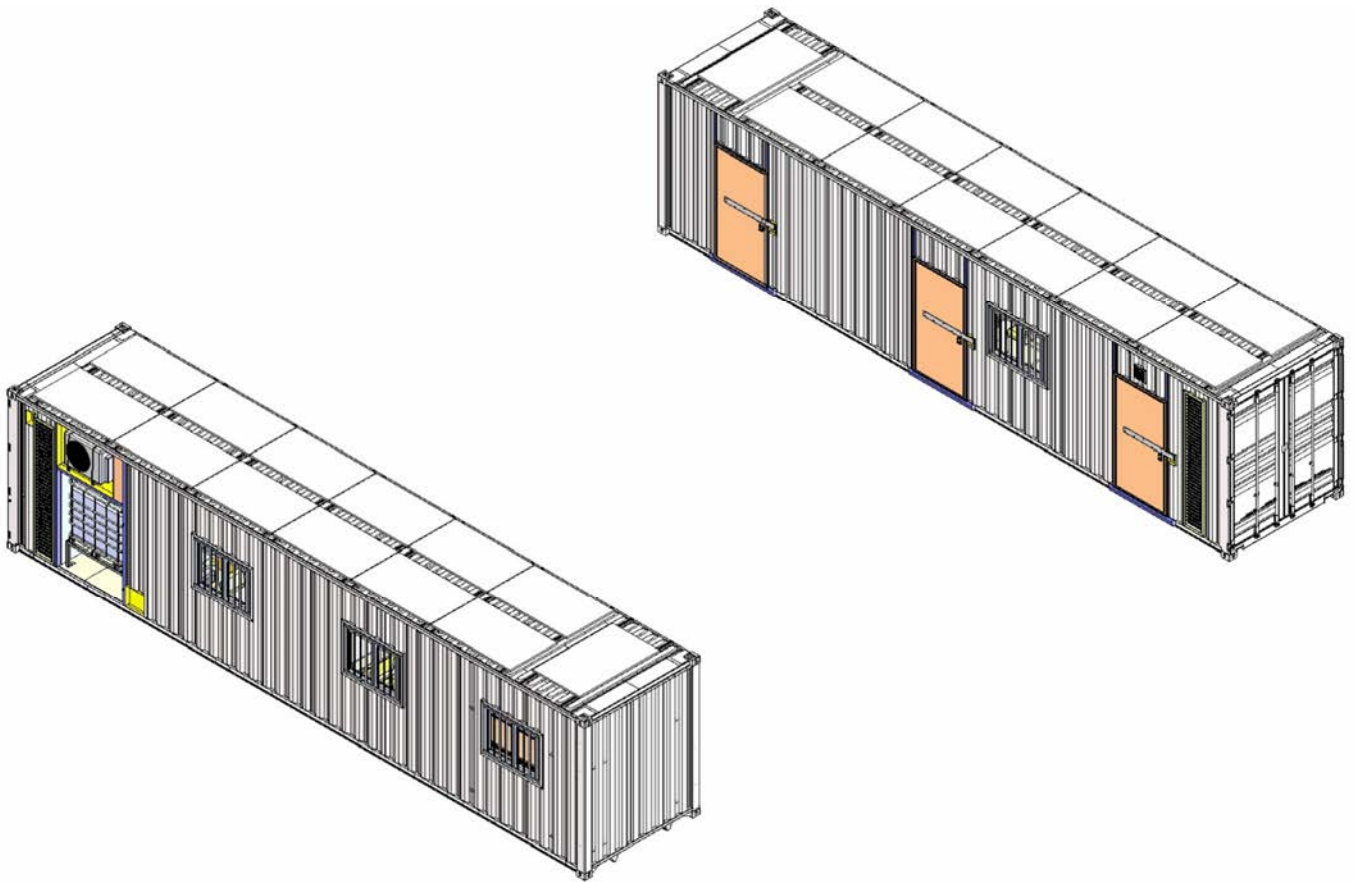


# Royal Wolf Site Hub – Installation, Operation and Maintenance Manual

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0	31/03/2023	Approved for Use	MB/GT/DG	DG	DG
1	07/07/2023	Minor updates	DG	-	-
2	28/05/2024	Generator details / firmware update / troubleshooting	DG	MB	GT



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## 1 Introduction

Royal Wolf is committed to providing the highest standards of product, quality, and service. We consider maximizing the life of our products and minimising your maintenance costs during operation as an important part of this commitment. This manual contains useful information intended to provide guidance when inspecting or maintaining your Royal Wolf containerised building.

The Royal Wolf Solar Site-Hub has been developed to be a low maintenance off the grid solution for customers. The Site hub is completely powered by renewable energy and requires no onsite connection to have a fully airconditioned air-conditioned office or lunchroom. The Site Hub is a perfect fit for remote site businesses such as infrastructure projects and any other projects that require a robust and versatile solution for remote/restricted access business undertakings.

## 2 Features

The Site-Hub is a sustainable and environmentally friendly solution, powered entirely by renewable energy. It is fully air-conditioned for use as an office or lunchroom without the need for any onsite connections. The Site-Hub has been designed to be versatile and robust, with the ability to withstand harsh weather conditions and maintain a comfortable indoor temperature. Some of the features installed include:

- 1000ltr potable water storage
- Instantaneous hot water
- 306L Fridge / Freezer
- Stainless Steel Cabinetry
- Grey water tank
- General electrical outlets
- USB charging station
- Large capacity chemical toilet
- 5.4kw of Solar Panels
- 20kWh of battery storage
- 3.5kW Air-conditioner
- Lockable storage area with shelving
- High insulation ratings for all walls, floors, and ceiling

## 3 Transport and Handling

### 3.1 Preparation for Transport

The preferred method of transport for the Site Hub is via a side-loading prime mover. It is also possible to use a 40ft super tilt if required.

The Site Hub is suitable for rail when the CSC plate is present (note not all models have a CSC plate).

Approximate tare weight dry is 7100kg.

Ensure all doors are secured using the PAD locks or similar device through the locking bar on the right side of the door.



Ensure all items such as doors, windows, shutters, and contents are secured for transport. Liquid containing units such as hot water systems should be drained. Amenities must be drained and flushed prior to collection.

### 3.2 Handling, Lifting and Placing in Storage

When handling and lifting the Site Hub please be aware of the following:

- The Site Hub can only be double stacked when double corner casts are placed at the corners to protect the solar panels
- Before lifting ensure all water tanks are empty including the potable water IBC, the grey water tank under the sink and the toilet wash water and waste water tank.
- No Tyne forklifting is permitted.
- Lift via crane is to be done from the bottom corner casts, ensuring all rigging is completed without damage to the unit and equipment, especially the exposed solar panel on the roof.

## 4 Site Installation

### 4.1 Building Installation

The Site Hub should be installed and secured by an approved contractor in accordance with the applicable regulatory authority, and any law, by-law, and Australian Standard.

It is important to take review and inspect after building installation, and periodically thereafter, the foundations, counterweighting and ties attached to your containerised structure. Regular inspections will highlight incidence of damaged, dislodged foundations and allow time for repair.

Guidelines for installation:

- To ensure the best performance please ensure the Site Hub is installed on level flat ground. This ensures that doors are free to move within their door jams.
- The use of hardwood sole boards to level the unit will be suitable in most applications. However, if engineered footings are required, please contact your Royal Wolf representative.

## 5 Energy System - Solar Panels with Batteries

The Site Hub is a completely off the grid product. All electricity consumed from this container is generated by 13 x 420W solar panels and stored in the battery storage.

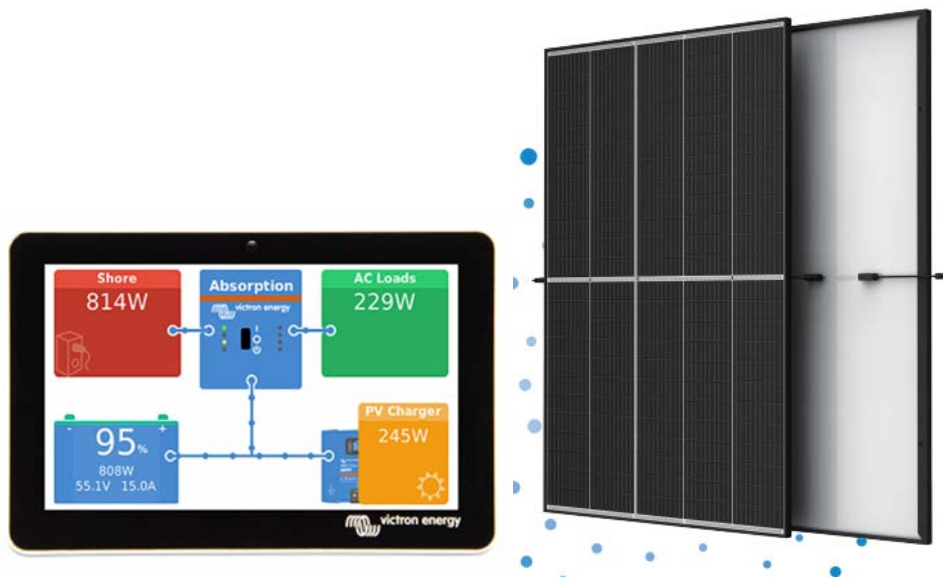
The system has undergone in-house testing to understand the limits and capabilities of the system and limitations of the system when poor weather prevails.



For the startup procedure please refer to the Start Up Guide.

With the container positioned with full sun exposure on the solar panels. The system has the capability to run for 5 days in poor weather conditions. The run time under these conditions can be extended by minimizing the use of the aircon or to run the AC at a maximum of 22 degrees.

A touch screen display is installed to communicate live information on battery charge, AC loads and Solar generation. This feature assists customers to understand energy consumption of the system and allow them to monitor their own usage.



Should the solar system require a firmware update, RW should be contacted to do this. The procedure for this update is listed in the link below and is completed using the VictronConnect software which is available for Android, iOS, Windows, and macOS.

[https://www.victronenergy.com/media/pg/VictronConnect\\_Manual/en/introduction.html](https://www.victronenergy.com/media/pg/VictronConnect_Manual/en/introduction.html)



## 6 Start-up Guide

### 6.1 Solar Powered Electrical System Start-up Guide

When you receive the Site hub, locate the container so that the solar panels on the roof receive full sun.

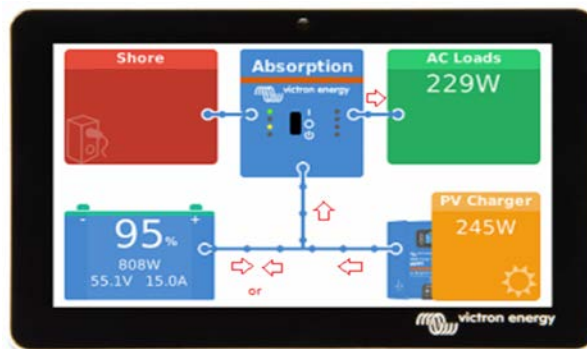
The service bay behind the container doors contains the battery and solar system. A decal on the wall will have a quick start-up guide with the following:

1. Switch on Battery Isolator 1 and Battery Isolator 2
2. Turn on Solar Isolator 1
3. Open the service room distribution board and switch the three switches in
  - Mains/Genset: Turn off (in the down position)
  - Solar Switch Position 1: Turn on (Switch in the up position)
  - Sub Board: Turn on (Switch in the up position)
4. After these switches are turned on. The inverter will have a light displaying that the inverter is on.

Inside the container there is a distribution board located near the stainless-steel kitchenette. Turn on all switches inside the distribution board.

At this point the container should have power. Please turn on all appliances inside the container's main room and turn on the water pump inside the potable water storage room (only if the IBC is filled with water)

Located next to the distribution board there is an LCD display. This will show you the power consumption, battery charge percentage and solar energy generated. Feel free to touch and swipe across to show the different displays. When you have the display at the screen below. The flow of energy/ battery percentage should be displayed as shown below.



How to read this display:

- The PV Charger is the number of watts generated from the solar panels.
- The AC Loads is how much energy the container is using. You will see this number shift as you turn appliances on and off.
- If the PV Charger value is higher than the AC Loads value. The solar panels are generating more energy than the container is using, and all the additional energy created will charge the batteries.

## 6.2 Mains Power / Generator Connection Guide

If the container has been in poor weather condition for longer than a week or the container has been located where the solar panels will no longer receive full sun, the container will have to be connected to a generator or mains power. The connection point is located in the service room labelled as Mains.

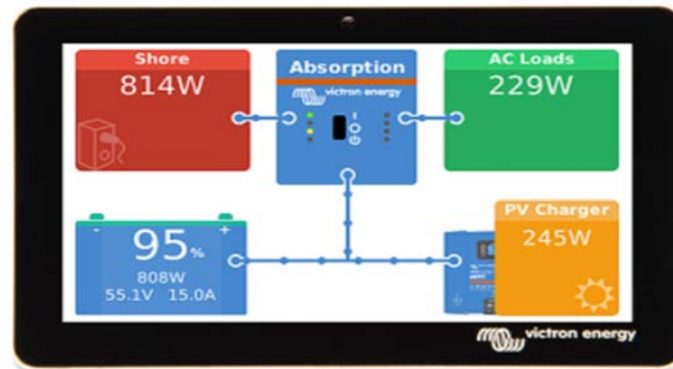
Power supply will be by max 8kVA generator or mains power lead through a 32 AMP single phase socket.

To ensure that the power connection is charging the batteries please ensure the steps below have been followed. Open the service bay located behind the container doors which contains the battery and solar system. A decal on the wall will have a quick Mains connection/ generator connection guide with the following:

1. Switch on Battery Isolator 1 and Battery Isolator 2
2. Turn on Solar Isolator 1
3. Open the distribution board and switch the three switches in this position:
  - Left switch Mains/Genset: Turn on (in the up position)
  - Central switch position 2 main genset: Switch in the down position
  - Right Switch Sub Board: Turn on (Switch in the up position)
4. After this has been completed you can plug in your 32 AMP single phase lead into the mains/generator connection plug.



To check that the container is receiving power from the generator or mains power, check the display inside the container for this display. The square in red will display the power generated by the power connection.



With this setting the energy consumed will be using a combination of solar and power connection to power the container and charge the batteries.

### 6.3 Plumbing System Startup

When the Site hub is received the Stiebel Eltron hot water system, and the Zip Instantaneous water boiler will be unplugged. Do not plug in these appliances until the steps below have been completed.

Fill the IBC with potable water.

1. Turn on the pump switch. Located under the IBC
2. Plug in Stiebel Eltron and set temperature to ECO mode
3. Plug in the Instantaneous Zip Water Boiler
4. Located under the stainless-steel sink between the wall and grey waste tank is a valve. When this valve is opened the grey waste tank will drain externally to the container.
5. Turn on the taps and test the hot and cold water. Test the Zip water boiler.

### 6.4 Pre-use Quick Checks

Please ensure:

- The water tank is full.
- The water pump is on and supplying water to the sink.
- The toilet water tank is full.
- The Zip/Birko is in the off position
- The Stiebel is in the off position (under sink)
- Check that water is pumping through the system by turning on the sink mixer tap.
- After water is confirmed, turn the ZIP/Birko water heater and the instantaneous hot water system (Siebel) on and run water for at least 30 seconds

## 7 Solar System Final Shutdown Procedure

When shutting down the Site Hub in preparation for transit and de-hire, the following process must be followed.





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## 7.1 Shutdown and Isolation of Battery/Solar system

The service bay behind the container doors contains the battery and solar system. A decal on the wall will have a quick start-up guide with the following:

1. Switch off Battery Isolator 1 and Battery Isolator 2
2. Turn off Solar Isolator 1
3. Open the service room distribution board and switch the three switches in
  - Mains/Genset: Turn off (in the down position)
  - Solar Switch Position 1: Turn to neutral (Switch in the central position)
  - Sub Board: Turn Off (Switch in the up position)
4. In the main room distribution board turn all switches off (in the down position)

## 7.2 Plumbing System

When the Site hub is received the Stiebel Eltron hot water system, and the Zip Instantaneous water boiler will be unplugged. Do not plug in these appliances until the steps below have been completed.

1. Empty and dispose of the IBC. Please leave all the plumbing connections in the potable
2. Turn off the pump switch. Located under the IBC
3. Unplug the Stiebel Eltron
4. Unplug in Zip Water Boiler, and lever the tap unit the internal tank is empty
5. Drain the grey wastewater tank.

## 7.3 Secure All items.

Ensure all doors are secured either using the PAD locks and on the right side of the door, or secure with the locking bar.

# 8 Site Hub Features, Operation and Maintenance

## 8.1 Need for Regular Maintenance Inspections

Regular building maintenance is good sense because it allows identification of potential problems early and allows preventative maintenance to stop a small problem from becoming a major issue that can affect your building, your equipment & furniture and even the people who work in it.

## 8.2 Type of Inspection

Regular maintenance inspections are a simple, straightforward process that cost no more than a little time. Virtually all the common maintenance items can be detected visually.

The following items should be inspected prior to every deployment:

- Solar panel attachments – check that they are secure
- Check components are secure in the service bay
- Pressure test plumbing and check for leaks
- Electrical test and tag
- Royal Wolf container survey as per operational standards



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### 8.3 Potable Water Storage Tank

The 1000ltr IBC is installed new for every hire (single use only) and is to be replaced prior to the next hire. Little or no maintenance is expected for this item apart from a visual check for leaks.



Note the IBC is to be filled with potable water only. Please remove the IBC from the stand prior to de-hire.



### 8.4 Pressure Pump - Premium REEFE PRJ80E

The pressure pump supplies potable water from the IBC to the instantaneous hot water system, the ZIP boiler and the cold water line for the mixer tap in the kitchenette sink. It has the following features:

- High suction capability up to 6m
- Certified to AS/NZS4020 for use with potable water
- Superior Carbon Ceramic Mechanical seal for durability
- Automatic pressure controller automatically checks for water every 24 hours after a run dry event.
- Quick-plug connection on pressure controller
- Max water Temperature – 50 °C
- Max Ambient temperature - 40 °C



CODE	20579	MODEL	PRJ80E
AMPS	4.5	WATTS	550
RATED FLOW	31 L/min	RATED HEAD	24m
MAXIMUM FLOW	75 L/min	MAXIMUM HEAD	48m
SOFT SOLIDS		OUTLET (mm)	25
CABLE LENGTH	1.5m	SIZE (mm)	400 x 180 x 390
WEIGHT	9.6 KG		

The pressure pump and connected pressure piping should be inspected for leaks particularly on startup and after relocation (transport) of the Site Hub.

### 8.5 95L Grey Water Tank

A grey water tank is located under sink to collect and store waste (grey) water from the kitchenette sink. This unit has a normally closed ball valve to enable discharge of the grey water outside to a safe location. The discharge line can be plumbed to a main drain.



#### 8.5.1 Periodic Service and Maintenance

- If plumbed to main drainage, please ensure the ball valve is in the open position (red handle is in line with pipe)



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- If utilizing the waste tank, please ensure the ball valve is positioned in the closed position (red handle is 90deg to the pipe)
- Wastewater must be discharged to a council approved waste management facility or an appropriately licensed contractor.
- After emptying fill sink with clean water and flush tank.

## 8.6 Instantaneous Hot Water System

An instantaneous hot water system is fitted under the kitchenette sink and supplies hot water to the sink mixer tap.

This unit is a the STIEBEL ELTRON SNU 5 under sink open vented water heaters deliver hot water quickly to a single sink. This point of use water heaters eliminate long runs of pipework for isolated sinks and reduce the waiting time for hot water to arrive at the outlet. They are conveniently installed directly underneath the sink and must be fitted with specialised open vented tapware.



The Stiebel has been set on ECO mode at 60 Degrees Celsius. This setting will use the least amount of energy to preserve the battery for as long as possible. It is not recommended that you change this mode.

Visual maintenance inspections for leaks should be undertaken periodically.



Maintenance and repairs must be carried out by a qualified plumbing contractor or contact your Royal Wolf representative to arrange for assistance.



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## 8.7 Zip Hydroboil Plus

In addition to the instantaneous hot water system, a Zip Hydroboil hot water boiler is fitted above the kitchenette sink. This unit has the following features.



Red lever and spout available mid 2009

New electronic Zip Hydroboil Plus:  
the most energy-efficient instant boiling water system yet

The graphs below compare typical energy usage for a variety of boiling water systems

- All tests were conducted by Aston University, Department of Engineering Systems and Management.
- The results show weekly power consumption based on a working week from 9am to 5pm Monday to Friday.
- The figures exclude any provision for water draw-off. Each 167ml cup drawn off would add 0.016kWh.
- Power consumption from instant boiling water systems is based on continuous operation except where noted otherwise.
- 2hr Sleep Mode = 7 day test with sleep mode effective 7pm to 9am Monday-Friday and all day Saturday and Sunday.
- Timed Mode = 7 day test using integral timer to power OFF 5pm to 9am Monday-Friday and all day Saturday and Sunday.

### New Electronic Zip Hydroboil Plus

Electronically controlled instant boiling water system.

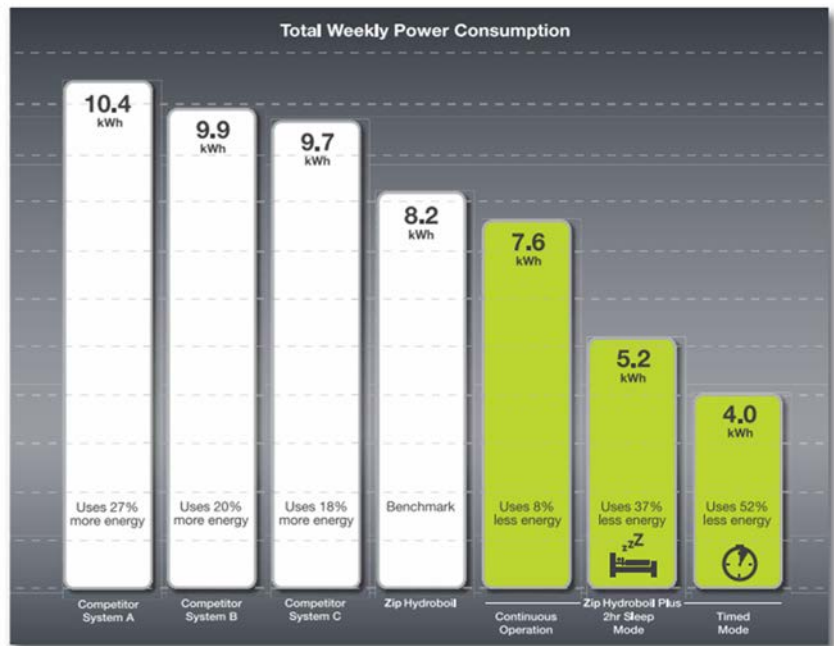
Capacities 3.0 and 5.0 and 7.5 litre.  
Cups at a time 18, 30 or 45.  
Recovery rate 100 cups/hr (3.0 litre).  
Recovery rate 140 cups/hr (5.0 & 7.5 litre).

New cool touch two-way safety tap.  
Fingertip control for filling cups.  
Tap locks ON to fill pots hands free.  
Safety lock with combined finger and thumb operation, where needed.  
Lock indicator on display panel.  
Variable boiling temperature control.  
Temperature factory set to 98°C.  
Touch-panel function setting.

Twin chamber boiling technology.  
Stainless steel boiling chamber.  
Simple to service tank with removable access ports top and bottom.  
New energy saving Power-Pulse™.  
Sleep mode when idle 2 or 4 hours.  
Sleep mode when lights go out.  
Integral 24hr 7 day timer.  
Filter change indicator (where needed).  
White or stainless steel case.

Two year warranty.

On-site parts and labour.



Visual maintenance inspections for leaks should be undertaken periodically. (Note it is normal for the unit to discharge minor amounts of liquid from the drain pipe).



Maintenance and repairs must be carried out by a qualified plumbing contractor or contact your Royal Wolf representative.



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## 8.8 Stainless Steel Kitchenette

A stainless steel kitchenette with bench and shelf is permanently fitted to the Site Hub. The following instructions from the manufacturer detail appropriate care and maintenance.

# CLEANING

## METHODS & RECOMMENDATIONS


*While stainless steel is a highly-durable material, there are a few simple tips to keeping it clean and in tip-top condition. Well maintained stainless steel will last for decades.*

**General Cleaning Methods**

1. **Polish or brush with the grain of the stainless steel.**  
*This will help to diminish marks or scratches.*
2. **Day to Day Cleaning** - mild detergent and cloth or soft brush  
*(no bleach). Make sure you rinse with clean water and wipe the surface dry. Harsh bleaches can permanently ruin any stainless steel surface. Detergent is fine. Specialist stainless steel cleaners are fine, but largely unnecessary.*
3. **Deep Clean** - for a really intense clean, use methylated spirits or turpentine and then rinse with clean water and dry.  
*Follow up with light rub of olive oil and polish with soft cloth.*
4. **Tea and Coffee Stains** - Soak the affected area with boiling water and baking powder. Then rinse with fresh water and dry.
5. **Rust Marks** - We recommend using a proprietary stainless steel cleaner (such as a phosphoric acid). Please handle with care and ensure you rinse with clean water and dry carefully.
6. **Limescale** - Soak in boiling water with 25% vinegar solution, rinse well with baking powder solution and then rinse with clean water.
7. **Paint** - Paint stripper or turpentine, with nylon brush. Rinse well with fresh water and dry.

**General Tips:**

- ⊗ Do not use steel wool brushes or scourers which have been used on ordinary steel as these will damage the stainless surface and allow rust to form.
- ⊗ Don't use concentrated bleach, hydrochloric acid or any cleaning chemical that has Chlorine. Chlorine is a corrosive chemical for all types of stainless steel.
- ⊗ Don't scrub against the grain of the steel.
- ✓ Do use a soft cloth and follow these guidelines for years of great stainless steel!





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### 8.9 Large Capacity Fridge Freezer

A large capacity 240VAC fridge freezer is fitted to each site hub. Typically, this unit is a LG GB-335PL (or equivalent) fridge freezer with 306 litre total capacity and is 595mm width, 1720mm high, and 677mm deep. It has a 4.5-star energy rating, a right-hinged door, and a stainless-steel finish.

Care and maintenance simply involve cleaning and defrosting if necessary.



### 8.10 Air Conditioner

The site hub is highly insulated and fitted with an energy efficient Mitsubishi Heavy Industries 3.5kw 240VAC reverse cycle split system air conditioner. The condenser for this unit is installed in the utility bay above the IBC. Details for operation and maintenance of this unit can be found online using the model numbers listed below.

Maintenance instructions are listed in the tables and diagrams in the following pages.



Indoor		<b>SRK35ZSA-W (DXK12ZSA-W)</b>	
Outdoor		<b>SRC35ZSA-W (DXC12ZSA-W)</b>	
Power supply			1 Phase 220~240V 50Hz
Capacity	Cooling T1	kW	3.5 (0.9~4.4)
	Heating H1		3.7 (0.9~5.4)
Refrigerant R32	Quantity	kg	0.75
	Pre charged to pipe length	m	15

Basic operational practices should be followed:

- After turning the unit off, wait two or three minutes before restarting. If you attempt to restart before this time, you may find the compressor will not start, or the circuit breaker may trip.
- Do not change the TEMPERATURE quickly backwards and forwards. This could cause the compressor to turn off and then try to start too quickly and may blow a fuse.
- Keep windows and doors shut as much as possible. This improves the efficiency of the air conditioner.
- Inspect the filter regularly, as a dirty filter does not allow the air to flow properly, reducing performance of the air conditioner.

#### 8.10.1 Cleaning the filter

- Remove the filter and hand wash in warm water with detergent.
- Do not wring out.
- Allow the filter to dry before replacing.



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### 8.10.2 Air conditioner troubleshooting

Before you call for service, please check that you have done these things as failure to carry out the below could result in callout charges.

Problem	Possible cause	What to do
Air conditioner has no power.	<ul style="list-style-type: none"> <li>Power point not on or plug not in.</li> </ul>	<ul style="list-style-type: none"> <li>Switch on power.</li> <li>Check power with small appliance.</li> </ul>
The air conditioner does not start after being adjusted or turned off.	<ul style="list-style-type: none"> <li>No power at power point.</li> <li>Attempt made to restart a/c too rapidly.</li> <li>Temperature was changed quickly in one direction then another.</li> </ul>	<ul style="list-style-type: none"> <li>Turn the selector knob to "off."</li> </ul> <p>Wait 5 minutes.</p> <ul style="list-style-type: none"> <li>Turn the machine on and slightly turn the temperature knob &amp; wait for temperature to change.</li> </ul>
Air conditioner does not heat or cool as fast as it did previously.	<ul style="list-style-type: none"> <li>Windows are open.</li> <li>Dirty air filter.</li> <li>Air moving around unit is restricted.</li> </ul>	<ul style="list-style-type: none"> <li>Close the windows.</li> <li>Clean the air filter.</li> <li>Clean leaves, soot dust on outside coil, clear space around outside coil.</li> </ul>

### 8.11 Chemical Toilet

A hygienic chemical toilet is fitted within in a private ensuite of the site hub. This is a Merlin unit with the following specification.



#### MFT3 Fibreglass Internal

- White fibreglass internal
- Base size 900mm wide x 790mm deep
- 180L waste tank – 360 uses approx
- 70L fresh water tank
- Heavy duty marine flush pump – Chimp I
- Polypropylene bowl and stainless steel flap

#### 8.11.1 Periodic Service and Maintenance

- Lift the toilet lid and add Chem blue or other equivalent toilet chemical directly into the waste tank with approx. 5lt of water to activate chemical. (Chemical can be purchased from Toilet Service suppliers or Caravan/Camping outlets)
- Ensure Drain bung is screwed into water tank and is firm then unscrew 125mm cap on top of water tank shelf and fill tank with water to approximately 75mm below cap and then secure cap firmly. (Tank holds approx. 110lt of water)
- Operate Flush pump to check operation and check drain bung for any weeps or leaks.
- Recommended Servicing and Pump out Intervals – 6-12 People once per fortnight, 12 -20 people once per week, above 20 twice per week. Pump out and servicing is done by local contractors or regional councils but note that some contractors or councils will only pump waste and do not refill water reservoirs, supply chemical or paper or clean the toilet.



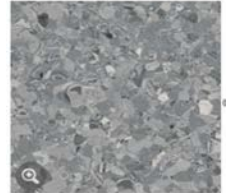
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- At demobilisation of the Site Hub waste tank must be pumped and flushed out and the water tank emptied prior to pick up by Truck.

### 8.12 Floor Coverings

The Site Hub floor has been covered with 2mm Homogeneous vinyl flooring – Colour Smokestone.

Using a static mop or vacuum will remove dust, dirt and debris and regular damp mopping or scrubbing will remove most marks and the wear of daily use.



Hints...

- When using detergents always ensure that manufactures dilution rates are adhered to.
- Products with high 'pH' levels (above 10.0) should be neutralised after use.
- Black heel marks can be removed from the surface with fine steel wool.
- Always use clean equipment.
- Spot mopping / spot scrubbing should be used when necessary.

### 8.13 Walls Internal

Your Royal Wolf containerised building may include any one of several different internal finishes. Cleaning with a domestic product such as detergent, non-abrasive and crème cleansers (when applied with a cloth or a sponge) will keep your interior walls clean. Internal finishes other than specified wash down areas are not waterproof. You should avoid the excessive use of water to wash down walls.

For most surfaces, your internal finishes should not need to be painted or replaced, provided that regular cleaning and care is maintained.



Strong abrasive cleaners should be avoided.



Royal Wolf recommend that you do not penetrate the internal cladding, to avoid contact with electrical wiring within the walls or ceilings.

### 8.14 Windows

Four large windows are installed in the site hub. Regular maintenance should be undertaken as follows:

- Window seals should be inspected to ensure that they are tight and weatherproof. Replacing damaged seals can prevent the potential problem of water seepage. Windows can be cleaned inside and out with domestic glass cleaner.
- To prolong the life of internal window tracks, Royal Wolf recommend they be dusted and vacuumed periodically.

### 8.15 Doors

Two Personnel Access (PA) doors are fitted to the main living area and one door to the toilet. There are also utility doors and container doors present.





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Regular inspections of all external doors and mechanisms are recommended. Check that all safety mechanisms are working correctly. Problems with these components can lead to reduced security, possible weather damage or reduced degree of safety in evacuations.

External doors can be cleaned with the same process as external walls. Be careful to ensure doors and windows are closed when cleaning externally to avoid water entering the building.

Regularly inspect and remove dust from doors, frames and, where applicable screens or roller door tracks. Also regularly inspect door hinges magnets and locking assembly.

Before opening doors, please ensure that you push the door lever to enable easy opening and prevention of lock damage.

### 8.16 Walls External

Regular cleaning will assist in protecting the exterior walls of the building from corrosive or harmful environments. External walls can be cleaned with water and mild detergent.

Your normal Royal Wolf colour coated finish requires little attention other than regular cleaning and inspection. The exterior walls should not require painting unless scratching, vandalism, or impact damages the surface.

Regular inspections of the structure will assist in the early detection of damage leading to the entry of dust, water, or other contaminants such as pests, termites, ants & other vermin.

- Periodically inspect exposed fixings.
- Check for corrosion or mechanical inadequacy.

If problems are detected during your inspection process, immediate repair to the affected areas is recommended.

### 8.17 Solar panels

Cleaning of the solar panels will be required to ensure that the panels can work to capacity. Failing to do so can reduce the capacity of power system built into the container. Cleaning intervals are determined by the site location and subsequent dirt build up. It is recommended that a weekly visual inspection is carried out to observe the amount of dirt build up and cleaning scheduled accordingly.

#### 8.17.1 What is the best way to clean your solar panels?

The best solution for cleaning is a combination of water and a mild soap or a cleaning solution specifically designed for photovoltaic panels.

- Rinse the panels with water to remove loose dirt and debris.
- Mix a cleaning solution of water and a bar of mild soap, such as dish soap, or a specialised solar panel cleaning solution.
- Apply the cleaning solution to the panels with a soft cloth or squeegee.
- Use a soft-bristled brush to gently scrub away any stubborn dirt or debris.
- Rinse the panels thoroughly with water to remove all cleaning solutions and soap residue.
- Use a clean, soft cloth to dry the panels.



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### 8.17.2 What should you not do when cleaning solar panels?

When cleaning solar panels, it's important to avoid certain practices that can damage the panels or reduce their efficiency:

- Don't use abrasive materials or chemicals: Scratches or damage to the panels can reduce their ability to absorb sunlight and generate electricity. Avoid using abrasive materials, such as scouring pads or wire brushes, and harsh chemicals that can damage the panels.
- Don't clean the panels on a sunny day: Cleaning the panels when they are hot can cause the cleaning solution to evaporate too quickly, leaving streaks or residue on the panels. Clean the panels on a cloudy day or in the shade.
- Don't use high-pressure hoses or gurneys: High-pressure water can cause damage to the panels and their seals, reducing their efficiency and potentially causing water damage to the electrical components.
- Don't walk on the panels: Walking on the panels can cause physical damage, reducing their efficiency and potentially voiding the manufacturer's warranty.

Source: <https://www.originenergy.com.au/blog/cleaning-your-solar-panels/>

## 8.18 Inspection Records

Royal Wolf recommend records are maintained to show the frequency and details of inspections. Records should be kept of any repair work. An inspection record card is included at the end of the maintenance manual. This card may be used to record safety and maintenance inspections.

With branches throughout Australia and New Zealand, our personnel are available for professional advice. There is also a comprehensive Royal Wolf website that provides general information regarding Royal Wolf and our products and services.

In Australia, visit [www.royalwolf.com.au](http://www.royalwolf.com.au) or phone 1300 651 700.

In New Zealand, visit [www.royalwolf.co.nz](http://www.royalwolf.co.nz) or phone 0800 266 824.

## 9 Fire Safety

Smoke alarms and mounts for fire extinguishers are installed.

### 9.1.1 Maintenance of smoke alarms

Regular maintenance of smoke alarms may save lives.

- Smoke Alarms should be tested regularly by operating the test button.
- Clean the grille area of the smoke alarms once a month using the fine nozzle of a vacuum cleaner or a soft brush.
- Never paint smoke alarms as it will interfere with their operation.
- Replace the smoke alarms' batteries in accordance with manufacturers recommendations.

### 9.1.2 General fire safety for containerised buildings

Ensure a site evacuation procedure has been developed and clearly communicated to all who are using the building.

- Where the building is in a high fire risk area, sprinklers or other fire suppression systems are recommended.



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- Make sure windows and doors are kept clear of obstructions.
- Keep gas cylinders outside the building unless a properly designed storage cupboard has been fitted.
- Turn off all appliances before leaving the building.

## 10 Building services

### 10.1 Electrical

Modifications to the electrics within the Site Hub must not be made. For the safety of yourself and others, a licensed electrician should perform all works. If you would like an electrical modification completed to a hire building, please contact Royal Wolf for an obligation free quote.



All electrical works must be carried out by a licenced Electrician.

Royal Wolf buildings contain concealed electrical wiring located behind insulation panels.

If the building is relocated, ensure connection of power to the building and appropriate testing, is completed by a licensed electrician. Where safety switches are fitted, ensure regular inspection and function tests are performed in accordance with the relevant Occupational Health & Safety Regulations, laws, by-laws and Australian or New Zealand Standards.

### 10.2 Switchboard & Cabling



Always engage a licensed electrician if safety switches or circuit breakers are repeatedly tripping. This may offer evidence of damaged electrical equipment or overload of the electrical system.

Overload can readily occur where multiple high demand appliances are operated simultaneously on one circuit. Periodic checking of the circuit by a licensed electrician can prevent this from happening. Please contact Royal Wolf or your licensed electrician if:

- The usage of the building changes.
- The electrical load, occupancy, or power consumption of your building changes, as this may necessitate a need for increased load capacity.
- The building or electrical cabling is damaged or dislodged.

### 10.3 Safety Switch

Periodically check your safety switch (sometimes called the RCD or ELCB) located in the distribution board to ensure it correctly deactivates the electrical supply when tripped. First place the safety switch to the on position, then press the test (T) button. The safety switch should then automatically flick off. If this does not occur, the safety switch is malfunctioning, and a licensed electrician should be contacted. This simple test can ensure proper function of the safety system.

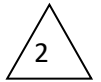
### 10.4 Plumbing



A licenced plumber must be employed to connect the potable water supply, grey water, or waste (black) water outlets to sullage, sewer or septic systems.

Regularly inspect taps, pipes, toilets, and sinks for leaks or broken seals. Damage to these facilities can lead to drainage problems or potential corrosion, rot or ponding of water. In the case of lost water supply, sewer, drainage, or gas line problems please contact a licensed Plumber.

Regular inspections of the lines and outlets will highlight potential problems and provide an opportunity to correct prior to an emergency. Please follow sensible water consumption and hygiene practices when using the building.



## 11 Troubleshooting and FAQ

### 11.1 How do I know if my solar system is on?

Not sure whether your solar system is actually turned on and operating? There are two simple ways to check that your solar inverter is switched on:

1. If you have been given access, login to your monitoring app and check the status of your system. It should be reading 'online' and data should be displayed.
2. Check your inverter - is your inverter light green or blue during the day? Most inverters have lights to indicate status. Usually a red or orange light indicates an issue.

It's important to check that your solar system is turned on, particularly after a storm or a blackout, to make sure that your system is operating and you are offsetting your energy usage.

If your solar inverter is off, your panels aren't generating any solar energy. Most monitoring apps or portals will display a green tick or 'normal' status.

### 11.2 My solar inverter is noisy, hums, or is warm to touch?

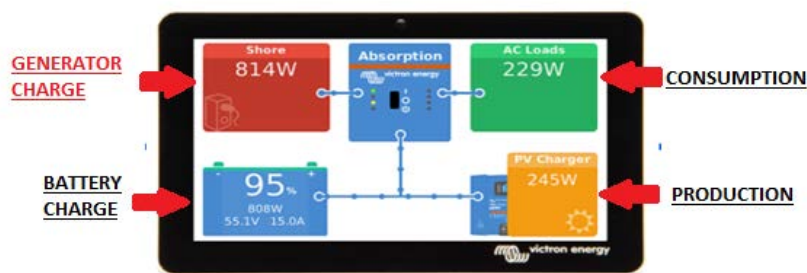
Don't stress! It's normal, especially in summer, for your inverter to make some noise, hum, or become warm to the touch. This just means it's working.

If it is making any abnormal noise, screeching, or electrical buzzing, this could be an indication that something is wrong. Do not try to investigate yourself! If in doubt, call your RW representative or an electrician and they will inspect it for you.

### 11.3 How do I read my solar battery data?

You can monitor the battery data and performance of your Site Hub through the Victron touch screen located inside the container next to the distribution board. It's important you familiarise yourself with your battery's monitoring data so that you can ensure you are making the most of your stored energy and can shift energy consumption behaviour when needed.

Generally speaking, you should pay attention to:





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- **Production:** this is how much solar energy is produced by the system.
- **Consumption:** this details how you are consuming or using your solar energy in your site. It should break it down so you can see how much you are consuming directly from the system during the day, how much you are using from your battery, and even how much energy you draw from the grid or generator.
- **State-of-charge:** this lets you know how charged your battery is at any given time. If you are aware of an upcoming blackout or storms, we recommend you focus on increasing the state of charge to 100% so you have as much energy storage as possible.

By monitoring these key metrics, you can better understand and optimize the solar energy system's performance in the Site Hub. The monitoring data will help you identify opportunities to maximize self-consumption and minimize grid reliance, ensuring efficient energy management of the Site Hub.

#### 11.4 Is my inverter working?

Check that the inverter is still switched on.

Check for operating lights indicating normal operation eg green constant lights or if there are any yellow, red or flashing lights or LED error codes which may identify a fault. This should be recorded for further troubleshooting.

#### 11.5 Is it the circuit breakers?

Move to the switchboard and review the system circuit breakers. Check that they are still in the on position.

#### 11.6 What about a reboot?

Solar systems, like computers, sometimes require a reboot. Turning it off and on is a good first step, and often resolves the issue without any further assistance required. Check if after a reboot the issue is resolved. Follow the shutdown and startup procedure instructions located in the service bay to perform a reboot on the solar system.

#### 11.7 Are the solar panels shaded or obstructed?

Shading is a significant concern when it comes to solar panel performance. Even partial shading on a small portion of a solar panel can significantly reduce energy production. Shading can result from nearby trees, buildings, or other structures that cast shadows on the panels at certain times of the day. Additionally, objects such as antennas, or nearby installations can obstruct the panels' exposure to sunlight. It is essential to assess the positioning of your panels and identify any potential sources of shading or obstructions. By addressing these issues, such as through strategic panel placement, tree trimming, or obstruction removal, you can maximize the efficiency and output of your solar system.

#### 11.8 Still having issues?

If the system is connected to the internet your RW representative can diagnose the issue remotely in most circumstances. To connect to this internet a mobile hotspot may have to be used. The following menus should show how to find the wi-fi network settings.



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The image displays four sequential screenshots of a mobile application interface, illustrating the navigation path to the Wi-Fi settings. Each screenshot is enclosed in a red circle.

- Screenshot 1:** Shows the "Device List" screen. The "Menu" icon (three horizontal lines) at the bottom right is circled in red.
- Screenshot 2:** Shows the "Device List" screen with the "Settings" option highlighted in blue and circled in red.
- Screenshot 3:** Shows the "Settings" screen with the "Wi-Fi" option highlighted in blue and circled in red.
- Screenshot 4:** Shows the "Wi-Fi" screen with the "Wi-Fi networks" option highlighted in blue and circled in red.

