

FENECON

# FENECON Commercial 92 — Assembly and Operating Instructions

Version:2026.07.01

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# 1. Informationen zu dieser Anleitung

Das Personal muss diese Betriebsanleitung vor Beginn aller Arbeiten sorgfältig gelesen und verstanden haben.

## 1.1. Hersteller

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## 1.2. Formelles zur Betriebsanleitung

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## 1.3. Version/revision

| Version/Revision | Change | Date | Name |
|---|---|---|---|
| 2024.08.01 | Draft Initial Version | 08.08.2024 | FENECON FT |
| 2024.10.01 | Published on docs.fenecon.de | 01.10.2024 | FENECON PM |
| 2025.1.1 | Integration of fire department notice | 27.01.2025 | FENECON PM |
| 2025.8.1 | Integration of split base | 01.08.2025 | FENECON TK/MR |
| 2025.11.01 | Integration of flood warning | 03.11.2025 | FENECON PM |
| 2026.07.01 | Implementation of ISO Warning Messages | 01.07.2026 | FENECON PM (MRH) |

Table 1. Version/revision

## 1.4. Symbol conventions

### 1.4.1. Symbol conventions — ISO admonitions

**DANGER**

Indicates an immediately dangerous situation that — if not avoided — will result in death or serious injury.

**WARNING**

Indicates a potentially dangerous situation that — if not avoided — could result in death or serious injury.

**CAUTION**

Indicates a potentially dangerous situation that, if not avoided, could result in a minor or moderate injury.

**NOTICE**

Indicates a potentially dangerous situation that — if not avoided — could result in property damage.

**SAFETY**

These safety instructions identify facilities that are important for rescuing people.

### 1.4.2. Symbol conventions — Additional Information

**IMPORTANT**

Indicates important information that is essential for using the product.



**NOTE**

Additional information and tips.

## 1.5. Structure of Warning Labels

When followed, warning notices help prevent potential injury and property damage, and the signal word indicates the severity of the hazard.

Warnings are structured according to the SAFE method:

| Signal Word | Meaning |
|---|---|
| S | Signal Word (DANGER, WARNING, CAUTION, or NOTICE) |
| A | (German: Art) — Type and source of the hazard<br>Description of the hazard and its cause. |
| F | (German: Folge(n)) — Consequence<br>Description of the possible consequences for humans, animals, and the environment that may result from the danger. |
| E | Escape<br>Recommendations on how to avoid dangers. |

Table 2. SAFE Method



**DANGER**

**DANGER**
Description of the nature and source of the danger and the possible consequences of failure to comply.

- Preventive Measures/Prohibitions.

## 1.6. Terms and abbreviations

The following terms and abbreviations are used in the installation and service instructions:

| Term/Abbreviation | Meaning |
|---|---|
| AC | Alternating Current |
| BHKW | Combined heat and power plant (CHP) |
| BMS | Battery Management System |
| DC | Direct Current |
| EMS | Energy Management System |
| Energy-Meter | Electricity meter for the Inverter at the grid connection point |
| FEMS | FENECON Energy Management System |
| MPPT | Maximum Power Point Tracking — Finder for the maximum power point |
| GCP | Grid connection point |
| CPC | Circuit protective conductor |
| PV | Photovoltaic |

| Term/Abbreviation | Meaning |
|---|---|
| RTE | Round-Trip-Efficiency (RTE)<br>System efficiency; ratio of discharged to charged energy quantity |
| SG-Ready | Smart-Grid-Ready — Preparation of the Heat pump for external control |
| SoC | State of Charge<br>State of Charge; The available capacity in a battery, expressed as a percentage of the nominal capacity. |
| SoH | State of Health — Ageing condition |
| VDE | Verband der Elektrotechnik Elektronik Informationstechnik e. V.<br>German Association for Electrical, Electronic & Information Technologies |
| Widget | Component of online monitoring |

Table 3. Terms and abbreviations

## 1.7. Scope of delivery

| Item | Component | Amount | Comment |
|---|---|---|---|
| 1 | KACO 92 kW — Inverter | 1 | |
| 2 | FENECON Commercial — BMS box (incl. FENECON Energy Management System) | 1 | |
| 3 | FENECON Commercial — Parallel switch box | 1 | |
| 4 | FENECON Commercial — Extension Box | 1 | up to 4, depending on the system configuration |
| 5 | FENECON BMS box | 1 | per battery tower |
| 6 | FENECON Battery Module | 15 | per battery tower, depending on the ordered capacity |
| 7 | FENECON Base (included with FENECON BMS box) | 1 | per battery tower |
| 8 | KDK 2PU CT | 1 | |

Table 4. Scope of delivery

| Component | Comment |
|---|---|
| Installation and service instructions FENECON Commercial | Instructions for the installer |
| Quick start guide FENECON Commercial | Quick start guide for the installer |
| Operating instructions FENECON Commercial | Instructions for the user/end customer |

Table 5. Documents

## 1.8. Applicable documents

All documents listed in the appendix to these installation and service instructions must be observed. Cf. Applicable Documents

## 1.9. Availability

The operator must keep these installation and service instructions or relevant parts of them within easy reach in the immediate vicinity of the product.
If the product is handed over to another person, the operator shall pass these instructions on to that person.

# 2. Safety

## 2.1. Intended use

The FENECON electrical energy storage system is used to store electrical energy in rechargeable lithium iron phosphate battery modules (charging) and to provide electrical energy (discharging). This charging and discharging process takes place via a connected inverter. The system must only be used in compliance with the permissible technical data (see section Technical data).

FENECON power storage systems consist of various modules. In particular, these include a BMS (battery management system), the FENECON Energy Management System (FEMS), battery modules and bases. All processes of the electricity storage system are monitored and controlled by the FEMS.

Any other use is not an intended use.

## 2.2. Reasonably foreseeable misuse

All applications that do not fall within the scope of the intended use are considered misuse.

Work on live parts is generally not permitted. Electrical work must only be carried out by qualified electricians.

The following safety rules must be observed for all work on electrical components:

1. Disconnect.
2. Secure against restarting.
3. Check that there is no voltage.
4. Earth and short-circuit.
5. Cover or shield neighboring live parts.

**Non-compliance with the safety rules is considered a reasonably foreseeable misuse.**

Other misuses include in particular:

- improper transportation, installation or assembly at a location, trial operation or operation that could damage the system.
- change in the specified technical characteristics, including the individual components.
- change or deviation of the connected load.
- functional or structural changes.
- operating the product in a faulty or defective condition.

- improper repairs.
- operation without protective devices or with defective protective devices.
- disregarding the information in the original installation and service instructions.
- fire, open light and smoking in the vicinity of the storage system.
- insufficient ventilation at the installation site.
- unauthorized changes and actions to the electrical energy storage system.
- use as mobile energy storage.
- direct use in a PV system (integration via an AC-coupled grid is possible).



Installing firmware updates through external sources does not invalidate the warranty for systems of the FENECON commercial series.

However, functional compatibility is not confirmed in such a case.

## 2.3. Area of application — Electromagnetic compatibility (EMC)

The low-voltage equipment is intended for use in the following areas of application:

- General public (public)

Use in other areas of application is not in accordance with the intended use.

## 2.4. Qualification of the staff

Qualified personnel must be deployed for the intended use, installation and maintenance of the system. The area of responsibility, competence and supervision of the personnel must be precisely regulated by the operator.

### 2.4.1. Trained electricians

Trained electricians include persons who:

1. are able to carry out work on electrical systems due to their technical training, knowledge and experience as well as knowledge of the relevant standards and regulations.
2. have been commissioned and trained by the operator to carry out work on electrical systems and equipment of the battery system.
3. are familiar with how the battery system works.
4. recognize hazards and prevent them by taking appropriate protective measures.

### 2.4.2. Service staff

Service personnel includes the manufacturer's personnel or specialist personnel instructed and authorized by FENECON GmbH, who must be requested by the operator to work on the system (e. g. assembly, repair, maintenance, work on the batteries, etc.).

## 2.5. General information on the FENECON system

The product must be positioned in such a way that sufficient room for movement can be guaranteed for service and maintenance personnel in every phase of the product's life. The service life of the product depends on the service life and maintenance intervals carried out by qualified personnel. The service life is particularly influenced by preventive maintenance and servicing.

- The battery modules must only be installed and the cable connections made by trained electricians.
- The electrical energy storage system must only be used under the specified charging/discharging conditions (see section Technical data).
- Keep the electrical energy storage system away from children and animals.
- Do not connect the plug contacts of the BMS box in reverse.
- Do not short-circuit battery modules.
- Only use the battery modules as intended.

  Improper use can lead to overheating, explosion or fire of the battery modules.
- Read the instructions for installation and operation to avoid damage due to incorrect operation.
- The battery modules may have insufficient cell voltage after a long storage period. If this is the case, please contact the service department
- Do not expose the battery modules to high voltages.
- Place the battery modules on level surfaces.
- Do not place any objects on the FENECON battery towers.

### 2.5.1. Environmental influences

- Keep the electrical energy storage system away from water sources.
- Do not immerse the electrical energy storage system in water, moisten it or touch it with wet hands.
- Set up/store the electrical energy storage system in a cool place.
- Do not heat the electrical energy storage system.
- Do not expose the electrical energy storage system to open fire.
- Do not set up or use the electrical energy storage system near open fires, heaters or high-temperature sources.

  The heat can cause insulation to melt and the safety ventilation to be damaged. This can lead to overheating, explosion or fire on the battery modules.
- No soldering work must be carried out on the electrical energy storage system. Heat introduced

during soldering can damage the insulator and the safety venting mechanism and lead to overheating, explosion or fire of the battery modules.

### 2.5.2. Mechanical influences

- The battery modules must not be dismantled or modified. The battery modules contain a safety mechanism and a protective device, damage to which can lead to overheating, explosion or fire of the battery modules.
- Do not step on the electrical energy storage system.
- Do not attempt to crush or open battery modules.
- Do not apply any mechanical force to the electrical energy storage system.

  The battery modules can be damaged and short circuits can occur, which can lead to overheating, explosion or fire of the battery modules.
- Do not throw or drop parts of the power storage system.

  Do not use defective or dropped battery modules.
- Do not use the electrical energy storage system if changes in color or mechanical damage are detected during assembly, charging, normal operation and/or storage.
- If the protective devices are damaged, abnormal charging currents and voltages can cause a chemical reaction in the battery modules, which can lead to overheating, explosion or even fire in the battery modules.

### 2.5.3. Installation, operation and maintenance

- During maintenance, servicing, and cleaning work, ensure that the product is operated in a safe manner and secured against being turned back on.
- In addition, all instructions in the installation and service instructions must be followed.

Always observe the following safety instructions when installing, operating or maintaining the battery modules:

- Installation/maintenance work and making cable connections must only be carried out by qualified personnel (trained electricians).
- During maintenance work, stand on dry insulating objects and do not wear any metal objects (e.g. watches, rings and necklaces) during maintenance work/operation.
- Use insulated tools and wear personal protective equipment.
- Do not touch two charged contacts with a potential difference.
- Measure the battery voltage with a multimeter and ensure that the output voltage is 0 V in off

mode.

- If an anomaly is detected, switch off the battery tower immediately.
- Only continue the maintenance work after the causes of the anomaly have been eliminated.
- The battery modules can cause electric shock and burns due to high short-circuit currents.
- Do not touch the battery module connectors (+) and (-) directly with a wire or metal object (e. g. metal chain, hairpin). Excessive current can be generated in the event of a short circuit, which can lead to overheating, explosion or fire of the battery modules.

### 2.5.4. Fire protection

- Do not expose the electrical energy storage system to direct sunlight.
- Avoid contact with conductive objects (e. g. wires).
- Keep heat and fire sources, flammable, explosive and chemical materials away from the electrical energy storage system.
- Explosion hazard: Do not dispose of battery modules in a fire!

### 2.5.5. Storage

- Area: Fireproof indoors/outdoors with suitable weather protection.
- Air temperature: -20 °C to 40 °C.
- Relative humidity: max. 50 % at +40 °C.
- Do not store battery modules (lithium iron phosphate batteries) with flammable or toxic objects.
- Store battery modules with safety defects separately from undamaged battery modules.

**NOTICE**

**Storage for more than 12 months**
Possible consequences: Deep discharge of the cells/battery failure.

- External charging of the battery modules to rated voltage — forced charging must be performed, which is controlled via the FEMS.
- This must be performed by the manufacturer or by a company authorized by the manufacturer.

### 2.5.6. Charging

- Keep the battery module's SoC below 30% prior to shipment, and recharge the battery module if it has been in storage for more than 12 months.

## 2.6. Operating resources

### 2.6.1. Electrolyte solution of the battery modules

- Electrolyte solution is used in the battery modules (lithium iron phosphate).
- The electrolyte solution in the battery modules is a clear liquid and has a characteristic odor of organic solvents.
- The electrolyte solution is flammable.
- The electrolyte solution in the battery modules is corrosive.
- Do not inhale the vapors.
- If the electrolyte solution is swallowed, induce vomiting.
- Leave the contaminated area immediately after inhaling the vapors.
- Eye and skin contact with leaked electrolyte solution must be avoided.
- Contact with electrolyte solution can cause severe burns to the skin and damage to the eyes.

  After skin contact: Immediately wash skin thoroughly with neutralizing soap and consult a doctor if skin irritation persists.

  After eye contact: Immediately flush eye(s) with running water for 15 minutes and seek medical advice.

**Delayed treatment can cause serious damage to health.**

## 2.7. Residual risk



**DANGER**

**Warning: Electrical Voltage**
Working on live components can result in death or serious injury.

- Have work on electrical equipment performed exclusively by the manufacturer's qualified electricians or by specially authorized, trained electricians, in accordance with safety regulations.
- After disconnecting the power supply, wait at least 5 minutes before beginning any maintenance work.
- Please provide a grid disconnector for the electrical power supply on the customer's side.



**WARNING**

**Keep escape routes clear**
Blocked doors, emergency exits, or access points can lead to serious injuries in an emergency.

- Keep all doors, emergency exits, and areas around the system clear.
- Do not block escape routes.



**NOTICE**

**Unknown Malfunction Reports**
Unknown malfunctions and attempts to fix them may result in damage to the product.

- Do not attempt to fix unknown problems on your own.
- If a problem occurs that is not listed in the troubleshooting guide, please contact customer service.



**NOTICE**

**Floor Conditions and Building Structure**
The floor must be strong enough to support the weight of the battery towers.
Walls must be able to support the weight of the inverter and other system components.

- The housing is sealed to prevent electrolyte solution from leaking out.

## 2.8. Behavior in emergency situations

Proceed as follows in emergency situations:

1. Disconnect the electrical energy storage system from the grid.
2. Leave the zone of danger immediately.

3. Secure the area.
4. Inform those responsible.
5. Call a doctor if necessary.

## 2.9. Pictograms

Pictograms on the system indicate dangers, prohibitions and instructions. Illegible or missing pictograms must be replaced by new ones.

| Pictogram | Meaning | Description |
|---|---|---|
|  | Warning: Dangerous Electrical Voltage | Pictogram on the housing and labeling of components where it is not immediately apparent that they contain electrical equipment that could pose a risk of electric shock. |
|  | General warning symbol | |
|  | Warning Regarding Hazards Associated with Battery Charging | Pictogram on the housing and labeling of components where it is not immediately apparent that they contain electrical equipment that could pose a risk due to battery charging. |
|  | No open flames; Fire, open ignition sources, and smoking prohibited | Pictogram on the housing and labeling of components where it is not immediately apparent that they contain electrical equipment that could pose a risk due to open flames, fire, open ignition sources, and smoking. |
|  | Protective grounding symbol | |
|  | Separate Collection of Electrical and Electronic Equipment | |
|  | Follow instructions | |
|  | Use protective headgear | |
|  | Use protective footwear | |

## 2.9. Pictograms

| Pictogram | Meaning | Description |
|---|---|---|
|  | Use protective gloves | |
|  | CE mark | |
|  | Product is recyclable. | |

Table 6. Pictograms

## 2.10. Operating materials/equipment

### 2.10.1. Electrolyte solution of the battery modules

- Electrolyte solution is used in the battery modules (lithium iron phosphate).
- The electrolyte solution in the battery modules is a clear liquid and has a characteristic odor of organic solvents.
- The electrolyte solution is flammable.
- The electrolyte solution in the battery modules is corrosive.
- Contact with electrolyte solution can cause severe burns to the skin and damage to the eyes.
- Do not inhale the vapors.
- If the electrolyte solution is swallowed, induce vomiting.
- Leave the contaminated area immediately after inhaling the vapors.
- Eye and skin contact with leaked electrolyte solution must be avoided.

  After skin contact: Immediately wash skin thoroughly with neutralizing soap and consult a doctor if skin irritation persists.

  After eye contact: Immediately flush eye(s) with running water for 15 minutes and seek medical advice.

**Delayed treatment can cause serious damage to health.**

### 2.10.2. Electrical equipment

- Work on electrical equipment must only be carried out by qualified electricians.
- The five safety rules must be observed for all work on electrical components:
  1. Disconnect.
  2. Secure against restarting.
  3. Check that there is no voltage.
  4. Earth and short-circuit.
  5. Cover or shield neighboring live parts.
- Maintenance work must only be carried out by trained specialist personnel (service personnel).
- Before starting work, carry out visual checks for insulation and housing damage.
- The system must never be operated with faulty or non-operational electrical connections.
- To avoid damage, lay supply lines without crushing and shearing points.
- Only insulated tools must be used for maintenance on uninsulated conductors and terminals.

## 2.10. Operating materials/equipment

- Control cabinets (e. g. inverter housing) must always be kept locked. Only authorized personnel with appropriate training and safety instructions (e. g. service personnel) should be allowed access.
- The inspection and maintenance intervals for electrical components specified by the manufacturer must be observed.
- To avoid damage, lay supply lines without crushing and shearing points
- If the power supply is disconnected, specially marked external circuits may still be live!
- Some equipment (e. g. inverters) with an electrical intermediate circuit may still carry dangerous residual voltages for a certain period of time after disconnection. Before starting work on these systems, check that they are de-energized.

## 2.11. Personal protective equipment

Depending on the work on the system, personal protective equipment must be worn:

- Protective footwear
- Protective gloves, cut-resistant if necessary
- Protective eyewear
- Protective headgear

## 2.12. Spare and wear parts

The use of spare and wear parts from third-party manufacturers can lead to risks. Only original parts or spare and wear parts approved by the manufacturer must be used. The instructions for spare parts must be observed. Further information can be found in the wiring diagram.



Further information must be requested from the manufacturer.

## 2.13. IT security

FENECON systems and their applications communicate and operate without an internet connection. The individual system components (inverters, batteries, etc.) are not directly connected to the internet or accessible from the Internet. Sensitive communications via the internet are processed exclusively via certificate-based TLS encryption.

Access to the programming levels is not barrier-free and is accessible at different levels depending on the qualifications of the operating personnel. Safety-relevant program changes require additional verification.

FENECON processes energy data of European customers exclusively on servers in Germany and these are subject to the data protection regulations applicable in this country.

The software used is checked using automated tools and processes established during development in order to keep it up to date and to rectify security-relevant vulnerabilities at short notice. Updates for FEMS are provided free of charge for life.

# 3. Technical data

## 3.1. General

| Description | | Value/dimension |
|---|---|---|
| **Installation/** *Environmental conditions | IP classification | IP55 |
| | Operating altitude above sea level | ≤ 2,000 m |
| | Installation/operating temperature | -20 °C to +60 °C |
| | Relative humidity (operation/storage) | 0 to 100 % |
| | Battery operating temperature | -10 °C to +50 °C |
| | Optimal operating temperature of the battery | 15 °C to +30 °C |
| | Cooling | Temperature-controlled fan |
| | Loudness | < 60 dB |
| **Certification/guideline** | Overall system | CE |
| | Inverter | VDE 4105:2018-11<br>TOR generator type A 1.1<br>VDE 4110:2018-11 |
| | Battery | UN38.3<br>VDE 2510-50 |

Table 7. Technical data — General

## 3.2. Technical Data — Inverter

| Description | | Value/Dimension |
|---|---|---|
| **Inverter Model** | | **KACO blueplanet gridsave 92.0 TL3-S** |
| AC connection | Grid Connection | 400 V, 3L/PE, 50/60 Hz |
| | Rated Voltage | 400 V |
| | Rated Power | 92,000 VA |
| | Rated Current | 3 x 132.3 A |
| Efficiency | Max. Efficiency | Charging: 98.5% — Discharging: 98.7% |
| General | Protection Specification | IP66 |
| | Width \| Depth \| Height | 699 \| 450 \| 719 mm |
| | Weight | 80 kg |

Table 8. Technical Data — Inverter

### 3.2.1. Dimensions

The dimensions are given in mm.

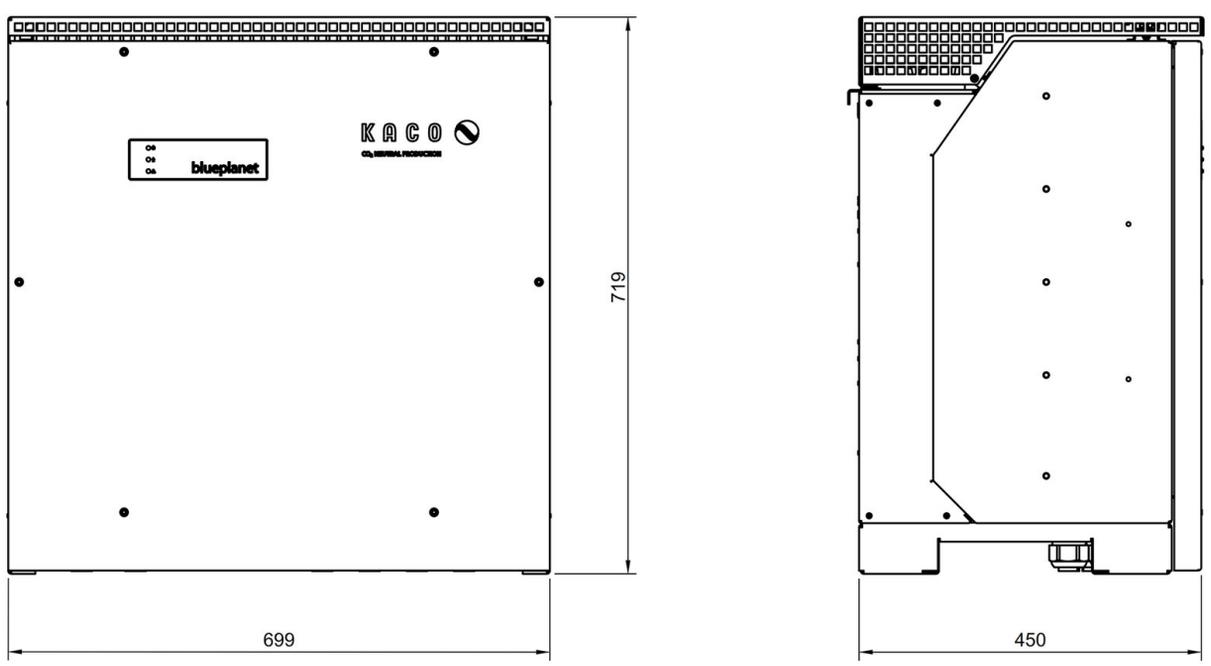



Image 1. Inverter — Dimensions

## 3.3. Technical Data — FEMS Box

| Description | Value/Dimension |
|---|---|
| DC operating voltage | 224 V to 672 V |
| Max. Current (Battery) | 50 A |
| Operating Temperature | -20 °C to 55 °C |
| Protection Specification | IP55 (plugged in) |
| Input Voltage | 110 V to 240 V / 0.7 A / 45 Hz to 65 Hz |
| Width \| Depth \| Height | 506 \| 401 \| 157 mm |
| Weight | 12 kg |
| Installation | stackable |

Table 9. Technical Data — FEMS Box

### 3.3.1. Dimensions

The dimensions are given in mm.

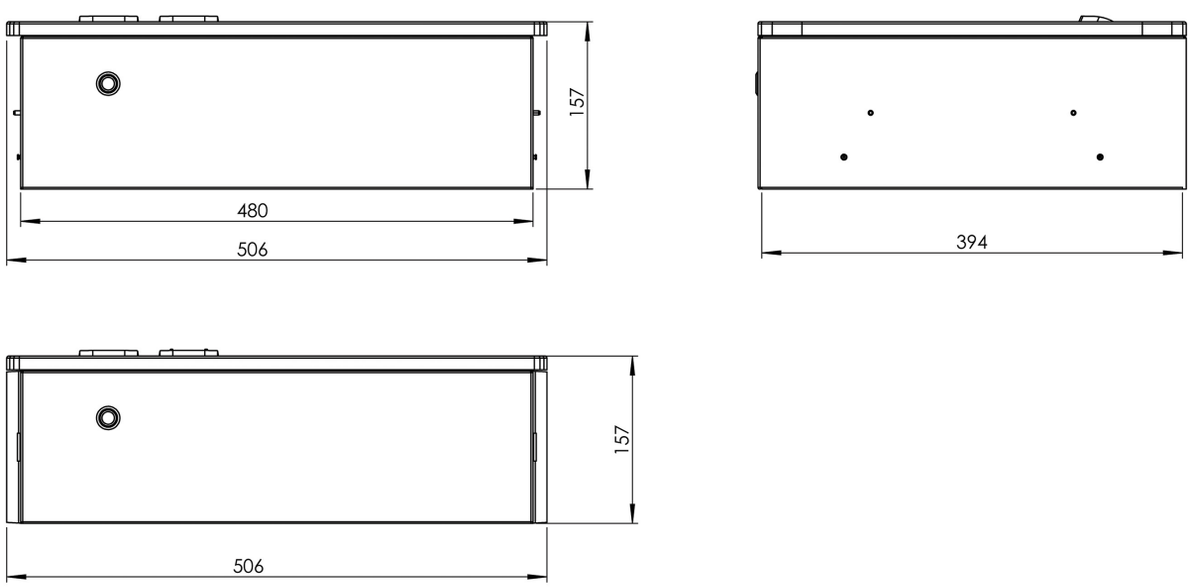



Image 2. Dimensions — FEMS Box

### 3.3.2. FEMS Box — terminal assignment

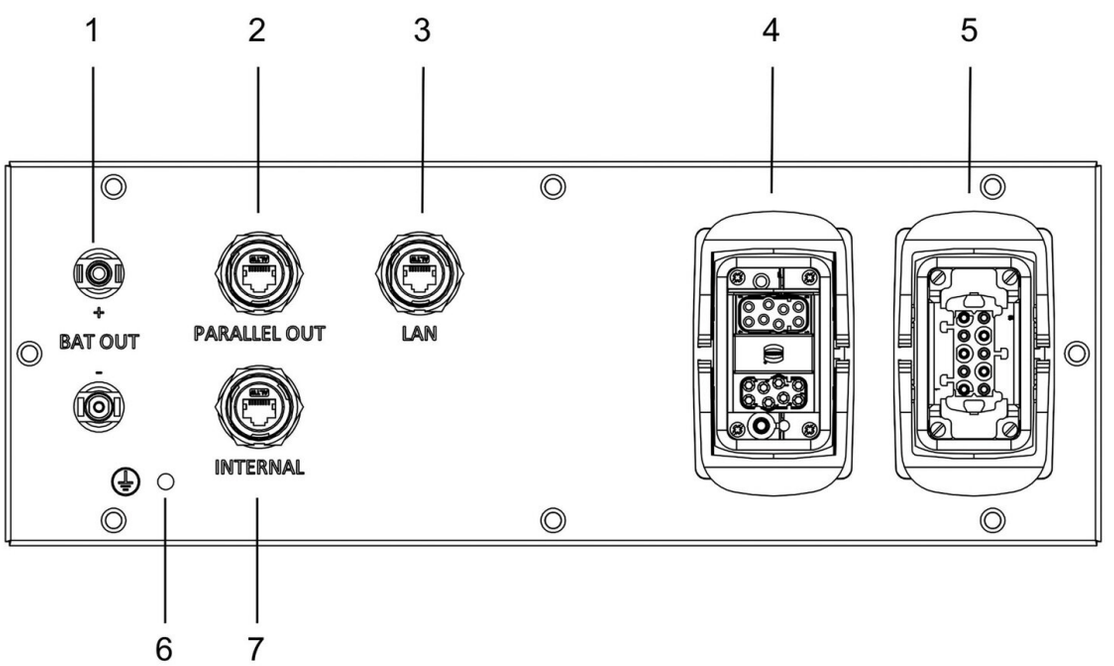



Image 3. Terminal assignment — FEMS Box

| List item | Description |
|---|---|
| 1 | Battery connection to the inverter (MC4-Evo stor) |
| 2 | Communication output for connecting multiple batteries in parallel |
| 3 | Customer network connection (LAN) RJ45 (network cable not included) |
| 4 | Inverter communication, relay outputs; digital inputs (16-pin connector), analog output |
| 5 | Power supply for FEMS box; dry contacts (max. 10 A, measured) (10-pin connector) |
| 6 | Earthing connection |
| 7 | For future applications (unassigned) |

Table 10. Terminal assignment — FEMS Box

## 3.4. Technical Data — Parallel Switch Box

| Description | Value/Dimension |
|---|---|
| Max. Operating Voltage | 800 V |
| Max. Current (Inverter) | 150 A |
| Max. Current (Battery) | 50 A |
| Operating Temperature | -20 °C to 40 °C |
| Protection Specification | IP55 |
| Width \| Depth \| Height | 606 \| 157 \| 639 mm |
| Weight | 26 kg |

Table 11. Technical Data — Parallel Switch Box

### 3.4.1. Dimensions — Parallel Switch Box

The dimensions are given in mm.

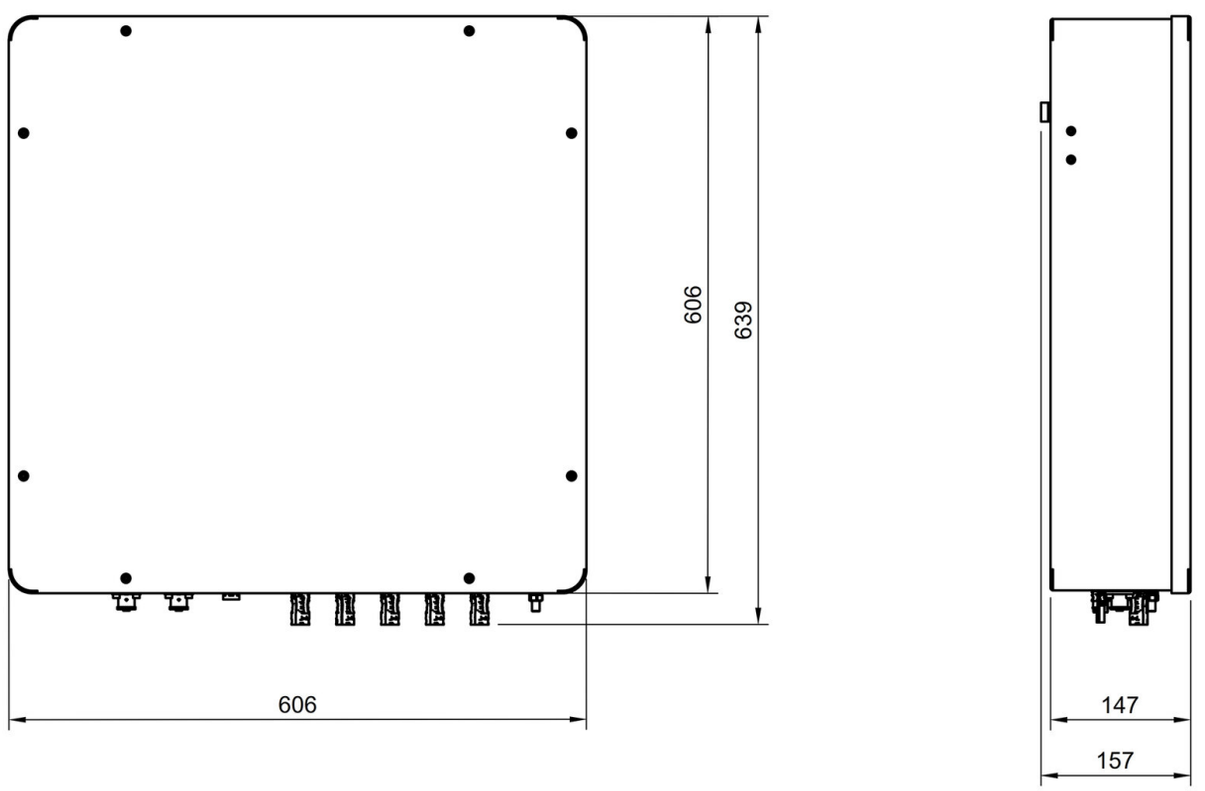



Image 4. Dimensions — Parallel Switch Box

### 3.4.2. Parallel Switch Box — Terminal Assignment

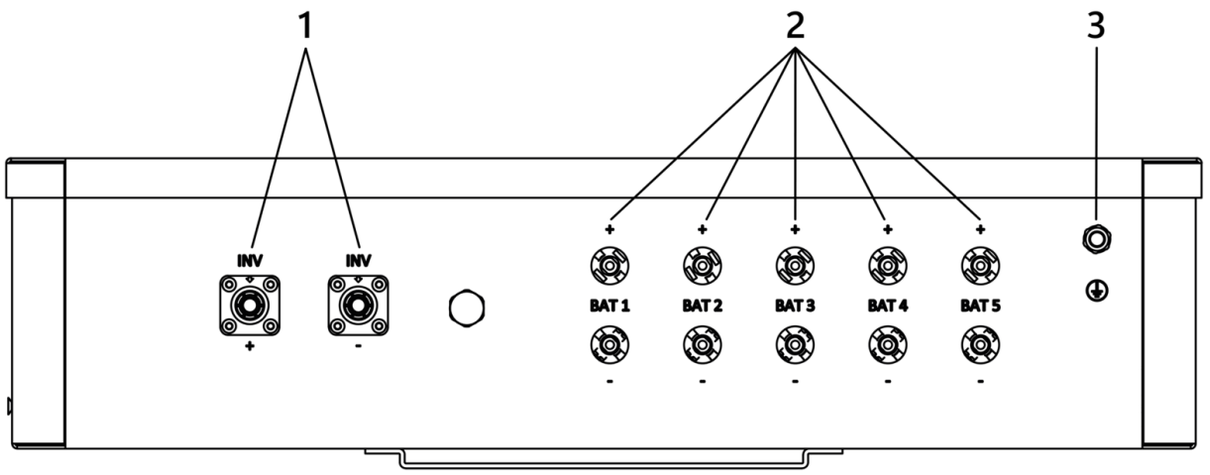



Image 5. Terminal Assignment — Parallel Switch Box

| List item | Description |
|---|---|
| 1 | Battery connection to the inverter |
| 2 | Battery connection for up to 5 battery towers |
| 3 | Earthing connection |

Table 12. Terminal Assignment — Parallel Switch Box

## 3.5. Technical Data — Extension Box

| Description | Value/Dimension |
|---|---|
| DC operating voltage | 224 V to 672 V |
| Max. Current (Battery) | 50 A |
| Operating Temperature | -10 °C to 50 °C |
| Ingress Protection | IP55 (when plugged in) |
| Width \| Depth \| Height | 506 \| 401 \| 157 mm |
| Weight | 9 kg |
| Installation | stackable |

Table 13. Extension Box — Technical Data

### 3.5.1. Dimensions

The dimensions are given in mm.

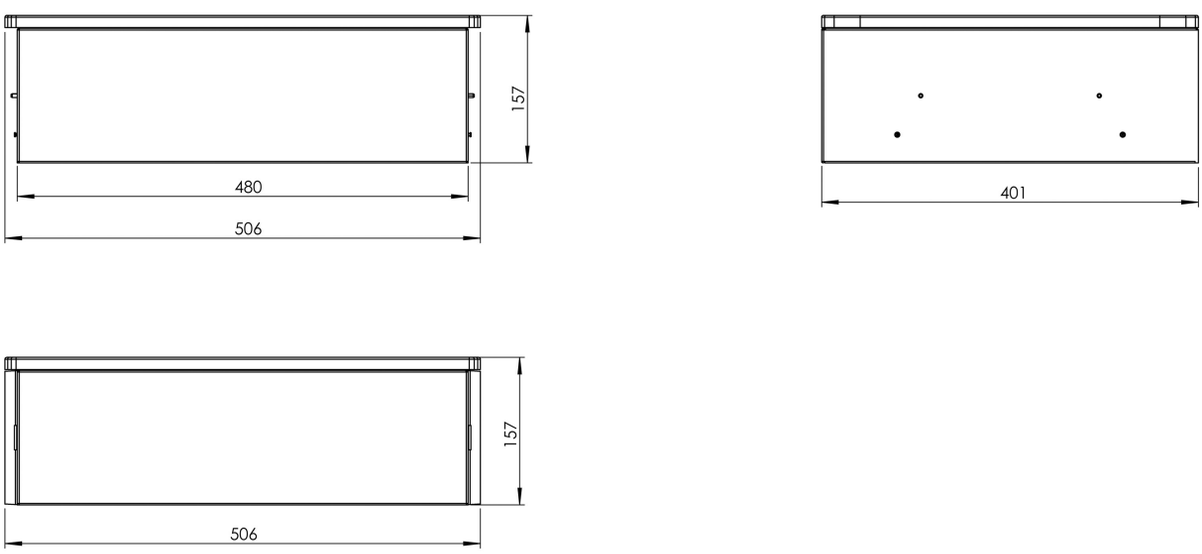



Image 6. Dimensions — Extension Box

### 3.5.2. Extension Box — Terminal Assignment

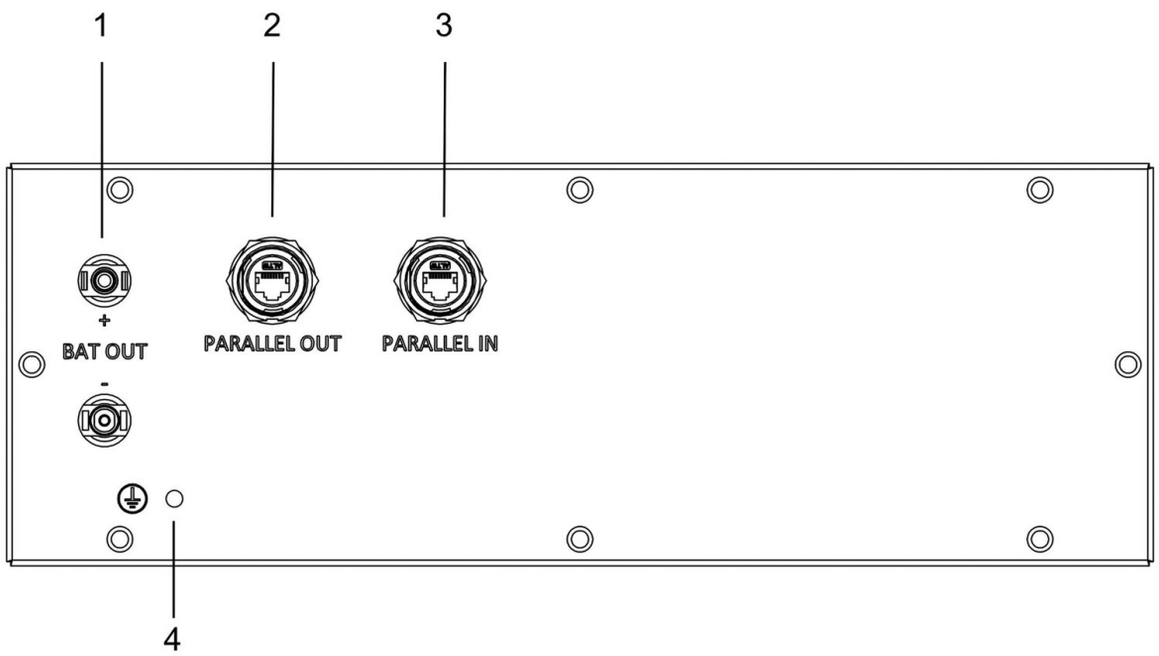



Image 7. Terminal Assignment — Extension Box

| List item | Description |
|---|---|
| 1 | Battery connection to the FEMS box in parallel (MC4-Evo stor) |
| 2 | Communication output for connecting multiple battery towers in parallel |
| 3 | Communication input for connecting multiple battery towers in parallel |
| 4 | Earthing connection |

Table 14. Terminal Assignment — Extension Box

## 3.6. Technical Data — BMS box

| Description | Value/Dimension |
|---|---|
| Maximum operating voltage range | 224 V to 672 V |
| Maximum output/input current | 50 A |
| Optimal operating temperature | 15 to 30 °C |
| Operating temperature range | -20 to 55 °C |
| Protection specification | IP55 (when plugged in) |
| Width (incl. side panel) \| Depth \| Height | 506 \| 401 \| 143 mm |
| Weight | 13 kg |
| Installation | stackable/wall-mounted |

Table 15. Technical Data — BMS box

### 3.6.1. Dimensions

The dimensions are given in mm.

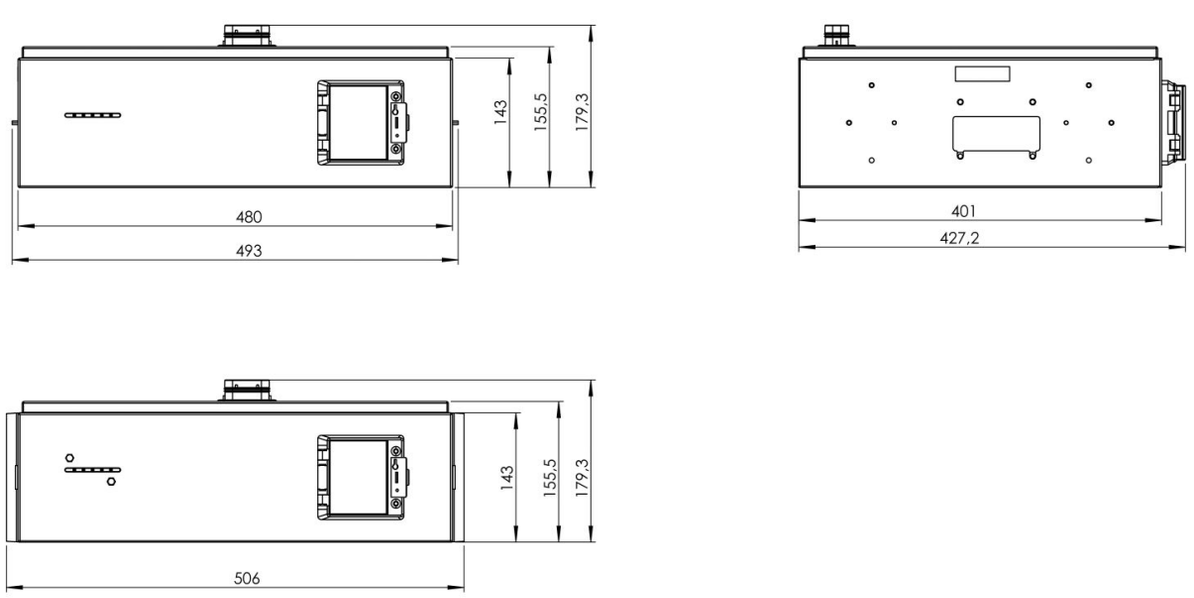



Image 8. Dimensions — BMS box

## 3.7. Technical data — FENECON battery module

| Designation | Value/dimension |
|---|---|
| Usable capacity | 62.4 Ah/2.80 kWh |
| Rated voltage | 44.8 V |
| Output voltage range | 39.2 V to 50.4 V |
| Battery operating temperature range | -20 °C to +55 °C |
| Storage temperature range (over 7 days) | -30 °C to +60 °C |
| Storage temperature range (over 30 days) | -20 °C to +55 °C |
| Storage temperature range (cumulative up to 270 days) | -10 °C to +45 °C |
| Protection specification | IP55 (plugged in) |
| Weight | 30 kg |
| Installation | stackable |
| Parallel connection | 4 battery towers in parallel |
| Cooling | natural cooling |
| Shipping capacity | < 30 % SoC |
| Module safety certification | VDE 2510/IEC62619 |
| UN transport test standard | UN38.3 |
| Relative humidity during storage | 5 % to 95 % |

Table 16. Technical data — Battery module

**NOTICE**

**Storage longer than 12 months**
Possible consequences: Deep discharge of the cells, defect of the battery module.

- External charging of the battery modules to rated voltage. This must be performed by the manufacturer or a company authorized by the manufacturer.

### 3.7.1. Dimensions

The dimensions are given in mm.

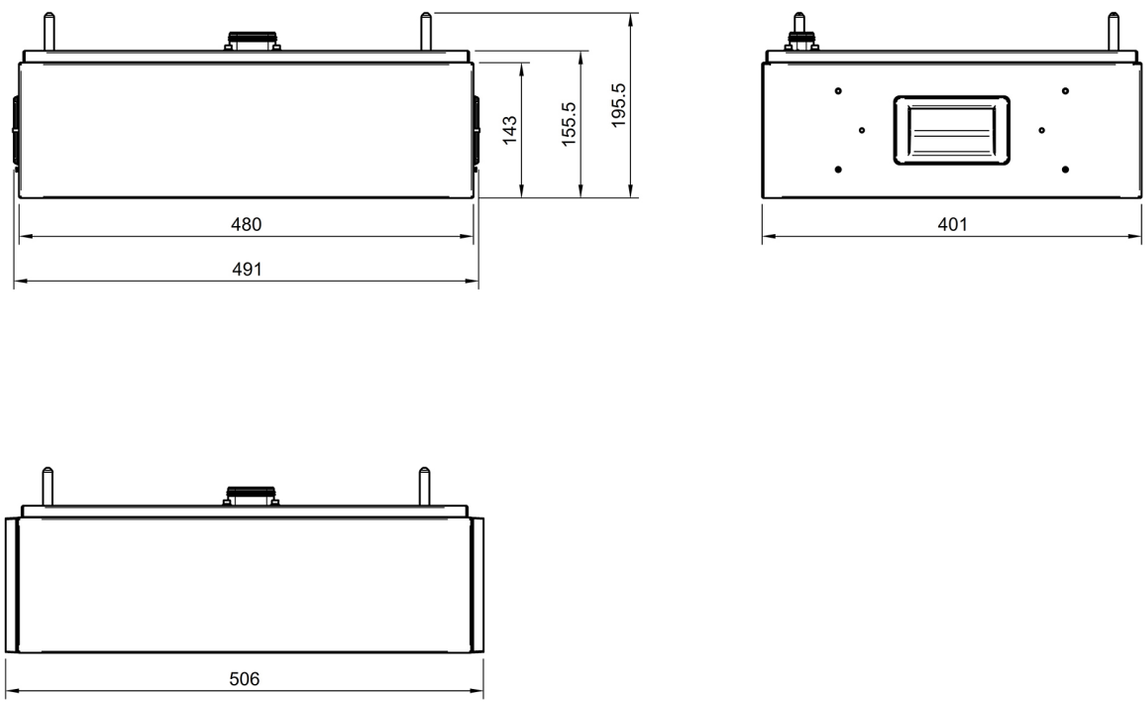



Image 9. Dimensions — Battery module

### 3.7.2. Electrical parameters of the battery modules

**For battery modules 5 to 7**

| Parameter | Value/dimension | | |
|---|---|---|---|
| **Number of modules** | **5S** | **6S** | **7S** |
| Nominal capacity in kWh | 14.0 kWh | 16.8 kWh | 19.6 kWh |
| Width incl. side panel | 506 mm | | |
| Depth | 401 mm | | |
| Height | 1120 mm | 1263 mm | 1406 mm |
| Weight | 187 kg | 217 kg | 247 kg |
| Nominal voltage | 224.0 V | 268.8 V | 313.6 V |
| Output voltage range | 196 V ~ 252 V | 235.2 V ~ 302.4 V | 274.4 V ~ 352.8 V |
| Maximum continuous charge/discharge power | 11.20 kW | 13.44 kW | 15.68 kW |

Table 17. Electrical parameters — No. of battery modules 5S to 7S (5 to 7 modules in series)

**For battery modules 8 to 11**

| Parameter | Value/dimension | | | |
|---|---|---|---|---|
| **Modules** | **8S** | **9S** | **10S** | **11S** |
| Nominal capacity | 22.4 kWh | 25.2 kWh | 28.0 kWh | 30.8 kWh |
| Width incl. side panel | 506 mm | | | |
| Depth | 401 mm | | | |
| Height | 1549 mm | 1692 mm | 1835 mm | 1978 mm |
| Weight | 277 kg | 307 kg | 337 kg | 367 kg |
| Rated voltage | 358.4 V | 403.2 V | 448.0 V | 492.8 V |
| Output voltage range | 313.6 V ~ 403.2 V | 352.8 V ~ 453.6 V | 392.0 V ~ 504.0 V | 431.2 V ~ 554.4 V |
| Maximum continuous charging/discharging power | 17.92 kW | 20.16 kW | 22.40 kW | 24.64 kW |

Table 18. Electrical parameters — Number of battery modules 8S to 11S (8 to 11 modules in series)

### For battery modules 12 to 15

| Parameter | Value/dimension | | | |
|---|---|---|---|---|
| **Module** | **12S** | **13S** | **14S** | **15S** |
| Nominal capacity | 33.6 kWh | 36.4 kWh | 39.2 kWh | 42.0 kWh |
| Width incl. side panel | 506 mm | | | |
| depth | 401 mm | | | |
| Height | 2121 mm | 2264 mm | 2407 mm | 2550 mm |
| Weight | 397 kg | 427 kg | 457 kg | 487 kg |
| Rated voltage | 537.6 V | 582.4 V | 627.2 V | 672.0 V |
| Output voltage range | 470.4 V ~ 604.8 V | 509.6 V ~ 655.2 V | 548.8 V ~ 705.6 V | 588.0 V ~ 756.0 V |
| Maximum continuous charging/discharging power | 26.88 kW | 29.12 kW | 30.00 kW | 30.00 kW |

Table 19. Electrical parameters — No. of battery modules 12S to 15S (12 to 15 modules in series)



The specified capacity values refer to one battery tower and are rounded to one decimal place.

## 3.8. Technical data — Base

| Designation | Value/dimension |
|---|---|
| Width (incl. side panel) \| Depth \| Height | 506 \| 401 \| 84 mm |
| Weight | 6 kg |
| Protection specification | IP55 (plugged in) |
| Installation | stackable |

Table 20. Technical data — Base

### 3.8.1. Dimensions — Base

The dimensions are given in mm.

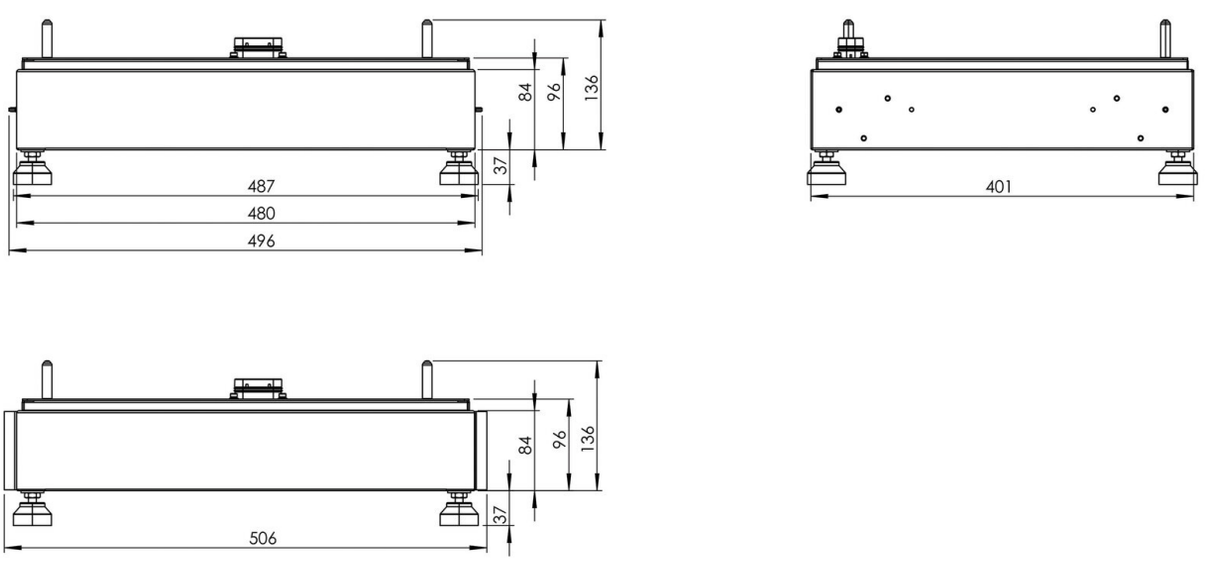



Image 10. Dimensions — Base

## 3.9. Technical data — Split base (optional)

| Designation | Value/dimension |
|---|---|
| Width (incl. side panel) \| Depth \| Height | 1312 \| 401 \| 84 mm |
| Weight | 11 kg |
| Protection specification | IP55 (plugged in) |
| Installation | stackable |

Table 21. Technical data — Split base

### 3.9.1. Dimensions — Split base

The dimensions are given in mm.

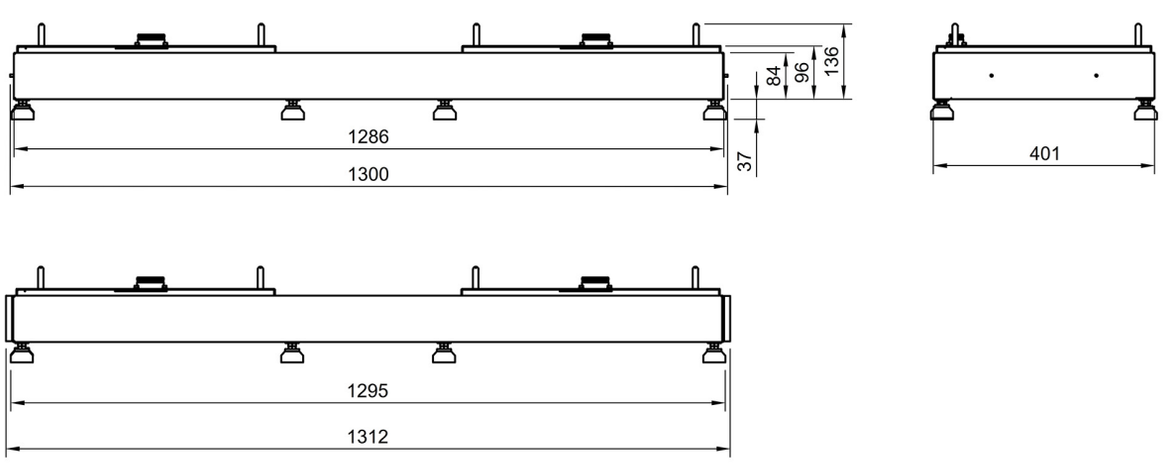



Image 11. Dimensions — Split base

## 3.10. Technical data — Top box (with option: split base)

| Description | Value/dimension |
|---|---|
| Width (incl. side panel) \| Depth \| Height | 506 \| 401 \| 157 mm |
| Weight | 9 kg |
| Protection specification | IP55 (plugged in) |
| Installation | stackable |

Table 22. Technical data — Top box

### 3.10.1. Dimensions — Top box

The dimensions are given in mm.

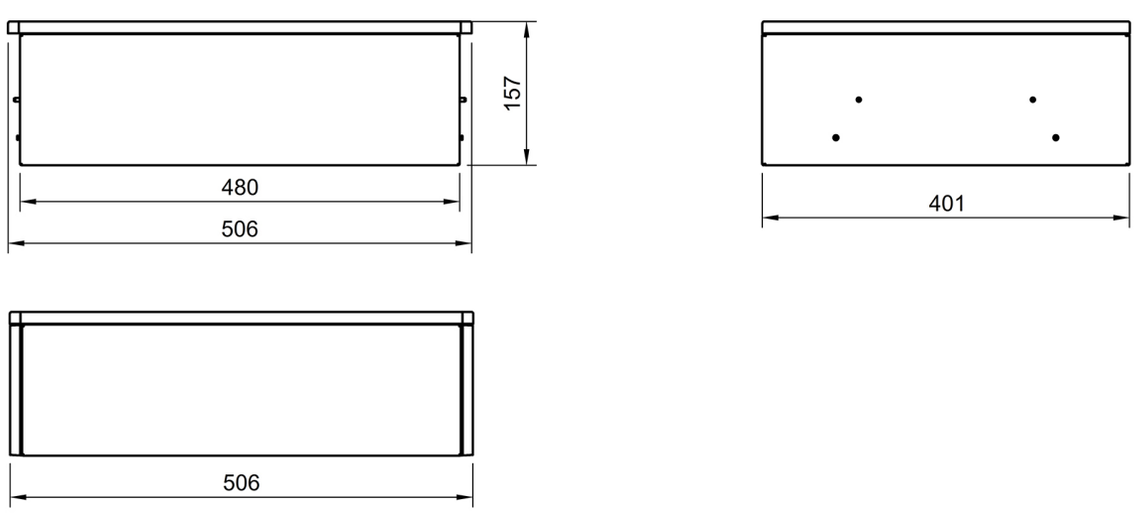



Image 12. Dimensions — Top box

# 4. General description

FENECON Commercial 92 is an AC-coupled electrical energy storage system that can build its own power grid for consumer loads. Lithium iron phosphate batteries (LiFePO4) are used in this modular system for storing electrical energy.

## 4.1. System configuration — General overview

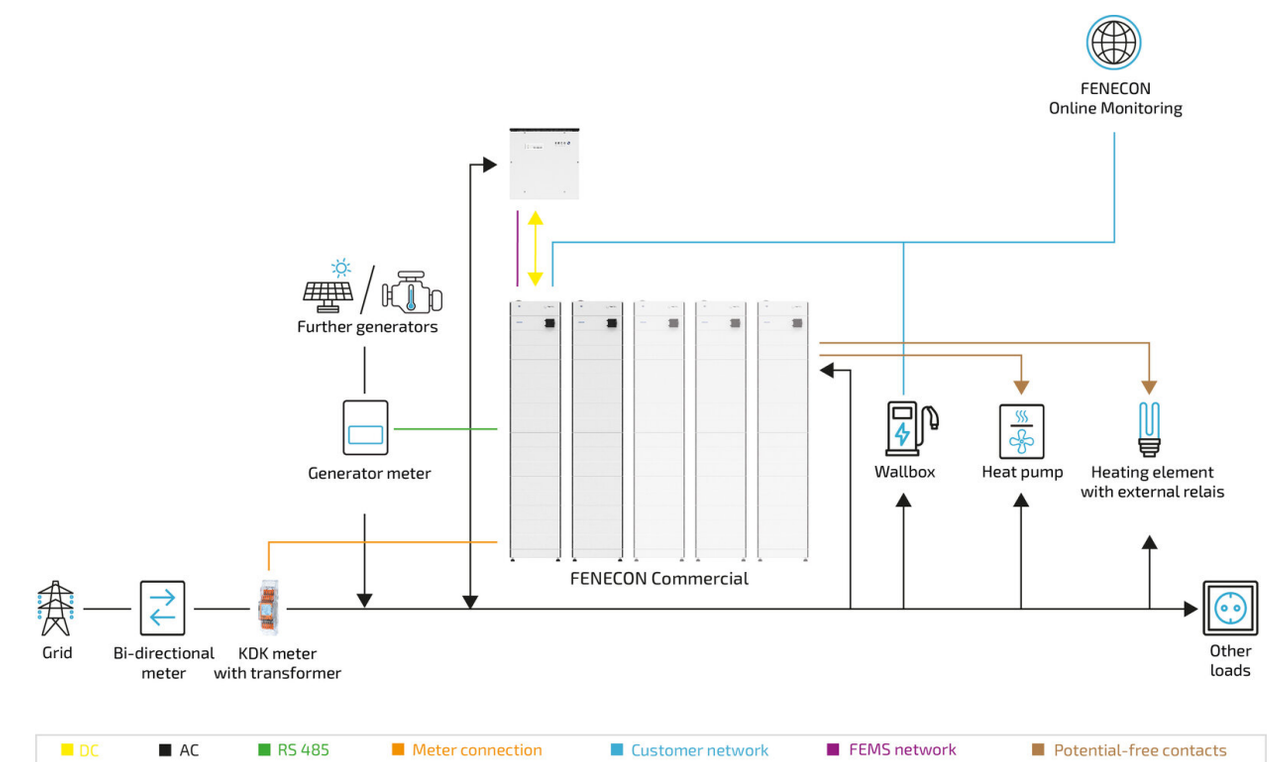



Image 13. System — schematic diagram with optional components (shown without protective device)

### 4.1.1. AC system diagram

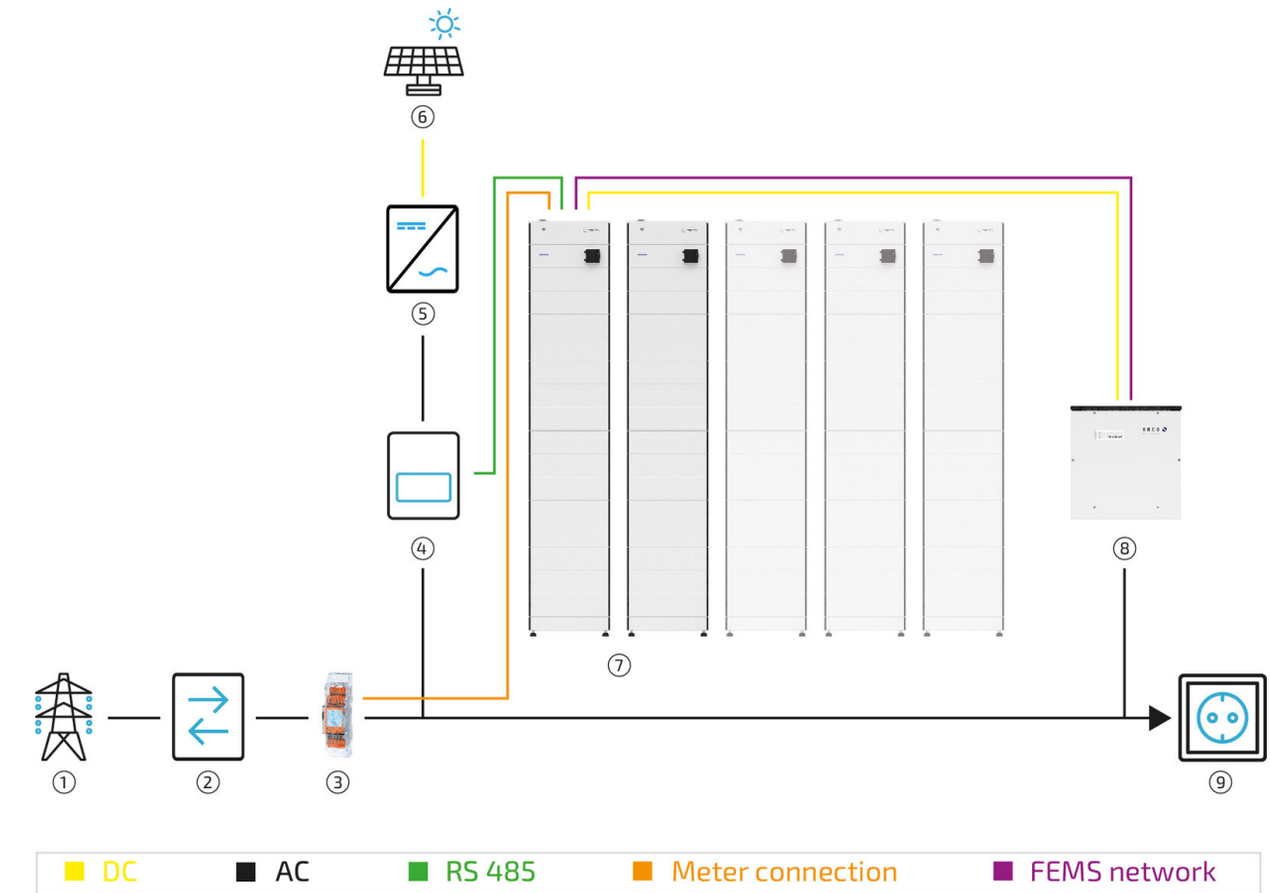



Image 14. AC system diagram (shown without protective device)

| Item | Description |
|---|---|
| 1 | Grid |
| 2 | Bi-directional meter |
| 3 | Energy meter |
| 4 | 3-Phase Sensor or with PV inverter App |
| 5 | PV inverter |
| 6 | PV system |
| 7 | FENECON Commercial 92 battery towers |
| 8 | Inverter |

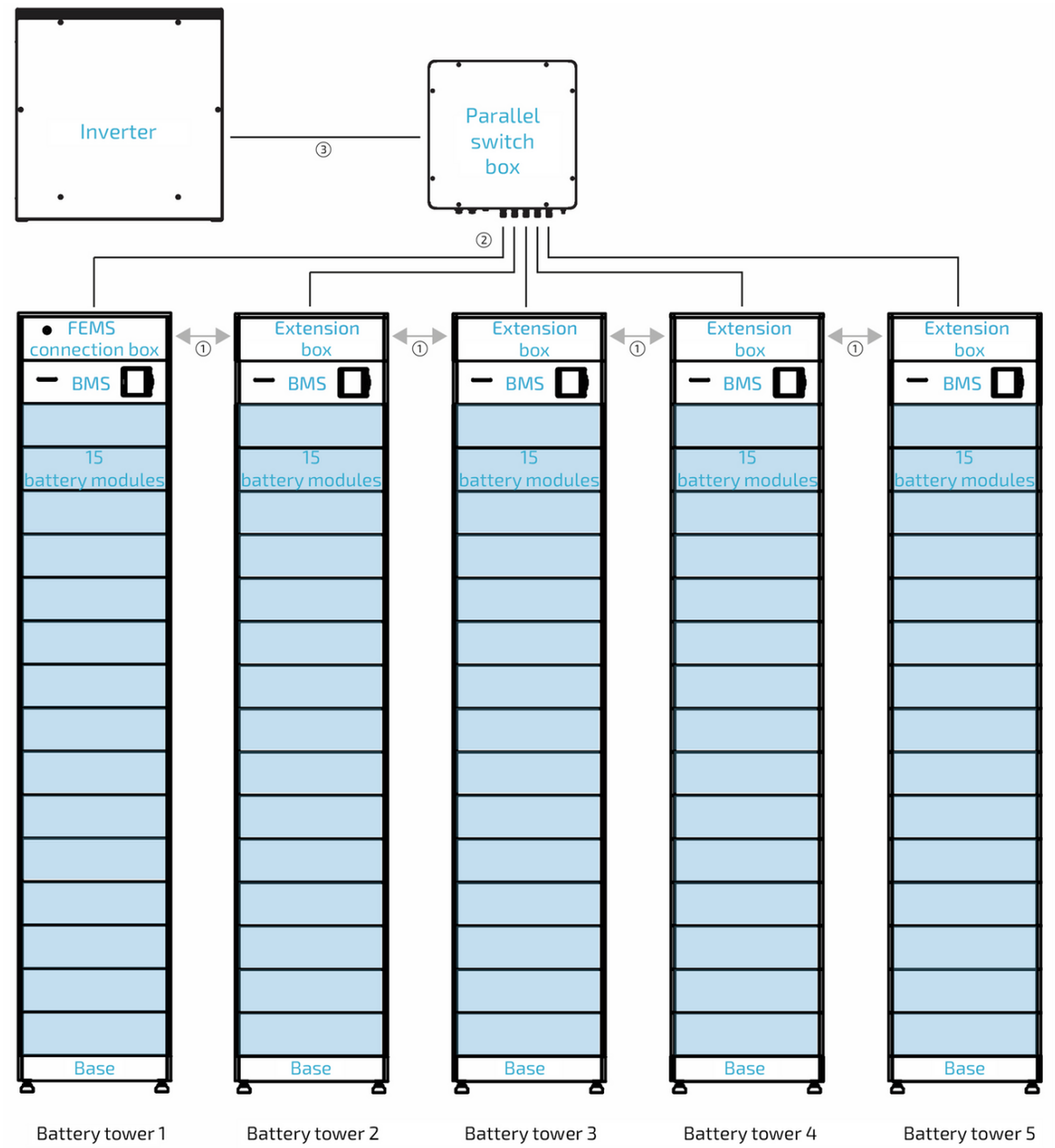
Table 23. AC system diagram

### 4.1.2. Required components

Depending on the system configuration, the following components are required. If up to five battery towers are connected in parallel, ensure that 15 battery modules are installed in each battery tower.

| Number of battery towers | Number of battery modules max. | BMS box (per tower) | EMS box | Parallel switch box | Extension box |
|---|---|---|---|---|---|
| 2 | 30 | 1 | 1 | 1 | 1 |
| 3 | 45 | 1 | 1 | 1 | 2 |
| 4 | 60 | 1 | 1 | 1 | 3 |
| 5 | 75 | 1 | 1 | 1 | 4 |

Table 24. System configuration — Required components




① Communication cable connection between battery towers
② DC cable connection between batteries and parallel switch box
③ DC cable connection between parallel switch box and inverter

Image 15. Structure of the FENECON Commercial 92 electrical energy storage system with five battery towers

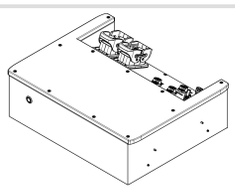
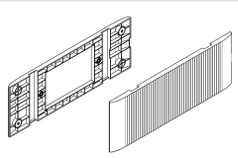
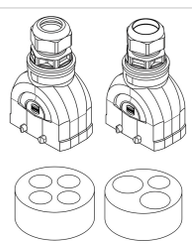
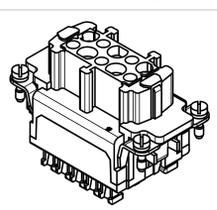
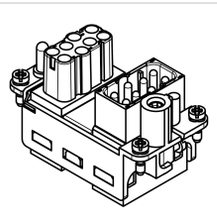
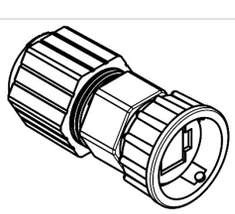
# 5. Assembly preparation

## 5.1. Scope of delivery

### 5.1.1. KACO blueplanet 92.0 TL3 — Inverter

The scope of delivery is listed in the Inverter manual.

### 5.1.2. FENECON Commercial 92 — EMS box

| Image | Amount | Description | Item no. |
|---|---|---|---|
|  | 1 | FENECON Commercial 92 — EMS box | FEC010 |
|  | 2 | Side panel | Part of complete set FEH050 |
|  | 2 | Harting housing with cable gland (13-21 mm), multi-hole seal (4 x 8 mm)<br>Harting housing with cable gland (19-25 mm), multi-hole seal (2 x 10 & 1 x 8 mm) | Part of complete set FEH050 |
|  | 1 | Harting socket, 10-pin | Part of complete set FEH050 |
|  | 1 | Harting insert, 16-pin (assembled) | Part of complete set FEH050 |
|  | 1 | Jumper plug | Part of complete set FEH050 |

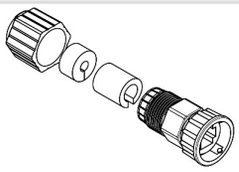
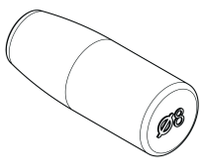
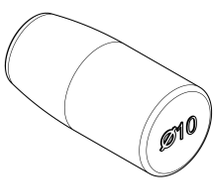
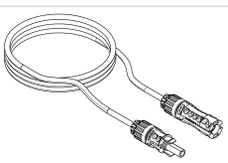
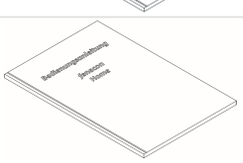
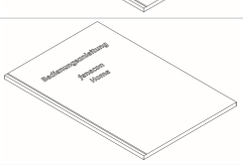
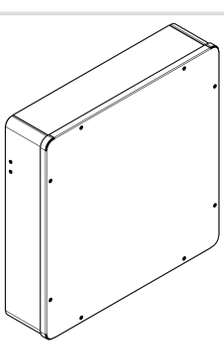
| Image | Amount | Description | Item no. |
|---|---|---|---|
|  | 2 | Network connector housing | Part of complete set FEH050 |
|  | 5 | Filler plug, 8 mm | Part of complete set FEH050 |
|  | 2 | Filler plug, 10 mm | Part of complete set FEH050 |
|  | 1 | Battery cable set, 10 m | FEC037 |
|  | 1 | Installation and service instructions (for installers) | |
|  | 1 | Operating instructions (for end customers) | |
|  | 1 | Quick start guide (for installers) | |

Table 25. Scope of delivery — FENECON Commercial 92 — EMS box

### 5.1.3. FENECON Commercial 92 — Parallel switch box

| Image | Amount | Description | Item no. |
|---|---|---|---|
|  | 1 | FENECON Commercial 92 — Parallel switch box | In combination with inverter FEC060 |

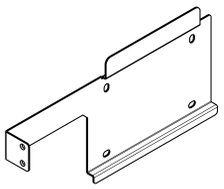
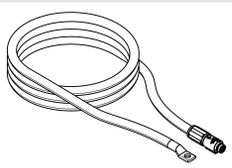
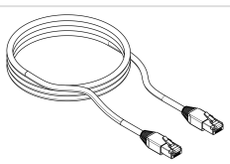
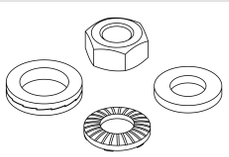
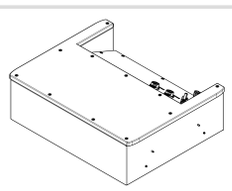
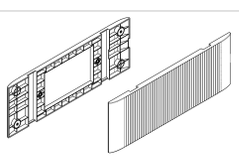
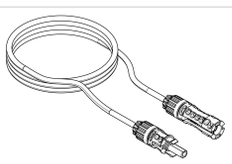
| Image | Amount | Description | Item no. |
|---|---|---|---|
|  | 1 | Wall bracket | FEC031 |
|  | 4 | Anchor with screw and washer | Part of complete set FEC033 |
|  | 1 | Two DC cables, 3 m | FEC034 |
|  | 1 | Communication cable — inverter-FEMS box; 10 m | FEC032 |
|  | 1 | Earthing kit | Part of complete set FEC033 |

Table 26. Scope of delivery — Parallel switch box

### 5.1.4. FENECON Commercial 92 — Extension box

| Image | Amount | Description | Item no. |
|---|---|---|---|
|  | 1 | FENECON Commercial 92 Extension box | FEC012 |
|  | 2 | Side panel | FEH059 |
|  | 2 | Each set of two DC cables, 10 m | FEC037 |

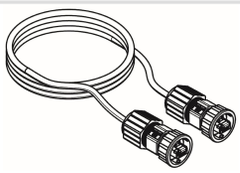
| Image | Amount | Description | Item no. |
|---|---|---|---|
|  | 1 | Communication cable, 2 m | FEH059 |

Table 27. Scope of delivery — Extension box

### 5.1.5. FENECON Commercial 92 — BMS box/base

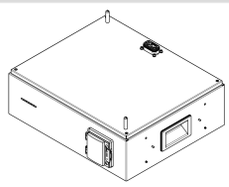
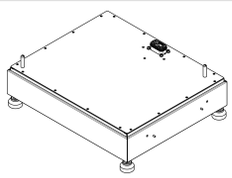
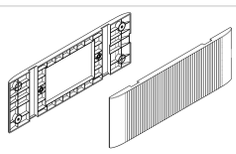
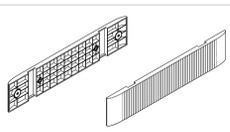
| Image | Amount | Description | Item no. |
|---|---|---|---|
|  | 1 | FENECON Commercial 92 — BMS box | FEH000 |
|  | 1 | Base | |
|  | 2 | Side panel (FENECON Commercial 92 — BMS box) | FEH051 |
|  | 2 | Side panel (base) | |
|  | 4 | Wall mounting — Mounting bracket | Part of complete set FEH052 |
|  | 4 | Wall mounting — Mounting bracket (wall part) | Part of complete set FEH052 |
|  | 4 | Bolt M4 x 10 | Part of complete set FEH052 |
|  | 4 | Bolt for wall-mounting M6 x 12 | Part of complete set FEH052 |

Table 28. Scope of delivery — BMS module/base

### 5.1.6. FENECON Commercial 92 — Battery module

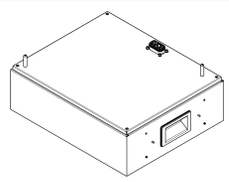
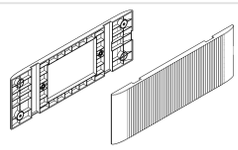
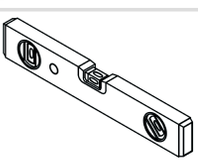
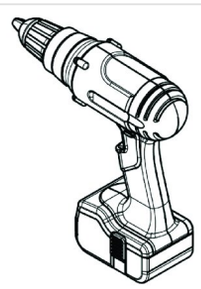
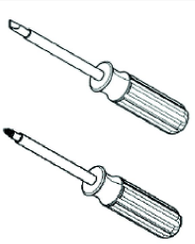
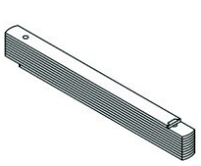
| Image | Amount | Description | Item no. |
|---|---|---|---|
|  | 1 | Battery module | |
|  | 2 | Side panel | FEH051 |
|  | 2 | Fixing plates | Part of connection set FEH053 |
|  | 4 | Bolt M4 x 10 | Part of complete set FEH053 |

Table 29. Scope of delivery — Battery module

## 5.2. Tools required

The following tools are required for assembly of the system components:

| Image | Description | Image | Description |
|---|---|---|---|
|  | Pencil |  | Spirit level |
|  | Impact drill or cordless screwdriver |  | Screwdriver set |
|  | Meter stick |  | Side cutter |

## 5.2. Tools required

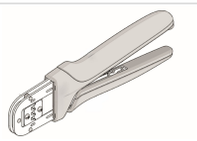
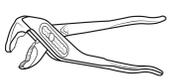
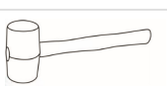
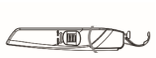
| Image | Description | Image | Description |
|---|---|---|---|
|  | Allen key, 3 mm |  | Set of flat spanners |
|  | Crimping tool |  | Multimeter |
|  | Pliers for cable glands |  | Protective eyewear |
|  | Safety footwear |  | Dust mask |
|  | Rubber mallet |  | Vacuum cleaner |
|  | Wire stripper |  | Protective gloves |
|  | Torque wrench |  | Stripping knife |

Table 30. Tools required

# 6. Assembly

**WARNING**

**Risk of injury during system assembly**
Improper assembly procedures can result in serious malfunctions and injuries.

- Install appropriate protective covers.
- Comply with all local accident prevention regulations.

**CAUTION**

**Danger due to incorrect assembly of the system**
Damage to the system during assembly can lead to serious malfunctions and injuries.

- Do not damage any cables, and make sure no one steps on the cables or plugs.
- When routing cables from the front, the customer must use appropriate covers to prevent the cables from posing a tripping hazard.
- When drilling holes, be sure to avoid the water pipes and cables running through the wall.
- Ensure the inverter is securely installed and protected against falling.
- Make sure that all devices are on the same network and that the battery modules are integrated into the existing surge protection system.
- Please refer to the inverter's supplier documentation.

**NOTICE**

**Occupational safety**
Inhalation of dust and eye injuries caused by dust particles when drilling holes.

- When drilling, wear protective eyewear and a dust mask to prevent dust from being inhaled or getting into your eyes.

The following components must be installed:

- Inverter
- Battery tower with base, battery modules, BMS box, and FENECON Commercial 92 EMS box

  Battery tower with base, battery modules, BMS box and Extension box

Before installation, carefully check that the packaging and products are undamaged and that all accessories listed in Chapter 5: [Preparing for installation] are included. If a part is missing or damaged, contact the manufacturer/dealer.

## 6.1. Installation — Inverter



**NOTICE**

**Installation of the Inverter**
The inverter is the KACO blueplanet 92.0 TL3 model.

- Please refer to the manufacturer's installation and service instructions for assembly and safety instructions.

## 6.2. Assembly — Parallel Switch Box

### 6.2.1. Parallel Switch Box — Warnings



**WARNING**

**Risk of Injury During System Installation**
Improper installation procedures can result in serious malfunctions and injuries.

- Install appropriate protective covers.
- Comply with all local accident prevention regulations.



**NOTICE**

**Occupational Safety**
Inhalation of dust and eye injuries caused by dust particles when drilling holes.

- When drilling, wear protective eyewear and a dust mask to prevent dust from being inhaled or getting into your eyes.



**NOTICE**

**Damage to the system**
Improper assembly can cause damage to the system.

- Please refer to the supplier documentation.

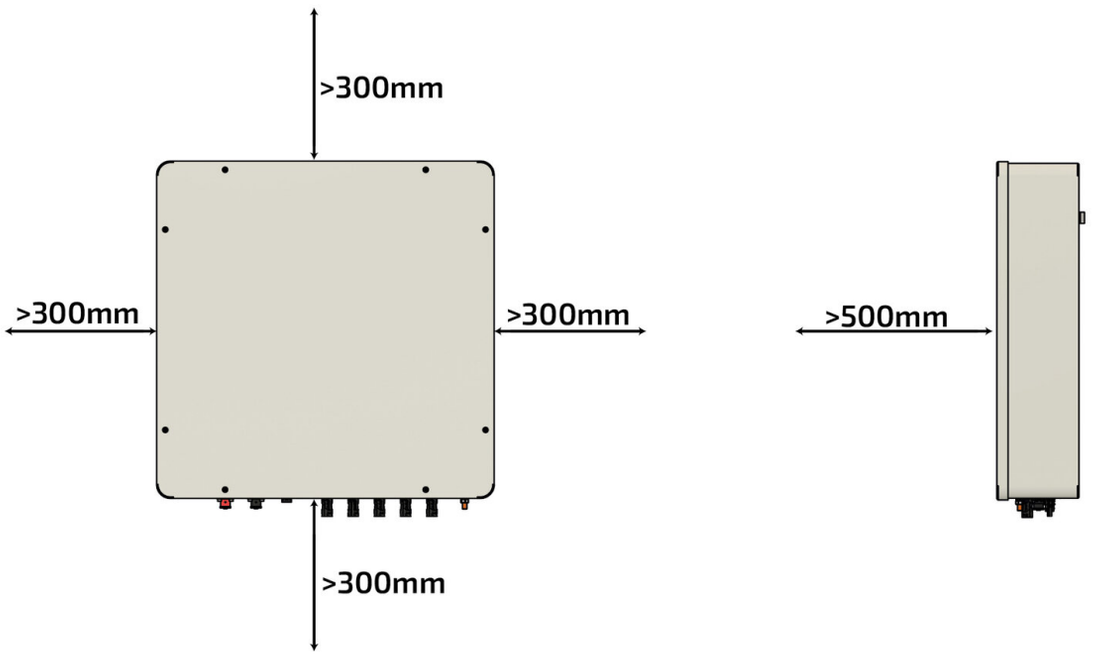
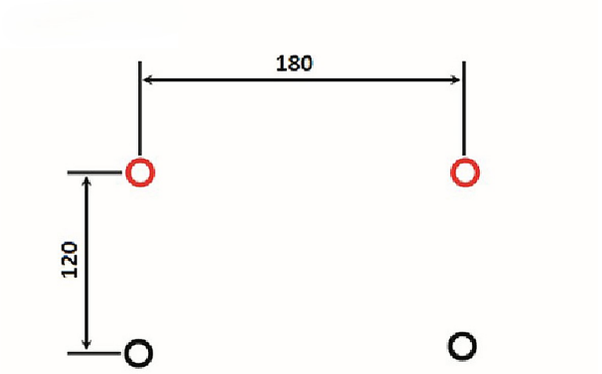


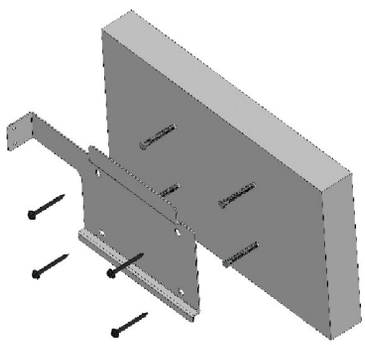

Image 16. Recommended clearances at the installation site — Parallel Switch Box

- The parallel switch box must be installed in a location protected from direct sunlight, rain, and snow.
- The assembly room must have a permanent ventilation system.
- A clearance of at least 300 mm must be maintained on the sides, above, and below the parallel switch box (cable ducts are not included in this measurement).
- Leave a clearance of at least 500 mm in front of the parallel switch box.

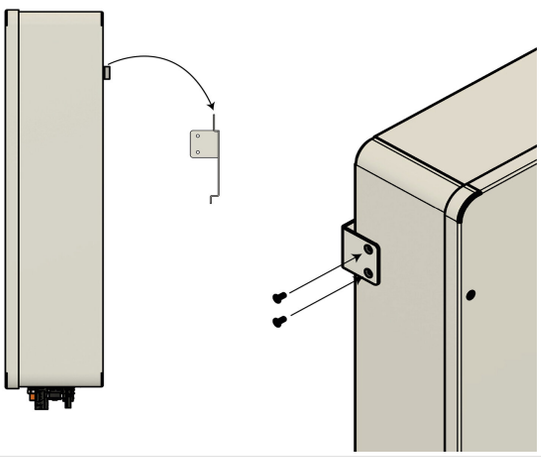
To install the parallel switch box on the wall, proceed as follows:




1. To mount the parallel switch box according to the specified dimensions, drill holes (8 mm diameter) for the included screw anchors.



2. Attach the wall mount to the wall. Screw anchors and bolts are included for this purpose. Always check the type of wall to determine whether the screw anchors can be used.



3. Use the bracket to hang the parallel switch box on the wall mount by its rear bracket.
4. Then secure the left side using the included bolts.

## 6.3. Assembly — Battery tower 1 with FEMS box

### 6.3.1. Warnings and Safety Instructions

**DANGER**

**Electric Shock from Live Parts**
Death or serious injury to the body and limbs due to electric shock from contact with live DC cables connected to the system.

- Before beginning work, disconnect the inverter, the BMS box, and the battery modules from the power supply and secure them to prevent them from being turned back on.
- Wait at least 5 minutes after shutting down the system before beginning work on the inverter.
- Please follow the safety instructions provided by FENECON GmbH in the Safety section.
- Do not touch any exposed live parts or cables.
- Do not remove the terminal strip with connected DC wires from the slot while it is under consumer load.
- Wear appropriate PPE during all work.



**DANGER**

**Fire and Explosion**

Death or serious injury to the body and limbs due to fire or explosion; in the event of a malfunction, a flammable gas mixture may form inside the battery module. Operating the device in this condition may cause a fire or trip an explosion inside the product.

- If an error occurs, do not take any direct action on the system.
- Make sure that unauthorized persons do not have access to the system.
- Disconnect the battery modules from the inverter using the DC fuse on the battery tower.
- Turn off the AC miniature circuit breaker, or if it has already tripped, leave it off and secure it to prevent it from resetting.
- Perform work on the inverter (e. g., troubleshooting, repairs) only while wearing PPE designed for handling hazardous substances (e. g., protective gloves, eye and face protection, and respiratory protection).



**DANGER**

**Fire and Explosion in Deeply Discharged Battery Modules**

Death or serious injuries to the body and limbs caused by fire or explosion resulting from the improper charging of deeply discharged battery modules.

- Before putting the system into operation, make sure that the battery modules are not deeply discharged.
- Do not put the system into operation if the battery modules are deeply discharged.
- If the battery modules are deeply discharged, contact FENECON Service.
- Charge deeply discharged battery modules only as instructed by FENECON Service.



**DANGER**

**Electric arcs caused by short-circuit currents**

Death or serious injuries to the body and limbs due to burns caused by heat generation and electric arcs resulting from short-circuit currents in the battery modules.

- Before performing any work on the battery modules, disconnect them from the power supply.
- Follow all safety instructions provided by FENECON GmbH.



**DANGER**

**Damage to a measuring instrument caused by overvoltage**

Death or serious injury to the body and limbs due to electric shock when touching the live housing of a measuring instrument: Overvoltage can damage a measuring instrument and cause a voltage to be present on the instrument's housing.

- Use only measuring instruments with a DC input voltage range of at least 1000 V or higher.



**WARNING**

**Weight of the Battery Modules**

Injuries to the body and limbs caused by crushing if the battery modules fall during transport or assembly.

- Handle the battery modules with care when transporting and lifting them.
- Be aware of the weight of the battery modules and their center of gravity.
- Wear appropriate PPE when performing any work on the battery modules.



**CAUTION**

**Toxic Substances, Gases, and Dust**

Damage to electronic components can cause toxic substances, gases, and dust to form inside the inverter. Contact with toxic substances and inhalation of toxic gases and dust can lead to skin irritation, chemical burns, breathing difficulties, and nausea.

- Perform work on the inverter (e. g., troubleshooting, repairs) only while wearing PPE designed for handling hazardous substances (e. g., protective gloves, eye and face protection, and respiratory protection).
- Make sure that unauthorized persons do not have access to the inverter.



**CAUTION**

**Hot Surfaces**

Injuries to the body and limbs caused by burns from hot surfaces: The surfaces of the battery tower can become very hot.

- Install the battery tower so that it cannot be touched accidentally.
- Do not touch hot surfaces.
- Before starting work, wait 30 minutes until the surfaces have cooled sufficiently.
- Please observe the warnings on the battery tower.

**NOTICE**

**Sand, Dust, and Moisture**
The ingress of sand, dust, and moisture can damage the inverter and impair its operation.

- Install battery towers only in locations where the humidity is within the specified limits and the environment is free of sand and dust.

**NOTICE**

**Electrostatic Charge**
Touching electronic components can damage or destroy a battery tower due to electrostatic discharge.

- Ground yourself before touching any component.
- When handling electronic components, wear appropriate PPE (e. g., antistatic shoes and gloves).

**NOTICE**

**Cleaning Agents**
The use of cleaning agents can damage battery towers and all other parts of the system.

- Clean the battery towers and all other parts of the system using only a cloth dampened with clean water.

**CAUTION**

**Occupational Safety During the Installation of Battery Towers and Modules**
Risk of injury to the body and limbs due to improper handling of battery modules.

- When performing the assembly of the battery modules, wear PPE: protective eyewear, insulated gloves, and protective footwear.
- Do not wear any conductive jewelry (e. g., watches, bracelets, rings).

## 6.3.2. Conditions at the installation site

**Indoor or outdoor installation**
We recommend installing the FENECON Commercial 92 — battery towers in a well-ventilated room without external heat sources. However, the battery towers can also be installed outdoors protected from the weather (e. g. garage).

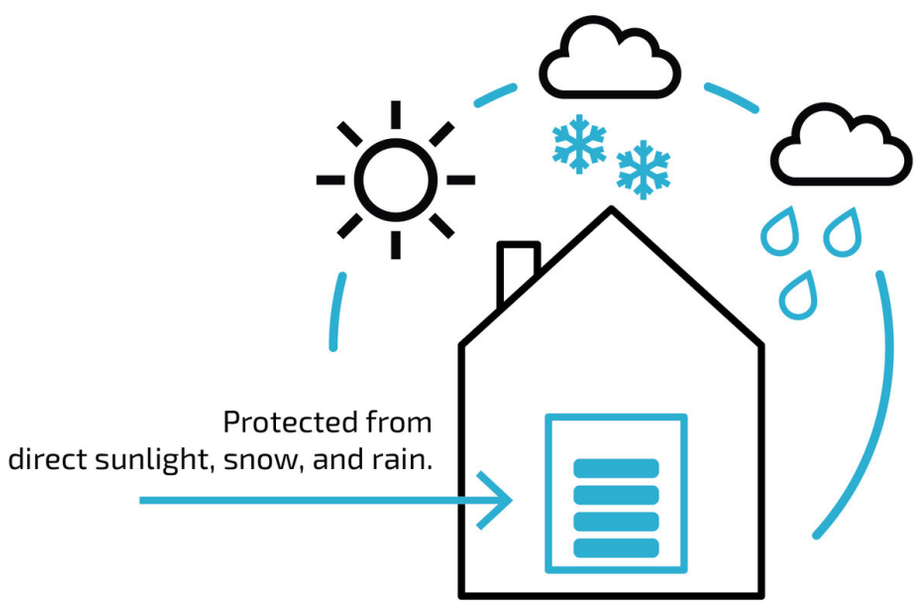



Image 17. Installation conditions

Installation at 2000 m above sea level and in unventilated locations is not permitted.

Also inadmissible installation sites:

- those with an explosive atmosphere.
- Places where flammable or oxidizing substances are stored.
- Wet rooms.
- Places where salty moisture, ammonia, corrosive vapors or acid can penetrate the system.

The electrical energy storage system should also be inaccessible to children and animals.

## 6.3.3. Clearances at the installation site and installation conditions

- Battery towers must be installed away from direct sunlight and protected from direct rain and snow.
- In conditions outside the optimum temperature range, the performance of the batteries is reduced. (optimum temperature range: +15 °C to +30 °C)

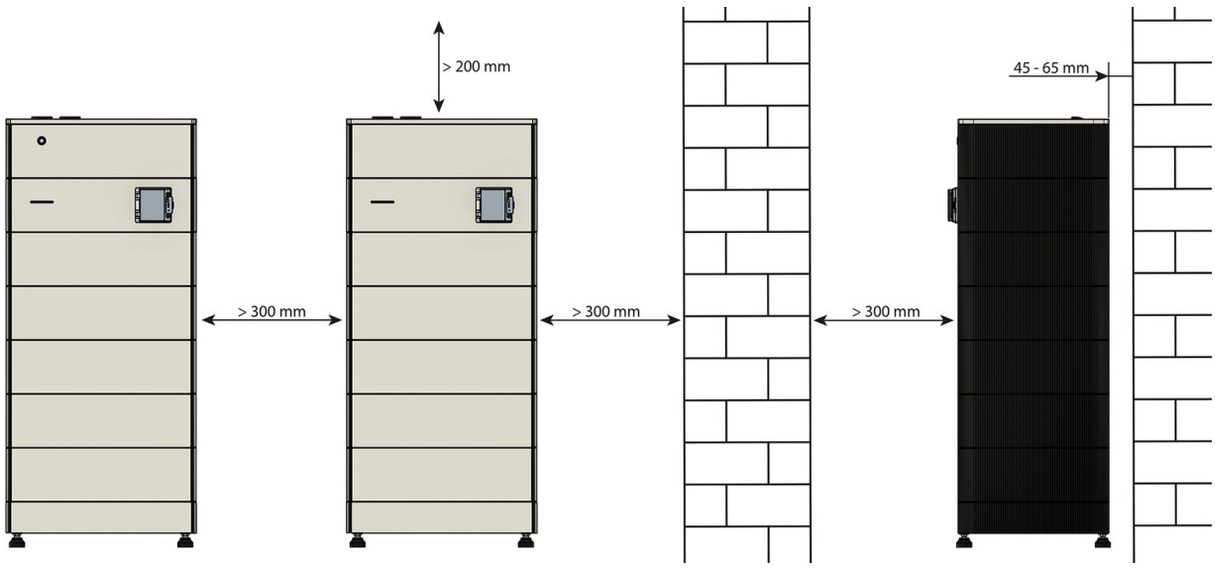


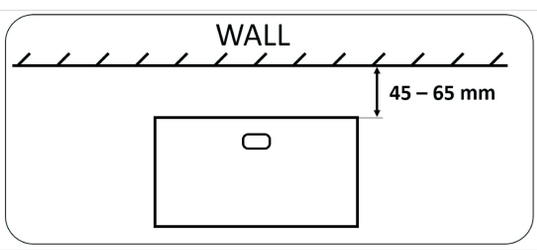

Image 18. Recommended Clearances at the Installation Site — Battery Towers

- A lateral clearance of 300 mm from a wall and 300 mm between two battery towers is recommended.
- Clearances of 300 mm from a wall are recommended at the front.
- A clearance of 200 mm from the ceiling is recommended.

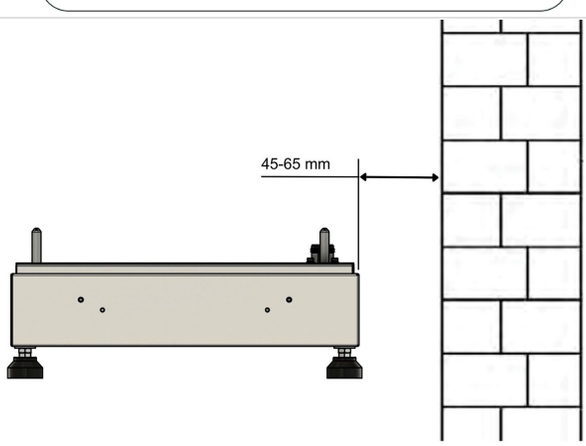
Falling below the recommended clearances can make installation more difficult and may result in earlier derating.

### 6.3.4. Assembly of battery towers with FENECON Commercial 92 EMS box and FENECON Commercial 92 Extension box

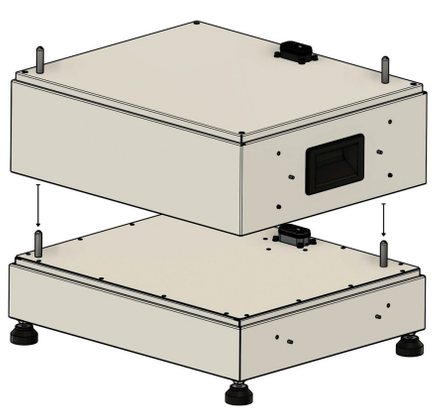
Proceed as follows to set up a battery tower:




1. The battery tower is installed stackable in front of a wall on a solid and level floor.
2. The distance to the wall must be 40 to 65 mm so that the wall bracket can be fitted correctly.

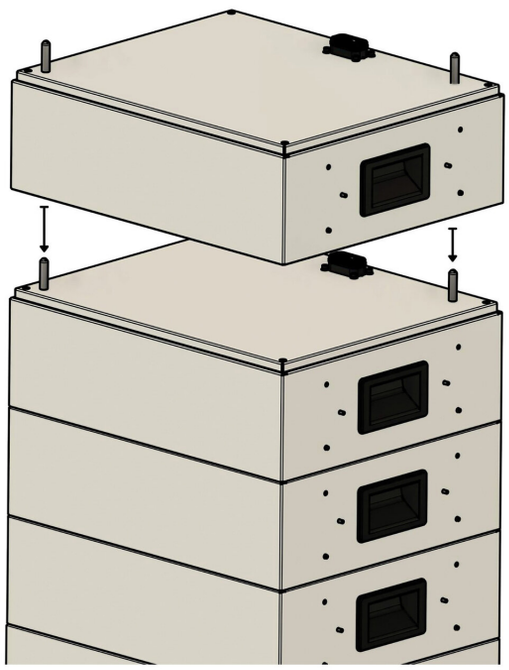



3. Place the base on the feet at the installation location (maintain a clearance of 40 to 65 mm from a wall).



1. Place a battery module on the base, paying attention to the plug-in bolts and positioning holes.
2. A black protective film may be stuck to the electrical connectors of the battery. If present, remove this before plugging together.

A maximum of 15 battery modules can be stacked on one base.



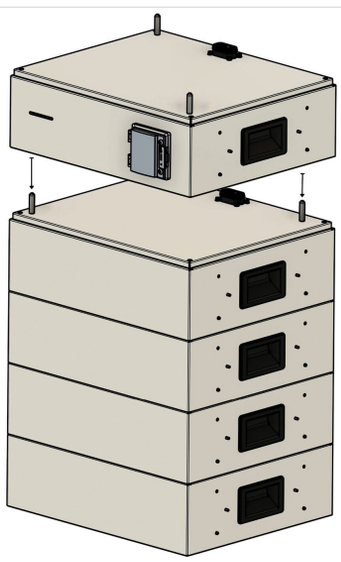
6. Install all remaining battery modules in the same way.

**DANGER**

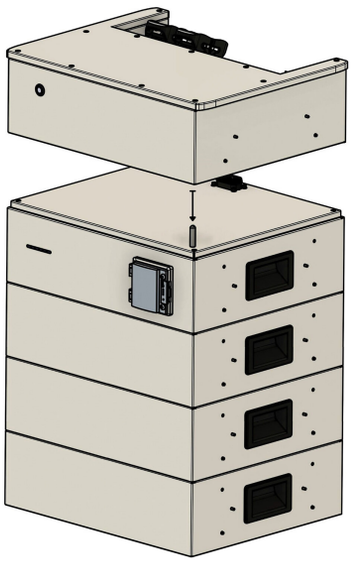
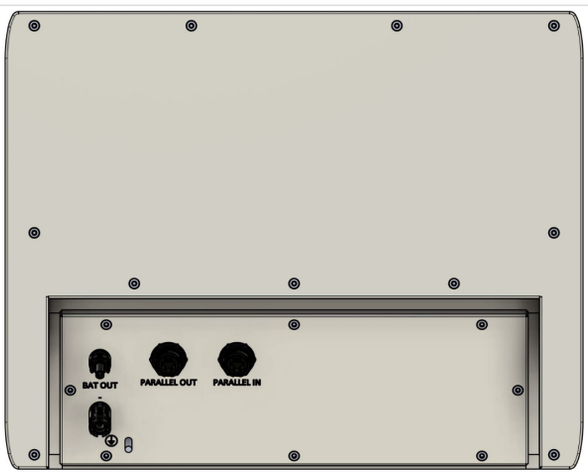
**Electric shock**

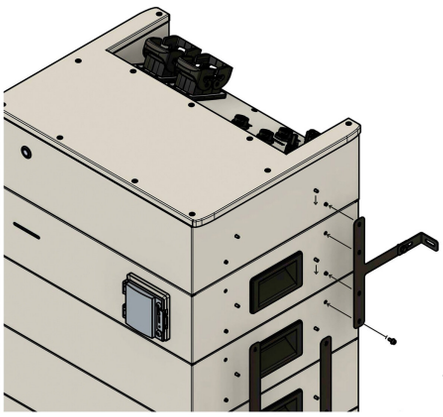
Death or serious injury to the body and limbs due to electric shock.

- Make sure the BMS box's circuit breaker is turned off before installing the BMS box.

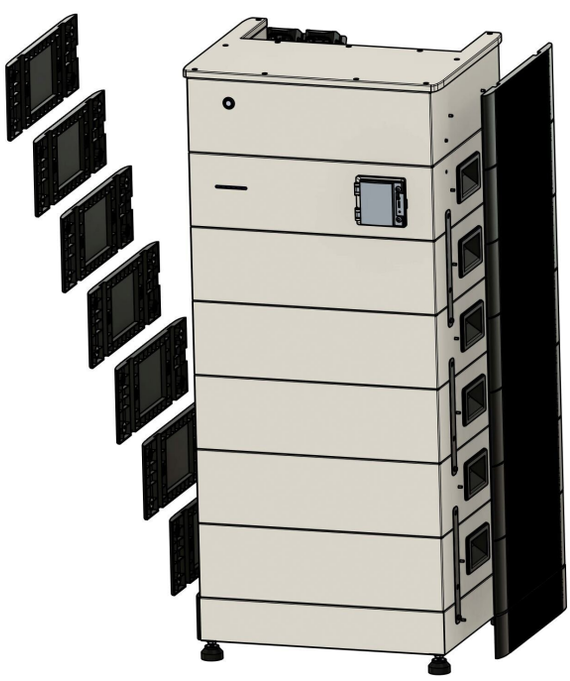


7. Place the FENECON Commercial 92 BMS box on the last battery.

| | |
|---|---|
|  | 8. Attach FENECON Commercial 92 EMS box to the 1st battery tower. |
|  | 9. Attach the FENECON Commercial 92 Extension box to all other battery towers. |
|  | 10. Fit the T-piece and the bracket with the enclosed M6 bolt. |



11. Hook in the mounting rails of the EMS box (wall side) and mark the holes for the wall bracket on the wall (see previous picture).
12. Drill the holes and screw the wall bracket to the wall.
13. Hook in all other rails alternately left/right one module lower and screw on with the enclosed bolts.
14. The following bracket arrangement is recommended for mounting the battery towers.



15. Insert the side panels of the base, the battery modules, the BMS box and the EMS box.

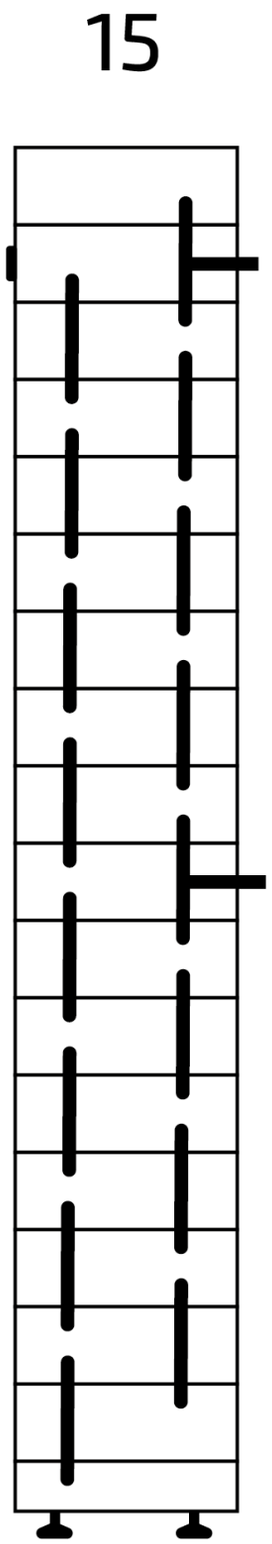


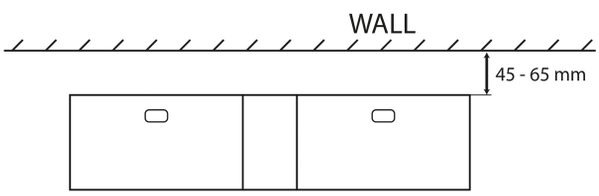

Image 19. Arrangement of the module fastening

## 6.4. Installation — Battery tower on split base

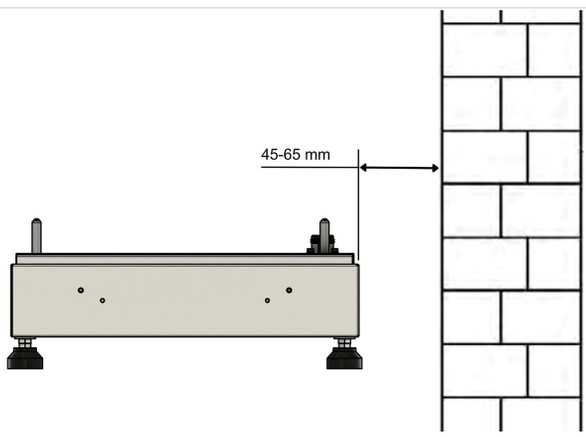
The split base can only be used with battery modules with item number FEH021.

The split base is used for a larger footprint installation **of a battery tower**, which reduces its height and enables installation in rooms with low ceilings.

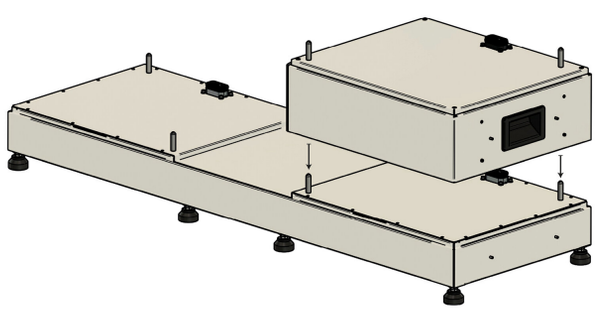
Proceed as follows to set up a battery tower with a split base:




1. The battery tower is installed stackable in front of a wall on a solid and level floor.
2. The clearance to the wall must be 40 to 65 mm so that the wall bracket can be fitted correctly.




3. Place the base on the feet at the installation location (maintain a clearance of 40 to 65 mm from a wall).



4. Place a battery module on the base, paying attention to the plug-in bolts and positioning holes.
5. A black protective film may be stuck to the electrical connectors of the battery. If present, remove this before plugging together.

- A maximum of 15 battery modules can be mounted on one split base.
- Ensure that the modules are evenly distributed on both sides of the split base.
- The difference in tower height must not exceed 5 modules.
  If this cannot be complied with, a maximum of 10 battery modules must be stacked on one side of the system.



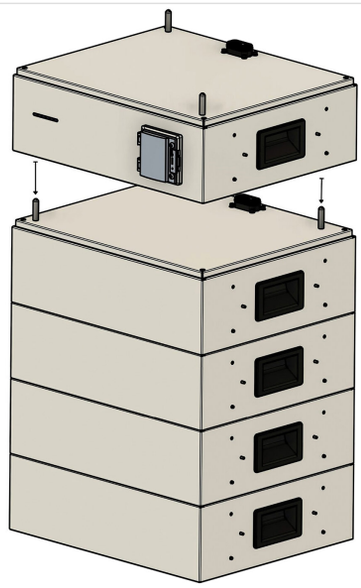
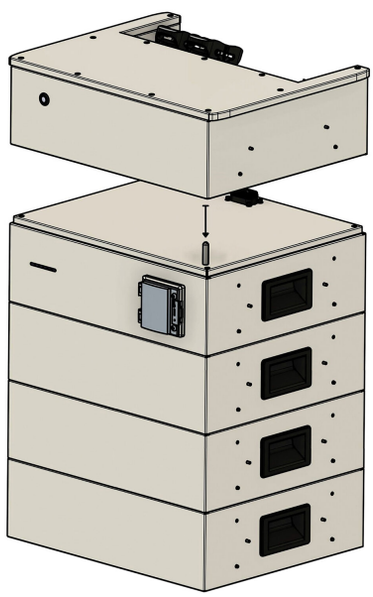
6. Install all remaining battery modules in the same way.

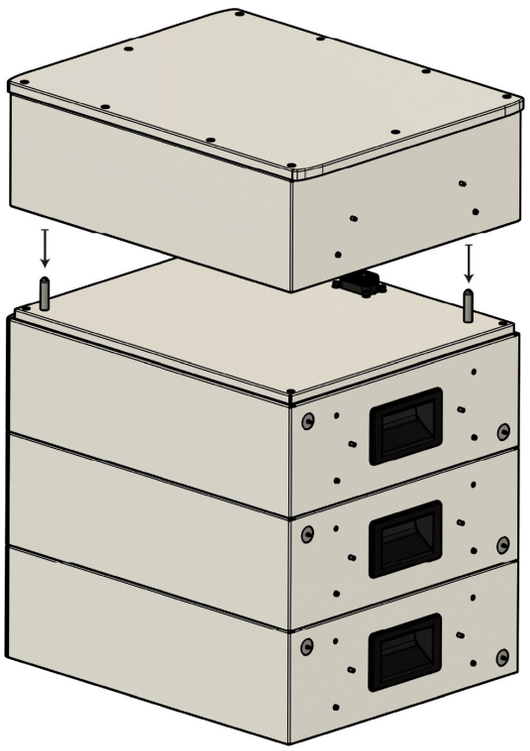
**DANGER**

**Electric shock**

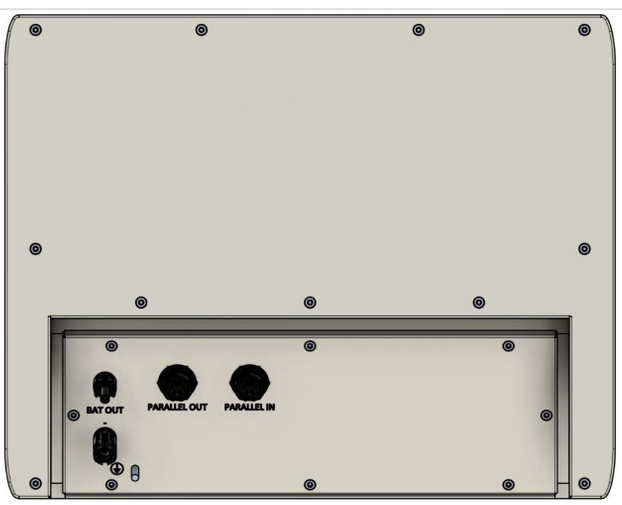
Death or serious injury to the body and limbs due to electric shock.

- Make sure the BMS box's circuit breaker is turned off before installing the BMS box.

| | |
|---|---|
|  | 7. Place the FENECON BMS box on the last battery. It does not matter which of the two towers on the split base the FENECON BMS box is placed on. |
|  | 8. Attach the FENECON EMS box to the BMS box. |



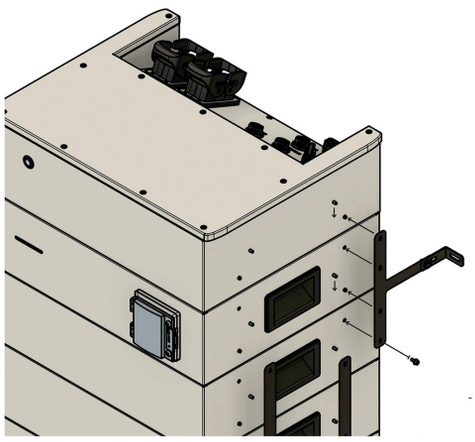
9. Place the Top box on the second tower.




10. Place the FENECON extension box on the top of all other split sockets.

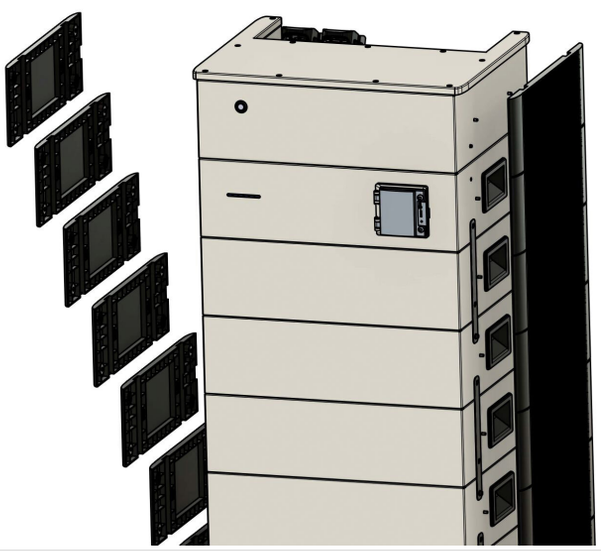


11. Fit the T-piece and the bracket with the enclosed M6 bolt.



12. Hook in the fixing rails of the EMS box and the Top box (wall side) and mark the holes for the wall bracket on the wall.
13. Drill the holes and screw the wall bracket to the wall.
14. Hook in all other rails alternately left/right one module lower and fasten with the enclosed bolts.
15. The arrangement of the mounting brackets shown here is recommended for attaching the battery towers.

See graphic Arrangement of module mounting — Split base for installation details.



16. Attach the side panels of the split base, the battery modules, the BMS box, the EMS box and the Top box.

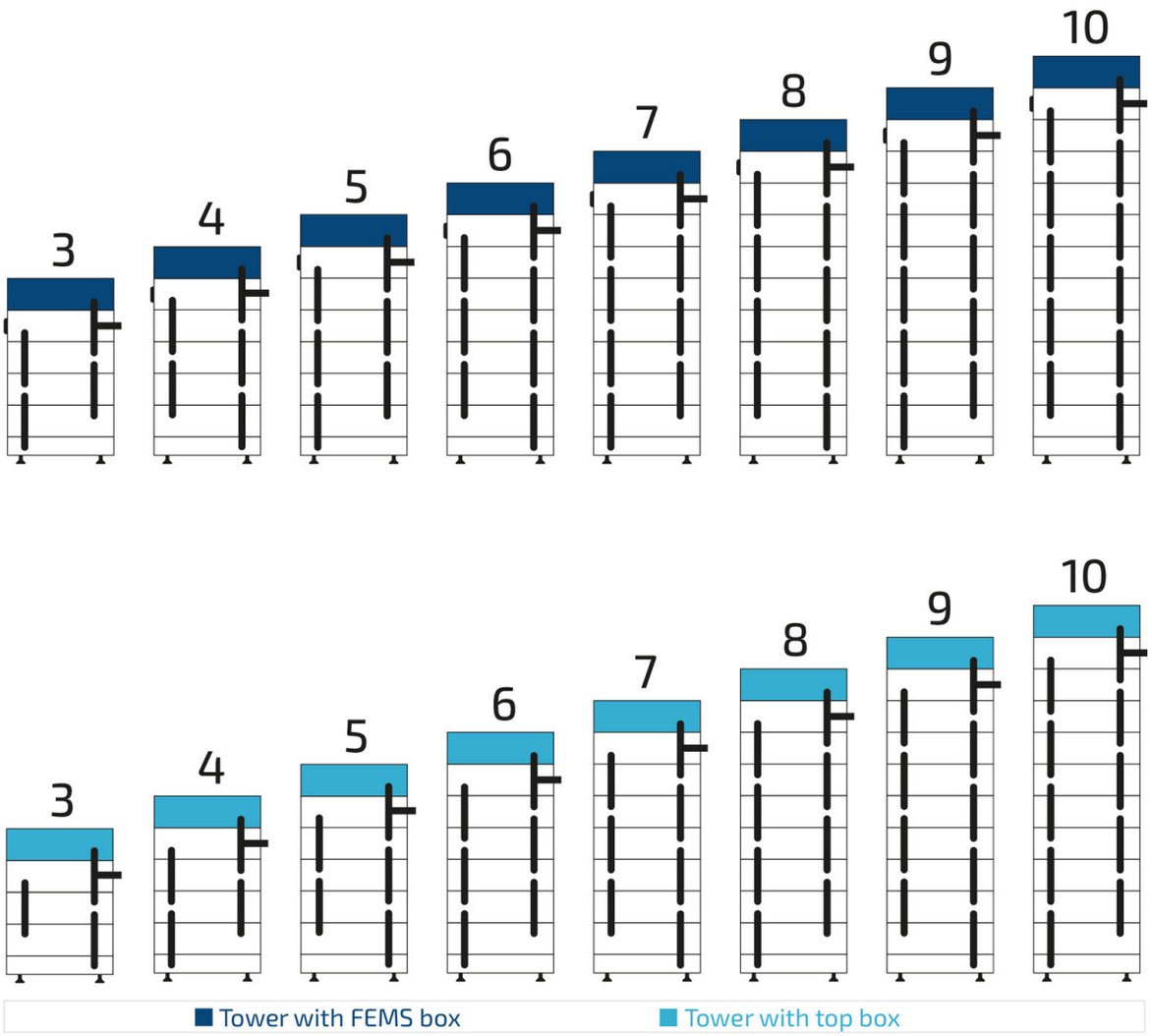
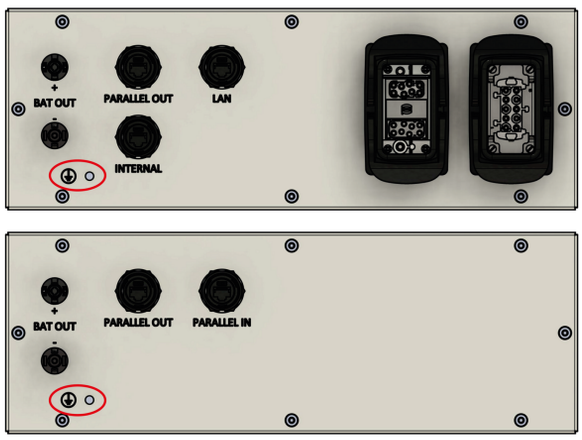


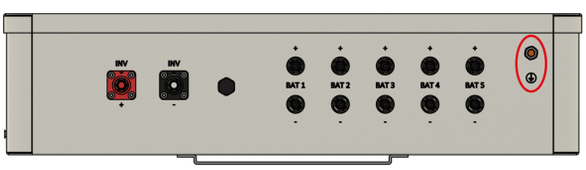

Image 20. Module mounting arrangement — Split base

## 6.5. Electrical installation

### 6.5.1. Earthing the inverter and battery towers




1. The battery towers must be grounded directly to the earth circuit connector.
2. At least a 10 $mm^2$ grounding cable must be used.
3. Use the earthing points of the EMS box and Extension box for this (red).




1. The parallel switch box must also be grounded directly to the earth circuit connector.
2. At least a 25 $mm^2$ grounding cable must be used.
3. Use the earthing points of the parallel switch box for this (red).

The cross-section of the earthing must be at least 10 $mm^2$. + The inverter and the battery towers must be earthed individually to the equipotential bonding.

## 6.5.2. Connection and wiring of the KACO Inverter

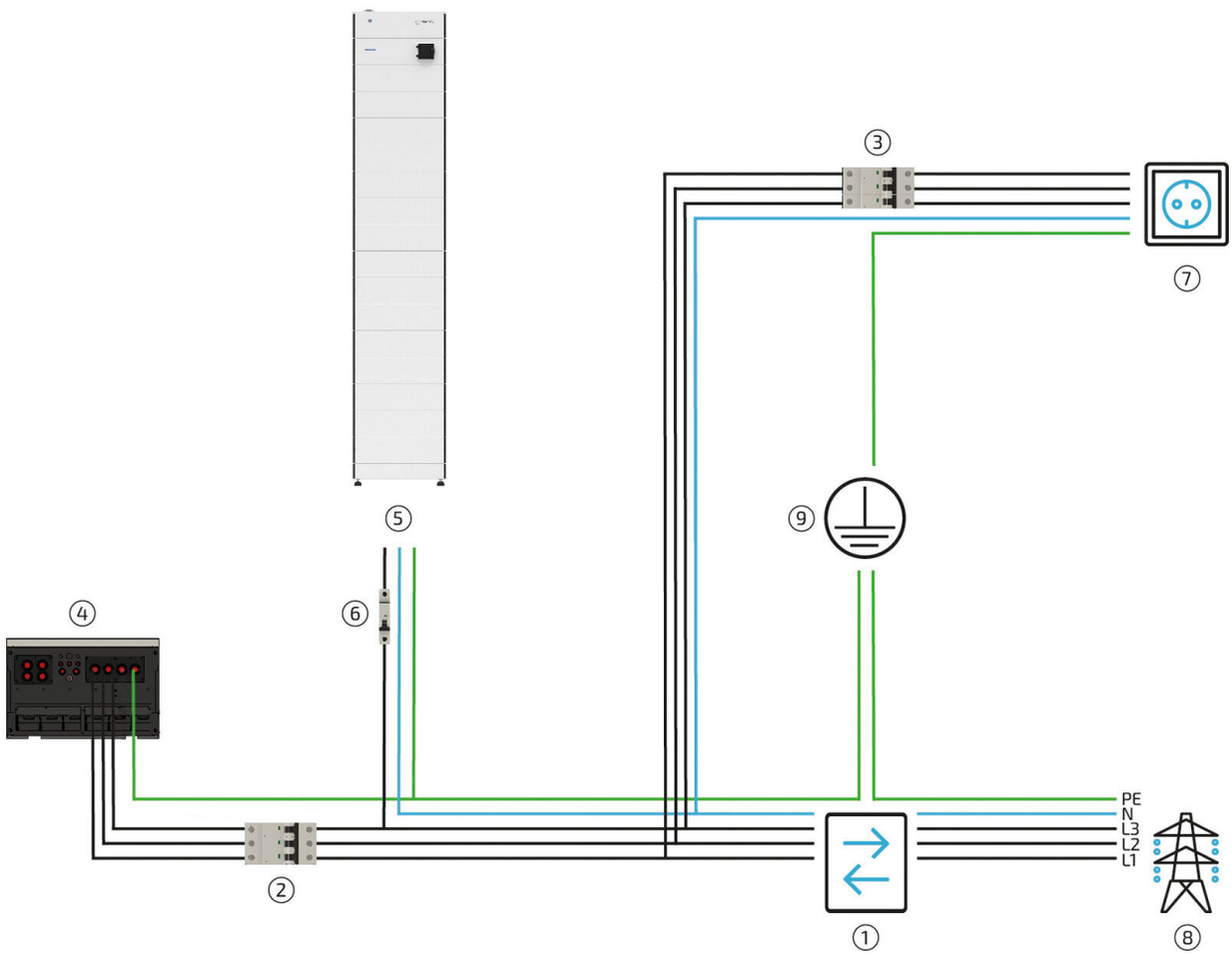



Image 21. General information AC connection

| Item | Description |
|---|---|
| 1 | Bi-directional meter from energy supplier |
| 2 | Inverter fuse 3-pole. (see Inverter manual)*[1] |
| 3 | Fuse the load with RCD type A and suitable MCBs |
| 4 | KACO inverter 92 kW |
| 5 | Battery towers |
| 6 | Fuse protection max. C6 or C10 1-pole |
| 7 | Consumer load |
| 8 | Power supply/grid connection |
| 9 | Earth circuit connector |

Table 31. Components for AC connection (not included in the scope of delivery)

*[1] In addition, the currently applicable national regulations and the requirements of the relevant grid operator must be followed. (If the grid operator requires an RCD, a Type A RCD with a 700 A trip current is recommended; a 30 A trip current may result in unwanted shutdowns.)

*[2]The currently valid national regulations, the specifications of the associated network operator and the manufacturer's specifications must be observed.



The manufacturer's manual supplied with the inverter must be used for the AC connection of the inverter.

### 6.5.3. Connection and wiring of the 3-phase sensor without current transformer

(KDK 2PU CT)

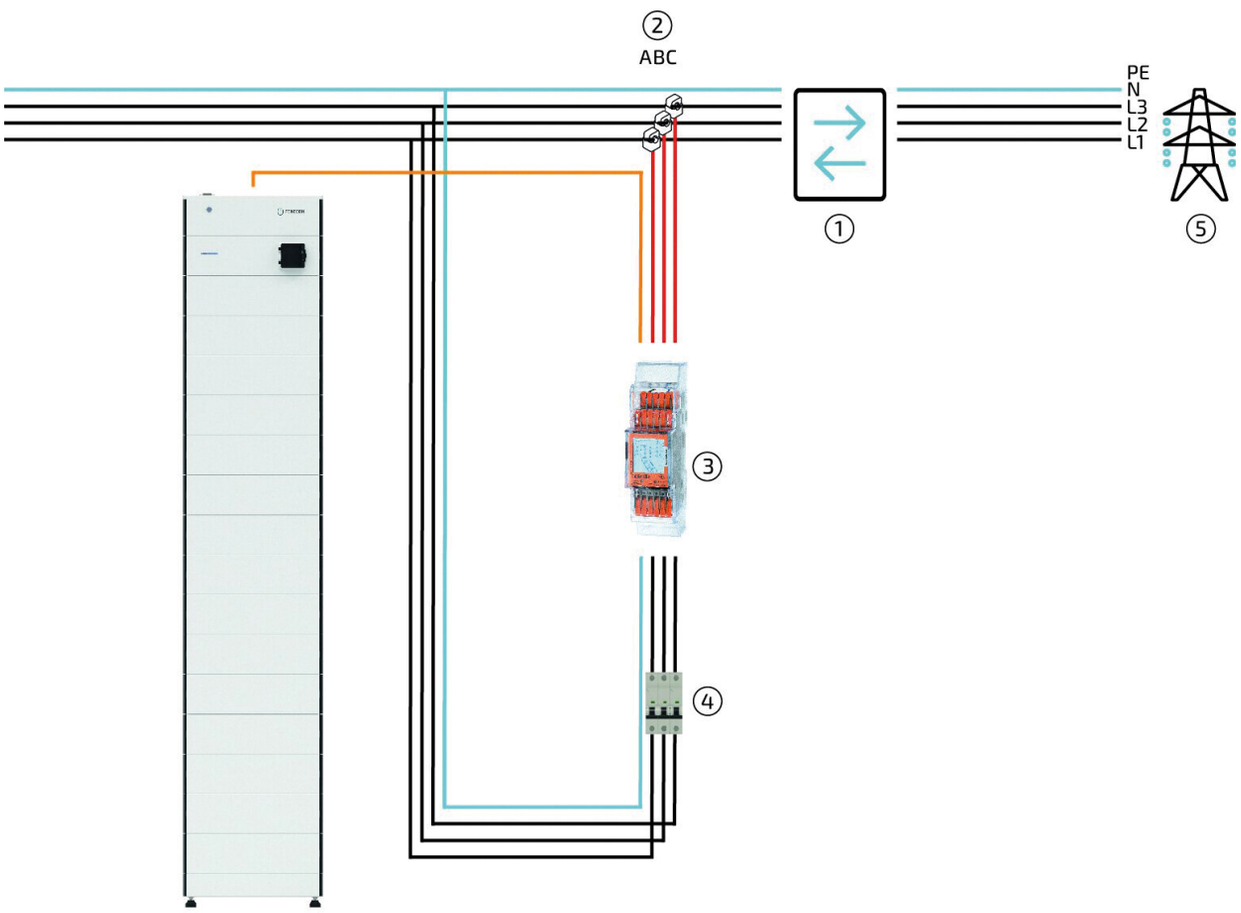



Image 22. AC connection Energy meter

| Item | Description |
|---|---|
| 1 | Bi-directional meter from energy supplier |
| 2 | Split-core CT (directly behind grid operator meter, not included in standard scope of delivery) |
| 3 | Energy meter |
| 4 | Fuse for the energy meter (recommended) B6 3-pole |
| 5 | Grid |

Table 32. Components for AC connection

*[1] In addition, the currently applicable national regulations and the requirements of the relevant grid operator must be followed. (If the grid operator requires an RCD, a Type A RCD with a 700 A trip current is recommended; a 30 A trip current may result in unwanted shutdowns.)

**Please note:**
The current transformers are not included in the scope of delivery! (Online:

> www.kdk-dornscheidt.de/produktkategorie/wandler/). Using the KDK meter as an example, the transformer ratio is 1 or 5. You can read the transformer ratio on the current transformers installed on site (see e. g. type plate).
>
> Für die Installation des Zählers verwenden Sie die Installations- und Konfigurationsanleitung — FEMS-Paket 3-Phasen-Sensor ohne Stromwandler (KDK 2PU CT): docs.fenecon.de/de/fems/fems-app/installation_manuals/KDK_2PU_CT_installation_manual.html

The Modbus communication available with the 2PU CT takes place via a serial RS485 interface (2 or 3 wire), which enables the device to be operated from FEMS. In the standard configuration, 64 devices can be connected to a PC or a controller over 1000 meters with one RS485 interface.

The connections for Modbus communication are located above the meter, in the front row of terminals.

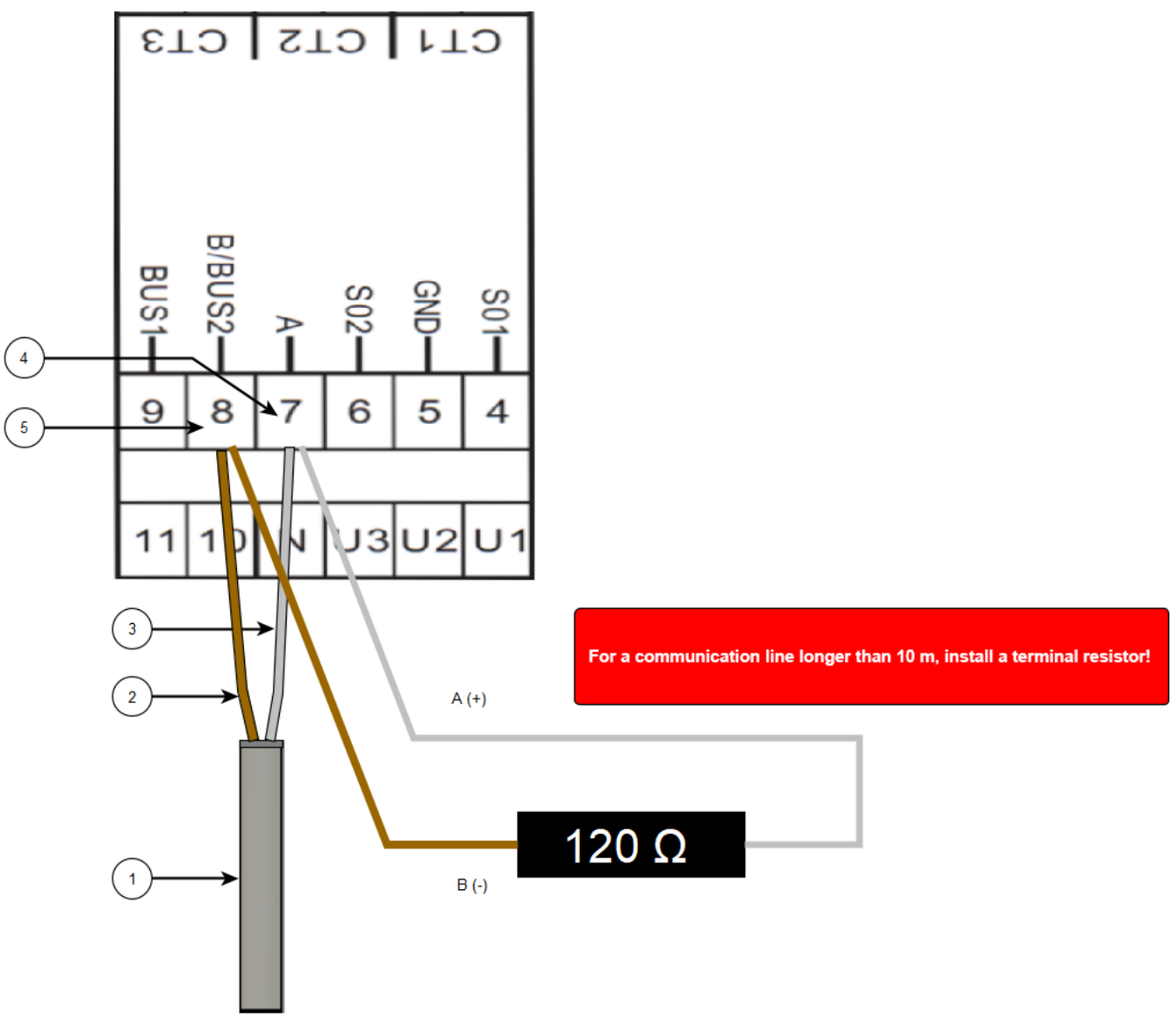
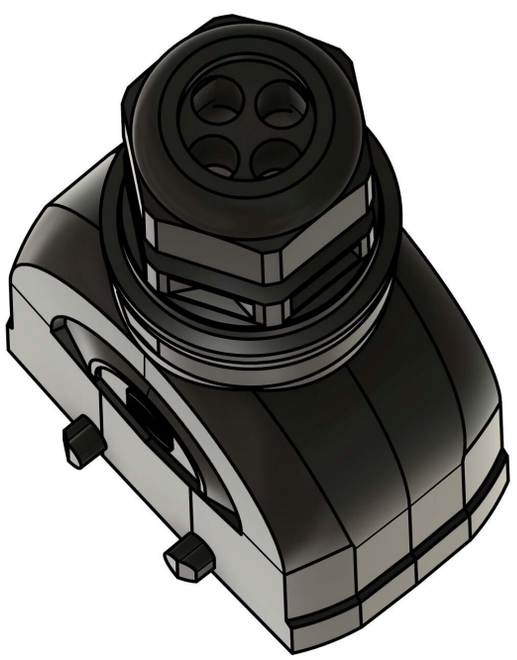
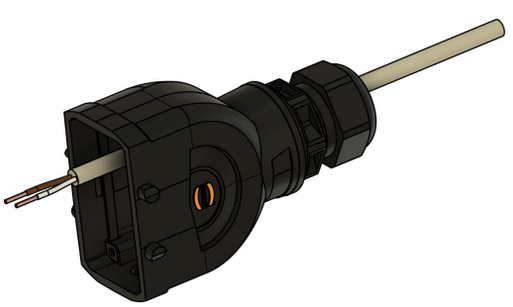
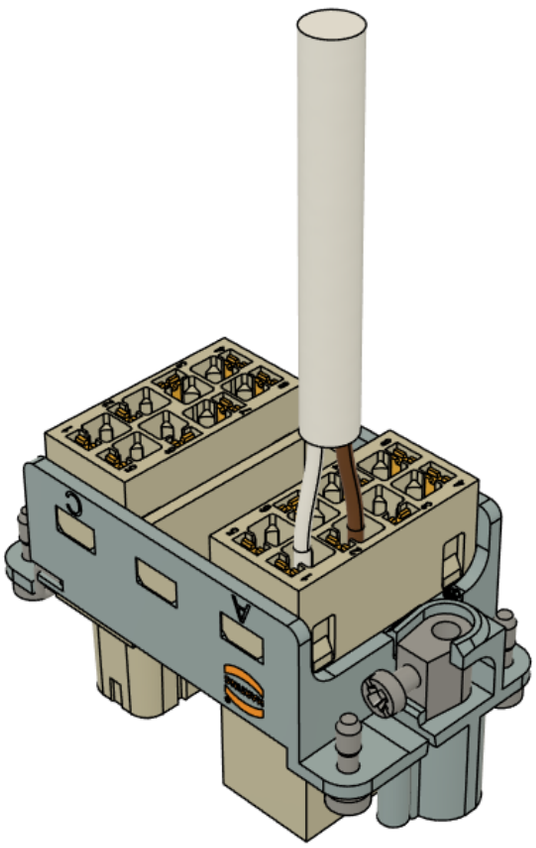



Image 23. RS-485 connection

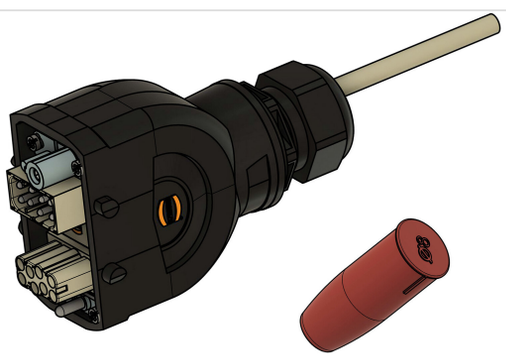
## 6.5. Electrical installation

1. COM RS-485 connection from the FEMS direction
2. Data conductor Positive (+) (A conductor)
3. Data conductor Negative (-) (B conductor)
4. Minus (-) contact
5. Plus (+) Contact

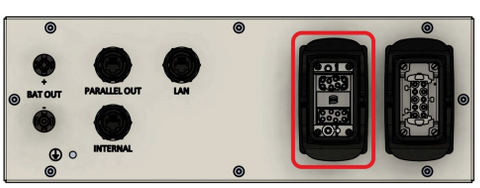
| | |
|---|---|
|  | 1. Feed the cable through one of the four holes in the multi-hole seal. |
|  | 2. Insert the cable through the bolt connection and the multi-hole seal into the Harting housing. |



3. The other end with two open pins must be connected to terminal 1/2 on the Harting plug (16-pin — A).
4. Connect the white core to terminal 1.
5. Connect the orange core to terminal 2.

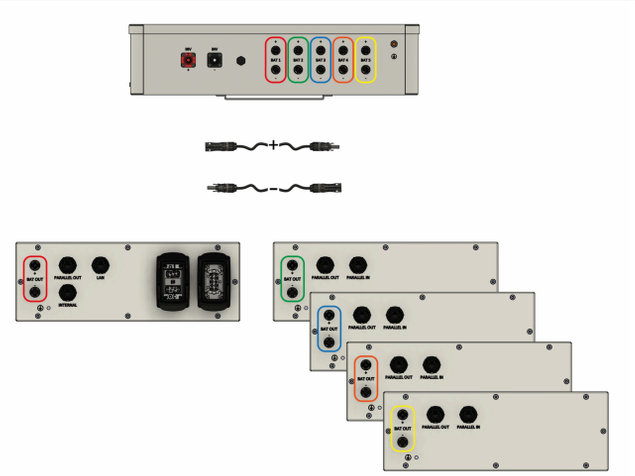


6. Then screw the socket into the Harting housing.
7. Close the other openings in the bolt connection with the enclosed filler plugs (8 mm).
8. Provide strain relief for the cable by tightening the bolt connection.

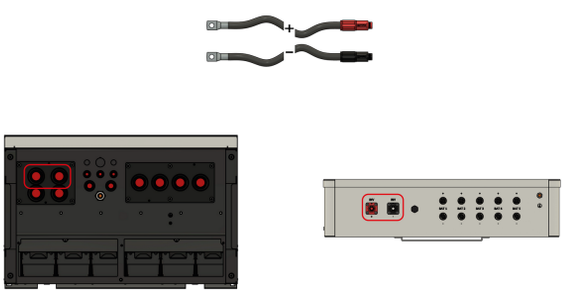



9. Close the remaining feed-throughs of the multi-hole seal with the enclosed 8 mm filler plugs and tighten the bolt connection.
10. Lock the plug at the top and bottom through the holders.

## 6.5.4. DC cable from the battery towers to the parallel switch box



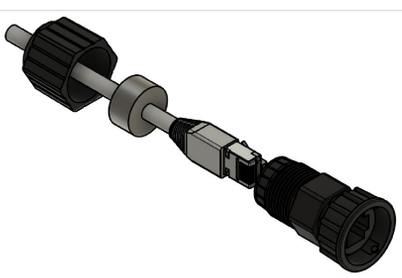
1. Use the enclosed 10 m DC cable between the battery towers and the parallel switch box.
2. Connect the cables to the battery (BAT OUT) and to the parallel switch box (BAT 1-5).
3. Connect plus (+) to plus (+) and minus (-) to minus (-).



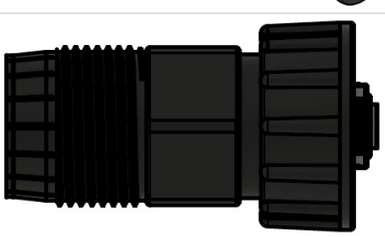
4. Use the enclosed 3 m DC cable for the compound between the parallel switch box and the inverter.
5. Connect the cables to the parallel switch box (INV) and insert them into the inverter using the appropriate bolt connections.
6. Refer to the inverter manual for this.

The DC plugs used on the battery side are not compatible with standard MC4 plugs.

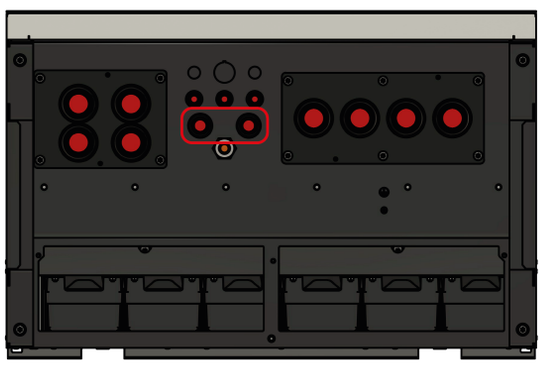
## 6.5.5. Communication between inverter and EMS box



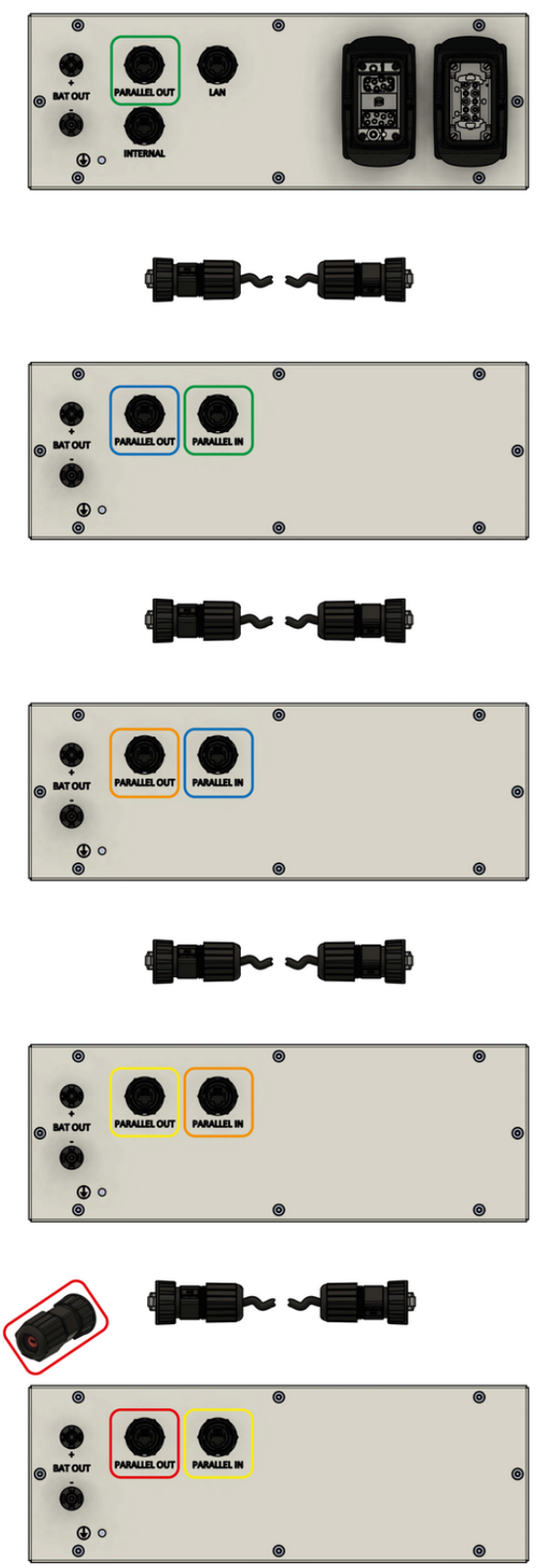
To seal the network connection, insert the enclosed 10 m network cable into the plug and screw it in place.



Make sure that the network connector protrudes approx. 3 mm beyond the bayonet catch at the front. For example, the jumper plug of the battery can serve as a reference for the position of the network plug.

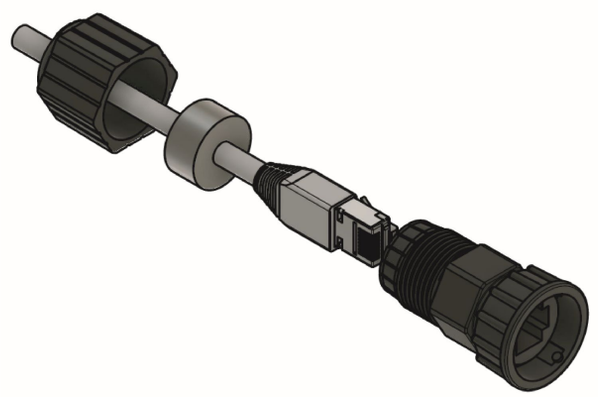
| | |
|---|---|
|  | Connect the network cable to the INTERNAL port of the EMS box. |
|  | Put the other end of the network cable through the screw connection of the inverter and connect it to the network port (4 — Ethernet for network connection DHCP).<br>Refer to the inverter manual for more information. |

## 6.5.6. Communication between the batteries



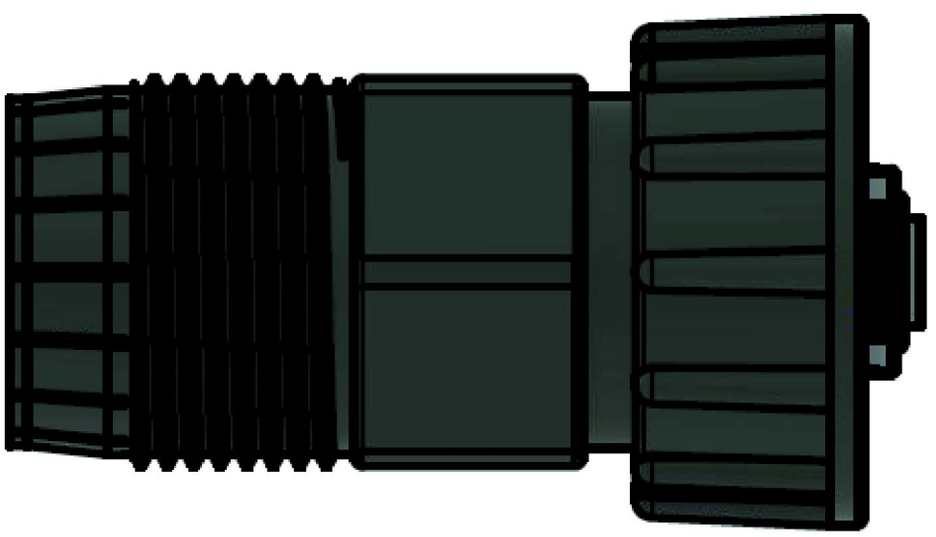

1. All enclosed network cables must be used for communication between the battery towers.
2. The first network cable must be plugged in and locked (green) between the EMS box (PARALLEL OUT) and the first Extension box (PARALLEL IN).
3. Likewise on all other towers, always between PARALLEL OUT and PARALLEL IN (blue/orange/yellow).
4. At the last tower, plug the jumper plug into PARALLEL OUT (red).

## 6.5.7. Communication with the customer network

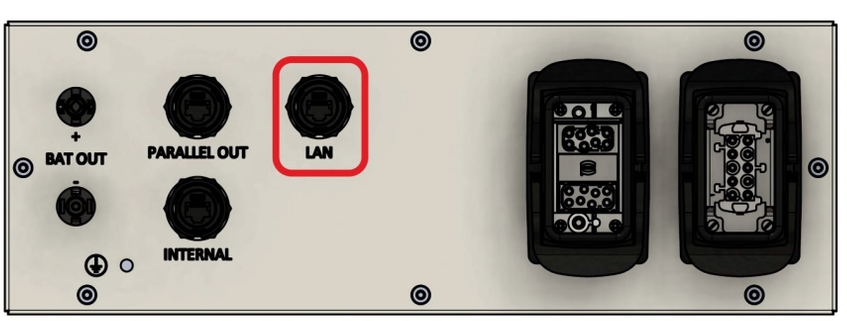


1. To seal the network connections, insert the cable into the connector and bolt it in place. Only the multi-hole seal and the bolt connection are required.

If the battery tower is installed indoors, this step can be skipped. And the network cable can be plugged in directly.



2. Make sure that the network connector protrudes approx. 3 mm above the bayonet catch at the front.
3. As an example, the jumper plug of the battery can serve as a reference for the position of the network connector.



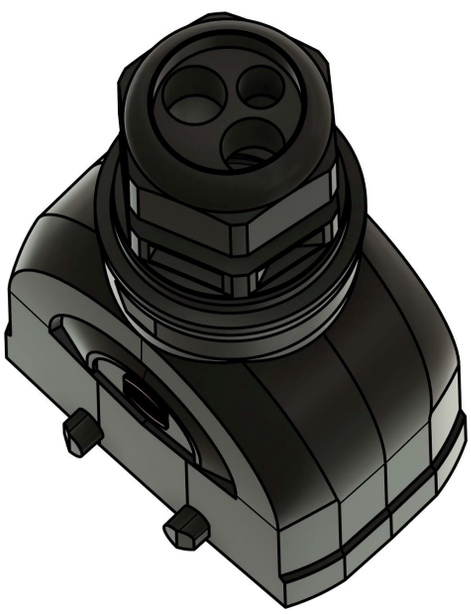

4. For internet connection and system configuration, connect the network cable to the LAN port of the battery and the other end of the cable to the customer's network.

The electrical energy storage system does not have a WiFi function.

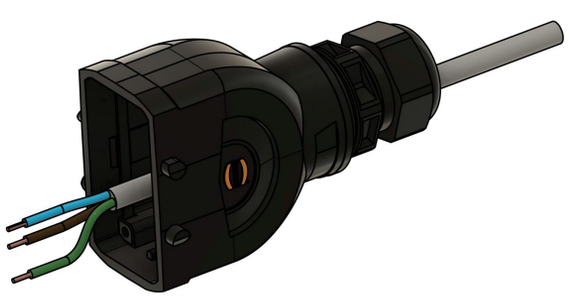
### 6.5.8. AC connection of the FENECON EMS box

An external 230 V power supply is required to supply the FENECON EMS box.

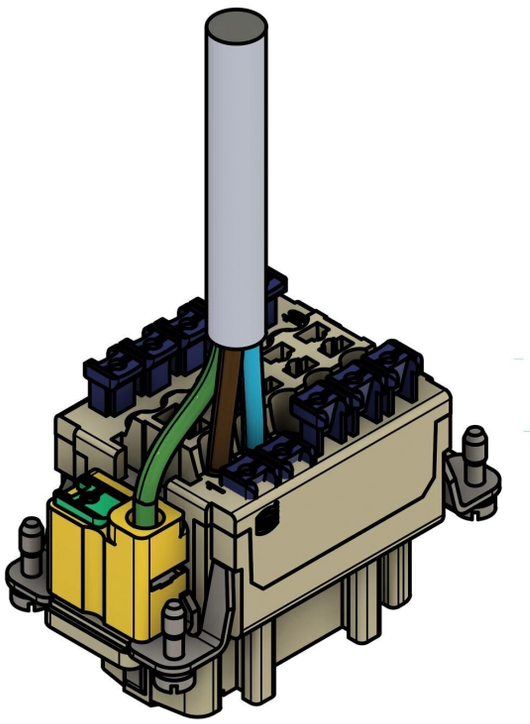
The purpose of this is to avoid loading the empty battery with additional consumer loads. This can occur particularly in winter when there is no sunshine or when there is snow on the PV system.



1. Feeding the cable through the smaller hole of the multi-hole seal.
   A cross-section of 3 x 1.5 $mm^2$ is recommended.
2. Make sure that the housing with the 3-hole seal is used.
   The other housing will be needed later.



3. Insert the cable through the bolt connection and the multi-hole seal into the Harting housing.

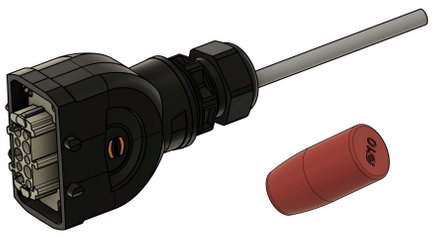


4. Harting socket insert, 10-pin, with cable.

   Connect L to 1.

   Connect N to 2.

   Connect PE to PE.

| | |
|---|---|
|  | 5. The other pins are for the integrated relay contacts.<br>If these are not used, the socket can be bolted into the housing.<br>6. Close the remaining feed-throughs of the multi-hole seal with the enclosed filler plugs (10 mm) and tighten the bolt connection. |
|  | 7. Connect the plug to the FEMS box.<br>8. Lock the plug at the top and bottom through the holders. |

# 7. Initial commissioning

**NOTICE**

**Please follow the instructions in the installation and service instructions**
The installation and service instructions state:

- that an appropriate cooling down period must be observed before starting work on the devices,
- that wearing appropriate protective gloves prevents the risk of burns.

## 7.1. General Safety Instructions for Commissioning

Commissioning must only be carried out by trained specialist personnel.

- Do not disconnect the electrical connectors while they are live. Disconnect the power supply.
- Batteries must not be connected or disconnected when a current is flowing.
- Opening batteries is prohibited.
- Before commissioning the system, ensure that the battery modules are not deeply discharged.
- If the battery modules are deeply discharged, contact FENECON Service.
- Only charge deeply discharged battery modules as instructed by the FENECON Service.

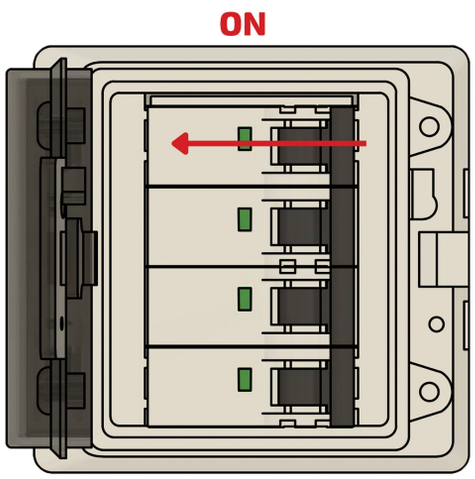
## 7.2. Checking the installation, connections and cabling

Check the system as follows before initial commissioning:

- All components (clearances, environment, mounting) are installed correctly.
- All internal wiring is complete and properly connected.
- All external supply lines (power supply, communication cable) are properly connected.
- All connected loads are matched to the system and the necessary settings have been made.
- All necessary tests of the system were carried out in accordance with the standards.

To set up the system, you will need a laptop with an Ethernet connection to the KACO inverter and a WiFi connection.
You can also use one device with an Ethernet connection in combination with a second device that has a WiFi connection.

### 7.2.1. Switching on the system




1. Rack in the EMS box (sub-distribution board or socket).
2. Rack in the inverter.
3. Racking in the battery towers (front battery tower).



4. If commissioning has already been completed, the battery will start and the LED bar should flash after approx. 60 seconds.
5. The system is now ready for use.

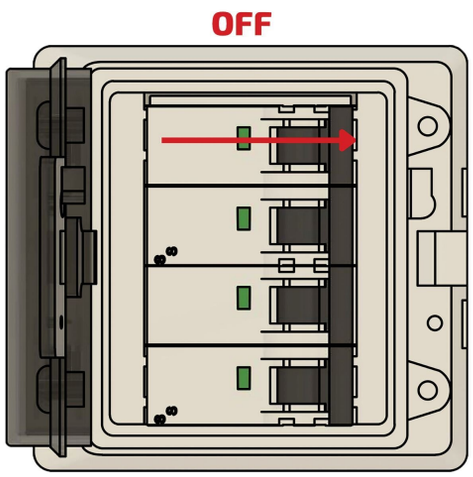
**Pressing the push-button on the front of the EMS Box will restart the system. The restart may take up to three minutes.**

If commissioning has not yet been completed, the battery will not start.

If the system has not yet been configured, the battery will enter error mode or shut down.
This can also happen during configuration. Therefore, it is recommended that you do not turn on the battery until you are prompted to do so during the configuration process.

The inverter only starts after configuration and only then synchronizes with the grid.

### 7.2.2. Switching off

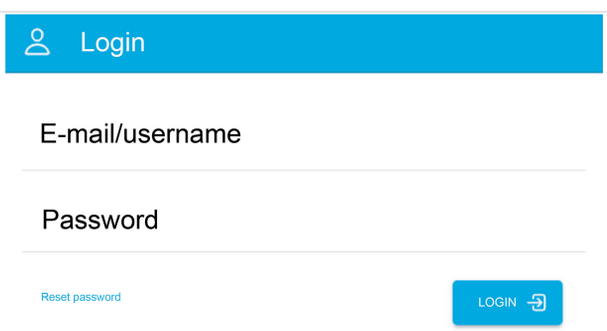



Switch off the battery towers (front battery tower).
Switch off the inverter (sub-distribution board, grid).
Switch off the EMS Box (sub-distribution board or outlet).
The system is not completely shut down until all LEDs on the inverter and the battery have gone out. This may take **approximately 30 seconds**.

## 7.3. Configuration via commissioning wizard

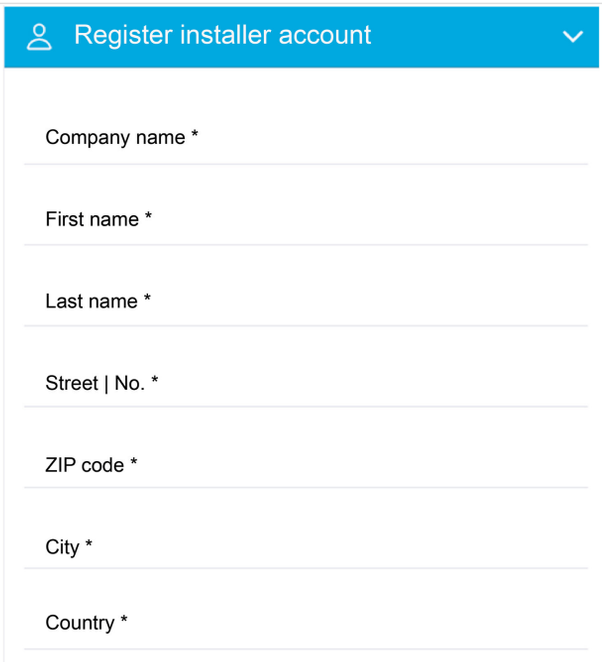
Open the FENECON homepage and click on the login for FEMS Online Monitoring "FEMS login" in the top right-hand corner. Alternatively, you can use the following QR code or link to access the page.

1. portal.fenecon.de/m

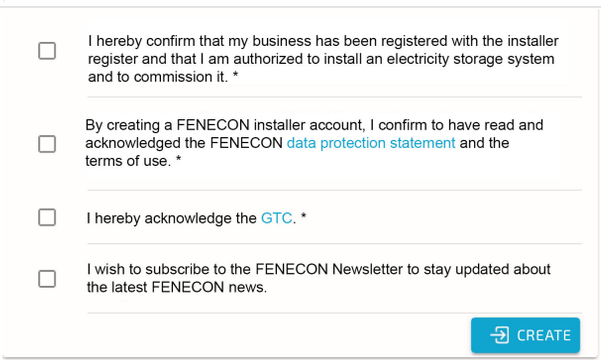



1. Log in with your installer account

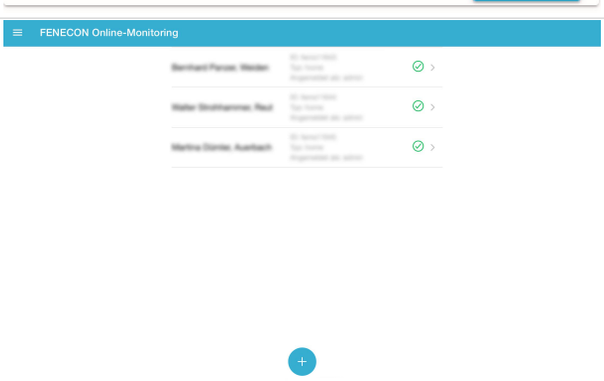
## 7.3. Configuration via commissioning wizard



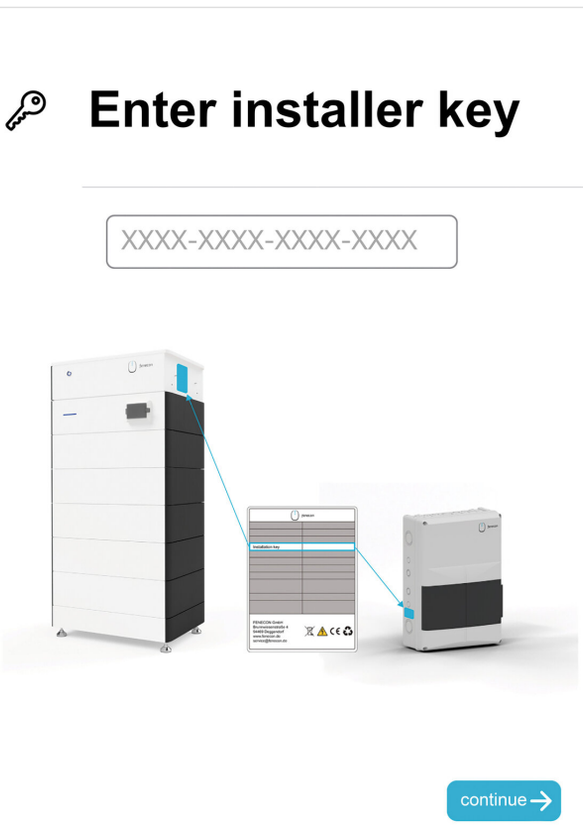

3. If an installer account has not yet been created, it can be created directly under the login window.
4. All information must be filled in correctly and completely.



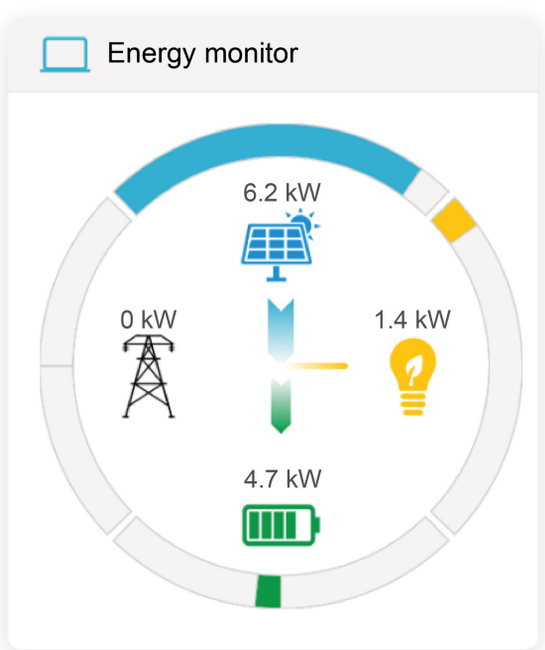

5. Once all the necessary points have been confirmed, the account will be created automatically.
6. You will be forwarded directly to the storage system configuration.




7. Click on the blue plus at the bottom.
8. add FEMS.




9. First, you must enter the 16-digit installer key.
10. This can be found on the right-hand side of the battery tower on the type label.
11. Installation key: XXXX-XXXX-XXXX-XXXX.
12. Then follow the installation wizard through the various steps.




13. Once commissioning is complete, the system is ready for operation and you will be forwarded directly to live monitoring.

- You will receive an e-mail with a summary of the complete commissioning (commissioning protocol) for your records.
- The customer also receives an e-mail with the personal access data for end customer monitoring.

# 8. FEMS Online Monitoring

The FEMS Online Monitoring is used to visualize all energy flows in your system. The Energy Monitor shows live data on grid withdrawal or feed-in, PV production, charging/discharging of the battery energy storage system and power consumption. Other widgets show the percentage of self-sufficiency and Self-consumption. In addition, the individual widgets offer a detailed view, which can also be used to view the performance values with phase accuracy.

In addition to the pure information display, all additionally purchased FEMS extensions, such as for integrating a heat pump, Heating element, combined heat and power plant (CHP), are also listed in Online Monitoring. Their functionality can be controlled via the corresponding widget.

In addition to the live view, the history offers the option of selecting self-selected time periods for Online Monitoring. The status of the entire system and the individual components can be monitored at any time using the info symbol.

## 8.1. Access data

Access to FEMS Online Monitoring is separated according to end customer and installer.

### 8.1.1. Access for the end customer

Access for the end customer is automatically generated once commissioning is complete and sent to the end customer by e-mail.
The terms and conditions still need to be confirmed here, then the monitoring is available without restrictions.

If additional users want to access the system, they must create their own user account. This is done as described in the section Configuration via commissioning wizard, but here "USER" must be selected in the header.

After successfully creating an additional user account, all we need is an email to service@fenecon.de with the email address used and the FEMS number concerned, we will create the link and other users can use the Online Monitoring of a system.

### 8.1.2. Access for the installer

The installer account can be created as described in the section Configuration via commissioning wizard on the FENECON homepage. Access is required for successful commissioning.

# 9. Capacity expansion of the system

The capacity can also be expanded at a later date; there is no time limit here.

The maximum capacity is not reached with additional new battery modules, as new modules are equal to the old modules.

## 9.1. Capacity expansion of the system by one or more battery towers

The capacity of the system can be subsequently expanded by one or more battery towers with the same capacity. There is no time limit here.

> The maximum configuration of the FENECON Commercial 92-System includes up to 5 battery towers, each with 15 battery modules and 210 kWh.

The full capacity is not achieved with new battery modules, as the new modules become similar to the old modules.



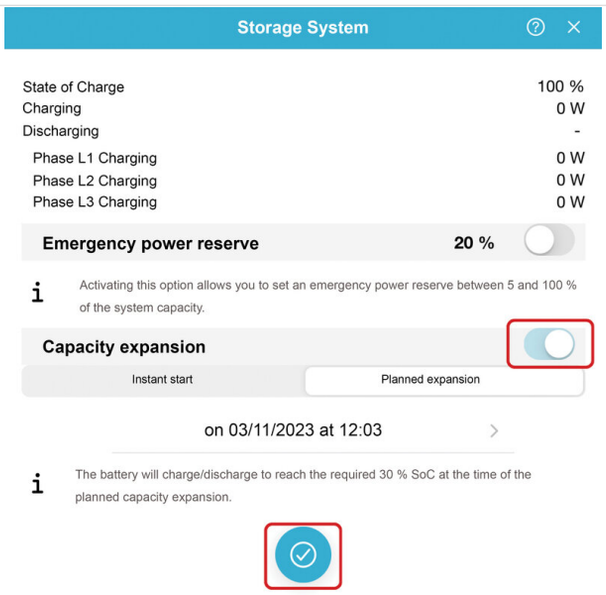
The system automatically performs a reference cycle, calculates the appropriate start time for a planned expansion, and prepares the battery for a stable target value of 30% SoC.

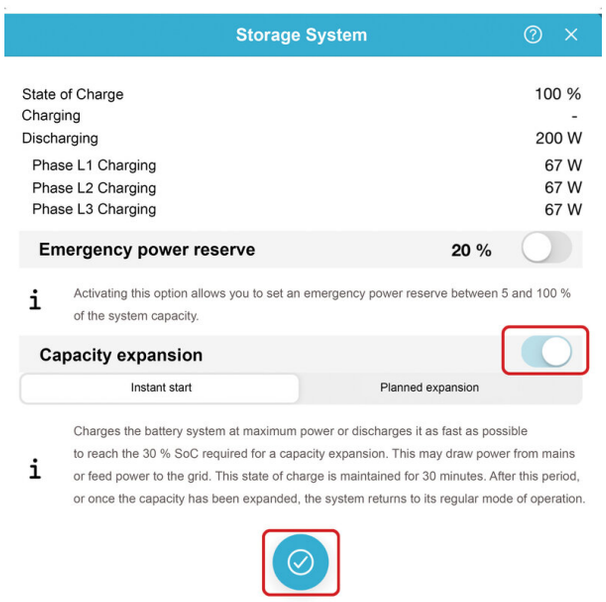
**Procedure**:

- Starting at 70% SoC: Charge to 100%, hold, then discharge to 30%
- Below 70% SoC: Discharge to 0%, hold, then charge to 30%

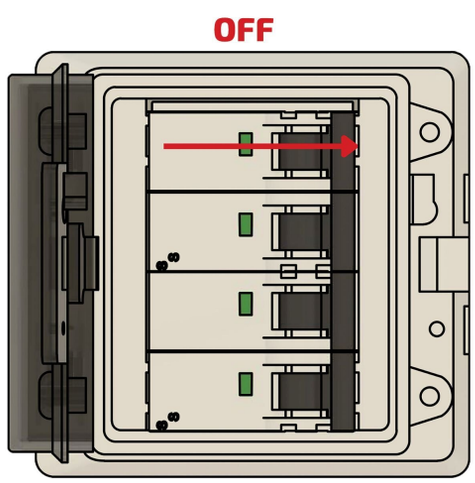
**Recommendation**: If possible, perform a few full charge cycles from 0% to 100% beforehand, especially with older batteries.

Proceed as follows before the extension:




1. Activate the "Capacity expansion" function in Online Monitoring under Electrical energy storage system.
2. The battery is charged/discharged to 30 %. When the state of charge is reached, charging/discharging is stopped and the charge level is maintained.




3. Switch off the entire system. The exact procedure is described in detail in the section Switching off.
   Fuse switch of the battery to OFF.
   AC fuse of the inverter to OFF.



4. Assembly of the new battery towers as described from section Assembly — Battery tower 1 with FEMS box and section Initial commissioning.
5. Everything can then be switched on again as described in the Switching on the system section.




6. Run the commissioning wizard again.

- If the exact voltage value of the old and new battery towers has not been matched, the new batteries will not be connected.
- This is not displayed as an error, but it can happen that the SoC displays of the individual battery towers show different charge levels.
- When the charge levels have equalized after a charging cycle, the last battery towers also switch on.
- The battery towers work independently, so the flashing frequency of the different towers may vary. The SoC display of the individual towers may also differ briefly.

# 10. FEMS extensions

For the following FEMS extensions, the integrated relays can be used directly on the (first) battery tower.
Various pins on the Harting plugs are provided for this purpose.

- Harting plug 10-pin: 3 x free relay channels (max.: 230 V; 10 A)
- Harting plug 16-pin: 2 x control contacts (max.: 24 V; 1 A)

  3 x digital input

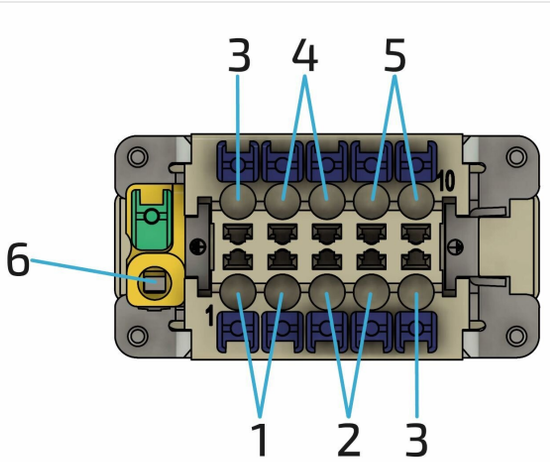
  1 x digital input for § 14a

  1 x analog output (0-10 V)

It may not be possible to connect and operate all apps at the same time.
For more information on the following apps, please visit our homepage.

www.fenecon.de/fems-apps/

Falls die integrierten Relais nicht ausreichen, kann ein externes 8-Kanal-Relaisboard über Ethernet angebunden werden.

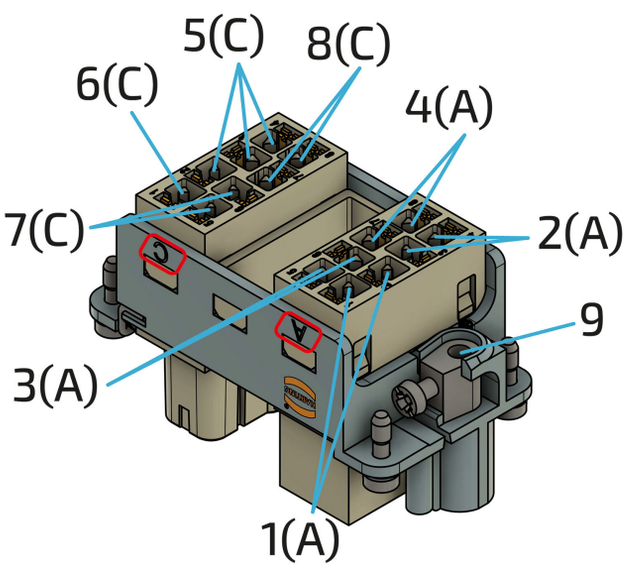



The pin assignment of the Harting plug (10-pin) is shown in detail below.

| Item | Description |
|---|---|
| 1 | 230 V supply for internal components |
| 2 | Relay 1 (230 V; 10 A) |
| 3 | Relay 2 (230 V; 10 A) |
| 4 | Relay 3 (230 V; 10 A) |

| Item | Description |
|---|---|
| 5 | Neutral conductor connection (required for integrated meter) |
| 6 | PE connection |

Table 33. Connector — Pin assignment — Power connector



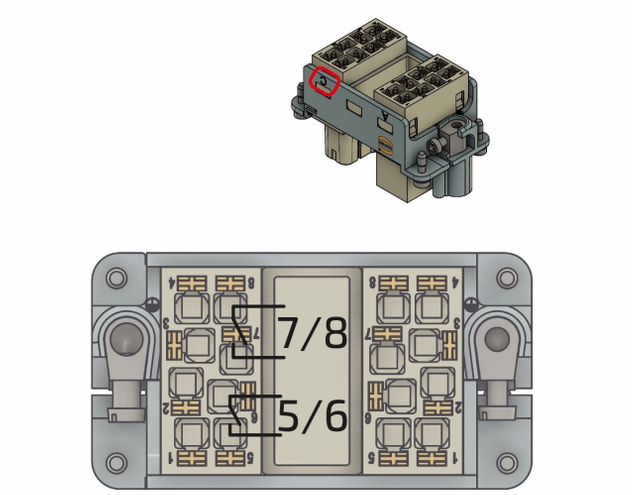

The pin assignment of the Harting plug (16-pin) is shown in detail below.

| Item | Description |
|---|---|
| 1 | RS485 connection — Inverter |
| 2 | RS485 connection — External devices |
| 3 | Analog output (0 to 10 V) |
| 4 | 12 V DC (12 V; GND) |
| 5 | 3 x digital inputs |
| 6 | Digital input for § 14a |
| 7 | Relay 5 (24 V; 1 A) |
| 8 | Relay 6 (24 V; 1 A) |
| 9 | PE connection |

Table 34. Connector — Pin assignment: Control connector

## 10.1. Connection of a heat pump via "SG-Ready"

The integration of an "SG-Ready" (Smart Grid-ready) heat pump is an advanced form of sector coupling of electricity and heat - often also referred to as a "power-to-heat" application. The control system ensures that the heat pump slightly overheats the thermal energy storage system at times when cheap (solar) electricity is available in order to save electrical energy at times when there is no cheap surplus electricity.



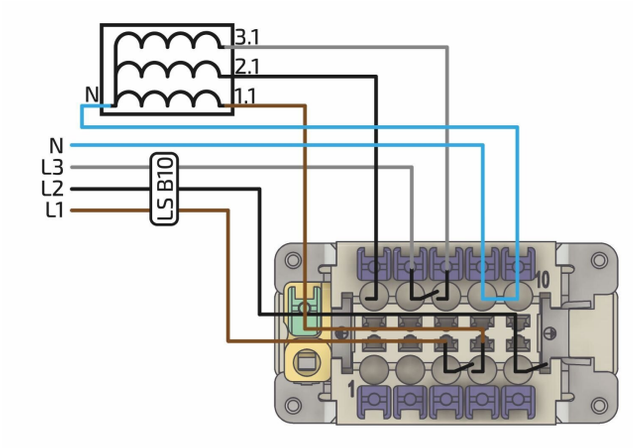

1. The internal relay contacts 5 and 6 can be connected via pins 5/6 and 7/8 on the Harting plug (16-pin — C).
2. For detailed information on connecting the heat pump, please refer to the manufacturer's installation instructions.

After installing the components, the app still needs to be installed.
To do this, proceed as described in the section Activation of the app in the FEMS App Center.

## 10.2. Connection of a heating element with a maximum of 6 kW

The integration of an electric heating element is the simplest and cheapest form of sector coupling of electricity and heat — often also called a "power-to-heat" application.

If the capacity of the electrical energy storage system is exhausted, self-generated energy must be fed into the public grid with low remuneration. In these cases, it often makes sense to use the surplus current for water heating (e. g. for hot water buffer tanks, pool heating, etc.). This way, other energy sources (e. g. wood or oil) can be saved.




1. So that each phase of the heating element can be controlled separately, each phase must be connected individually to a relay.
2. To do this, connect phase 1 (brown) to pin 3 on the Harting plug (10-pin). Continue from pin 4 to the heating element. Use pins 5/6 and 7/8 for phase 2 (black) and phase 3 (gray).
3. Loop through the neutral conductor N via pin 9/10.
4. A cable (5G1.5) from the sub-distribution board to the Harting plug and a cable (5G1.5) from the Harting plug to the heating element are recommended.
5. For detailed information on connecting the heating element, please refer to the manufacturer's installation instructions.

**NOTICE**

**Possible Damage to the System**
Damage to the system caused by using only one phase for the connection.

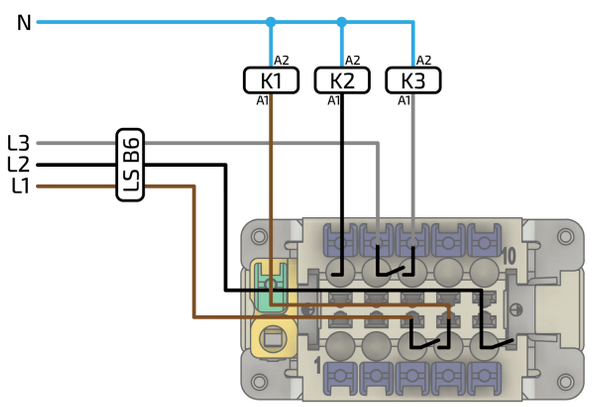
- Use three different phases for the connection.

After installing the components, the app still needs to be installed.
To do this, proceed as described in the section Activation of the app in the FEMS App Center.

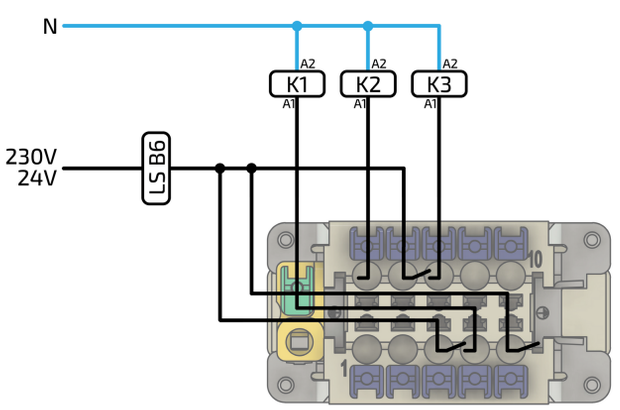
Manual mode is intended only for temporary operation. For continuous operation, use the external relay control.

## 10.3. Control of a heating element greater than 6 kW (control via external relay)

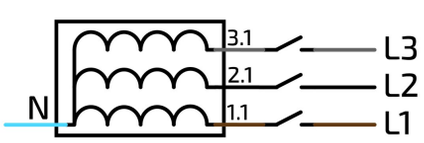
The externally installed relays must be laid out according to the power of the installed heating element.




1. So that each phase of the heating element can be controlled separately, each phase must be connected individually to the internal relay via an additional external relay.
2. Connect L1 to pin 3 via a MCB B6 fused. Route phase L1 from pin 4 to the external relay and connect to A1. A2 must be connected to neutral.
3. Proceed in the same way as step 2 with the other two phases. Connect K2 and K3 via pins 5/6 and 7/8.




4. As an alternative to L2/L3, L1 can of course also be looped through, or:
5. Alternatively, control the contactors/relays with 24 V. If another voltage source is used, do not connect A2 to N.




6. The power supply of the heating element must then be connected to the switching contacts of the relays.
7. For detailed information on connecting the heating element, please refer to the manufacturer's installation instructions.

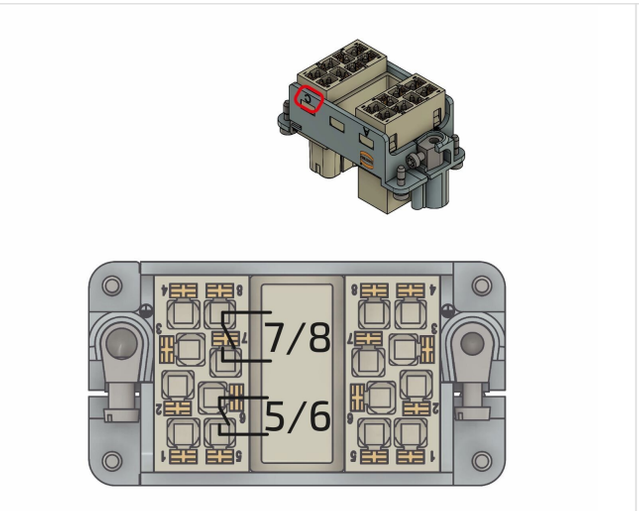
After installing the components, the app still needs to be installed.
To do this, proceed as described in the section Activation of the app in the FEMS App Center.

## 10.4. Controlling a CHP unit

The integration of a combined heat and power plant (CHP) into electrical energy management is an advanced form of sector coupling of electricity and heat.

This allows using the CHP as an electrical generator that is independent of the time of day and weather conditions. When the state of charge of the electrical energy storage system is low, the CHP is given a switch-on signal to produce electricity. This is useful, for example, if the battery capacity is not sufficient to cover electricity consumption at night. This avoids the need to purchase expensive current from the grid.

When the battery is charging, this signal is stopped again to prevent the CHP's current from being fed into the grid unnecessarily.

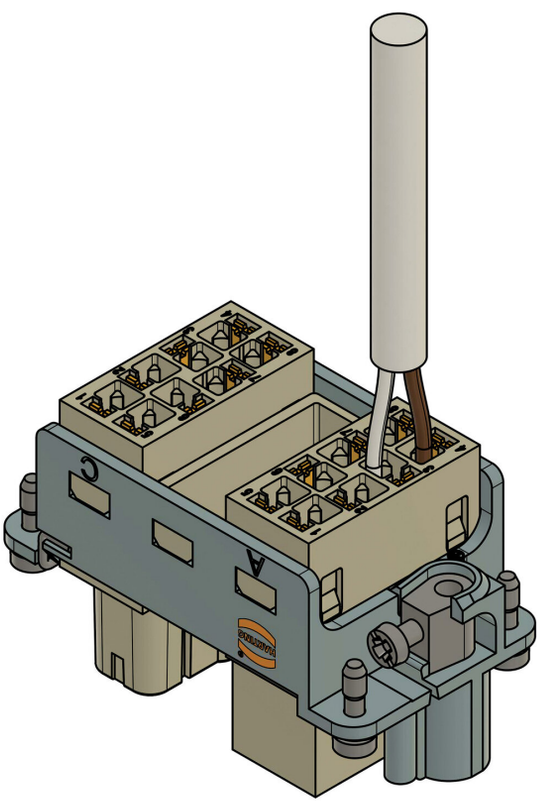



1. The enable signal for starting the CHP can be connected to pins 5/6 via the Harting plug (16-pin — C).
2. For detailed information on connecting the CHP, please refer to the manufacturer's installation instructions.

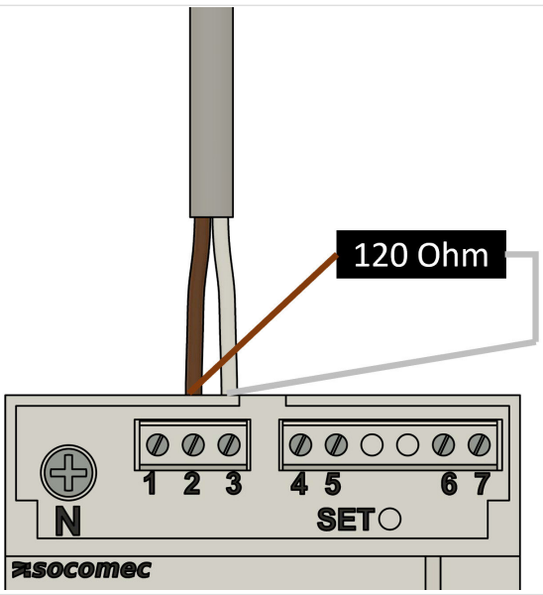
After installing the components, the app still needs to be installed.
To do this, proceed as described in the section Activation of the app in the FEMS App Center.

## 10.5. Additional AC meter

- If additional meters have been installed for monitoring other consumer loads or generators, these must be integrated into the circuit in accordance with the manufacturer's instructions.
- The communicative integration is shown below using a 3-phase sensor without a current transformer as an example.
- Only meters approved by FENECON can be integrated.
- The first production meter is always integrated with Modbus ID 6. All others in ascending order. The baud rate is 9600.

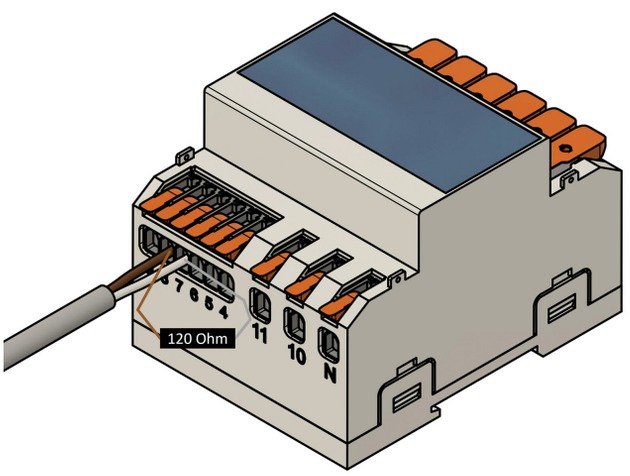


1. Connect the cores to pin 3/4 on the Harting plug (16-pin — A).
2. Connect the white core (alternative color possible) to terminal 3.
3. Connect the brown core (alternative color possible) to terminal 4.




**For example SOCOMEC E24**

4. The brown wire (alternative color possible) is connected to the meter at connection point 2 and the white core (alternative color possible) is then connected to 3.
5. A terminal resistor with 120 Ω must be installed between (+) and (-) (A/B) on the last bus device.




**For example KDK 4PU**

6. The brown wire (alternative color possible) is connected to the meter at connection point 8 and the white core (alternative color possible) is then connected to 7.
7. A terminal resistor with 120 Ω must be installed between (+) and (-) (A/B) on the last bus device.

If several meters are to be installed, they can be connected in series for communication purposes. For this purpose, the first meter can be bridged to the second, etc. The Modbus address must be set in ascending order.
Link to the overview page of the installation and configuration instructions for energy meters

Once the components have been installed, the app still needs to be installed.

- To do this, proceed as described in the section Activation of the app in the FEMS App Center.

## 10.6. Activation of the app in the FEMS App Center

After installing the hardware FEMS App extension, it still needs to be activated in the App Center. To do this, proceed as follows:

| | |
|---|---|
| | 1. portal.fenecon.de |
|  | 2. Log in with your installer account. |

First check whether updates are available for the FEMS.

## 11. Updating the FEMS

To be able to use all FEMS Apps extensively and in the latest version, carry out a system update to the latest version.

1. Open the ☰ burger menu at the top left of FENECON Online Monitoring.

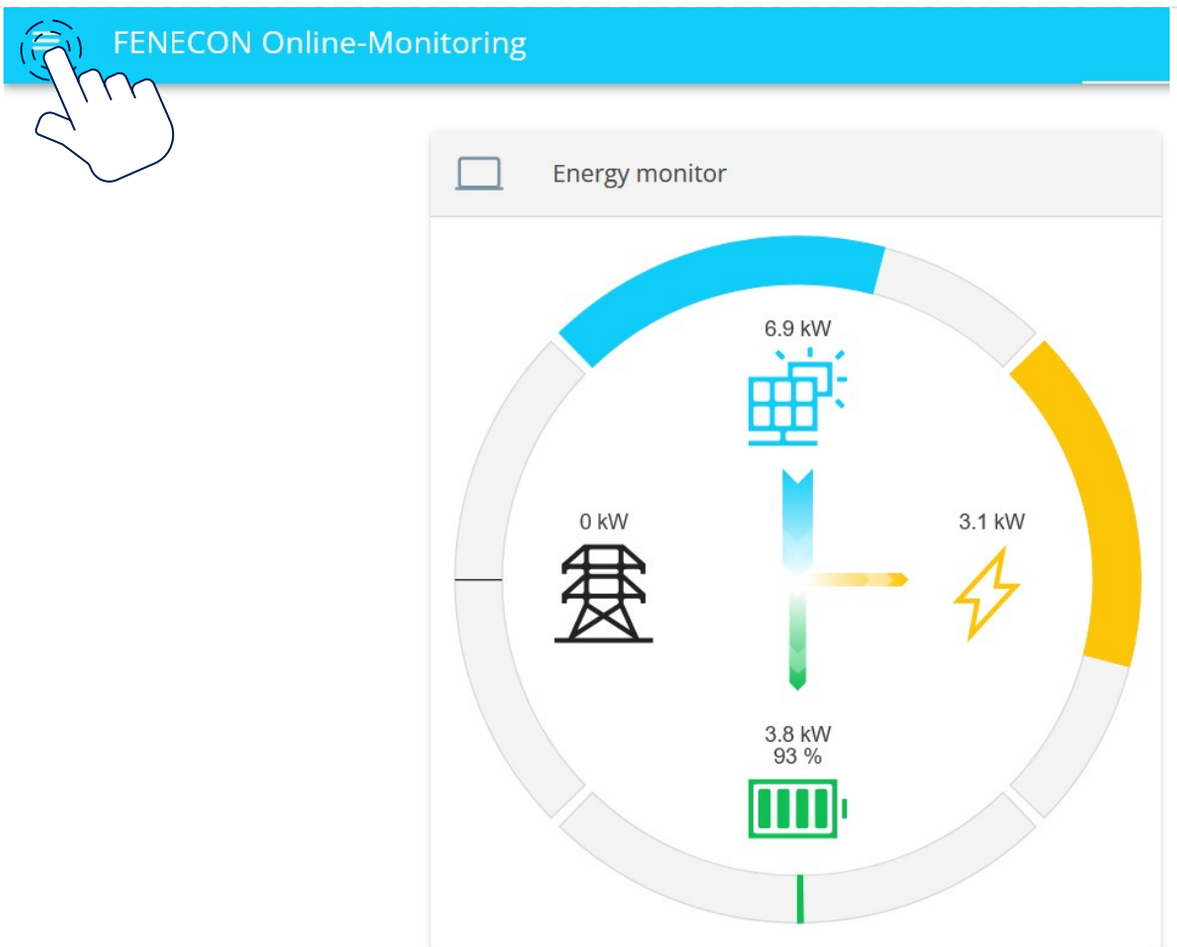



Image 24. Burger to side menu — System update — Step 1

2. Select *Settings*.




Image 25. Side menu — System update — Step 2

3. Select *FEMS System*.

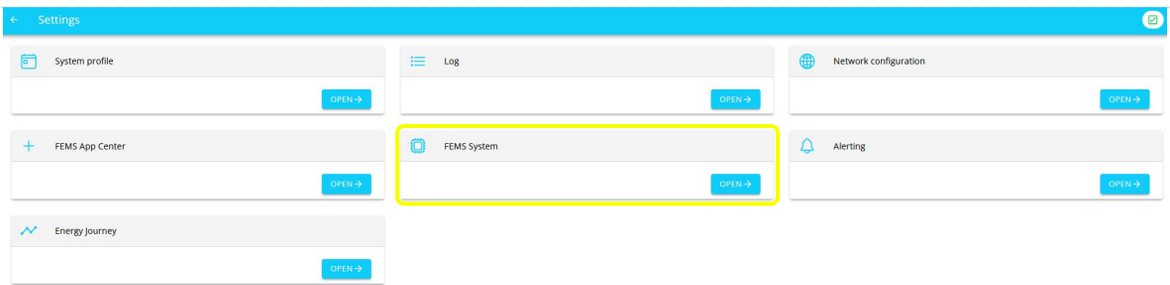



Image 26. App Center — System update — Step 3

4. Click on *INSTALL LATEST VERSION* to update the system. If the latest version is already installed, you do not need to do anything else.

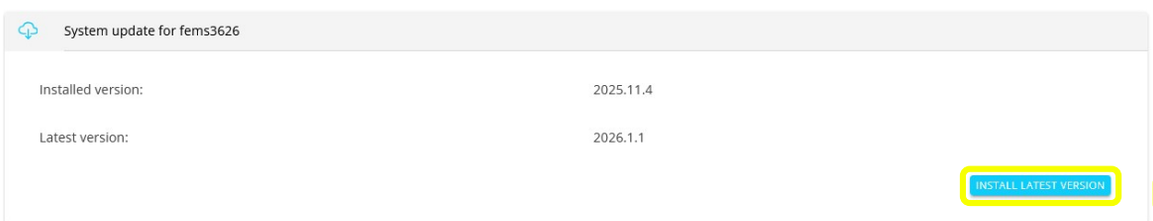



Image 27. App Center — System update — Step 4

To return to the settings menu after the FEMS system update:
*Click on the arrow* ← at the top left. This applies to all submenus in the **Settings** area.




Image 28. Back to the Settings menu

## 12. Starting point: FEMS AppCenter

1. After you have performed a system update, open the *FEMS AppCenter*.
   a. Alternatively, click the ☰ burger menu in the upper-left corner in Monitoring to go to the *FEMS AppCenter*.

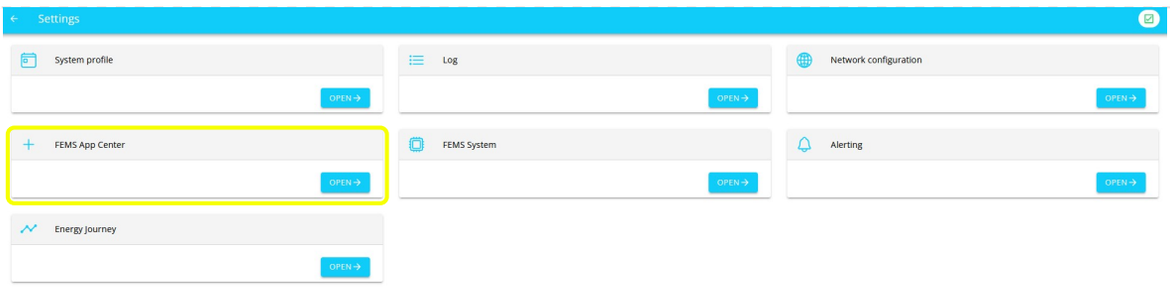



Image 29. AppCenter — Step 1

2. You are now in the AppCenter. From here, you can redeem and register license keys for apps, install new apps, and edit or configure apps that are already installed.

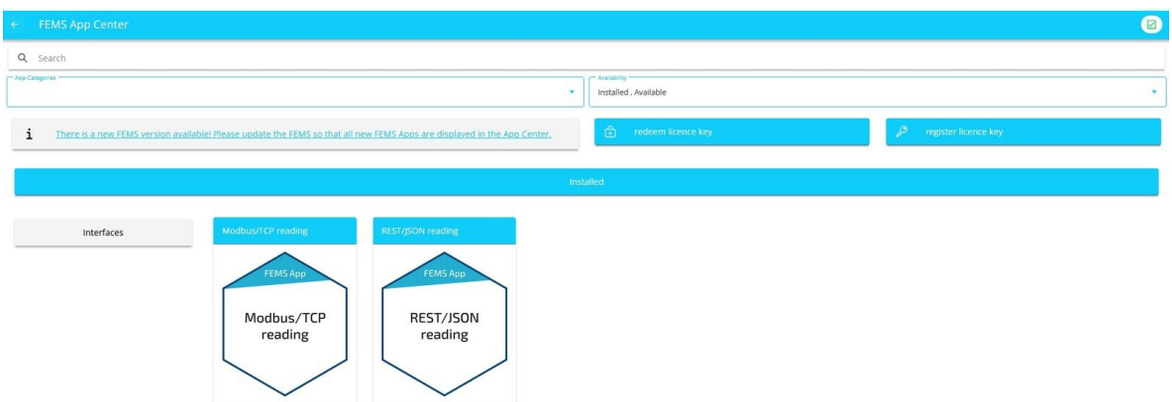



Image 30. AppCenter — Step 2

## 12.1. Installation of further FEMS Apps

The following instructions show an example of how to install an FEMS App PV inverter.

There are two ways to install an FEMS App via the App Center.

### 12.1.1. Installation after redeeming a licence key

After a licence key has been redeemed, a selection of available apps that can be installed is displayed.

The App Center offers a search bar and a filter option to get to the desired app more quickly:

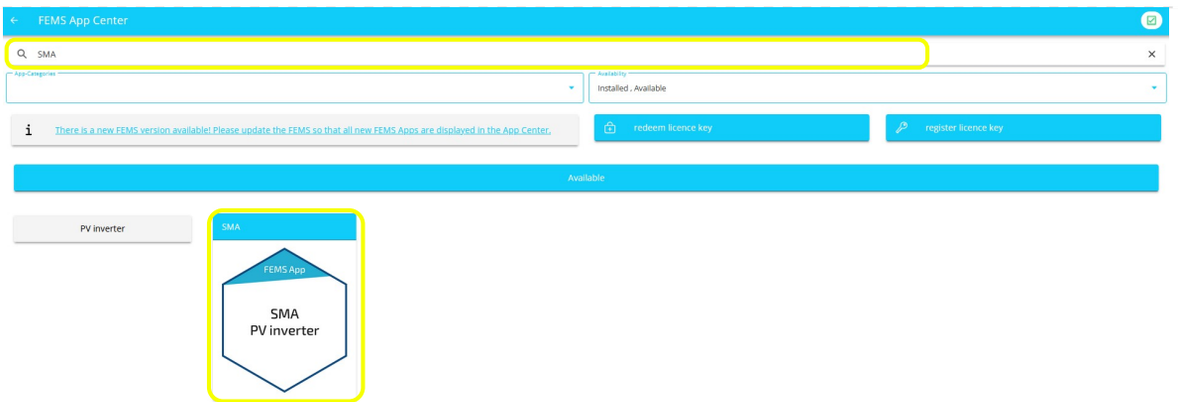



Image 31. Search for a specific app in the App Center

In the example, the **FEMS App SMA PV Inverter** was searched for. This app is selected by clicking or tapping on the tile.

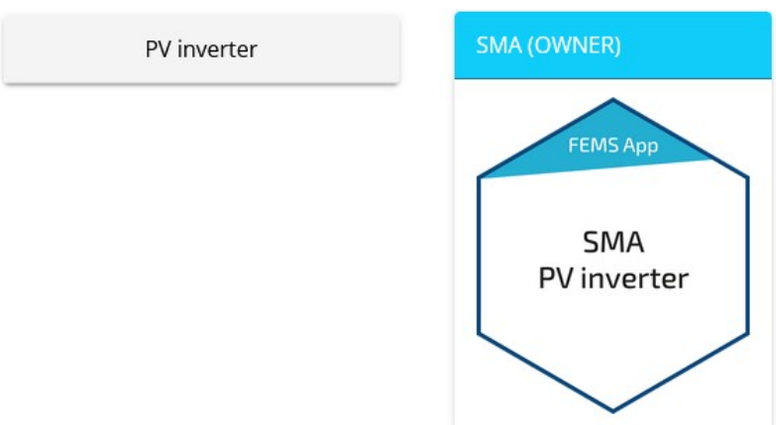



Image 32. App installation — Variant 1 — Step 1

You will then be taken to the app overview:

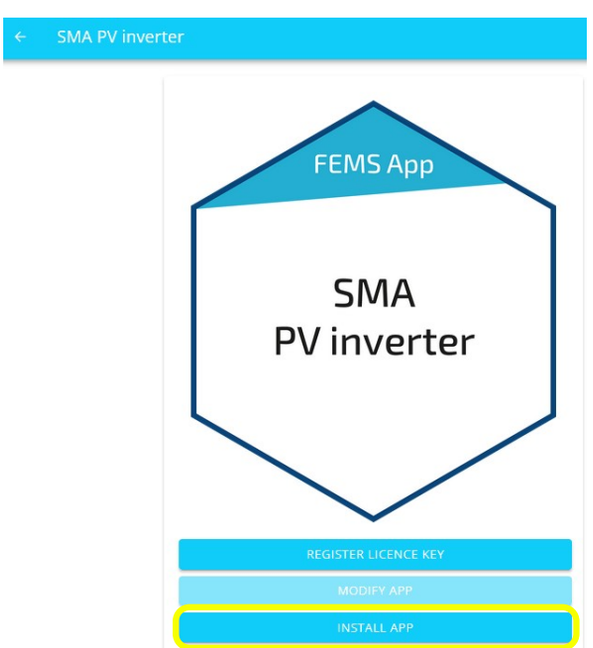



Image 33. App installation — Variant 1 — Step 2

Select the *INSTALL APP* button.

You will then be taken to the installation wizard for the respective app:




Image 34. App installation — Variant 1 — Step 3

Some of the input fields are pre-filled. Nevertheless, enter your data if it differs from the default values (e. g. IP address). Otherwise, the default values can be retained (e. g. port, Modbus unit ID).

Mandatory fields are marked with (*)

Check your entries and make sure that they are correct. Otherwise the respective app will not work properly!

Select the *INSTALL APP* button again.

Once the installation process has been successfully completed, the new app will appear in the App Center overview in the **Installed** category.

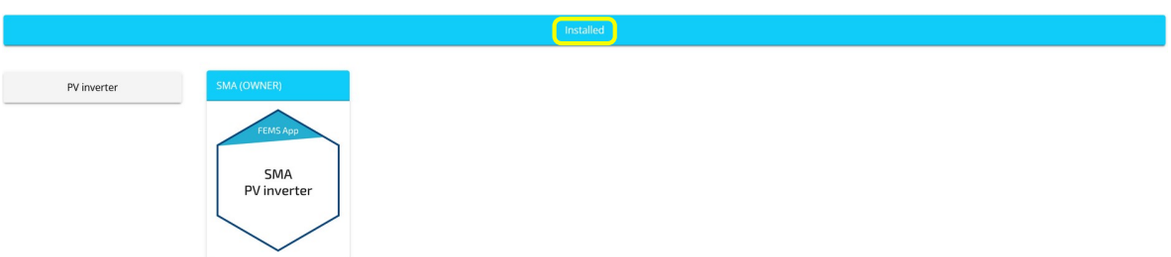



Image 35. App installation — Variant 1 — Step 4

## 12.1.2. Direct installation

You can also install an app directly. To do this, go to the App Center overview and search for the desired app.

Only apps from the "Available" category can be installed.

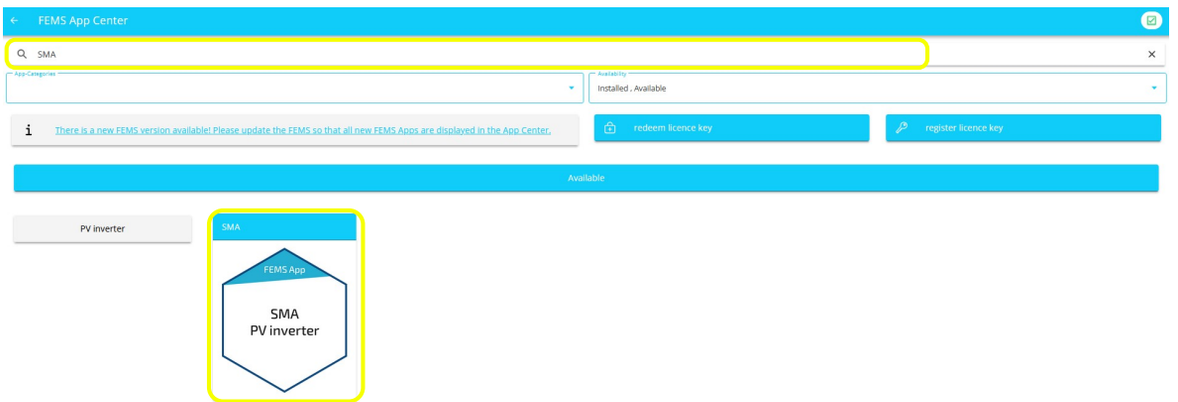



Image 36. Search for a specific app in the App Center

In the example, the **FEMS App SMA PV Inverter** was searched for. This app is selected by clicking or tapping on the tile.

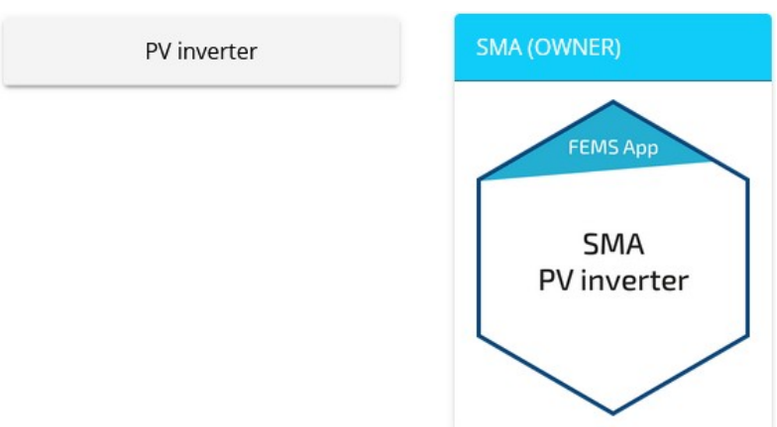



Image 37. App installation — Variant 2 — Step 1

You will then be taken to the individual view of the app:

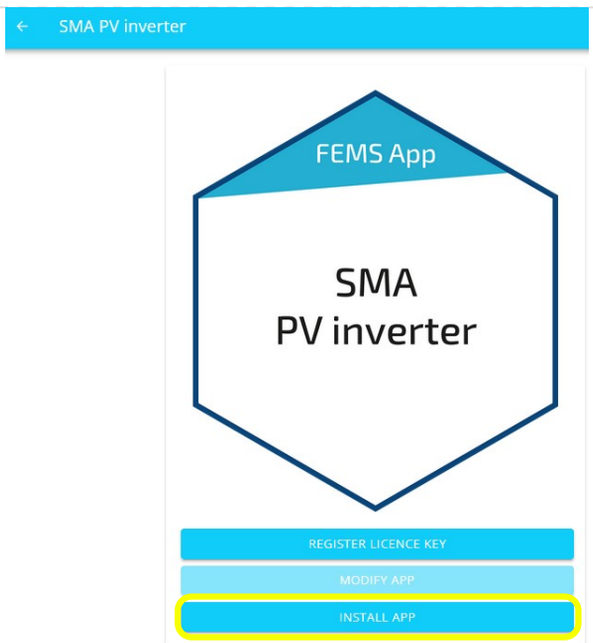



Image 38. App installation — Variant 2 — Step 2

Select the *INSTALL APP* button.

An input mask for redeeming a licence key appears:

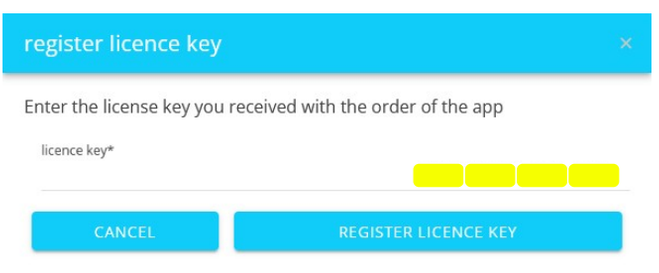



Image 39. App installation — Variant 2 — Step 3

You have two options here:

**Redeem a new licence key directly**

If you have not yet registered a licence key or wish to redeem a new licence key, enter the 16-digit key in the corresponding field and then click on *VALIDATE LICENCE KEY*.

The entered licence key is then checked for validity.

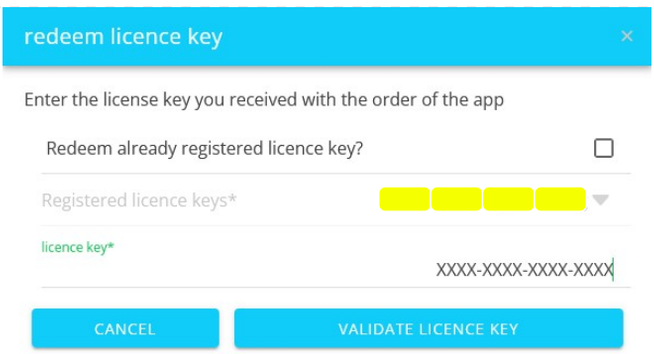



Image 40. Redeem new licence key directly

If the licence key is valid, it can be registered by clicking on the button of the same name. *REDEEM LICENCE KEY*

If the licence key is invalid, please check your entry and try again.

**Redeem an already registered licence key**

In this case, the button in the App Center looks like this:




If you want to redeem an already registered licence key, check the corresponding box ☑ and select the appropriate, already registered licence key via ▾ drop-down menu.

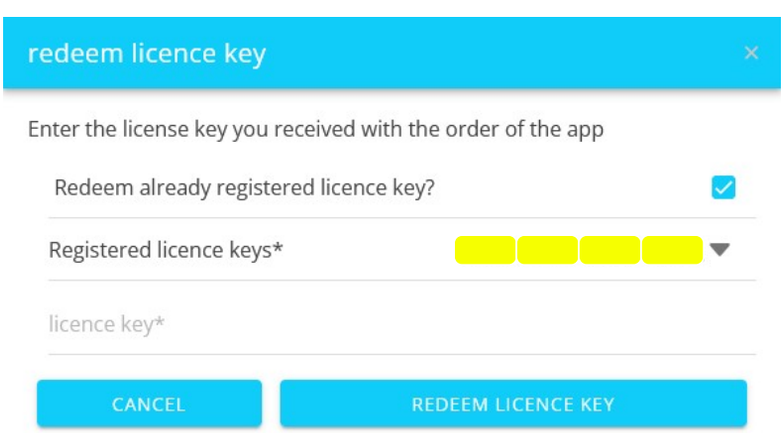



Image 41. Redeem already registered licence key

Then click on the *REDEEM LICENCE KEY* button.

You will then be taken to the installation wizard for the respective app.




Image 42. App installation — Variant 2 — Step 4

Some of the input fields are pre-filled. Nevertheless, enter your data if it differs from the default values (e. g. IP address). Otherwise, the default values can be retained (e. g. port, Modbus unit ID).

Mandatory fields are marked with (*)

Check your entries and make sure that they are correct. Otherwise the respective app will not work properly!

Select the *INSTALL APP* button again.

Once the installation process is complete, the new app will appear in the App Center overview in the **Installed** category.

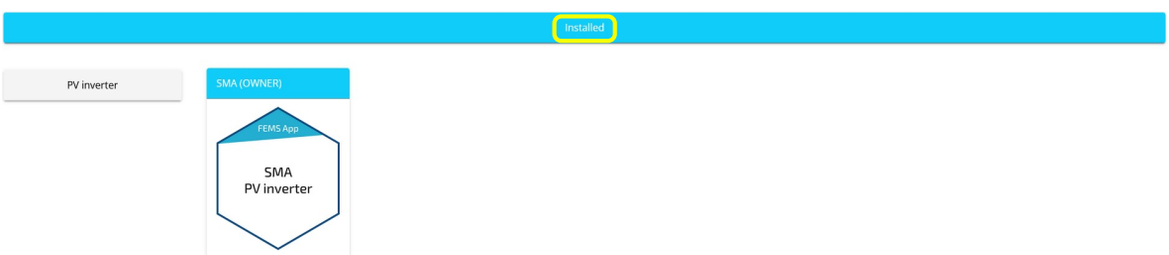



Image 43. App installation — Variant 2 — Step 5

# 13. External control of the inverter

There are various ways to override the inverter from external devices.

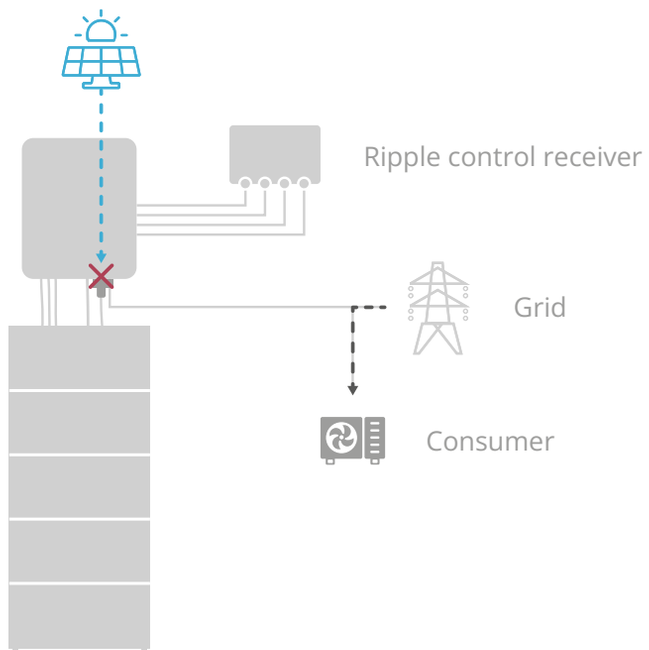
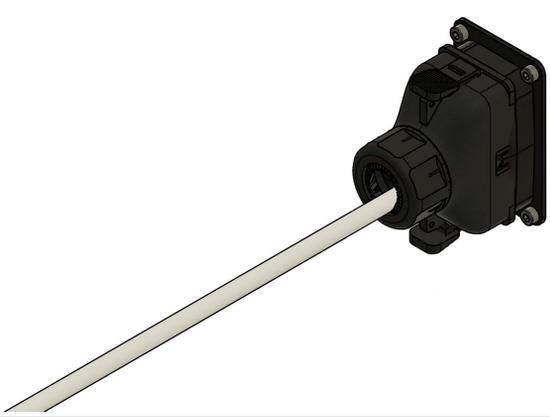



Image 44. Connection — Curtailment via ripple control receiver

## 13.1. Section 14a of the Energy Industry Act (EnWG)

The inverter can be limited to a maximum reference power of 4.2 kW. The digital input of the EMS must be assigned for this.



1. The signal can be connected via the Harting plug (16-pin — A & C) to pins 1 (C) and 8 (A).
2. For detailed information on connecting the FNN control box, please refer to the manufacturer's installation instructions.

## 13.2. Connect external mains protection component

When installing an external grid protection component, refer to the KACO inverter manual (see Section 7.8.5, page 29).

# 14. Troubleshooting

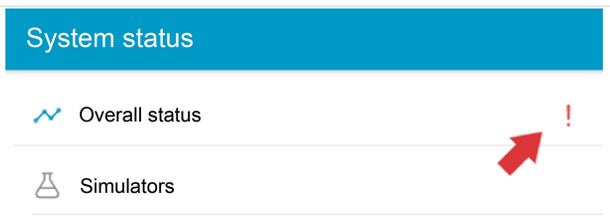
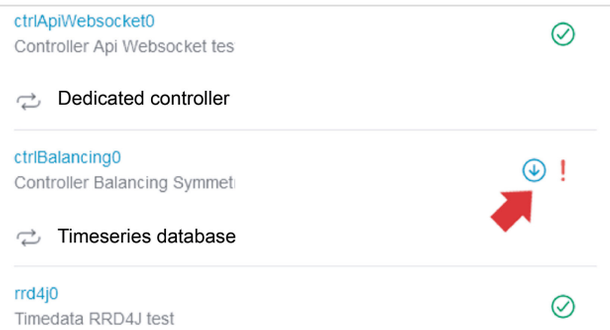
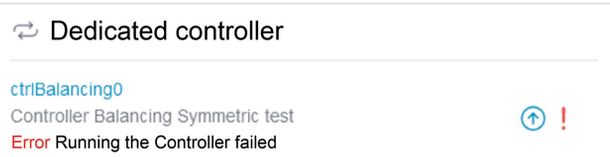
## 14.1. Errors in Online Monitoring

The system status can be checked after logging in at the top right using the color of the icon. A green tick indicates that everything is OK, an orange exclamation mark indicates a warning (*Warning*) and a red exclamation mark indicates an error (*Fault*).

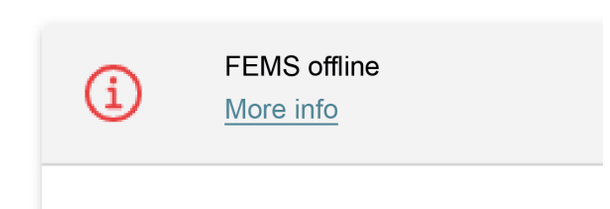
### 14.1.1. Fault display

| | |
|---|---|
|  | System status: Everything is OK |
|  | System status: Warning |
|  | System status: Error (Fault) |

### 14.1.2. Troubleshooting

| | |
|---|---|
|  | You can get a detailed overview of an existing warning or error by clicking on the exclamation mark in the top right-hand corner. |
|  | The scroll bar can be used to examine the origin of the warning or error in more detail.<br>In this example, the error lies with the controller used. |
|  | Clicking on the icon (down arrow) displays a more detailed error description depending on the error. |

In the example above, an incorrect reference for the grid meter was intentionally entered for test purposes, which is why the controller execution fails.

| | |
|---|---|
|  | Under certain circumstances, it may happen that the FEMS is not accessible and the error message opposite appears. |

If the FEMS is offline, follow the steps displayed below the message.

## 14.2. Battery tower

### 14.2.1. Fault display

Faults are displayed on the BMS box via a red LED.

The various errors are indicated by LED codes.

## 14.2. Battery tower

| System Status | System Information | LEDs | | | | | |
|---|---|---|---|---|---|---|---|
| | | blue/red | | 1 | 2 | 3 | 4 |
| **Bootloader** | | ★ | | ★ | ★ | ★ | ★ |
| **Start** | Master/Slave | ● | | ★ | ★ | ★ | ★ |
| | Parallel Box | ● | | | | | ★ |
| | Extension Box | ● | | | | ★ | |
| **Test Mode** | Single or Parallel Connection | ★ | | | | | |
| | | | | SoC Display | | | |
| **Charging** | 0 % to 25.0 % SoC | ● | | ■ | | | |
| | 25.1 % to 50.0 % SoC | ● | | ■ | ■ | | |
| | 50.1 % to 75.0 % SoC | ● | | ■ | ■ | ■ | |
| | 75.1 % to 99.9 % SoC | ● | | ■ | ■ | ■ | ■ |
| | 100 % SoC | ● | | ● | ● | ● | ● |
| **Discharging and Standby** | 100%–75.1% | ● | | ● | ● | ● | ● |
| | 75.0%–50.1% | ● | | ● | ● | ● | |
| | 50.0%–25.1% | ● | | ● | ● | | |
| | 25.0%–0% | ● | | ● | | | |
| **Error** | Overvoltage | ● | | | | | ● |
| | Undervoltage | ● | | | | ● | |
| | Overtemperature | ● | | | | ● | ● |
| | Undertemperature | ● | | | ● | | |
| | Overcurrent | ● | | | ● | | |
| | SoH too low | ● | | | ● | ● | |
| | Internal Communication | ● | | | ● | ● | ● |
| | External Communication | ● | | ● | | | |
| | Parallel Address Error | ● | | ● | | | ● |
| | Module Address Error | ● | | ● | | ● | |
| | BMS box fuse | ● | | ● | | ● | ● |
| | Module fuse | ● | | ● | ● | | |
| | Contact fault | ● | | ● | ● | | ● |
| | Insulation fault | ● | | ● | ● | ● | |
| | BMS error | ● | | ● | ● | ● | ● |

| | |
|---|---|
| ● | Blue permanently on |
| ■ | Blinking blue |
| ★ | Blue flashing quickly |
| ● | Red permanently on |

### 14.2.2. Troubleshooting

If faults cannot be rectified or in the event of faults that are not included in the fault list, contact FENECON Service. Cf. Service.

## 14.3. Fault list

| Component | Error/fault | Measure |
|---|---|---|
| Battery module | The battery module has become wet | Do not touch<br>Contact FENECON Service immediately for technical support |
| Battery module | The battery module is damaged | A damaged battery module is dangerous and must be handled with the utmost care.<br>Damaged battery modules must no longer be used.<br>If you suspect that the battery module is damaged, stop operation and contact FENECON Service |

Table 35. Troubleshooting

## 14.4. Service

If the system malfunctions, contact the FENECON Service:

Phone: +49 (0) 9903 6280-0

E-mail: service@fenecon.de

Our service hours:
Mon.-Thurs. 08:00 to 12:00 | 13:00 to 17:00
Fri. 08:00 to 12:00 | 13:00 to 15:00

# 15. Technical maintenance

## 15.1. Tests and inspections

**CAUTION**

**Potential Hazards Due to Improper Inspections**
When performing inspection work, ensure that the product is in a state of safety. Inspections that are not performed properly can have serious consequences for people, the environment, and the product itself.

- Inspection work must only be carried out by trained and qualified specialists.
- For all individual components, follow the maintenance instructions provided by the component manufacturers.

Check the product and the cables regularly for visible external damage. In the event of defective components, contact FENECON Service. Repairs must only be carried out by a qualified electrician.

## 15.2. Cleaning

Cleaning agents: The use of cleaning agents can damage the electrical energy storage unit and its parts.
It is recommended that the electrical energy storage unit and all its parts are only cleaned with a cloth moistened with clean water.

**NOTICE**

**Damage Caused by Incorrect Cleaning Agents**
The entire product must be cleaned regularly. Only appropriate cleaning agents must be used for this purpose.

- Cleaning agents must be free of chlorine, bromine, iodine, or their salts.
- Steel wool, putty knives, and similar items must not be used for cleaning under any circumstances.
- The use of unsuitable cleaning agents can lead to external corrosion.

## 15.3. Maintenance work

No regular maintenance work needs to be carried out on the system. Nevertheless, check the status of your electrical energy storage system regularly.

Regular re-referencing of the electrical energy storage system is recommended, i.e. it must be completely discharged (SoC = 0 %) and then fully charged again (SoC = 100 %), as otherwise capacity may be lost.

## 15.4. Repairs

In the event of defective components, contact FENECON Service.

## 15.5. Warranty cases

Warranty claims must be reported to FENECON in text form (e. g. by e-mail) within the warranty period. The notification must be made within a cut-off period of 8 weeks after the end customer has become aware of the warranty claim or could have become aware of it without gross negligence.

# 16. Advice for fire departments when dealing with FENECON Home & Commercial systems

The FENECON Home and Commercial systems operate in the low-voltage range, which means that they are operated with voltages of less than 1,500 volts direct current (DC) and less than 1,000 volts alternating current (AC).

It may be useful to install an additional switch that disconnects the building from the emergency power supply. This makes it easier for the fire department to act safely and quickly in an emergency.

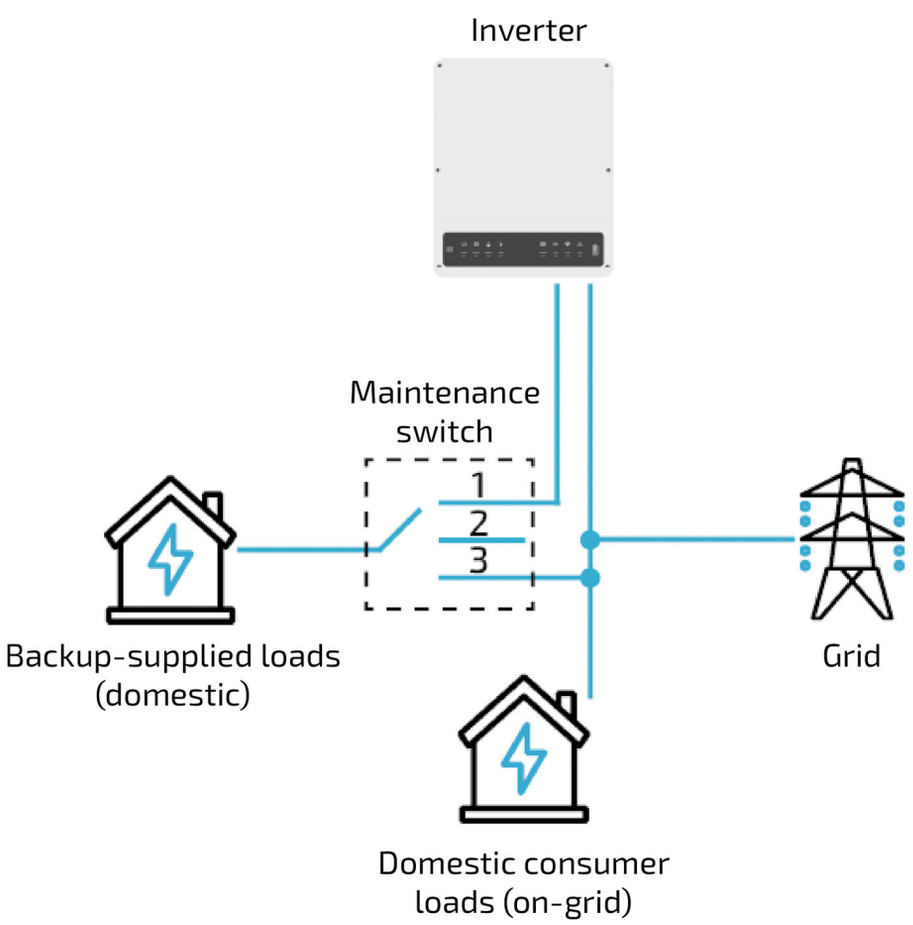



Image 45. Installation — Maintenance switch using the example of Home 20/30

For a precise procedure for emergency services, it is recommended to ask the relevant fire academies and request the corresponding information sheets and pocket cards for battery energy storage systems.

# 17. Flood safety measures FENECON Home & Commercial

**First steps after the water has receded**

Even if your battery energy storage system looks undamaged on the outside:

- Do not put the system back into operation yourself.
- Ventilate the room well before entering (open windows from the outside if possible).
- Avoid sparks (no smoking, no lighters).

Why a review is important:

Even though LFP batteries are very safe, water or moisture can:

- Cause short circuits in the electronics.
- Trigger corrosion of electrical connections.
- Create isolation problems that only become apparent later.

These problems do not have to occur immediately, but can develop over weeks.

**Commission a professional inspection**

Please contact:

- Your installer or a qualified electrician with experience in battery energy storage systems.
- FENECON, the manufacturer of your system.
- Your insurance company — document the damage with photos.

The qualified specialist will check:

- Whether water has entered the system.
- Whether electronic components have been damaged.
- Whether a recommissioning is safely possible or a replacement is necessary.

**No recommissioning without approval**

Battery energy storage systems that have come into contact with water must only be put back into operation after a professional inspection and express approval by a qualified specialist. This is for your safety and is often also a prerequisite for your insurance cover.

**When replacement is necessary**

If your electrical energy storage system needs to be replaced:

- The disposal of the defective system must be carried out professionally by specialized companies.
- Your installer will usually organize the removal and disposal.
- Do not attempt to transport damaged batteries yourself

**Storage disposal until collection**

If damaged battery modules cannot be collected immediately:

- Store them well ventilated outdoors with sufficient clearance from flammable materials. Storage in a

  Sand bed.

  Fireproof container, not gas-tight, ventilated.

  Water bath, e. g. metal tub, completely covered with water.
- Keep children and pets away.

Status: October 2025
Source: According to Specifications of the German Energy Storage Systems Association (BVES) e.V..

# 18. Handover to the operator

## 18.1. Information for the operator

The following information must be provided to the operator:

| Component | Information/Document | Comment |
|---|---|---|
| System | FEMS number | |
| System | Login data for Online Monitoring | |
| System | Operating instructions | |

Table 36. Information for the operator

# 19. Transport

This section contains information on external and internal transportation of the product.

Transportation is the movement of the product by manual or technical means.

- Check that the parts and outer packaging are in perfect condition.
- Use only suitable and certified slings and lifting equipment for transport!
- Check that

  You are wearing PPE,

  all screw and bolt connections are tightened firmly,

  the transport rail has been properly secured.



**WARNING**

**Danger from lifted loads**
It is prohibited to stand under lifted loads.

- Make sure that no one is near or on the product during transport. Do not use people as counterweights.
- Make sure no one is standing under suspended loads.



**CAUTION**

**DANGER** due to improper transport*!
Improper transport can pose health risks.

- Batteries must be removed or replaced by qualified personnel and must be transported by a hazardous materials carrier.
- When transporting the batteries, observe the current laws, regulations and standards, e. g. the Hazardous Goods Transportation Act (GGBefG).

**Legal regulations**
The product is transported in accordance with the legal regulations of the country in which the product is transported off-site.

# 20. Dismantling and disposal

## 20.1. Prerequisites

- The power supply to the electrical energy storage unit is interrupted and secured against being switched on again.



**CAUTION**

**Sharp and pointed edges**
Injuries to the body or limbs caused by sharp and pointed edges.

- Always wear appropriate protective equipment (cut-resistant protective gloves, protective footwear, protective eyewear) when working on the product!

## 20.2. Dismantling

- The electrical energy storage system may only be dismantled by authorized qualified electricians.
- Dismantling work must only be carried out when the system has been taken out of operation.
- Before starting disassembly, secure all components to be removed against falling, tipping over or moving.
- Dismantling work must only be carried out when the system is shut down and only by service personnel.
- The dismantling instructions of the component manufacturer ( Appendix, Applicable documents) must be observed.
- When transporting the battery modules, the current laws, regulations and standards must be observed (e. g. Dangerous Goods Transportation Act — GGBefG).

## 20.3. Disposal

- The FENECON electrical energy storage system must not be disposed of with normal household waste.
- The FENECON electrical energy storage system is RoHS and REACH compliant.
- Disposal of the product must comply with local regulations for disposal.
- Avoid exposing the battery modules to high temperatures or direct sunlight.
- Avoid exposing the battery modules to high humidity or corrosive atmospheres.
- Dispose of the electrical energy storage system and the batteries it contains in an environmentally friendly manner.
- Contact FENECON GmbH to dispose of the used batteries.



- For the disposal of all components, the usual procedures at the site and the applicable environmental protection regulations must be applied!
- For the disposal of auxiliary and operating materials, observe the local regulations and information from the safety data sheets.
- For disposal, please also observe the information in the individual operating instructions for the respective components.
- If in doubt about the disposal method, contact the manufacturer or the local waste disposal company.

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