# BATTMASTER®

## *Advanced Wireless Battery Monitoring System*

## Datasheet

# 1 General description

BATTMASTER® is a wireless battery monitoring system that measures and logs the voltage, internal resistance, temperature and current of lead acid batteries (2, 6 or 12 V nominal voltage) as individual blocks or within a battery string. It can operate as a standalone system or in conjunction with a PC/LAN. The modular architecture of the system has the benefit to be easily customizable to log other parameters on request (i.e. pressure, humidity, etc.).

BATTMASTER® is composed of 4 components:

| | |
|---|---|
| **CU (Central Unit)**: collects and stores the DAM and IDAM data, manages the communication with the PC and sends SMS/E-Mail notifications. | <br>**Figure 1: CU** |
| **DAM (Data Acquisition Module)**: measures the voltage, temperature and internal resistance of the battery and stores the most significant data until the next reading by the CU. All data are time stamped. | <br>**Figure 2: DAM** |
| **IDAM (Current Acquisition Module)**: measures the current of a battery or a string of batteries, in conjunction with a Hall effect current clamp (factory provided). It stores the most significant data until the next reading by the CU. All data are time stamped. | <br>**Figure 3: IDAM** |
| **BATTMASTER® Application Software**: Used to configure and monitor the system using an USB or Ethernet connection. It consists of a user friendly GUI (Graphical User Interface), a database (DB) and a communication module. | <br>**Figure 4: Application screen** |
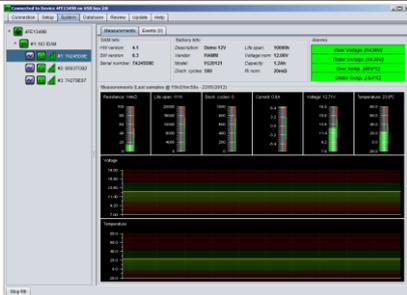
A typical system is composed by one **CU**, one **IDAM** for each string of batteries and one **DAM** for each battery. A simple system composed of one single string of batteries is shown below. Each **CU** supports up to **1024 (50 for lite version) DAMs** and **64 IDAMs**.

| | CU | | IDAM | | DAM |
|---|---|---|---|---|---|
| | Battery | | PC | | Mobile phone |
| | RF link | | USB | | 10/100Mb Ethernet |
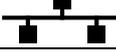
**Table 1: Symbols legend**
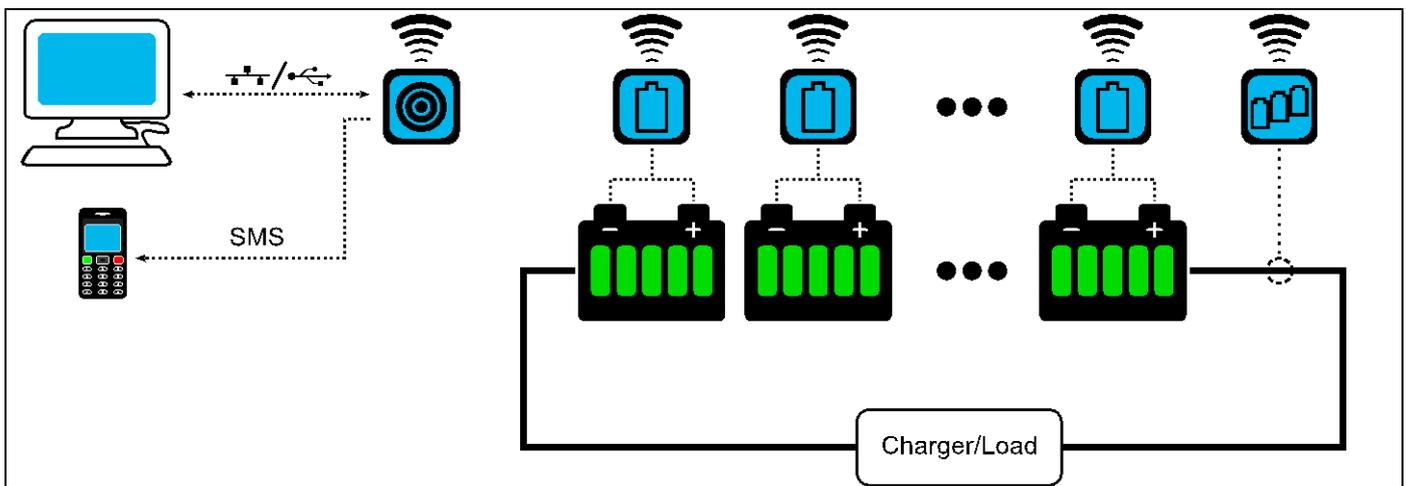


**Figure 5: Typical configuration**

# 2  Features and benefits

- Increased safety and reliability for critical application
- Reduction of maintenance costs
- Increased battery lifespan
- Commodity (ease) of installation and operation
- Possible integration with other systems
- Ethernet and Modbus/TCP connectivity allows remote monitoring
- Automatic SMS and E-Mail notifications
- Customizable for other parameters logging (i.e. pressure, humidity,…)

# 3 Functional description

Each **DAM** measures the voltage and temperature of the battery with a sampling rate of 10 ms. All significant data (minimum, maximum, average voltage and temperature, last Ri measured value, discharge cycles and out of limit voltage, temperature alarms) are stored in the DAM memory and transmitted to the **CU** when required.

The **IDAM** (optional) measures the current of the battery (or string of batteries) and the discharge cycles.

The **CU** downloads every **DAM's** stored data with a user settable *Acquisition Interval (AI)* on a *µSD card*. After downloading the data, the **DAMs** memory is erased and a new set of data is built for the following request.

The Acquisition Interval represents the time between 2 scans of the **DAMs** modules by the **CU**. The minimum recommended value for *AI* is 1h, because the batteries are slowly changing systems and there is no need of overloading the database with repetitive information. The minimum *AI* value is limited automatically by the system in proportion with the number of batteries. The system guarantees that no significant data will be lost, independently of the *AI* value.

*Ri Sampling Interval* represents the time between 2 *Ri* measures. *Ri* measures starts only if the specific battery is not in an alarm status.

The user can configure the system to automatically send *E-Mail* and *SMS notification* in case of an alarm or event. Up to **2 E-Mail addresses** and **3 cell phones numbers** for SMS can be configured.

By using the ʙᴀᴛᴛᴍᴀꜱᴛᴇʀ® software it is possible to view the actual system status/measures as well as retrieve the data collected on the *µSD card* for further analysis.

Modbus/TCP communication allows integration with other systems.

Various zoom/pan operations and user settable graphical parameters are possible.

Exporting the data in various graphical or spreadsheet formats is possible.
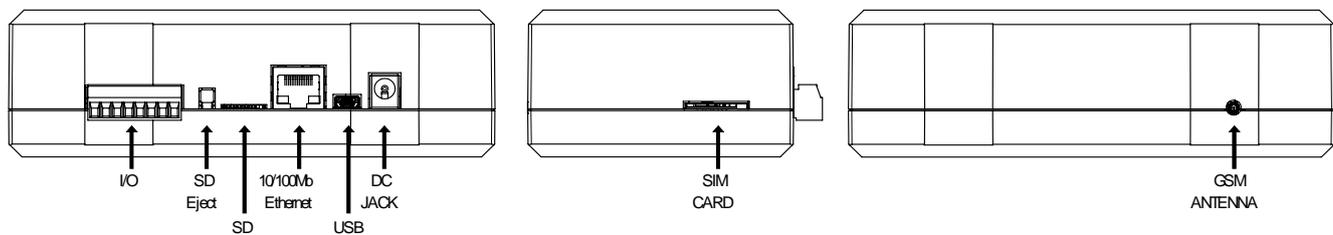


**Figure 6: CU connectors**

# 4 Dimensions
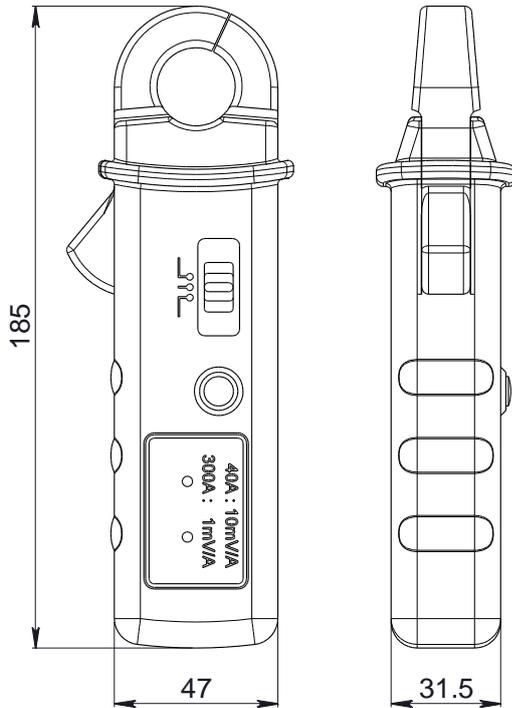


**Figure 7: 300A current clamp**
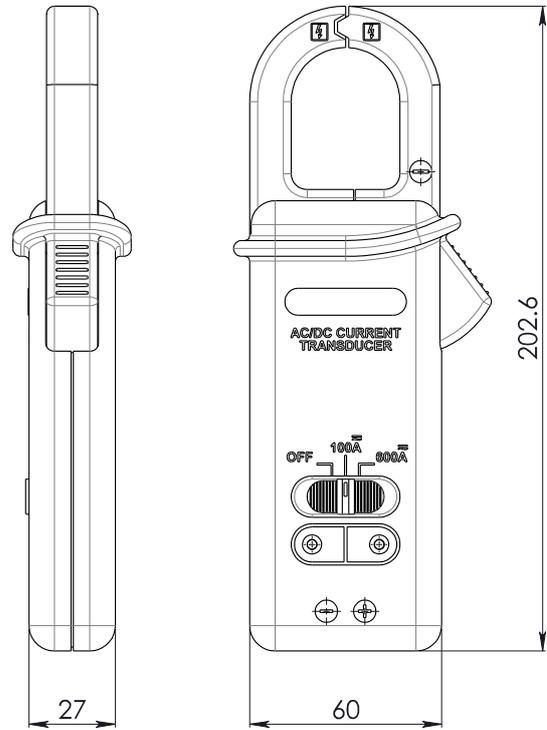


**Figure 8: 600A current clamp**
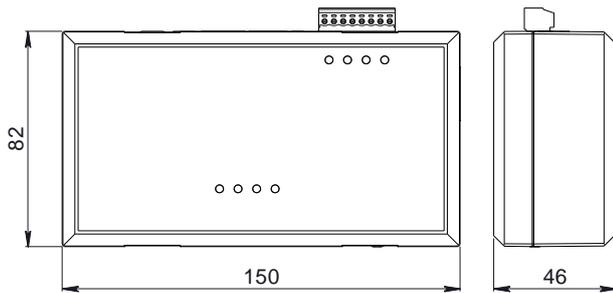


**Figure 9: CU enclosure**
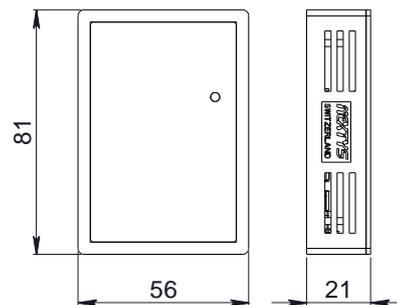


**Figure 10: DAM – IDAM enclosure**

# 5 General Characteristics

| CU | |
|---|---|
| **Supply input voltage range** | 4.5…5.5VDC by external power supply or by USB |
| **Current consumption** | 0.5A max. |
| **Weight** | 250g |
| **Plug-in AC adapter** | - Input: 100..240Vac / 300mA, 50..60Hz<br>- Output: 5Vdc / 1A |
| **Backup power** | 2X AAA NiMh rechargeable batteries (about 1.5h of backup) |
| **Digital inputs** | - 2 x opto isolated, 5…30VDC, 10mA<br>- Input 1: when active Real Time Logging enables<br>- Input 2: available for future use |
| **Digital outputs** | - 2 x relays, 30VDC 3A max<br>- Output 1: is closed if no alarm is ongoing, open otherwise<br>- Output 2: available for future expansion |
| **Data storage** | FAT32 custom formatted microSD card, up to 4GB (> 2 years for 1000 batteries at refresh rate 0.5h) |

| **Max. number of devices** | Full version | 64 IDAM, 1024 DAM |
|---|---|---|
| | Lite version | 64 IDAM, 50 DAM |

| **Connectivity** | **Ethernet** | - 10/100Mb<br>- Used for remote configuration and monitoring<br>- HTTP server and SMTP client |
|---|---|---|
| | **Modbus/TCP** | - Remote Monitoring<br>- Real Time Logging enable |
| | **USB2** | - Full speed 12Mbit/s<br>- Used for remote configuration and monitoring |
| | **GSM** | - Quad-Band 850/900/1800/1900MHz<br>- SMS alarms |
| | **RF** | - 868.00-868.60MHz, Max EIRP 4mW, 3 channels user settable<br>- Up to 100 meters outdoor, up to 30 meters indoor |

| DAM | | L type (2V batteries) | H type (6/12V batteries) |
|---|---|---|---|
| **Battery voltage range** | | 1.5…5.5VDC | 5…18VDC |
| **Current consumption (typical)** | | 80mA @ 2V<br>(Sleep mode: 9mA) | 30mA @ 12V<br>(Sleep mode: 4mA) |
| **Weight** | | 40g | |
| **RF** | | - 868.00-868.60MHz, Max EIRP 4mW, 3 channels user settable<br>- Up to 100 meters outdoor, up to 30 meters indoor | |
| **Battery Measures** | **Voltage** | 1.5…5.5VDC, ±1.5% | 5…18V, ±1.5% |
| | **Ri** | 1…300mΩ, ±10% or ±1mΩ | |
| | **Temperature** | - 20…80°C, ±2°C | |
| **Protections** | | -Reverse polarity (active)<br>-Overvoltage (passive) | |
| **Battery connection** | | Blade connector (Faston), ring or alligator clip; others possible on demand | |

| IDAM | Type 1 (300A) | Type 2 (600A) |
|---|---|---|
| Supply input range | 9…18VDC(from external power supply or battery) | |
| Current consumption (typical) | 50mA @ 12V<br>(Sleep mode: 15mA) | |
| Plug-in AC adapter | - Input: 100..240Vac / 500mA, 50..60Hz<br>- Output: 12Vdc / 1.67A | |
| RF | - 868.00-868.60MHz, Max EIRP 4mW, 3 channels user settable<br>- Up to 100 meters outdoor, up to 30 meters indoor | |
| Current Range | *40A range:*<br>0…40A, ±(1.5% + 0.4A)<br><br>*300A range:*<br>0…200A, ±(1.5% + 2A)<br>200…300A, ±(2.4% +3A) | *100A range:*<br>0…100A, ±(3% + 3A)<br><br>*600A range:*<br>0…400A, ±(3% + 4A)<br>400…600A, ±(4% +4A) |
| Weight | - IDAM module: 40g<br>- Current clamp: 200g | - IDAM module: 40g<br>- Current clamp: 250g |
| Protections | - Reverse polarity (active)<br>- Overvoltage (passive) | |

**Table 2: Devices characteristics**

**Note**: Referred values are typical. In order to improve the product specifications may change without prior notice.