating manuals, or labels.
- Inadequate maintenance, testing, or damage from external forces (e.g., glass breakage due to impacts, flying objects, vandalism, theft, or civil unrest).
- Soiling effects on the front glass from smoke, salt, chemicals, or other contaminants.
- Use on mobile units such as ships, boats, or vehicles.
- Natural disasters or forces (e.g., earthquakes, typhoons, tornadoes, floods, lightning strikes, snow, avalanches, mudslides, insects) or other unforeseeable events.

Scope of Coverage

Ice Solar Ltd does not cover costs for removal, reinstallation, customer conducted tests, or other indirect expenses.

Making a Claim to the Product Guarantee or Performance Warranty

To submit a claim, provide proof of purchase (showing the date), the exact model name, and details of the defect or degradation. Send your claim in writing to info@icesolar.co.nz within the applicable warranty period. Include a copy of the receipt. Ice Solar Ltd will not accept returns of solar thermal collectors without prior written approval.

Periodic Maintenance and Fault Finding

To ensure proper system operation and maintain your component warranty, perform maintenance according to the guidelines below.

Common Faults and Troubleshooting

- **Pump Not Operating:** If the controller's pump indicator is flashing (indicating the pump should be on) but the pump is not running, check the power supply to the pump. If it still doesn't work, contact a solar technician.
- **Power Surge:** The controller may reset to factory settings after a surge. Reset it to the set points provided in this manual for proper system protection and operation. We recommend installing surge protection.
- **Power Outage or Water Disruption:** The rooftop temperature may exceed emergency protection settings, causing the system to shut down to prevent overheating in the lines upon restoration. The system will reset overnight as it cools. For water line disruptions, bleed air from the solar pump:
 1. Turn off the pump.
 2. Loosen the silver bleed screw on the pump body until water drips out.
 3. Open the TPR (temperature and pressure relief) valve on top of the cylinder to release air (this may cause banging noises).
 4. When the noises stop and water flows freely from the TPR valve, close it and tighten the bleed screw until the dripping stops. This removes airlocks.
- **Airlock in Solar Line:** This can cause the pump to burn out and is often indicated by banging noises in the cylinder. Follow the bleeding procedure above.
- **Error Symbol on Display:** Check temperature values (T values) by pressing the + or – buttons. If values show '---', there is a cable break or loose connection. Rapid fluctuations indicate heat damage or an insecure connection.

Annual Maintenance

- Wash off dirt and debris from the collectors if needed.
- Ensure drains are free of obstructions.
- Check solar panels for shading (e.g., from trees or buildings).
- Verify thermal and pressure relief valves operate correctly.
- Check the tempering valve for proper water temperature delivery.
- Inspect for worn seals around the solar panel.
- Examine cables to thermocouple sensors for secure connections and good conductivity.
- Review temperature differentials and controller set points.
- Test the electrical relay and electric heating elements.
- Inspect the pump for leaks and bleed any airlocks.

Every 3 Years

- Inspect the entire system and connections for leaks.
- Check for deterioration in insulation and lagging.

WARNING: Evacuated glass tubes are fragile when removed from the solar collector. Handle glass with care and use appropriate safety measures (e.g., gloves, safety harness) when accessing the roof. Hazards from slipping, falling, or broken glass could result in serious injury. We recommend professional assistance for roof work.