



Original Operating Instructions

Battery Charger

BATx0280-ES-1-400-1 (Outdoor)

WSTECH is a Wind&Sun Technologies and Siemens Joint Venture.

Before starting any work, please read "Original Operating Instructions" and "Interface Description Modbus TCP and EtherCAT"!

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1 User Information

Thank you for purchasing the BATx0280-ES-1-400-1 (Outdoor). By purchasing this battery charger, you have chosen a high-quality WSTECH product. If you have questions about the application, please contact info@wstech.com.

Legal Information

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1.1 Identification of the Product

The type plates and option plates of the BATx0280-ES-1-400-1 (Outdoor) (hereinafter referred to as BAT or product) are located on the outside and inside of the front cabinet door.



Figure 1: Example of a type plate

Pos.	Description
1	Manufacturer
2	Hardware- and wiring diagram version
3	Technical data DC side
4	Degree of protection
5	Technical data AC side
6	Product denomination
7	Serial number

WSTECH

Optionen/ Options	
Inselnetzfunktion Island grid function	—
Ethercat-Schnittstelle Ethercat interface	X

X = installiert/ installed
— = nicht installiert/ not installed

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Figure 2: Example of an option plate

1.2 Scope

These original operating instructions (hereinafter referred to as operating instructions) are valid for the following products:

- BATD0280-ES-1-400-1 (Outdoor) (hardware version: 01X, wiring diagram version: 1.XX)
- BATY0280-ES-1-400-1 (Outdoor) (hardware version: 01X, wiring diagram version: 1.XX)

The illustrations used in these operating instructions are reduced to the essentials and may differ from the delivered product. The manufacturer may from time to time change these operating instructions and content therein.

1.3 Target Audience

All work on the product must be performed by qualified electricians.

Qualified electricians in the sense of these operating instructions are persons familiar with installation, mounting, commissioning, operating, troubleshooting, maintenance, decommissioning and disposal of this product. They are familiar with the hazards involved as well as work- and safety regulations of the product and have the appropriate qualifications. They know how batteries work and are operated.

Unauthorized persons are not allowed to operate the product. These persons must keep a safe distance from the product.

The transport of the product must be performed by trained and authorized persons with the appropriate qualifications.

1.4 General Information

These operating instructions provide detailed information regarding specifications, installation procedures, operation, commissioning, troubleshooting, maintenance, decommissioning, technical data, safety procedures and function settings of the product.

The manufacturer constantly adapts its products according to the latest state of the art of science and technology and therefore it assumes, that its products are free from defects in the sense of product liability. However, it cannot be excluded that for operation in critical application areas additional safety measures can be necessary.

The manufacturer requests the user of its products, in their own interest, to inform his contractors and the manufacturer about the application of its products to initiate possible additional safety measures.

The utilization and the service life of the product, as well as the avoidance of premature repairs depend on the proper commissioning, operation, maintenance and care. For professional maintenance follow the instructions contained in these operating instructions.

The manufacturer recommends the notice of these operating instructions to be acknowledged in writing by the personnel and noted in the personnel file.












The manufacturer recommends translation of these operating instructions into the native languages of foreign workers.

1.4.1 Related Documents

This and the related documents are provided on an USB Stick in the Section +C1.

- Interface Description Modbus TCP and EtherCAT (hereinafter referred to as *Interface Description*)
- Wiring diagram

1.4.2 Symbols

Symbol	Description
	DANGER! Indicates a direct danger situation which will lead to death or severe injuries.
	WARNING! Indicates a possible danger situation which can lead to death or severe injuries.
	CAUTION! Indicates a possible danger situation which can lead to lesser or lighter injuries.
	NOTICE Indicates a possible danger situation which can lead to damage to property or to the environment.
	Use head protection.
	Use hand protection.
	Use eye protection.
	Disconnect and safeguard against reconnection.
	Pay attention to supplementary documents to these operating instructions.
	WEEE identification
	ESD sensitive components

1.4.3 Terms and Abbreviations

Table 1: Naming convention

Complete designation	Designation in the document
Alternating current	AC
Battery inverter	BAT
Constant current–constant voltage	CC-CV
Direct current	DC
Electromagnetic compatibility	EMC
Electrostatic discharge	ESD
Energy storage	ES
Ethernet for Controller and Automation Technology	EtherCAT
Hardware version	HW
Insulated gate bipolar transistor	IGBT
International protection	IP
Transmission control protocol	TCP
Uninterrupted power supply	UPS
Waste of Electrical and Electronic Equipment	WEEE
Wiring diagram version	WD

1.5 Intended Use

This product is intended for use exclusively with batteries.

The product is constructed for outdoor use. It fulfils the IP44 degree of protection.

The product is not suitable for operation in areas with the risk of explosion and must be kept away from flammable or combustible materials.

It is prohibited to open the product, when it is raining, or the humidity is greater than 95%.

For all work appropriate tools must be used.

All work may only be carried out in compliance with the ESD protection measures.

Only operate the product with the maximum permissible connected loads stated in Section Electrical Data.

The operating conditions given in the technical data must be fulfilled at all times.

The manufacturer must not be liable for damages resulting from other persons conducting work on the product.

Never operate the product with open doors.

Never operate the product with any technical defects.

Never operate the product if it has been damaged in any way.

Never open the doors within the discharge time.

The type plate, safety signs and labels must remain permanently attached to the product.

Only the spare parts that are listed in this document may be used. The use of other spare parts must be construed as an alteration.

Without approval of the grid operator do not switch off or adjust settings which have influence on the grid management service.

Any changes and/or modifications to the equipment, its structure and its software are prohibited and will result in loss of warranty.

Intended use includes reading these operating instructions and complying with all instructions contained herein, in particularly the safety instructions. These operating instructions must be kept near or in the product for the lifetime of the product.

Should these operating instructions get lost or are destroyed, the customer must immediately contact the manufacturer to order, at customer's sole expense, a new operating instructions.

1.6 Safety Instructions



DANGER!

Danger to life due to disregarding the instructions for action!

Disregarding the safety instructions or performing unauthorized actions may lead to serious injury or death.

- Read and observe all safety instructions, warnings and symbols on the product and within these operating instructions.
- Observe the existing industrial safety measures for work, operation and safety regulations to the installation site.
- No activities may be performed without appropriate authorization or qualification.
- For questions contact customer service.



DANGER!

Danger to life due to high voltage!

After pressing the Enable switch or switching the AC circuit breaker in position **OFF**, dangerous voltage is present. Touching live parts can result in death or serious injury due to electric shock.

- Before working on the product, check that it is disconnected externally and safeguarded against reconnection.
- After stopping and before opening the product, observe a minimum wait time of at least **30 minutes** prior to opening.
- Do not touch live parts.
- Check that no residual voltage is present within the DC link by means of suitable testing equipment.
- No protection or security devices may be temporarily or permanently removed, altered or adjusted.
- Provide earth connection before connecting to the AC/DC power.
- Observe all safety warnings from the battery manufacturer.
- Observe that the AC/DC cables are still under voltage if they are not disconnected from the product externally.



WARNING!

Risk of injury due to fire or explosion!

There is risk of fire and explosion if inflammable solvents are used.

- Use only non-flammable solvents for cleaning.



NOTICE

Damage to components due to existing of termites!

Termites can get into the product and damage the components.

- Ensure that at the installation site and at the surrounding area no termites exist.
- If the installation site is in a termite infested area, the termites must be eliminated with appropriate measures before product installation.



NOTICE

Damage to components due to ingress of dirt, dust and moisture as well as intrusion of pests and vermin!


Ingress of dirt, dust, moisture and intrusion of pests and vermin can lead to damages of components.

- After unpacking immediately mount all cable entry grommets.
- Never leave the doors unattended open.
- Open the doors only if it is absolutely necessary and close quickly.
- Remove dust and water accumulation and all intruded pests and vermin as well as existing dirt (e.g. excrement, nests) from the interior area.
- Place only baits and poisons in solid form or in containers in the product.
- The use of baits and poisons in liquid, gas or powder form are not allowed.
- Never connect and operate the product if the interior area is polluted, damp or/and infested with insects.
- Before connecting the product baits and poisons as well as pests and vermin must be removed without trace.

NOTICE: During maintenance and repair work always ensure the area around the product is clean and persons working on the product adhere to high cleanliness standards.

NOTICE: The manufacturer does not accept responsibility for errors or damages if safety regulations are not met during handling, operation and maintenance.

1.7 Safety Sign on the Product

	<p>DANGER!</p> <p>Danger to life due to high voltage!</p> <p>Risk of electrical shock from not completely discharged capacitors.</p> <ul style="list-style-type: none">• Wait minimum 30 minutes after stopping before working on the product.
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The safety signs are located on the front and back door (Figure 4, Figure 5).

1.8 Safety Signs on the Packaging

2 Description

2.1 Functional Description

The product can feed the energy stored in batteries power controlled into the grid. For this purpose it converts the DC voltage of the batteries into grid-compliant AC voltage. If required, reactive power can be provided. To charge the batteries from the grid the inverter operates as a controlled rectifier.

2.2 Principle of the Product

Figure 3 shows the schematic structure of the product with its main components. The connection of the batteries is provided at the DC circuit breaker. The product transfers energy from the grid into the DC link and vice versa.

The control card controls the power semiconductors and measures the AC side and DC side currents and voltages. It measures the temperatures of the power semiconductors. The control card detects the positions of the circuit breakers and the Enable switch. The communication with the control card is provided via the user interface.

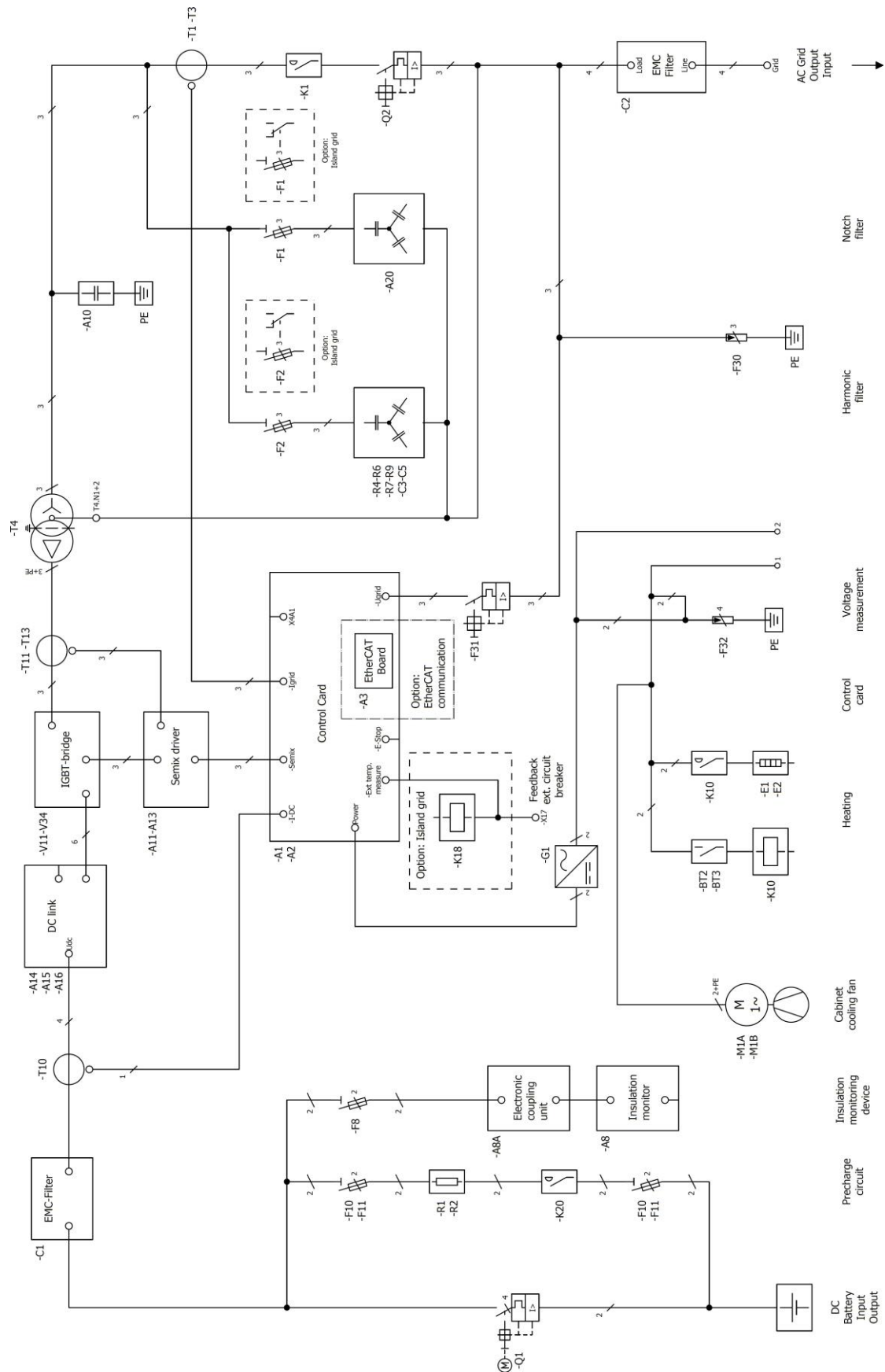


Figure 3: Schematic structure

2.3 Options

The following options are available:

- Island grid function
- EtherCAT interface

2.4 Views

2.4.1 Exterior View

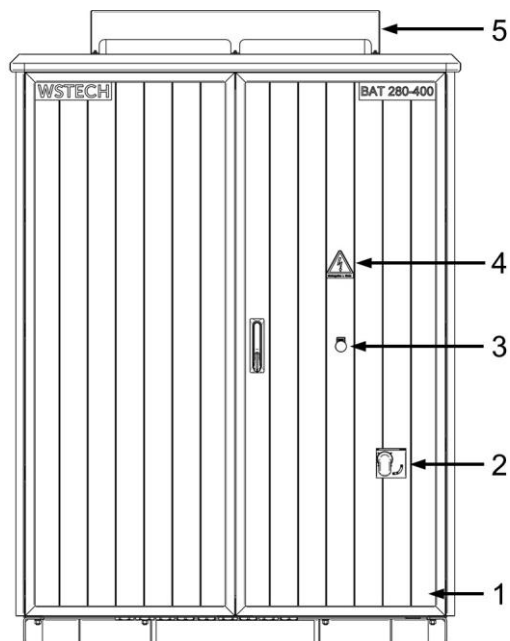


Figure 4: Exterior view front (+C1)

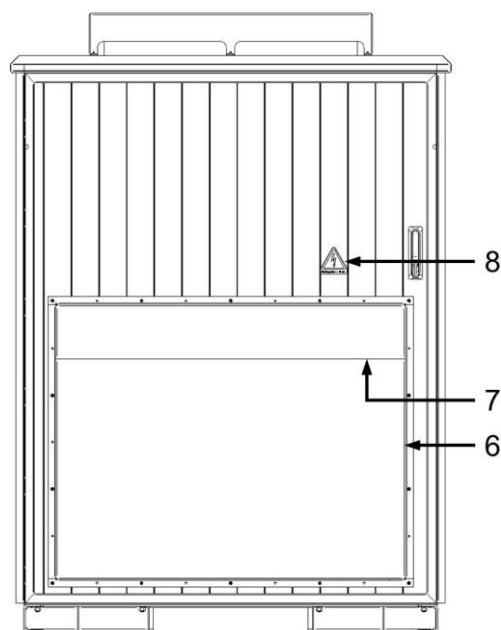


Figure 5: Exterior view back (+C2)

Pos.	Description
1	Type plate and option plate
2	Rotary handle for AC circuit breaker (-Q2)
3	Enable switch (-S1)
4	Safety sign
5	Cooling air outlet (with insect mesh)
6	Door cover
7	Cooling air inlet (with insect mesh)
8	Safety sign

2.4.2 Interior View

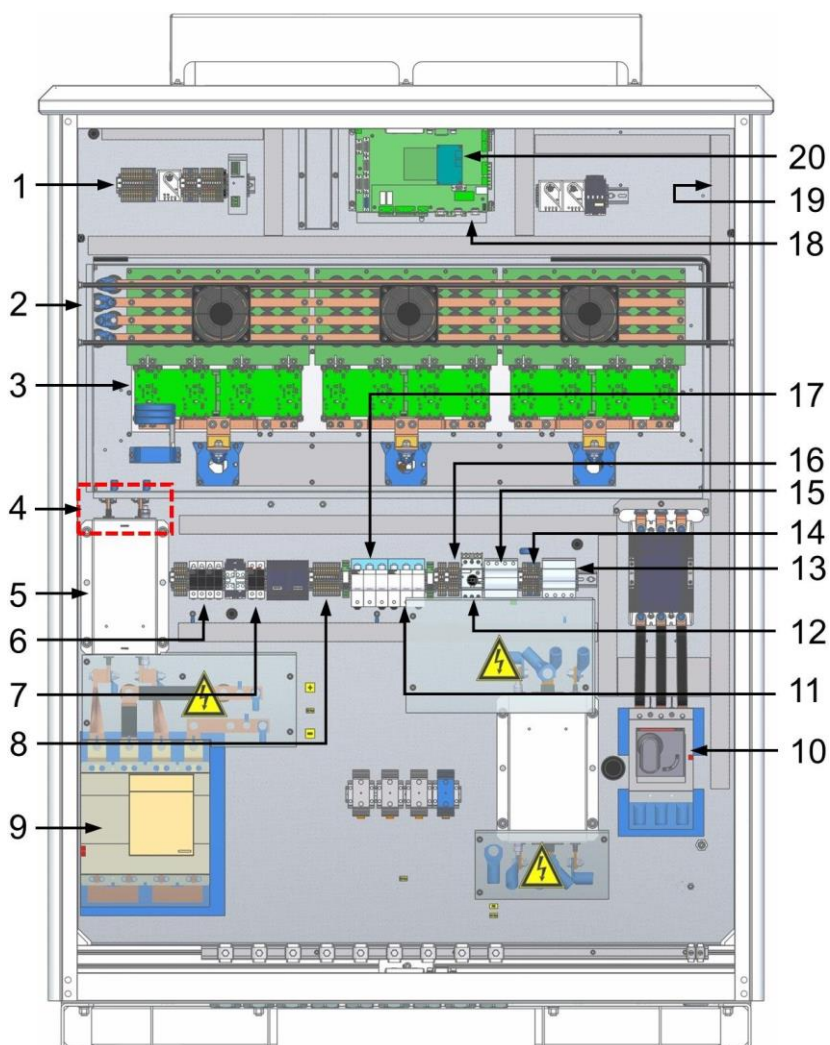


Figure 6: Interior view front (+C1)

Pos.	Description
1	Terminal strip (-X3), Current and voltage measurement
2	DC link
3	Power stack
4	DC link measurement points
5	DC EMC filter (-C1)
6	Fuse (-F10), (-F11), Precharge circuit
7	Fuse (-F8), Insulation monitoring device
8	Terminal strip (-X2), Feedback
9	DC circuit breaker (-Q1)
10	AC circuit breaker (-Q2)
11	Fuse (-F2), Harmonic filter
12	Motor protecting switch (-F31), Voltage measurement
13	Surge arrester (-F32), Supply voltage
14	Terminal strip (-X1), Supply voltage

Pos.	Description
15	Surge arrester (-F30), AC connection
16	Terminal strip (-X17), Island grid function (Option) and temperature measurement
17	Fuse (-F1), Notch filter
18	Control card (-A1; -A2)
19	Shock indicator
20	EtherCAT interface (-A3) (Option)

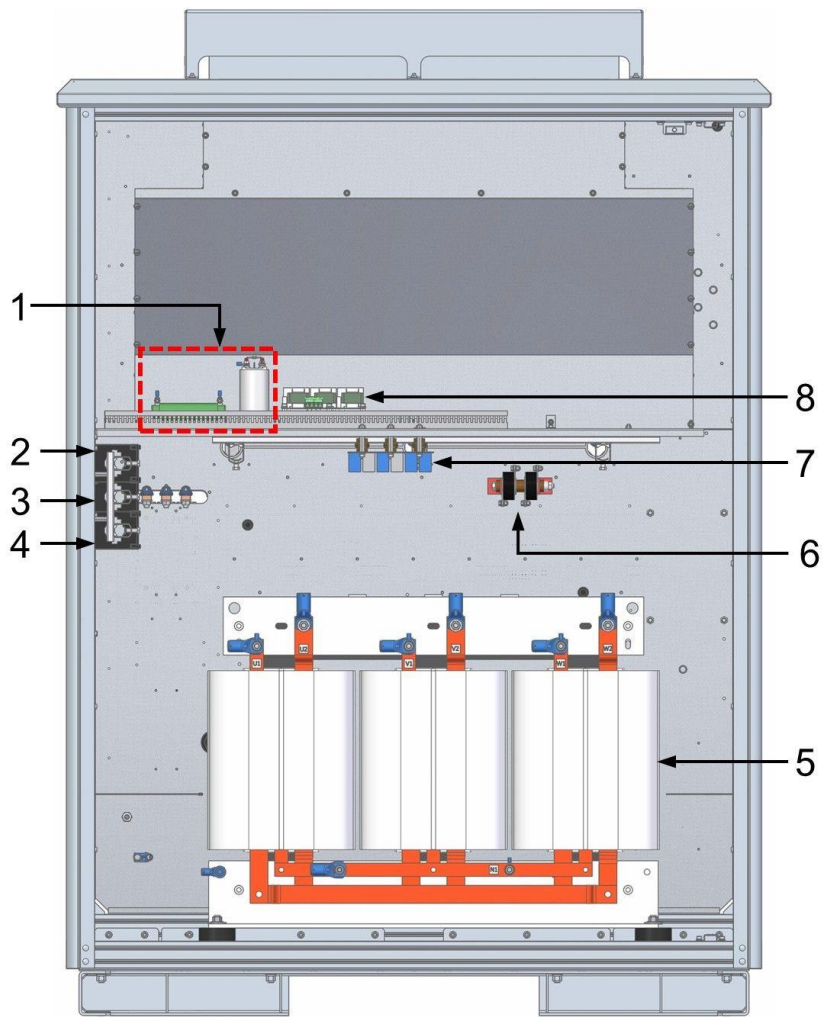




Figure 7: Interior view back (+C2)

Pos.	Description
1	Harmonic filter
2	Current sensor (-T3)
3	Current sensor (-T2)
4	Current sensor (-T1)
5	Transformer (-T4)
6	Resistors (-R1), (-R2), Precharge circuit
7	EMC filter (-A10)
8	Notch filter

3 Installation

	<p>NOTICE</p> <p>Damage to the product due to lightning!</p> <p>The product has NO lightning protection system. Absence of a lightning protection system can cause damage.</p> <ul style="list-style-type: none"> • The risk of lightning damage can be reduced by installing a lightning protection system.
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The manufacturer assumes no liability for any damage caused by lightning.

	<p>NOTICE</p> <p>Damage to the electrolytic capacitors and IGBTs!</p> <p>Long-term de-energized storage times can damage the electrolytic capacitors and IGBTs due to ingress of moisture.</p> <ul style="list-style-type: none"> • After a storage time of more than one year contact the customer service, before commissioning the product.
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3.1 Delivery


1. **Check** the shock indicators for transport damage. The shock indicators are inside of the product (Figure 6) and on the packaging. They indicate an improper transport.
 - ⇒ In case of damage, **contact** the freight forwarder.
2. **Check** the delivery for completeness (Table 2).
 - ⇒ If the delivery is not complete, **contact** the distributor.


Table 2: Scope of delivery

Description	Quantity
Battery charger	1
Cabinet key	2
Original Operating Instructions	1
Interface Description Modbus TCP and EtherCAT	1
Wiring diagram	1
Mounting materials	

The required material for installation, operation, commissioning is inside the product or in a separate package. If material is **not included in delivery** it is identified as not included in delivery.

3.2 Transport

	<p>DANGER!</p> <p>Danger to life due to falling loads!</p> <p>The product can fall or tip over when transported incorrectly, which may cause damage to the product and result in serious injury or death.</p> <ul style="list-style-type: none"> • Wear suitable personal protective equipment for all work on the product. • The product must only be transported by persons who have the knowledge described in section Target Audience. • Only transport the product using suitable transport facilities with sufficient load bearing capacity. • The product must be lifted in an upright position. • Do not stand under suspended loads. • Only remove the transport safeguards when the product is standing at the intended installation site.
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	<p>NOTICE</p> <p>Damage to the product when using hoisting gear (e.g. forklift)!</p> <p>The product can fall or tip over when transported incorrectly, which may cause damage to the product.</p> <ul style="list-style-type: none"> • Observe applicable safety regulations. • Extend the vehicle fork as far as possible. • Secure the product with belts to prevent tipping over.
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The manufacturer accepts no liability for damage caused through not complying with the terms of transport.

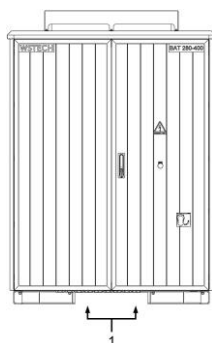


Figure 8: Transport

Pos.	Description
1	Forklift pocket

Figure 9 shows the dimension of the wooden box with pallet.

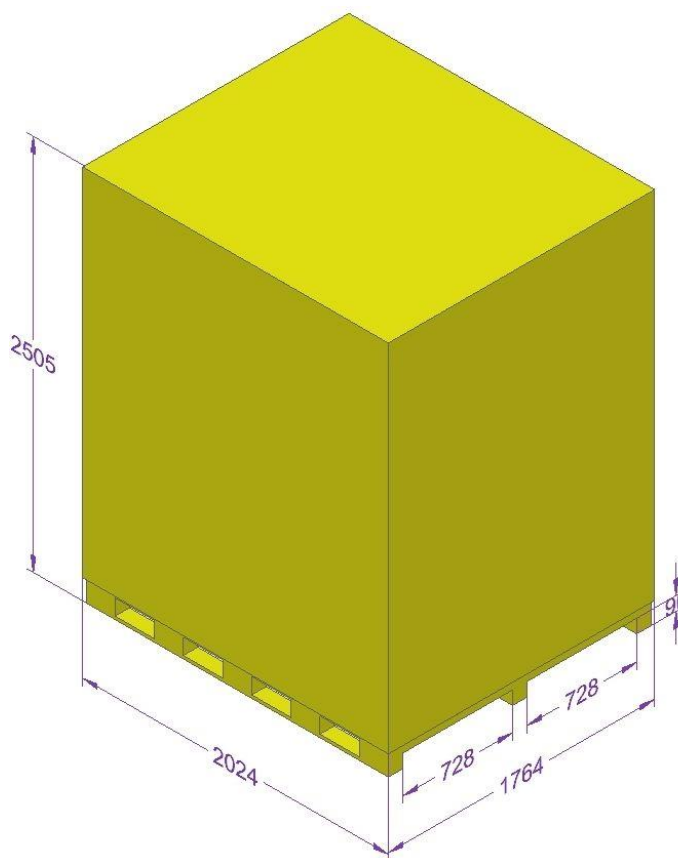


Figure 9: Transport wooden box with pallet (dimensioned)

3.3 Storage



NOTICE

Damage to the product due to incorrect storage!





Storage of the product with or without packaging as well as disconnected condition can lead to ingress of moisture and pollution.

- Packaging is only suitable for dry conditions.
- After unpacking, assemble and connect immediately **or** keep the product dry and clean.

The product must be stored only under the following conditions:

- Temperature: -25°C to 60°C
- Relative humidity: < 90 %

3.4 Installation Site

	<p>DANGER!</p> <p>Danger to life due to fire or explosion!</p> <p>Unsuitable installation sites can cause fire or explosion. This may cause damage to the product and result in serious injury or death.</p> <ul style="list-style-type: none">• No installation in potentially explosive atmospheres.• No installation on inflammable materials.• No installation in atmospheres, such as in the presence of inflammable materials.
 	<p>WARNING!</p> <p>Danger to life due to the product tipping over!</p> <p>When installed on an uneven foundation, the product can tip over. This may cause damage to the product and result in serious injury or death.</p> <ul style="list-style-type: none">• Wear suitable personal protective equipment for all work on the product.• The installation must be done on a stable and even foundation.• The foundation must be able to support the weight of the product.
	<p>NOTICE</p> <p>Damage to the product due to overheating!</p> <p>Insufficient cooling air can lead to damage or overheating of the product.</p> <ul style="list-style-type: none">• Ensure that sufficient cooling air at the installation site.

Requirements for the installation site:

- Foundation and formwork must be built according to applicable local regulations and standards.
- Ensure that there is sufficient room for installation, mounting, operation and repair.
- Required ambient conditions must be fulfilled (Table 11).
- Ensure that the minimum required distances for escape routes must be followed according to applicable local regulations and standards.
- The product must be positioned on a foundation that ensures sufficient air circulation. The moved cooling air volume can be seen in Table 11.
- The product must be properly positioned on the foundation.

Figure 10 shows the area of the cable entries. All dimensions are given in millimetres.

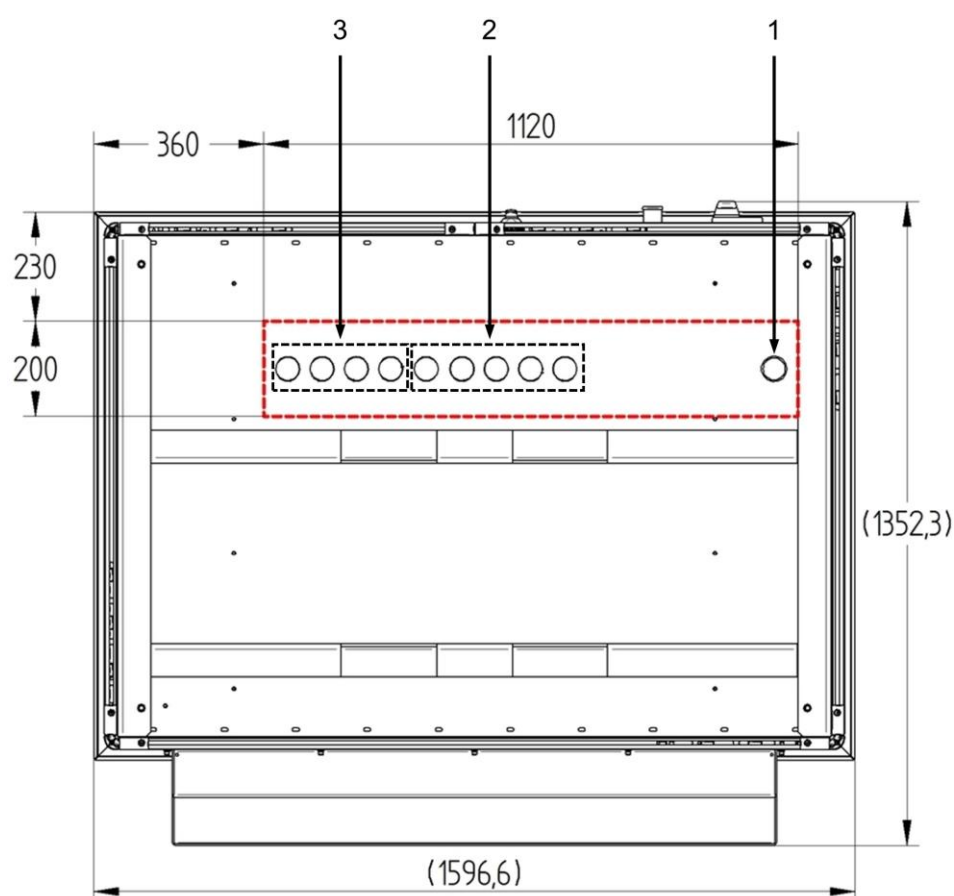


Figure 10: Cable entry area (bottom view)

Pos.	Description
1	Communication, measuring, supply voltage
2	AC connection
3	DC connection

Figure 11 shows the mounting points. All dimensions are given in millimetres.

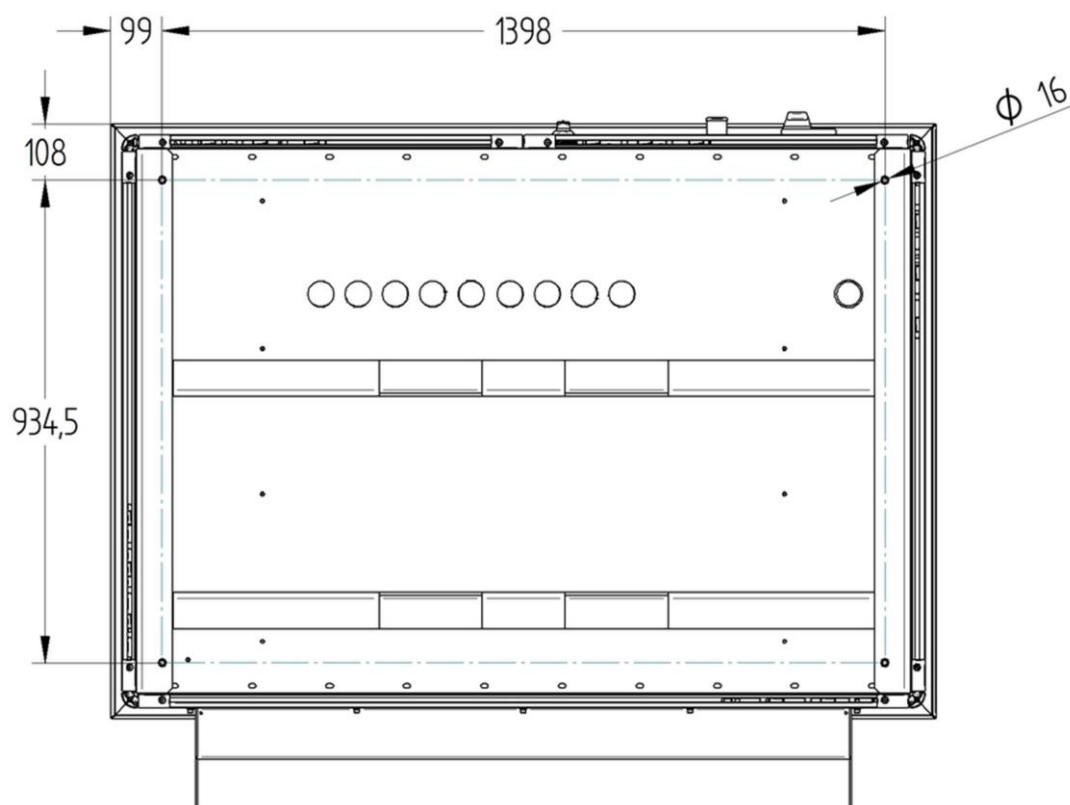


Figure 11: Mounting points (bottom view)

3.4.1 Distances

Following distances must be observed:




- **Front:** Minimum 600 mm with opened doors
- **Back:** Minimum 600 mm with opened door


On the sides is no specified distance needed.

3.4.2 Cooling

The air is sucked in from the rear (Figure 5), flows to the components to be cooled, and is blown out on the top of the product (Figure 4) by means of two radial fans mounted into a fan cover.

3.5 Connections

  	<p>DANGER!</p> <p>Danger to life due to electric shock!</p> <p>An incorrect selection and cable routing can cause damage to property or serious injury or death to persons.</p> <ul style="list-style-type: none"> • Wear suitable personal protective equipment for all work on the product. • Selection and installation of electrical equipment, cables and lines must comply to applicable local regulations and standards. • Ensure that the diameter of the cables and lines matches the diameters of the cable glands and connections. • Comply with the specified bend radii. • Offload the cables on both ends to relieve from pull and pressure. • Route only one cable through each gland.
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	<p>NOTICE</p> <p>Damage of protection device!</p> <p>All parameter changes to protection devices can cause damage.</p> <ul style="list-style-type: none"> • Do not change the parameters of protection devices without approval of the manufacturer. • Execute a trip test on the AC circuit breaker before commissioning the product.
--	--

Cable requirements:

- Compression cable lugs according to local regulations and standards.
- Minimum degree of protection IP20
- Cable entry grommets for AC connections and DC connections:
 - **Minimum:** Ø 22 mm
 - **Maximum:** Ø 36 mm
- Parameters for cable sizing can be seen in Table 10.

3.5.1 Required Connections

The following cables and lines must be prepared and in flawless condition, safe and de-energized:

- Grounding (Section 3.5.1.1)
- AC Connection (Section 3.5.1.2)
- DC Connection (Section 3.5.1.3)
- Supply Voltage (Section 3.5.1.4)
- Data Communication (Section 3.5.1.5)
- Option Island Grid Function (Section 3.5.1.6)

3.5.1.1 Grounding

Required material:

- 1 x M10x20 mm hexagon screw
- 1 x Ø 10.5 mm conical spring washer

Procedure:

1. **Route** the cable through the cable entry grommet.
2. **Connect** the PE conductor to the press-in nut (Figure 12).
3. **Tighten** the screw with a torque of **44 Nm**.

NOTICE: *The cable lug must be suitable for a M10 screw.*

4. **Fix** the cable with a cable clamp.

3.5.1.2 AC Connection

Prerequisites:

- All grid parameters must be fulfilled (Section 11.2.1).

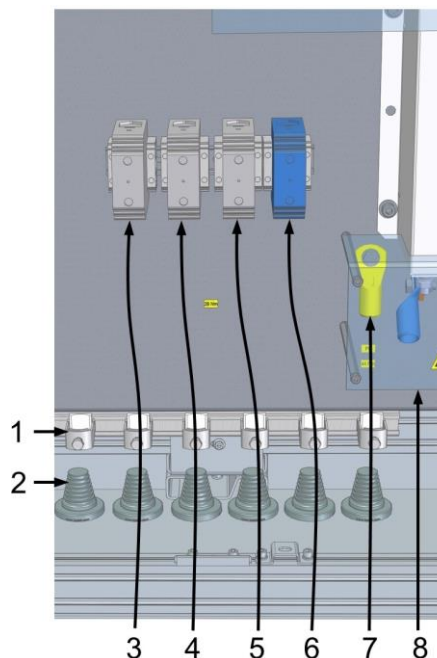


Figure 12: AC connection

Pos.	Description
1	Cable clamp
2	Cable entry grommet
3	L1 phase connection
4	L2 phase connection
5	L3 phase connection
6	Neutral conductor connection
7	PE conductor connection
8	Protective cover

Procedure:

1. **Observe** the sequence (Figure 12).
2. **Route** the cables through the cable entry grommets.
3. **Connect** the cables for L1, L2, L3 and N to the corresponding terminals (-X14).
4. **Tighten** the screws with a torque of **28 Nm**.

NOTICE: The terminals are suitable for conductor cross-section of maximum 240 mm².

5. **Fix** the cables with cable clamps.

3.5.1.3 DC Connection

Prerequisites:

If the battery has no circuit breaker or fuse, a circuit breaker or fuse **must** be installed between the battery and the product. This must be able to securely switch off the short-circuit current of the battery under fault conditions.

Required material:

- 4 x M8x20 mm hexagon screws
- 4 x Ø 8.4 mm conical spring washers

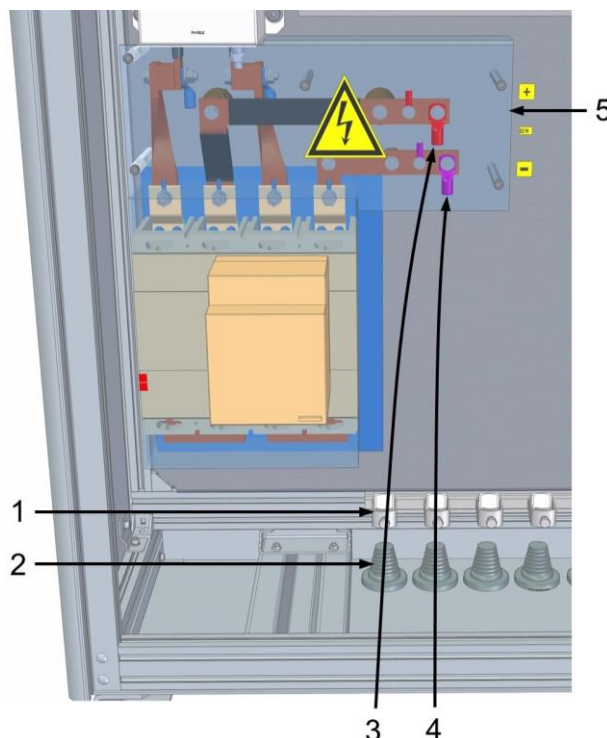


Figure 13: DC connection

Pos.	Description
1	Cable clamp
2	Cable entry grommet
3	DC (+)
4	DC (-)
5	Protective cover

Procedure:

1. **Remove** the protective cover (Figure 13).
2. **Check** the correct polarity.
3. **Route** the cables through the cable entry grommets.
4. **Connect** the DC (+) and DC (-) cables onto the corresponding terminals.
5. **Tighten** the screws with a torque of **22 Nm**.

NOTICE: The compression cable lug must be suitable for a M8 screw.

6. **Mount** the protective cover.
7. **Fix** the cables with cable clamps.

3.5.1.4 Supply Voltage

The supply voltage (optional UPS with buffered output voltage) feeds the fans, control and heating.

Requirements:

- Product operates with a supply voltage of 230 V_{AC}/50Hz/TN-grid.
- Supply lines must be connected and secured by means of a 16 A miniature circuit breaker with tripping characteristic B or a 16 A fuse with tripping characteristic gG.

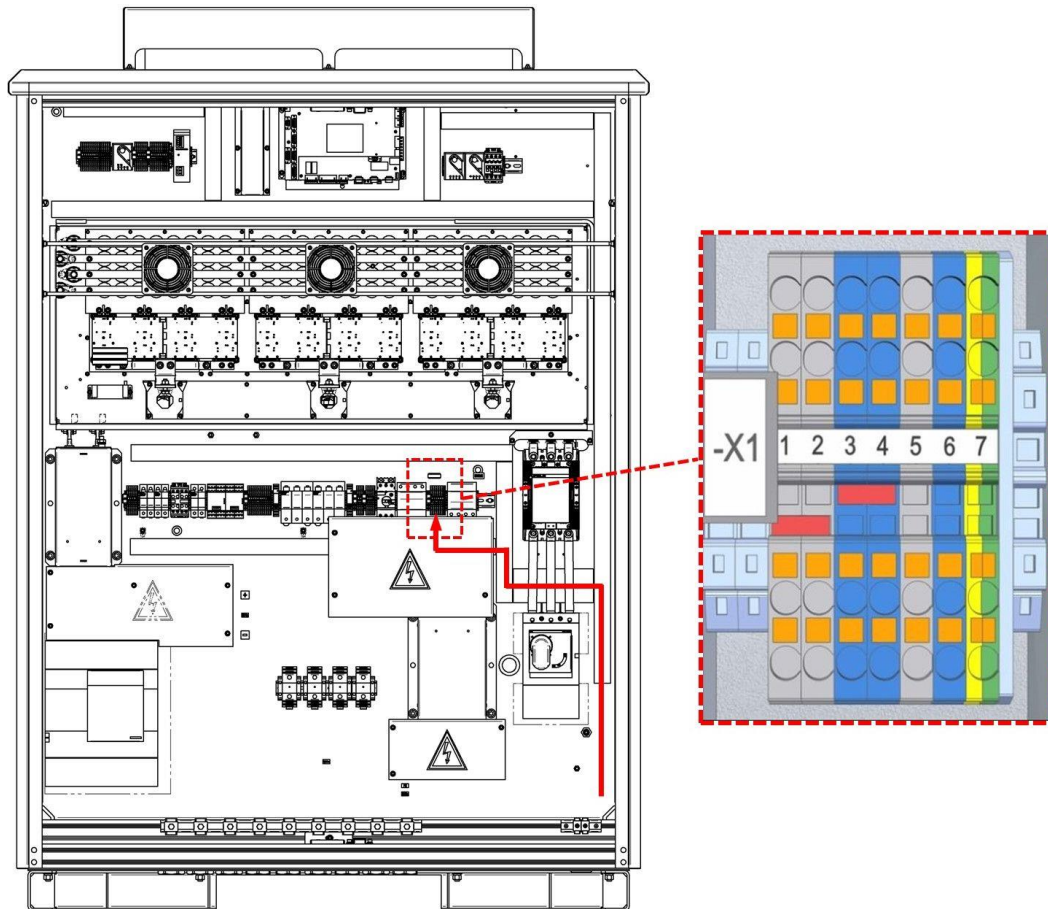


Figure 14: Connection supply voltage (-X1)

Depending on the demand the connection can be done in two ways:

Variant 1: Buffered supply voltage via an UPS

Procedure:


1. **Locate** terminal strip (-X1) (Figure 14).
2. **Open** corresponding cable ducts.
3. **Route** the cable through the cable entry grommet.
4. **Connect** PE, N and L conductor of the **UPS** to the terminal strip (-X1):
 - ⇒ Protective conductor PE to (-X1.7)
 - ⇒ Neutral conductor N to (-X1.3) or (-X1.4)
 - ⇒ Phase L to (-X1.1) or (-X1.2)
5. **Connect** PE, N and L conductor of the **unbuffered supply voltage** to the terminal strip (-X1):
 - ⇒ Protective conductor PE to (-X1.7)
 - ⇒ Neutral conductor N to (-X1.6)
 - ⇒ Phase L to (-X1.5)
6. **Close** cable ducts.
7. **Fix** the cables with cable clamps.

Variant 2: Unbuffered supply voltage

Procedure:

1. **Locate** terminal strip (-X1) (Figure 14).
2. **Open** corresponding cable ducts.
3. **Route** the cable through the cable entry grommet.
4. **Bridge** the terminals as follows:
 - ⇒ (-X1.1) or (-X1.2) to (-X1.5)
 - ⇒ (-X1.3) or (-X1.4) to (-X1.6)
5. **Connect** PE, N and L conductor to the terminal strip (-X1):
 - ⇒ Protective conductor PE to (-X1.7)
 - ⇒ Neutral conductor N to (-X1.6)
 - ⇒ Phase L to (-X1.5)
6. **Close** cable ducts.
7. **Fix** the cable with a cable clamp.

3.5.1.5 Data Communication

	<p>NOTICE</p> <p>Damage to the product due to overvoltage!</p> <p>Overvoltage can be generated by lightning, by capacitive or inductive interferences of another electric systems.</p> <ul style="list-style-type: none"> Ensure that a surge arrester is available, if an Ethernet cable is routed to the control card.
---	---

The data communication with the product is provided via the network connection of the control card.

Required material (not included in scope of delivery):

- Network cable with RJ45 plug

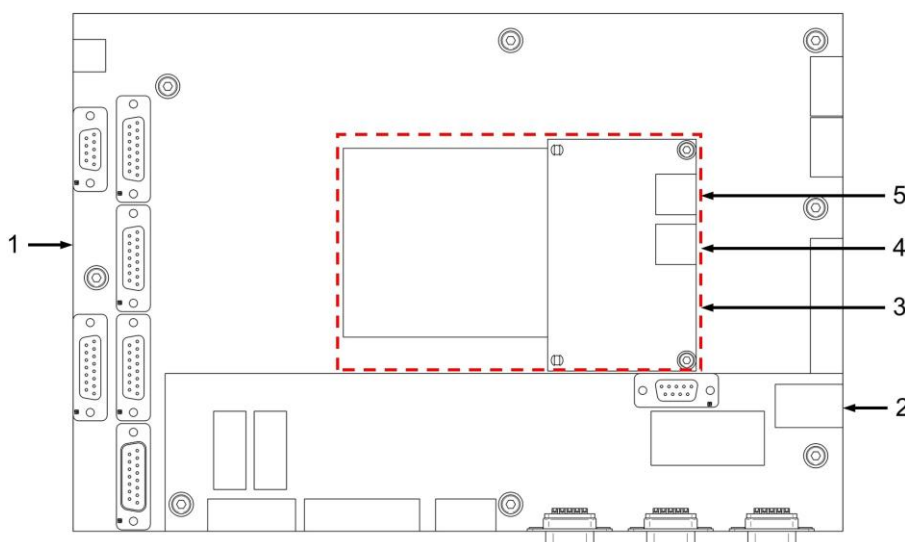


Figure 15: Connection data communication

Pos.	Description
1	Control card
2	Ethernet connection
3	Option EtherCAT interface
4	Input Option EtherCAT interface
5	Output Option EtherCAT interface

Procedure:

- Route** the cable through the cable entry grommet.
- Connect** the cables according to Figure 15.
- Lead** the cables downwards at the inner side of the cabinet.
- If necessary, **fix** the cables with cable straps.

3.5.1.6 Option Island Grid Function

If the product has the island grid function, an external voltage (+24 V_{DC}) must be applied on the terminals (-X17.1-2) so that the product can also operate parallel to the grid. By disconnecting the external voltage via an external disconnecting device, the product can establish an island grid.

The terminals (-X17.1-2) are implemented as a potential-free feedback contact. A signal on this feedback contacts manages the switching in and out of the island grid mode.

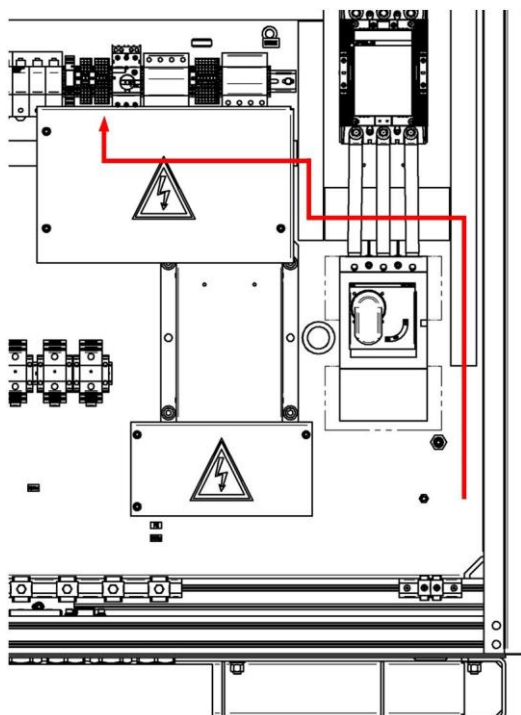


Figure 16: Cable routing terminal strip (-X17)

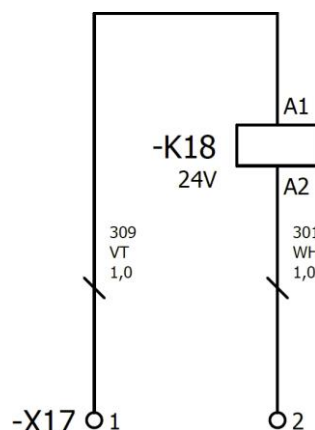


Figure 17: Wiring diagram extract terminal strip (-X17)

Procedure:

1. **Locate** terminal strip (-X17) (Figure 16).
2. **Open** the corresponding cable ducts.
3. **Route** the cable through the cable entry grommet.
4. **Connect** power supply (+24 V_{DC}) (Figure 17):
 - DC (+) to terminal (-X17.1)
 - DC (-) to terminal (-X17.2)
5. **Close** the cable ducts.
6. **Fix** the cable with a cable clamp.

3.5.2 Optional Connections

The following cables and lines must be in flawless condition, safe and de-energized:

- Feedback Operating Status (Section 3.5.2.1)
- Feedback Enable Switch (Section 3.5.2.2)
- Feedback Insulation Monitoring Device (Section 3.5.2.3)
- External Disconnecting Device (Section 3.5.2.4)
- External Voltage Measurement Device (Section 3.5.2.5)
- External Current Measurement Device (Section 3.5.2.6)
- External Temperature Measurement Device (Section 3.5.2.7)

3.5.2.1 Feedback Operating Status

The operating status of the control card feedback contacts can be queried via terminals (-X2.1-3).

Operating status	Terminal	Contact
Ready for operation	(-X2.1) to (-X2.2)	open
	(-X2.1) to (-X2.3)	close
Not Ready for operation	(-X2.1) to (-X2.2)	close
	(-X2.1) to (-X2.3)	open

3.5.2.2 Feedback Enable Switch

The feedback contact of the Enable switch can be queried via the terminals (-X2.8-9) (Figure 18).

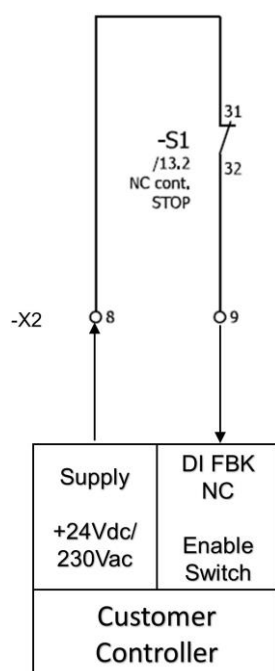


Figure 18: Feedback Enable switch

3.5.2.3 Feedback Insulation Monitoring Device

The feedback contact of the insulation monitoring device can be queried via terminals (-X2.10-12). The connection is provided as potential-free feedback contact.

Mode of operation of the insulation monitoring device:

If the measured value of the insulation resistance drops below the set threshold value, the output relays switch into the fault state. If the measured value exceeds the threshold value plus hysteresis, the output relays switch back into their original state.

Table 3: Feedback of insulation monitoring device

Relay state	Terminals	State
Original state	(-X2.10) to (-X2.12)	closed
	(-X2.10) to (-X2.11)	open
Fault state	(-X2.10) to (-X2.12)	open
	(-X2.10) to (-X2.11)	closed

3.5.2.4 External Disconnecting Device

The customer can integrate an external disconnecting device (NC characteristic, potential-free) into the Enable circuit.

Procedure:

1. **Locate** the terminal strip (-X2) (Figure 6).
2. **Open** the corresponding cable duct.
3. **Remove** the cable bridge between the terminals (-X2.5-6).
4. **Route** the cables through the cable entry grommet.
5. **Connect** a disconnecting device between the terminals (-X2.5-6).
6. **Close** cable duct.

3.5.2.5 External Voltage Measurement Device

Required material (not include in scope of delivery):

- Voltage measuring device

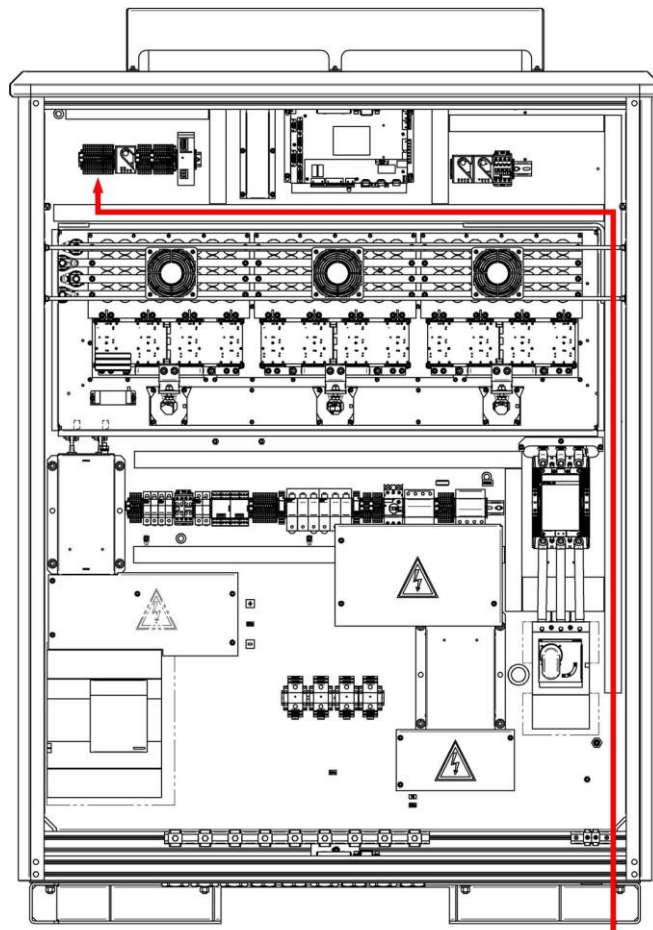


Figure 19: Cable routing terminal strip (-X3)

Procedure:

1. **Locate** the terminal strip (-X3) (Figure 19).
2. **Open** the corresponding cable ducts.
3. **Route** the cables through the cable entry grommet.
4. **Connect** the cables to the terminal strip (-X3):
 - Phase **L1** on (-X3.11)
 - Phase **L2** on (-X3.12)
 - Phase **L3** on (-X3.13)
 - Neutral conductor **N** on (-X3.14)
5. **Close** cable ducts.
6. **Fix** the cable with a cable clamp.

3.5.2.6 External Current Measurement Device

Required material (not include in scope of delivery):

- Current measuring device

Procedure:

1. **Locate** the terminal strip (-X3) (Figure 19).
2. **Open** the corresponding cable ducts.
3. **Route** the cable through the cable entry grommet.
4. **Remove** the cable bridges between terminals:
(-X3.1) to (-X3.2)
(-X3.3) to (-X3.4)
(-X3.5) to (-X3.6)
5. **Connect** the measuring devices to the following terminals:
For phase **L1** (-X3.1) to (-X3.2)
For phase **L2** (-X3.3) to (-X3.4)
For phase **L3** (-X3.5) to (-X3.6)
6. **Close** cable duct.
7. **Fix** the cable with a cable clamp.

3.5.2.7 External Temperature Measurement Device

Required material (not include in scope of delivery):

- Temperature sensor (e.g. Pt100)

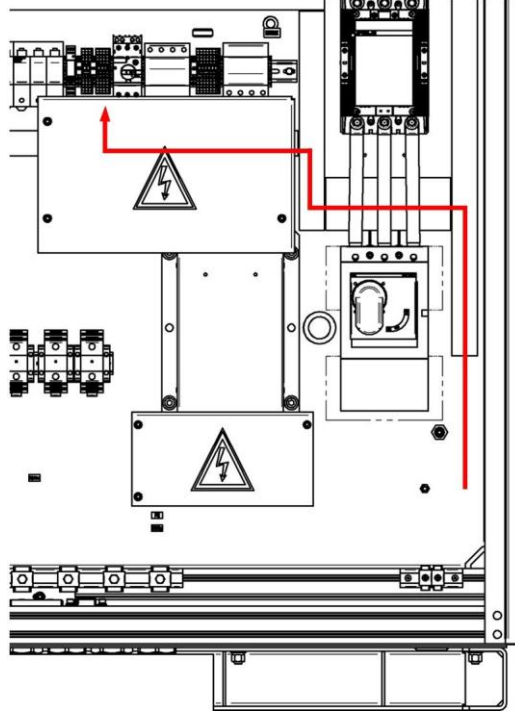


Figure 20: Cable routing terminal strip (-X17)

Procedure:

1. **Locate** the terminal strip (-X17) (Figure 20).
2. **Open** the corresponding cable ducts.
3. **Route** the cable through the cable entry grommet.
4. **Connect** the lines to the terminals (-X17.3) and (-X17.4).
5. **Close** cable ducts.
6. **Fix** the cable with a cable clamp.

3.6 After Installation

After installation the following items must be checked:

- No waste packaging, waste and tools within the product
- No transportation and installation damages occurred.
- Connection lines and terminals are properly connected and the torque has been checked.
- If any of the foregoing is not ensured, the product may be damaged. The manufacturer disclaims any and all liability for damages resulting from a failure to following the listed steps in this Section 3.6.

4 Commissioning



WARNING!

Danger to life due to incorrect installation!

If the product is not installed correctly it may cause damage to the product and result in serious injury or death to persons within the products vicinity.

- Carry out the installations as described in Section **Installation** to ensure a safe and proper operation.



NOTICE



Damage to the product due to incorrect commissioning!

Incorrect commissioning can damage the product.



- Commissioning the product via the user interfaces is described in the *Interface Description*.

4.1 Transport Securing

 	<p>WARNING!</p> <p>Risk of injury due to flying cable tie pieces!</p> <p>The cable ties are under tension, pieces can cause injury when cutting.</p> <ul style="list-style-type: none">• Wear suitable personal protective equipment.
--	---

During transportation the transformer is secured with cable ties. Before commissioning, the cable ties must be removed.



Figure 21: Example of transport securing

Procedure:

1. **Open** the back door.
2. **Remove** all cable ties that are used for transport securing.
3. **Close** the back door.

4.2 Preparing Commissioning

Prerequisite:

- Conditions for operation must be fulfilled (Section 11.2).

Procedure:

1. **Ensure** that the Enable switch pressed.
2. **Ensure** that the product is de-energized.
3. **Ensure** that all fuses are inserted (Figure 6).
4. **Ensure** that the motor protecting switch (-F31) is in position **I** (Figure 6).
5. **Ensure** that the sliding switch of the DC circuit breaker (-Q1) is in position **AUTO**.
6. **Ensure** that the AC circuit breaker (-Q2) is in position **OFF**.
7. **Ensure** that all cables and lines are undamaged, connected correctly and in proper condition.
8. **Connect** the PE conductor (Section 3.5.1.1)
9. **Connect** the supply voltage (Section 3.5.1.4).
10. **Connect** the batteries to the corresponding terminals (Section 3.5.1.3).
11. **Connect** the product to the grid (Section 3.5.1.2).
12. **Ensure** that the screws on all connections and terminals have the correct torque.

4.3 Performing Measurements before Operation



WARNING!

Risk of injury due to high voltage when measuring!

Improper measurements at high voltage can cause injury.

- Perform measurements only with appropriate measurement devices.
- During measurement, all circuit breakers must be switched in position **OFF** and all fuse inserts must be removed.
- The product must only be started by persons who have all skills described in section Target Audience.



NOTICE

Damage to measuring device due to overvoltage!

Measurements with the incorrect measuring range can cause damages.

- Use only measuring devices with the correct measuring range.

Procedure:

1. **Measure** the DC voltage from plus to minus connection at the DC circuit breaker inside the product (Figure 13).

NOTICE: The voltage must be positive, and the measured values must be within the specified limits (Table 10).

2. **Measure** the AC voltage on the bottom terminals (-X14) (Figure 12):
 - ⇒ Phase to Phase
 - ⇒ Phase to N
 - ⇒ Phase to PE

NOTICE: The measured values must be within the specified limits (Table 10).

3. **Ensure** that the AC voltage have a clockwise rotary field.
4. **Close** doors.
5. **Pull out** the Enable switch.
6. **Switch** the AC circuit breaker in position **ON**. The DC circuit breaker is operated automatically.

NOTICE: Operation is started after the appropriate checks via the user interface.

5 Operation

5.1 User Interfaces

The product has two user interfaces:

- Modbus TCP interface
- Ethernet/EtherCAT interface

5.2 Operating Modes

The operating modes and switching between them are carried out by external control via the Ethernet interface. Controlling the product via the Ethernet interface is described in the *Interface Description*.

Error monitoring is active in each operating state. If an error occurs, all functions of the product are stopped automatically. An error message is available via the Modbus TCP interface. When the cause of the error is eliminated, the product must be reset via the higher-level control to restart operation.

5.3 Enable Switch

Pressing the Enable switch opens the AC and DC circuit breakers.

When all possible errors are eliminated, the Enable switch may be pulled out. The product restarts operation after the Enable switch has been pulled out and the product has been reset by means of the higher-level control.

NOTICE: The red-marked areas are under voltage when the AC/DC cables are not disconnected externally (Figure 22). The blue-marked area shows the DC link voltage.

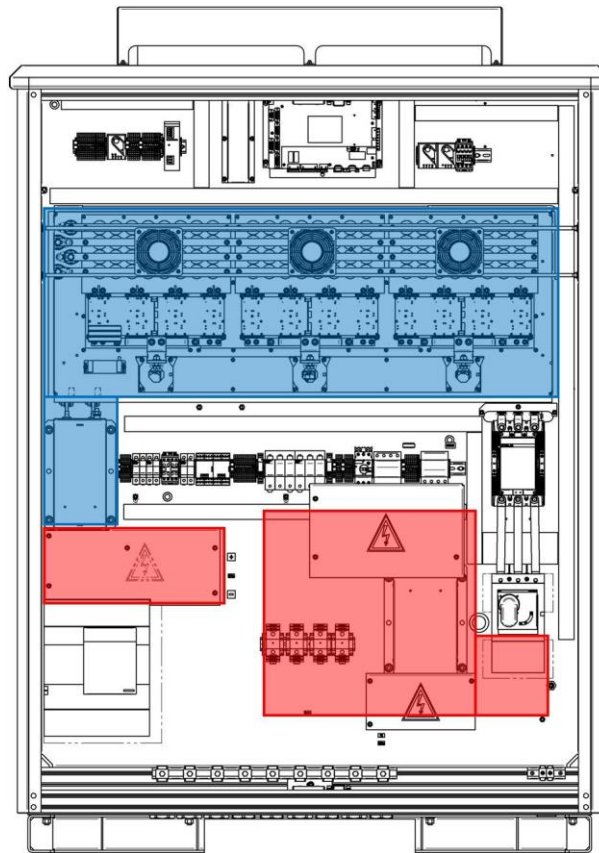


Figure 22: Danger areas



5.4 Starting the Product

Procedure:

1. **Switch** the AC circuit breaker in position **ON**. The DC circuit breaker is operated automatically.

NOTICE: Operation is started after the appropriate checks via the user interface.

5.5 Performing Measurements

	<p>DANGER!</p> <p>Danger to life from electric shock if the product is not locked!</p> <p>After stopping the product dangerous voltage is present.</p> <ul style="list-style-type: none">• Perform measurements only with closed doors.
	<p>NOTICE</p> <p>Damage to measuring device due to overvoltage!</p> <p>Performing measurements with the incorrect measuring range can cause damages to the measuring device.</p> <ul style="list-style-type: none">• Use only measuring devices with the correct measuring range.

5.5.1 AC Voltage

Requirements for measuring the AC voltage externally:

- The motor protecting switch (-F31) must be in position **I** (Figure 6).

Procedure:

1. **Ensure** that the measuring device is connected (Section 3.5.2.5).
2. **Start** the product (Section 5.4).
3. **Check** if the values are within the specified limits (Table 10).

5.5.2 AC Current

Procedure:

1. **Ensure** that the measuring device is connected (Section 3.5.2.6).
2. **Start** the product (Section 5.4).

NOTICE: The internal current sensors (Figure 7) have a translation ratio of 800/1A.

3. **Check** if the values of the AC current are within the specified limits (Table 10).

5.5.3 Ambient Temperature

The product offers the possibility to show the ambient temperature on the customer interface.

Procedure:



1. **Ensure** that the temperature sensor is connected (Section 3.5.2.7).
2. **Start** the product (Section 5.4).
3. **Check** if the values are within the limits of the specified limits (Table 11).

5.6 Stopping the Product

Procedure:

1. **Set** the product in operation mode **OFF** via the user interface.
2. **Switch** the AC circuit breaker in position **OFF**. The DC circuit breaker is operated automatically.

6 Troubleshooting

 	<p>WARNING!</p> <p>Risk of injury due to improper condition of the product!</p> <p>Incorrect troubleshooting can lead to serious bodily injury or death and/or property damage.</p> <ul style="list-style-type: none">• Wear suitable personal protective equipment for all work on the product.• Troubleshooting must be done only by authorized and trained electricians.• If the displayed failure cannot be eliminated locally, contact customer service.
--	---

Error messages and the associated error codes can be displayed via the user interface. The description of the error codes and troubleshooting is part of the *Interface Description*.

Depending on the occurred error, the product changes the operating mode.

If the product switches off due to an error, the error must be reset before the product can be switched on again. A reset can be done automatically or manually.

6.1 BAT Error Codes

Table 4: Extract of BAT Error Codes

Code	Error Description	Corrective Action
11	temperature_high_L1_HW	Check cooling
12	temperature_high_L1_SW	Check cooling
13	temperature_high_L2_HW	Check cooling
14	temperature_high_L2_SW	Check cooling
15	temperature_high_L3_HW	Check cooling
16	temperature_high_L3_SW	Check cooling
17	temperature_high_PT100_X108A12	Check cooling
18	temperature_high_PT100_X108A34	Check cooling
19	temperature_high_PT100_X108B12	Check cooling
20	temperature_high_PT100_X108B34	Check cooling
21	temperature_high_board	Check cooling
22	temperature_low_L1_SW	Check heating
23	temperature_low_L2_SW	Check heating
24	temperature_low_L3_SW	Check heating
25	temperature_low_PT100_X108A12	Check heating
26	temperature_low_PT100_X108A34	Check heating
27	temperature_low_PT100_X108B12	Check heating
28	temperature_low_PT100_X108B34	Check heating
29	temperature_low_board	Check heating
66	Overvoltage_grid_L1,_stage_1	Check Grid voltage
67	Overvoltage_grid_L1,_stage_2	Check Grid voltage
68	Overvoltage_grid_L1,_stage_3	Check Grid voltage
71	Overvoltage_grid_L2,_stage_1	Check Grid voltage
72	Overvoltage_grid_L2,_stage_2	Check Grid voltage
73	Overvoltage_grid_L2,_stage_3	Check Grid voltage
76	Overvoltage_grid_L3,_stage_1	Check Grid voltage
77	Overvoltage_grid_L3,_stage_2	Check Grid voltage
78	Overvoltage_grid_L3,_stage_3	Check Grid voltage
81	Overvoltage_DC_board	Check DC voltage
82	Overvoltage_DC_SW	Check DC voltage
116	Undervoltage_grid_L1,_stage_1	Check Grid voltage
117	Undervoltage_grid_L1,_stage_2	Check Grid voltage
118	Undervoltage_grid_L1,_stage_3	Check Grid voltage
121	Undervoltage_grid_L2,_stage_1	Check Grid voltage
122	Undervoltage_grid_L2,_stage_2	Check Grid voltage
123	Undervoltage_grid_L2,_stage_3	Check Grid voltage
126	Undervoltage_grid_L3,_stage_1	Check Grid voltage
127	Undervoltage_grid_L3,_stage_2	Check Grid voltage
128	Undervoltage_grid_L3,_stage_3	Check Grid voltage
131	Undervoltage_DC_board	Check DC voltage
132	Undervoltage_DC_SW	Check DC voltage
151	DC_circuit_breaker_tripped	Check DC circuit
155	AC_circuit_breaker_tripped	Check AC circuit
156	Emergency_Stop_S1	Check Emergency

Table 5: Extract of BAT Error Codes (continued)

Code	Error Description	Corrective Action
157	OV-Protection_/_Filter_Fuses	Check OV-Protection
158	Insulation Error	Check Insulation
161	Inverter_HW_Error_L1	Check Powerstack
162	Inverter_HW_Error_L2	Check Powerstack
163	Inverter_HW_Error_L3	Check Powerstack
164	Port_Idc_error	Check Idc-Sensor connection
169	Precharge_DC-Link	Check Precharge circuit Check DC-Source
171	Grid_rotation	Check grid rotation
172	Switch_on_condition failed	Check Grid voltage / frequency
174	Frequency_error	Check frequency
175	Island_Grid_detected	Check Grid voltage

6.1.1 BAT Error Codes 11-21

Corrective action:

1. **Clean** the cooling air inlet and cooling air outlet (Figure 4, Figure 5).
2. **Check** the insect meshes (cooling air inlet and outlet) for pollutions.
⇒ If insect meshes are polluted, **remove** insect meshes on back and top of housing.

NOTICE: The covers are connected with the PE conductor to the cabinet.

3. **Clean** insect meshes.
4. **Fix** insect meshes.

6.1.2 BAT Error Codes 22-29

Corrective action:

1. **Check** if the ambient temperature is within the specified limits (Table 11).

6.1.3 BAT Error Codes 66-68, 71-73, 76-78, 116-118, 121-123, 126-128, 175

Corrective action:

1. **Ensure** that the motor protecting switch (-F31) in position I.
2. **Measure** the AC voltage.
3. **Check** if the values are within the specified limits.
⇒ The values can be seen in the *Interface Description*.

6.1.4 BAT Error Codes 81, 82, 131, 132

Corrective action:

1. **Measure** the DC voltage. (Section 4.3)
2. **Check** if the values are within the specified limits.
⇒ The values can be seen in the *Interface Description*.

6.1.5 BAT Error Codes 151, 155

Corrective action:

1. **Check** if the AC circuit breaker is in position **TRIPPED**.
 - ⇒ If the AC circuit breaker is in position **TRIPPED**, then **switch** the AC circuit breaker in position **OFF**.
 - ⇒ Afterwards **switch** the AC circuit breaker in position **ON**.

6.1.6 BAT Error Code 156

Corrective action:

1. **Check** if the Enable switch is pressed (Figure 4).
 - ⇒ If the Enable switch is pressed, then **pull out switch** the Enable switch.
2. **Check** if the cabinet doors are closed (Figure 4, Figure 5).
 - ⇒ If the cabinet doors are opened, **close** the cabinet doors.

6.1.7 BAT Error Code 157

Corrective action:

1. It is recommended to **replace** all surge arrester modules, if the indication shows a red flag.
 - ⇒ **Locate** surge arresters (-F30) and (-F32) (Figure 6).
 - ⇒ **Use** surge arresters of the spare parts list (Table 9).
2. It is recommended to **check** all fuses of the notch filter (-F1) and harmonic filter (-F2).
 - ⇒ **Located** fuses (Figure 6).
 - ⇒ **Use** fuses of the spare parts list (Table 9).

6.1.8 BAT Error Code 158

Corrective action:

1. **Check** if there is a short-circuit to ground in the battery.

6.1.9 BAT Error Codes 161-163

Corrective action:

1. **Contact** customer service.

6.1.10 BAT Error Code 164

Corrective action:

1. **Contact** customer service.

6.1.11 BAT Error Code 169

Corrective action:

1. **Contact** customer service.

6.1.12 BAT Error Code 171

Corrective action:

1. **Ensure** that the AC voltage have a clockwise rotary field.

6.1.13 BAT Error Codes 172, 174

Corrective action:

1. **Ensure** that the motor protecting switch (F31) is in position **I**.
2. **Measure** the AC voltage and grid frequency.
3. **Check** if the values are within the specified limits.
⇒ The values can be seen in the *Interface Description*.

6.2 BAT Warning Codes *Table 6: Extract of BAT Warning Codes*

Code	Warning Description	Corrective Action
12	temperature_high_L1	Reduce power/check cooling
14	temperature_high_L2	Reduce power/check cooling
16	temperature_high_L3	Reduce power/check cooling
17	temperature_high_PT100_X108A12	Reduce power/check cooling
18	temperature_high_PT100_X108A34	Reduce power/check cooling
19	temperature_high_PT100_X108B12	Reduce power/check cooling
20	temperature_high_PT100_X108B34	Reduce power/check cooling
21	temperature_high_board	Reduce power/check cooling
22	temperature_low_L1	Check heating
23	temperature_low_L2	Check heating
24	temperature_low_L3	Check heating
25	temperature_low_PT100_X108A12	Check heating
26	temperature_low_PT100_X108A34	Check heating
27	temperature_low_PT100_X108B12	Check heating
28	temperature_low_PT100_X108B34	Check heating
29	temperature_low_board	Check heating
170	Overvoltage protection fault	Check OV protection and filter fuses

6.2.1 BAT Warning Codes 12, 14, 16, 17-21

Corrective action:

1. **See** Section 6.1.1.

6.2.2 BAT Warning Codes 22-29

Corrective action:




1. **See** Section 6.1.3.

6.2.3 BAT Warning Code 170

Corrective action:

1. **See** Section 6.1.7.

7 Maintenance

 	<p>DANGER!</p> <p>Danger to life due to high voltage!</p> <p>After stopping the product dangerous voltage is present in the product. Touching live parts can result in death or serious injury due to electric shock.</p> <ul style="list-style-type: none">• Wear suitable personal protective equipment for all work on the product.• Before working on the product, check that it is switched off and safeguarded against reconnection.• After switching off the product, observe a minimum wait time of at least 30 minutes prior to opening.• Use a test device to ensure that no residual voltage is present in the DC link.• No protection or security device may be temporarily or permanently removed, altered or adjusted.• Observe all warnings from the battery manufacturer.• Observe that the AC/DC cables are still under voltage if they are not disconnected from the product externally.
	<p>WARNING!</p> <p>Risk of injury due to improper maintenance!</p> <p>Incorrect maintenance can lead to serious bodily injury or property damage.</p> <ul style="list-style-type: none">• Maintenance intervals must be followed strictly.• It must be ensured that no tools, loose parts or similar are left in the system.

Procedure:

1. **Set** operation mode to **OFF** via the user interface.
2. **Switch** the AC circuit breaker to position **OFF**. The DC circuit breaker is operated automatically.
3. **Disconnect** the AC/DC voltage and supply voltage externally.
4. **Ensure** that the product is de-energized.

7.1 Maintenance every 12 Month

NOTICE: During each maintenance interval, the following points must be checked.

Table 7: Maintenance in de-energized condition (every 12 months)

Maintenance Tasks	See
Visual Inspection of Housing	Section 7.2.1
Visual Inspection of Interior Area	Section 7.2.2
Cleaning of Cooling Air Inlet and Cooling Air Outlet	Section 7.2.3
Torque Check of Electrical Connections	Section 7.2.4
Condition Check of Cables and Lines	Section 7.2.5
Condition Check of Fuses	Section 7.2.6
Functional Test of DC Circuit Breaker	Section 7.2.7
Functional Test of AC Circuit Breaker	Section 7.2.8
Functional Test of Enable Switch	Section 7.2.9

7.2 Maintenance in De-energized Condition

7.2.1 Visual Inspection of Housing

Maintenance Tasks:

1. **Check** the housing for visual defects e.g. corrosion, discoloration or damages.
⇒ In case of visual defects, **repair** these immediately.
2. **Check** if any labels e.g. safety signs and type plates on the housing are damaged or missing (Figure 4, Figure 5).
⇒ In case of damaged or missing labels, **contact** customer service.

7.2.2 Visual Inspection of Interior Area

Maintenance Tasks:

1. **Check** the interior area for dust and water accumulation.
⇒ In case of dust and water accumulation, **remove** it from the interior area.
2. **Check** parts for discoloration or damage.
⇒ In case of discoloration or damage, **contact** customer service.

7.2.3 Cleaning of Cooling Air Inlet and Cooling Air Outlet

Maintenance Tasks:

1. **See** Section 6.1.1.

7.2.4 Torque Check of Electrical Connections

Maintenance Tasks:

1. **Check** connections and connectors of all parts for tight fit.
 - ⇒ If connections are loose, **contact** customer service for specific torque.
 - ⇒ **Tighten** with specific torque.
2. **Check** the grounding connection (Section 3.5.1.1), AC connection (Section 3.5.1.2) and DC connection (Section 3.5.1.3) for tight fit.
 - ⇒ If one of the connections is loose, **tighten** it with shown torque (Table 8).
3. **Check** the insulation and electrical connections for discoloration and corrosion.
 - ⇒ In case of discoloration or corrosion, **renew** the connection immediately.
 - ⇒ **Tighten** with specific torque (Table 8).

Table 8: Torque of electrical connections

Connection	Torque
Grounding	44 Nm
AC connection	28 Nm
DC connection	22 Nm

7.2.5 Condition Check of Cables and Lines

Maintenance Tasks:

1. **Check** all cables and lines for damage.
 - ⇒ In case of damage, **renew** the damaged cables and lines.

7.2.6 Condition Check of Fuses

Maintenance Tasks:

1. **Check** if fuses are intact (Figure 6, Figure 7).
 - ⇒ If fuses are triggered, **renew** the fuses immediately.

7.2.7 Functional Test of DC Circuit Breaker

Maintenance tasks:

1. **Check** the continuity of the DC circuit breaker (-Q1) when it is in position **ON**.
 - ⇒ If the DC circuit breaker has no continuity, **replace** it.
2. **Check** the continuity of the DC circuit breaker (-Q1) when it is in position **OFF**.
 - ⇒ If the DC circuit breaker has continuity, **replace** it.

7.2.8 Functional Test of AC Circuit Breaker

Maintenance tasks:

1. **Check** the continuity of the AC circuit breaker (-Q2) when it is in position **ON**.
⇒ If the AC circuit breaker has no continuity, **replace** it.
2. **Check** the continuity of the AC circuit breaker (-Q2) when it is in position **OFF**.
⇒ If the AC circuit breaker has continuity, **replace** it.

7.2.9 Functional Test of Enable Switch

Maintenance tasks:

1. **Check** the continuity of the Enable switch (-S1) when it is pulled out.
⇒ If the Enable switch (-S1) has no continuity, **replace** it.
2. **Check** the continuity of the Enable switch (-S1) when it is pressed.
⇒ If the Enable switch has continuity, **replace** it.

8 Decommissioning

Procedure:

1. **Stop** the product (Section 5.6).
2. **Switch off** the AC/DC voltage externally and **secure** it from being switched on again.
3. **Ensure** that the product is de-energized.
4. **Disconnect** the AC/DC cables.
5. **Ensure** that the AC/DC cables are permanently de-energized.
6. **Ensure** that no residual voltage is present within the DC link by means of suitable testing equipment (Figure 6).
7. **Switch off** voltage measurement and supply voltage (Section 8.1) and **disconnect** the lines.
8. **Ensure** that the lines for supply voltage are permanently de-energized.
9. **Disconnect** Ethernet cable and any other connected cables and lines.

8.1 Disconnecting Voltage Measurement and Supply Voltage

By switching the motor protecting switch (-F31) in position **O**, the voltage measurement is disconnected from the grid (Figure 6).

The supply voltage is externally connected from outside and can be disconnected by means of an external fusing.

9 Disposal

The product contains electrical components and metals. Final and professional disposal of the product must be executed by the customer under the applicable statutory regulations of the country in which the product is used. Please observe the special regulations for electric and electronic equipment in particular.

The product has been manufactured in accordance with the applicable EC Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electric and electronic equipment (**Restriction of Hazardous Substances**).

The product contains electrical/electronic components and materials such as electrolytic and plastic film capacitors. Comply with the regulations these products must be depolluted correctly. The regulations issued by government agencies must apply, particularly the regulations associated with the European Waste Catalogue.

We use only environmentally friendly packaging for the transport of our appliances. Please recycle cardboard, paper and plastic packaging appropriately.

10 Customer Service

If you have questions regarding the product, please contact our customer service.

Please have the following information ready so we can help as quickly as possible.

- Product denomination (provided on the type plate)
- Serial number (provided on the type plate)
- Location
- Date of delivery
- Invoice address
- Hardware- and wiring diagram version (provided on the type plate)
- Failure description:
 - Inverter status,
 - Failure date,
 - Error code,
 - Detailed failure description
 - How often does the error occur?

Address	WSTECH GmbH Eckernförder Landstraße 78 D-24941 Flensburg, Germany
Telephone	+49-(0) 461-430122-69
Fax	Fax: +49-(0) 461-430122-11
E-mail	service@wstech.com
Internet	www.wstech.com
Accessibility of Customer Service	From Monday to Friday from 8:00 a.m., to 3:00 pm (CET).

11 Appendix

11.1 Spare Parts List

Table 9: Spare parts list

Item designation	Article description	Type	Part No.
-E1; -E2	Heating with fan	230V / 400W	550019
-F1; -F2	Fuse	10 x 38 mm	500081
-F1; -F2 (Island grid function)	Fuse	14 x 51 mm	500392
-F8	Fuse	10 x 38 mm	500032
-F10	Fuse	10 x 38 mm	510284
-F11	Fuse	10 x 38 mm	510284
-F30	Surge arrester	277 V _{AC} with remote contact	570086
-F31	Motor protecting switch	0.4 A	510001
See above	Auxiliary switch	-	510116
-F32	Surge arrester	277 V _{AC}	570083
-M2; -M3; -M4	Axial flow fan	24 V _{DC}	650004
-M1A, -M1B	Radial fan	230 V _{AC}	650061
-Q1	DC circuit breaker	Four-pole	510180
-Q2	AC circuit breaker	Three-pole	510009

11.2 Technical Data

11.2.1 Electrical Data

Table 10: Electrical data

BATx0280-ES-1-400-1 (Outdoor)		Remarks
AC SIDE		
Maximum rated apparent power	280 kVA	At rated AC voltage
Rated active power	280 kW	At $(\cos(\varphi)) = 1.0$
Rated AC voltage	400 V, 3~ + neutral, 50 Hz	Other values on request
Grid configuration	TN	
Maximum output current	404 A	
Maximum short-circuit current	36 kA	
Line power factor ($\cos \varphi$)	> 0.98	At > 20 % of rated power
AC-current distortion (THD)	< 3 %	
DC SIDE		
Nominal voltage	750 V	
Voltage range	450 ... 890 V	
Currents	± 630 A	
Maximum short-circuit current	40 kA	
Current THD	< 3%	
Number of DC Inputs	1	
GENERAL		
Control strategy	CC-CV Power controlled Island mode	
Efficiency	(92.2 97.1 97.2 96.8 96.4) %	At (10 30 50 75 100) % power
Loss in standby (at night)	< 30 W	
Maximum auxiliary power	< 600 W	+ Heating requirements
MEASURING ACCURACY		
Grid frequency	± 40 mHz	Average value of 8 grid periods

11.2.2 General Data

Table 11: General data

	BATx0280-ES-1-400-1 (Outdoor)	Remarks
Ambient temperature	-20 °C ... 50 °C	Others on request
Humidity	< 95 %	Not condensing
Storage temperature	-25 °C ... 60 °C	
Storage maximum humidity	< 90 %	Not condensing
Maximum altitude above sea level	1500 m	Without derating in power
Cooling type	Forced air	
Air cooling volume	3000 m³/h	
Protection class	IP44	
Dimensions (L x W x H)	1597 x 1353 x 2249	In (mm)
Weight	< 2000 kg	
Cabinet colour	RAL7035	Others on request
Noise level	< 80 dbA	
EMI	EN61000-6-2 EN61000-6-4	
Medium voltage directive	BDEW	
Low voltage directive	VDE-AR-N 4105	
CE-conformity	Complies	

11.3 EU Declaration of Conformity

WSTECH

WSTECH is a Wind & Sun Technologies
and Siemens Joint Venture

EU Declaration of Conformity

Manufacturer: WSTECH GmbH
Eckernförder Landstraße 78
24941 Flensburg

Type of product: Multi-mode inverter with operating two modes,
battery charging (energy storage) or supply
Inverter (inject energy into the grid)

Product types:

BATD0050-ES-1-400-1	-
BATD0100-ES-1-400-1	BATY0100-ES-1-400-1
BATD0150-ES-1-400-1	BATY0150-ES-1-400-1
BATD0200-ES-1-400-1	BATY0200-ES-1-400-1
BATD0280-ES-1-400-1	BATY0280-ES-1-400-1

We declare that the above specified inverters are compliant with the regulations of the European Community. This especially applies for the EMC directive defined in 2014/30/EU and the low voltage directive defined in 2014/35/EU.

The device complies with following standards:

EMC Emission: EN 61000-6-4: 2007 + A1:2011
EMC Immunity: EN 61000-6-2:2005
Equipment safety: EN 62109-1:2010, EN 62109-2:2011

Signed:



Lorenz Feddersen
Chief Technology Officer

Date:

20 October 2017

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