

BLUE NOVA energy

Product User Manual

iESS Intelligent Energy Storage Systems



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Compiled by	BlueNova Dev Dept.
Edited by	C. Delport
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Congratulations on becoming the owner of a BlueNova® flagship iESS solution.

This document contains information on the structural specifics, installation, troubleshooting, safety & maintenance procedures, storage guidelines as well as emergency/first aid procedures of iESS systems.

Please keep this document in a safe place for the entire duration of your iESS's operational lifespan. Critical information in this document may need to be referenced in future. Do not discard this document.

TECHNICAL SUPPORT – iESS & HV SYSTEMS

Should you have any technical queries or require technical support on BlueNova® iESS systems and/or HV batteries, please contact one of the following designated people:

NAME	POSITION	EMAIL
Cusaan Schutte	HV Support Technician	✉ cusaans@bluenova.co.za
Lourens Smit	iESS Production Foreman	✉ lourenss@bluenova.co.za
Eduard van der Merwe	HV Training Instructor	✉ eduardv@bluenova.co.za

Alternatively, contact our Head Office to be connected to anyone else in our team:

BLUENOVA HEAD OFFICE

☎ Phone: +27 21 205 2000 ✉ E-mail: support@bluenova.co.za

DISCLAIMER

BlueNova® iESS systems are custom designed on a case-by-case basis in order to meet the unique requirements of each application / deployment. The exact composition & technical specifications of each iESS supplied to-date is defined in the contractual agreement entered into between BlueNova and the purchasing client in each case. Some or all information in this manual may therefore not be applicable to any specific iESS systems in the field that may have to be serviced, tested or otherwise operated. Unless explicitly stated otherwise in the sales agreement or any other relevant official documentation associated with a specific sale, all statements, information, and recommendations in this document are provided “AS IS” without constituting or inferring to association with any official warranties or guarantees.

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01 SAFETY FIRST

1.1 System access & maintenance

All personnel authorised to access, maintain or operate the iESS or any part thereof must be familiar with the functionality & potential dangers of all integrated core components as well as of the iESS system as a whole. In the interest of personal safety, iESS access authorisation should be granted only to suitably qualified engineering personnel.

Maintenance procedures on the BCS must be conducted by a qualified HV engineer or service technician only. Maintenance on the air conditioning system must also be performed as required by an accredited qualified contractor.

1.2 Personal protective equipment

NOTE: PPE must be worn whenever installing, servicing or otherwise directly interacting with iESS systems or the distribution circuitry connected to it directly, in accordance with [ISO 20345:2021](#)

When working inside the container, the following minimum PPE must be worn at all times, regardless:

- Work clothes
- Steel toe boots
- Protective glasses

When maintenance tasks are performed (such as checking cables or wires, measuring voltage, replacing electrical components, or cleaning modules and brackets), insulated gloves rated at $\geq 16.5 \text{ Cal/cm}^2$ must also be worn.

NOTE: All equipment used to operate, service or otherwise interact with any iESS-integrated component and/or subsystem or the distribution circuitry connected thereto must be electrically insulated to the minimum extent of the standards defined in [IEC 60900:2018/COR2:2020](#).

1.3 Battery safety

IMPORTANT: The voltage of LiFePO₄ battery configurations in iESS systems can be up to 780VDC or more. iESS integrated battery outputs will remain live even if the DC section of the container is disconnected from inverters/loads. Touching the output terminals or other conductive material connected thereto should be avoided at all costs. Failure to do so might result in damaging equipment, voiding of product warranties, serious personal injury or even death.

- Do not connect the battery's positive and negative terminals in short circuit, nor those of any battery module.
- Do not use the battery without an integrated BlueNova® approved BMS.
- Do not disassemble, pierce, cut or in any way physically alter any part of the battery configuration or its cells.
- Do not burn, incinerate, or otherwise subject the battery configuration or any of its cells to extreme heat.

1.4 Safety warnings (signage)

It is important to ensure that the original safety & warning notifications applied to the interior and exterior of the iESS system remain protected from damage as well as clearly visible to minimise accidents and injuries.

- Safety warning signage should be kept clean, unobstructed & clearly visible at all times.
- Damaged safety warning signage should be repaired and/or replaced as soon as possible.
- Safety warnings should be applied and remain in close proximity to the hazards/dangers that each refers to.

In the event of performing maintenance and/or repair procedures in or around iESS systems, additional signage might have to be placed around the site in question. Temporary signage should also remain unobstructed & clearly visible. If necessary, appropriate barriers and/or fencing should also be erected to prevent unauthorized access to the site.

Temporary safety warnings & barriers should be removed upon completion of repair/maintenance procedures, and the site should be left in a safe condition.

1.5 Emergency & first aid procedures

The emergency procedures listed below are applicable to incidents involving LiFePO₄ batteries only. This manual does not cover emergency procedures which may be applicable to incidents involving other iESS-integrated components & subsystems. Please refer to the OEM documentation for potential additional procedures.

1.5.1 Fire / thermal event

- Evacuate the danger zone. Open ventilation in the room if it is safe to do so.
- Extinguish the fire with a CO₂ fire extinguisher if possible. Do not proceed with this step without wearing suitable fire-resistant PPE or if it is too dangerous.
- Should the fire be extinguished, any remaining smoking cells should be immersed completely in water. Do not proceed with this step without wearing suitable PPE – especially gloves and goggles – or if it is too dangerous.

1.5.2 Skin contact

- Wash the affected area immediately with soap & water.
- If irritation persists, seek medical attention.

1.5.3 Eye contact

- Rinse eyes immediately with clean water for at least 15 minutes.
- Seek medical attention immediately afterwards.

1.5.4 Ingestion

- Do not take emetic (vomit-inducing) medicine to counteract the ingestion of cell/battery electrolyte.
- Seek medical attention immediately.

02 STRUCTURAL OVERVIEW

2.1 Default system layout

Each BlueNova® iESS is designed according to the unique set of requirements of its application. For this reason, any single iESS system can consist of either one or more standard 6m/12m shipping containers. In multi-container iESS systems, the HV battery configuration & BMS will be allocated to some of the iESS's containers (collectively the DC section), while the inverter(s) and remaining components are allocated to the remaining containers.

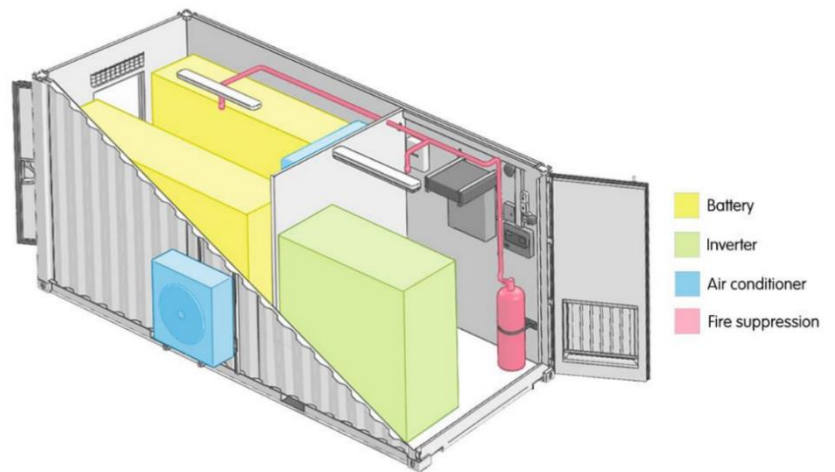
The majority of iESS systems supplied to-date however, have each been deployed in a single 6m shipping container only.

For this & other reasons, the typical component layout applied in single 6m container iESS is considered to represent the default system layout of the iESS product range in general. A dividing wall separates the AC and DC sections.

In addition to the HV inverter(s) and battery configuration, iESS systems will also include all of the following standard subsystems:

- Access control assembly
- Fire suppression system
- HVAC components
- Remote monitoring electronics

Additional components & subsystems (such as CCTV cameras) can be optionally included during the production phase of iESS systems.



2.2 Subsystems & components

This subchapter provides additional information on the various components & subsystems which may be included in iESS systems. The standard subsystems installed in all iESS solutions are listed first (indicated by suffix “core”), followed by the non-standard components & subsystems which may be optionally installed (indicated by suffix “optional”).

2.2.1 Container (core)

As mentioned in section 2.1, iESS systems are assembled in one or more 6m/12m ISO shipping containers. Structural modifications to containers during the production phase include:

- Fitment of the dividing wall to separate the AC section from the DC section (for single container iESS systems).
- Fitment of interior insulation (urethane panels) & installation of all operational components & subsystems.
- Structurally securing all installed subsystems in preparation for transportation of the iESS to its intended site.
- Fitment of ventilation components incl. exterior cowlings & door louvres with air filters (on AC section's doors).
Note: Door louver filters need to be cleaned periodically to maintain optimum ventilation efficiency.
- Application of branding / co-branding material (if any) in accordance with associated agreement(s).
- Fitment of the entry plate (AC section) from which to connect the iESS to the distribution network(s) on site.

The industry standard dimensions of both 6m and 12m ISO containers are listed below:

- 6m x 2.4m x 2.8m (L x W x H)
- 12.1m x 2.4m x 2.9m (L x W x H)

Note: The shipping containers used to build iESS systems in are not always supplied by the exact same manufacturer. Actual container dimensions may therefore differ slightly from the above specified values from time to time.

2.2.2 Access control (core)

Single container iESS systems each have two access points. The DC section is accessed through a single standard size door (fitted during production) on one end, while the AC section is accessed through the container's original double doors at the opposite end of the container. Both doors are internally fitted with electromechanical locks.

Access point: DC section



Access point: AC section



The access control systems integrated in all deployed iESS containers are pre-configured to continuously minimise vulnerabilities by which unauthorised system access might be gained.

- All container access points are locked with internally fitted electromechanical locks.
- Lock disengagement requires entering the correct access code on the container's keypad (normally installed to the immediate left of the DC section's door).

- Upon entering a valid access code, the locks for all access point doors will be disengaged for 2 minutes. The **GREEN** indicator lamp above the keypad will light up at this stage & remain lit for the same above duration.
- As soon as the 2-minute window expires, the green indicator will switch off and all locking mechanisms will become primed to lock/engage.
 - Access point doors that are closed at this stage will be locked immediately.
 - Access point doors that are still open at this stage, will remain open, while its associated locking mechanisms remain primed. The **YELLOW** indicator lamp above the keypad will light up to indicate the presence of unlocked access point doors in such cases.
 - Lock engagement is triggered as soon as any primed lock's corresponding door is closed.
- The **YELLOW** indicator lamp will switch off as soon as all access point doors are closed, and locks engaged.

Note: See Appendix A for instructions on how to change the master access code for the keypad security assembly. For instructions on how to configure biometrics-based systems, please consult the relevant enclosed user manual.

2.2.3 Fire suppression (core)

The FM 200 fire suppression system fitted into iESS systems is installed during the production phase and establishes automatic fire suppression functionality in both the AC and DC sections. Maintenance and/or modification of this subsystem may only be performed by relevantly qualified technicians. The user manual is available online [here](#).

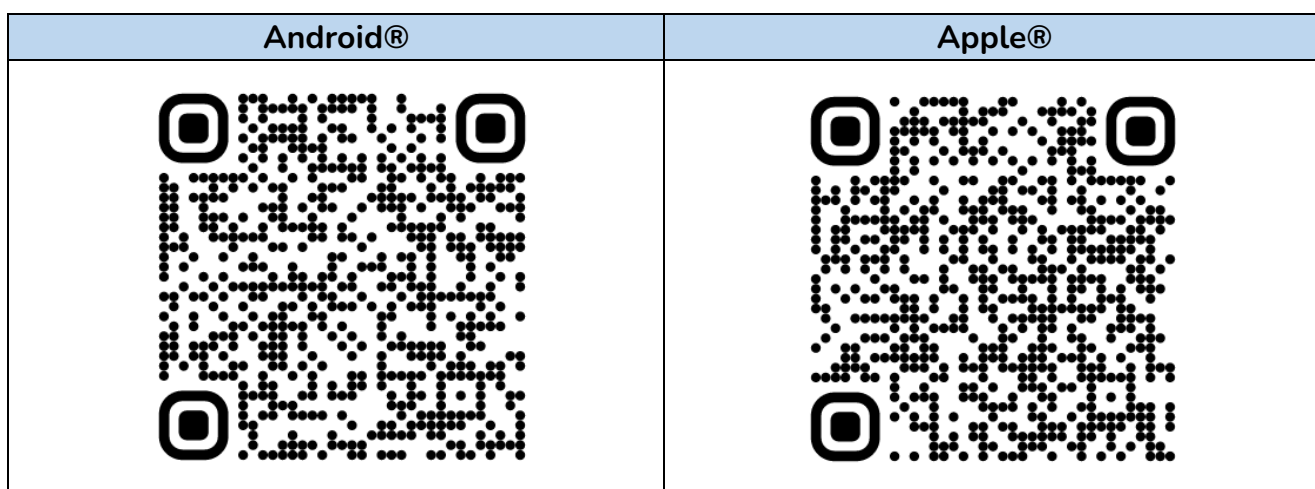
FM 200 fire suppression systems can be remotely monitored. This is an optional feature available upon request.

2.2.4 CCTV (optional)

CCTV video monitoring systems can be optionally integrated in iESS systems. The cameras used in these subsystems include Wi-Fi connectivity which enables them to be accessed & controlled remotely.

To activate installed cameras and enable remote control, the following steps should be completed:

- Download & install the Smart Life app (Size ±220MB)

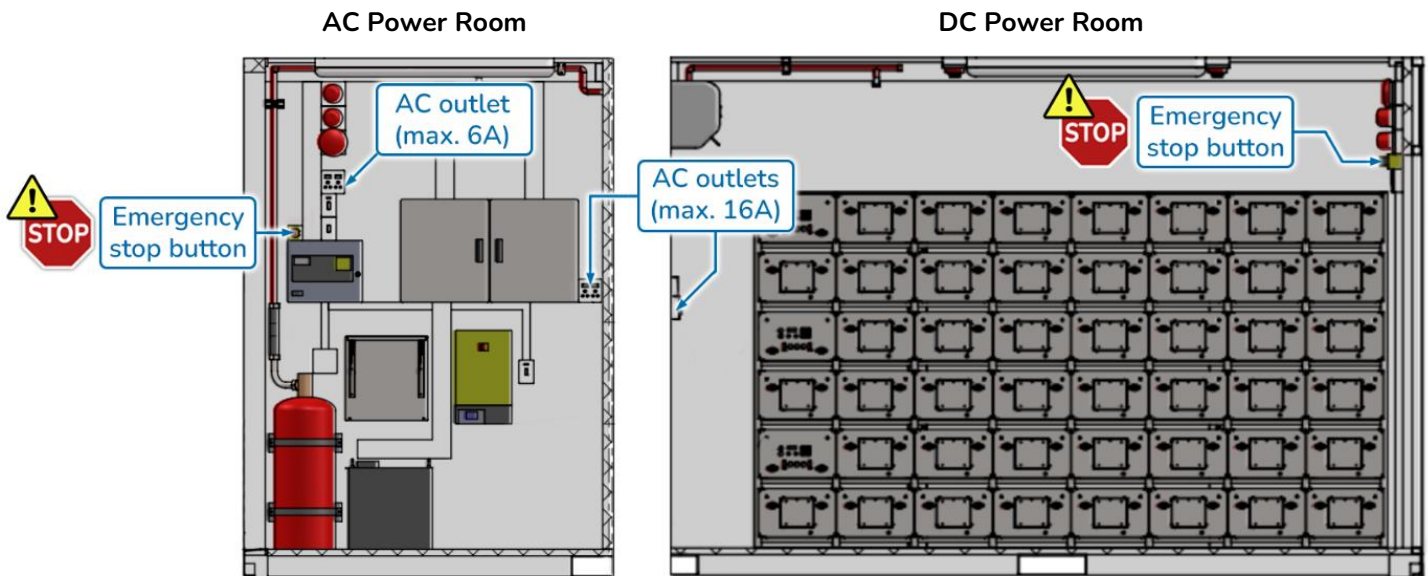


- Register all cameras on the Smart Life app to activate them. Note that the app is free to download, but that in-app purchases and/or subscription fees might apply.

2.2.5 Electric reticulation & emergency stop (core)

Standard electric reticulation in single 6m container iESS systems extends to the ceiling lights fitted in both the AC and DC sections as well as 2 x wall sockets (rated to supply maximum current of 6A and 16A respectively) powered from the UPS. Additional wall sockets can be added during the production phase upon request.

An emergency stop button is fitted inside both the AC and DC sections of all iESS systems. In single 6m container builds, the emergency stop buttons are normally located in the following positions:



Activating an emergency stop button in any iESS system will immediately shut down the system's inverter(s) and disconnect the HV battery configuration from all external connections by triggering the main contactor to disengage.

2.2.6 System state indicators (core)

iESS systems are fitted externally with the indicator lamp array illustrated below.



The array indicates various system statuses by lighting up as follows:

- RED** - Fire suppression system activated.
- BLUE** - System active / running.
- GREEN** - Access point doors unlocked.
- YELLOW** - Access points are primed to lock, but one or more doors are still open.

2.2.7 High voltage battery (core)

HV battery configurations in iESS systems consist of a number of 52VDC battery modules connected in series. Each battery module contains 16 x 280Ah LiFePO4 cells, resulting in an installed capacity of 14.56kWh @C10 per module. HV battery configurations are sized to be compatible with the iESS system's integrated HV inverter(s).

WARNING! The collective DC voltage of iESS battery configurations can be up to 780VDC or more. iESS battery configurations remain live even when disconnected from components in the AC section and/or after executing an emergency stop in any iESS system. Physical contact to the HV battery configuration's output terminals (or any conductive material connected thereto) must be avoided at all costs. Failure to do so may result in damaged equipment, voided product warranties, serious personal injury or even death.

The modular design of iESS battery configurations allow for the replacement of any number of modules in the event of under-performance and/or malfunction. Battery module replacement may only be carried out by a suitably qualified BlueNova® approved contractor.

2.2.8 HVAC - Heating, ventilation & air conditioning (core)



The temperature and ventilation functionality inside iESS containers is maintained by an air conditioning system set to maintain an ambient internal temperature of 25°C in accordance with the ideal operating temperature of LiFePO₄ battery configurations.

The manufacturer & model specifics of iESS-integrated air conditioning systems differ from time to time. Please refer to the OEM documentation of the air conditioning equipment integrated in any specific iESS system to ensure that:

- the equipment is operated correctly, and
- the equipment is serviced by a qualified contractor in accordance with OEM warranty requirements.

2.2.9 BMS - Battery management system (core)

A BMS is an electronic system normally consisting of multiple electronic components designed to be connected to the cells and other components of certain types of batteries for the purposes of establishing new functionalities or improve existing ones. The minimum core functionalities which should be provided by all BMS electronics designed for lithium-ion batteries should include cell voltage balancing as well as auto-protective countermeasures against adverse operations/operating conditions such as over-charging and over-discharging of the battery.

The BMS electronics in iESS HV battery configurations continuously measure, calculate & report the following data:

- **Voltage** (total battery voltage & cell voltages)
- **Current** (actual charge/discharge current)
- **Temperature** (actual average internal temp.)
- **SoC** (calculated percentage)
- **SoH** (calculated percentage)

The above capabilities partly contribute to the following established BMS functionalities in iESS systems:

- Cell balancing ("equalisation")
- Calculation & reporting of performance data
- Battery authentication (unique ID)
- CAN compatibility with select HV inverters
- Over-charge & over-discharge protection
- Protection against out of temperature range use
- On-board monitoring (via integrated OLED display)
- Remote monitoring (via BMAC & RMAC)

2.2.10 DB - Main distribution board (core)

The main distribution board is located in the AC section of single container iESS systems. The following components & subsystems are powered from the main distribution board:

- UPS
- Fire suppression system (from UPS)
- Access control system
- HVAC system
- BMAC & RMAC modules (from UPS)
- BMS
- Wall sockets & lights (from UPS)



2.2.11 BCS - Bridge-coupled series inverter (core)



The BCS is a bi-directional inverter through which an iESS system's integrated HV battery configuration is charged and discharged as/when required. BCS models that can be integrated in iESS systems include:

- [ATESS® HPS Series](#)
- [Sunsynk® 3-Phase Hybrid Series](#)
- [Kehua® BCS-A Series](#)
- [AEG® Convert SC Flex](#)

BCS inverters allow for the selection of several modes of operation:

- Backup / standby
- Energy arbitrage
- Power factor correction
- Microgrid mode

BCS inverters are normally both floor- and wall-mounted to iESS containers. Heat is dissipated through an exhaust duct connected to the BCS's outlet and running along the top of the container wall to the exterior outlet. Air intakes normally form part of BCS enclosures and are left unmodified during the production phase. Power to the control circuitry of the BCS is supplied by the UPS (also installed in the AC section) via the main DB.

The **BLUE** lamp of an iESS system's external indicator array will be lit whenever its integrated BCS is operational.

WARNING! The various BCS models which may be integrated in iESS systems operate at high AC and DC voltages. Configuration and/or maintenance of BCS inverters should only be performed by suitably qualified technicians. Failure to do so may result in equipment damage, voided product warranties, serious personal injury or even death.

2.2.12 UPS - Uninterruptible power supply (core)

The UPS in single container iESS systems is installed in the AC section and normally consists of a BlueNova® [RacPower BN52V-100-5.2k BP](#) battery connected to a preconfigured Victron® or Sunsynk® 48V 5kVA inverter. UPS battery capacity can be extended in increments of 5.2kWh up to a maximum of 46.8kWh per inverter if necessary.

iESS UPS systems are powered from the external energy sources of each iESS via the main DB, and in turn supply uninterruptible power via the same DB to the following iESS components & subsystems:

- Fire suppression system
- BMAC module
- RMAC module
- Reticulation components (wall sockets & lights)
- LTE Router

RacPower BP batteries integrated in iESS UPS subsystems are each supplied with a 10-year warranty. The warranties of UPS-integrated inverters are determined by the supplier of the inverter in each case. Please consult the relevant OEM documentation for more information on any specific inverter's warranty & associated conditions.



2.2.13 RMAC - Remote monitoring & control (core)

The RMAC is a subsystem consisting of several components that collectively control key output functions of the BCS and BMS. RMAC functionality is driven by an integrated algorithm designed to meet the specific requirements of each iESS deployment during the design phase and can only be altered or modified by qualified BlueNova® personnel.

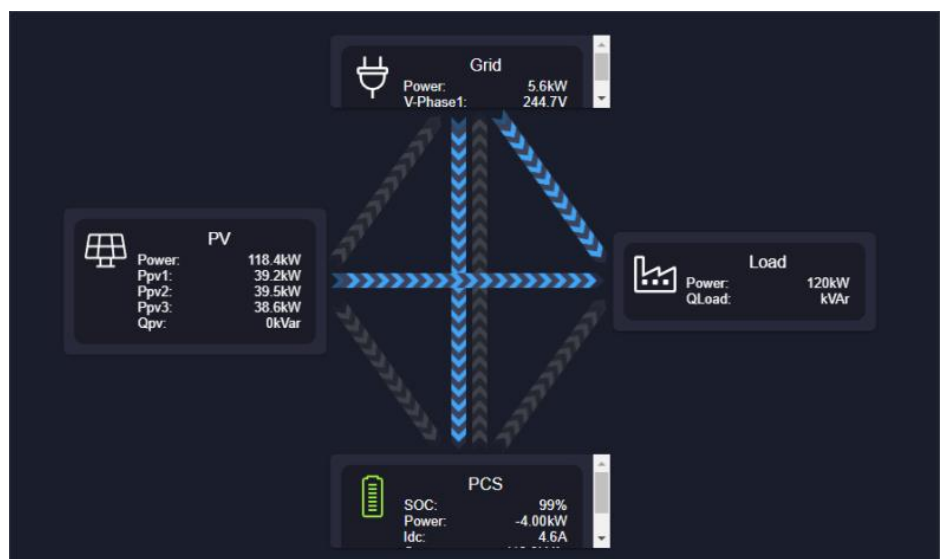
RMAC systems include serial communication functionality & associated control output connection points to which a GSM router may optionally be connected to establish remote system monitoring functionality. The following 3 x diagrams are examples of how RMAC functionality might be illustrated under the conditions specified in each case:

Mode 1

Conditions:

- Load demand > PV supply
- Battery SoC < 100%

While the collective load demand exceeds PV-generated supply, 100% of the PV array's generated power will be directed to the load & the remaining difference will be supplied by the utility grid. The battery will also be recharged from the grid until it reaches 100% SoC.

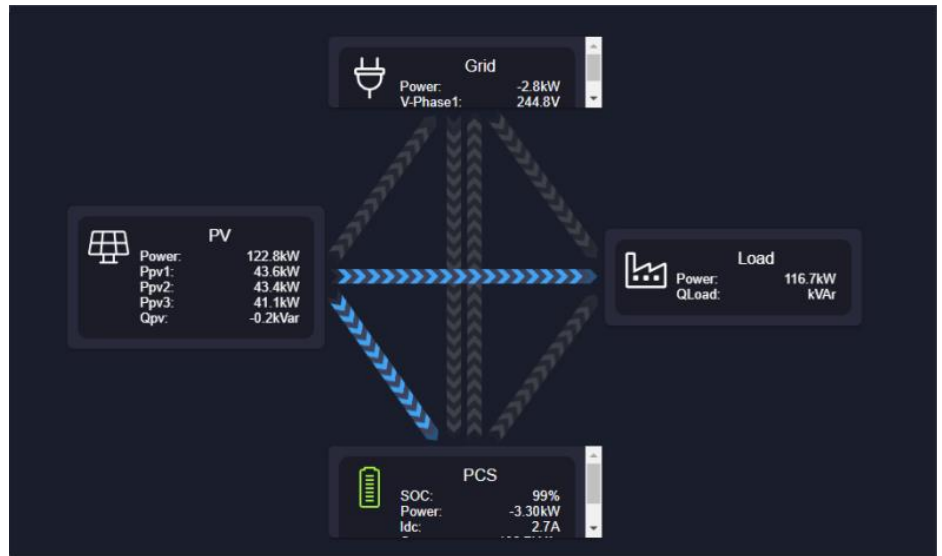


Mode 2

Conditions:

- PV supply > Load demand
- Battery SoC < 100%

While PV-generated supply exceeds collective load demand, the PV array alone will supply all connected loads with power. Surplus PV-generated supply will be directed to the battery until it is recharged to 100% SoC.



Mode 3

Conditions:

- PV supply < Load demand

While the collective load demand exceeds PV-generated supply, 100% of the PV array's generated power will be directed to the load & the remaining difference will be supplied from a connected transformer source. The battery will not be recharged until conditions change.



RMAC functionality is further supported with the integration of a BlueNova® BMAC-HV module – an electronic device developed to establish serial communication compatibility between BlueNova® HV battery configurations and select HV inverters. BMAC-HV modules also include data transmission capabilities via Wi-Fi to enable system performance & health variables (especially those which are battery-related) to be remotely monitored via the [BlueNova® Live Monitoring Web Platform](#).

Note: To establish remote monitoring, a BMAC-HV module requires a dedicated internet-connected 2.4GHz Wi-Fi access point within range of the module that does not share the same SSID (access point name) with any 5GHz Wi-Fi access point also within range. Please refer to the [BMAC user manual](#) for specific configuration instructions.

03 INSTALLATION NOTES

3.1 Main DB

The main DB is supplied via a 3-phase connection from the BCS & serves as central point from which power is distributed to the iESS system's HVAC and UPS subsystems. Power supply can be isolated via the mains breaker located at the top left of the DB.

The right-hand side of the DB is reserved for power distribution to 12V & 24V telemetry- and RMAC components.

3.2 UPS

The UPS is supplied from the DB via the isolator located in proximity next to the UPS. In turn, the UPS supplies uninterruptible power (while its battery is sufficiently charged) via a separate section on the DB to the fire suppression system, ceiling lights, wall sockets and 24V components.

To switch the UPS system on:

- Verify that the UPS's battery is connected to the inverter.
- Once the main supply is connected, switch the UPS on via the main screen panel.
- Press & hold the power button until the UPS dedicated loads power up / switch on.

3.3 BMS

The BMS is fully configured during the commissioning phase and does not require any further manual procedures to be completed in order to be activated. The I/O device located in the telemetry section of the DB controls the BMS.

3.4 BCS inverter

iESS-integrated BCS inverters primarily receive DC input from the same iESS system's high voltage LiFePO4 battery. The main isolator of most BCS inverters will normally be located on the righthand side of each unit, on the same side as the unit's main input & output power connection points. In iESS assemblies, the UI and internal ventilation fans of BCS inverters are externally powered from the iESS's integrated UPS (although these can also be powered by the BCS itself). Switching to this mode can be done via the UI of most types of BCS inverters.

The relevant DC input breaker needs to be closed before a BCS can be switched on. During startup, a password prompt should appear on the unit's UI. The default passwords for some iESS-compatible BCS models are listed below:

BCS manufacturer	Default password
Kehua®	222
ATESS®	1234

To restart a BCS inverter, isolate the unit from the UPS and any other power sources & open the relevant DC breaker on the corresponding DB. Once the unit has shut down, reconnect the UPS & close the DC breaker again.

Under certain conditions BCS inverters might have to be reset to factory default state. The exact procedure required to do this differs from model to model, but it would generally require entering a unique password which should be displayed on the inside of the BCS enclosure's doors.

Please note not to change any configuration settings without authorization, as the BCS is set up during commissioning for site specific conditions and operation. Changing these settings will result in damage and malfunction of the iESS.

3.5 HVAC system

The HVAC is supplied by main DB with 3-phase connection. The main isolator is located to the left of the indoor unit. The unit is controlled by a wired remote above the door.

The outdoor unit will need to be fitted and connected with pre-made pipes and electrical cable once placed on site. The outdoor compressor will be pre-charged with gas. Piping needs to be done by a qualified technician to ensure there are no leaks in the system.

3.6 Fire suppression system

The fire suppression system is powered by the UPS via the main DB.

The release solenoid is removed for transport and needs to be connected again once on site.

The operating key should be in auto/manual mode for normal operation. No setting should be changed as unit is commissioned during the production phase.

See **Appendix B** for more information on the different states of the fire suppression system.

04 BASIC OPERATING INSTRUCTIONS

4.1 Pre-operation checklist

1. Confirm all power is disconnected.
2. Confirm all circuit breakers are in the OFF position.
3. Confirm fire system is active and set to manual mode.
4. Confirm all BMUs are switched OFF by opening red missile switches.
5. Switch ON UPS by holding ON button for 4 seconds.
6. Close DC fuse in DB.
7. Switch ON all circuit breakers in DB.
8. Properly close all doors of the relevant iESS system.
9. Do access enrolment.
10. Confirm access is complete and the green indicator light is ON.
11. Open the iESS system main doors.
12. Confirm relays are activated.

4.2 Switching the system ON

1. Close inverter DC breaker and ensure inverter AC breaker is open by using designated handle.
2. Turn ON only one string at a time and measure appropriate voltage on DC bus on the inverter.
3. Close the red missile switches on BMU. Flip the negative switch first and then the positive switch.
4. Turn ON the 12 V power supply.
5. Turn ON the BMU power by switching the main ON/OFF switch.
6. Repeat steps 2 to 5 for all string's BMUs.
7. Ensure that the DC currents that are flowing between the strings are <5 A.
8. Switch and close AC breaker on inverter with designated handle.
9. Access settings on inverter touch screen. Enter access code – (1234 – ATESS inverter); (222– Kehua inverter).
10. Press the inverter ON button on touch screen and confirm.
11. After 2 minutes, the main inverter will be ON and AC available to charge and discharge.

12. Confirm step 10 by measuring the AC input on the inverter to ensure AC is available.
13. After the successful Switch ON procedure ensure that the fire system is active and set to Auto mode.
14. Close all doors of iESS

4.3 Switching the system OFF

1. Access settings on inverter touch screen. Enter access code – (1234 – ATESS inverter); (222-Kehua inverter).
2. Press the inverter OFF button on touch screen and confirm.
3. Open the AC breaker on the inverter with the designated handle.
4. Open the DC breaker on the inverter with the designated handle.
5. Switch OFF only one string at a time at each relevant BMU.
6. Switch OFF the BMU main ON/OFF switch.
7. Turn OFF the 12 V power supply

4.4 Remote monitoring

Please reference the [BMAC User Manual](#) for instructions on how to configure remote monitoring.

4.5 Emergency stop

The emergency stop buttons are located in both the AC- and DC rooms of the iESS container. When the stop button is pressed the fire suppression and the main relay are triggered in the DB board shutting down the system.

- The location of the emergency stop button in the AC room is located left of the fire panel, above the red fire suppression cylinder.
- The location of the emergency stop button in the DC room is located above the main entrance door, next to the main room light switch.



05 STORAGE GUIDELINES

- a. Ensure that the battery is switched off when stored.
- b. Disconnect the communication cable.
- c. Always store batteries in a cool and well-ventilated area – ideally $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$.
- d. Store away from moisture and heat.
- e. Do not store batteries upside down for overly extended periods.
- f. Check the open circuit voltage of stored batteries at least once per month. Recharge batteries sufficiently and frequently enough to prevent the open circuit voltage falling below 40V.
- g. The battery needs to be charged every 6 months if out of use.
- h. Ensure that the stored battery's state of charge is always above 50%. 100% SOC% is optimal.
- i. Do not place more than 6 units on top of each other.

06 APPENDICES

6.1 Appendix A: Changing the master access code

The below procedure will enable the user to change the default Master Code or the currently stored Master Code to a new Master Code (default access code: 1234#). See the Smartguard [online installation guide](#) for additional information.

Enter the following keystrokes:

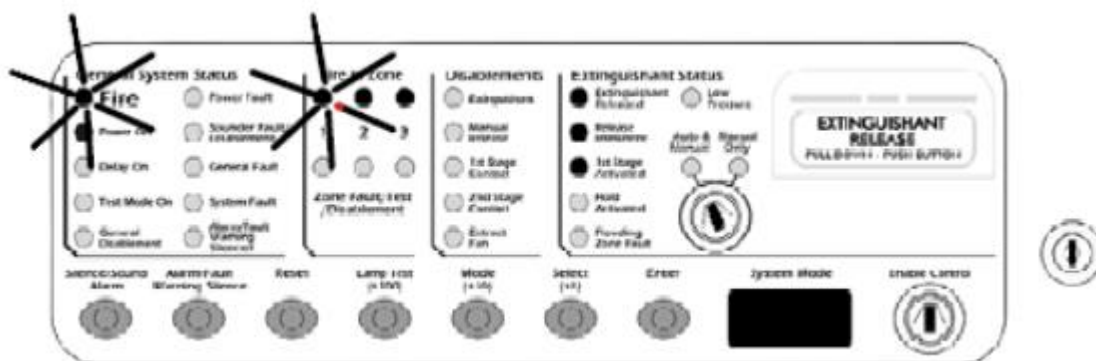
1. Enter Program Mode *** Master Code¹ ***
2. Select KwikLearn **0 #**
3. Enter address **0 #**
4. Enter new code **Code #**

¹Default Master Code= **1 2 3 4**

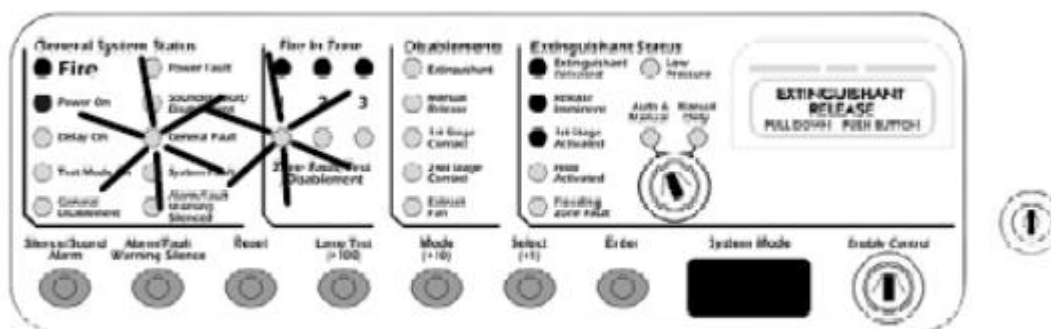
Indicator LEDs

6.2 Appendix B: Fire suppression system states

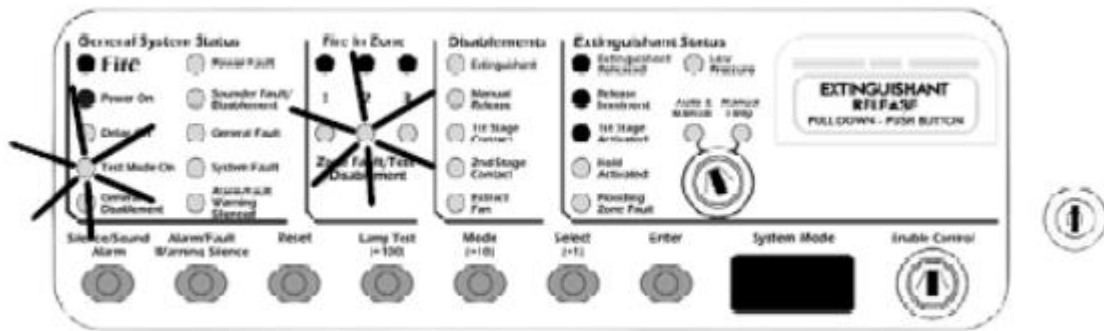
Type: **Fire alarm condition**
 Output: General fire indicator lights and zonal fire indicators flash. Buzzer sounds urgently.
 Actions: Carry out fire emergency procedures.



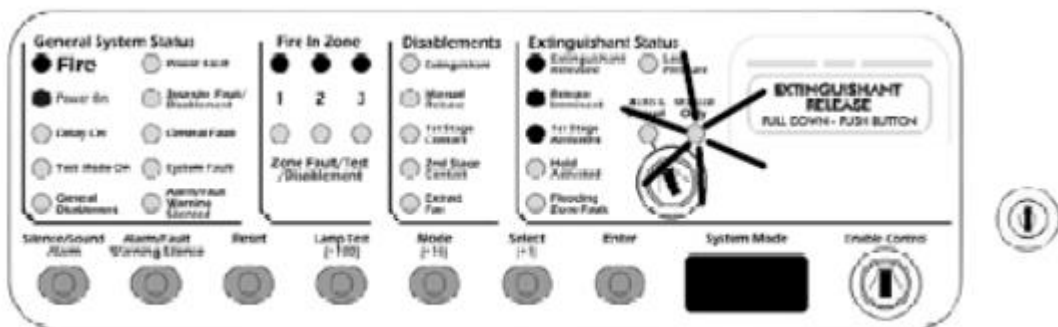
Type: **Fault condition**
 Output: General fault indicator lights and specific fault indicators flash. Buzzer sounds continuously.
 Actions: Contact HV support.



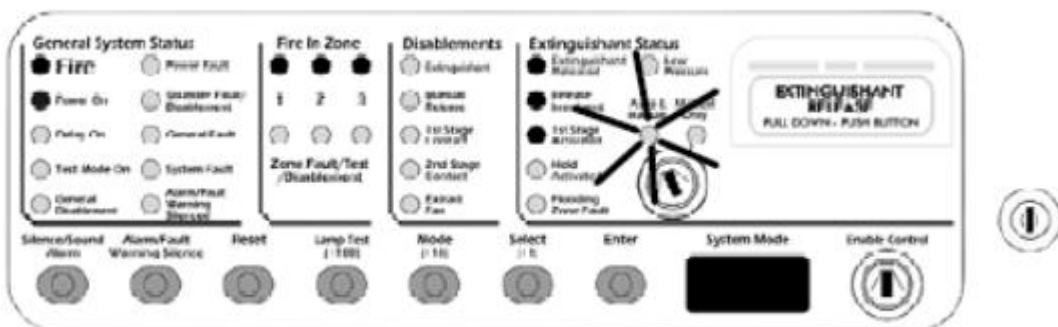
Type: **Disabled condition**
 Output: General disablement indicator and specific fault indicator lit continuously.
 Actions: Maintain vigilance during disablement conditions.



- Type: **Manual only mode**
 Output: Manual only indicator light on.
 Actions: Extinguishant will not be released automatically. Manually extinguishing fire might be necessary.



- Type: **Automatic & manual mode**
 Output: Automatic & manual indicator lights on.
 Actions: None. Extinguishant will be released automatically upon detection of fire.



6.3 Appendix C: Terminology

The following table lists the industry-specific abbreviations, acronyms & units of measurement used throughout this document in alphabetical order, alongside the corresponding full term and description of each:

Abbr.	Full term	Function / description
A	Ampere	The unit of measurement of electrical current.
AC	Alternating current	Electrical current that changes direction several times per second, such as supplied by utility grids & inverter output to load current. Incompatible with batteries directly.
Ah	Ampere-hour	The unit of measurement of cell capacity. For this and other reasons, battery capacity is not specified in Ah, but instead Wh.
BCS	Bridge-coupled series inverter	
BMAC	Battery monitor & control module	An electronic module developed for the purposes of establishing serial communication (or improve the quality thereof) between most BlueNova® batteries and capable peripheral devices. Includes Wifi connectivity which, by extension, allow for the remote monitoring of battery performance & health variables via the BlueNova® Live Web Platform – https://live.bluenova.co.za/
BMS	Battery management system	A composite electronic system designed primarily to extend the operational lifespan of batteries. Minimum core functionalities of a BMS should include cell voltage balancing well as countermeasures against adverse operation/conditions. The BMS in BlueNova® HV batteries include additional non-standard functionalities such as serial communication capability.
C(n)	Rate of charge / discharge	(where n = the number of hours required to hypothetically recharge the battery from 0-100% SoC at constant current)
(n)C	Rate of charge / discharge	(where 1/n = the number of hours required to hypothetically recharge the battery from 0-100% SoC at constant current)
CAN	Controller Area Network	A serial communication protocol designed to allow for the transmission and receipt of serial data to/from multiple interconnected compatible devices via a single common bus. Internationally recognised & used.
DC	Direct current	Electrical current that flows in one direction only at any given time, such as battery charge & discharge current and solar PV supplied current.
DB	Distribution board	The central component from which input energy is distributed from one or more energy sources to the various connected loads in electrical systems of a certain size. Apart from being the primary distribution point in such systems, DB's also promote overall safety by extension of the breakers & other protective components they should be fitted with.
EMS	Energy management system	A system consisting of several different hardware and software modules based control measures infrastructure typically used to monitor, regulate & control the generation & transmission of energy from a centralised operating system in large industrial and/or utility-scale applications.

EoL	End-of-life	The predetermined maximum point to which a component/product is projected to degrade (or has actually reached) over a certain period of use under specific operating conditions. Battery EoL is expressed as a (minimum) number of cycles at a maximum percentage DoD per cycle. Other conditions that affect the service life of batteries include: ambient temperature range, load demand (or charge & discharge rate), battery chemistry, quality of installation and peripheral compatibility.
HVAC	Heating, ventilation & air conditioning	A system consisting of various technologies for controlling the temperature, humidity & air purity in enclosed spaces.
IP(xy)	Ingress protection rating.	Indicates how well an electrical device's enclosure protects its contents from contamination / damage by foreign matter (where x = numerical rating for solids, and y = for liquids).
LiFePO ₄	Lithium iron phosphate	The cell chemistry used in iESS-integrated high voltage batteries. Part of the lithium-ion family of battery chemistries.
Ω	Ohm	The unit of measurement of electrical resistance.
OEM	Original equipment manufacturer	Refers to the original supplier of a product or component. Excludes intermediary suppliers / distributors in the supply chain. Most products and components are usually branded with the name and/or logo of the OEM.
PPE	Personal protective equipment	Clothing & equipment designed specifically to protect people against industry-specific hazardous conditions & materials.
RMAC	Remote monitoring & control	An electronic system consisting of various modules. Controls functionality of the BCS, BMS & load control in iESS systems.
RS485	Recommended Standard #485	An industry standard serial communication protocol developed for multi-node systems. Internationally recognised & used.
SoC	State-of-charge	Indicates to what extent a battery has been charged. Expressed as a percentage (where 100% SoC is the actual capacity of the battery at the same given time,
SoH	State-of-health	Expressed as a percentage. Indicates how much of a battery's original capacity is retained at any given time (or indirectly, how much of its capacity has been lost to degradation/fade).
SSID	Service set identifier	The public name given to a wireless network & broadcasted by the network's router so that it can be found & connected to.
UPS	Uninterruptible power supply	A device that maintains seamless power to its connected load in the event of a grid power failure. A UPS commonly includes a battery that is kept charged when not in use.
V	Voltage	The unit of measurement of the electric potential difference (or electric pressure / tension) between two points.
VAC	Voltage at alternating current	The unit of measurement of the electrical potential difference between two points in alternating current system architectures.
VDC	Voltage at direct current	The unit of measurement of the electrical potential difference between two points in direct current system architectures.
Wh	Watt-hour	The unit of measurement of energy (and by extension, also battery capacity).