

E-MOBILITY

Maximum safety

With cable entries that reliably protect high-voltage on-board electrical systems



When reliability has right of way in electric commercial vehicles

High-voltage on-board electrical systems follow their own laws.

As the number of electric, hybrid and hydrogen-powered vehicles on the roads continues to rise, high-voltage on-board electrical systems are called upon to meet ever-stricter safety and reliability requirements. One crucial aspect that is easily overlooked is **high-performance cabling** conforming to the

highest safety standards. Multilayer high-voltage cables, designed with **high resilience and durability in mind**, as well as safe cable glands that perform a special interface role in the on-board electrical system are just two examples.



HV on-board electrical systems – a challenge for the EMC design

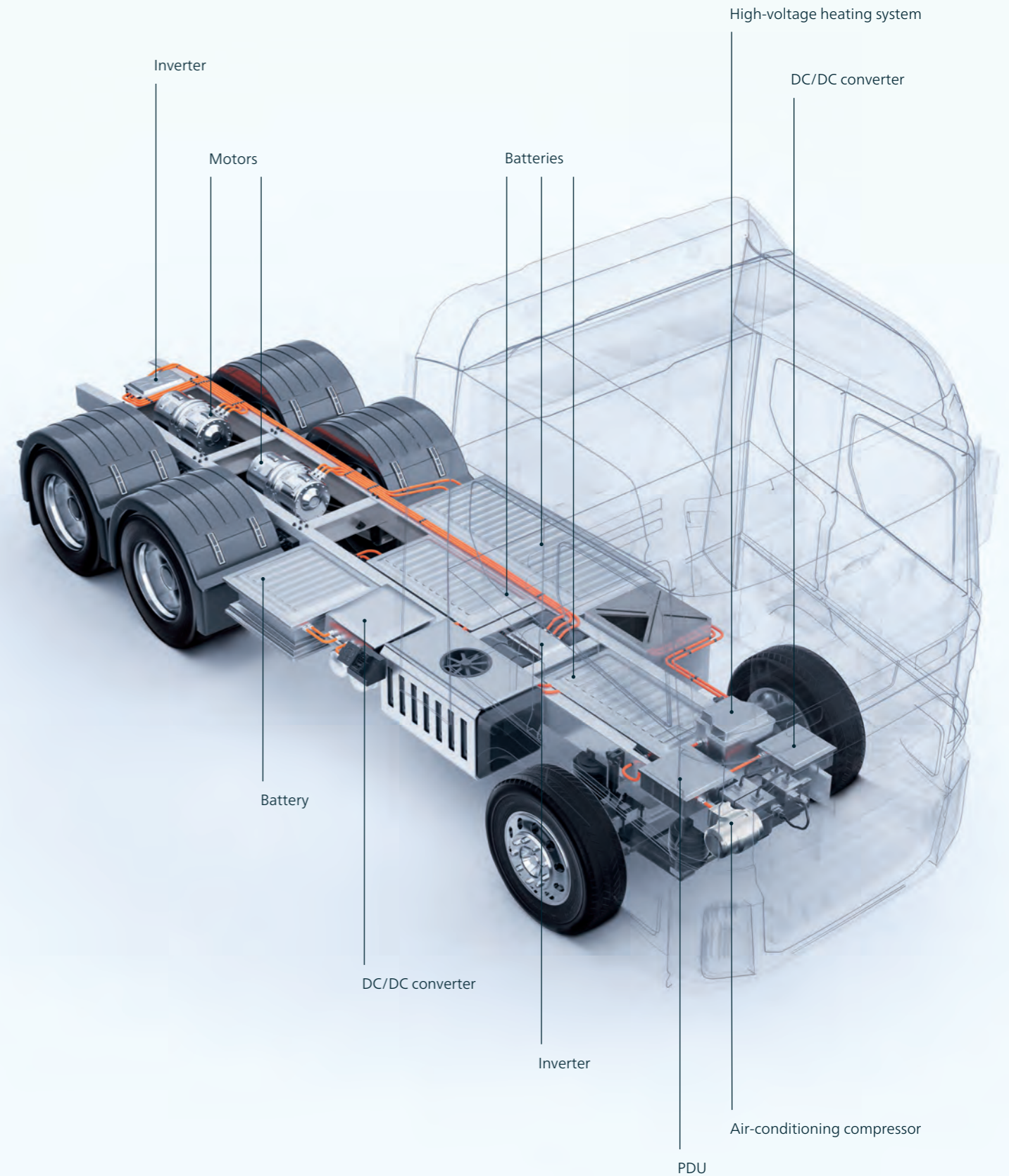
High currents and interference signals reliably under control.

The goals – **maximum range, minimum charging time** and **maximally efficient power electronics** – present the industry with a new and demanding challenge: how to safely discharge high-voltage interference radiation and the often very high currents that are induced on the cable shielding.

The **electromagnetic interference signals** which are produced by the different components along the HV on-board electrical system – high-voltage battery modules, electric motors, inverters or DC/DC converters, to name a few – can lead to permanent system impairments. This risk is aggravated by the fact that a large number of modules have to be accommodated in a very small space

and also by the vehicle's combination of low and high voltages. The inverter and the various other components of the electric power train simultaneously induce **high currents in the cable shield**. Especially in commercial vehicles with an alternative propulsion system, this frequently results in double-digit shield currents – indeed in some cases more than 100 amps – which stretch the current-carrying capacity of the **cable shields to their maximum**.

PFLITSCH solved this challenge with EMC cable glands that were explicitly developed for the electromobility market and impress with **high screening attenuation** and **excellent current-carrying capacity**.



HV on-board electrical systems made safe easily

With strong connections that convince in every aspect.

PFLITSCH offers a separate portfolio of high-quality cable glands, perfectly tailored to the special requirements of electromobility and optimally adapted for use in HV on-board electrical systems. Compared to our specific EMC solutions for other industries, they feature silicone sealing inserts for maximum **temperature change resistance** and a design conforming to the strict **corrosion resistance requirements of VDA 233-102**.

The high interference potential of the electrical drive component means all vehicle components must be EMC-compliant. The low contact resistances between the cable shield and the contact point are a **big advantage and an effective way** to achieve safe

current discharge. Thanks to the 360° contact principle of our shielding braid with the unique TRI spring design, **durable, low-impedance contact is possible over a large area**. Our EMC cable glands additionally impress with quick and reliable assembly, requiring only a small number of individual parts and no complicated crimping or special tools.

We are absolutely convinced of the quality and reliability of our EMC solutions. That's why with **PFLITSCH GUARD** we promise you **certified safety** that meets the highest standards of high-voltage on-board electrical systems without restriction.



Satisfying highest standards of EMC



What you require

- » Protection of electrical components and systems against electromagnetic interference signals
- » Ability to discharge high shield currents from the cables
- » High resistance of the cable entries to
 - › heavy vibration
 - › extreme temperature changes
 - › UV and weather effects
 - › mechanical stress, e.g. grit
 - › chemical stress
- » No contact corrosion at the cable entry
- » High durability for all cable entry components
- » Quick, simple and, above all, reliable assembly, leading to time and money savings
- » Easy maintenance coupled with calculable time and costs

Our product solutions

- » Low-impedance discharge of high shield currents enables reliable protection of the on-board electrical system and surroundings
- » 360° contact with the cable shield over a large area thanks to the patented triangular spring permits safe discharge of all interference signals
- » Strong, durable contact, even when subject to vibration
- » Exceptional attenuation properties, even in the upper frequency range
- » Time and cost savings because assembly is quick, simple and reliable – only a small number of individual parts need to be installed and no special tools are required
- » Convenient pre-assembly because sealing and contacting are separate from one another, resulting in larger stripping tolerances
- » Our silicone sealing insert is resistant to environmental influences, the operating fluids and lubricants used in the vehicle as well as the frequent – and sometimes extreme – temperature changes
- » Cable gland design optimised for the various single- and multiple-core HV cable cross sections
- » Large sealing and screening ranges can be covered with just one cable gland size
- » Contact corrosion is avoided because the aluminium enclosure is connected using a cable gland made from nickel-plated brass and tested according to VDA 233-102



AE blueglobe TRI HTS

Material	Brass, nickel-plated*
Sealing insert	Silicone
Contact	Stainless steel TRI spring
Sizes	M12 to M32**
Max. cable cross section	150 mm ²
Operating temperature range	-55 °C to +180 °C

* Lead-free variant on request. ** Some sizes under development.

For maximum current-carrying capacity and screening attenuation



What you require

- » Extremely high current-carrying capacity – safe discharge of shield currents greater than 100 amps
- » High-frequency interference radiation almost completely shielded

Our product solutions

In addition to the properties of the AE blueglobe TRI HTS, the AE blueglobe D-TRI NM HTS with its two in-line, bronze TRI springs also offers the following advantages:

- » Low-impedance discharge of shield currents greater than 100 amps
As an example, the size M25 was tested with the following shield currents:
 - › constant 200 amps for 1 hour
 - › intermittent peak value of 380 amps for 15 minutes
 The EMC contact via the TRI spring maintains its full function.
- » Very high screening attenuation – even with high-frequency interference radiation up to 1 GHz

We will be happy to assist you as a development partner with other sizes.



AE blueglobe D-TRI NM HTS

Material	Brass, nickel-plated*
Sealing insert	Silicone
Contact	Bronze TRI spring
Size	M25
Cable cross section	50 mm ² , 70 mm ²
Strain relief	Class B according to EN 62444
Operating temperature range	-55 °C to +180 °C

* Lead-free variant on request.

The precise measuring procedure for determining screening attenuation

A special, innovative test procedure developed in-house allows the **screening effect of cable glands** to be precisely determined using the KoKeT (Koaxial Kelvin Tube) system. KoKeT is the first system capable of measuring the screening attenuation and (absolute)

transfer impedance of direct current up to more than 1.5 GHz. It is unique in that the **cable has no influence on the test results**, so that exact reproducibility is ensured (≤ 3 dB).



PFLITSCH KoKeT

Condensation has no place in the enclosure

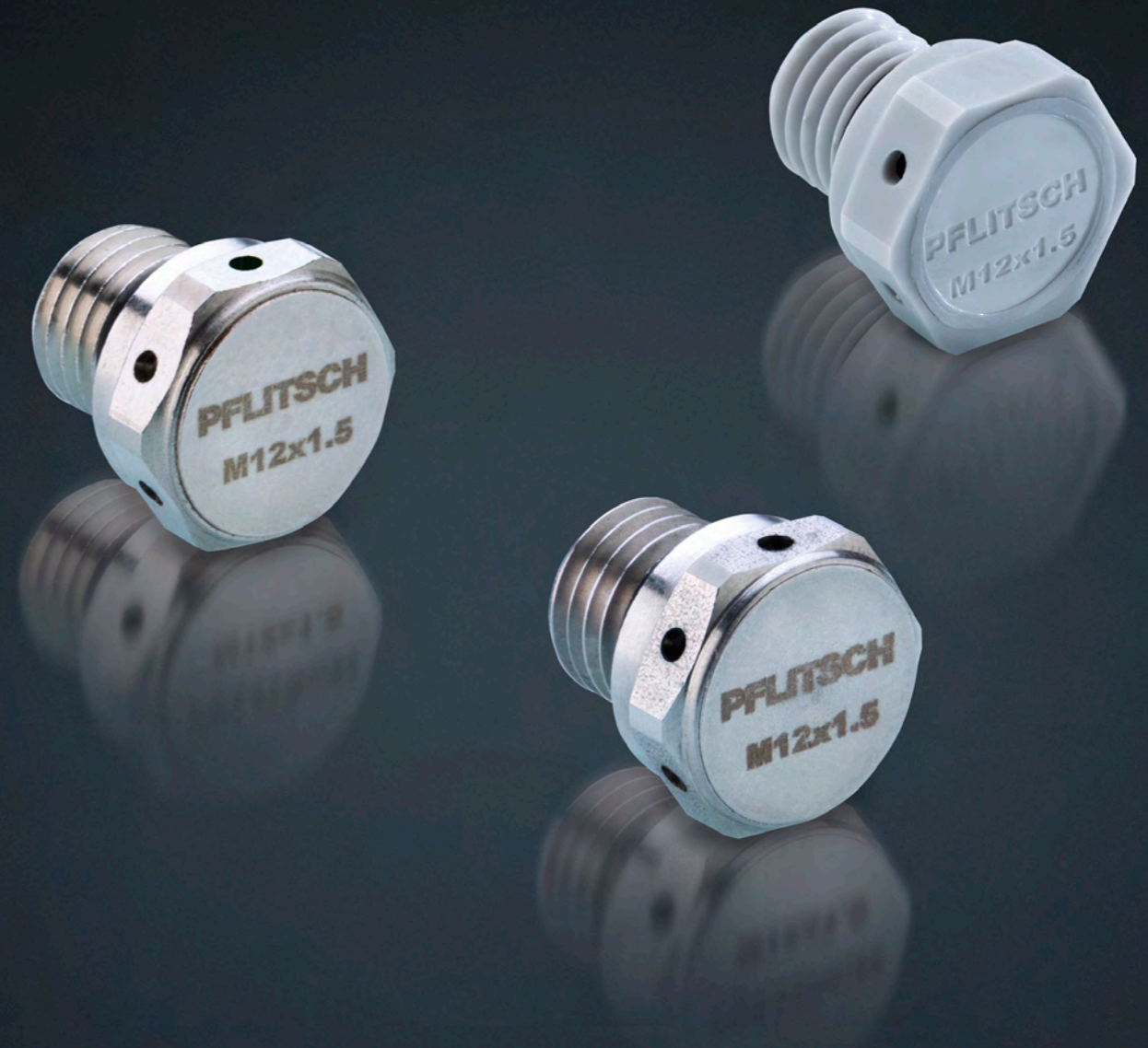


What you require

- » No condensation in your vehicle's well-sealed enclosures, such as the PDU (power distribution unit) or the battery, even in case of high relative humidity or extreme temperature changes
- » The leakage limit of the enclosure seals (average 70 mbar) must never be exceeded
- » Resistance to the most diverse influences in harsh environments
- » Suitability for potentially explosive atmosphere
- » Compact design

Our product solutions

- » Continuous ventilation of the enclosures prevents malfunctions due to condensation
- » Secure seal against moisture owing to the high IP66, IP68 and IP69K protection
- » Reliable operation on account of the hydrophobic or oleophobic diaphragm
- » Exceptional durability thanks to the high UV resistance
- » Ex-e and UL-approved variants offer certified safety
- » Low-profile design
- » Available in brass, stainless steel or polyamide (black, grey) as well as in two different airflow versions:
 - › standard level (SL)
 - › high level (HL)



Pressure equalisation elements

	DAE Ms	DAE V2A	DAE PA6
Thread size	M12	M12	M12
Spanner width	17 mm	17 mm	18 mm
Connection thread length	6 mm, 10 mm	6 mm, 10 mm	6 mm, 10 mm
Mounting height	8 mm	8 mm	9 mm
Temperature resistance	-40 °C to +105 °C	-40 °C to +105 °C	-40 °C to +105 °C
Airflow SL HL version	16 l/h 150 l/h	16 l/h 150 l/h	16 l/h 150 l/h
Moisture ingress point of SL HL version	0.8 bar 0.2 bar	0.8 bar -	0.8 bar 0.2 bar
Type of protection SL HL version	IP66, IP68	IP66, IP68, IP69 IP66, IP69K	IP66, IP68, IP69K

Get in touch with our
e-mobility experts now.



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