ferroamp A03 Single 8 kW Solar String Optimizer

ferroamp A03 Single 8 kW Solar String Optimizer User Manual

Contents

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Introduction

This document gives instructions about how to install, troubleshoot and maintain the SSO. Read the entire document and make sure that you understand the safety information before you start to install the SSO.

Safety

Signal words are used to identify different risk levels: Electricity, Warning, and Caution. The signal word Note is used for information.

Electricity
Indication of a dangerous condition or situation where high voltage can cause injury or death to persons if it is not prevented.

Warning
Indication of a dangerous condition or situation that can cause injury or death persons if it is not prevented.

Caution
Indication of a situation or condition that can cause damage to property if it is not prevented.

Safety Instructions

- Install the SSO according to the instructions in this manual.
- Obey all national and local laws and regulations.
- The SSO must be installed by authorized personnel.
- Do not use the product if it has visible damage.
- Do not use the product if you think that there are loose parts in the housing.
- Only a Ferroamp technician can open the SSO. Contact your dealer for further information.

Warranty

The warranty does not apply:

- If the product has been modified.
- If the product was not installed according to the instructions in this manual.

Design and Description

This section gives information about:

- Included items
- Dimensions and Component Overview
- The LED indicator

Included Items

Item	Quantity
SSO Single 8 kW	1
Mounting bracket	1
MC4 PV-connector (+)	1
MC4 PV-connector (-)	1
End terminals (DC nanogrid cable)	3×2
Ring terminal (PE-connection)	2
Installation manual	1
Warranty booklet	1

Table 1. Included items

Component Overview

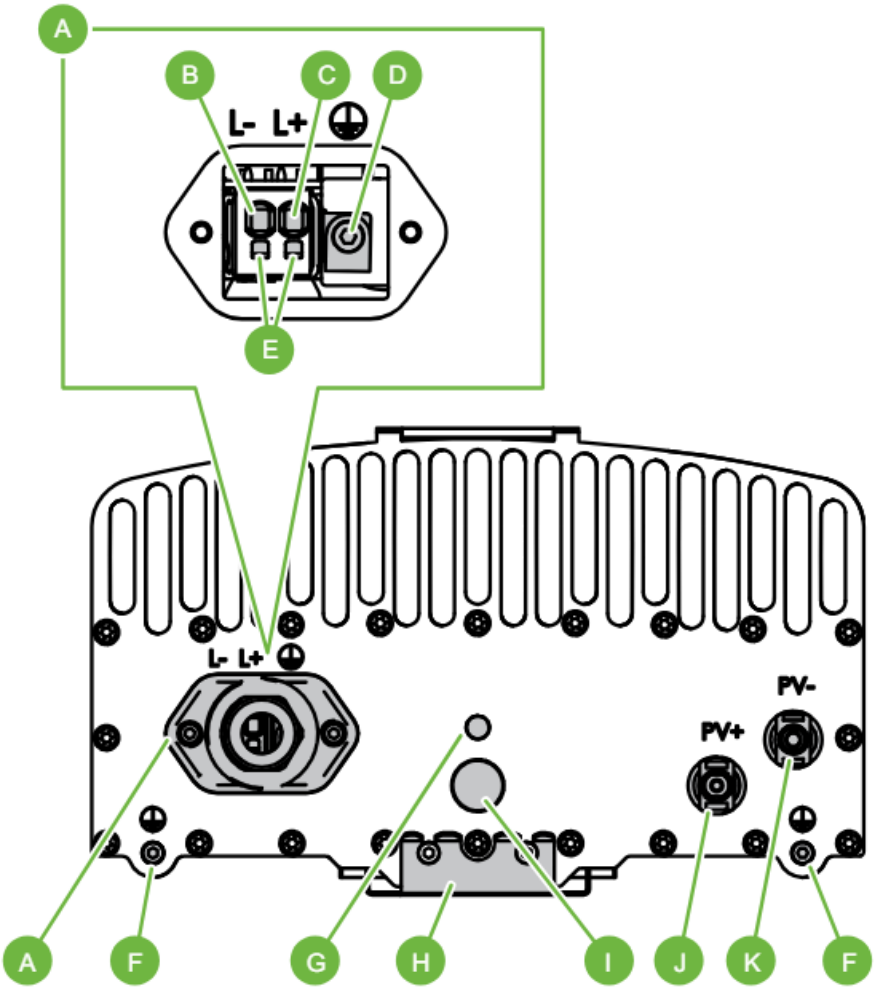


Figure 1. Component overview

Figure 1. Component overview

- A. DC nanogrid connection
- B. Spring-loaded plug-in connector for L-
- C. Spring-loaded plug-in connector for L+
- D. Ground connection via a ring terminal
- E. Release latches for spring-loaded connections
- F. Protective grounding, external (PE)
- G. LED indicator
- H. Mounting bracket
- I. Ventilation valve
- J. PV string connection, PV+ (6 mm^2)
- K. PV string connection, PV- (6 mm^2)

Weight and Dimensions

- Weight
  - 7.0 kg

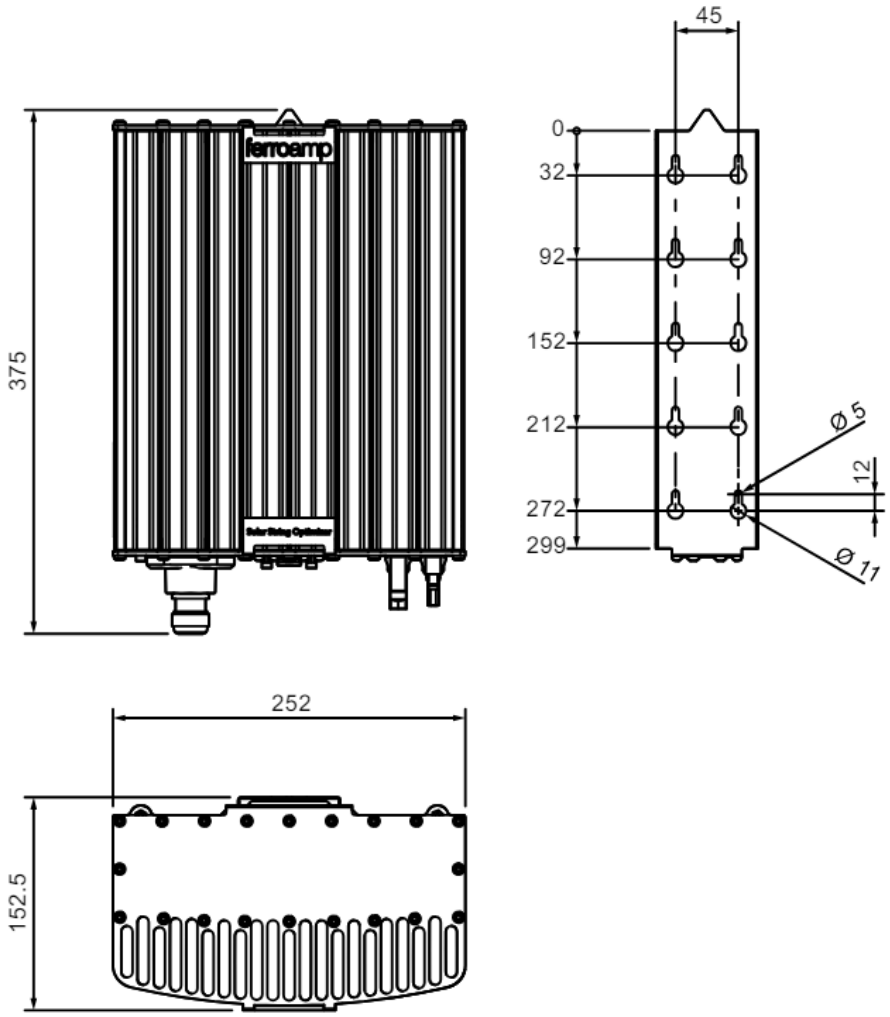


Figure 2. Product dimensions

LED Indicator

The LED indicator is in the center of the bottom of the SSO. The indicator gives information about the status of the SSO, including error codes.

LED Status

Symbol	Description	Status
●	No light	DC nanogrid offline or incorrect polarity
○	Continuous light	Active production
... ● ○ ○ ○ ● ...	Pulsating light	Idle mode, no production
✲ ... ✲ ...	Different number of pulses	Error state. Count the number of pulses and refer to *Table 3. Error states*

Table 2. LED status

Error States

The SSO sends the error signal continuously. Count the pulses between the pauses and refer to the table that follows.

Symbol	Description	Status
... ● ✲ ● ...	1 pulse	Incorrect polarity from the PV string
... ● ✲✲ ● ...	2 pulses	Isolation fault (IMD)
... ● ✲✲✲ ● ...	3 pulses	Ground fault (RCD)
... ● ✲✲✲✲ ● ...	4 pulses	Too high input voltage (>1000V)
... ● ✲✲✲✲✲✲ ● ...	5 pulses	Overheating (stopped or restricted power production)
... ● ✲✲✲✲✲✲ ● ...	6 pulses	Incorrect voltage on the DC nanogrid
... ● ✲✲✲✲✲✲✲ ● ...	7 pulses	Other internal fault. Contact your reseller.
... ● ✲✲✲✲✲✲✲✲ ● ...	8 pulses	No communication with the EnergyHub

Table 3. Error states

Installation

Electricity
When a PV panel is exposed to light it supplies voltage to connected equipment and wires. Injury or death to persons can occur.

Warning
Do not install the SSO so that it blocks the way if an emergency evacuation becomes necessary. Injury or death to persons can occur.

This chapter gives step-by-step instructions for a complete installation the SSO. The information guides you through:

- Installing the SSO
- Connecting the PV string
- Connecting to the DC nanogrid

Necessary tools

- MC4 connector crimping tool. Ferroamp recommends tools from Stäubli or Amphenol.
- End terminal crimping tool (1.5 – 6 mm)
- Hex key, 3 mm
- Cable cutter
- Wire stripper

Required conditions:

- A disconnect switch must be installed between the SSO and the EnergyHub.
- PV string dimensioning must be done before you install the SSO. Refer to Ferroamp Academy for detailed information.
- The SSO must be installed vertically with the connections facing down.
- The SSO must be protected from direct sunlight.
- The location of the SSO must have sufficient ventilation.

- Make sure that surrounding materials can resist a temperature of a minimum of 70 °C. The SSO can reach a working temperature of 70 °C.
- If you install the SSO in a cabinet, forced ventilation is necessary to supply the necessary heat dissipation.
- The wall and the fasteners must hold a load of a minimum of 10 kg.
- The SSO must have a clear space of a minimum of 50 mm on the sides and 200 mm at the top and bottom.

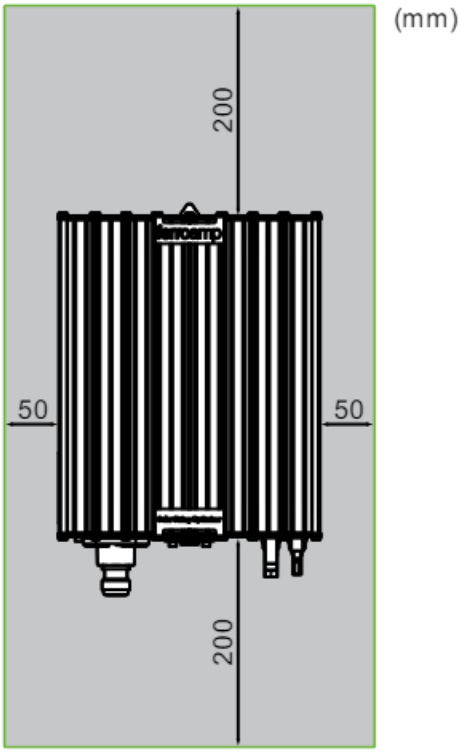


Figure 3. Clear space around the SSO

- If you install additional adjacent units you must use the CC measurements specified in the following figure.

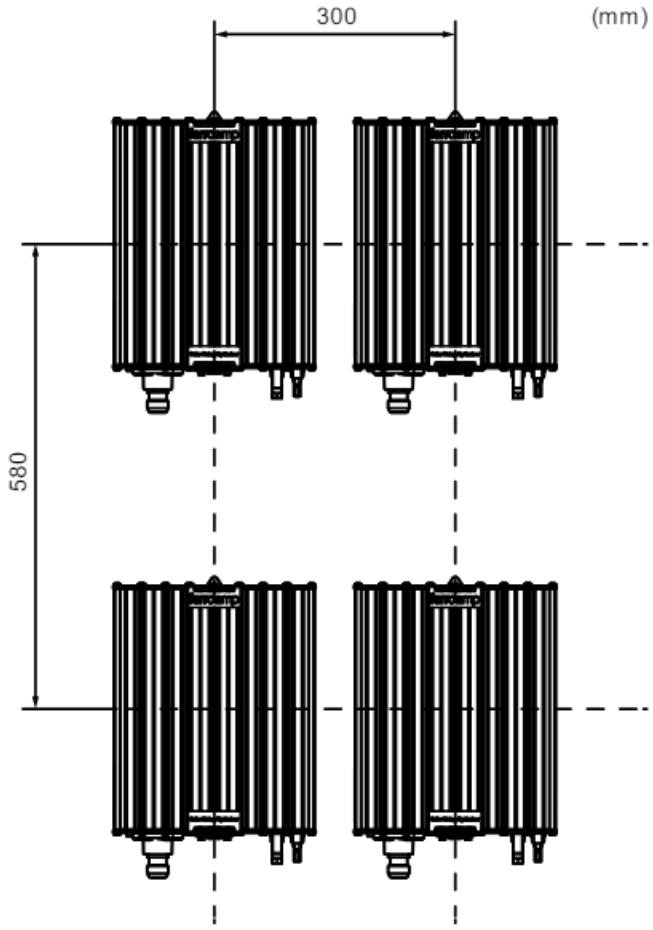


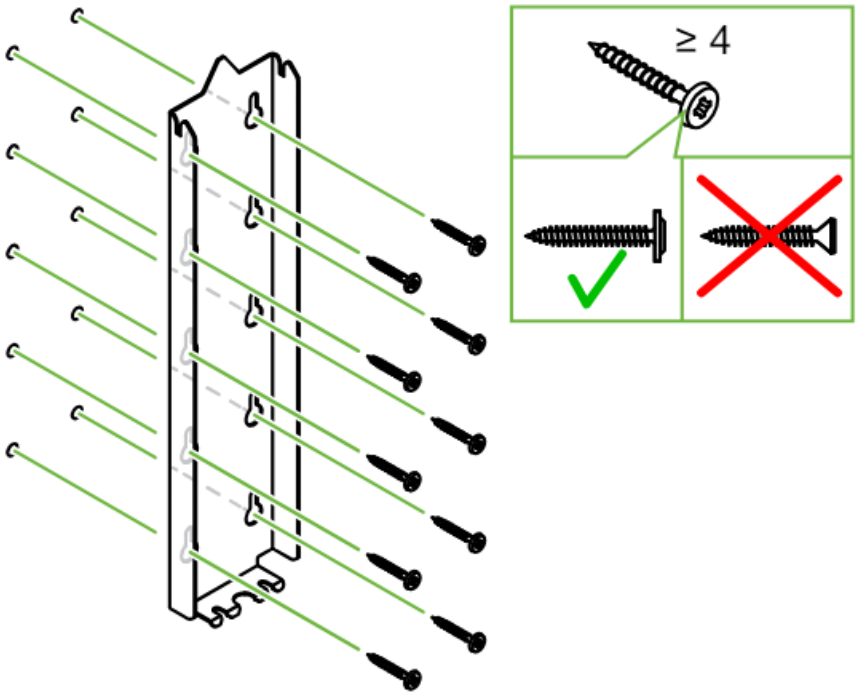
Figure 4. CC measurements for additional units

Installing the SSO

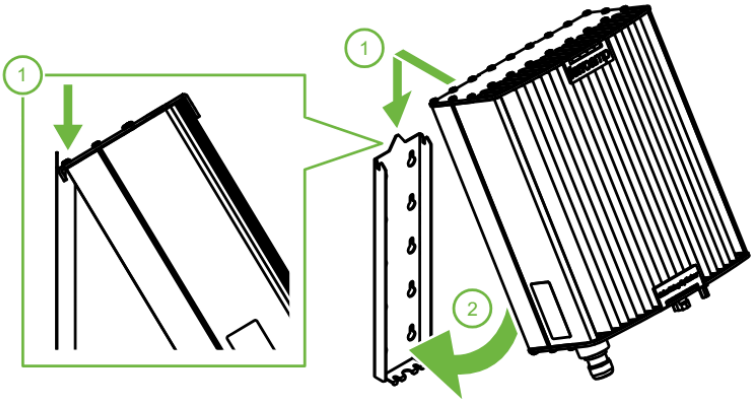
To install the SSO:

Caution
Do not use countersunk screws when you install the SSO. A countersunk screw head can bend the bracket.

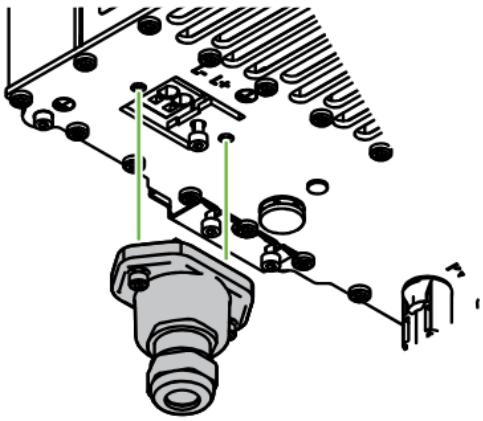
1. Install the mounting bracket with a minimum of four mounting screws. Make sure the pointed part of the bracket faces upward.



2. Put the SSO on the top of the bracket and hold it with your hands until you know it is safely attached.



3. Make sure that the SSO is straight and in the middle of the bracket.
4. Carefully tighten the two screws at the bottom of the bracket to a maximum of 1 Nm.



Connecting the PV String

Electricity

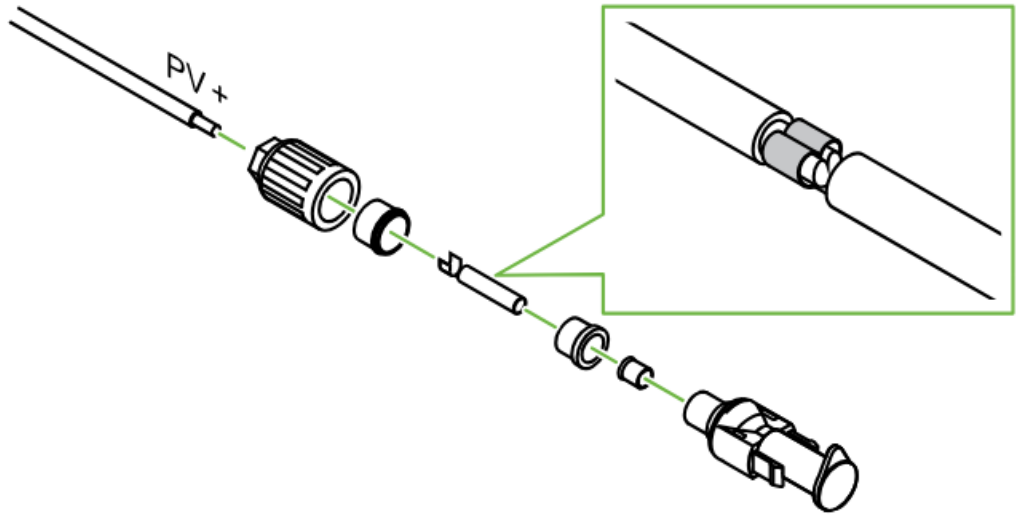
Make sure that the DC nanogrid is not energized when you connect the PV string. Injury or death to persons can occur.

Electricity

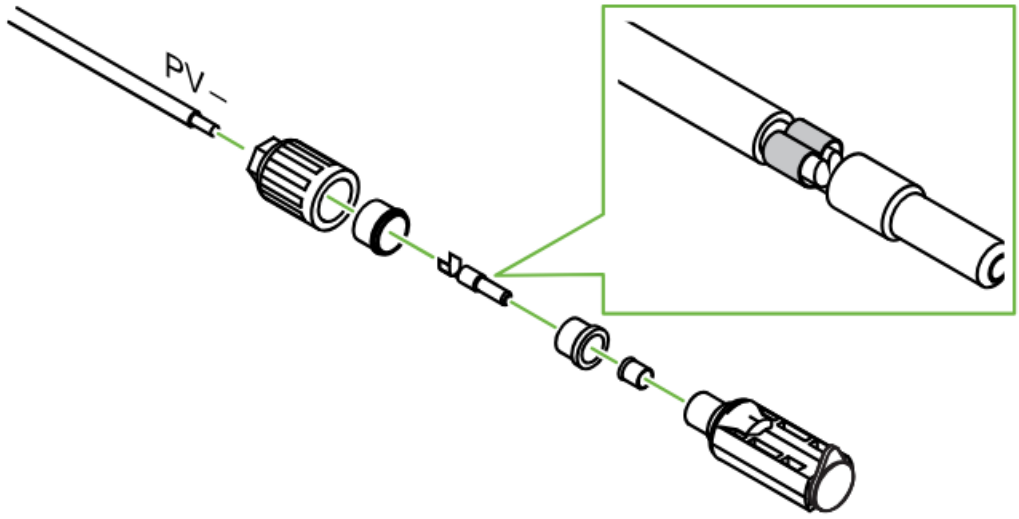
Only use the connectors supplied with the product. Incorrect connectors can cause loose contact and electric arcing. Damage to equipment, Injury or death to persons can occur.

To connect to the PV string:

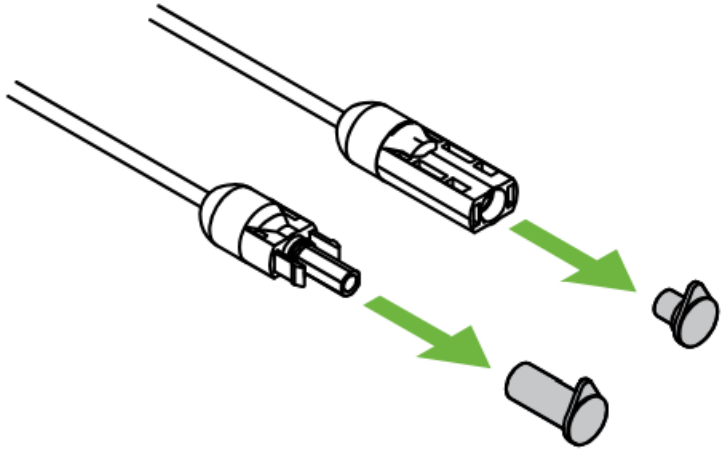
1. Connect the positive (+) PV connector to the positive (+) terminal of the PV string. Use the crimping tool.



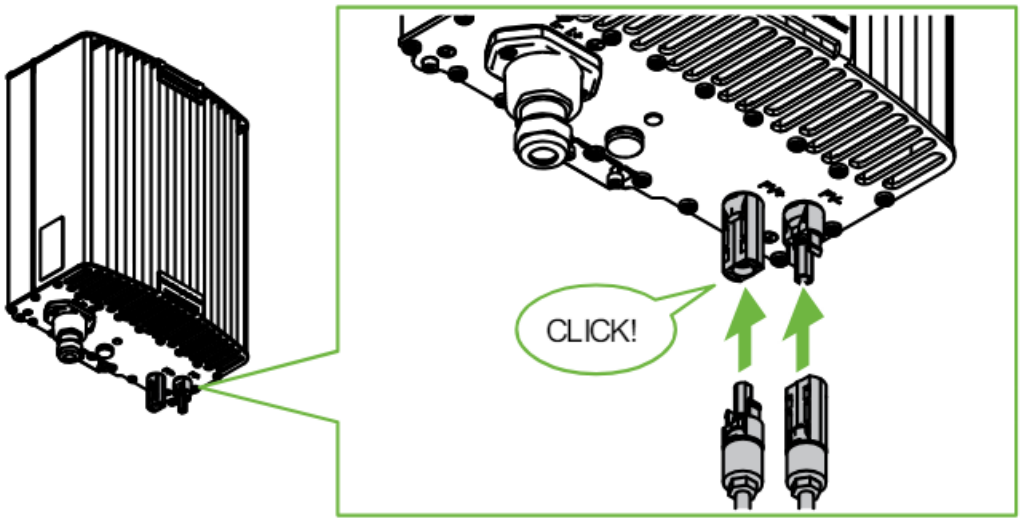
2. Connect the negative (-) PV connector to the negative (-) terminal of the PV string. Use the crimping tool.



3. Remove the rubber plugs and discard them.



4. Connect the two connectors to the SSO.



Connecting to the DC Nanogrid

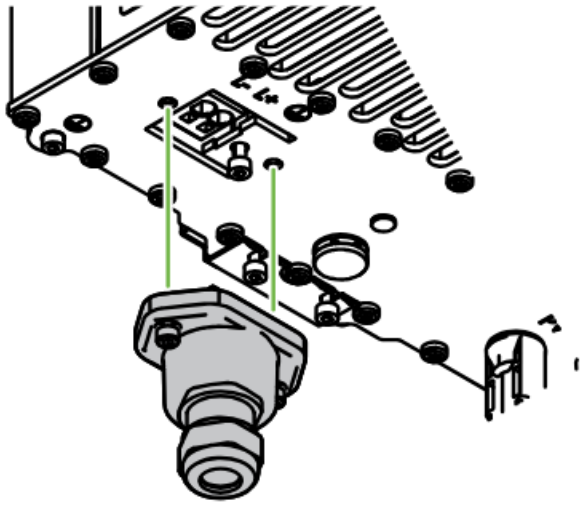
Electricity
Make sure that the DC nanogrid is not energized when you connect the SSO. Injury or death to persons can occur.

Electricity
The protective earth does not replace grounding of the DC net connection. The DC net connection must be grounded for a safe installation. Injury or death to persons can occur.

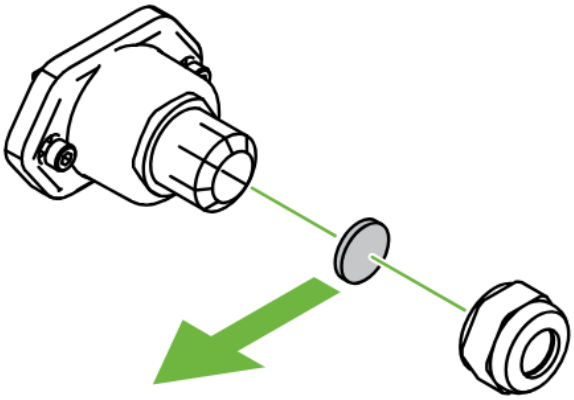
Caution
Electrical work must be done in a dry environment. If water or moist enters the housing when you open the cable gland, damage to the equipment can occur.

To connect to the DC nanogrid:

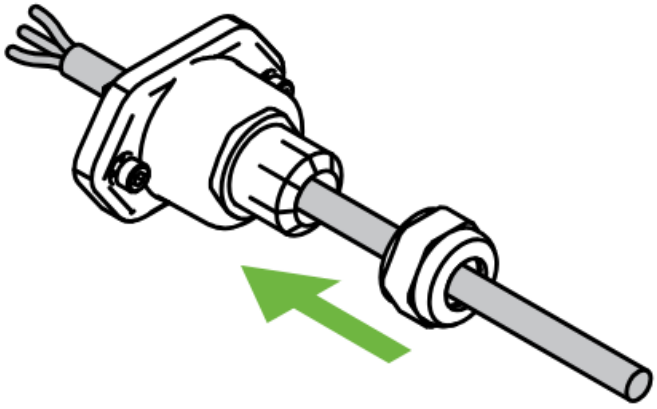
1. Calculate the correct cable dimension. A maximum voltage drop of 2 % between SSO and EnergyHub is allowed. You can use Ferroamp's cable calculator to calculate the correct dimension, **Cable Calculator | Ferroamp Tools**
2. Loosen the two screws on the cable gland and remove it.



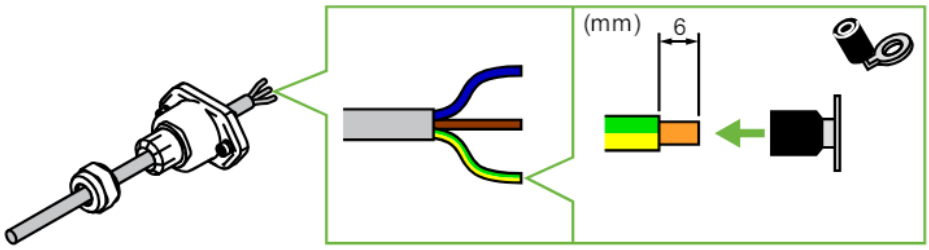
3. Remove the gland and remove the rubber plug from the cable lead-through. Discard the plug.



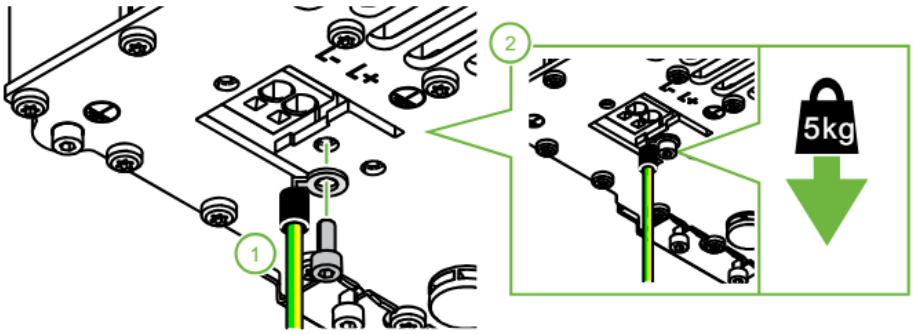
4. Put the cable through the cable gland.



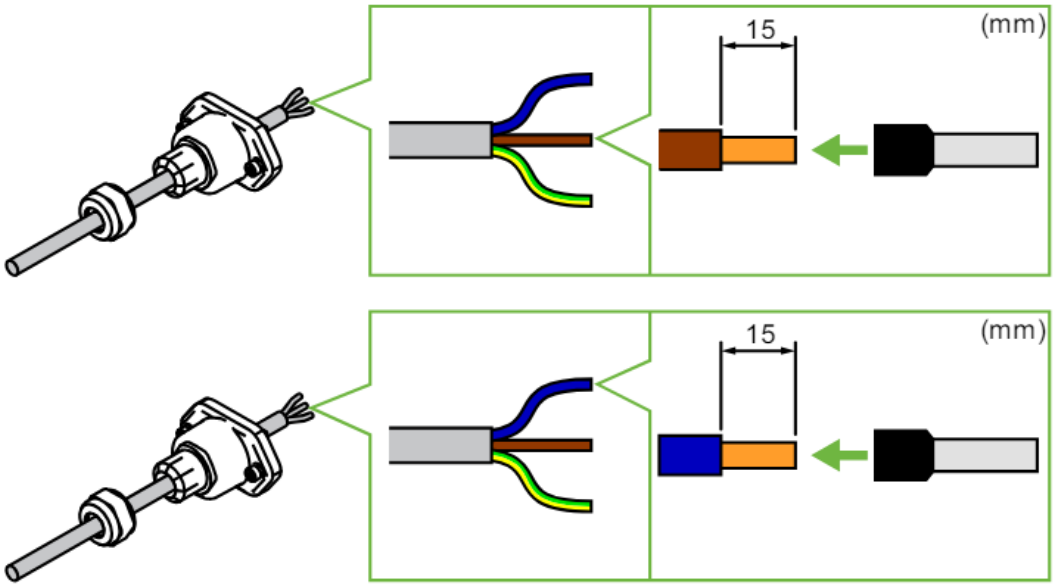
5. Strip 6 mm insulation from the PE cable.



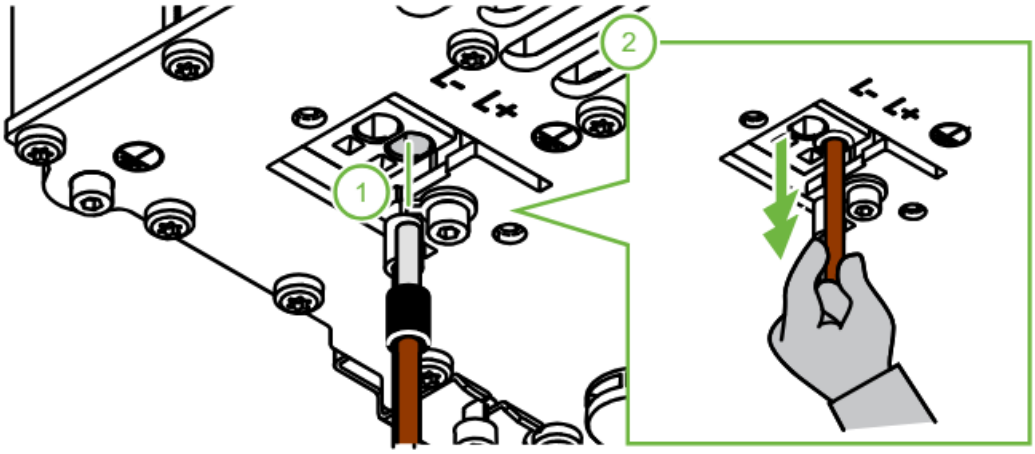
6. Install the ring terminal on the PE cable.
7. Connect the PE cable.



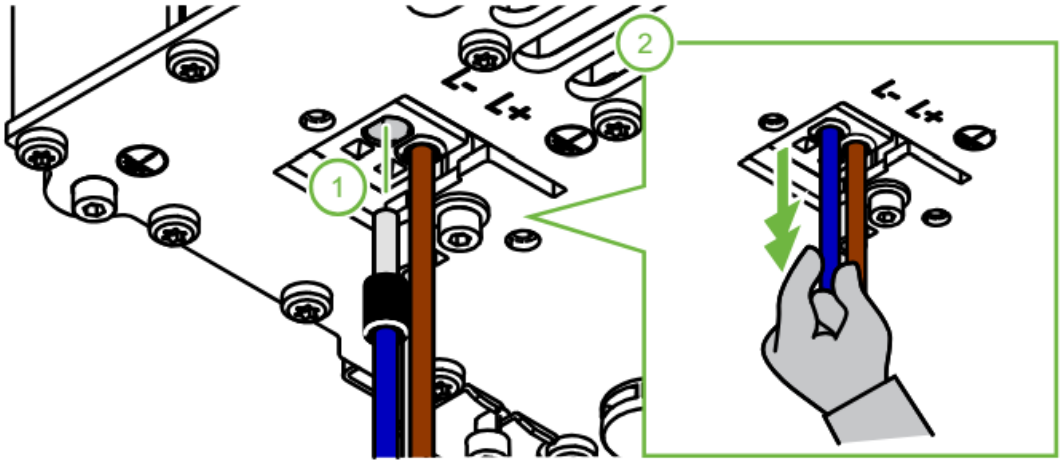
8. Make sure that the PE connection can hold a load of 5 kg.
9. Strip 15 mm insulation from the L+ and the L- conductors.
10. Install the end terminals on the L+ and the L- conductors.



11. Connect the L+ connector to the right spring-loaded connector. Push the ferrule all the way in until it is flush with the housing.



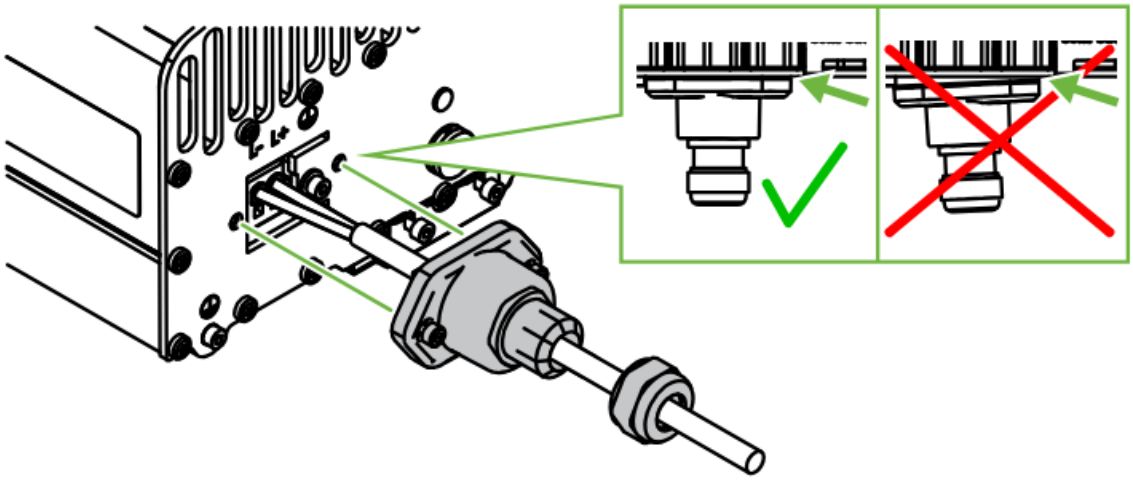
12. Connect the L- connector to the left spring-loaded connector. Push the ferrule in until it is flush with the housing.



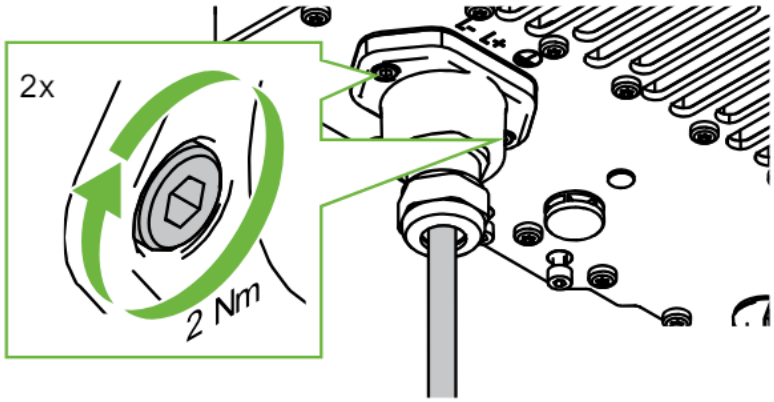
13. Pull both connectors lightly to make sure that they are correctly attached.

    Caution Make sure that the cable gland is tight against the housing. If the gland is incorrectly installed, water can enter the housing and cause damage to the equipment.

14. Install the cable gland tightly against the housing.

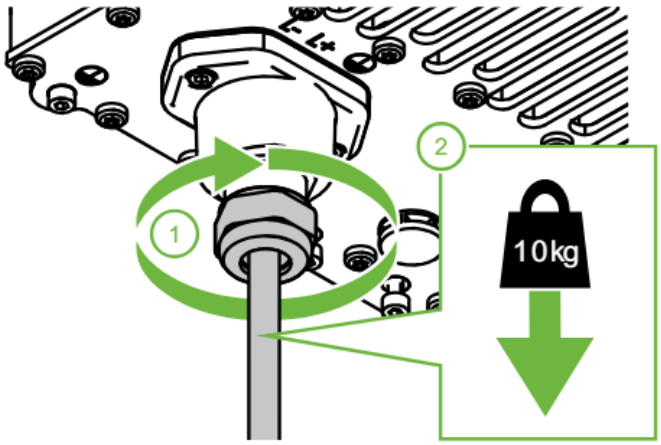


15. Tighten the two screws on the cable gland to 2 Nm.

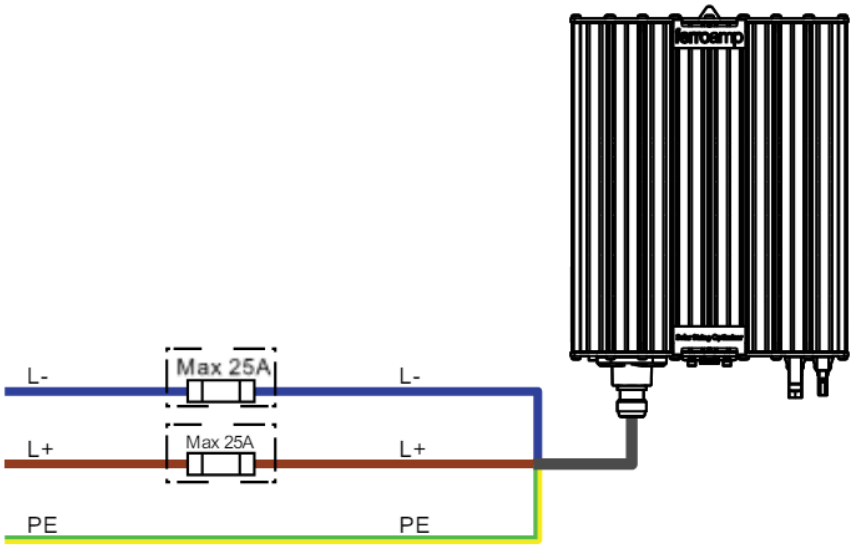


Caution The cable gland breaks easily. Do not use adjustable pliers or similar tools when you close it.

16. Use your fingers to tighten the cable gland. Make sure that it closes.
17. Make sure that the connection can hold a load of 10 kg.



18. Install a gPV fuse of maximum 25 A between the SSO and the DC nanogrid.



19. Start solar power production. Refer to the user manual for the EnergyHub.

Disconnection

Electricity

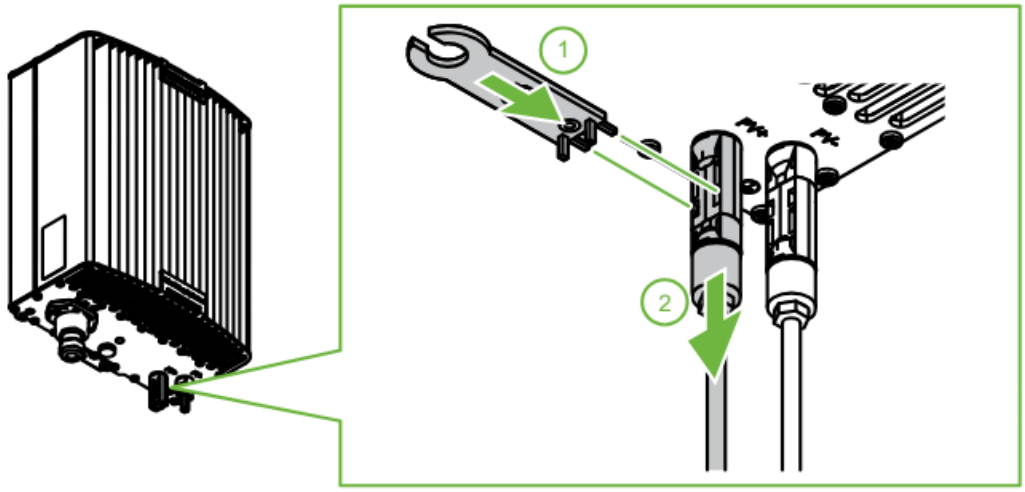
- When a PV panel is exposed to light it supplies voltage to connected equipment and wires. Injury or death to persons can occur.
- Do not disconnect the DC nanogrid from an SSO that operates. Dangerous arcing can occur and cause injury or death to persons.
- Do not disconnect a PV string from an SSO that operates. Dangerous arcing can occur and cause injury or death to persons.
- Dangerous voltage can remain for up to 5 minutes on the PV terminals of the SSO when you disconnect the PV string. Injury or death to persons can occur.

Necessary tools

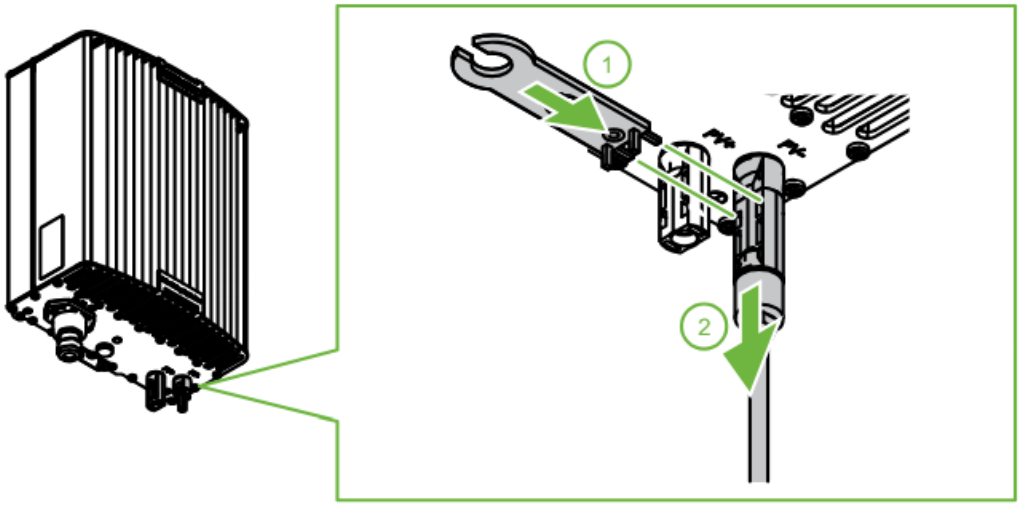
- MC4 connector wrench. Ferroamp recommends tools from Stäubli or Amphenol.
- Hex key, 3 mm
- Flat screwdriver, 2.0 – 3.5 mm

To disconnect an SSO:

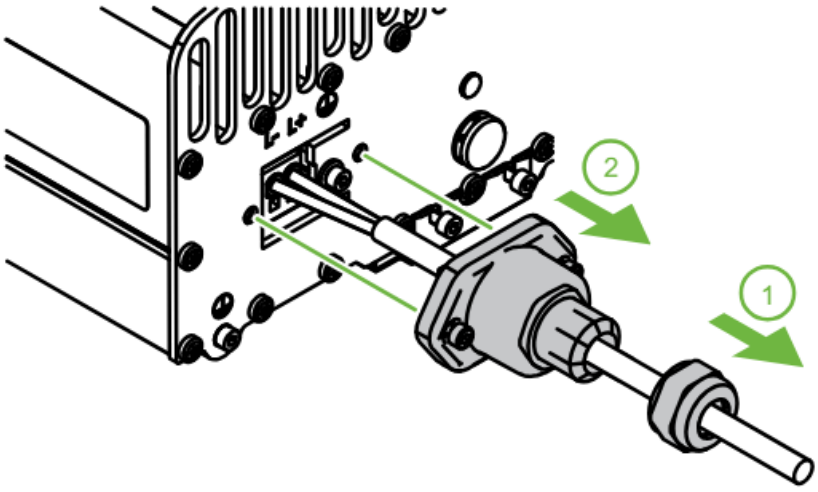
1. Turn off the DC nanogrid.
2. Open the breakers in the SSO DC distribution.
3. Wait for the solar power production to stop. This occurs after approximately 30 seconds.
4. Make sure that the LED indicator shows OFF.
5. Use a DC clamp to make sure that the wires have no current.
6. Disconnect the PV+ connector



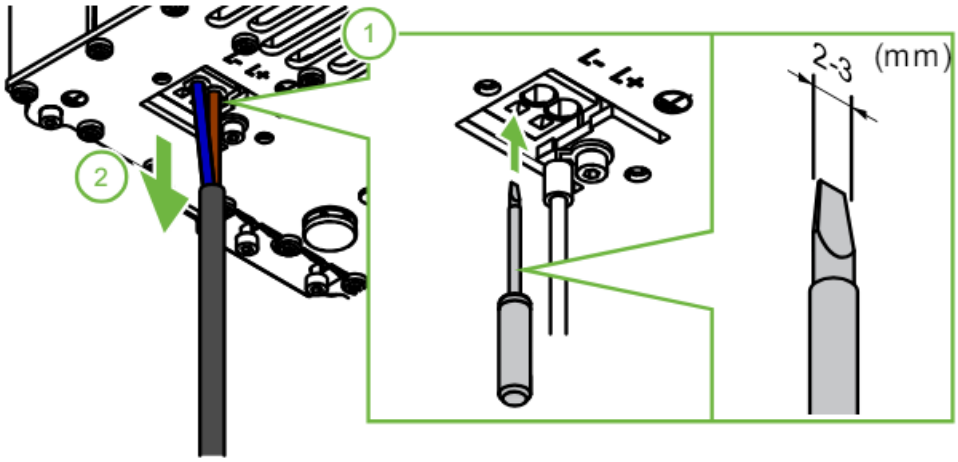
7. Disconnect the PV- connector.



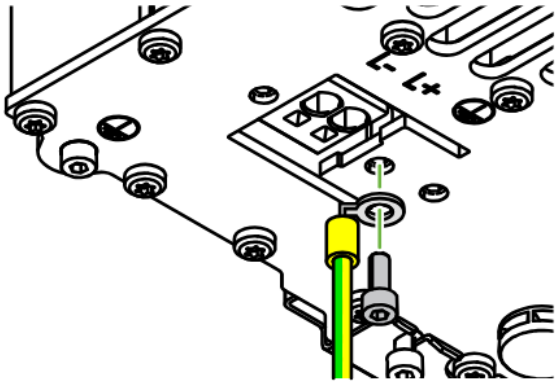
8. Open the gland and remove it.



9. Push the release latches for L+ and L- with a flat screwdriver and remove the conductors. If you insert the screwdriver so that it stays at the release latch, the terminal stays open while you work.



10. Remove the PE cable.



Troubleshooting

Refer to LED Indicator for information about error states.

EnergyHub does not have a connection to the SSO
When the EnergyHub and the DC nanogrid are on, the EnergyHub automatically identifies all connected SSOs. The identification can take up to 10 minutes. When the SSO is identified, it shows in a list on the EnergyHub display. Refer to the manual for EnergyHub.

An unidentified SSO can be caused by some of the following reasons:

- The polarity in the DC nanogrid is incorrect. Do a check of the polarity in the DC connector of the SSO that is not detected.
- Broken fuses or open breakers between the EnergyHub and SSO. Do a check of the fuses and breakers.

No solar power production but EnergyHub has a connection with an SSO through a display or portal

This error can be caused by some of the following reasons:

- Solar power is not set to active in EnergyHub (Mode PV). Refer to the EnergyHub manual.

Electricity
Do not disconnect a PV string if a current is flowing in either direction. Cover the panels or wait until nightfall before you disconnect a PV string. Injury or death to persons can occur.

- A PV string has incorrect polarity. Use a current clamp to make sure that no reverse current is flowing through the PV string during solar irradiation.
- The SSO is incorrectly connected to the DC nanogrid. Make sure that L+ or L- are not confused with PE, or that M (Middle of the DC nanogrid) is connected instead of a Line conductor in the DC nanogrid connection.
- Installation error in one PV string. Use applicable PV-related instrumentation to troubleshoot.
- Ground fault current from PV string. Use applicable PV-related instrumentation to troubleshoot.

Solar power production from an SSO is restricted
This error can be caused by some of the following reasons:

- EnergyHub is configured to restrict the export to an external power grid. Do a check of the system settings in the Portal. This will show if solar power production follows the load in the facility. This is easiest investigated through the power view in the portal.
- Insufficient cooling of the SSO. Make sure that the SSO has sufficient airflow and that the SSO is not in direct sunlight. This restriction occurs as a flattening of the power from one or more units when the solar irradiation is strong and the surrounding temperature too high.
- The SSO is restricted because of voltage drop in a wire. Contact your reseller for support.

Maintenance

Only authorized technicians can do electrical service on the product.

Cleaning
Make sure that the front of the SSO is clean and free from dust to make sure that the airflow is sufficient. If necessary, clean the unit with a moist cloth. Only use water to clean the unit.

Documents / Resources

	ferroamp A03 Single 8 kW Solar String Optimizer [pdf] User Manual A03 Single 8 kW Solar String Optimizer, A03, Single 8 kW Solar String Optimizer, Solar String Optimizer, String Optimizer, Optimizer

References

- Cable Calculator | Ferroamp Tools
- User Manual