***BACS_CSHXXXXD current sensor***

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***General safety precautions***

Improper use of the products described in this manual may result in personal injury and/or property damage. GENEREX is not liable for any injury or damage resulting from improper handling of these products. If used incorrectly, there may be a risk of explosions, fire and short circuits. Caution! Battery terminals are always live. Therefore, we never place metal objects or tools on the batteries. Electrolyte solutions in batteries are highly corrosive. In case of electrolyte leaking from a battery, be aware that these liquids are harmful to eyes and skin. Installation, maintenance and repair of batteries and battery equipment may only be carried out by trained personnel/service providers authorized by the battery manufacturer.

Observe the following regulations (IEEE standards only USA):

- ZVEI publication “Information on the safe handling of electrolytes for lead-acid batteries.”
- ZVEI publication “Safety data sheet for battery acid (diluted sulphury acid)”.
- VDE 0510 Part 2: 2001-12, based on EN 50272-2:2001: “Safety requirements for batteries and battery systems – Part 2: Stationary batteries”.
- IEEE Standard 450-2002: “Recommended Practices for Maintenance, Testing and
- Replacement of open lead batteries for stationary applications."
- IEEE Standard 1375-1998: “Guide for the Protection of Stationary Battery Systems

***Please also observe the following safety rules:***

1. Make sure that all electrical loads and power supplies/chargers (including isolators, fuses and switches) are turned off. This must be done by qualified personnel.
2. Remove all the watches, rings, necklaces, jewelry and other metal objects before working with batteries.
3. Use only insulated tools.
4. Wear insulation rubber gloves and rubber shoes.
5. Never place tools or metal parts on the batteries.
6. Make sure the battery or batteries are not accidentally grounded. (The consequences of accidental or incorrect connection can be mitigated and reduced by removing the ground connection.) If the system is grounded, disconnect it. Accidentally touching a grounded battery can result in severe electric shock.
7. Before making the connections, pay attention to the polarity. (It is better to have one too many sometimes as one too few.)
8. Filled lead batteries contain highly explosive gas (hydrogen-air mixture). Never smoking, handling open flames or creating sparks near the batteries. Always avoid electrostatic discharge: wear cotton clothing and ground yourself if necessary.
9. Wear appropriate protective clothing and equipment.

***cleaning and decontamination instructions***

To ensure the longevity and proper functioning of your device, please follow these cleaning and decontamination guidelines:

1. Turn off and unplug the device: To avoid the risk of electric shock or damage, always turn off and unplug the device from the electrical outlet or power source before cleaning or decontaminating.

2. Use approved cleaning agents:

   - To clean the device surface, use only soft, lint-free cloths or microfiber cloths.
   - For general cleaning, use dry cloth. Avoid using alcohol, ammonia or solvents, which may damage the surface.
   - If necessary, use a manufacturer-recommended electronics-safe solution to decontaminate the device. Make sure the solution is applied to the cloth and not directly to the device.

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***warning and safety instructions***

| | | |
|---|---|---|
| | INSTALLATION BY QUALIFIED PROFESSIONALS! | BACS® installation may only be carried out by qualified personnel. BACS® is installed on batteries where high voltages can cause injury or even death if handled incorrectly! The BACS® connection cables (temperature cable, bus cable, measuring cable) may be live! To avoid short circuits, do not touch, replace or cut BACS® cables before disconnecting the charger from the batteries! |
| | MAINTENANCE ONLY BY GENEREX PROFESSIONAL STAFF | The BACS® current sensor can only be serviced by the manufacturer. Do not open the BACS® current sensor. Do not attach any objects to the battery or the BACS® current sensor other than the connection cables! |
| | OPERATION ACCORDING TO ENSURE MANUFACTURER INFORMATION! | If the device is used in a manner not specified by the manufacturer, the protective function of the device may be impaired. |
| | ENVIRONMENTAL CONDITIONS OBSERVE! | Indoor use: The device is intended for indoor use where it is not directly exposed to outdoor weather conditions such as rain, snow or extreme temperatures. |

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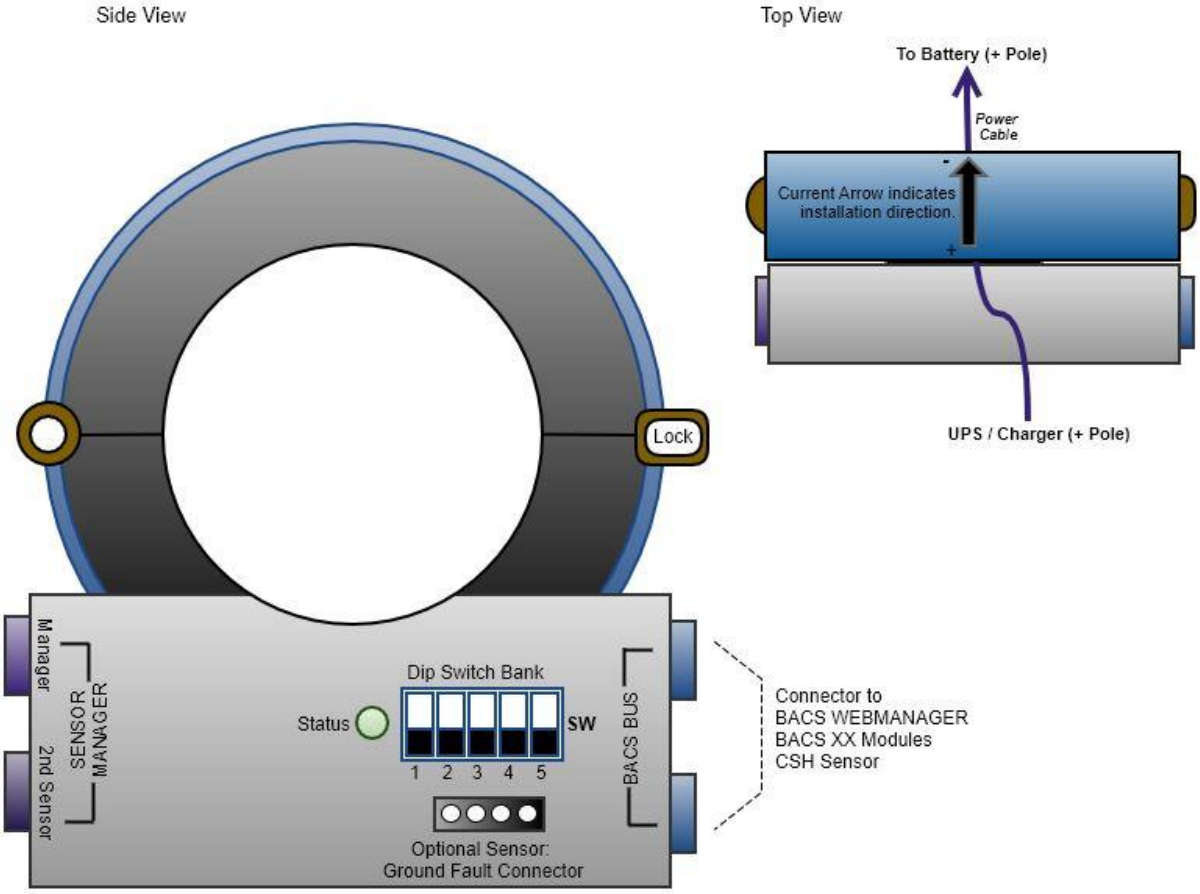
***manufacturer's contact information***

| Germany: | United States of America: |
|---|---|
| GENEREX SYSTEMS GmbH<br>Brunnenkoppel 3<br>22041 Hamburg | GENEREX SYSTEMS Inc.<br>18610 Starcreek Dr, Suite D<br>Cornelius, North Carolina 28037 |

***connection diagram***




***Example of part number***

Example BACS_CSHXXXX D

BACS prefix

measuring range (+/-)

1. 50 – 50 amps
2. 200 – 200 amps
3. 500 – 500 amps
4. 1000 – 1000 amps
5. 2000 – 2000 amps

Mounting type – D –differential current measurement

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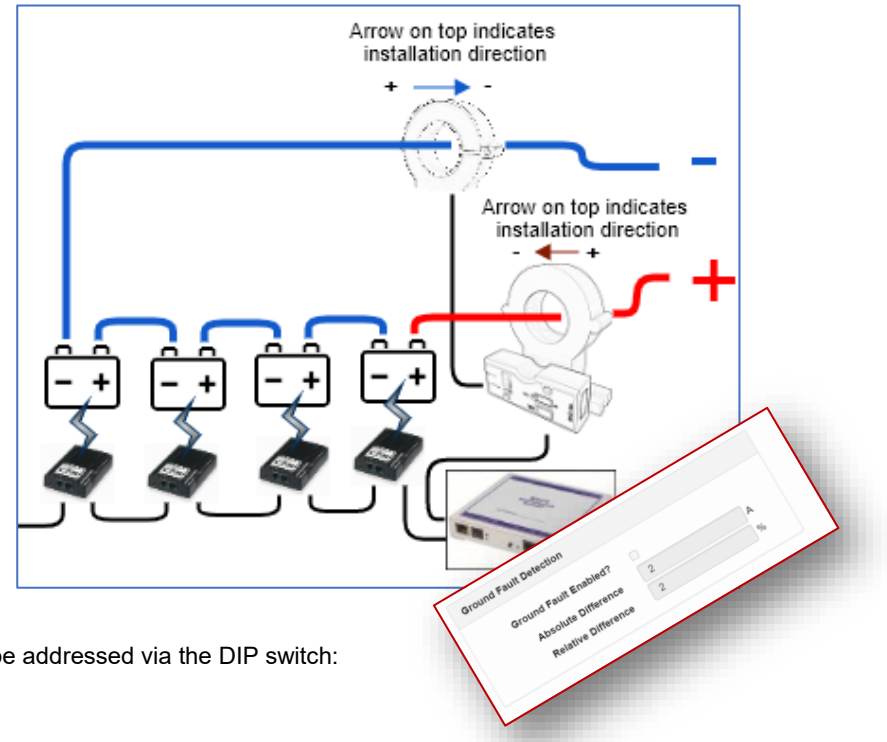
## Description & Functions

The BACS_CSHxxxxD current sensor is a measuring unit for integration into the BACS bus system. This unit measures the string current in the negative or positive area of a battery circuit and displays the data in amperes. The active measured value is displayed via the web interface and the BACS WEBMANAGER displays the "BACS status" of the string. The measured values are stored sequentially in the history files and this data can later be used with the BACS Viewer software for system analysis and performance interpretation.

*BACS – connection in ground fault mode*

The Ground Fault mode is a special operating mode that can find faults in a battery string using two combined current sensors. In the case of a faulty circuit, the respective measured values deviate from each other, which is an indication of a ground fault, and metal parts are under high voltage.
could.

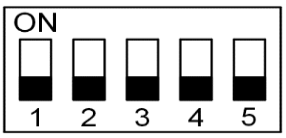
Note: Each sensor/probe pair is calibrated, make sure during installation that the sensor pairs are not mixed!




## Addressing

The BACS_CSHxxxxD current sensor can be addressed via the DIP switch:

*Address table for the string numbers:*



| | BACS CSHxxxD | | | | |
|---|---|---|---|---|---|
| String number: | SW 1 | SW 2 | SW 3 | SW 4 | SW 5 |
| 1 | OFF | OFF | OFF | OFF | - |
| 2 | ON | OFF | OFF | OFF | - |
| 3 | OFF | ON | OFF | OFF | - |
| 4 | ON | ON | OFF | OFF | - |
| 5 | OFF | OFF | ON | OFF | - |
| 6 | ON | OFF f | ON | OFF | - |
| 7 | OFF | ON | ON | OFF | - |
| 8 | ON | ON | ON | OFF | - |
| 9 | OFF | OFF | OFF | ON | - |
| 10 | ON | OFF | OFF | ON | - |
| 11 | out of | ON | OFF | ON | - |
| 12 | ON | ON | OFF | ON | - |
| 13 | OFF | OFF | ON | ON | - |
| 14 | ON | OFF | ON | ON | - |
| 15 | OFF | ON | ON | ON | - |
| 16 | ON | ON | ON | ON | - |

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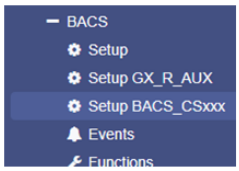
The physical address of the sensor is hard-coded and can be changed by setting the DIP switches. To activate the new settings, remove the BACS bus cable and reconnect the sensor. After rebooting, the new address is assigned and ready for use. To avoid incorrect measurements, please check your BACS string setup after changing the sensor address.

***Status LED:***

When the green LED on the BACS_CSHxxxxD current sensor is flashing, it indicates that power is present. The green LED is solid when the device is recognized by the BACS WEBMANAGER and measurements are being transmitted (normal operation). If communication with the BACS WEBMANAGER is lost, the LED will start flashing after 180 seconds to indicate that there is a communication problem.

***BACS configuration***



➔ Sensor configuration menu

Check the box “BACS CS Current Sensor Connected” to activate the sensor.

*Specifying the number of sensors installed*

Select "Only one current sensor for all strings" if there is only one current sensor. If this option is not selected, BACS assumes that the number of strings is equal to the number of current sensors.

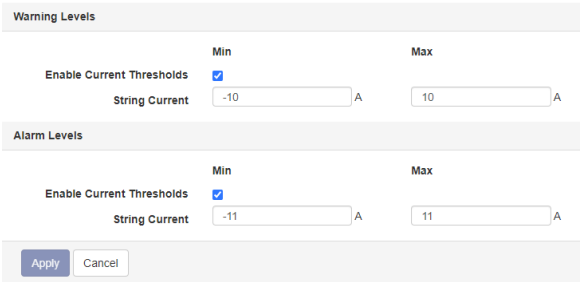
*threshold values*

A certain current must be detected before the sensor reports an ongoing charge/discharge cycle.

*Setting the thresholds:*

To enable the threshold function, select the corresponding check box. Jobs for these thresholds can be added to the BACS event handling menu.

Please ensure that the warning level values are always lower than the alarm level values.

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**Technical data and specifications: BACS CSHxxxxD current sensor**

| | | |
|---|---|---|
| module version | current sensor | Revision 5.x |
| power supply | volt | 12 V DC |
| power supply | Cable | via bus wiring |
| Current area | ADC | BACS_CSH50: +/- 50 ADC<br>BACS_CSH200: +/- 200 ADC<br>BACS_CSH500: +/- 500 ADC<br>BACS_CSH1000: +/- 1000 ADC<br>BACS_CSH2000: +/- 2000 ADC |
| measurement accuracy | resolution | 16 bit, ±1 A, ±2 % |
| electricity consumption | mA | 90 mA |
| control element | DIP SW | DIP switch for addressing |
| indicator | Optical | LED for status display |
| interface | Serial | Optical, isolated 4-pin connector |
| bus protocol | BACS | Proprietary GENEREX bus protocol, 9600 baud |
| temperature | Operation | -10 ... +60°C |
| temperature | storage | -25 ... +85°C |
| humidity | Rel. % | 0 - 95% non-condensing |
| Max. cable diameter (including cable sheath) of the circuit to be measured | mm | BACS_CSH50: 20 mm<br>BACS_CSH200 –<br>BACS_CSH2000: 40 mm |
| Dimensions CSHxxxxD | W x H x D | CSH 50D 85 x 73 x 70 mm<br>CSH 200 – 2000D 100 x 106 x 70 mm |
| Weight | gr | 1000g |
| environmental conditions | | Indoor use and altitudes <2000 m |
| degree of contamination | | pollution level 2 |
| protection class | IP | Protection class: IP 20 |
| Housing | material | ABS UL94-V0 |
| certifications | standard | DIN EN 50178, RoHS |

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