Overview

By combining a DC UPS module with at least one 24 V battery module and a SITOP power supply unit, longer power failures can be bridged without any interruption. Even if a greater buffering current is required, the DC UPS with maintenance-free lead battery provides optimum safety. It spans power failures up to several hours long and delivers up to 40 A.

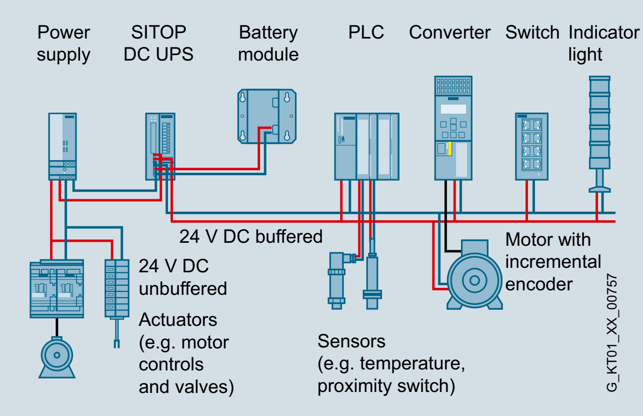
Benefits

- 24 V buffering for a few hours for the purpose of continuing processes
- Maintenance-free battery modules from 1.2 to 12 Ah
- High reliability and availability due to monitoring of the operational readiness, battery feeder, aging and charging status
- Long operating life of loads and batteries due to integrated battery management
- Settings by means of DIP switches: Battery connection threshold, end-of-charge voltage, charging current, bridging time
- SW tool, free of charge, for easy configuring and integrating in PC-based systems

Application

These battery modules that can be connected in parallel bridge power failures for a few hours. This enables processes or parts of them to be continued, measured values to be recorded without interruption and communication to be maintained. High-performance industrial PCs that have to be shut down also have somewhat higher energy demands. Especially if a large panel continues to be operated during the shutdown. The DC UPS is used, for example, in machine tool production, in the textile industry, in all types of production lines, bottling plants or also for the obstacle lights of wind power plants.

The serial or USB interface and a free software tool enable easy communication with a PC.



Configuration with SITOP DC UPS and battery module: 24 V buffering to maintain communication, signaling and sensor measured values. To relieve the load on the UPS, the actuators are supplied directly from the power supply unit.

Design

- DC UPS modules 24 V/6 A, 15 A, 40 A
- Digital inputs/outputs, optionally with serial or USB interface

- Battery modules 1.2 Ah, 3.2 Ah, 7 Ah, 12 Ah with lead rechargeable batteries of corrosion-resistant lead-calcium high-performance grid plates and glass fiber
- Battery module 2.5 Ah with "high-temperature battery" of pure lead

Technical specifications

The table shows the maximum buffering times for the battery modules for different load currents.

The SITOP Selection Tool offers detailed selection guidance according to criteria such as the required backup time, nominal current, peak current and battery connection threshold:
http://www.siemens.com/sitop-selection-tool

Load current	Battery module 1.2 Ah (6EP1935-6MC01)	Battery module 3.2 Ah (6EP1935-6MD11)	Battery module 7 Ah (6EP1935-6ME21)	Battery module 12 Ah (6EP1935-6MF01)	Battery module 2.5 Ah (6EP1935-6MD31)
1 A	34.5 min	2.6 h	5.4 h	9 h	2 h
2 A	15 min	1 h	2.6 h	4.6 h	1 h
3 A	9 min	39.3 min	1.6 h	2.9 h	37.5 min
4 A	6.5 min	27.1 min	1.2 h	2.2 h	27 min
6 A	3.5 min	17.5 min	41 min	1.2 h	17.6 min
8 A	2 min	12.1 min	28.6 min	53.3 min	12.5 min
10 A	1 min	9 min	21.8 min	43.5 min	8.8 min
12 A	-	7 min	17.3 min	33.3 min	6.8 min
14 A	-	5 min	15.1 min	27.5 min	5.1 min
16 A	-	4 min	12.5 min	23.8 min	4.3 min
20 A	-	1 min	9.1 min	20.1 min	-
25 A	-	-	-	12.6 min	-
30 A	-	-	-	9.1 min	-
35 A	-	-	-	17.1 min (2 x 12 Ah)	-
40 A	-	-	-	13.5 min (2 x 12 Ah)	-

Important information for selecting the battery capacity:

Determination of the mains buffering times is based on the discharge period of new or non-aged, completely charged battery modules at a battery temperature not below +25 °C to the shutdown of the DC UPS.

Battery aging reduces the still available battery capacity up until the end of the service life to typically around 50% of the original capacity value when new (1.2 Ah/3.2 Ah/7 Ah, etc.) and the internal resistance increases. When the message "Battery charge > 85%" appears, only around 50% x 85% = approx. 43% of the originally available capacity can be assumed at the end of the battery service life.

At battery temperatures below +25 °C, the available capacity drops approximately by another 30% at +5 °C battery temperature, to approximately 70% of the approximately remaining 43%. There is then only around 30% of the original capacity available.

A significantly larger battery capacity must therefore be selected when configuring the plant: A drop to approx. 50% is compensated for by selecting 1 / approx. 0.5 = approx. double the battery capacity (required as per the table for the relevant load current and the relevant buffering time). Available capacity of approx. 43% is compensated for by selecting 1 / approx. 0.43 = approx. 2.33 times the battery capacity. Available capacity of approx. 30% is compensated for by selecting 1 / approx. 0.3 = approx. 3.33 times the battery capacity.

Recommendation:

Instead of installing double the battery capacity, regular battery replacement halfway through the expected service life (reduction of capacity to approx. 50%) can be more advisable for the following reasons: Capacity does not drop below 100% until the halfway point of the expected battery life (or slightly beyond). With regular replacement after this point, only the single battery capacity (instead of double capacity) must be installed due to aging (-> neutral in price with regard to battery module costs, but only requires half the space).

Replacing the battery after half its service life dispenses above all with the large scatter range of the residual capacity at the end of the service life, which is not accurately defined by battery manufacturers (after the full time, many batteries are above, but many are also below the average 50% residual capacity, that is to say, even if double the capacity is installed, the influence of aging at the end of service life is not reliably compensated for, rather only typically) -> When replacing after half the expected service life, the configured buffering time is maintained with considerably greater reliability.

In the case of batteries stored in cool conditions (not above +25 °C) and for not longer than approximately 4 months, the following service life can be assumed, strongly dependent on battery temperature:

Battery temperature	Drop to approx. 50% of residual capacity	Recommendation: Replace (at 100% of residual capacity) all	Alternative recommendation
+20 °C	4 years	2 years	
+30 °C	2 years	1 year	
+40 °C	1 year	0.5 years	Install double capacity and replace 1 x per year

In normal cases (installation in the coolest location in the control cabinet at approx. +30 °C), the battery should be replaced with single installed battery capacity in accordance with the selection table after 1 year of operation!

- On the DC UPS module 40 A, at least 2 battery modules of 7 Ah or higher must be connected in parallel for output currents > 30 A. When connecting battery modules in parallel, you must ensure identical capacity and aging.
- After a power failure, the battery module is disconnected from the loads at the end of the selected buffering time either automatically or electronically by opening the On/Off control circuit, and as soon as the 24 V input voltage is available again, it is quickly re-charged with the charge current of the relevant DC UPS module (with I-U charge characteristic: First constant current I for fast charging, and changeover to constant voltage U to maintain the charge when the battery is almost full).

Overview

Maintenance-free battery modules with 1.2 Ah up to 12 Ah (lead-gel accumulator) for ambient temperatures from 0 to +40 °C as well as high-temperature battery module with 2.5 Ah (pure-lead accumulator) for ambient temperatures of –40 °C to +60 °C. The battery modules are completely prewired with battery retainer and terminals. For longer buffer times, the battery modules can be connected in parallel. Mounting onto standard mounting rail or directly to the wall.

Technical specifications

Article No. **Product** **Product type**	**6EP1935-6MC01** **SITOP Battery module** **Battery module 1.2 Ah**	**6EP1935-6MD31** **SITOP Battery module** **Battery module 2.5 Ah**
Charging current charging voltage		
End-of-charge voltage for DC		
• at -10 °C recommended	–	29 V
• at 0 °C recommended	–	28.6 V
• at 10 °C recommended	27.8 V	28.3 V
• at 20 °C recommended	27.3 V	27.9 V
• at 30 °C recommended	26.8 V	27.5 V
• at 40 °C recommended	26.6 V	27.2 V
• at 50 °C recommended	26.3 V	26.8 V
• at 60 °C recommended	–	26.4 V
Permissible charging current, max.	0.3 A	5 A
Safety		
Short-circuit protection	Battery fuse 7.5 A/32 V (solid-state circuitry blade-type fuse + support)	Battery fuse 15 A/32 V (solid-state circuitry blade-type fuse + support)
Design of the overload protection	Valve control	Valve control
Safety		
Protection class	Class III	Class III
CE mark	Yes	Yes
UL/cUL (CSA) approval	cURus-Recognized (UL 1778, CSA C22.2 No. 107.1), File E219627	cURus-Recognized (UL 1778, CSA C22.2 No. 107.1), File E219627
Degree of protection (EN 60529)	IP00	IP00
Operating data note		
Operating data note	For storage, mounting and operation of lead-acid batteries, the relevant DIN/VDE regulations or country-specific regulations (e.g. VDE 0510 Part 2/EN 50272-2) must be observed. You must ensure that the battery site is sufficiently ventilated. Possible sources of ignition must be at least 50 cm away.	For storage, mounting and operation of lead-acid batteries, the relevant DIN/VDE regulations or country-specific regulations (e.g. VDE 0510 Part 2/EN 50272-2) must be observed. You must ensure that the battery site is sufficiently ventilated. Possible sources of ignition must be at least 50 cm away.
Ambient temperature		
• during operation	-15 ... +50 °C	-40 ... +60 °C
• during transport	-20 ... +50 °C	-40 ... +60 °C
• during storage	-20 ... +50 °C	-40 ... +60 °C
Relative temporary capacity loss at 20 °C in a month typical	3 %	3 %

Technical specifications (continued)

Article No.	**6EP1935-6MD11**	**6EP1935-6ME21**	**6EP1935-6MF01**
Product	**SITOP Battery module**	**SITOP Battery module**	**SITOP Battery module**
Product type	**Battery module 3.2 Ah**	**Battery module 7 Ah**	**Battery module 12 Ah**
Charging current charging voltage			
End-of-charge voltage for DC			
• at -10 °C recommended	–	–	–
• at 0 °C recommended	–	–	–
• at 10 °C recommended	27.8 V	27.8 V	27.8 V
• at 20 °C recommended	27.3 V	27.3 V	27.3 V
• at 30 °C recommended	26.8 V	26.8 V	26.8 V
• at 40 °C recommended	26.6 V	26.6 V	26.6 V
• at 50 °C recommended	26.3 V	26.3 V	26.3 V
• at 60 °C recommended	–	–	–
Permissible charging current, max.	0.8 A	1.75 A	3 A
Safety			
Short-circuit protection	Battery fuse 15 A/32 V (solid-state circuitry blade-type fuse + support)	Battery fuse 20 A/32 V (solid-state circuitry blade-type fuse + support)	Battery fuse 20 A/32 V (solid-state circuitry blade-type fuse + support)
Design of the overload protection	Valve control	Valve control	Valve control
Safety			
Protection class	Class III	Class III	Class III
CE mark	Yes	Yes	Yes
UL/cUL (CSA) approval	cURus-Recognized (UL 1778, CSA C22.2 No. 107.1), File E219627	cURus-Recognized (UL 1778, CSA C22.2 No. 107.1), File E219627	cURus-Recognized (UL 1778, CSA C22.2 No. 107.1), File E219627
Degree of protection (EN 60529)	IP00	IP00	IP00
Operating data note			
Operating data note	For storage, mounting and operation of lead-acid batteries, the relevant DIN/VDE regulations or country-specific regulations (e.g. VDE 0510 Part 2/EN 50272-2) must be observed. You must ensure that the battery site is sufficiently ventilated. Possible sources of ignition must be at least 50 cm away.	For storage, mounting and operation of lead-acid batteries, the relevant DIN/VDE regulations or country-specific regulations (e.g. VDE 0510 Part 2/EN 50272-2) must be observed. You must ensure that the battery site is sufficiently ventilated. Possible sources of ignition must be at least 50 cm away.	For storage, mounting and operation of lead-acid batteries, the relevant DIN/VDE regulations or country-specific regulations (e.g. VDE 0510 Part 2/EN 50272-2) must be observed. You must ensure that the battery site is sufficiently ventilated. Possible sources of ignition must be at least 50 cm away.
Ambient temperature			
• during operation	-15 ... +50 °C	-15 ... +50 °C	-15 ... +50 °C
• during transport	-20 ... +50 °C	-20 ... +50 °C	-20 ... +50 °C
• during storage	-20 ... +50 °C	-20 ... +50 °C	-20 ... +50 °C
Relative temporary capacity loss at 20 °C in a month typical	3 %	3 %	3 %
Service life			
Service life of lead-acid battery			
• typical Note	capacity falls to 50 % of original capacity	capacity falls to 50 % of original capacity	capacity falls to 50 % of original capacity
• at 20 °C typical	4 y	4 y	4 y
• at 30 °C typical	2 y	2 y	2 y
• at 40 °C typical	1 y	1 y	1 y
• at 50 °C typical	0.5 y	0.5 y	0.5 y
• at 60 °C typical	–	–	–
Ambient temperature during storage Note	Along with the storage and operating temperature, other factors such as the duration of the storage period and the charge status during storage have a decisive influence on the possible useful life. Batteries should therefore be stored as briefly as possible, always fully charged, and within the temperature range 0 to +20 °C.	Along with the storage and operating temperature, other factors such as the duration of the storage period and the charge status during storage have a decisive influence on the possible useful life. Batteries should therefore be stored as briefly as possible, always fully charged, and within the temperature range 0 to +20 °C.	Along with the storage and operating temperature, other factors such as the duration of the storage period and the charge status during storage have a decisive influence on the possible useful life. Batteries should therefore be stored as briefly as possible, always fully charged, and within the temperature range 0 to +20 °C.

Technical specifications (continued)

Article No.	**6EP1935-6MD11**	**6EP1935-6ME21**	**6EP1935-6MF01**
Product	**SITOP Battery module**	**SITOP Battery module**	**SITOP Battery module**
Product type	**Battery module 3.2 Ah**	**Battery module 7 Ah**	**Battery module 12 Ah**
Mechanics			
Connection technology	spring-loaded terminals	spring-loaded terminals	spring-loaded terminals
Connection for power supply unit	1 screw terminal each for 0.08 ... 2.5 mm² for + BATT and - BATT	1 screw terminal each for 0.08 ... 4 mm² for + BATT and - BATT	1 screw terminal each for 0.08 ... 4 mm² for + BATT and - BATT
Product component belonging to	Accessories pack with solid-state circuitry fuse 15 A	Accessories pack with solid-state circuitry fuse 20 A and 30 A	Accessories pack with solid-state circuitry fuse 20 A and 30 A
Width of the enclosure	190 mm	186 mm	253 mm
Height of the enclosure	151 mm	168 mm	168 mm
Depth of the enclosure	82 mm	121 mm	121 mm
Installation width	210 mm	206 mm	273 mm
Installation height	171 mm	188 mm	188 mm
Weight, approx.	3.2 kg	6 kg	9 kg
Installation	snaps onto DIN rail EN 60715 35x7.5/15 or keyhole mounting for hooking in to M4 screws	can be screwed onto flat surface (keyhole mounting for hooking in to M4 screws)	can be screwed onto flat surface (keyhole mounting for hooking in to M4 screws)
Number of cells	12	12	12
Other information	Specifications at rated input voltage and ambient temperature +25 °C (unless otherwise specified)	Specifications at rated input voltage and ambient temperature +25 °C (unless otherwise specified)	Specifications at rated input voltage and ambient temperature +25 °C (unless otherwise specified)

Ordering data	**Article No.**
Battery module 1.2 Ah for DC UPS module 6 A	**6EP1935-6MC01**
Battery module 2.5 Ah for DC UPS module 6 A and 15 A	**6EP1935-6MD31**
Battery module 3.2 Ah for DC UPS module 6 A and 15 A	**6EP1935-6MD11**
Battery module 7 Ah for DC UPS modules 6 A, 15 A and 40 A	**6EP1935-6ME21**
Battery module 12 Ah for DC UPS modules 6 A, 15 A and 40 A	**6EP1935-6MF01**