XOLTA


# XOLTA BAT-80 AC

## Installation manual

# Contents

# Chapter 1: About this installation manual

This manual applies to the following versions of XOLTA BAT-80 AC:

- BAT-80 AC/25 kW
- BAT-80 AC/30 kW
- BAT-80 AC/50 kW
- BAT-80 AC/60 kW

This manual is designed for installers and technicians responsible for the installation and commissioning of BAT-80 AC. Includes detailed instructions, technical specifications, and essential information on requirements, safety measures, potential risks, and precautions to ensure a safe and efficient installation process.

## 1.1 Disclaimer

XOLTA have taken all necessary precautions to ensure that the information in this manual is accurate and up to date. The system is designed to ensure that an installed XOLTA battery energy storage system, along with all associated functionalities, operates safely under predefined operating conditions.

All XOLTA products are certified according to recognized national and international standards. It is essential that you thoroughly read the manuals and product descriptions relevant to the XOLTA battery energy storage system, and any battery extension, as provided by XOLTA, and use the system only in accordance with these documents.

XOLTA is not liable for any damage or loss resulting from use that is contrary to the manuals and product descriptions and is solely liable for damage caused by the Product in accordance with the rules of the Danish Product Liability Act regarding consumer purchases.

## 1.2 Copyright

# Chapter 1: General information about BAT-80 AC

BAT-80 AC is intended for outdoor installation.

| Property | Description |
|---|---|
| Battery rack part number | 101141 |
| Part numbers based on type | 25 kW: 108010<br>30 kW: 108011<br>50 kW: 108012<br>60 kW: 108013 |
| Battery type | LiFe P04 (LFP) |
| Nominal battery DC voltage | 768 V DC (range: 720-855 V DC) |
| Main power input and output | 3 x 400 V AC |
| Control power input | 1 x 230 V AC |
| Weight | Appr. 1020 kg (when containing 1 inverter) |
| Impact test (IEC 62262) | IK08 |
| Dimensions | H2170 x W845 x D800 |

*Table 1-1 - General battery information*

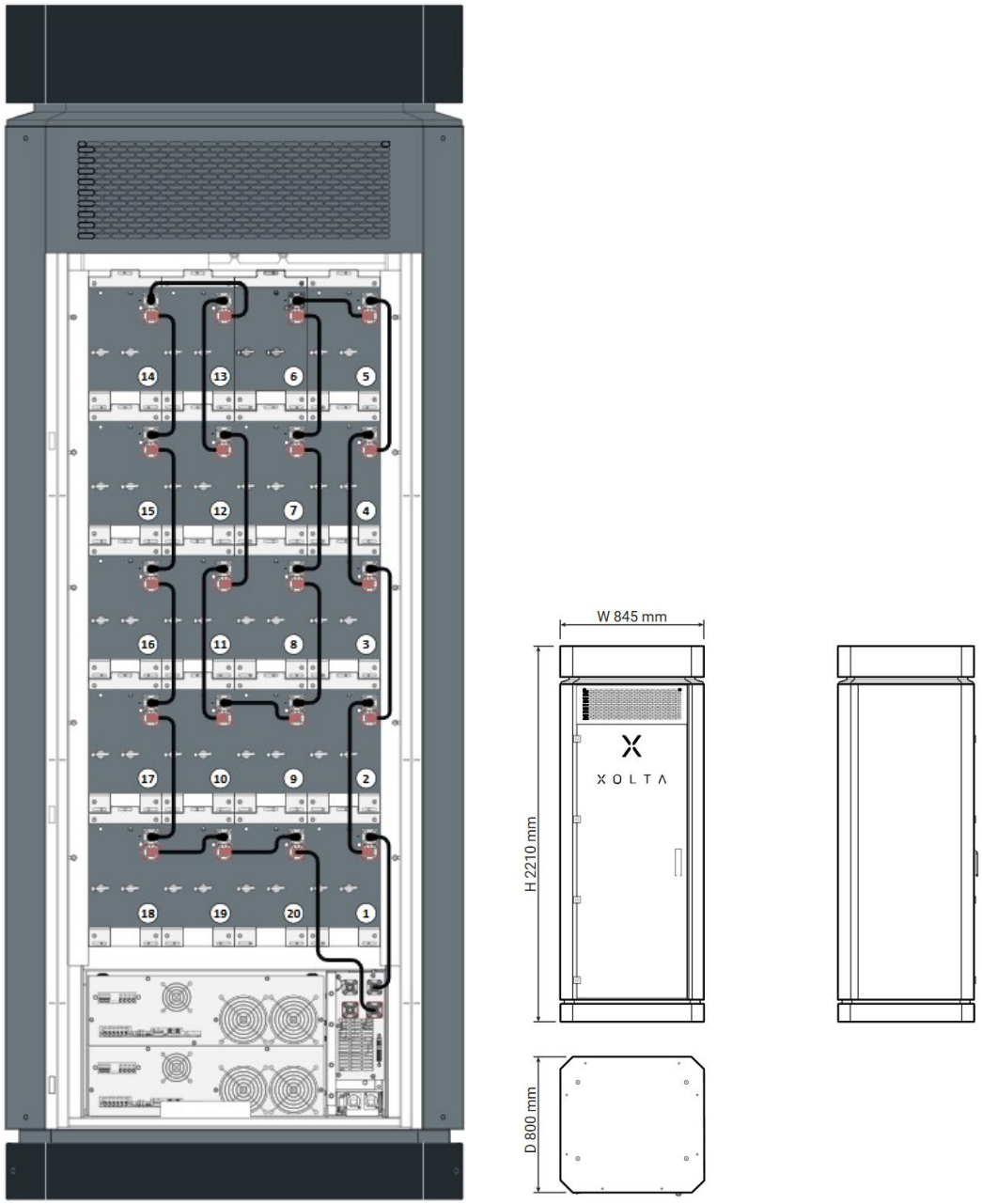



*Figure 1-1 - Left: BAT-80 AC front. Right: Dimensions.*

# Chapter 2: Safety and legal terms

## 2.1 Important safety instructions

Only a XOLTA trained electrical installer may install and perform service on BAT-80 AC. XOLTA accepts no liability for property damage or injury caused by system modification or repairs performed by unqualified personnel, without XOLTA approval, or failure to follow the following important safety instructions.

This chapter uses the following symbols:

 Warning - indicates a dangerous situation which, if not avoided, could result in death or injury.

 Caution - indicates a situation where damage to the equipment or injury may occur.

> **Important**: Read the entire document carefully before installing or using BAT-80 AC.

You will find the following symbols on the product:

| Symbol | Description |
|---|---|
|  | To ensure correct installation and operation, read this manual carefully before using the product. |
|  | This manual describes general warnings that must be observed. Read the manual carefully before using the product. |
|  | BAT-80 AC contains high voltages that can cause serious injury or death. |
|   | Wait at least 5 minutes after disconnecting the system from the power supply before opening the battery. Opening of internal components may require more than 20 minutes before the inverter capacitors are completely discharged.<br><br>**Important**: The product contains energized batteries. Power in the battery modules will remain indefinitely after disconnecting the power. |

| Symbol | Description |
|---|---|
|  | The product contains batteries with toxic electrolytes. |
|  | The electrolytes can be flammable. |
|  | The product contains electronics and batteries that must be handled separately from other waste. |

*Table 2-2 - Symbols*

### 2.1.1 Risks

| Risk | Guidance |
|---|---|
|  **Risk of explosion** | • Do not apply any external force to BAT-80 AC.<br>• Avoid physical damage to the battery. Keep BAT-80 AC away from places where it may accidentally be physically damaged.<br>• Do not place BAT-80 AC where there is fire. |
|  **Risk of fire** | • Keep the system away from flammable objects and heat sources.<br>• Do not expose the battery system at any time to ambient temperatures higher than 50°C.<br>• Do not clean the outside of the rack using pressurized water.<br>• Do not operate BAT-80 AC after mechanical or electrical damage. |
|  **Risk of electrical shock** | • High voltages are present on both AC and DC cables. Even if BAT-80 AC is disconnected from the grid, the battery cells can still hold a charge, creating a risk of death or serious injury because of electrical shock. Report any external cable or wire damage to XOLTA or your local XOLTA trained electrical installer.<br>• BAT-80 AC must be grounded to avoid risk of electrical shock. If you see any signs of the opposite, contact your XOLTA system supplier for further investigation.<br>• Do not touch uninsulated wires.<br>• Do not clean the outside of the rack using pressurized water.<br>• Never use a system if it is defective, damaged, or broken. Contact your XOLTA system supplier.<br>• Never attempt to disassemble, repair, modify the product, or use |

| Risk | Guidance |
|---|---|
| | it in any way other than as described in this manual. Repairs or replacement of components must only be performed by a XOLTA trained electrical installer. No operator serviceable parts inside.<br>• Never immerse BAT-80 AC in water or other fluids.<br>• During servicing in rainy conditions, use covers to prevent water from entering the rack.<br>• Do not operate BAT-80 AC after mechanical or electrical damage.<br>• Do not open the service door yourself for any reason. There are no parts inside to be serviced by you. Only a XOLTA trained electrical installer may do that. |
|  <br>**Risk of damage** | • Do not expose the battery system to temperatures below -25° C or higher than 50° C. Such exposure will result in irreversible degradation of the battery cells.<br>• Do not block or in any way obstruct the air intakes or outlets as this will lead to improper product operation or problems with thermal management. See also *Minimum clearance space between battery racks.* on page 20.<br>• Do not place any objects on top of the rack or within the required clearance space around the rack.<br>• Do not clean the outside of the rack using pressurized water. Using pressurized water increases the risk of water ingression to the interior of the battery, and it can cause the system to short-circuit.<br>• Do not operate BAT-80 AC after mechanical or electrical damage as this may cause the system to short-circuit.<br>• The XOLTA cabinet should always be placed in a level vertical position during operation. The rack must not be tilted by more than 15 degrees from a vertical position during transportation. |

*Table 2-3 - Risks and guidance*

## 2.1.2 Other precautions

 Other precautions to take:

- Do not use this product for any purpose other than what is described in this document.
- An unpleasant smell can indicate electrolyte leakage from the battery cells. In this case, switch off the system and contact your XOLTA system supplier immediately. To avoid health issues, ventilate the room if possible and avoid inhaling the odour.

- BAT-80 AC is heavy. Use suitable lifting equipment.
- Do not paint any part of the product.
- For storage longer than a month, charge the product to 30-40 % **SoC**[1], disable backup functionality, and disconnect it from the grid. Observe warranty conditions.
- Dispose of the product in accordance with local regulations.

## 2.2 What to do in an emergency?

BAT-80 AC is designed to meet strict safety standards. It monitors essential parameters of the battery system and protects the battery from damage. The main battery safety measures are presented in the table below.

| Main safety measures in BAT-80 AC | |
|---|---|
| ✓ | Lithium Iron Phosphate battery cells with excellent safety performance. |
| ✓ | State of the art battery management system (BMS) ensuring over-/under voltage and over/under temperature monitoring for each individual battery cell. |
| ✓ | Redundant battery cut-off contactor controlled by the **BMS**[2]. |
| ✓ | Temperature sensors monitoring the battery system temperature. |
| ✓ | Active battery current control depending on battery cells temperature, voltage, and state of charge. |
| ✓ | System diagnostics, error handling. and automatic grid connection or disconnection controlled by the site controller. |
| ✓ | Battery air humidity monitoring and condensation prevention system. |
| ✓ | AC and DC protective fuses. |

*Table 2-4 - Main safety measures*

[1]State of charge
[2]Battery management system

Despite all these built-in safety measures, emergencies can still occur. In such emergencies, the actions to take are described in the table below.

> **Note**: In some situations, you are required to turn off the system by disconnecting it from the power supply.

| Emergency | Action |
|---|---|
| **Leakage**<br>The battery pack might leak toxic electrolyte. Electrolyte is corrosive and odorous. | • Avoid any contact with leaking liquid or gas:<br>• If electrolyte is inhaled, move away from exposure to fresh air immediately. Use oxygen if available. Get medical attention.<br>• If your skin is exposed to electrolyte, remove any contaminated clothes and rinse skin with plenty of water for 15 minutes. Get medical attention.<br>• If your eyes are exposed to electrolyte, irrigate thoroughly with water for at least 15 minutes. Get medical attention.<br>• If you ingest electrolyte, wash your mouth with water and drink plenty of water. Get medical attention.<br>• If the system is installed indoors, do not enter the room.<br>• Ventilate the room if possible.<br>• Contact your XOLTA system supplier. |
| **Fire**<br>Fire may occur because of mechanical damage or external sources of heat and fire. Hazardous fumes such as carbon dioxide, carbon monoxide, and hydrocarbons are emitted during battery fires. | • Disconnect the power from BAT-80 AC, if possible, without getting close to the battery and without inhaling fumes.<br>• Never try to extinguish a battery fire yourself. If battery cells catch fire, then only qualified firefighting personnel with appropriate protective equipment should attempt to extinguish the fire. Keep away from any battery fire and contact your local fire department.<br>• If components other than battery cells catch fire, then ABC or carbon dioxide extinguishers can be used to extinguish the fire.<br>• Keep away from the battery and contact the fire department.<br>• Even if exposed to fire outside of the battery rack, do not attempt to operate it before it has been inspected by a XOLTA trained electrical installer. |
| **Immersion in water**<br>Immersing BAT-80 AC in water may cause short-circuit, electrical shock, and permanent | • Do not try to access the battery rack.<br>• Disconnect the power, if possible, without getting close to the battery rack. |

| Emergency | Action |
|---|---|
| damage to the battery system. The same applies if the rack is flooded during extreme weather conditions. | • Never use a XOLTA system that is or has been flooded.<br>• Keep away from the battery rack and contact your XOLTA system supplier. |
| **Damaged battery**<br>Any sign of mechanical or electrical damage, abnormal behaviour of or its peripheral components should be treated with extreme caution. | • Never use a damaged battery system again.<br>• Disconnect the power.<br>• Keep away from the battery and contact your XOLTA system supplier.<br>• Do not attempt to operate the system before it has been inspected by a XOLTA trained electrical installer. |

*Table 2-5 - Emergencies and actions*

## 2.3 Certified electrical installers with XOLTA training

XOLTA provides appropriate training to electrical installers for XOLTA systems. Only certified electrical installers with proper XOLTA training may install and commission XOLTA systems. Contact XOLTA for a list.

## 2.4 Safe disposal of Lithium-ion batteries


Only an authorized electrician should uninstall a XOLTA system. You must treat lithium-ion batteries as hazardous waste and never dispose of them with regular waste. Always follow local regulations when disposing of batteries and electronics.

The transportation of batteries is subject to special regulations, and you must always observe these regulations. When transporting batteries, treat them as dangerous goods according to local regulations. For more information, refer to the transportation regulations under the UN3480 shipping and handling classification for lithium-ion batteries.

You can return a XOLTA system at the end of its functional life to the original seller or to the dealer of your new residential battery.

## 2.5 Cyber security

The battery energy storage system connects to local communications networks outside the control of XOLTA. It is therefore the sole responsibility of the owner or operator to ensure that all appropriate measures are taken to mitigate any unauthorized access to or interference with the product

through the local connection. XOLTA and its affiliates are not liable for damage or losses related to such security breaches.

## 2.6 Voiding of warranty

Please refer to XOLTA's Terms and Conditions document delivered by XOLTA. The document describes the terms and conditions for the product warranty.

The warranty for the product does not apply to, and XOLTA will not be responsible for, any defect, loss or damage to any product caused if:

- The XOLTA **BESS**[1] is not continuously connected to the internet via LAN cable, meaning that XOLTA cannot monitor the performance of the product.
- The XOLTA BESS has not been stored, transported, set up, or installed in an appropriate and professional manner in accordance with technical standards and regulations, in accordance with the respective Installation Manual, or instructions of XOLTA. This also includes expose to vibrations.
- The XOLTA BESS has been operated contrary to its intended use or contrary to the instructions in the relevant documentation.
- The XOLTA BESS has been disconnected for more than 30 consecutive days in an environment where it was exposed to temperatures, humidity, or corrosion levels outside the limits specified in the section Key specifications or in the Product Datasheet.
- The XOLTA BESS was out of service for a continuous period of more than six months after the initial installation due to the fault of the owner.
- The XOLTA BESS was disconnected for a continuous period of more than 30 days after the initial installation due to the owner's own circumstances or actions.
- The XOLTA BESS has run continuously with high or full power forcing the system to have more than one charging cycle during a period of 24 hours measured as energy throughput in kWh.
- The XOLTA BESS has not been serviced properly and professionally according to technical standards or XOLTA's maintenance instructions.
- The XOLTA BESS has been improperly altered or otherwise tampered with by the owner or any third party.
- An over-voltage has occurred in the power grid to which the XOLTA BESS is connected.
- The XOLTA BESS has been exposed to force majeure - including but not limited to lightning, fire, earthquake or natural disaster - or harmful environmental conditions, such as air pollution, salt-water, sulphur corrosion, or other events outside the reasonable control of XOLTA.
- Any loss, theft, or damage caused by water, fire, or extreme weather conditions, any wear and tear or cosmetic damage.

> **Note**: For a complete list of circumstances under which the warranty does not apply, see section 29. Exclusions of Warranty in the Terms and Conditions document.

[1] Battery energy storage system

# Chapter 3: Before installing

## 3.1 Materials and equipment

> **Important**: To install BAT-80 AC, you must be registered as an installer with XOLTA. Also, proper training installing and handling XOLTA batteries is mandatory.


Installation lifting equipment:

- Crane.
- Forklift.

Materials included in the standard delivery:

- One battery rack.
- 20 battery packs installed.
- Inverters installed.
- Battery protection unit installed.
- Metal base.
- Keys.
- Four pieces M12 lifting eyes.
- Four pieces M12x20 with sealing washer.

Materials provided by the installer:

- Four Ø10 concrete bolts for mounting the plinth on the foundation.
- Inverter power cable (maximum 35 $mm^2$).
- Control power cable (maximum 2,5 $mm^2$).
- Patch cable (minimum CAT6).
- Foundation - can be purchased from XOLTA.
- Multistrand copper cables for power connections.

## 3.2 Lift BAT-80 AC using a forklift

If the ground around the installation site is flat and level, the BAT-80 AC rack, you can use a forklift to lift and install the battery rack.

> **Notes**:
>
> - Due to its high center of gravity, exercise caution when turning, accelerating, braking, or operating on uneven surfaces.
> - For more details about the mechanical installation, see *Mount the metal base* on page 21.

### Steps:

1. Remove the metal base front plate.


2. Position the lifting beams at a safe distance from the back of the rack to prevent damage to the metal base.


3. Lower the rack onto the metal base. The built-in guides will ensure proper alignment.

## 3.3 Lift BAT-80 AC using a crane

A trained and certified rigger is required to lift the BAT-80 AC rack using a crane.

Requirements:

- Use the provided M12 safety eyebolts from XOLTA.
- If using other eyebolts, they must have a Working Load Limit (WLL) of at least 0,55 tons at a 45° sling angle.
- Any additional lifting equipment, such as straps or chains, must be supplied by the rigger.

Sling angle and safety precautions:

- Use all four eyebolts and tighten them properly.
- The maximum allowable sling angle relative to vertical is 45°. See below figure.
- Exceeding this angle can cause damage to BAT-80 AC.


Max 45°
x 4
XOLTA

# Chapter 4: Installation requirements

## 4.1 Site requirements

- BAT-80 AC is intended for outdoor use and is protected up to IP45.
- The ambient temperature in the installation area should be within the range -20°C to +45° C.
- Make sure that BAT-80 AC is adequately ventilated and that you observe the clearance requirements.
- Do not immerse BAT-80 AC in water or exposed to high pressure water jets.
- Do not expose BAT-80 AC to high temperatures, flames, or physical force impacts.
- Do not expose BAT-80 AC to environments with a **C3 classification**[1] or above.
- Make sure the underlying foundation and ground can support the weight of BAT-80 AC.
- All BAT-80 AC racks should be level (±0,5°) and secured to the plinth and the underlying foundation.
- BAT-80 AC should always be placed on the north side to minimize direct sunlight, which may affect the system's performance.

> **Warning**
>
> Do not install BAT-80 AC in areas subject to the following conditions:
>
> - Areas prone to earthquakes.
> - Altitudes more than 2000 meters above sea level.
> - Areas prone to flooding, open flames, explosion, and extreme changes of ambient temperature.

## 4.2 Clearance requirements

You must adhere to the minimum clearance distances on all sides of the BAT-80 AC racks when planning for installation. These clearance distances ensure optimal operation of the thermal management system and provide enough space for a XOLTA trained electrical installer to service the BESS.

[1] A corrosion category based on ISO 12944, indicating a moderate level of environmental corrosion risk. It applies to urban and industrial areas with moderate sulfur dioxide pollution or coastal areas with low salinity.

| Minimum clearance distances | |
|---|---|
| **Side clearance** | 300 mm |
| **Clearance between battery racks** | 200 mm |
| **Frontal clearance** | 1000 mm |
| **Back clearance** | 300 mm |
| **Top clearance** | 1000 mm |
| **Foundation leveling** | ±0,5° |

*Table 4-6 - Minimum clearance distances*

**Notes**:

- That the first rack in a row must have at least 300 mm free space to the left of the rack when facing the rack. This allows access for service of all components.
- Please make sure to follow the site requirements, but always take local conditions into consideration.

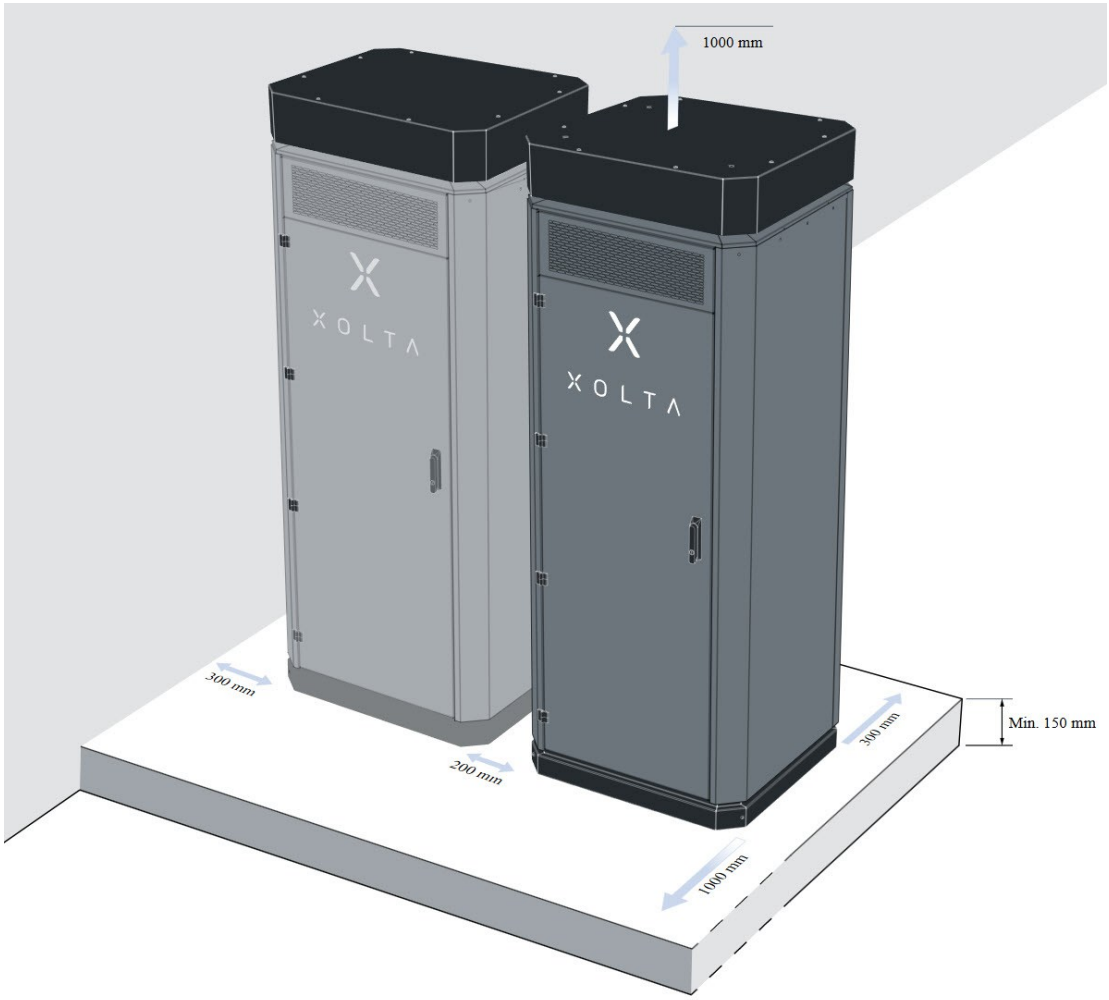



*Figure 4-2 - Minimum clearance space between battery racks.*

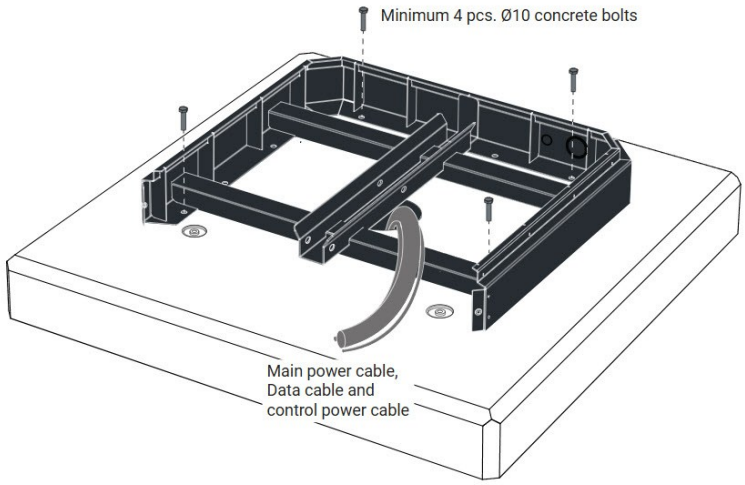
# Chapter 5: Mechanical installation

## 5.1 Mount the metal base

You must use a concrete foundation or similar capable of supporting the weight of BAT-80 AC. Upon request, XOLTA provides a concrete plinth for mounting the metal base.

Before mounting the metal base, ensure the following:

- The concrete foundation is level within ±0.5°.
- The concrete foundation must be level and comply with Danish standard DS 412, Category 1, with a maximum flatness deviation of 3 mm per 2 meters.
- You have the necessary items:
- 1 metal base
- 4 Ø10 concrete bolts
- Drilling and tightening tools




**Steps:**

1. Position the metal base on the plinth with the front panel removed.
2. Route the main power cable to the right side of the base as shown in the figure.
3. Drill four holes for the concrete bolts, ensuring they are evenly spaced.
4. Secure the base using at least four Ø10 concrete bolts.

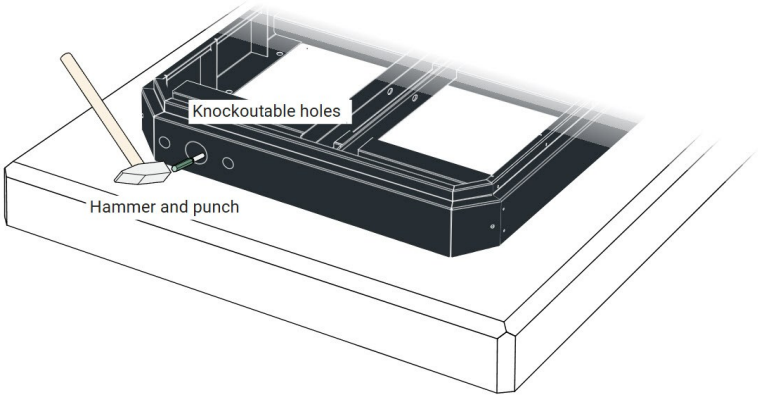
## 5.2 Alternate cable routing

The back of the metal base includes three laser-cut knockouts for cable routing:

- Main power cable: Use the Ø51 mm hole with an M50 cable gland.
- Control power and data cables: Use the 2 × Ø25 mm holes, each fitted with an M25 cable gland.

Open the knockouts:

1. Use a hammer and punch to gently open the required holes.
2. Install the appropriate cable glands before routing the cables.




## 5.3 Mount BAT-80 AC to metal base

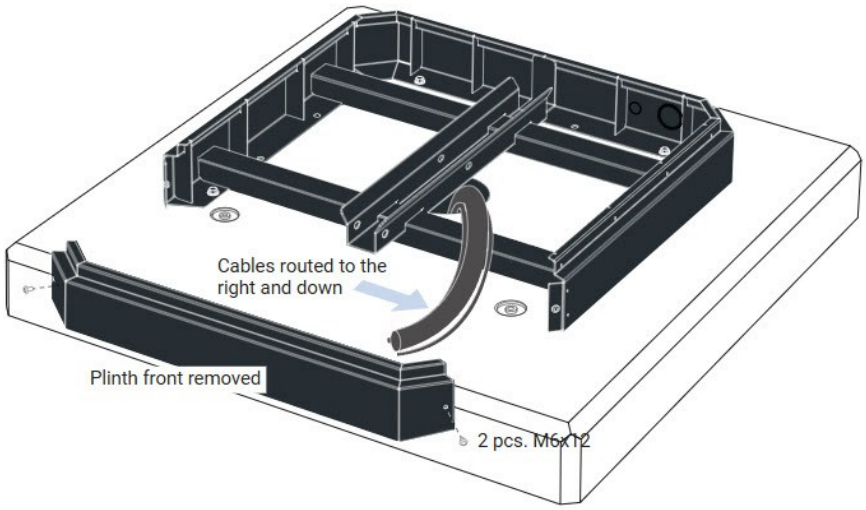
Before beginning the installation, ensure the following:

1. The metal base is securely mounted to the foundation.
2. You have the necessary components and tools:

- 1 BAT-80 AC rack.
- 4 M10x20 EN1665 bolts.
- Tools for tightening the bolts.
- Forklift or crane for lifting.

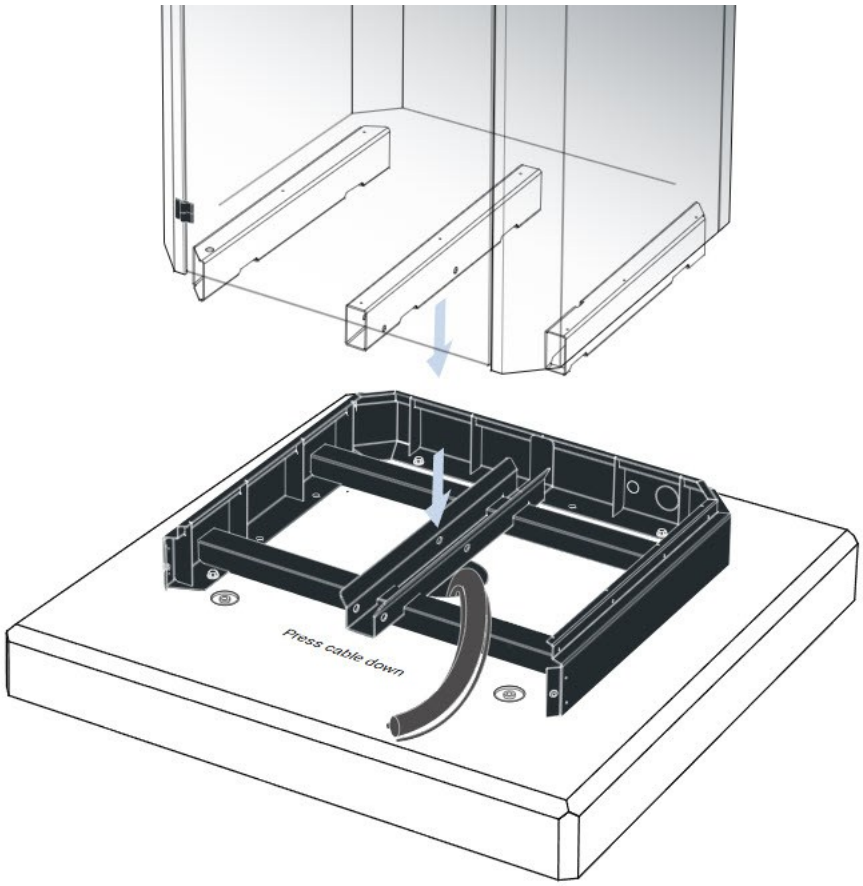
### Steps:

1. Prepare the metal base:
1. Remove the front cover of the base.
2. Route the main power cable to the right and downward inside the base as shown in the figure.



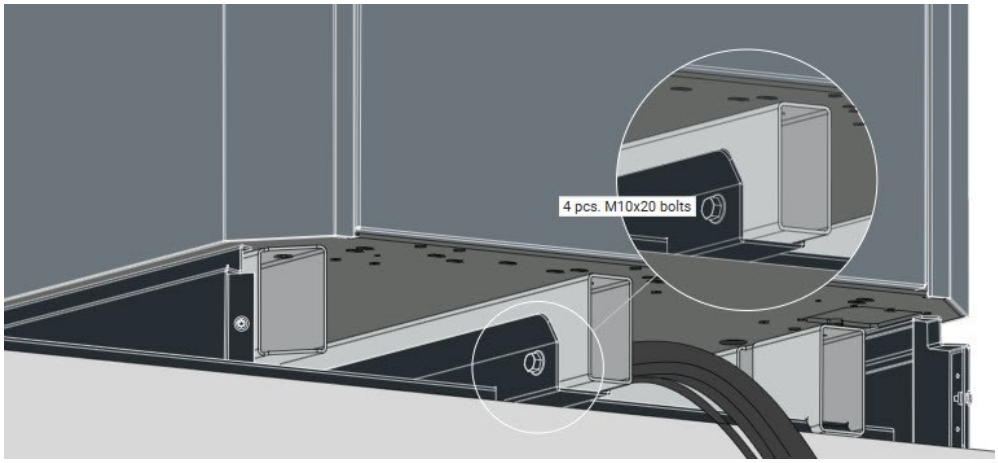
2. Lower the BAT-80 AC rack onto the base:

1. Use a forklift or crane to lift the BAT-80 AC rack.
2. Carefully lower the BAT-80 AC rack onto the base, ensuring that cables are not pinched or damaged.
3. Bundle the wires securely to prevent damage during placement.
4. Align the BAT-80 AC rack properly with the base. If positioned correctly, it will automatically center itself.




3. To secure the BAT-80 AC rack:

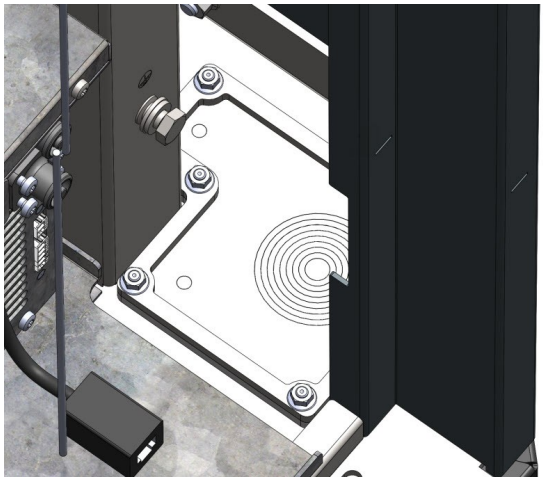
1. Once the BAT-80 AC rack is firmly placed on the base, insert the 4 M12x20 EN1665 bolts.
2. Fasten the bolts into the center of the base and the center square tube of the BAT-80 AC rack as shown in the figure.




3. Tighten all bolts securely to complete the installation.

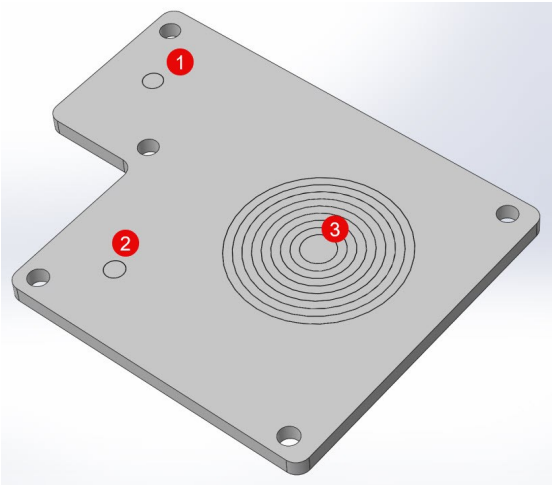
## 5.4 Route the internal cables

A rubber gasket ensures that no moisture or air can enter the battery rack. Follow the steps in this topic to route the cables through the BAT-80 AC rack.



**Steps:**

1. Prepare the rubber gasket:
1. For control power (1) and communication (2), use a drill or utility knife to remove the pre-cut rubber and ensure a snug fit for the cables.

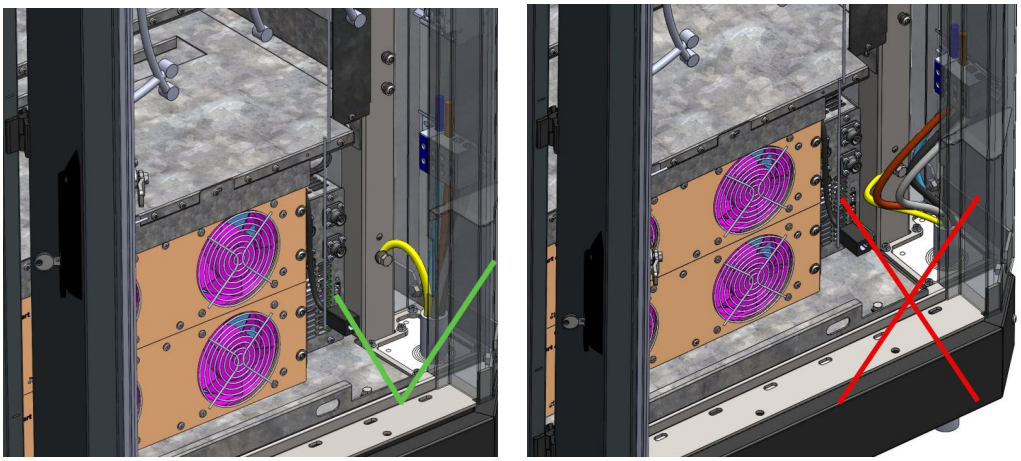



2. For the power cables (3), use a utility knife to remove the pre-cut rubber and ensure a snug fit for the cables.

> **Note**: If a cable does not fit snugly and the gasket does not fully seal the battery rack, apply sealant around the cable.

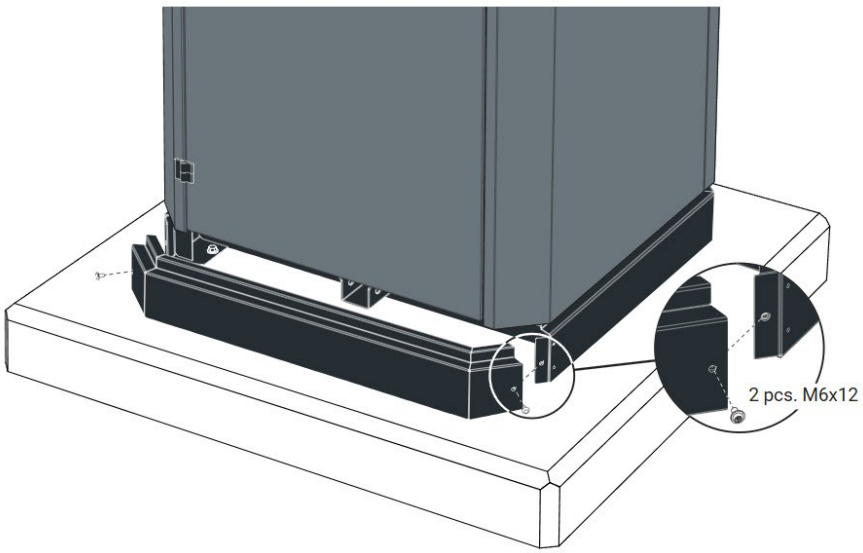
2. Insert the cables through their respective holes in the rubber gasket.

> **Important**: The battery rack has a drawer gap required for sliding out the inverter, BPU, and other controlling units. Make sure the cables do not bend and cover the drawer gap as this will prevent installers and technicians from pulling out the drawer during service. This is illustrated below.



## 5.5 Reattach the plinth front

After routing the cables into the BAT-80 AC rack, reattach the front of the base that you removed in *Mount BAT-80 AC to metal base* on page 22. Use the two M6x12 screws, as shown below.


2 pcs. M6x12

# Chapter 6: Connecting the system

## 6.1 General connection requirements

The grid power cables enter through the base of the rack and pass through the rubber membrane.

> **Note**: The cables used must meet the required bending radius specified in the table below.

| Electrical/Comms | Connections | Requirements |
|---|---|---|
| Electrical panel | Nominal inverter current per rack<br>Install pre-fuse/circuit breaker accordingly | 3 x 400VAC + N, 37A (BAT-80AC/25) |
| | | 3 x 400VAC + N, 45A (BAT-80AC/30) |
| | | 3 x 400VAC + N, 74A (BAT-80AC/50) |
| | | 3 x 400VAC + N, 90A (BAT-80AC/60) |
| | BPU power supply | 1 x 230VAC +N + PE, 10A per rack |
| | External power meter | 3 x 400VAC + N + PE per meter |
| | Protective earthing | Sizing according to power level above |
| | RCD | Required according to Danish legislation |
| BAT-80 AC | Inverter mains supply | 3 phase 400 V AC + N + PE per rack<br>Terminal size rack SAG 35 $mm^2$<br>Multi strand CU-cable required with minimum bending radius r50 mm |
| | BPU supply | 1 x 230 V AC + N + PE, 10 |

| Electrical/Comms | Connections | Requirements |
|---|---|---|
| | | A per rack<br>Terminal size SAG 2,5 mm |
| | Communication to central switch | Ethernet CAT-6 cable per rack |
| | Earthing | Terminal size rack SAG 35 $mm^2$ |
| External communication switch | Ethernet communication between batteries, power meters, and other system peripherals | 1 port per battery rack<br>1 port per power meter |
| TCP/IP power meter | Power meter power supply | 3 x 400 V AC + N + PE per meter |
| | Ethernet connection to public internet | Ethernet CAT6 cable per site |

*Table 6-7 - General connection requirements*

## 6.2 Inverter power ratings

The **inverter power ratings**[1] for the different versions of BAT-80 AC are specified in the table.

| Version | Maximum power rating |
|---|---|
| BAT-80 AC/25 AC | 25 kVA |
| BAT-80 AC/30 AC | 30 kVA |
| BAT-80 AC/50 AC | 50 kVA |
| BAT-80 AC/60 AC | 60 kVA |

*Table 6-8 - Inverter power ratings*

[1]The inverter power rating indicates the maximum amount of power the inverter can deliver to the load or grid under specified conditions. It is measured in kilovolt-amperes (kVA) and determines the system's capacity to convert and supply electrical energy.

## 6.3 Installation diagram

> **Note**: Make sure the power meters and battery racks are on the same subnet as they communicate via Modbus TCP.

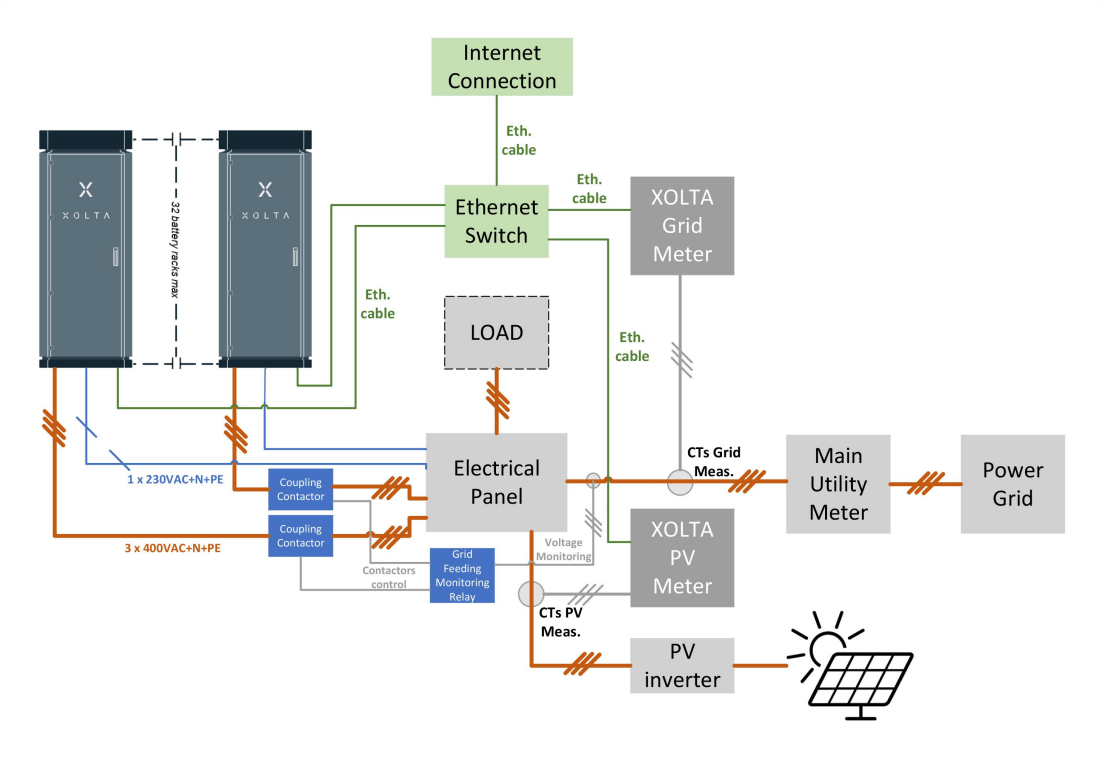



*Figure 6-3 - BAT-80 AC installation diagram*

## 6.4 Power cables requirements

The tables below outline the power cable requirements for BAT-80 AC across different AC ratings.

> **Note**: BAT-80 AC/30 AC and BAT-80 AC/60 AC do not accept a neutral connection.

> **Important**: Do not install an RCD in front of the grid (mains) connections.

| Terminal | Term 1 | Term 2 | Term 3 |
|---|---|---|---|
| Function | Controller PE | Controller neutral | Controller power |
| Voltage specification | PE | AC: N | L: 240 VAC |
| Conductor cross section BAT-80 AC 25/30 AC | Max 2.5 $mm^2$ | | |
| Conductor cross section BAT-80 AC 50/60 AC | Max 2.5 $mm^2$ | | |
| Prefuse | 16 A | | |

*Table 6-9 - Power cable requirements for terminal 1, 2, and 3.*

| Terminal | Term 4 | Term 5 | Term 6 | Term 7 | Term 8 |
|---|---|---|---|---|---|
| Function | Inverter PE | Inverter neutral | Inverter power L1 | Inverter power L2 | Inverter power L3 |
| Voltage specification | PE | AC: N | L1: 400 VAC | L2: 400 VAC | L3: 400 VAC |
| Conductor cross section BAT-80 AC/25 AC | Max 35 $mm^2$<br>**Note**: The terminal block supports aluminum cables up to 50mm², but cables of this size are very stiff, making routing under or inside the rack difficult. | | | | |
| Conductor cross section BAT-80 AC/30 AC | Max 35 $mm^2$ | | Max 35 $mm^2$<br>**Note**: The terminal block supports aluminum cables up to 50mm², but cables of this size are very stiff, making routing under or inside the rack difficult. | | |
| Prefuse | > 50 A < 100 A | | | | |
| Conductor cross section BAT-80 AC/50 AC | Max 35 $mm^2$<br>**Note**: The terminal block supports aluminum cables up to 50mm², but cables of this size are very stiff, making routing under or inside the rack difficult. | | | | |

| Terminal | Term 4 | Term 5 | Term 6 | Term 7 | Term 8 |
|---|---|---|---|---|---|
| Conductor cross section<br>BAT-80 AC/60 AC | Max 35 $mm^2$<br>**Note**: The terminal block supports aluminum cables up to 50$mm^2$, but cables of this size are very stiff, making routing under or inside the rack difficult. | | | | |
| Prefuse | According to power level | | | | |

*Table 6-10 - Power cable requirements for terminal 4, 5, 6, 7, and 8*

## 6.5 Connect BAT-80 AC with the AC power

The figure shows how to wire the AC grid power into the terminals within the battery rack. Make sure to follow the terminal numbers according to the table in *Power cables requirements* on page 29.

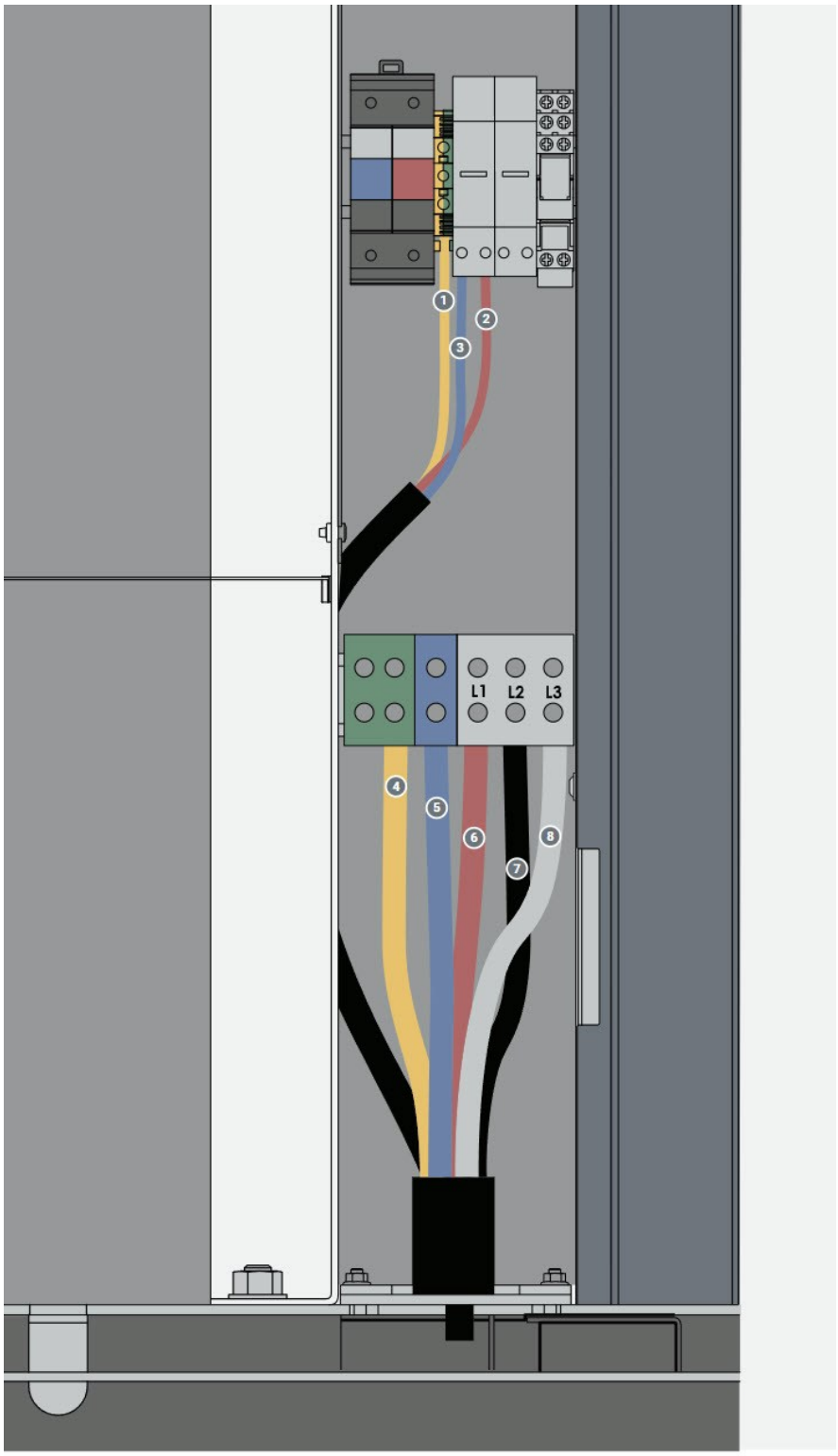



*Figure 6-4 - Wiring of the AC grid power cable*

## 6.6 Connect the communications cable

The figure below illustrates the entry point for the Ethernet cable that provides internet connectivity to the battery rack.

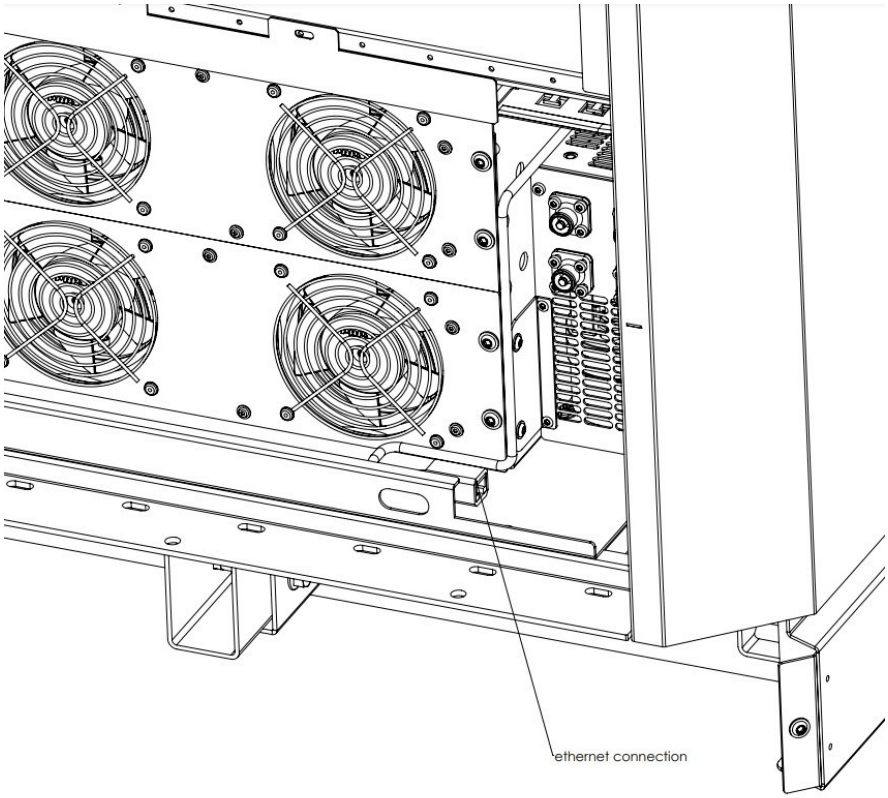



*Figure 6-5 - Entry point for the Ethernet cable.*

# Chapter 7: NS protection and grid monitoring

Decentralized energy generation systems, such as battery storage systems, supply electricity to the power grid. To maintain grid stability, the feed-in process must be carefully controlled to ensure consistent frequency and voltage quality.

Each decentralized energy generation system requires grid and system protection, known as NS (Network Support) protection or NA Schutz protection. NS protection ensures that the BESS operates safely within grid regulations, preventing disturbances such as overvoltage, undervoltage, or frequency imbalances. It plays a crucial role in maintaining grid reliability by detecting and responding to abnormal grid conditions, disconnecting the BESS if necessary to avoid damage or instability.

The inverters inside the rack are configured to comply with country- or region-specific grid codes, including response to over- or under-frequency events. However, full compliance requires an external NS protection relay (NA Schutz relay) at the system level. This relay continuously monitors grid conditions and provides an additional layer of safety by ensuring that the entire system, regardless of the number of BAT-80 AC units, meets grid protection requirements. Even in a multi-unit setup, a single monitoring unit is sufficient to ensure proper grid protection and network support functionality.

For more information about NA Schutz requirements, approved components, and configuration guidelines, refer to the *NS Protection Reference Manual*: https://xolta.com/wp-content/uploads/XOLTA_NetworkSystems_Protection_BAT-80AC_UK.pdf.

# Chapter 8:  Testing and commissioning the battery

To test and commission the battery, follow the link http://installer.xolta.com, sign up if you haven't already done so, and follow the instructions in the installer app. When you are logged in, you can access a reference manual.

**Note**: If you experience any problems, please contact XOLTA support at support@xolta.com or by calling +45 35 15 31 23, extension *2*.

# Chapter 9: Terminology

This section describes the terms and abbreviations used in this manual.

**AC**
Alternating current

**AC unit**
An air-cooling unit in the battery energy storage system used to absorb and transfer heat inside the battery unit.

**API**
Short for "Application Programming Interface". A set of commands and protocols that enables different software applications to interact and exchange data by defining how requests and responses should be structured.

**Battery protection unit**
A unit containing switches and fuses for battery protection .

**BESS**
Battery energy storage system

**black start mode**
A system operation mode in which the battery energy storage system independently generates power without external grid support, allowing it to restart other power generation sources and restore grid operations following a blackout. See also “grid forming mode”.

**BMS**
Battery management system

**BoL**
Beginning of life

**BPU**
Battery protection unit

**C3 classification**
A corrosion category based on ISO 12944, indicating a moderate level of environmental corrosion risk. It applies to urban and industrial areas with moderate sulfur dioxide pollution or coastal areas with low salinity.

**CAN**
Controller area network

**CMU**
Cell monitoring unit of n-BMS

**Controller area network**
Serial communication protocol developed by Bosch.

**DC**
Direct current

**de-energize**
To disconnect or isolate the battery energy storage system from any power source to prevent the flow of current. A de-energized battery might still be partially or fully charged.

**DoD**
Depth of discharge

**DSO**
Short for "distribution system operator", also known as "electricity distribution company". This is the company responsible for operating, maintaining, and developing the electrical distribution network, ensuring a reliable supply of electricity to end-users, and facilitating the integration of renewable energy sources and other distributed energy resources.

**EES**
Energy storage system

**EMS**
Energy management system

**EoL**
End of life

**FCR**
Short for "Frequency Containment Reserve". FCR is a primary frequency response service that stabilizes grid frequency deviations by automatically balancing generation and consumption within seconds after a disturbance. It is the first line of defense to maintain grid frequency near its nominal value.

**FCR-D**
Short for "Frequency Containment Reserve for Disturbances". FCR-D is activated during larger, more significant frequency disturbances that fall outside the range of normal operations. It provides a stronger, more targeted response to prevent the grid frequency from falling below critical thresholds.

**FCR-N**
Short for "Frequency Containment Reserve - Normal". FCR-N is a subtype of FCR designed to handle smaller frequency deviations during normal grid operation. It ensures continuous frequency stabilization within a defined tolerance band.

**FFR**
Short for "Fast Frequency Response". FFR provides rapid active power support to counteract significant frequency drops, acting faster than traditional FCR. It is often used to address high-inertia grids or during large, sudden power imbalances.

**grid forming mode**
An operational mode where a battery energy storage system actively controls voltage and frequency, creating a stable grid environment and maintaining power balance, even in the absence of external grid input or under weak grid conditions. See also “black start mode”.

**GUI**
Graphical user interface

**IGBT**
Insulated gate bipolar transistor

**Inverter power rating**
The inverter power rating indicates the maximum amount of power the inverter can deliver to the load or grid under specified conditions. It is measured in kilovolt-amperes (kVA) and determines the system’s capacity to convert and supply electrical energy.

**IP**
Ingress protection code according to International Electrochemical Commission

**Maximum power point tracker**
A crucial component in photovoltaic systems that optimizes the performance of solar panels by maximizing the power they can deliver under varying conditions. It is typically part of a solar charge controller or inverter.

**MCB**
Miniature Circuit Breaker

**MCU**
Main Control Unit of n-BMS

**Meter**
A digital device that has been physically installed and is awaiting connection to the XOLTA server, measuring and recording real-time electricity consumption, generation, and grid interaction for efficient energy management in a battery storage system. Synonym: smart meter.

**miniature circuit breaker**
A circuit protection device that protects against overcurrent and short circuits.

**MODBUS**
Serial communication protocol developed by Modicon

**MPPT**
Maximum power point tracker

**n-BMS**
Battery Management System from Lithium Balance A/S

**NTC**
Negative temperature coefficient thermistor

**OVC**
Short for "over voltage category". The level of transient overvoltage the battery energy storage system can withstand based on its location in the electrical installation. It ranges from OVC I (low exposure, electronic devices) to OVC IV (high exposure, utility connections). Transient protection is achieved through a surge protection device.

**Over voltage category**
The level of transient overvoltage the battery energy storage system can withstand based on its location in the electrical installation. It ranges from OVC I (low exposure, electronic devices) to OVC IV (high exposure, utility connections). Transient protection is achieved through a surge protection device.

**PCS**
Power conditioning system

**Peak shaving**
The process of reducing short-term high power demand (peak loads) by using energy storage or alternative power sources to lower electricity costs and relieve grid stress.

**photovoltaic**
A technology that converts sunlight directly into electricity. It's a way of generating energy by using solar panels that capture sunlight and turn it into usable power for homes, businesses, or devices.

**POR**
Power on reset

**PV**
Photovoltaic also know as solar energy

**R134A**
A type of refrigerant used in air conditioning and refrigeration systems.

**RCBO**
Residual Current Breaker with Overcurrent.

**RCCB**
Residual Current Circuit Breaker.

**RCD**
Residual current device

**residual current breaker with overcurrent**
A circuit protection device that combines the functions of RCCB and MCB into a single device.

**residual current circuit breaker**
A circuit protection device that detects earth faults or residual currents.

**residual current device**
A circuit protection device that detects leakage currents and cuts off the power to prevent electric shocks.

**RJ45**
Short for "Registered Jack 45". A standardized connector used for Ethernet networking, featuring an 8P8C (8 Position, 8 Contact) design. It is commonly found on twisted-pair cables like Cat5e and Cat6, enabling connections between devices such as computers, routers, and switches. RJ45 supports high-speed data transmission and adheres to wiring standards like TIA/EIA-568.

**SC**
Site controller

**SoC**
State of charge

**SPD**
Short for "Surge Protection Device". A device designed to protect batteries and other electrical components from voltage spikes or surges, for example, because of lightning strikes. It's installed between the power supply and the battery it's protecting. When a surge occurs, the device either diverts the excess voltage to the ground or limits it to a safe level that won't damage the system.

**Surge arrester**
A type of surge protection device (SPD) used in electrical power systems to limit voltage surges and divert excess current safely to the ground, preventing damage to equipment during events like lightning strikes or switching surges.

**surge protection device**
A device designed to protect batteries and other electrical components from voltage spikes or surges, for example, because of lightning strikes. It's installed between the power supply and the battery it's protecting. When a surge occurs, the device either diverts the excess voltage to the ground or limits it to a safe level that won't damage the system.

**TCO**
Total cost of ownership

**TCP**
Transmission control protocol

**time of use**
A pricing model used by utility companies where electricity rates vary depending on the time of day, day of the week, or season. Under TOU, electricity is typically more expensive during peak demand periods (when usage is high) and cheaper during off-peak times

(when demand is lower). This pricing structure encourages consumers to shift their energy use to off-peak periods to lower costs and reduce strain on the electrical grid.

**TMS**
Thermal management system

**ToU**
Time of Use

XOLTA

## About XOLTA

XOLTA is a Danish company specializing in the development and production of advanced battery systems for energy storage. The solutions are designed for both residential households and businesses, enabling efficient solar energy storage and energy consumption optimization. XOLTA's products promote energy efficiency, reduce dependency on the power grid, and support a sustainable future.

## Address

Mileparken 1
2740 Skovlunde
Denmark
CVR 43675346

**XOLTA Support**

+45 35 15 31 23
support@xolta.com