

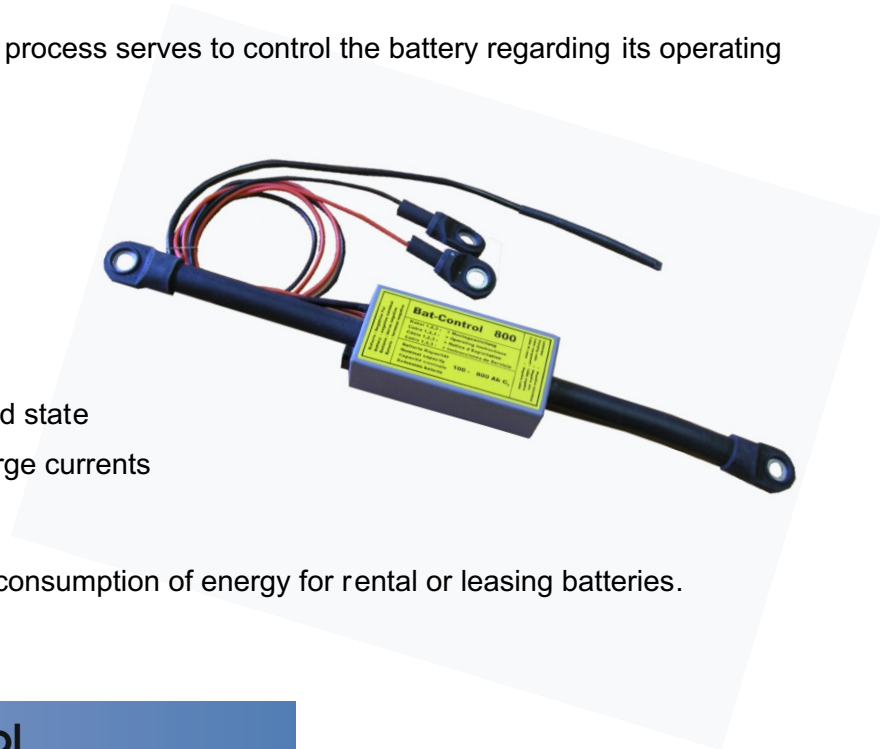
# Bat-Control

## Battery control system „Bat-Control“

The battery control system „**Bat-Control**“ is supervising the charging and discharging processes of the battery, its operating conditions and is storing the parameters gained during this procedure. This data can later be selected and read-out at any time.

The data received during the supervision process serves to control the battery regarding its operating conditions as for example:

- Charge state
- Discharge depth
- Battery temperature
- Deep discharges
- Number of cycles
- Long holding times in a discharged state
- Overstressing by elevated discharge currents
- Mean voltage deviations



The above data is used for invoicing the consumption of energy for rental or leasing batteries.

### Advantages of Bat-Control

- Integrated invoicing of energy for rental or leasing batteries
- Storage of 1200 complete data records
- Battery voltage range 24 – 96 V
- Comprehensive software for evaluation and invoicing of consumed Ah and kWh, charged Ah, charging factor, max. battery temperature, average battery temperature
- 3 types of Bat-Control for 100-400 Ah, 410-800 Ah and 810-1600 Ah
- Display and calculation of stress factors such as excess temperature, increased charging current, total discharge, half-voltage failure, holding time in a discharged state
- Recording of energy consumption
- Automatic invoicing

# Bat-Control

## Supervision of the battery

In this appliance, Bat-Control has the function of a monitoring system. The complete battery-relevant data is being determined and stored.

When a battery failure occurs, the relevant data can be read out and evaluated in order to detect the cause of the failure and to solve the problem.

**During each discharge cycle, the following data is being stored:**

- The average discharge current
- The average and max. battery temperature
- The discharge depth
- The charging factor
- Potentially arising stress factors such as excess temperature, increased charging current, deep discharge, half-voltage failure, holding time in a discharged state

The screenshot shows the 'data set' window with a 'single discharge cycle' summary. It includes fields for date of storage (19.07.06), cycle (1), active time (3.01 hours), and various capacity and energy metrics. The 'taken capacity' is 160.55 Ah, and the 'taken energy' is 3430.39 Wh. The 'loaded current' is 20.094 Ah, and the 'charge factor' is 1.18. The window also shows a 'stress factor' section with fields for middle temp (29.9 °C), max temp (33.2 °C), middle discharge current (95.0 A), and discharge depth (33.87 %).

It is possible to store 1200 complete data records. Once available storage space is full, the oldest data will be deleted accordingly, each time new data is being entered.

## Integrated invoicing for rental batteries

**The following data is being stored cumulatively:**

- Number of cycles
- Operating hours
- Total sum of consumed Ah and kWh
- Total sum of charged Ah
- Cumulated charging factor

With Bat-Control you have a complete and verifiable survey of the operating conditions of the battery.

The cumulated data can be selected in order to analyse the failure cause.

The screenshot shows the 'create bill' window with a detailed invoice for a battery account. It includes fields for company (Test), name of customer (Mr. Test), street of customer (Pfladstr. 1), zip (123456), city (London), battery account from (20.07.06), customer no. (125), account no. (1), battery ID (123456), battery type (6 PzS 240), nominal capacity C5 (480 Ah), and serial no. (894408). The invoice table shows a comparison of 'read out new' and 'read out old' data for various metrics, including discharge [kWh] without stress factor, discharge [kWh] with stress factor 'overttemperature', discharge [kWh] with stress factor 'middle discharge current', discharge [kWh] with stress factor 'total discharge', discharge [kWh] with stress factor 'half voltage error', and discharge [kWh] with stress factor 'service life (partly) discharge'. The total sum [kWh] is 22666. The accounting price is 1108.80 Euro, and the VAT rate is 16%. The invoice amount is 222.49 Euro.