English

BICKER.de ELEKTRONIK

User Manual | UPSI-2406D

UPSI SYSTEM
DIN RAIL

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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
16.07.2020 Revision 0-1	Initial version
12.01.2022 Revision 1	Release version
09.02.2022 Revision 1-1	Chapter B3 included


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ELEKTRONIK
UPSI
DC UPS
STATUS
+ OUT -
- IN +
BAT DATA
BAT PWR
RL
RS232
USB
UPSI
DC UPS

A Brief specification

UPSI-2406D

24 V DC / 6 A

- **24 V DC UPS (DIN rail version)**
- **Intelligent input current detection**
- **Regulated output voltage in battery mode**
- **Minimum load detection**
- **Power fail Timer function**
- **Relay dry contact on power fail**
- **Reboot function**
- **Fuel gauge**
- **Shutdown via external signal**

Technical Data	
Input voltage	24 V DC (22.5…30 V)
Input current	7.5 A max.
Output voltage	Normal mode: V_{IN} – 0.5 V DC max. (depending on load) Battery mode: 23.5 V DC
Output current	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, RS232, HID UPS
Possible battery technology	LiFePO4, Supercaps (EDLC)
Ambient temperature	Operating: -20…+70 °C Storage / Transport: -30…+70 °C
Operating altitude	≤4000 m
Max. permitted humidity	≤95 % (at +25 °C, no dew)
Dimensions W / H / D	36 x 120 x 100 mm (without front connectors and DIN-Rail mounting bracket)
Weight	0.25 kg

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-2406D (hereinafter also called UPS) is a DC / DC UPS system with numerous digital features and high performance. The UPS can be operated with different energy storage devices (hereinafter also called battery(s)), which are different in technology, capacity and chemistry. Only energy storage devices made by Bicker Elektronik are to be used, due to the charging settings are made according the recognization of the used battery type. 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 UPS requires a rated dimensioned power supply of 24 V DC 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 connected 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 battery 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 battery mode is always regulated to 23.5 V DC and does not decrease as the voltage of the energy storage device drops. If the UPS operates in battery mode, the status LED is slowly flashing (1 Hz flashing). When the UPS is used with LiFePO4 battery and it is discharged completely in battery mode, the recharging 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.

B2 Intended use

This device is designed to be installed into a suitable enclosure which protects against electrical, water and fire hazards and can then be used indoors and outdoors. It is primary built for being mounted on a DIN Rail and is intended for professional use in applications such as industrial control, communication and measurement technology. It must not be used in devices or equipment where a malfunction will cause serious injury or endanger human life.

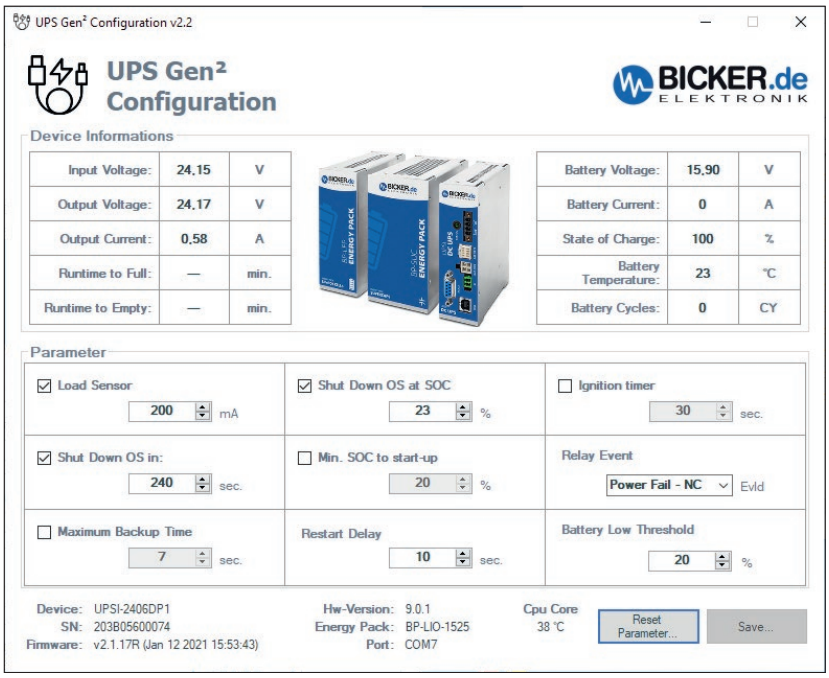
B3 UPS Gen² Configuration Software

UPS Gen² Configuration Software is required for setting parameters and programming new firmware for all UPSI Gen² devices under Microsoft® Windows. The software tool also shows the operating status of the UPS and its energy storage devices and can be connected to the device via USB:

The model has the native UPS device group integrated via USB / HID-UPS (HID Power Class). Most operating systems (OS) recognize the UPSI models via Plug & Play without additional driver and can be used with the operating system's own energy settings.

The UPS Gen² software tool offers additional setting options such as time-bound shutdown and other important features.

The Software can be downloaded here
The User Manual for the Software can be downloaded here



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 must not be immersed in water or exposed to splash water.
4. The device must not be operated in a humid environment or in an environment where dew and condensation are to be expected.
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. Keep ventilation openings clear.
10. Device must not be dropped.
11. All parts of the device and accessories must not be eaten or swallowed.
12. A current limited source is to be used. The required current values for the UPS are described in this manual.
13. 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.

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 – UPSI-2406D Unless otherwise stated, all specifications apply to 25 °C ambient temperature, 24 V DC input voltage and nominal output current (I_N).	
Input voltage	24 V DC
Input voltage range	22.5 V DC…30 V DC
Electric strength max.	35 V DC
Fixed connect threshold Undervoltage Voltage drop Input/Output	 22.5 V DC 0.5 V DC max. (depending on load)
Current consumption I_N (U_N, $I_{OUT} = I_N$, $I_{CHARGE} = 0$) I_{MAX} (U_N, $I_{OUT} = I_{STAT.BOOST}$, I_{CHARGE} = max) I_{DYN} (U_N, $I_{OUT} = I_{DYN.BOOST}$, $I_{CHARGE} = 0$) $I_{NO-LOAD}$ (U_N, $I_{OUT} = 0$, $I_{CHARGE} = 0$) I_{CHARGE} (U_N, $I_{OUT} = 0$, I_{CHARGE} = max)	 6.1 A 7.5 A 7.6 A <100 mA 2.4 A
Power consumption P_N (U_N, $I_{OUT} = I_N$, $I_{CHARGE} = 0$) P_{MAX} (U_N, $I_{OUT} = I_{STAT.BOOST}$, I_{CHARGE} = max) P_{DYN} (U_N, $I_{OUT} = I_{DYN.BOOST}$, $I_{CHARGE} = 0$) P_{CHARGE} (U_N, $I_{OUT} = 0$, I_{CHARGE} = max)	 146.5 W 180 W 182.5 W 58 W
Internal input fuse	Yes (15 A)
Switch-on time	<5 s
Switch-on time battery start (BS)	n.a.

OUTPUT DATA – UPSI-2406D (NORMAL MODE) Unless otherwise stated, all specifications apply to 25 °C ambient temperature, 24 V DC input voltage and nominal output current (I_N).	
Output voltage	24 V DC
Output voltage range	$U_{OUT} = U_{IN}$ – 0.5 V DC max. (depending on load)
Capacitive load	3000 µF (at start)
Output current I_N $I_{STAT.BOOST}$ $I_{DYN.BOOST}$ I_{SFB}	 6 A 6.3 A 6.4…7.5 A for max. 3 s 30 A (5 ms)
Output power P_N (U_N, $I_{OUT} = I_N$, $I_{CHARGE} = 0$) $P_{STAT.BOOST}$ (U_N, $I_{OUT} = I_{STAT.BOOST}$, $I_{CHARGE} = 0$) $P_{DYN.BOOST}$ (U_N, $I_{OUT} = I_{DYN.BOOST}$, $I_{CHARGE} = 0$)	 141.5 W 148.5 W 150…175 W for max 3 S
Short-circuit proof	Yes
No-load proof	Yes
Overcurrent shutdown	6.4…7.5 A for max. 3 s; 7.6…10.8 A for max. 100 ms; >10.8 A for max. 5 ms

OUTPUT DATA – UPSI-2406D (BATTERY MODE) Unless otherwise stated, all specifications apply to 25 °C ambient temperature, 24 V DC input voltage and nominal output current (I_N).	
Output voltage	23.5 V DC
Output voltage range	n.a.
Output current I_N $I_{STAT.BOOST}$ $I_{DYN.BOOST}$ I_{SFB}	 6 A 6.3 A 6.4…7.5 A for max. 3 s 30 A (5 ms)
Output power P_N (U_N, $I_{OUT} = I_N$, $I_{CHARGE} = 0$) $P_{STAT.BOOST}$ (U_N, $I_{OUT} = I_{STAT.BOOST}$, $I_{CHARGE} = 0$) $P_{DYN.BOOST}$ (U_N, $I_{OUT} = I_{DYN.BOOST}$, $I_{CHARGE} = 0$)	 140 W 147 W 149…175 W for max. 3 s
Short-circuit proof	Yes
No-load proof	Yes
Overcurrent shutdown	6.4…7.5 A for max. 3 s; 7.6…10.8 A for max. 100 ms; >10.8 A for max. 5 ms
Switching time normal mode ≫ battery mode	<600 µs

CONNECTION DATA INPUT / OUTPUT	
Connection method	Screwable plug connector
Conductor cross-section solid	0.129 mm^2 … 1.31 mm^2 (26 … 16 AWG)
Conductor cross-section flexible	0.129 mm^2 … 1.31 mm^2 (26 … 16 AWG)
Conductor cross-section with ferrule	0.129 mm^2 … 1.31 mm^2 (26 … 16 AWG)
Stripping length	6 mm … 7 mm
Tightening torque	0.3 Nm … 0.4 Nm

BATTERY CHARGE UNIT	
Charging method	CC / CV / CP
End-of-charge voltage	Depending on energy storage, app. 16 V max.
Charging current	Depending on energy storage, 4.5…5.0 A, 16 A max.
Battery technology	LiFePO4 / EDLC (Supercaps)

RELEASED ENERGY STORAGE	
BP-LFP-1325D	LiFePO4 / 13.2 V DC / 2.5 Ah / 33 Wh
BP-LFP-1375D	LiFePO4 / 13.2 V DC / 7.5 Ah / 99 Wh
BP-SUC-1645D	EDLC / 15.2 V DC / 6.8 kJ (4.5 kJ useful) / 1.89 Wh (1.25 Wh useful)
BP-SUC-16090D	EDLC / 15.2 V DC / 13.5 kJ (9.0 kJ useful) / 3.75 Wh (2.5 Wh useful)

CONNECTION DATA – RELAY	
Connection labeling	RL
Switch contact (potential free)	Relay
Status (configurable)	Power Fail Alarm
Switching voltage	24 V DC / 125 V AC
Current carrying capacity	1 A (DC) / 0.5 A (AC)
State - signal assignment	NO (Normally Open) / NC (Normally Closed) – configurable via Software (see UPS Gen^2 software manual)
Connection method	Lockable plug connector
Conductor cross-section solid	0.205 mm^2 … 1.3 mm^2 (24 … 16 AWG)
Conductor cross-section flexible	0.205 mm^2 … 1.3 mm^2 (24 … 16 AWG)
Conductor cross-section with ferrule	0.205 mm^2 … 1.3 mm^2 (24 … 16 AWG)
Stripping length	7 mm … 9 mm
Switching time	1500 ms max.

DATA INTERFACE – USB	
Interface designation	USB
Numbers of interfaces	1
Connection method	USB type B (female)
Locking	No
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

DATA INTERFACE – RS232	
Interface designation	RS232
Numbers of interfaces	1
Connection method	DSUB 9-Pin (female)
Locking	No
Transmission physics	RS232 light (TX / RX)
Topology	Point-to-point
Symbol rate (baud rate)	38400
Type of cable	1:1
Transmission length	≤10 m
Access time	< 1 s
Voltage level	-6 V DC … +6 V DC
Electrical isolation	No

GENERAL DATA	
Flammability class according to UL 94 (housing / terminal blocks)	V0
Weight	0.25 kg
UPS connection in parallel	No
UPS connection in series	No

HOUSING	
Degree of protection	IP 20
Protection class	III (without PE)
Mounting type	DIN-Rail mounting (EN 60715)
Housing version	Aluminium
Dimension W / H / D	36 mm / 120 mm / 100 mm (without front connectors and DIN-Rail mounting bracket)

ENVIRONMENTAL CONDITIONS	
Ambient temperature (operation)	-20… +70 °C
Ambient temperature (start up without load)	-30 °C
Ambient temperature (storage / transport)	-30…+70 °C
Max. permitted humidity	≤95 % (at +25 °C, no dew)
Operating altitude	≤4000 m
Climate class	3k3 (EN 60721)
Degree of pollution	2
Overvoltage category EN 61010-1 EN 61010-2-201	 I I
Indoor / Outdoor use	Yes / Yes (in housing)

STANDARDS	
Safety extra-low voltage	IEC 61010-1 (SELV) IEC 61010-2-201

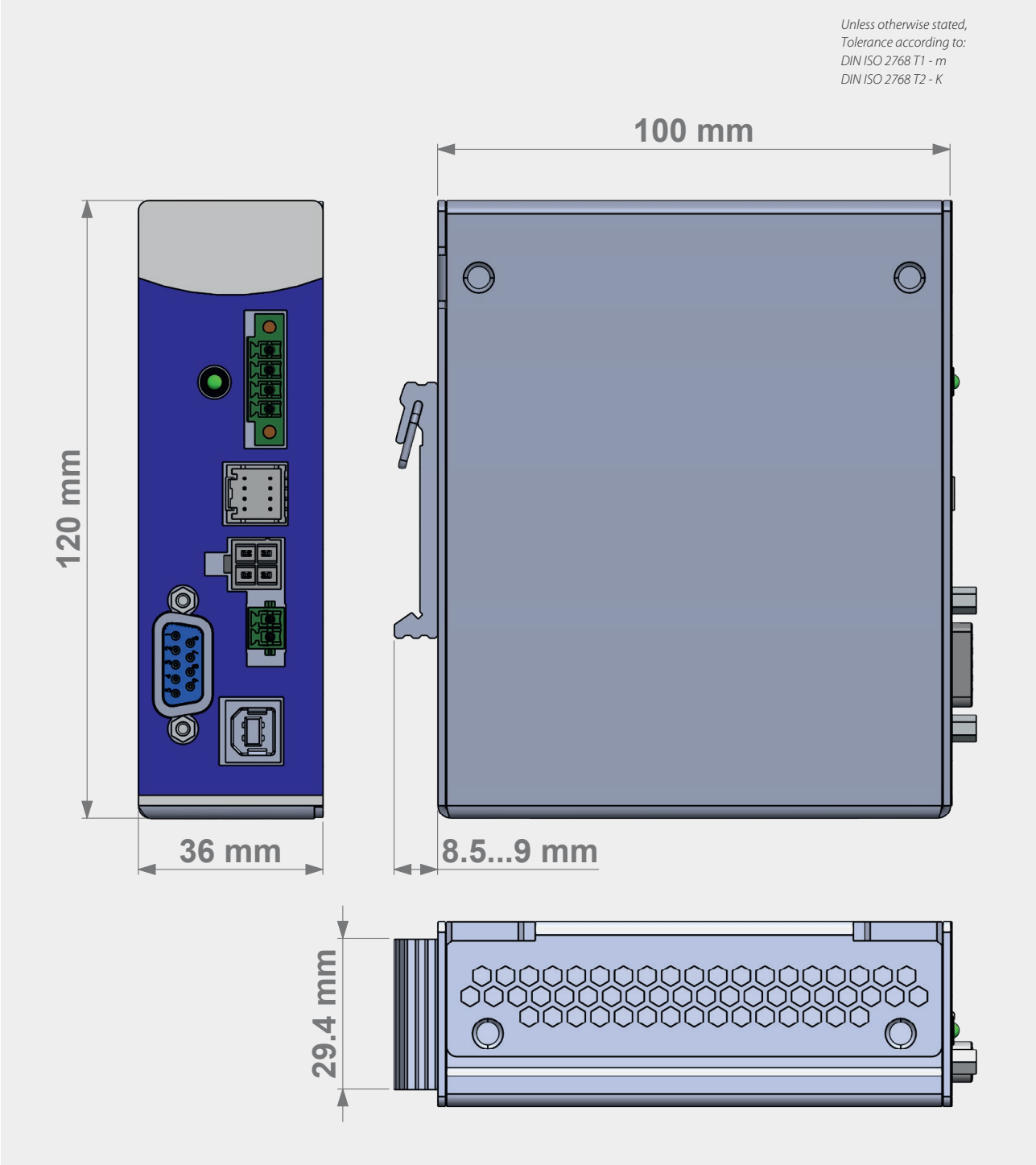
APPROVALS	
UL	n.a. (possible upon consultation)
CSA	
CB Scheme	

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

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

LEGEND	
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



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

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

F General Data

F1 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. Wires have to be connected safely and must not have contact with sharp edges. Pay attention to correct polarity! Before commissioning, check all the connections for correctness!

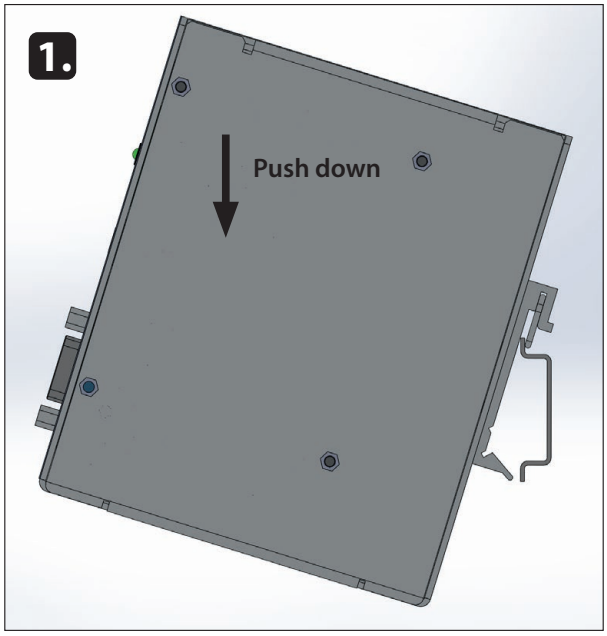
F2 Convection and installation position

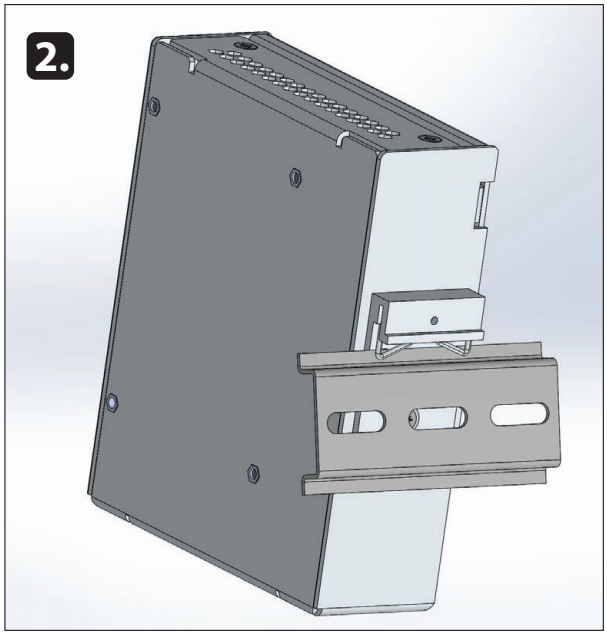
For this DIN rail version, vertical mounting on a horizontal rail (DIN rails according to EN 60715) is recommended in order to achieve the best possible convection of the UPS. Another mounting position is possible, but operation up to +70 °C ambient temperature can not be guaranteed.
Make sure that no ventilation holes are covered by other, neighboring components and devices.

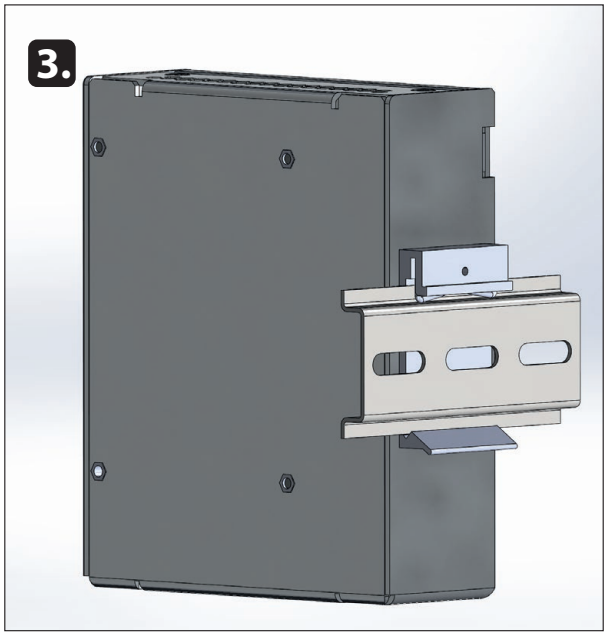
The following distances to neighboring devices are recommended:
Left / right: 20 mm
Top / bottom: 50 mm

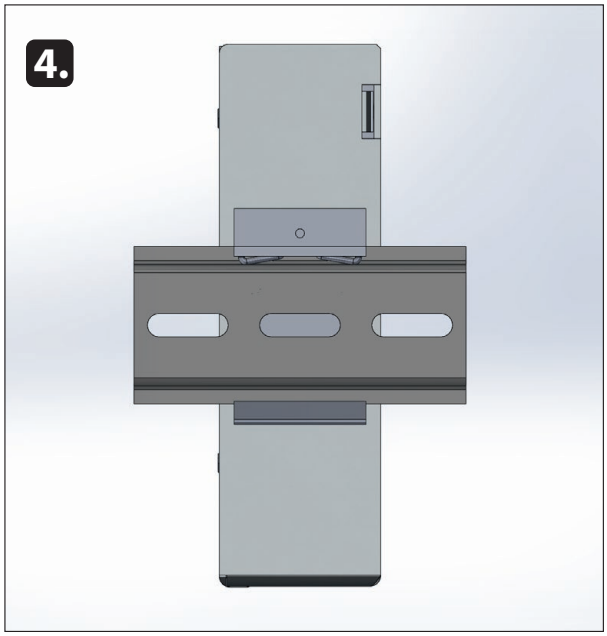
The devices comply with the IP protection class 20.

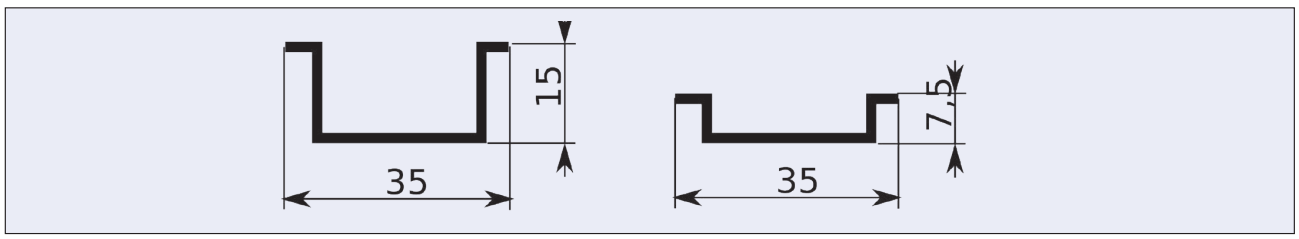
DIN-Rail mounting and DIN-Rail profile according to EN 60715





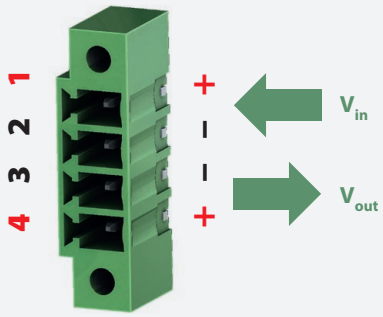






F3 Description of connectors

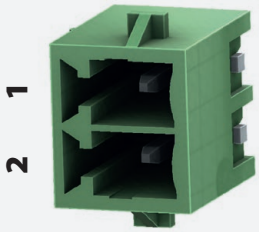
INPUT & OUTPUT (IN & OUT)



PIN	FUNCTION
1	Vin +
2	Vin –
3	Vout –
4	Vout +

RELAY CONNECTION (RL)

The function of the relay connection is configurable via software. When closing the relay the resistor value between both contacts is approx. 0 Ω, otherwise they are „open load“.



PIN	FUNCTION
1	Relay contact 1
2	Relay contact 2

RS-232

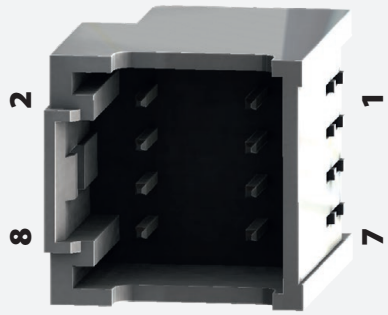
To enable PIN 9, PIN 1 has to be permanently switched to PIN 5 (GND).

PIN	FUNCTION
1	PIN 9 ENABLE
2	TXD
3	RXD
4	DSR
5	GND
6	DTR
7	NC
8	NC
9	+5 V (4.9 V at 20 mA / 4.6 V at 50 mA)

BATTERY POWER (BAT PWR)

PIN	FUNCTION
1	Battery –
2	Battery –
3	Battery +
4	Battery +

BATTERY DATA (BAT DATA)



PIN	FUNCTION
1	Internal temperature sensor to energy storage, connector 1
2	I^2C_0-SCL
3	Internal temperature sensor to energy storage, connector 2
4	I^2C_0-SDA
5	NC
6	SP0 (battery enable)
7	+5 V (max. 50 mA)
8	GND

BATTERY TYPE	USED PINS
LiFePO4	2, 4, 6, 8
Supercap	1, 2, 3, 4, 6, 7, 8

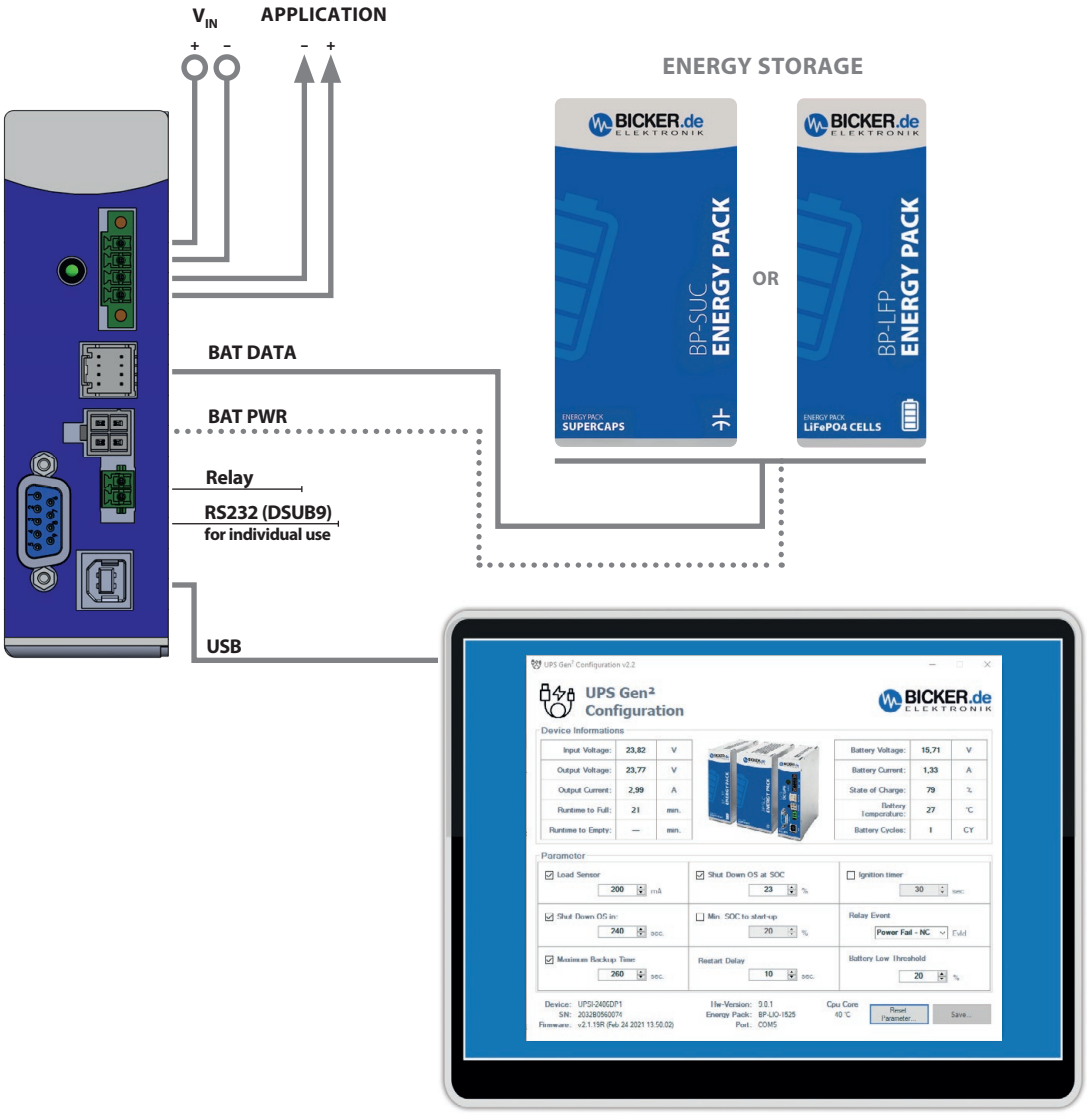
F4 Dimensioning the upstream power supply

Ensure that the upstream power supply is correctly dimensioned to guarantee the charging process of the batteries and the correct functioning of the application. The input has to be supplied from a SELV or PELV power supply. In order to operate the UPSI-2406D with complete functionality, the upstream power supply has to provide at least 24 V / 7.5 A and use **no** constant current function.

If less load than the maximum load is required at the output, the voltage supply can be dimensioned according to the table below (column 3).

UPSI-2406D		
I_{LOAD} [A]	I_{CHARGE} [A]	I_{IN-MIN} [A]
0	2.4	3
1	2.25	3.5
2	2.0	4
3	1.75	5
4	1.6	6
5	1.4	7
6	1.1	7.5

F5 Connecting diagram



CONNECTING ORDER

1. BAT PWR
2. BAT DATA
3. APPLICATION (V_{OUT})
4. DC SOURCE (V_{IN})
5. RELAY / USB / RS232

Dismantling order reverse to connection!

V_{IN}/V_{OUT} – ATTENTION!

1. Note polarity!
2. AWG16 wire should be used (1.5 mm²)

F6 Initial operation

The correct installation of UPS and energy storage has to be ensured. The energy storage can be unplugged and exchanged at any time in compliance with the connecting order (see chapter F5 „Connecting diagram“). There are three connections to consider: a data connection to the battery (BAT DATA), a power supply to the battery (BAT PWR) and the input / output to the UPS.

After that the start is accomplished by connecting the upstream power supply: When an input voltage higher than 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 via the system present signal. After that, the charging of the energy storage starts.

Only energy storages by Bicker Elektronik may be used. These are appropriately qualified and have the necessary protective functions. In addition, the charging methods are set using internal codes and settings.

The applied voltage at the input of the UPS is passed through to the output, reduced by a current-dependent voltage drop ($V_{OUT} = V_{IN} – 0.5$ V at maximum current). 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 F4 „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.

F7 Overview connector / Counterpart with description / Scope of delivery

CONNECTOR	PART NO.	COUNTERPART NO.
V_{IN}/V_{OUT}	Würth Elektronik 691325310004	Würth Elektronik 691364300004
RL	Würth Elektronik 691305140002	Würth Elektronik 691304130002
USB	Würth Elektronik 61400416121	USB Typ B Stecker
RS232	D-Sub9 Female	D-Sub 9 Male
BAT PWR	Würth Elektronik 64900429522	Würth Elektronik 649004113322
BAT DATA	Würth Elektronik 62400821722	Würth Elektronik 624008213322

SCOPE OF DELIVERY	
QUANTITY	**DESCRIPTION**
1x device	UPSI-2406D - DC UPS
1x	V_{IN} / V_{OUT} connector counterpart
1x	Relay connector counterpart

F8 Charging time

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

F9 Reverse polarity / Overcurrent / Short circuit

Reverse polarity:
The device has active reverse polarity protection at the input if the input terminal is connected with reverse polarity while the device is still switched off (e.g. during commissioning). If the device operates in battery mode and the input terminals 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 battery 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 battery 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 plugs a damage of the device can occur.

F10 Backup time in battery mode

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

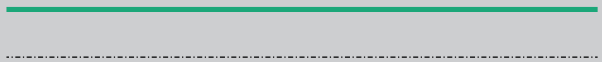
F11 Behaviour in case of exceeding maximum backup time

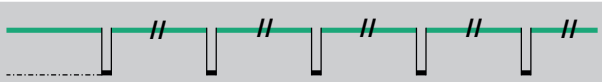
When the given buffering times are exceeded, the output is separated on the basis of the discharge voltage of the corresponding energy storage (total discharge protection).
With supercapacitors in particular, an additional switch-off threshold can take effect if the discharge current of the energy storage device is too high (>15 A). This can occur at very high load currents at the output of UPSI-2406D. 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.

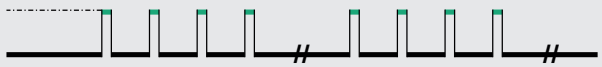
If the allowable output current during battery mode exceeds more than 70 %, the converter switches off first, without separating the output immediately. In this case, the voltage at the output of the UPSI-2406D can drop significantly below 23.5 V. This condition should be avoided by shutting down the system in time.

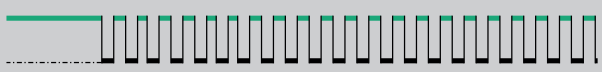
F12 Status LED

Valid from firmware version 2.1.19

MAIN STATES		
	Always on	**Status: mains voltage** >> Mains voltage is present.
	1 Hz flash (1 s on, 1 s off)	**Status: Battery mode** >> Mains voltage is not present.

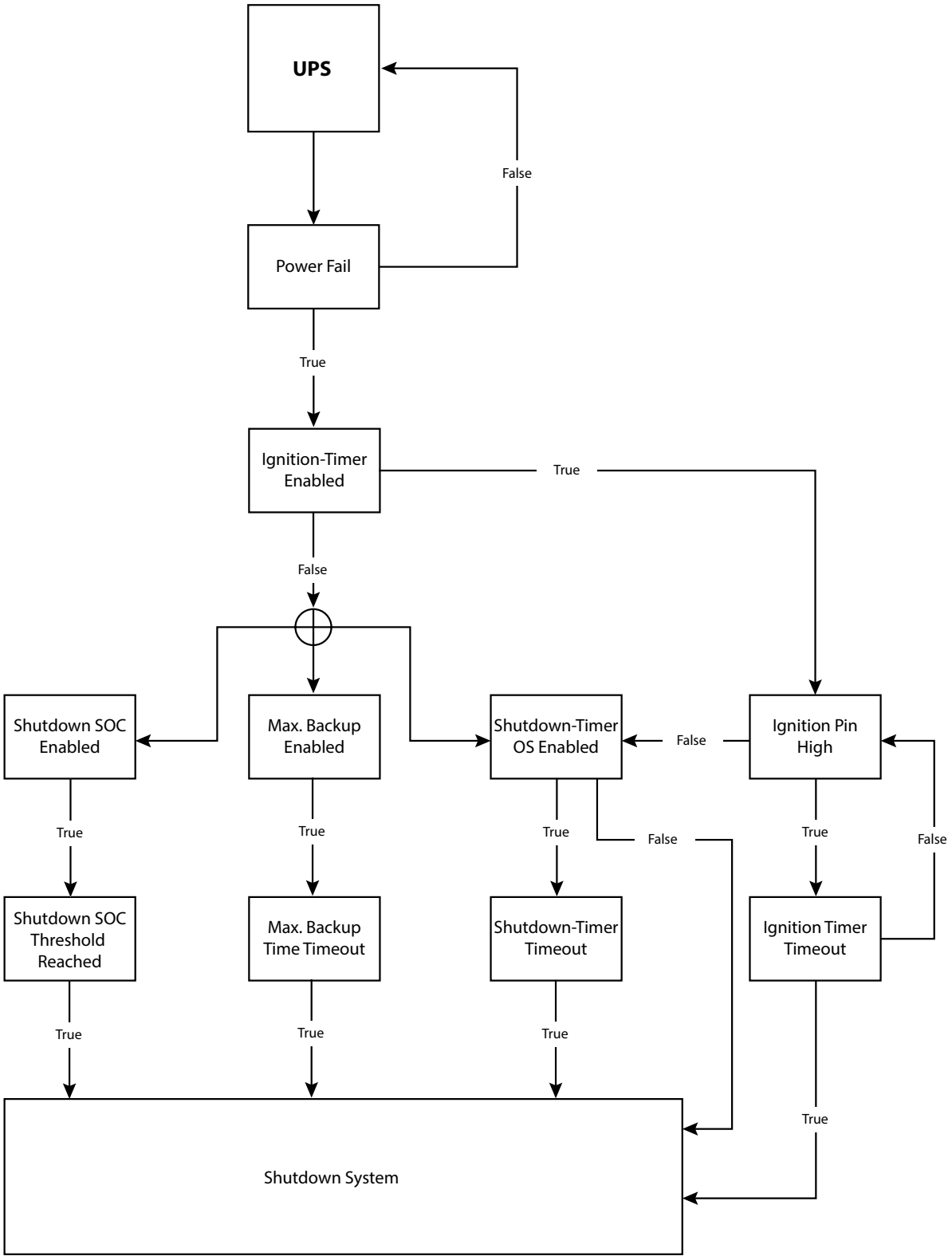
INTERNAL STATES		
	1 x flash (LED is off briefly), pause 2 s	**Status: Battery start*** >> Manual start from the battery by pressing the BS button.
	2 x flash (LED is off briefly), pause 2 s	**Status: Capacity not reached** >> Capacity is required. Output is only activated when the battery is charged to set SOC.
	3 x flash (LED is off briefly), pause 2 s	**Status: Shutdown** >> 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	**Status: Reboot** >> Output is deactivated and time until reboot runs (Reboot phase).

BATTERY FAILURES		
	1 x flash (LED is off a long time), pause 2 s	**Status: No battery detected**
	2 x flash (LED is off a long time), pause 2 s	**Status: Battery overvoltage** >> Charge voltage at battery is too high, battery is deactivated.
	3 x flash (LED is off a long time), pause 2 s	**Status: Battery overcurrent** >> Charge current at battery is too high, battery is deactivated.
	4 x flash (LED is off a long time), pause 2 s	**Status: Battery temperature failure** >> Battery temperature sensor was not detected or battery temperature is too high or low.

UPS FAILURES		
	Quick flashing without pause	**Status: UPS failure** >> Output current too low, UPS is deactivated. >> Overcurrent at output (charge current too high), output is deactivated >> Short circuit at output, output is deactivated >> Internal failure, UPS is deactivated.

** Not available for this version*

F13 Shutdown diagram



F14 Recommendations for a long UPS service life

Over time, the capacity of the Supercaps decreases and the ESR (equivalent series resistance) increases. However, EOL is often defined as a reduction in capacity to 70 % and a doubling of the ESR. An important aspect for the aging of the Supercaps is the end-of-charge voltage and the operating temperature.

LiFePO4 batteries also 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 optimium between service life and performance.

To extend the lifetime of the system, the UPS and energy storage should not be placed near sources of heat and should be placed within good air-circulation. When using LiFePO4 batteries, a larger capacity than actually required should always be used. The less deep the packs are discharged, the longer the service life lasts.

F15 Maintenance

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

F16 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.

F17 Disclaimer

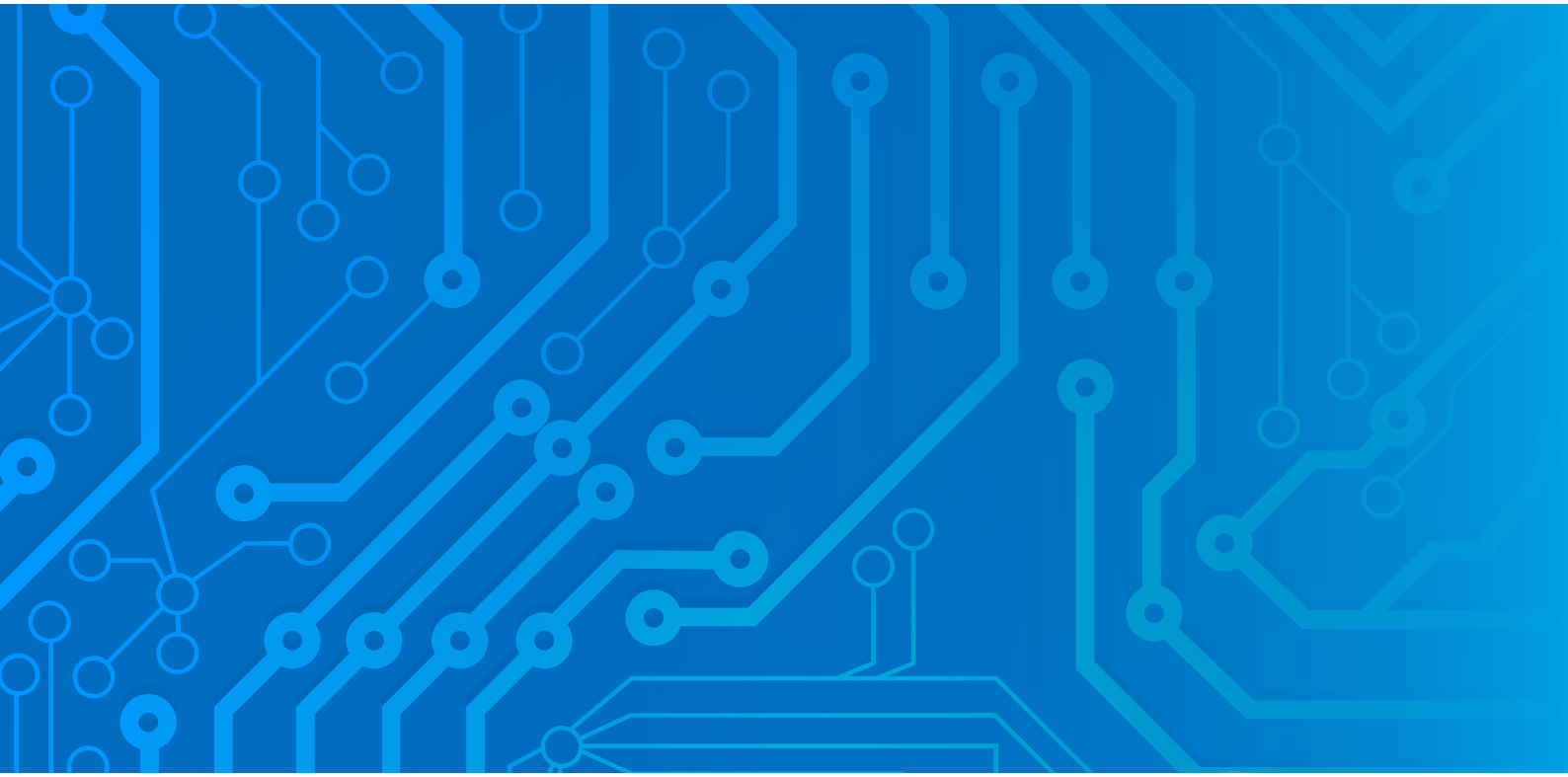
We, the Bicker Elektronik GmbH, have checked the contents of this document for compliance with the hardware and software described. Nevertheless, deviations can not be ruled out, so we assume no liability for the complete agreement. The information in this publication is checked regularly, necessary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

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

F18 Preventive measures and rules when operating the UPS system

The voltage drop of the supply line 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 22.5 V.
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.



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