Version 1.2

Original operating manual
About this manual

General
A qualified electrician must carry out installation, commissioning and maintenance. Please read this operating manual carefully to ensure a fault-free operation of the BMZ ESS 7.0 battery storage system. Please store this operating manual such that it is accessible to all persons who work on the BMZ ESS 7.0 system.

Scope
This manual is intended for all products of the BMZ ESS 7.0 series.

Differentiation between an operating company and operator
The end consumer is referred to as an operating company in this manual. The system is installed and put into operation for this operating company.
A person, who works on the system or its controllers, is referred to as an operator in this manual. This person must be a qualified electrician authorised by BMZ GmbH.

Liability exclusion
BMZ GmbH does not bear any liability for damage resulting from unintended usage and non-adherence to this manual. This includes personal injuries, material damage, damage to the product as well as consequential damage, repair damage and other handling of the product by non-qualified electricians. This liability limitation is applicable even when non-original spare parts are used.
Carrying out arbitrary changes or technical modifications in the product is strictly prohibited.
A liability for profits lost or other costs and financial losses is ruled out.
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1 Safety

Target group
This section is aimed at all persons, including technical personnel, commissioning and shutdown personnel as well as personnel who work on the battery storage system.

Background
Safety has utmost priority.
Use all aids provided to you along with the measures and processes listed in this section to ensure a safe operation. Get a detailed information about all safety aspects.
You should be aware of the fact that hazardous situations may always arise when handling battery storage systems. Furthermore, the use of a battery storage is associated with the residual risks under the following circumstances:

- Installation and maintenance activities are not carried out properly.
- Safety instructions given in this manual are not followed.
1.1 Classification of warnings and intended use

Safety instructions
This section described warnings in this operating manual and the intended use of the machine.

1.1.1 Warnings in the operating manual

Warnings
Warnings serve as instructions and precautionary measures that must be followed and taken to avoid a hazardous situation.

Classification of warnings
Warnings can be classified depending on the magnitude of a hazardous situation. The classification is based on a probability assumption for an exposure to a hazardous situation and what could happen in such a case. This manual differentiates between four warnings:

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Danger Icon" /></td>
<td>“DANGER” warns against hazardous situations. Prevent these hazardous situations. Otherwise, they will lead to deaths or serious injuries.</td>
</tr>
<tr>
<td><img src="image" alt="Warning Icon" /></td>
<td>“WARNING” warns against hazardous situations. Prevent these hazardous situations. Otherwise, they may lead to deaths or serious injuries.</td>
</tr>
<tr>
<td><img src="image" alt="Caution Icon" /></td>
<td>“CAUTION”, in combination with the warning icon, warns against hazardous situations. Prevent these hazardous situations. Otherwise, they may lead to insignificant or minor injuries.</td>
</tr>
<tr>
<td><img src="image" alt="Attention Icon" /></td>
<td>“ATTENTION” indicates a possible hazardous situation. Avoid these situations. Otherwise, they may damage the machine.</td>
</tr>
</tbody>
</table>

Note

This icon draws your attention to important, useful and helpful information.
1.1.2 Intended use

Intended use of the battery system
The BMZ ESS 7.0 system must be exclusively used to store the current generated by the photovoltaic systems.

Foreseeable misuse
Any other use is considered to be unintended. BMZ GmbH shall not be responsible for damage resulted from this.

The BMZ ESS 7.0 system is primarily not approved for the following usages:

- For a mobile use (e.g. on ships, in aeroplanes or in all types of land vehicles)
- For operation in outdoor areas
- For use in medical devices
- For use as a UPS system

DANGER
Possible risk to life due to unintended usage
This battery system is exclusively intended for the aforementioned purpose. Any other use or a modification of the battery system without a written consent of the manufacturer is considered to be unintended.

The manufacturer will not assume liability for any resultant damage. The operating company shall bear full responsibility for any risk.

The battery system may be put into operation only if it is ensured that all safety devices have been installed and functioning properly.

Never install or operate a potentially or obviously defective battery storage.

Prevent these hazardous situations. Otherwise, they will lead to deaths or serious injuries.

Intended usage also implies compliance with the usage and operating instructions specified by the manufacturer as well as maintenance and servicing conditions.
1.2 Safety instructions to be followed

Safety instructions
Follow the safety instructions in this section to ensure the safety of persons and the system.

1.2.1 General safety instructions

Target group
These general safety instructions are intended for all operators and operating companies of the battery system. Each person, who is entrusted with the installation, commissioning, operation, cleaning, maintenance and repair activities, must have read and understood this operating manual, especially the Safety section.

Laws and regulations
Follow the instructions (regulations) of the relevant authorities as well as safety and operating instructions.

Spare parts
Only use original spare parts in case of repairs or when replacing the parts.

- Using other parts that do not comply with our specifications may pose risks to persons and the system.
- BMZ GmbH shall not be liable for personal injuries and/or material damage resulting from changes in the system.

Operator
Only a qualified electrician may operate/maintain the battery storage system.

WARNING
Possible risk due to inadequately qualified persons
Only a qualified electrician may carry out installation, servicing and maintenance activities.

Prevent these hazardous situations. Otherwise, they may lead to deaths or serious injuries.

Suitable clothing (PPE)
Observe the following instructions regarding suitable clothing.

- Always wear protective shoes. Class S3
- Always wear ESD protective clothing.
- Wear suitable protective gloves.
- Wear suitable protective goggles.
- Do not carry electrically conductive objects (jewellery, rings, watches, chains)
Condition of the battery storage system
Keep the battery storage system clean and in an excellent condition. Operate the battery system only if it is in a flawless condition.

Other safety instructions
Follow the detailed safety instructions in Operation, Maintenance & Dismantling and Disposal sections.

1.2.2 Safety instruction when working with the tool

Target group
These safety instructions are intended for all persons who are entrusted with the transport and installation of the battery storage system.

Adhere to the operating manual
Always follow the instructions in the operating manual.

Working with the tool
Adhere to the following warning when using the tool:

⚠️ WARNING

A forgotten tool poses the risk of injuries.
Do not keep any tools or metal parts on or in the battery.

If a tool is not removed before commissioning, it may cause a short-circuit and injure persons or damage the system.
- Only use the completely insulated tool.
- Before commissioning/re-commissioning the battery system, ensure that there are no tools in the battery system.

Prevent these hazardous situations. Otherwise, they may lead to deaths or serious injuries.
1.2.3 Safety instructions for transport and installation

Target group
These safety instructions are intended for all persons who are entrusted with the transport and installation of the battery storage system.

Adhere to the operating manual
Always follow the instructions in the operating manual.

Adhere to the installation manual
Always follow the instructions in the installation manual.

DANGER
Risk of life due to live components
There is a risk of life in case of a contact with live components.
- Only trained experts may work on the machine.
- When working on the current circuit or on the battery, always switch off the main switch first. Secure it with a padlock.
- When working on the current circuit or on the battery, always open the safety disconnection elements first. Secure the battery in which the disconnection elements are spatially separated and kept.
- Follow the 5 safety rules of battery technology.
- Never install or operate a potentially or obviously defective battery storage.

Prevent these hazardous situations. Otherwise, they will lead to deaths or serious injuries.

WARNING
Risk due to the loss of static stability
There is a risk of injuries due to the weight of the system.
- The system may tilt or fall in case of improper transport.
- Only use the transport aids that are suitable for the weight.
- Ensure the correct weight distribution of the system when transporting.
- The transport aids must provide a braking effect in case of a steep transport route.

Prevent these hazardous situations. Otherwise, they may lead to deaths or serious injuries.
Safety instructions for transport and installation, continued

**WARNING**

**Risk of injuries due to improper operation**

Only trained experts may work on the system.
- In case of maintenance and repair activities, the danger area is extended by 1 m around the system. Pay attention to the swivel range of the opening flap.
- The operating company must ensure that the access to the danger area is prevented during the movement sequences.

Prevent these hazardous situations. Otherwise, they may lead to deaths or serious injuries.

---

### 1.2.4 Safety instructions for operation

**Target group**

These safety instructions are intended for all persons who are authorised to operate the battery storage system.

**Adhere to the operating manual**

Always follow the instructions in this operating manual when operating the battery storage system.

**Safety instructions for operation**

Only use original parts of the manufacturer or the components approved by the manufacturer for the energy storage unit.

**DANGER**

**Risk of life due to live components**

When working on the electrical device, you may come in direct contact with parts carrying electric potential. Such a direct contact causes an electric shock.
- Follow the 5 safety rules of battery technology.
- Furthermore, only experts may maintain, modify or dismantle the battery storage system.
- Never install or operate a potentially or obviously defective battery storage.

Prevent these hazardous situations. Otherwise, they will lead to deaths or serious injuries.
Safety instructions for operation, continued

⚠️ DANGER

Danger due to erupting fire (electric hazard)
Fire may erupt during operation due to sparks or heated surfaces.

- Follow the corresponding safety regulations (5 safety rules).
- Furthermore, only experts may maintain, modify or dismantle the battery storage system.
- Never install or operate a potentially or obviously defective battery storage.

Prevent these hazardous situations. Otherwise, they will lead to deaths or serious injuries.

⚠️ WARNING

Health hazards due to negligent use of personal protective equipment
Working without personal protective equipment may cause serious injuries.

- Wear personal protective equipment (PPE).

Prevent these hazardous situations. Otherwise, they may lead to deaths or serious injuries.

⚠️ WARNING

Danger due to burns (electric hazard)
When working on the electrical device, you may come in direct contact with defective and/or overloaded parts and get burns.

- Follow the 5 safety rules of battery technology.
- Furthermore, only experts may maintain, modify or dismantle the battery storage system.

Prevent these hazardous situations. Otherwise, they may lead to deaths or serious injuries.
1.2.5 Safety instructions for cleaning

Target group
These safety instructions are intended for all persons who are authorised to clean the battery storage system.

Adhere to the operating manual
Always follow the instructions in the operating manual when cleaning the battery storage system.

Safety instructions for cleaning

<table>
<thead>
<tr>
<th>ATTENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of damaged machine</td>
</tr>
<tr>
<td>• Never clean the system or system parts using a vapour jet or spray water. Dirt and water may enter the system and cause major damage.</td>
</tr>
<tr>
<td>• Use only a moist and clean cotton cloth for cleaning.</td>
</tr>
</tbody>
</table>

Avoid these situations. Otherwise, they may damage the machine.

1.2.6 Safety instructions for maintenance and dismantling

Target group
These safety instructions are intended for all persons who are authorised to maintain/dismantle the battery storage system.

Adhere to the operating manual
Always follow the instructions in this operating manual when maintaining/dismantling the battery storage system.
Safety instructions for maintenance/dismantling

Observe the following warning when working on the electrical device:

<table>
<thead>
<tr>
<th>¡DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Risk of life due to live components</strong></td>
</tr>
<tr>
<td>There is a risk of life in case of a contact with live components.</td>
</tr>
<tr>
<td>- Only trained experts may work on the system.</td>
</tr>
<tr>
<td>- When working on the current circuit or on the battery, always switch off the main switch first. Secure it with a padlock.</td>
</tr>
<tr>
<td>- When working on the current circuit or on the battery, always open the safety disconnection elements first. Secure the battery in which the disconnection elements are spatially separated and kept.</td>
</tr>
<tr>
<td>- Pay attention to the risk of electric arcs when pulling the NH1 isolator under the full load of the battery</td>
</tr>
<tr>
<td>- Follow the 5 safety rules of battery technology.</td>
</tr>
</tbody>
</table>

Prevent these hazardous situations. Otherwise, they will lead to deaths or serious injuries.

<table>
<thead>
<tr>
<th>¡DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Risk due to falling and being slung away</strong></td>
</tr>
<tr>
<td>When working on the electrical device, a person may fall or be slung away due to a contact with parts carrying electric potential or parts with electrostatic charges.</td>
</tr>
<tr>
<td>- Follow the corresponding safety regulations</td>
</tr>
<tr>
<td>- Furthermore, only experts may maintain, modify or dismantle the switch cabinet.</td>
</tr>
</tbody>
</table>

Prevent these hazardous situations. Otherwise, they will lead to deaths or serious injuries.
Safety instructions for maintenance/dismantling, continued

**DANGER**

Danger due to erupting fire (electric hazard)

Fire may erupt during operation due to sparks or heated surfaces.
- Follow the corresponding safety regulations (5 safety rules).
- Furthermore, only experts may maintain, modify or dismantle the switch cabinet.

Prevent these hazardous situations. Otherwise, they will lead to deaths or serious injuries.

**WARNING**

Health hazards due to negligent use of personal protective equipment

Working without personal protective equipment may cause serious injuries.
- Wear personal protective equipment (PPE).

Prevent these hazardous situations. Otherwise, they may lead to deaths or serious injuries.

**CAUTION**

Danger due to burns (electric hazard)

When working on the electrical device, you may come in direct contact with defective and/or overloaded parts and get burns.
- Follow the corresponding safety regulations
- Furthermore, only experts may maintain, modify or dismantle the switch cabinet.
- Pay attention to the risk of electric arcs when pulling the NH1 isolator under the full load of the battery

Prevent these hazardous situations. Otherwise, they may lead to insignificant or minor injuries.
1.2.7 Safety instructions for battery interiors

Target group
These safety instructions are intended for all persons who are authorised to work on battery modules of the battery storage system.

Adhere to the operating manual
Always follow the instructions in the operating manual and in the specifications when working on these modules.

Safety instructions for battery module

**DANGER**

Danger due to leaking electrolyte
Only the trained experts and persons qualified and approved by BMZ GmbH may work on the battery. Modifications or manipulations in the battery may lead to considerable safety risks and are therefore prohibited.

- Do not solder cables to the battery.
- Do not short circuit the battery.
- Never open, dismantle, drill and crush the battery.
- Never allow the battery to fall.
- Do not expose batteries to rain or dip them in liquids.
- Do not touch damaged batteries with bare hands. Lithium can cause severe skin burns. Handle damaged batteries with suitable safety equipment and tools.
- Do not use defective, damaged or leaked batteries.
- Do not use batteries that show discolouration, deformations, unusual noises or severe heat.

Prevent these hazardous situations. Otherwise, they will lead to deaths or serious injuries.
Safety instructions for battery module, continued

**DANGER**

_Danger due to leaking electrolyte_

The materials / mediums to be used for intended operation of the battery storage system are procured and used by the manufacturer of the system. The manufacturer is thus solely responsible for the proper handling of these materials / mediums and the associated hazards. Hazard and disposal instructions must be provided by the manufacturer. Follow the safety data sheets of material and medium manufacturers.

_Prevent these hazardous situations. Otherwise, they will lead to deaths or serious injuries._

---

### 1.2.8 Safety instructions for fire prevention

**Fire protection**

Take essential precautions to respond efficiently in case of a fire.

**Instructions for fire prevention**

Pay attention to the following points:

- Keep the fire extinguisher(s) in the immediate vicinity of the system. (Fire extinguisher of fire class D)
- Also keep in mind that poisonous vapours may be developed due to burning batteries and may hamper and damage the function of respiratory tracts.

**Hazard due to fire**

The battery storage system does not pose a fire hazard. In case of a fire in the system, avoid its spreading to other objects. The battery storage system is de-energised at the time of delivery. Internal connection poles are always live. Therefore, ensure that a tool or a metallic object is not kept in the battery system. This could lead to a short-circuit and severe heat formation, which in turn could cause an explosion.
Actions to be taken in case of a damage

**WARNING**

Possible risk of life due to electric shock when quenching fire or due to flooding.

If you do not observe the following behavioural instructions, they may cause material damage and personal injuries; BMZ GmbH shall not bear any liability in such a case.

- Switch off the battery storage system if it is possible without any risk.
- Notify the fire brigade immediately.
- Help others and yourself to get out of the danger area immediately.
- Inform the fire brigade about the presence of Lithium-ion batteries.

Prevent these hazardous situations. Otherwise, they may lead to deaths or serious injuries.

---

**Damaged cells and battery**

Contact the manufacturer.

Never operate a potentially or obviously defective battery storage.

---

### 1.2.9 Explosion protection

**General information**

The battery storage system is de-energised at the time of delivery. Internal connection poles are always live. Therefore, ensure that a tool or a metallic object is not kept in the battery storage system. This could lead to a short-circuit and severe heat formation, which in turn could cause an explosion.

**Explosive atmospheres**

The battery storage system is not suitable for use in explosive atmospheres.

Ensure that there are no ignition sources in the within a radius of 3 m around the system.
1.2.10 Residual risks

General information
The battery storage system was designed such that no persons are exposed to avoidable hazards. Special danger areas are secured using special safety devices. Despite this, some danger areas still remain. When working on the battery storage system, you must be aware of these danger areas, the actions to be taken to keep the risk of injuries and material damage minimal. This operating manual contains safety instructions to indicate these danger areas and essential actions to minimise the risks resulting from such danger areas.

1.3 Data and safety devices of the battery storage system

Safety instructions
The data and devices for the safety of the battery storage system are specified in this section.

1.3.1 General hazard instructions and pictograms

Overview
Adhere to the safety systems and safety instructions described in this operating manual. Keep the area around the battery storage system free from objects during operation to ensure that unhindered access is always possible.

- The NH isolator switches off all poles of the battery towards outside if pultruded.
- Pay attention to the risk of electric arcs when pulling the isolator under the full load of the battery.
Explanation of warning symbols and pictograms
The following warning symbols have been affixed on the battery storage system to be able to ensure the safety of personnel and the battery storage system:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="symbol.png" alt="Exclamation Point" /></td>
<td>Warning against general hazard sources.</td>
</tr>
<tr>
<td><img src="symbol.png" alt="Electric Potential" /></td>
<td>Warning against electric potential.</td>
</tr>
<tr>
<td><img src="symbol.png" alt="Combustible Materials" /></td>
<td>Warning against combustible materials.</td>
</tr>
<tr>
<td><img src="symbol.png" alt="Batteries" /></td>
<td>Warning against risks posed by batteries.</td>
</tr>
<tr>
<td><img src="symbol.png" alt="Electric Shock" /></td>
<td>Warning against electric shock.</td>
</tr>
<tr>
<td><img src="symbol.png" alt="Do Not Dispose" /></td>
<td>Do not dispose with household waste. Please return the battery storage system to the manufacturer.</td>
</tr>
</tbody>
</table>

*Table 1-1 Hazard instructions, pictograms*
1.3.2 Installed safety systems

Overview of safety systems of the battery storage system

<table>
<thead>
<tr>
<th>Description</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH isolator switch</td>
<td>• Connection area: outer housing</td>
</tr>
</tbody>
</table>

The externally accessible fuse elements (NH1) ensure the line protection and short-circuit protection.

1.3.3 Safety checks

General information
The following safety checks were conducted by the manufacturer in the factory.

<table>
<thead>
<tr>
<th>Description</th>
<th>Position</th>
</tr>
</thead>
</table>
| Test scope                | • Technical test of the battery management system for flawless scope of functions  
|                           |   o Check whether communication between the battery and the inverter functions.  
|                           |   o Cell voltage test                          
|                           |   o Temperature sensor test                     
|                           | • Functional test of the battery at the inverter  
|                           | • Visual inspection of the finished product (outer housing)  
|                           | • Check the complete delivery scope.            |
2 Function, delivery scope and technical key variables

2.1 Function

Overview
The BMZ ESS 7.0 energy storage system stores electric energy in its electro-chemical intermediate storage. This energy can then be retrieved later to compensate the daytime-dependent difference between the power generation and power consumption.
In combination with a suitable inverter, the BMZ ESS 7.0 system also offers an option of standby power function in case of a mains failure.
Thanks to the modular system, the required storage capacity can be flexibly arranged on the basis of the BMZ ESS 7.0 system.

2.2 Delivery scope

Overview of standard delivery scope
The BMZ ESS 7.0 battery storage system is delivered with the following components:

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMZ ESS 7.0</td>
<td>1</td>
</tr>
<tr>
<td>CAN terminal resistance (integrated in the battery)</td>
<td>1</td>
</tr>
<tr>
<td>Operating manual</td>
<td>1</td>
</tr>
<tr>
<td>Installation check list (integrated in the operating manual; see section 10.3)</td>
<td>1</td>
</tr>
<tr>
<td>Warranty card (integrated in the operating manual; see section 10.2)</td>
<td>1</td>
</tr>
<tr>
<td>Test certificate</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2-1: delivery scope
2.3 System overview

Battery storage system: Front view

Figure 2-2: battery storage system, front view

<table>
<thead>
<tr>
<th>Position</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Battery housing</td>
</tr>
<tr>
<td>2</td>
<td>Supporting feet (adjustable height)</td>
</tr>
<tr>
<td>3</td>
<td>Air suction</td>
</tr>
</tbody>
</table>

Battery storage system, side view

Figure 2-3: battery storage system, side view

<table>
<thead>
<tr>
<th>Position</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Battery housing</td>
</tr>
<tr>
<td>2</td>
<td>Removable side wall with an inspection window and NH1 fuses</td>
</tr>
<tr>
<td>3</td>
<td>Supporting feet (adjustable height)</td>
</tr>
<tr>
<td>4</td>
<td>Air suction</td>
</tr>
</tbody>
</table>
Battery storage system, side view

Figure 2-4: battery storage system, side view

<table>
<thead>
<tr>
<th>Position</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Battery housing</td>
</tr>
<tr>
<td>2</td>
<td>Air suction</td>
</tr>
<tr>
<td>3</td>
<td>Supporting feet (adjustable height)</td>
</tr>
</tbody>
</table>

Battery storage system, rear view

Figure 2-5: battery storage system, rear view

<table>
<thead>
<tr>
<th>Position</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Battery housing</td>
</tr>
<tr>
<td>2</td>
<td>Air outlet with fan</td>
</tr>
<tr>
<td>3</td>
<td>Supporting feet (adjustable height)</td>
</tr>
<tr>
<td>4</td>
<td>RS485 bus for multi-parallel mode</td>
</tr>
<tr>
<td>5</td>
<td>USB port</td>
</tr>
<tr>
<td>6</td>
<td>PLUS line with 50 mm²</td>
</tr>
<tr>
<td>7</td>
<td>CAN bus for inverter</td>
</tr>
<tr>
<td>8</td>
<td>MINUS line with 50 mm²</td>
</tr>
</tbody>
</table>
2.4 Rating plates and warning stickers

General information

The rating plate is provided on the rear side of the battery.

![Figure 2-6: battery storage system, rear side](image)

<table>
<thead>
<tr>
<th>Position</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manufacturer / address</td>
</tr>
<tr>
<td>2</td>
<td>QR code (contents: <a href="http://www.bmz-gmbh.de">www.bmz-gmbh.de</a>)</td>
</tr>
<tr>
<td>3</td>
<td>Safety instruction: Read the operating manual without fail before installation or usage</td>
</tr>
<tr>
<td>4</td>
<td>Safety instruction: Do not operate a defective battery</td>
</tr>
<tr>
<td>5</td>
<td>Safety instruction: The battery must not become wet.</td>
</tr>
<tr>
<td>6</td>
<td>Recycling instruction symbol</td>
</tr>
<tr>
<td>7</td>
<td>CE mark</td>
</tr>
<tr>
<td>8</td>
<td>Serial number</td>
</tr>
<tr>
<td>9</td>
<td>Manufacturing year/month</td>
</tr>
<tr>
<td>10</td>
<td>Product name</td>
</tr>
<tr>
<td>11</td>
<td>QR code (contents: serial number)</td>
</tr>
<tr>
<td>12</td>
<td>Safety instruction: various safety instructions</td>
</tr>
</tbody>
</table>

*Table 2-8: rating plate*
Recycling symbol

*Figure 2-9: battery storage system, recycling symbol*

Detailed view

*Figure 2-10: recycling symbol*
## 2.5 Technical key variables

### Product data

The following table describes the variants of the BMZ ESS 7.0 system:

<table>
<thead>
<tr>
<th>Battery storage</th>
<th>Unit</th>
<th>BMZ ESS 7.0</th>
<th>BMZ ESS 7.0 Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy content</td>
<td>kWh</td>
<td>6.743</td>
<td>6.743</td>
</tr>
<tr>
<td>Usable energy content</td>
<td>kWh</td>
<td>5.4</td>
<td>5.4</td>
</tr>
<tr>
<td>Nominal capacity C10</td>
<td>Ah</td>
<td>121.5</td>
<td>121.5</td>
</tr>
<tr>
<td>Nominal voltage</td>
<td>V</td>
<td>55.5</td>
<td>55.5</td>
</tr>
<tr>
<td>Expected calendar-based service life</td>
<td>a</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Expected cycle-based service life</td>
<td>5000</td>
<td>5000</td>
<td></td>
</tr>
<tr>
<td>Expected residual capacity at the end of service life</td>
<td>%</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Degree of efficiency at 25 °C</td>
<td>%</td>
<td>&gt; 95</td>
<td>&gt; 95</td>
</tr>
<tr>
<td>Cooling</td>
<td></td>
<td>active</td>
<td>active</td>
</tr>
<tr>
<td>Interfaces</td>
<td></td>
<td>CAN 2.0</td>
<td>CAN 2.0</td>
</tr>
<tr>
<td>Technology</td>
<td></td>
<td>Lithium Ion NMC</td>
<td>Lithium Ion NMC</td>
</tr>
<tr>
<td>Self discharge rate per month</td>
<td>%</td>
<td>1-3</td>
<td>1-3</td>
</tr>
<tr>
<td>Dimensions H/W/D</td>
<td>cm</td>
<td>Approximately 46 x 64 x 48</td>
<td>Approximately 57 x 68 x 48</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>95</td>
<td>100</td>
</tr>
<tr>
<td>Certifications</td>
<td></td>
<td>UN 38.3; CE</td>
<td>UN 38.3; CE</td>
</tr>
</tbody>
</table>

*Table 2-11: overview of technical specifications*
3 Transport

3.1 Safety instructions for transport

Target group
Safety instructions intended for the installation personnel who transport, install and put the BMZ ESS 7.0 battery storage system in operation.

Safety instructions
For transporting the battery storage system and when working on electrical devices, please follow the safety instructions from the Safety section, page 10.

3.2 Transporting the battery storage system

Delivery of the battery storage system

Delivery
The battery storage system is packed in a mechanically robust, three-walled corrugated paper carton and delivered.

Incoming inspection
Check for the completeness using the delivery note.

Damage
Check the delivery for damage.
Visual inspection: e.g. damaged packing, scratches, dents, paint damage, missing components

Is the delivery damaged during transport:

• Ask the forwarding agent to acknowledge obvious transport damage in writing and on the site.
• Contact the last forwarding agent immediately.
• Store the packing (for a possible inspection by the forwarding agent or for returning the product).
• Take photos for easier documentation.
• Write a short fault report.
• Never install or operate a potentially or obviously defective battery storage.

Check the goods at the time of acceptance
Before accepting the goods, check whether the shipment is complete and flawless. The operating manual contains an exact list of all components.

Before accepting the goods, check whether the carton is broken, deformed or destroyed. In such case, refuse the acceptance or accept only with conditions and a written confirmation of the forwarding agent.

Immediately check whether the test seal in the battery is intact. The inner housing of the battery has 3 test seals. If one test seal is destroyed, refuse to accept the goods.
If a test seal is destroyed, all guarantee and warranty claims for the product shall be void.
If the test seal is destroyed: Do not install or commission the energy storage system under any circumstance.

Rear side of the battery inner housing

![Rear side of the battery inner housing](image)

*Figure 3-1: seal position*

Front side of the battery inner housing

![Front side of the battery inner housing](image)

*Figure 3-2: seal position*

**Contents of the seal / translation of the seal:**

**English:** Warranty is VOID if this seal is broken

**German:** Garantie / Gewährleistung ist ungültig, wenn dieses Siegel gebrochen ist

**Packing for return shipment**

- If possible, use the original packing and the original packing material.
  If both are no longer available, request a packing company with experts or contact the manufacturer.
- Place the transport units on a pallet (it must be designed depending on the weight).
- Use the original packing material to protect the housing from scratches and transport damage.
If you have queries regarding packing and transport safeguarding, please consult BMZ GmbH.

**Contact**  
Telephone: 0049 (0)6188 99 56 9830  
Email: CS.BigPack@bmz-gmbh.de

---

**Intermediate storage**  
The freight packing of the battery, spare parts and replacement parts are designed for a storage duration of a maximum of 6 months from the delivery.

**Storage conditions:**

- Closed and dry room with a room temperature from +10 °C to +30 °C (temperatures below and above this range shorten the service life)
- Relative air humidity must be a maximum of 80% (non-condensing).
- The spatial distance from walls or other objects must be at least 50 cm.
- The battery storage system must be stored only in an upright position.

⚠️ Never clean the battery storage system or its immediate vicinity using a vapour jet or spray water. Dirt and water may enter the battery storage system and cause major damage.

⚠️ Before storing the lithium ion battery, inform your insurer.

After a storage time of a maximum of 6 months, execute an equalisation charge process for the battery as described in the operating manual of the battery inverter.

- If this is not done, batteries may get damaged.
- If this is not done, it will lead to consequential costs which will not be borne by BMZ.

The entire time of storage of batteries must be included in the usage duration.

---

**Transport to the installation site (of the customer)**

- Only the experts may carry out the transport in accordance with local conditions.
- The commercial installer is authorised to transport an energy storage unit without the ADR note for the transport of hazardous goods.
- The free limit for such "transports of hazardous goods" is 333 kg or 999 points (net weight of the hazardous product x 3 = points /ADR regulation). According to ADR, the identification of the vehicle is essential from 1000 points onwards ad the driver must have an ADR note.
- Every transport must be provided with an accompanying document (transport document as per ADR hazardous goods UN3480) irrespective of the points.

The transport units are transported on pallets and exclusively in original packages up to the customer’s installation site. The product must be installed out of the reach of children and animals.
WARNING

Risk of injuries due to improper transport.
Pay attention to the weight of the transport unit when transporting (see technical specifications).

- The transport unit may tilt during transport. Pay attention to the centre of gravity.
- If necessary, secure the transport unit using suitable lifting tackles before transporting.

Prevent these hazardous situations. Otherwise, they may lead to deaths or serious injuries.

Transport with a sack truck

The sack truck must be designed for the weight of transport units.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Place the energy storage unit, with the contact with the rear wall, on the sack truck.</td>
</tr>
<tr>
<td>2</td>
<td>Secure the energy storage unit with tightening straps on sack trucks.</td>
</tr>
</tbody>
</table>

Use a soft protective cloth to protect the energy storage unit from scratches.

In case of steps, only use the specially designed step sack trucks.

Figure 3-3: transporting with the sack truck
4 Installation, assembly and commissioning for the first time

General information
Only the experts trained by BMZ GmbH may carry out the installation, assembly and first commissioning activities.

4.1 Installation site requirements

Installation site
The BMZ ESS 7.0 battery storage system is only intended for usage in buildings. Usage of the battery only in non-living space. The battery housing has been designed for a stack of up to 3 battery storage systems. Use the structural analysis of the building to check whether it is designed for the load of the system. Each energy storage unit weighs approximately 95 kg. If three energy storage units are stacked on each other, intermittent loads of a maximum of 285 kg act on the floor.

The installation site must fulfil the following requirements:

- Levelled (e.g.: maximum setting range of adjusting feet)
- Dry (maximum air humidity 80%)
- Clean (well-swept, dust free)
- Vibration-free (maximum shock 0.5 g)
- No direct solar radiation
- No naked flames or other ignition sources near the installation place (minimum distance 3 m)
- Adequate distance (at least 20 cm) between the battery storage system and walls
- Adequate air circulation to dissipate the heat generated by the battery storage system.
- Installation site below 2000-metre altitude.
The room air must not contain contaminations like suspended particles, metal dust or combustible gases. Ensure that the air humidity does not exceed 80%.

Figure 4-1: Requirements for the installation site, distance of the ESS from walls, top view

Figure 4-2: Requirements for the installation site, distance of the ESS from walls, side view
The room temperature should be in a range from 0 °C to 25 °C, wherein 15-20 °C are optimum for a long service life.

- Operate the battery storage system only in the upright position.
- Ensure that the service flap at the side (NH1 fuses) is always freely accessible.

Install the battery inverter and the battery storage system near each other. Do not lay the connecting cable between the battery and the inverter in windings. The maximum length of this cable is 2.3 m.
Only use the provided original cable.

- Do not shorten the cable arbitrarily.
- Do not extend the cable arbitrarily.
- Do not lay the cable in loops.

Immediate surroundings of the battery storage system
The immediate surroundings of batteries must be clean and dry. Oil contaminations, dirt or water residues must not be found outside the battery. If contaminations are found, remove them immediately. Additional information regarding this is given in: VDE 0510 Part 2: 2001-12, EN 50272-2: 2001 “Safety requirements for batteries and battery systems – part 2: stationary batteries”.

4.2 Filling the warranty card
The customer / installer must fill the warranty card carefully; it shall be valid only with a signature and the company stamp. Send the duly filled warranty card to BMZ GmbH. The warranty card is given in the annexe of this manual. Guarantee and warranty claims against the manufacturer can be asserted only if the installed battery has been registered with the manufacturer along with the filled warranty card.

4.3 Filling the installation check list
The installer must fill the installation check list carefully; it shall be valid only with a signature and the company stamp. Send the duly filled installation check list to BMZ GmbH. The installation check list is given in the annexe of this manual. Guarantee and warranty claims against the manufacturer can be asserted only if the installed battery has been registered with the manufacturer along with the filled installation check list.
4.4 Installation of the battery storage system

Installation steps

Proceed as follows to install the battery storage system:

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1    | Unpack the battery storage system carefully and check it for transport damage.  
In case of transport damage, contact the forwarding agent or the manufacturer immediately.  
- Do not use a knife to open the packing.  
- Never install and operate a defective energy storage unit. |
| 2    | Check whether all structural parts and accessories exist. |
| 3    | Check whether the battery storage system has been switched off.  
- Both LEDs must not light up.  
- Use a voltmeter to measure the DC voltage. |
| 4    | Bring the battery storage system on the pallet to the installation place using suitable transport aids. |
| 5    | Check whether the current isolator (NH isolator) is pulled. |
| 6    | Use a suitable lifting device to lift the battery storage system from the pallet (e.g. workshop crane). |
| 7    | Position the battery storage system on the installation site.  
- Adhere to the minimum distances from walls. (See section 4.1 Requirements for the installation site) |

Figure 4-3: representation of the pulled current isolator

The current isolator must be pulled before installation.
4.5 Preparing the electrical connections for the single mode

Definition of single mode:
Single mode means the operation of a BMZ ESS 7.0 energy storage system at an inverter.

Safety instructions
Please follow the safety instructions in the Safety section, page 10.

Establish the connections between the inverter and the battery

Pre-conditions:
- The current isolator (NH isolator) must be pulled
- The battery inverter must be switched off (“Off”)

Check for the correct polarity carefully before establishing connections. Connection lines are marked in different colours:
- Plus pole = RED
- Minus pole = BLACK

The connection of a battery with an SMA Sunny Island inverter is described below as an example.

- When using another inverter, please follow the specifications in the corresponding manufacturer’s documentation.
- Check whether the inverter used by you is approved for use with the BMZ ESS 7.0 battery storage system.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1    | Push the 50 mm² lines through metric screw joints into the housing of the inverter.  
      Plus pole = RED  
      Minus pole = BLACK |

*Figure 4-4: inverter, connection area for battery lines*

- The 50 mm² connection lines must **NOT** be connected to incorrect poles.
- Follow the installation manual of the inverter manufacturer.
2 Connect the power cable of the battery inverter to the poles of the NT isolator. Use the 2 screws of the M8x20 size as well as washers and tension washers.

![Picture of connection](image)

*Figure 4-5: sample representation of the connection of plus and minus power cables with the SMA Sunny Island inverter*

- Ensure that the contact surface of cable shoes rests completely.
- Maximum tightening torque: 12 Nm. (Tolerance +/- 5 Nm)

3 Connect the CAN communication cable between the inverter and the battery storage system. For this purpose, patch the patch cable (RJ45) from the **CAN socket** of the battery storage system to the **CAN socket** of the inverter. (Marked in yellow)

![CAN socket](image)

*Figure 4-6: representation of external connections of the battery system, CAN*
Insert the NH fuses in the cover of the NH isolator.

Figure 4-7: battery storage system, side view of the opened housing

Change the fuse inserts depending on the inverter to which the battery is connected.

Recommendation:
- SI3.0M-11: 80 A
- SI4.4M-11: 100 A
- SI6.0H-11: 160 A
- SI8.0H-11: 200 A

Figure 4-8: representation of the correctly inserted fuses
<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Insert the housing cover in the housing and tighten the screws of the cover. For this purpose, use 2 DIN 7985 M4x6 fillister-head screws. Fix these using a PH2 Phillips screwdriver and a maximum tightening torque of 2.5 Nm (tolerance: +/-0.1 Nm).</td>
</tr>
<tr>
<td>6</td>
<td>Execute the first commissioning process by following the specifications from the Operation section (page 78).</td>
</tr>
<tr>
<td>7</td>
<td>Configure the parameters of the inverter as mentioned in section 4.18 (Recommended parameters). Ensure that the batteries are not earthed by mistake. If they are earthed, disconnect the corresponding connection. Check all parts for firm fitting. Re-tighten all screws and terminals.</td>
</tr>
</tbody>
</table>
4.5.1 Checking the connections
Check the connections as per the exact specifications in the installation check list given in the annexe.

4.5.2 Switching the battery storage system on and off
The battery storage system and the inverter must be correctly installed before they can be put into operation.

Switch on the battery storage system using a switch
Proceed as follows to start the battery storage system:

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Open the screws on the service flat using a PH2 screwdriver.</td>
</tr>
<tr>
<td>2</td>
<td>Check whether the NH isolator is equipped with correct (see section 4.5) NH fuses and put into operation correctly.</td>
</tr>
<tr>
<td>3</td>
<td>Check the connections of the DC power cable (+, -) and the CAN communication cable of the battery inverter.</td>
</tr>
<tr>
<td>4</td>
<td>Actuate the push button through a short (longer than 1 second) push.</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="A clicking sound must be heard." /></td>
</tr>
<tr>
<td>5</td>
<td>Check the LED status of the battery storage system.</td>
</tr>
<tr>
<td></td>
<td>• The green LED flashes quickly (every 100 msec): The pre-charging path is activated and charges the capacitors of the inverter. (The pre-charging time depends on the type and number of connected inverters. The pre-charging time can take from 30 seconds to 2 minutes)</td>
</tr>
<tr>
<td></td>
<td>• Both LEDs flashes slowly (every 1 second): The battery is active and waits for communication through the inverter.</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="The battery switches off automatically after 20 minutes if there is no communication between the battery and the inverter." /></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Additional information regarding the LED flashing patterns is given in the Pilot lamps section, page 79." /></td>
</tr>
<tr>
<td>6</td>
<td>Switch on the battery inverter.</td>
</tr>
<tr>
<td></td>
<td>• The green LED lights up continuously</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="If there is no communication between the battery storage system and the inverter, the battery switches off automatically after 20 minutes to avoid erroneous operating modes. Both LEDs flash in a one-second cycle if there is no communication." /></td>
</tr>
</tbody>
</table>
Switch on the battery storage system using an external voltage source

Proceed as follows to start the battery storage system:

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The external voltage source can be used to switch on the system only if it was not switched off using the push button (press the push button longer than 10 seconds at a stretch).</td>
</tr>
<tr>
<td>2</td>
<td>Connect an external voltage source greater than 36 VDC.</td>
</tr>
<tr>
<td>3</td>
<td>The battery detects the external voltage source automatically and switches the operating mode from inactive to active.</td>
</tr>
<tr>
<td>4</td>
<td>If it is switched on in an unauthorised manner, the green LED flashes quickly (100 ms flash cycle). You must now start the battery using a normal switch-on sequence (by pressing the push button longer than 1 second).</td>
</tr>
</tbody>
</table>

Switch off the battery storage system using a push button

Proceed as follows to switch off the battery storage system:

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Open the screws on the service flat using a PH2 screwdriver.</td>
</tr>
<tr>
<td>2</td>
<td>Keep the switch-on button pressed for at least 10 seconds.</td>
</tr>
<tr>
<td>3</td>
<td>After approximately 8 seconds, both LEDs start flashing quickly (100 ms flash cycle). Keep the button pressed for 2 more seconds.</td>
</tr>
<tr>
<td>4</td>
<td>The LEDs switch off. The battery storage system is now switched off. A clicking sound must be heard.</td>
</tr>
</tbody>
</table>

Switch off the battery storage system using time

The battery switches off automatically after a defined time of 20 minutes when the battery does not detect any CAN communication externally.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>If an external source (e.g. the battery inverter) does not detect a CAN communication of the battery, the battery switches off automatically after 20 minutes.</td>
</tr>
</tbody>
</table>

4.5.3 Configuring the parameters of the inverter

The inverter parameters must be configured for the BMZ ESS 7.0 battery in order to operate it optimally in combination with the inverter. See section 4.18
4.6 Preparing the electrical connections for the parallel mode

Definition of parallel mode:
Parallel mode means the operation of multiple BMZ ESS 7.0 energy storage systems at one or more inverters.

Safety instructions
Please follow the safety instructions in the Safety section, page 10.

The following safety instructions are additionally applicable for the parallel operation:

- If the battery is operated under full load, housing parts and lines may generate heat.
- When wiring the batteries, ensure that a short-circuit is never formed between the plus and minus poles of one or more batteries. There is a risk of life.
- When laying the lines, do not extend them from the plus and minus poles.
- When laying the lines (plus and minus poles), ensure that they are not rolled.

Establish the connections between the inverter and the battery
Pre-conditions:

- The current isolator (NH isolator) of each battery must be pulled
- The battery inverter must be switched off (“Off”)
- Use a suitable switch cabinet to connect the batteries in the parallel circuit to the inverters.
  BMZ recommends using a DC busbar with a suitable line fuse for each connected line.
  BMZ recommends using products of SMA (Bat fuse) or Enwitec (BAT BREAKER BOX)

Check for the correct polarity carefully before establishing connections. Connection lines are marked in different colours:

- Plus pole = RED
- Minus pole = BLACK
Prerequisites for the battery firmware version

- Batteries can be connected in parallel from firmware version V2.00 onwards.
- The BMZ Service Tool in a specific version (at least Version 0.0.26) must be used to update the battery to a new firmware version.

Requirements for the battery inverter

- The parallel connection capability of BMZ ESS 7.0 batteries is approved only with the battery inverters of SMA Sunny Island.
- Check whether the inverter used by you is approved for use with the BMZ ESS 7.0 battery storage system.

4.7 Connection concept of multiple BMZ ESS 7.0 batteries with one or more battery inverters

4.7.1 Communication

Wiring of the communication line from the battery to the inverter

- Connect the CAN cable to the battery that has been configured as the master and connected with the inverter.

Wiring of the communication line from between the batteries (internal communication of battery)

- All batteries in the parallel circuit are connected with each other via the RS485 bus for internal communication between them. The batteries are connected in a bus topology. For this purpose, T-connectors (or even Y-adapters) are used at the RJ45 sockets (“INTERNAL” label) of batteries.
- One T-connector (or even a Y-adapter) is used for each battery.
The RS485 bus must be closed with 120 Ohm at both ends.

Example of a RJ45 T-connector (or even a Y-adapter) with corresponding pin assignment.

Figure 4-11: RJ45 Y-adapter (even RJ45 T-connector)

Figure 4-12: pin assignment of RJ45 Y-adapter (T-connector)
4.7.2 Output contact

- All plus poles of batteries must be laid on a copper rail using the Bat Breaker Box.
- All minus poles of batteries must be laid on a copper rail using the Bat Breaker Box.

**Important:** A short-circuit between the lines from the plus pole of the battery and the minus pole of the battery must be prevented under any circumstance.

![Diagram showing the output cable of BAT Breaker Box](image-url)

*Figure 4-13: output cable of BAT Breaker Box*
Connection of the plus pole of inverter (3 units)

Connection of the minus pole of inverter (3 units)

Connection of the plus poles of batteries (6 units)

Connection of the minus poles of batteries (6 units)

Figure 4-14: BAT BREAKER Box of Enwitec (example for 6 batteries and 3 inverters) with a closed housing
Connection of the plus pole of inverter (3 units)

Connection of the minus pole of inverter (3 units)

Connection of the plus poles of batteries (6 units)

Connection of the minus poles of batteries (6 units)

Connection side of inverter
- Cable shoe M10
- Maximum Cu cross-section: 95 mm$^2$

Connection side of battery
- Cable shoe M8
- Maximum Cu cross-section: 50 mm$^2$
- Tightening torque: 13-18 Nm

Figure 4-15: BAT BREAKER Box of Enwitec (example for 6 batteries and 3 inverters) with an open housing

Important:
Please refer to the installation manual of the manufacturer for additional instructions regarding installation and operation.
Important:

When interconnecting the output contacts, all fuses (NH1 isolators) of individual batteries and the switch cabinet are removed, and the automats in the BAT BREAKER Box are set to OFF.

*Figure 4-16: battery storage system, side view, power isolator pulled*
4.7.3 Laying the power cable
- The power cable should be as short as required.
- The length of the Pack+ and Pack- cables must not exceed the respective maximum lengths.
- Cables of each battery (plus and minus poles) must always have the equal length.
- Cables of a battery connected in a parallel circuit must have the equal length between the batteries.

![Diagram of the ESS System]

**Figure 4-17: cable lengths of the ESS system**

- max. length of cable: 1,5m (4ft 1e+1in)
- recommended cable cross-section: 70mm² or 95mm²

- max. length of cable: 2m (6ft 7in)
- recommended cable cross-section: 50mm² or 70mm²

**Important: Connection of the power cable**

When wiring the Bat Breaker Box (output rail), ensure that only Pack PLUS is connected to Pack PLUS potentials.
When wiring the Bat Breaker Box (output rail), ensure that only Pack MINUS is connected to Pack MINUS potentials.

*RISK OF A SHORT-CIRCUIT!!!*
4.8 Configuration of the ESS parallel mode

Thanks to the modular concept of the BMZ ESS 7.0 system, different configurations of BMZ ESS 7.0 batteries with SMA Sunny Island inverters are possible.

4.8.1 1-phase operation of a SMA Sunny Island inverter on 1 ESS battery

4.8.2 1-phase operation of a SMA Sunny Island inverter on 2 ESS batteries
4.8.3 1-phase operation of a SMA Sunny Island inverter on 3 ESS batteries

Figure 4-20: 1-phase operation on 3 ESS batteries
4.8.4 3-phase operation of a SMA Sunny Island inverter on 3 ESS batteries

Figure 4-21: 3-phase operation on 3 ESS batteries
4.8.5 3-phase operation of a SMA Sunny Island inverter on 4 ESS batteries

Figure 4-22: 3-phase operation on 4 ESS batteries
4.8.6 3-phase operation of a SMA Sunny Island inverter on 5 ESS batteries

Figure 4-23: 3-phase operation on 5 ESS batteries
4.8.7 3-phase operation of a SMA Sunny Island inverter on 6 ESS batteries

![Diagram of 3-phase operation on 6 ESS batteries]

Figure 4-24: 3-phase operation on 6 ESS batteries
4.9 Configuration of the ESS battery

4.9.1 System structure
- In a complete system of batteries connected in parallel, configure one battery as a “master”.
- In a complete system of batteries connected in parallel, configure all other batteries as “slave”.
- You can connect up to 6 batteries with each other in parallel.

4.9.2 Addressing the batteries
- Configure each battery with an unambiguous and unique address.
  Numbers 1 to 12 are available.
  Note: Each battery must have a different bus address (device address).
  Note: Do not use Device address “0”.

4.10 Definition of the battery mode during commissioning and parameter configuration

![Figure 4-25: representation of the BMZ ESS service tool](image)

4.10.1 Single:
This is the delivery status of every BMZ ESS 7.0 battery ex-works.
The mode is used for the status: 1 BMZ ESS 7.0 battery operated at one SMA Sunny Island inverter.

4.10.2 Master:
This is the status of a BMZ ESS 7.0 battery in a group of multiple BMZ ESS 7.0 batteries connected in parallel.
Important: Only one battery may be configured as a master.
The mode is used for the status: multiple BMZ ESS 7.0 batteries are operated at one or more SMA Sunny Island inverters.

4.10.3 Slave:
This is the status of multiple BMZ ESS 7.0 batteries in a group of multiple BMZ ESS 7.0 batteries connected in parallel.
Important: Each battery, except the master battery, must be configured as a slave battery.
The mode is used for the status: multiple BMZ ESS 7.0 batteries are operated at one or more SMA Sunny Island inverters.

4.11 Work step sequence to configure the parameters of batteries

Execute the following steps to configure the parameters of batteries for a system comprising ESS batteries connected in parallel.

**Figure 4-26: representation of the work sequence to configure the parameters of a BMZ ESS battery**
4.12 Work step sequence to commission the batteries

Execute the following steps to commission a system comprising ESS batteries connected in parallel.

**Prior conditions**

- Latest Firmware used by all batteries (no mix of different firmware versions allowed)
- Hardware (connecting of power cable harness and communication harness) done completely and correctly
  - Plus- and Minus connections via BAT Breaker Box between battery and inverter
  - Battery INTERNAL (port "intern") communication
  - Battery to inverter communication (CAN Bus)

**Battery 1 Master**

1. Close NH1 Breaker at battery
2. Turn ON battery with pushing button (push button > 1 sec.)
3. green LED should blink in 1 second clock pulse (precharge for inverter is active)
4. green & red LED should blink in 1 second clock pulse (main relay shall be closed)
5. Turn ON the inverter
6. green LED should be on solid (communication (CAN bus) with inverter is working correct

**Battery 2 Slave**

1. Close NH1 Breaker at battery
2. Turn ON battery with pushing button (push button > 1 sec.)
3. green LED should blink in 1 second clock pulse
   - Slave battery is in stand by mode
   - Communication to master battery is working correct
   - Battery is waiting until external voltage level is identical to internal voltage level
4. green LED on solid
   - Slave battery changes status from standby to active
   - Main relay of the slave battery is turned ON

**Battery 3 Slave**

1. Close NH1 Breaker at battery
2. Turn ON battery with pushing button (push button > 1 sec.)
3. green LED should blink in 1 second clock pulse
   - Slave battery is in stand by mode
   - Communication to master battery is working correct
   - Battery is waiting until external voltage level is identical to internal voltage level
4. green LED on solid
   - Slave battery changes status from standby to active
   - Main relay of the slave battery is turned ON

**etc.**

**Finish**

At the end please check how many slave batteries got recognized from the master battery
- Connect Notebook with BMZ service tool via USB port to master battery
- Open BMZ service tool (by clicking onto sub menu "parallel")
- Check how many batteries got recognized as "detected devices" at battery master
- Check how many batteries got recognized as "devices with closed switch" (means: how many batteries do have a closed main relay and are working in parallel mode now)

*Figure 4-27: representation of the work sequence to commission a BMZ ESS battery*
4.13 Configuration of firmware for parallel mode

Use the BMZ service tool to configure the battery using the USB service port. The following files must be available to configure the battery parameters:

1. ESS30ServiceTool.exe (example: current service tool V0.0.26)
2. System.Windows.Interactivity.dll
3. Optional for firmware update: 31502A_V205.flash (example: current firmware V2.05)

**Important:** All three files must be in the same folder.

![File structure of the BMZ ESS service tool](image)

**4.13.1 Setting the master battery mode**

In a group of multiple BMZ ESS 7.0 batteries connected in parallel, configure one battery as a master.

**Important:**

1. Set the “Master” mode and configure the battery parameters by clicking on “set mode”.
2. In a group of multiple BMZ ESS 7.0 batteries connected in parallel, only one battery may be configured as a master.

![Representation of configuration of the parameters of a BMZ ESS battery](image)

3. **IMPORTANT:** Configure the parameters of the battery with the maximum voltage level and the maximum charge status as the master battery.
4.13.2 Setting the master battery address

- Address 0 is the default address. Do not use Address 0. Type in + or – to get to device address 1 or higher.
- Each battery connected in parallel must have an unambiguous and unique address (device address).
- The master and slave batteries function only with the addresses configured with numbers from 1 to 12.

Figure 4-30: representation of configuration of the parameters of a BMZ ESS battery

**Important:**

1. Set the “address” (device address) to “1” and configure the battery parameters by clicking on “set address”.
2. In a group of multiple BMZ ESS 7.0 batteries connected in parallel, **only one battery** may have the address “1”.
3. If you use device address “1” please make sure that you typed in “+” and “-” before so that “1” will be recognized from the battery BMS.
### 4.13.3 Setting the slave battery mode

In a group of multiple BMZ ESS 7.0 batteries connected in parallel, configure all batteries, except the master, as slaves.

**Important:**

1. Set the “Slave” mode and configure the battery parameters by clicking on “set mode”.

![Figure 4-31: representation of configuration of the parameters of a BMZ ESS battery](image)

---

### 4.13.4 Setting the slave battery address

- Address 0 is the default address.
- Each battery connected in parallel must have an unambiguous and unique address (device address).
- The master and slave batteries function only with the addresses configured with numbers from 1 to 12.

![Figure 4-32: representation of configuration of the parameters of a BMZ ESS battery](image)
Important:

1. Set the “address” (device address) to “2” and configure the battery parameters by clicking on “set address”.
2. In a group of multiple BMZ ESS 7.0 batteries connected in parallel, only one battery may have the address “2”.
3. Configure a unique and unambiguous address (device address) for all other slave batteries.

4.14 Commissioning the parallel connection of multiple batteries

4.14.1 Switch-on sequence

1. At the time of commissioning, first switch on the master battery.
2. Check whether the main relay of the master battery is switched on
   -> Check via LED flashing speed (see section 5.1) or BMZ service tool (see section 4.4)
3. If the main relay of the master battery is closed, you can now switch on other slave batteries.

4.14.2 Stand-by mode of a slave battery:
When you switch on the slave batteries, the batteries are automatically in the stand-by mode. (The stand-by mode is indicated by a green flashing LED) Only when the master sends a switching signal for the main relay of the slave battery, the main relay of the slave battery is switched on. The slave battery can be used the complete battery system only after this.

4.14.3 Switch-on criterion of the slave battery:
Each battery compares the internal battery voltage with the externally applied voltage through a measurement.

![Block circuit diagram of the BMZ ESS slave battery](image)

*Figure 4-33: block circuit diagram of the BMZ ESS slave battery*

If the voltage automatically measured by the battery at the master battery differs from the slave battery voltage by less than +/-100 mV, the slave battery switches off automatically.
**Important:**

To ensure that all slave batteries are activated from the master battery in case of a different voltage level for different batteries, change the charge status of the master battery by charging and discharging using the inverter. Within a full cycle (i.e. the battery is completely charged once and completely discharged once), the master battery scans all slave batteries in the stand-by mode and switches them off one by one. This process may take a few hours depending on the available PV energy or loads in the company network.

### 4.14.4 Example 1:

6 batteries connected in parallel with different charge statuses:

- The master battery is switched on and the main relay is switched on
- 2 slave batteries are switched on and the main relay is switched on
- 3 slave batteries are switched on and the main relay is **NOT** switched on

![Figure 4-34: representation of example 1, different SOC of BMZ ESS batteries connected in parallel](image)

### 4.14.5 Example 2:

6 batteries connected in parallel with different charge statuses:

- The master battery is switched on and the main relay is switched on
- 4 slave batteries are switched on and the main relay is switched on
- 1 slave battery is switched on and the main relay is **NOT** switched on
4.14.6 Example 3:
6 batteries connected in parallel with different charge statuses:

- The master battery is switched on and the main relay is switched on
- 5 slave batteries are switched on and the main relay is switched on
4.15 Checking the parallel connection of multiple batteries

4.15.1 Check the number of connected (detected) batteries

- Connect the notebook to the master battery.
- The “Detected devices” number shows the number of batteries connected to the master (and that are in the stand-by mode).

![Figure 4-37: check the number of BMZ ESS batteries connected in parallel](image)

**Other test criterion:** The LED of a battery in the stand-by mode flashes green.
4.15.2 Check the number of batteries for which the main relay is closed

- Connect the notebook to the master battery.
- The “Devices with closed switch” number shows the number of batteries connected to the master for which the main relay is closed.
- These batteries are connected in parallel to the master battery and can thus be used in the complete system (charging and discharging).

![Figure 4-38: check the number of BMZ ESS batteries connected in parallel](image)

Other test criterion: The LED of a battery in the parallel mode (active) continuously lights up in green.

4.16 Adding new batteries

BMZ allows subsequent extensions of the battery system until six months after the first installation.

1) Configure a new battery as a slave
2) Disconnect the NH isolator of the output rail
3) Disconnect the NH isolator of the battery
4) Connect the power cable of the slave battery to the output rail.
5) If the new slave battery is switched on, switch it off by pressing the button for 10 seconds (LEDs must be off)
6) Connect the NH isolator of the battery
7) Connect the NH isolator of the output rail
8) Switch on the slave battery using the button (press the button for > 1 second, LEDs flash)

After adding a new battery, you may still need to deal with the equalising currents. This may lead to the adjustment of the capacity even if no current flows from or to the inverter.
### 4.17 Checking the connections of parallel battery systems

Check the connections as per the exact specifications in the installation check list given in the annexe.

#### 4.17.1 Switching the battery storage system on and off

The battery storage system and the inverter must be correctly installed before they can be put into operation.

**Switch on the battery storage system using a switch**

Proceed as follows to start the battery storage system:

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Open the screws on the service flat using a PH2 screwdriver.</td>
</tr>
<tr>
<td>2</td>
<td>Check whether the NH isolator is equipped with correct (see section 4.5) NH fuses and put into operation correctly.</td>
</tr>
<tr>
<td>3</td>
<td>Check the connections of the DC power cable (+, -) and the CAN communication cable of the battery inverter.</td>
</tr>
</tbody>
</table>
| 4    | Actuate the push button through a short (longer than 1 second) push.  
|      | A clicking sound must be heard. |
| 5    | Check the LED status of the battery storage system.  
|      | - The green LED flashes quickly (every 150 msec): The pre-charging path is activated and charges the capacitors of the inverter. (The pre-charging time depends on the type and number of connected inverters. The pre-charging time can take from 30 seconds to 2 minutes)  
|      | - For slave batteries: The green LED flashes slowly (every 1 second): The battery is active and waits for the switch-on signal of the master battery.  
|      | - Both LEDs flashes slowly (every 1 second): The battery is active and waits for communication through the inverter.  
|      | - The battery switches off automatically after 20 minutes if there is no communication between the battery and the inverter.  
|      | - Additional information regarding the LED flashing patterns is given in the Pilot lamps section, page 79. |
| 6    | Switch on the battery inverter.  
|      | - The green LED lights up continuously  
|      | - If there is no communication between the battery storage system and the inverter, the battery switches off automatically after 20 minutes to avoid erroneous operating modes. Both LEDs flash in a one-second cycle if there is no communication. |
Important: (see chapter 4.14.1)

At the time of commissioning of batteries connected in parallel, first switch on the master battery.

1. Check whether the main relay of the master battery is switched on
   - Check via LED flashing speed (see section 5.1) or BMZ service tool (see section 5.2)
2. If the main relay of the master battery is closed, you can now switch on other slave batteries.

If the switch-on sequence for batteries connected in parallel is not followed, it may happen that none of the batteries allow switching off the main relay.

### Switch on the battery storage system using an external voltage source

Proceed as follows to start the battery storage system:

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The external voltage source can be used to switch on the system only if it was not switched off using the push button (press the push button longer than 10 seconds at a stretch).</td>
</tr>
<tr>
<td>2</td>
<td>Connect an external voltage source greater than 36 VDC.</td>
</tr>
<tr>
<td>3</td>
<td>The battery detects the external voltage source automatically and switches the operating mode from inactive to active.</td>
</tr>
</tbody>
</table>
| 4    | If it is switched on in an unauthorised manner, the green LED flashes quickly (100 ms flash cycle)
   You must now start the battery using a normal switch-on sequence (by pressing the push button longer than 1 second). |

### Switch off the battery storage system using a push button

Proceed as follows to switch off the battery storage system:

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Open the screws on the service flat using a PH2 screwdriver.</td>
</tr>
<tr>
<td>2</td>
<td>Keep the switch-on button pressed for at least 10 seconds.</td>
</tr>
</tbody>
</table>
| 3    | After approximately 8 seconds, both LEDs start flashing quickly (100 ms flash cycle).
   Keep the button pressed for 2 more seconds. |
| 4    | The LEDs switch off. The battery storage system is now switched off.
   A clicking sound must be heard. |
Switch off the battery storage system using time
The battery switches off automatically after a defined time of 20 minutes when the battery does not detect any CAN communication externally.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>If an external source (e.g. the battery inverter) does not detect a CAN communication of the battery, the battery switches off automatically after 20 minutes.</td>
</tr>
<tr>
<td>2</td>
<td>Optional: If the battery is installed in parallel mode, the battery defined as master first switches off after 20 minutes without CAN communication of the external source. The slave battery then switches off after 20 minutes. If a master or a slave battery is now switched on in the parallel mode, all batteries in the complete system are switched on since they are activated by the pre-charging voltage of the battery that is switched on first (see Switching on the battery storage system using an external voltage source)</td>
</tr>
</tbody>
</table>

**4.17.1 Configuring the parameters of the inverter**
The inverter parameters must be configured for the BMZ ESS 7.0 battery in order to operate it optimally in combination with the inverter.
See section 4.18

**4.18 Recommended parameters of the SMA Sunny Island inverter at the time of installation:**
In order to ensure the optimum working range of the battery and to optimise the quantity of storable energy, the battery manufacturer has given the following recommendations for the parameters of the inverter:

- A detailed description of parameters is given in the operating manual of your SMA Sunny Island inverter.
- Amongst the recommended parameters, we differentiate between “On-grid” and “Off-grid” applications.

**4.18.1 On-grid application**
1. Enter the following values in the quick configuration guide during the basic configuration of the Sunny Island inverter (see the documentation of the system):
   - Battery type BatTyp: Lilon_Ext-BMS
   - Battery capacity BatCpyNom: 105 Ah (C10)
2. After the basic configuration of the Sunny remote control, turn the knob and select the input page password (1/1).
3. Press the knob. This will take you to the input page.
4. Calculate the checksum of the Runtime operating hours. Determine the installer password.
   - Example: The Runtime operating hours are 1234 h. The checksum is the sum of all digits: \[ 1 + 2 + 3 + 4 = 10 \]
5. Select Set on the Sunny remote control and press the knob.
6. Set the determined installer password and press the knob. The Sunny remote control is in the installer mode.

7. Select the **700# Operator Level** menu and press the knob.

8. Select the **700.01 Act Lev** parameter, press the knob and set to **Expert**.

9. Confirm the `<accept Y/N>` query with **Y**.

10. Set the following parameters to the specified values only if the Sunny Island units are used in systems for own consumption optimisation:

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>261.03</td>
<td>Season enable</td>
<td>No</td>
</tr>
<tr>
<td>262.01</td>
<td>ProtResSOC</td>
<td>3%</td>
</tr>
<tr>
<td>262.02</td>
<td>BatResSOC</td>
<td>2%</td>
</tr>
<tr>
<td>262.03</td>
<td>BUResSOC</td>
<td>1%</td>
</tr>
<tr>
<td>262.04</td>
<td>PVResSOC</td>
<td>5%</td>
</tr>
<tr>
<td>262.05</td>
<td>MinStfcsmmpSOC</td>
<td>89%</td>
</tr>
</tbody>
</table>

*Figure 4-39: SMA on-grid parameters*

- In order to optimise the efficiency of the battery, the battery automatically executes a learning cycle at periodic intervals, wherein the actually usable capacity of the battery is automatically determined.

- In this learning cycle, the battery must cover the SOC limits of 100% and 12% as frequently as possible. The learning cycle starts at 100% SOC (battery full) and ends at 12% SOC. If both incidents occur in succession and, in the meantime, the energy is not charged more than 20% SOC, then the learning cycle is evaluated as “successfully executed”.

- The higher the frequency of execution of this learning cycle, the more precise is the SOC calculation.

- The higher the frequency of execution of this learning cycle, the more the energy that the battery can save and transfer.
4.18.2 Off-grid application

In the expert mode, set the following parameters when installing the inverter:

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diesel generator request</td>
<td>12% SOC</td>
</tr>
<tr>
<td></td>
<td>Load dropping relay</td>
<td>10% SOC</td>
</tr>
<tr>
<td></td>
<td>Bat Pro 3</td>
<td>7% SOC</td>
</tr>
<tr>
<td></td>
<td>Bat Pro 2</td>
<td>5% SOC</td>
</tr>
<tr>
<td></td>
<td>Bat Pro 1</td>
<td>3% SOC</td>
</tr>
</tbody>
</table>

Figure 4-40: SMA off-grid parameters

- In order to optimise the efficiency of the battery, the battery automatically executes a learning cycle at periodic intervals, wherein the actually usable capacity of the battery is automatically determined.

- In this learning cycle, the battery must cover the SOC limits of 100% and 12% as frequently as possible. The learning cycle starts at 100% SOC (battery full) and ends at 12% SOC. If both incidents occur in succession and, in the meantime, the energy is not charged more than 20% SOC, then the learning cycle is evaluated as “successfully executed”.

- The higher the frequency of execution of this learning cycle, the more precise is the SOC calculation.

- The higher the frequency of execution of this learning cycle, the more the energy that the battery can save and transfer.
5 Operation and service software

General safety instructions
Please follow the safety instructions in the Safety section, page 10.

5.1 Pilot lamps (LED)

5.1.1 LED indicators on the battery module
The pilot lamps on the battery module indicate the possible statuses and incidents in the operation of the battery storage system.

<table>
<thead>
<tr>
<th>Colour pattern</th>
<th>Flashing frequency</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>The battery is switched off</td>
</tr>
<tr>
<td>Green + Red</td>
<td>Continuously lit up</td>
<td>Service mode (a PC is connected)</td>
</tr>
<tr>
<td>Quick flashing (100msec)</td>
<td></td>
<td>The battery is in error mode</td>
</tr>
<tr>
<td>Slowly flashing (1sec)</td>
<td></td>
<td>The battery is switched on, but no communication with the inverter.</td>
</tr>
<tr>
<td>Green</td>
<td>Continuously lit up</td>
<td>The battery is switched on (normal mode)</td>
</tr>
<tr>
<td>Slowly flashing (1sec)</td>
<td></td>
<td>Pre-charging is activated. (Normal mode)</td>
</tr>
<tr>
<td>Slowly flashing (1sec)</td>
<td></td>
<td>SLAVE battery (normal mode)</td>
</tr>
<tr>
<td>Red</td>
<td>Quick flashing (100ms)</td>
<td>The battery is in error mode</td>
</tr>
</tbody>
</table>

Please contact the BMZ Service immediately (see section (7))

Figure 5-1: Pilot lamps table (LED)
### 5.1.2 Charging status indicator
The charging status indication is given using the communication line via the inverter.

### 5.2 Connection of the notebook for servicing

#### 5.2.1 USB port
Each rechargeable battery set has a USB port.
The installer can use this port to execute the following steps:

- Update (firmware)
- Read error memory

Proceed as follows to read the battery storage system via the USB port:

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1    | Open the screws on the service flat using a PH2 screwdriver.  
Loosen and remove the upper fillister-head screw of the lateral service flap. |
| 2    | Now push the flap of the side panel upwards to remove it. |
| 3    | Switch off the battery system.  
Figure 5-3: push button with LEDs  
Both LEDs must not light up. |
<p>| 4    | Pull out the NH fuses of the NH isolator and remove the safety bracket and fuses from the isolator. |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 5 | Connect the notebook to the battery storage system. Connect the USB A cable of the notebook to the USB A port of the battery storage system.  
   
   ![USB communication](image)

   *Figure 5-4: USB communication*

| 5a | This step is applicable if there is no communication between the battery storage system and the notebook. Connect the USB cable directly from the battery storage system.  
   
   ![USB port of BMZ ESS battery, inner side of housing](image)

   *Figure 5-5: USB port of BMZ ESS battery, inner side of housing*

   Loosen the cable binder of the USB cable carefully using a side cutter and pull the USB plug internally from the socket (rear wall). |

| 6 | Connect the notebook with the battery storage system using the USB cable.  
   
   ![The notebook must not be connected with the AC grid via the charging cable.](image)  

   The notebook must not be connected with the AC grid via the charging cable. |

| 7 | Switch on the battery storage system using the push button.  
   
   ![push button and LEDs](image)

   *Figure 5-6: push button and LEDs* |

| 8 | The service software can now be installed and started. |
5.2.2 Service software

The software is easy to operate and works with all commonly used Windows versions. The following functions are possible:

- Read battery status (cell voltages, temperatures)
- Firmware update
- Configuration of the battery for parallel mode
- Download log files (for sending to the Service Department via email)
- Prepare PDF report (actual status of the battery)

For more information regarding the service software, please refer to the operating manual of the BMZ service tool. It is a separate document. Please contact BMZ GmbH for this purpose.
6 Fault/damage event

6.1 Fault indicators

6.1.1 Fault indicators of pilot lamps

Fault indicators of pilot lamps
Two LEDs are provided on the battery storage system. In case of errors in the battery storage system, they either individually flash in red or flash together in red and green. Detailed information regarding the flashing pattern is given in the Pilot lamps section (page 78).

Fault indicators of the battery via the inverter
Detailed information regarding error codes displayed by the inverter are given in the corresponding section of the operating manual of the inverter manufacturer.
6.2 Actions to be taken in case of a damage

General information
If the battery storage system is used for the intended purposes, lithium ion batteries do not pose any risk. If cells and the housing are damaged, there is a risk of contact with electrolytes.

⚠️ WARNING

Possible risk to life due to leaking electrolytes.

If you do not observe the following behavioural instructions, they may cause material damage and personal injuries; BMZ GmbH shall not bear any liability in such a case.

- Switch off the battery storage system if it is possible without any risk.
- Ensure adequate ventilation outside.

Prevent these hazardous situations. Otherwise, they may lead to deaths or serious injuries.

Please follow the safety data sheet of the BSW: “Use of stationary lithium solar power accumulators” under www.solarwirtschaft.de

6.2.1 First aid measures

If the battery storage system and the battery modules installed in it are damaged, please initiate the following first aid measures:

Contact with skin and eyes:

- Skin irritations may occur. Wash the skin thoroughly with soap and water.
- Irritations in eyes may occur. Wash eyes thoroughly with water for 15 minutes and then visit a doctor.

Respiratory tracts:

- Generated gases may damage respiratory tracts.
- Ventilate immediately or go in fresh air; in worst cases, call a doctor immediately.

Burns:

- Do not touch the injured person until the de-energised status of the system is ensured
- Take freely lying live cables away from the injured person using non-conductor objects
- Ensuring breathing and the functioning of cardiovascular system is utmost important in case of unconscious patients. If necessary, initiate cardiopulmonary resuscitation immediately
- Let the burn injuries of responding patients cool and cover them with a sterile wound dressing
7 Service and maintenance activities

General information
The manufacturer recommends a regular annual maintenance of the battery system.
Check the following points while doing this:

- Operate the battery with the current firmware
- Battery has not external damage
- Air circulation outside and inside the battery is possible without any problem.
- Air suction is clean and freely accessible
- Histogram of temperature progressions is not problematic and within the permissible temperature range of the battery (see section 5.2)

A deviation from normal operation is shown by the battery indicator of the inverter. The battery has an independent error memory that can be read by an expert authorised by BMZ GmbH.

If you have any queries regarding this, please contact BMZ Service.

BMZ Service Centre
If you have queries regarding the BMZ ESS 7.0 system or require help, you can always contact the BMZ Service Centre.

Business hours
Monday to Friday: 08:00 hours to 17:00 hours
Saturday, Sunday and holidays: Closed

Contact:
Service telephone: +49 (0)6188 99 56 9830
Fax: +49(0)6188 99 56 699
Website: http://www.bmz-gmbh.de
Email: CS.BigPack@bmz-gmbh.de
7.1 Complaint handling

1. Contact a solar technician of BMZ Service via hotline +49 (0)6188 9956-9830 or email CS.BigPack@bmz-gmbh.de.

2. BMZ Service asks solar technicians for the data of the memory (SN, pdf report and log file) -> service tool is required.

3. If it is not available, BMZ Service will send you the latest FW of the service tool and the complaint order free of charge.

4. The solar technician shall fill in the complaint order completely and send it along with the pdf report and Error.log files to CS.BigPack@bmz-gmbh.de.

5. The solar technician will sign the complaint order to acknowledge that he/she has informed his/her wholesaler about this complaint.

6. If necessary, BMZ Service shall send a packing kit via a forwarding agency

7. If the solar technician packs the solar storage unit in a ready-to-dispatch condition, BMZ Service shall arrange for the pick-up from the solar technician.

8. BMZ Service shall pick up the storage unit from the solar technician, repair it and send it back to the solar technician (if the solar technician cannot rectify the problem).

9. In irreparable cases, BMZ Service shall send a replacement device and pick up the defective storage unit from the solar technician.

10. BMZ Service shall reimburse the cost for firmware update and replacement of a solar storage unit with a flat service rate of € 150 net.

11. The cost details must be sent in an invoice containing detailed points and the storage unit details (SN, pdf report and log file) to BMZ.

12. Business relationships exist only between BMZ and the OEM or its associated authorised dealers (solar technicians, dealers).

13. Direct complaint handling through end customers is ruled out.

If you have questions or if you want information, please contact:
Tel. +49 (0)6188 9956-9830 or CS.BigPack@bmz-gmbh.de
8 Warranty conditions

Preamble
Solar energy generated in excess of current needs is stored by the new modular lithium-ion battery ESS 7.0 for later use. BMZ GmbH is entirely focused on the high quality of its products. Production meets highest quality requirements and is subject to permanent control of BMZ GmbH's quality management. It has successfully passed all the required approval tests.

8.1 General instructions
These Terms of Warranty shall not affect the statutory rights of the customer (warrantee), including but not limited to supplementary performance, cancellation, reduction, damages. These Terms of Warranty apply in addition and supplementary to the warrantee's statutory and contractual warranty rights.
The warrantee's statutory rights shall persist even if a case of warranty occurs and/or if the warrantee raises a warranty claim.

8.2 Guarantee
BMZ GmbH provides its immediate/direct customer (warrantee) with the warranty that the products under this warranty are free from defects in the product or its manufacture.
The warranty implies a performance of 5,000 cycles over not more than 7 years of use (fair value warranty).
The warranty shall not affect the obligations of customers who classify as entrepreneurs within the scope of Art. 377 of the German Civil Code (HGB).
This warranty assumes a battery to be "defective" if its capacity drops below 80% of its design capacity. (The design capacity is established at a battery temperature of 25 °C and with the battery being disconnected from the other components of the energy storage system, i.e. from inverters and other consumers.)
This warranty is non-transferable.

8.3 Warranty service
In case of a warranty claim, BMZ GmbH will choose to either expertly repair the product or replace it with a new/equivalent product. BMZ GmbH will take ownership of replaced products.

Under this warranty, BMZ will replace a defective BMZ battery as follows:
Stage 1: Supply of a new BMZ battery up to 24 months after commencement of the fair value warranty;
Stage 2: 72% of the purchase price at months 25 to 36 after commencement of the fair value warranty;
Stage 3: 58% of the purchase price at months 37 to 48 after commencement of the fair value warranty;
Stage 4: 44% of the purchase price at months 49 to 60 after commencement of the fair value warranty;
Stage 5: 30% of the purchase price at months 61 to 72 after commencement of the fair value warranty;
Stage 6: 16% of the purchase price at months 73 to 84 after commencement of the fair value warranty;
Stage 7: 0% at month 85 or later after commencement of the fair value warranty.

Table 8-1: warranty service
In case the inspection reveals that a warranty claim is not justified, the warrantee shall pay the costs the warrantor incurs by the inspection.
8.4 Warranty exclusion

1. This warranty does not cover defects caused by use.

2. This warranty does not cover adverse effects on the product caused by:

- the product having been disused and stored for more than 6 months and/or the temperature ranges specified by BMZ not having been met (the product's on-board system stores the product and storage details);
- the product not having been installed by a specialist company in accordance with its intended use and/or the installation instructions;
- the product not having been stored, transported, assembled, installed, operated and/or repaired according to generally accepted codes of practice; the product not having been used as intended;
- the product having been modified;
- the product having been opened;
- the product having been exposed to force majeure (lightning/hailstorm/fire/vandalism).

3. This warranty only covers immediate damages. It covers neither indirect damages - specifically collateral and consequential damages - nor personal damage and/or loss of property. Collateral damages shall specifically include costs incurred by inspection, disassembly and disposal. Neither does it cover any loss of profit, reputational damage, etc.

8.5 Warranty limitation

1. The overall liability to pay for warranty claims shall be limited to the purchase price payable by the warrantee.

2. Satisfying warranty claims shall not start a separate own warranty.

8.6 Warranty time without KfW subsidy

The period of this fair value warranty is seven (7) years or 5000 complete cycles; part cycles shall be added up to complete cycles. A cycle is considered complete if the BMZ battery is recharged to 100% of its capacity, regardless of its discharge level. The warranty period shall start on the day the end-use customer starts using the BMZ battery but not later than 6 months after handing it over with reference to the date on the delivery ticket.

8.7 Warranty time with KfW subsidy (optional service by BMZ GmbH)

The period of this fair value warranty is ten (10) years or 5000 complete cycles; part cycles shall be added up to complete cycles. A cycle is considered complete if the BMZ battery is recharged to 100% of its capacity, regardless of its discharge level. The warranty period shall start on the day the end-use customer starts using the BMZ battery but not later than 6 months after handing it over with reference to the date on the delivery ticket.

8.8 Area of applicability of warranty

Applicability of this warranty is limited to Europe, Norway and Switzerland.
8.9 **Claiming for damages/warrantor**

Damages shall be claimed from BMZ GmbH, Am Sportplatz 30, 63791 Karlstein, Germany.

Damages shall be claimed in writing any provide the following details:

- When has the battery been purchased? (Submit invoice to show date of purchase)
- What is the affected battery's model designation/serial number?
- Which defect has occurred?
- When did the defect occur?
- Which is the preferred method of compensation (replacement/repair)?

8.10 **Concluding provisions**

The customer's claims under this warranty shall be limited to the performance specified in section 8.2. BMZ GmbH shall not be held liable for delays in the performance specified in section 8.2 if such delay is caused by force majeure, war, warlike situations, strike, or other similar circumstances not under BMZ control.

This written warranty is subject to the laws of the Federal Republic of Germany.

The place of venue shall be the Landgericht (district court) of Aschaffenburg, Germany.

Revised: December 2014
9 Dismantling and disposal

Introduction
This section describes the dismantling and disposal process for the battery storage system.

9.1.1 Disposal of the battery storage system

Risk of damage
Only the experts should dismantle the system.
Used batteries are collected by the distributor. Please contact the BMZ Service Centre (Tel: +49 (0)6188 99 56 9830, email: CS.BigPack@bmz-gmbh.de) regarding used batteries.

⚠️ CAUTION

WARNING AGAINST POISONOUS MATERIALS.
Numerous materials have been used in the battery storage system. Some of them may cause damage to people and the battery storage system if not handled properly.
Always follow the local regulations for waste disposal.
Appoint an authorised disposal company for professional disposal.
Prevent these hazardous situations. Otherwise, they may lead to insignificant or minor injuries.

Degree of risk of materials

<table>
<thead>
<tr>
<th>Material group</th>
<th>Degree of risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-ferrous metal</td>
<td>High to very high</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>Moderate</td>
</tr>
<tr>
<td>Plastics</td>
<td>Moderate</td>
</tr>
<tr>
<td>Electronic scrap</td>
<td>High</td>
</tr>
<tr>
<td>Batteries</td>
<td>Very high</td>
</tr>
<tr>
<td>Cables and lines</td>
<td>High</td>
</tr>
</tbody>
</table>
10Annexe

Overview
The annexe contains the following documents:

- Declaration of conformity
- Warranty card
- Installation check list
10.1 Declaration of conformity

**Annexe**

**ID 1000344**

**BMZ GMBH**
Am Sportplatz 28  D-63791 Karlstein a Main
Tel: +49 (0)6166 9550-0  Fax: +49 (0)6166 9550-300
E-Mail: mail@bmz-gmbh.de  Internet: www.bmz-gmbh.de

---

**EG-Konformitätserklärung**

**Firma:** BMZ GmbH  
**Anschrift:** Am Sportplatz 28  63791 Karlstein  
**Produkt:** Lithium-Ionen-Batterie  
**Bezeichnung:** 15S54P ICR18650-22P 54,7V 116,1Ah 6,4kWh  
**Artikel-Nr.:**  30890-00

Für das oben angegebene Produkt bestätigen wir, dass es den Anforderungen der folgenden Europäischen Richtlinien und Nomen entspricht:

Die Übereinstimmung des Produktes mit den Richtlinien wird nachgewiesen durch die vollständige Einhaltung der angeführten harmonisierten und nicht harmonisierten Nomen.

---

**2006/66/EG Batterieverordnung**
Richtlinie des Europäischen Parlaments und des Rates über Batterien- und Akkumulatoren sowie Akkubatterien und Akkumulatoren

---

**2014/30/EU EMV-Richtlinie**
Richtlinie des Europäischen Parlaments und des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit und zur Aufhebung der Richtlinie 55/2006/EG

---

**2014/35/EU Niederspannungsrichtlinie**
Richtlinie des Europäischen Parlaments und des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrößen

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Karlstein a Main, 20.07.2016

Sven Bauer, Geschäftsführer  
IV. Dirk Oestreich, Leiter Entwicklung

---

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, sichert jedoch keine Eigenschaften im Sinne des Produkthaftungsgesetzes zu.

---

**Version 1.2  Page 91 of 94**
10.3 Installation check list

Installation Checklist BMZ ESS 7.0

<table>
<thead>
<tr>
<th>Company name of installer (please use upper case letter)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name, given name of installer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Street and house number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Postal code</th>
<th>city of residence</th>
<th>state</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Telephone number (including area code)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E-Mail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Serial number of BMZ ESS 7.0 energy storage device</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

Please fill out the checklist completely and send it to the battery manufacturer.

After a successful registration, the battery manufacturer gives a guarantee that exceeds the legal requirements.

"With my signature I confirm that I have received and read the operating instruction including the safety notes and installation instruction for the BMZ energy storage system. I confirm that I have successfully completed a BMZ training on the product BMZ ESS 7.0 and received a certificate.

I accept the terms of warranty."

Date: ____________________
Signature of installer: ____________________

— attach copy of invoice —

Checklist for installer

<table>
<thead>
<tr>
<th>Required Tools</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>The installer brings the following tools:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Allen wrench</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• reversible ratchet VDE insulated with extension (VDE insulated)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• wrench socket (VDE insulated) size 13, 17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Phillips screwdriver (VDE insulated)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• side cutter (VDE insulated)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• water pump plier (VDE insulated)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required protective equipment</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>The installer is recommended to bring the following personal protective equipment (PPE):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• safety footwear class 53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• protective goggles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• safety gloves for electrically skilled persons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• eye wash bottle for emergencies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• fire extinguisher (ABC extinguishing powder)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 10-3: installation check list
# Installation Checklist BMZ ESS 7.0

## Required accessories

The installer is required to bring the following accessories or spare parts:
- Lifting carriage or hand truck with stair climbing function
- Multimeter (volt meter)
- NH1 fuse (depending on inverter with different nominal values)
  - SI3.0M-11: 80 A
  - SI4.4M-11: 100 A
  - SI6.0H-11: 160 A
  - SI8.0H-11: 200 A

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifting carriage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multimeter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NH1 fuse</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Checking installation location

- Assembly space is okay
- Distance to walls > 20cm
- Air circulation possible
- No ignition source < 3m
- Dry
- Even
- Clean
- No direct sunlight

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to walls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air circulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ignition source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Even</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct sunlight</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Checking for damage

- Inspect packaging for transport damage
- Inspect battery for damage
- **Never** put a damaged battery into operation!

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packaging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Checking installation

- Cabling between inverter and battery is checked
  - 2 pcs 50 mm² cables connected
  - Communication cable connected
  - No short circuit
  - No incorrect polarity of main cables (positive and negative)
  - Cables not damaged or destroyed

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cables</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Inserting NH fuses

- NH1 fuse is inserted (see operating instruction or installation instruction)

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH1 fuse</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Instructing the end customer

- Safety instruction for end customer is conducted
- Operating instruction for end customer is conducted

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Reading the battery

- Check the battery condition with the service software
  - System time is displayed correctly
  - Temperature memory is reset
  - Error memory is reset

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>System time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error memory</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## SMA parametrization

- Parametrization of SMA Sunny Island inverter is carried out

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>Parametrization</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Putting system into operation

- BMZ battery and SMA Sunny Island inverter are put into service

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMZ battery</td>
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<td></td>
</tr>
<tr>
<td>SMA inverter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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*Figure 10-4: installation check list, part 2*