Geyser wise

intelligent energy control

GeyserWise Dual

Thermostat instruction manual

SANS 181 compliant

All in one hot water management

Before operating and installation, carefully read all instructions. Do not discard this manual.

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WARRANTY CONDITIONS APPLY:

1. We, GeyserWise CC, warrant to you that, for a period of six months from the date of purchase, the GeyserWise Dual in one Hot Water Management System (the "good") will be free of any defect.
2. If any defect in the good is discovered by you within six months from date of purchase, you can return the good to our service centre or to one of our duly authorised service agents. We will then, at your option -
    1. repair or replace the good; or
    2. refund to you the price paid by you for the good.
3. A good returned under this warranty must be presented to us in its original packaging together with all accessories.
4. We will refuse the return of any good which has been -
    1. partially or wholly dissembled;
    2. physically altered;
    3. used in a manner contrary to any instructions provided by us; or
    4. permanently installed or attached and/or combined with other goods or property in any way.
5. We will not -
    1. repair the good where the defect or damage to the good is found to be a direct result of your negligence, recklessness or malicious behaviour; and/or
    2. be liable for damage caused to the good as a result of wear and tear unless such damage manifests itself -
        1. within 12 months from date of purchase (where the good has been used for normal family, personal or household purposes); or
        2. six months from the date of purchase (where the good has been used for commercial or professional purposes).
6. Where we issue a refund under this warranty, we will deduct the charges we are allowed to deduct under the Consumer Protection Act, No 68 of 2008.

BY SIGNING BELOW, YOU ACKNOWLEDGE THAT YOU HAVE READ AND UNDERSTOOD ALL THE TERMS AND CONDITIONS CONTAINED IN THIS WARRANTY.

Signed at _____ on _____

COMPONENTS

Control box

The control box is the brain of the system. It performs all the programmed functions and sends instructions to the pump and the element.

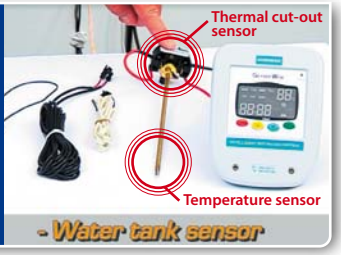
Display unit

An array of useful information can be displayed. This includes the temperature of the water in the geyser, the temperature in the collector, whether the pump is running or not, when the element is on, actual hours of electricity used, etc.

Water geyser sensor

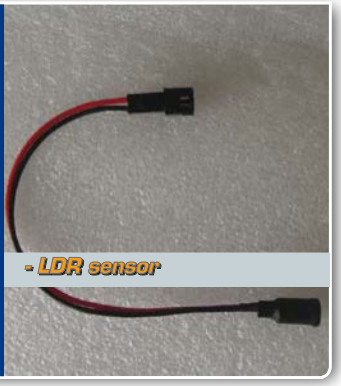
The water geyser sensor measures the temperature in the geyser and acts as a thermostat.

The temperature sensor for the thermostat in the stem-type thermostat is in the last 2cm of the stem. The sensor for the thermal cut-out is in the first centimetre of the stem of the unit.



LDR sensor (Light Dependant Resistor)

The LDR measures the quality of light outside. If the quality of light is good then the element will switch to DC mode in which case the water will be heated making use of the PV panels. When light conditions are poor the element will switch to AC mode in which case water will be heated making use of normal 220V electricity.



ABOUT THE GEYSERWISE

Application

GeyserWise Dual is suitable for installation on electric geysers and GeyserWise Photovoltaic waterheating systems.

When installing the GeyserWise be sure to follow the appropriate instructions of each particular manufacturer for all other components as well:

- Installation of geyser.
- Installation PV panels.
- Installation of MPPT controllers.

Installation

Installation, maintenance and dismantling may only be performed by trained personnel in accordance with this instruction manual and safety instructions.

Use the GeyserWise only after first thoroughly reading and understanding this instruction manual and the safety instructions. In the event of any ambiguities regarding the installation and operation, consult trained personnel or contact our offices.

Technical information

- Operating voltage 230VAC / 50HZ.
- Main relay contact rating 20AMP (**Max 3kW element**).
- Operating voltage range 160V - 250V AC.
- Control circuit 5.5 - 12VDC.
- Earth leakage protection at 25mA action time ≤ 0,1 second.
- Recommended ambient temperatures: -20 to 55°C; Max 75°C
- Temperature range 0 - 200°C ("-5" when below -5°C).
- DC on at set light value up to 75°C.
- DC differentail between 3 - 7°C (control DC element in on or off state).
- 230 VAC temperature setting ranges 30 - 65°C.
- 230 VAC heat failure - when increase at a rate of 4°C or less per hour.
- Mechanical thermal cut-out 90°C (300 manual resets).
- Thermal cut-out - Isolate live.
- Dry heat detection - empty cylinder.
- Temperature tolerance ± 5°C and manufacturing drift is less than 6°C.
- Temperature differential setting 1°C.
- 230 VAC switching differential for the element 6°C.
- LDR sensor for light detection.
- LDR settable 150 - 200 value.
- Temperature probe failure detection for tank.
- Temperature probe range for geyser is -30 to +130°C.
- Light level 1 range 0 - 200.
- Isolate both L + N when element in an off state.
- ⧈ Control box insulated - Class 1.
- Operating life - 50 000 cycles.

Improper usage

The GeyserWise must not be operated in the following environments:
- Outdoors.
- In damp rooms.
- In rooms in which the operation of electrical and electronic components may be dangerous.

Dangers during installation

- Risk of death by electrocution.
- Risk of fire due to short circuit.

Be sure to follow the below instructions:
- All work on an open GeyserWise must be performed with the mains supply disconnected.
- All safety regulations apply when working on the mains supply.
- Before connecting the GeyserWise, make sure that the power supply matches the specifications on the type plate.
- Factory labels and markings may not be altered, removed or rendered unreadable.
- Make sure that all devices which are connected to the GeyserWise conform to the technical specifications of the GeyserWise.

Exclusion of liability

The manufacturer cannot monitor the compliance to this manual as well as the conditions and methods during installation and operation. Improper installation of the system may result in damage to the property and, as a result, in bodily injury.

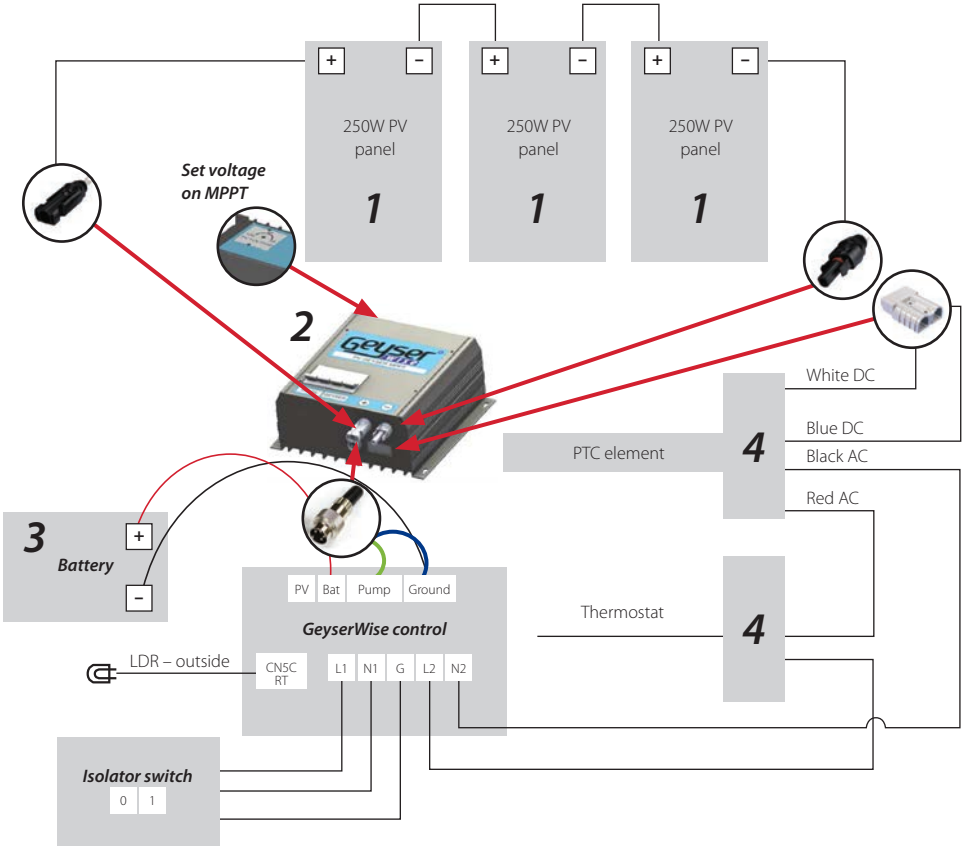
Therefore, we assume no responsibility for loss, damage or costs which result from or are in any way related to incorrect installation, improper operation, incorrect execution of installation work and incorrect usage and maintenance.

Please note that our normal warranty does not cover any natural disasters, for example:
- Flooding
- Lightening
- Earthquakes

The manufacturer reserves the right to make changes to the product, technical data or assembly and operating instructions without prior notice.

GEYSERWISE PV GEYSER MPPT

PV system connection diagramme to retrofit 150L. Also available for 100L and 200L geysers.



Installation procedure steps

A summary of the installation steps are as follows:

1. Apply all safety measures.
2. Install the control box.
3. Install the display unit.
4. Remove existing thermostat and replace with new supplied thermostat.
5. Install LDR sensor.
6. Complete all electrical connections.
7. Set up the controller and all settings.

STEP 1: Apply all safety measures

An installer should always take precautions when working with electricity.
The most important safety precautions to perform BEFORE doing any maintenance on a geyser are:

1. **Switch off circuit breaker** of geyser at main DB. This is done to ensure that there is no power supply to the geyser.

2. **Switch off isolator switch** in the roof. The isolator switch acts as a switch to isolate both live and neutral from the main supply should someone accidentally switch on the main supply or the circuit breaker fails.

3. **Test with a MULTIMETER** to ensure that there is no current on the wires. **IMPORTANT!** Make sure that there is no reading on the multimeter.

STEP 2: Install control box

Find a dry place near the isolator switch. **The control box must not be exposed to the elements!**

STEP 3: Install the display unit

The display unit must be installed in a location that is accessible to the end user, but not in reach of children that might want to play with it.

The display unit provides valuable information on the functionality and status of your hot water system.

Draw the display unit cable from the unit to the control box. Plug it into the three pin plug as provided on the control box. It can only fit into one plug.

The standard display cable of 5m is supplied. Extension cables are available on request from our offices. A maximum extension of 20m is recommended.

Only use GeyserWise extention cables for extensions!!!

STEP 4: Remove thermostat and replace with supplied geyser temperature probe

The geyser's thermostat needs to be removed. The geyser temperature probe provided by GeyserWise has a built in probe that measures the temperature in the geyser. It also supplies information to the element whether it should switch on or not.

The GeyserWise geyser temperature probe incorporates a thermal cut out to prevent electrical overheating. The live feed to the element will be broken at temperatures above 90°C. When the cut out switches off, it needs to be reset manually by pressing the red button on the thermal cut out.

1. Remove the existing thermostat by disconnecting all the wires on the connector terminal block of the thermostat.

2. Replace the conventional element with the GeyserWise AC/DC element as per the AC/DC element instruction manual and the wiring diagram on page 5.

3

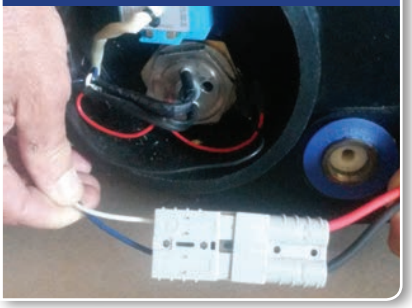
Ensure that you insert the geyser temperature probe into the correct pocket.

4

Insert the new geyser temperature probe and connect the live wires once again on the connector terminal block.

5

Plug the DC part of the element into the MPPT Connector Cable as supplied

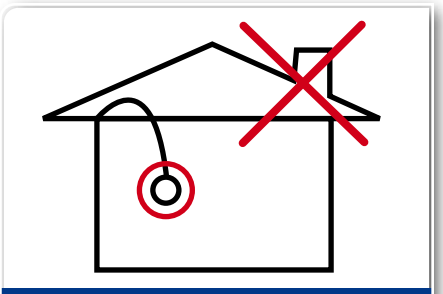


6

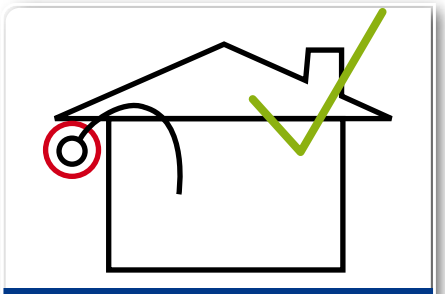
Push the plug connected to the geyser temperature probe through the hole as provided on the geyser.

Plug it into the dedicated plug as provided on the control unit.

STEP 5: Install the LDR sensor



Do not install inside.



Install outside.

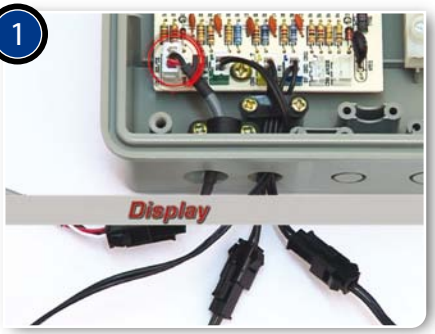
The function of the LDR sensor is to detect the quality of light outside.

You will be supplied with an extension cable. Do not use any other extension than the extension cable provided.

Plug the LDR sensor into the control box at the dedicated port.

Connections on control box summary

1



2

3

STEP 6: Complete all electrical connections

The hard wiring of a controller is critical.

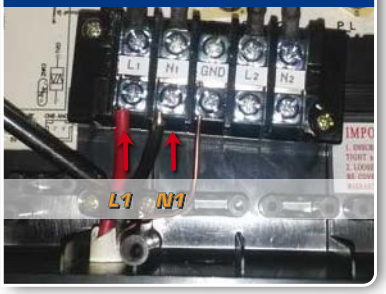
Main power supply
The main power supply is provided from the isolator switch.

- The **Red** wire is your **Live** wire.
- The **Black** wire is your **Neutral**.
- The other wire provided is your **Earth**.

Each control box has knock outs at the bottom of the unit. To make an entry into the control box, just remove the knock out.

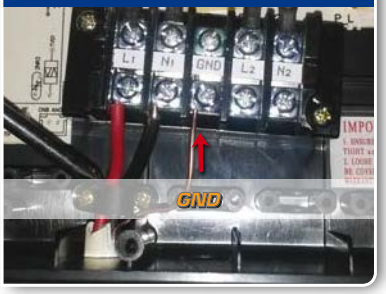
1

Connect Live and Neutral as indicated. Ensure that the wires are properly fastened as they are drawing a large current. Loose connections can damage the connector block.



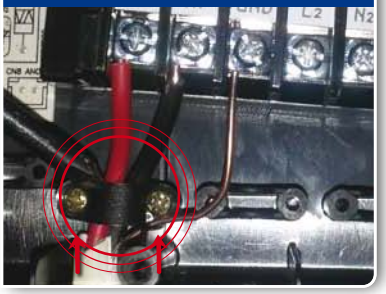
2

Connect Earth wire as indicated



3

Fasten all connections with the cord grip and screws as indicated to ensure that the wire cannot be moved.



Connect wire between controller and geyser

Note: Ensure that a wire is used that complies with the requirements of SANS 10142.

1

Connect Live and Neutral as indicated. Ensure that the wires are properly fastened as they are drawing a large current. Loose connections can damage the connector block.

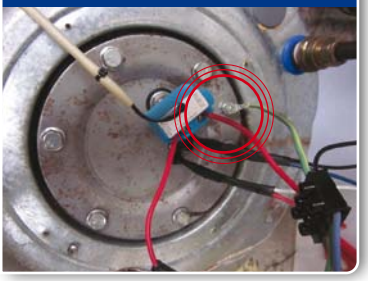
2

Connect Earth wire as indicated.

3 Fasten all connections with the cord grip and screws as indicated to ensure that the wire cannot be moved.

4 Connect wires to geyser's connector block.

5 Ensure the geyser is earthed as indicated (in case the geyser needs to be earthed).



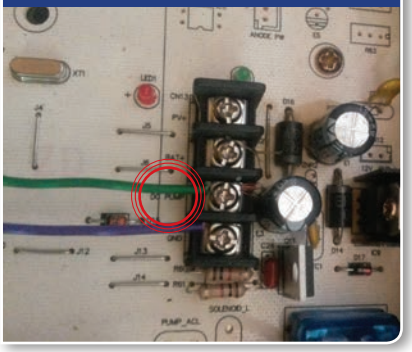
6 Replace cover of geyser to protect the electrics.

MPPT CONNECTION

Connect MPPT positive to DC pump and negative to ground.
Connect positive to DC pump and negative to ground.

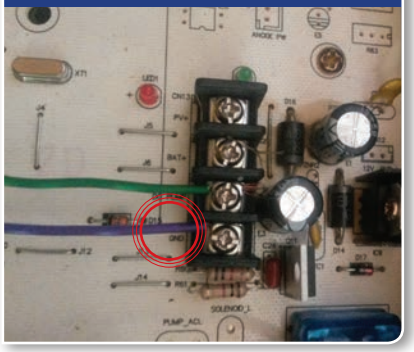
1

MPPT Positive



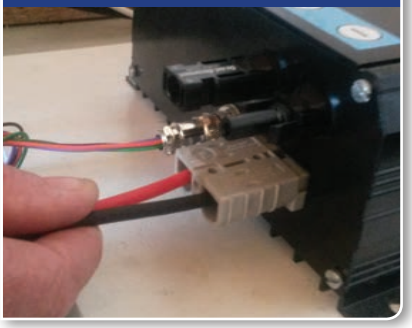
2

MPPT Negative



3

Plug MPPT connector cable into the MPPT



Replace lid on control box and fasten properly.

Before you replace the lid it is important to do a final check on the electrics by comparing it to the wiring as indicated on the lid.

Power up system

1. Switch on main supply at DB board.
2. Then switch on power at isolator switch.

DISPLAY

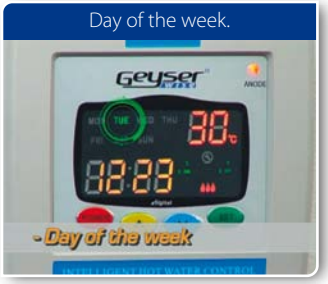
The display is the feedback mechanism to the user and displays important information about the solar system or electric geyser.

It displays the following:

Geyser temperature.

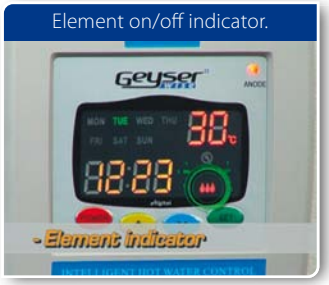
LDR reading (press up and down arrows simultaneously once). In case of Pumped solar system only.

Day of the week.

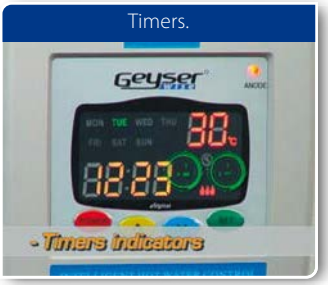


Real time clock.

Element on/off indicator.

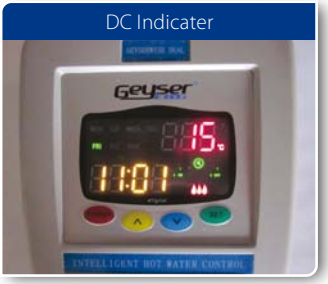


Timers.



Error messages.

DC Indicater



Adjusting the day of the week

To adjust the day of the week, follow the steps below:

1. Press the green set button until the day of the week flashes.

2. Adjust the day of the week by using the **∧** and **∨** arrow buttons.

Adjusting the real time clock

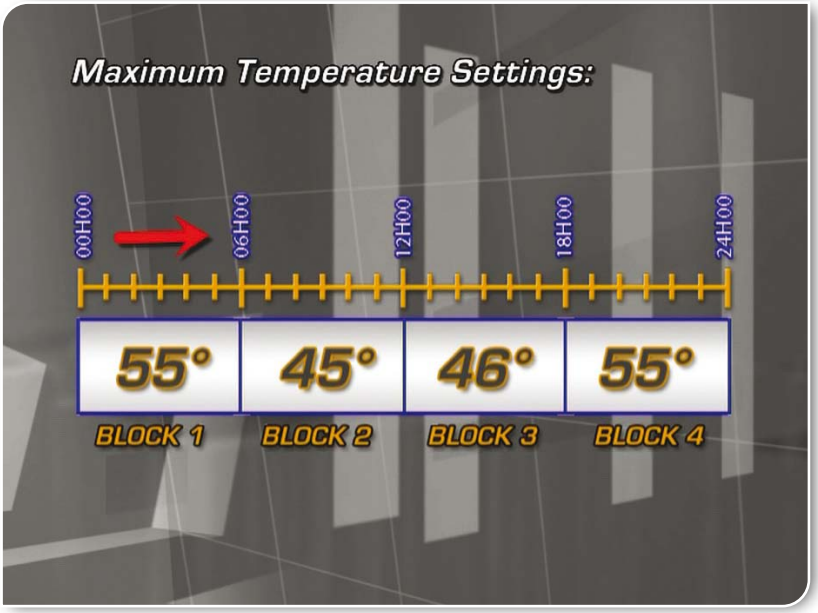
To adjust the real time clock follow the steps below:

1. Press the green set button until the time flashes.

2. And set the hours to your requirement. Press the green set button immediately after setting the hours to get to the minute counter. Set the minutes according to your requirements by using the **∧** and **∨** arrow keys.

Maximum temperature settings

There are four maximum temperature settings. It is important to note that these settings apply to the four quarters of the day and not to the set times that the elements must come on.



1. To adjust the maximum temperature settings, press the green set button until the first block temperature setting is displayed. The temperature will be flashing and the number of the block will be displayed in the timer indicator block. The below screens show the temperature flashing in block number 1.

2. Set the temperature per block to user requirements by using **∧** and **∨** arrow keys.

Setting LDR reading

1

Press the green set button until three digits display in the temperature display.

2

Set the LDR reading to your requirements using the **v** and **^** arrow keys. Available readings 150 - 200.

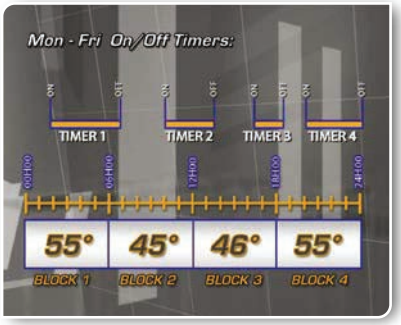
Setting DC temperature

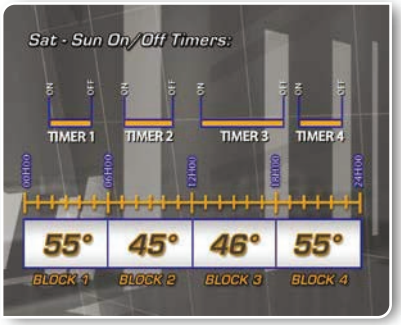
1

To adjust the DC maximum temperature setting, press the green set button five times. The DC temperature and word "on" will flash on the screen. Use the **^** and **v** buttons to adjust the temperature.

Setting geyser element timers

There are four on/off timers that can be set with the GeyserWise. Note that you can set different timers for the weekend.





To set timer number one, follow the steps as indicated below:

1. Press the green set button until the timer indicators and Monday to Friday flashes. The below picture shows that you are at the Monday to Friday setting for timer number 1 on.

2. Adjust the hours you require by using the **Λ** and **V** buttons. Immediately press the green set button again to get to the minutes and use the **Λ** and **V** buttons to adjust the minutes.

3. To set the number 1 off timer, press the green set button until the timer indicators and Monday to Friday flashes. The below picture shows that you are at the Monday to Friday setting for timer number 1 off.

To get to the weekend timer setting press the green set button until the timer indicators and Saturday and Sunday flashes.

4. Adjust the hours you require by using the **Λ** and **V** buttons. Immediately press the green set button again to get to the minutes and use the **Λ** and **V** buttons to adjust the minutes.

Follow the same steps as above for timer 2, 3 and 4.

Eliminating a timer

It is possible to eliminate a timer setting. To eliminate a setting follow the below steps:

- Press the down arrow button until the timer setting reaches 00:00.
- Press the down arrow once more to eliminate until --:-- is displayed.

Follow the steps on page 41 with on and off setting.

Element indicator

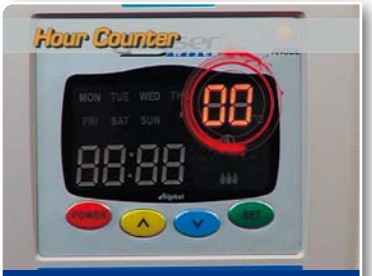
The element indicator shows the user when the element is switched on.

When the element indicator is on, it means that the element is switched on.

When the element indicator is flashing, it means the water has reached the maximum temperature setting and the water will be allowed to cool down 6°C at which time the element switches back again.

Hour counter

The number of hours that the element was on can be counted. If the user pushes the up and down arrows simultaneously and keep them in for 6 seconds, the number of hours will be displayed.



For example: Let's say the hour indicator indicates 30 hours. You then multiply the number of hours with your geyser element rating, e.g. 4 kW. This then means that the user consumed 120 kWh since the last time the unit was reset.

To reset the hour counter, keep the up and down arrow buttons in simultaneously until the main time settings reappear.

ERROR CODES - SUMMARY

The error codes indicate various problems and warnings. Therefore these require actions from the installer.

Error code: E00 - When two middle buttons pressed together

Possible cause:

LDR Sensor not connected

Action(s):

Check the LDR sensor

Error code: E1 - Earth leakage

Possible cause:

Faulty element or earth leakage (more sensitive than normal household earth leakage).

Action(s):

Element needs to be replaced - contact our office or qualified person to replace the element.
(More information on page 21)

Error code: E2 -Dry burn protection

Possible cause:

Empty cylinder
Thermal pocket too close to element

Action(s):

Check all water connections to the geyser
(More information on page 21)

Error code: E3 - Sensor failure water geyser

Possible cause:

The sensor could be damaged or there is a connection problem

Action(s):

Replace sensor
Check electrical connections and/or plug in control unit (More information on page 7)

Error code: E4 - Heating loss

Possible causes:

- Leaking hot water pipe
- Faulty valve
- Scale build up
- No power supply to the element
- Reversed thermosiphoning
- Faulty heating element

Action(s):

Check all of the above
(More information on page 22)

Error code: E5 - Over temperature protection

Possible cause:

Geyser temperature exceeds 85°C

Action(s):

Open hot water tap to reduce temperature in geyser
(More information on page 23)

Error code: E6 - Water leak

Possible causes:

- Leaking geyser
- Valves leaking
- Overflow leaking

Action(s):

Check all connections
(More information on page 23)

Error code: E7 - Communications failure

Possible cause:

Poor contact or damaged cable

Action(s):

Check communications wire between control box and display unit (More information on page 23)

E00 Error code: When two middle buttons pressed together

When two middle buttons are pressed LDR sensor not connected.

Possible cause

LDR Sensor not connected.

Remedial action

Connect LDR sensor.

E1 Error code: Earth leakage

Please note that the geyser element will not work during an E1 error code. First try to reset the unit by switching the geyser off at the DB board and then switching it back on after 3 seconds. If the error persists, follow the steps below.

Possible cause

Earth leakage fault on the element.

Remedial action

- It's recommended that you contact an electrician or GeyserWise technician to deal with the E1 error code.
- The following steps should be taken by the electrician or technician. PLEASE DO NOT DO THIS YOURSELF.
  1. Switch off mains power to geyser (DB board and isolator switch).
  2. Remove the live and neutral wire from the element.
  3. Use a multimeter to measure resistance between element and earth. There should be no reading (open circuit). If there is a reading, the element is down to earth and needs to be replaced.

E2 Error code: Dry burn protection

Please note that the geyser element will not work during an E2 error code. First try to reset the unit by switching the geyser off at the DB board and then switching it back on after 3 seconds. If the error persists, follow the steps below.

Possible cause

Empty cylinder due to:

- Geyser is empty due to work on main water supply.
- The thermal pocket too close to the element.

Remedial action

- Make sure there is water in the geyser by opening a hot water tap.
- If the geyser does have water in it, get a technician to check the thermal pocket is pulled away from the element (DO NOT DO THIS YOURSELF).
- Note that a red copper element could suffer damages in case the tank is empty.

E3 Error code: Sensor failure water geyser

Please note that the geyser element will not work during an E3 error code. First try to reset the unit by switching the geyser off at the DB board and then switching it back on after 3 seconds. If the error persists, follow the steps below.

Possible cause

The sensor to the geyser is damaged or not connected properly.

Remedial action

Get a technician to check the connector, wiring and geyser probe to ensure all wires are intact and connections made properly as per this instruction manual.

E4 Error code: Heating loss

Possible cause

An E4 error code occurs when the element is switched on and heats at a tempo of less than 4° in an hour - considerably less than what would be expected. This means that the element is not working to capacity or a heat loss is occurring somewhere. This could lead to using a lot more electricity than would be expected. The heat loss could occur for various reasons:

- No power supply to element.
- Element failure.
- Leaking hot water pipe.
- Pipe work not installed correctly.

The E4 error code is based on the specific heat equation. How long should it take a body of water to be heated from one temperature to another higher temperature? For example:

If a 150 litre geyser filled with cold water (20°C, say) is switched on, how long will it take a 3kW element to heat the water to 65°C? The basic equation is:

Q = mc(T2-T1)/3600

where: **Q = energy in KWh needed to raise water temperature from T1 to T2**
m = mass of water (Kg); = 150 in this case
c = specific heat of water (4.19 KJ/Kg/ C)

Therefore Q can be calculated as 7.85kWh, and a 3kW element will take 7.85/3 = 2.6h to bring the geyser's water up to 65°C.

In the above equation it takes a 3kW element 2.6 hours to heat 150 litre of water by 45 degrees. On average 17.4°C per hour.

Based on this equation we went to look at the requirements in the ESKOM rebate programme regarding sizes of elements and tanks, values given below.

Recommended element ratings are as follows that are used in the programme may not exceed a power rating of:

- 1kW for a system between 50 litres and 99 litres.
- 2kW's for a system between 100 litres and 250 litres.
- 3kW's for a system between 251 litres and 350 litres.

Based on the equation,

- A 1kw element on 99 litres should heat at a tempo of 9° per hour.
- A 2kw element on a 250 litre tank should heat at a tempo of 7° per hour.
- A 3kw element on a 350 litre tank should heat at a tempo of 7° per hour.

Remedial action

- Switch off mains to geyser at DB board for 3 seconds.
- Switch the geyser back on at the DB board.
- Press the red power button on the GeyserWise to switch on element.
- You should see at least 1°C temperature rise in 20 minutes without any water withdrawals.
- If you still get an E4 error code please contact our offices for further advice.

E5 Error code: Over temperature protection

Please note that the geyser element will not work during an E5 error code. First try to reset the unit by switching the geyser off at the DB board and then switching it back on after 3 seconds. If the error persists, follow the steps below.

Possible cause

Geyser temperature exceeds 85°C

Action(s)

Open hot water tap to reduce temperature in geyser

E6 Error code: Water leak

Please note that the geyser element will not work during an E6 error code. First try to reset the unit by switching the geyser off at the DB board and then switching it back on after 3 seconds. If the error persists, follow the steps below.

Possible causes

- Leaking geyser
- Valves leaking
- Overflow leaking

Action(s)

Check all connections

Remedial action

Check if there is any water in the drip tray under the geyser. If there is any water, dry the drip tray and water leak detector. The source of the water should be investigated.

E7 Error code: Communication failure

Please note that the geyser element will not work during an E7 error code. First try to reset the unit by switching the geyser off at the DB board and then switching it back on after 3 seconds. If the error persists, follow the steps below.

Possible cause

Poor contact or damaged cable

Action(s)

Check communications wire between control box and display unit

HOW TO PREVENT LOOSE CONNECTIONS ON THE TERMINAL BLOCKS

From time to time our installers experience burnt terminals blocks due to connections not tightened properly when the unit is installed.

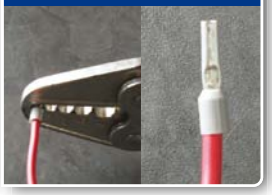
The terminal blocks used in GeyserWise are rated at 41 Amp 750 volt with temperatures rating of 140°C.

It is very important that the connections are tightened properly when the unit is wired up and the below steps illustrate how to prevent any loose connections. There are two methods that can be used - the Boot Lace Ferrule Method and the Fold Back Method.

Use of Boot Lace Ferrule Method

Boot Lace Ferrule Method.

1. Crimp Ferrule on 2.5mm² wire.



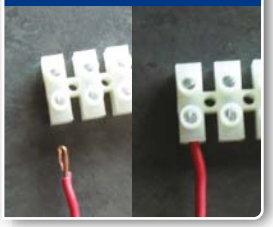
2. Now connect onto the GeyserWise.

Use of Fold Back Method

1. Strip of wire 20mm.

2. Fold back wire on itself.

3. Insert into connecter block and tighten properly.



Please note: Regulations require that a minimum of 2.5mm² wire is used.

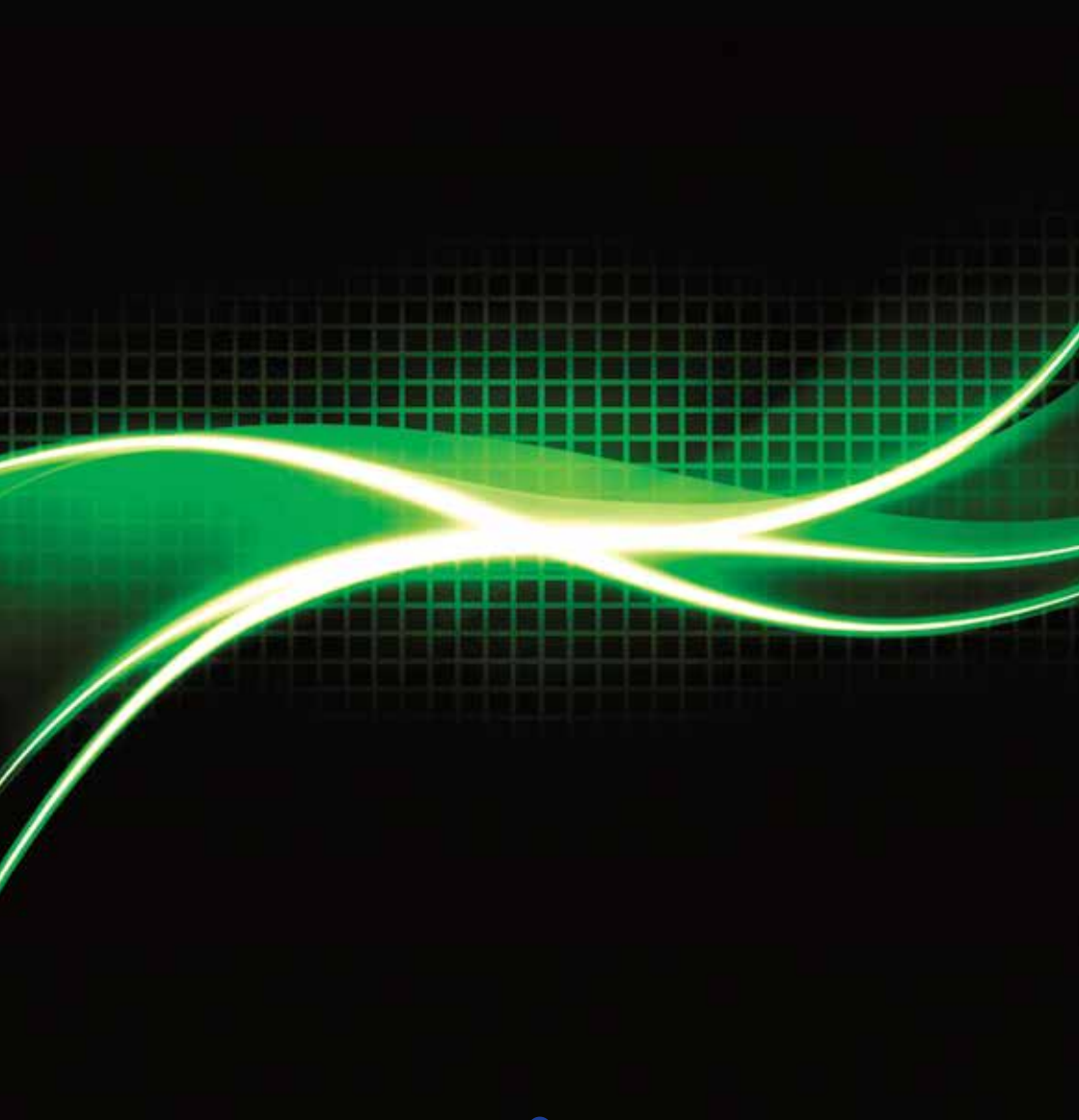
ALWAYS TIGHTEN ALL CONNECTIONS ON THE TERMINAL BLOCK PROPERLY.

Leaking hot water pipe - check the water meter if no taps are open.

Reverse thermosiphone in case of a pumped solar system - at night if the element is on and the collector temperature rises, you have reverse thermosphon on the solar system.

Scale build-up on the element can also cause water to heat up slower than expected.

To reset the E4, switch off geyser at the main distribution board for three seconds and switch on again. The E4 will now be reset. Press the power button to switch on the element. If you gain no temperature in the geyser for 15 minutes, investigate the possible causes as above and contact our offices for further assistance.



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