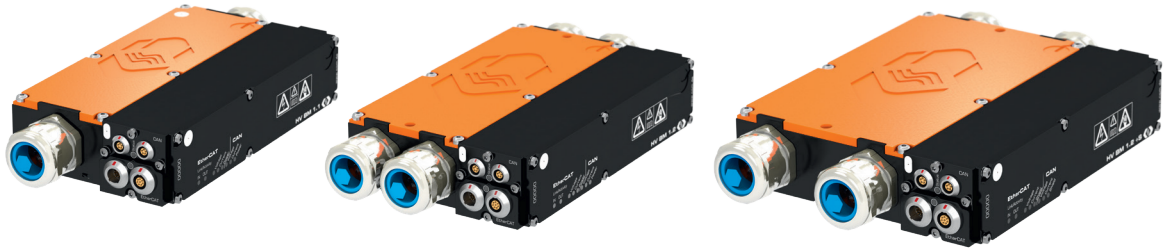
Safety Instructions

HV Breakout Module Type 1.1 | 1.2 | 1.2+S



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 use poses risks such as life-threatening electrical shocks and fire hazards.** ☞ Only use qualified and trained personnel (observe local guidelines/regulations). ☞ Do not modify the HV measurement modules in any way, neither electrically nor mechanically. ☞ Observe safety instructions.

	WARNING!
	The orange lid of the device housing can be removed to mount or dismount the HV power cables. If the lid of the housing is not mounted and the HV power cables are not de-energized, there is a risk of accidentally touching non-insulated contacts at high-voltage potential. **If the device is not de-energized, there is a risk of life-threatening electrical shocks.** ☞ Before removing the lid, make sure that the HV power cables are de-energized. ☞ Remove the lid only to connect the HV power cables and then re-mount it properly. ☞ Fix the HV power cables with the ring terminals and nuts supplied. ☞ Only operate the high-voltage measurement modules when the lids are mounted. ☞ Observe the mounting instructions in the user guide. It is particularly important that lids and cable glands are properly mounted in order to ensure the tightness of the housing.

WARNING!

Depending on the hardware version, the lids of the housings of HV BM 1.1/1.2/1.2+S modules are equipped with different insulators on the inside. As a result, different safety distances between the HV-conducting metal parts (threaded bolts, HV power cables, ring terminals and nuts) and the lid of the housing apply within the insulated area. The necessary safety distances are maintained when the installation is carried out in accordance with the instructions in the user guide using CSM's assembly materials (ring terminals, nuts, washers). Outside the insulated area, the distance between the HV-conducting metal parts and the lid must be at least 3.5 mm for all module types and independently of the hardware revision.

Type of module / Hardware revision	Type of insulation in the lid	Minimum permissible distance within the insulated area
HV BM 1.1 / A, B	Separate insulation plate between the lid and the connection area of the HV power cables	> 1 mm
HV BM 1.1 / E	Insulation plate	> 1 mm
HV BM 1.2 / A, B	Kapton film	> 0 mm
HV BM 1.2 / as of D	Insulation plate	> 1 mm
HV BM 1.2+S / A, B	Insulation plate	> 1 mm

If the insulation is damaged or the minimum distance between the HV-conducting metal parts and the lid of the housing is insufficient, there is danger to life.

☞ Use only lids with fully intact insulators (Kapton films, insulation plates).

☞ Observe the minimum distances between the HV-conducting metal parts and the lid 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!

☞ Observe safety instructions.

HV power cables made of aluminum require a specific connection technology. Please contact our technical support for further information.

WARNING!

The measurement module has to be connected to the vehicle‘s potential equalization or protective earth (PE) in order to ensure user safety.

In the event of a fault, there is danger to life due to high-voltage potential if this connection is not established.

☞ Connect the measurement module to the vehicle's potential equalization or PE using a suitable ground cable.

☞ Only use qualified and trained personnel.

WARNING!

The internal temperature of the measurement module and the temperature of the shunts must not exceed +120 °C. As soon as the temperature of a shunt exceeds this value, the HV Breakout Module sends the error code "0x8001" instead of the measured values for U and I. The user usually does not see this error code but the error message "THERMAL_OVERLOAD" that has been generated from the DBC or A2L file. This data is sent until the temperature of all shunts drops below +115 °C again.

Exceeding the specified temperature impairs the operational safety of the HV measurement module. There are risks including life-threatening electrical shocks and fire hazards.

- ☞ Tighten the nuts for fastening the ring terminals with the specified torque to keep the contact resistance low (observe the installation instructions in the user guide).
- ☞ Reduce or interrupt the current flow through the shunts to prevent a further temperature increase of the module.
- ☞ Always monitor the temperatures in order to make sure that the threshold value will not be exceeded.

CAUTION!

The measurement module can heat up considerably if it is operated in a specific working environment (e.g. engine compartment). The shunts integrated in the measurement module can also build up heat during operation under high load.

Touching the surface of the module may cause serious burns.

- ☞ Let the measurement module cool down before handling, especially before removing the orange-colored lid.
- ☞ Wear appropriate safety gloves.

- Only use qualified and trained personnel for handling HV Breakout Modules.
- Make sure that HV Breakout 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 isolation test in accordance with the latest edition of EN 61010 has to be carried out at least once per year.
- The entire documentation that has been delivered with the HV Breakout Module has to be read thoroughly before initial operation. The operating personnel has to be instructed accordingly. Please contact CSM GmbH with any further questions.

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