



# Safety Instructions

## HV Breakout-Module Type 1.x+U



### General safety instructions

Please observe the following safety instructions and signs provided with the measurement modules as well as the safety-specific information in the accompanying technical documentation.

#### WARNING!



HV Breakout Modules (HV BM) are used in high-voltage applications.  
**Improper handling of the modules may result in electrical shocks which are dangerous to life.**  
☞ Only use qualified and trained personnel.  
☞ Observe safety instructions.

#### WARNING!



The orange lid of the device housing may be opened to mount or remove the HV power cables.  
☞ Before handling, especially before opening the lid, make sure that the HV power cables are de-energized.  
☞ Fix the HV power cables preferably with the ring terminals and nuts supplied.  
☞ Observe the mounting instructions in the user guide. It is particularly important that the lid and the cable glands are properly mounted in order to ensure the tightness of the housing.

#### WARNING!



When using **HV power cables made of aluminum** in combination with ring terminals for HV power cables made of copper, the contact resistance between the two components increases.  
**This can lead to a massive increase in temperature and in the worst case to the development of fire.**  
☞ Use ring terminals for copper cables only in combination with HV power cables made of copper!  
**HV power cables made of aluminum** require a specific connection technology. Please contact our technical support for further information.

#### WARNING!



When performing measurements in +U mode, one of the potential taps is directly connected to the module housing. Due to the internal resistance of the measurement input in parallel to the isolation barrier, the effective isolation resistance in +U mode is reduced from 50 GΩ to 4 MΩ.  
If the module is not operated in +U mode, the effective isolation resistance remains unchanged.  
☞ Only use qualified and trained personnel.

**WARNING!**

The improper opening of the device housing compromises the operational safety of the HV measurement module and entails the risk of life-threatening electrical shocks.

**HV BM 1.x+U measurement modules are not integrated into the interlock loop. If the lid is not mounted, there is danger to life by accidentally touching non-insulated contacts at high-voltage potential.**

- ☞ Remove the lid only to connect the HV power cables and then re-mount it properly.
- ☞ Do not carry out any mechanical or electrical modifications on the HV measurement module.
- ☞ Only operate the high-voltage measurement module with its lid closed.

**WARNING!**

The internal temperature of the measurement module and the shunt temperatures must not exceed +120 °C. As soon as that value is exceeded, the module will send the error code „0x8001“ and the error message „THERMAL\_OVERLOAD“ instead of a measured value until the temperature value drops again below +115 °C.

**Exceeding the limit compromises the operational safety of the HV measurement module and entails the risk of life-threatening electrical shocks.**

- ☞ Tighten the nuts for fastening the ring terminals to the shunts using the specified torque (observe the installation instructions in the user guide).
  - ☞ Monitor the temperatures in order to make sure that the limit will not be exceeded.
  - ☞ Reduce or interrupt the current flow through the shunt to avoid a further increase of temperature of the module.
- User Guide „HV BM 1.x“, section „Options Info Message and BM Temperatures (additional CAN signals)“.

**WARNING!**

The measurement module has to be connected to the vehicle chassis or protective earth (PA/PE) in order to ensure user safety.

**If the ground connection is not established, there is danger to life due to high voltage.**

- ☞ Connect the measurement module to ground/PE using a suitable ground strap.
- ☞ Make sure that this work is only carried out by qualified and trained personnel.

**CAUTION!**

If several HV BM 1.x+U modules are connected in parallel and operated in +U mode, the internal resistances in parallel to the isolation barrier of the measurement inputs can cause the effective isolation resistance to drop to such an extent that the ground leakage monitor will respond.

- ☞ Make sure that the isolation resistance does not drop below the threshold value of the ground leakage monitor when applying these measurement setups.

**CAUTION!**

The measurement module can heat up considerably if it is operated in a corresponding working environment (e.g. engine compartment). The shunts also heat up significantly during operation under high load. The surface and the inside of the measurement module can therefore become extremely hot.

**Touching the surface may cause serious burns.**

- ☞ Let the measurement module cool down before handling, especially before opening the orange lid.
- ☞ Wear appropriate safety gloves, if required.



- ▶ Make sure that HV BM 1.x+U measurement modules are only operated within an operating temperature range of -40 °C to +120 °C and at a relative humidity of max. 95 % (non condensing).
- ▶ To ensure operational safety, an HV BM 1.x+U has to undergo an isolation test in accordance with the latest edition of EN 61010 at least once per year.
- ▶ Before initial operation, read the entire documentation thoroughly that has been delivered with the HV Breakout Module. The operating personnel has to be instructed accordingly. Please contact CSM GmbH with any further questions.

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