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MANUAL

UNINTERRUPTIBLE
POWER SUPPLY

Buffered power supply unit
PCC-4124-040-01

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1. Order data

The following table shows the ordering data for the buffered power supply units

Table 1: Order numbers

Buffered power supply units		
Variant	**Input Voltage**	**Output Current**
PCC-4124-040-01	24 Vdc	4 A

2. General Information

2.1 Safety instructions

Please read these warnings and safety instructions carefully before operating the appliance. The appliance may only be installed by skilled and qualified personnel. In the event of malfunctions or damage, switch off the supply voltage immediately and send the device to BLOCK Transformatoren-Elektronik GmbH for inspection. The device does not contain any service parts. If an internal fuse blows, there is most likely an internal defect in the appliance. The data provided is for product description purposes only and should not be construed as guaranteed characteristics in the legal sense.

2.2 Qualified personnel

The product associated with this documentation may only be handled by qualified personnel in compliance with the documentation associated with the respective task, in particular the safety instructions and warnings contained therein. Qualified personnel can ensure, on the basis of their training and experience, that the use of the described product complies with all safety requirements and the applicable provisions, regulations, standards and laws.

2.3 Intended use

This device is designed for installation in an enclosure and is suitable for use in general electronic devices such as industrial control systems, office equipment, communication devices or measuring devices. Do not use this device in control systems of airplanes, trains or nuclear facilities where a malfunction could lead to serious injury or danger to life.

2.4 Disclaimer

The contents of this publication have been checked with the utmost care to ensure that they correspond to the hardware and software described. Nevertheless, there may be discrepancies between the product and the documentation. Deviations may also arise due to the continuous further development of the product.
For this reason, we cannot guarantee complete conformity. Should this documentation contain errors, we reserve the right to make any necessary corrections without prior notice.

ATTENTION
Switch off the input voltage before carrying out installation, maintenance or modification work and secure it against unintentional reconnection.

ATTENTION
Do not make any changes or attempts to repair the device. Do not open the device!

ATTENTION
Prevent the ingress of foreign objects such as paper clips and metal parts.

ATTENTION
Do not operate the device in a damp environment or in an environment where condensation or condensation is to be expected.

ATTENTION
Do not touch the housing during operation or shortly after switching off. Hot surfaces can cause injuries.

3. Productdescription

The **PCC-4124-040-01** buffered power supply is an intelligent24V power supply with an integrated energystorage solution based on **supercapacitors**. It ensures a stable supply of DC consumers with up to **4A output current** and reliably buffers short-term mains interruptions - without the use of high-maintenance batteries.

The combination of switching power supply and supercapacitor-based buffer stage protects critical systems from failures, voltage drops and data loss. The technology enables short charging times, a long service life and reliable operation even under difficult environmental conditions.

A special feature is the **galvanic decoupling** between the input and output circuits, which effectively prevents feedback to the mains and interference with sensitive loads.

Figure 1: PCC-4124-040-01

3.1 Technical Data

deutsch | english

Technische Daten | Technical data

		PCC-4124-040-01
Eingangsdaten	**Input data**	
Eingangsnennspannung	Rated input voltage	200 - 240 Vac
Eingangsspannungsbereich	Input voltage range	180 - 264 Vac
Nennfrequenzbereich	Frequency range	44 Hz - 66 Hz
Eingangsnennstrom (Nennlast)	Nominal input current (nominal load)	1,5 A (230 Vac)
Einschaltstrombegrenzung	Inrush current limitation	< 30 A, NTC
Eingangssicherung intern	Internal fuse	4 AT
Empfohlene Vorsicherung	Recommended external protection	6 A, 10 A, 16 A, Charakteristik B, C
Ausgangsdaten	**Output data**	
Ausgangsspannung	Rated output voltage	24 Vdc
Ausgangsspannungsbereich	Output voltage range	23 - 28,5Vdc
Ausgangsstrom	Rated output current	4 A
Überlastverhalten	Overloadbehaviour	Konstantstrom (U/I Kennlinie) Constant current (U/I Line)
Wirkungsgrad	Efficiency	typ. 82 %
Verlustleistung	Power loss	6W
Restwelligkeit (Nennlast)	Residual ripple (nominal load)	typ. 100 mV_{ss}
Integrierte Pufferung	**Integrated buffering**	
Pufferzeit	Backup time	45s (1A) / 7s (4A)
Pufferschwelle	Buffer threshold	<180 Vac
Ausgangsspannung im Pufferbetrieb	Output voltage in buffer mode	Entsprechend der Ausgangsspannung im Normalbetrieb According to the output voltage in normal mode
Ladezeit beim Neustart	Loading time at restart	< 45 min
Speichertechnologie	Storage technology	Superkondensator Supercapacitor
Größe des internen Speichers	Size of internal memory	2025 Ws
Signalisierung	**Signaling**	
Betriebsanzeige	Power indicator	Langsames Blinken: Laden slow flashing: charging
		Schnelles Blinken: Entladen fast flashing: discharging
		Dauerhaftes Leuchten: Geladen continuous light: charged
Umwelt	**Environment**	
Lagertemperatur	Storage temperature	-25 °C ... +85 °C
Umgebungstemperatur	Operational temperature	-25 °C ... +70 °C
Derating	Derating	Strom: -3,4% / K > 50°C Current: -3,4% / K > 50°C
Einbaulage	Mounting position	waagerecht für Tragschiene TH 35, horizontal for Rail TH 35
Zulässige Luftfeuchtigkeit	Allowable humidity	5 bis 96 % relative Feuchte, keine Betauung zulässig 5 to 96 % relative humidity with no dew
Kühlung (Abstand zu benachbarten Teilen)	Cooling (spacing to vicinal components)	kein Mindestabstand links erforderlich, 5 mm rechts, 50 mm oben/unten No minimum spacing left required, 5 mm right, 50 mm over/under
Sicherheit und Schutz	**Safety and protection**	
Schutzart	Protection index	IP20
Prüfspannung	HV test voltage	4,2 kVdc
Schutzklasse	Safety class	II (im geschlossenen Schaltschrank) II (in the closed Cabinet)
Anschlusskabel	Conductors	Zum Anschluss Kupferkabel mit min. 75 °C verwenden Use Copper Conductors only, rated min. 75 °C
Einsatzbereich	Installation	Einsatz in Bereichen mit Verschmutzungsgrad 2 For installation in Pollution Degree 2 environment
Überspannungskategorie	Overvoltage category	III
Rückspeisungsfestigkeit	Feedback voltage	max. 30 Vdc
Normen	**Safety standards**	
Sicherheit	Safety	EN 61558-2-16
EMV	EMC	EN 61204-3
Mechanische Daten	**Mechanical data**	
Gewicht	Weight	0,8 kg
Maße (B x H x T)*	Dimensions (W x H x D)*	59 x 127 x 125 mm
Anschlüsse Eingang (L, N, PE)	Terminals input (L, N, PE)	Push-In, max. 2,5 mm²
Anschlüsse Ausgang (+, +, -, -)	Terminals output (+, +, -, -)	Push-In, max. 2,5 mm²
Bestellnummern	**Order Numbers**	
Bestellnummer	Order Number	PCC-4124-040-01

* Tiefe T ab Oberkante Tragschiene.
depth from upper edge of DIN rail.

Figure 2: Technical Data

3.2 Functional diagram

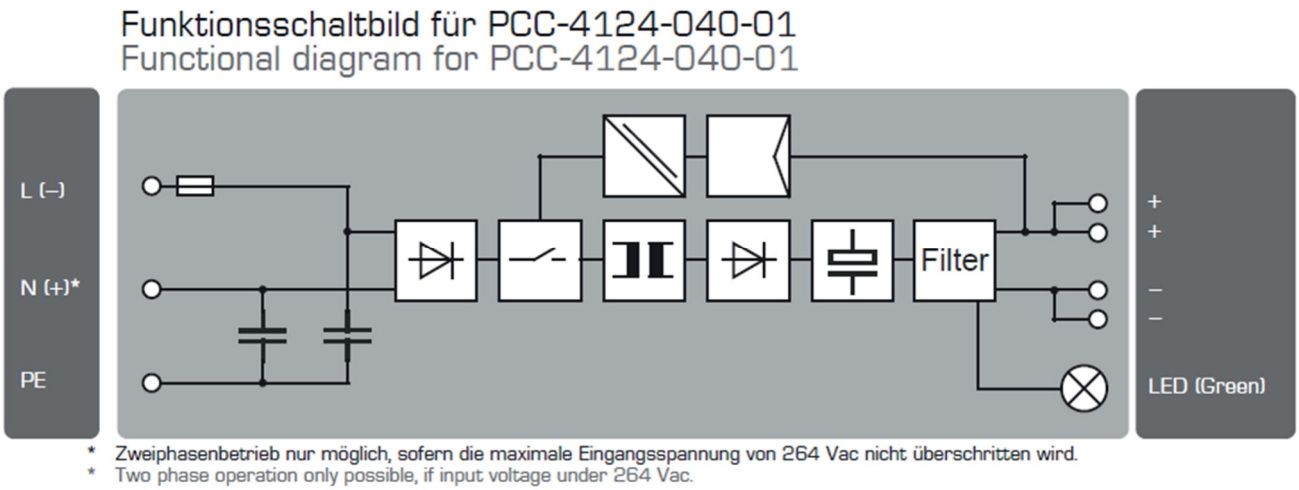

Figure 3: Functional diagram PCC-4124-040-01

3.3 Dimensioning

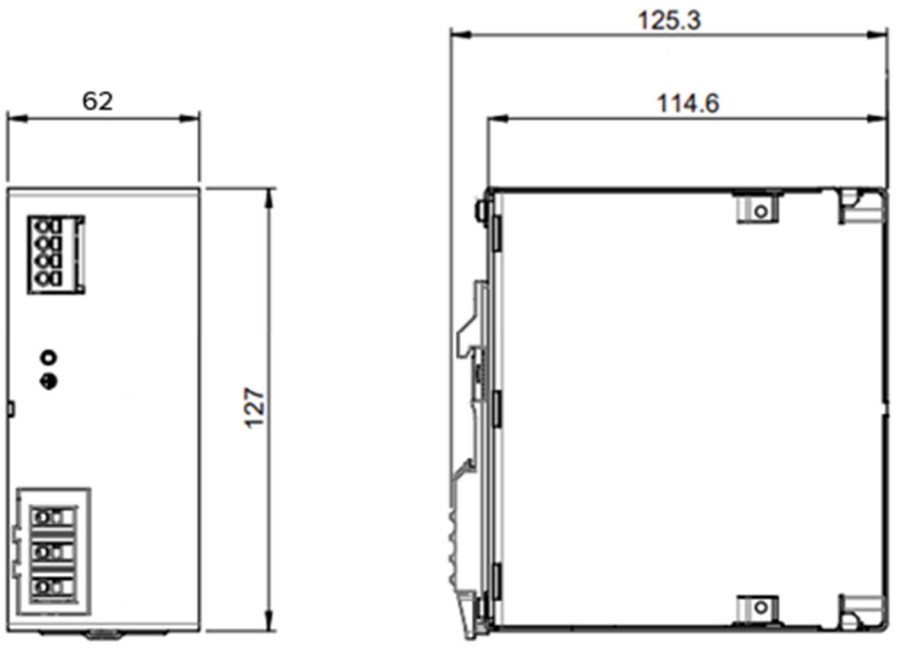

Figure 4: Dimensioning PCC-4124-040-01

3.4 Assembly

The buffered power supply unit (PCC-4124-040-01) can be mounted on the mounting rails without tools.
To do this, first turn the front of the device slightly upwards and place it on the DIN rail. Make sure that the device is pushed down as far as it will go. When the device is seated on the top-hat rail, the underside is pressed against the mounting rail until it locks into the top-hat rail (followed by a "click" sound). To check, gently shake the device again to ensure that it is properly locked.
A standard tool, such as a slotted screwdriver, is required for removal. The device can be detached from the top-hat rail by lifting the underside of the device and pressing down on the fastening.

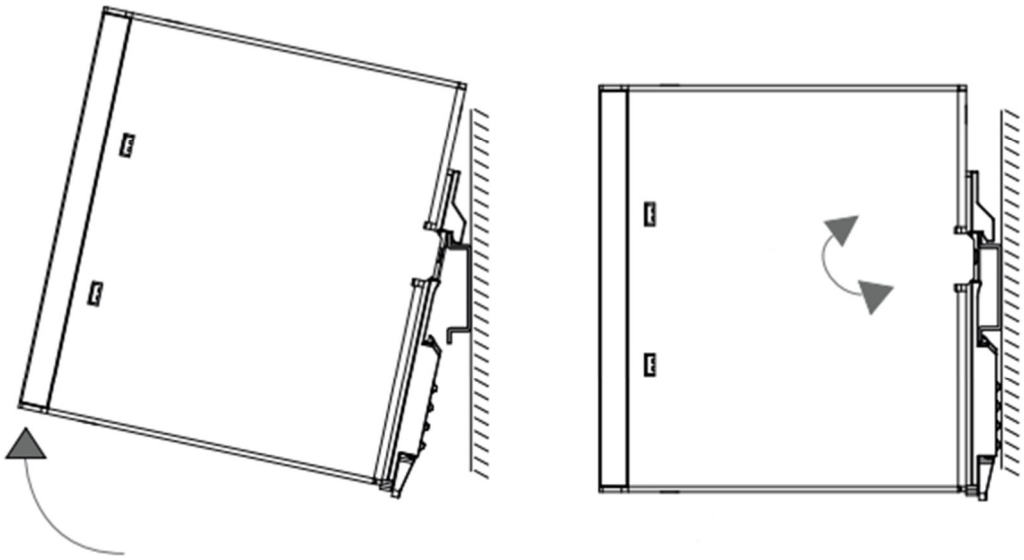

Figure 5: Assembly

To ensure cooling by natural convection, the distances to neighboring appliances must be observed.

Attention:
Mounting the buffered power supply unit upside down is **not** permitted.

Attention:
Do not touch the housing during operation or shortly after switching off. Hot surfaces can cause injuries.

Attention:
Any other installation is not permitted.

To ensure cooling by natural convection, a distance of at least 40 mm from neighboring appliances must be maintained at the top and bottom. Direct side mounting of other appliances is permitted.

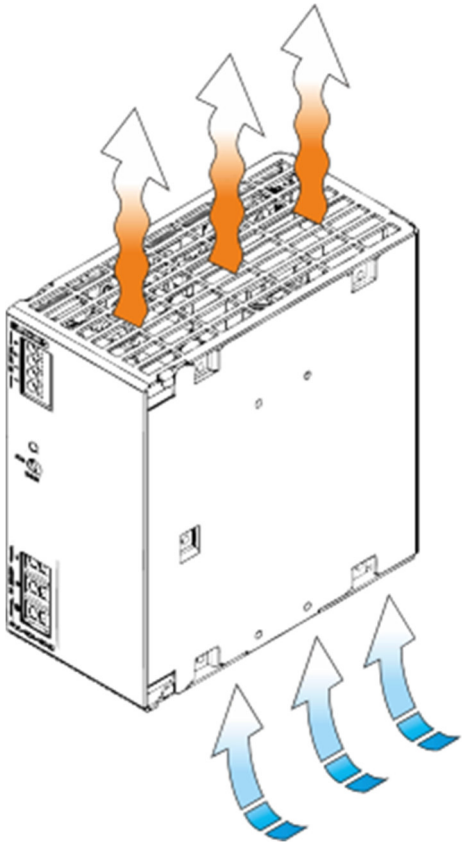

Figure 6: Convection cooling

ATTENTION
Only mount the appliance horizontally. Any other installation is not permitted.

3.5 Connections and signaling

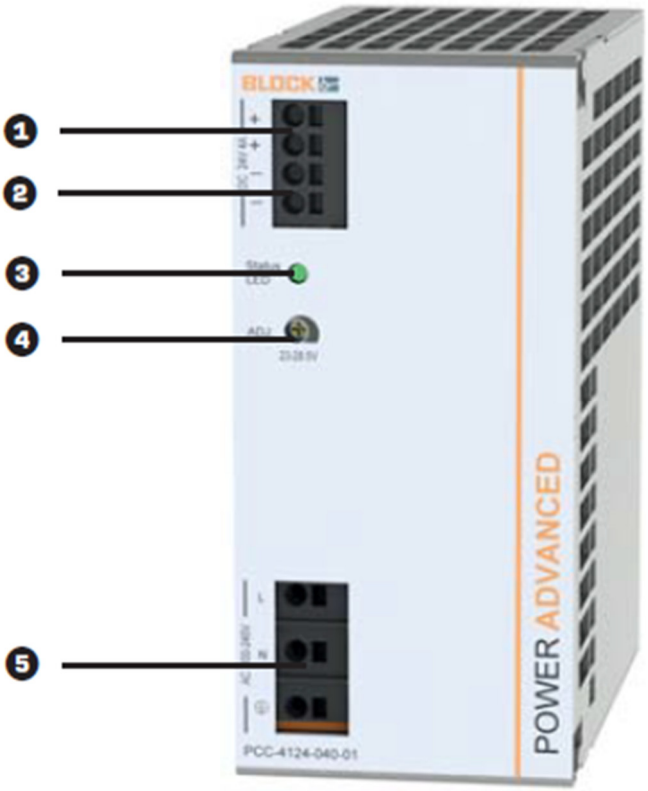

Figure 7: Connections and signaling

Table 1: Connections

Nr.	Function	Note
1	DC-Output 24V +, +	Spring loaded terminals. Max. 2.5mm² (+, +)
2	DC-Output 24V -, -	Spring loaded terminals. Max. 2,5mm² (-, -)
3	Operating display:	• Slow Flashing - Loading • Fast flashing - Discharging • Permanent light - Charged
4	Setting the output voltage 23 ... 28,5 Vdc	-
5	AC-Input (200 ... 240 Vac)	Spring loaded terminals. Max. 2,5mm² (L, N, PE)

4. Commissioning

Once the device has been mounted on the top-hat rail, the electrical connection can be made.

1. **Mains connection:** Connect the 230 V supply cable to the „Input“ terminals provided. The conductors L (phase), N (neutral conductor) and PE (protective conductor) are required.

2. **Load connection:** Connect the connected device to the „Output“ terminals (24V). A plus (+) and a minus (-) are required for this.

3. **Commissioning:** Once all connections have been made correctly, the supply line can be energized and the buffer module can be put into operation.

If required, the buffer module can be connected in **parallel** or in **series**. Please note:

The input current of the module should always be at least **0.2 A** higher than the load connected to the output.

LED display:

A green LED signals the charging process of the internal capacitors. As long as the capacitor voltage is below 20 V, the LED **flashes**. If the voltage is above 20 V, the LED **lights up continuously** – the module is ready for operation.

4.1 Buffer operation

If the mains voltage fails, the system switches to buffer mode without interruption. The energy required to maintain the DC 24 V supply voltage is provided from the internal memory of the buffer module. This is possible up to a maximum of 4 A for a short time, e.g. to shut down an IPC.

4.2 Life expectancy

The service life of the supercapacitors - and therefore of the entire device - depends largely on two factors:

- The ambient temperature
- The applied capacitor voltage

A higher voltage leads to a shorter service life.

- At an ambient temperature of 25°C and a minimized voltage of 23V, the expected service life is approx. 192,000 hours.
- At a maximum voltage of 28V, the service life is significantly reduced to approx. 32,000 hours.

At the end of this operating time, the remaining capacity of the supercapacitors is around 70% of the initial value.

Note on aging:

In the first approx. 200 operating hours, the capacity drops by around 15%. After this, the capacity is reduced linearly to the stated final value of 70%.

In order to maximize the service life at high temperatures, the charging voltage is automatically reduced to 23V from an ambient temperature of 55°C. This protects the supercapacitors and extends the service life of the device.

4.3 Operating states

The **PCC-4124-040-01** buffered power supply unit has various operating statuses that are visualized via the integrated LED display. These statuses provide reliable information about the current device status, suchasthe charging process of the supercapacitors or active buffer operation.

The following table provides an overview of the possible operating states and their meaning. It is used for quick status diagnostics during operation.

Table 2: Operating states

Operating state	Buffer ready	LED
Charging mode	No	Slow Flashing
Buffer operation	Yes	Fast Flashing
Loaded	Yes	Permanent light

4.4 Buffer times

The **PCC-4124-040-01** buffered power supply unit secures the24V DC power supply in the event of brief mains interruptions by using integrated, maintenance-free supercapacitors. In the event of a voltage dip, thedeviceautomatically takes overthe supply to the connected loads and thus protectsyour application from downtime or data loss.
The actual achievable buffer time depends on the respective load current. The following table shows the typical buffer times as a function of the connected load and serves as a basis for system-compatible design.

Table 3: Buffer times

Current	4A	3A	2A	1A	0,5A	0,1A
Buffer time	7 Seconds	22 Seconds	35 Seconds	45 Seconds	152 Seconds	544 Seconds

4.5 Derating

Compliance with the thermal operating limits is crucial for reliable operation of the **PCC-4124-040-01**. The device is designed for use in an ambient temperature range of **-25°C to +70°C**. From an ambient temperature of **+50°C**, however, a temperature-dependent derating must be taken into account.

Above+50°C, the maximum permissible output current is reduced by a factor of**-3.4% per Kelvin**. This serves to thermally protect the components and ensures a long service life and safe operation even at high ambient temperatures.

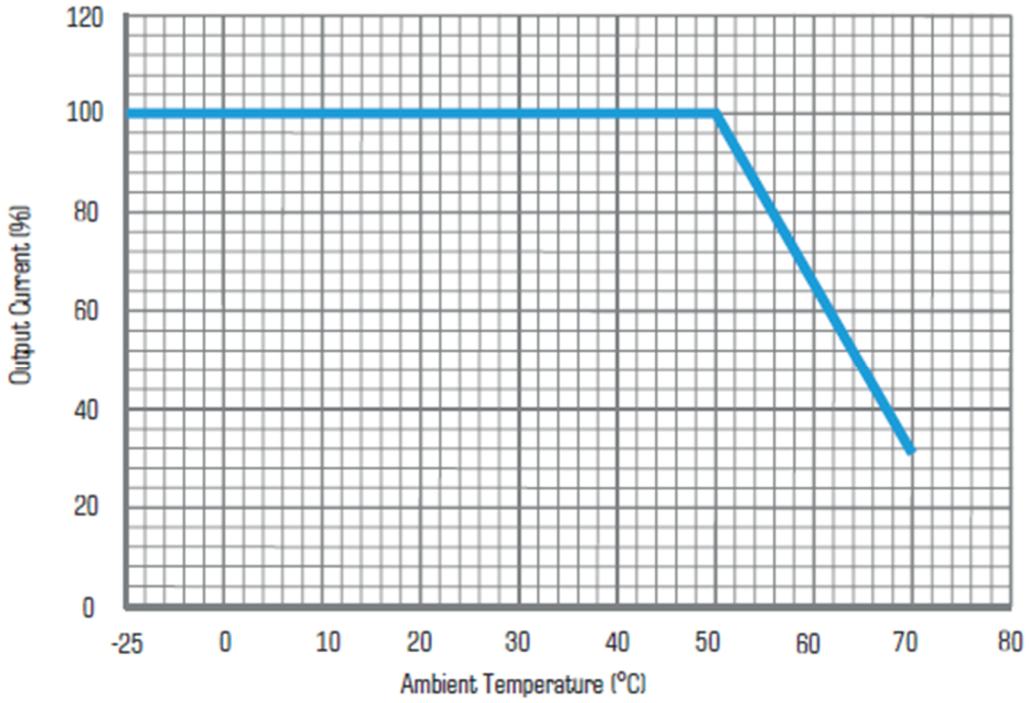

Figure 8: Derating

5. Maintenance

5.1 Service life of the buffered power supply unit

Under nominal conditions - i.e. at ambient temperatures**of** up to **+40°C**, full load operation and occasional buffer activation - the expected service life of the device is **over 10 years**. The supercapacitors used are designed for a very high number of charging and discharging cycles and do not require replacement during regular operation.

Factors influencing the service life
The actual service life depends largely on the operating conditions:

- **Temperature:** An ambient temperature above +50°Caccelerates the ageing of the capacitors and other components**.** From this point, a current reduction of **-3.4% per Kelvin** is requiredaccording to the derating characteristic.
- **Cycle behavior:** Repeated buffering cycles do have an effect on the ageing of supercapacitors, but to a much lesser extent than with chemical energy storage systems. Even with regular buffering, several hundred thousand cycles are possible.
- **Load and ventilation:** Continuous operation under full load with insufficient heat dissipation can reduce the service life. Adequate air circulation in the switch cabinet is recommended.

Recommendations for maximum service life

- **Thermal relief:** Ensure that the ambient temperature remains below +50°Cwherever possible.
- **Regulated load distribution:** Operation within the specified current range, taking derating into account, ensures protection of the internal components.
- **Use according to the application:** The device should not be operated permanently in buffer mode, but should be intended for short-term mains interruptions.

5.2 Storage of the buffered power supply unit

The buffered power supply unit is supplied in an uncharged state. In this state, it should not be stored above +85°C or below -25°C.

6. Disposal and recycling

Ensure proper disposal of electronic components

Do not dispose of the power supply with household waste.

Observe the applicable national regulations.

Ensure proper disposal or recycling

Dispose of or recycle packaging material that is no longer required with household waste.

Observe the applicable national regulations.