Invitation to Tender for a Battery Management System with individual accumulator voltage balancing function
“EQUALISATION”
Patent no.: DE102004013351A1

The above mentioned patented battery management system is distributed under the registered brand name (trademark in Europe, USA, China) “BACS” – Battery, Analysis and Care System – and fulfills, accordant the above mentioned patent number, the following functions:

In difference to the competition the BACS system distinguishes.

- Simple installation via bus capable sensor modules onto every accumulator within a battery system
- Detection of voltage, internal resistance (depending on sensortype) and temperature of every accumulator within a battery system
- High-precision internal resistance measuring (depending on the building class of the module) and trending for the detection of corrosion, drying-out and other failures
- Patented auto-adaptive control of the charge distribution to each accumulator to provide the ideal utilization of the battery capacity up to 18% and increase of the lifespan of up to 30% compared to common battery packs in UPS devices
- BACS possesses the certification for the USA (UL) and Canada (CSA) and the FCC class B. (ATEX classification in progress)
- Longtime and remote monitoring and trending via graphical evaluation of up to 330 accumulators in up to 10 parallel strings
- BACS possesses a security switching at accumulator failures, with special measuring cables (double fusible cut-out), which disconnects the module automatically, if a failure occurs, to avoid a battery fire
- Optional switching of a battery breaker to avoid thermal runaways and adaption to environmental temperatures, preassembled power cables and bus communication cables making the installation of the BACS modules simple
- Extremely resistant against UPS radiation, measuring of the internal resistance at any time, also if the charger is not disconnected
- Simple configuration of the thresholds and operating parameters via web-interface
- Detailed diagnosis via web-interface of the BACS Control unit “BACS WEBMANAGER” and its internal data logger
- Storage of all battery data on non volatile RAM for up to 3 years
- Graphical display of all operating performance data of the battery system for the analysis and accurate diagnosis of battery via PC
- Alert communication of alarms via network or modem using email, SMS, SNMP, MODBUS, RCCMD protocol, optical via LED and acoustical alarm (buzzer) and relay contact
- Connectivity of additional electric current sensors for the monitoring of the string current
● Connectivity and at the same time monitoring of UPS and other non-
GENEREX devices with serial interface (all-in-one UPS SNMP Manager and
BMS system in one device)
● Optional connectivity for further sensors (temperature, humidity, hydrogen gas
sensor, electrolyte fill level sensor, other sensors)
● Optional evaluation unit with graphical display

Detail description of the most important functions:

● **Active individual battery manager**
The BACS system uses an „auto-adaptive“ control process to provide individual
charging and discharging voltage of every accumulator within the battery system.
The BACS Webmanager (control unit) collects the voltages of every single
accumulator via the communication bus and sets a target voltage level for every
accumulator. The BACS modules will now cooperate to equalise the voltage of all
accumulators to reach this final target level at the same time, not leaving any
accumulator behind or allow that accumulators drift beyond tolerates voltage
thresholds. That means if an accumulator with higher impedance tries to hoist the
voltage at the ongoing charging current, the BACS module activates a bypass and
through this, redirects the charging current from this accumulator to others which may
require extra charge. Thus the voltage of this accumulator remains constant around
this set point and will follow as soon as the central unit alters this set point. Through
this optimized charging of each accumulator via the BACS „Equalisation“ process, full
charge level of every accumulator in the battery string is archived, which results in a
up to 18% high battery capacity compared with non-Equalised systems. Furthermore
it avoids, that single accumulators will be overcharged (avoids gassing or dry out) or
undercharged. Due to the above mentioned “care” charging of the accumulator, a
dramatic higher service life and reliability is possible. Since the „auto-adaptive“
control may hide weak batteries by Equalisation the voltage levels, but the parallel
measured impedance trending indicates that this accumulator is damaged and
should be replaced as soon as possible. The charging difference until a replacement
is possible, will be fully balanced through the BACS „Equalisation“ process.

● **Active monitoring**
The system is measuring all modules constantly and logs its data into the internal
flash ROM. Trending of impedance, voltage and temperature is watched and if
module reports a value which is no longer within the defined thresholds, the flexible
configurable event manager may start counter actions or send out warnings.
Through this constant measuring and monitoring process the user receives early
warnings and has time to take preventive action before it is too late.

● **Analysis, alarm forwarding and storage of the data**
All data and information of the accumulator modules will be stored and controlled
through the central processing unit (BACS Webmanager). The BACS Webmanager
can manage and control up to 256 accumulator modules. The accumulator modules
can be split into 10 parallel strings. The current state of the accumulators and the
UPS (if the UPS is serial connected) are displayed via web-browser and optical and
acoustically through an LED and a buzzer and on the dry contact alarm output.
The BACS WEBMANAGER provides a web interface and several other interfaces to
remote accessing the stored data and to send out alarm message (network message,
modem, email, SMS, SNMP, MODBUS and as option PROFIBUS and LONBUS).
• **Installation**

BACS is a plug-and-play system, easy to install, with automatic addressing and default thresholds for most accumulator types. It provides optical isolated bus system and several fuses and protections against high impedance batteries, wrong setup or other damages at the battery or the installation itself.

For technical details about the BACS system please refer to the latest datasheet available as download from [www.generex.de](http://www.generex.de).