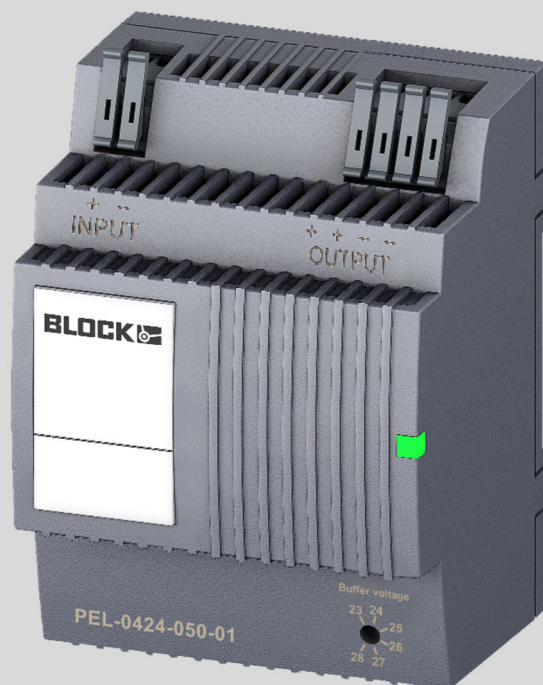


MANUAL

UNINTERRUPTIBLE
POWER SUPPLY



Buffer module
PEL-0424-050-01

TABLE OF CONTENTS

1. ... ORDER DATA	3
2. .. GENERAL NOTES.....	4
2.1 Safety instructions	4
2.2 Qualified Personnel	4
2.3 Intended use	4
2.4 Disclaimer.....	4
3. .. Product description	6
3.1 Technical Data	7
3.2 Functional diagram	8
3.3 Dimensioning.....	8
3.4 Assembly.....	9
3.5 Connections and signalling	10
4. .. Commissioning	11
4.1 Buffer operation.....	11
4.2 Life expectancy	12
4.3 Buffer times.....	13
4.3.1 PEL-0424-050-01 (23V).....	13
4.3.2 PEL-0424-050-01 (24V).....	13
4.3.3 PEL-0424-050-01 (25V)	13
4.3.4 PEL-0424-050-01 (26V)	13
4.3.5 PEL-0424-050-01 (27V).....	13
4.3.6 PEL-0424-050-01 (28V)	13
4.4 Derating	14
5. .. Maintenance.....	15
5.1 Storage of the buffer module	15
6. .. Disposal and recycling.....	15

1. ORDER DATA

The following table shows the ordering data for the buffer modules.

Table 1: Order numbers

Buffer module		
Variant	Input Voltage	Output current
PEL-0424-050-01	24 Vdc	5 A
PMC-0424-050-01	24 Vdc	5 A
PMC-0424-050-02	24 Vdc	5 A
PMC-0424-050-03	24 Vdc	5 A

2. GENERAL NOTES

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 document have been carefully checked for consistency with the hardware and software described. Nevertheless, there may be discrepancies between the product and the documentation. Discrepancies may also arise due to the continuous development of the product. For this reason, we cannot guarantee complete consistency. Should this documentation contain errors, we reserve the right to make necessary corrections without prior notice.



ATTENTION

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



ATTENTION

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



ATTENTION

Prevent foreign objects such as paper clips and metal parts from entering the device.



ATTENTION

Do not operate the device in a damp environment or in an environment where dew or condensation is likely to occur.



ATTENTION

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

3. Product description

The **PEL-0424-050-01** is a compact buffer module based on supercapacitors, designed to reliably bridge short-term voltage dips in 24 V DC power supply systems. With a buffer storage **capacity of 980 Ws** and a maximum buffer current of 5 A, it protects sensitive consumers from data loss or system downtime.

In addition, the module has a boost function that can provide short-term currents of **up to 12 A** – ideal for intercepting dynamic load peaks.

The module provides active decoupling between input and output, allowing it to immediately switch to buffer mode in the event of a voltage dip without feeding back into the supply system. This separation ensures a stable output voltage while protecting the source.

Thanks to its robust electronics, the module is designed for ambient temperatures of up to +70°C – ideal for use in demanding industrial environments.

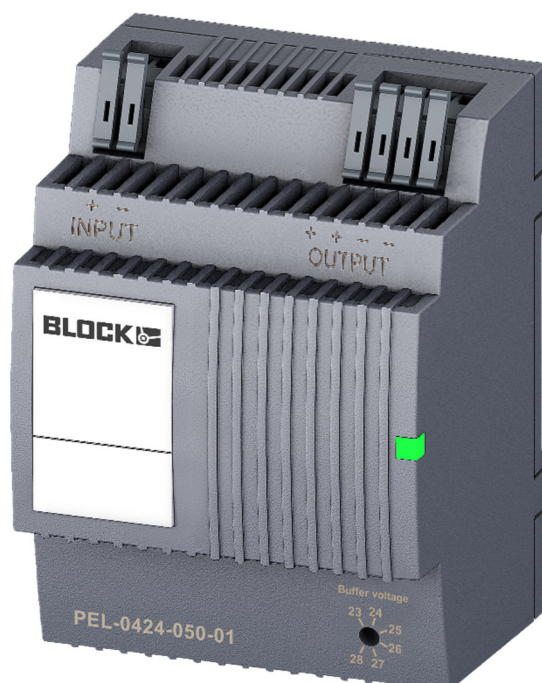


Figure 1: PEL-0424-050-01

3.1 Technical Data

deutsch	english		
Technische Daten	Technical data		
		PEL-0424-050-01	
Eingangsdaten	Input data		
Eingangsnennspannung	Rated input voltage	24 Vdc	
Eingangsspannungsbereich	Input voltage range	23-28,5 Vdc	
Eingangsstrom	Input current	max. 5,2 A	
Ausgangsdaten	Output data		
Ausgangsspannung	Rated output voltage	24 Vdc	
Ausgangsspannungsbereich	Output voltage range	23-28,5 Vdc entsprechend der Eingangsspannung according to input voltage	
Ausgangsstrom	Rated output current	5 A (12A Boost, 2s)	
Parallelschaltbar	Parallel operation		
Serienschaltbar	Serial operation		
Eingang + Ausgang entkoppelt	Input + Output decoupled		
Wirkungsgrad (Nennlast)	Efficiency (nominal load)	97,57 %	
Verlustleistung (Nennlast)	Power loss (nominal load)	3 W	
Integrierte Pufferung	Integrated buffering		
Pufferzeit	Backup time	4,5s (5A) 28V - 18V	
Pufferschwelle	Buffer threshold	<22 Vdc	
Ausgangsspannung im Pufferbetrieb	Output voltage in buffer mode	23V, 24V, 25V, 26V, 27V, 28V (voreingestellt auf 28Vdc) (preset to 28Vdc) Einstellbar über Potentiometer Adjustable via potentiometer	
Ladezeit beim Neustart	Loading time at restart	< 600s	
Ladestrom Superkondensatoren	Charging current super capacitors	200 mA	
Verhalten bei leerem Speicher:	Behavior when storage is empty:	Abschaltung Uout < 18V Shut down Uout < 18V	
Speichertechnologie	Storage technology	Superkondensator Super capacitor	
Signalisierung	Signaling		
Betriebsanzeige	Power indicator	Zustände LED States LED	Langsames Blinken: Laden slow blinking: charging Schnelles Blinken: Puffern fast blinking: buffering Dauer Leuchten: Sollspannung erreicht light up continuously: Target voltage reached
Umwelt	Environment		
Lagertemperatur	Storage temperature	-25 °C...+80 °C	
Umgebungstemperatur	Operational temperature	-25 °C...+70 °C	
Derating	Derating	23V Pufferspannung > 50 °C 23V Buffer voltage > 50 °C	
Einbaulage	Mounting position	waagrecht für Tragschiene TH 35, horizontal for Rail TH 35	
Zulässige Luftfeuchtigkeit	Allowable humidity	5 bis 96 % relative Feuchte, keine Betäuung zulässig 5 to 96 % relative humidity with no dew	
Kühlung (Abstand zu benachbarten Teilen)	Cooling (spacing to vicinal components)	kein Mindestabstand rechts/links erforderlich, 50 mm oben/unten No minimum spacing right/left required, 50 mm over/under	
Sicherheit und Schutz	Safety and protection		
Schutzart	Protection index	IP 20	
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	
Rückspesungsfestigkeit	Feedback voltage	max. 35 Vdc	
Normen	Safety standards		
Sicherheit	Safety	EN 61010-1, EN 61010-2-201	
EMV	EMC	EN 61000-6-2, EN 61000-6-3	
Mechanische Daten	Mechanical data		
Gewicht	Weight	0,2 kg	
Maße (B x H x T)*	Dimensions (W x H x D)*	72 x 89 x 55 mm	
Anschlüsse Eingang (+, -)	Terminals input (+, -)	Federzug, max. 2,5 mm ² Spring-clamp terminals max. 2,5 mm ²	
Anschlüsse Ausgang (+, +, -, -)	Terminals output (+, +, -, -)	Federzug, max. 2,5 mm ² Spring-clamp terminals max. 2,5 mm ²	
Bestellnummern	Order Numbers		
Bestellnummer	Order Number	PEL-0424-050-01	

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

Figure 2: Technical Data

3.2 Functional diagram

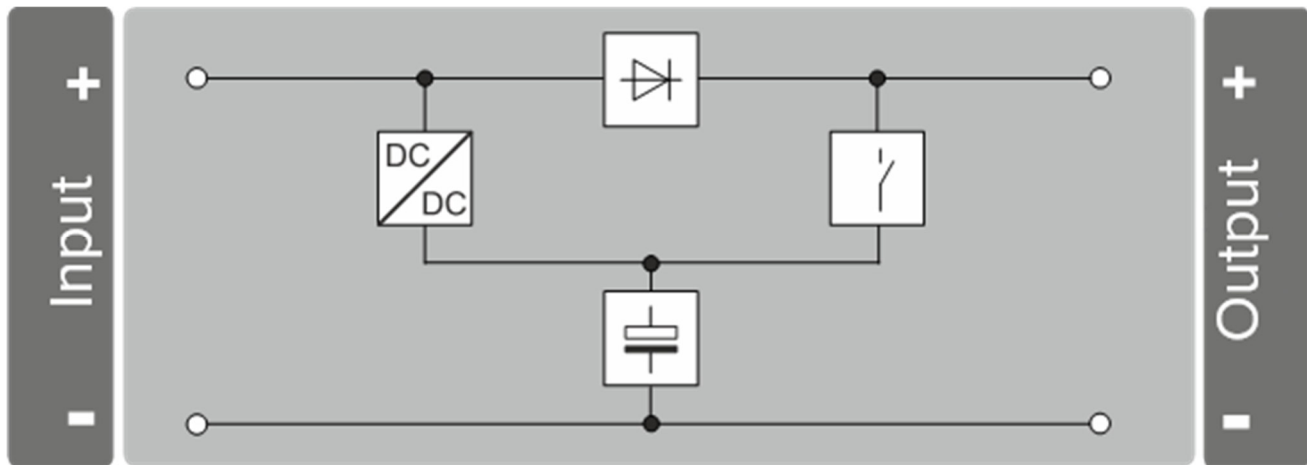


Figure 3: Functional diagram PEL-0424-050-01

3.3 Dimensioning

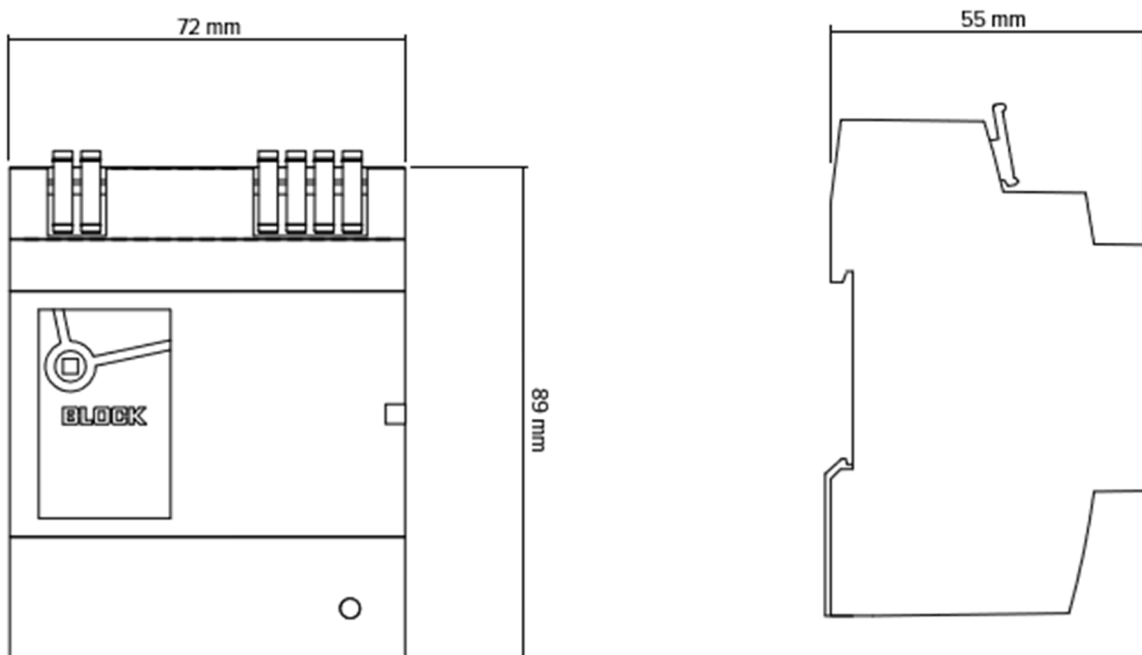


Figure 4: Dimensioning PEL-0424-050-01

3.4 Assembly

The buffered power supply unit (PEL-0424-050-01) can be mounted on the mounting rails without tools. To do this, first turn the front of the device slightly upward and place it on the top-hat rail. Make sure that the device is pushed down as far as it will go. Once the device is seated on the top-hat rail, press the underside 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 in place.

A standard tool, such as a flat-blade screwdriver, is required for removal. By pressing down on the mounting bracket, the device can be removed from the top-hat rail by lifting the underside of the device.

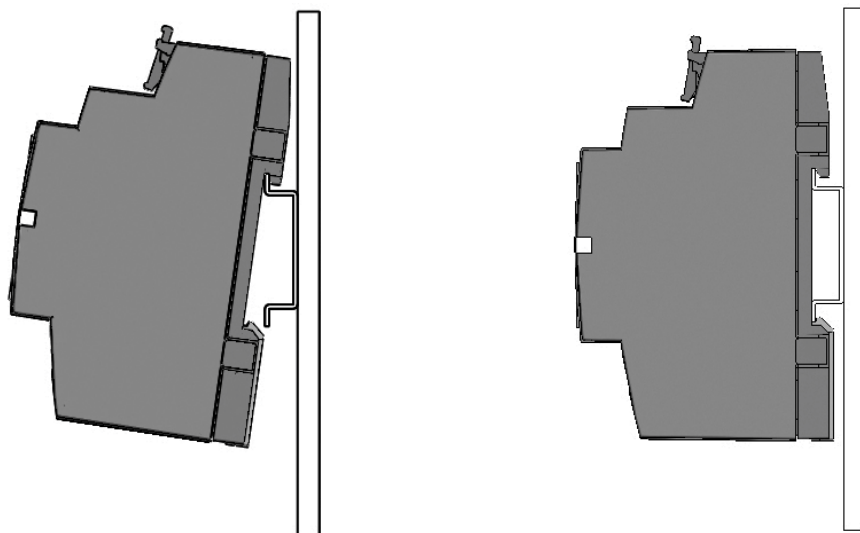


Figure 5: Assembly

To ensure cooling through natural convection, observe the distances to adjacent devices.



Attention:

Installation of the buffered power supply unit overhead is not permitted.



Attention:

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



Attention:

Any other type of installation is not permitted.

3.5 Connections and signalling

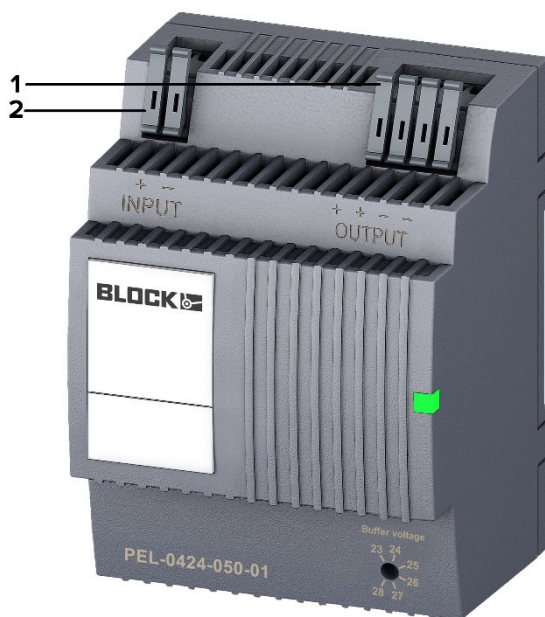


Table 1: Connections

Nr.	Function	Note
1	Output terminals of the power supply	Spring-loaded terminals. Max. 2,5mm (-, -, +, +)
2	Input terminals of the power supply	Spring-loaded terminals. Max. 2,5mm ² (+, -)

4. Commissioning

1. Assembly

Mount the buffer module on a standard 35 mm DIN top-hat rail in the control cabinet. Ensure adequate ventilation and that the permissible ambient temperature of **+70 °C** is not exceeded.

2. Connecting the input voltage (24V DC)

Connect the 24 V DC supply to the "Input" terminals of the module (**plus (+) and minus (-)**). Ensure the correct polarity. The input current should be at least **0.2A higher** than the connected load to ensure safe recharging of the supercapacitors.

3. Connecting the load

Connect the consumer load to the module's "output" terminals (**plus (+) / minus (-)**). The maximum output current is **5 A**. Thanks to **active decoupling**, there is no feedback to the source in the event of a voltage dip - the output voltage remains stable.

4. Switch on the power supply

After correct connection, the input voltage can be switched on. The module automatically starts charging the integrated **supercapacitors** (capacity: **580Ws**).

5. Observe LED status display

The green LED flashes continuously during the charging process. As soon as the supercapacitors are fully charged, the LED changes to a **steady light** - the module is now ready for operation.

The internal capacitor voltage can be set in the range from **23V to 28V**. **The voltage is preset to 28V at the factory**. The permanently lit LED indicates that the set charging setpoint has been reached.

6. Operating behavior in the buffer case

In the event of a voltage dip at the input, the module immediately takes over the supply of the connected load (up to max. 5A). The decoupling ensures an uninterrupted switchover to buffer mode.

7. Temperature behavior

The module is designed for use up to an ambient temperature of **+70 °C**. Above this threshold, the internal charging voltage is automatically limited to **23V** in order to maximize the service life of the supercapacitors.

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 5 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 on two factors: the ambient temperature and the voltage that is permanently applied to the capacitors. As a general rule, **the higher the voltage, the shorter the service life**.

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

At the end of the respective service life, the residual capacity of the supercapacitors is typically still around **70%**.

The capacity drops by around **15%** in the first **200 operating hours**. After that, the drop is **almost linear** up to the stated value of 70%.

From an ambient temperature of **+50°C**, the internal charging voltage is automatically limited to **23V**. This protects the supercapacitors and makes a decisive contribution to extending the service life of the module.

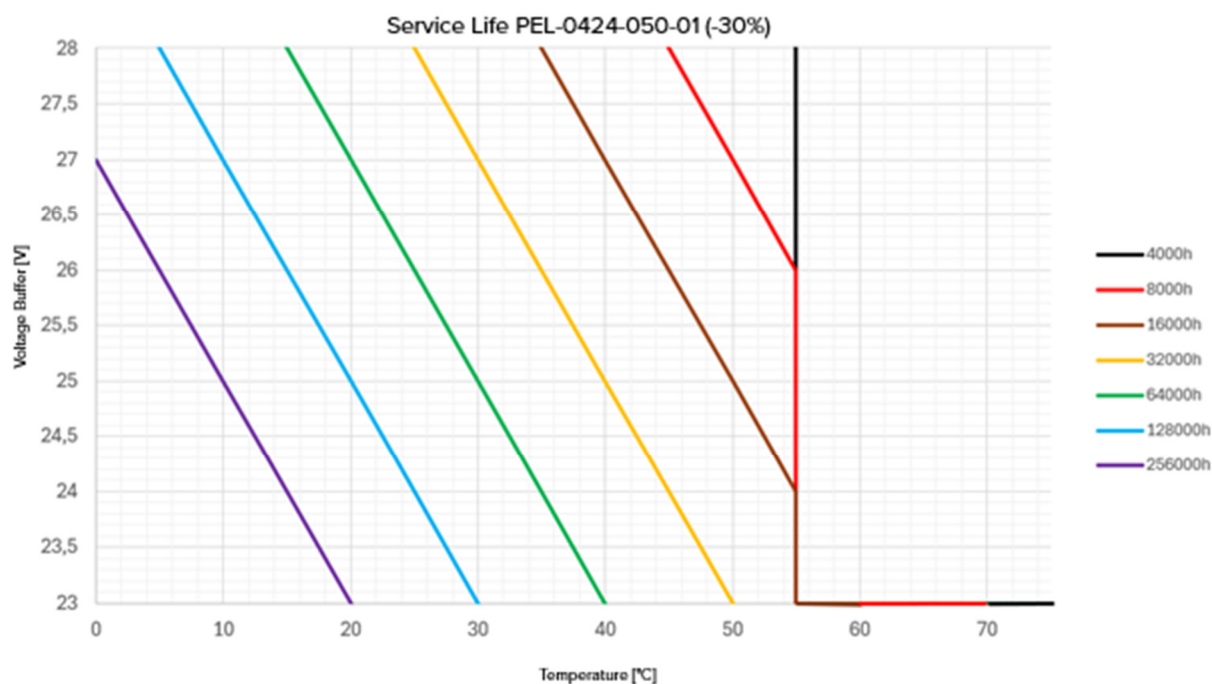


Figure 6: Service Life

4.3 Buffer times

The buffered power supply unit **PEL-0424-050-01** secures the 24V DC power supply in the event of brief mains interruptions by using integrated, maintenance-free supercapacitors. In the event of a voltage dip, the device automatically takes over the supply to the connected loads and thus protects your 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.

4.3.1 PEL-0424-050-01 (23V)

Current	5 A	3 A	2 A	1 A	0,5 A	0,1 A
Buffer time	2,11 Sec.	3,95 Sec.	6,22 Sec.	12,8 Sec.	25,4 Sec.	94,9 Sec.

4.3.2 PEL-0424-050-01 (24V)

Current	5 A	3 A	2 A	1 A	0,5 A	0,1 A
Buffer time	2,64 Sec.	4,79 Sec.	7,4 Sec.	15,3 Sec.	30,4 Sec.	111 Sec.

4.3.3 PEL-0424-050-01 (25V)

Current	5 A	3 A	2 A	1 A	0,5 A	0,1 A
Buffer time	3,05 Sec.	5,46 Sec.	8,44 Sec.	17,4 Sec.	34,6 Sec.	138 Sec.

4.3.4 PEL-0424-050-01 (26V)

Current	5 A	3 A	2 A	1 A	0,5 A	0,1 A
Buffer time	3,56 Sec.	6,4 Sec.	9,7 Sec.	20 Sec.	39,9 Sec.	156 Sec.

4.3.5 PEL-0424-050-01 (27V)

Current	5 A	3 A	2 A	1 A	0,5 A	0,1 A
Buffer time	4,14 Sec.	7,4 Sec.	11,36 Sec.	22,92 Sec.	45,6 Sec.	183 Sec.

4.3.6 PEL-0424-050-01 (28V)

Current	5 A	3 A	2 A	1 A	0,5 A	0,1 A
Buffertime	4,96 Sec.	8,64 Sec.	13,24 Sec.	26,7 Sec.	52,3 Sec.	219 Sec.

4.4 Derating

To maintain a long service life of the supercapacitors, the buffer module has integrated derating behavior depending on the ambient temperature.

As soon as the ambient temperature exceeds **50°C**, the internal buffer voltage is **automatically reduced to 23V**. This voltage drop serves to thermally protect the capacitors and prevents premature ageing at high ambient temperatures.

The derating starts dynamically and ensures that safe and long-lasting operation of the module is guaranteed even at temperatures of up to **+50 °C**.

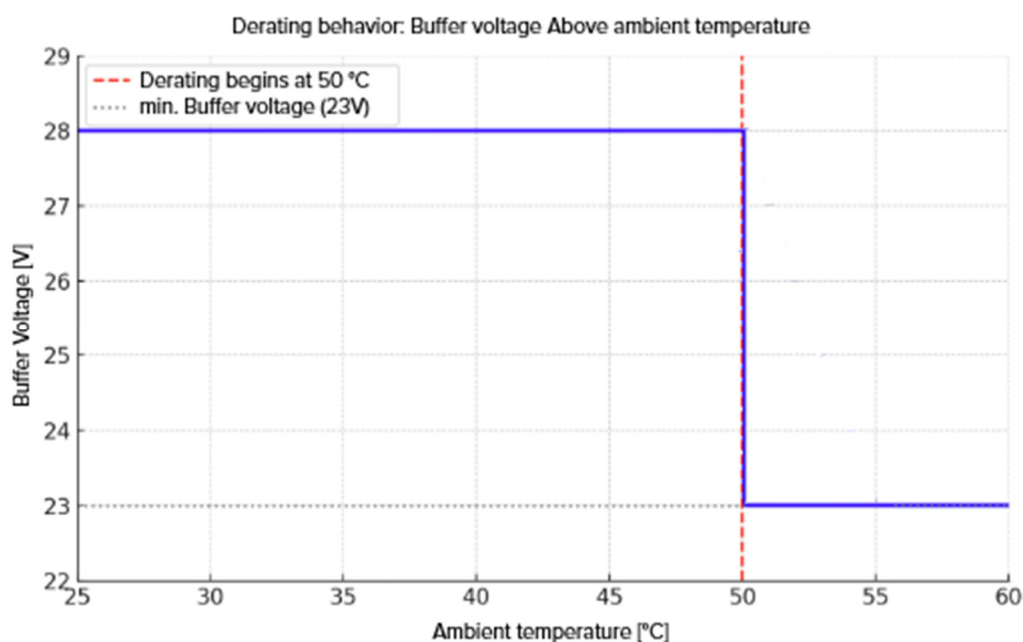


Figure 7: Derating

5. Maintenance

5.1 Storage of the buffer module

The buffer module is supplied uncharged. In this state, it should not be stored above +80°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.