

# A Cure for Sudden Loss of Power

Industrial-grade intelligent supercapacitor-based power backup module





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**Why**

# **Supercapacitor UPS for Industrial System?**

## **Hidden Risks of Power Outages Are More Than You Think**

When the operator is not on duty, abruptly cutting off the main power supply to the machine equipment instead of performing a proper shutdown can lead to potential damage to the operating system or hard disk. Moreover, unexpected power disruptions can pose a serious threat. Unstable power supplies, particularly during peak summer power consumption periods, introduce an element of unpredictability. A sudden power outage without prior warning can result in data loss, system damage, downtime, and necessitating additional expenses for system restoration and maintenance. Such interruptions can even hamper production line efficiency.

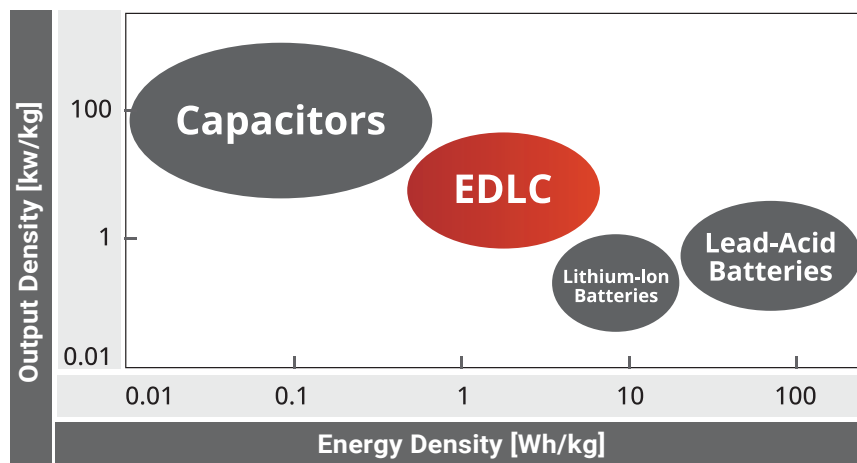


# Battery vs. Supercapacitor

In industrial environments, to ensure 24/7 operation or data safety, you need a steady power source for consistent operations.

However, deploying a UPS in an industrial environment is a tremendous challenge due to high operating temperatures. With traditional battery-powered UPS that provides additional operation time after power loss, the high ambient temperature (reaching up to 50°C or higher) will cause traditional batteries to degrade over time, energy storage capacity and reliability wise. Another issue faced by the traditional UPS is that it cannot initiate a proper shutdown to protect the data and hardware if the battery energy runs out.

For decades, battery has been the preferred form of energy storage as it has high energy density (10 to 100 Wh/kg). However, limited by operating temperature (typically 0°C to 40°C) and cycle life (2 years or 500 charge-discharge cycles), battery is neither rugged nor durable enough for industrial applications. Supercapacitor, also called electric double-layer capacitor (EDLC), is an emerging category of capacitor offering 10 to 100 times more energy density than electrolytic capacitor (1 to 10 Wh/kg). In addition to its impressive energy density, supercapacitor also has a wide operating temperature range (-40°C to 85°C) and long operating life (10 years or 500,000 charge-discharge cycles). These two traits help make it a reliable industrial power backup solution.



Energy Storage Technologies

# Intelligent Supercapacitor-based Power Backup Module

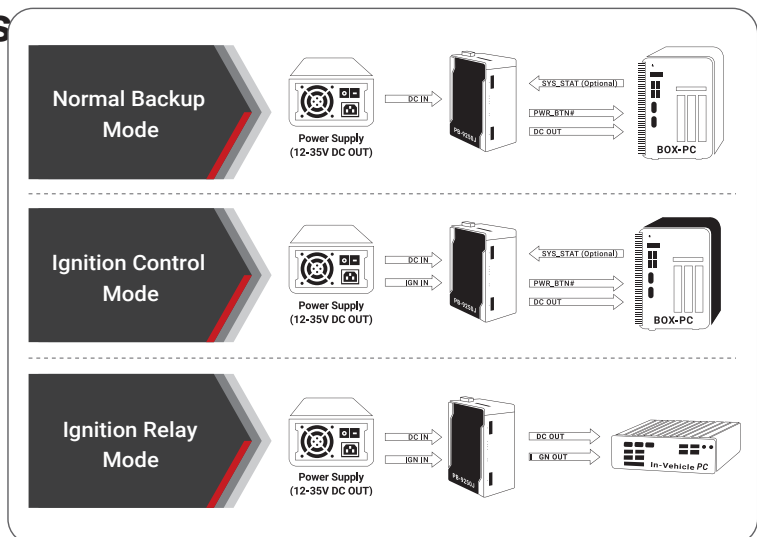
Neosys PB Series, an industrial-grade intelligent supercapacitor-based power backup module boasting a robust capacity of up to 9250 watt-seconds, excels in extreme environments ranging from -40°C to 70°C. It offers an impressive lifespan of up to 10 years or 500,000 charge-discharge cycles.

By integrating supercapacitor and patented CAP energy management technology, the PB series outperforms other types in capacitance, and serves as a bridge between electrolytic capacitors and rechargeable batteries. Its rapid charging and discharging capabilities make it ideal for demanding industrial applications in both high and low-temperature settings, such as factories, outdoor environments, vehicles, and mobile scenarios.

|   |  |
|---|--|
| <b>SuperCAP lifespan configuration</b>  | <b>Rugged wide-temp operations</b>   |
| 10 years or 500,000 charge-discharge cycles. Sustains back-end system from seconds to minutes during power loss.  | Neosys' power backup module supports up to -40 to 70°C wide-temp range operation to suit harsh environments. |
| <b>Patented CAP energy management</b>   | <b>Compatible with all box-PCs</b>   |
| Patented CAP energy management technology that can monitor real-time power consumption to ensure the proper timing to shutdown during an unforeseen power loss. | Excellent compatibility for easy installation and implementation with existing computer/ equipment.          |

## Versatile operating modes

PB series offers a range of versatile operating modes tailored to diverse applications and environments. The Normal Backup mode is well-suited for general applications, such as automation and machine vision. Meanwhile, the Ignition Control and Ignition Relay modes are specifically designed to meet the requirements of in-vehicle and railway applications.



# Patented CAP Energy Management Technology

To design and create a reliable supercapacitor-based power backup system requires fundamental techniques such as charge/ discharge control, active load balance and DC/ DC regulation. But the real challenge is how to get the most out of the capacitor energy while ensuring the system shuts down safely during the blackout.

At Neousys Technology, our patent (R.O.C. Patent No. I598820) incorporates a microprocessor with supercapacitor and charge/ discharge controller. The proprietary firmware embedded in the MCU not only monitors energy level continuously, it also automatically initiates soft-shutdown to prevent data loss/ corruption.

The patented architecture provides sophisticated features such as real-time energy monitoring, high/ low voltage protection and auto/ manual shutdown control. Users can also extend the lifespan of supercapacitors up to 4.8x via the parameter configuration utility.

|                                  | PB-2500J              | PB-9250J-SA<br>PB-4600J-SA<br>PB-9250J-110V | Off-line UPS          | Interactive UPS       | On-line UPS           |
|----------------------------------|-----------------------|---|-----------------------|-----------------------|-----------------------|
| <b>Energy storage technology</b> | Supercapacitor        | Supercapacitor                              | Battery               | Battery               | Battery               |
| <b>Backup time</b>               | 1 ~ 3 mins            | 1 ~ 10 mins                                 | > 30 mins             | > 30 mins             | > 30 mins             |
| <b>Operating temperature</b>     | -25°C to 65°C         | -25°C to 70°C                               | 0°C to 40°C           | 0°C to 40°C           | 0°C to 40°C           |
| <b>Lifespan</b>                  | > 10 yrs              | > 10 yrs                                    | 2 yrs @ 25°C          | 2 yrs @ 25°C          | 2 yrs @ 25°C          |
| <b>Regulated power output</b>    | Yes                   | Yes   | No                    | No                    | Yes                   |
| <b>Shutdown control</b>          | Automatic plug & play | Automatic, plug & play                      | Via RS-232 & software | Via RS-232 & software | Via RS-232 & software |

# Applications



## Semi-conductor and Automated Inspection Systems

An industrial machine's PC is susceptible to damage during unforeseen power outages, posing a significant risk to expensive semiconductor manufacturing and inspection systems. To mitigate risks, consider implementing PB-9250J to ensure proper shutdown of the PC and safeguard the stored data in HDD/SSD.



## Automated Inspection Systems for Vehicles

The undercarriage scan in automated vehicle inspection systems identifies and alerts faults without exposing personnel to potential harm. By incorporating the PB-9250J, you not only facilitate a secure shutdown of the PC to protect crucial data stored in HDD/SSD, but it also allows you to pick up where you were left off in the middle of a scan when the power outage occurred.



## Level Crossings and Third Rail Systems

Effective power management is paramount in railway applications, particularly in scenarios such as level crossings or third rail systems where power loss durations range from seconds to minutes. With an operating temperature range of  $-40^{\circ}\text{C}$  to  $70^{\circ}\text{C}$  and accepting a wide-range DC input of 43V-160V, the PB-9250J-110V is a robust solution that can ensure uninterrupted power supply in demanding railway environments.

# Selection Guide



| Model Name                   |                       | PB-9250J-SA  | PB-4600J-SA                   | PB-2580J-SA                   | PB-9250J-110V   |
|------------------------------|-----------------------|--|-------------------------------|-------------------------------|---|
| Supercapacitor Configuration | Composition           | 8x 370F, 3.0V supercapacitors  | 4x 370F, 3.0V supercapacitors | 8x 100F, 2.7V supercapacitors | 8x 370F, 3.0V supercapacitors   |
|                              | Capacity              | 9250 watt-second   | 4600 watt-second              | 2580 watt-second              | 9250 watt-second  |
|                              | Expected lifespan     | >10 years  |                               |                               |   |
|                              | Cycle life            | 500,000 charging/ discharging cycles   |                               |                               |   |
| Power Specification          | Input Voltage         | 12 to 35V DC input   |                               |                               | 43-160 VDC  |
|                              | Input Connector       | 1x 3-pin pluggable terminal block (V+, GND, IGN_IN)                              |                               |                               | 1x 3-pin pluggable terminal block (V+, GND)   |
|                              | Output Voltage        | Charge mode: DC_IN bypass(DC_OUT = DC_IN)<br>Discharge mode: 12 or 24V           |                               |                               | 24 VDC  |
|                              | Output Power          | Maximum 180W output  | Maximum 100W output           | Maximum 70W output            | Maximum 120W output   |
|                              | Output Connector      | 1x 3-pin pluggable terminal block (V+, GND, IGN_OUT)                             |                               |                               | 1x 3-pin pluggable terminal block (V+, GND)   |
| I/O Interface                | COM Port              | 1x DB9 for 3-wire RS-232   |                               |                               | 1x DB9 for 3-wire isolated RS-232   |
|                              | Iso. DIO              | 1x 10-pin pluggable terminal block for<br>- PWR_BTN# output<br>- SYS_STAT input  |                               |                               | 1x 10-pin pluggable terminal block for<br>- ATX mode PWR_BTN# output (open-drain, pulse type)<br>- AT mode PWR_BTN output (open-drain, level type)<br>- DISCHARGING ALERT output (open-drain, level type)<br>- SYS_STAT input |
| Mechanical                   | Dimensions            | 82.5 x 175.2 x 128.2 mm  | 82.5 x 175.2 x 128.2 mm       | 32.8 x 176.6 x 126 mm         | 110 x 175.2 x 128.2 mm  |
|                              | Weight                | 1.7 kg   | 1.68 kg                       | 0.93 kg                       | 2.33 kg   |
|                              | Mounting              | DIN-rail mounting or optional wall-mounting                                      |                               |                               |   |
| Environmental                | Operating Temperature | -25°C~ 65°C<br>-40°C ~ 85°C with reduced energy capacity                         |                               |                               | -40°C ~ 70°C EN50155 OT4 class  |
|                              | Storage Temperature   | -40°C ~ 85°C   |                               |                               |   |
|                              | Vibration             | Compliant with IEC61373:2010, Category 1, Class B Body mounted (part of EN50155) |                               |                               |   |
|                              | Shock                 | Compliant with IEC61373:2010, Category 1, Class B Body mounted (part of EN50155) |                               |                               |   |
|                              | EMC                   | Compliant with EN50155:2007, CE/FCC Class A, according to EN 55032 & EN 55035    |                               |                               |   |
|                              | EN50155               | -  | -                             | -                             | EN50155 All mandatory sections of EN 50155:2017   |
|                              | EN45545               | -  | -                             | -                             | EN45545 EN 45545-2 (Fire protection on railway vehicles)  |
| Released Date                | 2019/ 7               | 2019/ 7  | 2021/ 9                       | 2023/ 7                       |   |

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