CYGNUS HPG 12-24 KVA

User manual v1.6

For use with the following models:

- CYG3/12/37/AGM
- CYG3/12/50/AGM
- CYG3/18/37/AGM
- CYG3/18/50/AGM
- CYG3/24/37/AGM
- CYG3/24/50/AGM

www.fireflycleanenergy.co.uk

Firefly® CLEAN ENERGY

CYGNUS® HYBRID POWER GENERATOR

Firefly® CLEAN ENERGY

TABLE OF CONTENTS

CYGNUS® HYBRID POWER GENERATOR

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TABLE OF CONTENTS

FIGURES

1 INTRODUCTION

1.1 Foreword

Firefly takes this opportunity to congratulate you on receiving your new Cygnus HPG.

Designed and manufactured within the United Kingdom using only the finest European sourced electrical components, your new Cygnus HPG offers sustainable power generation with the reliability that you demand.

The purpose of this manual is to introduce you to Cygnus HPG and provide you with a guide to its safe installation and operation. This manual describes how your Cygnus HPG works, will help you with fault finding and examines what key components are doing and why.

1.2 Conventions

Throughout this user manual the following symbols are used:

WARNING

This symbol warns of the presence of a dangerous voltage which could cause harm to the operator or others.

This symbol indicates the potential of damage to the unit or connected devices.

This symbol indicates important or useful information.

The following terms are used in this manual to provide greater clarity:

- Firefly will be referred to as “The manufacturer”.
- The Cygnus HPG Hybrid Power Generator will be referred to as “Cygnus HPG” or “Unit”.
- Any items that consume power will be referred to as “Consumers”.

1.3 Warnings

This user manual is an important part of Cygnus HPG. It must be kept available to all operators and kept close to the unit so that it can be referred to at any time.

WARNING

When the unit is operating it generates potentially lethal voltages. Work must only be performed on the unit by the manufacturer or a qualified service engineer approved by the manufacturer.

All items connected to the unit including distribution cables and boxes should be regularly checked and adhere to the same local regulations and standards as a regular grid-tied mains installation.

1.4 Standards & Regulations

Cygnus HPG conforms to the following standards and regulations:

- Manufactured in compliance with ISO 9001:2008
- LVD 2006/95/EEC: EN 50178:1197, EN 62040-1:2008
- EMC Directive 2004/108/EC: EN 61000-6-2:2005, EN 61000-6-3:2007, EN 61000-3-2:2006, EN 61000-3-12:2005, EN 62040-2:2006
- IP44
- WEEE Directive

RoHS

IP56

1.5 Disposal & Recycling

Cygnus HPG comprises of components that must be disposed of responsibly. For the sake of the environment many of the components within the unit can be recycled or reused. Firefly will ensure the safe decommissioning and recycling of the unit at no charge if the unit is returned to the manufacturer. Otherwise, please contact the manufacturer for more information on safe and proper decommissioning of your Cygnus HPG.

1.6 Firefly Contact Details

Firefly Solar Generators Limited Unit 20 Cliffe Industrial Estate South Street Lewes East Sussex BN8 6JL United Kingdom	Tel: +44 (0) 1273 40 95 95 Fax: +44 (0) 1273 40 95 96 E-mail: info@fireflycleanenergy.co.uk Web: www.fireflycleanenergy.co.uk

1.7 About Firefly

Firefly is the market leading expert in the design and manufacture of off-grid, portable Hybrid Power Solutions for temporary and permanent power applications. Firefly has built its highly regarded reputation within the industry, based on excellent customer service and product reliability. Founded in 2007 the Company continues to develop innovative solutions to cater to the needs of its ever growing customer sectors.

The Company offers green energy products and services that meet the needs of environmentally concerned individuals and organisations internationally, that are looking to reduce their carbon emissions caused by the use of fossil fuels and diesel powered equipment. The unique range of renewable technology solutions produce zero emissions, are truly silent running and eliminate the need for fuel.

The systems are manufactured in the UK, under an ISO 9001:2008 approved quality control system. Component suppliers are carefully selected to ensure high levels of reliability and performance of the final product. Installation and stringent testing is carried out to ensure compliance with EU and local legislation where applicable.

2 GETTING STARTED

2.1 Storage

1. Cygnus HPG is designed to be used and stored outside. However, to prevent unnecessary weathering it is recommended that the unit is stored inside when possible.
2. It is recommended that the battery bank is charged regularly while in storage. Refer to "3.2 Charging From An AC Supply" on page 21 for further information.
3. The emergency stop should be engaged (pushed in) and output protection switches should be switched off when in storage and not being charged to prevent unnecessary discharge of the battery bank.

2.2 Transporting, Lifting & Positioning

This unit is considerably heavier than regular fuel powered generators of similar physical dimensions. Be sure to double check the capacity of lifting equipment.

2.2.1 Transportation

1. Cygnus HPG can be transported using its optional trailer, light or heavy goods vehicle with adequate available payload. Check the relevant transportation documentation for suitability.
2. The gross weight of the unit can be found on the rating plate positioned on the left hand side of the unit.
3. It is recommended that the unit is secured using suitable straps when in transit to prevent it from moving.

2.2.2 Lifting (Loading/Unloading)

1. Cygnus HPG must be loaded or unloaded using the correct equipment operated by suitably trained personnel.
2. Using the fork pockets, Cygnus HPG can be loaded or unloaded with a suitable fork-lift truck or telehandler.
3. Cygnus HPG can be safely lifted using its integral lifting ring.

Refer to lifting equipment's operation manual for lifting capacity and manufacturer's operating instructions.

Always check the rating plate to ascertain the gross weight of the unit.

The unit must remain upright at all times.

2.2.3 Positioning

1. The unit must be positioned upright on a flat, solid surface. Ensure that the unit is not at risk from being submersed in water above the fork pockets.
2. The unit should be positioned as close as possible to the chosen input source (e.g. Gen. Set, solar array) and where necessary, close to its earth point.
3. Ensure adequate space is allowed for ventilation on all sides and that vents are not obstructed.

2.3 The Cygnus HPG Control Panel

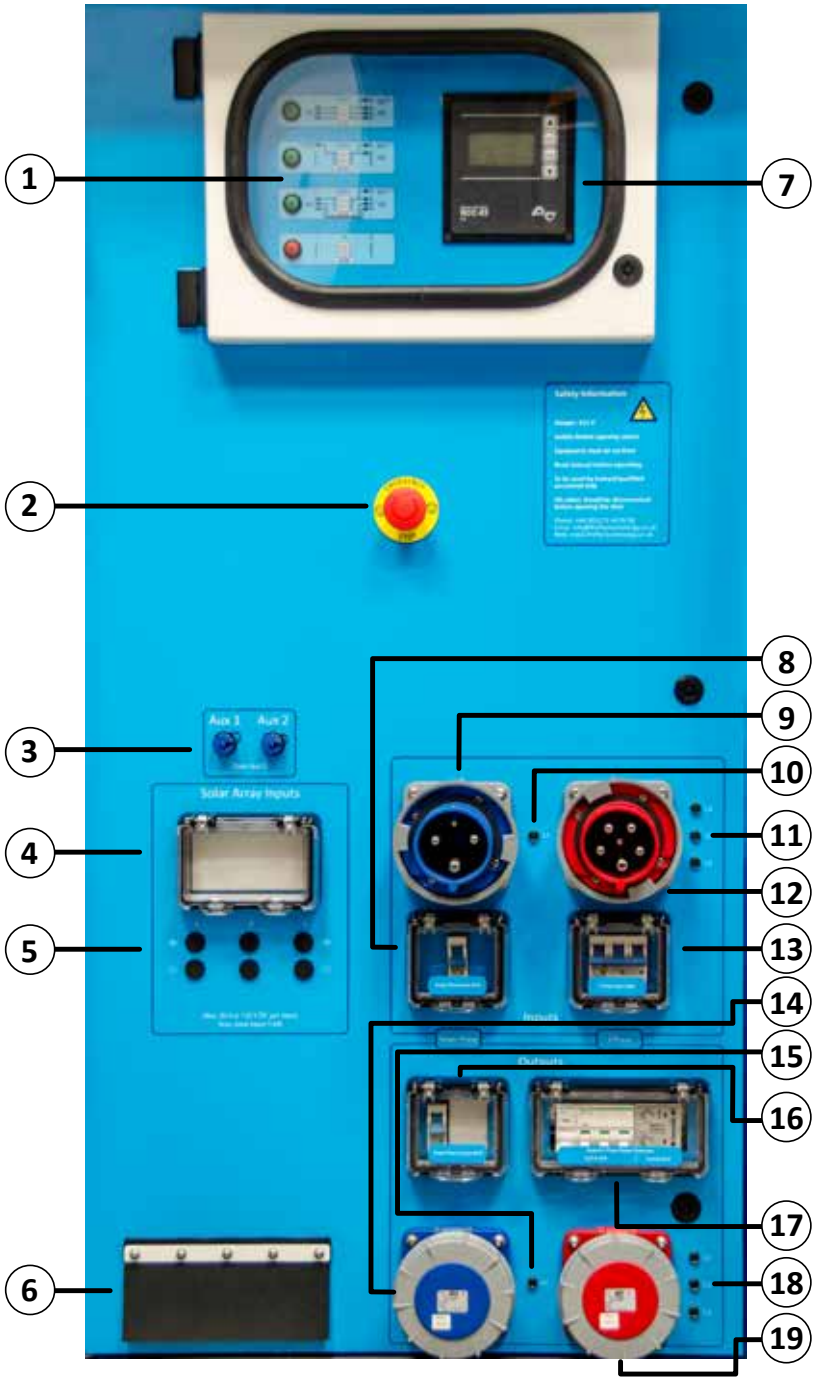


Fig. 1 - Control Panel

1. **Mode Selector-** Allows switching between the three power routing modes and off
2. **Emergency Stop-** Press in to immediately halt all operation
3. **Auxiliary connections (Generator start)-** Provides signals for various applications including the control of a Gen. Set.
4. **Solar Array Isolator Switches[§]-** Provides overload protection for the Solar Array inputs. Switch off to isolate the Solar Array circuit, on to enable it.
5. **Solar Array Inputs[§]-** 30 A MC3 connections for solar arrays
6. **Bus Bar Connection-** Provides entry for hard wired AC input and output connections.
7. **RCC 03-** Provides status and control of the unit's inverters and charge controller[§]
8. **Single Phase AC Input Protection-** over current MCB
9. **Single Phase AC Input Connector-** 230 V AC single phase 63 A CEE Form plug
10. **Single Phase AC Input Indicator-** indicates presence of AC at input connection
11. **Three Phase AC Input Indicators-** indicates presence of AC on each line of the input connection
12. **Three Phase AC Input Connector-** 230 V AC three phase 63 A CEE Form plug
13. **Three Phase AC Input Protection-** over current MCB
14. **Single Phase AC Output Connector-** 230 V AC single phase 63 A CEE Form socket
15. **Single Phase AC Output Indicator-** indicates presence of AC at output connection
16. **Single Phase AC Output Protection-** RCD earth leakage and MCB over current
17. **Three Phase AC Output Protection-** RCD earth leakage and MCB over current
18. **Three Phase AC Output Indicator-** indicates presence of AC on each line of the output connection
19. **Three Phase AC Output Connector -** 230 V AC three phase 63 A CEE Form socket

[§]Solar inputs and charge controller only available on models with Solar Prep option

2.4 Connecting Cygnus HPG

WARNING

When using as a standalone power source, a protective earth must be connected to the unit in compliance with applicable local standards and regulations.

This can be done either by connecting to a suitable existing electrical earth, or by using an earth rod available from the manufacturer as an accessory.

2.4.1 Earth attachment: Installing an Earth Rod

1. The Earth Point of Cygnus HPG is an M10 threaded stud with washers and wing nut located on the skid to the right side of the unit.
2. Find a suitable place to drive the earth rod into the ground. The earth rod should be driven down at least half way into the ground using a mallet and placed as near to the unit as possible.
3. Check the earth cable is securely clamped to the rod. The clamp may need re-tightening after driving the earth rod down.
4. Undo the wing nut from the unit's earth bolt and remove one of the washers. Then slide the ring terminal at the end of the earth cable onto the earth bolt. Replace the washer and securely tighten the nut. Refer to "Fig. 2 - Earth Point"

Fig. 2 - Earth Point

Fig. 3 - Earth Rod

2.4.2 Input Options

The unit can accept inputs from an AC power source (single phase or three phase. Further information on connecting these items is available in section "3.2 Charging From An AC Supply" on page 21) and solar arrays using the optional Solar Prep kit.

The AC input current is adjustable, allowing the unit to be charged from AC sources with lower current capacities.

Fig. 4 - 5 mm Double Barb Key

2.4.3 Connect The AC Input

> Only one AC input can be connected at a time- damage will be caused by attempting to simultaneously connect single phase and three phase inputs.

2.4.3.1 Select Input Method

1. Ensure that the unit is switched off- see "3.1.5 Turning Off The Cygnus HPG" on page 20.
2. Open the main door by unlocking the three locks located at its right hand side using the provided 5 mm double barb key See "Fig. 5 - 5 mm Double Barb Key" on page 14.
3. Locate the Input Selector switch at the bottom left corner- see "Fig. 6 - AC & Aux. Bus Bar Connections, Input Selector Switch" on page 14.
4. Turn switch anti-clockwise to select Bus Bar input or clockwise for use of the CEE Form connectors .

2.4.3.2 Connecting with CEE Form Industrial Plugs

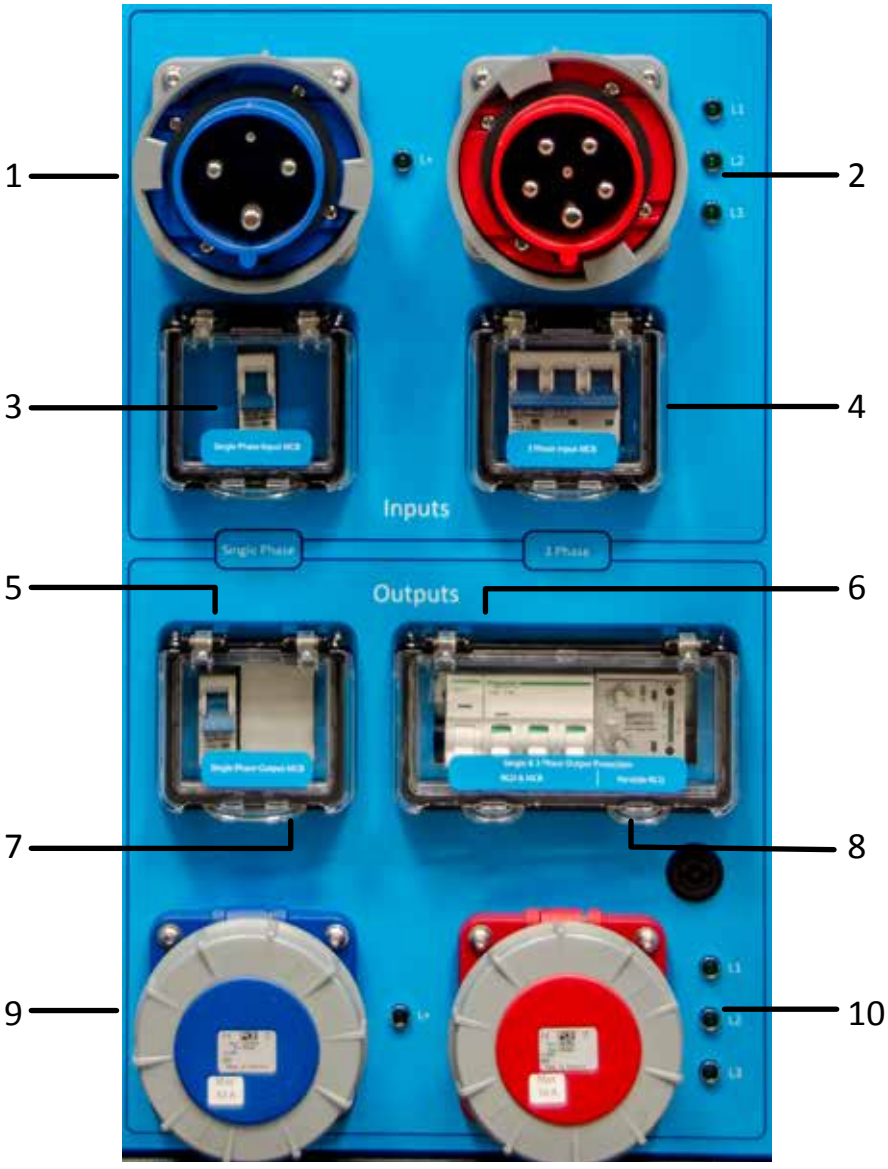
1. Ensure that the AC supply being connected to the unit is switched off.
2. Ensure the input breakers are switched off.
3. Ensure that Cygnus HPG is in Mode 4: Off.
4. Ensure that the CEE Form connectors are dry; wipe off any excess moisture with an absorbent cloth.
5. Insert the 230 V AC supply's CEE Form industrial socket into either the single phase or three phase AC Input plug. See "Fig. 7 - Inputs, Outputs and Circuit Breakers" on page 15
6. Switch on the AC input's power supply.

7. The LED indicators next to the chosen AC input will illuminate to show the presence of power.
8. Switch on the unit's input breaker.

2.4.3.3 Connecting by Hard Wiring Into The AC Input Bus Bar

1. Before any power connections are made, ensure that Cygnus HPG is in Mode 4: Off. See "3.1.1 Description Of The Power Modes" on page 17
2. Open the main door by unlocking the three locks located at its right hand side using the provided 5 mm double barb key See "Fig. 5 - 5 mm Double Barb Key" on page 14.
3. The Bus Bar is located at the bottom left corner.
4. Ensure that the wire used is suitable for the application.
5. Pass the cables through the rubber flap in the door
6. Connect to the lower row of connections using 6 mm ring terminals.
7. Remove the 10 mm nuts.
8. Attach ring terminals, referring to "Fig. 6 - AC & Aux. Bus Bar Connections, Input Selector Switch" on page 14

AC & Aux. Bus Bar Connections, Input Selector Switch



Replace and tighten the 17 mm nuts.

1	63 A Single Phase Input	2	63 A Three Phase Input
3	Single Phase Input MCB	4	Three Phase Input MCB
5	Single Phase Output RCD	6	Three Phase Output RCD
7	Single Phase Output MCB	8	Three Phase Output MCB
9	63 A Single Phase Output	10	63 A Three Phase Output

Fig. 5 - Inputs, Outputs and Circuit Breakers

2.4.4 Connect The AC Output

2.4.4.1 Connecting with CEE Form Industrial Plugs

1. Before any power connections are made, ensure that Cygnus HPG is in Mode 4: Off. See "3.1.1 Description Of The Power Modes" on page 17
2. Ensure that the output breakers are switched down into the off position. See "Fig. 7 - Inputs, Outputs and Circuit Breakers" on page 15
3. Check that the Variable RCD is set correctly. See "4.4 Variable RCD" on page 29
4. Ensure that the CEE Form connectors to be used are dry; wipe off any excess moisture with an absorbent cloth.
5. Plug the electrical consumers in to a 230 V AC Out CEE Form socket: blue for single phase or red for three phase. See "Fig. 7 - Inputs, Outputs and Circuit Breakers" on page 15

2.4.4.2 Connecting by Hard Wiring Into The AC Output Bus Bar

1. Before any power connections are made, ensure that Cygnus HPG is in Mode 4: Off. See "3.1.1 Description Of The Power Modes" on page 17
2. Open the main door by unlocking the three locks located at its right hand side using the provided 5 mm double barb key See "Fig. 5 - 5 mm Double Barb Key" on page 14.
3. The Bus Bar is located at the bottom left corner.
4. Pass the cables through the rubber flap in the door
5. Connect to the lower row of connections using 6 mm ring terminals.
6. Remove the 10 mm nuts.
7. Attach ring terminals, referring to "Fig. 6 - AC & Aux. Bus Bar Connections, Input Selector Switch" on page 14
8. Replace and tighten the 10 mm nuts.

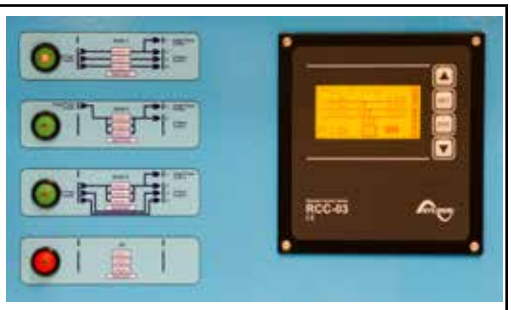
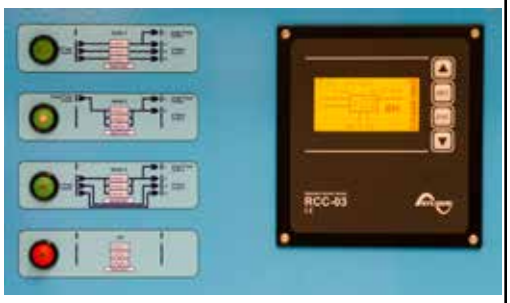
3 GENERAL OPERATION

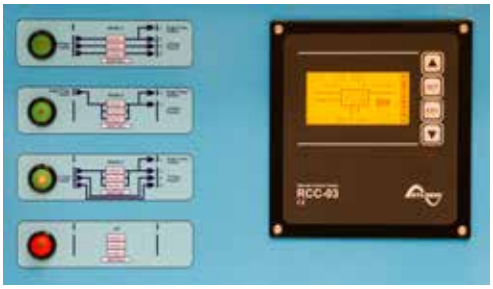
3.1 Turning The Power On

Once all connections are complete, the AC Output of the unit is ready to be switched on.

3.1.1 Description Of The Power Modes

Cygnus HPG has three different modes of operation. The modes control how the inverters are configured and how the power is routed through the unit. The mode is selected by depressing a single button behind the top control panel door.

Mode 1: Three Phase A three phase input is accepted. Three phase power is backed up by the unit's battery bank and available at the output. L1 of the three phase output is also available at the single phase output. The three phase breakers (see 4, 6 & 8 "Fig. 7 - Inputs, Outputs and Circuit Breakers" on page 15) protect the circuit.	
Mode 2: Single Phase A single phase input is accepted. The unit provides a single phase output as well as L1 of the three phase output. The single phase breakers (see items 3, 5 & 7 "Fig. 7 - Inputs, Outputs and Circuit Breakers" on page 15) protect the circuit.	

Mode 3: Three Phase With L1 Backup A three phase input is accepted. Power on L1 and the single phase output is backed up by the unit. L2 & L3 power from the inputs is passed through to the L2 & L3 outputs. The three phase breakers (see 4, 6 & 8 "Fig. 7 - Inputs, Outputs and Circuit Breakers" on page 15) protect the circuit.	
Off All primary internal circuitry is disabled. Cooling systems remain operational.	

3.1.2 Switching On The Cygnus HPG

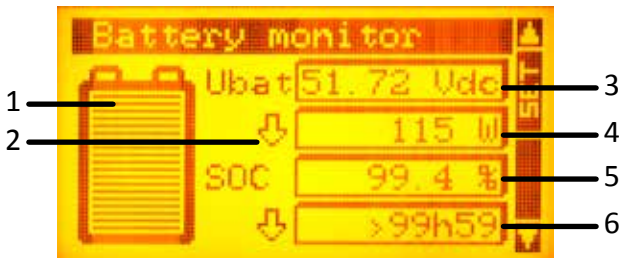
The relevant power mode must first be decided upon. This will depend on the power requirements of the installation.

1. Ensure that the Emergency stop button is released by rotating it clockwise.
2. Switch on the relevant breakers. For “Mode 1: Three Phase” and “Mode 3: Three Phase With L1 Backup”, the three phase breakers must be switched up into the on position. For “Mode 2: Single Phase”, the single phase breakers must be switched up into the on position.
3. Press the chosen mode button. The selected mode button’s LED indicator will flash during initialisation and remain solid once the output is available.
4. The RCC-03 display should illuminate.
5. The LED indicators next to the chosen AC output connector will illuminate, indicating that power is available at the selected output(s).

3.1.3 Monitoring Battery Bank State of Charge

The status of the unit's internal battery bank is monitored using the RCC 03's controls. To access the controls

1. Open the control centre door using the supplied key- see "Fig. 6 - 5 mm Double Barb Key" on page 17
2. The RCC 03 will initially be in standby mode. Pressing any button will illuminate the display and prepare it for input
3. Press the down arrow once to access the main Battery Monitor screen
4. See "Fig. 8 - The RCC 03 Battery Monitor Screen" for a description of the available information.



1	SoC quick overview
2	Arrows indicate direction of current: Up = charging Down = discharging
3	Voltage of internal battery bank
4	Power being consumed/ Power being used to charge the battery bank
5	SoC Percentage value
6	During charge: Estimated time to 100% SoC During discharge: Estimated runtime at present power draw

Fig. 6 - The RCC 03 Battery Monitor Screen

3.1.4 Emergency Stop Button

1. If there is an emergency and it is necessary to stop the power from the unit, depress the Emergency Stop Button (Fig. 1, C6) on the Control Panel.
2. The unit will then shut down. Cygnus HPG can not be switched on again until the Emergency Stop Button is released by twisting the red part of the button clockwise.
3. Once the problem has been rectified, follow the instructions in "3.1 Turning The Power On" on page 17 to switch the power back on.

3.1.5 Turning Off The Cygnus HPG

1. Open the control centre door using the supplied key- see "Fig. 4 - 5 mm Double Barb Key" on page 13
2. Select the Off button- see "3.1.1 Description Of The Power Modes" on page 17
3. The button's indicator will flash while the system is shutting down and stay illuminated when the system is in the off mode.

The unit's internal cooling system may continue to operate when the unit is in the Off mode

3.1.6 Disconnecting Cygnus HPG

1. Ensure that Cygnus HPG is turned off "3.1.5 Turning Off The Cygnus HPG" on page 20
2. Switch off all breakers- see "Fig. 6 - Inputs, Outputs and Circuit Breakers" on page 15
3. If an input cable is connected, disconnect it- see "Fig. 6 - Inputs, Outputs and Circuit Breakers" on page 15
4. Disconnect the output cable(s) - see "Fig. 6 - Inputs, Outputs and Circuit Breakers" on page 15
5. Remove the earth cable by unscrewing the Earth Point wing nut- see "Fig. 2 - Earth Point" on page 12
6. Replace the washer and wing nut onto the Earth Point bolt.

3.2 Charging From An AC Supply

The unit can be charged via a 220 - 240 V AC supply from either the AC grid supply or a secondary power system. To connect an AC supply to Cygnus HPG:

1. Connect the AC Input (See "4.1 Connecting To A Fuel Generator For Automatic Stop/Start" on page 27)- Input LEDs will confirm the presence of the input.
2. Select the required mode for the chosen input (See "3.1.1 Description Of The Power Modes" on page 17)
3. View the Battery Monitor display to confirm that the battery bank is charging and for detailed status (see "3.1.3 Monitoring Battery Bank State of Charge" on page 19)

The unit can be used while charging- the power automatically passes through to consumers as required.

Charging time will increase when consumers are using available input current

The input is factory set to accept a 63 A input. It is possible to adjust the unit to accept inputs with lower input currents.

3.3 System Settings

WARNING

The AC Output Voltage and System Earthing parameters must only be changed by a competent electrical engineer.

The following settings are available to users through the RCC-03 controls. Further details available on request.

Basic Settings		
	Maximum current of AC Source	Min: 2 Default: 50 Max: 50
	Restore default settings	Yes -> Confirm
Inverter		
	AC Output Voltage **Danger! Adjustments should only be made by qualified personnel**	Min: 220 V Default: 230 V Max: 245 V
AC In & Transfer§		
	Maximum current of AC Source (Mode 1: Three Phase)	Min: 2 Default: 50 Max: 50
	Maximum current of AC Source (Mode 2: Single Phase Mode & Mode 3: Three Phase With L1 Backup)	Min: 2 Default: 21 Max: 50
Aux. Contact 1		
	Operating Mode	Automatic (Default) Reverse Automatic Manual On Manual Off
	Combination of Events	Any (Default) And
	Contact active with fixed time schedule	
	Program 1	Day of week Start hour End hour

§ AC In & Transfer Current settings provide adjustment to allow charging sources with various capacities to be used with the unit.

	Contact active on event	Yes No
	Xtender is off	For info only
	Contact active with inverter power or smart boost	
	Inverter power level 1 activate	Default: Yes No
	Power level 1 (% pNom)	Min: 20 Default: 80 Max: 120
	Time delay (minutes)	Min: 0 Default: 0 Max: 60
	Inverter power level to deactivate (% pNom)	Min: 20 Default: 70 Max: 120
	Time delay to deactivate (minutes)	Min: 0 Default: 60 Max: 60
	Contact active according to SoC	
	Contact activated with SoC 1	No Yes (Default)
	Contact deactivated over SoC (minutes)	Min: 20 Default: 60 Max: 100
System		
	Remote entry On/Off	For info only
	Auto restarts	
	After battery undervoltage	No Yes (Default)
	After inverter or Smart Boost overload	No Yes (Default)
	Delay to restart after overload (seconds)	Min: 2 Default: 20 Max: 60

	System Earthing (Earth-Neutral) - <u>Danger! Adjustments should only be made by qualified personnel</u>	
	Prohibited ground relay	No (Default) Yes
	Continuous neutral	No (Default) Yes
RCC Settings		
	Language	English French German Spanish
	Time	
	Date	
	User Level	Unlock code required-available from the manufacturer on request.
	Save & Restore Files	
	Save all files (system backup)	Set & Confirm
	Restore all files (system recovery)	Set & Confirm
	Apply configuration files (load master file from SD card)	Set & Confirm
	Extended and Special Functions	
	Advanced options for service engineers only	

3.4 Care And Maintenance

3.4.1 General Cleaning

1. Ensure that Cygnus HPG is switched off. See "3.1.5 Turning Off The Cygnus HPG" on page 20
2. Minor cleaning should be performed using a damp microfibre cloth.
3. Detergents or chemicals should not be used.

WARNING
Do not use a hose or pressure washer to clean Cygnus HPG

3.4.2 Caring For The Battery Bank

The Cygnus HPG battery bank uses sealed, maintenance free batteries. The only routine care necessary is to ensure that when not in use, the unit is charged at least once a month to keep the battery bank topped up. Refer to "3.2 Charging From An AC Supply" on page 21 for further information.

Leaving Cygnus HPG in a state of discharge for extended periods will seriously affect its performance.

3.4.3 Testing Cygnus HPG

It is recommend that the unit should be tested annually for electrical safety by a qualified electrician.
Local regulations may require more frequent testing. Please refer to local regulations for further details.

WARNING
If Cygnus HPG fails the relevant tests, do not use or open the unit. It must only be opened by a qualified service engineer.

It is recommended that a full service is performed every two years in order to ascertain the condition of your system. Please contact the manufacturer for further information.

3.5 Troubleshooting

Issue	Possible Cause(s)	Suggestion
Power is on at the Cygnus HPG but the consumers are not receiving any power	The output MCBs or RCDs may not be switched on	Check that the MCBs and RCDs are pushed up to the on position and that the relevant output LEDs are illuminated.
The system power has been switched on with one of the mode buttons but there is no display	The emergency switch may be depressed	Twist the emergency switch clockwise to release.
	The door limit switch may be activated	Ensure that the door is correctly closed and all three locks engaged.
There is power being sent to Cygnus HPG but it is not charging or passing through power	The input MCBs may not be switched on	Check the input MCBs are pushed up to the on position and the input LEDs are on
Output voltage is lower than 220 V AC over distance	If the distance between the unit and the consumers is more than 50 m the voltage can drop too low.	Adjust the voltage settings using the RCC 03
“Battery Voltage Too Low” Message on RCC-03	This indicates that the battery bank voltage has reached its lower limit	Charge Cygnus HPG from your chosen renewable power source, from an AC grid connection or secondary power system
The RCD continually trips	There is an electrical fault with the consumers connected to the AC output	Check the electrical integrity of the consumers being connected to the unit
The MCB continually trips	The consumers being connected draw too much power for the rated output of the unit	Refer to the maximum output rating on the unit’s rating plate and reduce the total power draw accordingly.
Generator auto start not working	Auxiliary signal cable is loose or has been damaged	Reattach or replace the auxiliary cable.
A Solar Array is connected to the Solar Array inputs but the Control Centre’s Solar Charge indicator does not illuminate	The system has not been switched on	Ensure that the system is switched on and that isolators are in the on position.
	The Solar Isolator is in the off position	

4 APPENDICES

4.1 Connecting To A Fuel Generator For Automatic Stop/Start

Auxiliary connections are provided which allow the automatic control of a fuel powered generator. These allow Cygnus HPG to control the start up and shut down of the attached generator under pre-programmed conditions using the RCC-03.

WARNING

When using Cygnus HPG with a fuel powered generator, do not connect the Cygnus HPG generator's earth. The earth from the fuel powered generator is passed through to Cygnus HPG.

4.1.1 Control Panel Auxiliary Connections

Two auxiliary connectors are provided on Cygnus HPG's main control panel. See "Fig. 1 - Control Panel" on page 10, item 4. Aux. 1 is programmed to allow control of a secondary power source such as a biofuel generator.

An auxiliary connecting cable is available from the manufacturer as an accessory. Only the yellow, green & red connections are used as follows:

Wire Colour	Connection
Red	Normally Closed
Yellow	Common
Green	Normally Open
Blue	Not Used

4.1.2 Bus Bar Auxiliary Connection

Screw terminal connections are also provided behind the rubber flap at the bottom left of the main control panel door. These are alternative connections for the same two auxiliary channels as the control panel mounted connectors.

Terminal Number	Connection
1	Aux. 1 Normally Closed
2	Aux. 1 Common
3	Aux. 1 Normally Open
4	Aux. 2 Normally Closed
5	Aux. 2 Common
6	Aux. 2 Normally Open

Fig. 7 - Auxiliary Bus Bar

4.2 Earthing Cygnus HPG

4.2.1 When Used Inline With A Fuel Powered Generator

When Cygnus HPG is being used inline with a fuel powered generator, Cygnus HPG should not be connected to earth directly. The fuel powered generator should be earthed and the Cygnus HPG's earth connection will be made through the Bus Bar or CEE Form connectors. This ensures that any earth leakage is detected and managed correctly by the fuel powered generator.

4.2.2 When Used As A Standalone Power Source

When used as a standalone generator, either powered solely from the internal battery bank or when receiving input from a solar array, Cygnus HPG should be connected to earth. This can be facilitated either by use of an earth rod (see "4.2 Earthing Cygnus HPG" on page 28) or connecting to a suitable existing earth point.

4.2.3 When Charging A Standalone Generator from An AC Source

While a standalone Cygnus HPG is being charged from an AC source such as a three phase grid connection or fuel powered generator which will be disconnected once the unit is charged, it is not necessary to disconnect the Cygnus HPG's earth connection.

WARNING

When using as a standalone power source, a protective earth must be connected to the unit in compliance with applicable local standards and regulations.

This can be done either by connecting to a suitable existing electrical earth, or by using an earth rod available from the manufacturer as an accessory.

4.3 Warnings

4.3.1 Safety Notice Regarding The Units' Batteries

Servicing of the batteries should be performed or supervised by personnel knowledgeable about batteries and required precautions. When replacing batteries, replace with the same type and number of batteries.

CAUTION: Do not dispose of batteries in a fire. The batteries may explode.
CAUTION: Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

4.4 Variable RCD

A Variable RCD (Residual Current Device) Circuit Breaker is provided as part of the AC output protection system. It allows for the adjustment of the sensitivity and time delay before the Variable RCD trips.

WARNING

The Variable RCD is a vital safety device providing protection from potentially fatal electrocution. It is factory adjusted for standard use and should not be adjusted without consulting the manufacturer.

A Variable RCD is adjusted when one or more additional RCDs are used further down the power distribution chain. Contact the manufacturer for further information before attempting to make adjustments to the Variable RCD.

The Variable RCD is factory set for 30 mA sensitivity with zero delay.

CYGNUS® HYBRID POWER GENERATOR

Cygnus® Three HPG Technical Data Sheet (AGM)

Model[1]	CYG3/12/ 37/AGM	CYG3/12/ 50/AGM	CYG3/18/ 37/AGM	CYG3/18/ 50/AGM	CYG3/24/ 37/AGM	CYG3/24/ 50/AGM
Prime Power Rating @ 25°C (kVA)	10.5		15		21	
Standby Power Rating @ 25°C - 30 mins (kVA)	12		18		24	
Surge Power Rating @ 25°C - 5 secs (kVA)	31.5		45		63	
AC Output Voltage - 50 Hz (V)	230 1Ph, 400 3Ph (Both Adjustable)					
AC Input Current Max. (A)	63 1Ph, 50 Per Phase 3Ph					
AC Output Current Max. (A)	56				63	
Transfer Relay Time (ms)	< 15					
Standby Power Consumption (W)	6.3		6.6		7.2	
Inverter Protection	Overload, Overheat, Short Circuit, Low Battery					
Battery Storage Type	AGM (Sealed Lead Acid)					
Battery Capacity @ 25°C, C20, 70% DoD[2] (kWh)	37	50	37	50	37	50
Earth Fault Protection	Variable RCD					
Power Input Connections	1 x 63 A 1Ph & 3Ph CEE Form, AC In Busbar					
Power Output Connections	1 x 63 A 1Ph & 3Ph CEE Form, AC Out Busbar					
Auxiliary Connection (Remote Generator Start)	Bulgin Buccaneer Mini400 4 Pin (2 x Auxiliary 2 Wire Contacts - Fully Programmable) & Internal Auxiliary Busbar					
Battery Monitoring	LCD Display With Voltage Indicator, Power Input / Output, Time Available, % Capacity Available, Charge State History & Battery Management					
Available Menu Languages	English, French, Spanish, German					
Charge Time - 63 A 3Ph Inlet[3] (hours)	7.5	10	6			
Water/Ingress Protection Rating	IP54					
Operating Temperature Range[4] (°C)	-20 to +45					
Weight (kg)	2420	2570	2420	2570	2420	2570
Dimensions W x D x H (mm)	998 x 2050 x 1500					
Fork Pocket Dimensions W x D x H (mm)	190 x 996 x 100					
Distance Between Fork Pockets (mm)	810					
Lifting Ring	Rotatable, 4 Tonne WLL Capacity					
Solar Preparation Upgrade Package[5]	MPPT Controller With Up To 7 kWp Array Connection					
Remote Communication & Data Collection Package	Integrated GSM Modem To Collect System Status, Live & Historic Data, Fault & Event Notification, System Control & Programming					

[1] Units with solar preparation option have /S suffix
[2] kWh is based on C20 rate and will vary depending on rate of discharge (see Fig. 2, Fig. 5 & Fig. 6)
[3] Charge time dependent on availale current of external source
Battery bank capacity may be affected by charging or discharging at less than 0°C (see Fig. 4)
[4] Battery bank total cycle life may be affected by charging or discharging in excess of 25°C (see Fig. 3)
[5] Optional upgrade available pre or post purchase of main unit

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Cygnus® Three HPG Technical Data Sheet (AGM)

Battery Bank Cycle Life

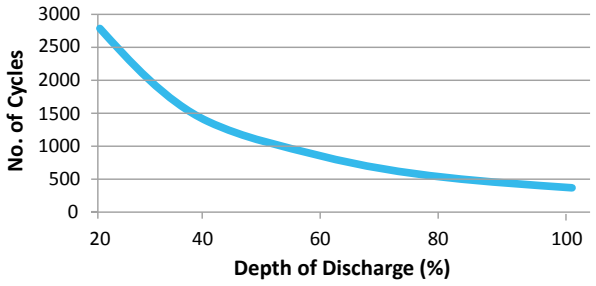

Fig. 1

Total System Load

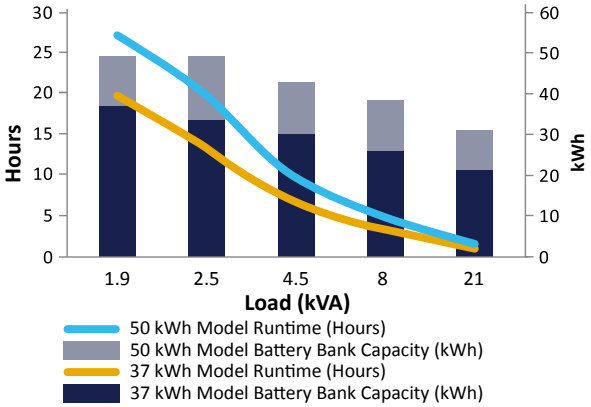

Fig. 2

Temperature Vs Battery Cycle Life

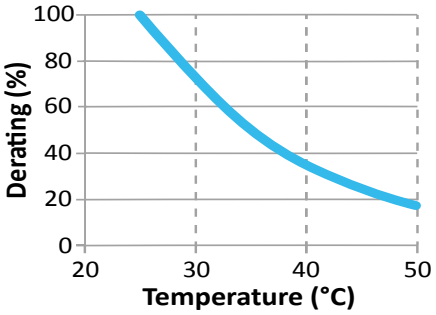

Fig. 3

Temperature Vs Storage Capacity

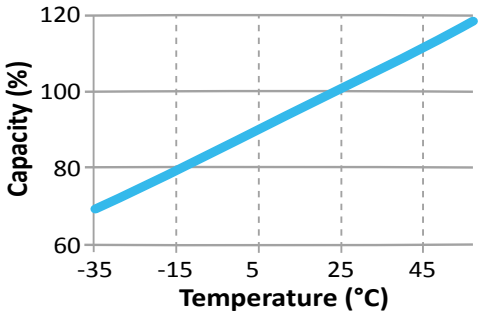

Fig. 4

Runtime & Capacity Vs Total System Load (50 kWh)

Runtime (hours)	Available Storage (kWh)	Current (A)	Power (kVA)
20	49.7	10.8	2.5
18	48.3	11.7	2.7
16	47.0	12.8	2.9
14	45.6	14.2	3.3
12	44.2	16.0	3.7
10	43.7	19.0	4.4
9	42.6	20.6	4.7
8	41.5	22.6	5.2
7	40.7	25.3	5.8
6	39.9	28.9	6.7
5	39.0	33.9	7.8
4	36.6	39.7	9.1
3	34.8	50.5	11.6
2	33.6	73.0	16.8
1.6	31.7	84.8	19.5

Fig. 5

Runtime & Capacity Vs Total System Load (37 kWh)

Runtime (hours)	Available Storage (kWh)	Current (A)	Power (kVA)
20	37.3	8.1	1.9
18	36.3	8.8	2.0
16	35.2	9.6	2.2
14	34.2	10.6	2.4
12	33.1	12.0	2.8
10	32.8	14.2	3.3
9	31.9	15.4	3.5
8	31.1	16.9	3.9
7	30.5	19.0	4.4
6	29.9	21.7	5.0
5	29.2	25.4	5.8
4	27.4	29.8	6.9
3	26.1	37.9	8.7
2	25.2	54.8	12.6
1.5	23.3	73.8	17.0
1.1	21.8	88.1	20.3

Fig. 6

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