



# **Grid Independent Regenerative Charger G.I.R.C.**



General operations guide

**Revision 001**

**Date of Issue: November 2024**

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## DEFINITIONS

**GIRC** - Grid independent regenerative charger  
**FOE** - FlyOnE Pty Ltd Sustainable Aviation  
**CHARGER** - Pipistrel Charge regulator governing energy flow into the aircraft  
**PIPISTREL** - Manufacturer of Electric Aircraft and charge regulators  
**SOC** - State of charge  
**CTAF** - Common Traffic Advisory Frequency  
**RCD** - Residual Current Device (Circuit Breaker Switch)  
**ICE** - Internal Combustion Engine  
**HMI** - Human Machine Interface  
**ARO** - Aerodrome Reporting Officer  
**CASA** - Civil Aviation Safety Authority

## LIST OF CONTACTS

**FlyOnE Services Support** - Ph. 02 90001167 E. [elevate@flyone.com.au](mailto:elevate@flyone.com.au)  
**Rottnest Island ARO** - Ph. 08 937296788  
**Rottnest Island CTAF** - 126.00



### **DANGER, HIGH VOLTAGE!**

Hazard of electrical shock, fire or death.

Read these operating instructions carefully before using the charger.

- Do not put your fingers in the charger's plug-in socket holes or any other hole in the device.
- Do not use the charger if the supply cable is damaged, has damaged insulation or shows signs of improper use.
- Do not use the charger if the aircraft's charging plug-in socket is damaged in any way.
- Do not use the charger if it is damaged in any way.
- The charger must be used with grounded electrical conditions.
- If you are not sure whether it is safe to use the charger, immediately disconnect the charger from the network power supply
- Do not use the charger until the issue is positively identified and resolved.
- The charger is only intended for use with Pipistrel electric aircraft.



### **CAUTION!**

A potentially hazardous situation which could lead to equipment damage or injury.

- Always position the supply cable so that it's not in the way of vehicles or people passing by. Avoid situations that could lead to cable damage, while the Off-board charger is in use.
- When charging is complete, always remove and stow the cable to prevent injury to yourself and others.
- Use a wet cloth or a cloth soaked in soap and water solution to clean the H100 Off-board charger. Do not use chemical cleaners or solutions. Do not pour water on the charger, solar panels or on any components in the charger system.
- Off-board charger repairs and maintenance can only be carried out by FlyOnE authorized personnel.



### **CAUTION!**

A potentially hazardous situation which could lead to equipment damage or injury.

There is a minimal risk of the LiFePo storage battery sustaining damage or liquid ingress that may compromise the battery and result in a thermal runaway (fire) situation.

LiFePO<sub>4</sub> batteries use a non-flammable electrolyte that does not catch fire even if the battery is punctured or damaged. GIRC is equipped with a fire suppression system inside the battery housing, but is made from non flammable materials (aluminium and steel).

Best practice in the event of a suspected electrical fire is to isolate GIRC items and to keep well clear of the area until it can be inspected by emergency services and/or a FlyOnE authorised technician.

# 1. DESCRIPTION

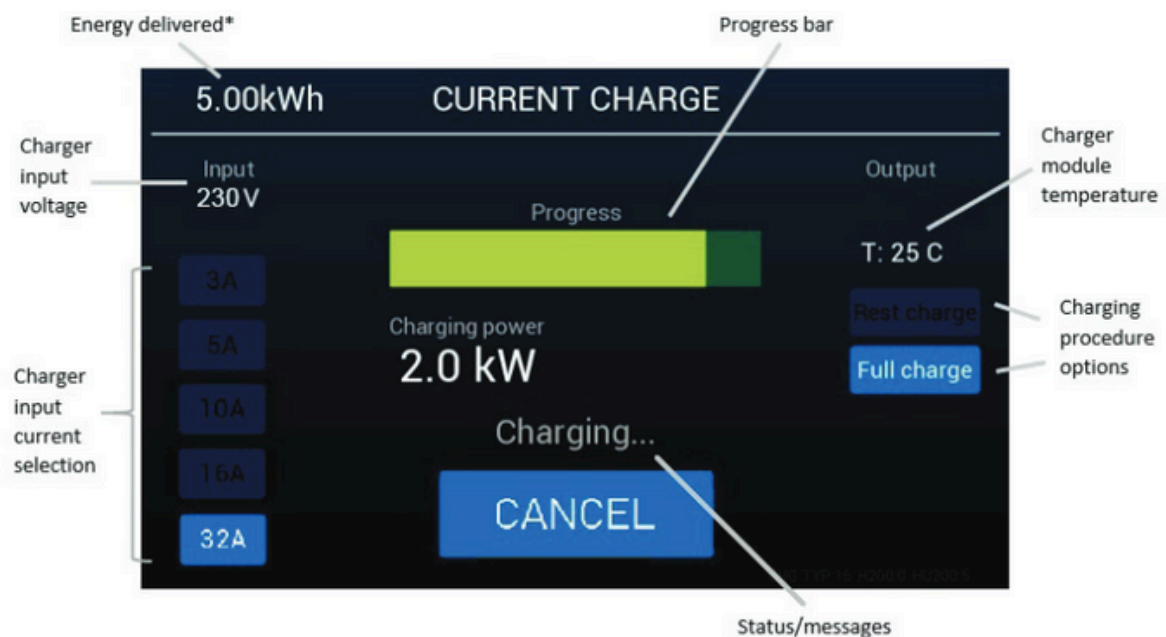
**1.1** The GIRC Off-board charger is a Grid independent regenerative battery charger approved to be used on the ground for charging Alpha Electro and Taurus Electro aircraft's on-board batteries only by approved Electro Pilots that have completed the Electro Fundamentals briefing.

GIRC is a complete charger system, harvesting solar energy via onboard Photovoltaic panel and storing the energy onboard in a LiFePo onboard battery system, with an accompanying power delivery charge regulator system for Pipistrel (and other) Electric Aircraft.

The energy collection and storage parts of the system are self regulation, with isolation circuits for safety and long periods of inactivity.

All of charge regulator functions are controlled and monitored by the charge controller. The charge controller communicates with the aircraft system controller and executes it's commands.

Pipistrel GIRC charge regulators have a Human Machine Interface in the form of a 7" (inch), capacitive touch screen located inside the weather shield cabinet on the GIRC structure. The screen is used to inform the user of the charger's and aircraft's charging status, issue a start/stop charge command, select charging current/mode and monitor the state of the charging process.



HMI digital display (example)

## 2. PREPARING TO CHARGE

**2.1** Any handling or activation of the GIRC, or connecting and charging a compatible aircraft, can only be performed by trained Electro Pilots that have completed the Electro Fundamentals briefing with an Authorised representative of FlyOnE.

The access hatches for onboard GIRC are locked and only approved Pilots will be granted lock access.



To prepare to tie down and charge, the aircraft needs to be parked in the location below indicated by the adjacent icon in Fig 2..  
Maintain 1M separation between the wing tip and the GIRC



To prepare to tie down and charge, place the warning cones (located inside the 'CHARGE' side access hatch) in the area indicated in Fig 2.

**2.2** GIRC occupies a foot print area of 8m<sup>2</sup> (2 x 4m)

The aircraft has space requirement from wing tip to wingtip and nose to tail of of 60.3m<sup>2</sup> (10.4 x 6m) - Typical of any 2-4 seat aircraft that regularly fly to the island  
GIRC fits within the unoccupied space between the wing and tail of the aircraft, overlapping the footprint of the two for a total space occupied of 60.3m<sup>2</sup> when parked.



Fig. 2

### 2.3 TIE DOWN

After positioning the aircraft in the designated location and deploying the warning cones, retract flaps fully (0°) and secure the controls by looping the seat belt around one of the control sticks.

Chock all three wheels with the chocks located inside the locked GIRC 'CHARGE' cabinet.  
Fit the tie down hooks to the wings as per the Pilot Operating Handbook and secure the weighted tethers (located under the lee of the GIRC).

Apply the prop tether to the nosewheel strut to prevent windmilling of the prop.

### 3. AIRCRAFT SIDE CHARGING INTERFACE

**3.1** The airplane/charger charging interface consists of a plug-receptacle combination, standardized in IEC 62196-2. The charging connector is rated for 500 VDC maximum charging voltage and up to 64 A of continuous charging current.

The charger plug is equipped with an electric locking mechanism, which locks the plug into the receptacle during charging. This safety feature prevents unintentional disconnects during charging.

Just like road vehicle chargers, GIRC is designed to be used unsupervised, ie. after the charge cycle is initiated, the system will self manage until the aircraft is fully charged, or the timer setting threshold has been met. Once engaged, the Pilot can leave the aircraft and explore and enjoy the island as standard aircraft parking conditions are in place around the aircraft.



Charging plug-receptacle interface  
(Example Alpha Electro)

**3.2** The charger operational temperature will remain within operational thresholds under almost all circumstances as it is well shaded and insulated against direct sunlight and has been tested with ground temperatures of up to 36 degrees.

It will continue to operate normally with ambient temperatures as high as 40 degrees. Do not plan to run a charge cycle when the weather is forecast above this level as the system will reach cut off temperature and stop charging.

**3.3** If typical operating thresholds have been exceeded, you will need to leave the aircraft tied down and wait until a time where the charge cycle can be completed for an 85% SOC departure from the island.

NOTE: Rottnest Island Authority has NOT approved the connection of the Pipistrel charge regulator to a standard GPO, despite the charge regulator being compatible with any regular 10A GPO and drawing no more from the grid than a small portable air conditioner would. The charge regulator must remain connected to GIRC or to an alternate power source such as a portable generator - See 'Change management', section 5.3



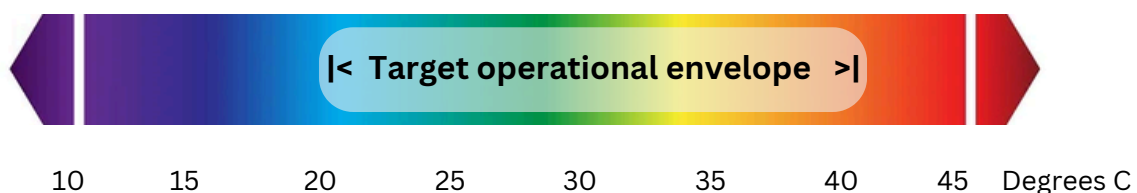
## 4. CHARGING

- Unscrew the FAST CHARGE PORT cap on the aircraft.
- Plug the charger into the charging socket located in the nose of the aircraft.
- Deploy hazard warning cones around the prop and cable areas.
- Power up GIRC by engaging the **Inverter** RCD switch (second from the top) in the 'CHARGE' side hatch to the left 'ON' position.
- If charging for a long period, set the timer to disengage the charger for the amount of SOC required based on the charge time. eg. Time (hrs) x kW (displayed on HMI) = SOC
- Power-up the charger, located inside the 'CHARGE' side hatch on GIRC by rotating the charger's red emergency shut-off switch clockwise.
- Access the charger's display and it's menu.
- Push the "FULL CHARGE" button in the charger display's menu.
- Select the desired charger input current from the left side of the display (max 10A setting)
- Confirm your selection with the "CONFIRM" button.
- The charge regulator will initiate charging. Close the GIRC lid to protect from salt spray and dust.
- After charging is complete or has reached the desired level, push the red shut off switch.
- Disengage the aircraft, stow the cable, return the **Inverter** RCD switch (second from the top) in the 'CHARGE' side hatch to the left 'OFF' position.

The estimated energy consumption in the aircraft on route to Rottnest Island from Jandakot is 7-10kWh. If at full capacity, the GIRC will be able to deliver up to 12kWh at a maximum 3kW/h.

### 4.2 Battery thermal thresholds

Maintaining optimal thermal envelope is critical for the longevity and operational performance of the batteries. Exceeding the top level of 40 degrees C for an extended time will have a lasting degenerative effect on the battery life. Similarly, attempting to operate the batteries at a cell temperature of sub 15 degrees C will have a notable performance deficit.



While the aircraft will not issue a top temperature warning and disengage the charger until 45 Degrees C, all efforts should be made to keep the battery under 40 Degrees during the charge or discharge cycle. This is done by selecting the lowest available charge setting to fit within your required departure time.

NOTE: Do not depart to return to Jandakot from Rottnest Island with less than 80% SOC in the aircraft. Allow for an even greater SOC if returning in a headwind.

- The charger's display indicates when charging is completed > press "CONFIRM" button.
- To disconnect the charger, turn the rocker switch on the right side of the charger to OFF and switch the Inverter RCD switch in the 'CHARGE' side hatch to the left 'OFF' position.
- Remove the charging cable from the FAST CHARGE PORT and stow it back in the 'CHARGE' side hatch.
- Place the cap back on the aircraft's charging socket, pack away the warning cones and lock the GIRC hatch.



## 5. CHANGE MANAGEMENT

### 5.1 Mission planning

Mission planning for a flight transit to and from the island in a Pipistrel Electric Aircraft is bound by the standard Visual Flight Rules that apply to all certified VFR Aircraft.

For the latest revision of standard Civil Aviation Safety Authority Visual Flight Rules information, visit <https://www.casa.gov.au/resources-and-education/publications/industry-guides/pilot-guides/visual-flight-rules-guide#Feedback>

### 5.2 Airport operations

Airport operations at the island in a Pipistrel Electric Aircraft are bound by the standard ERSA Airport Operations guide that applies to all VFR Aircraft.

For the latest revision of standard AIP Australia FAC for Rottnest Island, visit [https://cra.id.au/xplane/charts/ERSA-2024-SEP-05/Rottnest%20Island%20\(YRTI\)%20FAC.pdf](https://cra.id.au/xplane/charts/ERSA-2024-SEP-05/Rottnest%20Island%20(YRTI)%20FAC.pdf)

Further helpful information can be found at <https://www.casa.gov.au/sites/default/files/2022-07/stay-ontrack-flying-the-perth-region.pdf>

### 5.3 Unexpected disruption to GIRC usability

In the event of a Pipistrel aircraft being present on the island, but the GIRC is non functional for any unforeseen reason, the aircraft can be charged from any 10A GPO or a portable ICE generator.

Rottnest Island Authority has NOT approved the connection of the Pipistrel charge regulator to a standard GPO, despite the charge regulator being compatible with any regular 10A GPO and drawing no more from the grid than a small portable air conditioner would.

FlyOnE has a portable generator on standby at Jandakot Airport that can be flown to the Island on short notice with our sister company, Rottnest Air Taxi, in the event of a GIRC malfunction. If a GIRC Malfunction is identified or suspected, the Aircraft user will contact FOE support services on the number provided in the list of contacts on page 2 of this document.

Routine records and any issues that emerge will be communicated with the ARO via the AD Manager phone number in the AIP FAC guide for YRTI airport available on Page 2 of this document.



## 6. RISK MANAGEMENT

### 6.1 Risk Register

Scale - 1, Extremely low - 10, High

Risk / Hazard	Likelihood	Consequence	Risk Factor	Mitigation Method
Battery Catches Fire	2	8	8	The battery compartment has an automatic fire suppression system
Inverter Catches Fire	2	6	4	The inverter is in a separate compartment to the battery so won't likely spread and will need to be put out with conventional electrical fire extinguisher attached to exterior of GIRC
Charger Catches Fire	1	6	4	The charger is in a separate compartment to the battery so won't likely spread and will need to be put out with conventional electrical fire extinguisher attached to exterior of GIRC
Solar Panels Catch Fire	1	7	6	Fire fighting equipment is provided attached to the Exterior of GIRC
Damage from high winds	4	5	2	All components are securely attached to rigid framework capable of handling typical conditions at the Island.
Electric shock	1	9	5	All electrical work is performed by trained professionals to ensure no high-voltage wires are accessible by fingers
Raining	5	1	3	GIRC is waterproof when closed and shut down, but operation is not approved during rainfall.
Wildlife interaction	1	1	2	The GIRC structure has no cavities or attributes that are likely to be appealing to any local fauna. Bird droppings may need to be occasionally cleaned from the solar panels

## 6.2 Hazards, Incidents & Near-Miss Reporting

The health and safety of all visitors, staff and contractors on Wadjemup / Rottnest Island Airport is paramount to FOE. To support this, a clear and logical reporting procedure has been established to ensure that any hazards, accidents, injuries, or near-misses are reported quickly, and actions are put in place to rectify the situation.

Here's what to do if you spot a hazard, or an incident or near-miss occurs at the GIRC Trailer.

### Definitions

These terms define the situations in which the Hazard, Incident, and Near-miss (HIN) Reporting procedure should be used.

- **APRON.** The area marked on the map below where aircraft movements and parking occurs
- **FOE.** Fly On E Pty Ltd Company Operating Electric Aircraft.
- **GIRC.** Grid Independent Regenerative Charger trailer with solar panels and a battery.
- **Hazard.** A hazard is a source or a situation that has the potential to cause harm in terms of human injury or ill-health, damage to property, damage to the environment, or a combination of these.
- **Incident.** An incident is when an event has occurred that did cause harm or injury to a person. This includes any instances requiring first aid, medical treatment, and lost time due to injuries.
- **Near-miss.** A near-miss is when an event occurred that did not cause harm or injury to a person, but came very close to happening. For example, machinery damage occurred where no injury was sustained by the operator.
- **Risk.** The likelihood of a hazard or incident, and consequence of injury or harm occurring.
- **RIA.** Rottnest Island Authority.
- **Safe Operating Temperatures.** As indicated in section 4.2, between 20 and 40 degrees

### 6.2.1 Temporary relocation of GIRC

GIRC will remain fully easily moveable at any time by removing the wheel chocks and releasing the jockey stabilisers at the front and rear of the structure.

The structure can then be easily 'wheeled' by a single person on flat sealed ground should any facility maintenance demands require this.

## 6.3 When to notify of a hazard, incident or near-miss

There is an important differentiator between what is considered a notifiable incident for working purposes, and what is considered an accident on the island.

You must fill out Rottnest Island Authority's (RIA) HIN report if an incident arises due to the work that you're undertaking.

These include:

- **Visitor risk.** If the hazard, near-miss, or incident involved visitors to Wadjemup or Rottnest Island Authority (RIA) officers.
- **Environmental risk.** If the hazard, near-miss or incident relates to the environment of the Rottnest Island Reserve. This includes things like damage to wildlife or habitat, or unauthorised leaks or spills of hazardous substances into the water or air.
- **Work Health and Safety (WHS) issues.** WHS incidents cover any hazard, near-miss or incident resulting in, or having the potential for injury, ill-health, damage or other loss involving staff, contractors or consultants.
- **Notifiable incidents.** Notifiable incidents are serious, and include the death of a person, a notable injury (like a fracture), illness or disease (such as Legionnaires' disease, or other infectious diseases), or a dangerous incident occurring.
- **Reportable environmental incident.** An environmental incident must be reported if it breaches Commonwealth, State, or Rottnest Island Authority environmental law, regulations, or approvals, and has the potential to cause environmental harm, attract negative media attention, adversely affect future operations for remediation of a particular site.

### When you don't need to notify

Incidents may happen for reasons which don't have anything to do with work you're undertaking. In these circumstances, you don't need to fill out a HIN report. For example:

- A worker or another person suffers a heart attack while at work which is unrelated to the work at hand.
  - A person driving to work is injured in a car accident (where driving is not part of their work).
  - Someone with epilepsy has a seizure at work.
- In these cases, you don't need to fill out a HIN report.

## 6.4 How to notify of a hazard, incident, or near-miss

- Start by assessing the incident.
- All notifiable incidents must be reported within 12 hours to the appropriate manager of FOE and RIA. This responsibility is outlined in the HIN Report Form.
- Corrective action must then be taken to isolate and control the incident.
- Complete the **online HIN Report Form**, supplying as much information as possible.  
<https://camms.com.au/incident/Public/Index?client=RIA>
- Collect and include evidence, including photographs, diagrams, and GPS data.
- Your HIN report will be registered and logged.
- Corrective actions will be assigned, either to you, RIA or a third party.
- Once all actions to eliminate the hazard and/or mediate the impact are complete, the incident will be closed.
- If necessary, RIA staff will notify external regulators.

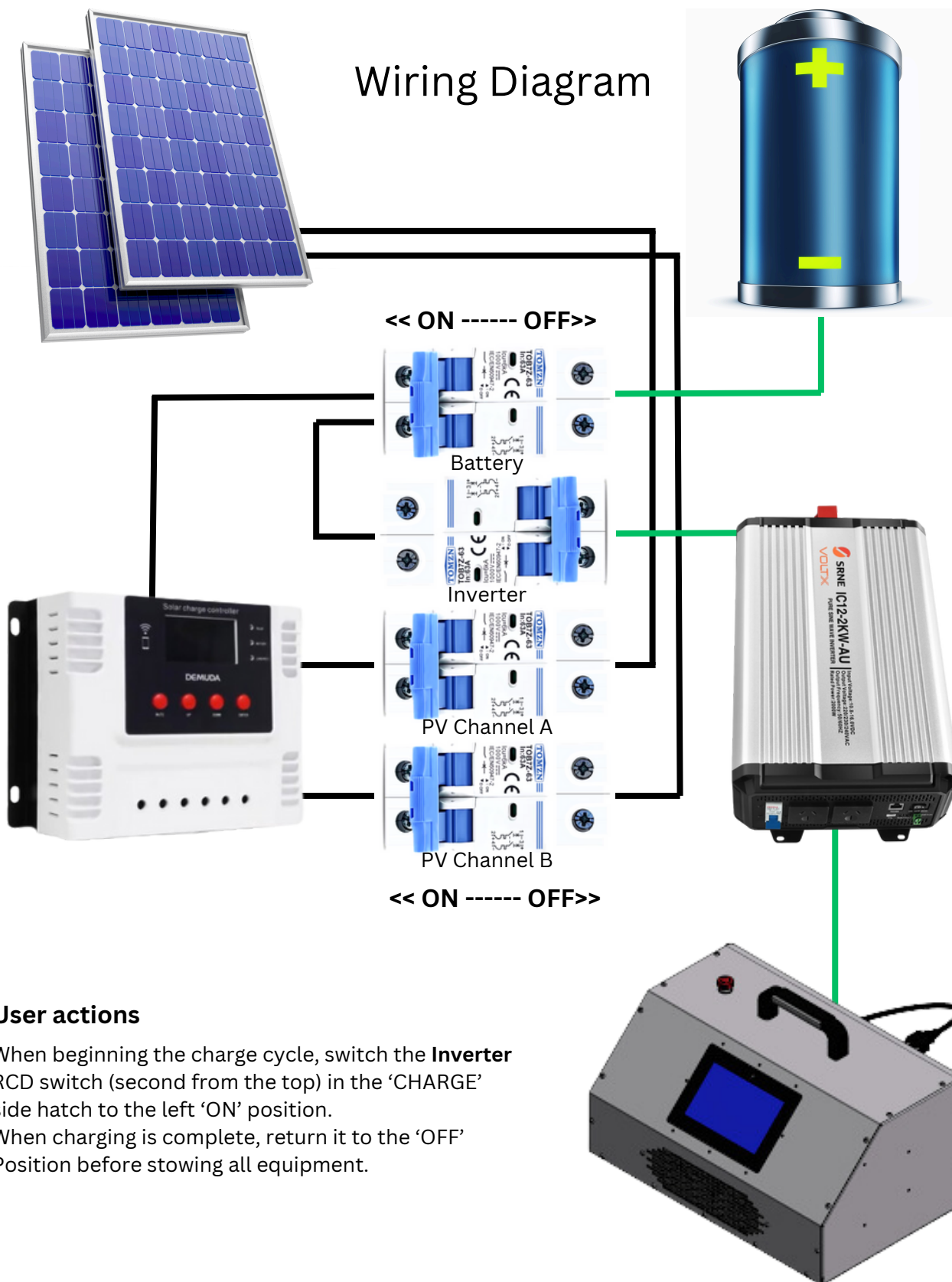
## 6.5 Electrical Safety Shutdown Procedure

In the event of an incident or accident involving electric shock or an electrical fire, it is best practice to shut down all electrical systems by switching all of the circuit breaker switches to the right position for 'OFF', as per the diagram on the following page.

### Fire Extinguisher

An electrical fire extinguisher is located at the operational side of GIRC next to the charge cable hang space.





### User actions

When beginning the charge cycle, switch the **Inverter** RCD switch (second from the top) in the 'CHARGE' side hatch to the left 'ON' position. When charging is complete, return it to the 'OFF' Position before stowing all equipment.

# ELECTRICAL SPECIFICATIONS

ENERGY COLLECTION	
Maximum Energy Collection	1kW
PV Voltage	62V Max.
PV Current	60A Max.
ENERGY STORAGE	
Maximum Energy Storage	15kWh
Nominal battery voltage	51.2V
Battery type	LiFePo
ELECTRICAL OUTPUT	
Maximum output power	3 kW
Output voltage range	110 - 440 V
Output current	10 A max.
FUNCTIONAL INTERFACES	
Firmware update	via USB port
OPERATIONAL RATINGS	
Efficiency (max.)	92%
Power factor	> 95%
Ambient operating temperature	From -20°C to +40°C
Cooling	Forced air cooling
Lightning protection	No






# Supplementary material - CASA certificate of Airworthiness example of one of the Pipistrel Electric Aircraft

Australian Government Civil Aviation Safety Authority		
Certificate/Job Number DM22-12991		
TC / TAC Number		
SPECIAL CERTIFICATE OF AIRWORTHINESS		
1. Registration Mark 23-2055	2. Manufacturer's Designation of Aircraft Pipistrel d.o.o. Ajdovscina ALPHA Electro	3. Aircraft Serial No. 830AE60
4. Airworthiness: <input checked="" type="checkbox"/> Category <input type="checkbox"/> Categories		
Light Sport Aircraft		
4(a). Purpose Private Operations / Flight Training		
5. This certificate is issued pursuant to the Civil Aviation Safety Regulations of Australia in respect of the above aircraft which is considered to be airworthy when maintained and operated in accordance with the Civil Aviation Safety Regulations of Australia and any prescribed conditions set out as an Annex to this certificate. However, the above mentioned aircraft does not meet requirements in Annex 8 to the Convention on International Civil Aviation and therefore the aircraft must not be operated in international airspace or over the territory of a foreign country without the special permission of that country.		
Certificate issue date 04 / 04 / 2022 (day/month/year)		Certificate expiry date N/A (day/month/year)
<input type="checkbox"/> Delegate of the Authority <input checked="" type="checkbox"/> Authorised person*		
(Signature) Darren Barnfield (Printed Name) Instrument of Appointment Number: 1-138VSM Note: This certificate is subject to the conditions listed on the annex dated 04 / 04 / 2022. Attachments to this certificate form part of this certificate.		
6. Subject to suspension or cancellation, pursuant to the Civil Aviation Safety Regulations of Australia, this certificate shall remain in force until the expiry date below or the aircraft ceases to be registered on the Australian Civil Aircraft Register. NO ENTRIES MAY BE MADE ON THIS CERTIFICATE EXCEPT BY A DELEGATE OF THE AUTHORITY OR AN APPROPRIATE AUTHORISED PERSON.		
Any person finding this certificate should forward it to the Civil Aviation Safety Authority		

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Australian Government Civil Aviation Safety Authority		
Certificate/Job Number DM22-12991		
TC / TAC Number		
ANNEX TO A SPECIAL CERTIFICATE OF AIRWORTHINESS		
THIS ANNEX IS ISSUED AS PART OF THE CERTIFICATE OF AIRWORTHINESS IDENTIFIED ABOVE AND MUST BE ATTACHED TO THAT CERTIFICATE AT ALL TIMES.		
Aircraft Registration 23-2055 is subject to the following conditions:		
12. If the aircraft no longer complies with one or more of these conditions, the C of A becomes void. Continued operation with an invalid C of A is a criminal offence. It is permissible, however, for the registration holder of a non-commercial aircraft to apply for an Experimental Certificate.		
13. Hours flown and maintenance carried out on the aircraft shall be recorded on a "Maintenance Record Form" produced by Recreational Aviation Australia or other approved sources.		
		
<input type="checkbox"/> Continued next page		
Page 3 of 3		
NO ENTRIES MAY BE MADE ON THIS ANNEX EXCEPT BY A DELEGATE OF THE AUTHORITY OR AN APPROPRIATE AUTHORISED PERSON. PURSUANT TO REGULATION 11.077 OF THE CIVIL AVIATION SAFETY REGULATIONS OF AUSTRALIA, A PERSON MUST NOT CONTRAVENE A CONDITION SPECIFIED ON A CERTIFICATE OF AIRWORTHINESS.		
Any person finding this certificate should forward it to the Civil Aviation Safety Authority		

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## Supplementary material - Insurance certificate of currency for FlyOnE owned aircraft and ground infrastructure



### Agile Aviation Underwriting Services

Agile Underwriting Services Pty Ltd  
ABN 48 607 908 243 : AFSL 483374  
Lvl 5, 63 York St  
SYDNEY NSW 2000  
1300 705 031

## AIRCRAFT INSURANCE - CERTIFICATE OF INSURANCE

This is to certify that the Insurance described below is current for the period specified and is issued in accordance with the terms, conditions, definitions, limitations and exclusions of the policy.

This Certificate is issued as a matter of information only and confers no rights upon the holder. It does not amend, extend or alter the coverage afforded by the Policy/Policies listed. It is provided as a summary only of the cover provided and is current only on the date of issue.

### GENERAL INFORMATION

Unique Market Ref No:	B04440364A23AA		
Policy Type: Policy No:	Agile Underwriting - Aircraft Insurance Policy		
Effective Date: Details:	101B1337523C	Currency:	AUD
Inception Date: Named	03/04/2024		
Insured: Address:	23-2091 reduce to ground risks only		
Interested Parties: Cloud	31/03/2024	Expiry Date:	31/03/2025 @1600hrs LST
Dancer Sport Aircraft	FlyOnE Pty Ltd		
Lilydale Flying School	3/8 Riversdale Road Burwood WA, 6100		
Blackbird Private Equity	Nature of Interest:		
Royal Aero Club of WA	Operator		
Broker:	Operator for 23-2091		
	Financier		
	Operator for 23-2092 & 23-2055		
	Connect Business Insurance		

### GEOGRAPHICAL LIMITS

Australia
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