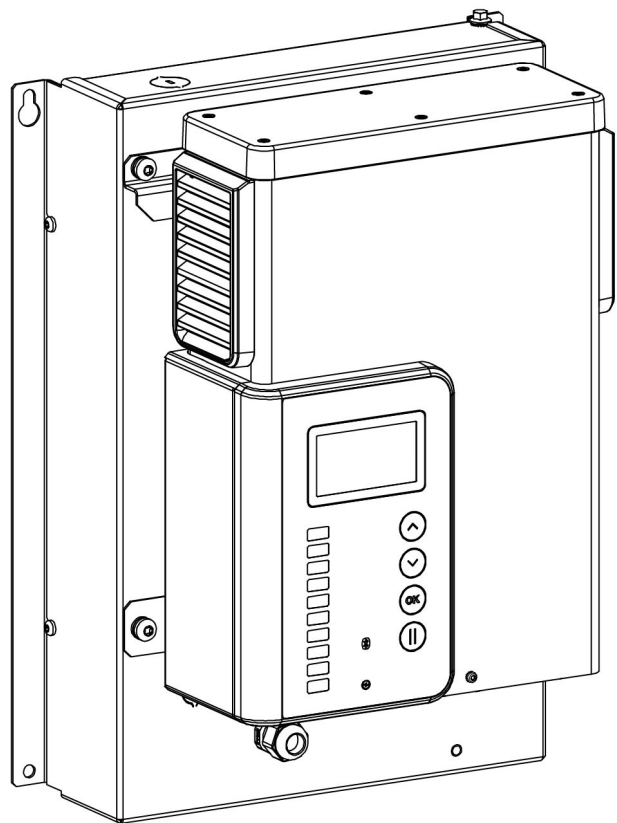
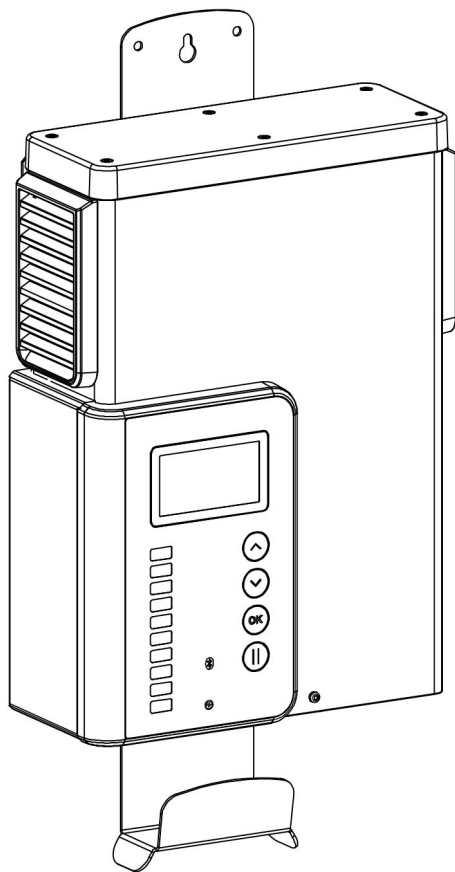


MICROPOWER SX USER MANUAL

Battery charger (Li-ion)



Valid for Micropower SX-Li / SX-Li-CAN with
Model Code:
3AGD7*5, 3AGD8*5

MICROPOWER GROUP[™]
POWERFUL SOLUTIONS PARTNER

Safety.....	3
Safety precautions.....	3
Warning information.....	6
Graphical symbols.....	6
Introduction.....	7
Description.....	7
Receiving.....	7
Installation.....	7
Mechanical installation.....	7
Electrical overview.....	7
Electrical installation.....	8
Operation.....	8
User interface - Control panel.....	8
Charging.....	9
LED indication.....	9
Parameter settings.....	10
Check settings.....	10
Maintenance and troubleshooting.....	11
Statistics.....	11
Safety shut-off.....	11
Fuse protection.....	11
Alarms.....	12
Checks.....	12
Technical data.....	12
Recycling.....	12
Additional information.....	13
Contact information.....	13
Figures.....	14
Fig. 1 Control panel.....	14
Fig. 2 Installation.....	14
Fig. 3 Connections and components.....	17
Fig. 4 Dimensions.....	18
Fig. 5 Installation options.....	20
Approvals.....	21

Safety

Safety precautions



Read the instructions. The manual contains important safety and operating instructions. Always keep this manual near the product.

Read and understand these instructions, the battery instructions provided by your battery manufacturer, and your employer's safety practices, before using, installing, or servicing the product.

Only qualified personnel should install, use, or service this product.

Applies to the European market, EN standard: This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

Applies to markets outside Europe, IEC standard: This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

Intended use

The battery charger is intended for charging lithium-ion (Li-ion) batteries.

Battery charger and BMS adjustment

The charging process must be controlled by an external Battery Management System (BMS), connected, and adjusted to the battery. The chargers covered in this manual do not have any internal integrated BMS system, which means that an external BMS system must be used. The BMS can either communicate with the charger via serial data communication (CAN bus), by analog I/O functions, or both in combination.

When CAN bus is used, the charger and the charging process may be controlled by the BMS system, and the battery charger uses given values from the BMS system to charge the battery. While controlling the charger and charging process via CAN bus, the BMS system must be able to disconnect the charger and load from the battery by external switches in case of emergency.

The charger can alternatively charge the battery through a pre-set charging curve adjusted to the actual battery. Also in this charging mode, the charging process must be monitored and controlled by an external BMS system. The BMS system must monitor the charging process and the battery status and must stop the charging curve generated from the charger if needed. The BMS unit can communicate with the charger via analog I/O functions but must then also be able to disconnect the charger from the battery via external switches in case of emergency.

Before start charging

Proper installation of the battery charger and implementation of necessary safety devices and measures, including their maintenance, is the responsibility of the operating company/customer. As a basic rule, a risk and hazard analysis must be prepared in accordance with local requirements and best practices.

Before connection, check the marking on the battery and the battery charger.



CAUTION

Incorrect settings of the battery charger may damage the battery. Always check settings before start charging.

Ensure that the battery is equipped with a suitable and adjusted BMS and that the conditions for any of the following two alternative charging processes are met.

Alt 1. BMS controlled charging by use of serial communication and analog control. Ensure that the charger is adjusted for correct:

- Serial data communication.
- Analog I/O functions (if used).

Alt 2. Charging with charging curve, monitored by external BMS.

Ensure that the charger is adapted for the battery type. Check, confirm, and if adjustable, set the following for each individual battery type before charging:

- Charging curve.
- Number of battery modules.
- Battery capacity (Ah).
- Analog I/O functions (if used).

LITHIUM-ION BATTERY SAFETY SYSTEM



WARNING

RISK OF BATTERY DAMAGE!

Read and follow the precautions provided below:

Charging of lithium-ion batteries may only be performed when a, for battery and battery charger, approved safety system for battery monitoring and module balancing is connected and active.

The complete system is further referred to in this manual as a BMS system.

The BMS system must:

1. Monitor and protect the battery so that no hazardous conditions can occur when charging or using the battery.
2. Monitor and balance each individual series-connected module in the battery.
3. Disconnect the battery from the battery charger and power load, in accordance with applicable national standards, before a hazardous situation may arise.
4. Ensure that each individual module is balanced, considering voltage and charge level.
5. Operate automatically without the need for manual monitoring.

The battery chargers covered by this manual do not have their own integrated BMS system.

All use of battery chargers covered by this manual requires that an external BMS system is connected and active during all charging and use of the battery. The BMS system must be automatic and approved for battery and battery charger.

Even if a battery charging curve for lithium-ion battery is selected and adjusted in the battery charger, an external BMS system must be connected and active during all charging and use of the battery. The BMS system must be automatic and approved for battery and battery charger.

- Ensure that the battery's limitations according to its data sheets are not exceeded during charging or use. Note that the restrictions apply to each module in the battery.
- Charging lithium-ion batteries must not be performed if the modules have a temperature lower than 0 °C.
- The lithium-ion modules to be charged should have a uniform temperature.
- Battery modules must not be hermetically enclosed in external housings without proper ventilation being ensured.

**CAUTION****RISK OF MATERIAL DAMAGE!**

Read and follow the precautions provided below:

- Do not charge non-rechargeable batteries, damaged batteries or battery types not intended for the charger.
- Do not disconnect the battery when the charging process is in progress. Arc flash may occur and damage the connector pins. Always stop the charging process before the battery is disconnected.
- Do not keep flammable material close to battery charger.

**WARNING****RISK OF FIRE OR EXPLOSION!**

Sparks or molten metal falling from the charger can cause fire or explosion. Read and follow the precautions provided below:

- Install over noncombustible material such as metal or concrete.
- Keep the charging area clear of combustible material.

**WARNING****RISK OF ELECTRIC SHOCK!**

High voltage inside. The battery charger contains voltage at a level that can cause personal injury. Read and follow the precautions provided below:

- Incorrect connection of battery cables can cause personal injuries and damage to the battery, battery charger and cables. Make sure the connections are correct.
- Disconnect the battery and power supply before maintenance, servicing, or dismantling.
- Check that the power supply at the site of the installation complies with the rated voltage specified on the battery charger's data label.
- The battery charger may only be connected to a power outlet with protective earth.
- Do not operate the charger if there is any evidence of damage.
- If the supply cord or plug is damaged, the manufacturer, its service agent, or similarly qualified persons must carry out any replacement of the cord / plug in order to avoid a hazard.
- If a stationary appliance is not fitted with a supply cord and a plug, or with other means for disconnection from the supply mains, disconnection must be incorporated in the fixed wiring in accordance with the national wiring rules.

**WARNING**

High output voltage. Do not touch uninsulated battery terminals, connectors, or other live electrical parts. Read and follow the precautions provided below:

When installing or performing work on battery, charger, and battery terminals – do not risk short circuits. A short circuit may cause personal injury and permanently damage the battery. For all work on battery chargers, batteries and battery systems, suitable insulated tools must be used.

**WARNING****RISK OF BURNS!**

Read and follow the precautions provided below:

Battery cables / battery connectors may become hot during charging. Wear protective gloves.

Warning information

Hazardous situations and precautions are presented in the text as follows.

**WARNING**

Indicates a potentially dangerous situation. Death or serious injury may occur if appropriate precautions are not taken.

**CAUTION**

Indicates a situation where damage or injury could occur. If it is not avoided, minor injury and/or damage to property may result.

NOTE

General information not related to the safety of persons or the product.

Graphical symbols

The following graphical attention symbols may appear on the products and in the documentation.



Read the instructions. The manual contains important safety and operating instructions.



Stop operation. Always stop the charging by pressing the Pause button before any disconnection.



WARNING, risk of electric shock. High voltage inside. High output voltage. Do not touch uninsulated battery terminals, connectors, or other live electrical parts.



CAUTION, undesirable consequences. The situation needs operator awareness or action.



For indoor use only. The battery charger is designed only for indoor use unless the charger is at least IPX4-rated.



Wear protective gloves. Battery cables / battery connectors may become hot during charging.

Introduction

This document contains use and maintenance instructions for the intended battery charger.

This document is of relevance for the one who uses the battery charger for its purpose; to charge batteries.

Target groups:

- Installers
- Operators
- Maintenance personnel and technicians

Description

The MICROPOWER SX is a stand-alone battery charger for lithium-ion (Li-ion) batteries, compatible with Micropower GET System through Bluetooth communication. As standard, the charger is also equipped with a display, radio transceiver and interface for CAN bus communication. The charger's LEDs indicate the status of the charging process.

Receiving

On receipt, visually inspect the product for any physical damage. If necessary, note any damage on the delivery receipt and contact the transport company immediately.

Check the delivered parts against the delivery note. Contact your supplier if something is missing, see *Contact information*.

Installation

NOTE

Installation may only be performed by a qualified service partner.

Mechanical installation



The battery charger is designed only for indoor use unless the charger is at least IPX4-rated.

- Attach and secure the battery charger to a wall with screws (not included).
- Comply with the dimensions specified for free space around the battery charger. See *Fig. 2 Installation*.



CAUTION

The battery charger may become warm during use. Ensure ventilation around the charger.

The battery charger should always be securely fastened. Use screws and lock washers when attaching the charger.

Electrical overview

See *Fig. 3 Connections and components*:

1. Negative terminal (-).
2. Positive terminal (+).
3. Fuse, for specifications see *Fuse protection*.

Electrical installation

WARNING

RISK OF ELECTRIC SHOCK!

Incorrect connection of battery cables can cause personal injuries and damage to the battery, battery charger and cables. Make sure the connections are correct.

WARNING

RISK OF ELECTRIC SHOCK!

Risk of live chassis.

Always connect the charger to a power outlet with protective earth.

1. The battery charger is produced for different mains voltages. Check that the power supply at the site of the installation complies with the rated voltage and current specified on the battery charger's data label. The charger is normally equipped with a fixed mains cable with connector.
2. Check the polarity of the battery connector and cable before connecting the battery. The charger is normally delivered with a battery cable with the following polarity:
 - Positive (+) = Red
 - Negative (-) = Blue or Black

NOTE

When installing a battery cable, the output terminals in the charger should be tightened with a torque of $4.5 \pm 0.5 \text{ Nm}$. Do not over-torque.

3. Connect the battery cables to the battery.
4. Connect the charger to the BMS.
5. Check adjustments for BMS and charging process, refer to Safety precautions, *Before start charging*.

Operation

User interface - Control panel

See Fig. 1 Control panel

1. Mains indicator (Blue)
2. Charging indicators (LED indication)
3. Pause (stop / resume charging)
4. OK / Select
5. Menu navigation
6. Display

Charging



WARNING

RISK OF ELECTRIC SHOCK!

Do not use the battery charger if it is damaged. Disconnect the mains immediately.

Do not touch damaged parts, uninsulated battery terminals, connectors, or other live electrical parts.

Contact service personnel.

Connect and start charging

1. Check the cables and connectors for visible damage.
2. Connect the mains cable. The mains indicator lights up blue when the mains is connected.
3. Connect the battery charger to the battery.
 - The BMS controls the charging process. If charging curve is used, the charging process starts automatically.
 - The charging status is shown on the display on the control panel and by the charging indicators (LED indication).
 - Green LEDs indicate that the battery is fully charged. The battery charger continues with maintenance charging.
 - The battery can be continuously connected to the battery charger when not in use.

For a detailed description, see the section LED indication.

Stop charging and disconnect



CAUTION

RISK OF MATERIAL DAMAGE!

Do not disconnect the battery when the charging process is in progress. Arc flash may occur and damage the connector pins. Always stop the charging process before the battery is disconnected.

1. Stop the battery charging process by pressing the **Pause** button on the battery charger control panel.

The charging process can be resumed by pressing the **Pause** button again.
2. While stopped, disconnect the battery charger from the battery.

LED indication

The LEDs light up or flash in different patterns to indicate the condition and state of charge (SOC). If no LED is lit but the Mains indicator is lit blue, it indicates that the battery is not connected.

Li-ion with CAN control						
Green	Green double flashing	Green On	Red and green	Yellow flashing	Red On	Red flashing
SOC % 						
Charging in progress. The number of green LEDs indicates the progress of the charge cycle.	Equalize charging (balancing) in progress.	Charging completed.	An alarm is active, but charging is still in progress.	Charging paused. A battery is connected, but charging is paused (due to e.g. Stop input).	An alarm is active. Charging is stopped.	Software malfunction.

Li-ion with BBC activated					
Green	Green On	Red and green	Yellow flashing	Red On	Red flashing
Charging in progress. One LED at a time lights up and moves upwards.	Charging completed and status is BBC.	An alarm is active, but charging is still in progress.	Charging paused. A battery is connected, but charging is paused (due to e.g. Stop input).	An alarm is active. Charging is stopped.	Software malfunction.

Parameter settings

⚠ CAUTION

Incorrect settings of the battery charger may damage the battery. Always check settings before start charging.

Check settings

NOTE

When the battery charger is configured for Battery Management System (BMS) control, please check the CAN setting.

Navigate in the charger's display as follows:

1. Press **OK**.
2. Go to [Service] using arrow down.
3. Press **OK**.

4. Go to [Charging param] or [CAN] using arrow down.
5. Press **OK**.
Current settings are displayed.

Maintenance and troubleshooting



WARNING

RISK OF ELECTRIC SHOCK!

Only qualified personnel should install, use, maintain and service this product.

Disconnect the battery and power supply before maintenance, servicing, or dismantling.



WARNING

RISK OF ELECTRIC SHOCK!

Do not use the battery charger if it is damaged. Disconnect the mains immediately.

Do not touch damaged parts, uninsulated battery terminals, connectors, or other live electrical parts.

Contact service personnel.

Statistics

The charger is collecting charger data for data analysis and service. The data can be accessed through Service Tool, GET App or GET Cloud.

Safety shut-off

Charging can be terminated if:

- The recharged number of ampere-hours exceeds the preset value.
- The charging time for any of the charging phases exceeds the preset value.
- Voltage and current exceed the maximum set value.
- The battery is disconnected without the battery charger being stopped.
- The BMS turns off the battery charger via CAN bus.
- The CAN bus communication with the battery is interrupted.

Charging is temporarily stopped or reduced when:

- The battery charger temperature exceeds charger limits.
- The BMS stops or reduces charging via the CAN bus.

Fuse protection

The charger has a fuse, see *Fig. 3 Connections and components* pos 3.

Model	Fuse type	Bolt size	Current rating	Voltage rating	Rated tightening torque
SX17-32 24 V	160LET BS88 High speed	M6	160 A	150 V	7.0 Nm ±10%
SX17-32 48 V	100LET BS88 High speed	M6	100 A	150 V	7.0 Nm ±10%

Alarms

If the battery charger's built-in self-testing function detects a fault, this is indicated via the LEDs, refer to LED indication. Note the information and contact service personnel.

Checks

The following are recommended to be done regularly:

1. Check the cables and connectors for damage.
2. Check that the battery is free from defects, in good condition and is the correct type for the battery charger.
3. Check that the BMS and battery are properly connected and that the battery fuse, if any, is not broken.
4. Check that the mains voltage is correct and that there are no blown fuses.
5. Check that the air filter mat, if any, is clean and not clogged. Clean it once a month, or sooner if airflow is affected. Replace the mat if it is damaged or cannot be cleaned.

Technical data

Operational ambient temperature: -5 to 40 °C (23 to 104 °F) ⁽¹⁾

Storage temperature: -40 to 80 °C (-40 to 176 °F)

Mains voltage: See data label ⁽²⁾

Mains fuse: See data label ⁽²⁾

Battery types: Li-ion ⁽³⁾

Output voltage: See data label ⁽²⁾

Output current: See data label ⁽²⁾

Recommended battery capacity:

Min. capacity (Ah) = Rated DC output current × 1.25

Max. capacity (Ah) = Rated DC output current × 5

Efficiency: > 90 % at full load

Ingress protection: IP21

Overvoltage category: II

Connectivity options:

Radio: 2.4 GHz (2402–2480 MHz) ⁽⁴⁾

Bluetooth: 2.4 GHz (2402–2480 MHz) ⁽⁴⁾

Approvals: See data label ⁽²⁾

1) Measured at the charger air inlet.

2) Located on the battery charger.

3) The charger can also charge other battery types when the battery is equipped with a Battery Monitoring Unit (BMU).

4) FCC: T7V1780 IC: 216Q-1780

Recycling

The battery charger is recycled as metal and electronics scrap. Local regulations apply and must be followed.

Additional information

Further information and documentation can be found at:



docs.micropower-group.com

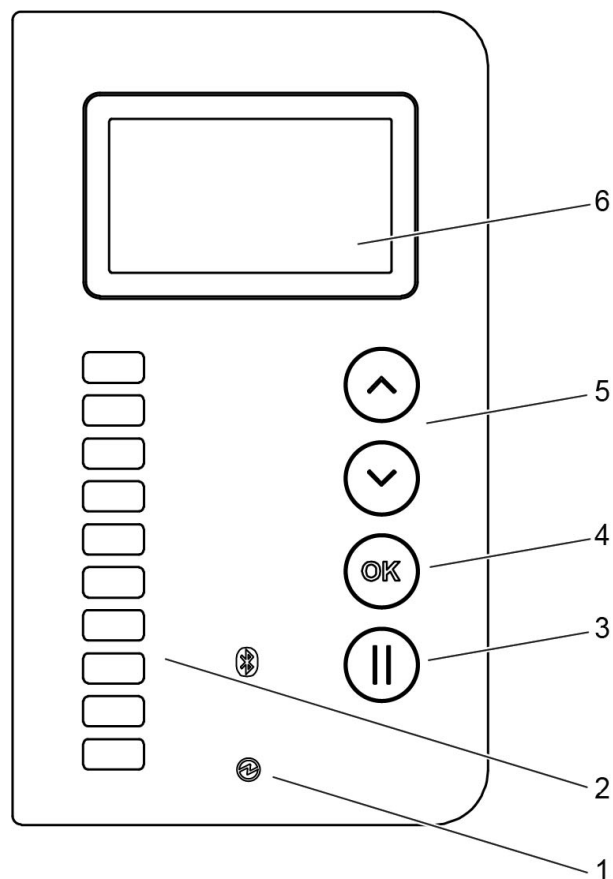
For the latest updates, please refer to the online version of this manual.

Contact information

Micropower Group AB
Gullhallavägen 20C, SE-352 50 Växjö, Sweden
Phone: +46 (0)470-727400
Support: +46 (0)10 811 00 80
e-mail: support@micropower-group.com
www.micropower-group.com

Figures

Fig. 1 Control panel

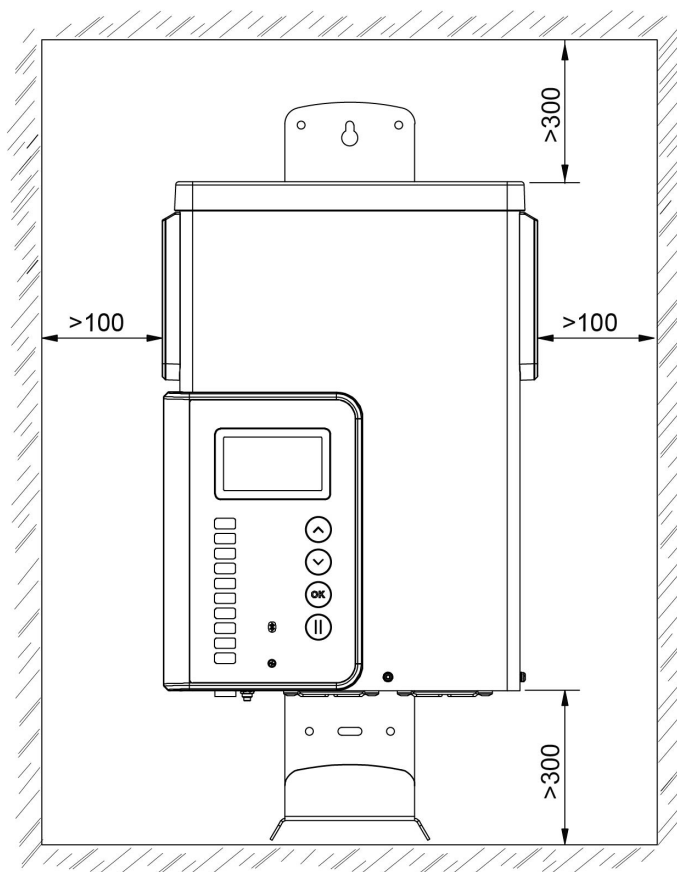
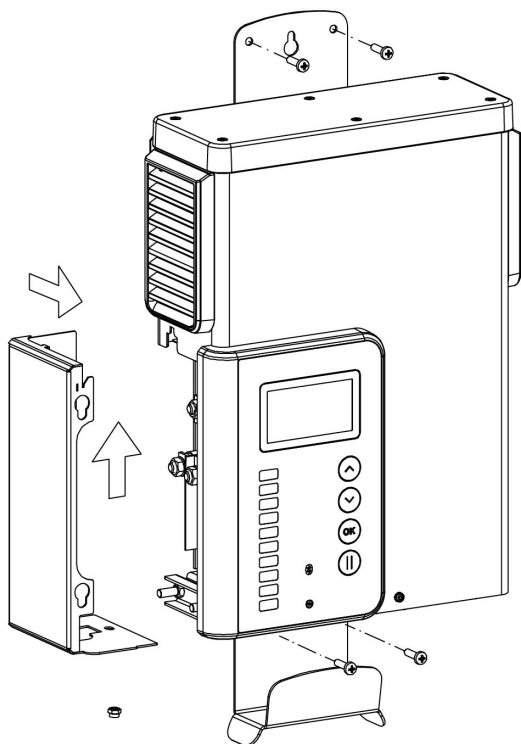


See *User interface - Control panel*

Fig. 2 Installation

Standard:

(mm)



Option box:

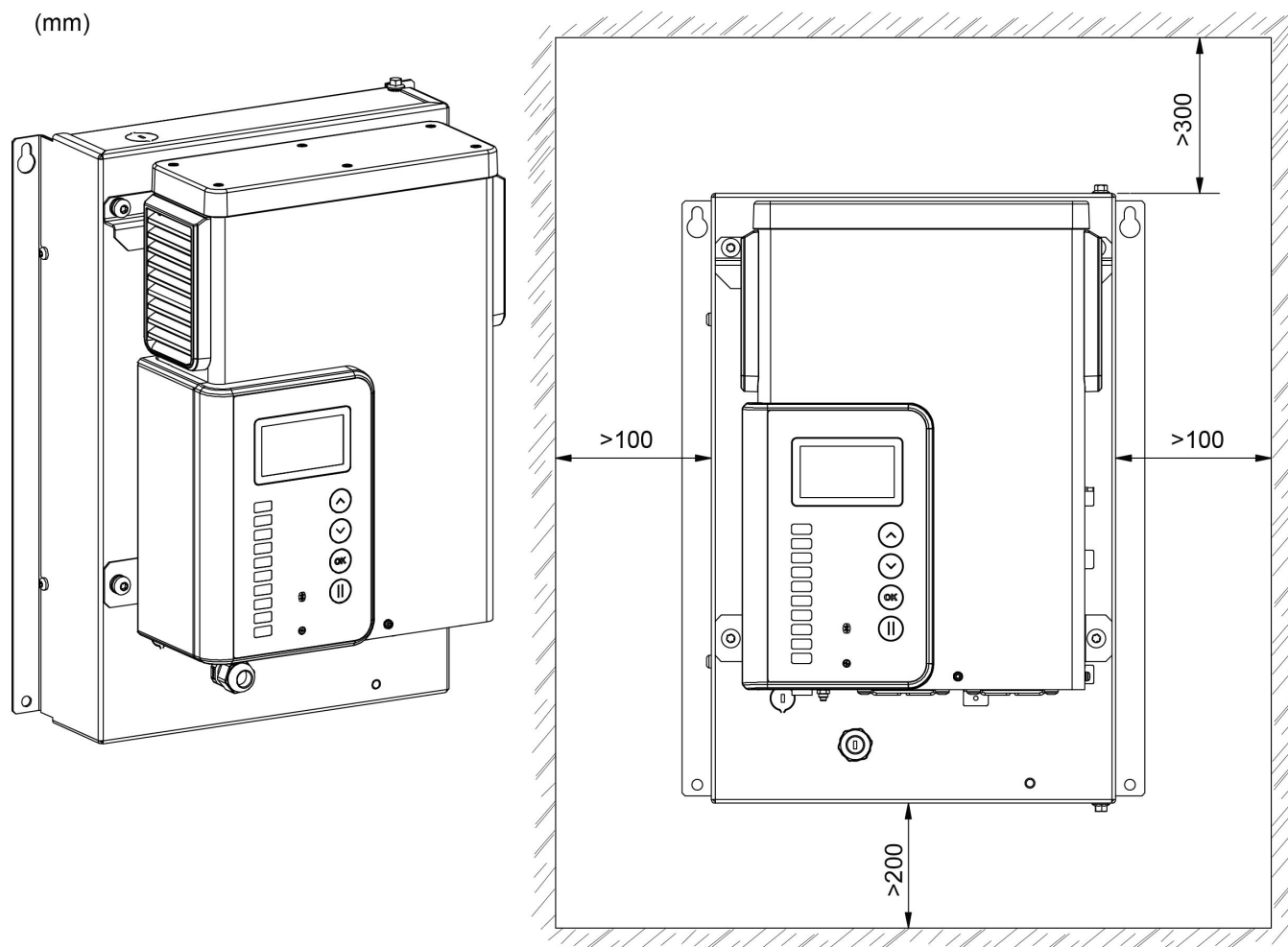
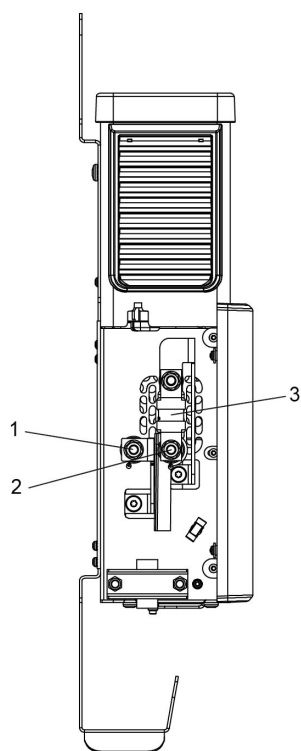


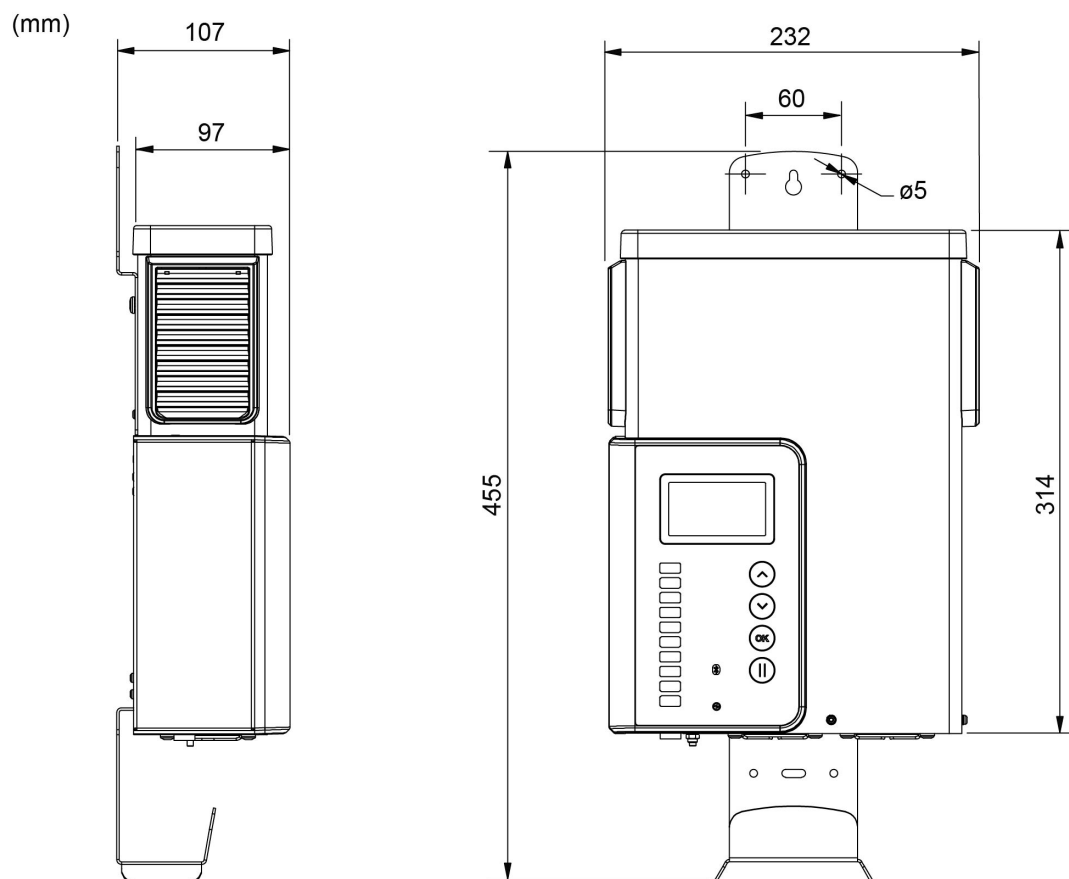
Fig. 3 Connections and components



See *Electrical overview*

Fig. 4 Dimensions

Standard:



Option box:

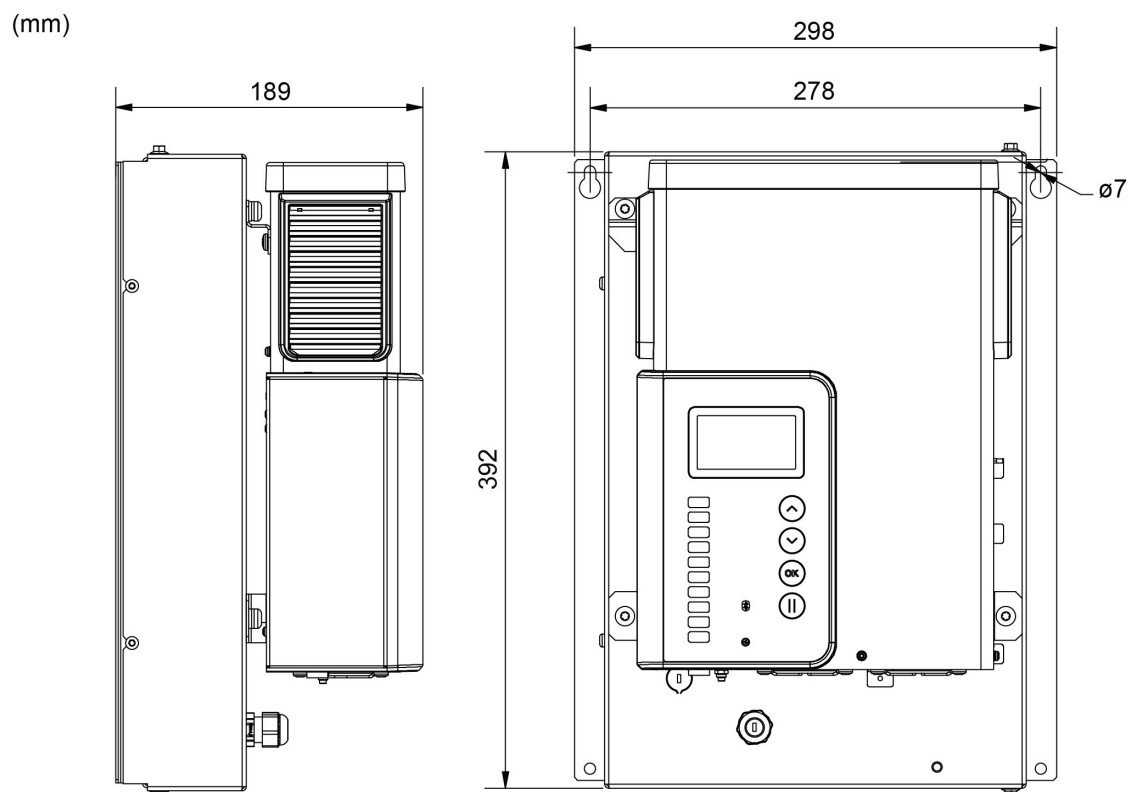
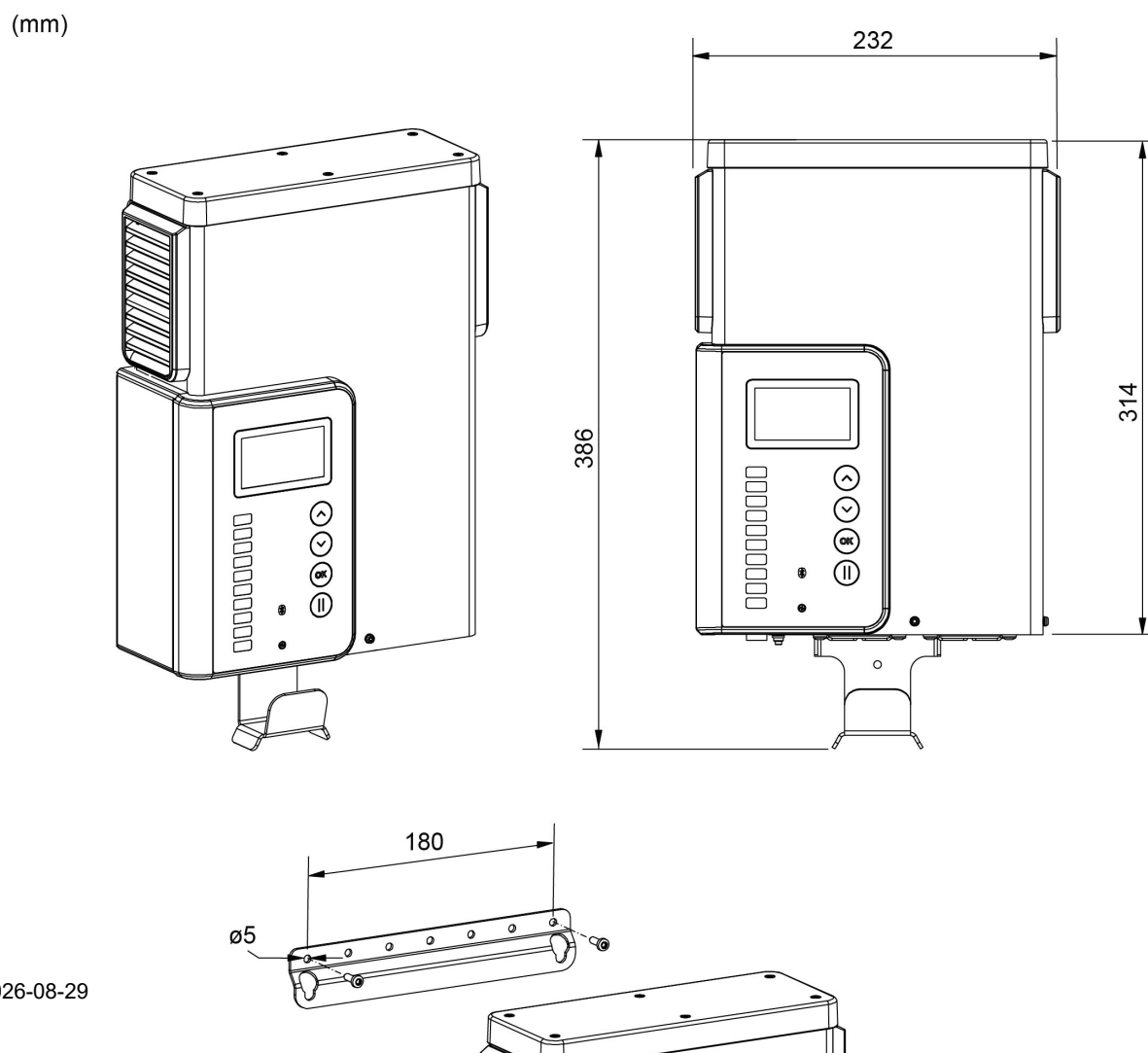


Fig. 5 Installation options



Approvals

Manufactured by: Micropower Group AB

The manufacturer declares that this product complies with applicable requirements and the Radio Equipment Directive 2014/53/EU. Complete declaration is available at docs.micropower-group.com.