



HomeHub  
Modular Residential Energy Storage

# Operating Manual for the HomeHub Battery



# Legal Provisions

## Copyright

This manual is protected by copyright

The information contained in this document is the property of GS HUB GmbH.

Duplication or reprinting, even in extracts, as well as the true-to-original reproduction of the illustrations are permitted for internal and/or private use as long as the duplication is not for commercial purposes and does not require permission.

Any use or publication beyond that is only allowed with written permission from GS HUB GmbH.

The *"HomeHub"* battery system is a product of

GS HUB GmbH  
Trendelburger Straße 45a  
34434 Borgentreich  
Germany

© 2020 GS HUB GmbH

## Warranty

The current warranty conditions can be downloaded at <https://support.homehubportal.com/>.

## Trademarks

All trademarks are recognized even if they are not specifically marked. All of the trademarks or brands used in this document only refer to the respective product or the owner of the trademark or brand. The mention of products that are not GS HUB GmbH products is for informational purposes only. GS HUB GmbH does not claim any trademarks or brands other than its own. The absence of identification does not imply that a product or label is not subject to trademark rights.

## Limitation of Liability

All texts, technical information, data, notes, and illustrations relating to the operation contained in this manual correspond to the technical state of development at the time of publication.

The content of the documentation does not justify any claims on the part of the buyer.

The manufacturer is not liable for damages, malfunctions, or their consequences due to the non-observance of these operating instructions, improper use, improper repairs, unauthorized modifications, or the use of unauthorized spare parts.

Please read these instructions carefully and completely for your own safety!

# Table of Contents

Legal Provisions.....	2
Copyright.....	2
Warranty.....	2
Trademarks.....	2
Limitation of Liability.....	2
Notes on this Document.....	6
Scope of Application.....	6
Target Group.....	6
Symbols and Warnings.....	6
Markups.....	7
Nomenclature.....	7
Up-to-dateness.....	7
Functioning of the Product.....	8
Intended Use.....	8
Safety Instructions.....	8
Safeguards.....	10
Safety Marking.....	10
Disposal.....	11
General Information.....	12
Software Updates.....	12
Operating Information.....	12
Data Protection and Data Security.....	12
Work Equipment and Personal Protective Equipment.....	13
Scope of Delivery.....	14
HomeHub 2,5 kWh.....	15
HomeHub 5 kWh.....	16
HomeHub 7,5 kWh.....	17
HomeHub 10 kWh.....	18
Produkt Overview.....	19
Dimensions.....	20
Symbols on the Product.....	21
Connection Overview.....	22
Opening and Closing of the Front Door.....	22
Assembly.....	23
Removing the Back Panel.....	23
Installation of Management and Battery Modules.....	23
Installation of the Busbars.....	24
Installation of the Internal Bus Cables.....	25
Addressing the Battery Module.....	26
Adding, Exchanging, or Removing Modules.....	27
Removing a Module.....	27
Setting up the Battery System.....	28
Placement Requirements.....	28
Electrical Connection/Wiring.....	30

Before Starting Work.....	30
General Information on Wiring.....	30
Commissioning.....	35
Completing the Installation.....	36
User Interface Structure.....	37
Operating Concept.....	37
General Color Scheme.....	37
System Overview.....	38
Modul Display.....	41
Menu.....	41
System Informationen.....	42
Event Log.....	43
Settings.....	45
Authorization Levels.....	46
Configuring Battery Modules.....	48
Configuring the Inverters.....	49
Battery.....	50
Languages.....	51
Screen.....	51
Network.....	52
Time Zone.....	54
Time.....	54
System Update.....	55
Troubleshooting and Status Codes.....	59
Appendix.....	65
Technical Data.....	65
Recommended Battery Parameters for Inverters.....	68
Compatible Accessories and List of Compatible Devices.....	69
Help.....	70
Notes.....	71

# Notes on this Document

## Scope of Application

This document has been compiled for the *HomeHub* battery system as of software version 1.2.10 with management module type *MU8G1* from hardware version 4.0 and from firmware version 8.2 in combination with battery modules type *BU25G1* from hardware version 4.0 and from firmware version 3.11.






## Target Group

This document is intended for professionals and owners. The procedures described in this document, which are identified by a warning symbol and the label "Technician", may only be carried out by qualified technicians (electricians). Work that does not require special qualifications is not marked and may also be performed by users.

Qualified technicians must have the following qualifications:

- Training for the installation and commissioning of electrical equipment and systems.
- Knowledge in dealing with hazards and risks associated with the installation, repair, and operation of electrical equipment, batteries, and systems.
- Training for the installation and configuration of networked IT systems.
- Knowledge of the relevant standards and guidelines.
- Knowledge of the functioning and operation of batteries.
- Knowledge of the functionality and operation of the inverter used.
- Knowledge and observance of this document with all of the safety instructions.
- Knowledge and observance of the inverter documentation with all of the safety instructions.

## Symbols and Warnings

Warning	Explanation
	A warning of this level of danger indicates an imminently dangerous situation.  If the dangerous situation is not prevented, it may result in death or serious injury. Following the instructions in this warning is essential to avoid the risk of death or serious injury to persons.
	This level of warning indicates a possibly dangerous situation.  If the dangerous situation is not prevented, it may result in injury and/or death or material damage. Following the instructions in this warning is necessary to avoid injury to persons or material damage.
	This level of warning indicates a possible material damage.  If the situation is not avoided, this may result in material damage. Following the instructions in this warning is necessary to prevent material damage.
	A note identifies additional information that facilitates the handling of the device but it is not relevant to safety.
	Chapters or sections describing work that may only be carried out by skilled personnel.

## Markups

Markup	Explanation	Examples
<b>Bold</b>	Text on the screen Elements on the user surface Connector name Terminal number and terminal name Element designations Elements that you should select Values/text that you should enter	The value is displayed in the <b>Energy</b> field. Select <b>Settings</b> . Enter the value <b>10</b> in the <b>Minutes</b> field. Connect <b>A</b> and <b>B</b> of <b>Bus1</b> .
○	Terminal number Cable	The RJ45 connection socket ○. Connect the network cable ○.
→	Connects a series of elements that you should select.	Select <b>Systems</b> → <b>Language</b> .
[Symbol] [Button] [Key]	Button or key that you should select or press.	Touch the <b>Gear</b> [ ⚙ ]. Press [ <b>Adopt</b> ].
<i>Italic</i>	Quotations in body text Proper names and designations of products in the body text	Your <i>HomeHub</i> battery storage. The <i>Studer XTM 4000-48</i> .

## Nomenclature

Complete designation	Short form in this document
GS HUB Battery System - HomeHub	HomeHub
Battery Management System	BMS
Energie Management System	EMS
GS HUB EMS - HomeHub Easy Energy Manager	EasyEMS
Photovoltaics	PV, e.g. PV system, PV inverter

In general, the following terms are used for operation via the graphical user interface with the help of a touch-sensitive screen:

- The term "tap" (tap on, double tap, etc.) corresponds to the action of touching the relevant element on the screen with a fingertip; for alternative operation with a mouse (e.g. for remote access with screen transmission), "tap" is to be understood as a synonym for the action "clicking".
- The term "swiping" (swiping up, down, away, etc.) corresponds to the action of touching the relevant element on the screen with a fingertip and moving that fingertip in a certain direction in order to move the visible section or an element on the screen using this gesture.

The term "relay" is sometimes commonly used in graphical user interfaces as a generic term for "contactor".

## Up-to-dateness

A current version of these operating instructions, which is suitable for the current software version of the products, can be found at <https://support.homehubportal.com/>



# Functioning of the Product

The HomeHub battery system is an intrinsically safe, modular, and rechargeable Li-ion battery based on LiFePO<sub>4</sub> with an integrated battery management system.

The HomeHub consists of at least one stainless steel cabinet with five slots, for one management module and up to four battery modules (battery submodule). The management module features a touch-sensitive screen, which shows all the important information on the product at a glance as well as various external interfaces.

In combination with a compatible battery or hybrid inverter and the easyEMS (optional, depending on the application), your HomeHub becomes an energy storage system that can be used for self-sufficiency or self-consumption optimization, as an UPS/backup power system as well as in off-grid systems.

Examples of different options, application possibilities, and installation scenarios can be found in our application guide.

## Intended Use

The product is intended for use in conjunction with suitable battery or hybrid inverters for the temporary storage of electrical energy for private households, offices, and small businesses with moderate energy requirements.

When used as intended, the product is a safe and clean source of electrical energy.

The product is splash-proof and generally suitable for use in weather-protected outdoor areas as well as indoors. The product is not EX-protected and must not be installed in EX areas.

The product is not suitable for supplying life-support medical equipment. A power failure must not result in personal injury.

For safety reasons, it is prohibited to disassemble or modify the product or its modules or to install components that are not specifically recommended or sold for the product by GS HUB GmbH. Unauthorized modifications or conversions will void the warranty.

Any use of the product other than that described herein is considered inappropriate and is strictly prohibited. Any other use may result in personal injury or material damage.

The enclosed documentation is an integral part of the product. The documentation must be read, observed, and kept accessible and dry at all times.

Use the product only in accordance with the information in the enclosed documentation as well as in accordance with the local standards and regulations. This document does not replace any regional, state, provincial, federal, or national laws, regulations, or standards applicable to the installation, electrical safety, and use of this product or products that are bundled or combined with this product. GS HUB GmbH is not responsible for compliance or non-compliance with these laws or regulations in connection with the installation of the product.

## Safety Instructions

This chapter contains safety instructions that must always be observed during all work on or associated with the product (HomeHub battery system) and its operation. In order to prevent personal injury and material damage and to ensure the continuous and safe operation of the product, read this chapter carefully and follow all the safety instructions at all times.

- An up-to-date copy of the manual should always be kept in close proximity to the device so that it can be read in case of any doubts.
- Do not tamper with the device.
- The covers of the modules must not be removed.
- Maintenance and repair may only be carried out by an authorized professional.
- Only accessories and spare parts approved by the manufacturer may be used.
- The environmental conditions specified in the product documentation must be complied with at all times.
- Make sure that unauthorized individuals do not have access to the product, especially the battery connections.
- Use the product only when it is in a technically sound and operationally safe condition.
- Remove your metal jewelry (e.g. watches) or similar accessories prior to performing any work on the product.

- Wear suitable personal protective equipment while performing any work on the product.

**⚠ DANGER** Risk of fatal electric shock.

The installation, modification, and operation of electrical systems and equipment are subject to special hazards due to electrical energy. An electric shock can be fatal. Installation and commissioning may only be carried out by qualified personnel (see Target Group). Perform all work on the inverter according to the manufacturer's specifications.

**⚠ DANGER** Death hazard due to fire and explosion.

In rare individual cases, flammable substances may be released or ignitable gas mixtures may be generated inside the product in the event of a fault/damaged product. In this state, a fire may start inside the product or an explosion may occur. This can result in life threatening injuries or death from hot or dispersed parts. In the event of a malfunction, do not perform any direct work on the product. Make sure that unauthorized individuals do not have access to the product. Protect the battery and the immediate surroundings from open flames, embers, or sparks.

**⚠ WARNING** Risk of injury and fire due to abnormal heat generation from a damaged product.

When operating a damaged product, hazardous situations may arise; parts may develop abnormally high heat, thereby possibly causing them or adjacent parts to catch fire. Use the product only when it is in a technically sound and operationally safe condition.

**⚠ WARNING** Risk of cable fire.

Regularly check the DC power cables for external damage. Cables that are not in perfect condition must be replaced immediately. Consult a qualified electrician.

**⚠ WARNING** Risk of injury and contamination due to the release of corrosive and toxic substances, gases, and dusts.

In some rare cases, damage to electronic components inside the product may release substances such as graphite, electrolyte, hydrogen fluoride, and other PAH and CMR substances. Touching toxic substances and inhaling toxic gases and dusts may cause skin irritation, chemical burns, breathing difficulties, and nausea. If the product is placed or stored indoors, be sure to ventilate well. Do not perform any repair work or the like yourself and ensure that unauthorized individuals do not have access to the product.

**⚠ WARNING** Risk of burns due to hot cabinet parts.

The metal cabinet and parts inside the product may heat up during operation or storage, especially when it is exposed to direct sunlight. Touching these cabinet parts can cause injuries due to burns. Make sure that the product is stored and/or positioned in a suitable location and that accidental contact is not possible during operation. Protect the product from direct sunlight at all times.

**⚠ WARNING** Risk of burns due to short-circuit currents.

A short circuit at the DC connection of the product can lead to electric arcs or heat generation and thereby to burns as well as product damage. Always switch the product off before working on it and verify that the battery connections are at zero potential.

**⚠ WARNING** Risk of lacerations or cuts.

Various parts may have burrs or sharp edges. To reduce the risk of injury, suitable personal protective equipment (e.g. gloves) must always be worn during transport, assembly, and disassembly.

**⚠ WARNING** Risk of bruises, contusions, or fractures due to the weight of the product and moving parts.

When loading, unloading, and transporting as well as assembling the product, exercise increased caution to avoid accidents, material damage, or personal injury caused by dropping, tipping, or slipping of the product or individual parts due to its considerable weight. Transport and lift the product or product parts carefully and pay attention to the corresponding weight. Never work by yourself and only lift the product using appropriate auxiliary equipment.

**⚠ ATTENTION** Damage to the product due to electrostatic discharge.

Electrostatic discharge can cause irreparable damage to the electronic components of the product. Be sure to ground yourself before touching any part of the product.

**⚠ ATTENTION** Damage to the product due to unsuitable cleaning agents.

Aggressive cleaners and chemicals can cause irreparable damage to the outside as well as inside components of the product. Always use a lint-free, soft, damp cloth to clean the surface. Do not use aggressive cleaners and never spray the product directly.

**⚠ ATTENTION** Damage to the product due to unsuitable operating conditions.

Components inside the product can be irreparably damaged by excessively high or low temperatures, by an environment that is too humid or too dry, or by excessive charging and discharging currents. The environmental conditions specified in the product documentation must be complied with at all times.



## Safeguards

This battery system features a number of safeguards to ensure the safe operation of the Li-ion battery.

Safeguards	Explanation
<b>APT</b> (Adaptive Power Throttling)	<b>Adaptive Drosselung (Derating)</b> Proactive adjustment of the setpoint values: Depending on the processed sensor data and the operating state, different charge and discharge currents are transmitted to the inverter in order to prevent possible protective measures or critical states ahead of time.
<b>UVP</b> (Under Voltage Protection)	<b>Undervoltage protection</b> Voltage monitoring at the system and cell level: If the voltage falls below a specified value, a warning is issued first. If the voltage drops below a critical threshold, the protection is triggered.
<b>OVP</b> (Over Voltage Protection)	<b>Over Voltage Protection</b> Voltage monitoring at system and cell level: If the voltage exceeds a specified value, a warning is issued first. If the voltage continues to increase above a critical threshold, the protection is triggered.
<b>UTP</b> (Under Temperature Protection)	<b>Under temperature protection</b> Dual temperature monitoring at the module level: If the temperature falls below a specified value, a warning is issued first. If the voltage drops further and below a critical threshold, the protection is triggered.
<b>OTP</b> (Over Temperature Protection)	<b>Over temperature protection</b> Dual temperature monitoring at the module level: If the temperature exceeds a specified value, a warning is issued first. If the temperature continues to increase above a critical threshold, the protection is triggered.
<b>OCP</b> (Over Current Protection)	<b>Overcurrent protection</b> Current monitoring at the system level: If the current exceeds the specified value for a short time or just slightly, a warning is issued first. If exceeded for a longer period of time or above a critical threshold, the protection is triggered. In addition, a fuse (400 A) is installed as a fallback level.
<b>Circuit breaker</b> (power contactor)	<b>Load contactor</b> In order to safely disconnect the system in case of a critical condition, the system is equipped with a main contactor with a breaking capacity of 2000 A.

After the system has been turned on, the BMS checks the status of all the components. Once the operating conditions are safe and permissible, the contactors of the modules are closed one after the other. During the start-up phase, the pre-charge contactor is dosed first in order to allow for the slow and controlled charging of the inverter's internal storage. Subsequently, the main contactor is switched on and the precharging contactor is disconnected again.

The BMS cyclically checks the status of all the components during operation. If an irregularity or fault occurs within the battery system, it is processed by the BMS, assigned to a category and stored for later maintenance. According to the type, duration, and severity, this is indicated to the operator and, if possible, indicated to the inverter.

In the worst case, when a critical condition exists, the battery system is transferred into a safe state by interrupting the power and then shutting down the battery system completely, i.e. continued operation or automatic restart is not possible. Please note that in the case of off-grid installations, battery inverters with a built-in transfer system or usage of the backup/emergency power function, the consumers connected to them will also no longer be supplied with power.

## Safety Marking



Devices with CE marking comply with the essential requirements of the Low Voltage and Electromagnetic Compatibility Directives.

## Disposal



Do not dispose of this device in household waste! According to the European Waste Electrical and Electronic Equipment Directive and its implementation in national law, used power tools must be collected separately and recycled in an environmentally friendly manner. Be sure to return your used equipment to your dealer or obtain information about a local authorized collection and disposal system. Ignoring this EU directive can lead to potential effects on the environment and your health!

# General Information

## Software Updates

The product supports updates and upgrades. This means that the software components can be updated to ensure a long service life.

The system also undergoes continuous development to increase functionality, improve existing features, maintain system security, and make adjustments to meet new regulations and standards.

**WARNING** Risk of power failure. During a software update, it is possible that the BMS of the product disconnects the complete battery for a short time (safe state). This is usually the case when the software update includes a firmware update of the management module or the battery modules. Please note that in the case of off-grid installations, battery inverters with a built-in transfer system or usage of the backup/emergency power function, the consumers connected to them will also no longer be supplied with power. Only update the firmware component of the product during daylight hours or when a supply from the power supply is ensured or a brief power failure can be tolerated without consequences. If necessary, have an external maintenance bypass installed.

**ATTENTION** Outdated software versions can pose a security risk or prohibit continued operation. Therefore, regularly check for the availability of updates to the latest software versions and perform the update.

**NOTE** A software update can change existing functions, symbols, texts, designations as well as the appearance and structure of the graphical user interface or add new functions. This may also require the reconfiguration of the system. Please read the release notes on our website and regularly download the latest version of the product documentation (see Up-to-dateness on page 7).

## Operating Information

**ATTENTION** High costs are possible due to unsuitable Internet plans. The amount of data transferred via the Internet may vary depending on the usage. The amount of data depends, for example, on the number of battery modules or the frequency of device updates. The use of the HomeHub portal function also requires a permanent Internet connection. It is, therefore, not recommended to use an Internet plan with time-based charges; instead, use an Internet plan with a data flat rate.

## Data Protection and Data Security

We are committed to your privacy and the protection of your personal data. The use of our cloud services is possible without providing personal data.

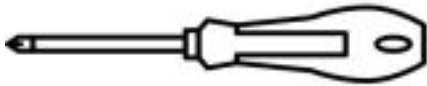
For purely technical reasons, the battery system transmits the IP address of the Internet connection to our own servers located in Germany every time you connect to one of our online/cloud services. A general and permanent storage of the IP address does not take place. Furthermore, all data transfers between the battery system and the services take place exclusively via an encrypted transmission channel (TLS).

Our product support and cloud services are only available for original products. In order to avoid registration with personal data by the end customer, accounts or logins to the product as far as possible, the product transmits its serial number for authentication. During the search for updates, this is also used for the purpose of finding and providing suitable update packages released for the specific product. The serial number transmitted in this context will not be permanently stored by us in any way or evaluated for statistical purposes.

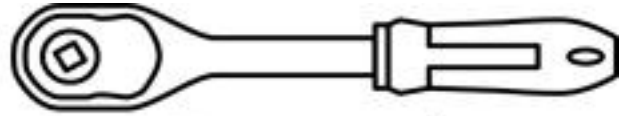
For further details, please refer to the respective privacy statements of our services.

The operator/user is responsible for backing up any changes made to the factory settings of the product. In case of deleted personal settings or captured monitoring data on the product or online/cloud services, the manufacturer is not liable.

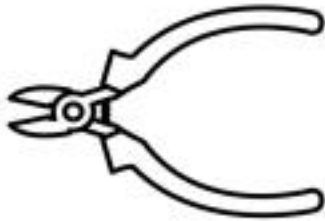
## Work Equipment and Personal Protective Equipment



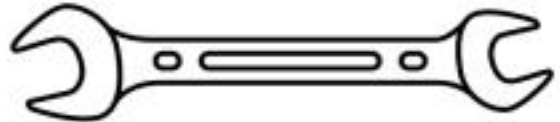
Philips screwdriver  
M3 - M12



Torque wrench  
13' Nuss



Wire cutter



Screwdriver  
13' + 17'



Safety gloves

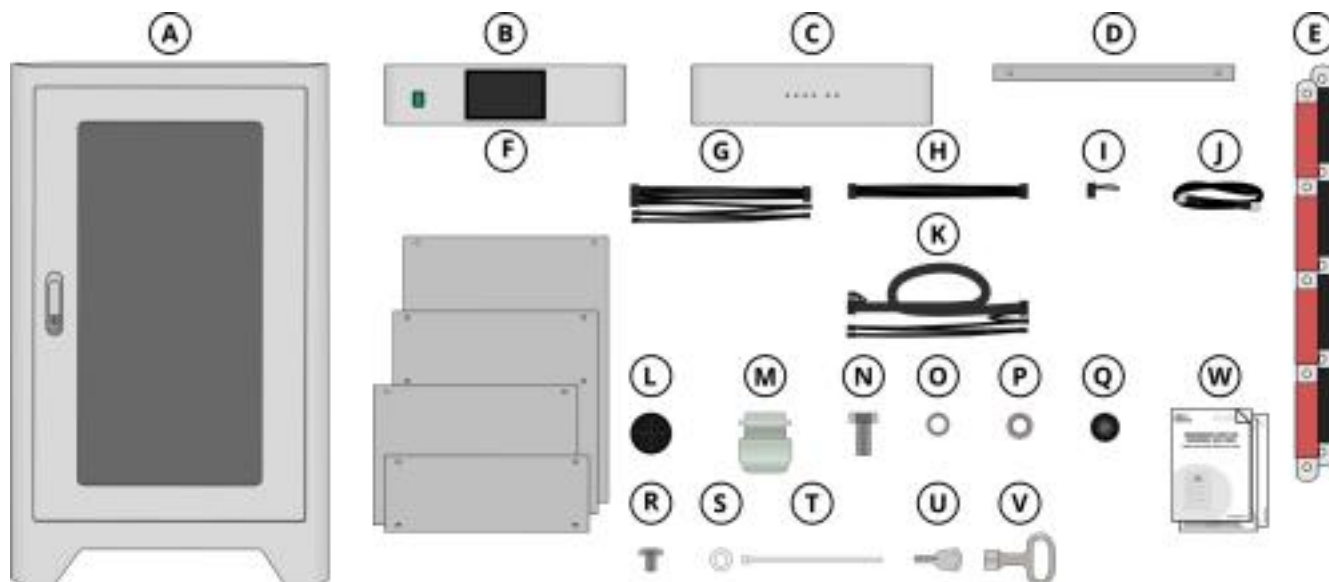


Safety shoes

## Scope of Delivery

The cabinet, management module, battery modules, and accessories of this product are shipped individually packaged.

- Please check the packaging for visible damage upon delivery and report any damage to the carrier immediately.
- Check the scope of delivery for completeness and visible external damage. Contact your specialist dealer immediately if the scope of delivery is incomplete or damaged.



## HomeHub 2,5 kWh

Position	Number	Designation
A	1	Cabinet with rails
B	1	Management module
C	1	Battery module
D	2	End and intermediate faceplate
E	2	Busbar
F	1	Maxi faceplate (502 × 560 mm)
	1	Management module cable
I	1	Terminating resistor
J	1	RJ-45 Patch cord
L	12	Cable duct
L	4	Watertight cable gland
M	6	M8 × 16 screw
N	6	Spring washer Ø 8 mm
O	6	Washer Ø 8 mm
P	6	Insulating cap
Q	8	Faceplate screw M5 × 12
R	8	Faceplate washer
S	16	Cable tie
T	2	Front door key
U	1	Back door key
W	1	Documentation

## HomeHub 5 kWh

Position	Number	Designation
<b>A</b>	1	Cabinet with rails
<b>B</b>	1	Management module
<b>C</b>	2	Battery module
<b>D</b>	3	End and intermediate faceplate
<b>E</b>	2	Busbar
<b>F</b>	1	Maxi faceplate (502 × 560 mm)
	1	Management module cable
<b>H</b>	1	Battery module connection cable
<b>I</b>	1	Terminating resistor
<b>J</b>	1	RJ-45 Patch cord
<b>L</b>	12	Cable duct
<b>M</b>	4	Watertight cable gland
<b>N</b>	8	M8 × 16 screw
<b>O</b>	8	Spring washer Ø 8 mm
<b>P</b>	8	Washer Ø 8 mm
<b>Q</b>	8	Insulating cap
<b>R</b>	10	Faceplate screw M5 × 12
<b>S</b>	10	Faceplate washer
<b>T</b>	16	Cable tie
<b>U</b>	2	Front door key
<b>V</b>	1	Back door key
<b>W</b>	1	Documentation

## HomeHub 7,5 kWh

Position	Number	Designation
A	1	Cabinet with rails
B	1	Management module
C	3	Battery module
D	4	End and intermediate faceplate
E	2	Busbar
F	1	Maxi faceplate (502 × 220 mm)
	1	Management module cable
H	2	Battery module connection cable
I	1	Terminating resistor
J	1	RJ-45 Patch cord
L	12	Cable duct
M	4	Watertight cable gland
N	10	M8 × 16 scre
O	10	Spring washer Ø 8 mm
P	10	Washer Ø 8 mm
Q	10	Insulating cap
R	12	Faceplate screw M5 × 12
S	12	Faceplate washer
T	16	Cable tie
U	2	Front door key
V	1	Back door key
W	1	Documentation



## HomeHub 10 kWh

Position	Number	Designation
<b>A</b>	1	Cabinet with rails
<b>B</b>	1	Management module
<b>C</b>	4	Battery module
<b>D</b>	6	End and intermediate faceplate
<b>E</b>	2	Busbar
	1	Management module cable
<b>H</b>	3	Battery module connection cable
<b>I</b>	1	Terminating resistor
<b>J</b>	1	RJ-45 Patch cord
<b>L</b>	12	Cable duct
<b>M</b>	4	Watertight cable gland
<b>N</b>	12	M8 × 16 screw
<b>O</b>	12	Spring washer Ø 8 mm
<b>P</b>	12	Washer Ø 8 mm
<b>Q</b>	12	Insulating cap
<b>R</b>	12	Faceplate screw M5 × 12
<b>S</b>	12	Faceplate washer
<b>T</b>	16	Cable tie
<b>U</b>	2	Front door key
<b>V</b>	1	Back door key
<b>W</b>	1	Documentation

## HomeHub 12,5 kWh

Position	Number	Designation
A	2	Cabinet with rails
B	1	Management module
C	4	Battery module
D	6	End and intermediate faceplate
E	2	Busbar
F	1	Maxi faceplate (502 × 780 mm   19.7 x 30.7 in )
	1	Management module cable
H	3	Battery module connection cable
I	1	Terminating resistor
J	1	RJ-45 Patch cord
K	1	Battery module connection cable extension
L	24	Cable duct
M	8	Watertight cable gland
N	14	M8 × 16 scre
O	14	Spring washer Ø 8 mm
P	14	Washer Ø 8 mm
Q	14	Insulating cap
R	18	Faceplate screw M5 × 12
S	18	Faceplate washer
T	32	Cable tie
U	2	Front door key
V	1	Back door key
W	1	Documentation

## HomeHub 15 kWh

Position	Number	Designation
<b>A</b>	2	Cabinet with rails
<b>B</b>	1	Management module
<b>C</b>	6	Battery module
<b>D</b>	8	End and intermediate faceplate
<b>E</b>	4	Busbar
<b>F</b>	1	Maxi faceplate (502 × 560 mm   19.7 x 22 in)
	1	Management module cable
<b>H</b>	3	Battery module connection cable
<b>I</b>	1	Terminating resistor
<b>J</b>	1	RJ-45 Patch cord
<b>K</b>	1	Battery module connection cable extension
<b>L</b>	24	Cable duct
<b>M</b>	8	Watertight cable gland
<b>N</b>	16	M8 × 16 screw
<b>O</b>	16	Spring washer Ø 8 mm
<b>P</b>	16	Washer Ø 8 mm
<b>Q</b>	16	Insulating cap
<b>R</b>	20	Faceplate screw M5 × 12
<b>S</b>	20	Faceplate washer
<b>T</b>	32	Cable tie
<b>U</b>	2	Front door key

## HomeHub 17,5 kWh

Position	Number	Designation
A	1	Cabinet with rails
B	1	Management module
C	4	Battery module
D	6	End and intermediate faceplate
E	2	Busbar
F	1	Maxi faceplate (502 × 390 mm   19.7 x 15.3 in)
	1	Management module cable
H	3	Battery module connection cable
I	1	Terminating resistor
J	1	RJ-45 Patch cord
K	1	Battery module connection cable extension
L	24	Cable duct
M	8	Watertight cable gland
N	20	M8 × 16 scre
O	20	Spring washer Ø 8 mm
P	20	Washer Ø 8 mm
Q	20	Insulating cap
R	22	Faceplate screw M5 × 12
S	22	Faceplate washer
T	32	Cable tie
U	2	Front door key

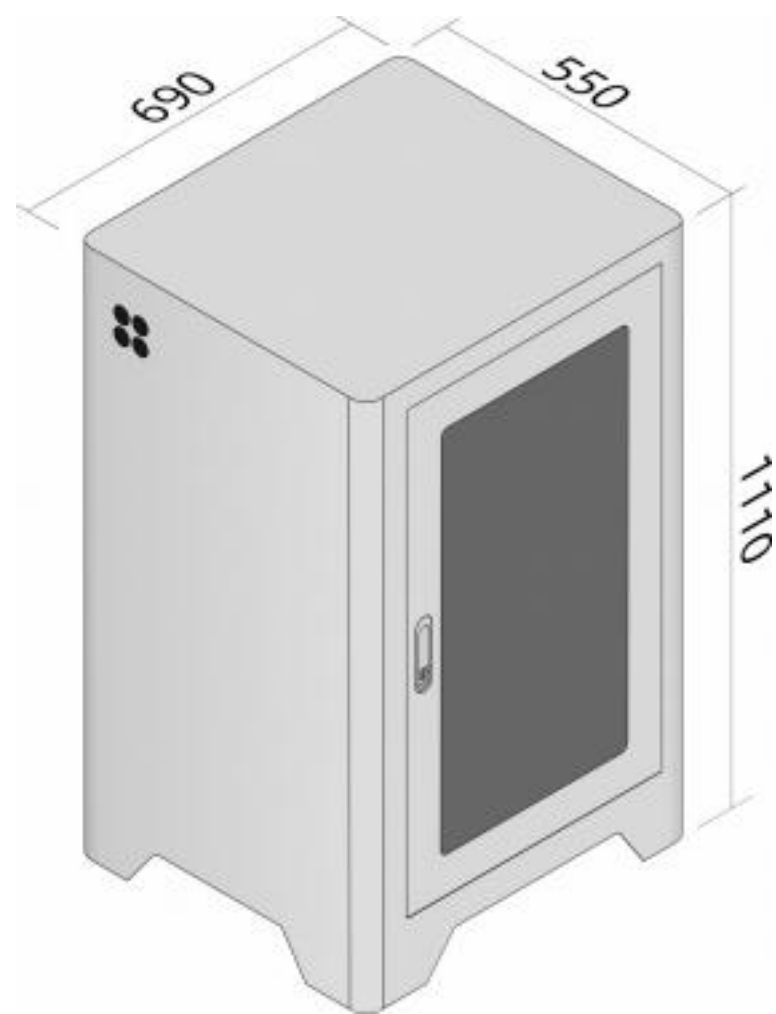
## HomeHub 20 kWh

Position	Number	Designation
<b>A</b>	1	Cabinet with rails
<b>B</b>	1	Management module
<b>C</b>	4	Battery module
<b>D</b>	6	End and intermediate faceplate
<b>E</b>	2	Busbar
<b>F</b>	1	Maxi faceplate (502 × 220 mm   19.7 x 8.6 in)
	1	Management module cable
<b>H</b>	3	Battery module connection cable
<b>I</b>	1	Terminating resistor
<b>J</b>	1	RJ-45 Patch cord
<b>K</b>	1	Battery module connection cable extension
<b>L</b>	24	Cable duct
<b>M</b>	8	Watertight cable gland
<b>N</b>	18	M8 × 16 screw
<b>O</b>	18	Spring washer Ø 8 mm
<b>P</b>	18	Washer Ø 8 mm
<b>Q</b>	18	Insulating cap
<b>R</b>	24	Faceplate screw M5 × 12
<b>S</b>	24	Faceplate washer
<b>T</b>	32	Cable tie
<b>U</b>	2	Front door key









## Produkt Overview



# Dimensions



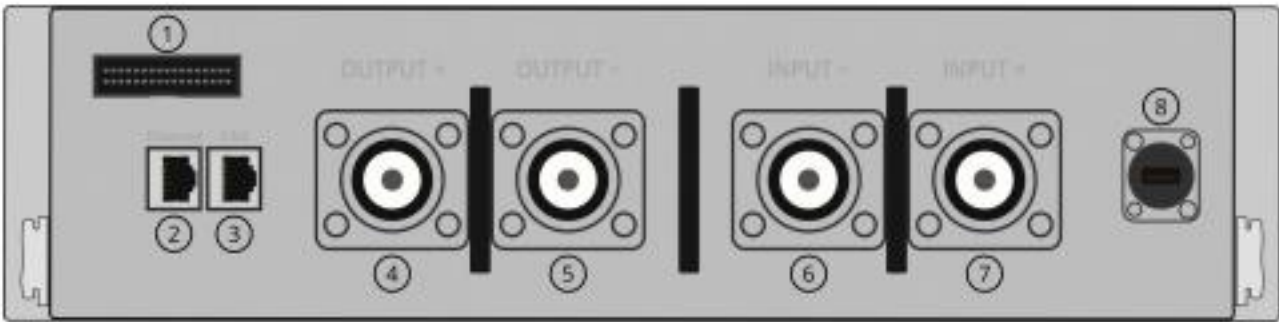
## Symbols on the Product

Symbol	Explanation
	Observe the operating instructions Observe all the instructions and documentation supplied with this product.
	IEC 60417 For indoor use only (management module + battery module) Identification of electrical equipment intended mainly for indoor use.
	Protection class III/protection by extra-low voltage The product operates with a safety extra-low voltage.
	WEEE marking/disposal notice The product must not be disposed of with household waste, but only in accordance with the applicable disposal regulations for electrical waste.
	Recycling code (cabinet)
	Recycling marking Li-ion battery
	General recycling marking
	CE marking The product complies with the requirements of the applicable EU directives.



# Connection Overview

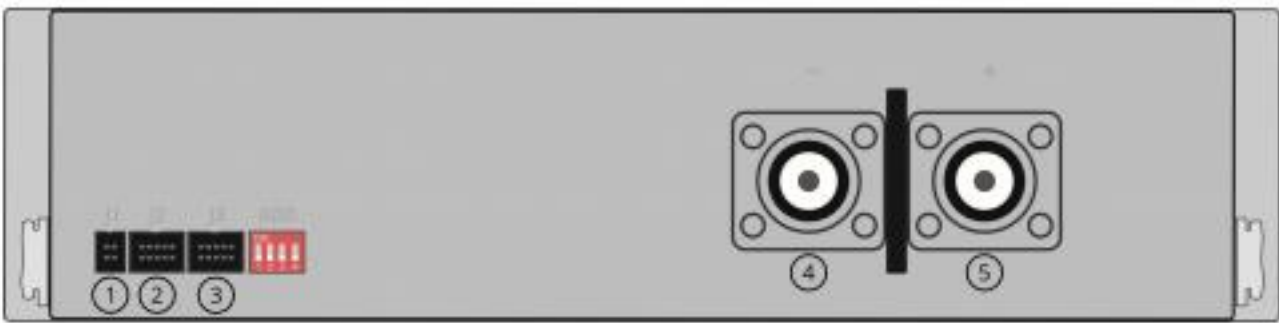
## Management Module



- 1 Internal battery communication bus and module power supply
- 2 Network connection socket (Ethernet)
- 3 Inverter connection socket (CAN)
- 4 DC battery connection (OUTPUT +)

- 5 DC battery connection (OUTPUT -)
- 6 Internal DC connection for busbar (INPUT -)
- 7 Internal DC connection for busbar (INPUT +)
- 8 USB connection

## Battery Module



- 1 Internal BMS power supply (J1)
- 2 Internal battery communication bus (J2)
- 3 Internal battery communication bus (J3)

- 4 Internal DC connection for busbar (-)
- 5 Internal DC connection for busbar (+)

# Opening and Closing of the Front Door

Unlock the front door, if necessary. Press the bottom part (push button located underneath the lock) to release the lever. The lever jumps forward. Now turn the lever to the right to open the door.



To close the door, turn the lever back to the left and then guide the lever back into the socket by applying slight pressure. If the cabinet is locked, the lever cannot be released.

# Assembly

## TECHNICIAN

The product must be assembled or set up before use.

### DANGER

In principle, the product can be assembled by the user. The product alone is a device of protection class III with safety extra-low voltage. In addition, technical measures ensure that, as long as the product is not switched on, the connections of the battery modules and the battery connection for the inverter on the management module are voltage-free and there is no risk of burns due to short-circuit currents at that point. Nevertheless, we recommend its assembly by a suitably trained specialist.

### NOTE

The product has been tested at the factory to ensure function and safety.

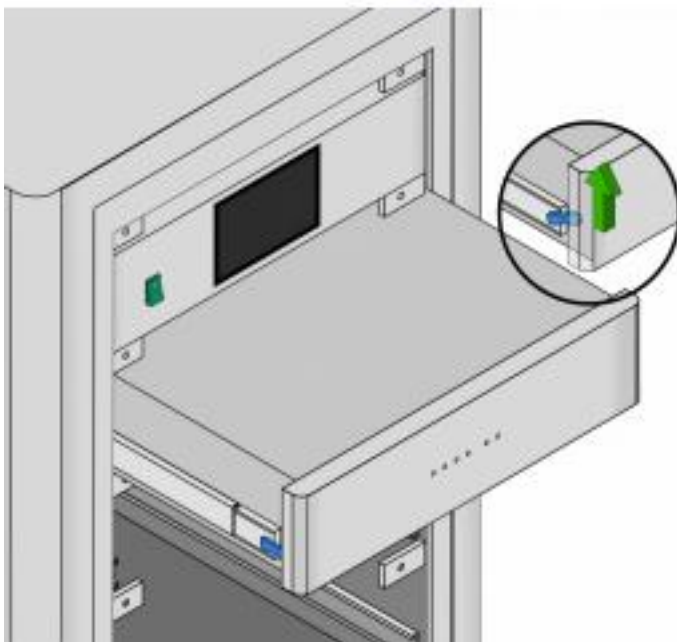
## Removing the Back Panel



To remove the back panel of the HomeHub for assembly and cabling, insert the triangular key into the opening provided and turn it to the right as far as it will go.

Pull the levers on the left and right to unlock the back panel. Tilt the unlocked rear panel back about twenty degrees, lift the rear panel out of the support guide, and set it aside.

## Installation of Management and Battery Modules



To insert the modules, pull the rails out of the interior of the cabinet until you hear them click into place.

Carefully insert the guide rails of the module into the cabinet rails.

Then, pull up the blue levers on both sides at the same time to release the latched rails and push the module in until it audibly latches again.

Repeat this process until all the modules are installed and snapped into the housing.

## Installation of the Busbars

Attach as shown in the figure:

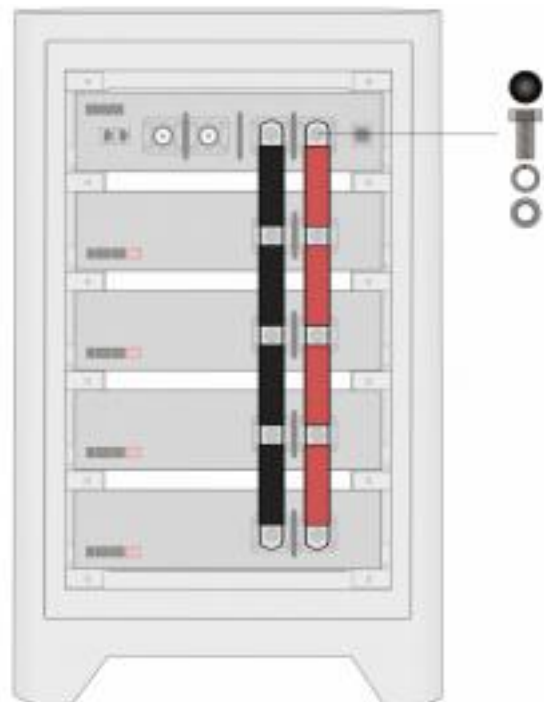
1. The black power rail to the internal DC connectors ⑥ (INPUT -) of the management module and ④ (-) of the battery modules.
2. The red power rail to the internal DC connectors ⑦ (INPUT +) of the management module and ⑤ (+) of the battery modules.

Use the screws ①, spring washers ② and washers ③ supplied for this purpose.

3. Tighten the screws with a torque of 16 Nm.
4. Place the insulating caps ④ on the screw heads.

**NOTE** For battery systems with fewer than 4 battery modules:

To enable the expansion of the battery system later on, do not shorten the busbars and ensure to insulate the bare joints of the busbars that remain empty with self-welding insulating tape.



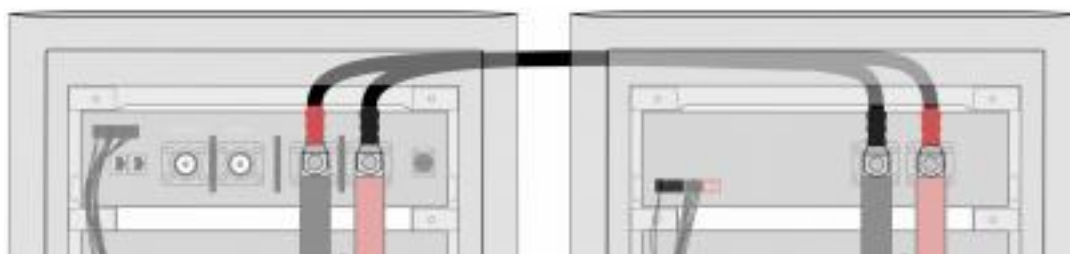
## Extension for systems over 10 kWh

Route the battery connection cables for the system extension from the outside to the inside through the cable bushings. For outdoor installation, use the waterproof fittings included in the scope of delivery. The cables can be routed along both, the right or left hand side, into another cabinet. Please observe the General Information on Wiring.

1. Connect the battery cables together with the busbar to the corresponding DC battery terminals ⑥ (INPUT -) and ⑦ (INPUT +) of the management module.
2. Connect the battery cables together with the busbar to the corresponding DC battery terminals ④ (-) and ⑤ (+) of the top battery module.

Use the screws ①, spring washers ②, and washers ③ supplied for this purpose.

3. Tighten the screws with a torque of 16 Nm.
4. Place the insulating caps ④ on the screw heads.

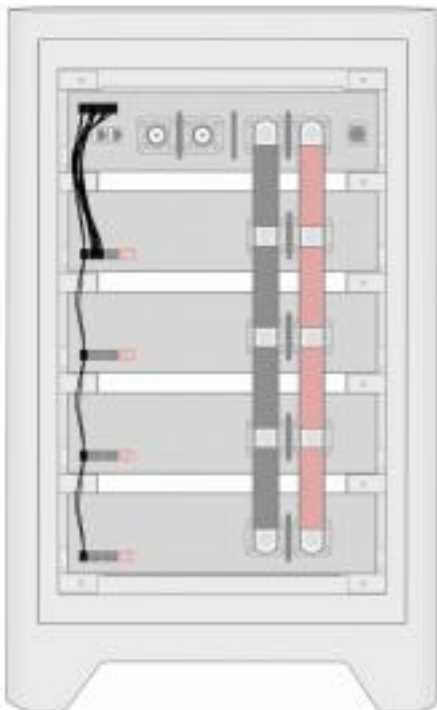


# Installation of the Internal Bus Cables

**ATTENTION** Make sure that the main switch of the battery system on the management module is set to off ( **O** ).

**NOTE** Make sure that the connectors of all the cables are engaged.

## Management Module Cable



Connect the management module cable **(F)** as shown in the adjacent figure:

1. Connect the large plug to the socket **(1)** of the management module.
2. Connect the small plugs one after the other from top to bottom to the socket **(1) (J1)** of the battery modules. For systems that consist of several cabinets, initially leave out the lowest module.
3. Connect the middle plug to the socket **(2) (J2)** of the first battery module.

**NOTE** For battery systems with fewer than 4 battery modules:

To enable the future expansion of the battery system, do not remove the unused connectors; instead, tie them together with a cable tie.

## Battery Module Connection Cable and Terminating Resistor



Connect each additional battery module with a symmetrical battery module connection cable **(G)**, as shown in the adjacent figure (daisy chain):

1. Connect a plug to the socket **(J3)** of the battery module.
2. Connect the other plug to the socket **(J2)** of the battery module located underneath.
3. For systems that consist of several cabinets, go to this point first Connection between cabinets (for systems over 10kWh).
4. Plug the terminating resistor into the last battery module.

## Connection between cabinets (for systems over 10kWh)



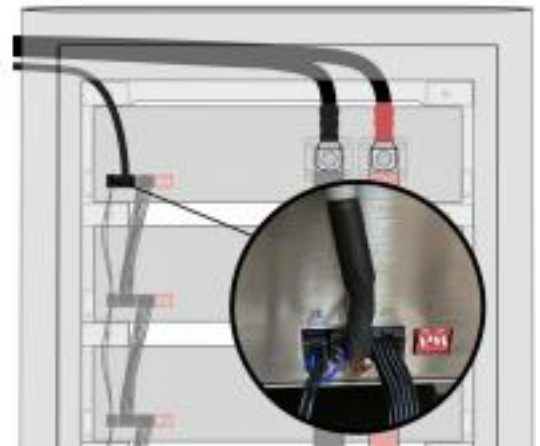
If you are expanding an existing 10kWh system, first remove the terminator plug in socket ( J3 ) on the hitherto last battery module as well as the plug of the management module cable ( F ) from socket ( J1 ) of this battery module.

1. Connect the socket of the connection cable extension to the last plug of the management module cable ( F ) in the first cabinet and to the socket ( J3 ) of the last battery module as shown in the adjacent figure.

Plug the connection cable extension into the socket ( J1 ) and ( J2 ) of the top battery module in the second cabinet.

If applicable, connect all other small plugs, one after the other, from top to bottom to the socket ( J1 ) of the battery modules.

Continue connecting the remaining battery modules as described for the first cabinet as well as under Battery Module Connection Cable and Terminating Resistor.



## Adressing the Battery Module

The addresses of the battery modules are set using a DIP switch on the back of the modules. The addresses must be assigned without gaps, consecutively, and starting at "0000" (for the address of the first module).



The address codes for the battery modules can be found in the following table.

Battery module	Adress code	DIP switch
1	0000	
2	0001	
3	0010	
4	0011	
5	0100	
6	0101	
7	0110	
8	0111	



# Adding, Exchanging, or Removing Modules

## TECHNICIAN

**ATTENTION** When adding or replacing battery modules, switch off the battery system and the voltage source (usually battery inverter) to avoid damage to the system components

**ATTENTION** Be aware of the heavy weight of the battery modules.

**NOTE** After changing the number of battery modules in the battery system by adding or removing units, it may be necessary to adjust the module address and the number of modules setting. For more information, see Addressing the Battery Module on page 31 and Configuring Battery Modules on page 54.

## Removing a Module

1. To remove a module, remove the back panel of the cabinet (see Removing the Back Panel on page 27).
2. Detach the module from the busbars.
3. Detach the module from the busbars
4. On the front side, remove the end or intermediate faceplate underneath the module.
5. Pull up the blue levers on both sides simultaneously to unlock the module, while pulling the module out of the cabinet until the rail audibly clicks into place.
6. Again, pull up the blue levers on both sides simultaneously to release the latched rails and slowly and carefully remove the module by pulling it out of the rails.

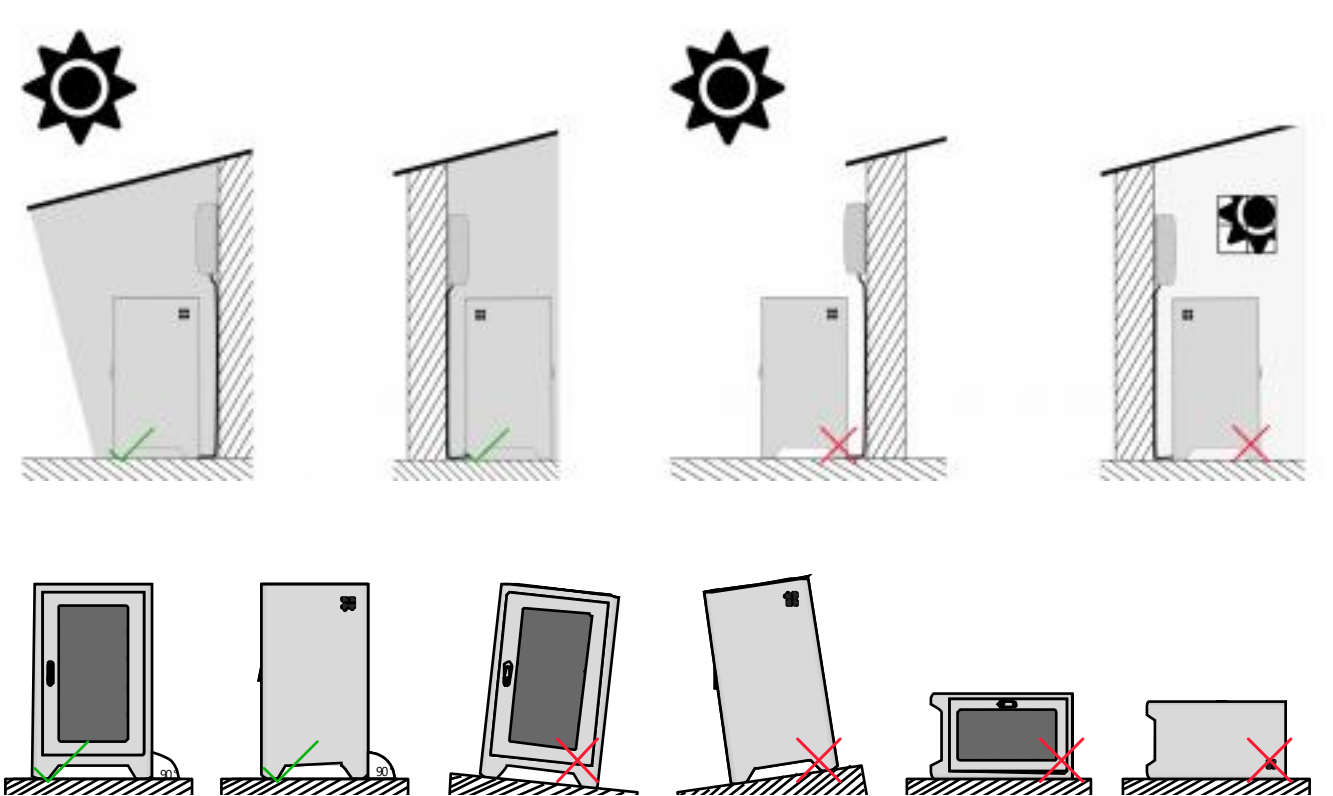
# Setting up the Battery System

## Placement Requirements

- No special room is required for the operation of the product, but it is nevertheless recommended
- Do not place the product in an escape route area.
- Do not install the product in areas with highly flammable substances, flammable gases, or a high fire load.
- Do not install the product in areas that are subject to explosion hazards.
- The place of installation should not be too hot in the summer or too cold in the winter, and the operating conditions specified in the technical data of the product documentation are to be observed at all times. Major fluctuations in ambient conditions should also be avoided. For optimum operation, the ambient temperature should be between +15°C and +35°C.
- The product must be placed in a fundamentally weather-protected location.
- The installation site must always be chosen in a way that the product is protected from direct sunlight. Direct sunlight on the product may damage the screen and cause it to heat up considerably, which may result in the product shutting down. Extensive heat build-up also leads to the premature aging of the battery cells.
- The product is not vandalism proof and must be placed on the premises in such a way that it can be easily monitored and is not accessible to unauthorized third parties.
- The floor must be level, permanently load-bearing, and meet the requirements for the product's own weight. The product has adjustable feet to compensate for unevenness. However, the surface should be as flat as possible. Severe unevenness should be addressed by appropriate measures prior to the installation of the product.
- It must be possible to feed the cables into the cabinet from below or from the sides.
- The installation of the product must not prevent access to shutdown devices.
- The installation site should be freely and safely accessible at all times without the need for additional aids (e.g. scaffolds or lifting platforms).



Acceptable and Unacceptable Installation Locations/Positions



# Electrical Connection/Wiring


## TECHNICIAN


### Before Starting Work


- Take off your metal jewelry or similar accessories.
- Wear suitable personal protective equipment whenever working on the product.
- When performing installation work, be sure to discharge all static before touching the equipment.
- Disconnect the system and devices from the power supply and secure them against being switched on again.
- Disconnect the system and devices from the power supply and secure them against being switched on again.
- Confirm that there is no voltage.
- Cover or fence off adjacent live parts.


### General Information on Wiring


- For all the cables used for data transmission, such as network, bus, and signal cables for small signals, generally only use cables with shielded and stranded wire pairs, such as LiYCY(TP), J-Y(St)Y or F/UTP, U/FTP, F/FTP, or S/FTP. The shielding minimizes the interference from high-frequency electromagnetic fields, and the twisted pairs of wires minimize interference from crosstalk and crosstalk effects.
- For outdoor installation, use only halogen-free, UV-resistant cables with high transverse water tightness.
- As DC connection cable to connect the battery system with the battery inverter or a busbar, use a battery cable with a maximum length of 3 m and 95 mm<sup>2</sup> (H07V-K) and suitable crimped or tubular cable lugs with a hole diameter of M8 (e.g. KLAUKE 108R8). For the diameter of the hole on the inverter side, please refer to its documentation.

 **WARNING** All cables and wires must be solid, undamaged, insulated, and sufficiently dimensioned. Loose connections, smoldered, damaged, or insufficiently dimensioned cables and lines must be repaired or replaced immediately. Perform an annual check of all the connectors and cable connections. In the case of mobile systems, it is advisable to check the connections more frequently.

 **WARNING** The cable lugs must be carefully pressed on and the screws must be properly tightened. Improper connections and fittings lead to the dangerous overheating of the connections.

 **ATTENTION** Unsuitable cables can lead to interference or transmission errors and thereby to impaired functionality. Connection, bus, measuring, and signal lines must be selected and installed in such a way that inductive and capacitive interference does not impair the functionality. In general, avoid the routing bus, measuring, and signal lines together with the power or connection lines.

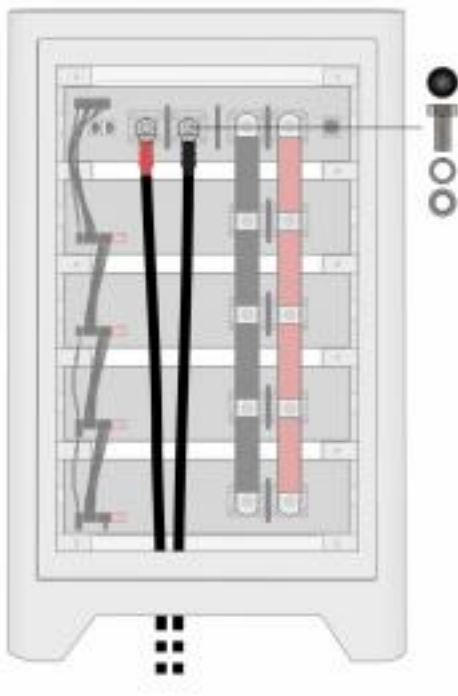
 **ATTENTION** Install a suitable power supply filter upstream of the battery inverter in order to minimize any interference caused by power supply feedback from AC-coupled generation systems and consumer devices on the battery system and to ensure smooth operation.

 **ATTENTION** For Ethernet cabling, use a Cat.5e or higher category cable. Recommended types of cables are: Cat.7 S/FTP installation cable and Cat.6a S/FTP patch cable.

## Connecting the Battery Connection Cables

### **NOTE**

The cables and wires can be routed along the right, left, and underneath the cabinet!



1. Route the battery connection cables from the outside to the inside through the cable bushings. For outdoor installation, use the waterproof fittings included in the scope of delivery.
2. Connect the battery connection cables to the corresponding DC battery terminals ① (**OUTPUT +**) and ② (**OUTPUT -**) of the management module.

Use the screws ①, spring washers ② and washers ③ supplied for this purpose.

3. Tighten the screws with a torque of 16 Nm.
4. Place the insulating caps ④ on the screw heads.

## Connect the Inverter

**WARNING** Danger due to incompatible inverters.

An incompatible inverter can lead to malfunctions or damage to the battery. With incompatible inverters, there is no guarantee that they will comply with the values specified by the battery management system, such as charge and discharge currents. Make sure that the inverter used is approved for use with the HomeHub.

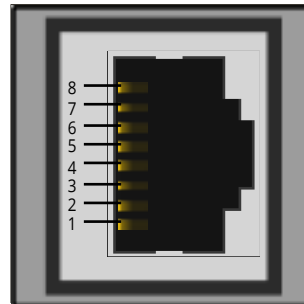
Connect the + pole of the inverter to the ① (OUTPUT +) socket and the - pole to the ② (OUTPUT -) socket of the management module according to the inverter manual and using suitable cables.

If necessary, make a suitable CAN communication cable (see below CAN Pin Assignment and refer to the auxiliary table Communication cable for compatible inverters) and connect its BMS connector to the communication port ③ (CAN) of the battery system according to the inverter's instructions. **You can use the included patch cord.**

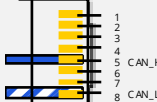
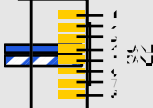
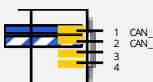
### CAN Pin Assignment

The communication port ③ (CAN) (Western modular jack RJ45) for the communication of the BMS with the inverter is assigned as follows:

Pin	Signal
1	GND
2-4	N/A
5	CAN_H
6-7	N/A
8	CAN_L



### Communication cable for compatible inverters

Inverter	Inverter pin assignment	HomeHub pin assignment:
Studer Xtender	See Studer Xtender (Xcom-CAN)	
SMA Sunny Island		
GoodWe ES-Serie		
Sofar Solar		

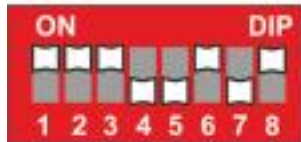
## Studer Xtender (Xcom-CAN)

**NOTE** There is **no** need to make a communication cable. The pin assignment of the RJ-45 socket can be defined via jumpers inside the communication module.

**NOTE** To access the DIP switches and jumpers, open the communication module (2 screws on the back). Please use a Phillips screwdriver no. 1 for this purpose.

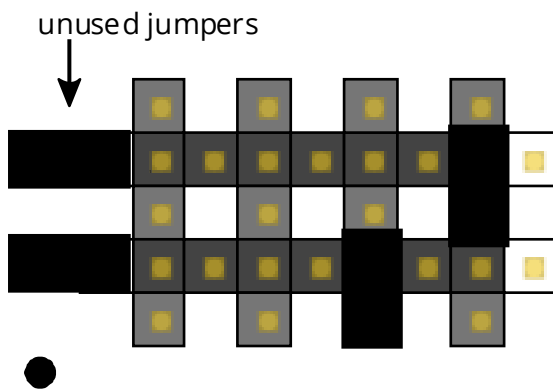
### Selecting the Xcom CAN function

Set the DIP switches for the Xcom CAN function for use with the HomeHub as follows (to Studer BMS Protocol and 250 kbps):



### Selecting the pin assignment

For use with the HomeHub place the jumpers on the jumper block as follows:

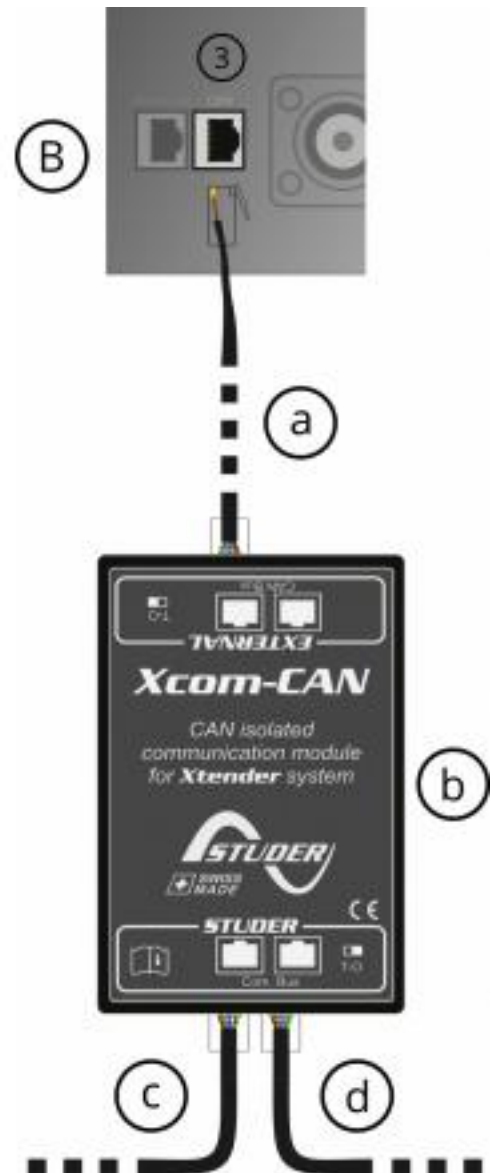


On the EXTERNAL side, connect the connection socket ③ (CAN) of the management module ② and a Studer Xcom CAN communication module ①, using a communication cable (supplied by Studer) or a patch cable ④.

Use additional communication cables ③ and/or ④ connect the Xcom CAN communication module ① to the Xtender or other Xcom bus devices.

Adjust the termination of the Xcom bus or the bus devices according to their instruction manuals.

**NOTE** The two devices at the ends of the Xcom bus chain must be set to **T** for "Terminated"; all the other devices on this bus must be set to **O** for "Open".

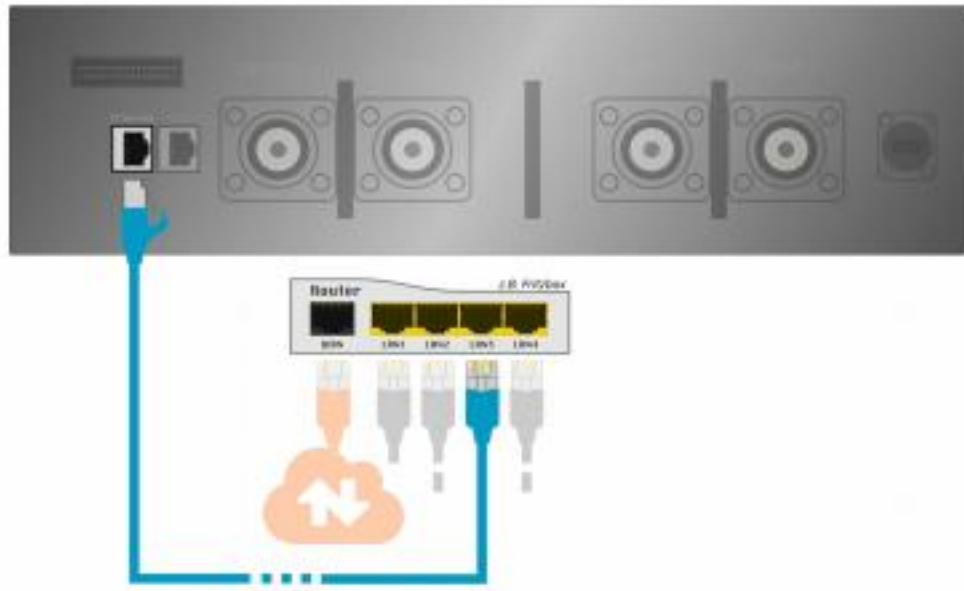


## Connecting the Ethernet Network

**NOTE** The *HomeHub* can be used without an Internet connection and without a network connection. However, in order to be able to use the *HomeHub*'s full range of functions, the management module must be connected to the Internet.

**NOTE** When using the EasyEMS, at least a network without an Internet connection must be available in order to establish a connection among the devices.

**NOTE** The RJ45 connector ② (**Ethernet**) is used to establish the connection to the network.



**ATTENTION** Do not confuse the network connection socket ② (**Ethernet**) with the connection socket ⑤ (**CAN**) as this may cause damage to the devices.

**ATTENTION** In systems where an EMS or other devices such as smart meters with an Ethernet interface are used, for example for dynamic self-consumption control, the Ethernet network also serves as a control bus. We, therefore, recommend using a static network configuration (for all devices involved) in order to avoid the operational problems caused by changing IP addresses. Furthermore, unwanted, interfering network traffic can lead to high latency and bandwidth problems that may have an impact on the function and reliability of the system. We, therefore, recommend isolating the system network from all possible sources of interference from your own private or company network. In order to do so, separate the networks from each other, e.g. by using an additional router.

# Commissioning

## TECHNICIAN

Please read from page 42 onwards to understand the User Interface Structure and, in particular, the Settings of the product.

**ATTENTION** Before commissioning, check that all the devices and safety features are properly wired and that all other devices meet the requirements for commissioning.



**ATTENTION** By default, the product is configured at the factory for operation with 4 battery modules (10 kWh system). If the number of installed battery modules differs from the factory setting, the settings must be adjusted to meet the actual number of modules installed in order to ensure proper functioning during commissioning.

**ATTENTION** By default, the product is configured for operation with a *Studer Xtender* inverter via *Xcom-CAN*. If a different inverter is used, the settings must be adjusted correspondingly in order to ensure proper functioning during commissioning.

**NOTE** The first initialization may take a few minutes.

**NOTE** The default display language is English. If you want to change the language setting, please do so as early as possible. For more information, please see Languages on page 57.

1. Turn on the *battery system* and wait until it has booted up completely and the screen is ready for use. In the following, please acknowledge or respond to the possible error message(s). If possible, postpone any update requests for the moment in order to first adjust the basic settings such as the display language, number of installed battery modules, and inverter used during the initial commissioning.
2. Log in to the system as an installer or switch to expert mode. For more information, please see Authorization Levels on page 52.
3. Check the number of modules as described on page 54, Configuring Battery Modules, and adjust it, if necessary.
4. Then, select the correct battery inverter, as described in Configuring the Inverters on page 55.
5. If desired or necessary, configure the network as described under Network on page 58.
6. Set the Time Zone as described on page 60.
7. Now, check for any available system updates. If the system is connected to the Internet, you can look for the latest version. Otherwise, use the System Information display described on page 48 and our website to verify that all the software and firmware versions of the system are up to date. You can also perform an update without an Internet connection using a USB stick. For more information, see page 61 onwards.

The *battery system* is working properly and is ready for operation, if in the **Main Relay** area of the main display, the relay symbol [  ] **Main** is green or closed, the relay symbol [  ] **Precharge** is red or open and no error is displayed in the **System status** and **Module status** area.

Proceed with the setup and commissioning or parameterization of the connected battery or hybrid inverter. For recommended values for the battery parameters of the compatible inverters, please refer to the Appendix Fehler: Verweis nicht gefunden.

**NOTE** It is recommended to delete the event log after the complete commissioning and configuration. For more information, please see Event Log on page Fehler: Verweis nicht gefunden.

## Completing the Installation

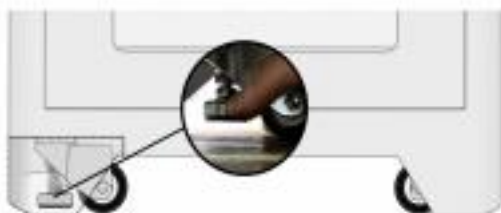
After successfully connecting and commissioning your *HomeHub*, reinsert the back panel.

Proceed in reverse order to remove the back panel (see Removing the Back Panel on page 27).

Then, mount the end and intermediate faceplates **(D)** or, if applicable, the maxi faceplate **(I)** using the supplied screws **(P)** and washers **(Q)**, as shown in the illustration.

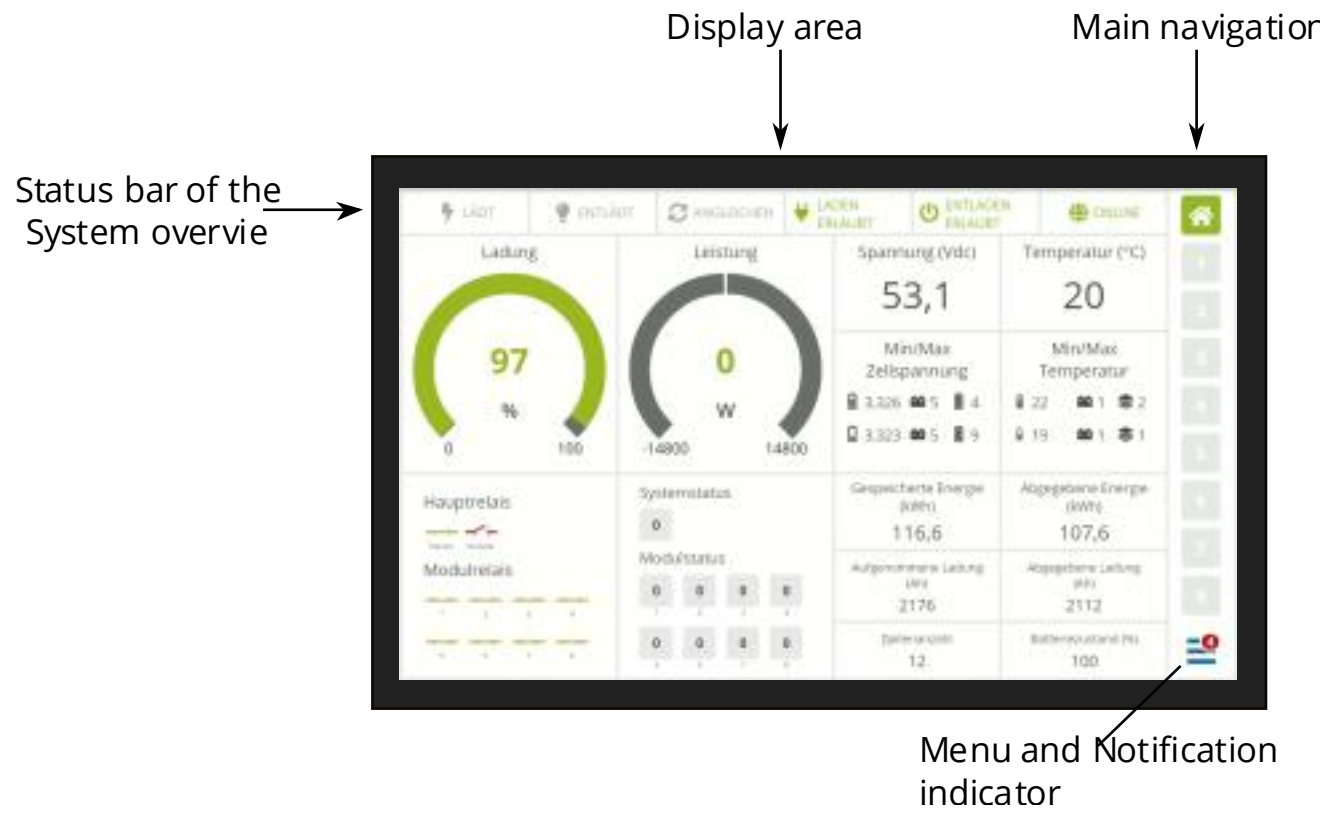
Then, place the *HomeHub* in its final position. In order to level and lock the *HomeHub* in place, lower the supporting feet by turning them to the left. The feet can be turned using a 17mm wrench.

After all the casters have been relieved and the *HomeHub* is fully aligned and standing firmly on its feet, tighten the lock nuts on the feet with a 17mm wrench.





# User Interface Structure



## Operating Concept

The management module features a touch screen with a graphical user interface. Tap or swipe to navigate through the displays or to adjust the settings.

## Input Fields and Buttons

Buttons	Explanation
	Buttons for selecting, switching, or acknowledging are usually colored areas (according to the general color scheme) with text or a symbol, depending on the status and context.
	Elements for confirmation, e.g. in settings or in a dialog, usually do not have a colored background. Buttons of this type always have an immediate effect
	Slide switches that activate or deactivate a certain function or switch it on or off have an immediate effect (for example, switching the network connection on or off).
	Changes to sliders, checkboxes, lists, slide switches serving as checkboxes with two options, and input fields are only saved and, therefore, go into effect once the desired change(s) has (have) been confirmed.
	The blue arrow in the upper right-hand corner is the general return button to jump back one level and return to the previous screen.

## General Color Scheme

The battery system uses colors for better visualization. In addition to an extensive color scheme and color gradients for values, sensors, counters, and sliders in the overviews, settings, and diagrams, the following signal colors/tones are of particular importance.

- **Red**: Mostly used as a general signal and accent color whenever your attention is required and there is a need for action in connection with malfunctions, for example. A red "X" on an icon indicates either that there is a conflict or that the corresponding component is disabled, not connected, or not configured. Icons indicating the number of notifications associated with a symbol as well as open relays (interruption of the current flow) are also displayed in red.
- **Orange**: Also used as a signal and accent color when increased attention is required, for example for warnings.
- **Green**: Shades of green are used as a general signal and accent color for the status indicators, e.g. for currently selected or active buttons. In some places, this indicates that the corresponding component is active, connected, correctly configured, or ready for operation. Event messages are also displayed in green, e.g. all-clear or elimination messages
- **Blue**: Serves as a neutral contrast/accnt color. Most titles, headings, and buttons in menus and settings are blue. Informative event messages are also accented in blue.
- **Grey**: Most of the disabled, inactive, or unselected elements and buttons are gray.

## System Overview







The system overview (also called "Dashboard" or "Home screen") is divided into different areas that summarize the current status and the relevant parameters of the battery system.



**NOTE** As long as you are in the main display (system overview or a module display), you can switch between the screens by swiping up or down or tapping the main navigator buttons.

## Status Bar

The status bar, which is located at the top of the system overview, has six system status elements with the following meanings:

Status display	Explanation
	<b>System status CHARGIN</b> If this status indicator is highlighted in green, the battery is being charged at this moment. If this button as well as the <b>DISCHARGIN</b> status display are highlighted in gray, the battery storage unit is in standby mode.
	<b>System status DISCHARGIN</b> If this status indicator is highlighted in green, the battery storage is being discharged at this moment. If this button as well as the <b>CHARGIN</b> status display are displayed in gray, the battery storage unit is in standby mode.
	<b>System status BALANCIN</b> Balancing of cell voltages takes place as needed during charging or in standby mode. If this button is highlighted in green, the battery management is balancing battery cells so that your voltage values are as equal as possible again.
	<b>Operating status CHARGING ALLOWED</b> If this button is highlighted in green and shows <b>CHARGING ALLOWED</b> , the battery can be charged. If this button is displayed in gray and shows <b>CHARGING PROHIBITED</b> together with a red X, it is currently not possible to charge the battery any further.
	<b>Operating status DISCHARGING ALLOWED</b> If this button is highlighted in green and shows <b>DISCHARGING ALLOWED</b> , the battery can be discharged. If this button is displayed in gray and shows <b>CHARGING PROHIBITED</b> together with a red X, it is currently not possible to charge the battery any further.
	<b>Connection status</b> This button displays the current network connection status.

## Relay Status Display

This area visually summarizes the status of all the relays of the battery system, divided into **main relays** and **module relays**.

## Error Display

The areas **System status** and **Module status** provide a numerical display of the current number of detected status deviations (errors, warnings, etc.) for each module. When a status deviation is detected, the corresponding numbers turn red. These display elements are also buttons that can be used to go to a more detailed display (all current status codes of the module). For more information on the significance of the status codes, please refer to the chapter Troubleshooting and Status Codes starting on page 65.

System status (detailed display)



The error display disappears automatically as soon as the problem is resolved. After each power-up, verify that the system is functioning properly and that all of the status indicators are green.













To exit any of the detailed system status displays and to return to the main display, tap the blue arrow in the upper right-hand corner.

Module status (detailed display)

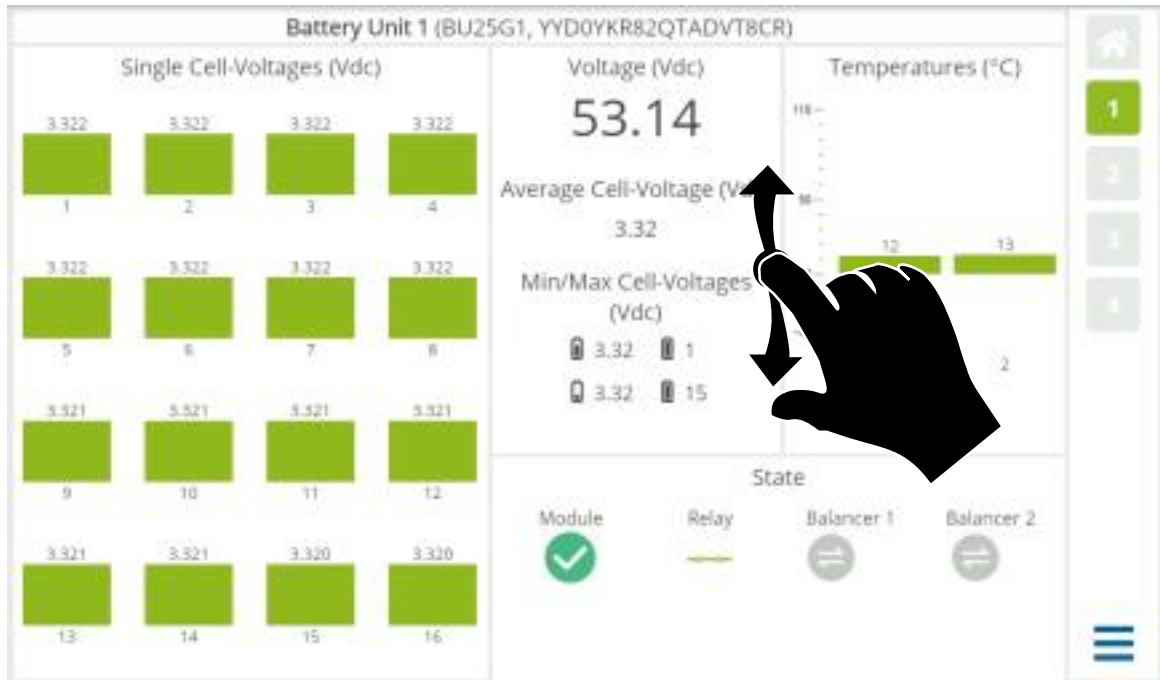


To exit any of the detailed module status displays and to return to the main display, tap the blue arrow in the upper right-hand corner.

## Important Recurring Symbols

Symbol	Erklärung
	Symbol for a closed relay / contactor.
	Symbol for a opened relay / contactor.
	Symbol for a battery cell in general.
	Symbol for the most charged cell (maximum cell voltage).
	Symbol for the least charged cell (minimum cell voltage).
	Symbol for a battery module in general.
	Symbol for a stack of pouch battery cells in a battery module.
	Symbol for the highest temperature.
	Symbol for the lowest temperature.
	General warning sign related to errors, warnings, and essential notes.
	Protection symbol: corresponds to a critical error or condition.
	Information symbol for general notes.

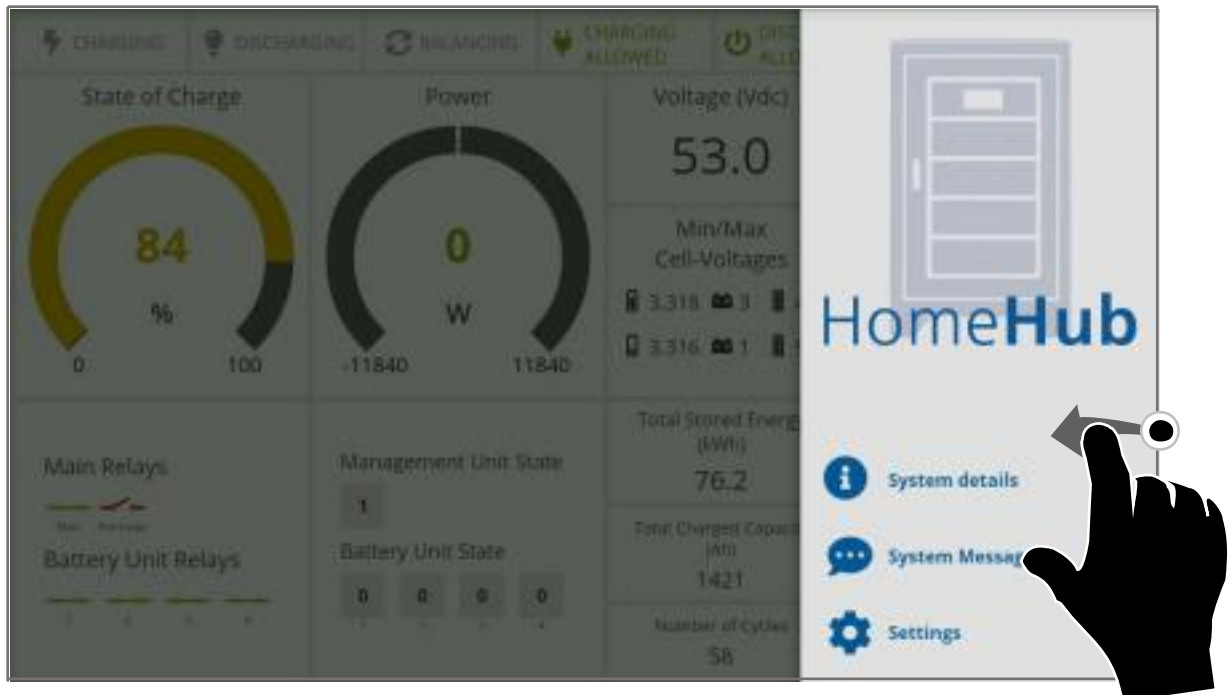
## Modul Display



The module displays provide a detailed view of the current state and status of each battery module.

To go to a specific module display, swipe up or down the appropriate number of times or tap the button with the desired module number in the main navigator. The module number corresponds to the bus address shown on the back of the battery module.

## Menu

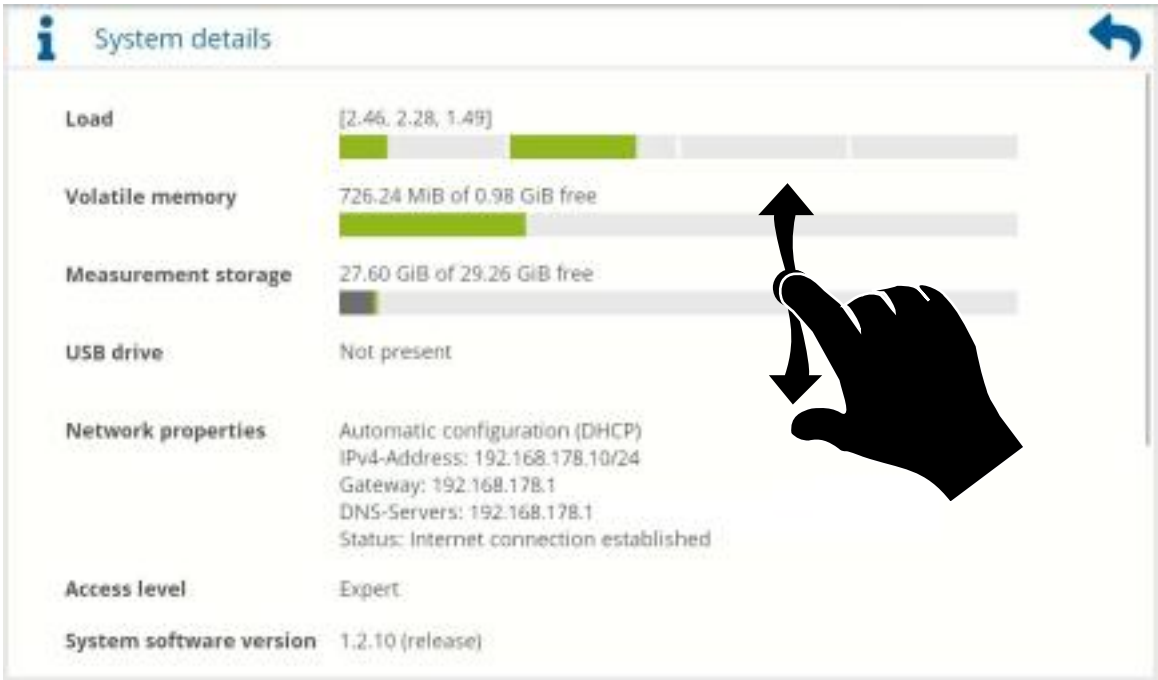


In the main display (system overview or a module display), open the menu by swiping in from the right edge of the screen or by tapping the **menu icon** [≡] in the lower right-hand corner of the main screen.

# System Information

The system information display summarizes the general technical information of your battery system.

To access the system information, open the menu in the main display and then tap **System information** [i].

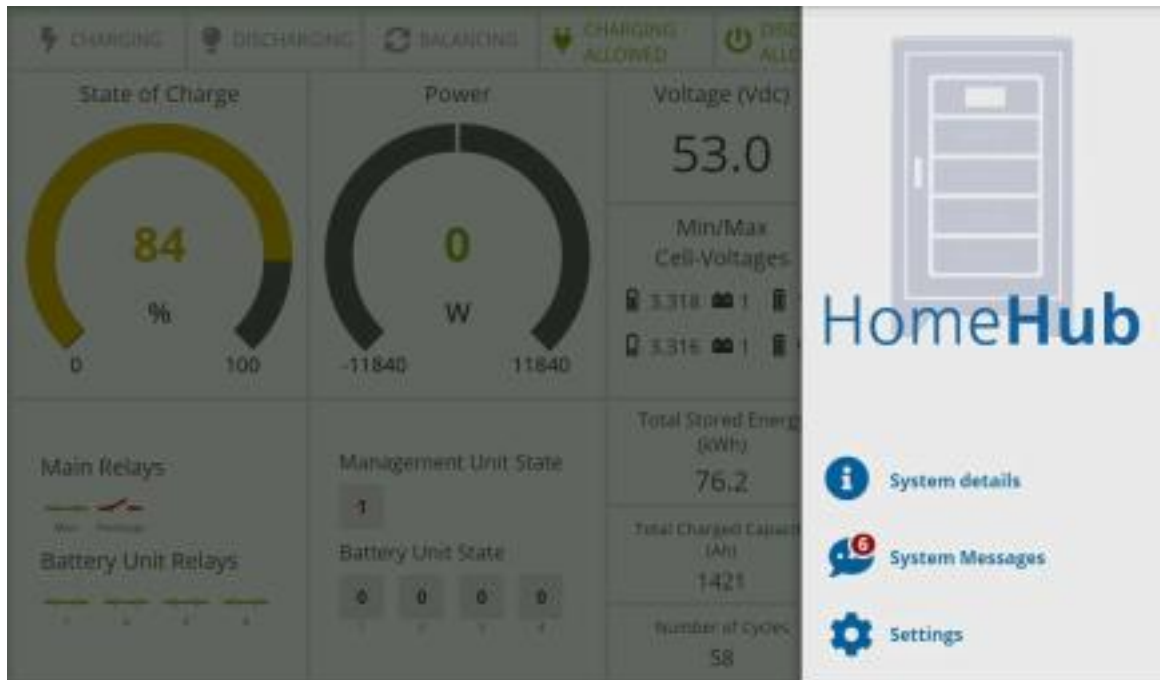


To exit the system information display and to return to the main display, tap the blue arrow in the upper right-hand corner.

**NOTE** In order to be able to support you with questions about your product or for technical assistance, you can find the necessary information, such as serial numbers and version status, in this display.



## Event Log



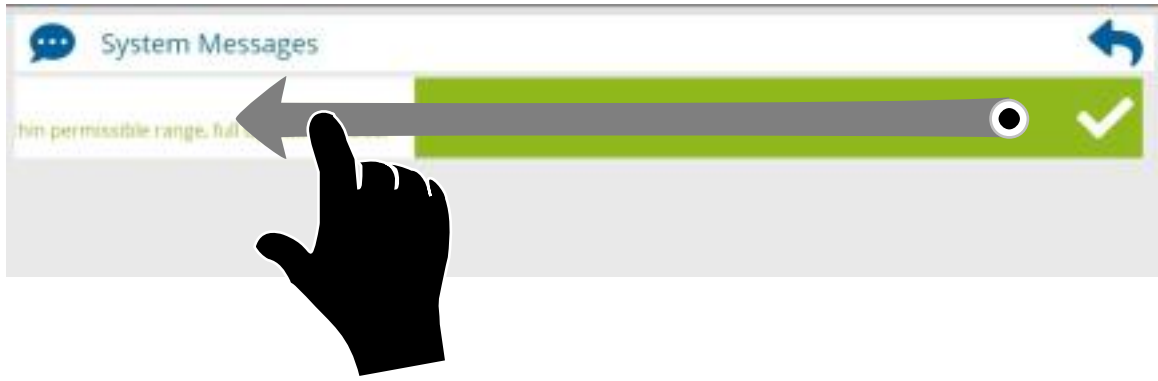
Under **System messages**, you will find the event log, with all messages/events of the battery system that have not yet been acknowledged. To access the system information, open the menu in the main display and then tap **System messages** [🗨️].

The screenshot shows the System Messages screen with a list of events. The messages are sorted by time, with the newest message at the top. The messages are displayed with icons indicating their priority: information (i), warning (⚠️), and error (❗).

Time	Message
12:50:00 PM	System booted up
12:48:50 PM	Management Unit D1: External Bus (CAN) communication interruption
12:47:31 PM	System booted up
12:47:22 PM	Management Unit C9: Units error, quantity of battery units is incorrect.
12:47:22 PM	Management Unit EE: Low-power mode.
12:47:22 PM	Management Unit D1: External Bus (CAN) communication interruption
12:47:22 PM	Management Unit CA: Addressing Error, at least one battery unit address is incorrect.
12:47:22 PM	Management Unit

The messages are displayed as a list, sorted according to the time of their occurrence. The newest message is at the top. Messages of the current day are always displayed without a date. Symbols as well as the coloring of the messages indicate their priority (see General Color Scheme on 42 and Important Recurring Symbols on page 46).





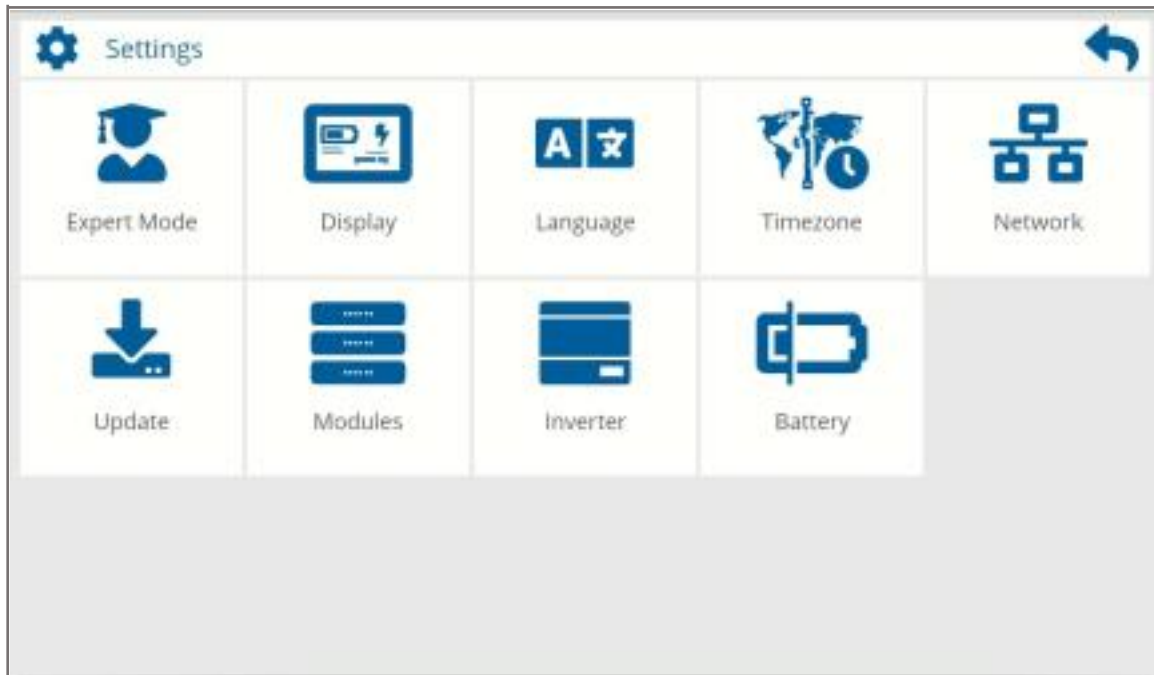
To acknowledge a message, swipe it to the left out of view.

To exit the **system messages** and return to the main display, tap the blue arrow in the upper right-hand corner.

# Settings

You can configure the entire battery system directly on its screen.

To do this, switch from the main screen to by opening the menu at the bottom (See Menu page 47) and tapping **Settings** [⚙️].



The **Settings** are divided into various submenus that can be selected as required by tapping on them.

To exit the **Settings** and to return to the main display, tap the blue arrow in the upper right-hand corner.

**NOTE** Depending on your current authorization level, different configuration areas and settings are available. For more information, please see Authorization Levels on page 52.

**NOTE** Depending on the selection of individual settings or the status of some areas, buttons and other settings options will be available or hidden as required, e.g. if they are not currently performing any function.

**NOTE** Note the **Adopt (Save)** buttons in the various sections are only activated if there is a change from the current setting; otherwise, they are "grayed out" and have no function.

## Authorization Levels

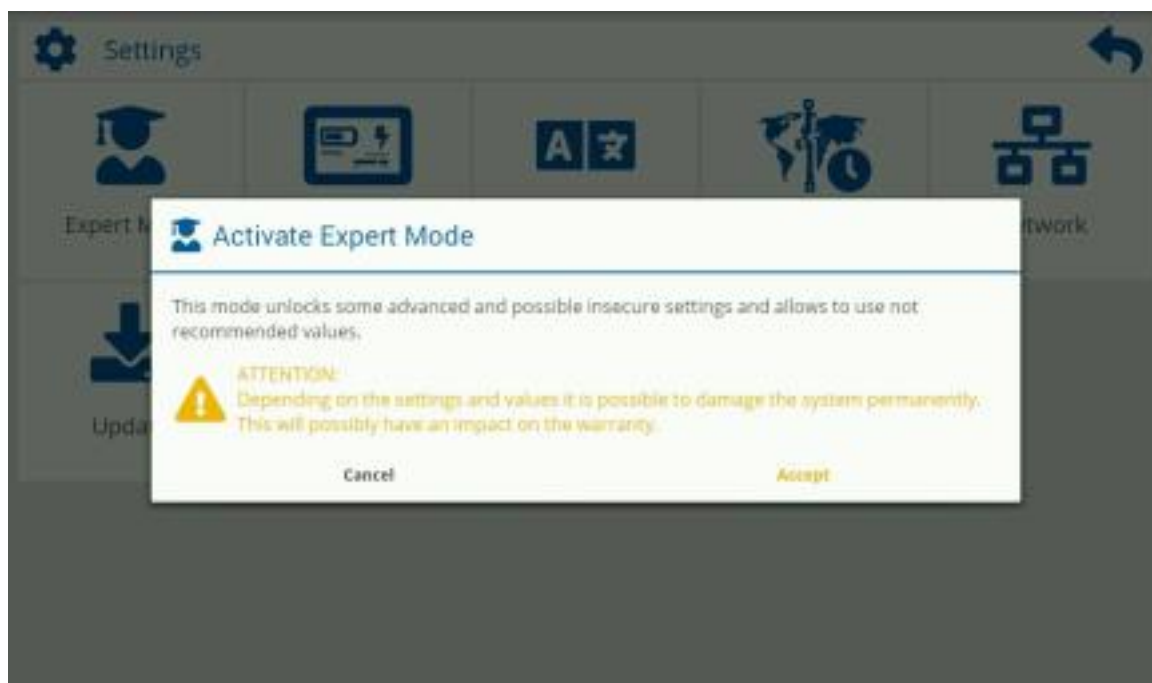
There are different authorization levels to protect against unintentional changes that have an impact on the basic function or lifetime of the battery system.

Level	Description
User	As the standard user, you can adjust the general settings such as display settings.
Expert	As an Expert, you can make changes to fundamental settings such as the number of connected modules, inverters, or the depth of discharge. By doing that, you should be aware of the impact that your actions could have.
Installer	As an authenticated installer, all of the expert settings can be temporarily changed, and some specific maintenance functions are also available.

Use the **Expert mode** [👤] button to switch between the authorization levels.

**ATTENTION** Incorrect configuration of the basic battery/system settings can lead to malfunctions as well as influence the lifetime and thus the warranty of the system.

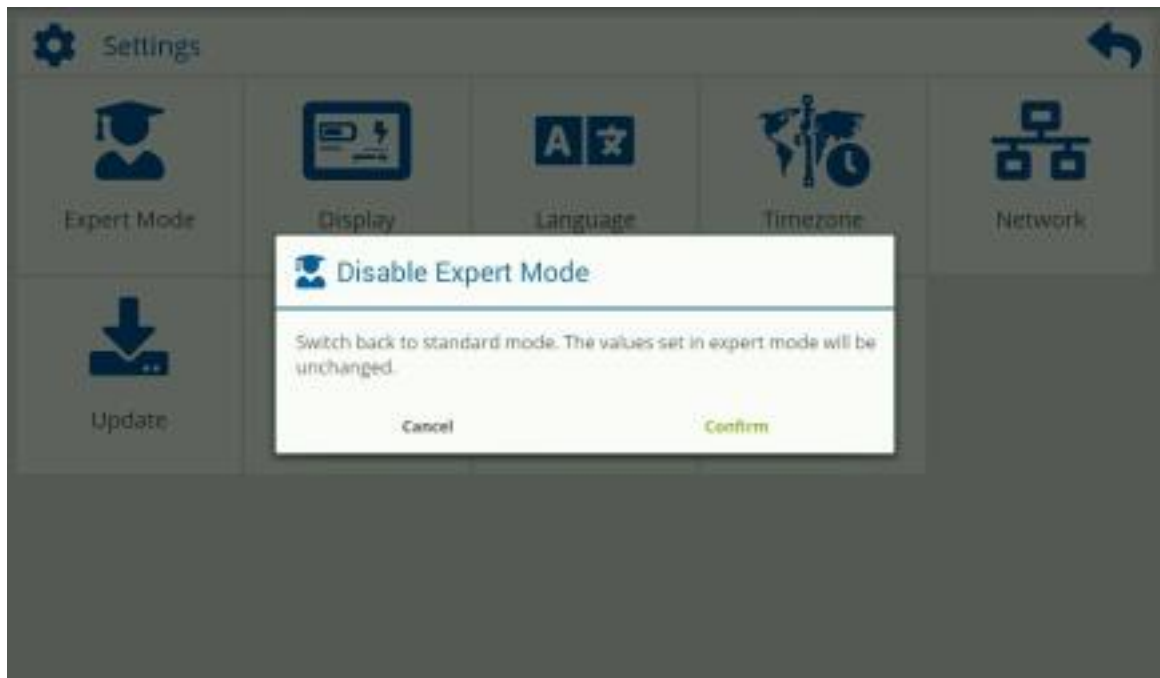
### Activating Expert Mode



To activate the expert mode, go to **Settings** [⚙️] ( see Settings page 51).

Then, tap on **Expert mode** [👤] and confirm by tapping **Confirm**.

## Deactivating Expert Mode



To deactivate expert mode again and go back to the safe standard user mode, go to **Settings** [⚙️] (see Settings page 51). Then, tap on **Expert mode** [🎓] and confirm by tapping **Confirm**.

## Configuring Battery Modules

### TECHNICIAN

**NOTE** To be able to set the number of installed battery modules, your authorization level must be at least Expert. For more information, please see Authorization Levels on page 52.



For the battery system to function properly, it is necessary to configure the correct number of currently installed battery modules during the initial installation or when making changes.

To do this, switch to **Settings** [⚙️] and then tap **Modules** [🔋].

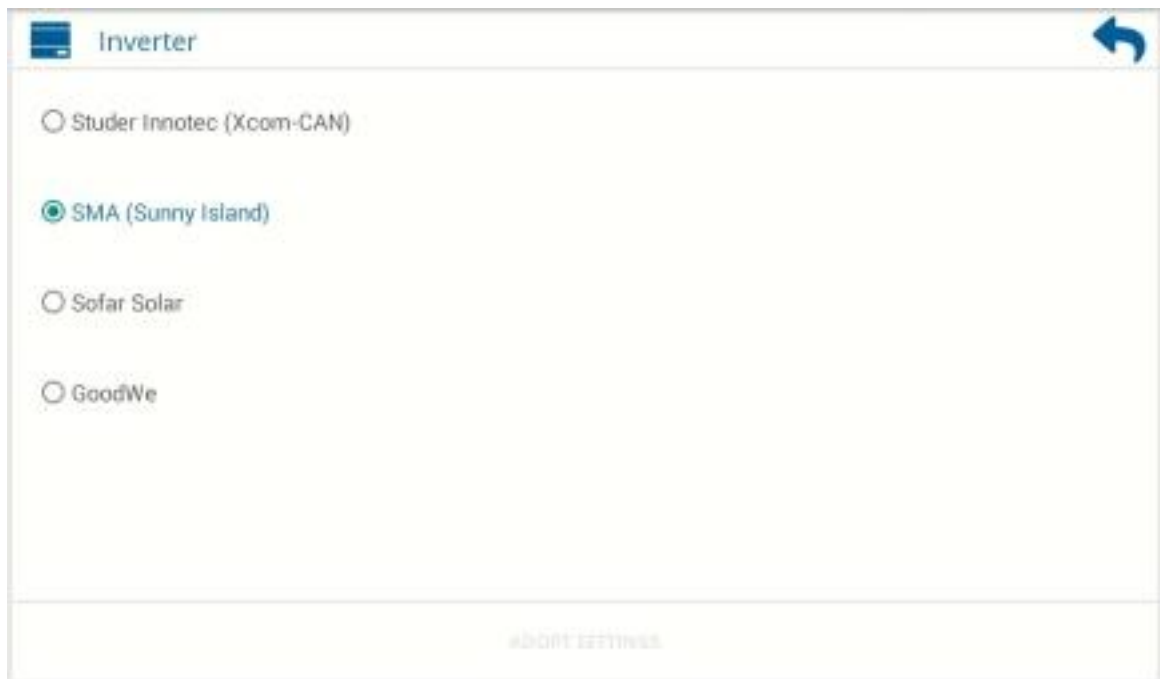
The "**Selecting the number of installed battery modules**" settings dialog that opens shows you the currently saved value as a preselection in the center for verification purposes. Now, determine the correct number of installed battery modules by swiping up or down.

Then, save the specified number by tapping **Adopt**.

## Configuring the Inverters

### ⚠️ TECHNICIAN

**NOTE** To be able to set the inverter, your authorization level must be at least Expert. For more information, please see Authorization Levels on page 52.



To improve compatibility, ensure trouble-free operation, and prevent possible damage to the battery, it is essential for the battery management to be able to adapt the battery system to the individual characteristics of the different inverters. This requires selecting the correct battery or hybrid inverter coupled to the battery system.

To do this, switch to **Settings** [⚙️] and then tap **Inverter** [📱].

In the selection list, the currently selected inverter is displayed as a preselection in blue letters for you to review.

Tap on the corresponding inverter or manufacturer to select it.

Save the selection by tapping **Adopt settings**.

Return to **Settings** by tapping the blue arrow in the upper right-hand corner.

# Battery

## TECHNICIAN

**NOTE** To be able to set the number of installed battery modules, your authorization level must be at least Expert. For more information, please see [Authorization Levels](#) on page 52.



The **Battery** configuration area allows for the individual setting of the **Depth of discharge** of the battery system. Depending on the application and the inverter used, it may make sense to set the **Depth of discharge** differently from the standard setting

**ATTENTION** Proceed with caution. Improper selection of the depth of discharge can lead to undesired behavior and malfunctions as well as have an impact on the service life and thereby on the warranty of the system.

To set the **depth of discharge**, switch to **Settings** [⚙️] and then go to **Battery** [🔋].

Once you have set the desired **depth of discharge** on the slider, save it with **Adopt settings**.

Return to **Settings** by tapping the blue arrow in the upper right-hand corner.

## Languages



To change the display language of the screen, go to **Settings** [⚙️].

Tap on **Language** [🌐].

After changing the setting to the desired language, confirm by tapping **Adopt settings**.

Return to **Settings** by tapping the blue arrow in the upper right-hand corner.

## Screen



To adjust the **brightness** or **shutdown time (Power off)** of the screen as well as the SoC display or the charge/discharge display of the system overview, switch to **Settings** [⚙️] and then go to **Screen** [📺].

To save the desired settings, tap **Adopt settings**.

Return to **Settings** by tapping the blue arrow in the upper right-hand corner.



# Network

To configure the **Network connection (Ethernet interface)**, switch to **Settings** [⚙️] and then go to **Network** [🌐].



If the interface is activated, the current values as well as the current status will be displayed for diagnostic purposes (here **Internet connection established**) in both modes, in **Automatic configuration mode (DHCP)** and in case of a static assignment of the network parameters.

**NOTE** By default, the system is delivered with the Ethernet interface switched on and **Automatic Configuration (DHCP)** activated.

## Static Network Configuration

To assign static network parameters, tap the switch element in the **Automatic configuration (DHCP)** line to disable this feature. A virtual numeric keypad will appear on the right-hand side for entering the parameter values.

The screenshot shows the 'Network' configuration screen. At the top, there's a 'LAN connection' section. Below it, the 'Ethernet' status is shown as 'ON' with a green toggle. The 'Use Automatic Configuration (DHCP)' option is set to 'OFF' with a gray toggle. Below this are five input fields: 'IP Address' (with a hint 'e.g. 192.168.1.2'), 'Netmask' (with a hint 'e.g. 255.255.255.0'), 'Gateway' (with a hint 'e.g. 192.168.1.1'), 'Primary DNS Server' (with a hint 'e.g. 192.168.1.1'), and 'Secondary DNS Server' (with a hint 'e.g. 192.168.1.1'). At the bottom left is an 'ADOPT SETTINGS' button. On the right side, there is a virtual numeric keypad with buttons for 'Clear', 'DELETE', digits 0-9, and a decimal point.

For a purely local network communication, you must at least assign the **IP address** and **subnet mask** and enter them in the corresponding fields.

In order to successfully establish an Internet connection, e.g. to check for updates, a gateway must be available in the network and its IP address must also be entered in the Gateway field. In addition, at least one available DNS server must be entered in the **Primary DNS server** line for the purpose of name resolution. In basic networks with routers, such as a Fritzbox, its IP address is usually the gateway and the DNS server.

If a second, redundant DNS service is available, you can optionally enter it in the field for the **Second DNS server**.

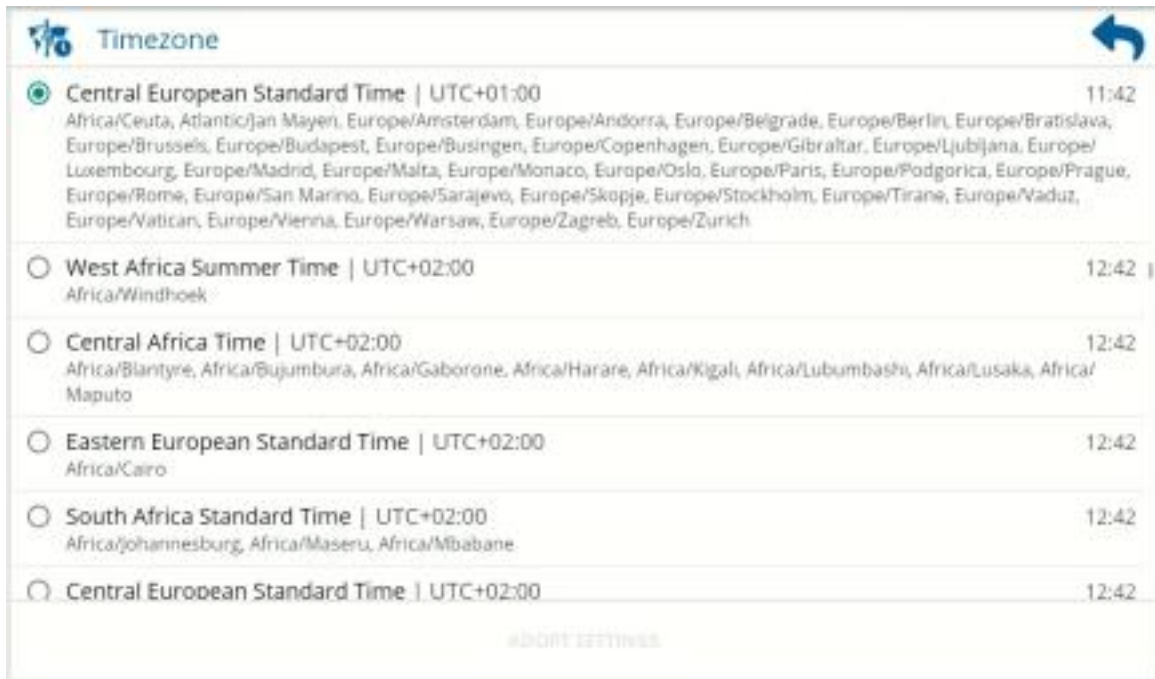
**NOTE** Alternatively, if desired, you can also use free public DNS services such as Cloudflare or APNIC with the IP address 1.1.1.1, Google with the IP address 8.8.8.8, or Quad9 with the IP address 9.9.9.9.

**NOTE** If the network parameter fields do not contain any value or have not been saved before, the field in light gray shows a sample value as a hint. However, the field is still empty and may have to be filled with a valid value in order to function correctly.

Once all of the required parameters have been entered, save them by tapping **Adopt settings**.

Return to **Settings** by tapping the blue arrow in the upper right-hand corner.

## Time Zone



The currently selected time zone is displayed in the list.

Tap on the desired time zone to select it.

To save the changes, tap **Adopt settings**.

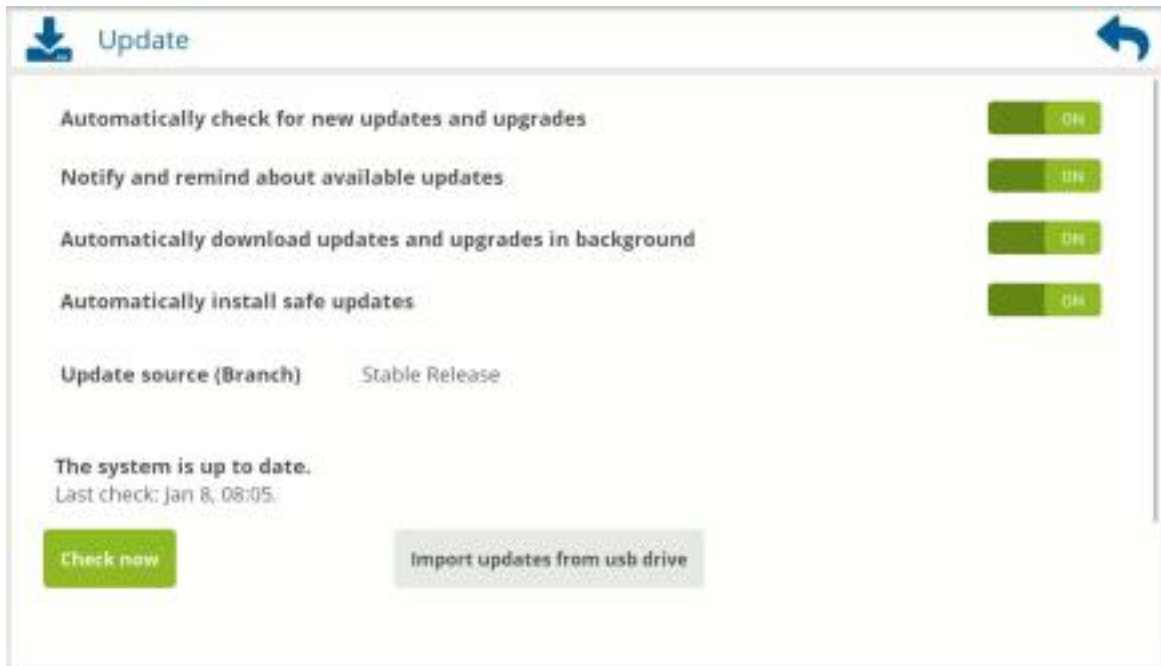
Return to **Settings** by tapping the blue arrow in the upper right-hand corner.

**NOTE** To make it easier to find the correct time zone, they are sorted by time difference. In the upper right-hand area of the respective time zone, you can see the current system time in the respective local time of the time zone.

## Time

To set the date and time, the battery system must be connected (at least briefly/temporarily) to the Internet. Similar to a radio-controlled dock, the system automatically synchronizes to the correct time.

# System Update



To update the system or change the settings for automatic updating, go to **Settings** [⚙️] and then **Update** [📶].

There are basically two ways to update your battery system.

1. For a manual offline update, you must first download the update package from our website and then transfer it to the battery system by means of a USB stick. For more details, see [Importing Updates](#).
2. Alternatively, if your battery system is connected to the Internet, you can conveniently have the battery system search online for a suitable update. This can be done either manually or the battery system can check for updates independently at regular intervals.

To allow the battery system to automatically perform the search in the background, enable the option **Automatically check for new updates**.

After that, you can choose to be notified by the battery system via dialogs or other displaying elements that a newer software version is available. To do so, enable the option **Notify and remind me when updates are available**.

You also have the option of selecting whether the battery system should automatically download any available update packages and store them in the update buffer for subsequent installation. To do so, enable the option **Automatically download updates in the background**.

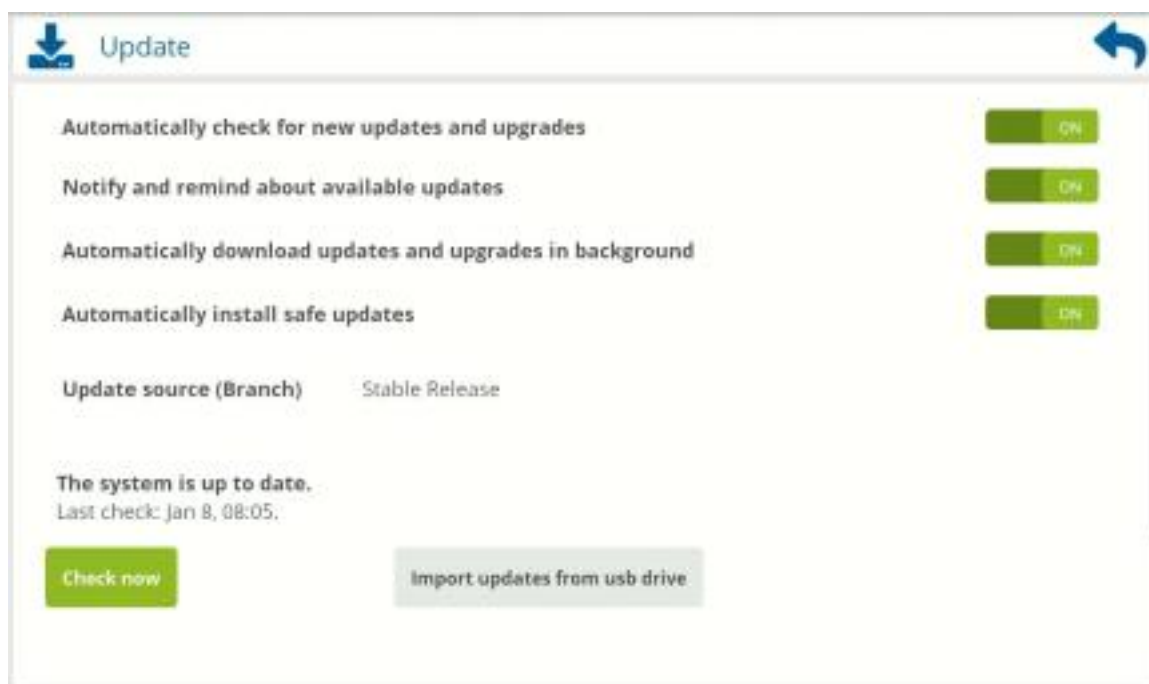
If you allow the battery system to download update packages automatically, you can also choose to have updates that are considered safe to be installed automatically. To do so, enable the option **Automatically install safe updates**.

**NOTE** Safe updates, in this context, are updates that do not involve an update of the basic BMS firmware components but, for example, only affect the user interface of the screen. Therefore, during safe updates, there will be no interruption of the power supply as a result of the update.

In order to manually initiate the search for an update, tap the **Check for updates** button. The system will now search for the latest available version.

Once you have performed the desired actions or changed any settings, return to **Settings** by tapping the blue arrow in the upper right-hand corner.

## Importing Updates



**NOTE** In order to be able to import an update via USB, your authorization level must be at least Expert. For more information, please see Authorization Levels on page 52.

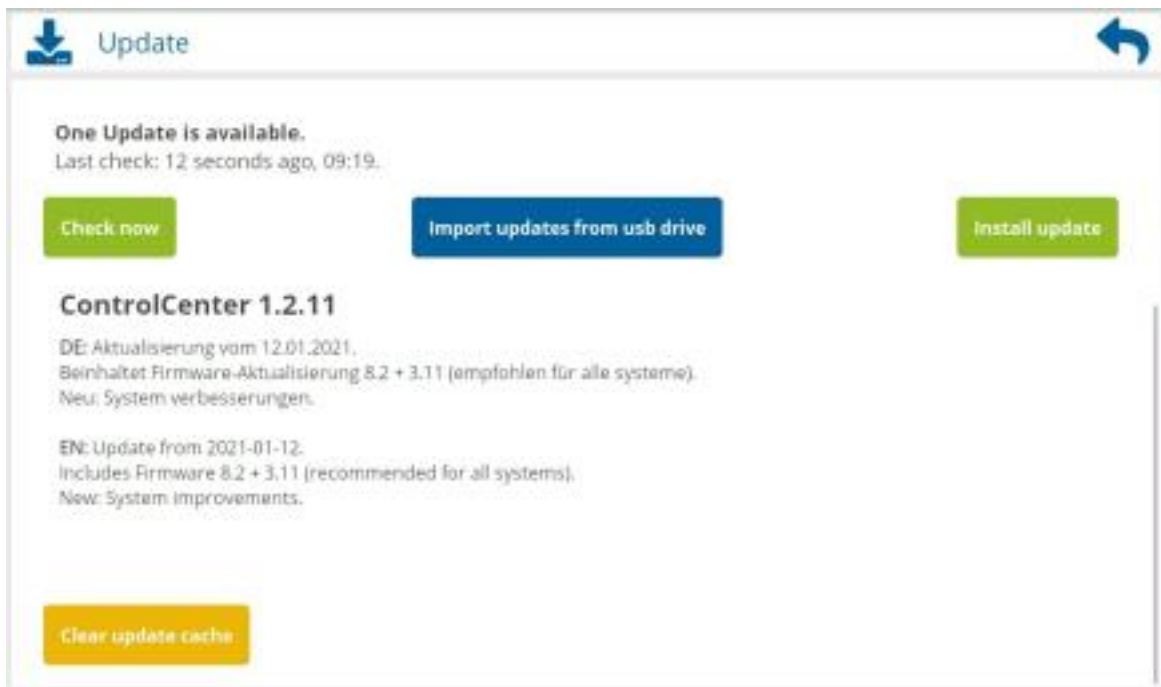
Insert the USB stick into the socket provided (see Connection Overview page 26). After your USB stick has been successfully detected, the **Import update from USB** button will be activated. Tap **Import update from USB**.



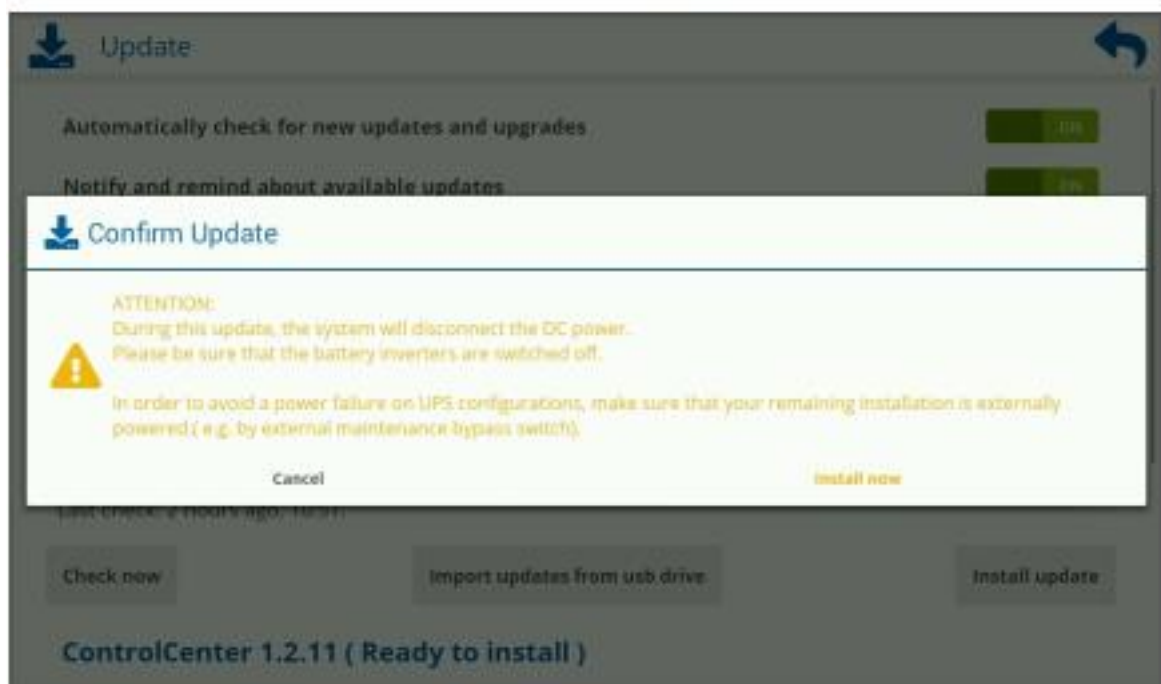
Then, in the opened file dialog, tap to select the desired update package and then tap Confirm to start the import process.

**NOTE** The file dialog and the import function filter out unsuitable files, i.e. only suitable updates and their folders are available and will be displayed so you can navigate through the USB stick file system to where you have stored the update package(s).

## Installing the Update

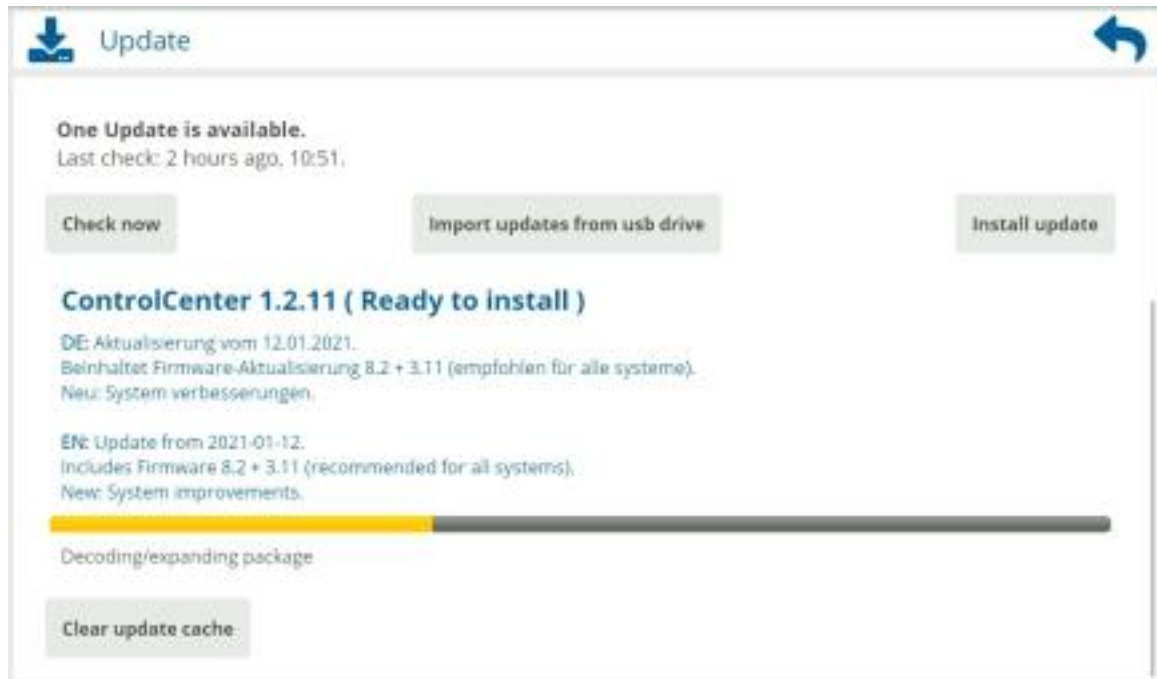


Once an update is ready to be installed (downloaded or imported), tap **Install update**.



In the following, an additional dialog, **Confirm update**, pops up, to inform you again about possible consequences, depending on the components to be updated; read this dialog carefully and follow the instructions.

Then, confirm by tapping **Install now**. It is only now that the system will start the actual update process.




Note that, during the update process, the screen may black out for a few seconds.

**ATTENTION** Keep the battery inverters switched off during the entire update process. In addition, do not turn off the system during the update process.

Once you have performed the desired actions or changed any settings, return to **Settings** by tapping the blue arrow in the upper right-hand corner; tap the blue arrow again to return to the main screen.

**NOTE** After returning to the main screen, the battery system may prompt you with a dialog message to perform a subsequently necessary update of the basic BMS firmware component of the modules.

# Troubleshooting and Status Codes

 **NOTE** Once the power contactor of the management module is open (see also Safeguards on page 10) the battery system automatically goes into energy-saving mode and turns off completely after a few seconds. To turn the battery system back on, turn off the main switch on the management module and wait at least **10 seconds** before turning it back on.

Not all problems and errors can be solved by yourself or a specialist on site. If repairs are necessary, please contact your dealer or service technician.



## Statuscodes des Managementmoduls

Code	Description	Troubleshooting
<b>C8</b>	<b>Self-test error</b> This common error typically occurs along with other errors.	Perform troubleshooting for other errors that may have occurred and turn the system off and back on as needed.
<b>C9</b>	<b>Incorrect number of battery modules</b> The set number of battery modules does not match the number of detected battery modules on the internal bus. Usually, this error occurs after additional battery modules have been added or one has been removed.	Set the number of battery modules in the Settings to the value of the installed battery modules (see page 54).  <b>! TECHNICIAN</b>  1. Turn off the system. 2. Check that the cables are connected properly. 3. Check the bus cable for broken wires or corrosion on the connector contacts. 4. Turn the system back on.
<b>CA</b>	<b>Addressing error</b> At least one address of a battery module is configured incorrectly. This error may occur during the initial installation or if a battery module has been added or removed and the addresses are not set correctly.	<b>! TECHNICIAN</b>  1. Turn off the system. 2. Make sure that the individual addresses of the battery modules are set as described in Addressing the Battery Module on page 31. If necessary, set the DIP switches to the correct addresses. 3. Turn the system back on.
<b>CB</b>	<b>Voltage difference of the battery modules is too high</b> After the power has been turned on, the voltage difference between battery modules does not correspond to the switch-on conditions. Operation is temporarily limited to the remaining battery modules. Typically, this condition can occur after a new battery module has been added.	Wait at least one full charge or discharge cycle or try to charge or discharge the system deliberately. As soon as the voltage differences of the battery modules meet the switch-on conditions, they are automatically switched on and the warning will be deleted. If this warning persists or occurs frequently, contact your dealer or service technician.
<b>CC</b>	<b>Relay malfunction</b> At least one relay or contactor of a battery module is not working properly.	Turn the system off and back on again. If this warning persists or occurs frequently, contact your dealer or service technician. It is impossible to fix this error by yourself.
<b>CD</b>	<b>Malfunction of the precharging relay</b> Relay monitoring has detected that the precharging relay or contactor may be blocked. A previous overcurrent may have damaged the contacts, thereby causing them to fuse, jam, or get stuck.	See code <b>CC</b> .
<b>CE/CF</b>	<b>Malfunction of the main relay</b> Relay monitoring has detected that the main relay or contactor may be blocked. A previous overcurrent may have damaged the contacts, causing them to fuse, jam, or get stuck.	See code <b>CC</b> .

Code	Description	Troubleshooting
D0	<p><b>Internal bus error</b> Communication between the management module and the battery module(s) is faulty or interrupted.</p> <p>One possible cause is that the bus cable between the devices is disconnected or damaged, e.g. a broken wire or corrosion on the connector contacts.</p>	<p>First, make sure that the number of battery modules is set correctly. Especially in combination with error <b>C9</b> or <b>CA</b>. Follow these instructions first.</p> <p><b>! TECHNICIAN</b></p> <ol style="list-style-type: none"> <li>1. Turn off the system.</li> <li>2. Make sure that all of the cables are connected properly.</li> <li>3. If necessary, disconnect and reconnect each connector of the internal bus individually.</li> <li>4. Turn the system back on.</li> </ol>
D1	<p><b>Interruption of external CAN communication</b> Communication between the BMS and the inverter(s) is faulty or interrupted.</p>	<ol style="list-style-type: none"> <li>1. Make sure that the battery inverter is switched on and ready for operation.</li> <li>2. Check the status of the main relay in the <b>System Overview</b>.</li> <li>3. Perform troubleshooting for other errors that may have occurred and turn the system off and back on as needed.</li> </ol> <p><b>! TECHNICIAN</b></p> <ol style="list-style-type: none"> <li>1. Check the output voltage.</li> <li>2. If necessary, disconnect the inverter and switch off the battery system.</li> <li>3. Check the bus cable (pin assignment, contact resistance) and make sure that it is connected correctly.</li> <li>4. Check that the battery power cables are correctly connected to the inverter. If necessary, continue troubleshooting on the inverter and make sure that the inverter is not damaged.</li> <li>5. Turn the system back on.</li> </ol>
D2	<p><b>Short-circuit protection</b> An impermissibly high discharge current has been detected. Charging and discharging is not allowed as of now.</p>	<p><b>! TECHNICIAN</b></p> <ol style="list-style-type: none"> <li>1. Resolve the cause of the external short-circuit or overload.</li> <li>2. Turn the system off and back on again.</li> </ol>
D3	<p><b>Charging overcurrent protection</b> A charging current of more than <math>n \cdot 60</math> A has been detected for more than 5 seconds. Charging is not allowed as of now.</p>	<ol style="list-style-type: none"> <li>1. Reduce the charging current and ensure that the current remains below <math>n \cdot 50</math> A or, for systems with more than 4 battery modules (10 kWh), below 250 A.</li> <li>2. Turn the system off and back on again.</li> </ol>
D4	<p><b>Charging overcurrent warning</b> A charging current of more than <math>n \cdot 55</math> A has been detected for more than 10 seconds.</p>	<p>Reduce the charging current and ensure that the current remains below <math>n \cdot 50</math> A or, for systems with more than 4 battery modules (10 kWh), below 250 A.</p>
D5	<p><b>Discharging overcurrent protection</b> A discharging current of more than <math>n \cdot 60</math> A has been detected for more than 5 seconds. Discharging is not allowed as of now.</p>	<ol style="list-style-type: none"> <li>1. Reduce the discharging current and ensure that the current remains below <math>n \cdot 50</math> A or, for systems with more than 4 battery modules (10 kWh), below 250 A.</li> <li>2. Turn the system off and back on again.</li> </ol>
D6	<p><b>Discharging overcurrent warning</b> A discharging current of more than <math>n \cdot 55</math> A has been detected for more than 10 seconds.</p>	<p>Reduce the discharging current and ensure that the current remains below <math>n \cdot 50</math> A or, for systems with more than 4 battery modules (10 kWh), below 250 A.</p>

Code	Description	Troubleshooting
<b>D7</b>	<b>Overcharge/overvoltage protection</b> If the voltage of individual cells is greater than or equal to 4.0 V, charging is no longer allowed.	<ol style="list-style-type: none"> <li>1. Stop charging the battery system.</li> <li>2. Make sure that the voltage of all the cells has dropped below 3.4 V.</li> <li>3. Turn the system off and back on again.</li> </ol>
<b>D8</b>	<b>Overcharge/overvoltage warning</b> If the voltage of individual cells is greater than or equal to 3.8 V, charging is no longer allowed.	<ol style="list-style-type: none"> <li>1. Stop charging the battery system.</li> <li>2. Make sure that the voltage of all the cells has dropped below 3.4 V.</li> </ol>
<b>D9</b>	<b>Undervoltage protection</b> If the voltage of individual cells is greater than or equal to 2.7 V, discharging is no longer allowed.	<ol style="list-style-type: none"> <li>1. Charge the battery system immediately..</li> <li>2. Make sure that the voltage of all the cells is at least 3.05 V.</li> </ol>
<b>DA</b>	<b>Undervoltage warning</b> If the voltage of individual cells is greater than or equal to 3.0 V, discharging is no longer allowed.	<ol style="list-style-type: none"> <li>1. Charge the battery system.</li> <li>2. Make sure that the voltage of all the cells is at least 3.05 V.</li> </ol>
<b>DB</b>	<b>System undervoltage warning</b> If the total system voltage is less than or equal to 48 V, discharging is no longer allowed.	<ol style="list-style-type: none"> <li>1. Charge the battery system.</li> <li>2. Make sure that the voltage of the entire system reaches 50 V.</li> </ol>
<b>DC</b>	<b>High temperature protection (charging)</b> If a temperature of 90°C has been reached during the charging process, charging or discharging is not allowed. The red light of the battery module(s) flashes.	<ol style="list-style-type: none"> <li>1. Wait until the system has cooled down.</li> <li>2. Make sure that the average system temperature is below 40°C and that the highest temperature has dropped to 45°C.</li> </ol>
<b>DD</b>	<b>High temperature protection (discharging)</b> A temperature of 90°C was reached during the discharging process. Charging and discharging is not allowed as of now. The red light of the battery module(s) flashes.	See DC.
<b>DE</b>	<b>High temperature protection (standby)</b> A temperature of 90°C was reached during standby. Charging and discharging is not allowed as of now. The red light of the battery module(s) flashes.	See DC.
<b>DF</b>	<b>Overtemperature protection (charging)</b> A temperature of 60°C was reached during the charging process. Charging is not allowed as of now.	See DC.
<b>E0</b>	<b>Overtemperature warning (charging)</b> A temperature of 50°C was reached during the charging process. The charging process is significantly throttled.	See DC.
<b>E1</b>	<b>Overtemperature protection (discharging)</b> A temperature of 70°C was reached during the discharging process. Charging and discharging is not allowed as of now.	See DC.
<b>E2</b>	<b>Overtemperature warning (discharging)</b> A temperature of 50°C was reached during the discharging process. The discharging process is significantly throttled.	See DC.

Code	Description	Troubleshooting
E3	<b>Overtemperature protection (standby)</b> A temperature of 70 °C was reached during standby. Charging and discharging is not allowed as of now.	See DC.
E4	<b>Overtemperature warning (standby)</b> A temperature of 50°C was reached during standby.	See DC.
E5	<b>Undertemperature protection (charging)</b> A temperature of -10°C was reached during the charging process. Charging is not allowed as of now.	1. Wait until the system has warmed up. 2. Make sure that the average system temperature is above 15°C and that the lowest temperature has increased to -5°C.
E6	<b>Undertemperature warning (charging)</b> A temperature of 5°C was reached during the charging process.	1. Wait until the system has warmed up. 2. Make sure that the average system temperature is above 15°C and that the lowest temperature has increased to 10°C.
E7	<b>Undertemperature protection (discharging)</b> A temperature of -20°C was reached during the discharging process. Charging and discharging is not allowed as of now.	1. Wait until the system has warmed up. 2. Make sure that the average system temperature is above 15°C and that the lowest temperature has increased to -15°C.
E8	<b>Undertemperature warning (discharging)</b> A temperature of -10°C was reached during the discharging process. Charging is not allowed as of now.	See E5
E9	<b>Undertemperature protection (standby)</b> A temperature of -20°C was reached during standby. Charging and discharging is not allowed as of now.	See E7
EA	<b>Undertemperature warning (standby)</b> A temperature of -10°C was reached during standby. Charging is not allowed as of now.	See E5
EB	<b>Low temperature protection (charging)</b> A temperature of -25°C was reached during the charging process. Charging and discharging is not allowed as of now.The red light of the battery module(s) flashes.	See E5
EC	<b>Low temperature protection (discharging)</b> A temperature of -25°C was reached during the discharging process. Charging and discharging is not allowed as of now. The red light of the battery module(s) flashes.	See E5
ED	<b>Low temperature protection (standby)</b> A temperature of -25°C was reached during standby. Charging and discharging is not allowed as of now.The red light of the battery module(s) flashes.	See E5
EE	<b>Energy saving mode</b> Indicates that the battery system is in power saving mode after the main relay has been disconnected.The battery system will soon shut down completely.	Turn the system off and back on again.

## Status Codes of the Battery Modules

Code	Description	Troubleshooting
<b>11</b>	<b>Self-test error</b> This common error typically occurs along with other errors.	Perform troubleshooting for other errors that may have occurred.
<b>12</b>	<b>Relay malfunction</b> The relay monitoring has detected that the contactor may be blocked. A previous overcurrent may have damaged the contacts, causing them to fuse, jam, or get stuck.	See Code CC under Statuscodes des Managementmoduls.
<b>13</b>	<b>Internal bus error</b> Communication between the management module and this battery module is faulty or interrupted.	See Code <b>D0</b> under Statuscodes des Managementmoduls.
<b>14/15</b>	<b>General single cell monitoring error</b> A general cell monitoring malfunction has been detected.	First, perform troubleshooting for other errors that may have occurred. If this warning persists, contact your dealer or service technician. It is impossible to fix this error by yourself.
<b>16/17</b>	<b>Voltage reference error</b> The deviation of the internal reference is too large.	It is impossible to fix this error by yourself.
<b>18/19</b>	<b>Cell voltage detection error</b> A measurement provides implausible values due to strong power supply feedback during charging or a wire break in a sensor line.	Turn the system off and back on again. If this warning persists, contact your dealer or service technician. It is impossible to fix this error by yourself. If this error occurs frequently, install a suitable line filter.
<b>1A</b>	<b>Internal communication error</b> Electronics malfunction or failure.	It is impossible to fix this error by yourself.
<b>1B</b>	<b>Temperature monitoring warning</b> Temperature sensor 1 delivers implausible values or has failed.	Turn the system off and back on again. If this warning persists or occurs frequently, contact your dealer or service technician. It is impossible to fix this error by yourself.
<b>1C</b>	<b>Temperature monitoring warning</b> Temperature sensor 2 delivers implausible values or has failed.	See Code <b>1B</b> .
<b>1B + 1C</b>	<b>Temperature monitoring error</b> Temperature monitoring has failed completely.	It is impossible to fix this error by yourself.
<b>1D</b>	<b>Cell voltage control protection</b> Indication of damaged cells. The voltage deviation of at least one cell of the battery module exceeds 500 mV. Charging and discharging is not allowed as of now. The red light of the battery module flashes.	It is impossible to fix this error by yourself.
<b>1E</b>	<b>Collection error</b> General collection error.	It is impossible to fix this error by yourself.

# Appendix

## Technical Data

	2,5 – 10 kWh System	12,5 – 20 kWh system (two cabinets)
Maximum energy	10 kWh	20 kWh
Maximum capacity	200 Ah	400 Ah
Maximum charging current	200 A (1 C @ 25 °C)	240 A
Maximum discharge current	200 A (1 C @ 25 °C)	240 A
Charging time	>1 h	>1.6 h
End-of-charge voltage	57.6 V <sub>dc</sub>	57.6 V <sub>dc</sub>
End-of-discharge voltage	43.2 V <sub>dc</sub>	43.2 V <sub>dc</sub>
Maximum number of battery modules	4	8
IP rating	IP 55	
Protection class	III (SELV/PELV)	
Communication ports	CAN (inverter communication) Ethernet (communication accessories such as the EMS, online updates, and service)	
Battery management system	Yes	
Software updatable	Yes	
Uninterrupted emergency power	Yes (for AC depending on battery inverter)	
Adjustable depth of discharge	Yes, between 60% and 100% (standard and recommended 80%)	
Conformity	CE, RoHS, IEC 62619:2017/AS IEC 62619:2017, YDB 032-2009, UN38.3	
Number of cycles	6,000 (at 80% depth of discharge)	
Material	Stainless steel	
Maximum weight	208 kg	400 kg
Dimensions (length x width x height)	(690 × 550 × 1100) mm 27.2 x 21.7 x 43.3 in	(1380 × 550 × 1100) mm 2 x 54,5 x 21,7 x 43.3 in
Operating temperature	-10 °C to +55 °C	
Storage temperature	-20 °C to +60 °C	
Relative humidity	Up to 95 % not condensing	
Protective devices	UVP (multi-level undervoltage protection) OVP (multi-level overvoltage protection) UTP (multi-level undertemperature protection) OTP (multi-level overtemperature protection) OCP (overcurrent protection) APT (adaptive power throttling) Fuse Power contactor	

## Cabinet with Rails (CH5G1)

Maximum number of module inserts	5
Material	Stainless steel
IP rating	IP 55
Weight	80 kg   176 lbs
Dimensions (length x width x height)	(690 × 550 × 1100) mm   27.2 x 21.7 x 43.4 in
Cable duct	3 × 4 × M25 × 1,5   3 x 4 x 1 in x 1,5

## Management Module (MU8G1)

Display	7" color display (WSVGA 1024×600 px)
Processor	1.5 GHz Quad-Core CPU
Working memory	1 GB DDR3 RAM
Data storage	ca. 28 GB
Maximum current	240 A
Maximum number of battery modules	8
IP rating	IP 43
Cabinet material	Stainless steel
Weight	16 kg   35 lbs
Dimensions (length x width x height)	(435 × 502 × 118) mm   17.1 x 19.8 x 4.6 in
Connections	2 × M8 pole terminal for busbar 2 × M8 pole terminal for connecting cable 1 × internal battery bus 1 × Ethernet 1 × CAN bus for battery inverter
Operating temperature	-20 °C to +60 °C
Storage temperature	-20 °C to +60 °C
Relative humidity	Up to 95 % non-condensing
Adjustable depth of discharge	Yes, between 60% and 100% (standard and recommended 80 %)
Protective devices	UVP (common undervoltage protection) OCP (over current protection) APT (adaptive power throttling) Power contactor Fuse

## Battery Module (BU25G1)

Nominal voltage	51.2 V <sub>dc</sub>
Nominal capacity	50 Ah (2.5 kWh)
Recommended charging current	10 A (0.2 C @ 25 °C)
Maximum charging current	50 A (1 C @ 25 °C)
Cell chemistry	Lithium-Iron-Phosphate (LiFePO <sub>4</sub> )
End-of-charge voltage	57.6 V <sub>dc</sub>
End-of-discharge voltage	43.2 V <sub>dc</sub>
End-of-charge voltage (cell)	3.6 V <sub>dc</sub>
End-of-discharge voltage (cell)	2.7 V <sub>dc</sub>
Temperature sensors	2
Balancer	2
Cells	16 (16S1P)
Protective devices	UVP (undervoltage protection at cell level) OVP (overvoltage protection at cell level) UTP (undertemperature protection) OTP (overtemperature protection) Power contactor
Charging temperature	0 °C to +55 °C   32 °F to 130 °F
Discharging temperature	-10 °C to +55 °C   14 °F to 130 °F
Storage temperature	-20 °C to +60 °C   -4 °F to 140 °F
Relative humidity	up to 95% non-condensing
Connections	2 × M8 pole terminal for busbar 2 × internal battery bus (daisy chain) 1 × internal power supply
Number of cycles	6,000 (at 80% depth of discharge)
Weight	28 kg   62 lbs
Cabinet material	Stainless steel
Dimensions (length x width x height)	(435 × 502 × 118) mm   17.1 x 19.8 x 4.6 in



## Recommended Battery Parameters for Inverters

### Studer Xcom-CAN BMS

Parameter	Parameter name/number	Value
SoC level for backup	6062	$\geq 30\%$
SoC level below which battery discharge will be stopped	6070	20% ( = depth of discharge of the battery system)

### SMA Sunny Island

Parameter	Parameter name/number	Value
Deep discharge range	ProtRes	5%
Deep discharge protection range	BatRes	20% ( = depth of discharge of the battery system)
State of charge retention range	PVRes	$\geq 30\%$

### GoodWe

In the inverter settings (via the *GoodWe PV Master app*), set the battery model according to the table below.

Size of battery system	Batterie model
2.5 kWh	-
5.0 kWh	-
7,5 kWh	LG RESU6.5
10 kWh	LG RESU10

# Compatible Accessories and List of Compatible Devices

## Accessories

GS HUB EasyEMS

## Compatible Battery Inverters

STUDER Innotec Xtender XTM und XTH

SMA Sunny Island

## Compatible Hybrid Inverters

GoodWe ES-Serie

SofarSolar HYD ES-Serie

## DC-coupled Charge Controllers

STUDER Xtender VarioString und VarioTrack

# Help

## Technical Support

E-Mail: [info@gs-hub.de](mailto:info@gs-hub.de)

Obere Hilgenstock 26

34414 Warburg

© 2019 GS HUB GmbH

## Notes

This system was installed for you by: