FENECON Commercial 100

Assembly and Operating Instructions

Version: 2026.03.01

Table of Contents

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

1.3. Version/revision

Version/Revision	Change	Date	Name
2026.03.01	Publication on docs.fenecon.de	03.2026	FENECON PM

Table 1. Version/revision

1.4. Symbol conventions

	This symbol indicates an imminent danger. If this danger is not avoided, it can lead to death or serious injury.
	This symbol indicates a potentially dangerous situation. If this dangerous situation is not avoided, it may result in minor or moderate injury.
	This symbol indicates a warning. Failure to observe this warning may result in damage and/or destruction of the system.
	This symbol indicates a note. It is recommended that the note be observed.

Table 2. Symbol conventions

1.5. Structure of warning notices

Warning notices protect against possible personal injury and damage to property if observed and classify the magnitude of the danger by means of the signal word.

Source of the danger
Possible consequences of non-compliance

- Measures for avoidance/prohibitions

Danger sign
The danger sign indicates warnings that warn of personal injury.

Source of danger
The source of danger indicates the cause of the hazard.

Possible consequences of non-compliance
The possible consequences of ignoring the warning are e. g. crushing, burns or other serious injuries.

Measures/prohibitions
Measures/prohibitions include actions that must be taken to avoid a hazard (e. g. stop the drive) or that are prohibited to avoid a hazard.

1.6. Terms and abbreviations

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

Term/abbreviation	Meaning
AC	Alternating Current
CHP	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
Commissioning	Commissioning
MPPT	Maximum Power Point Tracking Finder for the maximum power point
GCP	grid connection point
PE	Protective conductor
PV	Photovoltaics
RTE	Round-Trip-Efficiency (RTE) 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 State of charge The available capacity in a battery, expressed as a percentage of the nominal capacity.
SoH	State of Health — State of ageing
VDE	German Association for Electrical, Electronic & Information Technologies e. V.
Widget	Component of Online Monitoring

Table 3. Terms and abbreviations

1.7. Scope of delivery

List item	Component	Amount	Comment
1	FENECON Commercial 100 — Inverter	1	100 kW
2	FENECON Commercial — EMS box (incl. FENECON Energy Management System)	1	
3	FENECON Commercial 50 — Parallel switch box	1	
4	FENECON Commercial — Extension box	1	optional: 2, depending on the system configuration
5	FENECON-BMS box	1	per battery tower
6	FENECON-Battery module	up to 15	per battery tower, depending on the ordered capacity
7	FENECON base (included with FENECON-BMS box)	1	per battery tower
8	GoodWe Energy Meter	1	FEH040

Table 4. Scope of delivery

Component	Comment
Installation and service instructions FENECON Commercial 100	Installer's guide
Quick start guide FENECON Commercial	Quick start guide for the installer
Operating instructions FENECON Commercial	Instructions for the user/end customer
Brochure FENECON Commercial	

Table 5. Documents

1.8. Applicable documents

All documents listed in the appendix to these installation and service instructions must be observed.
See 15.1 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 passes these installation and service 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 via external sources does not invalidate the warranty for systems in 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

When carrying out maintenance, servicing and cleaning work, ensure that the product is switched off in a safe manner and secured against being switched on again. In addition, all instructions in these 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.

Storage longer than 12 months
Possible consequences: Deep discharge of the cells/defective battery.

- External charging of the battery modules to nominal voltage — forced charging must be carried out, which is controlled via the FEMS. This must only be carried out by the manufacturer or by a company commissioned by the manufacturer.

2.5.6. Charging

- Keep the SoC of the battery module below 30% for shipping and charge the battery module if it has been stored 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

Warning of electrical voltage

Work on electrical equipment may only be carried out by qualified electricians from the manufacturer or by specially authorized, trained electricians and in compliance with the safety regulations.
Maintenance work must not be carried out for 5 minutes after the power supply has been disconnected.
The customer must provide a mains disconnection device for the electrical power supply.

Unknown fault messages

Unknown faults and attempts to rectify them can lead to damage to the product.
If there is a fault that is not included in the fault list, inform customer service.

All doors, emergency exits and areas around the electrical energy storage system must remain clear; do not obstruct escape routes!

The condition of the floor outside the storage system is the responsibility of the user. However, the housing is sealed so that no electrolyte can escape.

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.

Piktogramm	Bedeutung	Beschreibung
	Warnung vor gefährlicher elektrischer Spannung	Piktogramm am Gehäuse, und Kennzeichnung von Komponenten, bei denen nicht klar zu erkennen ist, dass sie elektrische Betriebsmittel enthalten, die Anlass für ein Risiko durch elektrischen Schlag sein können.
	Allgemeines Warnzeichen	
	Warnung vor Gefahren durch das Aufladen von Batterien	Piktogramm am Gehäuse und Kennzeichnung von Komponenten, bei denen nicht klar zu erkennen ist, dass sie elektrische Betriebsmittel enthalten, die Anlass für ein Risiko durch das Aufladen von Batterien sein können.
	Keine offene Flamme; Feuer, offene Zündquelle und Rauchen verboten	Piktogramm am Gehäuse und Kennzeichnung von Komponenten, bei denen nicht klar zu erkennen ist, dass sie elektrische Betriebsmittel enthalten, die Anlass für ein Risiko durch offene Flammen, Feuer, offene Zündquellen und Rauchen sein können.
	Schutzerdungskennzeichen	
	Getrennte Sammlung von Elektro- und Elektronikgeräten	
	Anleitung beachten	
	Kopfschutz benutzen	

Piktogramm	Bedeutung	Beschreibung
	Fußschutz benutzen	
	Handschutz benutzen	
	CE-Kennzeichen	
	Produkt ist recyclingfähig.	

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.

- 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 — inverter	-30 °C to +60 °C
	Relative humidity (operation/storage)	50 % non-condensing (up to 90 % permissible for short periods)
	Operating temperature of the battery	-20 °C to +55 °C
	Optimal operating temperature of the battery	+15 °C to +30 °C
	Cooling	Adaptive fan
	Noise level	65 dB
	Max. Grid connection	variable via external transformer (not included)
Certification/guidelines	Complete system	CE VDE 2510-50
	Inverter	VDE 4105:2018-11 VDE 4110:2023 TOR generator type A 1.1
	Battery	UN38.3 IEC62619 EMC (complete)
	Other countries	Sweden (Registered: Rikta Rätt), Netherlands (Planned: Synergrid C10/11)

Table 7. Technical data — General

3.2. Technical data — FENECON Commercial 100 inverter

Description		Value/dimension
Inverter model		FINV-100-1-DAH
DC-PV connection	Max. DC input power	200 kW_p
	MPP tracker	8
	Number of inputs per MPPT	2 (MC4)
	Starting voltage MPPT	200 V
	Max. DC input voltage in V	1000 V
	MPPT voltage range	160 V to 950 V
	Rated input voltage in V	620 V
	Max. input current per MPPT Input current per MPPT	42 A
	Max. Short-circuit current per MPPT	55 A
AC connection	Grid connection	400/380 V, 3L/N/PE, 50/60 Hz
	Max. output current output current (400 V)	139.2 A
	Max. input current (400 V) Input current (400 V)	139.2 A
	Nominal apparent power output	100,000 VA
	Max. apparent power output Apparent power output	110,000 VA
	Cos (φ)	-0.8 to +0.8
Emergency power	Emergency power capable	Yes, with STS box (optional)
	Network configuration	TN-C, TN-CS, TNS, TT
	Supplied with emergency power	110,000 VA (36,600 VA)*
	Black start	Yes
	Solar recharging	Yes
Efficiency	Max. Efficiency	98.1 %
	European efficiency	97.7 %
General	Width | Depth | Height	995 | 358 | 758 mm
	Weight	97 kg
	Topology	not insulated

Table 8. Technical data — FENECON Commercial 100 inverter

*also in parallel mains operation

3.2.1. Dimensions

The dimensions are given in mm.

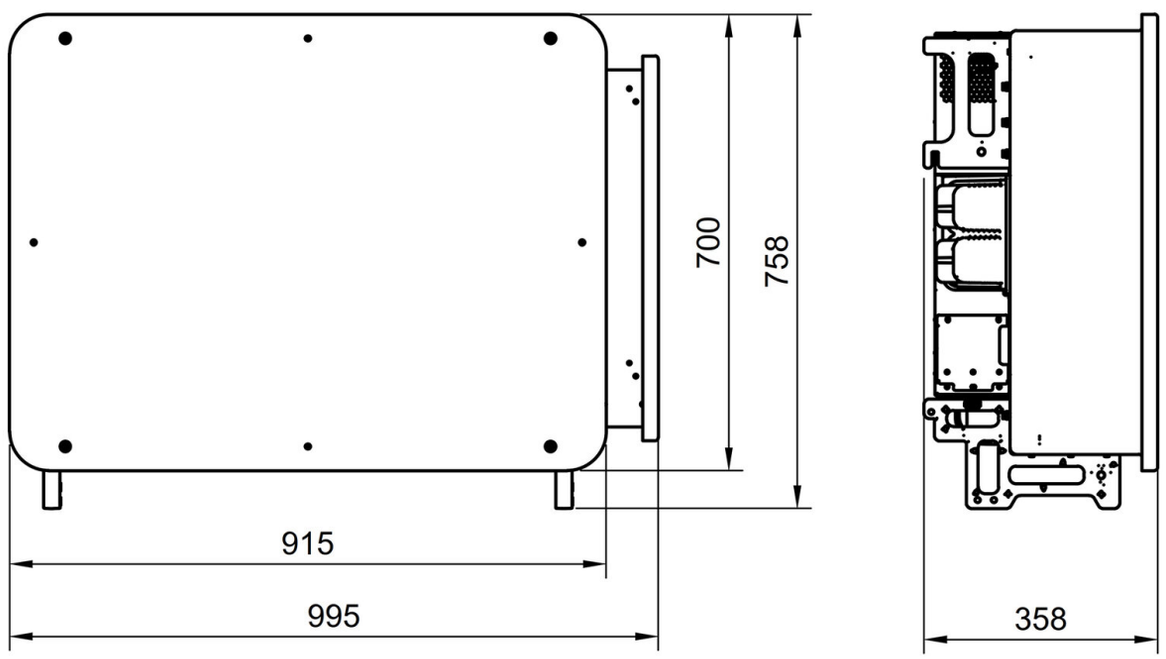


Figure 1. Inverter — Dimensions

3.3. Technical data — EMS box

Description	Value/dimension
DC operating voltage	224 V to 672 V
Max. Current (battery)	50 A
Operating temperature	-10 °C to 50 °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 — EMS box

3.3.1. Dimensions

The dimensions are given in mm.

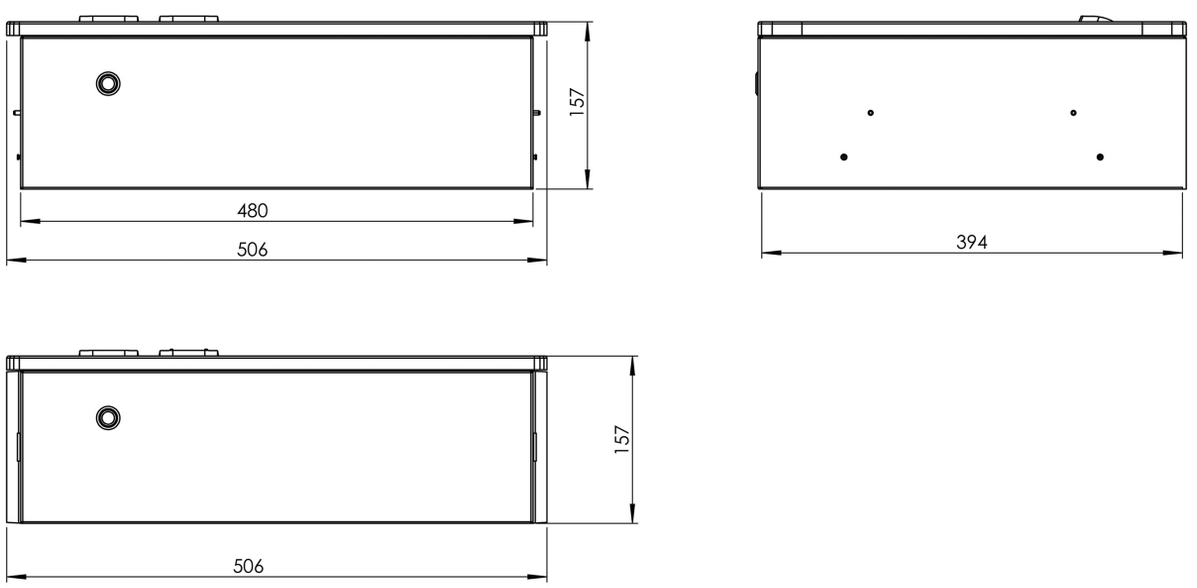


Figure 2. Dimensions — EMS box

3.3.2. EMS box — Terminal assignment

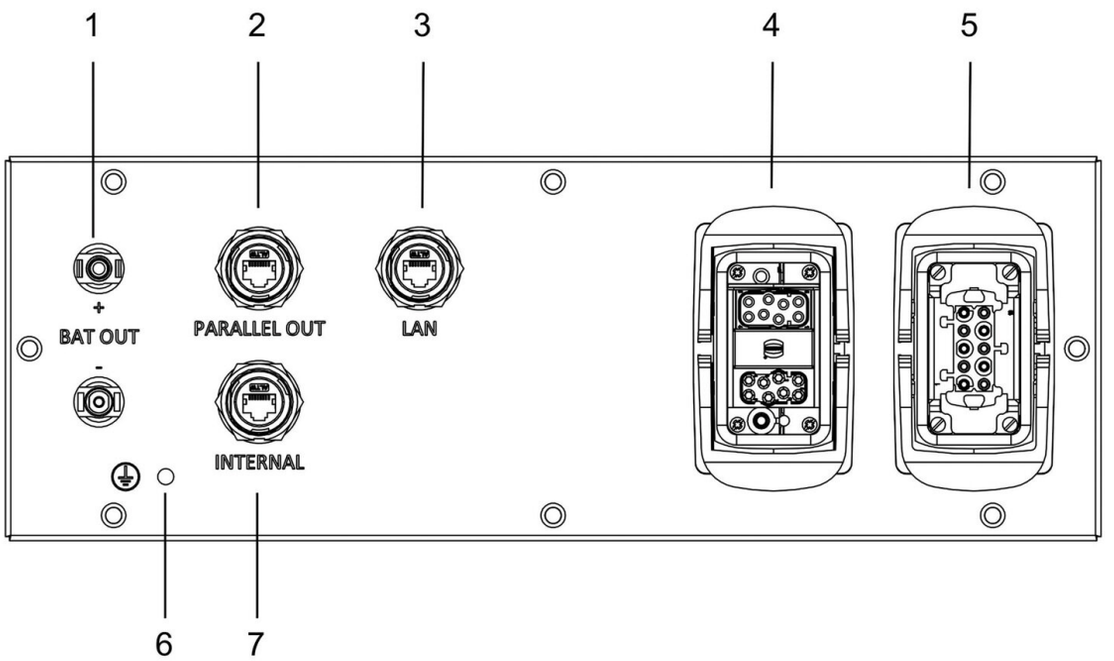


Figure 3. Terminal assignment — EMS box

List item	Description
1	Battery connection to the inverter (MC4-Evo stor)
2	Communication output for parallel connection of several batteries
3	Connection to customer network (LAN) RJ45 (network cable not included in scope of delivery)
4	Communication inverter, relay outputs; digital inputs (16-pin connector), analog output
5	Power supply FEMS box; potential-free contacts (max. 10 A, measured) (10-pin plug)
6	Earthing connection
7	For future applications (not assigned)

Table 10. Terminal assignment — EMS box

3.4. Technical data — Parallel switch box

Description	Value/dimension
Max. operating voltage	800 V
Max. Current (inverter)	100 A
Max. current (battery) Current (battery)	50 A
Operating temperature	-20 °C to 45 °C
Protection specification	IP55
Width | Depth | Height	606 | 157 | 639 mm
Weight	27 kg

Table 11. Technical data — Parallel switch box

3.4.1. Dimensions

The dimensions are given in mm.

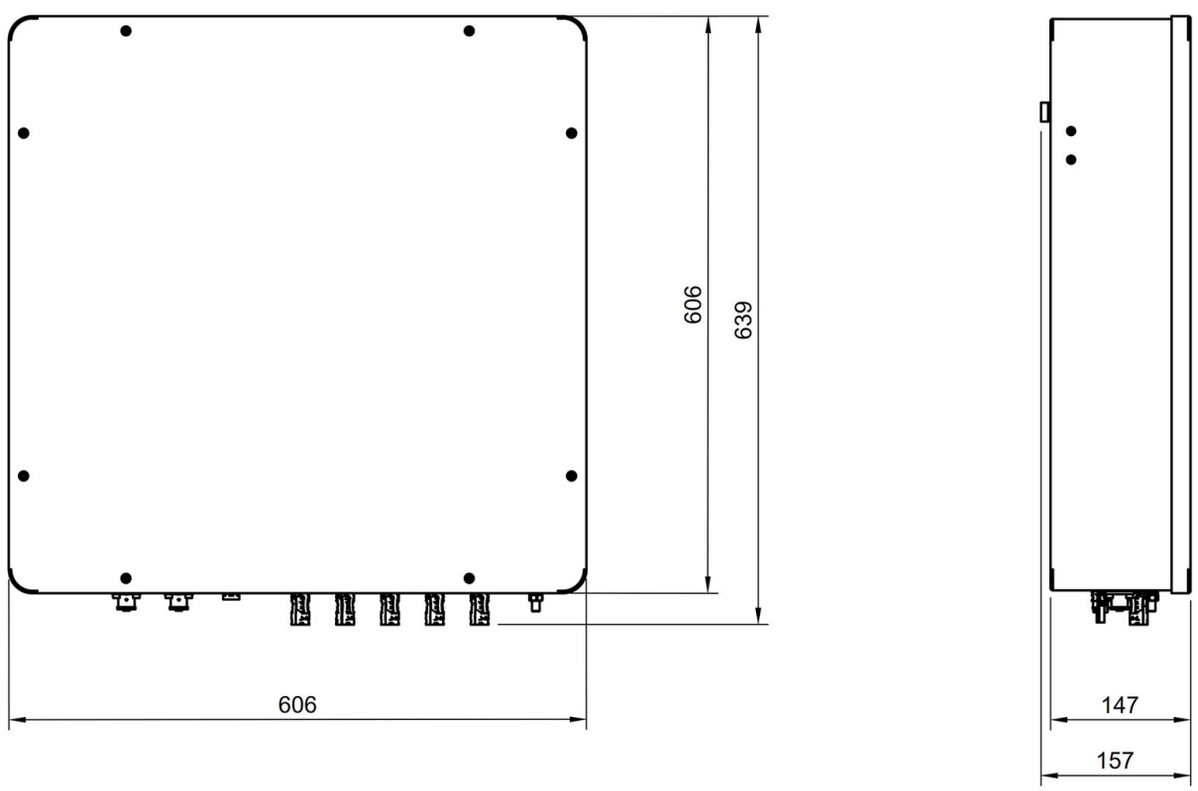


Figure 4. Dimensions — Parallel switch box

3.4.2. Parallel switch box — Terminal assignment

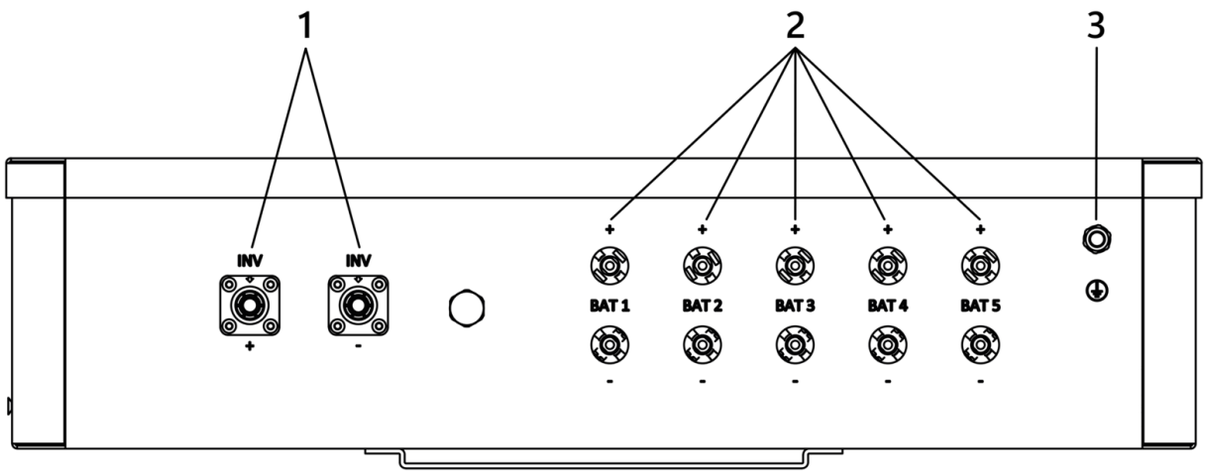


Figure 5. Terminal assignment — Parallel switch box

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 — FENECON Commercial 100 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 (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.

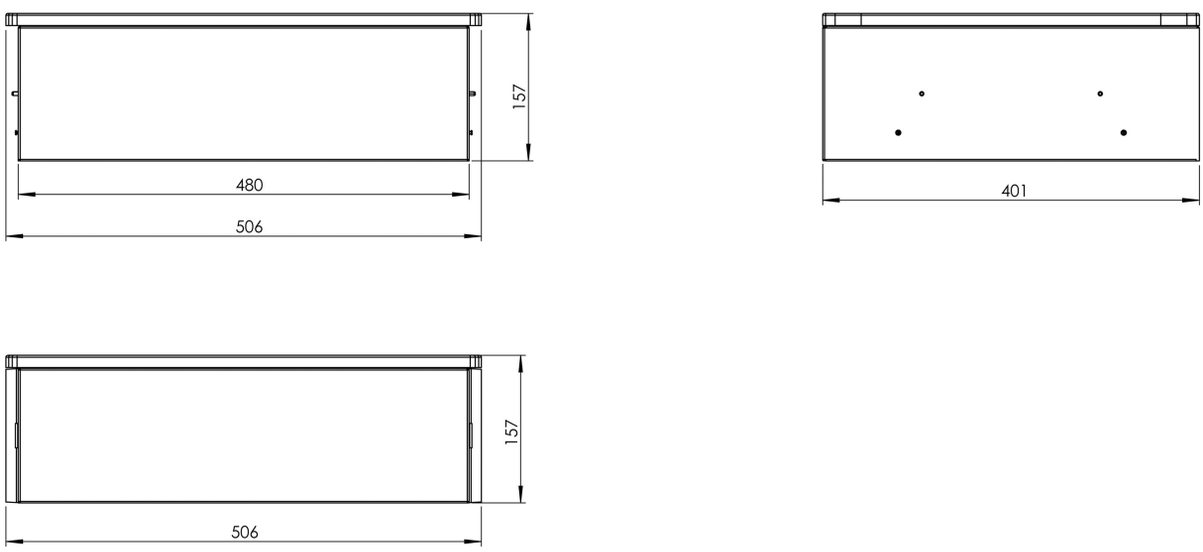


Figure 6. Dimensions — Extension box

3.5.2. Extension box — Terminal assignment

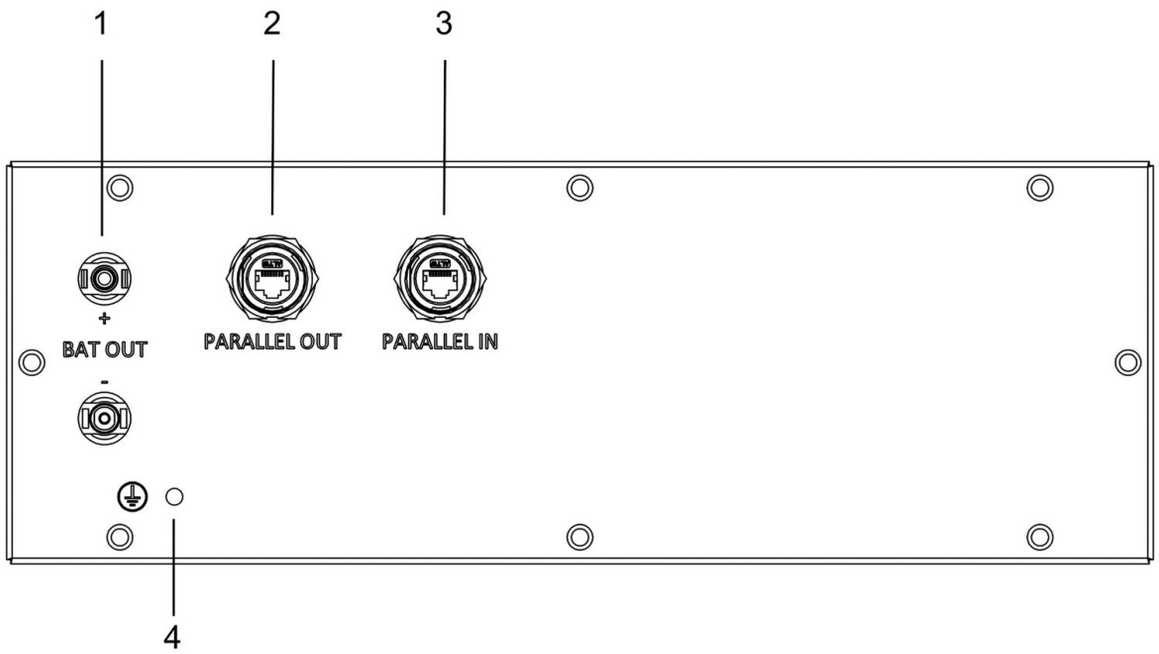


Figure 7. Terminal assignment — Extension box

List item	Description
1	Battery connection to the EMS box in parallel (MC4-Evo stor)
2	Communication output for parallel connection of several battery towers
3	Communication input for parallel connection of several battery towers
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
Ingress protection	IP55 (plugged in)
Width (incl. side panel) | Depth | Height	506 | 401 | 143 mm
Weight	13 kg
Installation	stackable/wall mounting

Table 15. Technical data — BMS box

3.6.1. Dimensions

The dimensions are given in mm.

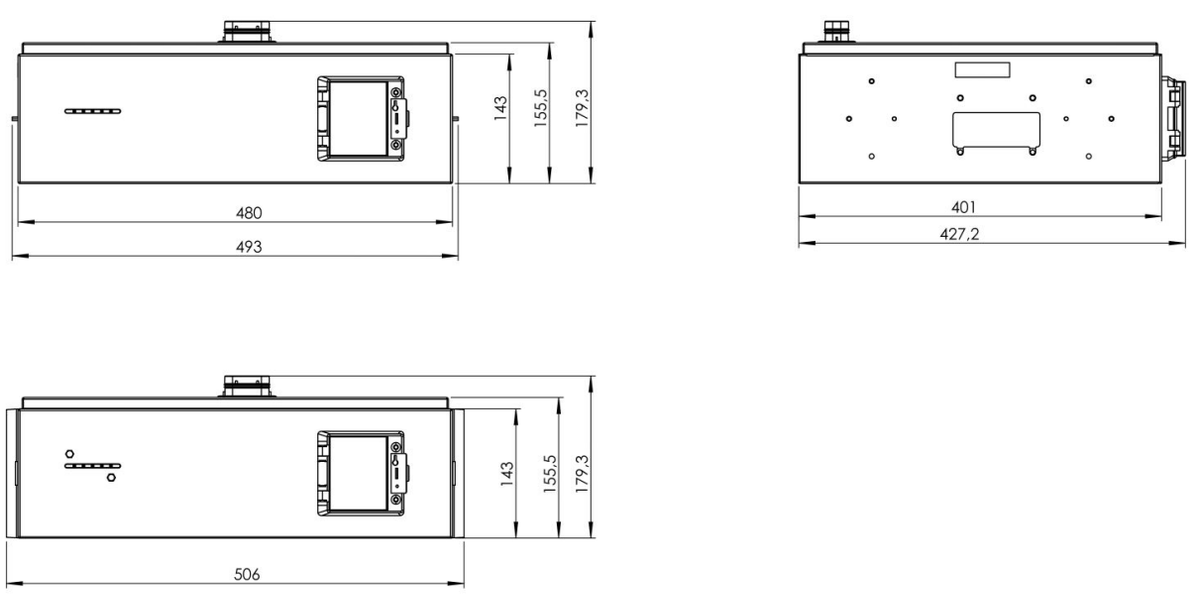


Figure 8. Dimensions — BMS box

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

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

- External charging of the battery modules to nominal voltage. This must only be carried out by the manufacturer or a company commissioned by the manufacturer.

3.7.1. Dimensions

The dimensions are given in mm.

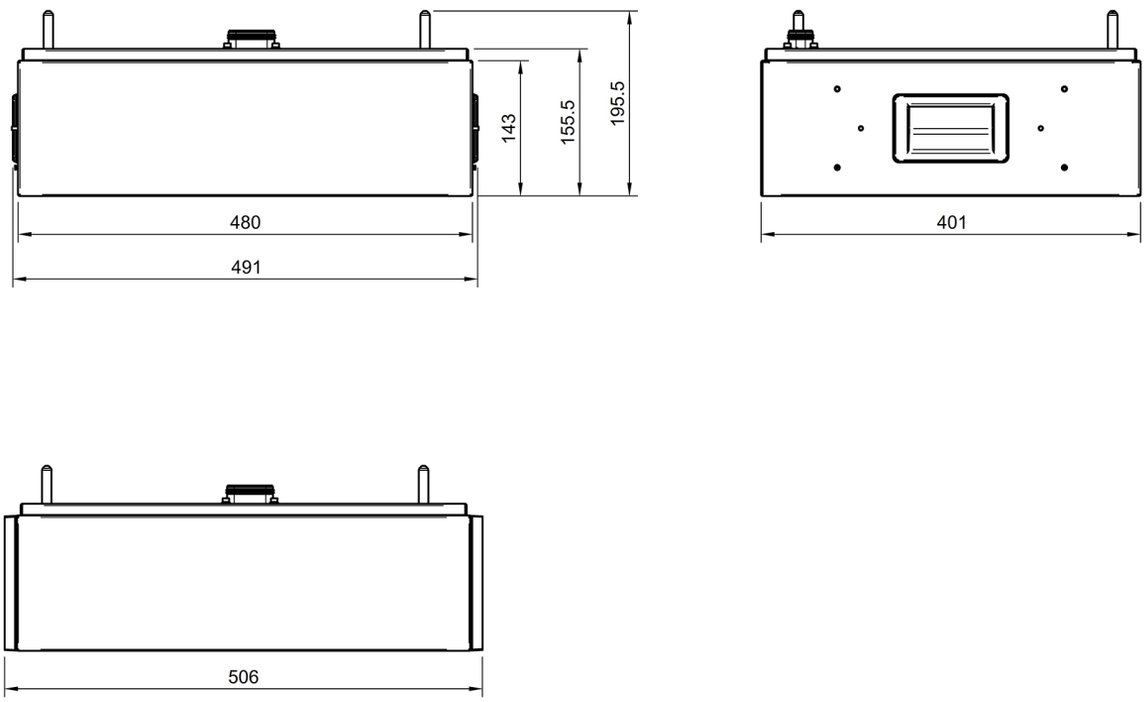


Figure 9. Dimensions — Battery module

3.7.2. Electrical parameters of the battery modules

For amounts of battery modules from 7 to 9

Parameter	Value/dimension		
No. of modules	**7S**	**8S**	**9S**
Nominal capacity in kWh	20.1	22.9	25.8
Usable capacity in kWh	19.6	22.4	25.2
Width incl. side panel in mm	506		
Depth in mm	401		
Height in mm	1406	1549	1692
Weight in kg	247	277	307
Nominal voltage in V	313.6	358.4	403.2
Output voltage range in V	274.4 ~ 352.8	313.6 ~ 403.2	352.8 ~ 453.6
Maximum continuous charging/discharging power in kW	15.7	17.9	20.2

Table 17. Electrical parameters — No. of battery modules 7S to 9S (7-9 modules in series)

For amounts of battery modules from 10 to 12

Parameter	Value/dimension		
Modules	**10S**	**11S**	**12S**
Nominal capacity in kWh	28.7	31.5	34.4
Usable capacity in kWh	28.0	30.8	33.6
Width incl. side panel in mm	506		
Depth in mm	401		
Height in mm	1835	1978	2121
Weight in kg	337	367	397
Rated voltage in V	448.0	492.8	537.6
Output voltage range in V	392.0 ~ 504.0	431.2 ~ 554.4	470.4 ~ 604.8
Maximum continuous charging/discharging power in kW	22.4	24.4	26.9

Table 18. Electrical parameters — No. of battery modules 10S to 12S (10 to 12 modules in series)

For amounts of battery modules from 13 to 15

Parameter	Value/dimension		
Modules	**13S**	**14S**	**15S**
Nominal capacity in kWh	37.3	40.1	43.0
Usable capacity in kWh	36.4	39.2	42.0
Width incl. side panel in mm	506		
Depth in mm	401		
Height in mm	2264	2407	2550
Weight in kg	427	457	487
Rated voltage in V	582.4	627.2	672.0
Output voltage range in V	509.6 ~ 655.2	548.8 ~ 705.6	588.0 ~ 756.0
Maximum continuous charging/discharging power in kW	27.5	27.5	27.5

Table 19. Electrical parameters — No. of battery modules 13S to 15S (13 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.

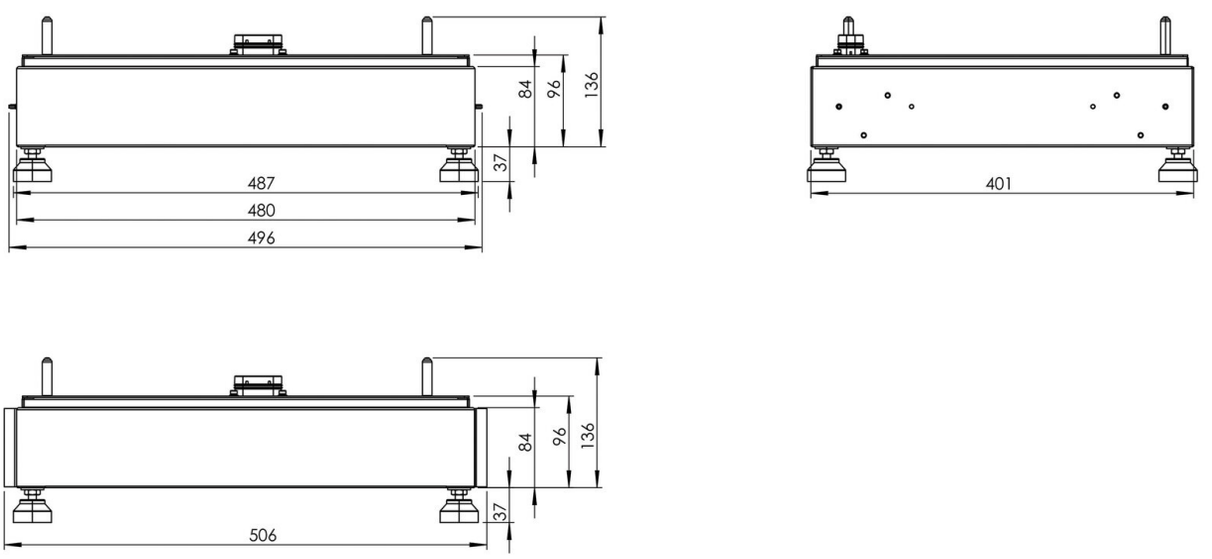


Figure 10. Dimensions — Base

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.

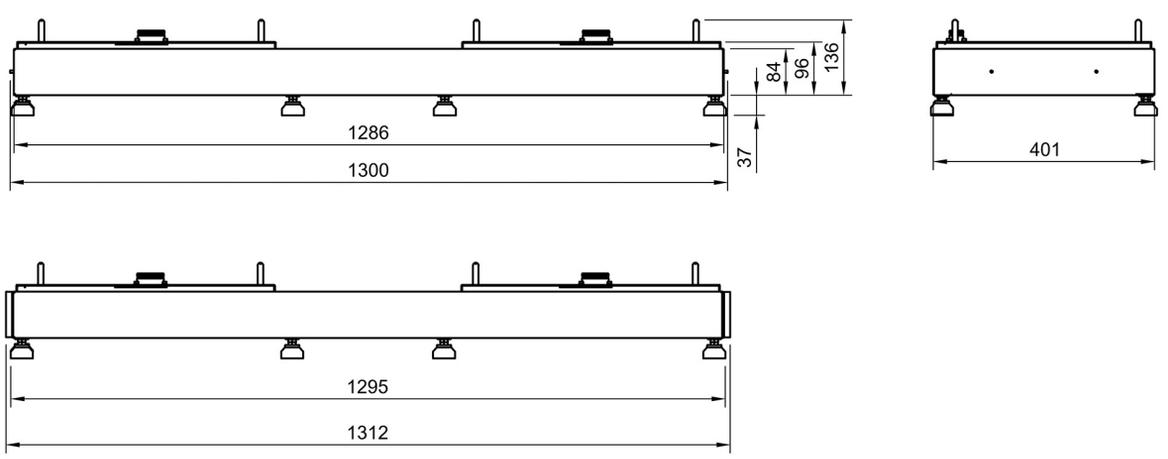


Figure 11. Dimensions — Split base

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.

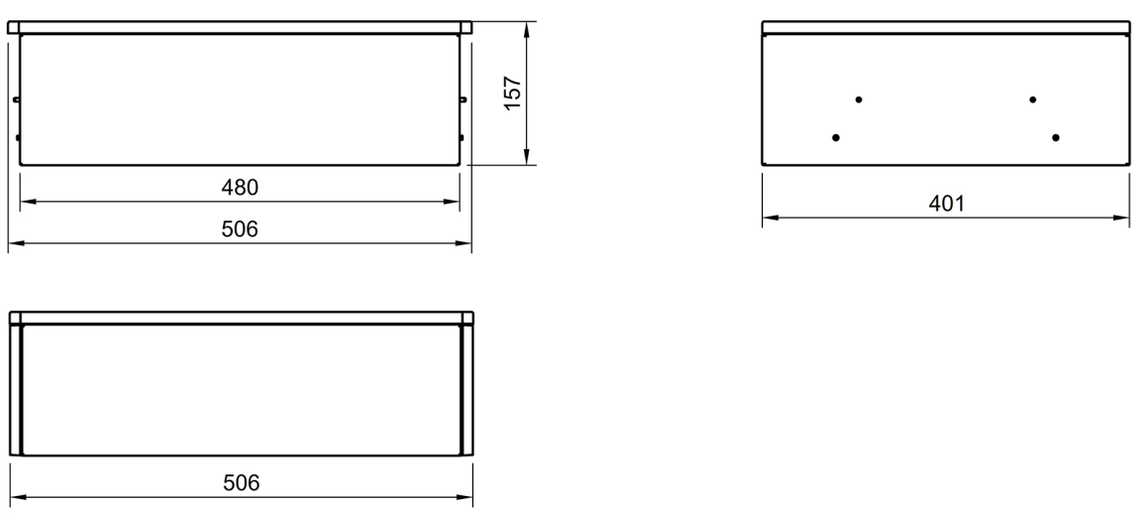


Figure 12. Dimensions — Top box

3.11. Technical data — STS box (optional emergency power)

Description		Value/dimension
Product designation		STS-210-150
Technical data	Rated output voltage	400/380 V, 3L/N/PE
	Rated AC frequency	50/60 Hz
	Max. power (consumer load, grid)	137,500 VA
	Max. Current (consumer load, grid)	210 A
*Emergency power	Loads supplied with emergency power	110,000 VA
	Unbalanced load	46,200 VA
	Black start	Yes
	Solar recharging	Yes
Generator	Rated apparent power	110,000 VA
	Max. apparent power	110,000 VA
	Rated current	210 A
	Max. Current	210 A
*General	Operating temperature range	-35 °C to +60 °C
	Width | Height | Depth	680 | 620 | 165 mm
	Weight	21 kg
	Protection specification	IP54
	Cooling	Intelligent ventilation
	Installation	Wall mounting

Table 23. Technical data — STS box

3.11.1. Dimensions — STS box

The dimensions are given in mm.

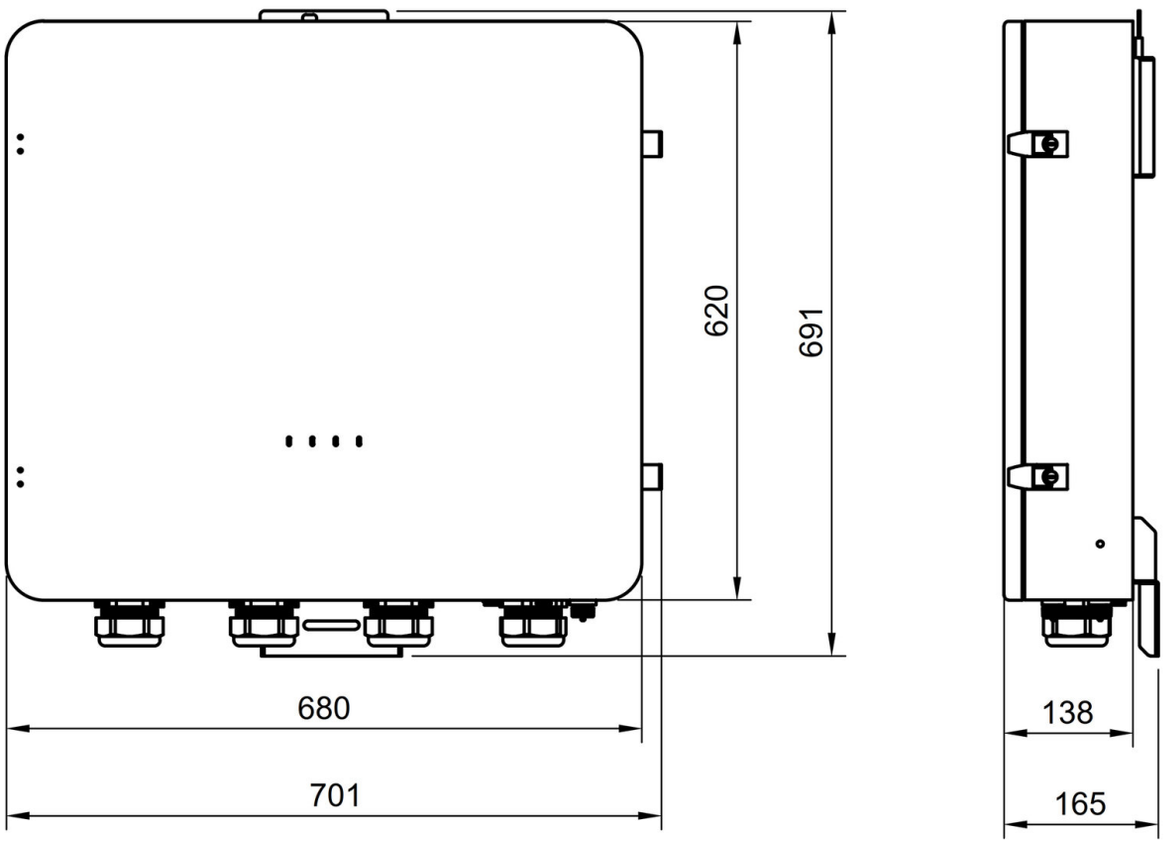


Figure 13. Dimensions — STS box

4. General description

The FENECON Commercial 100 is an electrical energy storage system gaining its back-up power capability through an STS box. It can build its own power grid for domestic or commercial use. Lithium iron phosphate batteries (LiFePO4) are used in this modular system for storing electrical energy.

4.1. System configuration — Overview (without back-up power)

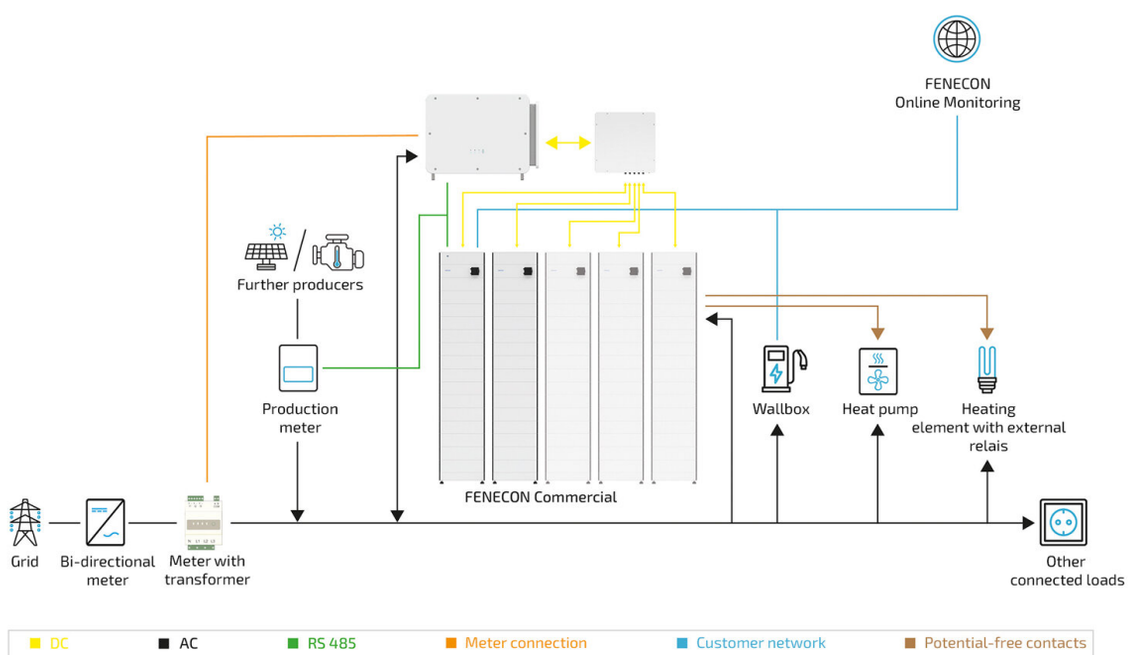


Figure 14. System — schematic diagram with optional components (shown without protective device)

4.1.1. Standard setup without back-up power

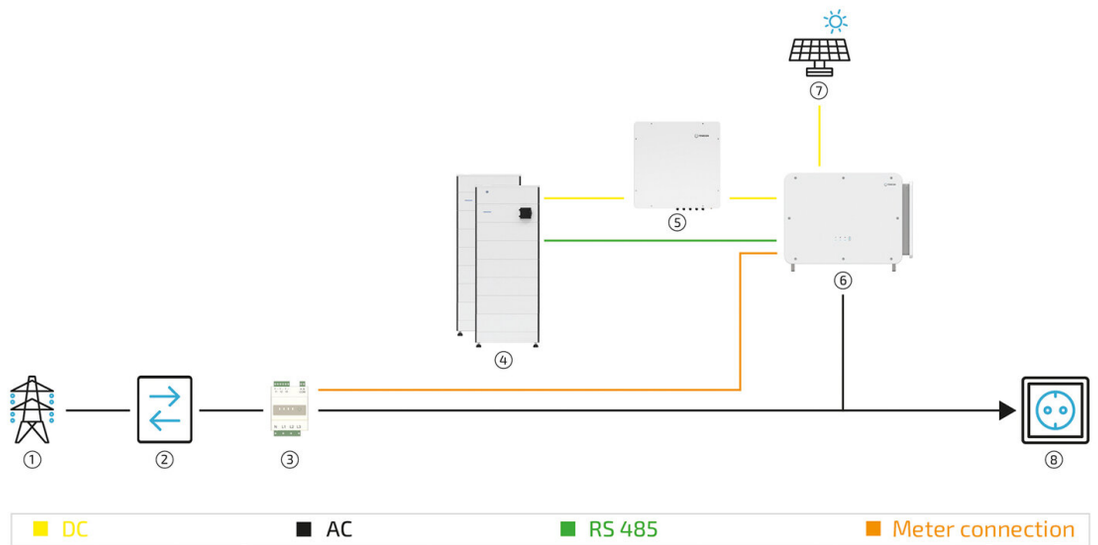


Figure 15. Standard setup without back-up power

List item	Description
1	Grid
2	Bi-directional meter
3	Energy meter
4	FENECON Commercial 100 battery tower
5	Parallel switch box
6	FENECON Commercial 100 inverter
7	PV system
8	Consumer load

Table 24. Standard setup without back-up power

4.1.2. AC system diagram

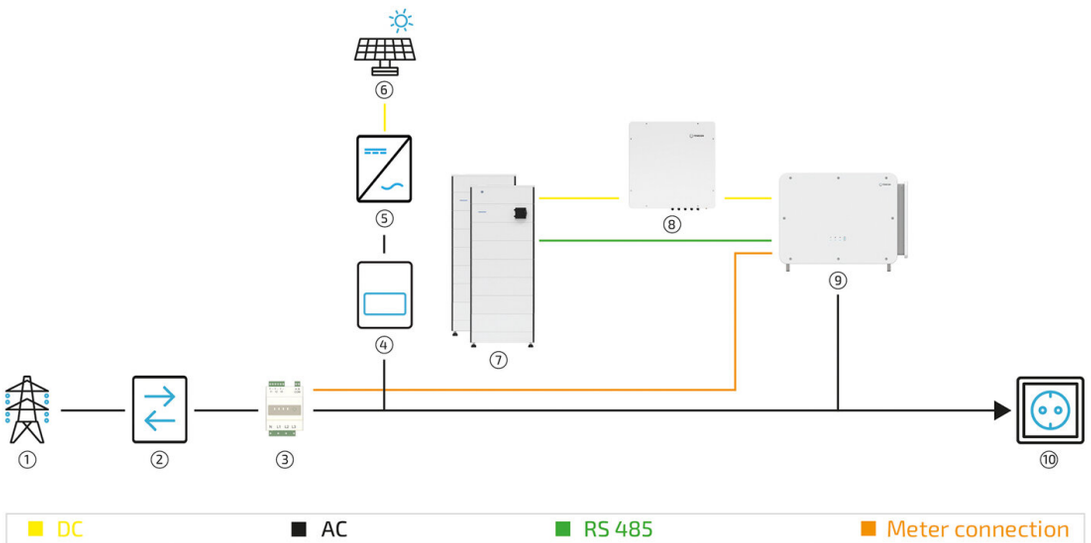


Figure 16. AC system diagram (shown without protective device)

List 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 100 battery tower
8	Parallel switch box
9	FENECON Commercial 100 inverter
10	Consumer load

Table 25. AC system diagram

4.1.3. System structure with additional PV producer

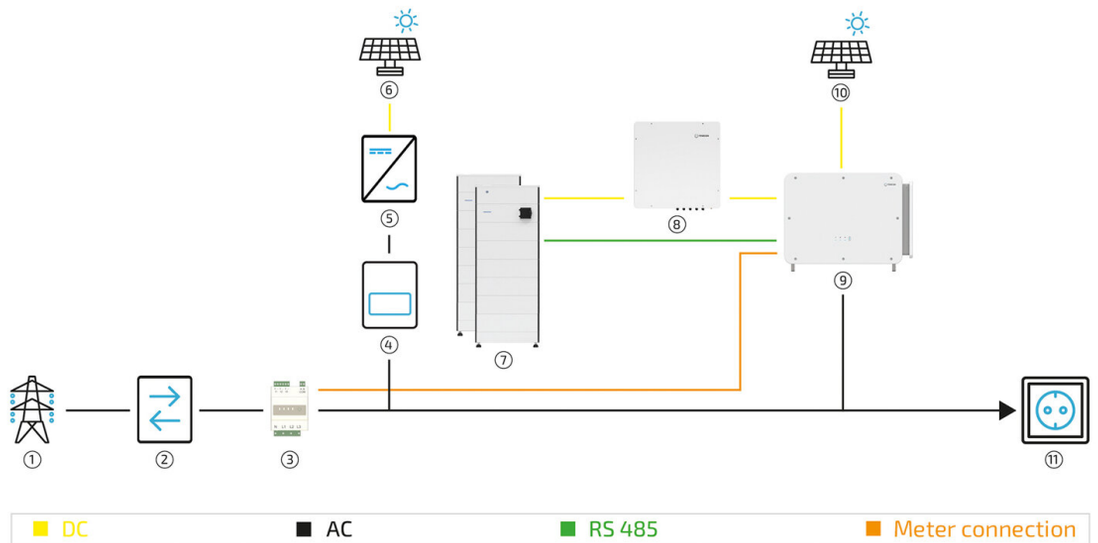


Figure 17. System structure with additional PV producer (shown without protective device)

List item	Description
1	Grid
2	Bi-directional meter
3	Energy meter
4	3-phase sensor or with PV inverter app
5	PV inverter
6	Additional PV system
7	FENECON Commercial 100 battery tower
8	Parallel switch box
9	FENECON Commercial 100 inverter
10	PV system
11	Consumer load

Table 26. System structure with additional PV producer

4.2. System design: Variants with back-up power via STS box

4.2.1. Standard setup with back-up power

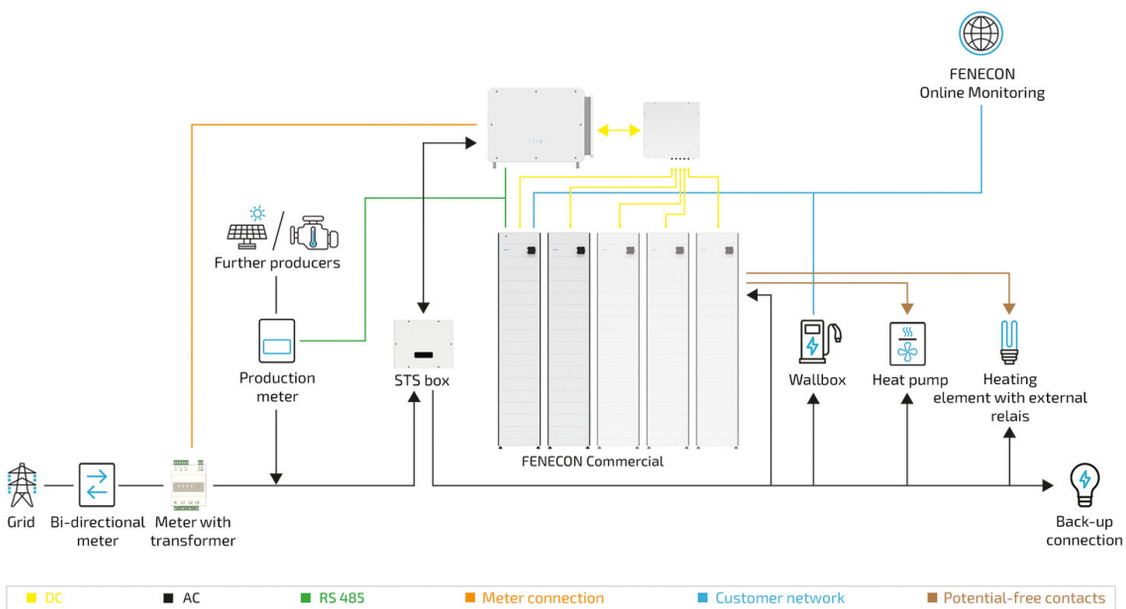


Figure 18. System — schematic diagram with optional components and back-up power via STS box (shown without protective device)

Within the back-up power function, the inverter acts as its own grid former and sets up its own 3-phase system for the separate emergency power branch (see Technical data). Compared to the public grid system, the network configuration of the emergency power mode has a lower "buffer effect" with regard to load peaks, starting currents, DC components and strongly fluctuating loads. Due to the limited power of the inverter, such loads are only possible within certain limits.

4.2.2. System with STS back-up power switchover

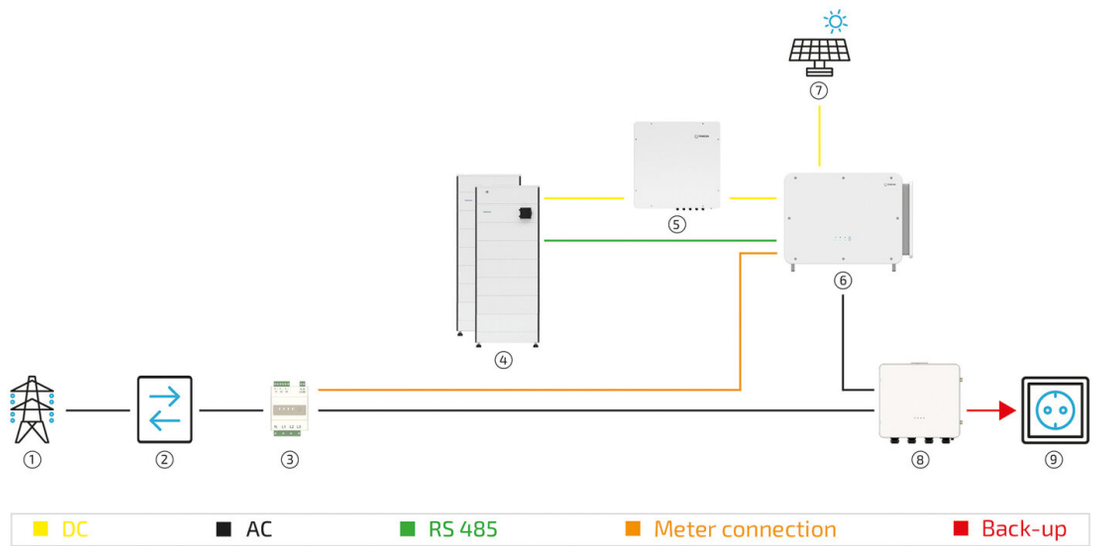


Figure 19. System with STS back-up power switchover (shown without protective device)

List item	Description
1	Grid
2	Bi-directional meter
3	Energy meter
4	FENECON Commercial 100 battery tower
5	Parallel switch box
6	FENECON Commercial 100 inverter
7	PV system
8	STS box
9	Consumer load (supplied with back-up power)

Table 27. System with STS back-up power switchover

4.2.3. System with STS back-up power switchover and additional PV producer

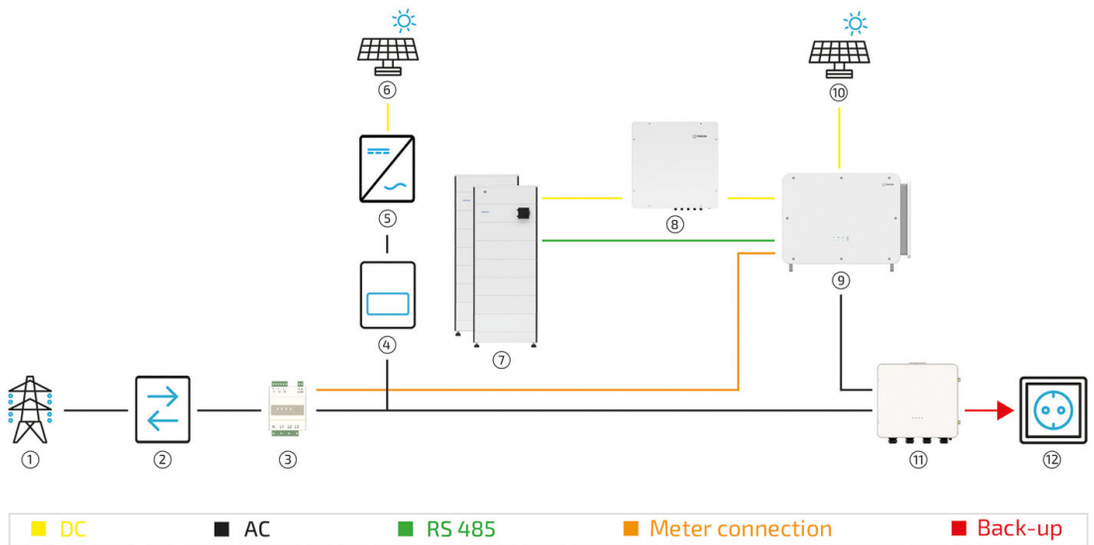


Figure 20. System with STS back-up power switchover and additional PV producer (shown without protective device)

List item	Description
1	Grid
2	Bi-directional meter
3	Energy meter
4	3-phase sensor or with PV inverter app
5	PV inverter
6	Additional PV system
7	FENECON Commercial 100 battery tower
8	Parallel switch box
9	FENECON Commercial 100 inverter
10	PV system
11	STS box
12	Consumer load (supplied with back-up power)

Table 28. System with STS back-up power switchover and additional PV producer

4.2.4. AC system with STS back-up power switchover

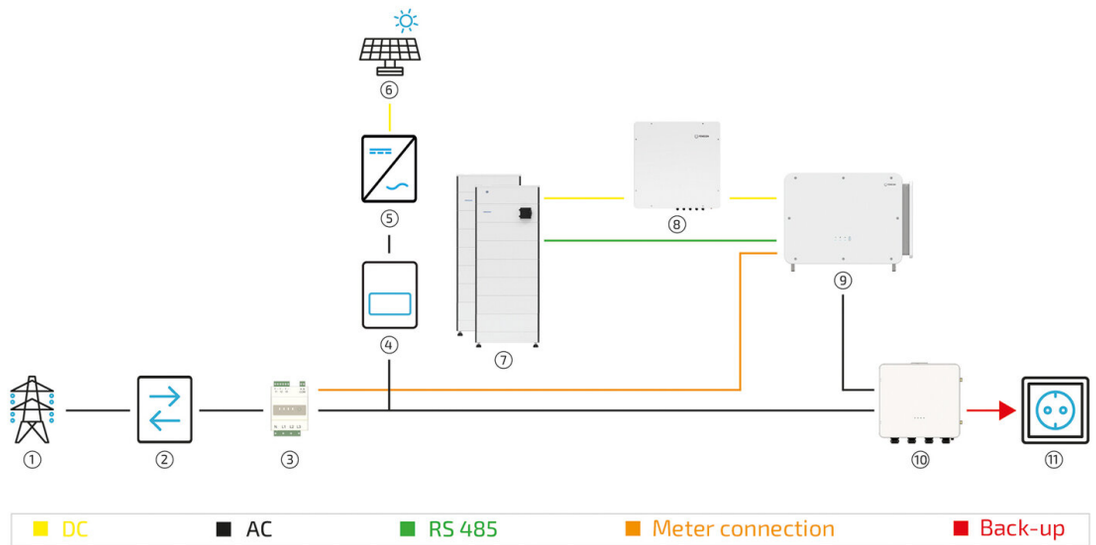


Figure 21. AC system with STS back-up power switchover

List 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 100 battery tower
8	Consumer load (supplied with back-up power)
9	FENECON Commercial 100 inverter
10	STS box
11	Consumer load (supplied with back-up power)

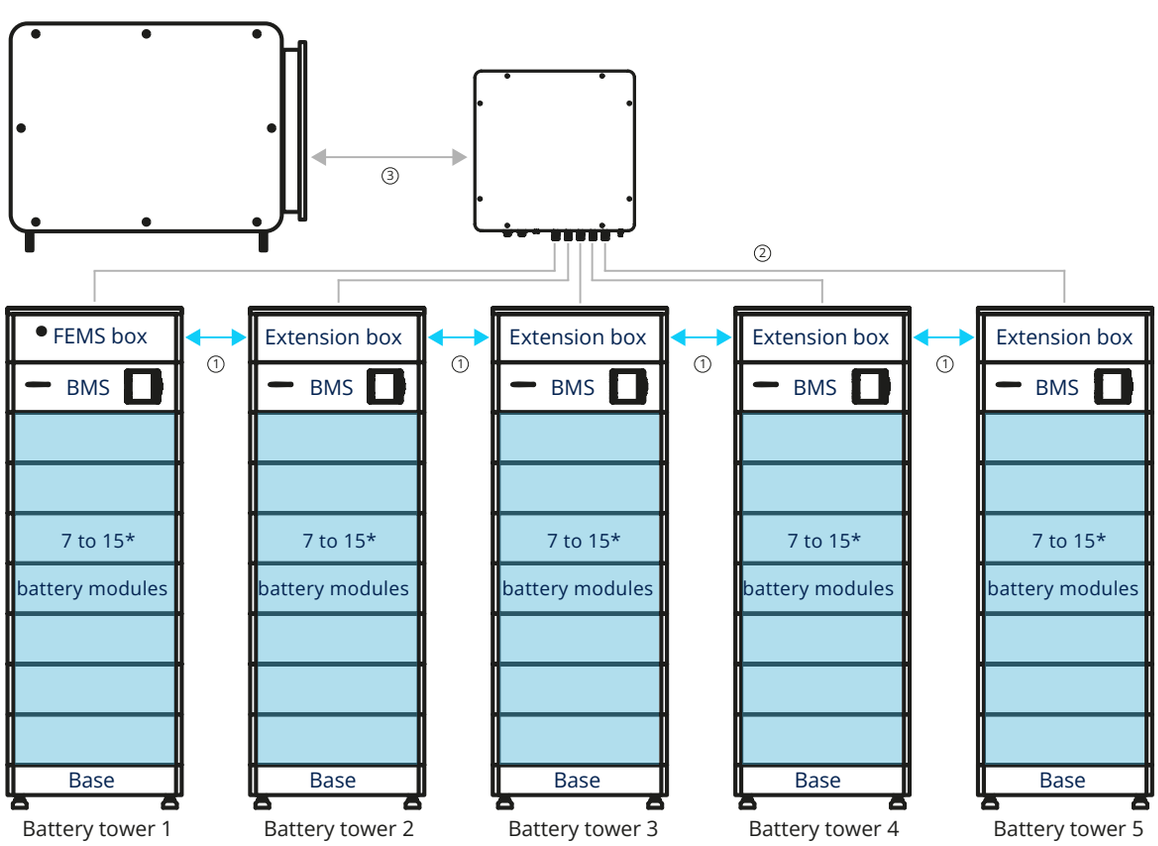
Table 29. AC system with STS back-up power switchover

4.2.5. Required components

Depending on the system configuration, a maximum of the following components are required. When connecting up to five battery towers in parallel, ensure that the same number of battery modules are installed in each battery tower.

Amount of battery towers	Amount 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 30. System configuration — Required components



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

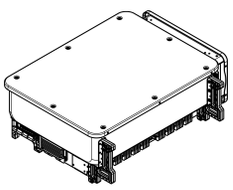
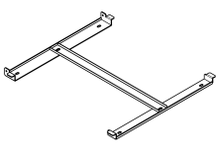
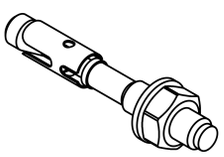
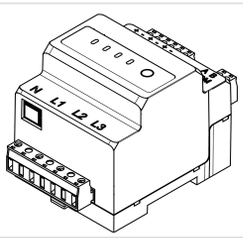
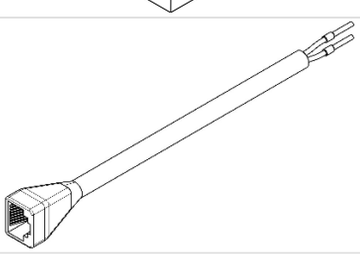
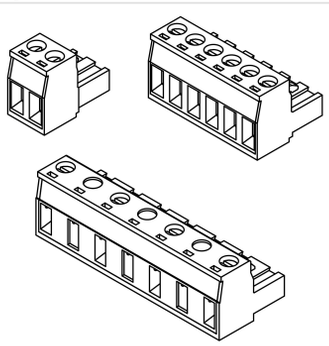
* Parallel connection of several towers:
> 2 towers with 5 modules each
> 3 towers with 11 modules each
> 4 towers with 12 modules each
> 5 towers with 13 modules each

Figure 22. Structure — FENECON Commercial 100 electrical energy storage system with five battery towers

5. Assembly preparation

5.1. Scope of delivery

5.1.1. FENECON Commercial 100 inverter

Image	Amount	Description
	1	FENECON Commercial 100 inverter
	1	Wall mount
	4	Fixing material
	1	3-phase sensor at grid connection point without current transformer
	1	Communication cable with RJ45 socket
	1	Plug for • Communication connection to the inverter • 3-phase sensor • Connection of the current transformers • Voltage tap

5.1. Scope of delivery

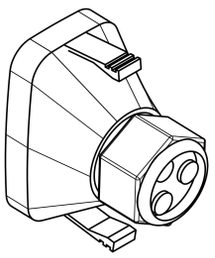
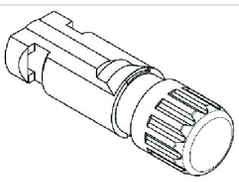
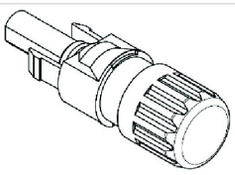
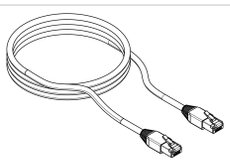
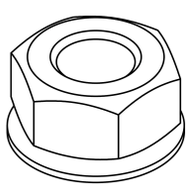
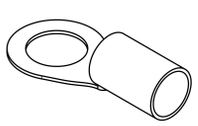
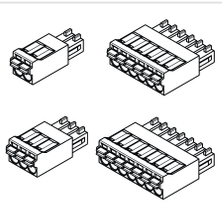
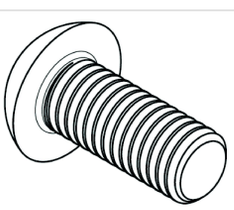
Image	Amount	Description
	2	Cover — communication port
	20	MC4 plug
	20	MC4 socket
	1	Meter cable (10 m)
	1	FEMS-cable (10 m)
	5	Nuts for AC connection
	5	Cable lugs for AC cables
	1	2 x PIN terminal, 2-pole | 1 x PIN terminal, 6-pole 2 x PIN terminal, 3-pin | 1 x PIN terminal, 7-pin
	2	Screw for earthing and fixing to wall bracket

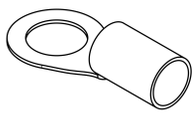
Image	Amount	Description
	1	Cable lug for earthing

Table 31. Scope of delivery — FENECON Commercial 100 inverter

5.1.2. Commercial EMS box

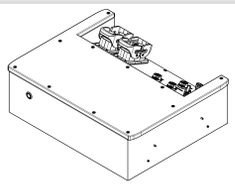
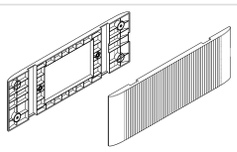
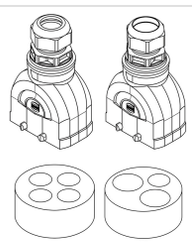
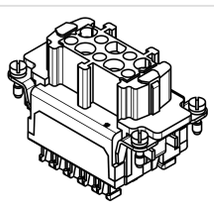
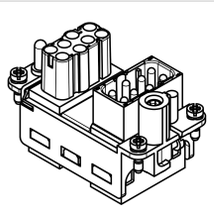
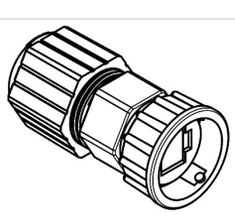
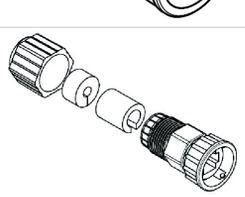
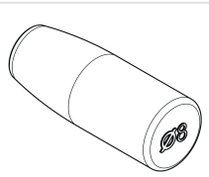
Image	Amount	Description
	1	Commercial-EMS box
	2	Side panel
	2	Harting housing with cable gland (13-21 mm), multi-hole seal (4 x 8 mm) Harting housing with cable gland (19-25 mm), multi-hole seal (2 x 10 & 1 x 8 mm)
	1	Harting socket, 10-pin
	1	Harting insert, 16-pin (assembled)
	1	Jumper plug
	2	Network connector housing
	5	Filler plug (8 mm)

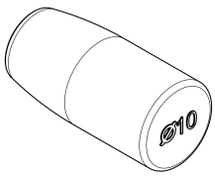
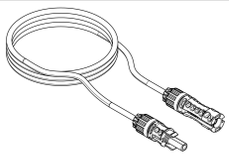
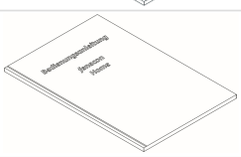
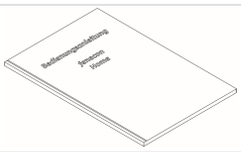
Image	Amount	Description
	2	Filler plug (10 mm)
	1	Battery cable set (10 m)
	1	Installation and service instructions
	1	Operating instructions (for the end customer)
	1	Quick start guide

Table 32. Scope of delivery — Commercial EMS box

5.1.3. FENECON Commercial 100 — Parallel switch box

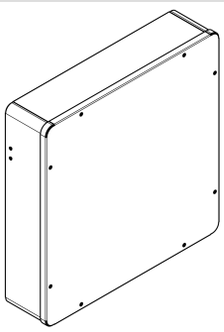
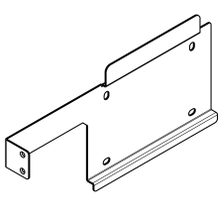
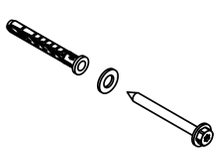
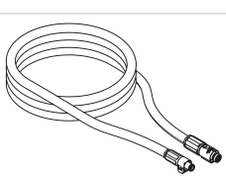
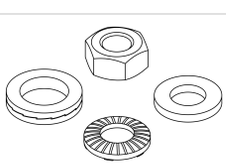
Image	Amount	Description
	1	FENECON Commercial 100 parallel switch box
	1	Wall bracket
	4	Anchor with screw and washer
	1	Two DC cables (3 m)
	1	Earthing kit

Table 33. Scope of delivery — Parallel switch box

5.1.4. Extension-Box

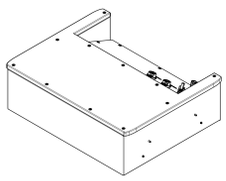
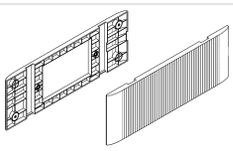
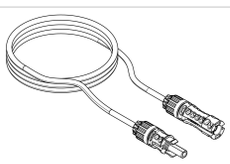
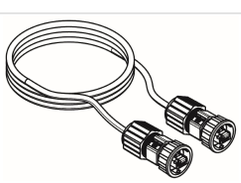
Image	Amount	Description
	1	Extension box
	2	Side panel
	1	Set of two DC cables (10 m)
	1	Communication cable (2 m)

Table 34. Scope of delivery — Extension box

5.1.5. BMS box/base

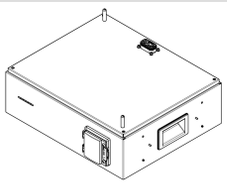
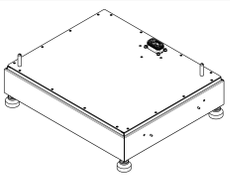
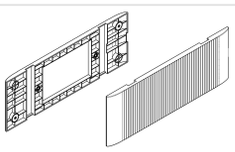
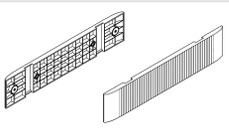
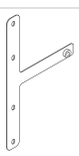
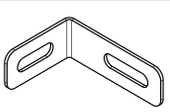
Image	Amount	Description
	1	BMS box
	1	Base
	2	Side panel (BMS box)
	2	Side panel (base)
	4	Wall mounting — Mounting bracket
	4	Wall mounting — Mounting bracket (wall part)
	4	Bolts, M4 x 10
	2	Bolts for wall mounting, M6 x 12

Table 35. Scope of delivery — BMS box/base

5.1.6. BMS box/split base (optional)

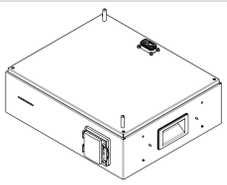
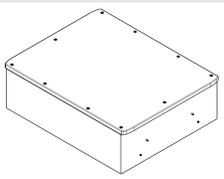
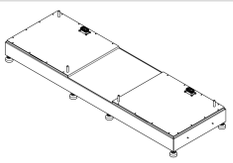
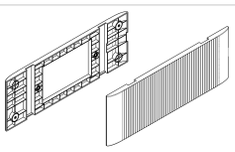
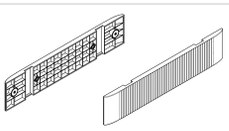
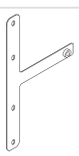
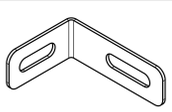
Image	Amount	Description
	1	BMS box
	1	Top box for split base
	1	Split base
	4	Side panel (BMS box)
	2	Side panel (split base)
	4	Wall mounting — Mounting bracket
	4	Wall mounting — Mounting bracket (wall part)
	4	Bolts, M4 x 10
	2	Bolts for wall mounting, M6 x 12

Table 36. Scope of delivery — BMS box/split base (optional)

5.1.7. FENECON Commercial 100 battery module

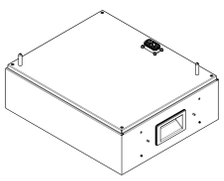
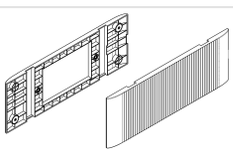
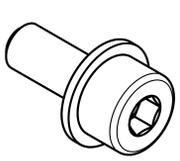
Image	Amount	Description
	1	Battery module
	2	Side panel
	2	Fixing plates
	2	Bolts, M4 x 10

Table 37. Scope of delivery — Battery module

5.1.8. STS box (optional)

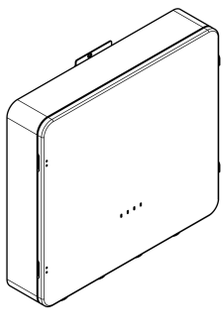
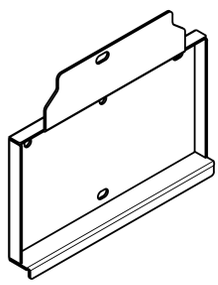
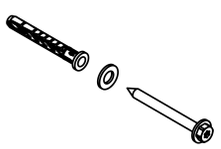
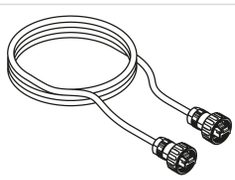
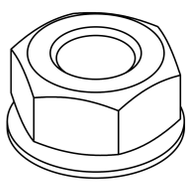
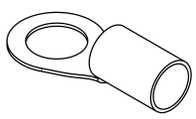
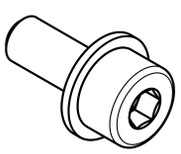
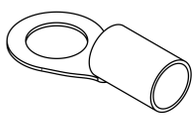
Image	Amount	Description
	1	STS box
	1	STS box wall bracket
	1	Set of anchors with screws and washers
	1	Communication cable inverter-STS box
	20	Nuts for AC connection
	20	Cable lugs for AC connection (M8 and M10)
	1	Bolt for earthing
	1	Cable lug for earthing

Table 38. Scope of delivery — STS box (optional)

5.2. Tools required

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

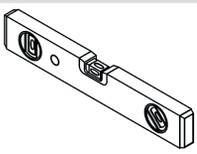
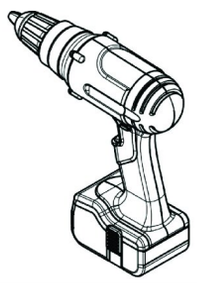
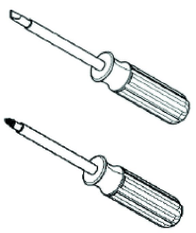
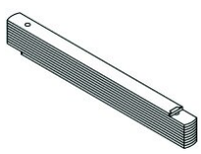
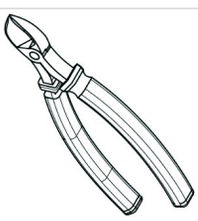
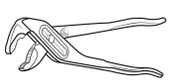
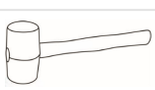
Image	Description	Image	Description
	Pencil		Spirit level
	Impact drill or cordless screwdriver		Screwdriver set
	Meter stick		Side cutter
	Allen key, 3 mm		Set of flat spanners
	Crimping tool		Multimeter
	Pliers for cable glands		Protective eyewear
	Safety footwear		Dust mask
	Rubber mallet		Vacuum cleaner
	Wire stripper		Protective gloves
	Torque wrench		Stripping knife

Table 39. Tools required

6. Assembly

- Do not damage any cables and make sure that nobody steps on the cables or plugs! Damage can lead to serious malfunctions!
- If cables are fed in from the front, the customer must use suitable covers to protect the cables against the risk of tripping.

- Ensure that all devices in the same network and the battery modules are integrated into the existing surge protection.

- When drilling holes, avoid the water pipes and cables laid in the wall.
- Wear protective eyewear and a dust mask when drilling to prevent dust from being inhaled or getting into your eyes when drilling holes.
- Make sure that the inverter is securely installed.
- The DC switch lock of a suitable size should be prepared by the customer. The diameter of the lock is 5 mm. The lock may not be installed if the size is not appropriate.
  Please refer to the supply documentation of the inverter.

Suitable protective covers must be fitted!
All local accident prevention regulations must be observed.

The following components must be installed:

- Inverter
- Battery tower with base, battery modules, BMS box, and FENECON Commercial 100 EMS box
- Optional:

  Battery tower with base, battery modules, BMS box and parallel switch box
- Optional:

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

Before installation, carefully check whether the packaging and products are damaged and whether all accessories listed in the Scope of delivery are included. If a part is missing or damaged, contact the manufacturer/dealer.

6.1. Inverter assembly

6.1.1. Safety instructions

Electric shock from live parts
Death or serious injury to the body and limbs from electric shock when touching live DC cables connected to the electrical energy storage system.

- Before starting work, disconnect the inverter, the BMS box and the battery modules from the power supply and secure them against being switched on again.
- Wait at least 5 minutes after switching off before starting work on the inverter.
- Observe the safety instructions of FENECON GmbH in the Safety section.
- Do not touch any exposed live parts or cables.
- Do not pull the terminal strip with connected DC conductors out of the slot under consumer load.
- Wear suitable personal protective equipment for all work.

Electric shock in the absence of overvoltage protection
Death or serious injury to the body and limbs from electric shock due to overvoltage (e. g. lightning strike) transmitted via the network cables or other data cables into the building and to other connected devices in the same network due to a lack of overvoltage protection.

- Ensure that all devices in the same network and the battery modules are integrated into the existing surge protection
- When laying network cables or other data cables outdoors, ensure that suitable overvoltage protection is in place when the cables from the inverter or battery tower (battery modules) pass from the outdoor area into a building.
- The Ethernet interface of the inverter is classified as "TNV-1" and offers contactor protection against overvoltages of up to 1.5 kV.

Fire and explosion
Death or serious injury to body and limbs due to fire or explosion; in the event of a fault, an ignitable gas mixture may be produced inside the inverter. Switching operations in this condition can cause a fire inside the product or tripped an explosion.

- In the event of a fault, do not carry out any direct actions on the electrical energy storage system.
- Ensure that unauthorized persons do not have access to the electrical energy storage system.
- Disconnect the battery modules from the inverter via the DC fuse on the battery tower.
- Switch off the AC miniature circuit breaker or, if it has already tripped, leave it switched off and secure it against being switched on again.
- Only carry out work on the inverter (e.g. troubleshooting, repair work) with personal protective equipment for handling hazardous substances (e.g. protective gloves, eye and face protection and respiratory protection).

Fire and explosion with deeply discharged battery modules
Death or serious injury to body and limbs from fire or explosion due to incorrect charging of deeply discharged battery modules

- Before commissioning the system, ensure that the battery modules are not deeply discharged.
- Do not operate the system if the battery modules are deeply discharged.
- If the battery modules are deeply discharged, contact Service.
- Only charge deeply discharged battery modules as instructed by the Service.

Toxic substances, gases and dusts
Damage to electronic components can result in toxic substances, gases and dusts inside the inverter. Touching toxic substances and inhaling toxic gases and dusts can cause skin irritation, chemical burns, breathing difficulties and nausea.

- Only carry out work on the inverter (e.g. troubleshooting, repair work) with personal protective equipment for handling hazardous substances (e.g. protective gloves, eye and face protection and respiratory protection).
- Ensure that unauthorized persons do not have access to the inverter.

Arcs due to short-circuit currents
Death or serious injury to the body and limbs due to burns caused by heat development and electric arcs due to short-circuit currents from the battery modules.

- Before carrying out any work on the battery modules, de-energize the battery modules.
- Comply with all safety instructions from the battery manufacturer.

Destruction of a measuring device due to overvoltage
Death or serious injury to the body and limbs due to electric shock when touching a live meter housing: An overvoltage can damage a meter and lead to a voltage being applied to the meter housing.

- Only use measuring devices with a DC input voltage range to least 1000 V or higher.

Hot surfaces
Injuries to the body and limbs due to burning on hot surfaces: The surface of the inverter can become very hot.

- Mount the inverter in such a way that it cannot be touched accidentally.
- Do not touch hot surfaces.
- Before starting work, wait 30 minutes until the surface has cooled down sufficiently.
- Observe the warning notices on the inverter.

Weight of the inverter
Injuries to the body and limbs due to crushing when falling during transportation or assembly of the inverter

- Transport and lift the inverter carefully.
- Observe the weight of the inverter and its center of gravity.
- Wear suitable personal protective equipment when working on the inverter.

Sand, dust and moisture
Ingress of sand, dust and moisture can damage the inverter and impair its function.

Electrostatic charge
Touching electronic components can damage or destroy the inverter via electrostatic discharge.

- Ground yourself before touching a component.

Cleaning agents
The use of cleaning agents can damage the inverter and parts of the inverter.

- Only clean the inverter and all its parts with a cloth moistened with clean water.

6.1.2. Installation conditions and clearances at the installation site

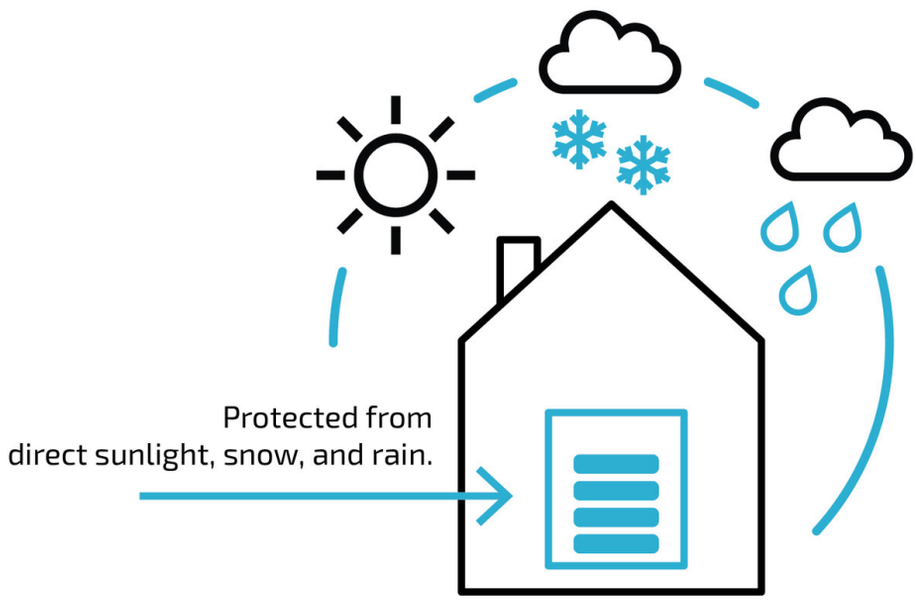


Figure 23. Installation conditions

- The inverter must be installed away from direct sunlight and protected from direct rain and snow.

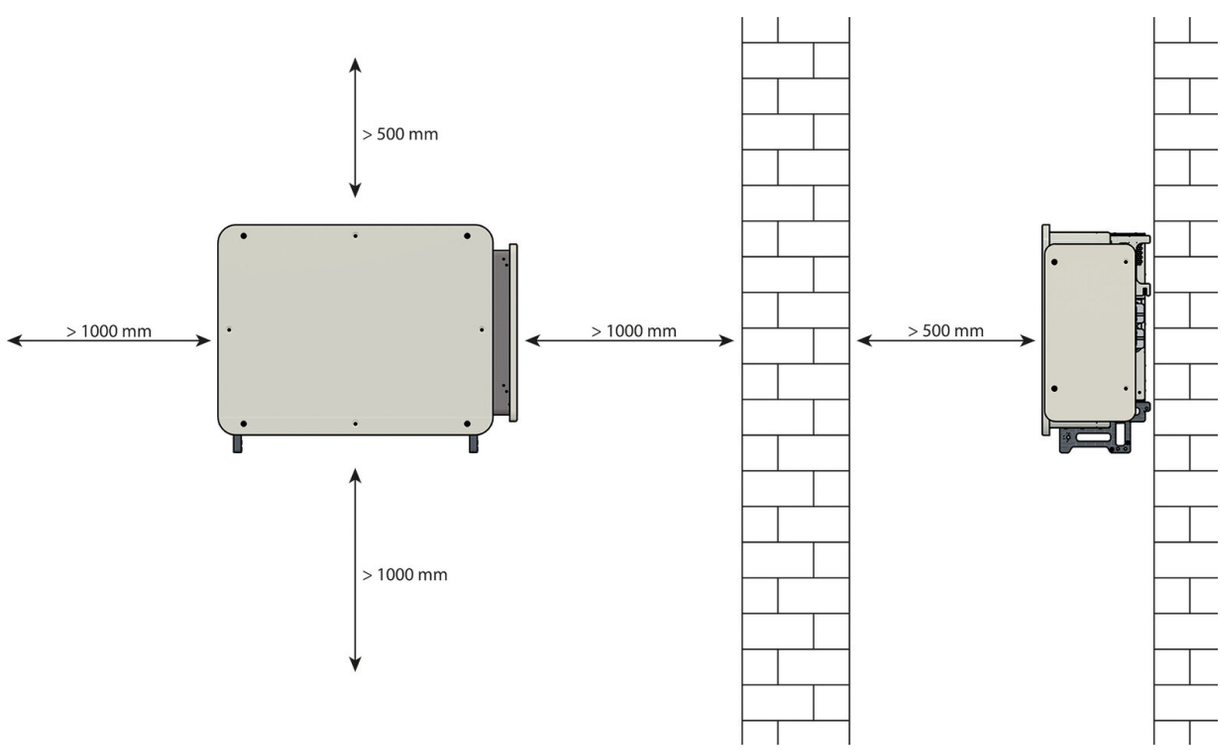


Figure 24. Recommended clearances at the installation site — Inverters

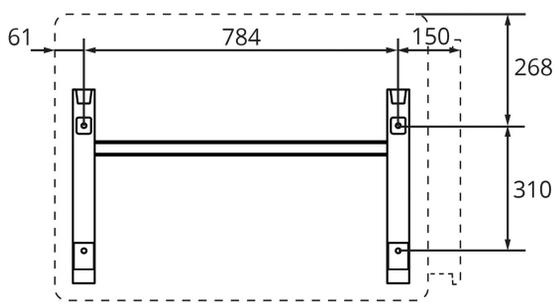
Installation conditions

- The wall must be stable enough for mounting the inverter and must not be flammable.
- Maintain a clearance of at least 500 mm above the inverter.
- Maintain a clearance of at least 1000 mm below the inverter (cable ducts not included).
- Maintain a clearance of at least 300 mm from the front of the inverter.
- Laterally: Maintain a clearance of at least 200 mm to the left of the inverter and at least 1000 mm to the right.
- The maximum clearance between the inverter and the installation location of the meter should be based on the cable supplied (10 m). The cable between the meter and inverter can be extended up to 100 m.

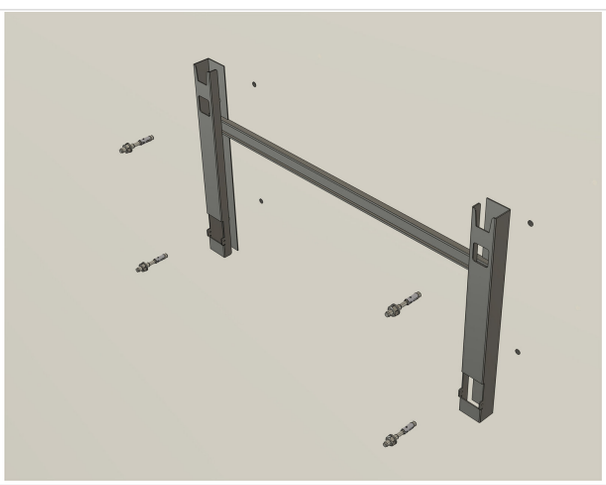
6.2. Assembly — FENECON Commercial 100 inverter

To install the FENECON Commercial 100 inverter on the wall, proceed as follows:

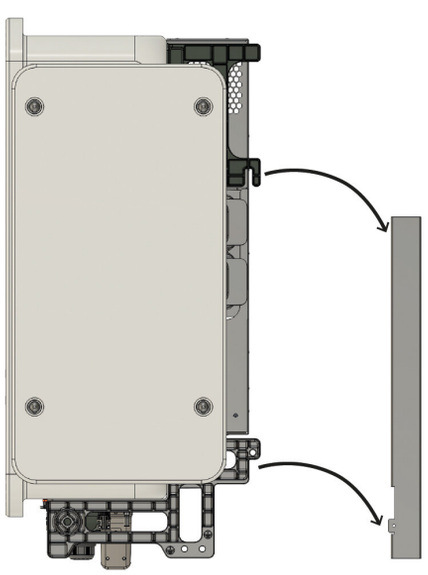
Assembly of the wall bracket



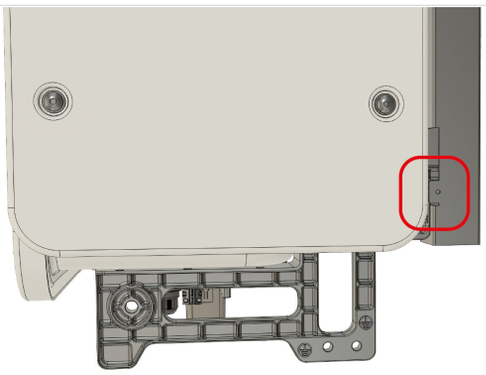
1. Mark and drill the holes for the wall bracket (Ø 10 mm, depth 80 mm).
2. Observe minimum clearances.



3. Mount the wall bracket on the wall. Always consider the condition of the wall to determine whether the screw anchors can be used.



4. Hook the inverter into the wall bracket at the top and bottom using the handles.



5. Secure the inverter on the left and right side using the bolts provided.

6.3. Assembly — Parallel switch box

6.3.1. Parallel switch box — Safety instructions

- Do not damage any cables and make sure that nobody steps on the cables or plugs! Damage can lead to serious malfunctions!
- If cables are fed in from the front, the customer must use suitable covers to protect the cables against the risk of tripping.

- Ensure that all devices in the same network and the battery modules are integrated into the existing surge protection.

- When drilling holes, avoid the water pipes and cables laid in the wall.
- Wear protective eyewear and a dust mask when drilling to prevent dust from being inhaled or getting into your eyes when drilling holes.
- Make sure that the inverter is securely installed.
- Do not disconnect electrical connectors under load!

- Suitable protective covers must be fitted!
- All local accident prevention regulations must be observed.

Please refer to the supplier documentation for the inverter.

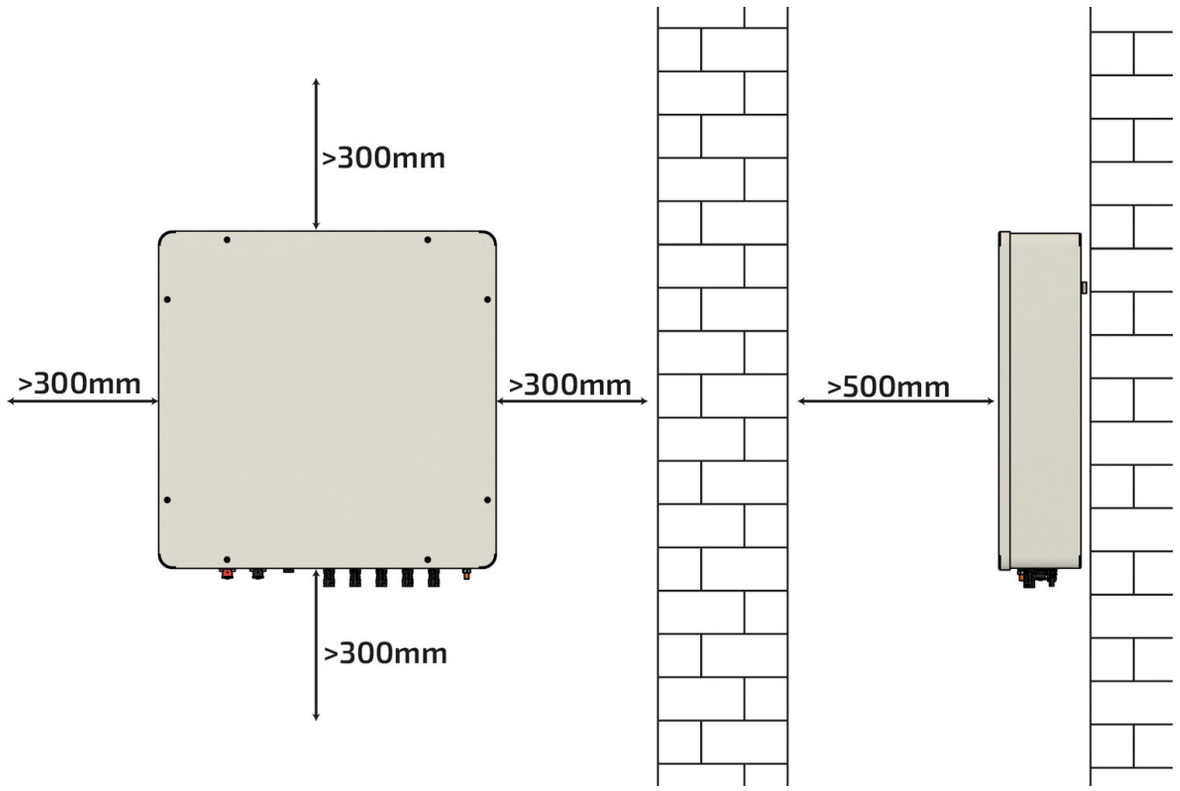
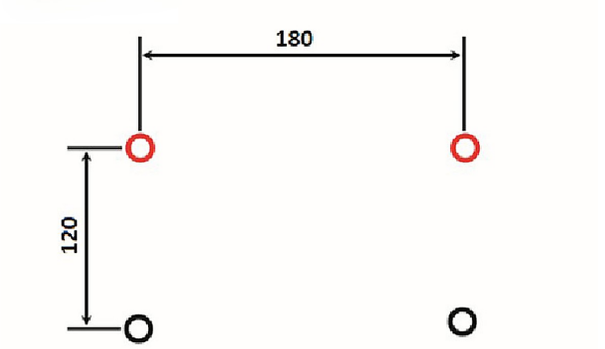


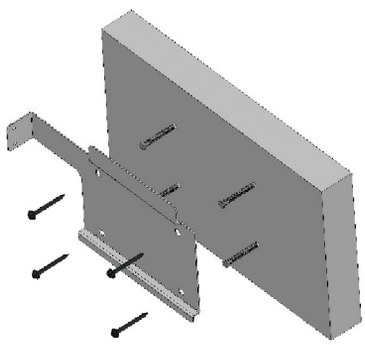
Figure 25. Installation conditions — Parallel switch box

- The parallel switch box must be installed away from direct sunlight, direct rain and snow.
- The installation room must have permanent ventilation.
- A clearance of at least 300 mm must be maintained to the side, above and below the parallel switch box (cable ducts are not measured here).
- Maintain a clearance of at least 500 mm from the front of the parallel switch box.

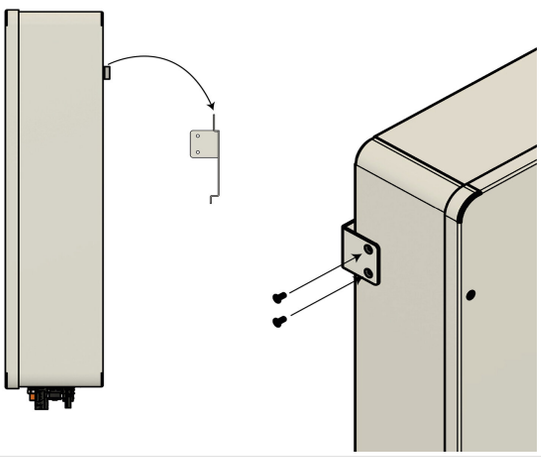
Proceed as follows to install the parallel switch box to the wall:



1. To attach the parallel switch box, drill 8 mm holes for the enclosed screw anchors according to the specified dimensions.



2. Attach the wall bracket to the wall. Anchors and screws are included for this purpose. The condition of the wall must always be taken into account to determine whether the screw anchors can be used.



3. Hang the parallel switch box on the wall bracket using the bracket on the back.
4. Then secure on the right-hand side using the bolts provided.

6.4. Assembly — STS box (optional)

6.4.1. STS box — Safety instructions

- Do not damage any cables and make sure that nobody steps on the cables or plugs! Damage can lead to serious malfunctions!
- If cables are fed in from the front, the customer must use suitable covers to protect the cables against the risk of tripping.

- Ensure that all devices in the same network and the battery modules are integrated into the existing surge protection.

- When drilling holes, avoid the water pipes and cables laid in the wall.
- Wear protective eyewear and a dust mask when drilling to prevent dust from being inhaled or getting into your eyes when drilling holes.
- Make sure that the inverter is securely installed.

- Suitable protective covers must be fitted!
- All local accident prevention regulations must be observed.

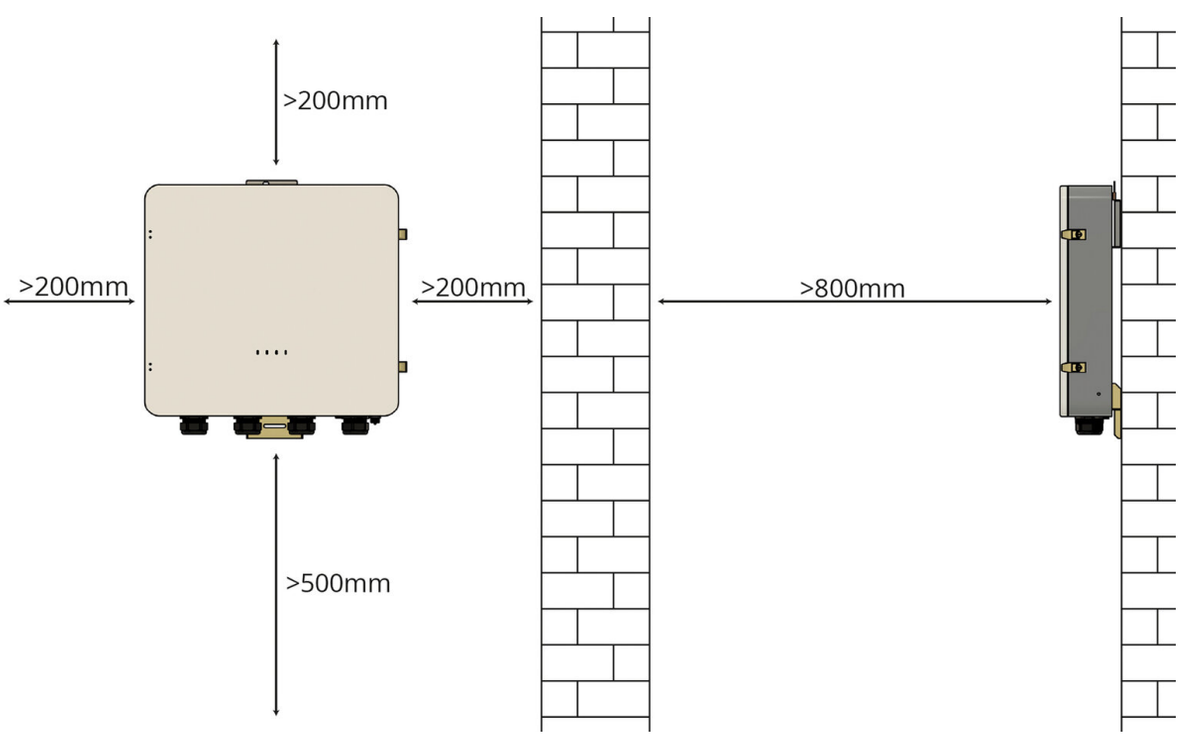
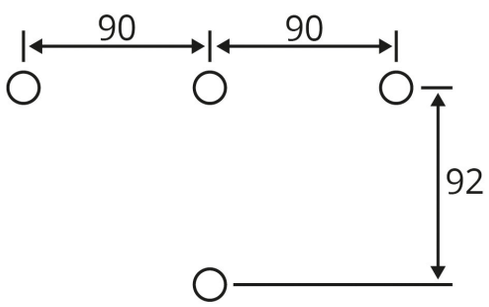


Figure 26. Installation conditions — STS box

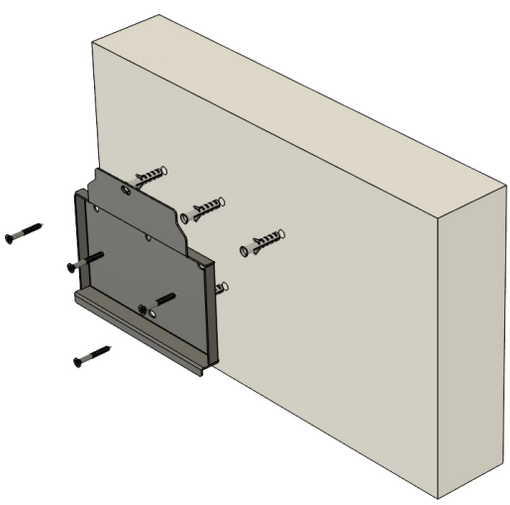
6.4. Assembly — STS box (optional)

- The STS box must be installed away from direct sunlight, direct rain and snow.
- The installation room must have permanent ventilation.
- **A clearance of at least 200 mm must be maintained to the side of the STS box (cable ducts are not measured here).**
- A clearance of at least 200 mm must be maintained **above** the STS box and a clearance of at least 500 mm must be maintained **below** the STS box.
- Maintain a clearance of at least 800 mm from the **front** of the STS box.

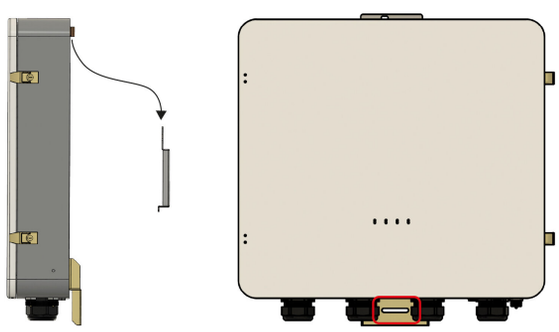
To install the STS box on the wall, proceed as follows:



1. To attach the STS box, drill 8 mm holes for the enclosed screw anchors according to the specified dimensions.



2. Attach the wall bracket to the wall. Anchors and screws are included for this purpose. Select the screw anchors used depending on the condition of the wall.



3. Hang the STS box on the wall bracket using the bracket at the back.
4. Then secure on the right-hand side using the bolts provided.

6.5. Assembly — Battery tower 1 with FEMS box

6.5.1. Safety instructions

Electric shock from live parts
Death or serious injury to the body and limbs due to electric shock when touching live DC cables connected to the electrical energy storage system

- Before starting work, de-energize the inverter, the BMS box and the battery modules and secure them against being switched on again.
- Wait at least 5 minutes after switching off before starting work on the inverter.
- Observe all the manufacturer's safety instructions in section 2: Safety.
- Do not touch any exposed live parts or cables.
- Do not pull the terminal strip with connected DC conductors out of the slot under consumer load.
- Wear suitable personal protective equipment for all work.

Electric shock in the absence of overvoltage protection
Death or serious injury to the body and limbs from electric shock due to overvoltage (e. g. lightning strike) transmitted via the network cables or other data cables into the building and to other connected devices in the same network due to lack of overvoltage protection.

- Ensure that all devices in the same network and the battery modules are integrated into the existing surge protection.
- When laying network cables or other data cables outdoors, ensure that suitable overvoltage protection is in place when the cables from the inverter or battery tower (battery modules) pass from the outdoor area into a building.
- The Ethernet interface of the inverter is classified as "TNV-1" and offers contactor protection against overvoltages of up to 1.5 kV.

Fire and explosion
Death or serious injury to the body and limbs due to fire or explosion; in the event of a fault, an ignitable gas mixture may be produced inside the battery module. Switching operations in this condition can cause a fire inside the product or tripped an explosion.

- In the event of a fault, do not carry out any direct actions on the electrical energy storage system.

- Ensure that unauthorized persons do not have access to the electrical energy storage system.
- Disconnect the battery modules from the inverter using an external disconnecting device.
- Switch off the AC miniature circuit breaker or, if it has already tripped, leave it switched off and secure it against being switched on again.
- Only carry out work on the inverter (e.g. troubleshooting, repair work) with personal protective equipment for handling hazardous substances (e.g. protective gloves, eye and face protection and respiratory protection).

Fire and explosion with deeply discharged battery modules
Death or serious injury to the body and limbs due to electric shock when touching a live meter housing: Overvoltage can damage a meter and lead to a voltage being applied to the meter housing.

- Before commissioning the system, ensure that the battery modules are not deeply discharged.
- Do not operate the system if the battery modules are deeply discharged.
- If the battery modules are deeply discharged, contact Service.
- Only charge deeply discharged battery modules as instructed by the Service.

Toxic substances, gases and dusts
Damage to electronic components can result in toxic substances, gases and dusts inside the inverter. Touching toxic substances and inhaling toxic gases and dusts can cause skin irritation, chemical burns, breathing difficulties and nausea.

- Only carry out work on the inverter (e.g. troubleshooting, repair work) with personal protective equipment for handling hazardous substances (e.g. protective gloves, eye and face protection and respiratory protection).
- Ensure that unauthorized persons do not have access to the inverter.

Arcs due to short-circuit currents
Death or serious injury to the body and limbs due to burns, heat development and electric arcs due to short-circuit currents from the battery modules.

- Before carrying out any work on the battery modules, de-energize the battery modules.
- Comply with all safety instructions from the battery manufacturer.

Destruction of a measuring device due to overvoltage
Death or serious injury to the body and limbs due to electric shock when touching a live housing of a measuring device. An overvoltage can damage a measuring device and lead to a voltage being applied to the housing of the measuring device.

- Only use measuring devices with a DC input voltage range of at least 1000 V or higher.

Hot surfaces
Injuries to the body and limbs due to burning on hot surfaces: The surface of the inverter can become very hot.

- Mount the inverter in such a way that it cannot be touched accidentally.
- Do not touch hot surfaces.
- Before starting work, wait 30 minutes until the surface has cooled down sufficiently.
- Observe the warning notices on the inverter.

Weight of the battery modules
Injuries to the body and limbs due to crushing if dropped during transportation or assembly of the battery modules.

- Carefully transport and lift the battery modules.
- Note the weight of the battery modules and its center of gravity.
- Wear suitable personal protective equipment when working on the battery modules.

Sand, dust and moisture
Ingress of sand, dust and moisture can damage the inverter and impair its function.

- Only install battery towers where the humidity is within the limit values and the environment is free of sand and dust.

Electrostatic charging
Touching electronic components can damage or destroy a battery tower via electrostatic discharge.

- Ground yourself before touching a component.

Cleaning agents

The use of cleaning agents can damage the inverter and parts of the inverter.

- Only clean battery towers and all parts of the inverter with a cloth moistened with clean water.

Installation site

- It is recommended to install the battery towers indoors.
- If installed outdoors, weather protection (sun and precipitation protection) must be provided.
- Avoid dirt and dust during assembly.
- Do not install battery towers in an area that is at risk of flooding.
- Do not install battery towers in very damp areas (e.g. bathrooms).
- Do not install battery towers where the ambient conditions are outside the permissible values (Section 3: Technical data).
- Keep battery towers away from heat sources and fire.
- Ensure direct contact between the battery module housing and the ambient air and do not cover or shield the battery module.

Installation

- Wear protective eyewear, insulating gloves and protective footwear when assembling the battery modules.
- Remove all conductive jewelry (e. g. watches, bracelets, rings).

6.5.2. Conditions at the installation site

Indoor or outdoor installation
We recommend installing the FENECON Commercial 100 — 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).

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.

6.5.3. Installation conditions and clearances at the installation site

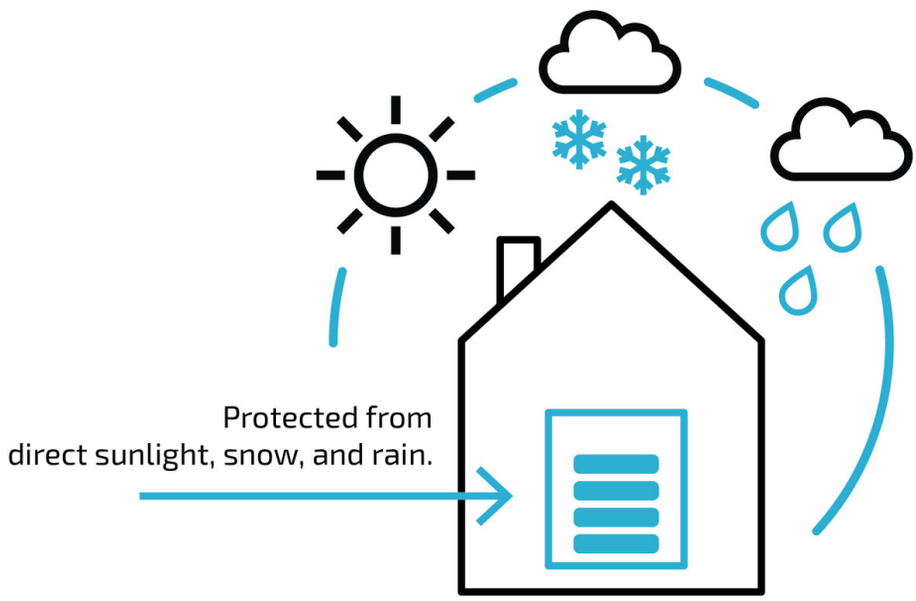


Figure 27. Installation conditions

- 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)

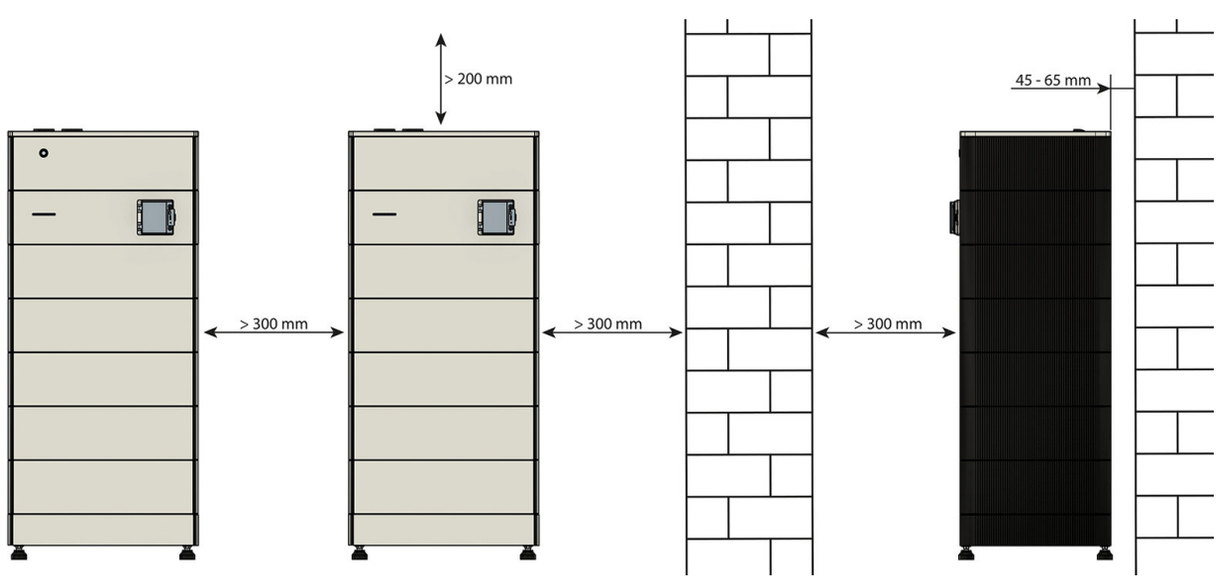


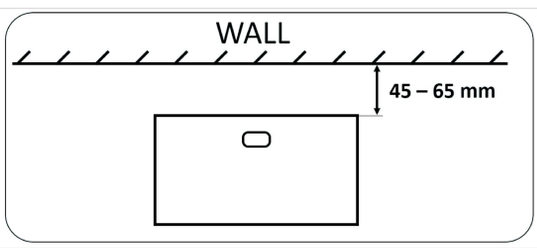
Figure 28. Clearances at the installation site

- 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.

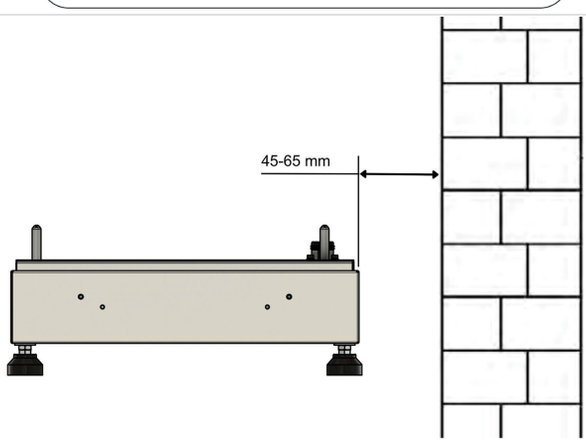
Falling below the recommended clearances can make installation more difficult and may result in earlier derating.

6.5.4. Assembly — Battery towers with FENECON Commercial 100 EMS box and FENECON Commercial 100 Extension box

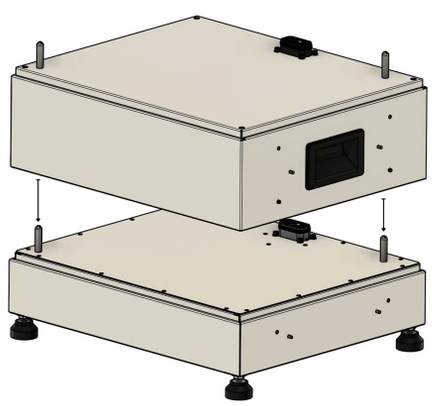
Proceed as follows to set up a battery tower:



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

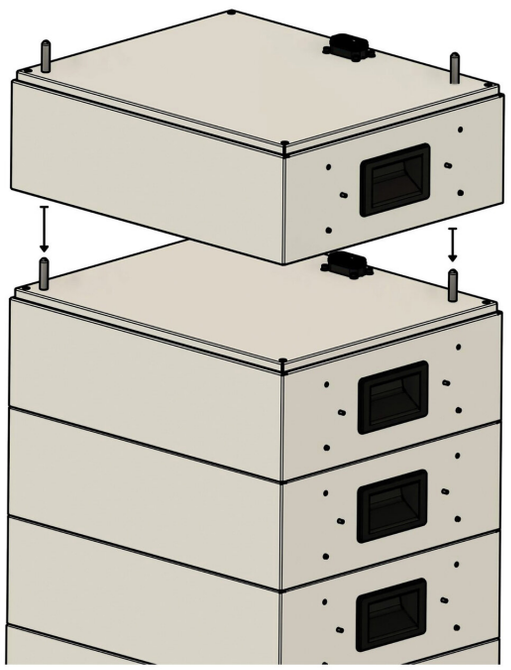


3. Place the base on the feet at the installation location (maintain a clearance of 40 to 65 mm from a wall).
4. Align horizontally.



5. Place a battery module on the base, paying attention to the plug-in bolts and positioning holes.
6. 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.

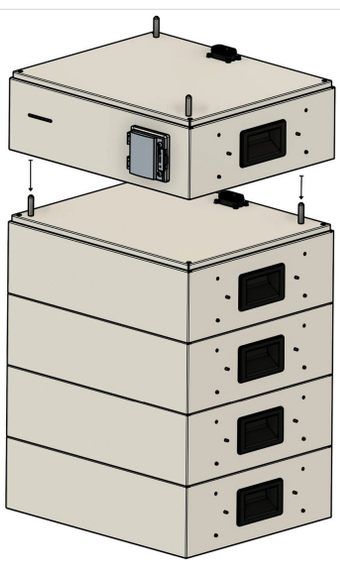


7. Install all remaining battery modules in the same way.

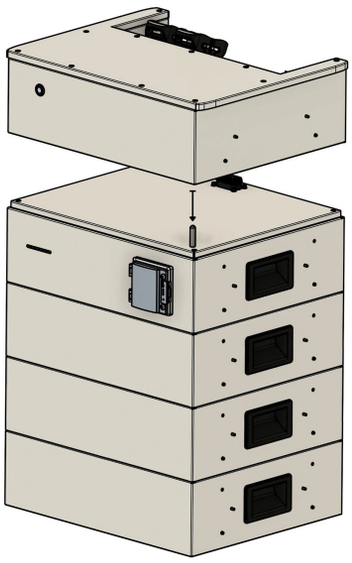
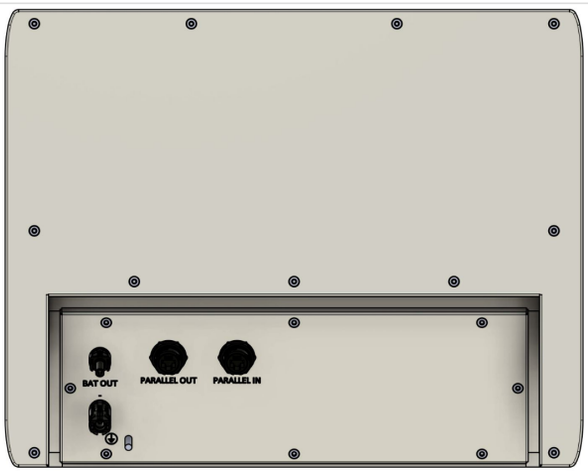
Electric shock

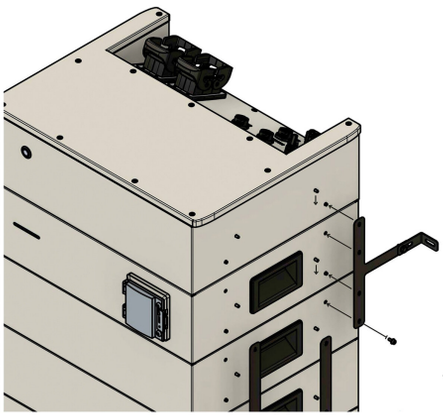
Death or serious injury to the body and limbs due to electric shock.

- Ensure that the circuit breaker of the BMS box is switched off before installing the BMS box.

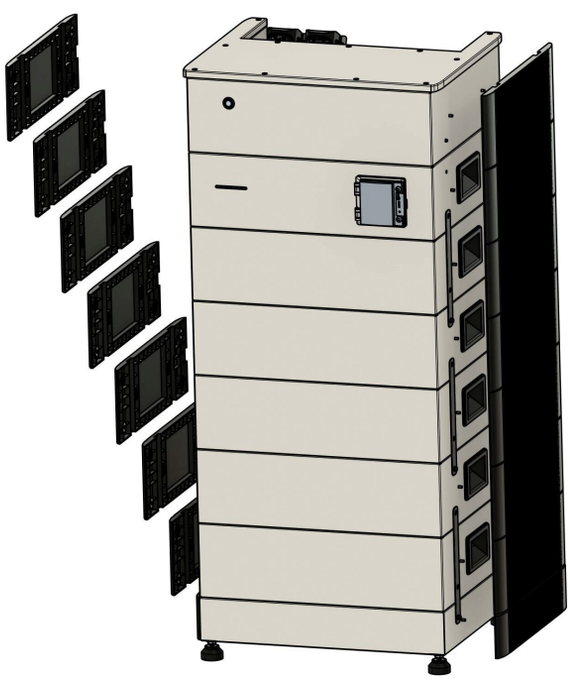


7. Place the BMS box on the last battery.

	8. Attach the FENECON Commercial 100 EMS box to the 1st battery tower.
	9. Attach the FENECON Commercial 100 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.

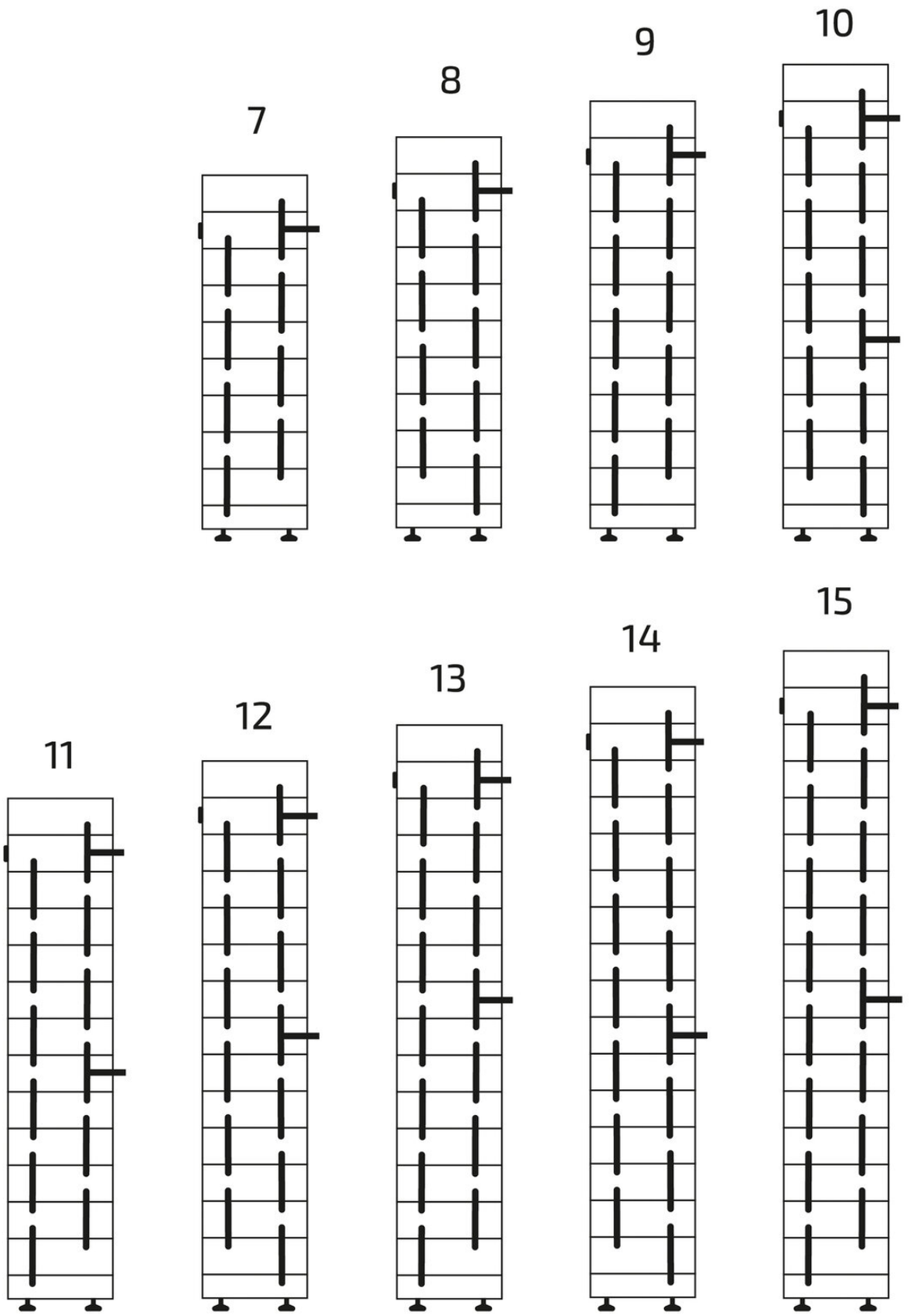


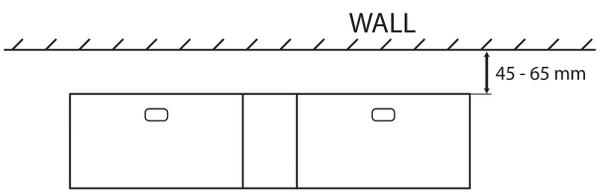
Figure 29. Arrangement of the module fastening

6.6. Installation — Battery tower on split base

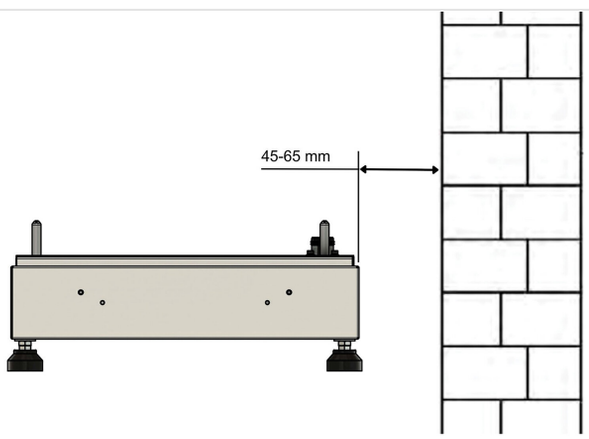
The split base can only be used with battery modules with item number FEH021.

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.

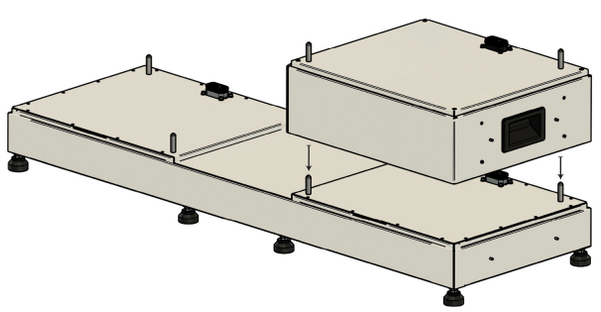
Proceed as follows to set up a battery tower with a split base:



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.

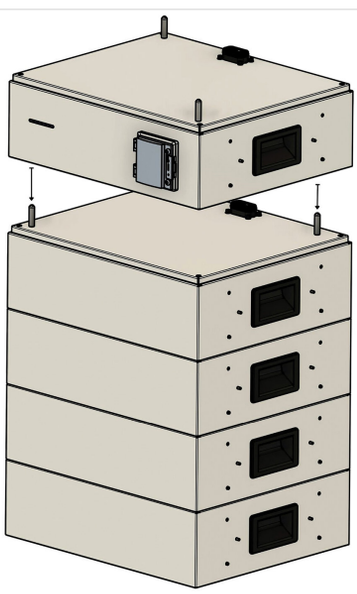
- A maximum of 15 battery modules can be mounted on one split base.
- Ensure that the modules are evenly distributed on both sides of the split base.
- The difference in tower height must not exceed 5 modules.
  If this cannot be complied with, a maximum of 10 battery modules must be stacked on one side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

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

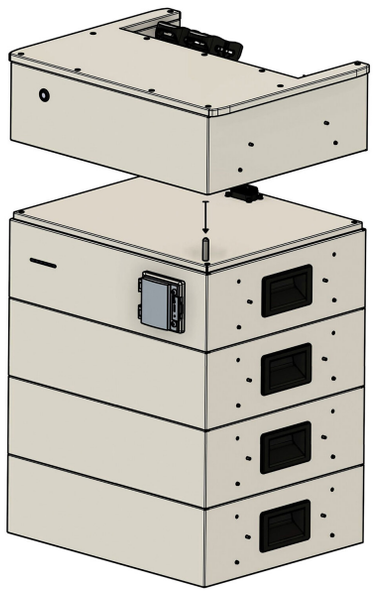
Electric shock

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

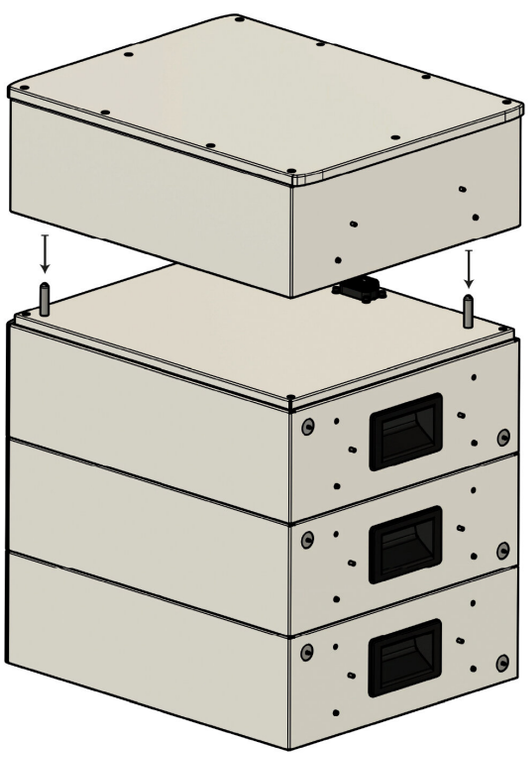
- Ensure that the circuit breaker of the BMS box is switched off before installing the BMS box.



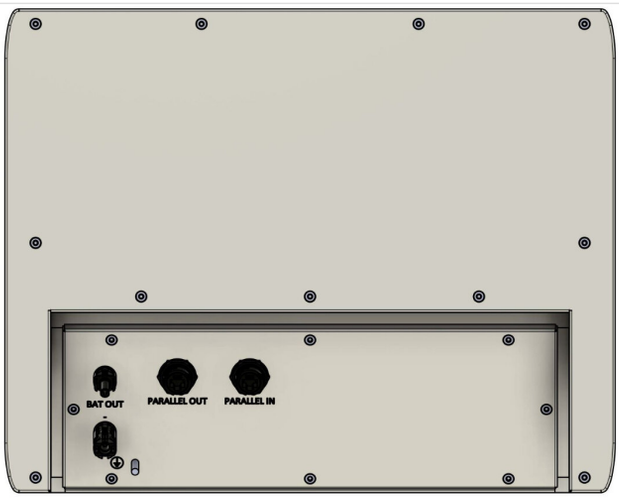
7. Place the FENECON BMS box on the last battery. It does not matter which of the two towers on the split base the FENECON BMS box is placed on.



8. Attach the FENECON EMS box to the BMS box.

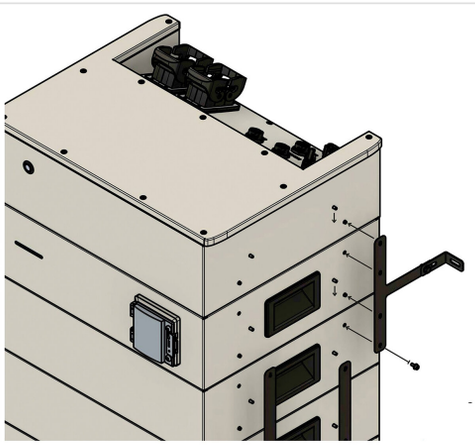


9. Place the Top box on the second tower.



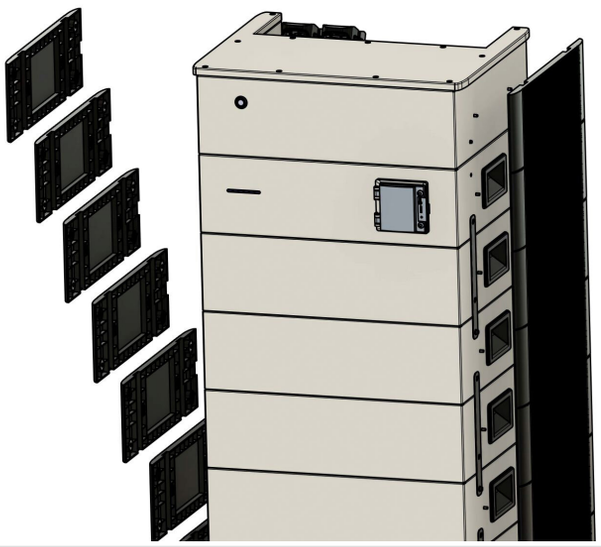
10. Place the FENECON extension box on the top of all other split sockets.

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.

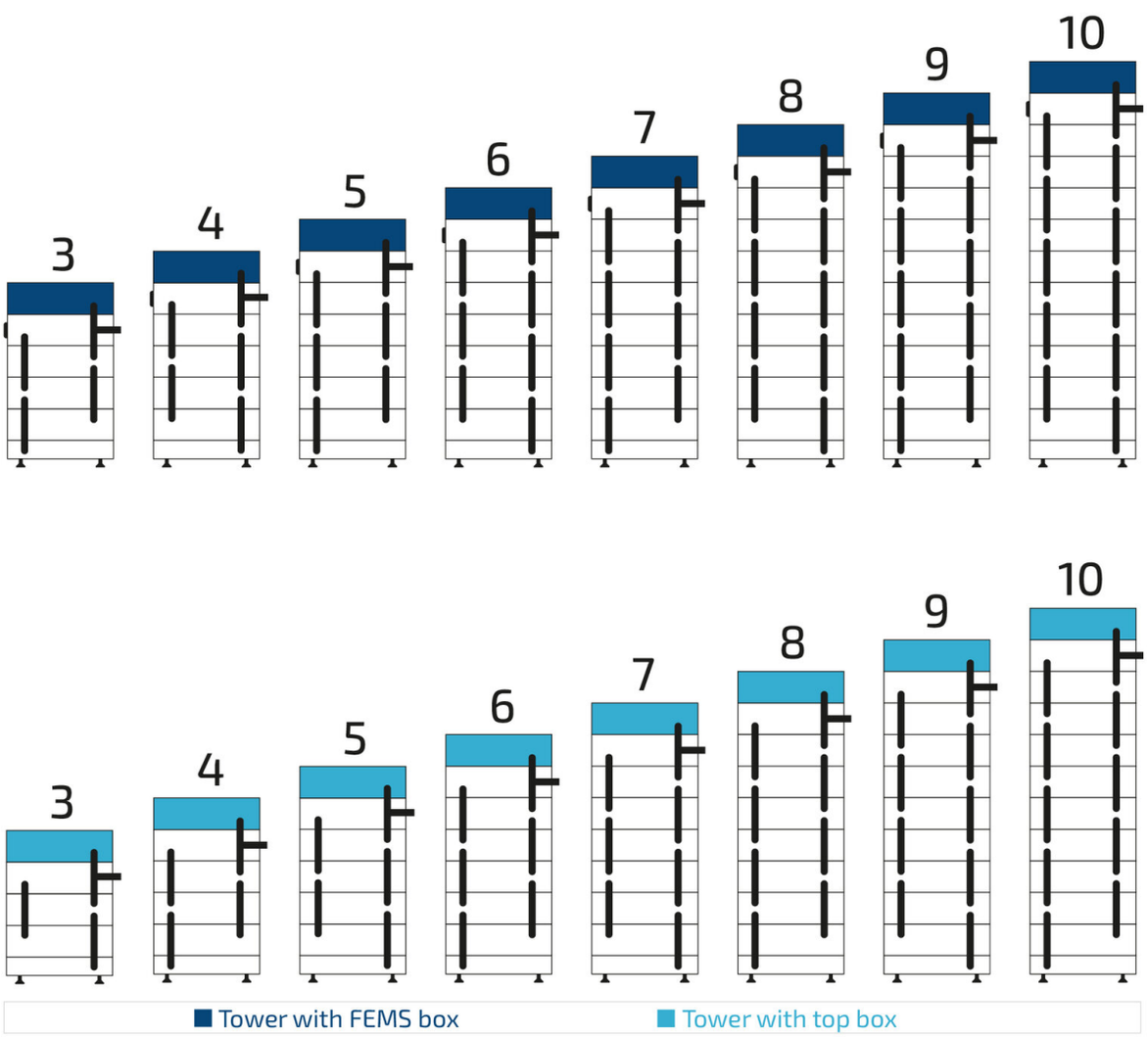


Figure 30. Module mounting arrangement — Split base

6.7. Explanation of the "zero feed-in" function

Connection and operation of electrical energy storage systems on the low-voltage grid in accordance with **VDE-FNN Note 07/2024** — Requirements for the energy flow direction sensor EnFluRi (section 4.3) and zero feed-in (section 4.4).

FENECON GmbH hereby declares that the inverters listed in the following table in combination with the respective energy meters specified fulfill the above requirements:

Inverter	Description	Internal Energy Meter	Home Energy Meter (FHM-120-C)*	3-phase sensor without current transformer at the grid connection point (FHM-C)**
Home 6	FINV-6-2-DAH	✅	✅ (optional)	❌
Home 10 (Gen. 1)	FHI-10-DAH	❌	✅	❌
Home 10 (Gen. 1)	FHI-10-DAH 16A	❌	✅	❌
Home 10	FINV-10-2-DAH	✅	✅ (optional)	❌
Home 15	FINV-15-2-DAH	✅	✅ (optional)	❌
Home 20	FHI-20-DAH	❌	✅	✅ (optional)
Home 30	FHI-29,9-DAH	❌	✅	✅ (optional)
Commercial 50 (Gen. 3)	FINV-50-1-DAH	❌	❌	✅
Commercial 100	FINV-100-1-DAH	❌	❌	✅

*Item no.: FHO055
**Item no.: FEH040

6.7.1. Configuration for zero feed-in via the FENECON Energy Management System

The inverters listed above can be configured via the FENECON Energy Management System so that the PV energy generated is used entirely by the user and is not fed-in to the public grid.
To do this, the **Maximum feed-in power** setting in the commissioning wizard must be set to **0 watts**.

6.7.2. Notes on the zero feed-in function:

- If FENECON inverters are used, deviations of < 1 % per phase may occur.
- The accuracy of the zero feed-in depends on the power factor of the connected consumer loads.
- A high proportion of reactive power, especially in the form of harmonics, can negatively affect the accuracy of the active power measurement.

- With zero feed-in, devices that regulate to PV surplus no longer work, as there is no longer a grid feed-in to which they can regulate.

6.7.3. Validity of the declaration:

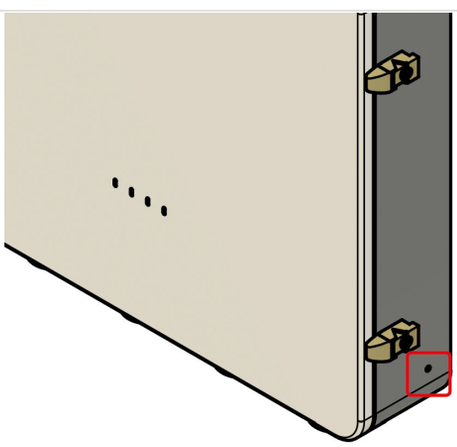
This declaration applies to all identical inverters. It loses its validity if:

- changes have been made to the device,
- the connection is made improperly,
- the installation was not carried out in accordance with the installation and service instructions, or
- the inverter is operated with an external generator.

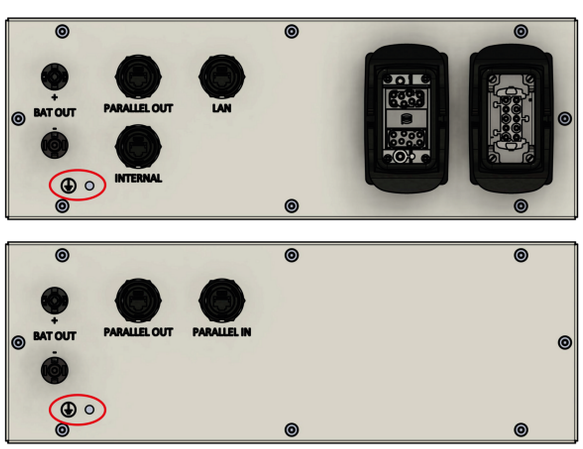
6.8. Electrical installation

6.8.1. Earthing the inverter and battery towers

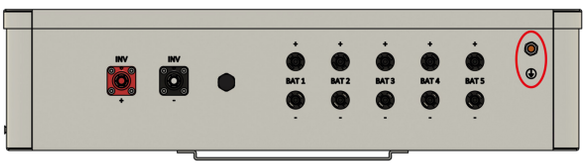
1. The inverter must be grounded directly to the earth circuit connector.
2. At least a 16 mm^2 grounding cable must be used.
3. To do this, attach the grounding cable to the inverter at the bottom right using the enclosed screw (red).



4. The STS box must be grounded directly to the earth circuit connector.
5. At least a 16 mm^2 grounding cable must be used.
6. To do this, attach the grounding cable to the STS box at the bottom right using the enclosed screw (red).



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



10. The parallel switch box must also be grounded directly to the earth circuit connector.
11. At least a 16 mm^2 grounding cable must be used.
12. 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 individually grounded to the equipotential bonding.

6.9. Approved network configurations for connecting the FENECON Commercial 100

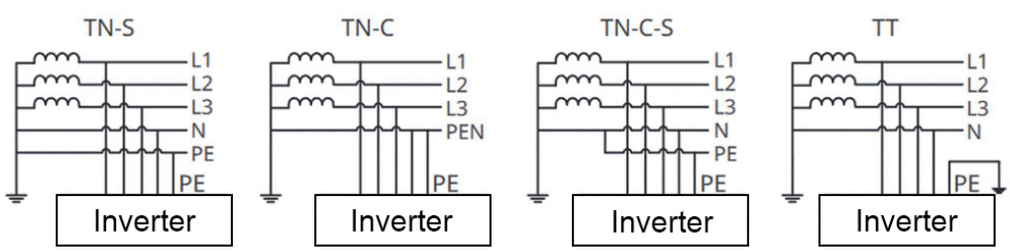


Figure 31. Approved network configurations for connecting the FENECON Commercial 100

6.9.1. Connection and wiring of the AC circuit (without back-up power)

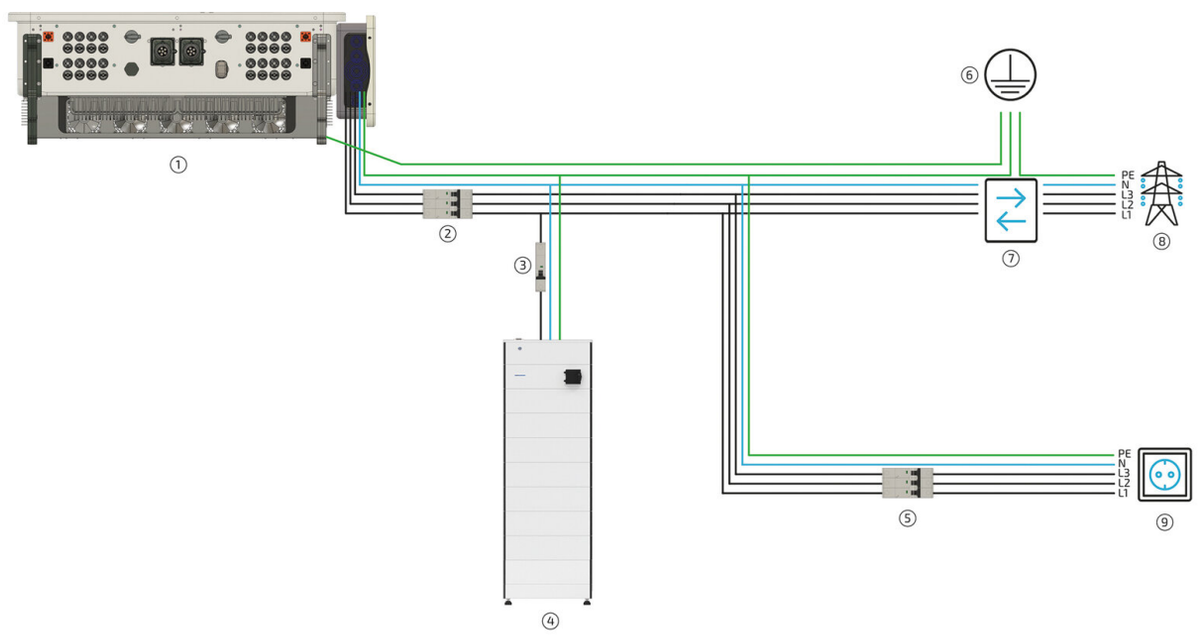


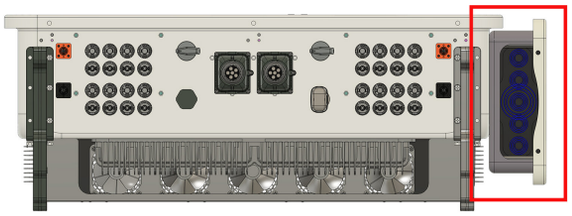
Figure 32. General AC connection (without back-up power)

List item	Description
1	FENECON Commercial 100 inverter
2	Inverter fuse protection, 3-pole[1]
3	Fuse protection maximum C6 or C10, 1-pole
4	FENECON Commercial 100 battery tower
5	Fuse protection of the consumer loads (no back-up power)
6	Equipotential bonding bar
7	Bi-directional meter (energy supply company)
8	Grid
9	Consumer loads (not supplied with back-up power)

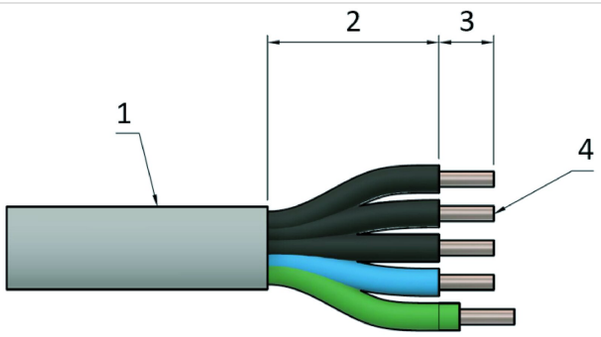
Table 40. Components for AC connection (not included in the scope of delivery)

[1] In addition, the currently valid national regulations and the specifications of the relevant grid operator must be observed. (If an RCD is required by the grid operator, an RCD type A with a tripping current of 300 mA is recommended; at 30 mA, unwanted shutdowns may occur).

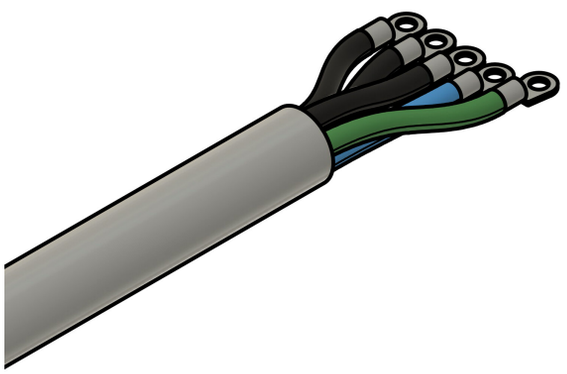
6.9. Approved network configurations for connecting the FENECON Commercial 100



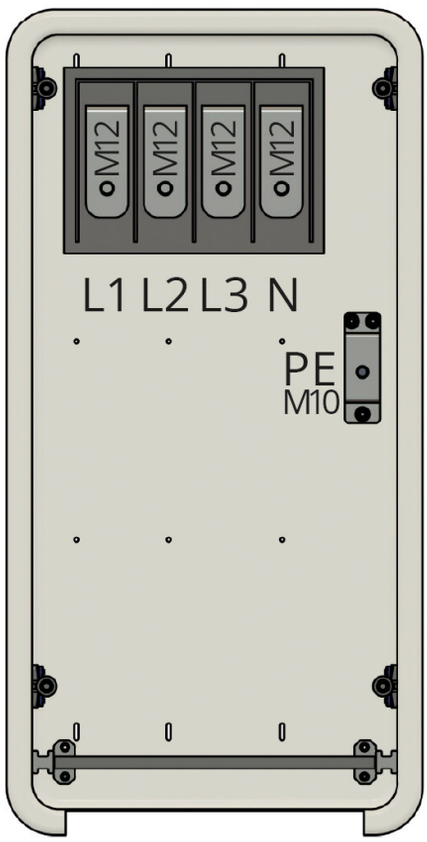
1. Insert the inverter supply cable into the connection compartment at the bottom right.



2. Strip the insulation and the cores.
3. Make sure that the PE is slightly longer than the other cores.



4. Press the enclosed cable lugs onto the cores. Alternatively, use other suitable cable lugs. The bolt diameter of 10/12 mm must be observed here.



5. Connect the cable. Use the enclosed M10/M12 nuts for this and tighten with 6-8 or 20-30 Nm.
6. Ensure that a clockwise rotating field is connected.
7. Ensure that phase L1 on the inverter and on the energy meter is the same phase; also ensure that this is the case for phases L2 and L3.

6.9.2. Connection and wiring of the AC circuit (with STS box/back-up power)

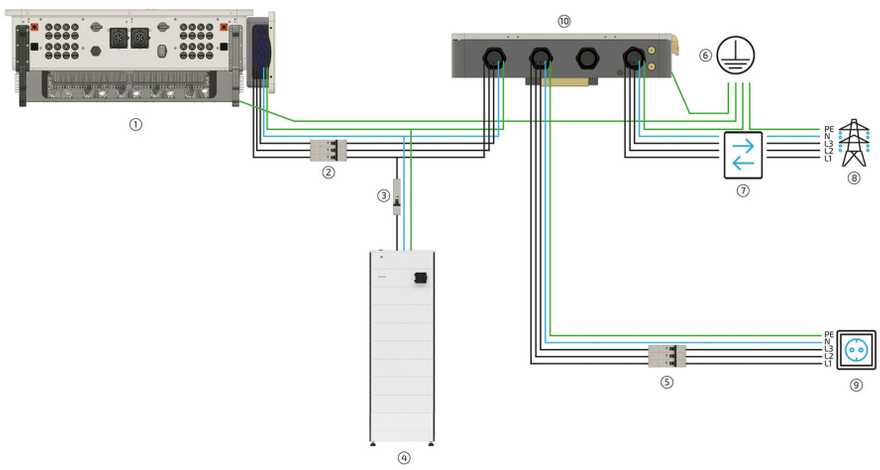


Figure 33. General AC connection (with STS box/back-up power)

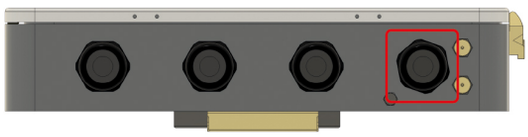
List item	Description
1	FENECON Commercial 100 inverter
2	Inverter fuse protection, 3-pole[1]
3	Fuse protection maximum C6 or C10, 1-pole
4	FENECON Commercial 100 battery tower
5	Fuse protection of the consumer loads (supplied with back-up power) with RCD type A and suitable MCBs
6	Earth circuit connector
7	Bi-directional meter (energy supply company)
8	Grid
9	Consumer load (supplied with back-up power)
10	STS box

Table 41. Components for AC connection (with STS box/back-up power)

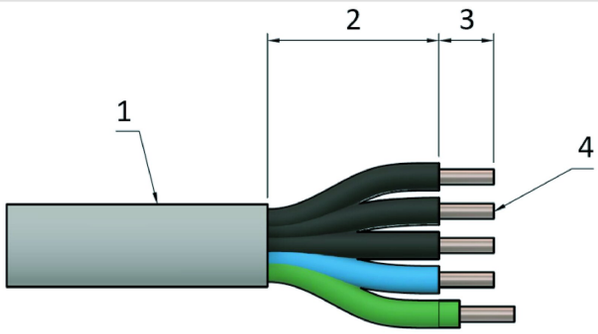
[1] In addition, the currently valid national regulations and the specifications of the relevant grid operator must be observed. (If an RCD is required by the grid operator, an RCD type A with a tripping current of 300 mA is recommended; at 30 mA, unwanted shutdowns may occur).

6.9.3. Connection and wiring of the AC circuit (with STS box)

As in the previous schematic diagram, the STS box must be connected to the grid.

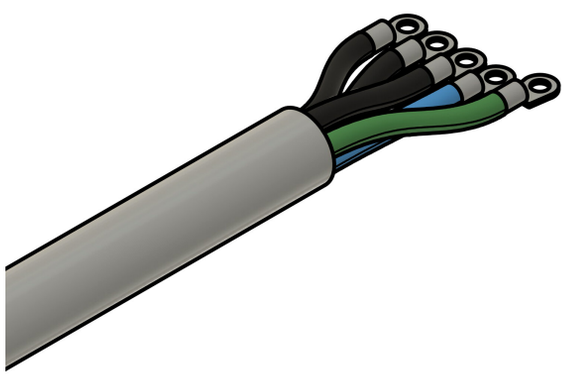


1. Insert the supply cable into the cable feed-throughs.

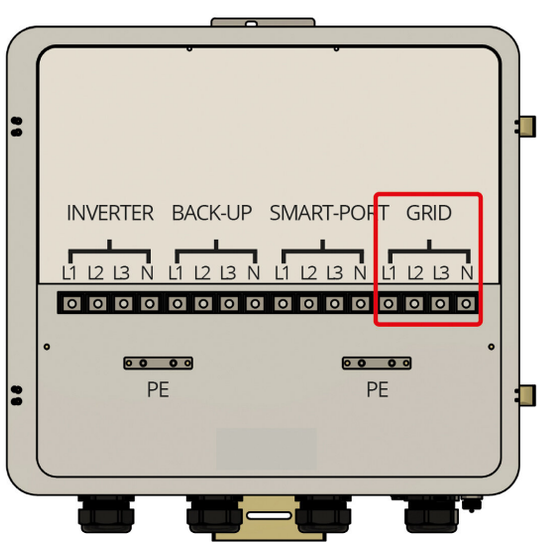


2. Strip the insulation and the cores.
3. Make sure that the PE is slightly longer than the other cores.

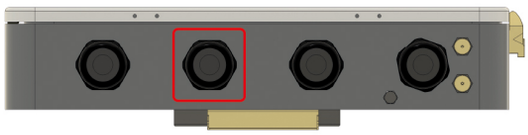
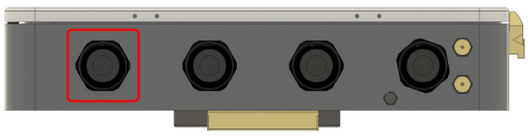
Section	Description	Dimensions
1	Outer diameter	< 44 mm
2	Length — stripped cable	approx. 350 mm
3	Length — stripped conductor	depending on cable lugs used



4. Press the enclosed cable lugs onto the cores. Alternatively, use other suitable cable lugs. The bolt diameter of 8/10 mm must be observed here.



5. Connect the cable to the GRID. Use the enclosed M8/M10 nuts for this and tighten to 6-8 Nm.
6. Ensure that a clockwise rotating field is connected.
7. Ensure that phase L1 on the inverter and on the energy meter is the same phase. Also ensure this for phases L2 and L3.
8. Fasten the cable feed-throughs to the inverter. Tighten the bolt connection.

	9. Repeat steps 1-8 to connect the consumer loads (BACKUP LOAD).
	10. Repeat steps 1-8 to connect the inverter (INVERTER). Make sure that M8 cable lugs are used here. (Torque: 8-10 Nm) 11. Make the connection to the inverter as described in the previous section.

- Use M10 cable lugs for the grid (GRID) connection and the consumer loads supplied with back-up power (BACKUP LOAD).
- Use M8 cable lugs for the inverter connection (INVERTER).

6.10. Installation — Energy meter

6.10.1. Connection overview

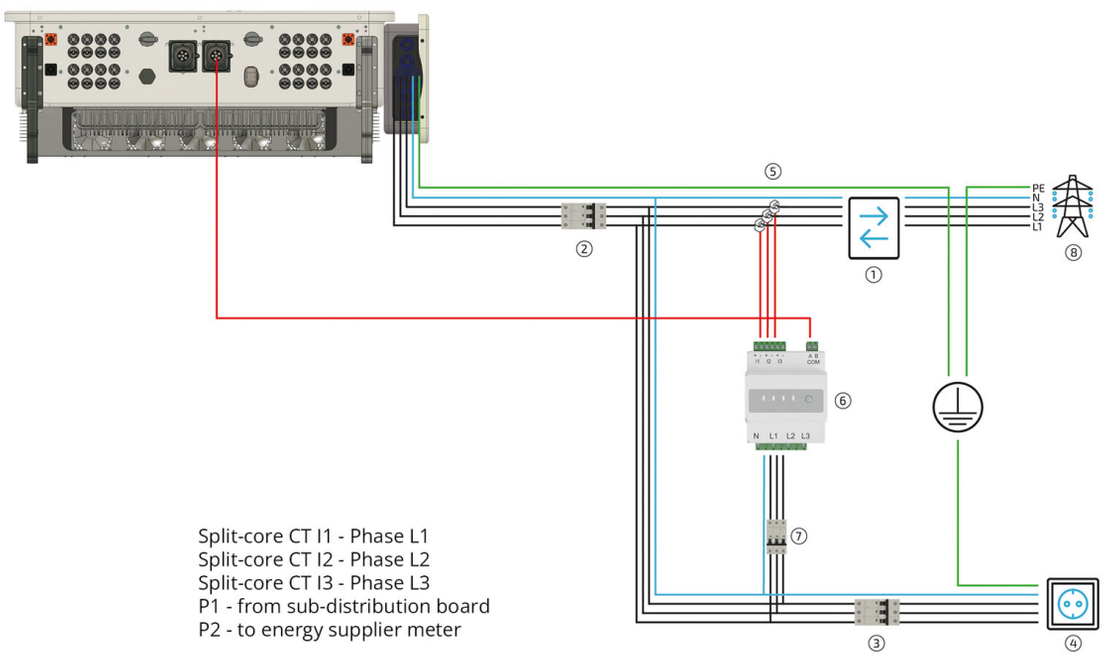


Figure 34. AC connection — 3-phase sensor without current transformer at grid connection point

List item	Description
1	Bi-directional meter (energy supplier)
2	Inverter fuse protection, 3-pole[1]
3	Fuse protection of the consumer loads (no back-up power) with RCD type A and suitable MCBs
4	Consumer loads (not supplied with back-up power)
5	Transformer — primary current: 200-5000 A; secondary current: 5 A (not included) (directly behind grid operator meter)
6	Extension with 3-phase sensor without current transformer at grid connection point
7	Fuse protection of the energy meter (recommended) B6, 3-pole
8	Grid

Table 42. Components for AC connection

[1]In addition, the currently valid national regulations and the specifications of the associated grid operator must be complied with.

6.10.2. Selection of suitable current transformers

The 3-phase sensor can be used with all manufacturers of current transformers. Only the required

parameters must be observed:

- Primary current (I_{pr}): 200 A — 5000 A
- Secondary current (I_{sr}): 5 A
- Accuracy class: 0.5 (or better)

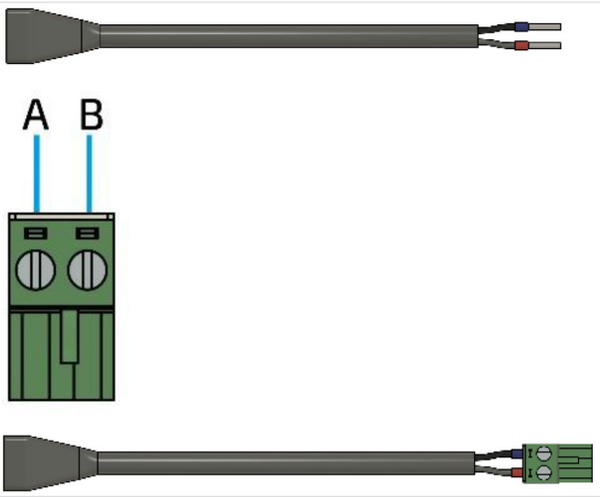
The dimensions of the transformers and the hole diameter for cables or copper busbars can be freely selected.

For example, we recommend the **Socomec 192T2020** current transformer. This is a transformer with a primary current of 200 A and a hole diameter of 21 mm.

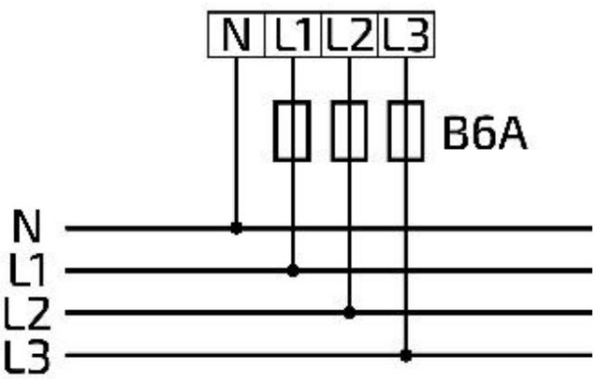
Selecting the correct primary rated current is very important for measurement accuracy. A rated current that is equal to or slightly greater than the fuse protection at the grid connection point is recommended.

To avoid measurement inaccuracies, the hole diameter of the measuring transformer should be selected to match the cable cross-section or the copper busbar.

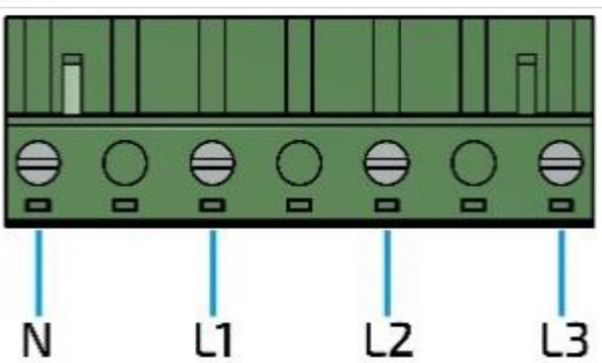
6.10.3. Electrical installation



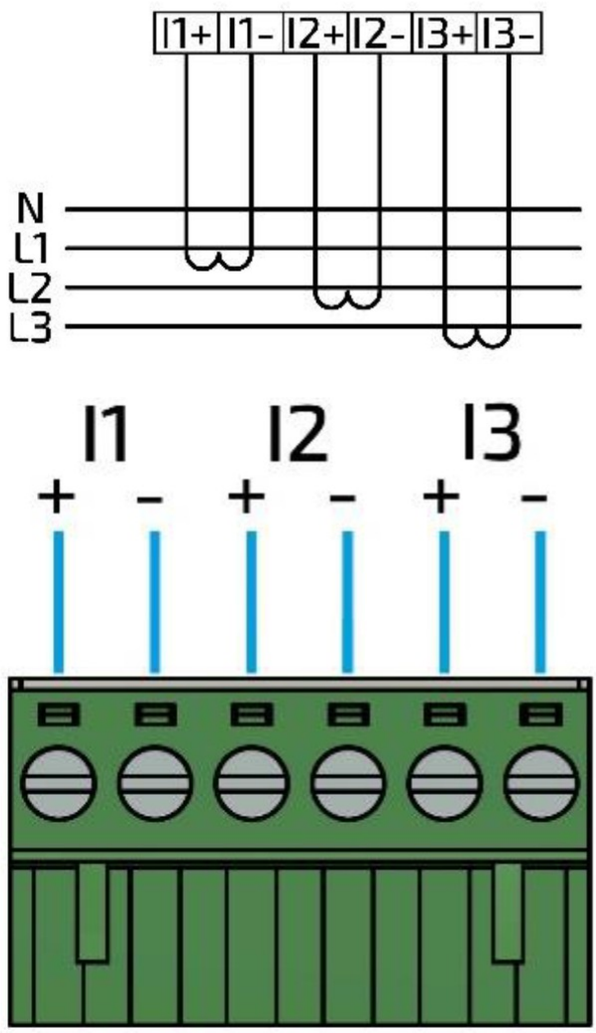
1. Connect the supplied communication cable with RJ45 socket to the communication plug as shown in the picture.
2. Connect the red core to A and the blue core to B.



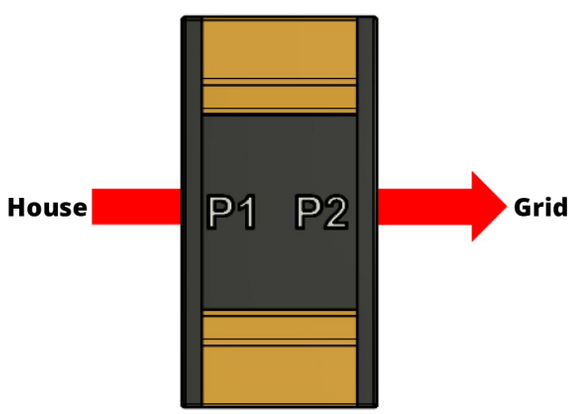
3. The three phases of the voltage tap must be pre-fused with a fuse (6 A), e.g. with a B6A automatic circuit breaker.



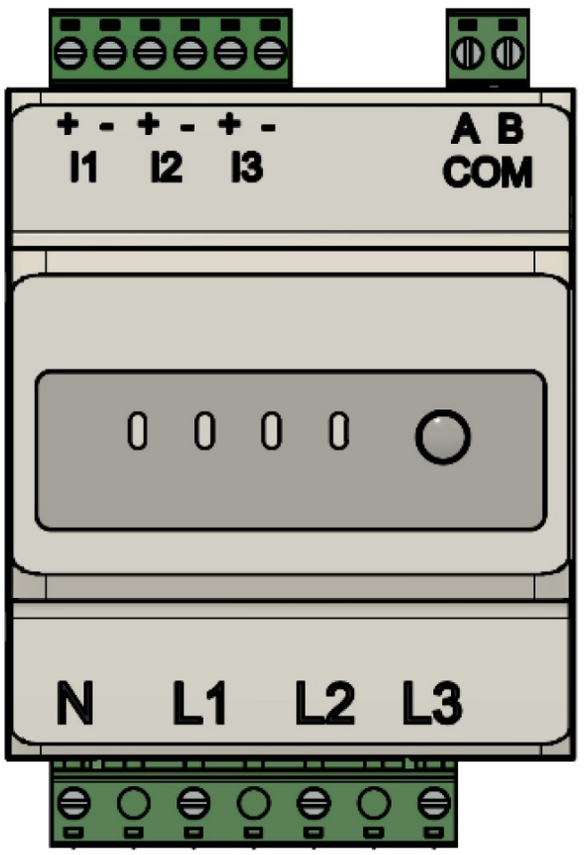
4. Connect the three phases and the neutral conductor to the terminal for the voltage tap as shown in the picture.
5. Suitable wire ferrules must be used for finely stranded cores.



6. Connect the current transformers with a CT ratio of 200 — 5000 A / 5A as shown in the picture.
7. Connection point S1 on the transformer is for plus (+) and S2 for minus (-).



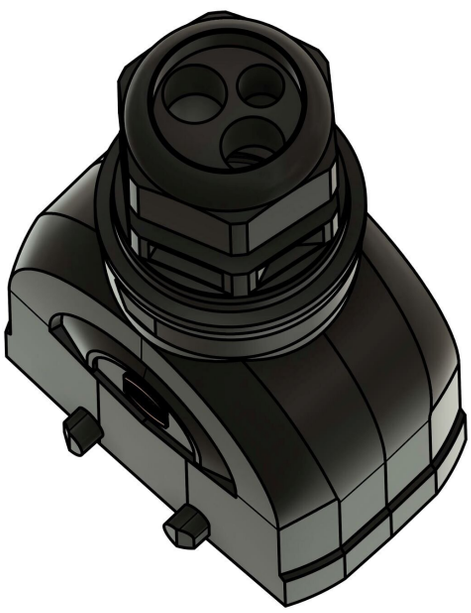
8. The P1 side of the current transformer must face the house.
9. The P2 side must face the grid.



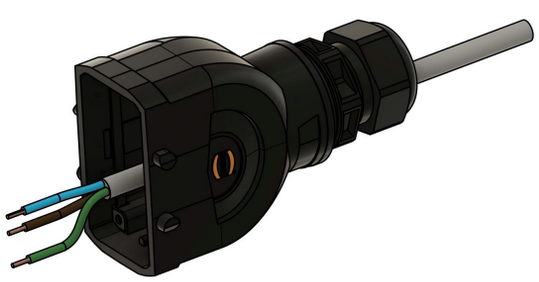
10. After connecting all cores in the terminals, they can be connected to the meter.
11. Ensure that all plugs are fully inserted.

6.10.4. AC connection of the FENECON Commercial 100 EMS box

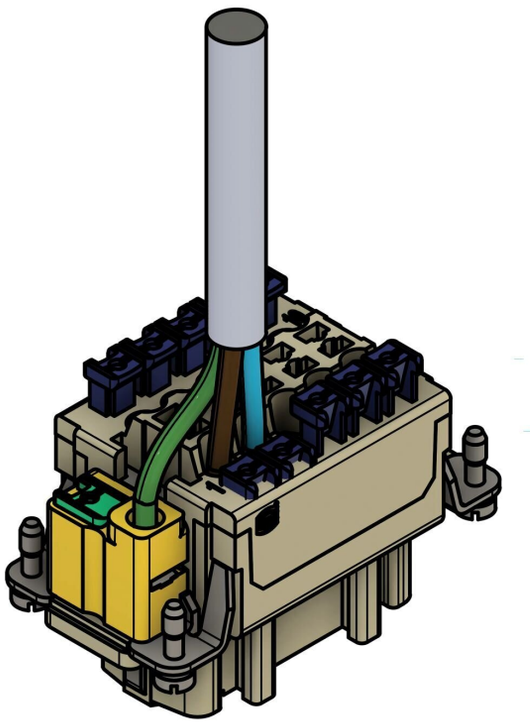
- An external 230 V power supply is required to supply the FENECON Commercial 100 EMS box.
- The purpose of this is to avoid loading the empty battery with additional consumer loads. This can occur particularly in winter when there is no sunshine or when there is snow on the PV system.



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.

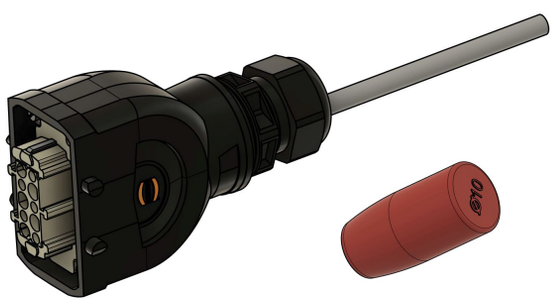


4. Harting socket insert, 10-pin, with cable.

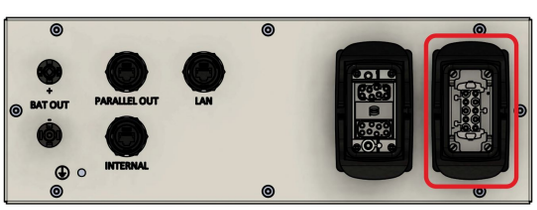
   Connect L to 1.

   Connect N to 2.

   Connect PE to PE.

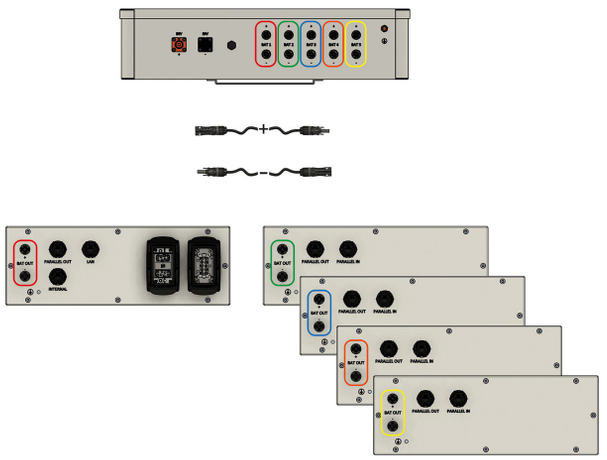


5. The other pins are for the integrated relay contacts.
   If these are not used, the socket can be bolted into the housing.
6. Close the remaining feedthroughs of the multi-hole seal with the enclosed filler plugs (10 mm) and tighten the bolt connection.

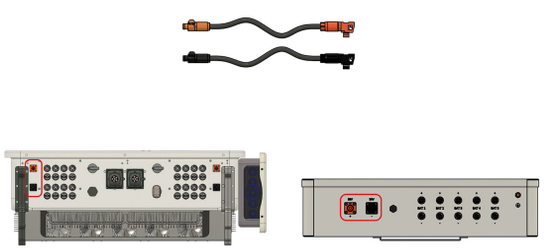


7. Connect the plug to the FEMS box.
8. Lock the plug at the top and bottom through the holders.

6.10.5. DC cable from the battery tower to the inverter



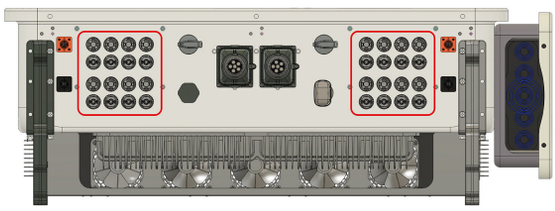
1. Use the enclosed 10 m DC cable between the battery towers and the parallel switch box.
2. Connect the cables to the battery (BAT OUT) and to the parallel switch box (BAT 1-5).
3. Connect plus (+) to plus (+) and minus (-) to minus (-).

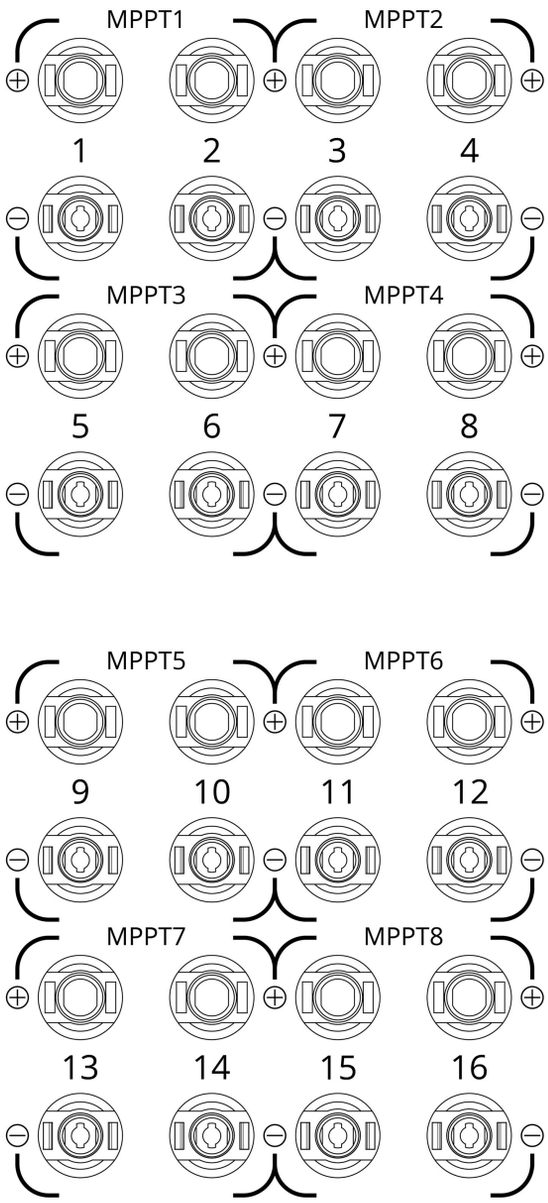


4. Use the enclosed 3 m DC cable for the compound between the parallel switch box and the inverter.
5. Connect the cables to the parallel switch box (INV) and insert them into the inverter using the appropriate bolt connections.
6. Refer to the inverter manual for this.

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

6.10.6. Connection and cabling of the PV system to the inverter



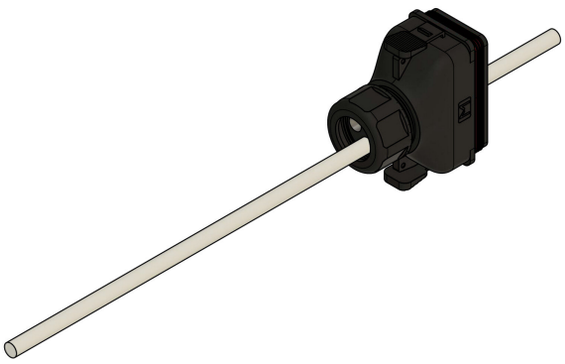


The various PV strings can be connected directly to the PV inputs on the inverter.

Table 43. Connection and cabling of the PV system to the inverter

Type 2 overvoltage protection is integrated in the inverter.

6.10.7. Communication between inverter and EMS box

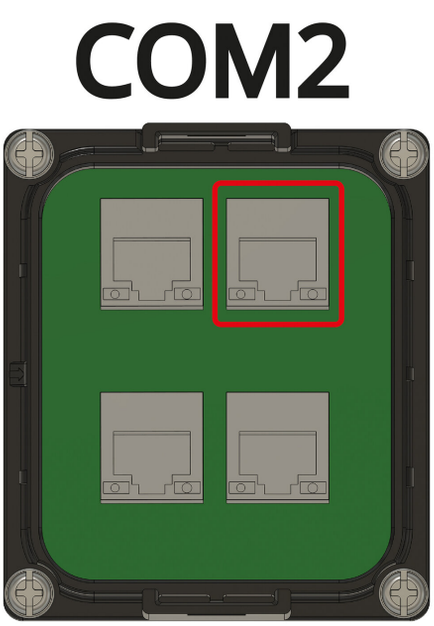


A cable with at least 5 cores with a cross-section of 0.34 mm^2 to 0.75 mm^2 is recommended.

1. Feed the cable through one of the holes in the multi-hole seal or multi-hole seal.

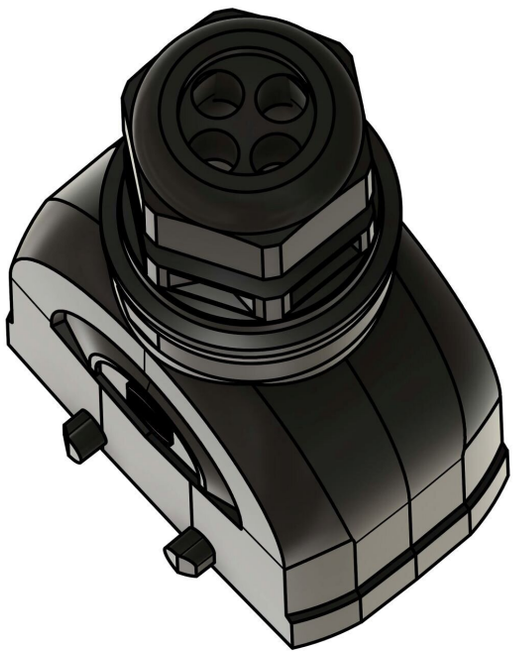
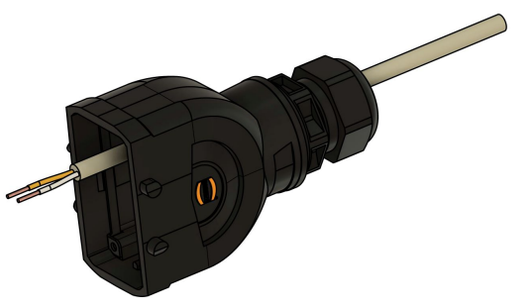
Attention: One feedthrough is already blocked by the communication cable between the inverter and EMS.

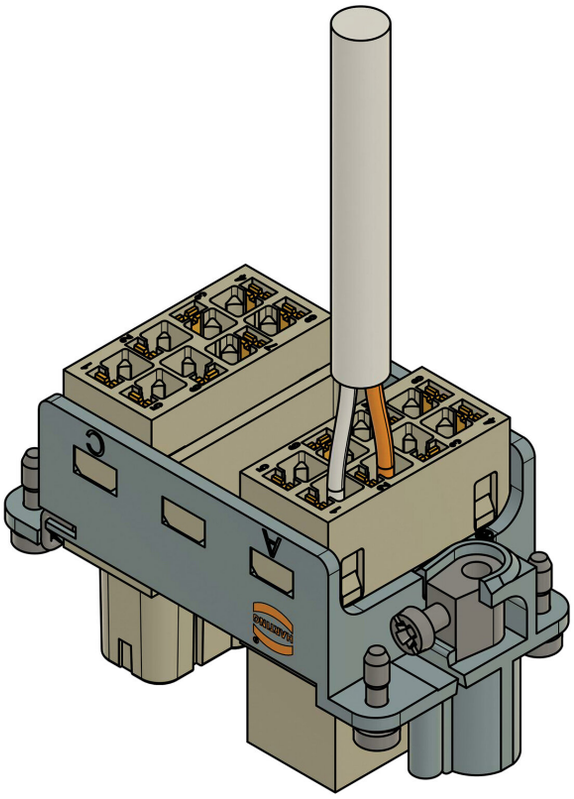
2. Leave the other openings of the multi-hole seal closed.



3. Connect the enclosed communication cable (network cable — 10 m — with open end) to the inverter.

4. Attaching the cover to the inverter and tightening the bolt connection.

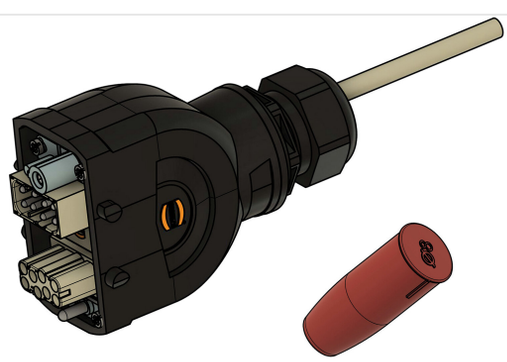
	5. Feeding the cable through one of the four holes of the multi-hole seal.
	6. Insert the cable through the bolt connection and the multi-hole seal into the Harting housing.



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

If controllable consumer loads have been installed and one of the following FEMS extensions has been purchased, the following two steps can be neglected for the time being.

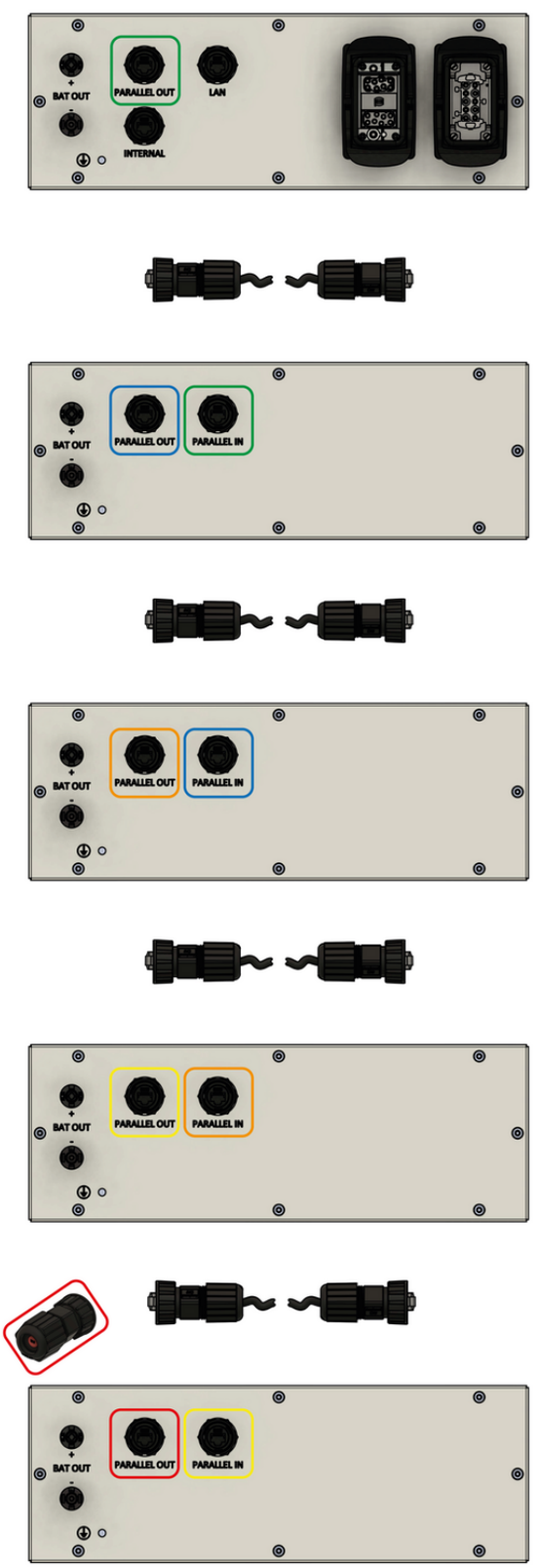
- FEMS App Heat pump "SG-Ready"
- FEMS App CHP



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

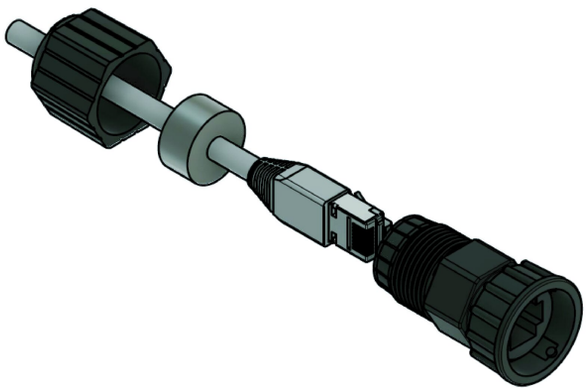
13. Close the remaining feedthroughs of the multi-hole seal with the enclosed filler plugs (8 mm) and tighten the bolt connection.
14. Lock the plug at the top and bottom through the brackets.

6.10.8. Communication between the batteries



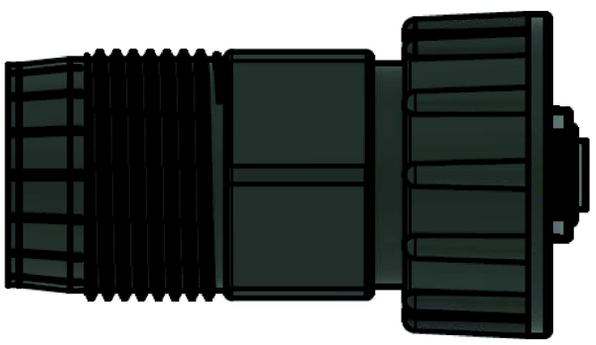
1. All enclosed network cables must be used for communication between the battery towers.
2. The first network cable must be plugged in and locked (green) between the EMS box (PARALLEL OUT) and the first Extension box (PARALLEL IN).
3. Likewise on all other towers, always between PARALLEL OUT and PARALLEL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

6.10.9. 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 point can be skipped and the network cable can be connected directly.



2. Make sure that the network connector protrudes approx. 3 mm above the bayonet catch at the front.
3. For 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.

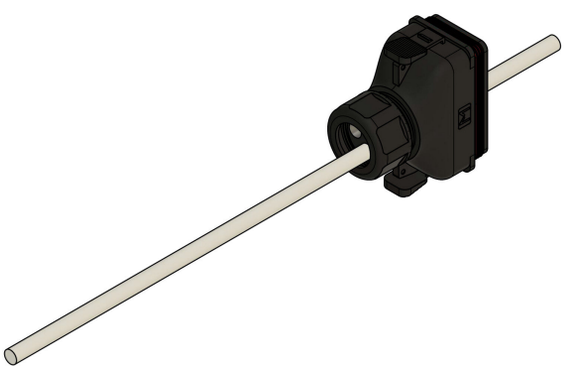
The electrical energy storage system does not have a WiFi function.

6.10.10. Cover for the internal input (optional)

Optionally, a network connector housing with filler plug (included in the scope of delivery) can be used as a cover for the internal connection. The network connector housing and the filler plug must be fitted beforehand.

An IP classification is only guaranteed if the corresponding plugs are locked on all connections.

6.10.11. Communication between energy meter and inverter

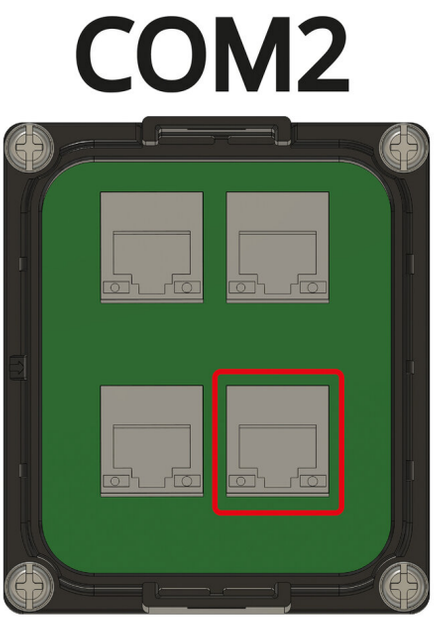


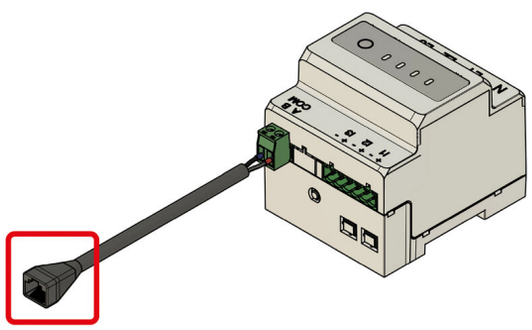
A cable with at least 5 cores with a cross-section of 0.34 mm^2 to 0.75 mm^2 is recommended.

1. Feed the cable through one of the holes in the multi-hole seal or multi-hole seal.

Attention: One feedthrough is already blocked by the communication cable between the inverter and EMS.

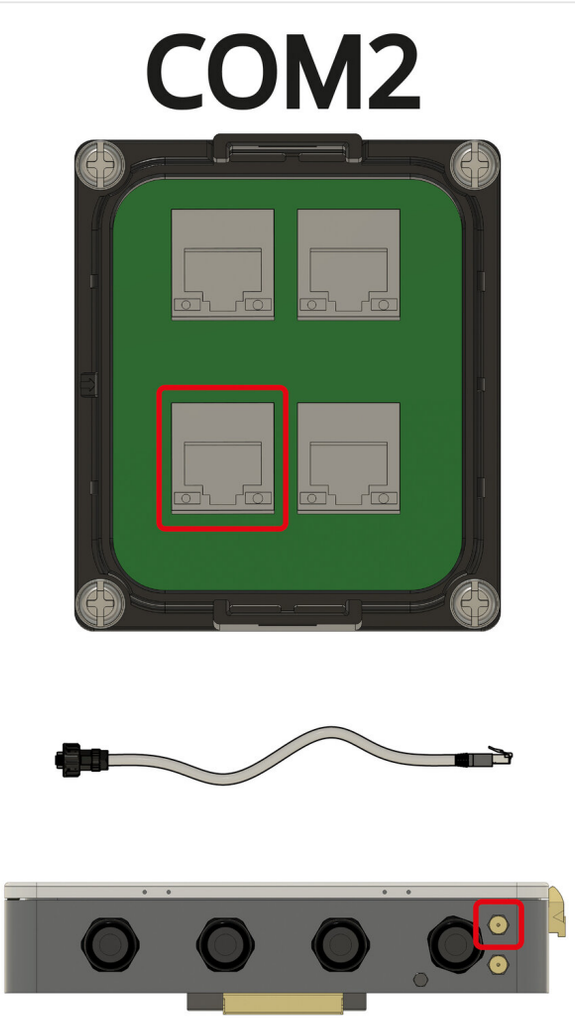
2. Leave the other openings of the multi-hole seal closed.





3. Connect the communication cable supplied with the inverter (labeled "Meter") to the inverter and tighten the screw connection.
4. Connect the other end to the meter.

6.10.12. Communication between inverter and STS box (optional)



Connect the communication cable supplied with the STS box to the inverter and the STS box and close the lock.

7. Generator input

7.1. Purpose and scope of application

- Supply of the system in the event of a power failure
- Automatic start at:

  Power failure.
- Optional: Recharging of the battery in the event of a power failure up to the defined SOC start/stop value.

The generator cannot be used to maintain the emergency power reserve.

7.2. Functionality

1. Power failure is detected.
2. The inverter acts as a grid former to supply the consumer loads.
3. The potential-free relay contact closes.
4. Wird der eingestellte SOC-Schwellwert unterschritten, schließt der potenzialfreie Relaiskontakt.
5. Switching on the generator (depending on the mode).
6. Generator production starts.
   a. The generator supplies the consumer load and can optionally charge the battery.
7. If the *Battery charging from the generator* mode is active, no more power is drawn from the generator as soon as the set SOC stop value is reached.
   a. As soon as the value falls below the set SOC start value, power is drawn from the generator again.

7.3. Technical requirements for the generator

- Nominal voltage: 230 V/400 V (tolerance: 10 %)
- Frequency: 50 Hz
- Frequency stability: max. ± 1 Hz
- Maximum power:

  There is no input restriction; for example, a 60 kW generator can be connected to the Commercial 50 inverter. The limiting factor is the maximum output power of the inverter (VA).
- Potential-free input is optional, manual start of the generator is also possible.

Ensure that the inverter has the latest firmware version (*dsp 5.516 arm 12.500* or higher) and the FENECON system has the latest FEMS version installed.

- The firmware of the inverter can currently only be updated by the FENECON Service.
- With older firmware versions, the set startup time may not be adhered to exactly.

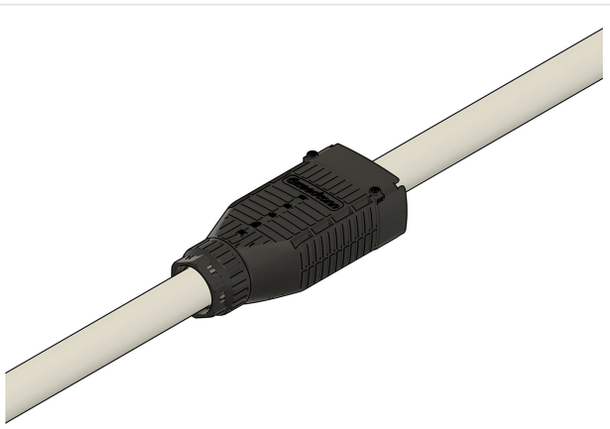
7.4. Restrictions

- No black start from the generator possible.
- Parallel operation of several generators is not permitted.
- The generator must not be used as a permanent primary network (maximum runtime: 24 hours).
- The power values of the generator and inverter cannot be combined. In emergency power mode, the loads are supplied either by the generator or by the battery.
- It cannot be guaranteed that all loads and consumer loads can be supplied.

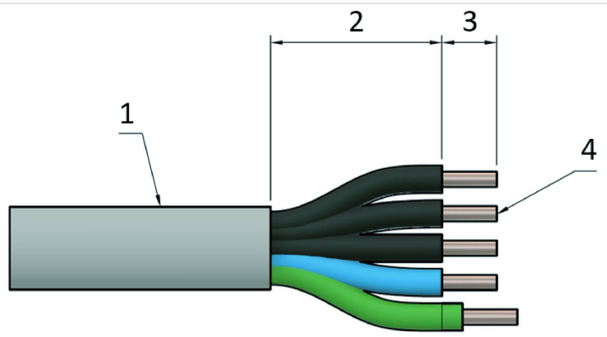
7.5. Installing the generator

Only qualified electricians must install the generator. Ensure that all safety precautions are observed.

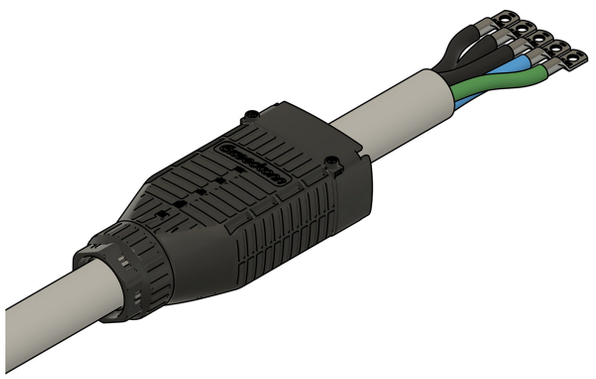
Refer to the manufacturer's specific instructions when installing the generator.



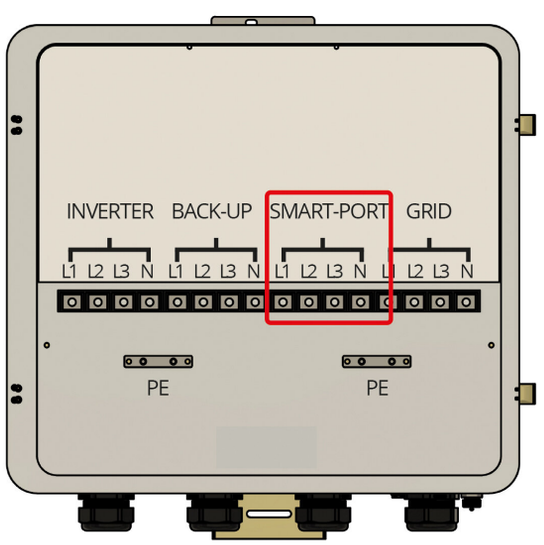
1. Insert the supply cable into the cable feed-throughs.



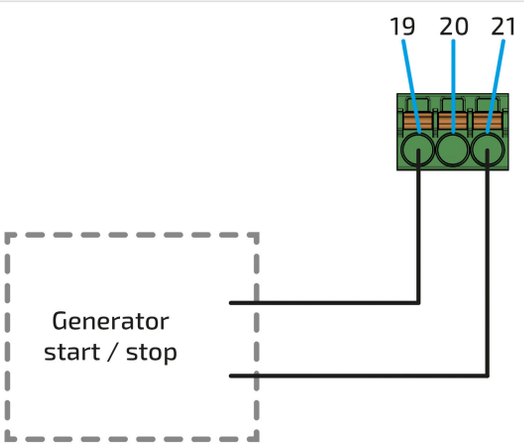
2. Strip the insulation and the cores.
3. Ensure that the PE is slightly longer than the other cores.
4. Pick the cross-section of the cores according to the power of the generator in accordance with the standard (e. g. DIN EN 60228).



5. Press the enclosed cable lugs onto the cores. Alternatively, use other suitable cable lugs. Observe the bolt diameter of 8 mm.



6. Connect the cable to SMART-PORT.
   Use the enclosed M10 nuts (wrench size 15).
   Tightening torque: 14-16 Nm.
7. Make sure that a clockwise rotating field is connected.
8. Connect the other end of the cable according to the generator instructions.



9. The communication line must be connected to pins 19 and 21 on the three-pin connector to enable the generator to start automatically in the event of a power failure and low SOC.
10. Recommendation: Core with a cross-section of 0.34 mm^2 to 0.75 mm^2.

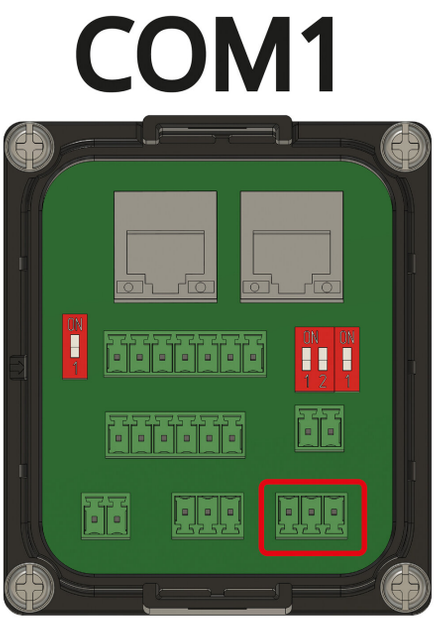
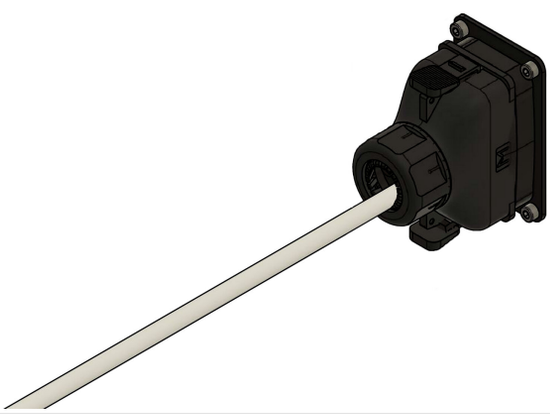
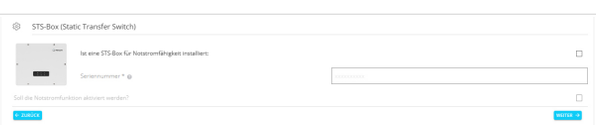
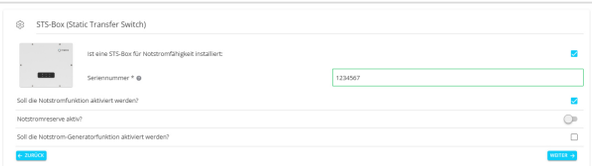
	11. Connect the three-pin plug to the inverter.
	12. Reattach the cover to the inverter and retighten the bolts.

Table 44. Installation of the generator for FENECON Commercial 100

7.6. Commissioning with generator

The system is commissioned with a connected generator using the commissioning wizard.

Carry out the following steps:

	1. Check the box next to *Is an STS box installed for emergency power capability?*: ☑ 2. Enter the serial number of the STS box.
	3. Activate the *emergency power function*: ☑

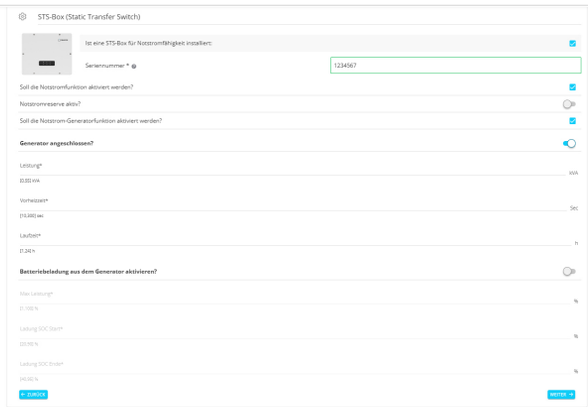
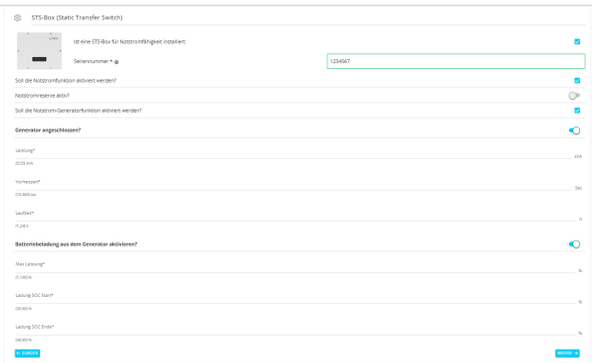
	4. Activate the *emergency power generator function*: ☑ 5. Check that the slider *Generator connected?* is set to *Yes*. 6. Enter the corresponding values for **power**, **startup time** and **running time**.
	7. If required, set the *Activate battery charging from the generator* slider to *Yes*. 8. Enter the desired [%] values for **Max. Power**, **Charging SOC start** and **Charging SOC end**. **If *Battery charging from the generator is active, the emergency power reserve must also be activated** Set the emergency power reserve to at least the same value as **Charging SOC start**. The value must also be higher.

Table 45. Commissioning with generator

7.7. Generator operation in FENECON Online Monitoring

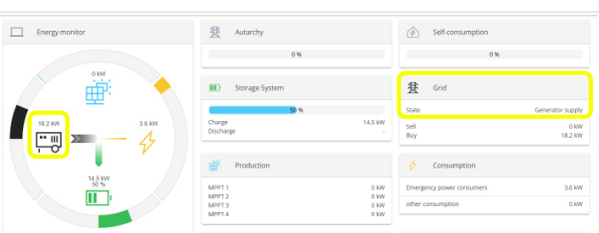
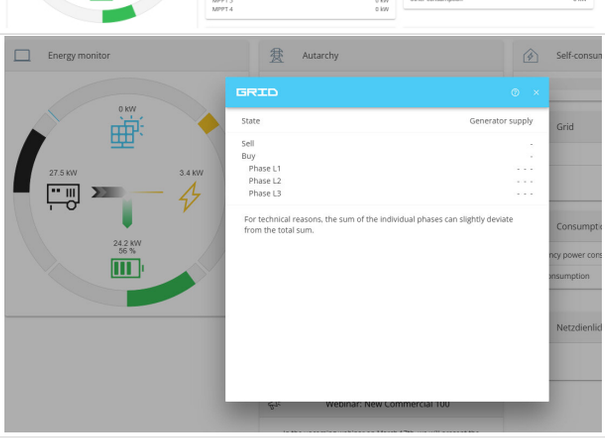
	If the generator is active, this is displayed both in the Energy Monitor and in the grid widget.
	Click on the grid widget to go to the expanded view of the widget.

Table 46. Generator in Online Monitoring

8. Initial commissioning

8.1. 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.

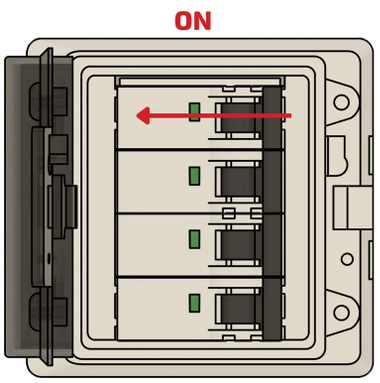
Commissioning must only be carried out by trained specialist personnel.

- 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.

This is indicated in the installation and service instructions:

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

8.1.1. 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.

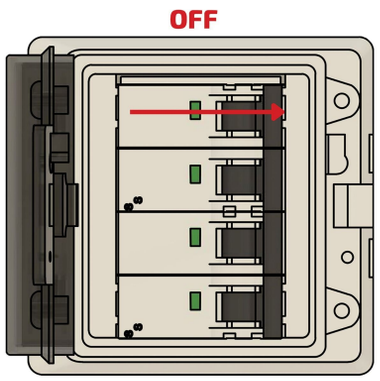
If commissioning has not yet been completed, the battery will not start.

The system is restarted by pressing the push-button on the front of the EMS box. The restart can take up to three minutes.

If the system has not yet been configured, the battery goes into error mode or switches off.
This can also happen during configuration. It is therefore recommended that you only switch on the battery when you are prompted to do so during the configuration process.

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

8.1.2. Switching off



Rack out the battery towers (front battery tower).
Rack out the inverter (sub-distribution board, grid).
Rack out the EMS box (sub-distribution board or socket).
The system is only completely switched off when all LEDs on the inverter and the battery have gone out. This may take approx. 30 seconds.

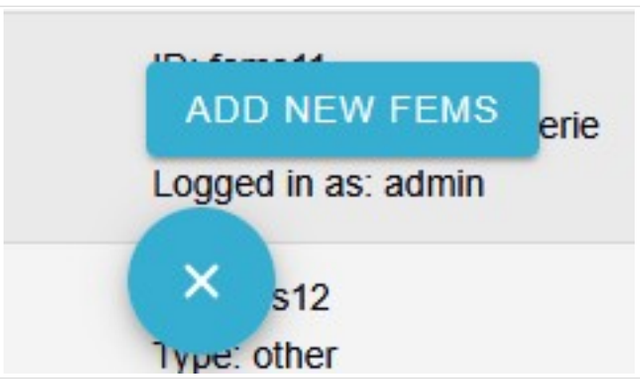
- You will receive an e-mail with a summary of the complete commissioning (commissioning protocol) for your records.
- The customer also receives an e-mail with the personal access data for end customer monitoring.

8.2. Configuration via commissioning wizard

Open www.fenecon.de and click on the login to FENECON Online Monitoring"FEMS-Login" in the top right-hand corner. Alternatively, you can use the QR code below or the link to access the page.

1. portal.fenecon.de

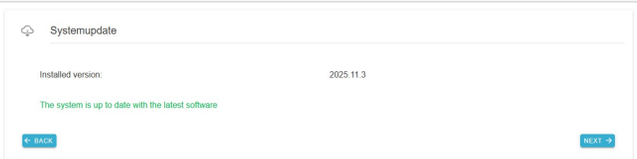
If you do not yet have an installer account, learn how to create one here.



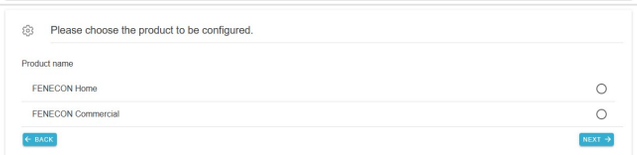
After logging in, you will be taken to this screen.
Click on the plus symbol at the bottom center and then on *ADD NEW FEMS*.
TIP: If you cannot access this screen directly, please click on the ☰ burger menu at the top left and then on *All systems*.

8.2. Configuration via commissioning wizard

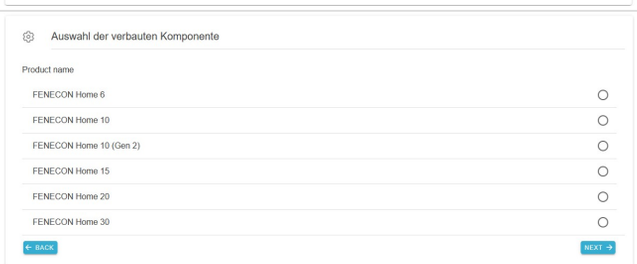
1. Enter the installer key.
   You can find this on the sticker on the inverter or on the FEMS box.



2. Carry out a software update if necessary.

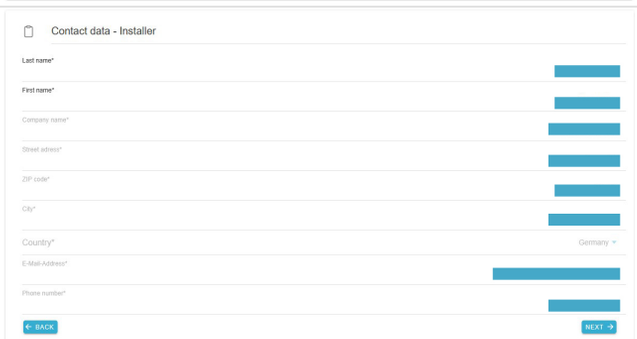


3. Select the attachment type, in this case: FENECON Home.

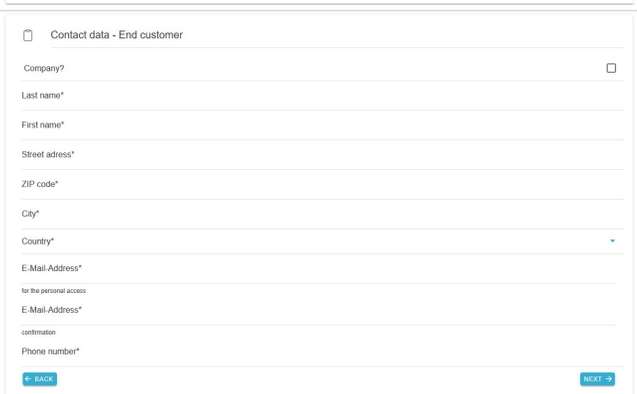


4. Select the system.

The product names are based on the output of the respective inverter.

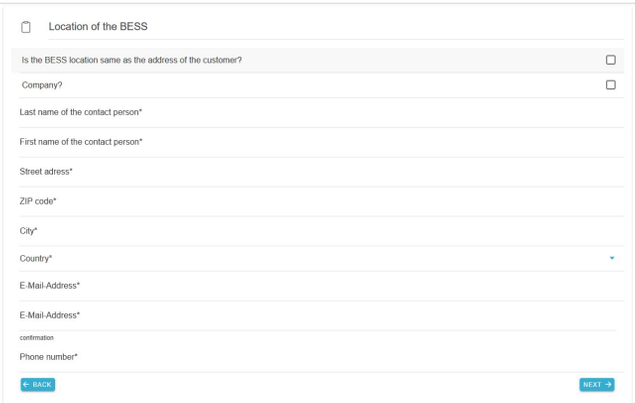


6. The contact details of the installer account are automatically transferred.

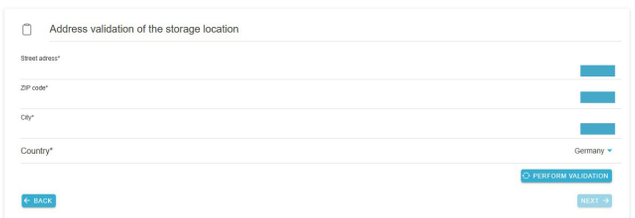


7. Enter the end customer's contact details here.

The end customer account is created with the e-mail address entered here. The end customer commissioning report is also sent to this address. Both the installer and the end customer will receive a commissioning report by email.



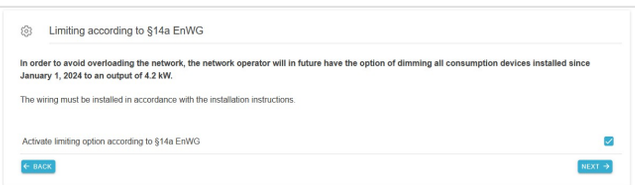
8. Enter the location of the storage system here if the system location differs from the customer address (for service purposes).



9. Click on *VALIDATE*.

   Then select the address found from the list.

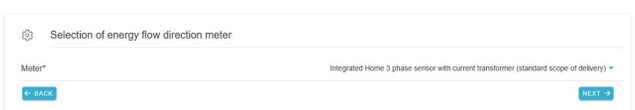
   The location coordinates are checked here to ensure the functions of location-dependent applications (e. g. weather data).



10. If dimming is required at the system location in accordance with § 14a EnWG, you can set this here.

11. This is where you activate the emergency power function and, if necessary, the emergency power reserve.

    The emergency power reserve can be configured by the end customer at any time afterwards. However, the general emergency power function CANNOT.



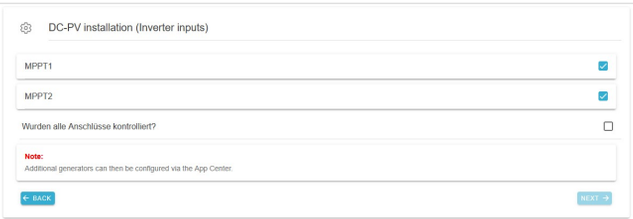
12. Select the energy flow direction meter ("EnFluRi") here:

    For **Commercial 50 Gen. 3** & **Commercial 100**: Here *only* the FENECON-meter for higher currents, which is optionally available for the Home 20 & 30, can be selected.

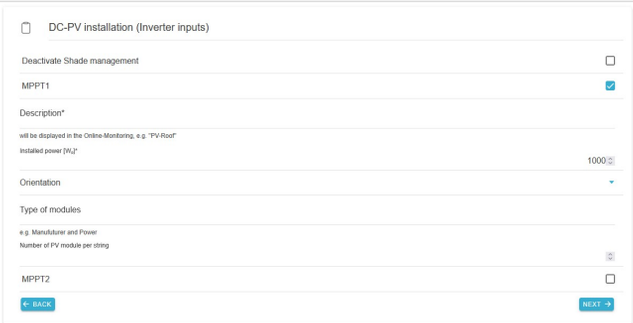
13. Select the pre-fuse of the house connection meter here.

    Specified in amperes (A).

8.2. Configuration via commissioning wizard

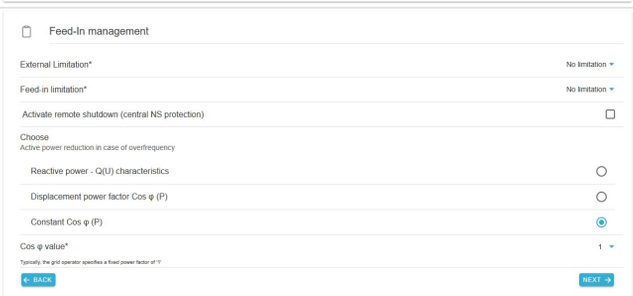


14. The connections of the MPP trackers are displayed here for checking purposes.
    Check whether the connections of the MPPT used have been made correctly and confirm that the connections have been checked.

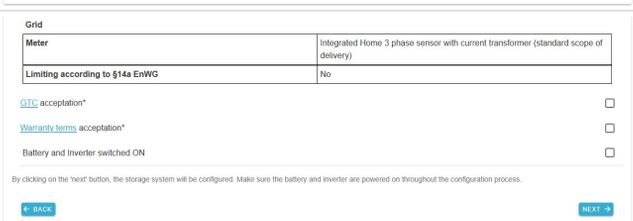


15. Configure shade management according to MPP trackers here.

    If PV optimizers are used, shade management must be switched off.

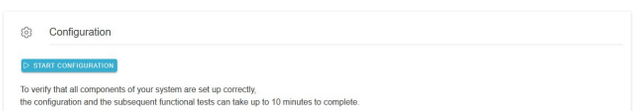


16. Configure Feed-in management according to the grid operator's specifications.



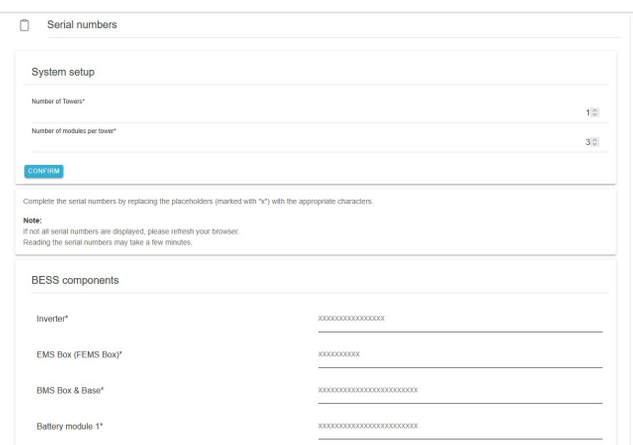
17. Check the information you have previously entered and confirm the terms and conditions and warranty conditions.

    The battery and inverter must also be switched on.



18. After clicking on ▶ *START CONFIGURATION* the configuration of the system begins.

    Leave the battery and inverter switched on during the entire configuration process.

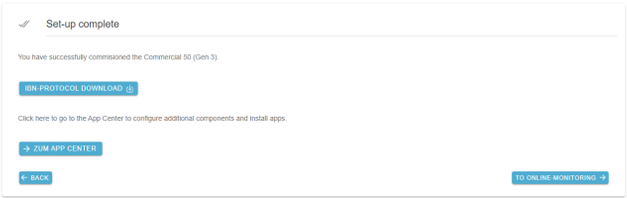


19. Select the number of battery towers and modules.

    Confirm the displayed serial numbers of the system components.

    The readout may take a few minutes.

    In rare cases, serial numbers must be added manually.



20. This completes the configuration via the commissioning wizard.

    The system is now ready for operation.

    You can now continue with the installation of FEMS Apps by clicking on *APP CENTER*.

- You will receive an e-mail with a commissioning report attached for your records.
- The customer also receives an e-mail with the personal access data for end customer monitoring.

9. 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.

9.1. Access data

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

9.1.1. 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.

9.1.2. 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.

10. 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.

10.1. Capacity expansion of the battery tower by one or more battery modules

If the electrical energy storage system is expanded with additional battery modules after commissioning, proceed as follows:

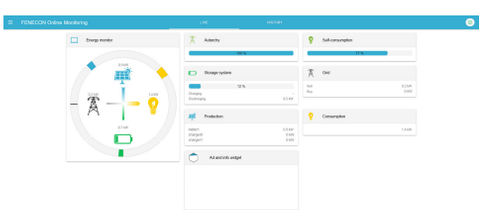
After a capacity expansion, the commissioning wizard must be carried out again.

Das System führt automatisch einen Referenzzyklus durch, berechnet bei geplanter Erweiterung den passenden Startzeitpunkt und bereitet die Batterie auf einen stabilen Zielwert von 30 % SoC vor.

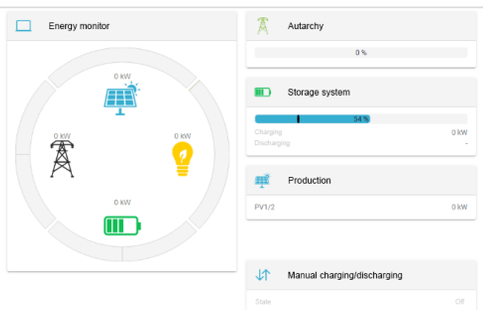
Ablauf:

- ab 70 % SoC: Laden auf 100 %, Haltezeit, danach Entladen auf 30 %
- unter 70 % SoC: Entladen auf 0 %, Haltezeit, danach Laden auf 30 %

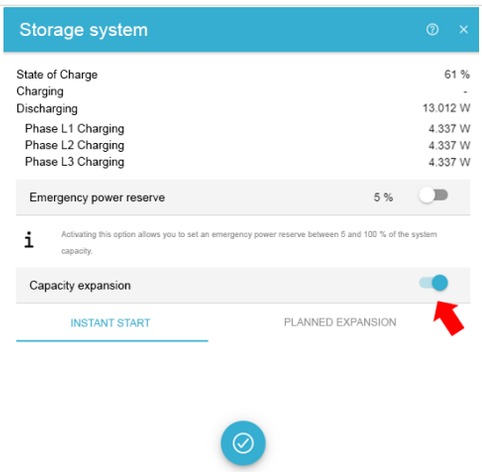
Empfehlung: Vorab möglichst einige vollständige Zyklen von 0-100 % durchführen, besonders bei älteren Batterien.



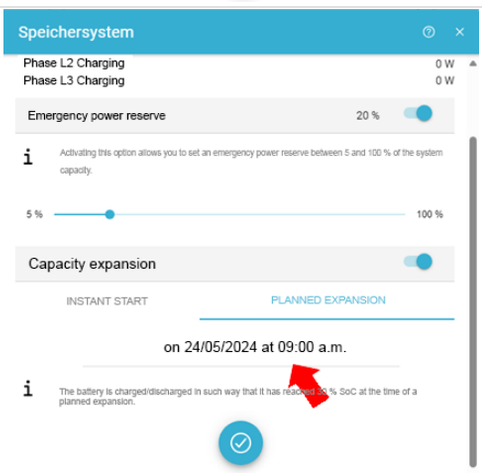
1. Open the Online Monitoring.
2. In order for the new modules to synchronize faster with the existing modules, an equal state of charge is required (30 % SoC). The electrical energy storage system automatically prepares itself if the state of charge does not have the same SoC.



3. Click on the "Electrical energy storage system" widget in Online Monitoring.



4. Activate the "Capacity expansion" function in Online Monitoring under Electrical energy storage system. The "Capacity expansion" is activated when the blue bar is displayed.
5. You can now choose between "Immediate start" and "Planned extension". With the two options, the battery is charged or discharged to 30 %.
6. When the state of charge is reached, charging/discharging is stopped and the charge level of 30 % is maintained.



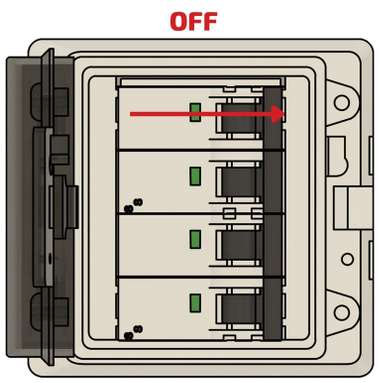
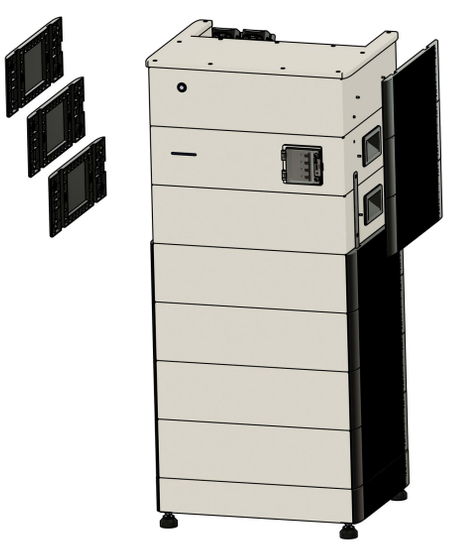
7. If you select "Planned extension", you can specify the planned day and time. In this example, 24.05.2024 and the time of 09:00 were selected. At this time, the battery is expected to be charged or discharged to reach 30 % for the "Planned extension".

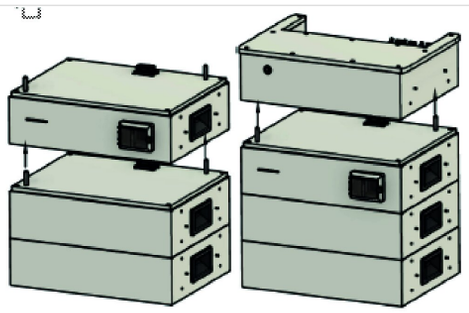
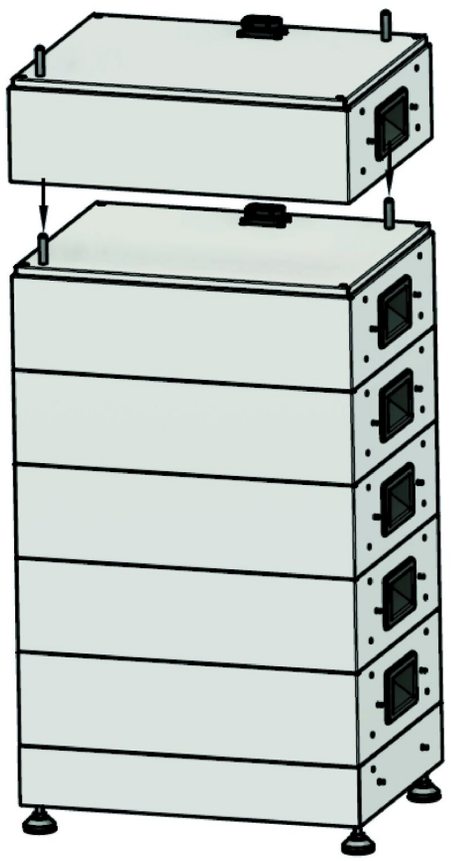
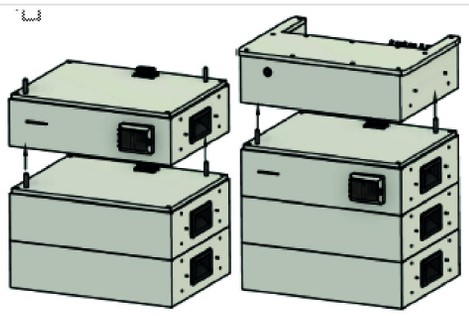
8. You must then confirm your desired settings by clicking on the blue tick. The desired extension will be saved and, depending on the option selected, implemented immediately or later at a specific time.

9. Then run the commissioning wizard again.

The capacity can also be extended at a later date; there is no time limit here. You will not reach the full capacity with the new battery module, as the new module will equalize with the old modules.

If the battery tower is extended by additional battery modules after several weeks or months, the following procedure must be followed:

29-30 % SoC	1. Charge/discharge the system to a charge level of 29-30 %; then switch off.
	2. Switch off the entire system. The exact procedure is described in the section Switching off. Set the battery fuse switch to OFF. DC switch of the inverter to OFF. AC fuse on the grid and emergency power side to OFF.
	3. Remove the top three side panels on each side. 4. Remove the latch up to the first battery module on both sides.

	5. Remove the FEMS box and BMS box and place them on their side. To do this, screw the wall bracket of the BMS box from the wall.
	6. Attach new battery module.
	7. Proceed as described in section Assembly — Battery tower 1 with FEMS box, step 8. Attach the FENECON BMS box. Attach the FEMS box. Attach the locks. Attach the side covers.

- If the exact voltage value of the old and new battery modules has not been matched, SoC jumps will occur when the battery is charged and discharged. This means that the full capacity is temporarily not available.
- The greater the voltage difference between the "old" and "new" batteries, the longer it can take until there are no more SoC jumps and the full capacity is available.

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

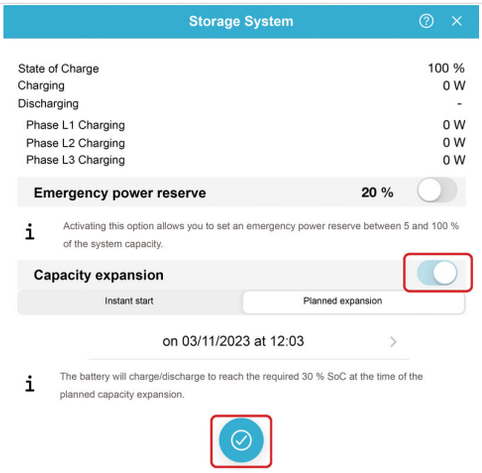
Das System führt automatisch einen Referenzzyklus durch, berechnet bei geplanter Erweiterung den passenden Startzeitpunkt und bereitet die Batterie auf einen stabilen Zielwert von 30 % SoC vor.

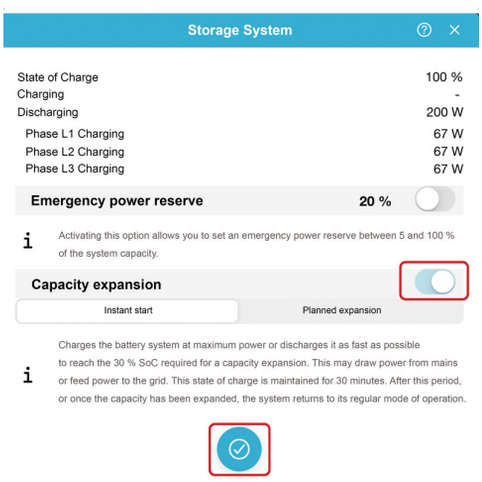
Ablauf:

- ab 70 % SoC: Laden auf 100 %, Haltezeit, danach Entladen auf 30 %
- unter 70 % SoC: Entladen auf 0 %, Haltezeit, danach Laden auf 30 %

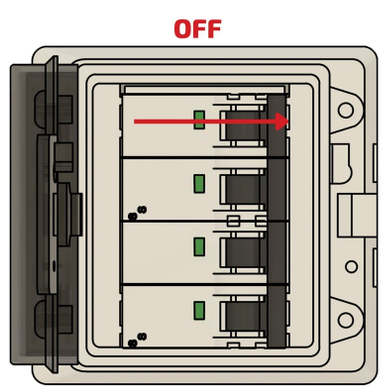
Empfehlung: Vorab möglichst einige vollständige Zyklen von 0-100 % durchführen, besonders bei älteren Batterien.

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.

11. 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

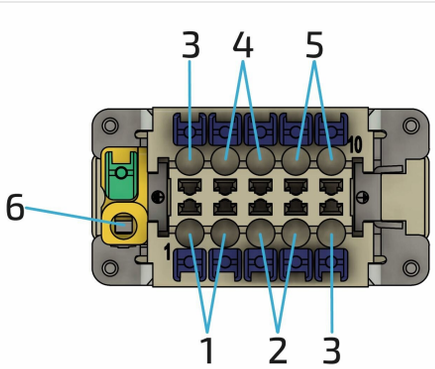
  1 x digital input for § 14a

  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/

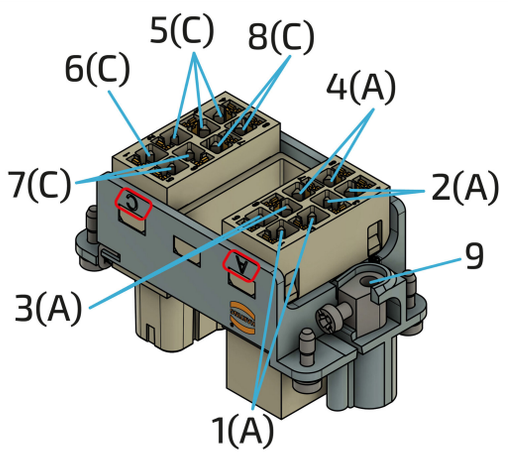
If the integrated relays are not sufficient, an external 8-channel relay board can be connected via Ethernet.



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)
5	Neutral conductor connection (required for integrated meter)
6	PE connection

Table 47. Connector — Pin assignment — Power connector

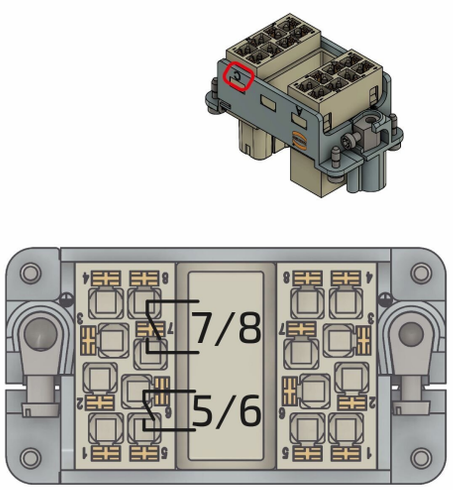
	The pin assignment of the Harting plug (16-pin) is shown in detail below.

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 48. Connector — Pin assignment: Control connector

11.1. 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.



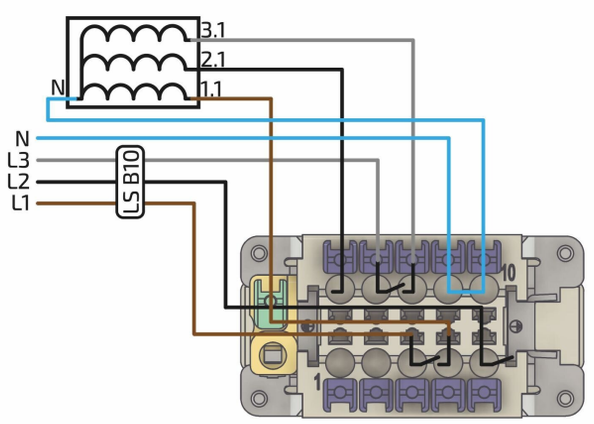
1. The internal relay contacts 5 and 6 can be connected via pins 5/6 and 7/8 on the Harting plug (16-pin — C).
2. For detailed information on connecting the heat pump, please refer to the manufacturer's installation instructions.

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.

11.2. 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.

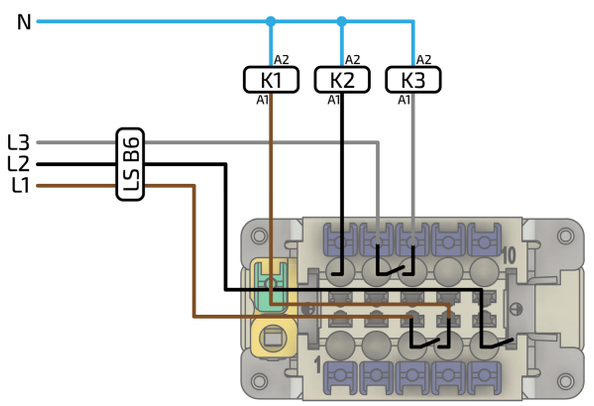
Ensure that three different phases are used. If only one phase is used, damage may occur.

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.

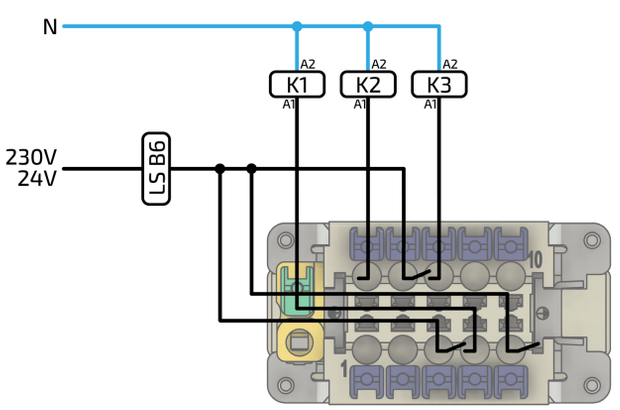
Manual mode is only suitable for temporary operation. For permanent operation, the external relay control must be used.

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

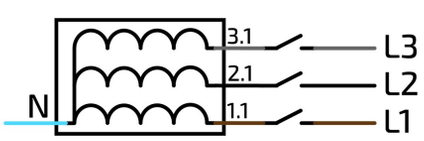
The externally installed relays must be laid out according to the power of the installed heating element.



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.

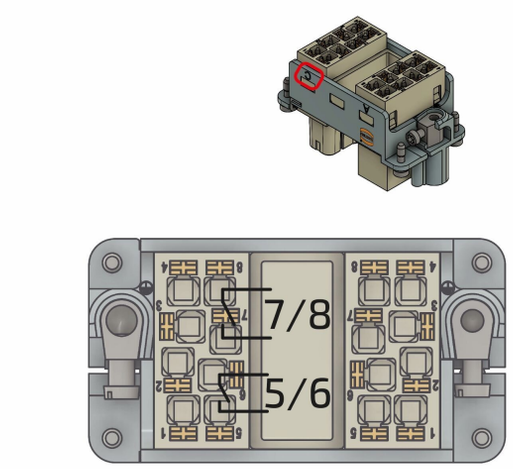
After installing the components, the app still needs to be installed.
To do this, proceed as described in the section Activation of the app in the FEMS App Center.

11.4. 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.

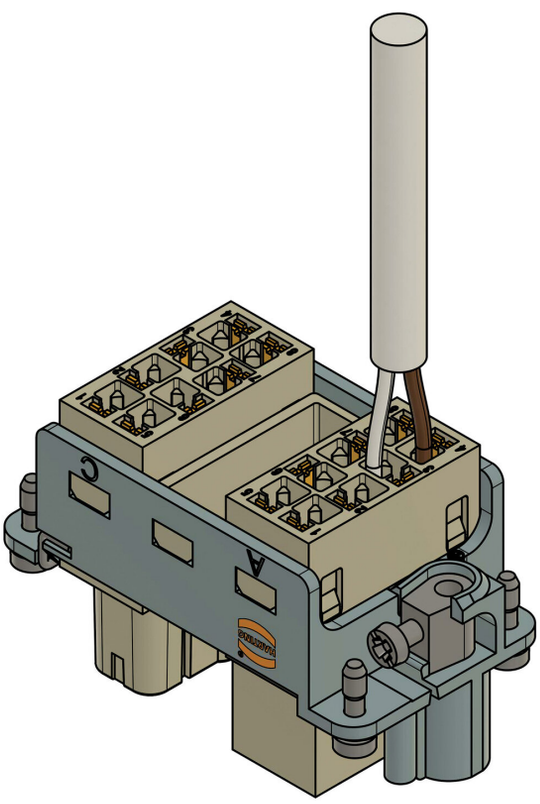


1. The enable signal for starting the CHP can be connected to pins 5/6 via the Harting plug (16-pin — C).
2. For detailed information on connecting the CHP, please refer to the manufacturer's installation instructions.

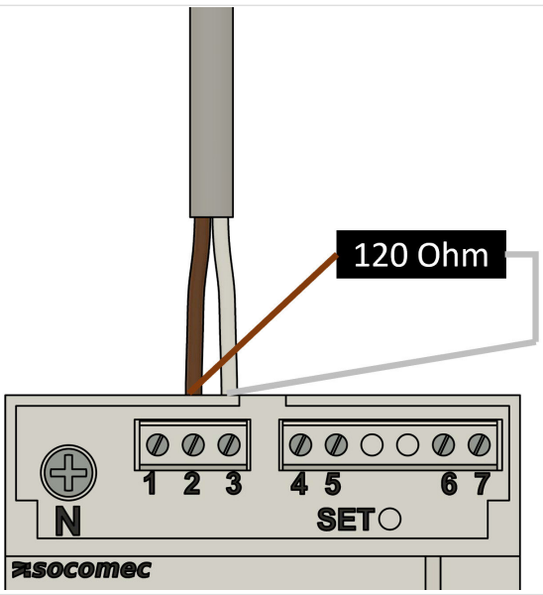
After installing the components, the app still needs to be installed.
To do this, proceed as described in the section Activation of the app in the FEMS App Center.

11.5. 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.

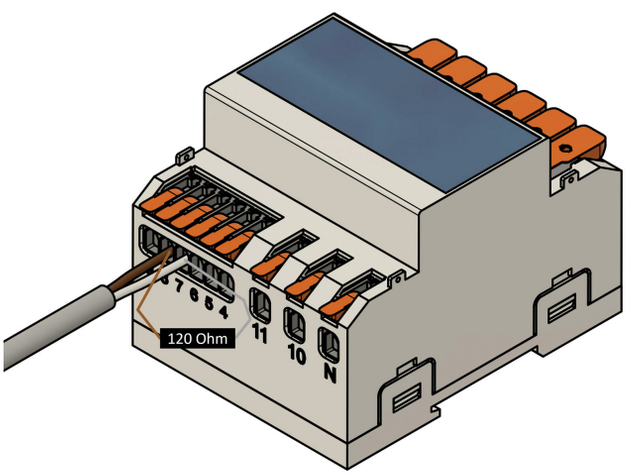


1. Connect the cores to pin 3/4 on the Harting plug (16-pin — A).
2. Connect the white core (alternative color possible) to terminal 3.
3. Connect the brown core (alternative color possible) to terminal 4.



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.

11.6. 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.

12. 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.

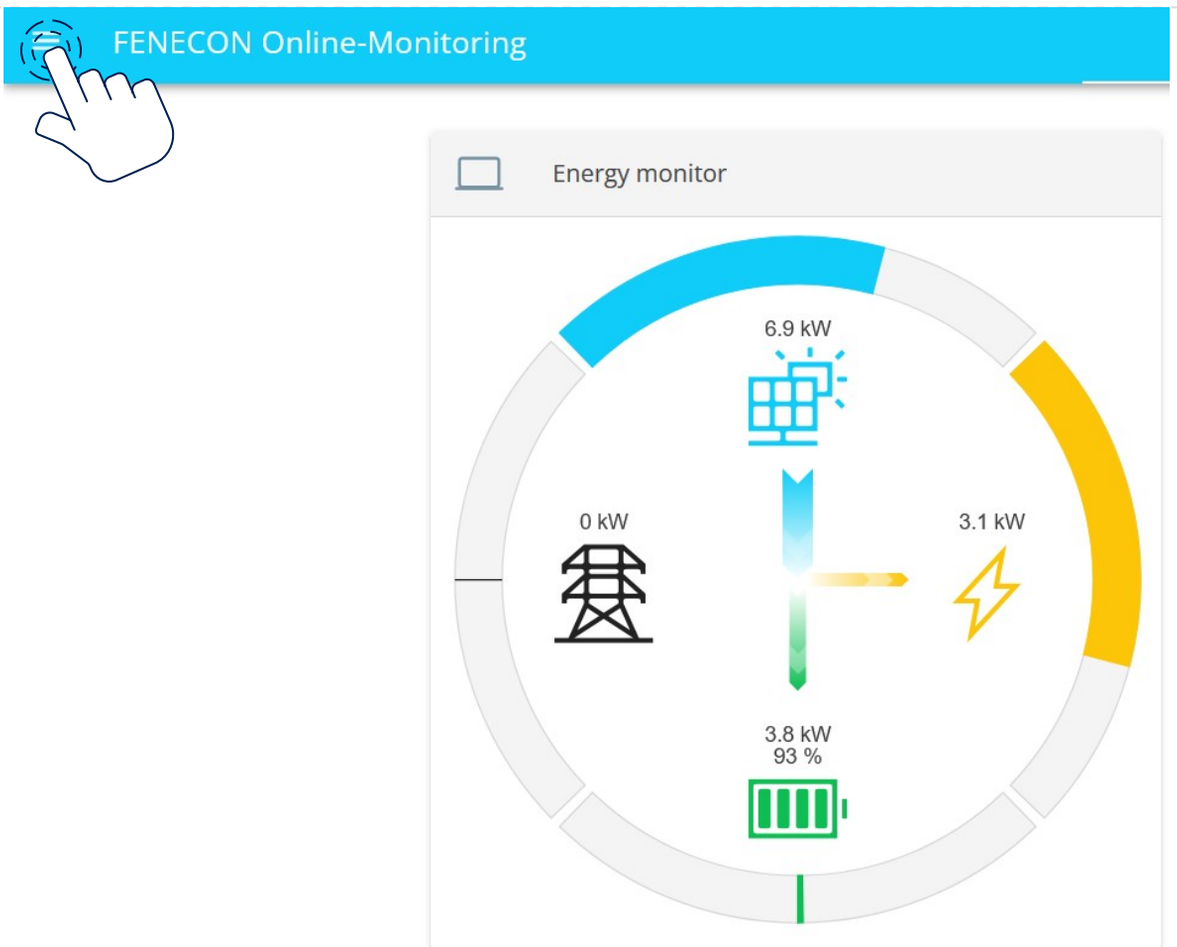


Figure 35. Burger to side menu — System update — Step 1

2. Select *Settings*.

Figure 36. Side menu — System update — Step 2

3. Select *FEMS System*.

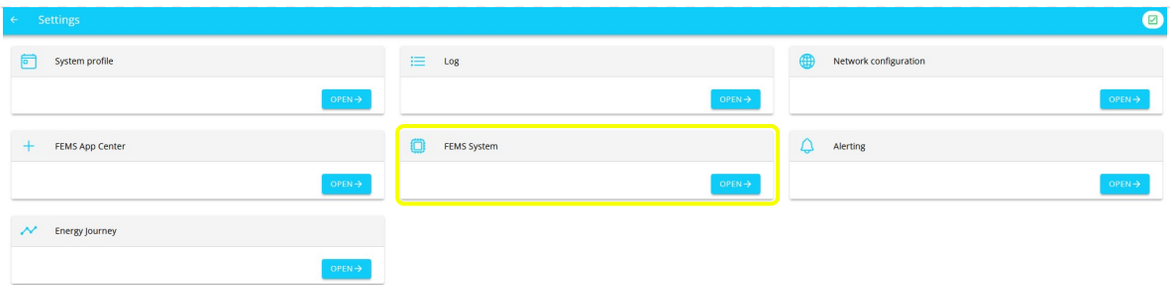


Figure 37. App Center — System update — Step 3

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.

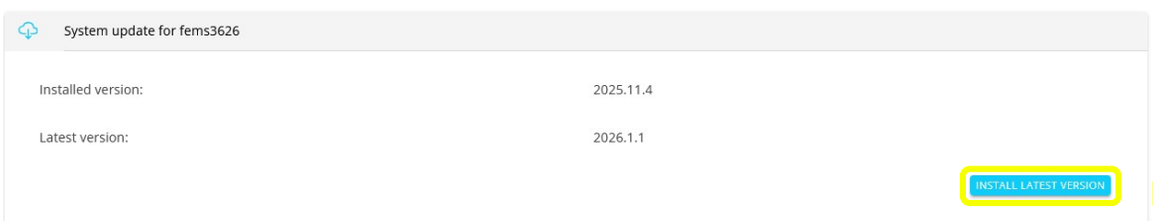


Figure 38. App Center — System update — Step 4

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.

Figure 39. Back to the Settings menu

13. Starting point: FEMS App Center

1. After you have performed a system update, open the *FEMS App Center*.
   a. Alternatively, go to the *FEMS App Center* via the ☰ top left burger menu in the FENECON Monitoring.

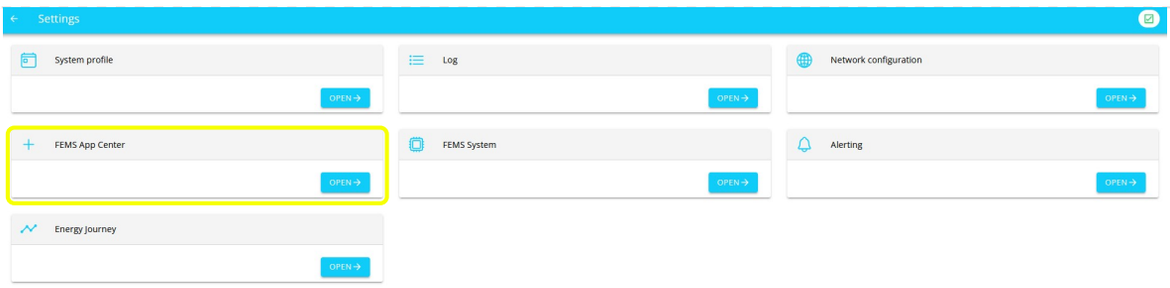


Figure 40. App Center — Step 1

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

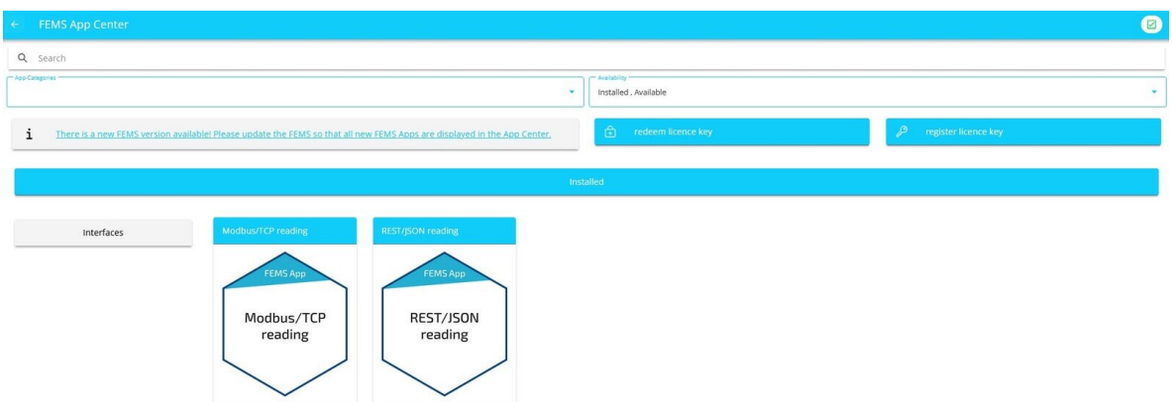


Figure 41. App Center — Step 2

13.1. 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.

13.1.1. 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:

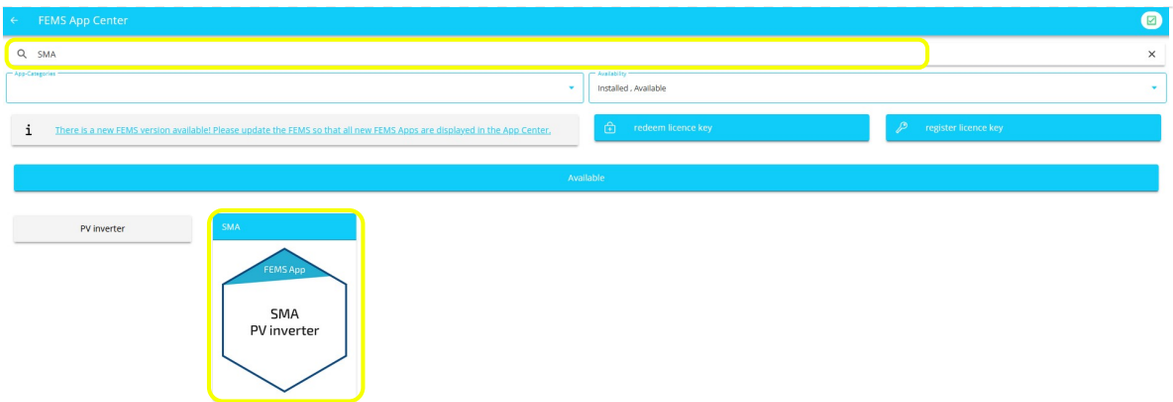


Figure 42. Search for a specific app in the App Center

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

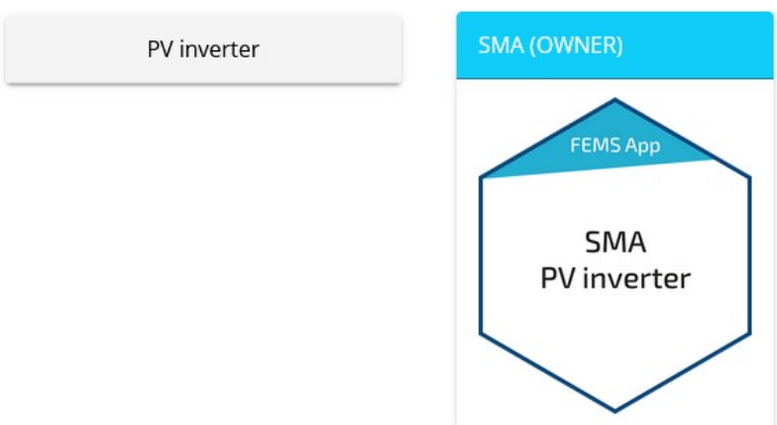


Figure 43. App installation — Variant 1 — Step 1

You will then be taken to the app overview:

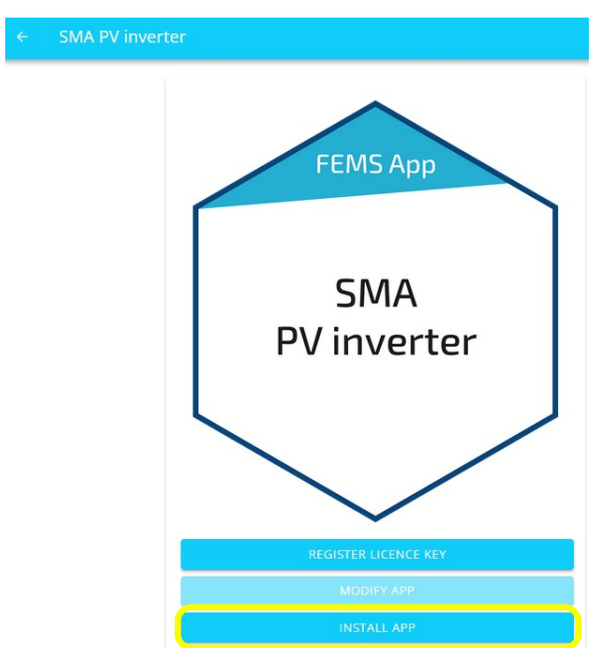


Figure 44. App installation — Variant 1 — Step 2

Select the *INSTALL APP* button.

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

Figure 45. 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.

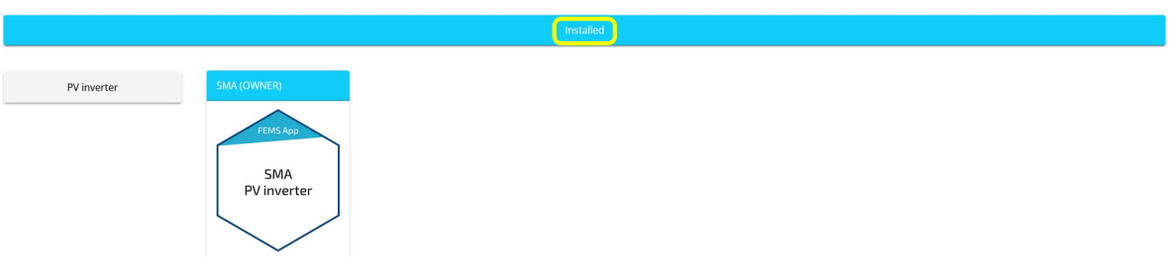


Figure 46. App installation — Variant 1 — Step 4

13.1.2. 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.

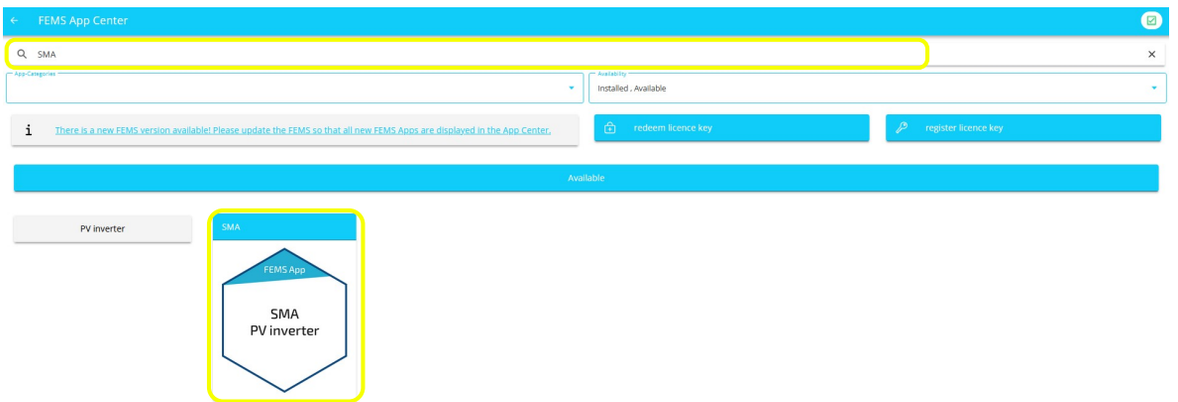


Figure 47. Search for a specific app in the App Center

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

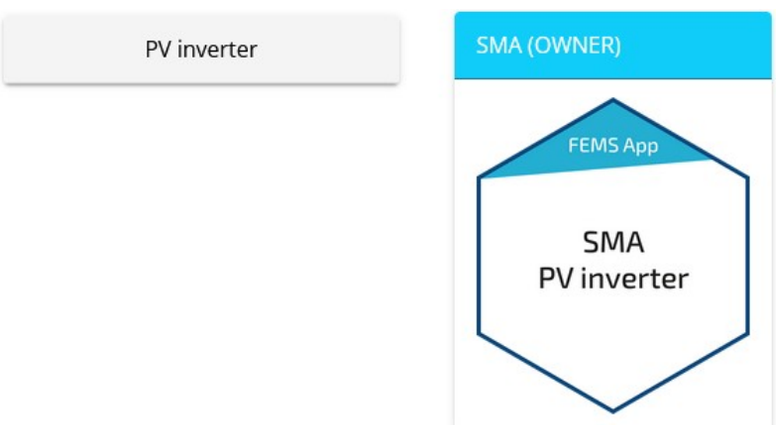


Figure 48. App installation — Variant 2 — Step 1

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

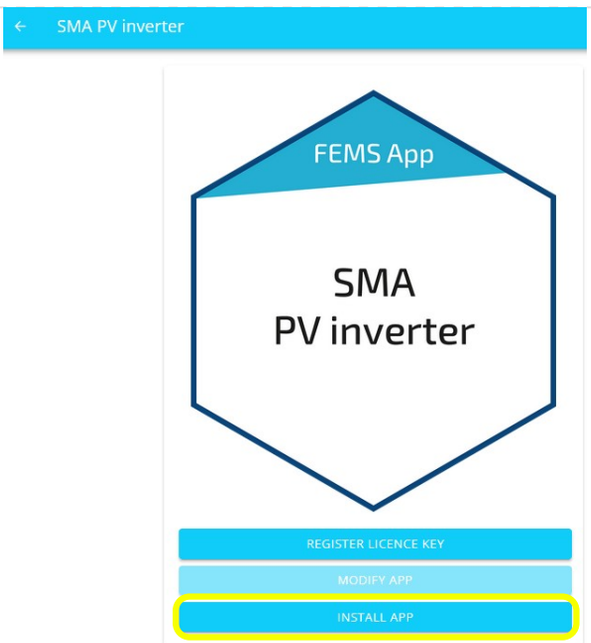


Figure 49. App installation — Variant 2 — Step 2

Select the *INSTALL APP* button.

An input mask for redeeming a licence key appears:

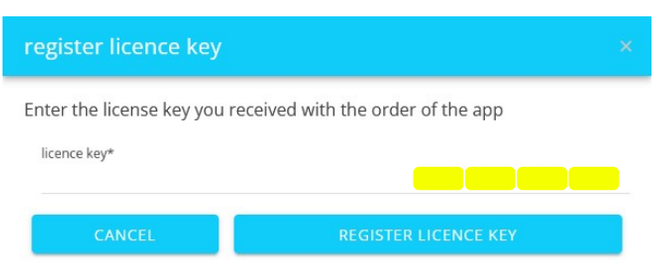


Figure 50. App installation — Variant 2 — Step 3

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.

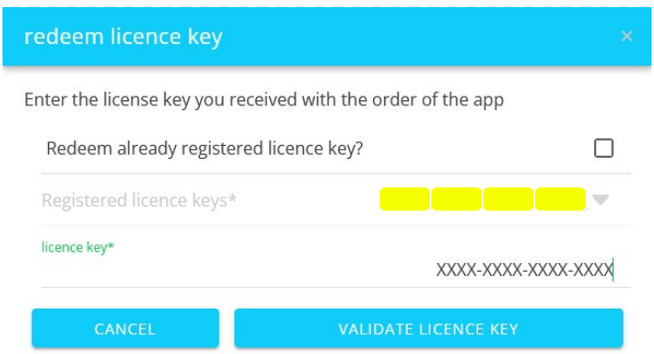


Figure 51. Redeem new licence key directly

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.

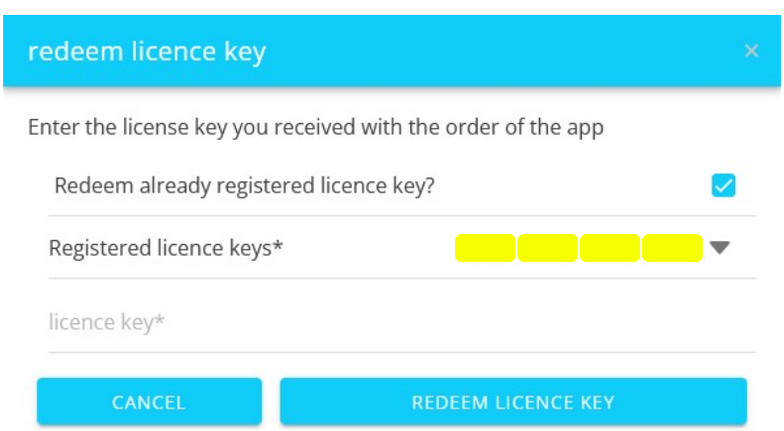


Figure 52. Redeem already registered licence key

Then click on the *REDEEM LICENCE KEY* button.

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

Figure 53. 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.

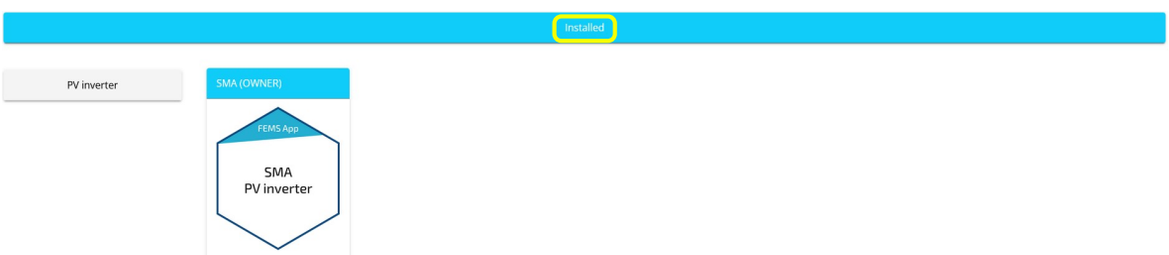


Figure 54. App installation — Variant 2 — Step 5

14. External control of the inverter

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

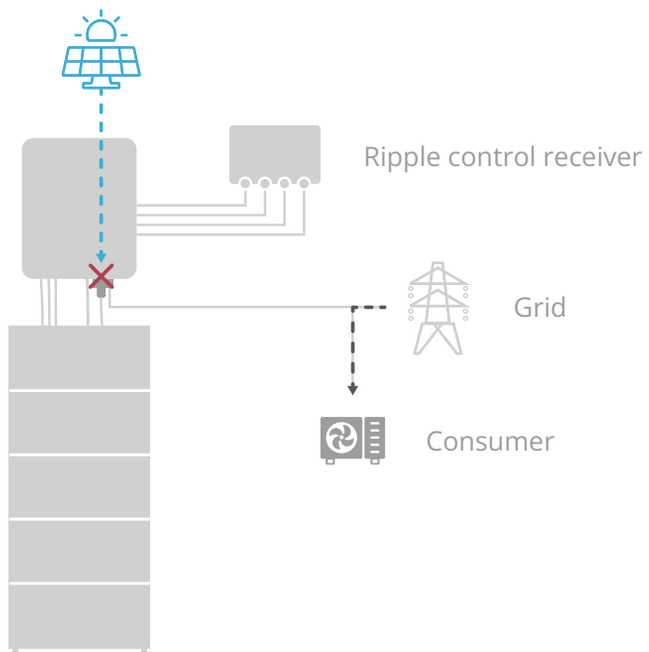


Figure 55. Connection — Curtailment via ripple control receiver

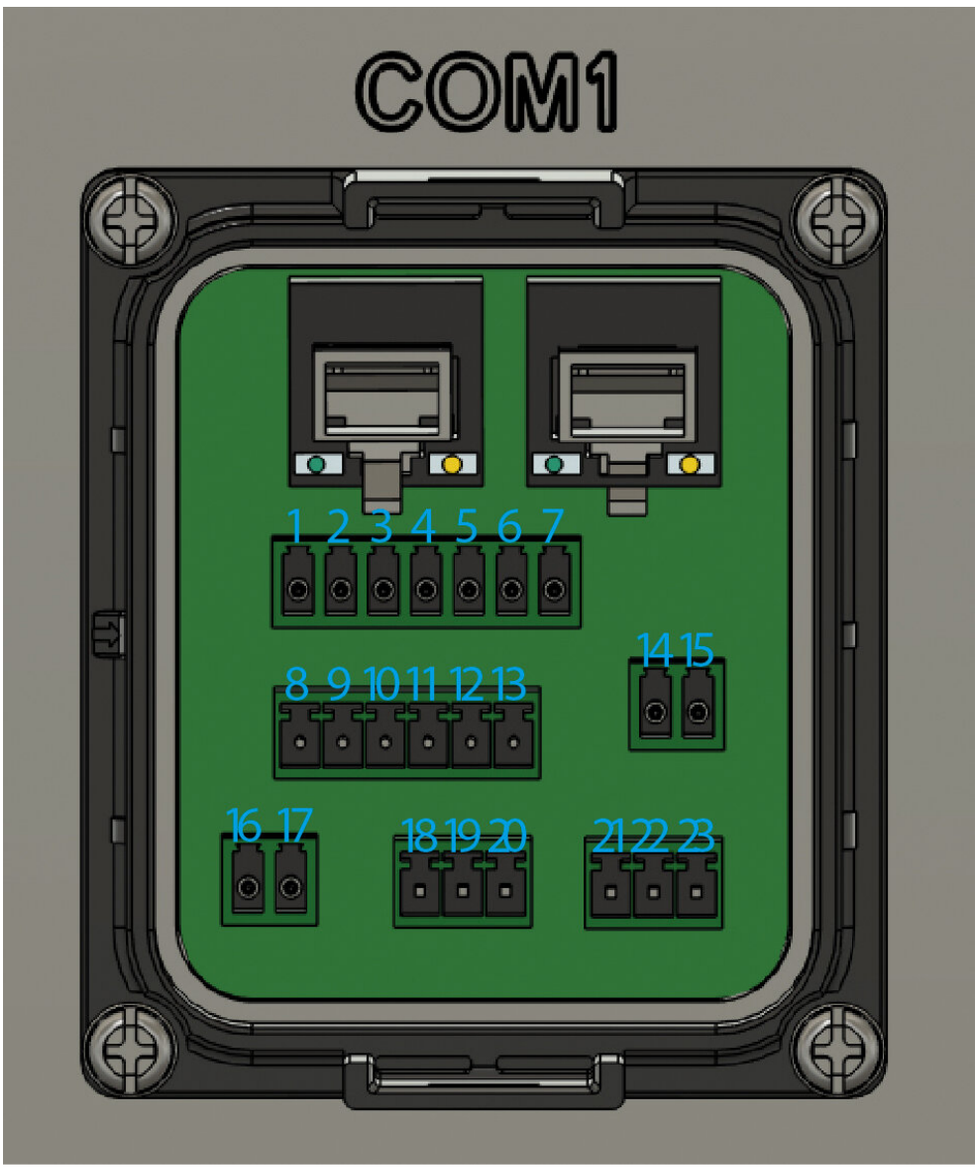
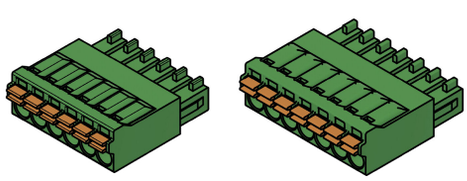


Figure 56. Controlling the Commercial 100 inverter externally

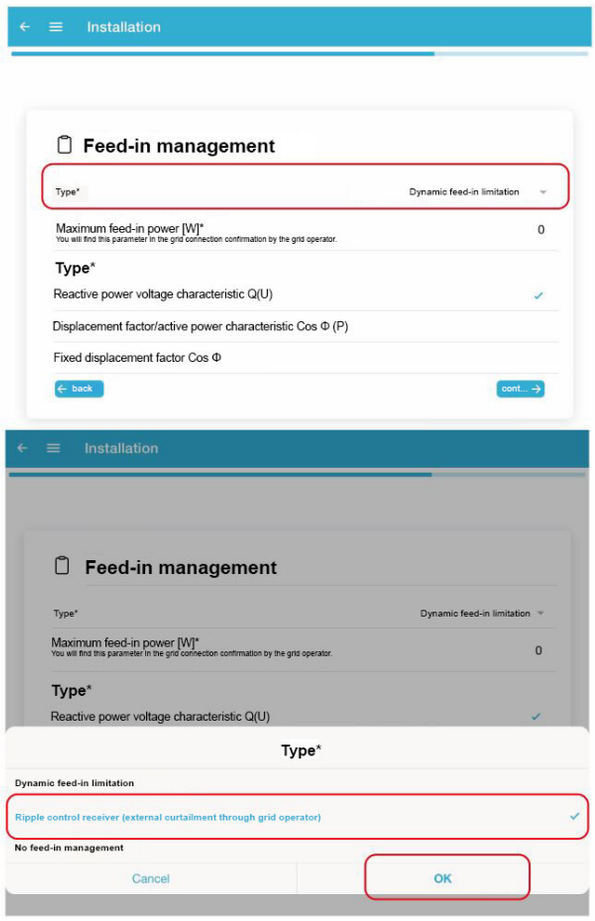
14.1. Ripple control receiver at the AC output

The inverter can be controlled directly via a ripple control receiver. The following plugs supplied with the inverter are required for this.



1. The inverter's small parts box includes a 6-pin and a 7-pin plug that can be plugged into the underside of the inverter.

14.1. Ripple control receiver at the AC output



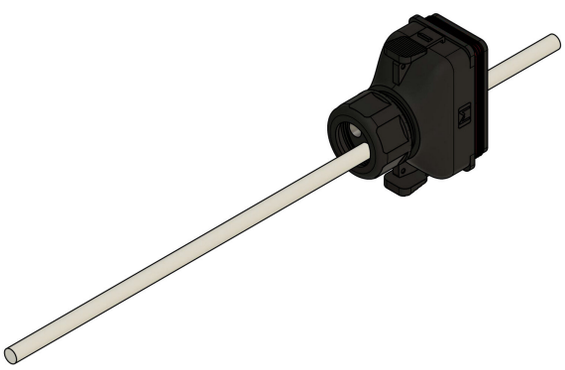
3. In order for the function to be activated, the ripple control receiver must be activated during commissioning.
4. Then confirm with *OK*.

The active power of the FENECON Commercial 100 inverter can be controlled directly by the energy supply company (grid operator) via a ripple control receiver (RCR).
The behavior of the inverter in the various control stages can be described as follows.

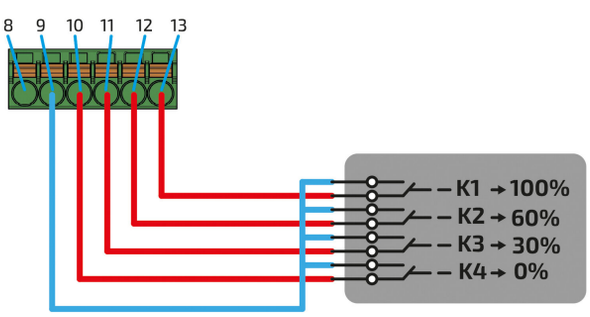
- 100 % Standard signal, inverter works without restrictions (100 kW)
- 60 % Inverter output power is reduced to 60 %. (60 kW)
- 30 % Inverter output power is reduced to 30 %. (30 kW)
- 0 % Inverter output power is reduced to 0 %. (0 kW)

If other inverters are used, these must also be connected separately to the RCR; how exactly depends on the grid operator and the RCR used.

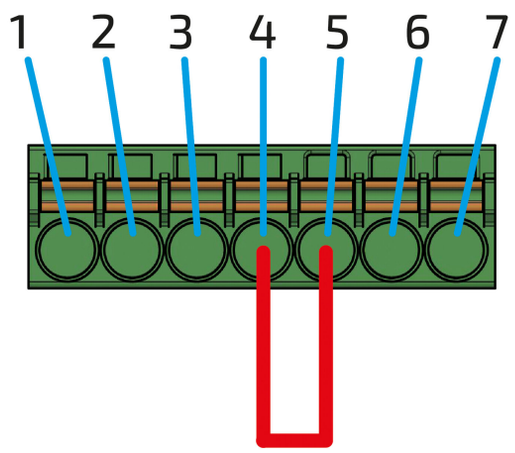
In the event of a curtailment to 0 %, the grid feed-in of the inverter is stopped completely, i.e. the consumer loads are supplied completely from the grid. Only the battery continues to be charged.



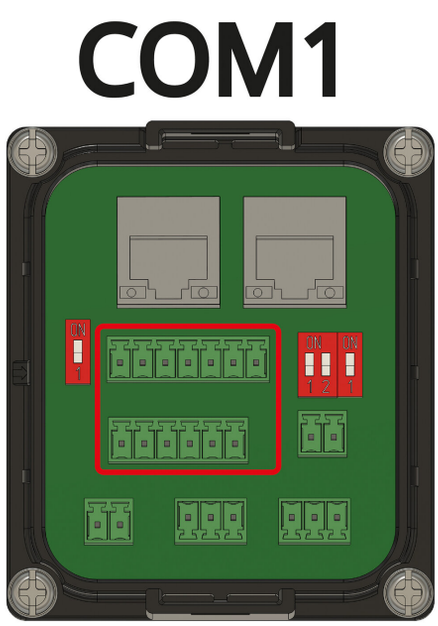
1. A cable with at least 5 cores with a cross-section of 0.34 mm^2 to 0.75 mm^2 is recommended.
2. Feed the cable through one of the holes of the multi-hole seal.
3. *Attention*: One feedthrough is already blocked by the communication cable between the inverter and EMS.
4. Leave the other openings of the multi-hole seal closed.



5. Connect the cores of the control cable as shown in the picture.



6. In order for the inverter to synchronize to the grid, a jumper must be connected between pin 4 and pin 5.
7. A core with a cross-section of 0.34 mm^2 to 0.75 mm^2 is recommended.



8. Plug in the two connectors on the underside of the inverter.

9. Attach the cover to the inverter and tighten the bolt connection.

14.2. Ripple control receiver on grid connection point

The system can be controlled directly via the ripple control receiver (RCR).

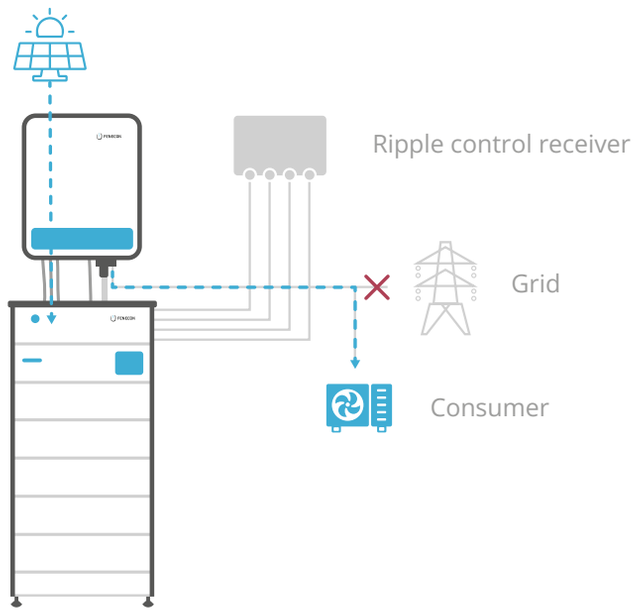


Figure 57. Connection — Curtailment via ripple control receiver

Observe the specifications of your grid operator when connecting the external radio ripple control receiver.

If other inverters are used, these must also be connected separately to the RCR; how exactly depends on the grid operator and the RCR used.

The behavior of the inverter in the various control stages can be described as follows:

- 100 % Standard signal, inverter works without restrictions (100 kW)
- 60 % Inverter output power is reduced to 60 %. (60 kW)
- 30 % Inverter output power is reduced to 30 %. (30 kW)
- 0 % Inverter output power is reduced to 0 %. (0 kW)

When connecting to the FEMS box, the following contacts must be connected in the Harting plug:

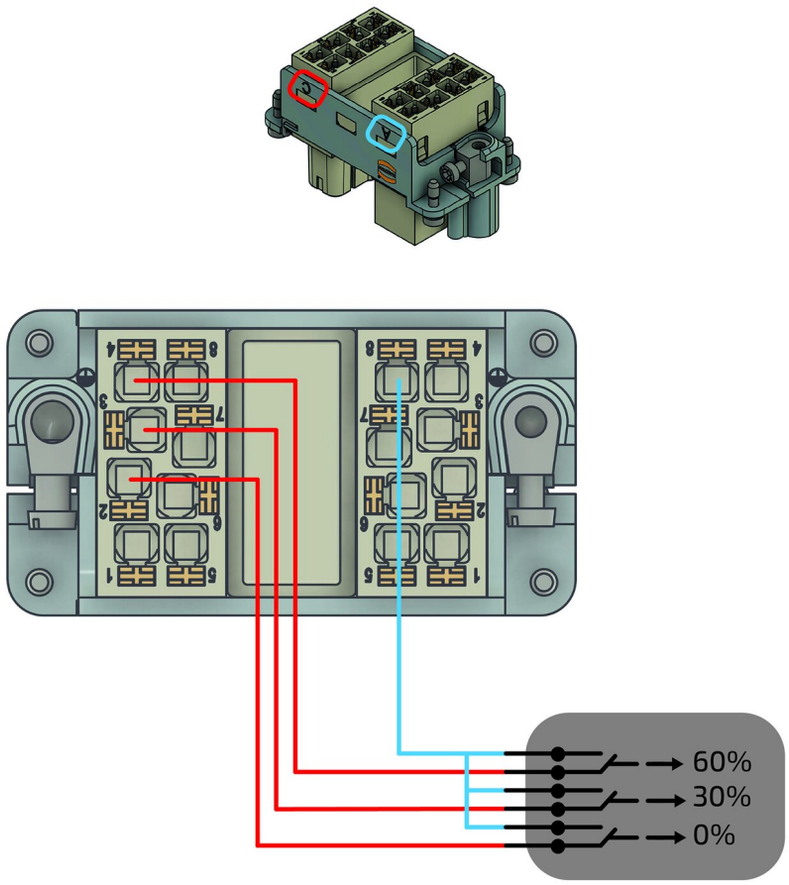


Figure 58. Connection — Ripple control receiver to GCP

During commissioning, the **dynamic ripple control receiver** must be selected under *External limitations*:

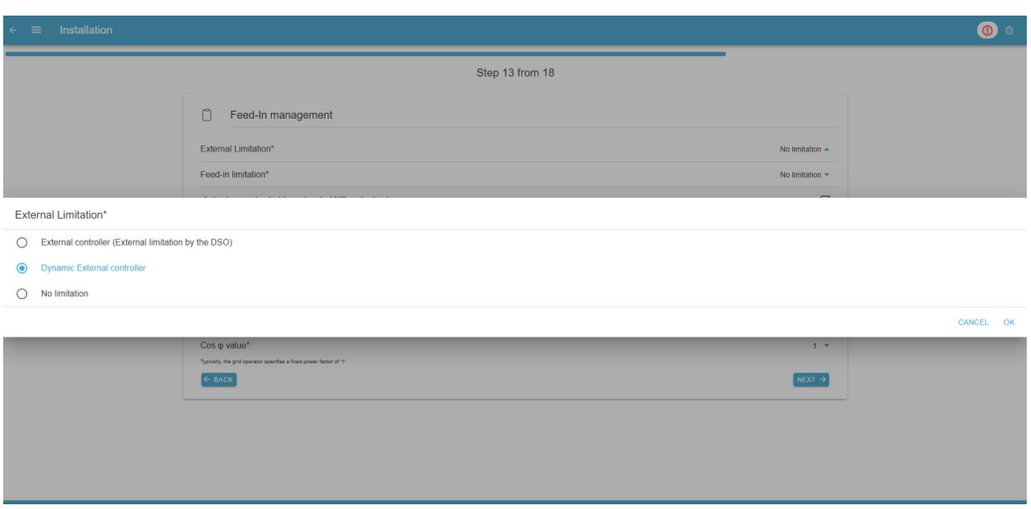


Figure 59. Selection of the dyn. ripple control receiver in FEMS

The ripple control receiver now regulates the grid limitation to the grid connection point and no longer to the AC output. This means that it is also possible to charge the battery and supply the consumer loads with PV production in the event of grid limitation.

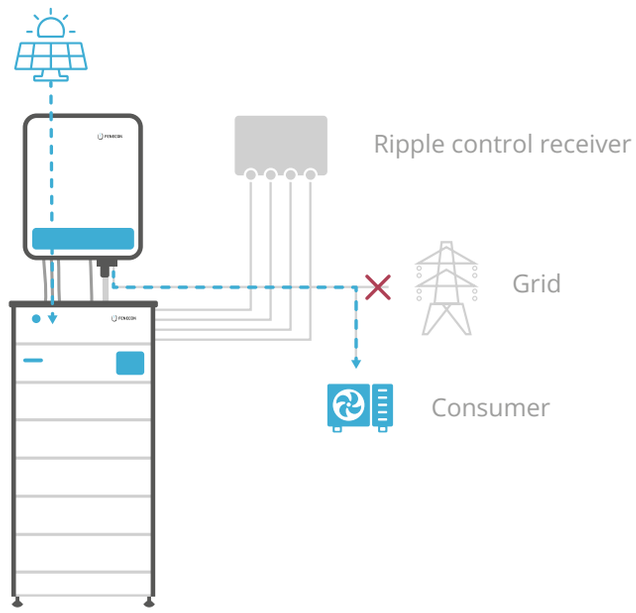
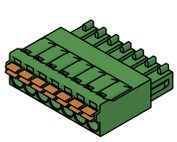


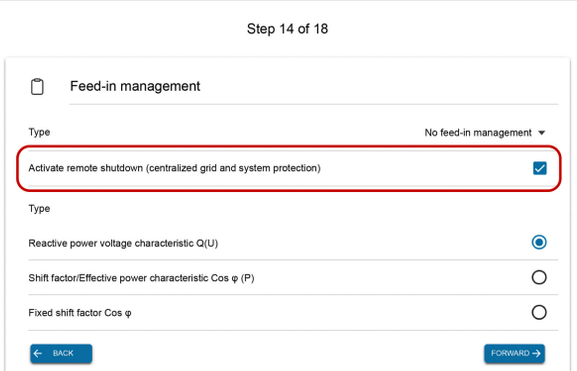
Figure 60. Connection — Curtailment via ripple control receiver

14.3. Remote shutdown

The inverter can be disconnected from the grid when remote disconnection is activated, e. g. via a central grid and plant protection. One of the following plugs supplied with the inverter is required for this.



1. The small parts box of the inverter comes with a 7-pin plug that can be plugged into the bottom of the inverter.

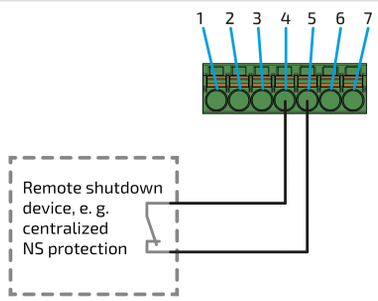


3. To activate the functions, the remote switch-off must be activated during commissioning.
4. Then confirm with *OK*.
5. Continue to the next step with *Next*.

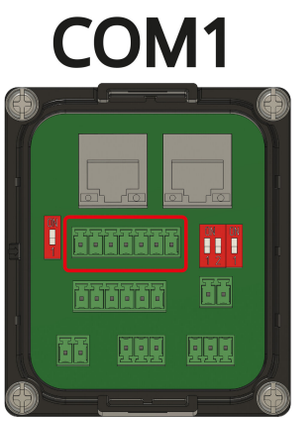
The emergency power output is still active (if activated) and supplies the emergency power to the consumer loads.

14.3. Remote shutdown

1. A cable with 2 cores and a cross-section of 0.34 mm^2 to 0.75 mm^2 is recommended.
2. Feed the cable through one of the holes in the multi-hole seal of the cover.
3. Attention: One feedthrough is already blocked by the communication cable between the inverter and EMS.
4. Leave the other openings of the multi-hole seal closed.



5. The core of the disconnection device must be connected to pins 4 and 5 so that the inverter can be disconnected from the grid.
6. The switch-off device must be equipped with a break contact
   In normal operation, pins 4 and 5 must be bridged via the switch-off device.



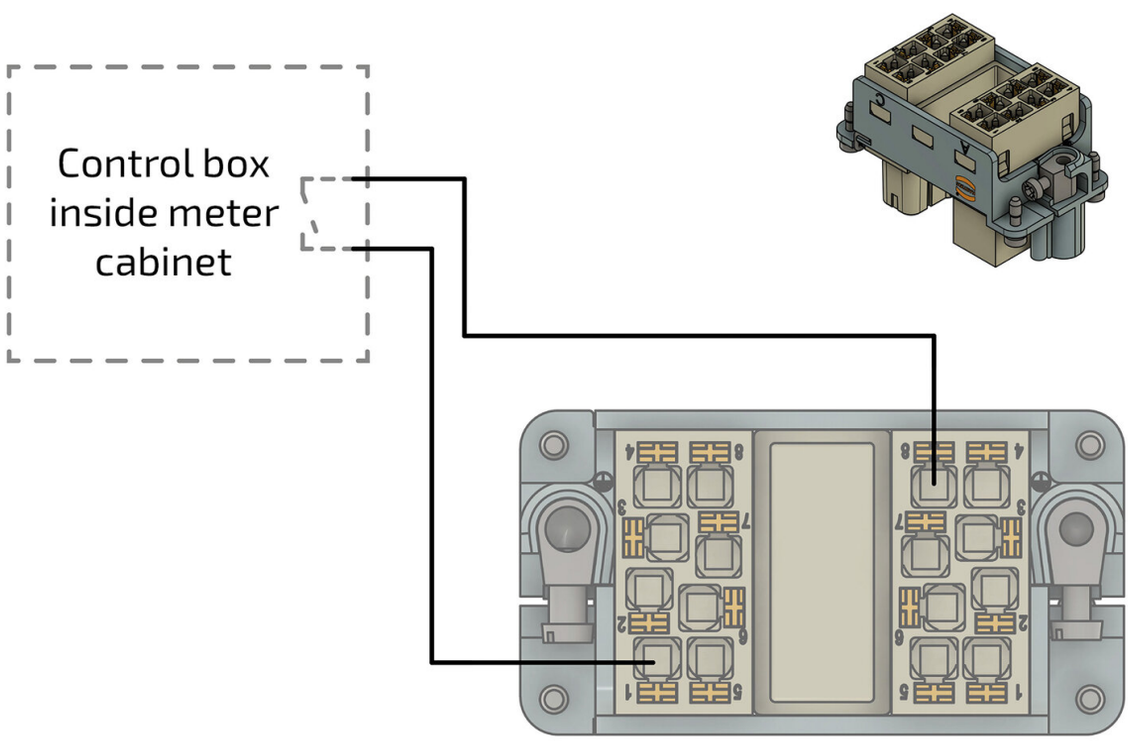
7. Plugging in the 7-pin connector on the underside of the inverter.

8. Attach the cover to the inverter and tighten the bolt connection.

This method can also be used to connect *P,ave monitoring*.

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

15. Troubleshooting

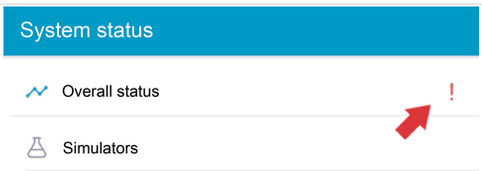
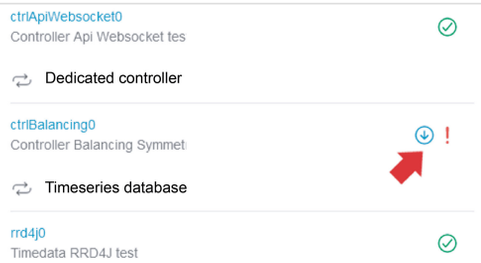
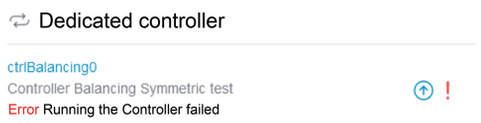
15.1. Errors in Online Monitoring

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*).

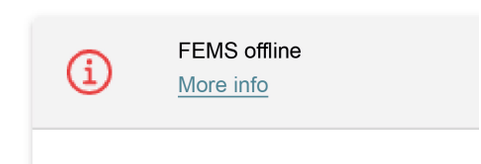
15.1.1. Fault display

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

15.1.2. 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. 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.

15.2. Battery tower

15.2.1. Fault display

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

The various errors are indicated by LED codes.

System status	System information	LEDs					
		blue/red		1	2	3	4
Bootloader		★		★	★	★	★
Start	Master/Slave	●		★	★	★	★
	Parallel Box	●					★
	Extension Box	●				★	
Check mode	Individual 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 % to 75.1 %	●		●	●	●	●
	75.0 % to 50.1 %	●		●	●	●	
	50.0 % to 25.1 %	●		●	●		
	25.0 % to 0 %	●		●			
Error	Overvoltage	●					●
	Undervoltage	●				●	
	Overtemperature	●				●	●
	Undertemperature	●			●		
	Overcurrent	●			●		
	SoH too low	●			●	●	
	Int. communication	●			●	●	●
	Ext. communication	●		●			
	Parallel address error	●		●			●
	Module address error	●		●		●	
	BMS box fuse	●		●		●	●
	Module fuse	●		●	●		
	Contact error	●		●	●		●
	Insulation error	●		●	●	●	
	BMS error	●		●	●	●	●

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

15.2.2. 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.

15.3. Fault list

Component	Error/fault	Measure
Battery module	The battery module has become wet	Do not touch 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. Damaged battery modules must no longer be used. If you suspect that the battery module is damaged, stop operation and contact FENECON Service

Table 49. Troubleshooting

15.4. 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

16. Technical maintenance

16.1. Tests and inspections

When carrying out inspection work, ensure that the product is in a safe condition. Improperly performed inspections can have serious consequences for people, the environment and the product itself.

Inspection work must only be carried out by trained and qualified specialists.

The maintenance instructions of the component manufacturer must be observed for all individual components.

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.

16.2. 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.

The entire product must be cleaned regularly. Only appropriate cleaning agents must be used for this purpose.
The cleaning agents must be free of chlorine, bromine, iodine or their salts. Steel wool, spatulas and the like must not be used for cleaning under any circumstances. The use of unsuitable cleaning agents can lead to external corrosion.

16.3. 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.

16.4. Repairs

In the event of defective components, contact FENECON Service.

16.5. 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.

17. 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.

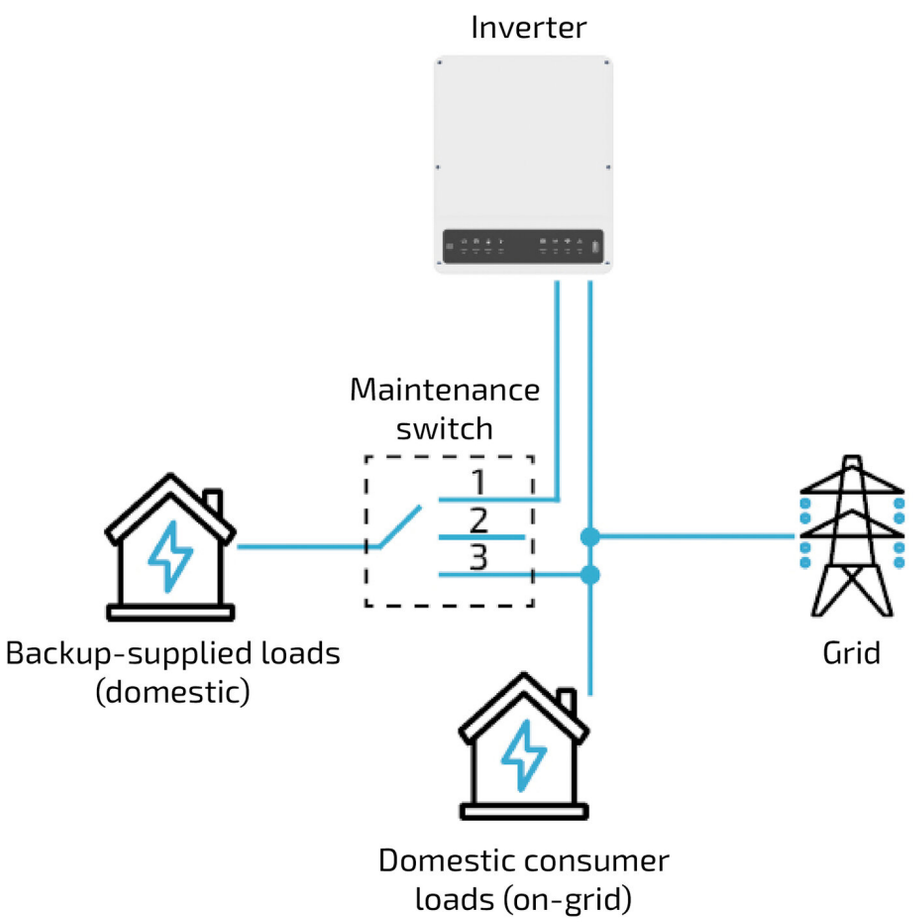


Figure 61. Installation — Maintenance switch using the example of Home 20/30

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.

18. 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..

19. Handover to the operator

19.1. 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 50. Information for the operator

20. 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.

- Only use suitable and tested lifting gear and hoists for transportation!

Risk due to lifted loads!
Standing under suspended loads is prohibited!

Check that the parts and outer packaging are in perfect condition.

Check that

- all screw and bolt connections are tightened firmly,
- the transport rail has been properly attached,
- you wear personal protective equipment (PPE).

- Ensure that nobody is on or near the product during transportation. Do not use people as counterweights.
- Ensure that nobody is below suspended loads.

Notes:

- The batteries are removed or replaced by specialist personnel and transported by a hazardous goods 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.

21. Dismantling and disposal

21.1. Prerequisites

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

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

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

21.2. 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).

21.3. 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.

22. Index

22.1. Index of Figures

22.2. Index of Tables