



Hot Topics!

- ****NEW**** Ex BACS – BACS officially enters the world of ATEX!
- ****A world first in Battery Management**** - Battery Capacity at UPS with “Intermittent Charging”
- ****NEW**** GENEREX OCEANIA



BACS

- ****NEW**** BACS BC 5 flexible + halogenfree Measuring Cables
- ****NEW**** BACS Current Sensor - Generation 5
- ****NEW**** BACS Velcro-fasteners on Battery Housings
- BACS Copycats
- Battery Fire!
- New EU Regulation for Batteries



UPS and Battery Management

- GENEREX Security Report 2023 - UL 2900
- Cybersecurity – of Vital Importance for Critical Infrastructure
- ****NEW**** OEM Customization



SMARTBATTERY / SMARTLOGGER / iBACS

- SMARTBATTERY – iBACS – SMARTLOGGER
- ****NEW**** SMARTBATTERY Companion App 2.0
- ****NEW**** Customize your SMARTLOGGER



Software

- Cybersecurity RCCMD



Click on the bullet points to get there!



Ex BACS

BACS officially enters the world of ATEX !

Some background: BACS and ATEX, so far – unofficial use of BACS within EX Zones

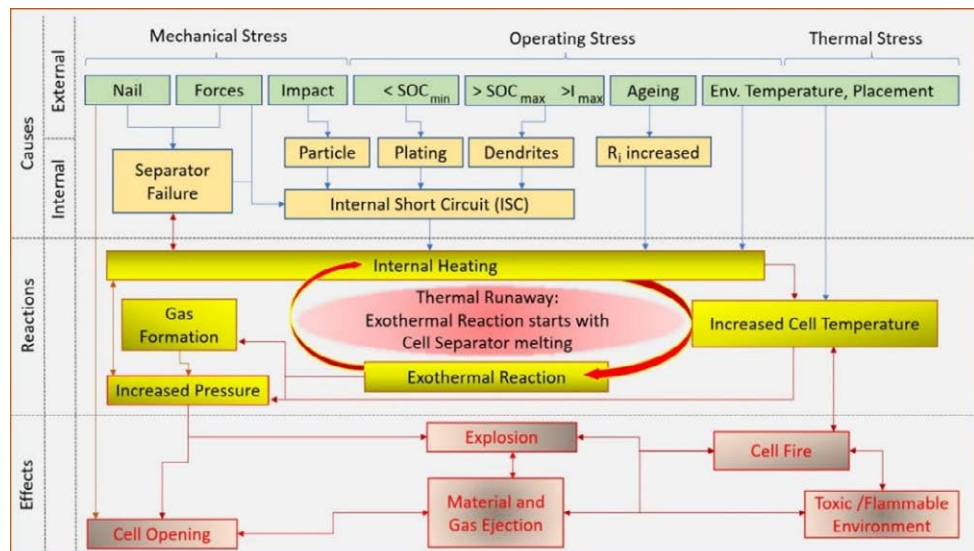
For a long time now BACS has been successfully utilized as a "stopgap" solution in hazardous areas - mostly for cost reasons. There are only a few BMS suppliers on the market with an ATEX certified solution, but their costs are 5-6 times higher than an identical installation with a non-ATEX variant.



However, the safety differences between competing “ATEX certified” BMS modules are technically only slightly better than BACS, so that many customers have ultimately decided to waive the ATEX certificate requirement for BACS, opting instead to allow for its use within these zones at their “own risk” and responsibility.

Though BACS has clearly established a reputation as the most trusted “early warning and de-escalation” system on the market -- able to detect and to some degree automatically prevent dangerous situations before they become critical -- it can never be guaranteed that flammable atmospheres cannot occur due to the emission of H₂ gas from overcharged batteries. The task of BACS is of course to prevent this “outgassing” of hydrogen by way of balancing in order to avoid the generation of an explosive atmosphere in the first place; however, if this should happen anyway through gross operator negligence or extreme environmental conditions, BACS must be able to alarm and disconnect itself from the battery in an emergency to avoid overheating and sparking. This is exactly one of the core competences of BACS - but it does not make it automatically ATEX certified!

Today’s user of batteries is under the impression that batteries are a "fire hazard". In the age of electric cars and metropolitan datacenters, battery fires have become a known and sometimes dramatic risk.



The principle of a thermal runaway: With BACS it is possible to identify the internal causes and interrupt the chain of events before the critical point for a thermal runaway is reached.

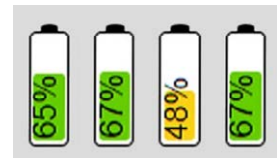
While this negative impression that batteries are a fire hazard has been reinforced by new and sometimes unstable lithium battery technologies, it's often overlooked that the real cause of fires in such battery technologies are the lithium cells themselves, and not any electronics in the local environment.

Lead-acid batteries have a much lower risk of fire as compared to lithium. However, there is a real risk that in the event of an undetected battery or charging problem, many wet cells (whether lead or other chemistries) can begin to emit hydrogen gas, which may then mix with the ambient air to form an explosive atmosphere – in this case the battery cells themselves do not “burn”, like with lithium, but if left untreated they could create an explosive atmosphere to which any other local electrical component might lend a spark...

Of course this is a "fault condition" and should theoretically be prevented by a BMS (eg. by balancing), or at the very least detected and alerted accordingly. Most BMS provide appropriate data measurement for this very issue; H₂ sensors can also be used to detect such H₂ gas leaks early to allow for preemptive action – an (automatic) shutdown of the charging system, or the switching on a ventilation system thru BACS can defuse the hazardous situation in the event of such a warning as provided by the respective BMS.

BACS fuse system as built-in protection against battery fires:

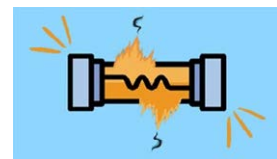
BACS is particularly effective in preventing individual batteries from being "cooked" and releasing hydrogen gas, by means of balancing. In such situations, BACS provides advanced warning and will ultimately disconnect itself from the battery by tripping the built-in fuses and sounding an alarm well before critical amounts of hydrogen gas have accumulated.



BACS has many unique safety features which are not found within competing BMS systems, including but not limited to:

High voltage fuses with automatic tripping and disconnection of the BACS module from the battery in case of a fault.

Overvoltage or polarity change on a defective battery is always dangerous and quickly leads to overheating of the battery itself. First, though, the sensor which is connected to the defective battery will overheat. To prevent this, the BACS module will be automatically disconnected from the battery by active triggering of the supply fuse once such a battery fault is detected. This will result in the disabling of balancing for all other modules in the system, even those that are not currently affected. This results in a "General Alarm" and the user is alerted and can take the necessary corrective actions to prevent further damage.



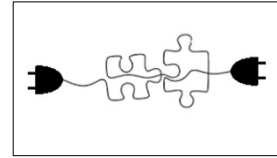
Highest operational safety for the fuses:

Located inside the measuring cable and sealed with adhesive and a protective jacket, the two BACS fuses are installed at considerable distance from the PCB of the BACS module. This prevents arcing in case of a fault or any sparking, once the fuses are triggered.



Highest operational safety for the plug connections:

Stable plug-in connections on the high voltage side (measuring cable to the BACS module) prevent accidental disconnection and any subsequently associated risk of sparking.



Multiple points of Galvanic Isolation:

BACS has a galvanic isolation between the high voltage side (to the battery) and the BACS communication side with low voltage (12 volts), with a corresponding reduction of the risk of sparking.



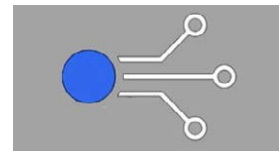
Balancing Monitored:

BACS monitors the safe function of balancing even without a working connection to the BACS WEBMANAGER. In case of a malfunction and overheating e.g. in case of a component failure, the BACS module will automatically switch off the balancing function long before a critical temperature is reached.



External sensors and reactors:

External sensors can be integrated into the broader BACS system, so that a given automatic reaction can be programmed to trigger before an emergency condition occurs. E.g. gas sensors in connection with switching relay logic cards (GX_R_AUX, CON_R_AUX) provide an automatic complete shutdown (emergency stop) of the entire BACS system or all other electrical devices in the affected environment and thus enable voltage isolation and also the extinguishing of a possibly built up ignition potential.



Because of these technical characteristics and built-in safety features, many users in the oil and gas industry have chosen to use BACS in explosion-risk areas, feeling confident and protected even though no certification is available for this purpose.

The high safety standards associated with BACS are not found within all BMS systems: A BMS is sometimes considered a potential trigger for a fire in battery rooms, simply because it only provides "monitoring", i.e. only warns, but cannot counteract. In the event of a problem, the user must listen, process and then ultimately react, otherwise there will inevitably be a chain reaction in which the BMS could ultimately provide the ignition spark that triggers an explosion. It is not for nothing that Battery **Monitoring** Systems without fuses and security failsafes are known in the market as "dangerous" if they are not also carefully and constantly observed. That's why we – and the industry at large! – think that a Battery **Management** System is superior to a Monitoring system since it can avoid critical situation by itself!

Nevertheless: It cannot be excluded that, despite all safety measures, a spark could occur - therefore we have decided to offer an ATEX certified product for both Zone 1 and Zone 2!

For this reason...

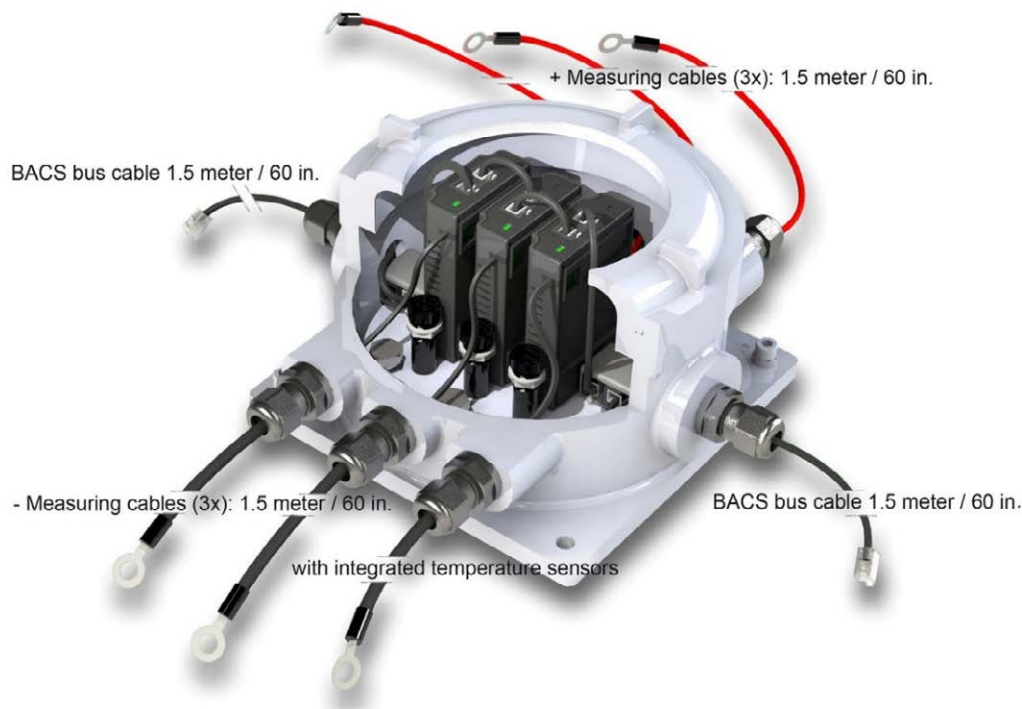
New Product Announcement!

BACS as an ATEX Certified Module for Zone 1 or Zone 2

In using a non ATEX-certified product within areas otherwise classified as hazardous, some customers make practical decisions within their own calculated sense of risk. When it comes to use in the oil and gas industry, products with different ATEX certification are required, sometimes even with no such certification. Which type of ATEX Zones (0, 1, 2 or no ATEX) is required in such cases depends in large part on the hazard frequency and probability inherent to the target environment. In some critical areas it is often sufficient to use products for ATEX Zone 2 because the existence of flammable atmospheres is not *constantly present*. Naturally, considering the material difference between the different ATEX class products, the choice between Zone 1 or Zone 2 or no ATEX is decisive for the cost of the product, itself.

From this coming October 2023 we are proud to offer our BACS Battery Management System as a certified ATEX Zone 2 product; from late Q4 2023 we'll also be adding an ATEX Zone 1 variation to our catalogue!

The "Generation 3" BACS C modules, successfully on the market now since 2010 and having achieved an install base of more than 3 million devices installed, are now approved for ATEX by means of a specially designed ATEX housing and additional electronics including specialized cables and cable glands. This new BACS product is certified as a Group II device and can be used in Zones 1 or 2, or 21 or 22. Flameproof encapsulation according to IEC60079-1 is used for protection, and the device is specified for gas group IIC (typical gas: hydrogen) or for conductive dusts such as metal dust or carbonaceous dust. The module can be assigned to temperature class T5 - up to 100°C.

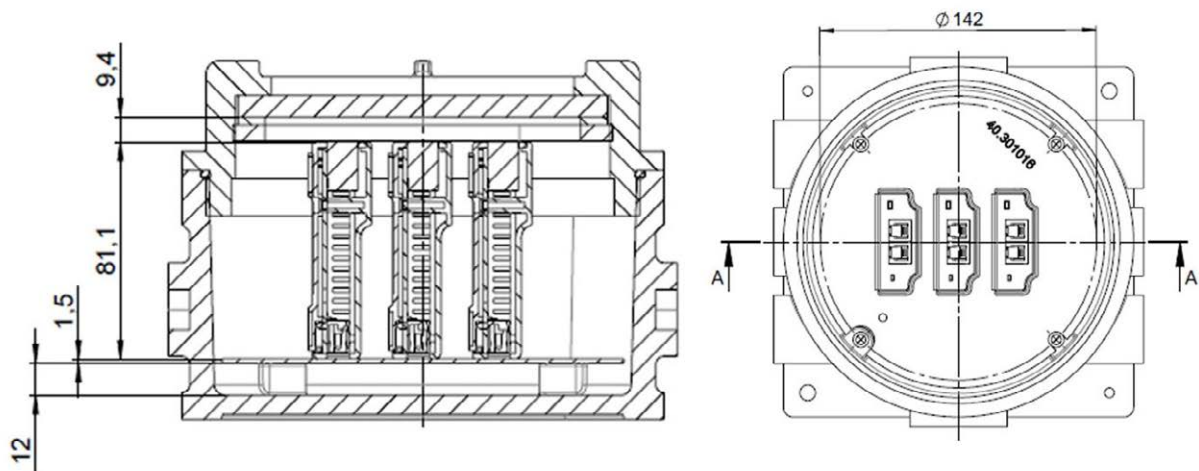


Picture: C20ex3/C30ex3/C40ex3 - Dimensions/Material: Width 190mm * Height 146mm, Weight (incl. 3 Modules) 3400g. Light grey Copper-free Aluminum, Glass Lid for LED check. For ATEX Zone II: Use in regions with temporary contamination with gas or dust and temperatures up to 100°C, according to ATEX Codes: Zone 2: II 3G Ex dc IIC T5 Gb bzw. II 3D Ex tc IIIC T100°C Db Zone 1: II 2G Ex db IIC T5 Gb bzw. II 2D Ex tb IIIC T100°C Db

In this concept up to 3 BACS modules are located within the ATEX housing (standard scope of delivery). The 3 BACS C modules are delivered fixed upon on a base board which is itself anchored within the housing, already interconnected ex works, and all battery measuring cables (each 1.5 m long) are led out through gas-tight glands. On the minus-side measuring cables a temperature sensor is installed within the cable lug, therefore the minus cable is slightly thicker than the plus cable. On the base board there are 6 high voltage fuses; these take the place of those mentioned earlier within this article as regards the standard BACS configuration, otherwise located in the measuring cables. These fuses are mounted vertically on holders and can be easily replaced.

All 3 modules are positioned with their status-indicative LEDs pointing upwards and through the featured "viewing window" so that the operator can view their respective operating statuses or otherwise easily access the addressing switches during configuration/installation. The battery measuring cables are available with M5, M6, M8, M10 or M12 ring terminals. All cables are halogen free and approved for use in EX regions.

The dimensions given in the following drawing are in millimeters. The total height is 146mm. The shape is square, so the width is the same over all sides and is 190mm.



Assembly and Installation:

There are 4 holes pre-cut in the housing base for mounting. The housing has a grounding point M6 to dissipate static charges. This ground wire is not included and will need to be provided by the customer / installation partner.

For commissioning, the housing cover must be opened by the installer. The BACS bus cable to the next Cxxex3 module has to be selected and mounted by the BACS installer. For this purpose, each Cxxex3 module provides 2 pieces of EX approved cable glands (right and left) for the passage of one BACS bus cable each side. The installer leads the BACS bus cable of the desired length through and closes the Cable Gland. Afterwards the addressing of all 3 modules will be done.

As soon as all modules are installed and addressed and the communication with the BACS Webmanager is working properly, all housing covers are closed again and are gas-tight. At this point, the commissioning is finished.

The ATEX version with 3 modules is available under the article names "**C20ex3**" for 12V, "**C30ex3**" for 6V and as "**C40ex3**" for 1.2-2V batteries for any kind of battery chemistry.

The reseller purchase price for authorized BACS dealers is between ~595 Euro/piece for the Zone 2 variation, and 697 Euro/piece for the Zone 1 variation. This results in a cost of around 198 Euro per battery for Zone 2 and 233 Euro per battery for Zone 1; for Zone 2 this is an especially competitive price, and for Zone 1 we find ourselves in a uniquely uncharted market position!

OEM customers receive an additional discount according to their respective contract level, or through use of a long-term Framework Contract.

Retrofittable on Existing Installations!

Due to the plug-and-play design of the new ATEX solution, existing BACS installations can be simply and intuitively “upgraded” into ATEX applicability with little to no aggravation. The ATEX housing and accompanying cables can be provided in a “shell” version – once installed, the existing system modules need simply be “plugged” into the individual ATEX housings and connected accordingly.

In this way, your customer need not sacrifice or throw away their existing BACS investment in order to reach ATEX certification!

The BACS system has thus become even more robust as an ATEX variant and, considering the established installed base (> 3 million modules in the field), it is the most successful and reliable system on the market.

We are taking first orders! From October 2023 we will receive the first deliveries from our production (up to 400 pieces per month). **If ordered today, then you will be supplied from the first batch this year!** Our colleagues from the sales department are waiting for your inquiries at **sales@generex.de (EMEA and South America)** and **sales@generex.us (USMCA - North and Central America)**.



A „World-First“ in Battery Management!

GENEREX BACS is the first manufacturer to supply a battery capacity (P_SoC - Periodic State of Charge) also for UPS and battery systems with "Intermittent Charging"!

BACS has been the key technology for active management of stationary batteries for 19 years. Balancing (or "Equalizing") ensures the stability of lead-acid batteries, NiCd or lithium (LTO/LiFePo) based cells and maintains the "health" of the cells - SOH (State-of-Health) - at the highest level with correct monitoring of the measured values / alarms.



Additionally, the interpretation and accuracy of the measured values of a battery system experience a massive improvement through use of balancing: Balancing keeps all cells/batteries closely within the manufacturer-defined "healthy" voltage window, allowing for a highly precise impedance measurement and thus a comparability of the impedance measured values from one cell to the next, as well as for the system as a whole.

Only with balancing do impedance measurements provide meaningful, comparable results!

This has resulted in BACS verifiably improving both the reliability and longevity of nearly every battery-based UPS concept. Our reference list of BACS users reads like a "Who's Who" of western industry. **BACS is a "Game Changer" in the industry and the 1st choice of data center operators in the western world!**

Since 2021 BACS has provided a percentage-based capacity indication (SoC - State of Charge) for each lead based battery, since 2022 also for NiCd batteries and also for lithium cells, type LTO.

The capacity indication determined by BACS is almost as good as the results of much more complex (and costly!) measuring methods like "current balancing". This is also made possible by the new, much more accurate current sensors of BACS type CSHxxx of the 5th generation. (For more information about our varying Current Sensor models, see our other article about Current Sensors featured within this Newsletter).

The problem with battery capacity:

The great difficulty in determining the "State-of-Health" to detect the unexpected failure of a battery leads to calculation problems of the "State-of-Charge". Suppose there is only one defective battery in a battery string and there is no discharge possibility like in an electric car. In that case, this defective battery will influence the total capacity massively, making every calculation uncertain. Especially with UPS systems there are almost never discharges with which one might check and calibrate the State of Charge; as such, with a UPS all batteries must always be considered as "Full" and as "Healthy", meaning any calculation of a capacity is inherently inaccurate.



Picture: CSHxxxF Generation 5 – for “F” flexible installations. Also available as traditional DIN Rail version and as Ground Fault Sensor

Most UPS users are not aware of this inaccuracy, simply because discharges within UPS systems are too rare. Only in special cases, such as highly critical data centers or military facilities, are determined attempts made to determine the deficient or missing UPS capacity indication by means of regularly scheduled capacity tests. During such tests, the "State of Charge" is also measured and often a massive deviation is found without a clear indication of the cause. **This is exactly where BACS provides the crucial clue:** In the picture on the right you can see a BACS system at the “intermittent charging resting phase” where a battery in the string with less capacity is detected (orange) and the user is given the possibility to get the optimal capacity out of the equipment by replacement! **Without capacity display, this problem would probably have been overlooked.**

But even without a battery exchange, battery systems with BACS will always get "more" out of the batteries than identical battery systems without BACS in regular comparison tests. **But so far this Capacity Increase was only true for UPS systems that operate "Float Charging"!**

String 1 LONG 5/2017						
No.	Volt. [V]	Temp. [°C]	Ri. [mΩ]	Charge [%]	Equalize	Status
1	12.52	23.8	21.25	64%		●
2	12.41	24.4	21.81	65%		●
3	12.46	24.5	20.91	67%		●
4	11.77	24.4	21.94	48%		●
5	12.46	24.0	20.93	67%		●
6	12.44	24.6	21.81	66%		●
7	12.42	24.5	21.72	66%		●
8	12.56	24.5	22.23	70%		●
9	12.43	24.5	22.00	66%		●
10	12.48	24.0	21.34	68%		●
11	12.46	23.8	21.77	62%		●
12	12.55	24.5	21.85	70%		●
13	11.08	24.5	21.63	29%		●
14	12.47	24.5	22.79	67%		●
15	12.51	24.1	21.21	68%		●
16	12.56	24.5	21.43	70%		●
17	12.48	25.0	21.41	67%		●
18	12.44	25.3	21.57	66%		●
19	12.55	24.6	21.67	70%		●
20	12.48	25.1	20.86	68%		●
Σ Voltage 247.51 V						
12.38 [V] Target Voltage						
-4.1 [A] DC Current -1.01 [KW] Real Power						
0 [A] AC Current						

As soon as UPS systems use "Intermittent Charging", even BACS would not be able to determine the battery capacity, since in doing so the UPS automatically creates a condition in which balancing ceases functionality!

Explanation:

When the UPS finishes a given Boost Charge mode and switches to the "resting phase", a 12V battery will drop from 13.60 volts down to its resting voltage, depending on the type of chemistry, from about 12.50-12.80 volts. This does not mean that the battery is "almost empty", it can be almost full **OR** almost empty. Everything in between is possible. **The voltage of the battery has no informational value about the capacity during rest voltage!**

Until now, BACS could not perform balancing when "Intermittent Charging" was active and therefore could not determine the battery capacity.

HOWEVER: New as of firmware 2.14, BACS can now also determine battery capacity of the "P-SoC" in the "special" situation created through Intermittent Charging!

Many UPS manufacturers have been struggling with lead acid problems in their equipment for years. Although the UPS chargers are correctly set to the battery type, over time undercharging occurs due to inherent inter-cell voltage differences and consequent overcharging of individual cells/blocks, a creeping chain reaction that leads to battery failures.

Without BACS there would be no correction for the voltage difference, and as such half of the batteries will eventually be undercharged and the other half will be constantly overcharged. This could lead to the swelling of overcharged batteries. As a result, this causes considerable problems when replacing the batteries.



To avoid this effect, UPS manufacturers have developed several different methods:

■ Some offer lithium based batteries instead of lead batteries:

This is risky, expensive and not recommended for stationary systems. Lithium batteries are certainly smaller and provide more autonomy time than lead batteries of the same relative size, but without a BMS with balancing such batteries are not safe to operate. Thus, not only is the technology considerably more expensive than lead-acid batteries, but in the event of a fault it is also "fire-hazardous" and therefore broadly considered unsuitable for use in stationary UPS systems.

■ Other UPS manufacturers install BACS with balancing:

An ideal solution, but only possible if "space" is available for the installation of the BACS module; otherwise a GENEREX "SMARTBATTERY" might be used.

■ Another "method" of the UPS manufacturers is to slightly lower the ideal charging voltage:

If the battery manufacturer specifies 13.60 volts at 25°C, then some UPS manufacturers supply only 13.45 volts and thus avoid overcharging, but lose capacity and, in the long term, reliability.

■ **A popular method used by UPS manufacturers is "Intermittent Charging":**

The charging voltage is completely switched off for weeks and only switched on again intermittently. This can be found e.g. with EATON models under the name "ABM". In the case of "intermittent charging", the otherwise commonly used trickle charge is switched off after a boost charge, until the UPS recognizes from the string voltage that the self-discharge has reached a limit after a few weeks. Then the charger is switched on again, and after the new strong charge there follows a longer pause in charging.

Use of „Intermittent Charging“ brings up 3 general problems:

1. Due to the long “pause” between the boost charges, it might be the case that individual batteries become **deeply discharged** without notice. This can occur without being picked up by the UPS because other batteries can compensate the voltage loss, especially if many batteries are in one string, as is the case with modern UPSs with high efficiency. If this happens frequently, after 5-6 years at the latest there is a high probability of finding deeply discharged batteries or batteries with too many charge cycles in the string.
2. The UPS can become "unreliable": after a long period of "intermittent charging", some batteries can reach the lower voltage limit and become sulfated. Sulfation within the battery prevents sufficient power from being supplied in the event of a power outage, since the voltage on badly sulfated batteries drops massively for a few seconds under load. If many batteries are affected, they may drop below the UPS shutdown voltage (Battery Low) threshold (about 10 volts) for a short time and the UPS will thus shut down almost immediately after the power failure. At the 2nd "attempt" the UPS works again perfectly because the subsequent charging phase has partially regenerated the batteries – however, the user now justly **no longer trusts their UPS device**.
3. The third problem is that with batteries that are charged by intermittent charging it is not possible to measure and display the battery capacity in any meaningful way. Most UPS users have probably never noticed that UPS systems often do not have a battery capacity indicator. The reason is that especially with this charging method one is unable to tell how "fully" the battery is charged when it is at the rest voltage of about 12.5 volts. The battery might actually be between 40% and 100% state of charge at 12.5 volts, much too **inaccurate for a display of capacity and thus the remaining runtime**.

Even with BACS the capacity could – **until now!** – not be determined satisfactorily with this charging technique. With a battery at rest voltage, too little measurable current flows from the battery and the natural self-discharge is no longer compensated. BACS could not handle this problem and UPS systems with this charging principle had either to be changed to normal "Float Charging" (switch off ABM) or had to do without BACS Balancing and had then only pure battery monitoring - without real added value compared to a system without BACS. **With FW 2.14 BACS has now an extra value again, even on ABM systems.**

A World First!

As of Firmware Version 2.14, BACS can provide a meaningful measurement value for the battery capacity even in "intermittent charging" mode!

The basic principles for this new measuring principle were developed in cooperation with the German Federal Ministry of Economics and Technology (BMWi). This was researched and tested in the "Home BMS" project and applied here for the first time in a product. GENEREX is a participant in this research project "Heim BMS" and the result of our research can now be seen here:



Bundesministerium
für Wirtschaft
und Energie

In the adjacent BACS screenshot you can see three pure lead batteries at 12.84 Volt. The batteries are in the "resting phase" and therefore in an "unknown state of charge" for BACS. There is no float charge voltage flowing and the amount of current drawn due to natural self-discharge is too low to measure.

String 1						
No.	Volt. [V]	Temp. [°C]	Ri. [mΩ]	Charge [%]	Equalize	Status
1	12.85	23.5	30.69	100%		
2	12.85	25.0	24.31	100%		
3	12.83	24.8	34.99	100%		

BACS is missing important parameters for the determination of the state of charge.

One could assume that these 3 batteries are not full at 12.84 Volt. **The new BACS Firmware 2.14 knows better!**

If you move the mouse over the column "Charge [%]", a blue field appears which shows the currently used measuring method.

Mode: Float" appears for "Float Charging". If "Intermittent Charging" was detected, "Mode: Idle" appears here, marked yellow.










This column shows the level of charge for each battery, if temperature and current are within supported limits.
Click on Text to sort.
Mode: Idle

BACS has recognized that "Intermittent Charging" is present and will now determine a 100% capacity despite only 12.84 Volt. With the same batteries under Float Charge Mode, 100% would need at least 13.5 Volts. In both cases BACS determines 100% as state of charge.

BACS correctly determines the full state of charge of 100% for both charge modes, despite massive voltage differences!

It becomes even clearer when the batteries have sunk even further after a few weeks of rest: (See the following BACS screen)

The voltage of the batteries has changed only a little in the 2 weeks charging break (from 12.84 Volt now to under 12.59 Volt). From the voltage one could assume that the batteries are **almost empty** - but BACS still shows a very good state of charge of over 90%.

String 1						
No.	Volt. [V]	Temp. [°C]	Ri. [mΩ]	Charge [%]	Equalize	Status
1	12.59	23.3	31.27			
2	12.59	24.5	24.68			
3	12.58	24.5	35.46			

=> BACS recognizes that with Intermittent Charging the capacity has changed only little even after 2 weeks charging break, and displays this correctly!

With BACS, GENEREX is proud to have the first BMS on the market that can determine the battery capacity "P-SoC" even with "Intermittent Charging"!



GENEREX OCEANIA: Made in Germany, Supported in Australia

GENEREX is proud to announce that beginning in 2023 we are expanding our best-in-the-industry support and sales network into Australia, New Zealand, and the broader Oceania region.



In cooperation with Greg Roszkowski, Technical Director at SNG Power Quality, we are opening GENEREX SYSTEMS (OCEANIA) PTY LTD, to further serve the sales and support requirements of Oceania's critical power supply and infrastructure industries. With a trusted partner located "around the corner" in Rowville, Victoria, we're very excited to offer a hands-on, local approach, which otherwise might be more difficult to manage from our head office on the other side of the planet!

Please feel free to reach out to info@generex.com.au or give us a call at +61 382032570 for more information or a friendly chat.

GENEREX





New BACS BC4 and BC5 measuring cables

You asked, and we heard you!

New flexible BACS measuring cables as special series available

When GENEREX introduced Halogen-Free measuring cables to our BACS Battery Management System in 2020, our goal was to improve the overall safety and environmental standards both of our own product and also the industry at large.

Additionally, it was already becoming clear that for critical energy infrastructure – especially installations within datacenters! – halogen-free would soon become the “norm”. It’s no secret that halogen – though a useful component to industrial material composition in general – carries with it a myriad of potential hazards when exposed to fire or burning conditions, not to mention a dubious reputation for environmental damage by way of its poor recycling profile.



More flexibility: Bending in almost anyway.

We were the first to make this change, **and we remain the only supplier on the market offering halogen-free cables as “standard” and at no additional cost**, and the industry feedback since has been overwhelmingly positive.

While the product quality and functionality continued undiminished, an unfortunate side effect of the switch to halogen-free materials was a noted decrease in flexibility to the cable itself. The “rigid cable” became a minor but noticeable issue for battery engineers and installation partners required to install BACS within tight or otherwise confined spaces. BACS Engineers and installation partners are a clever bunch, and they as such immediately began to find workarounds and quick fixes to this flexibility problem. Still, we at GENEREX began to hear requests and suggestions along the lines of “Hey the product is great and durable, but the new cables are difficult to install in tight spaces!”

Well, we heard you, and we’ve done something about it. **We’ve engineered a revised cable design which re-establishes the “flexible” nature of the pre-2020 measuring cables while still retaining the high safety standard assigned to halogen-free material use.**

The key component of the redesign is a simple one: while the material by and large remains unchanged, we’ve reverted back to the “flat” cable style as previously featured in the “old” cable types – the “flat” nature of the revised cable simply allows for better bending / manipulation as needed for those tighter spaces. The redesigned cables will be available with longer lead times and higher prices; please ask for a quote if such more flexible BC5 and BC4 cables are required.



New Current Sensor - Generation 5

**New current sensors generation 5:
Higher precision - DIN rail mounting AND “flexible” mounting -
with differential current measurement - with 8cm diameter -
for BACS and SENSORMANAGER**

Current sensors are used with the SENSORMANAGER and BACS for the measurement and data acquisition of DC and AC currents. Current values are important for the detection of battery faults, unbalanced strings, UPS or charger faults and for battery capacity measurements.



Improved Measurement Precision:

With Generation 5, our Current Sensors have seen a noted increase in measurement precision as compared to the preceding Generations 3 and 4. With Generation 5, the resolution -- especially in the low range (trickle charge) -- has been improved significantly, and thus also the measurement result of BACS' battery capacity functionality.



3. Generation



4. Generation



5. Generation

From left to right: The current sensors of Generation 3, 4 and 5: While the 3rd Generation sensor (on the far left) still had a “closed” ring through which the cables had to be pulled, Generation 4 (middle picture) introduced the “open” ring concept. With Generation 5 (right picture), the sensor is “flexible” and can be installed on a DIN rail as well as freely in the cable harness if desired.

New Mounting Variants:

In addition, a new mounting variant is added to the program with the 5th Generation. In addition to the still-available DIN rail mounting CSHxxxx, an **"F" flexible mounting variant** has been added to the program:

The CHSxxxF is ideal for a "hanging" position, allowing for free mounting in cramped conditions. Often, power cables are laid in such a way that a DIN rail cannot be mounted. Previously this would mean that the CSHxxxx with DIN rail would hang freely in the air, which is technically no problem, but visually it "leaves something to be desired"...

Sometimes the cables do not fit through the sensor hole when the sensor sits horizontally or vertically on a DIN rail, or if the cables are routed in such a way that there is no space for the DIN housing. This problem can be solved with the CSHxxxxF by hanging the sensor like a current clamp in a more suitable location within the installation.



*Sensor of Generation 5:
This sensor CSHxxx is
mounted on a DIN rail.*



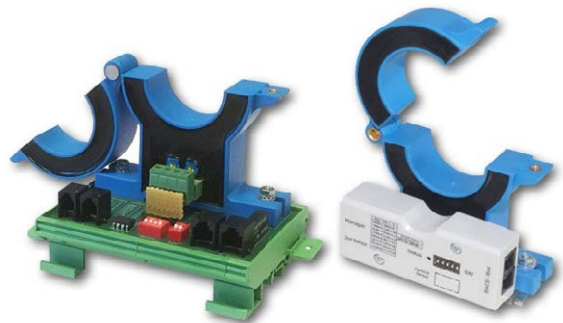
*Sensor of Generation 5:
This CSHxxxxF sensor can do both - mounting via a DIN rail
(optional) or free-hanging.*

Simple Application, New-Install or Retrofit:

A BACS system wouldn't inherently require current sensors if a UPS connection via COM 1 or via network (SNMP RFC 1628) is available. In such cases, the basic detection of a power failure can be carried out and reported by the UPS itself, and not by a given current sensor.

However, if the customer wants to have battery capacity and/or thermal runaway detection, then current sensors will need to be retrofitted for each battery string.

This is possible with all CS sensors featuring "H" in the product name. All CSH sensors are "openable" via hinge; this hinge technology allows the sensors to be retrofitted at any time without system interruption, which naturally makes for a much simpler and straightforward installation as compared to the previous "pull through" method, which required disconnection of any associated cables. However, this hinge method previously came at the expense of accuracy, so we have developed Generation 5, which now measures even more accurately than even the closed sensor of Generation 3.



*Generation 4 und Generation 5 Sensors:
The CSHxxx/F/D sensors are all equipped
with hinged technology and are therefore
very easy to install.*

Larger Transducer Diameter of 8cm:

The CSHxxxxF is also available in a variant with a larger transducer diameter: All variants of the CSxxxx and CSHxxxx current sensors were previously available with a maximum diameter of 40mm. This is sufficient for all common power cables in the EU, but in the USA and Asia, cable diameters even thicker than 4cm can sometimes be found, for example within power plants. Therefore we now offer a special version of the current sensor with 8cm diameter:

The type **CSHxxxxF8** is available as 1000A sensor and cable diameter up to 80mm.



CSH1000F8 with Transducer allowing cables with up to 80mm diameter

For BACS as well as for SENSORMANAGER:

All sensors of the 4th Generation and 5th Generation can be used either for the SENSORMANAGER or for BACS. For BACS the right side with the BACS bus sockets RJ10 is used, for the SENSORMANAGER the left side with RJ12 sockets.

Differential Current Input:

All sensors of the 5th Generation have the possibility to connect the **differential current sensor CSHxxxxD** in order to detect possible leakages between DC input and DC output.

Residual currents ought by all means be avoided in DC equipment as they can be potentially dangerous – these currents move along a non-linear path, and could cause electrocution if touched. The chance of a fatal electric shock depends on numerous factors, but this problem should be recognized and corrected to prevent injury and personal damage.



Generally live parts of electrical appliances are protected with a personal protection / residual current circuit breaker, but this is not the case with UPS systems! Depending on the specific system, there may be no residual current circuit breaker in use, so that a "leakage" can quickly lead to personal injury. The usual "workarounds" by means of an insulated battery pack etc. provide safety, but because of the potential danger of a leakage current this can lead not only to personal injury, but also to property damage - it is paramount to know immediately if and when such a condition exists. Leakage currents are harmful to the batteries and endanger the UPS technology, and can lead to a fire. For this reason, the use of residual current sensors is required in many tenders in the USA and by the US authority NERC.

The new CSHxxxF current sensor can be used with the CSHxxxD for the detection and measurement of differential currents.

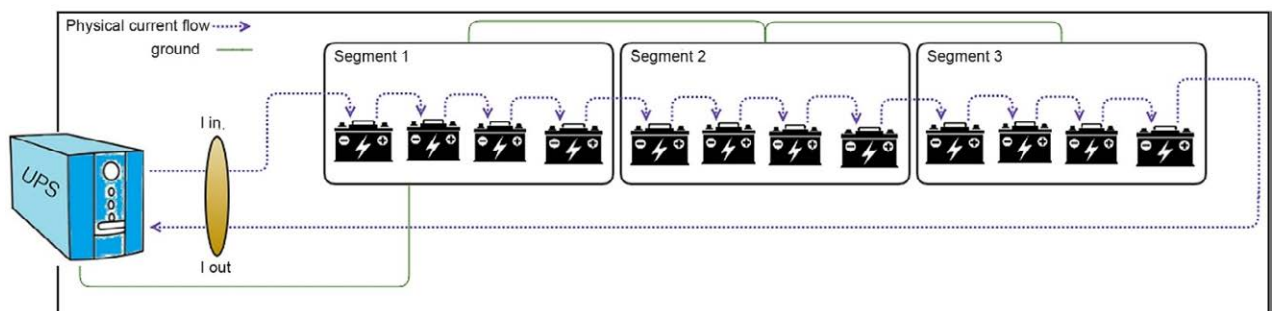
For this, the CSHxxxF is installed in the positive line of the DC bank and the CSHxxxD in the negative line. A communication cable is laid between the two sensors as shown in the picture:

As soon as a difference between input (CSHxxxF) and output (CSHxxxD) is detected, the BACS Webmanager raises an alarm and warns of a potentially life-threatening situation on site.

In addition, the Ground Fault Detection provides valuable information about the quality of the current flow, and indicates that losses occur in a monitored segment, which negatively affect the performance of the overall system and potentially pose a fire hazard.



Picture: CSH1000D (left) with connection cable to a CSH1000F (right)



Simple equation, big effect:

„What goes in must come out“: Both sensors are connected via “daisy chain” and then connected to a BACS WEBMANAGER. The WEBMANAGER can decide immediately on the basis of the available measurement data if there is an occlusion or similar deviations, and trigger an alarm according to its configuration.



BACS Velco-fasteners on PP Battery Housings

Adhesive problems for batteries with polypropylene, flame-retardant plastics

The BACS module housing is made of flame retardant ABS plastic, the same material as the housings of most batteries on the market. The Velcro tape used to position the BACS module therefore uses an adhesive that is "safe" and does not pose any risk to the surface to which it is glued (no solvents that could possibly remove the plasticizer from plastics). The adhesive and Velcro combination that BACS uses as standard is the 3M Type 3550 with "DUAL LOCK"; it's been used for more than 15 years on millions of battery cases worldwide.



The bonding process on ABS battery cases is simple: ensure sure that the battery bonding surface is clean and dry and that there are no remnants of silicones or other "gloss" coatings or acid residues, and if needed, "neutralizers" (e.g. NEUTRALON) can be used to clean the battery surface of acid residues. In the case of silicone, however, it becomes difficult. Since generally speaking a silicone remover ought not be used, only mechanical cleaning (eraser) is possible. With some porous battery case surfaces even this will not help - once contaminated with silicone, only the use of silicone glue can provide a firm hold for the BACS module.

But even if no silicone is found to complicate the bonding process, customers sometimes complain that the glue we use does not hold.

Because we here in Hamburg often do not know if the surface was cleaned during the gluing process or if the glue was not allowed to adequately dry, we have left the troubleshooting of such problems to the technician on site, who has found a solution in all cases.

However, since the introduction of the new halogen-free BACS measuring cables, there have been an increasing number of reports that the adhesive would not hold.

At first we thought that the cable's stiffness (mentioned elsewhere in this Newsletter!) resulted in a condition in which more pressure had been placed on the adhesive, causing it to peel off. But even after we'd made the cable more flexible, we continued to receive complaints about the adhesive strength, and so we investigated further:

It is not the stiffness of the halogen-free measuring cable that causes the modules to detach, but the plastic material used for the battery housings!

The adhesive supplied with the BACS modules is developed for ABS plastics, but also sticks to polypropylene and all other "smooth" surfaces – **the key word being “smooth” because in such cases the natural adhesion force is added to the adhesive force.** For this reason, our ABS Velcro tapes also adhere to the majority of Wetcells that are usually made of PP. Generally speaking Wetcell surfaces are transparent and therefore very smooth, which is sufficient for the ABS adhesive from BACS.

But polypropylene plastics for VRLA batteries often have a "rough" surface. With rough surfaces, less than half of the surface is available for adhesion force, which means that most of the bonding surface is "in the air". This is not enough to hold the BACS module in position, and adhesives so applied will eventually peel off because the air exchange causes the adhesive material to dry out. Even a replacement with new stickers - available as spare part under the article name "BACS_STRIP5" will not solve the problem permanently:

Picture: BACS Velcro Strips for ABS – Standard adhesive coming with every BACS Module



**For this very reason we’ve come up with a new solution:
For polypropylene (PP) battery cases, we now offer
"BACS_STRIP6".**

These Velcro strips are offered as a spare part (Per pack 20 pieces), already cut for BACS modules and compatible with the "Dual Lock" for ABS on the BACS module. The "BACS_STRIP6" battery adhesive side has much more adhesion on polypropylene surfaces. The combination of adhesive and Velcro also comes from the manufacturer 3M and has the article designation 3M3540.

**NEW
BACS_STRIP6 - Self-adhesive strips for BACS modules V3 on Polypropylene plastic battery housing. Velcro side „DUAL LOCK“ is compatible to BACS_STRIP5.**



You will find the new BACS_STRIP6 with 3M3540 in the upcoming Price List 7/2023, available for order now under this article name.

Together with the new more flexible halogen-free measuring cables, the new adhesive of the BACS_STRIP6 3M3540 ensures a secure connection, even with porous PP housings, when used correctly.



Copycats

Newer and more determined counterfeits on the market

How to tell the difference?

BACS is the unofficial standard in Battery Management in Europe and the USA for data centers of all kinds, and is also extensively used by military and a myriad safety-critical organizations (air traffic control, banks, civil infrastructure).



With this in mind, it ought not be surprising to find new BACS copies appearing on the market almost every new year. In truth this state of affairs has traditionally been somewhat flattering for us – the early copy generations were easy to distinguish and sloppily put together – and like the old Germans used to say, "much enemy - much honor". We understood that ours was a good, successful product, since nobody would go through the trouble of trying to copy a bad product's basic physical appearance...



Up until recently, all those copycat devices were really only “passing” visually similar, but miles away from the original in terms of function; to wit, most of them disappeared from the European and American markets after a short time, especially once significant import barriers were erected against Chinese products in the US for the BMS industry.

Now, all that has begun to change: recently we’ve become aware of a new BACS copy out of Asia which very cleverly tries to give the impression that it is in fact the “genuine article”!



In fact, this new copy has done such a careful job attempting to mimic the original that even we could not even differentiate the two at first glance. Especially insidious is that even the module sticker has been counterfeited, both the lettering "GENEREX - Patented" and even the UL certification number – such attention to detail testifies to a determined sense of criminal energy!

In addition, even the module firmware has been partly "reverse engineered", in that the counterfeit modules are able to communicate in a similar, if incomplete way to that of the original. As such, it is seemingly near impossible for an end-user or distracted battery engineer to tell the difference between the two. More concerning is the prospect of such a counterfeit product being successfully installed within a critical infrastructure or datacenter installation, thus "opening the back door" for a concerted Trojan-horse scenario on otherwise "cleared" Western infrastructure...

...However, as long as the original BACS WEBMANAGER from GENEREX is used and the latest firmware is applied, even the use of such a copy is -- at least from a network security point of view -- "safe": The GENEREX device will have been tested by independent organizations regarding network security (UL 2900-1) and will effectively provide a compartmentalization against the unknown risks of such copies in the network, no matter how cleverly they might be disguised.

However, the same cannot be said about the operational safety of the counterfeit modules!

In most countries, this copy would be a case for the public prosecutor. Unfortunately, not in Asia and Germany, where this is not prosecuted as "plagiarism" but "left to the market to sort out".

As a GENEREX Partner, or as an end-user being supplied by an Authorized BACS Reseller, you can rest assured that any and all modules supplied on our behalf will be "the real thing". However, with all of the above in mind, it is always worth "double checking" if and when a competing party offers "BACS" at dramatically different prices, or with questionable conditions. We're always available to lend our expertise! Just drop us a line at sales@generex.de or support@generex.de.



When the catastrophe is pre-programmed, and everyone should know about it ...

First, the good news:

The EU has not only recognized that batteries are subject to extreme wear and tear due to incorrect handling and that they pose serious environmental risk as eventual hazardous waste, but also that numerous accidents might have been avoided over the past years and decades if a stop had been put to the thoughtless and unregulated handling of these energy storage devices. **This is now to change, and the EU is pushing the pace.**



It's something we've covered before: to the article -> [click here](#) <-

To summarize briefly: we can say that the EU has determined in a study that battery consumption in the near future will increase 19-fold, and - who would have thought it - neither the infrastructure for the production of batteries nor for the production and storage of the necessary raw materials of said batteries are really available...and someplace will need to be found for the waste that is created by mass, unregulated use.

The study came to the conclusion that a "battery management system" would make a serious contribution to sustainability...but the knock-on safety implications of such a requirement are perhaps even more telling!

Battery management systems will be mandatory from 2026. Not only because of sustainability, but also to minimize potential hazards:

With the ever-increasing number of batteries in emergency power supplies to make the devices more efficient, the number of accidents related to batteries is also steadily increasing.

1. Fire-Hazardous Lithium

According to the "sanctuaries of green thinking," lithium is very high on the list for battery manufacturers because it promises extremely high energy density. Left unsaid is that lithium batteries operated without active battery management are an explosive matter. Just a few days ago - on March 7, 2023 - an e-bike owner in New York painfully learned that even a mini-lithium battery on a bicycle can lead to catastrophic fires.



Fire Commissioner Laura Kavanagh commented as follows:

“There is extraordinary damage. This entire building behind me is completely destroyed. The roof is caved in. There is nothing left. It’s all because of this one single e-bike.”

Even if the cause is not yet officially declared, the fire that a lithium battery can cause and the explosion damage that can occur are certainly underestimated. In automotive technology, however, there is no way around these high-performance batteries - but here a fire on the vehicle is much less critical than if the fire occurs in one's own house or even data center: With a burning car, you simply get out and walk away - with a burning data center, there is hardly any way to get the source of the fire "outside"...

2. Mindless Use of Batteries

This case from March 10, 2021 shows that a fire in a data center has a completely different "quality": A fire in a Strasbourg data center caused damage worth billions.

For a long time it was unclear as to what led to this disastrous fire, but now the official fire report has been published and shows how little the risk of energy storage systems is known in the industry: **the UPS and at the same time the battery bank were identified as the cause of the fire.**



On the question of how a fault in the batteries could lead to a fire without being detected, the operator stated that he "adheres to the data sheet of the battery manufacturer and assumes an appropriate service life". If you go by this, the Titanic should have sunk after the projected service life of 30 years!

There was no battery monitoring system on the premises, and the fire report logically ends with the recommendation to install a BMS to detect disastrous developments..

This recommendation of the fire experts is in perfect keeping with the demand for implementation made by the EU Directive : **From 2026 the use of battery management systems will be mandatory in the EU!**

This should be one more "wake-up call" for our customers - millions of installations in Europe do not have a BMS, and a frightening segment of operators do not even know how dangerous it can be to ignore this EU directive!



EU Regulation for Batteries

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020

This document describes in abbreviated form the content of this EU regulation with regard to the GENEREX products BACS, SMARTBATTERY and SMARTLOGGER and their use in stationary energy storage systems.

Demand for batteries is forecasted to increase 19-fold in the coming years;

Such exponential demand lends increasing strategic weight to the industrial and stationary battery markets. Significant scientific and technical advances will continue to be made in the field of battery technology, and in order to best shepherd such advances towards a sustainable and positively lasting impact it has proven necessary to create a harmonized regulatory framework for the entire life cycle of batteries placed on the market in the EU.



For this reason, on December 10, 2020, the European Commission published a proposal for the new Battery Regulation with the goal of repealing the Battery Directive 2006/66/EC and amending Regulation 2019/1020.

The whole documentation can be found here, for further reading:-> [EU BMS](#)<-

Particularly of relevance is Article 14, Chapter III, wherein the role of a Battery Management System is outlined. As stated in the legislation documentation, a **'battery management system'** is an electronic component that monitors and controls the electrical and thermal functions of the battery, manages and stores data on the parameters for determining the ageing state and expected lifetime of batteries, and communicates with the device in which the battery is installed. According to the EU Council, a "battery management system" must fulfill or otherwise provide necessary data measurement according a framework of key parameters.

BACS already provides a working, proven system in almost all respects otherwise required by this directive for 2026!

The following list (in short form)

The requirements of the EU = are shown in in **black letters**

The solution provided by BACS = are given in blue letters

Battery Capacity

1. **Remaining Capacity**

BACS: As of 2022 BACS is able to calculate and display individual cell/battery capacity in real-time.

2. **Remaining Battery Efficiency – ("Round Trip Efficiency"):**

BACS VIEWER illustrates and displays the difference between two discharges.

3. **Battery Capacity**

BACS is the only BMS on the market which displays the battery capacity against the AC / DC resistance (and includes Battery Current and Temperature in the Capacity measurements).

4. **Total Capacity Loss**

BACS: Through use of the BACSVIEWER software such a comparison is straightforward and readily accessible.

5. **Remaining Power Capacity and Power Loss**

BACS: Ensures a 100% state of charge for each battery thus providing the prerequisite for comparability of discharge tests. The long term data as provided in tandem with BACSVIEWER allows for a quick and efficient determination of lifespan power loss.

6. **Autonomy time**

BACS provides a calculation of autonomy time based on the relationship between UPS input, battery current, battery voltage and temperature and impedance.

7. **Battery Capacity determination by discharge tests**

BACS measures and indicates the battery capacity once per second during discharge, and such a discharge test can be carried out without the risk of unnoticed damages of cells/batteries

Impedance

1. **Ohmic Resistance and/or Electrochemical Impedance**

With BACS, this is indicated by the "RI" reading; the trend line as indicated in the BACS VIEWER shows the expected lifetime.

2. **Resistance**

BACS: The difficulty is that in given high voltage string applications (UPS), the cells/blocks tend to deviate from the ideal float charge voltage and differences of 2V and more are frequently found within the string. Such a situation makes it impossible to compare the AC/DC resistance measurements under float charge. BACS balances the voltage differences so that all cells/batteries are equal, not differing more than 0.01 Volt from one neighboring cell/battery to the next. This allows for a comparison between the AC/DC resistance values, and makes the use of such measurements useful for diagnostic procedure.

3. Baseline RI

BACS offers freely configurable threshold settings for RI resistance, based on absolute values in mOhms, based on Dynamic values, or based on a given set of “Base Line” values, depending on what best suits the installation.

Temperature

1. Temperature impacts on the battery capacity

BACS' Battery Capacity display is based on this capacity compensation per degree Celsius and adds this factor into its calculations of Battery Capacity.

2. Temperature influence on battery life span

BACS records the battery temperature over the long-term and the average temperature is shown so that the user knows what the life-span for his or her batteries should be.

3. Temperature influence on Battery self-discharge

BACS shows the trend of the battery voltages over time; also measured is the historical Equalization/Balancing activity in %. If balancing is indicated at 0% but the charger is running, this would indicate either that the battery breaker may be open and the self-discharge is draining the battery – OR – the temperature is too high so that the self-discharge is greater than the current from the charger, which has to be altered to compensate the behavior of the temperature increase or aging effect of the batteries.

4. Temperature influence on Battery charge current

At a given constant voltage, the float current passing through a fully charged stationary battery increases progressively with increasing battery temperature.

BACS shows this increasing current and balances this out within the limitations of the system. Typically, this is enough to avoid battery damages because the UPS or charger automatically decreases the charge voltage (and the current) if the external sensor reads higher temperatures.

5. Influence of ripple currents on battery temperature

BACS monitors and indicates AC and DC ripple currents, allowing for corrective action before such an effect causes an increase in battery temperature.

6. Temperature differences due to a poor design of a battery installation can cause battery faults

BACS is able to balance the voltages within the string, whether the voltage differences come from the poor layout or from chemical differences within the batteries. This ensures that performance reduction owing to temperature differences due to poor design in the battery layout is otherwise negated.

7. High temperature differences for a time period > 24h can cause a thermal runaway

BACS: If the charger is setup correctly and BACS can balance the voltage differences due to thermal or electrical differences, the risk of such a thermal runaway under float conditions can be dramatically reduced or avoided entirely.

8. High Temperature

BACS cannot prevent overheating of batteries due to room ventilation issues, but BACS can warn the user about such conditions and, if connected to the appropriate automation interfaces (GX_R_AUX), it can automatically switch on Air conditioning or trigger to open windows, fans, etc. to solve the situation.

9. Real Cooling Demand

BACS: The cooling demand is determined by the difference recorded by BACS; it generally increases with age due to the increased current consumption during trickle charging and thus indicates an increasing risk of thermal runaway.

Battery Current

1. Float current – AC component (super-imposed ripple current)

The ripple current (AC component) is generated by the charger and/or by the load (e.g. inverter) and is super-imposed to the DC float current. This ripple current does not contribute to the battery charge; it only generates additional heat. A high super-imposed ripple current and a DC current near zero will lead to discharge and deterioration of an effected lead-acid battery. It should be noted that the float current at the end of life of a VRLA battery doubles in comparison to a new battery.

BACS: Such an increase of the float current can be visualized with BACS and can trigger an alarm. Alarm levels for DC float currents can be set within the BACS configuration to avoid a malfunction of the battery due to increased water loss, excessive shedding of active material or the promotion of internal short circuits and excessive heat evolution, which in the end may cause thermal run-away.

2. Maximum ripple current

Under float conditions, the super-imposed effective ripple current at frequencies >30 Hz should be limited. Appropriate precautions should be taken in order to avoid dangerous voltages and short-circuits at and through the sensing leads. Fast fuses or current-limiting resistors shall be inserted into each sensing lead.

BACS is the only BMS on the market with 2 high voltage fuses featured within the sensing leads.

Flame retardant/low smoke and fume or acid resistant insulation may under certain circumstances be required for the sensing leads.

BACS utilizes halogenfree cables and fire retardant material for housing and components to avoid damages caused by such dangerous voltages – except the fuses – and can disconnect itself from the system to trigger alarms about the blown fuse and ripple voltage.

3. Load Current Share

BACS shows current values per string and allows to set thresholds if these values get imbalanced; should such an imbalance occur the operator can thus be informed accordingly.

4. Energy Flowthrough

this figure is measured through use of the new BACS Current Sensor Type CSHxxxF and CSHxxxD. The BACS Current Sensor in tandem with the measurement data of the BACSVIEWER is able to display the trend line of the aging battery or cell.

Battery Health and Sustainability

1. Ongoing Development of the Self-Discharge Rate

This can be identified by the otherwise naturally decreasing autonomy time of a given battery or cell. The older the batteries become, the higher the self-discharge rate. To

determine the exact development curve, the trickle charge must be switched off while the given cell or battery is in the fully charged state.

The BACS and SMARTLOGGER / SMARTBATTERY measured values will show the self-discharge rate after a few days. This must be compared with the self-discharge rate in new condition.

2. Date of Battery Manufacturing and Commissioning

this is defined and archived for up to 10 years during commissioning of BACS and SMARTLOGGER and SMARTBATTERY.

3. Data Access

clear unobstructed access to the aforementioned parameters be available for analyzation at any time in order to assess the residual value of the battery, to facilitate battery reuse, repurposing or remanufacturing, or to make the battery available to independent aggregators operating virtual power plants in electricity grids.

BACS, SMARTLOGGER, SMARTBATTERY provides the data in various formats to make it analyzable by recyclers.

4. Long-term Data Recording as applies to Storage and Transport Conditions

The SMARTBATTERY or SMARTLOGGER from GENEREX provides the desired long-term data – from “the cradle to the grave” – thus allowing for precise control of operating and storage conditions for the complete life cycle of a given battery unit.

5. Documentation Availability

Documentation must be provided for indicating the health and functionality of a given battery or cell. The economic operator who wants to perform the recycling must be provided with a document for the evaluation or testing of the aging condition.

SMARTBATTERY, SMARTLOGGER and BACS record and subsequently provide the required information for documentation.

6. Battery Passport

the EU requires that by January 1, 2026, every industrial battery and traction battery placed on the market must have an electronic identification file ("battery passport"). Each battery will have its own battery passport with individual identification and data on the producer, battery type, batch or serial number, date of manufacture, date placed on the market, chemistry. The battery passport is linked to the information on the basic characteristics of each battery type and model, which must be stored in a non-volatile memory and made available online.

BACS, SMARTLOGGER and SMARTBATTERY are already able to provide all the data required for a "battery passport" in a permanent and accessible format.

From 2026, these regulations are mandatory to be applied to all battery management systems.

Even now, in 2023, BACS already fulfills these “future” requirements and is the only system made in Germany / made in USA which qualifies for the strict EU requirements for operation within high security IT systems.



GENEREX Security Report 2023:

We work hard on the safety of our products. Of course, this also includes commissioning external specialists on our own behalf to independently and critically assess our products and review our safety measures.

Recently we contacted the **Electronic Warfare Institute** in

Canada (**EWI**) and asked them to perform a complete security audit based on the firmware 2.12 according to UL 2900 Standard (US Cybersecurity Standard). In addition to the UL 2900-1 standard, the Electronic Warfare Institute also focuses on the potential or ability of malware to be infiltrated into the CS141/BACS. More than 1 million attempts were made within 8 hours with various attack tools with the aim of crashing the web server of the CS141/BACS, or to make the system perform other functions than desired.

They did not succeed! And thus we are one of the few systems that EWI has tested wherein they were unable to find any security vulnerability which can be classified as "High". This goes for all interfaces; especially the operational stability of all hardware interfaces (RS232, RS485) were certified as robust, representing zero points of attack. The final report was surprisingly positive for such penetration tests, **but we nonetheless intend to improve.**

The bottom line:

If you activate a minimum level of security measures when setting up the CS141/BACS, the device can be considered safe based on the current state of technology!

The EMI report in detail describes some weaknesses classified as "Medium" and as "Minor" - we will evaluate these in the following analysis.

The category "Medium" describes vulnerabilities that can be exploited under certain conditions by untrusted persons **if the necessary access authorizations are available.**

First of all: in order to get such an access authorization to the CS141/BACS, the administrator password must be known. It should therefore be one of the minimum measures to assign a password to a new network device that is not broadly known to everyone.

It is exactly this prompt for a default password change that our firmware 2.12 prompts the user to do. If this is ignored, then this cannot be seen as a security vulnerability of the CS141/BACS, but falls into the category of "gross user error". Arbitrarily activating network services without using or monitoring them is also one of the grossly negligent errors of a user, and is certainly not the fault of the CS141/BACS.



With a minimum of common sense, every CS141/BACS is a secure device from initial installation - of course, we could set the hurdles even higher, but this would conflict with the fact that while we as GENEREX are the manufacturer, our customers are not the end users themselves, but a B2B - service provider who often sets up the device on behalf of the end user. Therefore, not all access restrictions can be activated in the delivery state - otherwise you could not install the CS141/BACS as a service provider at all.

System Notifications

Default Password

The default password is in use. You should change this for security reasons.

[Change Password](#)

System Time

Please note that logfile timestamps require valid system time.

[Configure System Time](#)

OK

Clearly visible: The CS141 warns its users about the serious security vulnerability "Default Password in Use". The warning clearly indicates that a default password is currently being used and should be changed.

1. Vulnerability classified as "Medium": The CS141/BACS uses a default password for the first user and there is no requirement to change this immediately on first login.

We asked ourselves this question much earlier, but finally decided that we only want to introduce this requirement to change the password at the first startup at the explicit request of our OEM customers. There are some OEM customers where we require this password change at the first login, but then it must be ensured that this password is not lost. Even we as a manufacturer cannot help to restore the access without losing all user-configured settings in doing so. Our products are sold exclusively through B2B partners, and they offer GENEREX products as part of other services, which often includes basic configuration. If now an elaborate configuration is "lost" because the customer forgot the password, then this is a problem for our partner - he cannot help and the end customer could ask for the setup work again - although he himself is responsible for the damage.

We think that in this phase of initial installation and handover to the end customer the loss of a password could be critical, much more critical and probable than a possible hacker attack at this point. For this reason, we "allow" ourselves this nuisance and continue to ship most devices with a default password, but prompt the user with a penetrating warning to change it.

We therefore do not allow this vulnerability, which is classified as "medium", and refer to our documentation including the Hardware Hardening Guide which makes every CS141/BACS the most secure device on the market.

2. Vulnerability classified as "Medium": Using an older OpenSSH library

This is not a security vulnerability in the sense that this access is not available to the user. The use of this Library is exclusively reserved for the BACS VIEWER.



Why don't we just disable SSH if this is criticized as a security vulnerability?

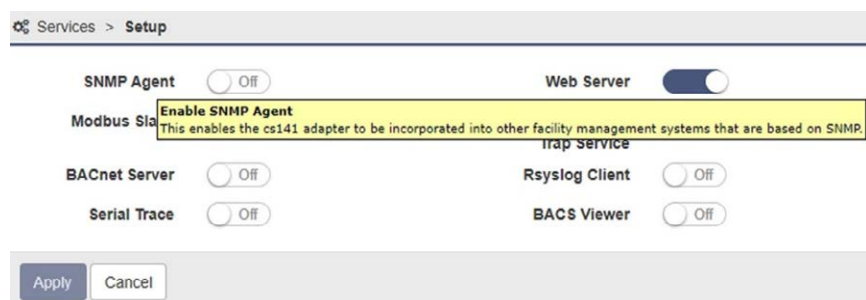
The reason is that SSH is an integral part of the SFTP functionality of the BACS VIEWER that many users want to use to fetch data from the CS141/BACS. Without SSH unfortunately also no SFTP works - therefore SSH must be present - even if there is no access for it.

To prevent an attack, we use a specially adapted and hardened version of OpenSSH, so the known vulnerabilities of OpenSSH are not applicable to the CS141/BACS, at all.

Many penetration software vendors already consider older version numbers as a clear indication of potential security risks, even if, as in our case, it is not at all founded. In this case, too, we consider the classification as a "medium" security risk to be unfounded because it is based solely on the detection of the version number of the OpenSSH library.

In order not to offer a gap to the penetration software anymore, we have set the switch "BACS VIEWER" to OFF in the standard delivery with FW 2.12. This means that no BACS VIEWER can be used. So no BACS VIEWER data can be fetched anymore (unless the user switches the option back ON) - but the penetration software is "calmed down" now.

BACS VIEWER users should set the switch to ON if they want to fetch data, and after that the port can of course be closed again.



3. Vulnerability classified as Medium: SNMP Service V2 with Default Community Strings is used

By default SNMP is disabled, so it does not pose a security risk. Should the user turn on SNMP and decide to use SNMP V2, but not use a different "password" than our default, then this is a conscious decision by the user and should also not be classified as a security vulnerability. Of course using SNMP V3 would be the safer way, but some customers want to use V2 and are aware of the risk and also our documentation points out this risk. Also, with SNMP V2 you can configure higher security and you don't have to switch to SNMP V3 right away; for some users this is enough.

Therefore, we do not accept this security gap, which is classified as "medium", and refer to the possibility of using SNMP V3.

The Security Audit of the Electronic Warfare Institute confirms:

Not only in terms of reliability, but also in the area of operational and cyber security, it's clear: The CS141 / BACS one of the most secure devices currently available on the market!

All security gaps classified as "medium" in the report are almost completely debunkable through proper configuration. If security gaps occur in a network, they are due to the circumstance of the initial setup by service providers or they are unavoidable due to the existing network design.

Customers all over the world trust GENEREX products, and with this security audit we can once again prove that this trust is justified!



Cybersecurity of Vital Importance for Critical Infrastructure!

From one security crisis to the next...

When the 2019 – 2021 Corona pandemic hit, companies worldwide found themselves called upon to flexibly adapt on-the-fly for the implementation of "home office workplaces" within their broader network environments; in those confused days "cybersecurity" was still a relatively new word for many



companies. That all changed pretty quickly – within a very short time it became clear that in order to function securely within the nebulous network environment of the new “home office” frontier, companies would need to overcome the hurdle of cybersecurity – and quickly, at that!

But the pandemic as a trigger for broader consideration of cybersecurity was nothing compared to the next cybersecurity threat that arose on February 24, 2022: with Russia's invasion of Ukraine, the world changed completely in terms of security policy. **A notable uptick in cyberattacks on Western infrastructure and NATO partners occurred in the days following the war's beginning, and as a result, Western organizations both large and small have made secure IT a top priority, applicable to all civilian and military users!**

The continually developing economic conflict between the USA and China puts GENEREX and all other western IT companies in a historically special position: **network products NOT originating from China have become the clear preference for all operators of western critical infrastructure!**

Avoiding Chinese components is a philosophy GENEREX has followed for years. Of course, this decision in favor of Western manufacturing makes our products more expensive than the manufacturers competing with us, who do not hesitate to make “political maneuvers” with their pricing in order to gain access to key, target markets. With these arising threat scenarios the wind has clearly changed - **GENEREX is one of the few remaining manufacturers from the western world producing network products for critical infrastructure in Europe and the USA; it's thus no wonder that we've become the first choice in most data centers!**

Already during the "Chip Crisis 2021-2022" this strategy has paid off in dividends - we were one of the few manufacturers who had no delivery problems in the face of supply loggerheads out of China. Our production was not without interruptions, but these were mostly due to logistical problems and the price poker of the manufacturers – the availability of components from our western distributors was never really endangered, if perhaps temporarily inflated in cost. **The decision to manufacture almost everything ourselves has not only allowed us to survive this crisis but has made us the most important manufacturer for the supply of network equipment for critical infrastructure power supplies in the world!**

That said, we're not interesting resting on our laurels...

It is not enough to produce in Europe and the USA, and it is also not enough to have a certificate for a safety standard, e.g. IEC 62443-4-2 or UL 2900-1 or similar, as our competitors do. Such certificates effectively serve as trumped up production snapshots and may not be worth the paper it is printed on the very next day.

Cybersecurity can only be guaranteed if the latest rising security vulnerabilities are checked and guarded against, daily. If our product is affected - then the newly detected vulnerability must be closed – without negatively affecting the product's functionality!

In Germany, this oversight is provided by the BSI (Federal Ministry for Information Security); other European institutes such as the Spanish INCIBE (Instituto Nacional de Ciberseguridad) also provide vigilant supervision. These organizations track the reports of vulnerabilities in software products (CVE - Common Vulnerabilities and Exposures) and communicate these vulnerabilities in real-time to the varying concerned manufacturers. However, any user of our software can also report a vulnerability to us! For this we communicate between the users and official bodies and publish the vulnerabilities as CVE only when there is already a solution available for the problem – **before** hackers can exploit the vulnerabilities to cause damage. Such early communication between these organizations and us as manufacturer ensures that attackers only have such vulnerabilities in unmaintained systems that can be exploited – **which is why we want to remind every user to install new security updates as soon as possible.** Every firmware update that shows a "Security Update" in red color (visible in the version history / release notes of our products) provides such security updates.

We provide the following email addresses for vulnerability report submissions: security@generex.de for Europe/Global and security@generex.us for North America. We investigate any and all incoming reports and promptly deliver corrected versions as necessary via the download area of the GENEREX websites.

In addition, you can find a "Security"-specific link (<https://www.generex.de/security>) in the footer of our webpage for reporting or otherwise submitting queries related to the cybersecurity or robustness of our products. The link includes the above mentioned email address, as well as a GPG Key for necessary encryption.

Only recently we have delivered a security update version 2.12 for the UPS network devices "CS141" and for "BACS". This is a very extensive update and requires some changes, so we want to explain these novelties here and advise you as GENEREX partner to update your customers to this version (or following) urgently.

Firmware 2.12 Security Enhancements

With firmware update 2.12, as always, numerous updates and innovations have been introduced, but especially in the area of cybersecurity there have been numerous optimizations made. The following is a list of the most important changes regarding cybersecurity:

1. **Non-essential system services have been pre-disabled**

Originally, the CS141 was preset so that it could be put into operation as quickly as possible with little "additional" effort on behalf of the installer. We've now had to change that: in the future, only the services that are absolutely necessary for basic operation will run as pre-set. More advanced services will have to be activated by the user via the



configuration interface, if required. This concerns Modbus, SNMP, BACnet, Syslog, Serial Trace. These changes to the standard setting are only valid for new devices and devices that are reset to the delivery status with a firmware update. For existing devices that already use these services, this will remain unchanged.

2. **Cybersecurity Warnings / Notifications**

The CS141 has received a new info area in its web interface – located on the left of the screen, below the logo – and will automatically provide notice in the future, for example, when the system is found to be using insecure or default passwords or other security-sensitive settings.



3. **Downgrade-Lock as of Firmware 2.12**

With Firmware 2.12 many security relevant changes have been made. Therefore we have decided to integrate a blocker with the Firmware 2.12 which prohibits a downgrade to "unsafe" firmware versions.



4. **TLS 1.3 becomes Standard**

One fundamental innovation is that, going forward, the CS141 will serve the specifications and guidelines of modern infrastructures with TLS 1.3. As long as TLS 1.2 is still used in networks, the CS141 remains compatible, but TLS 1.1 is switched off with the new firmware and can no longer be switched on.



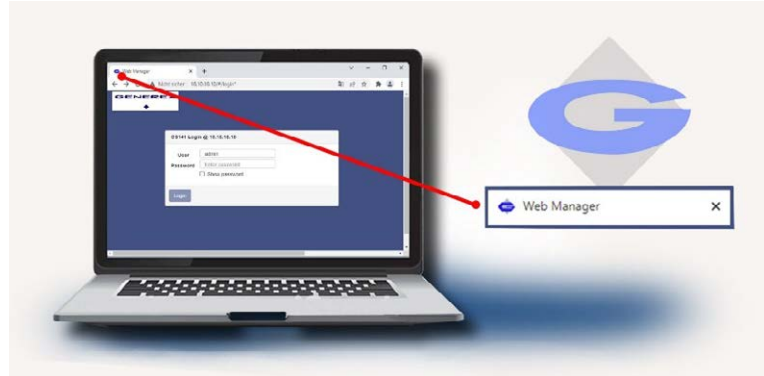
5. **Hardening Guide:**

UPS systems or battery systems are rarely to be found in publicly accessible networks – mostly they make up a part of a "technology" network with restricted access from the outside. However, if it is necessary to install the critical infrastructure of a UPS and battery system in a public or otherwise vulnerable network, then it may be necessary to enact additional security measures not otherwise included within our standard protocol. For such situations we provide a description in the manual under "Hardening Guide" on how to configure the CS141 & BACS so that a hacker attack is almost impossible. For customers who want to make sure that their device is as secure as possible, we recommend to have a look into the CS141 user manual where the "Hardening Guide" chapter describes it.



Advanced Service for OEM Partners Favicons and [OEM Name] Webmanagers

We're always on the lookout for new and innovative ways to improve the user experience for our OEM Partners and their valued customers.



Effective as of Firmware version 2.12, our OEM partners will see their own logo and “[OEM Name] Webmanager” atop any applicable web interface tabs.



In the example above, we've used our “neutral” GENEREX logo and “GENEREX Webmanager”.

Most of our OEM Partners will have already noticed this change having taken place; for those of you to whom our “neutral” logo and Webmanager name still apply, please contact Mrs. Martina Kohlstruck – m.kohlstruck@generex.de – to provide an up-to-date favicon of your choosing.

As always, we remain appreciative of your choosing GENEREX as OEM Partner and provider of the industry's most trusted Critical Power Management products and services!



SMARTBATTERY – iBACS – SMARTLOGGER

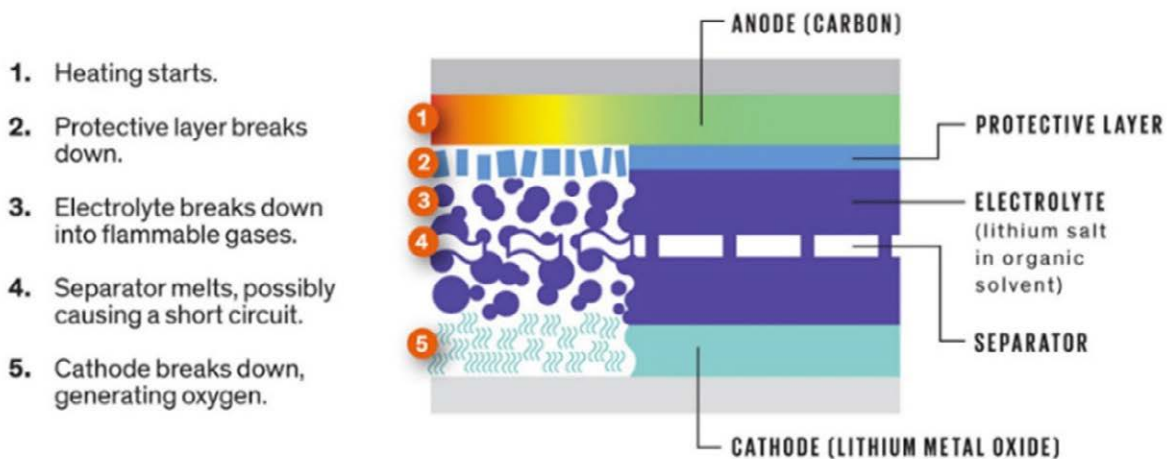
There are new requirements coming for the battery industry and battery service technicians – but there are new opportunities, too!

“Basic” as they are, batteries have proven to be among the most critical devices in modern IT systems. Numerous optimizations within battery chemistry now allow for higher and higher energy densities, but such rapid advances often take place according to the inherent limitations of modern technology.



The following applies to batteries: the higher the energy density per battery, the lower the permissible tolerances with respect to status fluctuations during operation!

Malfunctions always have consequences, but depending on the battery chemistry used, these consequences might be more or less severe. Acid/lead-based batteries, which can produce hydrogen during charge/discharge cycles, are still comparatively "harmless" in the event of a fault compared to modern battery chemistries such as lithium.



In lithium batteries, it is not the gas that is the problem when electrolyte is lost, but the internal thermal reaction in the case of short circuits. The relatively low temperature above which thermal runaway can no longer be stopped within lithium cells is critical: studies show that the thermal runaway temperature for common battery materials (lithium cobalt oxide cathode and lithium hexafluorophosphate anode) already starts at 67°C (152 °F). Such temperatures are reached quickly; even in normal operation without faults this can happen. With lead-based batteries, where BACS and SMARTLOGGER are mainly used, this is much less critical, but even with such chemistries care should nonetheless be taken to ensure that any applicable production, storage and transport conditions are met before a battery is shipped to the customer. This “cradle to grave” style of monitoring is in fact required by EU regulation from 2026 - **SMARTLOGGER** and **SMARTBATTERY** offer a solution for these new requirements for the battery industry.

New Requirements for the Battery Industry

The SMARTLOGGER is in fact a part of the broader SMARTBATTERY concept, and is factory installed any battery sporting the SMARTBATTERY solution. GENEREX licenses this patented technology for battery manufacturers and battery importers – it is available for all lead and lithium based batteries and complies with the new EU regulations scheduled to come into effect in 2026.

(Hint: For more information, have a look at our article “EU Regulation for Batteries “ from this year’s Newsletter)

Indeed, the SMARTBATTERY technology is already activated within the first hours of production within the factory, and recorded data is written into a specially protected “tamper free”, un-erasable memory. Thus, the vital functions (voltage, temperature) of a battery are already recorded during the production process, making the entire production, delivery process, storage and transport conditions transparent, before and after-sale.

This data, and all subsequently recorded data, remain available for the entire service life of the battery. The use of the SMARTBATTERY enables the battery manufacturer to issue increased operating guarantees and fail-safes because quality and operational condition is constantly monitored and documented. A SMARTBATTERY is **demonstrably better** than any other battery without such technology - and therefore also of a higher quality and safety standard!

Since the SMARTBATTERY by design cannot be reset or tampered with, the measurement data is an incorruptible witness to the use and treatment of the battery and is therefore invaluable in terms of warranty disputes.

Vital battery data recording every hour for 10 year

- NFC technology provides wireless data transmission and is compatible with any Android smartphone or NFC reader.
- Integrated high voltage fuses when using iBACS / iBACS PRO

Open Source interface

- Flexible battery data usage with 3rd party BMS systems.
- Native interface for the Battery Management Systems iBACS / iBACS

- M5 threaded screws and copper connectors for optimized power transmission and better thermal stability during discharge (optional also as FASTON 6.3mm)



SMARTBATTERY APP

- Graphical display of the measured values evaluate battery State of Health (SOH) on the fly.
- Display of measured battery capacity in AH based on recorded discharge cycles.
- Available free for Android in languages : German, English and Chinese



Insulated housing

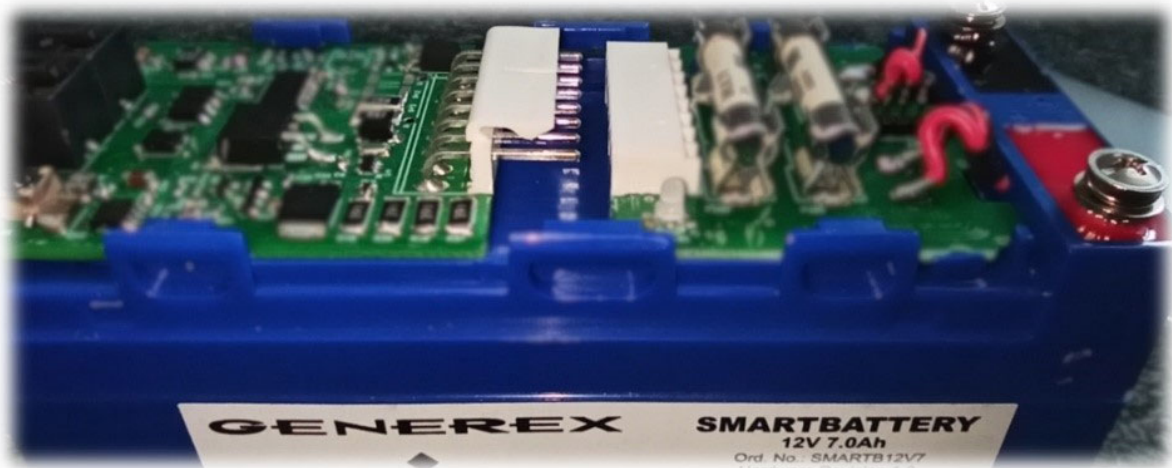
Integrated slot for the optional Battery Management System iBACS / iBACS PRO

- Up to 50% longer life span in all high voltage applications (more than 40 batteries per strand) and warranty that matches design life.
- Up to 20% more capacity for high voltage applications
- Galvanic isolation to maximize immunity against interferences
- Fast data bus for optimal data transmission

The SMARTBATTERY is compatible with any currently available battery chemistry and provides the manufacturer with otherwise missing insight about production, storage and transport. Seamless proof can be provided that a battery could not have suffered hidden damage due to improper handling during production, transport or storage, and for 10 years each battery records further mistreatment if and when it occurs. In addition, because each battery contains a unique and tamper-proof serial number, battery suppliers can collect supply chain information to prove compliance with EU and national safety regulations during transportation, installation, and recycling. At the end of its use life, the stored data can be used to prove that the battery was disposed of properly.

=> The EU directive for the battery industry valid 2026 is already fulfilled today, with the SMARTBATTERY!

Optionally, a SMARTBATTERY provides an additional slot for expansion cards to integrate e.g. an "iBACS" system ("Integrated BACS") or other similar such BMS solutions from 3rd party suppliers.



Picture: SMARTBATTERY (in blue) with SMARTLOGGER integrated, high voltage fuses and interface to the "iBACS" - BACS module for optional insertion into the SMARTBATTERY.

If the interface of the SMARTBATTERY is equipped with "iBACS", the data collection and archiving continues in parallel, but additionally serves the "iBACS" module with data. This redundant data collection and archiving is unique and makes SMARTBATTERY/BACS the most flexible system on the market at the lowest operational cost. GENEREX offers the patented SMARTLOGGER technology to all BMS vendors to allow battery manufacturers to use not only GENEREX products for their SMARTBATTERY models.

The new requirements for the battery industry also result in new opportunities for the battery service technician!

New Frontiers for the Battery Service Technician

With the SMARTBATTERY and SMARTLOGGER, GENEREX has introduced a flexible and modular battery monitoring solution that allows technicians to track and check the real-time battery condition on site during installation.



Picture: SMARTLOGGER with FASTON 6.3mm (also available with Ringcables in different sizes and length) and SMARTLOGGER with Crococlamps for Battery Service Engineers

The SMARTBATTERY and SMARTLOGGER allow the technician to directly measure the capacity of batteries without complex measurement setups. Any battery equipped with SMARTBATTERY technology can be read via the SMARTBATTERY Companion APP using NFC within 1-2 seconds.

The iBACS/SMARTBATTERY/SMARTLOGGER APP immediately provides all important information about a given battery's operating and health status. For this, the batteries to be monitored must either already be "SMART", i.e. already have the SMARTBATTERY technology installed - or be retrofitted with a SMARTLOGGER.

Difference to SMARTBATTERY:

The SMARTLOGGER is identical in function to the SMARTBATTERY, but the SMARTLOGGER is an external module intended for retrofit AND/OR for the battery service technician as a "tool" for battery testing.

Exceptions:

- The SMARTLOGGER lacks any sort of „slot“ for upgrade/expansion through use of the iBACS card.
- Unlike the SMARTBATTERY, the SMARTLOGGER can be "reset" by the technician, so it is not "married" to the battery for life, but can be used on another battery at any time. This makes the SMARTLOGGER a "tool" and is ideal for battery capacity tests or for temporary monitoring of installations. For this type of application, we offer the SMARTLOGGER with "crocodile clips" and with ring terminals, depending on how long the SMARTLOGGER is to be connected to the battery.

This way, a service technician can measure and document battery systems on site with less effort. After all data has been "collected", the SMARTLOGGER can then be reset to a „fresh“ state via APP command, and thus be made ready for use at the next customer.

The SMARTBATTERY Companion APP Version 2.0 is also new....

SMARTBATTERY Companion App 2.0

New Functions for the SMARTBATTERY iBACS and SMARTLOGGER

New features, more power, more convenience and more customer needs met: The new iBACS SMARTBATTERY and SMARTLOGGER Companion APP version 2.0 is here! Available for free on GOOGLE PLAYSTORE!

Gesundheitszustand

Die Farbe der Batterie gibt Ihnen sofort einen Überblick, ob die Batterie weitere Aufmerksamkeit benötigt oder wie gewünscht funktioniert.

LOG und KAPTEST

Detailinformationen über die im Übersichtsfeld angezeigte Batterie sowie weiterführende Funktionen und Optionen.

Verlauf	Status	Seriennr.	Datum / Zeit
✓	L007-0000000175	2022-09-16 14:44:36	
⚠	L007-0000000501	2022-09-16 14:44:11	
✖	L007-0000000402	2022-09-16 14:44:09	

Übersichtsfeld

Die Übersicht zeigt die letzte gescannte oder die von Ihnen aus der Verlaufsliste ausgewählte Batterie:

- Gruppe
- Seriennummer
- Version des Loggers
- Produktionsdatum
- Initialisierungsdatum
- Aktuelle Spannung
- Aktuelle Temperatur

Verlauf und Status

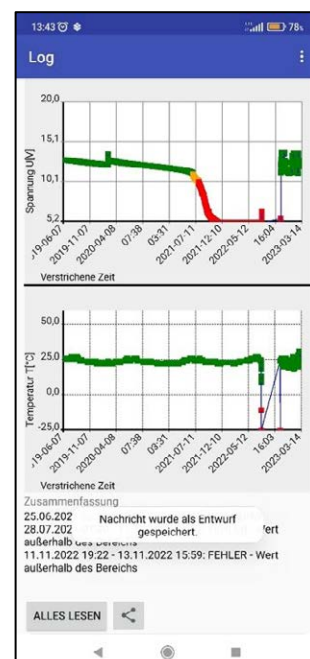
Enthält die Liste aller bisher gescannten Module mit einer Kurzreferenz zum Gesundheitszustand der Batterie.

Reliable data, measured whenever!

As the SMART technology functions as a component of the battery itself, the SMARTLOGGER continuously stores operating data from the respective battery and, if required, immediately provides all the necessary data to make a statement or decision about the need for action. The storage capacity is at least 10 years.

Real-time battery data and records are transferred directly to any Android phone or NFC reader via the SMARTBATTERY Companion App and an NFC interface.

The SMARTBATTERY technology offers significant cost advantages over a traditional BMS, with the limitation that the data must be collected by the technician via NFC and are not available on the network without using the interface.



Capacity Test

With the capacity test, one can calculate the expected capacity which might be extracted during a discharge.

Functionality of the Capacity Test:

Simply connect the SMARTLOGGER to the battery and click "START" on capacity test within the APP. The SMARTLOGGER or SMARTBATTERY increases the recording frequency and the discharge can begin. If necessary, the limits for the capacity test can be configured individually.

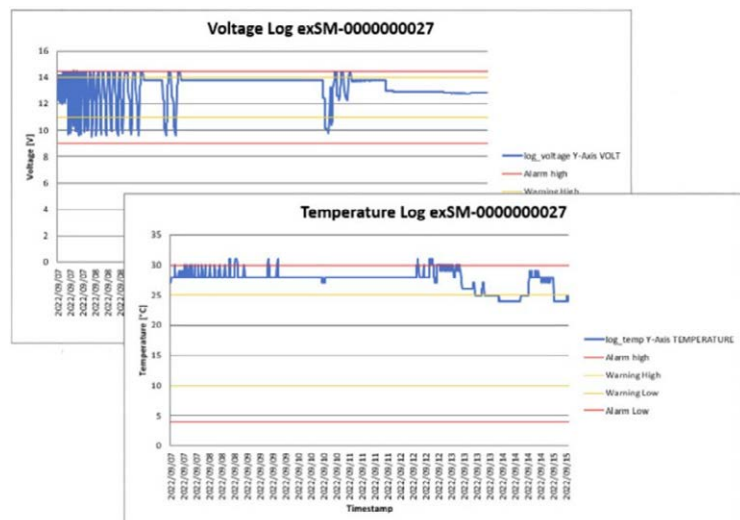
Since the app already comes with complete graphical offline monitoring, values of particular concern can be evaluated directly on site if required.

For further analysis, the battery data can be exported and sent via standard technologies such as mail or messaging services.



Battery data can be easily exported for use in Status Reports, etc

The data format of the APP can be exported by means of **SMARTBATTERY Exporter** - a freely available Windows program from the GENEREX website ([SMARTBATTERY | Generex](https://www.generex.com/SMARTBATTERY)) - into an EXCEL format file; the file will automatically display a graphical representation of the recorded data upon exportation to EXCEL – you can find an example in the image to the right. The voltage and temperature curve with set limit values is displayed in the EXCEL graphic, easily recognizable are deep discharges or other limit value violations and can be used in a report.



Black Box - With SMARTBATTERY, you record the path of a battery ex works "from the cradle to the grave" and meet the new EU directives for 2026 in the traceability of problematic materials.

What else have we improved with SMARTBATTERY Companion APP 2.0?

1. Name Change to "SMARTBATTERY Companion": the name of the APP has been changed - now you can find the APP in the GOOGLE Playstore under the search terms "iBACS", "SMARTBATTERY", "SMARTLOGGER".
2. BATTERY GROUPS: The function "ADD GROUP" creates a distinct battery group for each given customer in which all measurement results can be collected via drag'n'drop within the battery overview interface. This allows the Android phone to manage even larger battery systems for different customers.
3. "LOG" Function is able to process very large data packets >200k/>10 years.
4. A new Windows tool called the SMARTBATTERY EXPORTER – available for free via GENEREX website – converts all data to a Microsoft EXCEL compatible format and automatically generates graphs that can be used directly in a service report.
5. LOGRATE setting - depending on the application, the LOGRATE can now be set individually, e.g. to set a faster data measurement or a slower interval to extend the capacity of the LOGFILE to more than 10 years.



Customize your SMARTLOGGER

The word on our SMARTLOGGER “offline” BMS has been spreading since its launch back in 2020 – and we’ve constantly been working in the background to improve and fine-tune the product, even as its business prospects continue to improve!



One way in which we’re expanding the SMARTLOGGER’s marketability is by offering the customization of the module branding, itself, as an optional feature. Just like with our acclaimed BACS Battery Management System module-based branding – wherein a Reseller or OEM Partner can affix their logo via sticker onto the module itself – we’re now pleased to offer this service for the SMARTLOGGER!



For a quote, or to find out more about why the SMARTLOGGER has quickly become the Battery Engineer’s “most useful friend”, give our Sales Department a call at +49-(0)40-2269291 or send us an email at sales@generex.de



RCCMD - the World's most successful Shutdown Software Cybersecurity Improvements

Remote Console Command (RCCMD®) is one of the most popular shutdown solutions in the world - hardly any system manages the balancing act between user-friendliness, flexibility, functionality, security and reliability in networks like RCCMD can.



Most shutdown concepts are either :

- Very cumbersome - OR –
- Superfluously reveal details about a network through unnecessary communication.
- Inflexible - only a few operating systems are supported
- Use an extensive and often expensive licensing model

With RCCMD, GENEREX delivers a software concept that avoids all 3 of these common “shutdown concept” disadvantages.

The lean and resource-saving software architecture of RCCMD runs on almost any operating system, even including ancient operating systems or long discontinued processors like AS400, SUN, etc. What's more, the handling is remarkably straightforward: for beginners RCCMD provides an intuitive user interface, and for system integrators and experts it acts as a toolbox to manage e.g. virtualized server landscapes with different hardware and software architectures. Also unique is the licensing model, with which individual RCCMD clients can be quickly and unbureaucratically aligned to new tasks; it also allows for seamless sales “further down the pipeline” for our OEM and Reselling Partners. For larger installations with frequent server changes, there is also an RCCMD Corporate license, with which a key may be used up to a defined number of installations.

Since 2022, System Safety has become a top priority in our continued development of the RCCMD Software

RCCMD is typically installed within a separate building network, so increased network security has not been an issue until now. However, applications such as RCCMD are now also being used as “gaps” for cyber attacks, so we’ve found ourselves called into pro-action in order to prevent our own RCCMD from being used as such, as well!

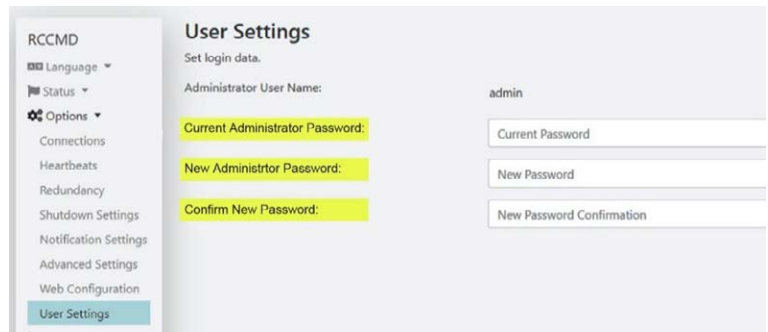
The new strategy hackers use isn’t necessarily to attack the usually well-protected servers, but to concentrate more on the server-related assistance systems to circumvent the weaker protection suspected there. RCCMD is designed to work without a constant UPS connection and is therefore difficult to find in the network because there is no constant traffic that can be overheard. However, the knowledge about RCCMD could also have “reached” hackers and GENEREX is aware of the special responsibility towards the users and must now increase the security standard.



RCCMD Security Measure, in detail:

1. In addition to the security configuration settings that have been built-in for years -- such as password-authorized channel listing in the network -- the architecture of RCCMD itself serves as the first hurdle that a given attacker will need to overcome. RCCMD is a connectionless client, which means that every RCCMD client installed in the network is constantly listening for incoming messages. This means that 99.99% of the time there is no "message" on the network upon which the attacker can eavesdrop, because such a message is only sent when there is a power outage and the UPS devices start sending messages. The authorization list in the RCCMD configuration is an additional hurdle, since only certain computers are allowed to send a message at all; all other attempts are rejected. These security measures have been sufficient for the last 20 years, but a new sort of threat landscape has arisen and companies are now scanning ALL software products for vulnerabilities, whether they are actually used or not - any outdated libraries will be justly targeted by such security software, regardless of whether they are realistic for use during an attack or not. That's why we "upgraded" RCCMD.
2. With the latest RCCMD version in the GENEREX or OEM download area, we are now introducing a major "security" update. This updates the all software modules and encrypts all communication.

3. RCCMD has always featured password protection, but the default install password was displayed in clear text as a convenience to the user if they couldn't find it in the documentation. In this way, even inexperienced RCCMD users



were able to carry out the initial configuration quickly. This helpful inclusion has now been deactivated; in the future RCCMD will no longer reveal anything about the initial installation password and will also display a message if the user does not replace this initial installation password with one with special cryptic rules.

4. But also on the sender side - i.e. with the CS141, BACS (and all other SNMP cards licensed by GENEREX manufacturers) changes are necessary to protect RCCMD from attacks. With the CS141 and BACS, e.g. the RCCMD



services have been switched off by default upon initial installation. Users who previously simply installed RCCMD clients would then automatically receive a message from the CS141/BACS if there were problems with the power supply. Now, though, a few more mouse clicks have to be made to activate this again: In the CS141 / BACS menu, the "UNMS & RCCMD Trap Service" must now be switched on to restore this functionality.

RCCMD itself is thus largely secure, but of course, we will automatically provide further security updates as soon as new threats become known.

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were able to carry out the initial configuration quickly. This helpful inclusion has now been deactivated; in the future RCCMD will no longer reveal anything about the initial installation password and will also display a message if the user does not replace this initial installation password with one with special cryptic rules.

4. But also on the sender side - i.e. with the CS141, BACS (and all other SNMP cards licensed by GENEREX manufacturers) changes are necessary to protect RCCMD from attacks. With the CS141 and BACS, e.g. the RCCMD



services have been switched off by default upon initial installation. Users who previously simply installed RCCMD clients would then automatically receive a message from the CS141/BACS if there were problems with the power supply. Now, though, a few more mouse clicks have to be made to activate this again: In the CS141 / BACS menu, the "UNMS & RCCMD Trap Service" must now be switched on to restore this functionality.

RCCMD itself is thus largely secure, but of course, we will automatically provide further security updates as soon as new threats become known.