

# USER MANUAL

## UPSI-IP-1 SERIES

ROBUST DC UPS WITH IP65/67 HOUSING



## Legend of used symbols

| Symbol                                                                            | Description                              |
|-----------------------------------------------------------------------------------|------------------------------------------|
|  | Attention! Important hazard warning.     |
|  | Do not dispose of in the domestic waste. |
|  | Warning of electrical voltage.           |

## Revision Directory

| Date                       | Change                                                                                                 |
|----------------------------|--------------------------------------------------------------------------------------------------------|
| 16.04.2021<br>Revision 0-1 | Initial version                                                                                        |
| 18.10.2021<br>Revision 1-0 | Release version                                                                                        |
| 16.12.2021<br>Revision 1-1 | Chapter B2, C and F1 updated                                                                           |
| 11.02.2022<br>Revision 1-2 | Chapter B4 included                                                                                    |
| 09.03.2023<br>Revision 1-3 | Chapter B4 Software description updated<br>5pole USB plug changed into 8pole multifunctional interface |
| 14.01.2026<br>Revision 1-4 | Chapter E20 Transport information included                                                             |

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## A Brief specification

### UPSI-1208IP-11U / 2406IP-12U

12V/8 A | 24V/6 A

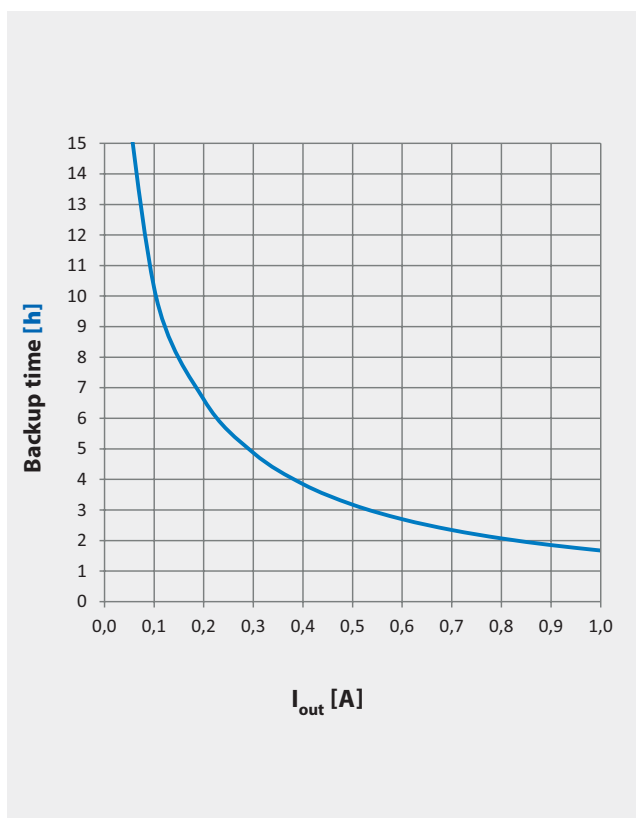
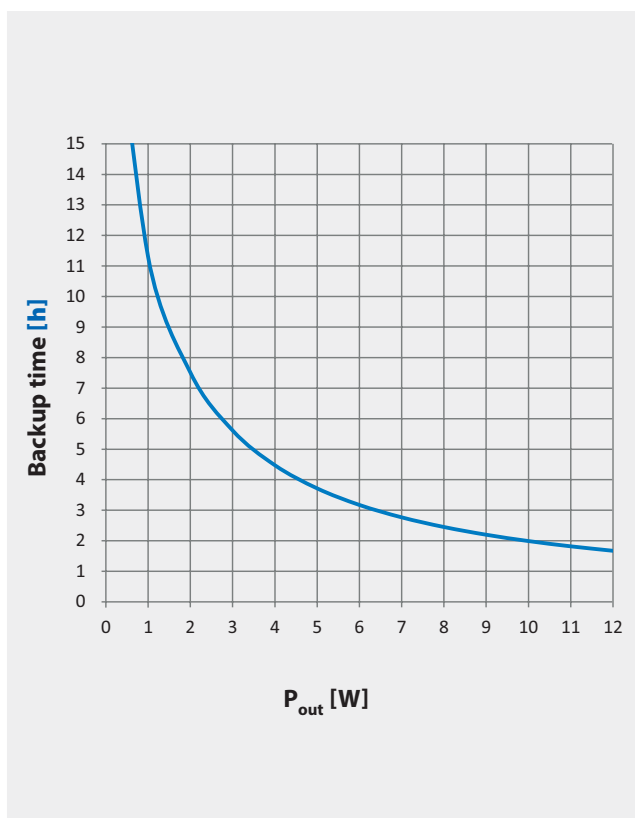
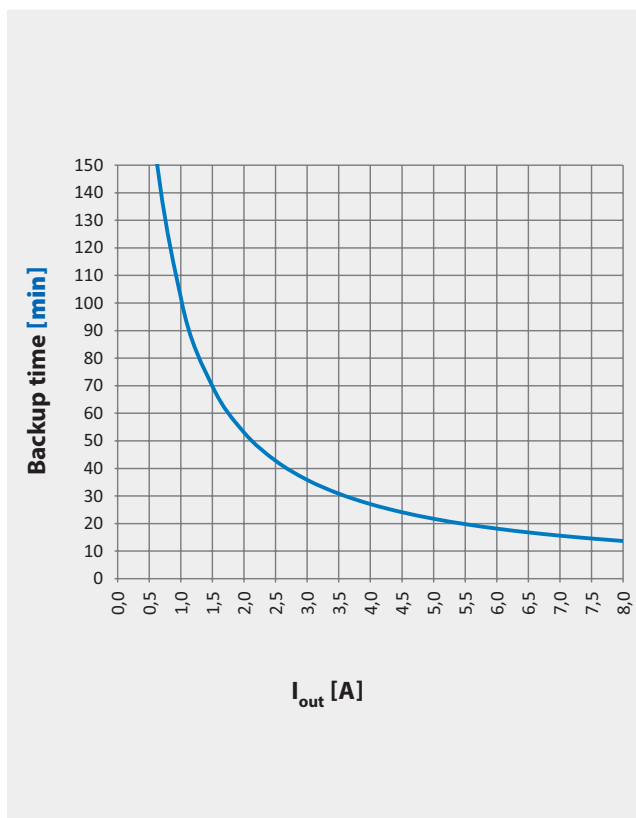
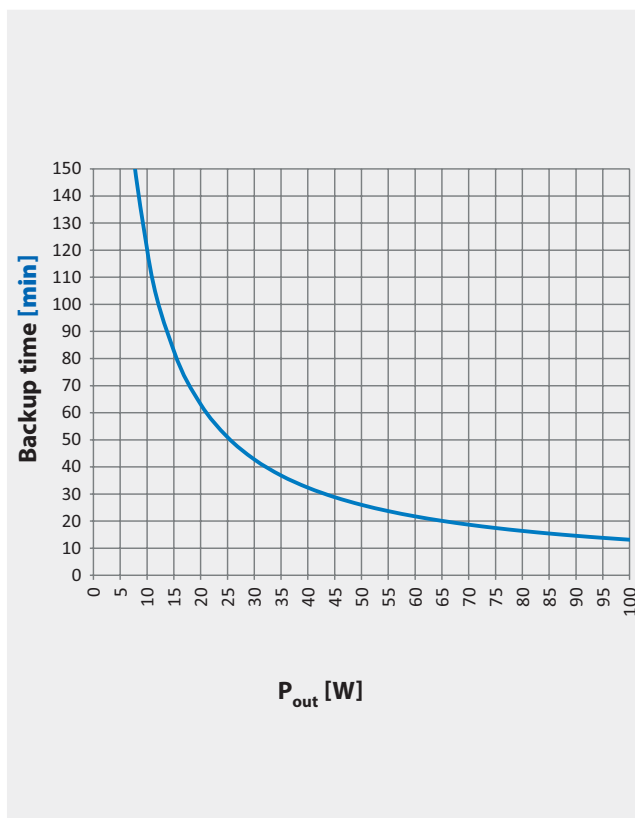
- ✓ **Outdoor DC UPS for extreme environments in robust aluminium housing with IP65/67 protection**
- ✓ **Already integrated LiFePO4 battery as energy storage (25 Wh / 33 Wh)**
- ✓ **Temperature range -20...+50°C**
- ✓ **Based on UPSI-1208/-2406 technology incl. features**
- ✓ **Preassembled mounting bracket**
- ✓ **Pressure compensation element to prevent condensation inside**
- ✓ **External multifunctional interface**
- ✓ **Power and USB cable set with 3 m length each inclusive**
- ✓ **Shock / Vibration according to EN 60068-2**



| Technical Data          | UPSI-1208IP-11U                                                                               | UPSI-2406IP-12U                      |
|-------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------|
| Input voltage*          | 12 VDC (11.5...16 VDC)                                                                        | 24 VDC (22.8...30 VDC)               |
| Input current           | 9.2 A max.                                                                                    | 7.3 A max.                           |
| Output voltage*         | 12...11.35 VDC<br>(depending on load)                                                         | 24...23.3 VDC<br>(depending on load) |
| Output current          | 8 A nominal                                                                                   | 6 A nominal                          |
| Capacitive load         | 3000 µF (at start)                                                                            |                                      |
| Charging method         | CC/CV/CP                                                                                      |                                      |
| Protection              | Input: Reverse polarity protection, Output: Overcurrent protection, Short circuit protection  |                                      |
| Interface               | USB, HID UPS, RS232, Relay (not usable together)                                              |                                      |
| Battery technology      | LiFePO4: 2.5 Ah / 25 Wh                                                                       | LiFePO4: 2.5 Ah / 33 Wh              |
| Ambient temperature     | Operating: -20...+50°C<br>Storage/Transport: -30...+55°C<br>(recommended SOC at storage: 80%) |                                      |
| Operating altitude      | ≤4000 m                                                                                       |                                      |
| Max. permitted humidity | ≤95 % (at +25°C)                                                                              |                                      |
| Dimensions W/ H / D     | 140 x 140 x 90 mm<br>(without connectors and mounting brackets)                               |                                      |
| Housing size            | 1 (UPSI-IP-1 series)                                                                          |                                      |
| Weight                  | 1.84 kg                                                                                       | 1.92 kg                              |
| Input and output cable  | 3x 2.5 mm <sup>2</sup> (incl. functional earth – FE) each, length 3 m, open end               |                                      |

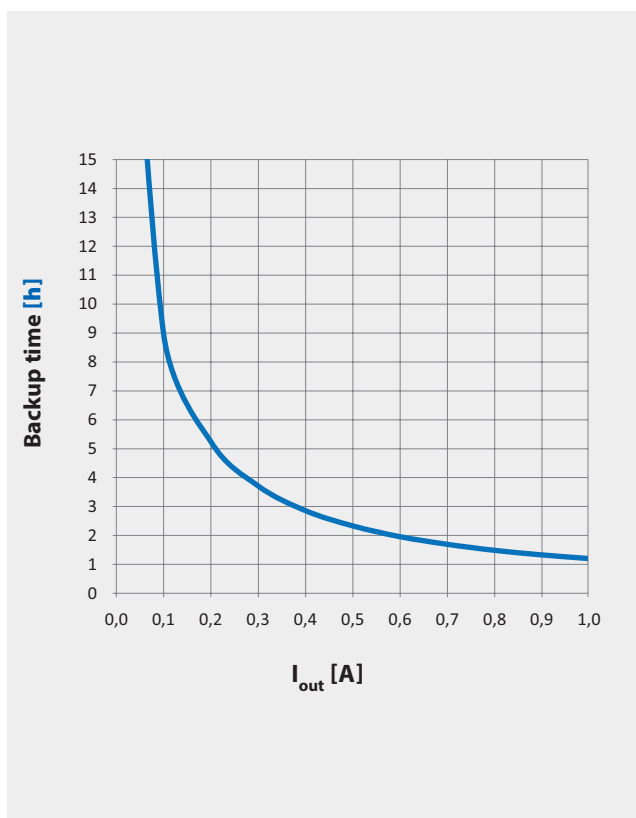
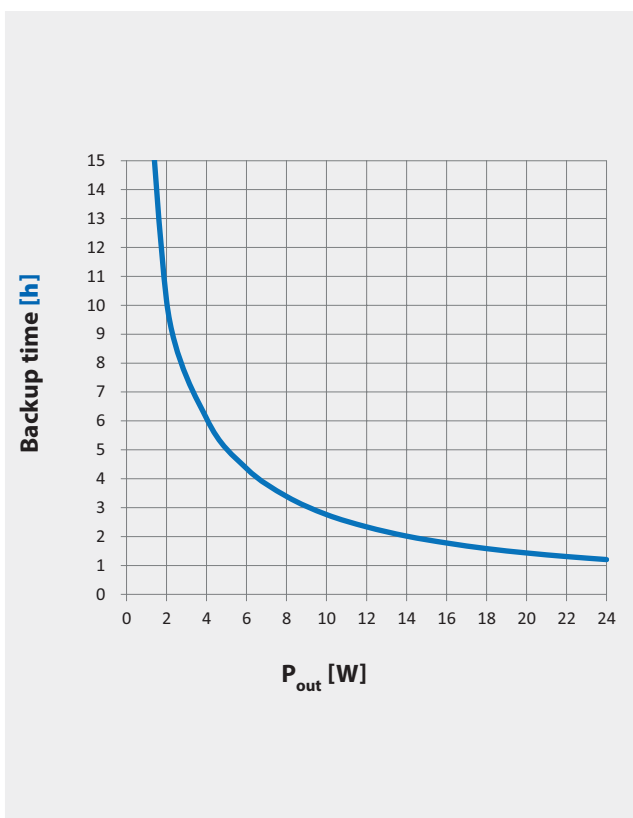
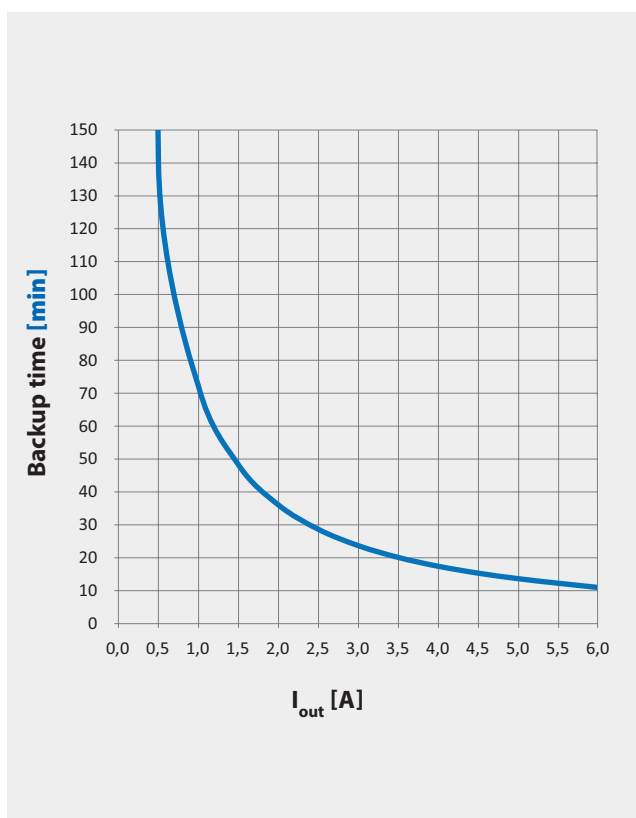
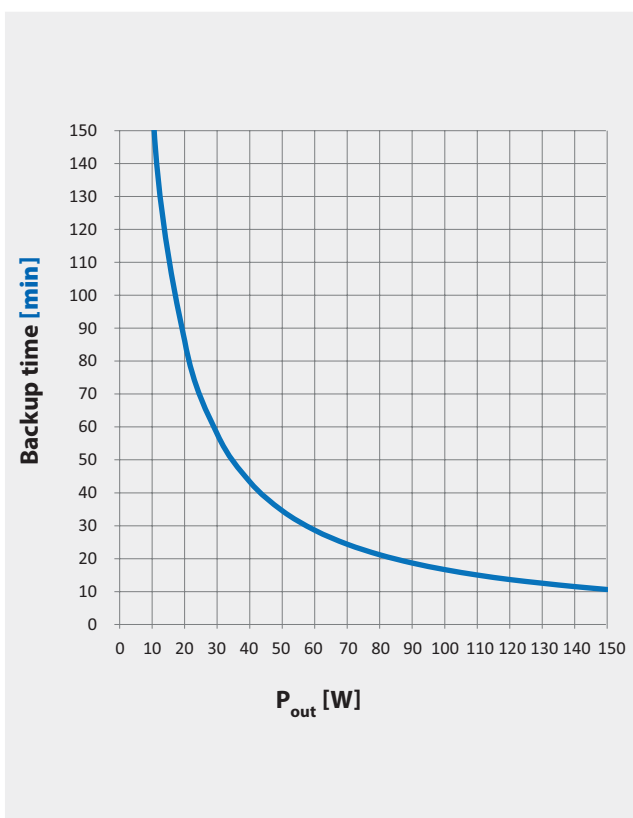
\*At housing inlet and outlet, without input and output cables

**Backup time\* BP-LFP-1025S** (in use with a UPSI-1208IP-11U)



\*Backup time depends on battery capacitance, load and temperature. At very high or low temperatures a reduction of backup time occurs. Unless otherwise specified, the values apply to measurements at +25 °C

**Backup time\* BP-LFP-1325S** (in use with a UPSI-2406IP-12U)



\*Backup time depends on battery capacitance, load and temperature. At very high or low temperatures a reduction of backup time occurs. Unless otherwise specified, the values apply to measurements at +25 °C

## B Introduction and description

### **Read carefully before initial operation!**

This manual shall help the user to get familiar with the product and its components and features. It shall provide information as accurately and completely as possible.

The manual as well as all documents has to be read and followed strictly before installation. Otherwise in certain situations warranty and guarantee can be cancelled partly or completely. Any liability on the part of Bicker Elektronik is excluded for possible existing errors as well as non-compliance with the instructions for use and installation.

## B1 Description of the product and its functions

The UPSI-1208IP-11U and UPSI-2406IP-12U (hereinafter also called UPS) are DC/DC UPS systems with numerous digital features and high performance. The UPSI-1208 or UPSI-2406 is combined with an already integrated LiFePO<sub>4</sub> energy storage. The primary use of the UPS is to secure the supply during power failures and/or voltage fluctuations. The application which should be protected is connected to the output of the UPS. The devices have IP65/67 protection and have been developed for the specific use under extreme conditions.

The UPS requires a rated dimensioned power supply of 12 VDC or 24VDC at the input. After the input voltage is applied, the UPS works in normal mode automatically. The input voltage is passed through to the output and the integrated energy storage device is charged simultaneously. The charging current depends dynamically on the load current at the UPS output. The green status LED lights up continuously when the UPS is in this state.

In the event of a voltage drop or a voltage fluctuation of the input voltage (below undervoltage limit), the UPS is switched to backup mode (also backup mode). In this state, the application at the UPS output is supplied via the energy storage device. The backup time (also buffer time) depends on the used energy storage, the value of the output current and the software settings of the UPS. An important feature is that the output voltage in backup mode is always regulated to 12 or 23.5VDC and does not decrease as the voltage of the energy storage device drops. If the UPS operates in backup mode, the status LED is slowly flashing (1 Hz flashing). After having been operated completely in backup mode, the recharging of the LiFePO<sub>4</sub> battery has to happen as soon as possible.

When the input voltage returns, the UPS is automatically switched back to normal mode and charging of the energy storage device is continued.

The UPS can also be used for user-initiated shutdowns of the supply voltage or cycles. Application examples are the replacement of larger batteries in vehicles in which the electronics should continue to be supplied, the opening and closing of safety valves after a malfunction or the shutdown of a system.

A pressure compensating element on the connection side of the housing prevents condensation inside the device.

## B2 Intended use – devices

These devices are primarily designed for use under difficult and extreme environmental conditions and can be used both indoors and outdoors. They have been developed for professional use in areas such as industrial control, communication and measurement technology. These products must not be used in devices or systems in which a malfunction leads to serious injuries or endangers human life.

Unlike the standard models of the UPSI series (Open Frame or DIN-rail mounting), the housing of the UPSI-IP-1 series have IP65/67 protection. This means that the components mounted in the housing (UPS PCB and energy storage) are completely protected against contact and dust (IP6x) as well as against water jets from any direction (IPx5) and water penetration when temporarily immersed in water (IPx7).

Complete protection according to IP65/67 is only given if the cables included in the scope of delivery (input, output, USB) are connected / plugged in.

If the USB interface is not required and the related USB cable is not plugged in, a suitable protective cap from Binder Connector has to be attached instead (not included in the scope of delivery). This is optionally available at Bicker Elektronik (article number „PSZ-1104“)

For permanent underwater operation, the devices are expressly **not suitable**.

The devices are shock and vibration-proof and certified according to EN60068-2.

## B3 Intended use – connecting cables

The connection cables included in the scope of delivery may only be used with the UPS devices in accordance with the manufacturer's specifications.

The connection cables (type „ÖLFLEX® SMART 108“ from the LAPP brand) are VDE approved control cables for occasional flexible use and fixed installation under medium load conditions. They are also suitable for use in dry, damp or wet areas. If using outdoors, observe the indicated temperature range and use with UV protection. They are largely resistant to certain oils at room temperature. They are suitable for occasional, non-automated movements. The maximum tensile load is 15 N/mm<sup>2</sup> of conductor cross-section during installation and operation. Compulsory guidance is not permitted.

## B4 Software

Two different software solutions are available for the UPS Gen<sup>2</sup> devices, which should be selected depending on the operating mode or desired functions.

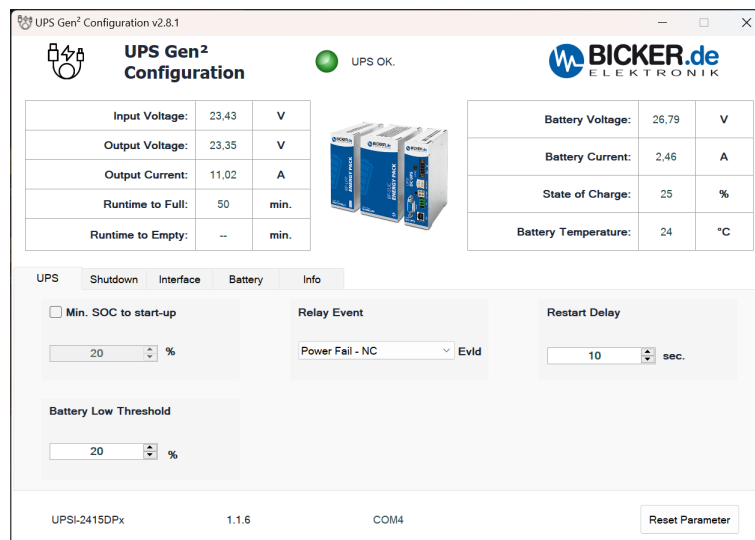
The models have the native UPS device group "HID Power Class" integrated via USB. Most operating systems recognize the UPS via Plug & Play as HID UPS or HID battery without additional drivers and can be operated with the operating system's own energy settings, which means self-sufficient operation without additional software. In this scenario, only the UPS Gen<sup>2</sup> Configuration Software is required to configure the internal UPS parameters.

If more functions are required, such as running a script before shutdown, the "UPScm - UPS Management Software" is the right choice. Unlike the "UPS Gen<sup>2</sup> Configuration Software", this is permanently installed and started on the system.

### UPS Gen2 Configuration Software

The UPS Gen<sup>2</sup> Configuration Software is used for setting parameters and programming new firmware for all UPSI Gen<sup>2</sup> devices under Microsoft® Windows. The software tool also shows the operating status of the UPS and its energy storage and can be connected to the device via USB.

The UPS Gen<sup>2</sup> software tool provides additional setting options in HID power mode, such as time-bound shutdown and other important functions.



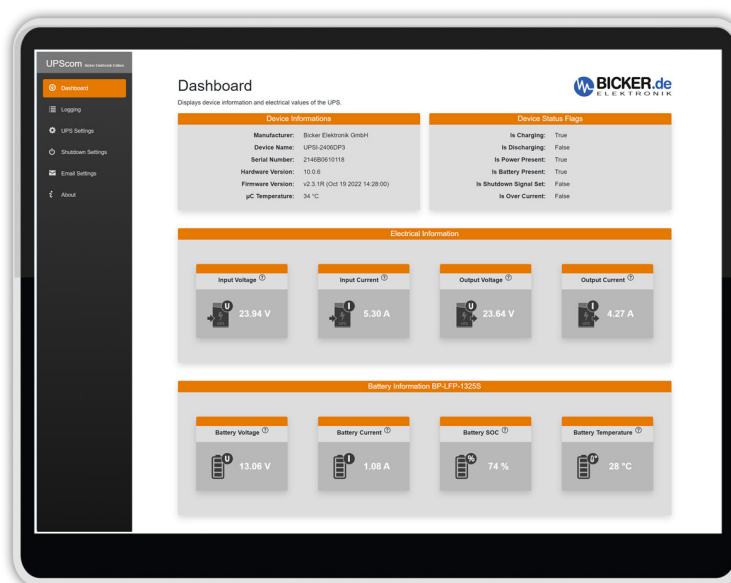
**DOWNLOAD**  
UPS Gen2 Configuration Software

**DOWNLOAD**  
User Manual

## UPScom - UPS Management Software

During a power fail, the “UPScom” software enables controlled shutdown and switch off of connected equipment to prevent data loss or corruption. The responsive WEB UI is called up in a web browser to set and pre-program all parameters of the DC UPS system as well as for real-time monitoring with a display of the charge status.

Adjustable parameters include load sensor (mA), shutdown delay, maximum backup time, minimum load capacity before system start, email notifications and running scripts or programs before the system shuts down.



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UPScom for Windows® – All CPU

**DOWNLOAD**  
UPScom for Linux – All CPU

**DOWNLOAD**  
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Installation Manual Linux

## C Safety instructions



### **WARNING!**

Disregarding of following issues can result in electric shock, fire, serious injury or death.

1. Care must be taken to ensure proper and professional wiring.
2. The device pack must not be exposed to fire and temperatures outside the specification.
3. The device may only be submerged temporarily (not permanently) for up to 30 minutes under water to a depth of 1 meter.
4. The device may only be exposed to water jets up to a maximum water volume of 12.5l/min.
5. The device must not be opened, short-circuited, reversed, overheated or otherwise soldered / welded.
6. Changes or attempts to repair the device are to be omitted.
7. Effects of foreign objects on the device must be avoided (e.g. metal parts).
8. Do not put obviously damaged devices into operation (e.g. dents, burn marks, rough contamination).
9. Device must not be dropped.
10. All parts of the device and accessories must not be eaten or swallowed.
11. A current limited source is to be used. The required current values for the UPS are described in this manual.
12. The UPS is supplied with voltage from both the input source and the energy storage. The latter is still energized even after the input source has been disconnected.
13. The input and output connectors must not be plugged in or disconnected under load.
14. Appropriate safety precautions have to be taken by the user so that the input and output connectors can not be accidentally disconnected.
15. In order to correctly lock the input and output connectors with the cable connectors, they have to be tighten by hand (approx. 0.5 Nm).
16. Complete protection according to IP65 / 67 is only given if all connection cables (input, output, USB) are correctly connected. If USB is not used, the connection has to be covered with a suitable protective cap.



## **ATTENTION!**

1. Improper use and opening of the device will void the warranty.
2. The device may only be used as intended.
3. The national accident prevention and safety regulations must be observed.
4. The assembly of the device and the electrical installation have to be state of the art.
5. The electrical, thermal and mechanical limit values have to be observed.
6. The UPS wiring specifications - as described in this manual - have to be followed.

## D Technical Data

### D1 General Technical Data

| INPUT DATA                                                                                                                                       |                             |                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------|
| Unless otherwise stated, all specifications apply to +25°C ambient temperature, 12 or 24 VDC input voltage and nominal output current ( $I_N$ ). |                             |                             |
|                                                                                                                                                  | UPSI-1208IP-11U             | UPSI-2406IP-12U             |
| Input voltage*                                                                                                                                   | 12 VDC                      | 24 VDC                      |
| Input voltage range*                                                                                                                             | 11.5 VDC...16 VDC           | 22.8 VDC...30 VDC           |
| Electric strength max.                                                                                                                           | 18 VDC                      | 35 VDC                      |
| <b>Fixed connect threshold</b>                                                                                                                   |                             |                             |
| Undervoltage                                                                                                                                     | 11.3 VDC                    | 22.0 VDC                    |
| Voltage drop Input/Output                                                                                                                        | 0.5 VDC (depending on load) | 0.4 VDC (depending on load) |
| <b>Current consumption</b>                                                                                                                       |                             |                             |
| $I_N$ ( $U_N, I_{OUT} = I_N, I_{CHARGE} = 0$ )                                                                                                   | 8.1 A                       | 6.1 A                       |
| $I_{MAX}$ ( $U_N, I_{OUT} = I_{STAT.BOOST}, I_{CHARGE} = \max$ )                                                                                 | 9.2 A                       | 7.3 A                       |
| $I_{DYN}$ ( $U_N, I_{OUT} = I_{DYN.BOOST}, I_{CHARGE} = 0$ )                                                                                     | 9.6 A                       | 7.6 A                       |
| $I_{NO-LOAD}$ ( $U_N, I_{OUT} = 0, I_{CHARGE} = 0$ )                                                                                             | <100 mA                     | <100 mA                     |
| $I_{CHARGE}$ ( $U_N, I_{OUT} = 0, I_{CHARGE} = \max$ )                                                                                           | 3.5 A                       | 2.25 A                      |
| <b>Power consumption</b>                                                                                                                         |                             |                             |
| $P_N$ ( $U_N, I_{OUT} = I_N, I_{CHARGE} = 0$ )                                                                                                   | 97 W                        | 146 W                       |
| $P_{MAX}$ ( $U_N, I_{OUT} = I_{STAT.BOOST}, I_{CHARGE} = \max$ )                                                                                 | 110.5 W                     | 175 W                       |
| $P_{DYN}$ ( $U_N, I_{OUT} = I_{DYN.BOOST}, I_{CHARGE} = 0$ )                                                                                     | 115 W                       | 182 W                       |
| $P_{CHARGE}$ ( $U_N, I_{OUT} = 0, I_{CHARGE} = \max$ )                                                                                           | 42 W                        | 54 W                        |
| Internal input fuse                                                                                                                              | Yes (15 A)                  | Yes (15 A)                  |
| Switch-on time                                                                                                                                   | <5 sec                      | <5 sec                      |
| Switch-on time battery start (BS)                                                                                                                | n.a.                        | n.a.                        |

\*At housing inlet, without cable

## OUTPUT DATA – NORMAL MODE

Unless otherwise stated, all specifications apply to +25 °C ambient temperature, 12 or 24 VDC input voltage and nominal output current ( $I_N$ ).

|                                                                  | <b>UPSI-1208IP-11U</b>                                                              | <b>UPSI-2406IP-12U</b>                                                              |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Output voltage*                                                  | 12 VDC                                                                              | 24 VDC                                                                              |
| Output voltage range*                                            | 12...11.35 VDC max.<br>(depending on load)                                          | 24...23.6 VDC max.<br>(depending on load)                                           |
| Capacitive load                                                  | 3000 µF (at start)                                                                  |                                                                                     |
| <b>Output current</b>                                            |                                                                                     |                                                                                     |
| $I_N$                                                            | 8 A                                                                                 | 6 A                                                                                 |
| $I_{STAT.BOOST}$                                                 | 8.4 A                                                                               | 6.3 A                                                                               |
| $I_{DYN.BOOST}$                                                  | 8.5...9.5 A for max. 3 s                                                            | 6.4...7.5 A for max. 3 s                                                            |
| $I_{SFB}$                                                        | 30 A (5 ms)                                                                         | 30 A (5 ms)                                                                         |
| <b>Output power</b>                                              |                                                                                     |                                                                                     |
| $P_N (U_N, I_{OUT} = I_N, I_{CHARGE} = 0)$                       | 91.5 W                                                                              | 142 W                                                                               |
| $P_{STAT.BOOST} (U_N, I_{OUT} = I_{STAT.BOOST}, I_{CHARGE} = 0)$ | 96 W                                                                                | 148.5 W                                                                             |
| $P_{DYN.BOOST} (U_N, I_{OUT} = I_{DYN.BOOST}, I_{CHARGE} = 0)$   | 98...108.5 W for max. 3 s                                                           | 150...176 W for max. 3 s                                                            |
| Short-circuit proof                                              | Yes                                                                                 | Yes                                                                                 |
| No-load proof                                                    | Yes                                                                                 | Yes                                                                                 |
| Overcurrent shutdown                                             | 8.5...9.5 A for max. 3 s;<br>9.6...10.8 A for max. 100 ms;<br>>10.8 A for max. 5 ms | 6.4...7.5 A for max. 3 s;<br>7.6...10.8 A for max. 100 ms;<br>>10.8 A for max. 5 ms |

\*At housing outlet, without cable

## OUTPUT DATA – BACKUP MODE

Unless otherwise stated, all specifications apply to +25 °C ambient temperature, 12 or 24 VDC input voltage and nominal output current ( $I_N$ ).

|                                                                  | <b>UPSI-1208IP-11U</b>                                                              | <b>UPSI-2406IP-12U</b>                                                              |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Output voltage*                                                  | 12 VDC                                                                              | 23.5 VDC                                                                            |
| Output voltage range*                                            | 12...11.85 VDC<br>(depending on load)                                               | 23.6...23.3 VDC<br>(depending on load)                                              |
| Capacitive load                                                  | n.a.                                                                                | n.a.                                                                                |
| <b>Output current</b>                                            |                                                                                     |                                                                                     |
| $I_N$                                                            | 8 A                                                                                 | 6 A                                                                                 |
| $I_{STAT.BOOST}$                                                 | 8.4 A                                                                               | 6.3 A                                                                               |
| $I_{DYN.BOOST}$                                                  | 8.5...9.5 A for max. 3 s                                                            | 6.4...7.5 A for max. 3 s                                                            |
| $I_{SFB}$                                                        | 30 A (5 ms)                                                                         | 30 A (5 ms)                                                                         |
| <b>Output power</b>                                              |                                                                                     |                                                                                     |
| $P_N (U_N, I_{OUT} = I_N, I_{CHARGE} = 0)$                       | 95.5 W                                                                              | 140 W                                                                               |
| $P_{STAT.BOOST} (U_N, I_{OUT} = I_{STAT.BOOST}, I_{CHARGE} = 0)$ | 100 W                                                                               | 147 W                                                                               |
| $P_{DYN.BOOST} (U_N, I_{OUT} = I_{DYN.BOOST}, I_{CHARGE} = 0)$   | 102...113 W for max. 3 s                                                            | 149...175 W for max. 3 s                                                            |
| Short-circuit proof                                              | Yes                                                                                 | Yes                                                                                 |
| No-load proof                                                    | Yes                                                                                 | Yes                                                                                 |
| Overcurrent shutdown                                             | 8.5...9.5 A for max. 3 s;<br>9.6...10.8 A for max. 100 ms;<br>>10.8 A for max. 5 ms | 6.4...7.5 A for max. 3 s;<br>7.6...10.8 A for max. 100 ms;<br>>10.8 A for max. 5 ms |
| Switching time<br>normal mode » backup mode                      | <600 µs                                                                             |                                                                                     |

\*At housing outlet, without cable

**ENERGY STORAGE UPSI-1208IP-11U**

|                                            |                       |
|--------------------------------------------|-----------------------|
| Installed type                             | BP-LFP-1025S          |
| Battery technology                         | LiFePO4               |
| Charging method                            | CC / CV / CP          |
| Nominal voltage $U_N$                      | 9.9 V                 |
| End-of-charge voltage                      | 10.4 V                |
| Charging current                           | $\leq 2C$ (4.5...5 A) |
| Undervoltage protection                    | 6.6 V                 |
| Nominal capacity                           | 2.5 Ah / 25 Wh        |
| Charging time ( $I_{\text{charge\_max}}$ ) | 34 min                |
| Buffer time ( $I_N$ )                      | 11 min 30 sec         |

**ENERGY STORAGE UPSI-2406IP-12U**

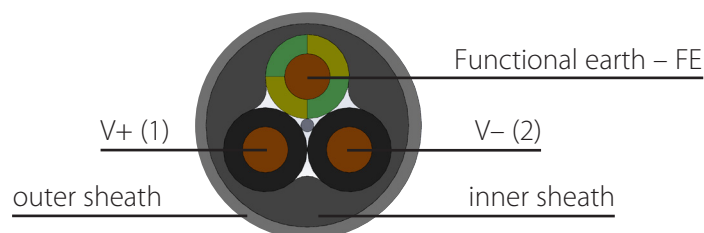
|                                            |                       |
|--------------------------------------------|-----------------------|
| Installed type                             | BP-LFP-1325S          |
| Battery technology                         | LiFePO4               |
| Charging method                            | CC / CV / CP          |
| Nominal voltage $U_N$                      | 13.2 V                |
| End-of-charge voltage                      | 13.8 V                |
| Charging current                           | $\leq 2C$ (4.5...5 A) |
| Undervoltage protection                    | 8.8 V                 |
| Nominal capacity                           | 2.5 Ah / 33 Wh        |
| Charging time ( $I_{\text{charge\_max}}$ ) | 38 min                |
| Buffer time ( $I_N$ )                      | 17 min                |

### CONNECTION DATA INPUT / OUTPUT (HOUSING)

| Connector                                                     | Input                                                                                                                                 | Output                    |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Connector type                                                | Flange plug                                                                                                                           | Flange socket             |
| Design                                                        | Pin (male), straight                                                                                                                  | Socket (female), straight |
| Connection locking                                            | Central screw                                                                                                                         |                           |
| Chassis-internal contact type:<br>Stranded wire to connectors | Screw clamp type                                                                                                                      |                           |
| Mechanical service lifetime                                   | >500 plug cycles                                                                                                                      |                           |
| Stranded wire size and cross section<br>internal              | Outward and downward stranded wires (Power): AWG16 (app. 1.5 mm <sup>2</sup> )<br>FE stranded wire: AWG18 (app. 1.0 mm <sup>2</sup> ) |                           |

### CONNECTION DATA INPUT / OUTPUT (CABLE)

| Connector                                                     | Input                                                                                                                                    | Output               |
|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Connector type                                                | Cable socket                                                                                                                             | Cable plug           |
| Design                                                        | Socket (female), straight                                                                                                                | Pin (male), straight |
| Chassis-internal contact type:<br>Stranded wire to connectors | Screw clamp type                                                                                                                         |                      |
| Mechanical service lifetime                                   | >500 plug cycles                                                                                                                         |                      |
| Tightening force / Torque                                     | 0.5 Nm (tighten by hand)                                                                                                                 |                      |
| Type of cable                                                 | ÖLFLEX® SMART 108 - PVC control cable, 3G2,5                                                                                             |                      |
| Cable construction                                            | Fine wire strands of bare copper; PVC conductor isolation, T12;<br>Two-layer design, PVC, TM2; Colour: outside silver grey, inside black |                      |
| Outside diameter cable                                        | 8.1 mm                                                                                                                                   |                      |
| Stranded wire cross section                                   | 2x Stranded wire (Power): each 2.5 mm <sup>2</sup> ;<br>1x Stranded wire (FE): 2.5 mm <sup>2</sup>                                       |                      |
| Minimum bending radius                                        | Occasional flexing: 15x outer diameter<br>Fixed installation: 4x outer diameter                                                          |                      |
| Temperature range                                             | Occasional flexing: -5 °C...+70 °C max. conductor temp.<br>Fixed installation: -40 °C...+80 °C max. conductor temp.                      |                      |



| CONNECTION DATA – MULTIFUNCTIONAL INTERFACE                   |                                                                                                                                |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Connector type                                                | Flange socket                                                                                                                  |
| Design                                                        | Socket (female), straight                                                                                                      |
| Connection locking                                            | Snap                                                                                                                           |
| Chassis-internal contact type:<br>Stranded wire to connectors | Solder                                                                                                                         |
| Mechanical service lifetime                                   | >500 plug cycles                                                                                                               |
| Stranded wire size and cross section<br>internal              | 8x AWG24 (ca. 0.25 mm <sup>2</sup> )                                                                                           |
| MULTIFUNCTIONAL INTERFACE – USB                               |                                                                                                                                |
| Transmission physics                                          | USB 2.0                                                                                                                        |
| Topology                                                      | Point-to-point                                                                                                                 |
| Protocol                                                      | VCOM, HID                                                                                                                      |
| Transmission length                                           | ≤3 m                                                                                                                           |
| Access time                                                   | <1 s                                                                                                                           |
| Chipset                                                       | NXP                                                                                                                            |
| Electrical isolation                                          | No                                                                                                                             |
| MULTIFUNCTIONAL INTERFACE – RS232                             |                                                                                                                                |
| Transmission physics                                          | RS232 light (TX/RX)                                                                                                            |
| Topology                                                      | Point-to-point                                                                                                                 |
| Symbol rate (baud rate)                                       | 38400                                                                                                                          |
| Transmission length                                           | ≤10 m                                                                                                                          |
| Access time                                                   | <1 s                                                                                                                           |
| Voltage level                                                 | -6 VDC...+6 VDC                                                                                                                |
| Electrical isolation                                          | No                                                                                                                             |
| MULTIFUNCTIONAL INTERFACE – RELAY                             |                                                                                                                                |
| Switch contact (potential free)                               | Relay                                                                                                                          |
| Switching voltage                                             | 24 VDC                                                                                                                         |
| Current carrying capacity                                     | 1 A                                                                                                                            |
| Status (configurable)                                         | Power Fail Alarm                                                                                                               |
| State - signal assignment                                     | NO (Normally Open) / NC (Normally Closed) – configurable<br>Software (see UPS Gen <sup>2</sup> configuration software manual ) |
| Conductor cross-section                                       | AWG 24                                                                                                                         |

**GENERAL DATA**

|                                       |                                                      |
|---------------------------------------|------------------------------------------------------|
| Flammability class according to UL 94 | V0                                                   |
| Weight                                | UPSI-1208IP-11U: 1.84 kg<br>UPSI-2406IP-12U: 1.92 kg |
| UPS connection in parallel            | No                                                   |
| UPS connection in series              | No                                                   |

**HOUSING**

|                      |                                                                                               |
|----------------------|-----------------------------------------------------------------------------------------------|
| Degree of protection | IP 65/67                                                                                      |
| Protection class     | III (with FE)                                                                                 |
| Mounting type        | Wall or surface mounting (or equal)                                                           |
| Housing version      | Aluminium die-cast housing, EN AC – AlSi12(Fe);<br>powder-coated, colour RAL 7001 silver grey |
| Dimension W / H / D  | 140 mm / 140 mm / 90 mm<br>(without connectors and mounting brackets)                         |

| ENVIRONMENTAL CONDITIONS                    |                                                                                                                                                            |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ambient temperature (operation)             | –20...+50 °C                                                                                                                                               |
| Ambient temperature (start up without load) | –20 °C                                                                                                                                                     |
| Ambient temperature (storage / transport)   | –30...+55 °C<br>(recommended SOC at storage: 80 %)                                                                                                         |
| Max. permitted humidity                     | 95 % (at +25 °C)                                                                                                                                           |
| Operating altitude                          | ≤4000 m                                                                                                                                                    |
| Climate class                               | 3K24 (EN 60721-3-3:2020-5)                                                                                                                                 |
| Degree of pollution                         | 4                                                                                                                                                          |
| <b>Overvoltage category</b>                 |                                                                                                                                                            |
| EN 61010-1                                  | I                                                                                                                                                          |
| EN 61010-2-201                              | I                                                                                                                                                          |
| Indoor / Outdoor use                        | Yes / Yes                                                                                                                                                  |
| Testing of environmental influences         | Tested and certified according to<br>DIN EN 60068-2-6:2008: vibration, sinusoidal, in operation<br>DIN EN 60068-2-27:2010: collision (shock), in operation |

| STANDARDS                |                                       |
|--------------------------|---------------------------------------|
| Safety extra-low voltage | IEC 61010-1 (SELV)<br>IEC 61010-2-201 |

| APPROVALS |                                   |
|-----------|-----------------------------------|
| UL        | n.a. (possible upon consultation) |
| CSA       | n.a. (possible upon consultation) |
| CB Scheme | n.a. (possible upon consultation) |

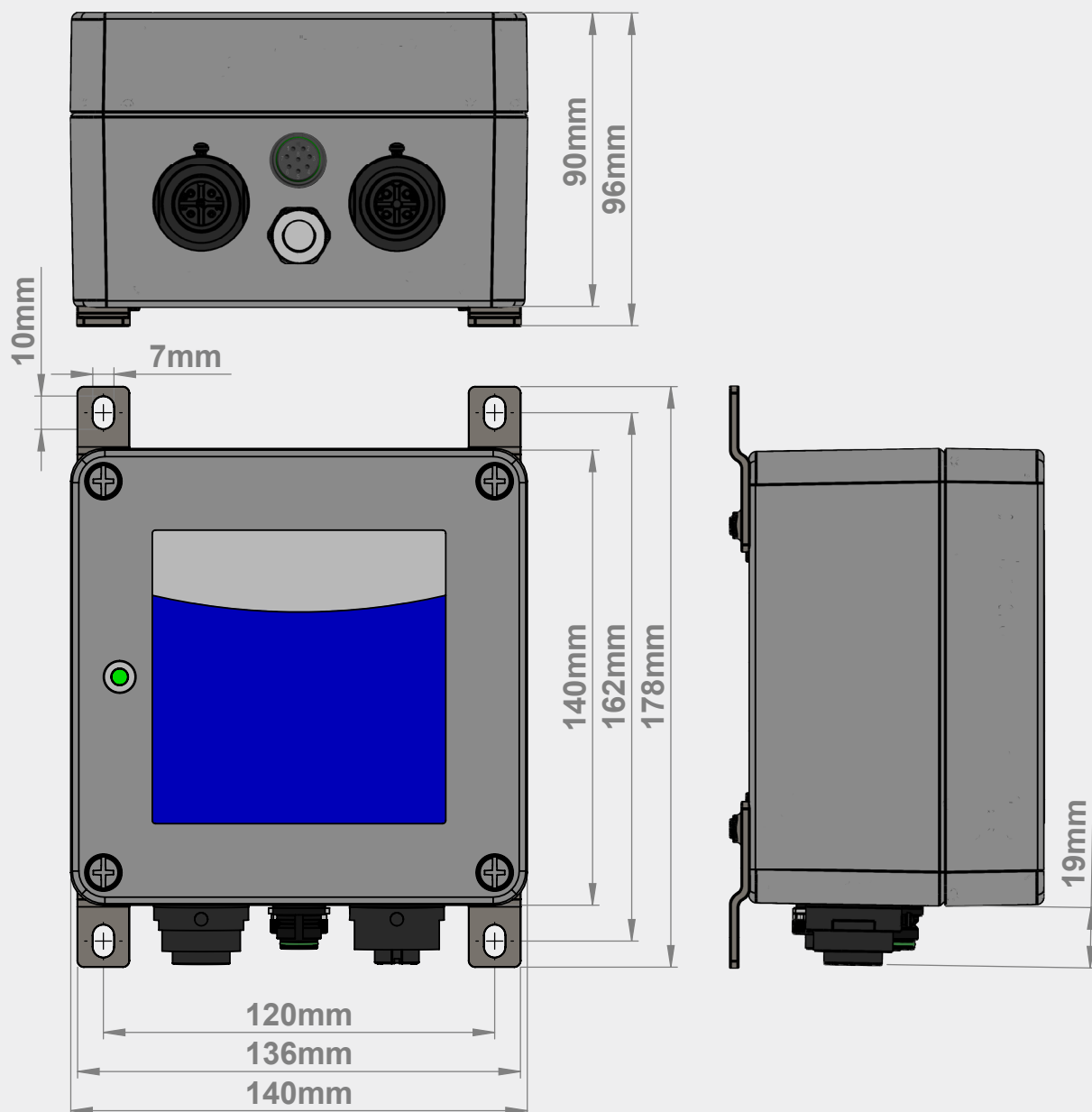
| INTERFERENCE IMMUNITY ACCORDING TO EN 61000 (INDUSTRY)                                                                                                    |                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Basic standard CE                                                                                                                                         | Fulfilled requirements according to EN 61000 (CE)<br>(Interference immunity of industrial environment) |
| <b>Electrostatic discharge</b><br><b>EN 61000-4-2</b><br>Contact discharge<br>Air discharge<br>Comment                                                    | 4 kV<br>8 kV<br>Criterion B                                                                            |
| <b>Electromagnetic HF field</b><br><b>EN 61000-4-3</b><br>Frequency range<br>Test field strength<br><br>Frequency range<br>Test field strength<br>Comment | 80 MHz ... 1 GHz<br>10 V/m<br><br>1.4 GHz ... 2 GHz<br>3 V/m<br>Criterion A                            |
| <b>Fast transients (Burst)</b><br><b>EN 61000-4-4</b><br>Test voltage<br>Comment                                                                          | 2 kV<br>Criterion A                                                                                    |
| <b>Surge voltage load (Surge)</b><br><b>EN 61000-4-5</b><br>Test voltage L–N<br>Test voltage L–PE, N–PE<br>Comment                                        | ±0.5 kV<br>±1 kV<br>Criterion A                                                                        |
| <b>Power frequency magnetic field immunity</b><br><b>EN 61000-4-8</b><br>Test level<br>Comment                                                            | 30 A/m<br>Criterion A                                                                                  |

| <b>EMISSION ACCORDING TO EN 55016-2-3 (DOMESTIC)</b>                                               |                                                                         |
|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| <b>Basic standard CE</b>                                                                           | <b>Fulfilled requirements according to EN 55016-2-3 (CE) (Domestic)</b> |
| <b>Conducted emission from the power port</b><br><b>EN 55016-2-3</b><br>Frequency range<br>Comment | 150 kHz–30 MHz<br>Conform                                               |
| <b>Electric field radiated emission</b><br><b>EN 55016-2-3</b><br>Frequency range<br>Comment       | 30 MHz–1 GHz<br>Conform                                                 |

| <b>LEGEND</b> |                                                                                          |
|---------------|------------------------------------------------------------------------------------------|
| Criterion A   | Normal operating behaviour within the defined limits.                                    |
| Criterion B   | Temporary impairment of the operating behaviour, that is corrected by the device itself. |

## D2 Drawing

Unless otherwise stated,  
Tolerance according to:  
DIN ISO 2768 T1 - m  
DIN ISO 2768 T2 - K



## E General Data

### E1 Assembly and installation advice



**Installation and operation of this device is only allowed to be executed by a qualified electrician!**

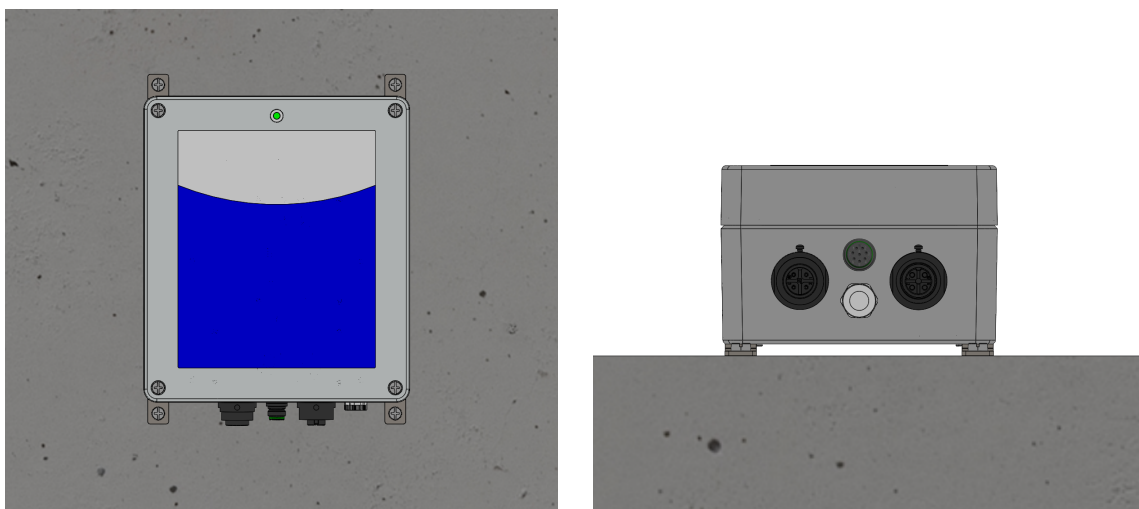
The application has to be separated from any power during the mounting process. The connector cables have to be correctly locked with the device connections and may only be screwed hand-tight (max. 0.5 Nm). Pay attention to correct polarity! Before commissioning, the connections must be checked for correctness. The interface cable is plugged to the multi-functional interface using snap-in technology and has to lock with it accordingly. If a cable is not plugged in, the connector has to be covered with a suitable protective cap (not included in the scope of delivery, optionally available, article number „PSZ-1104“).

The two functional earth strands (green / yellow) of the input and output lines are internally connected to both housing parts, the four mounting brackets and the input and output GND ( $V_{IN-}$  /  $V_{OUT-}$ ) of the UPS board.

### E2 Convection and installation position

It is recommended to mount the device vertically (on edge) or horizontally on a suitable wall or surface in order to achieve the best possible convection. Another installation position should be avoided if possible, as operation up to the highest ambient temperature can not be guaranteed. Although the device can basically be operated without external air convection, care should still be taken to ensure that there is enough convection around it so that the generated heat can be dissipated. Care should be taken not to install it in or at slim and narrow places such as niches, corners, crevices or the like, as this can cause it to be heated by other sources or devices and thus drastically reduce the service lifetime or errors and dangers can occur.

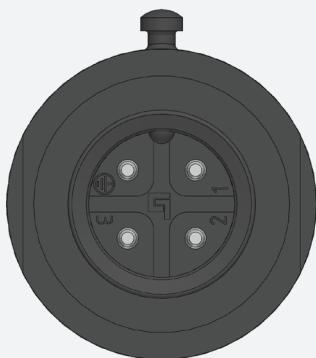
A distance of at least 100 mm (10 cm) in all directions from the housing wall to other, neighboring devices should be maintained.



The devices comply with the IP protection class 65/67.

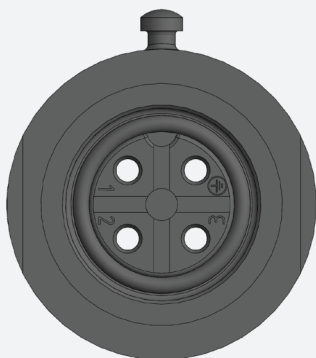
## E3 Description of connectors

### INPUT



| PIN                                                                               | FUNCTION    |
|-----------------------------------------------------------------------------------|-------------|
| 1                                                                                 | Vin +       |
| 2                                                                                 | Vin – (GND) |
| 3                                                                                 | n.a         |
|  | FE          |

### OUTPUT



| PIN                                                                                 | FUNCTION     |
|-------------------------------------------------------------------------------------|--------------|
| 1                                                                                   | Vout +       |
| 2                                                                                   | Vout – (GND) |
| 3                                                                                   | n.a          |
|  | FE           |

### MULTIFUNCTIONAL INTERFACE



| PIN | FUNCTION                        |
|-----|---------------------------------|
| 1   | Relay +                         |
| 2   | Relay –                         |
| 3   | TXD (RS232)                     |
| 4   | RXD (RS232)                     |
| 5   | V+ (USB)                        |
| 6   | Data+ (USB)                     |
| 7   | Data– (USB)                     |
| 8   | Common GND / Shield (USB/RS232) |

## E4 Dimensioning the upstream power supply

Ensure that the upstream power supply is correctly dimensioned to guarantee the charging process of the batteries and the correct functioning of the application. For charging the energy storage even at higher load must be taken care of.

The input has to be supplied from a SELV or PELV power supply. In order to operate the UPS devices with complete functionality, the upstream power supply has to provide at least the following sizes and use **no** constant current function.

UPSI-1208IP-11U: 12V/10A, app. 120W

UPSI-2406IP-12U: 24V/7.5A, app. 180W

If less load than the maximum load is required at the output, the voltage supply can be dimensioned according to the following tables (column 3 in each case).

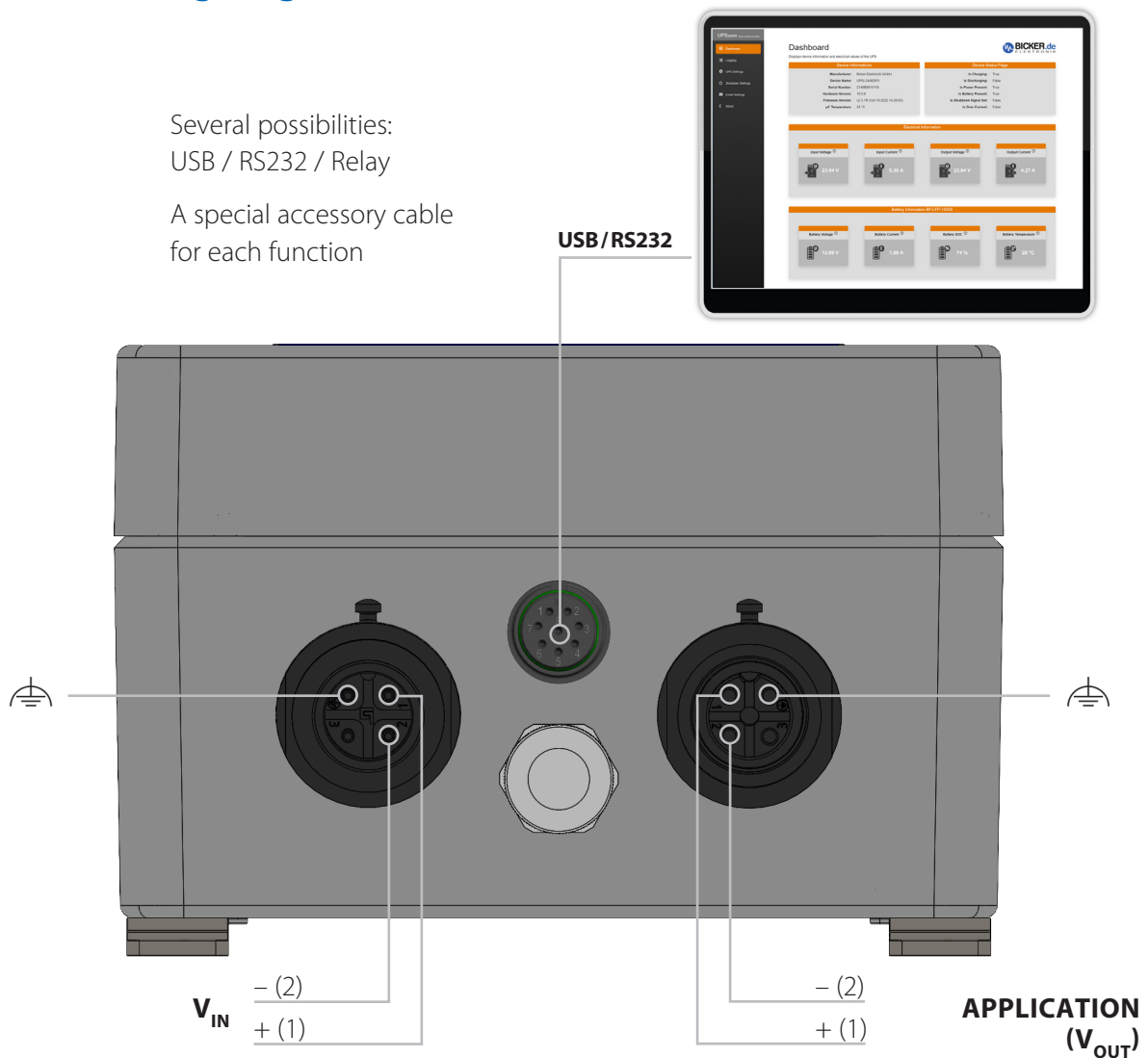
| UPSI-1208IP-11U       |                         |                         |
|-----------------------|-------------------------|-------------------------|
| $I_{\text{LOAD}}$ [A] | $I_{\text{CHARGE}}$ [A] | $I_{\text{IN-MIN}}$ [A] |
| 0                     | 3.5                     | 3.5                     |
| 1                     | 3.3                     | 4.5                     |
| 2                     | 3.0                     | 5                       |
| 3                     | 2.6                     | 6                       |
| 4                     | 2.3                     | 6.5                     |
| 5                     | 1.9                     | 7                       |
| 6                     | 1.6                     | 8                       |
| 7                     | 1.3                     | 9                       |
| 8                     | 1.0                     | 10                      |

| UPSI-2406IP-12U       |                         |                         |
|-----------------------|-------------------------|-------------------------|
| $I_{\text{LOAD}}$ [A] | $I_{\text{CHARGE}}$ [A] | $I_{\text{IN-MIN}}$ [A] |
| 0                     | 2.25                    | 2.5                     |
| 1                     | 2.1                     | 3.5                     |
| 2                     | 2.0                     | 4                       |
| 3                     | 1.7                     | 5                       |
| 4                     | 1.6                     | 6                       |
| 5                     | 1.4                     | 7                       |
| 6                     | 1.1                     | 7.5                     |

## E5 Connecting diagram

Several possibilities:  
USB / RS232 / Relay

A special accessory cable  
for each function



### CONNECTING ORDER

1. APPLICATION ( $V_{OUT}$ )
2. DC SOURCE ( $V_{IN}$ )
3. INTERFACE CABLE (ACCESSORY)

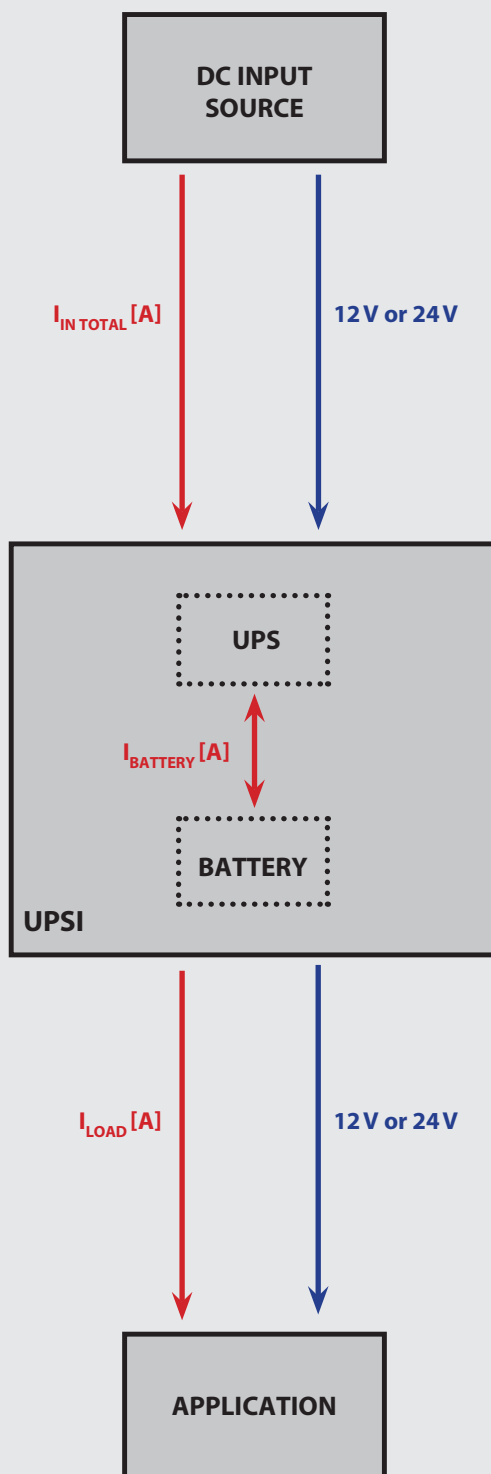
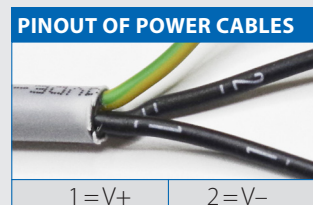
**Dismantling order reverse to connection!**



### $V_{IN}/V_{OUT}$ - ATTENTION!

1. Note polarity!
2. Pay attention to the maximum cable length. The supplied cables should not be lengthened because if the cables are too long, an unintentional power fail may be triggered (e.g. due to a voltage level change in the event of a load drop).

## WIRING DIAGRAM



## E6 Initial operation

The correct installation of the UPS has to be ensured.

**The start is accomplished by connecting the upstream power supply:** When a voltage higher than 11.5 or 22.5 V is connected to the input terminals, the energy storage gets queried and transmits its data. The UPS sets the corresponding end-of-charge voltage and releases the pack. After that, the charging of the energy storage starts.

The applied voltage at the input of the UPS is passed through to the output, reduced by a current-dependent voltage drop. The device charges the energy storage and monitors the upstream voltage thresholds at the input (UPS function).

It must be ensured that the source supplies enough current to guarantee the charging process (see chapter E4 „Dimensioning the upstream power supply“).



Even after disconnecting the upstream source and also no voltage is measurable at the output, the UPS can be still powered by the energy storage.

## E7 Overview connector / Counterpart with description / Scope of delivery

| CONNECTOR                 | PART NO. HOUSING END | PART NO. CABLE END |
|---------------------------|----------------------|--------------------|
| $V_{IN}$                  | Binder 09422315004   | Binder 9902100004  |
| $V_{OUT}$                 | Binder 09422415004   | Binder 9902090004  |
| Multifunctional Interface | Binder 9991280008    | Binder 9991250008  |

| SCOPE OF DELIVERY |                                                                              |
|-------------------|------------------------------------------------------------------------------|
| QUANTITY          | DESCRIPTION                                                                  |
| 1x device         | UPSI-1208IP-11U bzw. UPSI-2406IP-12U                                         |
| 1x                | $V_{IN}$ cable, 3x 2.5 mm <sup>2</sup> (inclusive FE), length 3 m, open end  |
| 1x                | $V_{OUT}$ cable, 3x 2.5 mm <sup>2</sup> (inclusive FE), length 3 m, open end |
| 1x                | USB cable, length 3 m, with type A connector (PSZ-1110)                      |

## E8 Accessories

|          |                                 |
|----------|---------------------------------|
| PSZ-1108 | Relay Cable                     |
| PSZ-1109 | RS232 Cable                     |
| PSZ-1110 | USB Cable                       |
| PSZ-1104 | Cover multifunctional interface |

## E9 Charging time

Charging times depend on energy storage, input voltage and the load current.

## E10 Reverse polarity / Overcurrent / Short circuit

Reverse polarity:

The device has active reverse polarity protection at the input if the input strands are connected with reverse polarity while the device is still switched off (e.g. during commissioning). If the device operates in backup mode and the input strands are connected with reverse polarity, no reverse polarity protection is given.

Overcurrent:

If the load current at the output is too high, the device switches it off. For maximally allowed current values and peak current values refer to chapter D „Technical Data“. The status LED indicates the error status by means of a very rapid flashing sequence. A restart attempt occurs every 10 seconds in normal mode. During backup mode there is no restart attempt.

Short circuit:

In the event of a short-circuit at the output of the UPS, the output is immediately disconnected (<5 ms). The status LED indicates the error status by means of a very rapid flashing sequence. A restart attempt occurs every second in normal mode (non-latch). During backup mode there is no restart attempt. The impact of a short-circuit to the device depends on length and diameter (impedance) of the output wiring. In case of a short-circuit directly at the device output a damage of the device can occur.

## E11 Backup time in backup mode

The nominal backup times can be found within the technical data of this user manual or the user manuals/datasheets of the used energy storages. At extreme low or high temperatures a reduction of the nominal backup times can occur.

## E12 Behaviour in case of exceeding maximum backup time

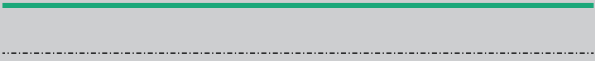
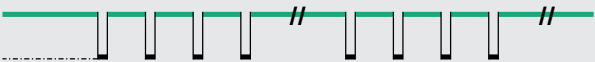
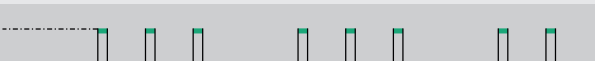
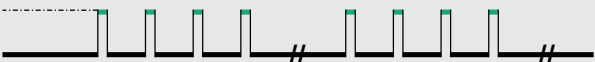
When the given buffering times are exceeded, the output is separated on the basis of the discharge voltage of the corresponding energy storage (total discharge protection).

The lower the voltage of the energy storage device decreases, the higher the discharge current so that a constant power is ensured at the output of the UPS.

If the allowable output current during backup mode exceeds more than 70%, the converter switches off first, without separating the output immediately. In this case, the voltage at the output of the UPS can drop significantly below 12 V or 24 V. This condition should be avoided by shutting down the system in time.

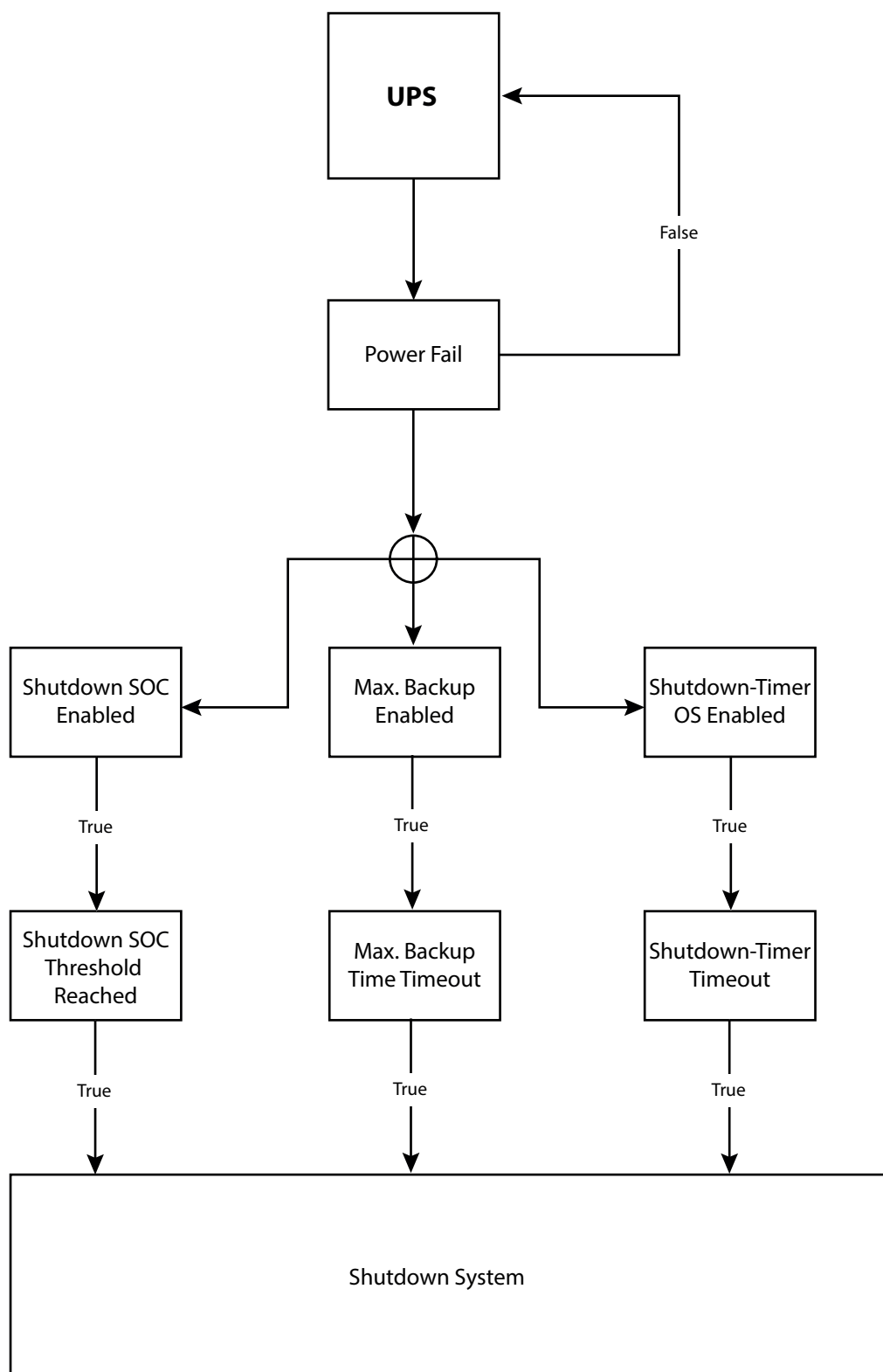
## E13 Status LED

Valid from firmware version 2.1.19

| MAIN STATES                                                                         |                                               |                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | Always on                                     | <b>Status: mains voltage</b><br>>> Mains voltage is present.                                                                                                                                                                                               |
|    | 1 Hz flash<br>(1 s on, 1 s off)               | <b>Status: Backup mode</b><br>>> Mains voltage is not present.                                                                                                                                                                                             |
| INTERNAL STATES                                                                     |                                               |                                                                                                                                                                                                                                                            |
|    | 1 x flash (LED is off briefly), pause 2 s     | <b>Status: Battery start*</b><br>>> Manual start from the battery by pressing the BS button.                                                                                                                                                               |
|    | 2 x flash (LED is off briefly), pause 2 s     | <b>Status: Capacity not reached</b><br>>> Capacity is required. Output is only activated when the battery is charged to set SOC.                                                                                                                           |
|   | 3 x flash (LED is off briefly), pause 2 s     | <b>Status: Shutdown</b><br>>> UPS has received a shutdown signal and is waiting until the set load sensor value has fallen below.                                                                                                                          |
|  | 4 x flash (LED is off briefly), pause 2 s     | <b>Status: Reboot</b><br>>> Output is deactivated and time until reboot runs (Reboot phase).                                                                                                                                                               |
| BATTERY FAILURES                                                                    |                                               |                                                                                                                                                                                                                                                            |
|  | 1 x flash (LED is off a long time), pause 2 s | <b>Status: No battery detected</b>                                                                                                                                                                                                                         |
|  | 2 x flash (LED is off a long time), pause 2 s | <b>Status: Battery overvoltage</b><br>>> Charge voltage at battery is too high, battery is deactivated.                                                                                                                                                    |
|  | 3 x flash (LED is off a long time), pause 2 s | <b>Status: Battery overcurrent</b><br>>> Charge current at battery is too high, battery is deactivated.                                                                                                                                                    |
|  | 4 x flash (LED is off a long time), pause 2 s | <b>Status: Battery temperature failure</b><br>>> Battery temperature sensor was not detected or battery temperature is too high or low.                                                                                                                    |
| UPS FAILURES                                                                        |                                               |                                                                                                                                                                                                                                                            |
|  | Quick flashing without pause                  | <b>Status: UPS failure</b><br>>> Output current too low, UPS is deactivated.<br>>> Overcurrent at output (charge current too high), output is deactivated<br>>> Short circuit at output, output is deactivated<br>>> Internal failure, UPS is deactivated. |

\* Not available with UPSI-IP-1 series

## E14 Shutdown diagram



## E15 Recommendations for a long UPS service life

LiFePO4 batteries age over time depending on cycles, operating temperature and the level of the end-of-charge voltage. The end-of-charge voltages are optimized so that they are at an optimum between service life and performance.

To extend the lifetime of the system, the device should not be placed near sources of heat and should be placed within good air-circulation. A larger capacity than actually required should always be used. The less deep the packs are discharged, the longer the service life lasts.

## E16 Maintenance

The UPS contains no serviceable parts. In case of a malfunction the upstream power source has to be disconnected and cables have to be removed. Use a dry cloth for cleaning!

## E17 Disposal

Electric and electronic devices must not be disposed with domestic waste!  
Please consider to each country's own regulation about recycling and disposal of used batteries at the end of their lifetime or resending to any recycling organization.



## E18 Disclaimer

We, the Bicker Elektronik GmbH, have checked the contents of this document for compliance with the hardware and software described. Nevertheless, deviations can not be ruled out, so we assume no liability for the complete agreement. The information in this publication is checked regularly, necessary corrections are included in the updated versions.

Suggestions for improvement as well as tips and criticism are always welcome.

## E19 Preventive measures and rules when operating the UPS system

The voltage drop of the lines has to be kept in mind! The maximum charge current can cause huge voltage drops if too long supply lines are used. If the voltage drop is too high a shortfall of the threshold values is possible and a not intended Power Fail could be caused. With maximum load the voltage at the input of the device must not undercut the respective minimum value.

Even after the upstream supply has been disconnected, the device continues to run for some time after the shortfall of the load sensor (setting of a threshold value for current: currents below this value will be classified as „system off“ (no load)).

A short direct at the output of the device can cause damage or destruction of the UPS. In the event of a fault, electrolytes can escape in liquid and gaseous form.

## E20 Transport information

### Transport regulations for devices with energy storage

Devices containing LiFePO<sub>4</sub> batteries are subject to special transport restrictions in accordance with applicable dangerous goods regulations.

#### **Road Transport**

The following UN classifications apply to road transport:

- **LiFePO<sub>4</sub> batteries:** UN3480/UN3481 (depending on installation/ packaging condition)

*Further information on dangerous goods regulations for road transport can be found at:*

🔗 [www.bmv.de](http://www.bmv.de) - Dangerous Goods by Road

#### **Sea and Air Freight**

For transport by sea and air, please contact the relevant authorities for information on the relevant regulations:

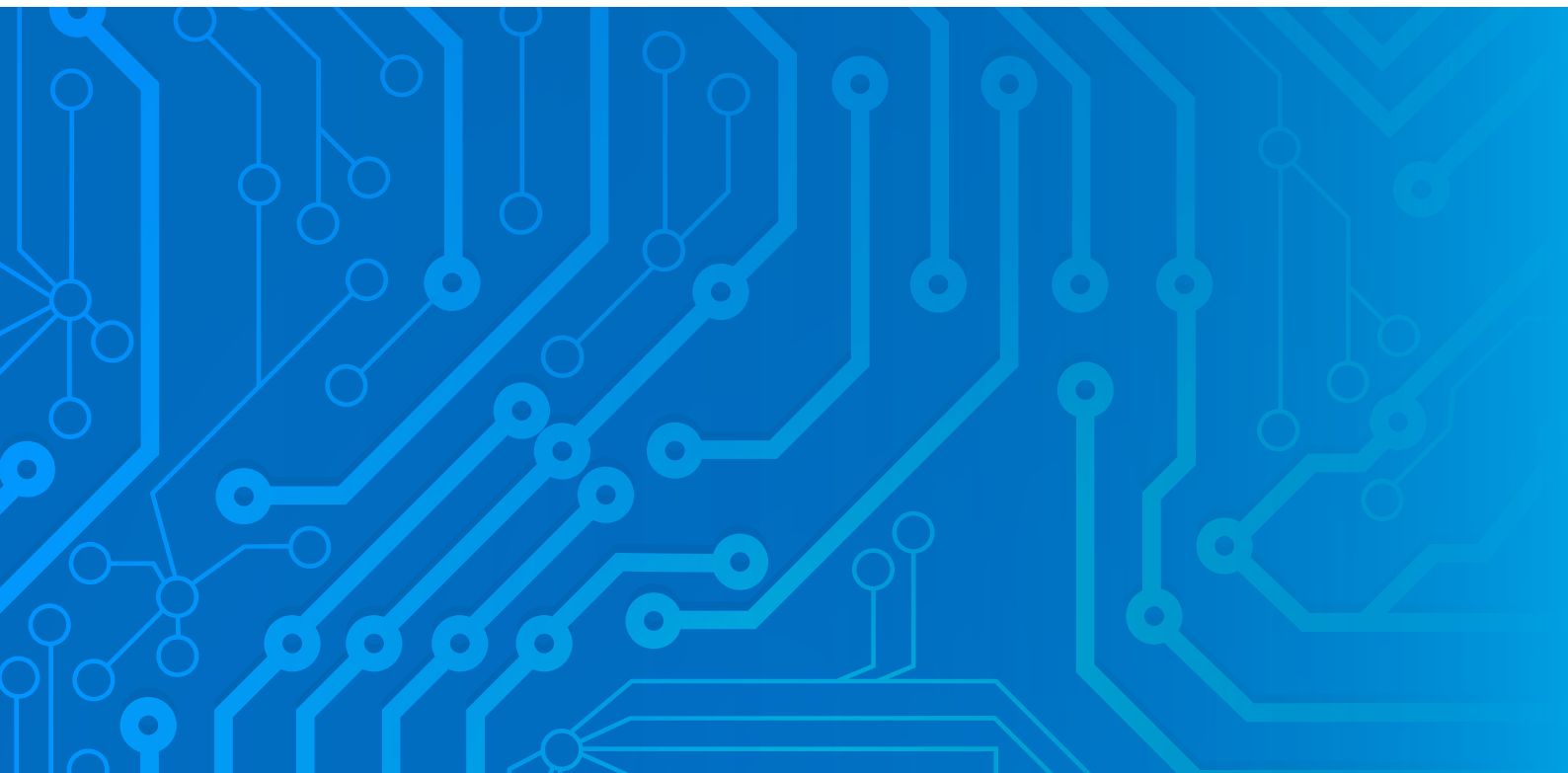
- **Sea freight:** 🔗 [www.bmv.de](http://www.bmv.de) - Dangerous Goods Maritime Shipping
- **Air freight:** 🔗 IATA Dangerous Goods Regulations

**Note:** Compliance with current regulations must be checked before each transport and the relevant documentation have to be provided.

## F Name / Address / Support E-Mail / Phone number of the manufacturer

Bicker Elektronik GmbH · Ludwig-Auer-Straße 23 · 86609 Donauwörth · Germany

E-Mail: [support@bicker.de](mailto:support@bicker.de) · Tel.: +49 (0) 906 70595-0



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