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User Manual | **UPSI-1208DP2**

UPSI SYSTEM
DIN-RAIL

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
31.03.2020 Revision 0-1	Initial version
10.06.2020 Revision 1	Release version
03.07.2020 Revision 1-1	Chapter B2 extended, Chapter B3 Environmental condition extended, Chapter C1 Input data Internal input fuse changed Chapter C1 Environmental conditions extended.
16.07.2020 Revision 1-2	PELV indication removed

A Brief specification

UPSI-1208DP2
12 V DC / 8 A

- **12 V DC UPS (DIN rail version)**
- **Integrated maintenance-free Supercaps**
- **Cycle Life >500 000**
- **Intelligent power sharing**
- **Regulated output voltage in backup mode**
- **Minimum load detection**
- **Power fail Timer-Funktion**
- **Relay dry contact on power fail**
- **USB & RS232 Interface**
- **HID control center**
- **Reboot-Funktion**
- **Fuel gauge**

Technical Data	
Input voltage	12 V DC (11.5…16 V)
Input current	9.1 A max.
Output voltage	Normal mode: V_{IN}– 0.5 V DC max. (depending on load) Backup mode: 12 V DC
Output current	8 A nominal
Capacitive Load	3000 µF (at start)
Charging method	CC / CV / CP
Protection	Overcurrent protection, Reverse polarity protection
Interface	USB, RS232, USB-HID
Type of battery	EDLC 3.5 kJ / 0.972 Wh useful
Ambient temperature	Operating: -20…+65°C Storage / Transport: -30…+65°C
Operation altitude	≤4000 m
Humidity	≤95 % (at 25°C, no dew)
Dimensions W/ H / D	63 x 120 x 100 mm ±0.5 mm
Weight	0.6 kg

Backup time UPSI-1208DP2

Nominal backup time vs. P$_{out}$

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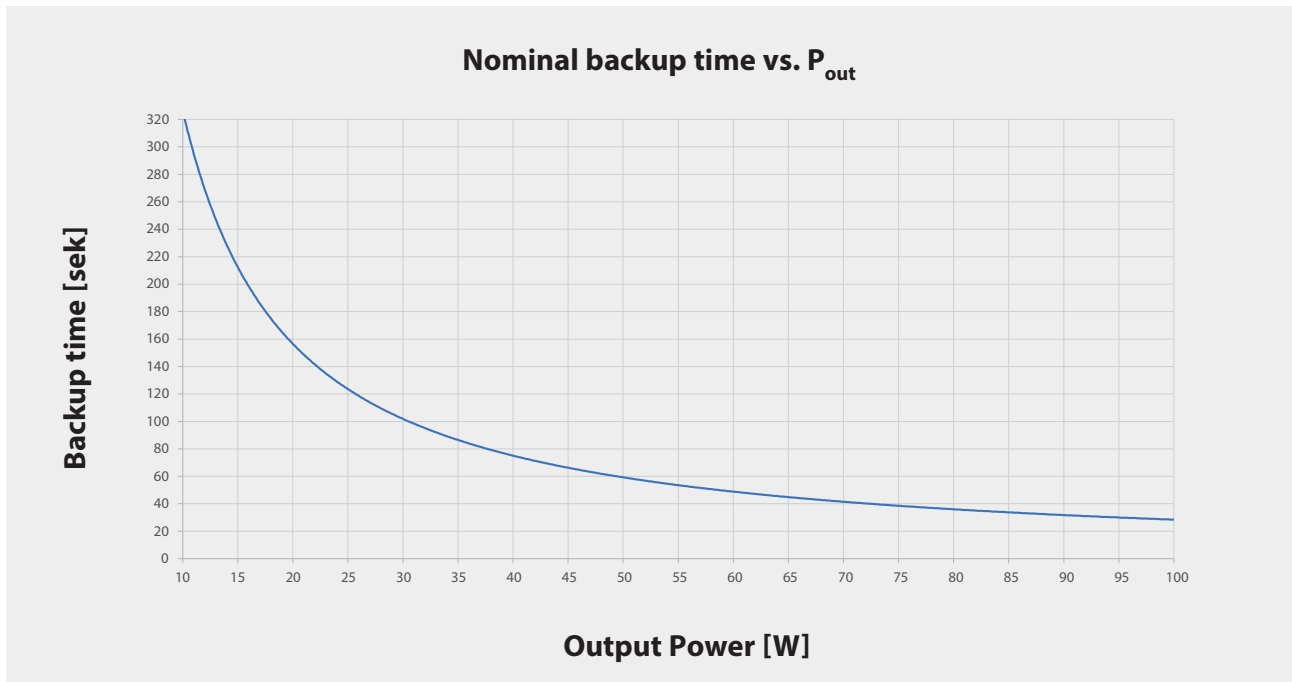
Backup time depends on battery capacitance, load and temperature.
At very high or low temperatures a reduction of backup time occurs.
Unless otherwise specified, the values apply to measurements at +25 °C

B Intended use

Congratulations for choosing a quality product!

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. However, for possible errors no liability can be assumed. Hints to existing mistakes, critics and suggestions for improvement are welcome at any time.

B1 Description of the product and its functions UPSI-1208DP2

The UPSI-1208DP2 (hereinafter called UPS) is a DC/DC UPS system with numerous digital features and high performance. The UPS combines the UPSI-1208 with a storage medium (Supercap).

B2 Read carefully before initial operation!

This manual as well as all datasheets and safety instructions must be read and followed strictly before installation. Otherwise in certain situations warranty and guarantee can be cancelled partly or completely. Any liability is excluded in case of non-compliance with the instructions for use and installation.

⚠️ **Take care while handling!**
Even after disconnecting the upstream source and also no voltage is measurable at the output, the UPS can be still powered by the storage medium.

B3 Intended use – Description

This device is designed for installation in a housing and can be used indoors and outdoors. Suitable enclosures must be used to protect against electrical, water and fire hazards. 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.

The functional purpose of the UPS is bypassing power failures and/or fluctuations. However, it may also be used for user-scheduled power-downs of mains and cycles, e.g. replacing larger batteries in vehicles, while continuing to power the electronics, opening or closing safety valves after a malfunction or shutting down a system. A longlife and high quality energy storage is used as storage medium.

An important characteristic of the UPS is the fact, that the output voltage is constantly regulated during backup operation without dropping when the accu voltage decreases. For an increase of lifetime the batterypacks will be charged quickly by optimized charging algorithms.

B4 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. Do not drop the device.

11. All parts of the device and accessories must not be eaten or swallowed.

12. Use a current limited source for the UPS. The required current values for the UPS are described in this manual.

13. The UPS is powered by more than one source. To shut down the UPS completely, both the input power source and the energy storage have to be disconnected. Even after unplugging the energy storage is still under voltage.

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.

C Technical Data

C1 General Technical Data

INPUT DATA – UPSI-1208DP2	
Unless otherwise stated, all specifications apply to 25°C ambient temperature, 12 V DC input voltage and nominal output current (I_N).	
Input voltage	12 V DC
Input voltage range	11.5 V DC…16 V DC
Electric strength max.	18 V DC
Fixed connect threshold Undervoltage Voltage drop Input/Output	11.5 V DC 0.5 V DC max. (depending on load)
Current draw I_N (U_N, $I_{OUT} = I_N$, $I_{CHARGE} = 0$) I_{MAX} (U_N, $I_{OUT} = I_{STAT.BOOST}$, $I_{CHARGE} = max$) $I_{NO-LOAD}$ (U_N, $I_{OUT} = 0$, $I_{CHARGE} = 0$) I_{CHARGE} (U_N, $I_{OUT} = 0$, $I_{CHARGE} = max$)	8.1 A 9.1 A 100 mA 3.5 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_{CHARGE} (U_N, $I_{OUT} = 0$, $I_{CHARGE} = max$)	97.2 W 109.2 W 42 W
Internal input fuse	Yes (15 A)
Switch-on time	<5 s
Switch-on time in battery mode (Bat.-Start)	n. a.

OUTPUT DATA – UPSI-1208DP2 (NORMAL MODE)

Unless otherwise stated, all specifications apply to 25°C ambient temperature,
12 V DC input voltage and nominal output current (I_N).

Output voltage	12 VDC
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	8 A
$I_{STAT.BOOST}$	8.25 A
$I_{DYN.BOOST}$	n. a.
I_{SFB}	30 A (5 ms)
Output power	
P_N (U_N, $I_{OUT} = I_N$, $I_{CHARGE} = 0$)	96 W
$P_{STAT.BOOST}$ (U_N, $I_{OUT} = I_{STAT.BOOST}$, $I_{CHARGE} = 0$)	99 W
$P_{DYN.BOOST}$ (U_N, $I_{OUT} = I_{DYN.BOOST}$, $I_{CHARGE} = 0$)	n. a.
Short-circuit proof	Yes
No-load proof	Yes

OUTPUT DATA – UPSI-1208DP2 (BACKUP MODE)

Unless otherwise stated, all specifications apply to 25°C ambient temperature,
12 V DC input voltage and nominal output current (I_N).

Output voltage	12 V DC
Output voltage range	n. a.
Output current	
I_N	8 A
$I_{STAT.BOOST}$	8.25 A
$I_{DYN.BOOST}$	n. a.
I_{SFB}	30 A (5 ms)
Output power	
P_N (U_N, $I_{OUT} = I_N$, $I_{CHARGE} = 0$)	96 W
$P_{STAT.BOOST}$ (U_N, $I_{OUT} = I_{STAT.BOOST}$, $I_{CHARGE} = 0$)	99 W
$P_{DYN.BOOST}$ (U_N, $I_{OUT} = I_{DYN.BOOST}$, $I_{CHARGE} = 0$)	n. a.
Short-circuit proof	Yes
No-load proof	Yes

CONNECTION DATA INPUT / OUTPUT

Connection method	Screw connection
Conductor cross-section solid	0.129 mm² … 1.31 mm² (26 … 16 AWG)
Conductor cross-section flexible	0.129 mm² … 1.31 mm² (26 … 16 AWG)
Conductor cross-section with ferrule	0.129 mm² … 1.31 mm² (26 … 16 AWG)
Stripping length	6 mm … 7 mm
Tightening torque	0.3 Nm … 0.4 Nm

ENERGY STORAGE UPSI-1208DP2 (BP-SUC-0835)

Charging characteristic	CC / CV / CP
Nominal voltage U_N	8.3 V DC
End-of-charge voltage	8.3 V DC
Charging current	15.5 A max.
Deep discharge protection	4.5 V DC
Battery technology	EDLC
Nominal capacity	160 F (useful 0.972 Wh or 3.5 kJ)
Charging time	2 min
Buffer time (I_N)	30 s

CONNECTION DATA – RELAY

Connection labeling	RL
Switch contact (floating)	Relay
Status (configurable)	Power Fail Alarm
State condition (configurable)	Input voltage <22.5 V DC
Switching voltage	24 V DC / 125 V AC
Current carrying capacity	1 A (DC) / 0.5 A (AC)
State - signal assignment	NO (Normaly Open) / NC (Normaly Closed) – configurable via Software
Connection method	Plug connection (screwless)
Conductor cross-section solid	0.205 mm² … 1.3 mm² (24 … 16 AWG)
Conductor cross-section flexible	0.205 mm² … 1.3 mm² (24 … 16 AWG)
Conductor cross-section with ferrule	0.205 mm² … 1.3 mm² (24 … 16 AWG)
Stripping length	7 mm … 9 mm

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 battery
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	-5 V DC … +5 V DC
Electrical isolation	No

GENERAL DATA

Flammability class according to UL 94 (housing / terminal blocks)	V0
Weight	0.6 kg
UPS connection in parallel	No
UPS connection in series	No
LED status indicator	Flashing interval 1 s

HOUSING

Degree of protection	IP 20
Protection class	III (without PE)
Mounting type	DIN-Rail mounting
Housing version	Aluminium
Dimension W / H / D	63 mm / 120 mm / 100 mm ±0.5 mm

ENVIRONMENTAL CONDITIONS – UPSI-1208DP2

Ambient temperature (operation)	-20… +65°C
Ambient temperature (start up without load)	-30°C
Ambient temperature (storage / transport)	-30… +65°C
Max. permitted humidity	≤95 % (at 25°C, no dew)
Installation height	≤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 (in housing) / Yes (in housing)

STANDARDS

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

APPROVALS

UL	ETL, UL61010-1 ETL, UL61010-2-201
CSA	CSA C22.2 61010-1-12 CSA C22.2 61010-2-201
CB Scheme	IEC 61010-1 IEC 61010-2-201
Electromagnetic compatibility / Conformity according to EMC directive 2014/30/EU	
Emitted interference according to EN 61000-6-3 (commercial and residential areas)	

INTERFERENCE IMMUNITY ACCORDING TO 61000-6-2 (INDUSTRY SECTOR)

Basic standard CE	Normative minimum requirements EN 61000-6-2 (CE) (Interference immunity of industrial environment)
Electrostatic discharge EN 61000-4-2	
Housing contact discharge	4 kV (test level 2)
Housing air discharge	8 kV (test level 3)
Comment	Criterion A
Electromagnetic HF field EN 61000-4-3	
Frequency range	80 MHz … 1 GHz
Test field strength	10 V/m (test level 3)
Frequency range	1.4 GHz … 2 GHz
Test field strength	3 V/m (test level 2)
Frequency range	2 GHz … 2.7 GHz
Test field strength	1 V/m (test level 1)
Comment	Criterion A

INTERFERENCE IMMUNITY ACCORDING TO EN 61000-6-2 (INDUSTRY SECTOR)

Basic standard CE	Normative minimum requirements EN 61000-6-2 (CE) (Interference immunity of industrial environment)
Fast transients (Burst) EN 61000-4-4	
Input	0.5 kV (test level 1 symmetrical)
Output	0.5 kV (test level 1 symmetrical)
Signal	0.5 kV (test level 1 symmetrical)
Comment	Criterion A
Surge voltage load (Surge) EN 61000-4-5	
Input	0.5 kV (test level 1 symmetrical)
Output	0.5 kV (test level 1 symmetrical)
Signal	0.5 kV (test level 1 symmetrical)
Comment	Criterion A
Power frequency magnetic field immunity EN 61000-4-8	
Comment	Criterion A

LEGEND	
Criterion A	Normal operating behavior within the defined limits.
Criterion B	Temporary impairment of the operating behavior, that is corrected by the device itself.

C2 Drawing UPSI-1208DP2
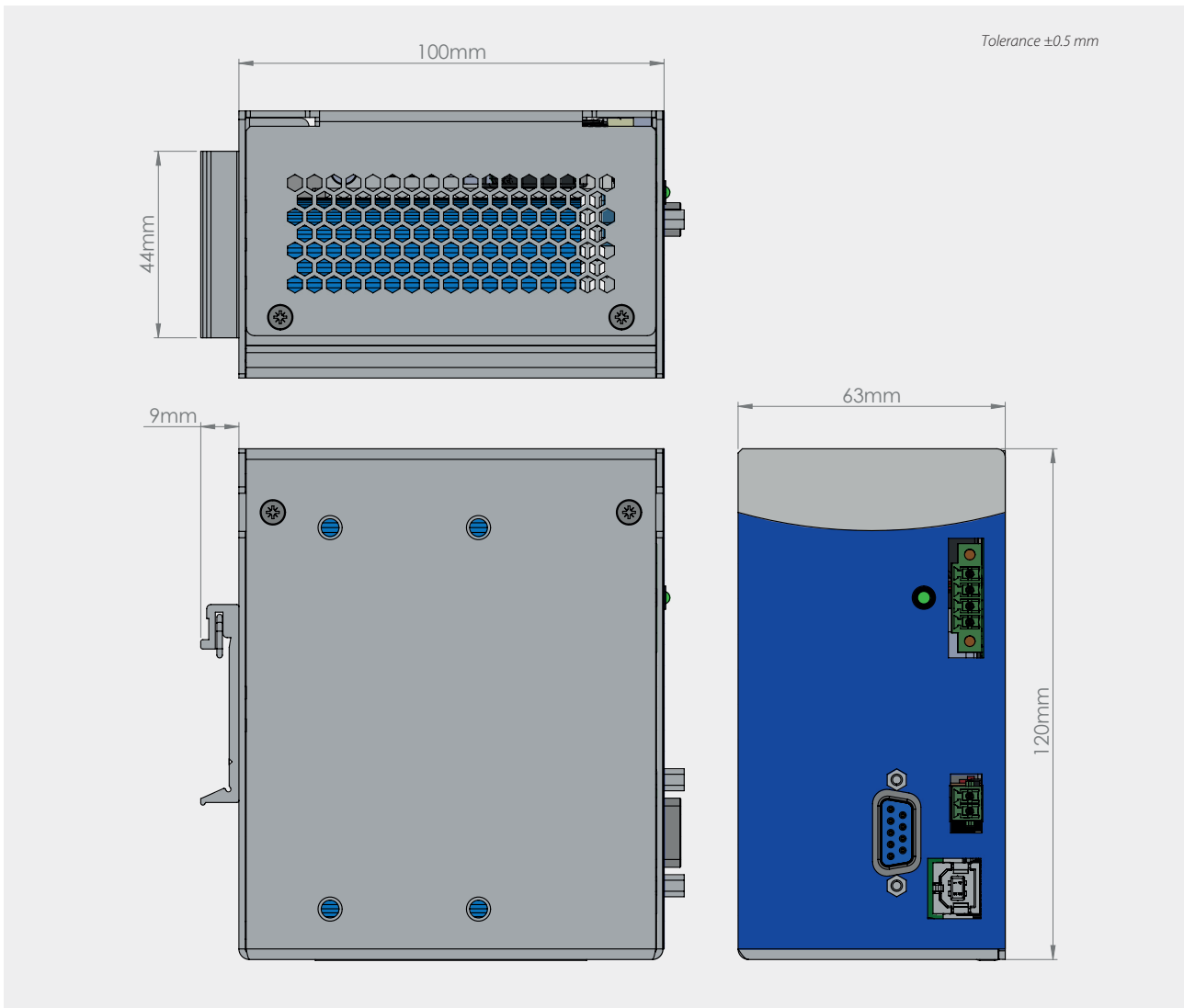
D Name / Address / Support E-Mail / Phone number of the manufacturer

Bicker Elektronik GmbH · Ludwig-Auer-Straße 23 · 86609 Donauwörth · Germany
E-Mail: support@bicker.de · Tel.: +49 (0) 906 70595-0

E General Data

E1 Assembly and installation advice

Installation and operation of this device is only allowed to be executed from qualified personnel!
The application must 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!

E2 Convection and installation position

Do not cover any ventilation holes by adjacent components. For this DIN rail versions, 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 an ambient temperature of +65°C can not be guaranteed.

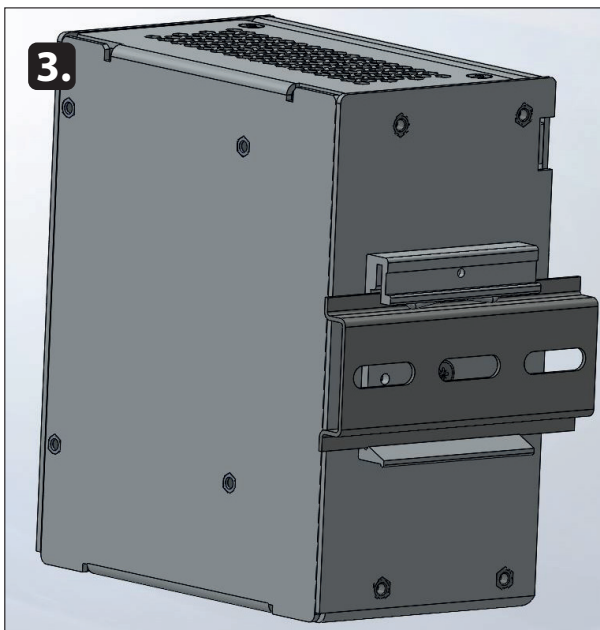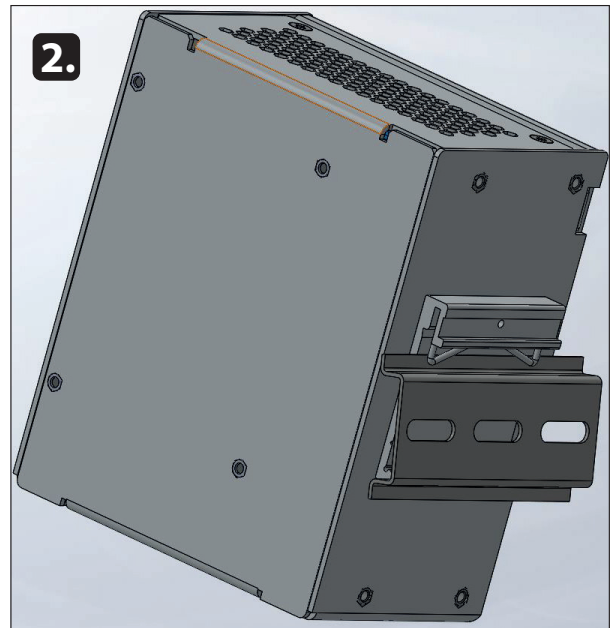The following distances to neighboring devices are recommended:
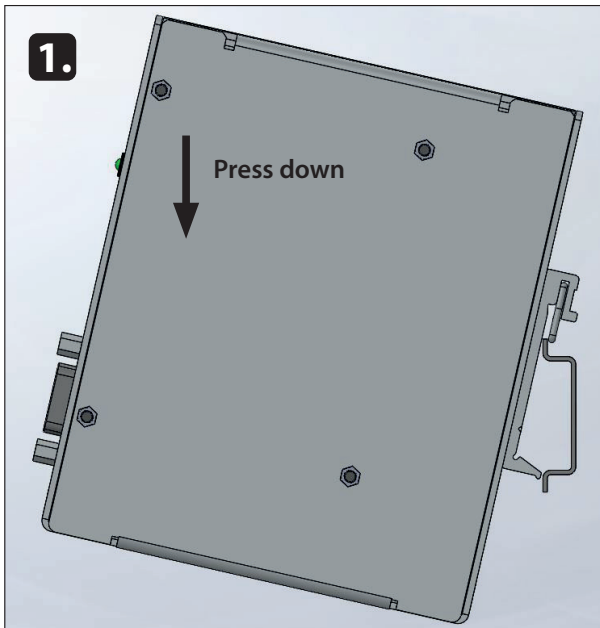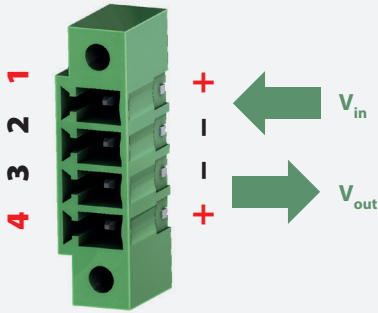Left / right: 20 mm
Top / bottom: 50 mm
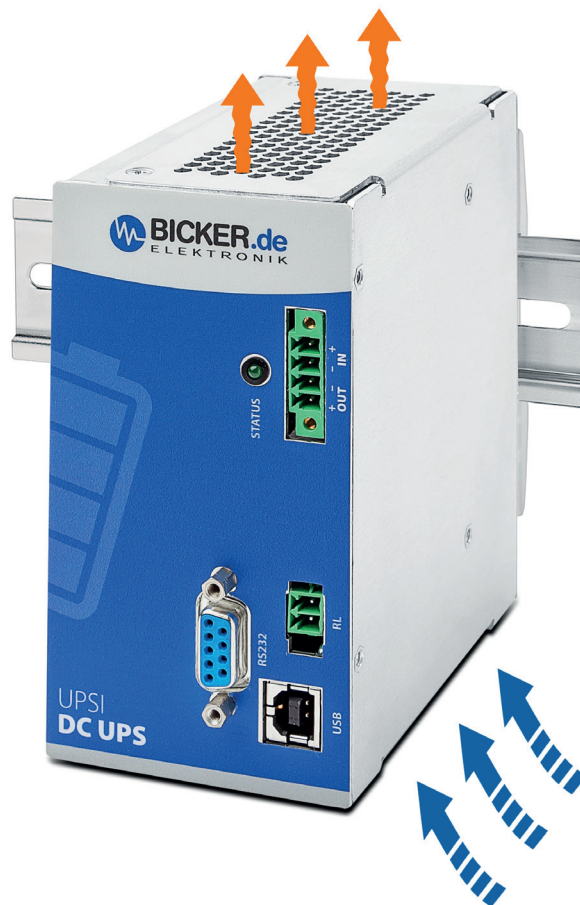
The devices comply with the IP protection class 20.

DIN-Rail mounting and DIN-Rail profile according to EN 60715
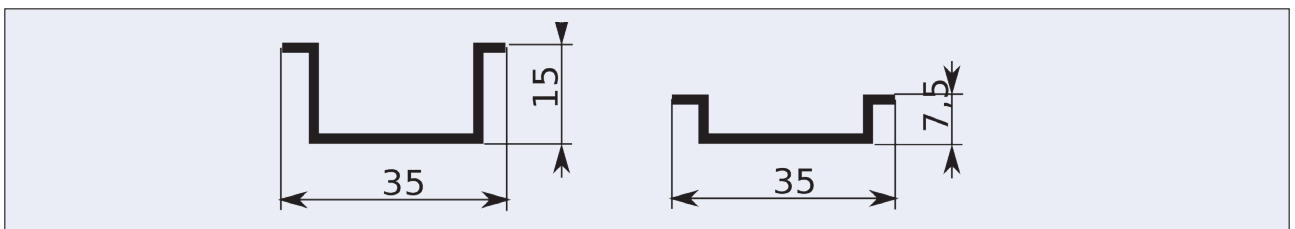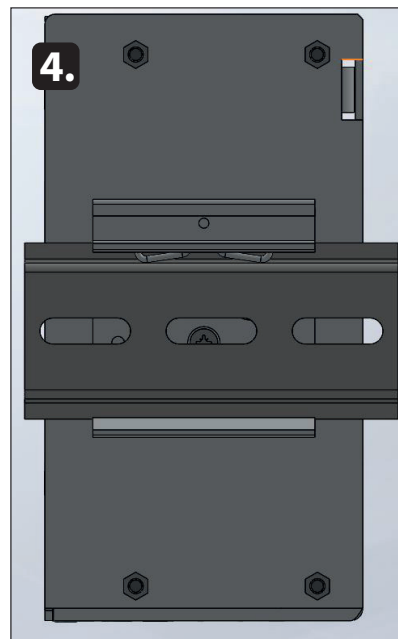
1. Press down

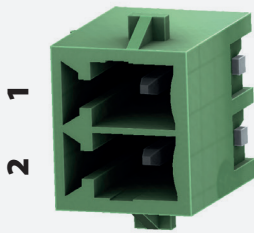**2.**

3.

4.

15
35

7,5
35

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. The input must be supplied from a SELV or PELV power supply. In order to operate the UPSI devices to the maximum, the upstream power supply has to provide at least the following output currents and voltages.

For UPSI-1208DP2: 10 A / 12 V

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

UPSI-1208DP2		
I_{LOAD} [A]	I_{CHARGE} [A]	I_{IN-MIN} [A]
0	3.5	3.5
1	3.3	4.5
2	3	5
3	2.6	6
4	2.3	6.5
5	1.9	7
6	1.6	8
7	1.3	9
8	1	10

E5 Initial operation

Ensure that the UPS is correctly installed.

Via connection to upstream power supply: When an input voltage higher than 11.5 V (UPSI-1208 DP2) is connected to the input terminals, the energy storage medium gets queried and transmits its data. Only then the charger gets enabled and the charging of the battery pack starts. This process lasts only a few milliseconds.

The applied voltage at the input of the UPS is passed through to the output, reduced by a current-dependent voltage drop (Vout = Vin - 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 also page 20, section E4 „Dimensioning the upstream power supply").

When using the Windows® Software to shut down the system, make sure that the following settings are done:
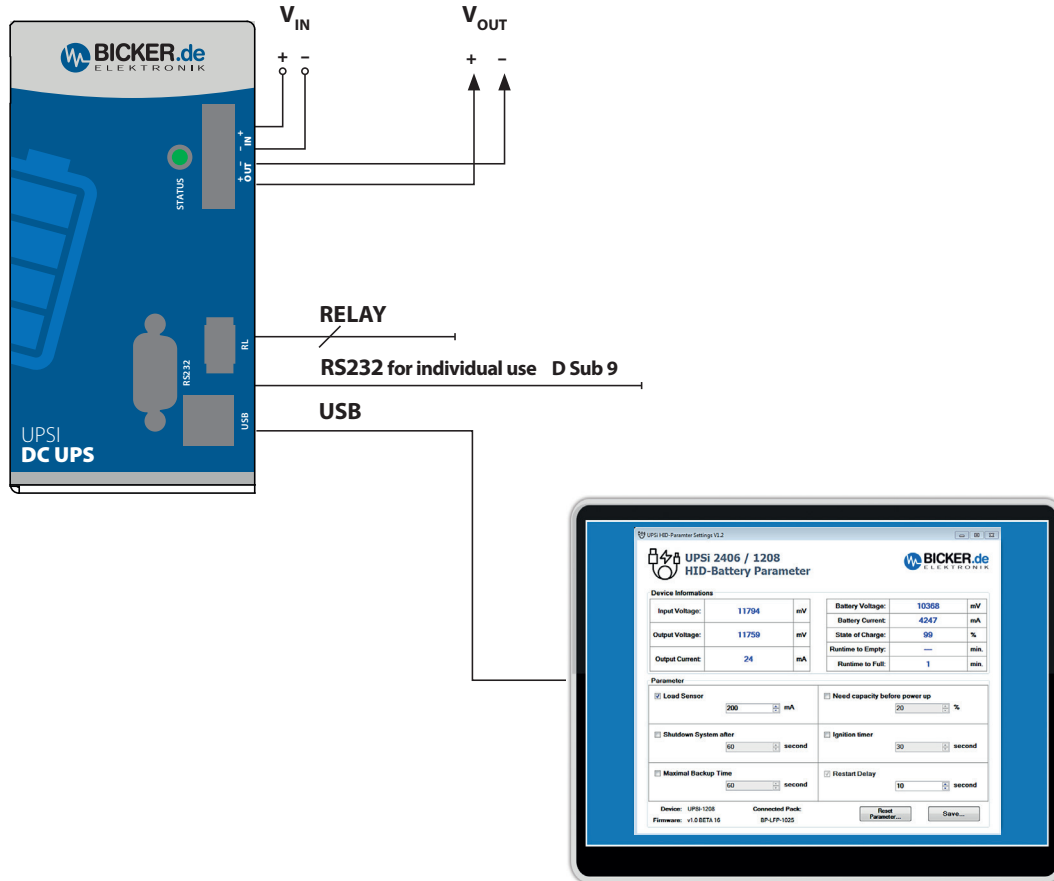
Control Panel >> System and Security >> Power Options
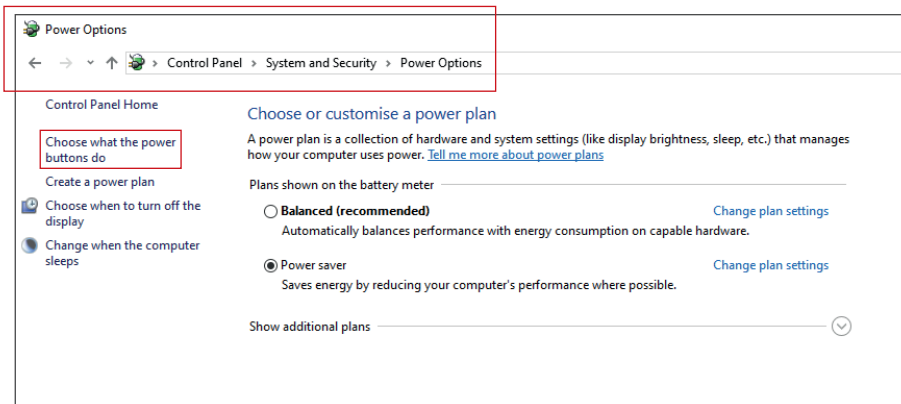
Choose what the power buttons do
>> When I press the power button: Shut down
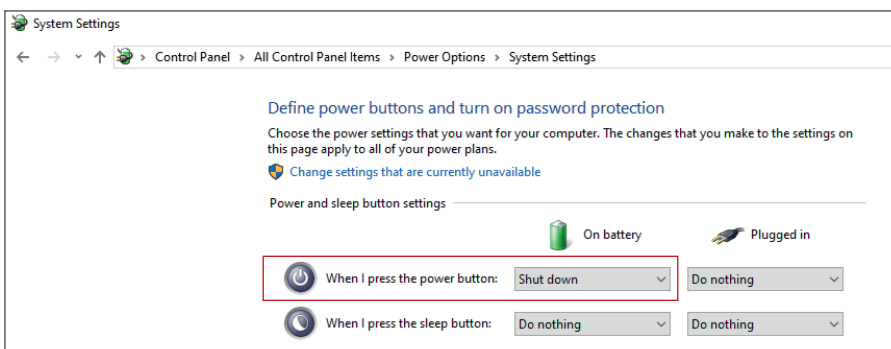
E6 Connection

CONNECTING ORDER

1. APPLICATION (V$_{OUT}$)
2. DC SOURCE (V$_{IN}$)
3. RELAY / USB / RS232

Dismantling order reverse to connection!

⚠️ **V$_{IN}$/V$_{OUT}$ – ATTENTION!**

1. Note polarity!
2. AWG18 wire should be used (1 mm^2)

E7 Overview connector / counterpart with description / Scope of delivery

CONNECTOR	PART NO.	COUNTERPART NO.
V_{IN}/V_{OUT}	WE691325310004	WE691364300004
RL	WE691305140002	WE691304130002
USB	WE61400416121	USB type B connector
RS232	D-Sub9 Female	D-Sub 9 Male

SCOPE OF DELIVERY	
QUANTITY	DESCRIPTION
1x device	UPSI-1208DP2 - DC UPS
1x	V_{IN} / V_{OUT} connector counterpart
1x	Relay connector counterpart

E8 Charging time

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

E9 Reverse polarity / Overload / Short circuit

The device is protected against reverse polarity at initial operation (device off, not active). When the device is operating in backup mode, reverse polarity protection not exists. If the load current is too high for a duration longer than 3 s, the device switches off (LED flashes quickly) and continues operation automatically after 10 s (non-latch).

In the event of a short-circuit, the output is immediately disconnected. A start attempt is made every second (non-latch, timer 1s). The impact of a short-circuit to the device depends on the length / diameter (impedance) of the output wiring. In case of a short-circuit directly at the plugs, a damage of the device can occur.

E10 Backup time

The nominal backup times can be found within the according data sheets or the technichal data at the beginning of this user's manual. At extreme low or high temperatures a reduction of the backup times can occur.

E11 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 storage medium (total discharge protection).
For supercapacitors, which are not sensitive to a deep discharge, a threshold has been definded which is limited by the current. The lower the voltage, the higher the current on the capacitors at constant output power.

If more than 70 % of the maximum allowable output current is consumed during discharge of the supercapacitors, the converter will shut down without immediately disconnecting the output and a lower voltage will appear at the output (state <2 s). This condition should be avoided by shutting down the system in time before discharging the supercapacitors under high currents.

E12 Status LED

1 x flash, pause 1,5 s	Status: Battery start
2 x flash, pause 1,5 s	Status: Capacity for start is required, state charging
3 x flash, pause 1,5 s	Status shutdown: Waiting for shutdown completion
4 x flash, pause 1,5 s	Status reboot: Output is switched off and time runs until restart (Reboot)
5 x flash, pause 1,5 s	Status: No battery recognized
6 x flash, pause 1,5 s	Battery voltage too high, battery disabled
7 x flash, pause 1,5 s	Charge current too high, battery disabled
1 Hz flash > power fail	Status: Backup mode
Always on	Status: System OK
Quick flashing	Critical Error Status: output voltage too low > UPS will be shut down Status: Overcurrent detected > UPS will be shut down

E13 Software

Information about the Software and the Command List can be found in the user's manual of the UPSI-2406(D).

E14 Recommendations for a long UPS service life

Supercaps do not have an actual „End of Life" (EOL). Over time, the capacity 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.

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 should not be placed near sources of heat. The UPS and batteries should be placed within good air-circulation. The less deep the packs are discharged, the longer the service life lasts.

E15 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!

E16 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.
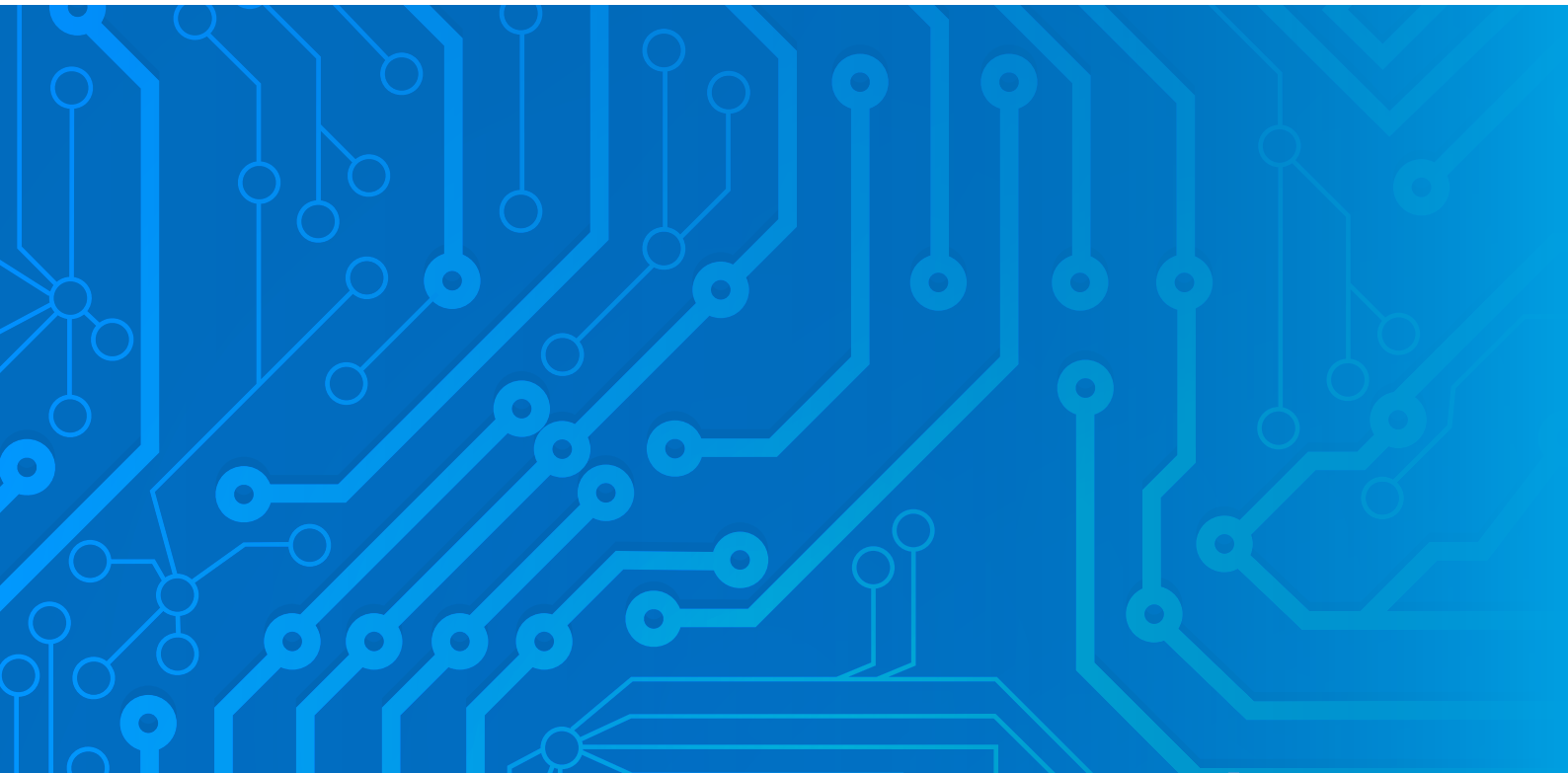.

E17 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.

E18 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 11.5 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. Only from a certain impedance (L >50 nH, R >50 mΩ) protection can be guaranteed. In the event of a fault, electrolytes can escape in liquid and gaseous form.