Thank you for choosing XESS.

Your decision to trust our product means a lot to us.

At XESS, our focus is on technical excellence. Our batteries are the result of rigorous engineering and precise craftsmanship, and we have invested heavily in ensuring that each battery delivers outstanding performance and reliability.

We recognize the importance of dependable power in standalone applications, and we are committed to providing you with top-tier products that get the job done.

If you have any questions or need support, our team is always ready to assist.

Sincerely,

Craig, Peter & the XESS Team

2/75 Bluestone Circuit, Seventeen Mile Rocks, QLD
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www.xess.energy

XESS

INSTALLATION AND OPERATION MANUAL

XESS ION 5120

www.xess.energy

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1: Introduction

Introducing the XESSION-5120, a cutting-edge Lithium LFP battery storage system designed for power and ease of use. Boasting advanced active cell balancing and dual-mode operation (Managed and Self-managed), it's optimized for peak performance in off-grid applications. Its robust 5.12 kWh capacity and sleek 19-inch form factor seamlessly integrate into 19-inch data racks or XESS ION prewired battery cabinets.

Scale your energy needs effortlessly with the ability to parallel up to 64 batteries, reaching a massive total capacity of 327 kWh. When combined with the XESS ONE standalone power system, CANBUS Managed communications ensure exceptional battery management, with an automatic switch to Self-managed mode if necessary. For versatility, the XESSION-5120 can also operate independently in Self-Managed mode with third-party PCEs (such as multimode inverters, battery chargers, and MPPTs).

Designed for continuous operation, the XESSION-5120 supports hot-swappable functionality and includes a circuit breaker for isolation. The built-in BMS monitors the circuit breaker and can electronically trip it for enhanced protection, complementing the mechanical overcurrent safeguards.

Equipped with low-temperature cell technology, the XESSION-5120 excels with industry-leading discharge capabilities at -20°C and charging capabilities at -10°C, making it ideal for cold climates.

This document offers comprehensive instructions for installing and operating the XESSION-5120 battery, as well as the XESSION-ENCR6 and XESSION-ENC10 battery cabinets. Experience unparalleled energy storage with the XESSION-5120.

2: Glossary

- **BESS**
  Battery Energy Storage System
- **BMS**
  Battery Management System
- **LED**
  Light Emitting Diode
- **LFP**
  Lithium Ferro Phosphate (LiFePO4)
- **SOC**
  State of Charge
- **SOH**
  State of Health
- **DOD**
  Depth of Discharge

3: Safety

When installing, commissioning, operating, and maintaining the product, strictly adhere to the safety requirements outlined in the manual. Incorrect operation or handling can result in damage to the product and other property, or cause injury or death to the operator or third parties.

When securing the product with screws or other components, use the appropriate tools and apply the torque specified in the manual or on the product label. Failure to do so may result in instability or damage to the product.

Ensure you are familiar with the proper use of different tools beforehand to prevent injury during installation.

Please read this manual thoroughly before installation to ensure the proper and safe installation and use of the product.

3.1. Warnings and Cautions

1. Installers and users must familiarize themselves with this manual.
2. Be cautious when handling power cables and plugs, as they carry voltage from the battery.
3. Ensure a fire extinguisher is readily available before installation and use.
4. Installation and operation must be performed by a suitably qualified person, and the system should be installed in restricted access areas.
5. Due to the weight of the battery module, it is recommended that at least a two-person lift, using lifting tools if necessary.
6. The battery should not be installed in direct sunlight.
7. The battery should not exceed temperatures as indicated in the product datasheet.
8. If the battery has been dropped, punctured, or is wet, do not install or operate the battery.
9. The battery should be kept out of reach of children and animals to prevent injury from accidental contact.
10. The battery should be kept dry and away from water.

3.2. Transportation

The XESS ION batteries should be shipped with terminals covered to prevent contact with metal objects and short circuits during transport. To comply with international transport regulations, the batteries are discharged to a specific low SOC before shipping.

Whenever possible, ship batteries in the manufacturer's original packaging, secured horizontally and firmly fastened to a pallet. Avoid shipping batteries vertically, and limit stacking to no more than six batteries.

Store batteries out of the reach of children and animals to prevent injury from accidental contact.

3.2. Handling

- Batteries are heavy and should be handled and installed by an adequate number of personnel using the proper tools.
- Installers should exercise caution during installation to prevent damage to the battery. If the battery is damaged before installation, such as case damage or terminal port damage, do not install or operate it and contact your place or purchase or XESS after-sales support.
- Do not touch the DC bus or battery ports directly.
- Avoid subjecting the battery to external forces, such as dropping it, dragging it on the ground, or placing heavy objects on it.
- Do not clean the battery or allow foreign objects or liquids to enter it.
- Do not unplug any cables while the battery is in operation.
- Do not use the battery with other brands or types of batteries.

3.3. Storage

- Batteries should be stored horizontally.
- Do not store the battery in direct sunlight or high humidity and keep away from heat and water.
- For long-term storage, maintain an ambient temperature of around 25°C.
- For short-term storage, ensure the temperature is between 0°C and 35°C.

3.5. Long Term Storage Check

The battery voltage of XESS-ION5120 batteries should be checked if they have been stored for long periods of time (≥6 months):

1. If the battery voltage is higher than 51.6V, the battery is in good condition and does not need charging. Subsequently, the batteries should be checked every 3 months.

2. If the battery voltage is lower than 51.6V, the battery should be charged to prevent irreversible damage from low power. It is recommended to charge the battery with a 55V DC charging voltage and 10A constant current for about 30 minutes.

3.6. Leaking Batteries

Immediately stop using a damaged battery and dispose of it properly or return it to a professional. Battery damage can lead to electrolyte leakage, which may cause breathing difficulties, skin irritation, and chemical burns. Follow these guidelines promptly if any of the following conditions occur:

- **Eye Contact:** Rinse gently with running water for at least 15 minutes and seek medical help promptly.
- **Skin Contact:** Rinse under running water for more than 15 minutes, remove any contaminated clothing, and seek medical attention.
- **Inhalation or Ingestion:** Leave the contaminated area and seek medical assistance immediately.

3.7. Fire

A battery fire may occur if the battery is too close to a flame or if the environmental temperature is unusually high. If the battery catches fire, it may release carbon monoxide, carbon dioxide, and other gases, emitting smoke.

In case of fire:
- Evacuate the area promptly and call emergency services.
- Use a full-face self-contained breathing apparatus (SCBA) and full protective gear while fighting the fire.
- Use a dry chemical fire extinguisher to cool and extinguish the battery to prevent the fire from spreading.

3.8. Wet Battery

If the battery is submerged in water, stop using it immediately and seek assistance from XESS Energy employees. If you need to disconnect power or are in the same liquid environment as the battery, wear rubber gloves and boots beforehand to protect from electric shock.

4: Product Information

4.1. Introduction: XESSION-5120 Battery System

The XESSION-5120, crafted by XESS Energy pty, is an advanced residential energy storage solution. Equipped with an internal Battery Management System (BMS), it vigilantly monitors the battery's status and intervenes promptly to safeguard against improper operations.

These operations encompass:
- Overcharging and over-discharging protection
- High and low battery temperature protection.
- Overcurrent and short circuit protection
- Active cell balancing

Moreover, to enhance battery protection, we have integrated an electronically controlled circuit breaker. This additional feature ensures timely intervention in cases of improper operations, further fortifying the safety and longevity of the battery.

4.2. XESSION-5120 Battery Module & Box Contents

Each XESSION-5120 battery comes supplied with all connection cables required to complete the installation into the XESS ION battery cabinets

Box Contents

#	Part	Qty
1	Termination Plug	1
2	Comms Cable	1
3	M6 x 16 Bolt	4

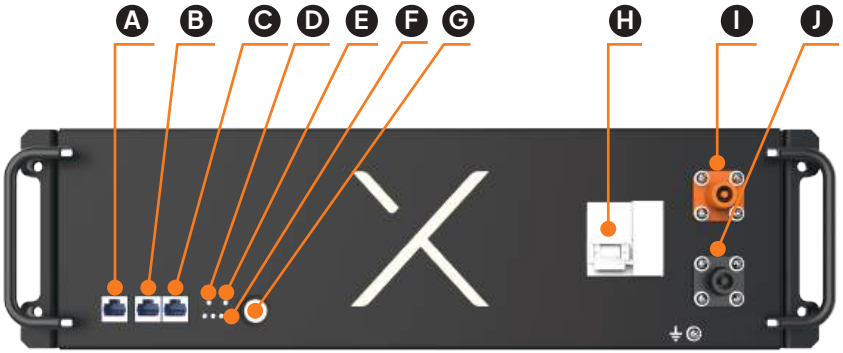
1

2

3

4.3. XESSION-5120 Battery Module Interface and Status LEDs

LEDs are provided to allow the user and installer to quickly view and understand the operation and state of the battery.



Interface & Status LEDs

There are LEDs on the front panel of XESS ION 5120 that indicate the battery state (Status, Error, and SOC).

Letter	Label	Function
A	COMMS	XESS One Comms
B	OUT	Battery Comms Out
C	IN	Battery Comms In
D	N/A	Error Indication
E	N/A	Battery Status
F	N/A	SOC Indicator
G	ON/OFF	On/Off Switch
H	MCB	Circuit Breaker
I	+	DC+ Port
J	-	DC- Port

4.4. XESSION-5120 Battery Module Specification

Parameter	Battery Specification
Part Number	XESSION-5120
Nominal Voltage	51.2 V DC
Operation voltage Range	40.8 V DC to 58.4 V DC
Capacity	5.12 kWh / 100 Ah
Depth of Discharge	Up to 100%
Maximum Continuous Discharge Rate	1C (@ 25°C)
Maximum Continuous Discharge Current	100 A (@ 25°C)
Maximum Discharge Power	5.12 kW
Peak Discharge Current	200 A (10.24 kW, 5s)
Maximum Continuous Charge C-Rate	1C (@ 25°C)
Maximum Continuous Charge Current	100 A (@ 25°C)
Peak Charge Current	200 A (@ 25°C)
Integrated Circuit Breaker	1-Pole 125A 80VDC
Lithium Chemistry	LiFePO4 / LFP
Cell Construction	Prismatic
Operating Temperature Range Managed	Charge: -10°C to 50°C / Discharge -20°C to 50°C
Operating Temperature Range Self-Managed	Charge: 0°C to 50°C / Discharge -5°C to 50°C
Operating Humidity	Up to 95% (non-condensing)
BMS Over-Voltage Cell Level Protection	3.65 V DC
BMS Under-Voltage Cell Level Protection	2.55 V DC
BMS Over-Temp Cut Off	56°C
Short Circuit Current	4500A
Arc Flash Incident Energy IEm in Cal/cm2 (45cm)	0.341
Arc Flash Incident Energy AFB in cm	23.952
Altitude	< 2500m
DC Connectors	100A Quick Connect
IP Rating	IP40
Efficiency	> 96%
Cooling	Natural Convection
Scalability	64 Batteries in Parallel
Series Connection	Not Permitted
Communications	CAN 2.0A / RS458 / No Comms
Weight	44 kg
Dimensions	440 x 134 x 480 mm
Warranty	7 + 3 Years (up to 10 Years) - Conditions Apply
Certifications - Cell	UL1973, UL9540A, IEC62619:2022, UN38.3
Certifications - Pack	IEC62619:2022, IEC62040, UN38.3, CE

4.5. XESSION-ENCR6 & XESSION-ENCR10 Cabinet & Specification

Parameter	Cabinet Specification	
Part Number	XESSION-ENCR6	XESION-ENCR10
Dimensions (WxDxH)	620 x 600 x 1270 mm	620 X 600 x 1890 mm
Fixing	4 x Wheels & 4 x Feet	
Max. Module Quantity	6 (30.72 kWh)	10 (51.20kWh)
Busbar Continuous Current Rating	600 A	1000 A
Battery Interconnection	Pre-wired Quick Connector with 4 AWG UL Cable	
DC Circuit Breaker	None	None
IP Rating	IP20	
Weight	91kg	128 kg
Warranty	Refer to Warranty Document	

XESION-ENCR6

XESION-ENCR10

5: Installation

This section provides important information and detailed guidelines for installing the XESS ION product range ensuring a safe and smooth installation process. Installation should be well considered, and all the specifications of the battery and supporting components should be understood to determine a suitable location and way of carrying out the installation.

5.1. Installation Location and Environment

For a safe, long-lasting operation, it is essential to choose an appropriate location for battery installation. If you opt not to purchase our XESS ION battery cabinets, please install the battery within a 19" data rack assembly or another compliant and secure electrical enclosure of your preference. Our cabinets are suitable for indoor use only, so please select an area where the battery can be readily connected, and serviced, and is in a dry dust-free indoor environment.

Furthermore, ensure that the chosen battery installation location meets the following conditions as closely as possible:

- The installation environment should be free from flammable and explosive materials.
- Maintain an ambient temperature between 15–30°C with air humidity between 0–95% and strive to maintain both temperature and humidity as stable as possible.
- Ensure the ground is flat, without any inclination angle or unevenness.
- Keep the environment clean, minimizing the presence of dust.
- Avoid direct exposure to sunlight, rain, or snow.
- Ensure good ventilation with adequate air circulation.
- Keep the battery away from children or pets to prevent accidental injury.

5.2. Battery Cabinets

The batteries are designed to fit within a 600mm deep 19" equipment rack. XESS offers two cabinet options designed to accommodate varying numbers of modules: the XESSION-ENCR6, capable of holding up to 6 battery modules, and the XESSION-ENCR10, accommodating 10 battery modules. Both cabinets come pre-wired, saving you considerable time during setup. You can select the appropriate cabinet to align with your specific requirements.

If you intend to design and assemble your own battery enclosure, here are some suggestions and advice:

- Incorporate rails into your enclosure design where feasible. Alternatively, ensure robust securing to prevent damage to the battery.
- When designing your enclosure, avoid stacking more than 6 batteries, unless the enclosure is specifically engineered to distribute the weight evenly.
- Maintain adequate air circulation around the battery pack by allowing at least 30mm of clearance on all sides within the enclosure.
- Ensure uniformity in the length and size of the power cables you connect.
- Select enclosure materials based on the battery's location and ensure they possess the appropriate IP rating.
- Ensure proper grounding of your enclosure and select suitable fuses, cables, and connections for optimal performance and safety.

5.3. Battery Connections

For streamlined power cable connections, the XESSION-5120 features Exconn (non-keyed) connectors on both the positive and negative terminals, saving you time. If you intend to parallel multiple cabinets, you may need to acquire additional power cables and determine your approach to combining the parallel connections. Parallel connections can be approached by a DC busbar assembly or a DC combiner box. When procuring power cables, ensure they are of uniform length to maintain consistent impedance across each battery and cable set.

5.4. Tools

The Tools below are necessary for the installation of the XESSION-5120. Please make sure you are well-prepared before you start with your installation.

5.5. Extra Accessories

The components listed below are not supplied with the batteries or cabinets, however, are necessary for connection to the inverter.

1. DC Cables
2. PE Cables
3. Communication Cable

- DC Cables should be sized to suit your connected PCE or load current requirements.
- DC cable terminals:
  - o XESSION-ENCR6: SCxxx-10
  - o XESSION-ENCR10: SCxxx-12
- PE Cable (CSA≥25mm) with Terminal (SC35-6)
- Shielded communication cable (CAT5 or higher) (only if connecting to XESS ONE or PCE's that Support Managed communications)

Ensure that you understand your local requirements for battery installations. Installation requirements will differ depending on country and jurisdiction and many may require DC isolation between the battery cabinets and the inverter.

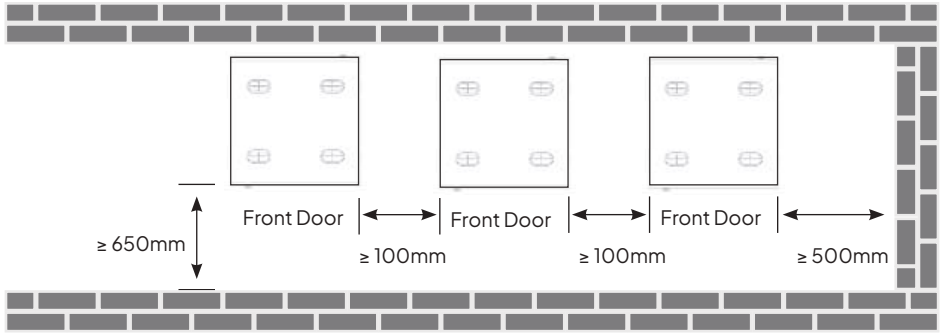
5.6. Positioning The Cabinet

Upon receiving the cabinet, meticulously inspect its exterior and interior for any signs of damage. Should you find any damage, promptly reach out to XESS Energy for assistance.

The XESS ION cabinets come installed with caster wheels for easy manoeuvrability into position.

5.6.1. Minimum Cabinet Clearances

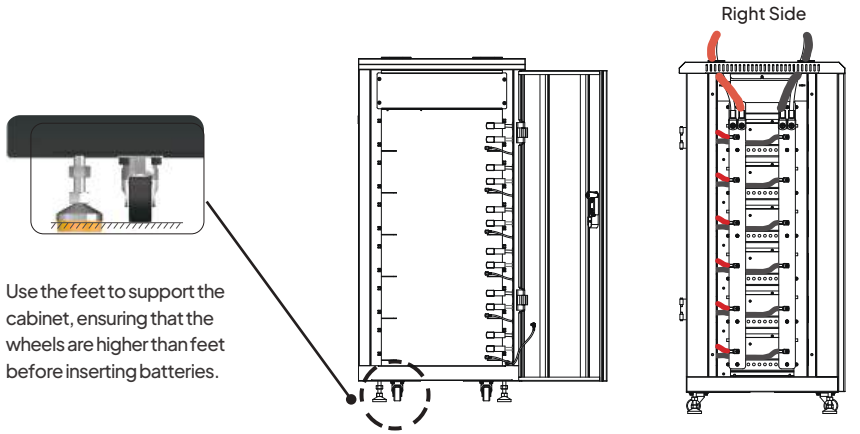
Minimum Clearance Requirements:



5.7. Connecting Power Cables and Deploying the Support Feet

Once a position and location has been determined, the load-bearing feet can be deployed. Ensure that the load-bearing feet are deployed before loading of the batteries.

The main DC cable connection busbar can be accessed on the right side of the cabinet. Simply remove the bolt and the panel can be removed.

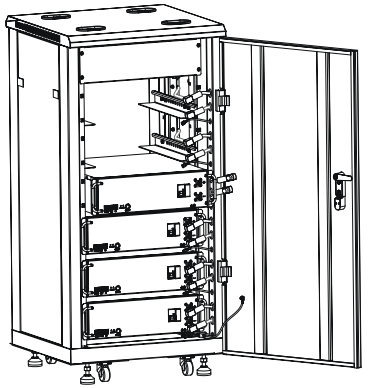


Use the feet to support the cabinet, ensuring that the wheels are higher than feet before inserting batteries.

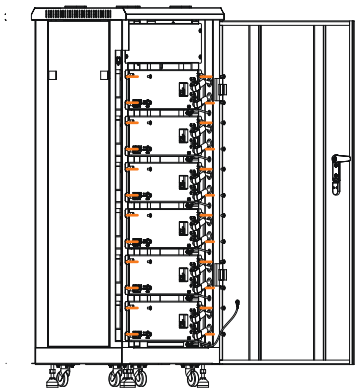
Power Lug Torque: **15 N·m**

5.8. Inserting and Fastening Battery Modules

The XESSION-5120 battery modules can be easily installed into the XESS ION battery cabinet. Starting for the bottom of the cabinet, slide the batteries in one by one until the desired amount is installed or the cabinet is full. The batteries should be secured in place using the supplied fastening screws and torqued accordingly.



Insert the Modules into the Cabinet

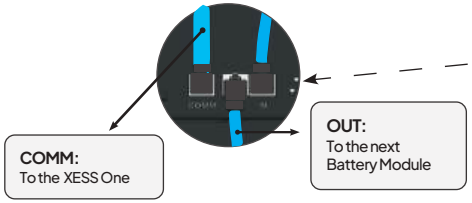


Module Bolt Torque: **3 N·m**

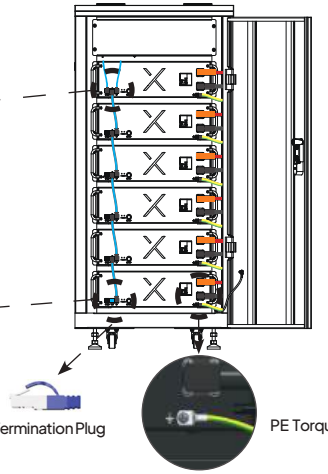
5.9. Cable Connection

5.9.1 Connecting the Communications and Protective Earth

Start at the Out Port of the first battery module.
(This battery will be the Master Battery)



Insert the termination plug into the "OUT" port of last battery in the chain.



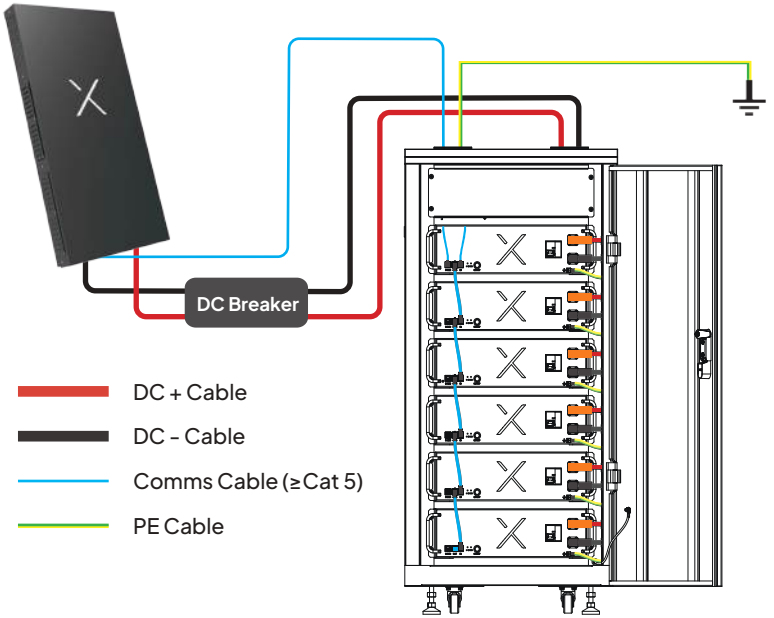
Connect the PE to each battery module.

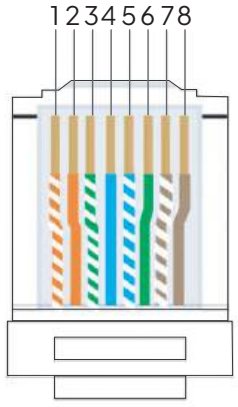
5.10. Connecting to Inverter

Ensure you follow your inverter manufacturer's guidelines. Connect the main battery DC cables to the respective positive and negative battery connections with the inverter. If connecting to an XESS ONE, plug the battery master communications into the XESS ONE CANbus input to allow Managed communications.

Important Note

- The comms cable should be Cat 5 or greater.





Master Comms Port Pin-Out

PIN No.	Definition
1	Null
2	Null
3	CAN_H
4	CAN_L
5	Null
6	Null
7	RS485B
8	RS485A

5.11. Switching to Self-Managed – No Communication Mode

The XESSION-5120 can operate without communication in Self-Managed (No Communication) Mode allowing connection to 3rd party charging sources that allow configuration of charging settings. This allows the XESS ION to be used as a lead acid replacement.

By default, the XESS ION battery is configured in Self-Managed Mode.

The battery will automatically switch to Managed (Communication) Mode once the communication cable between the inverter and the master battery is connected.

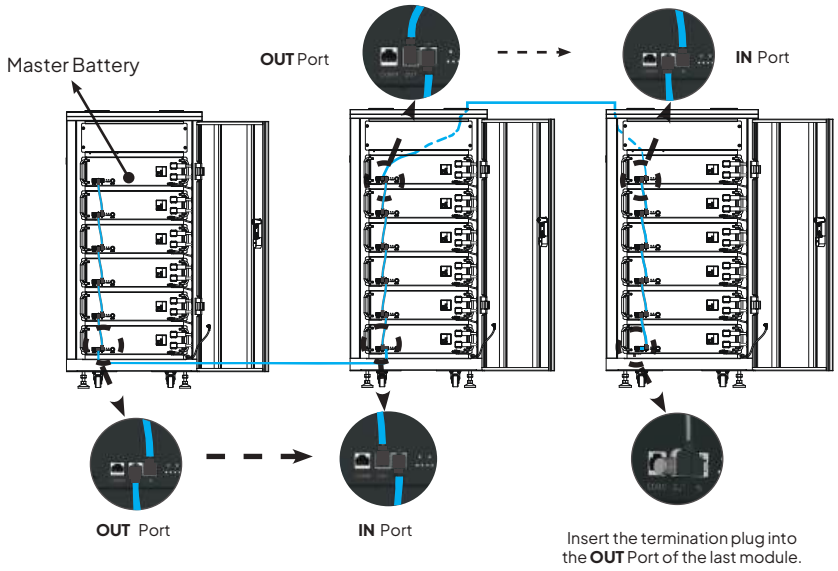
5.12. Connecting Multiple Cabinets

If a Single cabinet does not meet your system storage requirements, then multiple cabinets can be connected in parallel.

5.12.1 Connecting Communication Cables Between Multiple Cabinets

The diagram below shows the way of paralleling multiple cabinets. The communication cable should be connected from the OUT port of the last (bottom) battery of the first cabinet, through the pre-drilled hole in the cabinet to the IN port of the bottom battery of the second cabinet.

Note that the second to third cabinet connection should connect the two top batteries between the cabinets. (the top battery in the second cabinet is connected to the top battery in the third). This process should be repeated copying the same pattern of connection as more cabinets are connected.

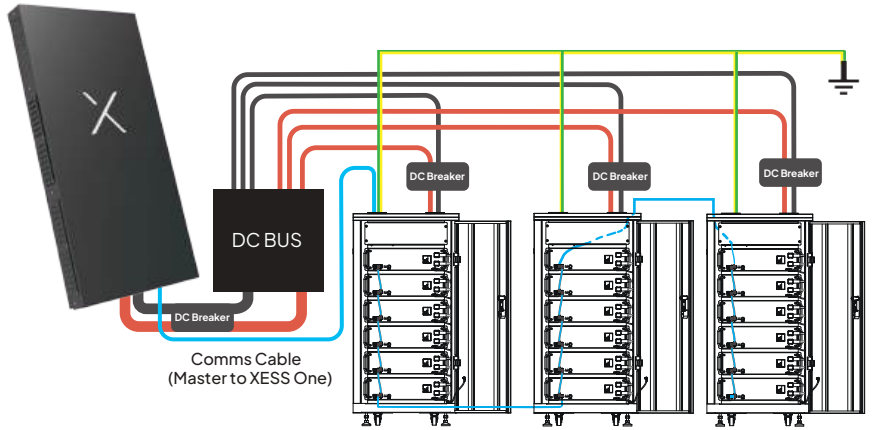


5.12.2 Connecting Parallel Cabinets to The Inverter

STEP 01 — Connect the PE cable.

STEP 02 — Connect the power cables of the paralleled cabinets to the DC combiner box/DC bus and then to the inverter.

STEP 03 — Connect the communication cable between the master battery and the inverter.



Note:

DC+ Cable

DC- Cable

COM Cable

PE Cable

Note:

1. The maximum number of paralleled XESSION-5120 modules is 64.
2. When multiple cabinets are connected in parallel, a DC bus or DC combiner box should be used
3. The DC power cable length of all cabinets should be the same length.
4. The communication cable length should be ≤5 m and CAT5 shielded cable or greater.

6. Commissioning

6.1. LED Status

The XESSION-5120 has LEDs to allow clear visualization of the status of the battery. These LEDs are simple and intuitive to understand.

LED	Status	Description
Error	●	An error has occured.
	●	There are no active errors.
Status	●	The battery is active and can be charged and discharged.
	●	The battery is not active.
SOC	● ● ● ●	75–100% SOC
	● ● ● ●	50–75% SOC
	● ● ● ●	25–50% SOC
	● ● ● ●	0–25% SOC
If SOC < 5% the first LED will flash quickly (0.5s ON, then 0.5s OFF)		1 Hz
If Discharging the last LED normally (1s ON, then 1s OFF)		0.5 Hz

6.2. Circuit Breaker Protection

The XESSION-5120 has an integrated circuit breaker. The circuit breaker plays a few key roles in protecting the battery.

- Energising and de-energising the battery output when being used as an ON/OFF switch.
- Battery protection in case of overcurrent, short circuit, overvoltage, or over-discharge.
- Battery automatic trip in case of internal BMS fault.

6.3. System Start-Up and Shut-Down Procedure

Now that the batteries are installed, you are almost ready to power up the system. Before doing so, inspect your installation by checking the following:

- Correct polarity of all battery connections.
- No damage to the cables.
- All system breakers are in the OFF position.
- Adequate airflow as per installation requirements.
- Compliance with local installation regulations, if applicable.

Starting up the battery system should follow the recommendations of the PCE manufacturer, this manual, and any relevant local or government safety requirements.

ON / OFF

System Start Up

1: Turn on the DC breakers between battery cabainet(s) and the XESS One.

2: Turn on the battery module breakers.

3: Press and Hold the 'ON/OFF' button on Master Battery to power up the system.

System Shutdown

1: Turn OFF the AC Isolators (IN/OUT) on the XESS One.

2: Turn OFF the PV Isolators on the XESS One.

3: Turn OFF the DC Breaker between the battery cabinet(s) and the XESS One.

4: Turn battery module breakers to Off position.

5: Press and Hold the ON/OFF button for 3 seconds on the Master Battery to shut down the system.

6.4. Charging and Discharging

The XESSION-5120 is equipped with the latest low-temperature technology. Making it not only able to discharge at -20°C, but also allows charging at -10°C.

- The charging temperature range is between -10°C~50°C
- The discharging temperature range is between -20°C~50°C.

The XESSION-5120 can provide a continuous current of 100A and a peak current of 200A for up to 5 seconds. Please ensure the current through the battery does not exceed 100A when charging.

Battery system should be charged to 100% calibration (SOC) regularly to ensure a healthy system operation. The below frequencies should be observed.

- Self-Managed Operation – Batteries to reach 100% SOC calibration every 14 days minimum.
- Managed Operations – Batteries to reach 100% SOC calibration every 30 days minimum.

Important

- If a battery module has not been charged for an extended period, causing an automatic shutdown, recharge the battery within 10 days to restore the SOC to a healthy state.
- If the power system is shut down for an extended period with no charging source, the battery ON/Off button should be turned off and the circuit breaker cycled to the off position.

6.4.1 Initial System Charging

To comply with international shipping requirements the XESSION-5120 batteries are shipped in a low state of charge (SOC).

When the system is powered up for the first time, it is recommended that the batteries have a calibration charge to 100% SOC.

Calibration charging to 100% SOC on the initial turn-on is very important in Self-managed applications where the connected PCE needs to learn the batter SOC.

6.4.2 Maintaining Accurate SOC in Self-Managed Application

State of Charge (SoC) drift occurs when the device calculating SoC accumulates errors over time. This error typically arises from component tolerances in voltage and current measurements, as well as from the algorithms used to determine battery capacity. Most systems will reset their accumulated error when they reach 100% SoC or enter a float state.

To minimize SoC drift, battery storage system must reach the float stage or 100% SoC as regularly as possible, ideally every 1 to 3 days. Here are some ways to address SoC drift:

1. Ensure the solar array is adequately sized to charge the batteries to float or 100% even on the winter solstice.
2. Install a backup power source (grid or generator) to enable battery charging during prolonged bad weather or high-load events.
3. Consult with the PCE manufacturer to determine the accuracy of the SoC calculator.

7. Maintenance

The battery does not require maintenance, however as part of your battery system maintenance schedule, it is recommended to carry out the following checks:

- Ensure there are no obstructions around the battery or battery enclosure.
- Check for signs of water ingress and or possible water hazards.
- Look for any signs of animals, insects, or other creatures nesting in or around the battery solution.
- Remove any foreign objects that have accumulated in or around the cabinet.
- Inspect battery connections and cables for secure fittings or any damage.
- Test the battery breaker by turning it off and on again.
- Check the LED indicators for proper functioning.
- Check for any signs of damage to batteries or cabinets.

8. Adding Batteries to an Existing System

You can add additional XESSION-5120 batteries to an existing XESSION-5120 battery installation at any time during the warranty period. The batteries must be of the same brand, type, and part number to ensure compatibility. If you are unsure, seek advice from XESS Energy's After Sales Support.

The XESSION-5120 advanced nature allows the new battery to be added to the existing battery bank regardless of the SOC and there is no need to match the voltage. The battery will self-balance matching the battery banks SOC and Voltage.

For Self-Managed mode applications, ensure all power conversion equipment (PCE) is updated to reflect the new, increased overall battery capacity.

Note: It is not possible to mix and match different battery types and capacities in an existing battery rack. Therefore, all batteries in a rack must be of the same type, part number, and specification, unless advised otherwise by XESS Energy.

9. Recovering a Flat Battery

When the State of Charge (SOC) of a battery module reaches 0% and its voltage falls below 40V, it indicates an over-discharge has occurred. To protect and recharge the battery, follow these methods:

1. If the inverter is operational, charge the battery directly using the inverter.
2. If there is another battery module with a higher voltage, connect the two modules in parallel. The higher voltage module will automatically charge the lower voltage module, balancing the battery modules.
3. If charging via the inverter is not possible, use a 48V adjustable constant current charger set to 54V and less than 10A. Charge the battery for 30 minutes.

Note: **If a battery module has not been charged for an extended period, causing an automatic shutdown, recharge the battery within 10 days to restore the SOC to a healthy state.**

10. Battery End of Life and Recycling

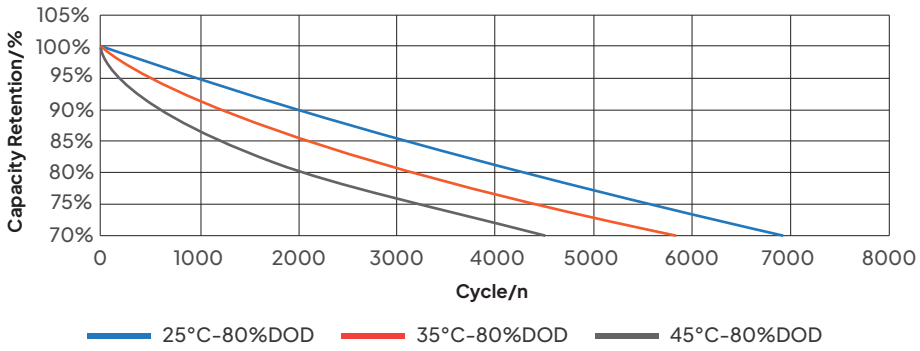
The XESSION-5120 battery is engineered for exceptional performance and longevity. However, when it's time for removal from service or replacement, you can return the battery to XESS Energy for repurposing or recycling.

At XESS Energy, we test and refurbish returned batteries to extend their life. Refurbished batteries are repurposed for charitable organizations, community projects, or educational applications, ensuring they continue to provide value and support sustainable initiatives.

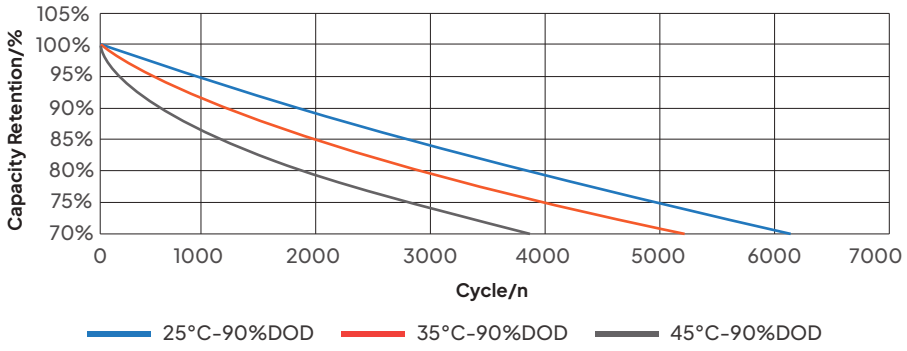
For batteries that cannot be repurposed, we ensure they are sent for recycling. This process maximizes the recovery of materials, contributing to the circular economy and minimizing environmental impact. By choosing XESSION-5120, you are not only investing in advanced energy storage but also supporting a sustainable future.

11. Battery Cycle Performance Characteristics

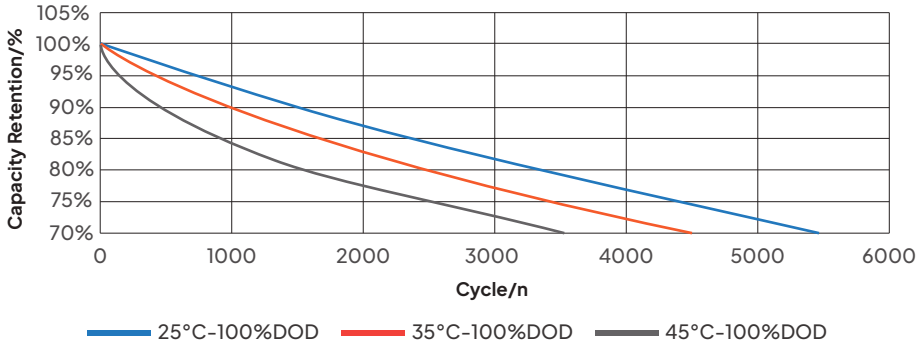
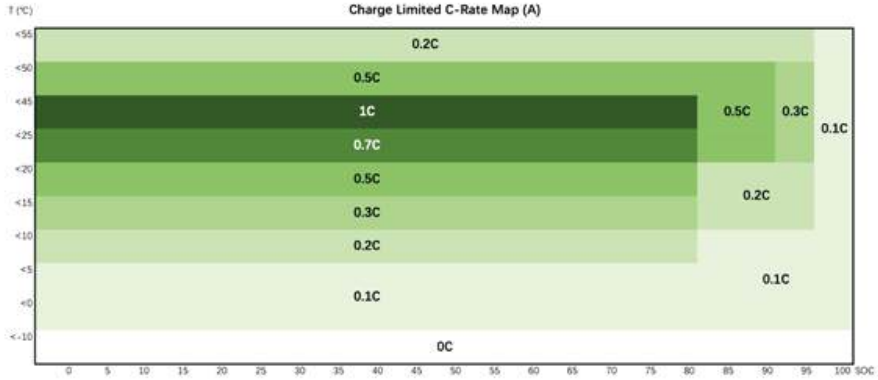
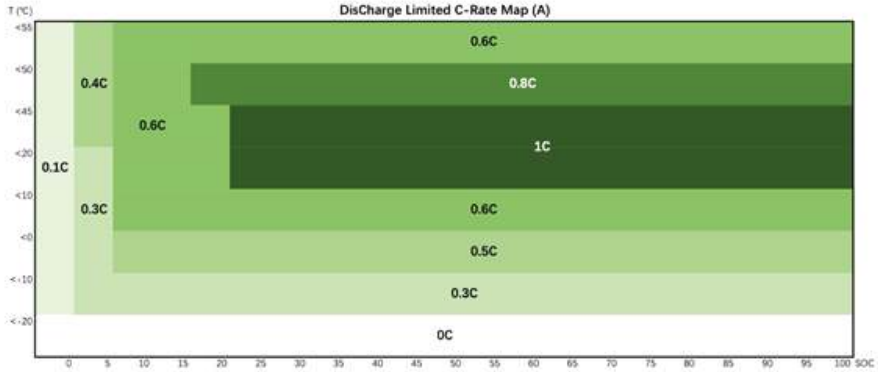
80% DOD Cycling Curve At Different Temperatures



90% DOD Cycling Curve At Different Temperatures



100% DOD Cycling Curve At Different Temperatures



12. Managed Battery Performance, Charge and Discharge