Operating Manual

xelectrix Power Box UNLIMITED Range M10/M20

Operating and Maintenance

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xelectrix Power / Technical Department

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Author, responsible for the content
xelectrix Power GmbH
Pem-Str. 2
4310 Mauthausen, Austria
Phone: +43 7238 31515
E-mail: support@xelectrix-power.com

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This document may include country-specific or model-specific variations in equipment and configuration of the installation in question.

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1 Introduction

Thank you for choosing our xelectrix Power Box (XPB) UNLIMITED, a high-quality Energy Storage System for very different areas of application. We develop and manufacture our xelectrix Power Box system to strict specifications. These products should serve you well for many years.

2 Preface

This is the operating manual for the energy storage system xelectrix Power Box (XPB) of the UNLIMITED Range. It describes the regular operation after commissioning as well as maintenance activities and measures for troubleshooting.
The operating manual is intended for the operator of a system. It serves the operator to use the system as intended and to carry out the correct maintenance activities and measures in the event of a fault. It may contain contractually agreed obligations in this context.
WARNING! This operating manual must always be at hand wherever the device is being used. Read and follow all instructions before using the xelectrix Power Box. Omission of the safety precautions could result in injury and/or system damage.

3 System Safety

	**DANGER! Indicates immediate and high danger. If it is not avoided, death or serious injury will result.**
	**WARNING! Indicates a potentially dangerous situation. Death or serious injury may result if appropriate precautions are not taken.**
	**CAUTION! Indicates a situation where damage or injury could occur. If it is not avoided, injury and/or property damage may result.**
	**NOTE!** Indicates a risk of flawed results and possible damage to the equipment.

3.1 General Safety Rules

The device is manufactured using state-of-the-art technology and according to recognised safety standards. If used incorrectly or misused, however, it can cause:

- injury or death to the operator or a third party,
- damage to the device and other material assets belonging to the operator.

All persons involved in operating, commissioning, maintaining, and servicing the device must

- be suitably qualified,
- have knowledge of and experience in dealing with electrical installations and
- read and follow this operating manual carefully.

The operating manual must always be at hand wherever the device is being used. In addition to the operating manual attention must also be paid to any generally applicable and local regulations regarding accident prevention and environmental protection.

All safety and danger notices on the device:

- must be in a legible state,
- must not be damaged,
- must not be removed,
- must not be covered, pasted, or painted over.

For the location of the safety and danger notices on the device, refer to section 3.10 in this operating manual.

- The terminals can reach high temperatures.
- Only operate the device if all its protection devices are fully functional.
- Any safety devices that are not functioning properly must be repaired by a suitably qualified technician before the device is switched on.
- Never bypass or disable protection devices.
- Before switching on the device, remove any faults that could compromise safety.

This is for your personal safety!

3.2 Intended Use, Environmental Conditions

Operation or storage of the device outside the stipulated area (see section 9) will be deemed as not in accordance with the intended purpose. The manufacturer shall not be held liable for any damage arising from such usage.

In particular, the following requirements must be observed:

- Environmental conditions like temperature, humidity etc. must match technical specifications (section 9).
- All connected electrical systems must be designed for 50 Hz operation.
- Left rotating electrical systems are not supported.

An XPB UNLIMITED is intended to be used in the following scenarios (see section 6):

- Operation in Island Mode (see section 6.3)
- Operation in Diesel generator Mode (see section 6.4), and
- Operation in Grid Mode (see section 6.5).

3.3 Qualified Service Engineers

The servicing information contained in this operating manual is intended only for the use of qualified service engineers. An electric shock can be fatal. Do not perform any actions other than those described in the documentation. This applies even if you are qualified to do so.

- All cables and leads must be secured, undamaged, insulated and adequately dimensioned. Loose connections, scorched, damaged or inadequately dimensioned cables and leads must be immediately repaired by authorised personnel.
- Maintenance and repair work must only be carried out by xelectrix Power authorised personnel.
- It is impossible to guarantee that bought-in parts are designed and manufactured to meet the demands made of them, or that they satisfy safety requirements. Use only original spare parts (also applies to standard parts).
- Do not carry out any modifications, alterations, etc. to the device without the manufacturer's consent.
- Components that are not in perfect condition must be replaced immediately.

3.4 Five Safety Rules for Electrical Works

In addition to specific precautions, all work on the system must always and without limitation comply with the five safety rules for works in and on electrical installations (DIN VDE 0105-100), which may only be carried out by a qualified electrical specialist.

Five safety rules:

1. Disconnect from the mains
2. Secure against re-connection
3. Verify that the system is dead
4. Carry out earthing and short-circuiting*
5. Provide protection from adjacent live parts

* Warning! Short-circuiting of the energy storage can be an additional danger due to the high power. It is therefore recommended not to short circuit the battery storage while still ensuring all the other safety measures[1].

After completion of works on the system, the five safety rules shall be repealed in reverse order.

3.5 Earth Potential Grounding

The machine must be grounded to ensure the proper function of RCD devices and personal protection. In case of an island mode configuration, connect the metal grounding spike or the input earth pin of the input connector to the proper grounding in Figure 1. For grid or generator connection, ensure proper grounding of the feeding line.
For all systems the earth grounding resistance should be less than 600 Ω or according to local regulations.

Figure 1: Earth Potential for the Unlimited M10 unit on the left and for the unlimited M20 on the right

[1] This is permitted in Austria according to the Electronic Protection Ordinance (ESV 2012) for plants with voltages below 1 kV if there is no risk of the system being voltaged.

3.6 Protective Equipment

Figure 2 shows the transport protection measures for the XPB UNLIMITED M10.

Figure 2: Transport protection for connectors

Figure 3: Transport protection for air conditioning system

Figure 2 shows the transport protection for the ConPanels for system configuration and control, power input and outputs. This is a standard cover for the XPB UNLIMITED M10 and M20. On Figure 3, is a customised protection grid installed as a protection against animals entry into the air conditioner housing. The transport protection must to be taken down during operation.

3.7 Noise Emission Values

During operation, the XPB UNLIMITED's power-electronics and the equipped dual fan air conditioner (used for heating and cooling) has a noise level below 70 db. This value differs depending on the amount of converted power, the ambient temperature, the level of soiling of the device and external heating through solar radiation, etc.

3.8 EMC Measures

xelectrix Power Box equipment is tested and comply with EMC limits. Cases, when there is sensitive equipment nearby, nonetheless some interference may occur. Just as other nearby devices could disturb the xelectrix Power Box equipment. In that case, the operator is obliged to take appropriate action to rectify the situation.

3.9 Data Protection

The user is responsible for the safekeeping of any changes made to the factory settings. The manufacturer accepts no liability for any deleted personal settings.

3.10 Safety Warning Labels

Safety warnings are attached on the external and internal part of the Unlimited Ranges. It is strictly prohibited to remove any safety warnings from the XPB system. See Figure 4 for the safety warning attached externally on the Unlimited Ranges.

Figure 4: Warning label on XPB Unlimited Ranges

Figure 5 shows the location of the safety warning label and the nameplate on the cabinet. The warning labels of the battery packs are hidden by covers.

Figure 5: Warning label and nameplate inside the Unlimited Ranges

Figure 6 shows the battery pack nameplate.

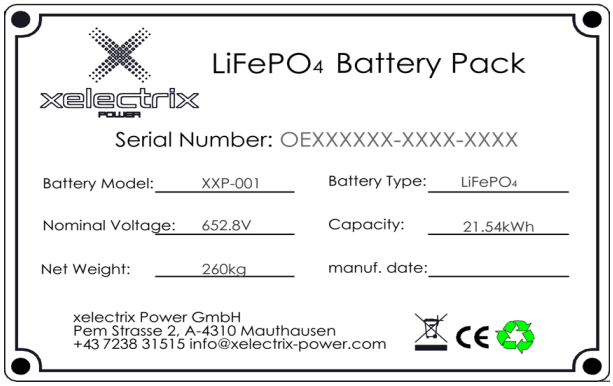

Figure 6: Battery pack nameplate

These attached safety warnings unconditionally must be taken into consideration.

	Both nameplates may not be removed or blurred!
	Danger to life! **Opening of the energy storage (battery package) and the cabinet is permitted only to trained, contractually agreed with personnel, and prohibited to other personnel for safety reasons.**

[1] All user must strictly adhered to the warnings labels and signs on the XPB units

4 Functional Design

4.1 System Overview

The XPB Unlimited range is a three-phase system which can be connected to different energy sources (low-voltage power grid or a diesel generator). The integration of the XPB Unlimited ranges with an energy source can be utilised as a hybrid system for charging and discharging to and from the batteries back to the grid or to consumer loads, see Figure 7. Other secondary grid dependant energy sources such as a photo-voltaic systems can also be integrated to the XPB unlimited system for operation.

The XPB Unlimited ranges are a complex systems of multiple components working together as a unit. The system primarily consists of a combination of high-efficiency accumulators (batteries) and a bi-directional inverter (DC and AC inverter), see Figure 8 for the 10 ft container series and Figure 9 for the 20 ft container series. This system works in a hybrid mode either to take power from a power source (for charging the energy storage and or supply to a load) or feeding energy back into the power grid (power grid support).

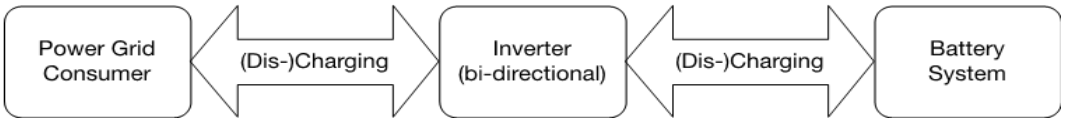

Figure 7: Functional component design of the XPB system

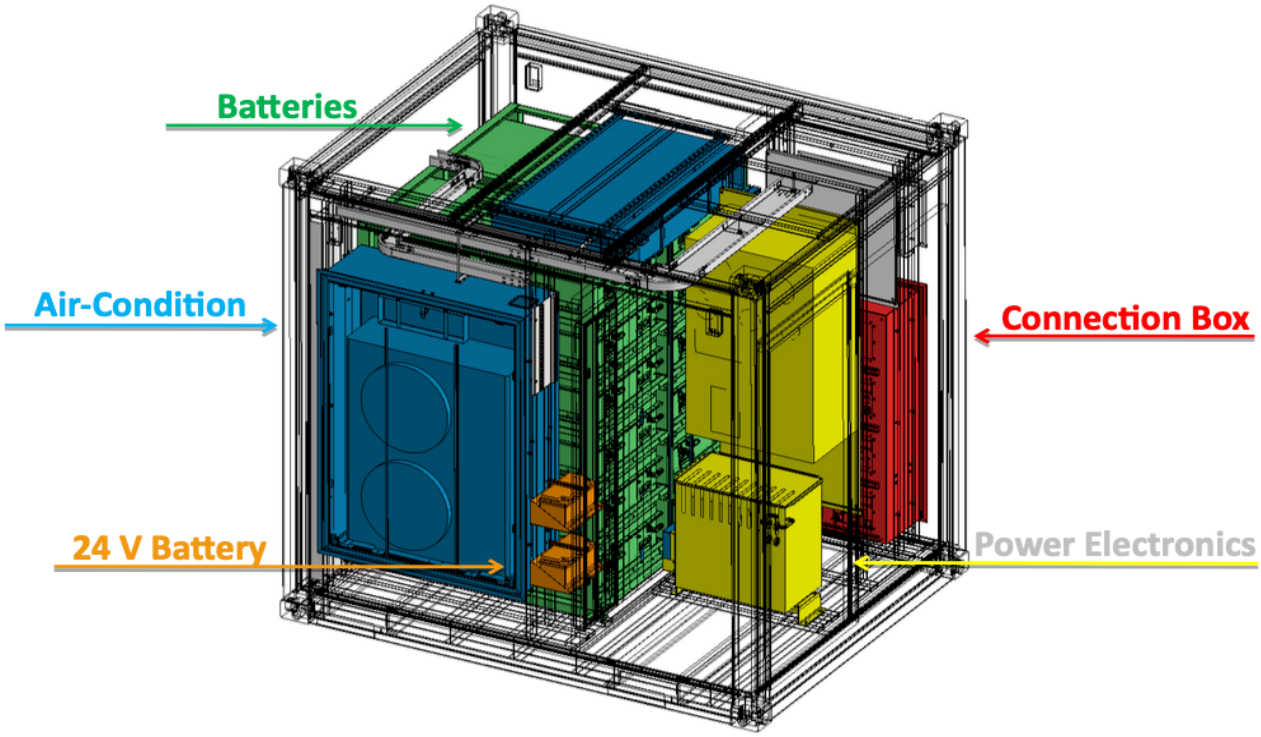

Figure 8: Basic component design of the Unlimited M10 Range

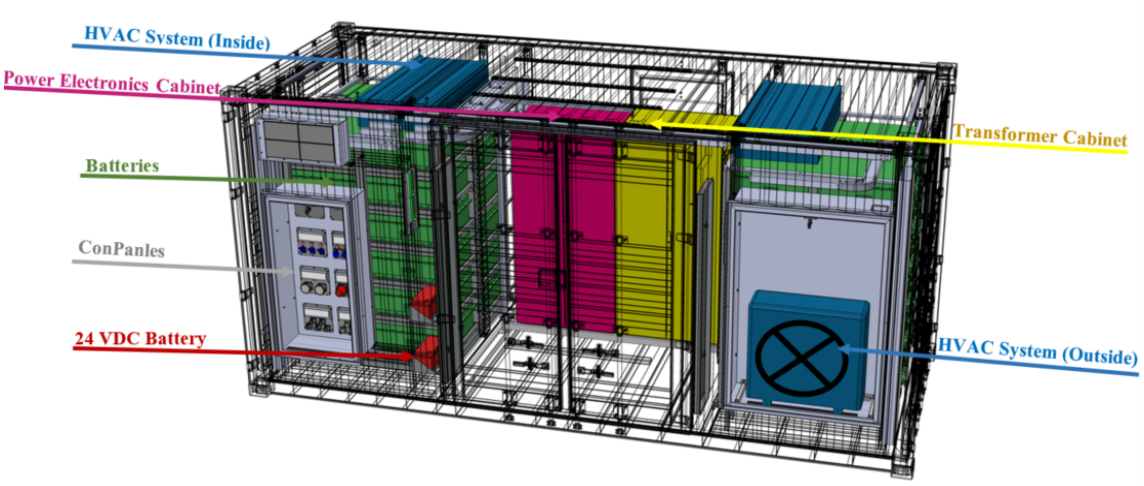

Figure 9: Basic component design of the Unlimited M20 Range

4.2 Functional Components

The models of the UNLIMITED series have the following parameters:

XPB Model	AC Input Current	AC Output Current	Inverter Power	Storage Capacity
XPB-U35-nnn-M10	200 A	250 A	35 kW	60 – 240 kWh
XPB-U80-nnn-M10	400 A	550 A	80 kW	100 – 240 kWh
XPB-U150-nnn-M10	730 A	950 A	150 kW	180 – 240 kWh
XPB-U35-nnn-M20	200 A	250 A	35 kW	240 – 480 kWh
XPB-U80-nnn-M20	400 A	550 A	80 kW	240 – 480 kWh
XPB-U150-nnn-M20	730 A	950 A	150 kW	240 – 480 kWh

Table 1: System characteristics depending on the model

The XPB Unlimited range is equipped with an AC input 400-amp AC Power locks (Figure 13) as one of the standard set up. The AC input and output Power locks are not fused and shall only be used up to the maximum limit of the rated plug amps.

For other AC input and output configurations, please ask your xelectrix sales representative. All other output plugs are protected by RCD and line breakers. The breakers will trip at overloaded plugs and/or leakage fault.

The XPB system consists of the following functional system components:

4.2.1 Energy Storage System (Battery System)

The energy storage system based on rechargeable batteries (accumulators) is used to store in "absorb" energy and store out "release" energy depending on the working point of the system and consists of one or more parallel-connected blocks (battery packs). A battery pack is a single $LiFePO_4$(LFP) cell array combined into a unit with a working voltage of 585 V to 744 V and a capacity of 20 kWh each. By connecting additional battery packs, the capacity of the system can be increased in increments of 20 kWh up to a maximum of 240 kWh.

The batteries themselves feature the highest safety standard possible. Each pole is protected through an individual contactor and each cell is monitored via the BMS. In addition, there are high voltage fuses and a mechanical fire extinguishing system in place, to provide extra safety.

In the XPB Unlimited, the batteries are installed behind a partition. Figure 9 shows the communication board of the storage batteries, the black start batteries and a circuit breaker. Those led batteries are needed to provide power for island start-up.

Figure 10: Battery control cabinet (communication system, circuit-breaker, black start batteries and light switch)

4.2.2 Inverter

The inverter is a controlled bi-directional DC and AC inverter in the power path between the power source and load sided three-phase system and the battery sided DC system with model-dependent nominal power.

4.2.3 Power Switch and Contactor

The power switches and contactors in the power path connect or separate the system, the low-voltage grid, the load (consumer) and possibly connected generators (e.g., photovoltaic systems) depending on the operating mode (section 4.3 Basic Operation Modes).

4.2.4 Transformer

The transformer is installed between the inverter, the load and the power source in the power path. It enables galvanic isolation and provides a neutral conductor.

4.2.5 System Control

The control of the system is carried out by a control unit (Main Control), which is connected to the respective system components via measuring and control lines.

For the operation of the control system, a 24 V internal power supply is installed, which is fed from either:

1. the mains voltage
2. the internal battery voltage during island operation (via appropriate converters) or
3. an internal emergency power supply in case of emergency operation and black start capability.

4.2.6 Energy Management System

An Energy Management System (EMS) is an integral part of the system. This regulates the entire system according to different control scenarios.

4.2.7 Monitoring

The xelectrix MONITOR collects various operating data and sends those values to the xelectrix Cloud, where monitoring data can be viewed by means of a web browser. The user must supply local network connectivity so that the xelectrix MONITOR can send data to the xelectrix Cloud.

4.2.8 Modbus/TCP Interface

The system is optionally equipped with a Modbus/TCP interface. This interface provides system information and allows control of the system. This enables XPB systems to be integrated into other energy systems for load flow control such as smart home systems by means of external Energy Management Systems (EMS).

To use the xelectrix Modbus/TCP interface, the user must supply local network connectivity to the xelectrix Modbus/TCP interface so that the user's EMS can query the xelectrix Modbus/TCP.

If you ordered your XPB system including the xelectrix Modbus/TCP interface, you can request a copy of the xelectrix Modbus/TCP interface description. XPB systems that are configured to support the xelectrix Modbus/TCP interface do not use their internal EMS.

Questions about this interface can be found in the **"xelectrix Modbus / TCP Interface Manual"** [2] or should be directed to xelectrix Support Team by email to **support@xelectrix-power.com**.[3]

[2] See document "xelectrix Modbus / TCP Interface Manual".
[3] Contact xelectrix Support Team.

4.3 Basic Operation Modes

The basic functions enable the following operation modes: grid/generator mode, island mode and bypass mode.

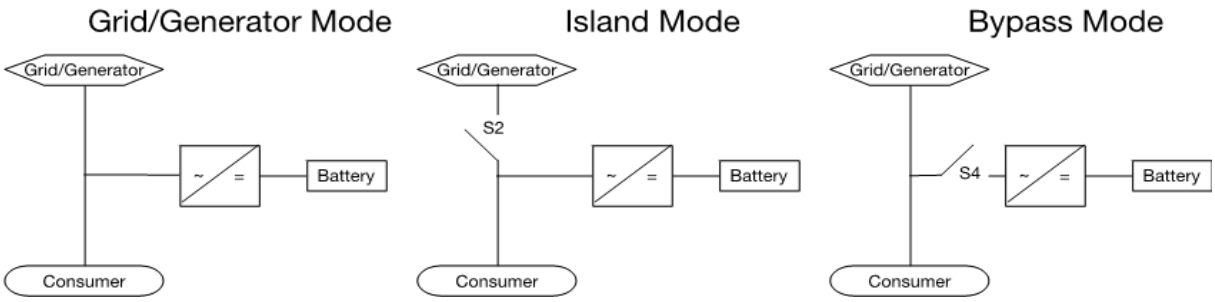

Figure 11: Operation modes of the XPB system (symbolic presentation)

4.3.1 Grid/Generator Mode

In grid mode, the system is connected to a low-voltage power grid. In generator mode, a diesel generator is connected as a power source.

Grid/Generator mode enables (partly simultaneously)

- charging of the energy storage,
- supplying of electrical consumers, in particular, to cover peak loads, and
- integration of electrical generation systems (e.g., photovoltaic systems).

4.3.2 Island Mode

In Island Operation mode the system operates without a connection to a grid or a diesel generator and is separated from such.

Island mode allows (partly simultaneously)

- (self-sufficient) supply of electrical consumers and
- integration of electrical generation systems (e.g., photovoltaic systems), and with that also
- charging the energy storage.

4.3.3 Bypass Mode

In Bypass mode, the system itself is not in active operation and is separated from the power path. However, it actively keeps up the connection between the power source (grid or generator) and the load. Therefore, consumers are directly attached to the power source through the XPB UNLIMITED.

The power source is monitored constantly, and the consumers are disconnected in case of failure. In this way, the consumers are additionally protected by the system. If a grid-disconnect occurs in this mode, the user will have to manually reconnect the load to the grid again by either starting the XPB system or by pressing the Force Hybrid Button (Blue) on a connected Display.

[3] XPB Unlimited Operation Modes

5 Operating Controls and Connectors

5.1 Control Panel (ConPanel)

The control board of the XPB Unlimited M10 is located on one of the control panels on the side of the container, as shown in Figure 12. Figure 13 shows the location of the control board on the XPB Unlimited M20, which is also on one of the control panels.

Figure 12: Side view of XPB UNLIMITED M10 with Control Panel

Figure 13: Front view of XPB UNLIMITED M20 with Control Panel

5.1.1 Touch Display

CAUTION! To avoid damages to the touch display always keep the cover closed and the screws tightened.

The touch display which is also known as the Human Machine Interface Display (HMI Display) can be used by pressing buttons <F1>, <F2>, <F3>, <F4>, <Arrow left>, <Arrow right> and by touching the screen.

Any XPB system control can be done via a sequence of pages (1, 2, 3...). The total number of visible pages depends on the authorisation level. See the document "Control Board with Touch Display / HMI Operating Manual" or Please ask your xelectrix sales representative or see the xelectrix Partner Area on the webpage <www.xelectrix-power.com>. for more details on the Touch Display.

Figure 14: Control Panel with Touch Display

[3]Please contact the xelectrix sales representative or see the xelectrix Partner Area on the webpage <www.xelectrix-power.com>.

5.2 Input/Output Power Board

Figure 15 shows the input/output connections on some control panels. The Unlimited series can be configured with different variations of input/output connections. For more details please contact your xelectrix sales representative or see the xelectrix Partner Area on the webpage <www.xelectrix-power.com>.

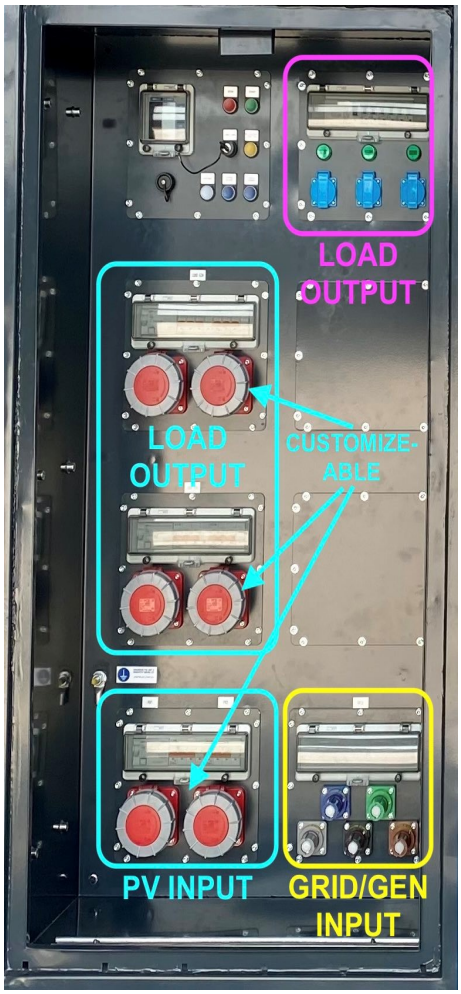

Figure 15: Input/Output Power Board

The input power-lock connections on the bottom right of the board can take up to 400A from the grid OR the diesel generator.

CAUTION! For limitation of INPUT power up to a maximum of 200, 400, or 730 Ampere (depending on Unlimited unit) and external circuit breaker must be applied!

The PV Input power plugs socket placed on the bottom left side can take up to a maximum of 63A. The input is protected by circuit breakers which are placed directly above.
The Load Output Plugs are placed in the middle and are customised. In this case, four 63A Load Output Plugs were built in. Those are also protected by circuit breakers.
Each of the three output power plug sockets on the top of the output power board can deliver power up to a maximum of 16A Single Phase. All sockets again are protected by circuit breakers (placed directly above).

[3]Please contact the xelectrix sales representative or see the xelectrix Partner Area on the webpage <www.xelectrix-power.com>.

5.3 Power Electronics

Danger to life!
Opening of the cabinet is permitted to trained and contractually agreed with personnel only and prohibited to other personnel for safety reasons.
Furthermore, trained or contractually agreed personal is not allowed to enter the Container, while it is under voltage.

Figure 16: Power electronics inside Unlimited M10

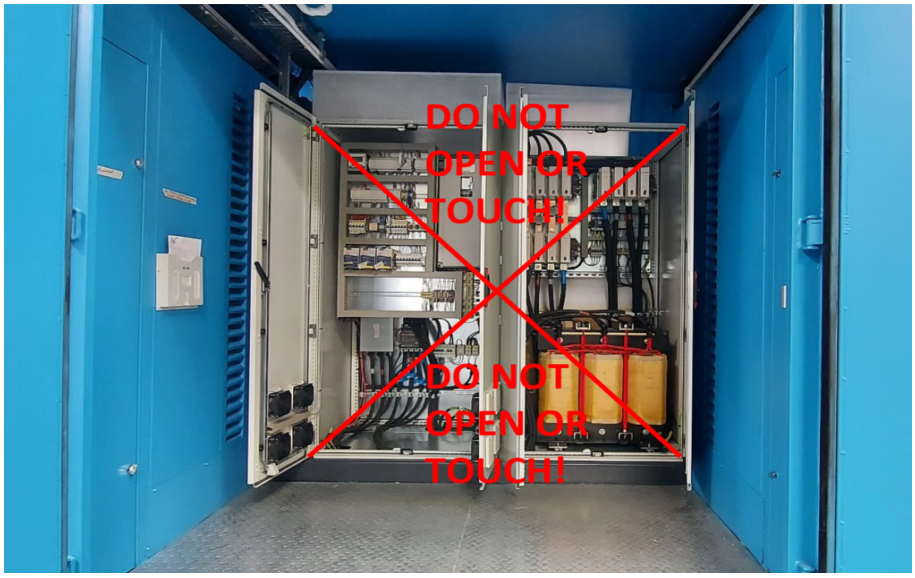

Figure 17: Power electronics inside Unlimited M20

6 Operating Instructions

6.1 Intended Use of Operation

It must be ensured that the operation of the system corresponds to the intended use, see section 3.2 for details.

6.2 Turning Lights on

To turn ON the lights in the XPB Unlimited series when the unit is switched off and is not connected to any power source, please follow the instructions below :

1. Switch automatic circuit-breaker F10 and F20 (see Figure 18)
2. Switch automatic circuit-breaker F21 (see Figure 10, Figure 19)
3. Use the light switch to switch on the lights for 10 minutes (see Figure 10)

The power supply for the lights comes from the black-start batteries (24 V / 2 pcs. 12V AGM batteries, see Figure 9).

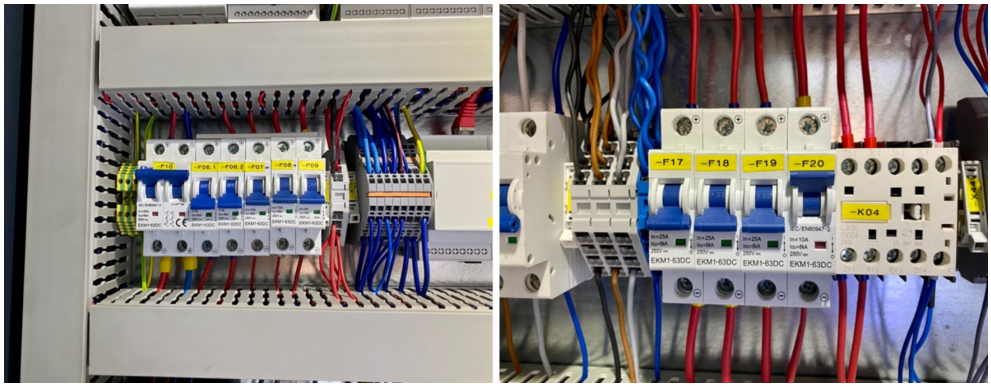

Figure 18: Circuit-breakers F10 and F20

Figure 19: Circuit-breaker (battery cabinet)

6.3 Operation in Island Mode

If an XPB UNLIMITED is neither connected to a grid nor a generator, the Island Mode is used. Here, the XPB UNLIMITED is forming an Island Grid and is supplying electricity to connected consumers limited with the power of the XPB UNLIMITED – U35 with 35 kW, U80 with 80 kW, U150 with 150 kW of power and the battery capacity remaining in the battery packs.

1. If the system is delivered for the **first time**, the first step is always to ground the XPB UNLIMITED.
2. Then a qualified service engineer (3.3) can enter the container and turn on all circuit breakers and switches, otherwise, the system will not boot (including air-conditioning, black-start batteries.
3. If all circuit breakers are turned on. Leave the cabinet and close the door.

Danger to life!
Opening of the cabinet is permitted to trained and contractually agreed with personnel only and prohibited to other personnel for safety reasons.
Furthermore, trained or contractually agreed personal is not allowed to enter the Container, while it is under voltage.

6.3.1 Preparation and Configuration for Island Operation

Prepare the system for operation with battery power following the steps of the operations described below in the specified order.

1. Before moving on check if potential grounding is applied properly as described in section 3.5.
2. Disconnect or switch off input power sources (grid, genset).
3. Connect consumers with output power sockets as described in the warnings on section 5.2.
4. Check battery voltage on the display. See document “Control Board with Touch Display / HMI Operating Manual”. The usual voltage range is between 585 V and 744 V. If the voltage is out of this range, please call your xelectrix Power Box supplier.

WARNING! Grounding the XPB UNLIMITED is mandatory before use.

6.3.2 Starting Up in Island Mode

If the system has been prepared and configured as described in section 6.3.1 or switched off in an orderly manner in accordance with section 6.3.3, it can be switched on and put into regular operation in Island Mode following the operating steps described below in the specified order.

The prerequisite for this is that the system is failure-free and any special reasons for the previous shutdown are eliminated and work on the system is finished as well as that the safety measures are carried out in reverse order according to section 3.4.

1. All steps described in section 6.3.1 must be applied and the system must be prepared and configured properly for the start-up. Respect warnings!
2. Press the “Black-start Button” (Yellow), keep it pressed for approx. 5 sec. until the “Stop Button” (Red) switches on. If the previous system shutdown was not induced by the user, the Start Button” (Green) will start flashing instead and you may skip the step of manually pressing the green button again.

3. Then press the green button to start up. The green start button starts flashing (see Figure 14).
4. When the green button changes from flashing to continuous light the system are turned on and fully active.

Then, the consumers can be supplied by the XPB UNLIMITED.

If the XPB unit is connected to a grid or a generator, the XPB unit would automatically sync to the available power sources.

6.3.3 Power Save in Island Mode

If the container is kicked on via black start and NOT started after that (e.g., green button) the system will **shut itself off after a delay of 5 minutes**to save power.

6.3.4 Turning Off in Island Mode

To switch off the system, the following operating steps and accompanying measures shall be carried out in the specified order.

1. Internal information (consumers).
2. Switch off the system (inverter) by pressing the red stop button and wait until blinking stops. Standby has been reached.
3. After 5 minutes of standby, the system will shut off completely. Instead of waiting you may press the red stop button again once in standby mode to shut off immediately.

Then, the XPB UNLIMITED is switched off completely. It could happen, that the fans are working for cooling reasons for a while.

For maintenance, automatic circuit breakers in the system must be switched off by a qualified technician. Before further activities at the system, the safety measures must comply in accordance with section 3.4 Five Safety Rules for Electrical Works.

6.4 Operation with Diesel generator

⚠	**WARNING! Grounding the XPB UNLIMITED is mandatory before use.**
⚠	**CAUTION! For limitation of input power up to a maximum of 200, 400, or 730 Ampere (depending on Unlimited unit) and Ampere, an external circuit breaker must be applied!**

6.4.1 Diesel Generator Operation: Preparation and Configuration

Prepare the system for operation with a diesel generator as a power source following the steps of operation described below in the specified order.

1. Before connecting the diesel generator with the XPB UNLIMITED check if potential grounding is applied properly as described in section 3.5.
2. Take all precautions necessary for the limitation of input power as described in the warnings on section 5.2.
3. Switch key to power feed by diesel generator as described in the document “Control Board with Touch Display / HMI Operating Manual”.[4]
4. Set the nominal power of the generator using the touch control panel. This will limit battery charging as well as the power supplied to the load as described in the document “Control Board with Touch Display / HMI Operating Manual”.[5]
5. Connect the diesel generator using the input connector socket on the input/output power board shown in Figure 15 and switch on the external input broker or fuse (MCB).
6. Connect consumers with output power sockets as described in section 5.2.
7. Check battery voltage on the display. See document “Control Board with Touch Display / HMI Operating Manual”. The usable voltage range is between 585 V and 744 V. If the voltage is out of this range, please call your xelectrix Power Box supplier.

6.4.2 Diesel Generator Operation: Starting Up

If the system has been prepared and configured as described in section 6.4.1 or switched off in an orderly manner in accordance with section 6.4.4, it can be switched back on and put into regular operation following the operating steps described below in the specified order.

The prerequisite for this is that the system is failure-free and any special reasons for the previous shutdown are eliminated and work on the system is finished as well as that the safety measures are carried out in reverse order according to section 3.4.

1. All steps described in section 6.4.1 must be applied and the system must be prepared and configured properly for the start-up. Respect warnings!
2. When the red button lights up press the green button to start up. The green start button starts flashing (see document “Control Board with Touch Display / HMI Operating Manual”.[6]).
3. When the green button changes from flashing to continuous light, the system is turned on and fully active.

[4] See document “Control Board with Touch Display / HMI Operating Manual”.
[5] See document “Control Board with Touch Display / HMI Operating Manual”.
[6] See document “Control Board with Touch Display / HMI Operating Manual”

6.4.3 Diesel Generator Operation: Recharging the Batteries

For recharging the batteries, start first the XPB UNLIMITED as described in section 6.5.2. Then configure the charge limit and the other configuration values appropriate to your connected diesel generator, see document “Control Board with Touch Display / HMI Operating Manual”.[7]).

Having set the parameters, the charging starts automatically. Charging carries on until at least 80% of battery capacity is reached. This is shown on the display page 1 "overview “, see document “Control Board with Touch Display / HMI Operating Manual”.[8]).

6.4.4 Diesel Generator Operation: Turning Off

To switch off the system, the following operating steps and associated measures shall be carried out in the specified order:

1. Internal information (consumers).
2. Switch off the system (inverter) by pressing the red stop button and wait until blinking stops (sleep mode reached, bypass operation).
3. Disconnect from the diesel generator by switching off the external input breaker or fuse (MCB).

After a delay of 5 minutes, the system will shut down the 24 V supply and change the system state to Suspend Mode.

If all indicators are off, the system is in suspend mode. If the main fuse is getting switched on again, the system will start up the 24 V supply automatically and change to standby mode.

For maintenance, all automatic circuit breakers in the system must be switched off by a qualified technician. Before further activities at the system, the safety measures must comply in accordance with section 3.4 Five Safety Rules.

6.4.5 Diesel Generator Operation: Switching to Island Mode without Interruption (“Force Island”)

If you are connected to a diesel generator, you may want to switch off the generator for various reasons, e.g., you want to switch off the diesel generator. In such a case you may not want to interrupt your consumers. Then you force the system to Island Mode by pressing the “Force Island Mode Button”, see document “Control Board with Touch Display / HMI Operating Manual”.[9]).

Note: Disconnecting the diesel generator suddenly without using the Force Island mode will lead to a short interruption of approx. 1 sec. at the consumer’s side.

Pressing the “Force Island Button” forces the power electronics to actively sync from the Grid/Generator mode to the Island mode leading to a seamless change-over.

After pressing the “Force Island Button” the “Start Button” starts blinking and showing the mode transition. A “Lock Sign” between the generator and the consumers are shown on Display Page 1 “Overview”. Internally the inverter is changing from inverter hybrid to inverter island mode.

After reaching the Island Mode the Generator is disconnected (with a “Lock Sign”) and the storage system is already connected to the consumers seamlessly. The generator can then be switched OFF and the “Lock Sign” stays, see Figure 20.

[7] See document “Control Board with Touch Display / HMI Operating Manual”
[8] See document “Control Board with Touch Display / HMI Operating Manual”
[9] See document “Control Board with Touch Display / HMI Operating Manual”

Figure 20: Island Mode reached after pressing the “Force Island Button”

6.4.6 Diesel Generator Operation: Forcing Generator Mode (“Force Hybrid”)

For a scenario where a generator is connected in automatic mode in the XPB UNLIMITED, the generator would be switched off if the batteries are fully charged and no loads are connected. If in this case a large load higher than the inverter’s rated power was connected to the XPB UNLIMITED, the system would fail, e.g., if a tower crane will start working.

To avoid such a scenario, use the function “Force Hybrid” by pressing the “Force Hybrid Button” to let the generator switched on and override the automatic switching off.

Pressing the “Force Hybrid Button” again unlocks the generator. The UNLIMITED system will be allowed again to stop the generator automatically.

6.4.7 Diesel Generator Operation: Using two different Generator Loads

Two different diesel generator load targets can be used with the XPB UNLIMITED without any system reconfiguration. For the configuration of the two charging limits see document “Control Board with Touch Display / HMI Operating Manual”.[10]).

The switching between the two configured charging limits is done during operation by pressing once the green “Start Button”. When the start button starts blinking two times, the charging limit “GenLoad 2” is active. Pressing again the green start button switches back to the charging limit “GenLoad 1”. This can be detected by a one-time blinking of the start button.

[10] See document “Control Board with Touch Display / HMI Operating Manual”

6.4.8 Diesel Generator Operation: Activation of Bypass Mode

If the system is currently switched off:

- Press Start Button.
- After about 10 seconds (you will hear the contactors switch and the display will show the grid and the load contactors connect).
- Before the XPB UNLIMITED is started up, press the red Stop Button.
- Now the system is in bypass (Only) mode and the consumers are directly supplied by the diesel generator through the XPB UNLIMITED.

If the system is currently running:

- Press Stop Button.

When the Stop Button stops blinking, the transition to bypass (Only) mode is finished. Then, the consumers are directly supplied by the diesel generator through the XPB UNLIMITED.

6.4.9 Diesel Generator Operation: Deactivation of Bypass Mode

If the XPB UNLIMITED is in Bypass Mode, then press the red “Stop Button” to disable the bypass (Only) mode. You will hear the contactors switch and the display will show the diesel generator and the load contactors disconnect. Now the system is in standby mode and the consumers are no longer supplied from the diesel generator.

6.5 Operation with Power Grid

⚠	**WARNING! Grounding the XPB UNLIMITED is mandatory before use.**
⚠	**CAUTION! For limitation of input power up to a maximum of 200, 400, or 730 Ampere (depending on Unlimited unit) and Ampere, an external circuit breaker must be applied!**

6.5.1 Grid Operation: Preparation and Configuration

Prepare the system for operation with grid power following the steps of the operations described below in the specified order.

1. Before connecting the source with the XPB UNLIMITED check if potential grounding is applied properly as described in section 3.5.
2. Take all the necessary precaution measures for limitation of input power as described in the warnings on section 5.2.
3. Switch key to power feed by the grid as described in document “Control Board with Touch Display / HMI Operating Manual”.[11]).
4. Set the maximum input power using the touch control panel. This will limit battery charging as well as the power supply of the load as described in document “Control Board with Touch Display / HMI Operating Manual”.[12]).
5. Connect the power grid using the input connector socket on the input/output power board shown in Figure 15 and switch on the external input broker or fuse (MCB).
6. Connect consumers with output power sockets as described in section 5.2.
7. Check battery voltage on the display. See in document “Control Board with Touch Display / HMI Operating Manual”.[13]). The usable voltage range is between 585 V and 744 V. If the voltage is out of this range, please call your xelectrix Power Box supplier.

6.5.2 Grid Operation: Starting Up

If the system has been prepared and configured as described in section 6.5.1 or switched off in an orderly manner following section 6.5.4, it can be switched back on and put into regular operation following the operating steps described below in the specified order.

The prerequisite for this is that the system is failure-free and any special reasons for the previous shutdown are eliminated and work on the system is finished as well as that the safety measures are carried out in reverse order according to section 3.4.

1. All steps described in section 6.5.1 must be applied and the system must be prepared and configured properly for the start-up. Respect warnings!
2. When the red button lights up press the green button to start up. The green start button starts flashing (see in document “Control Board with Touch Display / HMI Operating Manual”.[14]).
3. When the green button changes from flashing to continuous light, the system is turned on and fully active.

[11] See document “Control Board with Touch Display / HMI Operating Manual”
[12] See document “Control Board with Touch Display / HMI Operating Manual”
[13] See document “Control Board with Touch Display / HMI Operating Manual”
[14] See document “Control Board with Touch Display / HMI Operating Manual”

6.5.3 Grid Operation: Recharging the Batteries

For recharging the batteries, start first the XPB UNLIMITED as described in section 6.5.2. Then configure the target on charging appropriate to your grid connection point, see document “Control Board with Touch Display / HMI Operating Manual”.[15]).

Having set the parameters, the charging starts automatically. Charging carries on until at least 80 % of battery capacity is reached. This is shown on the display page 1 "overview”, see document “Control Board with Touch Display / HMI Operating Manual”.[16]).

6.5.4 Grid Operation: Turning Off

To switch off the system the following operating steps and associated measures shall be carried out in the specified order.

1. Internal information (consumers).
2. Switch off the system (inverter) by pressing the red stop button and wait until blinking stops (sleep mode reached, bypass operation).
3. Disconnect from the power grid by switching off the external input breaker or fuse (MCB).
4. If an output selector switch is installed, switch the output selector to OFF or GRID position.

After a delay of 5 minutes, the system will shut down the 24 V supply and change the state to suspend mode. If all indicators are off, the system is in suspend mode. If the main fuse is getting switched on again, the system will start up the 24 V supply automatically and change to standby mode.

For maintenance, all automatic circuit breakers in the system must be switched off by a qualified service technician. Before further activities at the system, the safety measures must comply in accordance with section 3.4.

6.5.5 Grid Operation: Switching to Island Mode without Interruption (“Force Island”)

If you are connected to Grid, it may occur that you want to disconnect the grid for various reasons, e.g., grid due to maintenance works. In such a case you may not want to interrupt your consumers.

Then you force the system to Island Mode by pressing the “Force Island Mode Button”, see document “Control Board with Touch Display / HMI Operating Manual”.[17]).

Note: Disconnecting the grid suddenly without using the Force Island mode will lead to a short interruption of approx. 1 sec. at the consumer’s side.

Pressing the “Force Island Button” forces the power electronics to actively sync from the Grid mode to the Island mode leading to a seamless change-over.

After pressing the “Force Island Button” the “Start Button” starts linking and showing the mode transition. A “Lock Sign” between the Grid and the consumers are shown on Display Page 1 “Overview”. Internally the inverter is changing from inverter hybrid to inverter island mode. After reaching the Island Mode, the Grid is disconnected (with a “Lock Sign”) and the storage system is seamlessly connected to the consumers. You can now disconnect the grid. The “Lock Sign” stays.

[15] See document “Control Board with Touch Display / HMI Operating Manual”
[16] See document “Control Board with Touch Display / HMI Operating Manual”
[17] See document “Control Board with Touch Display / HMI Operating Manual”

6.5.6 Grid Operation: Activation of Bypass Mode

If the system is currently switched off:

- Press Start Button.
- After about 10 seconds you will hear the contactors being switched and the display will show the grid and the load contactors as connected.
- Before the XPB UNLIMITED is started up, press the red Stop Button.
- Now the system is in bypass (Only) mode and the consumers are directly supplied by the grid through the XPB UNLIMITED.

If the system is currently running:

- Press Stop Button.

When the Stop Button stops blinking, the transition to bypass (Only) mode is finished. Then, the consumers are directly supplied by the grid through the XPB UNLIMITED.

6.5.7 Grid Operation: Deactivation of Bypass Mode

If the XPB UNLIMITED is in Bypass Mode, then press the red “Stop Button” to disable the bypass (Only) mode. You will hear the contactors switch and the display will show the grid and the load contactors disconnect. Now the system is in standby mode and the consumers are no longer supplied from the grid.

6.6 Cleaning the Power Electronics Cabinet

	**Danger to life!** **Opening of the energy storage (battery package) and the cabinet is permitted only to trained and contractually agreed with personnel and prohibited to other personnel for safety reasons.**
	**Danger to life!** **Do not a use pressure washer for cleaning the cabinet or of other parts of the XPB UNLIMITED.**
	**Danger to life!** **Do not flush any openings or ventilation gaps.**

Although the XPB UNLIMITED is rainproof it would be very dangerous to use pressure washers for cleaning the cabinet or other parts of the XPB UNLIMITED.

6.7 Storing an XPB UNLIMITED

For long-term storage reasons, XPB UNLIMITED must be stored indoors with a temperature above 10°C and below 35°C, with a relative humidity between 10 % and 90 %, non-condensing.

Please note: a battery energy storage system should – due to chemical discharging – never be stored with a low state of charge. Thus, before storing an XPB UNLIMITED please charge the XPB as described in chapters 6.4.4 and 6.5.4, respectively.

xelectrix Power recommends recharging the storage at least once every three months in case of a long storing period.

After having an XPB UNLIMITED stored for a longer time, the following tasks should be performed:

- Check for visible damages.
- Check if all controls are in good condition.
- Check if all input and output plugs are in good condition.
- Check if the cabinet is closed and locked.
- Check if all IP54 covers are water-proofed closed.
- Check the battery packs voltage as shown in chapters 6.4.1 and 6.5.1 for operation with a diesel generator or with the grid.
- Recharge batteries, see chapters 6.4.2 and 6.5.2.

6.8 Lifting an XPB Unlimited

The XPB UNLIMITED Ranges can be lifted by using the following measures:

- XPB UNLIMITED M10 equipped with 240 kWh battery capacity can be lifted using a forklift or a crane with load capacity of **at least 8 tons** (See Figure 21)
- XPB UNLIMITED M20 equipped with 480 kWh battery capacity can be lifted using a crane with a load capacity of **at least 20 tons** (See Figure 23)

Figure 21: Forklift lifting an XPB Unlimited M10

Be aware that the centre of gravity for the XPB Unlimited M10 is not exactly in the middle of the container but more towards the battery packs (depending on the transformer size and battery configurations). See Figure 22

Figure 22: Crane with lifting Beam moving the XPB Unlimited M10

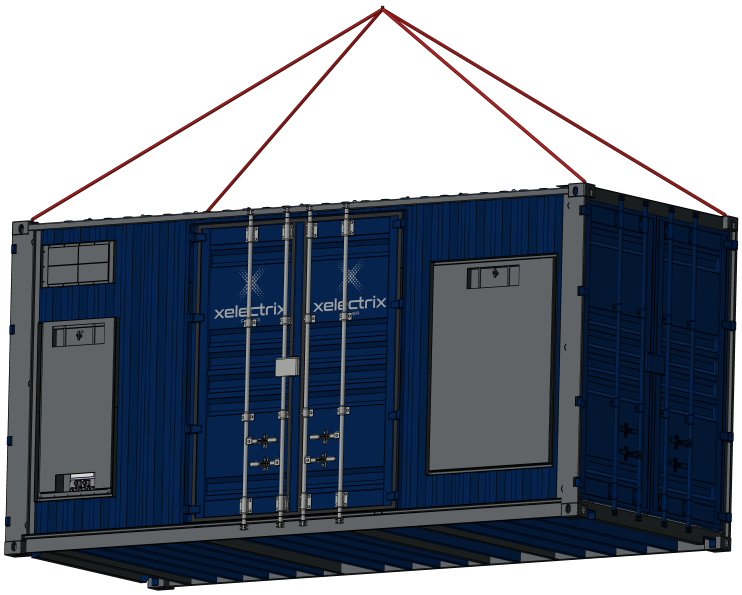

Figure 23: Crane lifting an XPB Unlimited M20

Note: When lifting the XPB Unlimited M20 with a crane, use the appropriate twist-lock and container hooks. Other efficient methods of lifting the XPB Unlimited M20 units are:

- Lifting Spreader (See Figure 24)
- Lifting Beams (See Figure 24)

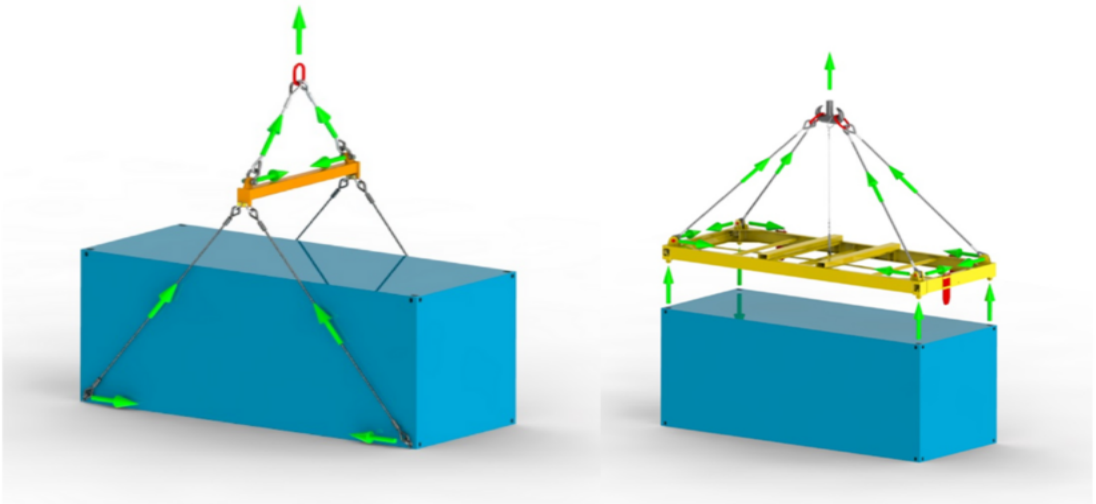

Figure 24: Other lifting methods for the XPB Unlimited M20

6.9 Transporting an XPB UNLIMITED

All lithium batteries are Class 9 – miscellaneous dangerous substances and articles. All xelectrix Power battery packs are tested and meet the criteria as stated in the United Nations Committee of Experts Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria Part III subsection 38.3 (UN38.3). xelectrix Power batteries are tested from various certification bodies, e.g., "TÜV Süd". The "Test Summary" is enclosed in the appendix of this manual or available at the Partner Area of the xelectrix Power webpage <www.xelectrix-power.com>.

Please note the attached symbol stickers UN 3090/3091, as assigned by the United Nations Committee of Experts for the Transport of Dangerous Goods Class 9 (see Figure 20: Sticker UN 3090). Those stickers must never be removed!

Figure 25: Sticker UN3090, UN 3091

Lithium batteries when transported must follow the relevant legislation for the mode of transport:

- for the road – the Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)
- for rail – the International Carriage of Dangerous Goods by Rail (RID)
- for sea – the International Maritime Dangerous Goods Code (IMDG Code)
- for air – the International Civil Aviation Organization (ICAO) Technical Instructions (TI) for the Safe Transport of Dangerous Goods by Air and the International Air Transport Association (IATA) Dangerous Goods Regulations (DGR)
- for inland waterways – the European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN).

Employers' Duties
For employers involved in shipments, it's required to ensure that when any dangerous goods (lithium batteries) are transported, they are carried in full compliance with the appropriate regulatory provision or provisions (if more than one mode is involved). Employers are required to carry out the following:

- Ensure that any employees involved in any way with the transport of dangerous goods have been appropriately trained before any involvement and that they have received appropriate refresher training. For air transport, refresher training is mandatory within 24 months.
- However, training is not required when the person is working under the direct supervision of a suitably trained person.
- Keep a record of any training given and, if requested, make a copy available to the employee.
- If involved in the carriage or the related packing, loading, unloading of significant quantities of dangerous goods by road or rail, appoint a vocationally trained and certified Dangerous Goods Safety Adviser (DGSA).

7 System Maintenance

Necessary maintenance measures are described below. The regular accomplishment of those measures must be ensured by the operator for proper, error-free and safe operation of the system.

The necessary activities must be carried out wherever indicated in the text by an authorized electrician. The complete and comprehensible documentation of this work must be recorded in the operating book. Defects or infirmities found must be rectified in accordance with section 7.3 Reconditioning and Repair.

7.1 Inspection

The inspection of the following components is used for an ongoing monitoring of the system and specific system components for their functionality.

7.1.1 System State

The system has to be checked regularly, at least quarterly, for good condition and any visual damage. This applies in particular to

- cabinet, energy storage and cable shafts: undamaged, locked/barred (where applicable), with regard to tightness, cleanliness (dust), dryness, free accessibility
- the attached warning signs and safety instructions: condition and readability
- all control cabinets, cable bays or line outlets: dry, clean, no signs of damage from insects or rodents
- the 24 V battery: tightness, cleanliness, dryness, no damage, fixed seat of the battery cables. Those inspections on the 24 V battery must be carried out by a licensed electrical specialist contracted by the system operator.

	When opening the cabinet, the hazard warnings in section 3 and in particular in section 3.4 must be observed!
	Opening the cabinet is only for authorised electricians allowed!

7.1.2 Electrical Inspection

An inspection of the electrical system (“electric certificate”) must be carried out by an authorised electrician before initial commissioning and at the required intervals in accordance with the local regulations and requirements.

Two power supplies must be checked. One is three-phase connected to the power grid on the input side (AC/DC), the other is connected to the DC intermediate circuit (DC/DC) on the input side, wherein one of them is connected to the HVDC on the input side.

	Danger to life! When measuring at the input side of the DC/DC power supply (orange cables), voltages of up to 800 V DC may occur!

The voltage directly at the 24 V outputs of both power supplies must be 27.7 to 28.0 V DC during grid-connected operation. For both power supplies, the measured voltage must be in the specified measuring range. If a value is measured outside the specified voltage range, clarification must be made by consultation with xelectrix.

7.2 Maintenance

Maintenance is intended to provide the operational readiness of the system by applying preventive measures.

7.2.1 Emergency Power Supply

The emergency power supply (24 V battery) consists of basically maintenance-free gel batteries. However, the necessary inspections or renewal intervals must be observed.

- In the course of an inspection to be carried out at least every 6 months, a visual inspection shall be carried out to determine whether the batteries are bloated or whether liquids may leak. In both cases, the batteries must be replaced immediately with new ones.
- In case of a failed cold start test, the batteries must be replaced with new ones.

The emergency power batteries must be replaced by new ones no later than 5 to 7 years after initial commissioning and thereafter every 5 to 7 years.

When handling with the battery wear safety goggles and protective gloves!

To purchase new batteries, please contact xelectrix Power GmbH in accordance with Section 8.

7.2.2 Inverter Capacitors

The capacitors in the intermediate circuit of the inverter are subject to a limited lifetime, depending mainly on the ambient temperature. In order to ensure the performance and operational reliability of the inverter, an annual test of the inverter capacitors (capacity and ESR/impedance measurement) must be carried out after 5 years, at the latest after 7 years. If necessary, but at the latest after 15 years, the inverter capacitors must be replaced by new ones.

The testing or replacement of the inverter capacitors must be carried out by a qualified electrician when the system is switched off.

For purchase of new inverter capacitors, please contact xelectrix support team in accordance with Section 8.2.

7.3 Reconditioning and Repair

The repair of parts with damages determined during the inspection (section 7.1) or the repair of defective components must be carried out in coordination with xelectrix Power GmbH.

7.4 Upgrading and Modification

Any technical modifications to the installation that the operator intends to make in terms of improvements or other changes (e.g., component replacements) must be coordinated with the xelectrix support team before implementation. Technical changes may require a new certification process. Unauthorized changes may cause malfunctions or damage to the system. This corresponds to a violation of the warranty conditions.

8 System Malfunctions

Any issues arising in a system or other support inquiries must be communicated to xelectrix Power GmbH immediately.

8.1 Troubleshooting

In the below table some faults and troubleshooting steps can be found. If your behavior is not listed contact the xelectrix Support Team as mentioned in section 8.2.

Basic Faults	Troubleshooting	Comments
Tripped circuit breakers	Push the circuit breakers upwards to turn the back on	If circuit breakers were tripped, or are not switched on (upward position), then the attached load cannot be supplied.
XPB unit is turned off on an island mode	Press the "Blackstart" button for at least 5 seconds, until the "Red" button turns on	If the XPB unit is turned-off in an island mode, after pressing the red button: The XPB was completely powered down.
NAM Errors	Report these errors to the xelectrix Power Support Team	NAM Errors can occur while connected to the Grid. These errors need to be reported to xelectrix Power GmbH, only in case of problems with the XPB unit.
Blackstart batteries are too empty to startup the unit	Recharge the blackstart batteries as follows: • Connect the XPB Unlimited unit to the grid. • Bring all breakers in position ON. • Keep the system on the grid for at least 48 hours.	If this does not work replace both blackstart batteries.

8.2 Technical Support

Please send support inquiries by email to support@xelectrix-power.com. Or just use the following QR code.

For your support inquiry please provide us at least with the following information:

1. Serial number of the device
2. Date of first commissioning
3. Detailed fault/inquiry description with photos and/or screen shots
4. Contact data of a contact person

After sending your inquiry, you will receive a first response and possibly initial instructions.

8.3 Debugging and External Help

All systems have a debugging device, the so called Remote Debug Kit installed. See Figure 26.

- All systems have debugging tools installed.
- For the debugging procedures, a qualified service engineer (section 3.3) must be present.
- Be aware of the mentioned safety procedure in sections 3.1 3.2 3.3 and 3.4.
- It is necessary to have an Ethernet cable, with the proper length, to connect a functional internet connection.
- A qualified service engineer (section 3.3) must plug it in, in the shown position (Figure 26)
- Wait for further instructions from the xelectrix team. No one is allowed in the cabinet, at any given time.

Figure 26: Remote Debug Kit

9 Technical Specifications

xelectrix
POWER

UNLIMITED

XPB-M10

10 ft Container System

With on-board Transformer and Switch Function

XPB-U35-60-M10
35 kW Inverter and
60 - 240 kWh Storage

XPB-U80-100-M10
80 kW Inverter and
100 - 240 kWh Storage

XPB-U150-180-M10
150 kW Inverter and
180 - 240 kWh Storage

PARALLEL PLATFORM TECHNOLOGY
The ability of the power box to be combined with different energy sources and to sum up their combined power outputs.

UNIQUE BI-DIRECTIONAL HYBRID INVERTER
In-house designed interface technology allowing the Power Box to charge and discharge using only one inverter.

UNIQUE XELECTRIX POWER BATTERY MANAGEMENT SYSTEM (BMS)
Monitoring and controls to actively ensure maximum battery life span and optimum efficiency are achieved.

PLUG & PLAY
Easy installation and with the possibility to combine the Power Box with grid supply, renewable energy sources and a generator.

BACKUP POWER
Blackout? With the Power Box you will continue to be supplied and the solar system will work as well.

HEALTH STATUS MONITORING
Ensuring that the complete system is functioning efficiency at all times.

DISCOVER NEW ENERGY

xelectrix Power GmbH
Pern-Str. 2, 4310 Mauthausen, Austria
Tel. +43 7238 31515, info@xelectrix-power.com
www.xelectrix-power.com

UNLIMITED – M10

	XPB-U	U35	U80	U150
Unit Details	Dimensions (LxWxH)	3.05 x 2.44 x 2.9 m 10 ft. High Cube Container		
	Base Weight	Depending on inverter / battery storage configuration		
	Lifting Points	Container transport		
	Protection	Sea Shipping Container, IP68 for Battery Packs		
Use	Installation	Indoor / Outdoor, IP54		
	Mounting	Container mounted		
	Ambient Temperature	-20 °C to + 35 °C, with tropical option up to + 45°C		
	Max. Humidity	90 % not condensing		
	Max. Altitude	4000 m (with a derating above 2000 m)		
Power Electronics	Inverter Power	35 kVA (35 kW @ cos phi = 1)	80 kVA (80 kW @ cos phi = 1)	150 kVA (150 kW@ cos phi = 1)
	Transformer	On-Board / 400 V, 3P+N+PE		
	Switch Function	On-Board		
Storage	Battery Type	Lithium Iron Phosphate ($LiFePO_4$)		
	Cell Safety	Over-Current, Over-Temperature, Over-Pressure, Over-Voltage Protection, internally fused (irreversible)		
	Net. Capacity	60 kWh expandable to 240 kWh in 20 kWh modules	100 kWh expandable to 240 kWh in 20 kWh modules	180 kWh expandable to 240 kWh in 20 kWh modules
	Battery Voltage	Nominal 650 V DC, Range: 585 to 744 V DC		
	Management	xelectrix Power BMS (Battery Management System)		
	Heating	Air Conditioning System for Heating & Cooling as Standard		
Connection	AC Input	400 V, 3P+N+PE, 200 A (for DG's up to 150 kVA)	400 V, 3P+N+PE, 400 A (for DG's up to 275 kVA)	400 V, 3P+N+PE, 730 A (for DG's up to 500 kVA)
	AC Output	400 V, 3P+N+PE, 250 A	400 V, 3P+N+PE, 550 A	400 V, 3P+N+PE, 950 A
	Types of Network	TN / TN-C / TN-S		
	Grid Frequency	EU: 50 Hz (45-55 Hz)		
	XPB Connection Interface	Input: Powerlock (Option: screwed) Output: Powerlock (Option: screwed) 4 x blind output boards	Input: screwed (Option: Powerlock) Output: screwed (Option: Powerlock) 4 x blind output boards	Input: screwed (Option: Powerlock) Output: screwed (Option: Powerlock) 4 x blind output boards
Safety	Cell Operating Range	-20 to +60 °C discharge +5 to +55 °C charge		
	Protection Measures	Integrated Thermal Management (passive cooling), integrated Voltage Protection, integrated Cell Internal Resistance Monitoring, integrated Over Current Protection (BMS ≥ 75 A, Fuse 100 A)		
	Fire Protection	Thermally triggered extinguishing system (N_2 / CO_2) in every Battery-Pack. Integrated multi-sensor CO_2 fire extinguishing system in Storage and Power Electronics Area.		
Options		60 Hz (55-65 Hz) Version, Country-specific Transformers, variable output distribution board configuration		
Standards		EN 61439-1, EN 61439-2, EN 61439-3, EN 61439-4, OVE E 8101,OVE R25:2020-03, TOR Erzeuger:2019-12, IEC 60364		

DISCOVER NEW ENERGY

xelectrix Power GmbH
Pem-Str. 2, 4310 Mauthausen, Austria
Tel. +43 7238 31515, info@xelectrix-power.com
www.xelectrix-power.com

UNLIMITED

XPB-M20

20 ft Container System

Power
35 kW, 80 kW, 150 kW

Storage Capacity
240 – 480 kWh

PARALLEL PLATFORM TECHNOLOGY
The ability of the power box to be combined with different energy sources and to sum up their combined power outputs.

UNIQUE BI-DIRECTIONAL HYBRID INVERTER
In-house designed interface technology allowing the Power Box to charge and discharge using only one inverter.

UNIQUE XELECTRIX POWER BATTERY MANAGEMENT SYSTEM (BMS)
Monitoring and controls to actively ensure maximum battery life span and optimum efficiency are achieved.

PLUG & PLAY
Easy installation and with the possibility to combine the Power Box with grid supply, renewable energy sources and a generator.

BACKUP POWER
Blackout? With the Power Box you will continue to be supplied and the solar system will work as well.

HEALTH STATUS MONITORING
Ensuring that the complete system is functioning efficiency at all times.

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UNLIMITED – M20

	XPB-U	U35	U80	U150
Unit Details	Dimensions (LxWxH)	6.06 x 2.44 x 2.9 m 20 ft. High Cube Container		
	Base Weight	Depending on inverter / battery storage configuration		
	Lifting Points	Container transport		
	Protection	Sea Shipping Container, IP68 for Battery Packs		
Use	Installation	Indoor / Outdoor, IP54		
	Mounting	Container mounted		
	Ambient Temperature	-20 °C to +35 °C, with tropical option up to +45 °C		
	Max. Humidity	90 % not condensing		
	Max. Altitude	4000 m (with a derating above 2000 m)		
Power Electronics	Inverter Power	35 kVA (35 kW @ cos phi = 1)	80 kVA (80 kW @ cos phi = 1)	150 kVA (150 kW @ cos phi = 1)
	Transformer	On-Board / 400 V, 3P+N+PE		
	Switch Function	On-Board		
Storage	Battery Type	Lithium Iron Phosphate ($LiFePO_4$)		
	Cell Safety	Over-Current, Over-Temperature, Over-Pressure, Over-Voltage Protection, Internally fused (irreversible)		
	Net. Capacity	240 kWh expandable up to 480 kWh (in 20 kWh modules)	240 kWh expandable up to 480 kWh (in 20 kWh modules)	240 kWh expandable up to 480 kWh (in 20 kWh modules)
	Battery Voltage	Nominal 650 V DC, Range: 585 to 744 V DC		
	Management	xelectrix Power BMS (Battery Management System)		
	Heating	Air Conditioning System for Heating and Cooling System		
Connection	AC Input	400 V, 3P+N+PE, 200 A (for DG's up to 150 kVA)	400 V, 3P+N+PE, 400 A (for DG's up to 275 kVA)	400 V, 3P+N+PE, 730 A (for DG's up to 500 kVA)
	AC Output	400 V, 3P+N+PE, 250 A	400 V, 3P+N+PE, 550 A	400 V, 3P+N+PE, 950 A
	Types of Network	TN / TN-C / TN-S		
	Grid Frequency	EU: 50 Hz (45-55 Hz)		
	XPB Connection Interface	Input: screwed (Option Powerlock) Output: screwed (Option Powerlock) 4x blind output boards	Input: screwed Output: screwed 4x blind output boards	Input: screwed Output: screwed 4x blind output boards
Safety	Cell Operating Range	-20 to +60°C discharge +5 to +55°C charge		
	Protection Measures	Integrated Thermal Management (passive cooling), Integrated Voltage Protection, Integrated Cell Internal Resistance Monitoring, Integrated Over Current Protection (BMS ≥ 75 A, Fuse 100 A)		
	Fire Protection	Thermally triggered extinguishing system (N_2 / CO_2) in every Battery-Pack. Integrated multi-sensor CO_2 fire extinguishing system in Storage and Power Electronics Area.		
Options		60 Hz (55-65 Hz) Version, Country-specific Transformers, variable output distribution board configuration		
Standards		EN 61439-1, EN 61439-2, EN 61439-3, EN 61439-4, OVE E 8101,OVE R25:2020-03, TOR Erzeuger:2019-12, IEC 60364		

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10 Test Summary Lithium Battery Cells

xelectrix POWER

TEST SUMMARY LITHIUM BATTERY CELLS according to Section 38.3 of the UN Handbook

(a) Cell, battery, or product manufacturer

xelectrix Power GmbH.

(b) Manufacturer's contact information incl. address

Pem-Str. 2, A-4310 Mauthausen, Austria
Tel.nr. +43 7238 31515-0
E-mail: info@xelectrix-power.com

(c) Name of the test laboratory, including address, e-mail phone no. and website

CNAS VKAN Certification and Testing
Tel. +86-10-67105332, +86-10-67105333 / FAX +86-10-67105089
E-mail: info@cnas.org.cn / Web: www.cnas.org.cn

(d) A unique test report identification number: **Ref. No. RZUN2018-3360**

(e) Date from the test report: **14.12.2018**

(f) Information about the cell or battery, include at a minimum

(i) Lithium ionen or Lihtium metall cells or batteries: **LITHIUM IRON PHOSPHAT CARBON CELL**

(ii) Mass: **140 Gramm**

(iii) Watt-hour rating or lithium content: **17,6 Wh/Zelle / rd. 21,5 kWh per Akku-Paket**

(iv) Physical description of the cell or battery: **Cylindrical shape, 32mm, grey color, 3,2 V 5500 mAh 17,6 Wh**

(v) Model number: **32650-5500 and 32650-6000**

(g) List of test conducted and results, i.e. passed / failed;

Test 1: Altitude simulation, Test 2: Thermal test, Test 3: Vibration, Test 4: Shock, Test 5: External Short Circuit, Test 6: Impact / Crush, Test 7: Overcharge, Test 8: Forced discharge, T1-T8 according to UN 38.3.4.1 up to UN 38.3.4.8 – all tests passed

(h) Reference to assembled battery testing requirements, if applicable:

ST/SG/AC.10/11/Rev.6/Amend.1/Section 38.3

(i) Reference to the revised edition of the manuals of tests and criteria used to amendments thereto, if any;

UN handbook for test and criteria part III, subsequence 38.3, paragraph 38.3.5

(j) Signature with name and title of signatory as an indication of the validity of information provided.

Mauthausen, 2.2.2020
Place and date of issue

xelectrix POWER
xelectrix power GmbH, Pem-Straße 2, 4310 Mauthausen
Tel. +43 7238 31515, info@xelectrix-power.com
UID/VAT: ATU 71683546, FN 462254k, EORI-No.: ATEOS1000087913
Mag. Alexander Hartl, Managing Director

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xelectrix Power GmbH
Pem-Str. 2, 4310 Mauthausen, Austria
Tel. +43 7238 31515, info@xelectrix-power.com
FN 462254k, UID/VAT: ATU 71683546, EORI-No.: ATEOS1000087913
Raiffeisenbank Kleinmünchen eGen AT75 3422 6000 0035 0868, BIC RZ00AT2L226

11 EC Declaration of Conformity

EC Declaration of Conformity

Manufacturer:

xelectrix Power GmbH
Pem-Str. 2
4310 Mauthausen
Austria

Product Description:

Product	Energy Storage System
Type	XPB-U
Trademark	xelectrix Power Box (XPB)

Hereby it is expressly stated that the listed products comply with the essential health and safety requirements according to the mentioned guidelines. In the event of a change of the product without agreement, this declaration will lose its validity.

Manufacturer's declaration:

Low voltage Directive 2014/35/EU

Electromagnetic compatibility 2014/30/EU

European standards and requirements:

EN 61000-6-2:2019	Immunity standard for industrial environments
EN 61000-6-4:2007 +A1:2011	Emission standard for industrial environments
EN 61000-3-2:2011	Limits for harmonic current emissions
EN 61000-3-3:2013	Limitation flicker in public low-voltage supply systems
EN 55022	Information technology equipment - Radio disturbance characteristics
EN 62109-1:2010, EN 62109-2:2011	Safety of power converters for use in photovoltaic power systems
EN 62477-1:2012 +A11:2014	Safety requirements for power electronic converter systems and equipment

The authorized person is responsible for the collation of technical documents:

Mag. Alexander Hartl, xelectrix Power GmbH, Pem-Str. 2, 4310 Mauthausen

Mauthausen, 3.4.2020
Place and date of issue

Mag. Alexander Hartl, Managing Director

xelectrix Power GmbH
Pem-Str. 2, 4310 Mauthausen, Austria
Tel. +43 7238 31515, info@xelectrix-power.com
FN 462254k, UID/VAT: ATU 71683546, EORI-No.: ATEOS1000087913
Raiffeisenbank Kleinmünchen eGen AT75 3422 6000 0035 0868, BIC RZ00AT2L226

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12 Warranty and Start-Up

12.1 Warranty Conditions

Please find the current Warranty Conditions at the xelectrix webpage at <www.xelectrix-power.com/warranty>.

12.2 Unit Registration and Start-Up Form

The following form Unit Registration and Start-Up Form has to filled and sent back to your xelectrix Power sales representative within 30 days of Start-up of the unit at the latest.

xelectrix POWER

Unit Registration and Start-Up Form

End Customer Company Name:	
Contact Name:	
Street:	
Zip Code:	
City:	
Country:	
Telephone:	
Email:	
DEALER	

Unit:	Serial Number:

PRODUCT COMPLETENESS

Accepted ☐
Comments (if applicable):
.....
.....
.....

FUNCTIONALITY

Accepted ☐
Comments (if applicable):
.....
.....
.....

Date and place

Official xelectrix Power DEALER

xelectrix Power GmbH
Pem-Str. 2, 4310 Mauthausen, Austria
Tel. +43 7238 31515, info@xelectrix-power.com
FN 462254k, UID/VAT: ATU 71683546, EORI-No.: ATEOS1000087913
Sparkasse Neuhofen Bank AG: AT38 2032 6000 0004 0212, BIC: SPNKAT21XXX

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