



# Safety Instructions

## HV Breakout Module



### For Products

- ▶ HV BM 1.1 (LE), as of revision E
- ▶ HV BM 1.2 (LE), as of revision E
- ▶ HV BM 1.2 +S
- ▶ HV BM 1.2 /S
- ▶ HV BM 3.1



### 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 of the HV Breakout Module may result in life-threatening electric shocks.

- ☞ Make sure that these modules are only handled by qualified and trained personnel.
- ☞ Observe safety instructions.

#### WARNING!



The orange housing cover can be opened to connect or disconnect the high-voltage power cables.

- ☞ Make sure that the high-voltage power cables are voltage-free before handling, especially before opening the cover.
- ☞ HV BM 1.1/1.2: Attach the high-voltage power cables only with the cable lugs and nuts supplied, or other suitable ones.
- ☞ Follow the assembly instructions in the installation manual. The cover and PG cable glands must be mounted correctly to ensure that the housing is securely fastened.

#### WARNING!



When using **high-voltage power cables made of aluminium**, the contact resistance between aluminium conductor and connecting component (cable lug), which is made of an electrochemically more noble metal (copper), increases.

**This can lead to a massive increase in temperature and ultimately result in fires.**

- ☞ When connecting high-voltage power cables made of copper to HV Breakout Modules, only use copper cable lugs!

**High-voltage power cables made of aluminium** require a special connection method. Please contact our technical support for further information.

### WARNING!



Improper opening of the housing will impair the operational safety of the HV measurement module and bears the risk of life-threatening electric shocks.

- ☞ Only open the housing for connecting the high-voltage power cables and carefully close it again afterwards.
- ☞ Do not carry out any mechanical or electrical modifications on the HV measurement module.
- ☞ Do not replace the shunt module.
- ☞ Only operate the measurement module with the housing cover closed.

HV Breakout Modules are not integrated into the interlock loop. When the housing cover is open, high voltage may be present at the unprotected contacts.

### WARNING!



The internal module temperature must not exceed +120 °C.

The shunt temperature must not exceed +120 °C. As soon as this value is exceeded, the module sends error value "0x8001" instead of a measurement value until the temperature falls below +115 °C again.

Exceeding these limits will impair the operational safety of the HV measurement module and may result in life-threatening electric shocks.

- ☞ Disconnect the power supply and/or interrupt the current flow through the shunt to prevent the module from heating up further.
- ☞ Monitor both internal module and shunt temperature to ensure that they never overheat.

→ See chapter "Temperature Monitoring" in the installation manual.

### WARNING!



In order to ensure user safety, the measurement module must be connected to vehicle ground (ISO leakage monitor) or protective earth (PA/PE).

**Without ground connection there is danger to life due to high voltage.**

- ☞ Use a suitable ground cable to connect the measurement module to ground/protective earth.
- ☞ Make sure that this work is only carried out by qualified and trained personnel.

### CAUTION!



The measurement module heats up considerably when operated in specific environments (e.g. engine compartment). The shunt also heats up when operated at high load. Therefore, the surface and the inside of the measurement module may become very hot.

Avoid continuous measurement of high currents in order to prevent the temperature inside the module from exceeding the specified range.

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

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



- ▶ Make sure that HV Breakout Modules are only handled by qualified and trained personnel.
- ▶ 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 confirm the operational safety of an HV Breakout Module, an isolation test in accordance with EN 61010-1:2010 is required at least once per year.
- ▶ Carefully read and consider the entire documentation delivered with HV Breakout Modules before initial operation. The operating personnel must be instructed accordingly. Please contact CSM with any additional questions.

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