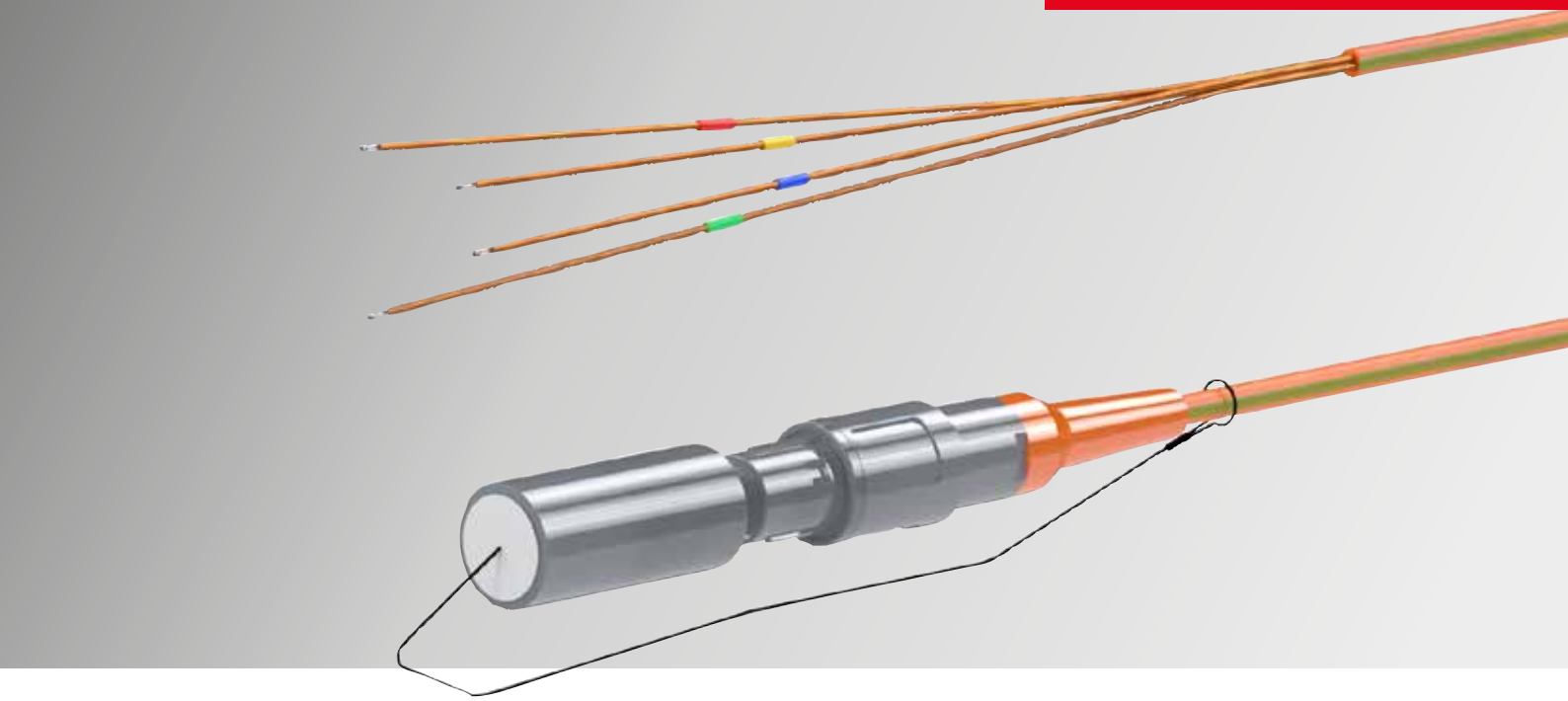


RÖSSEL MESSTECHNIK

Consultation. Solution. Innovation.

TMB - TEMPERATURE MEASUREMENT

IN BATTERY SYSTEMS

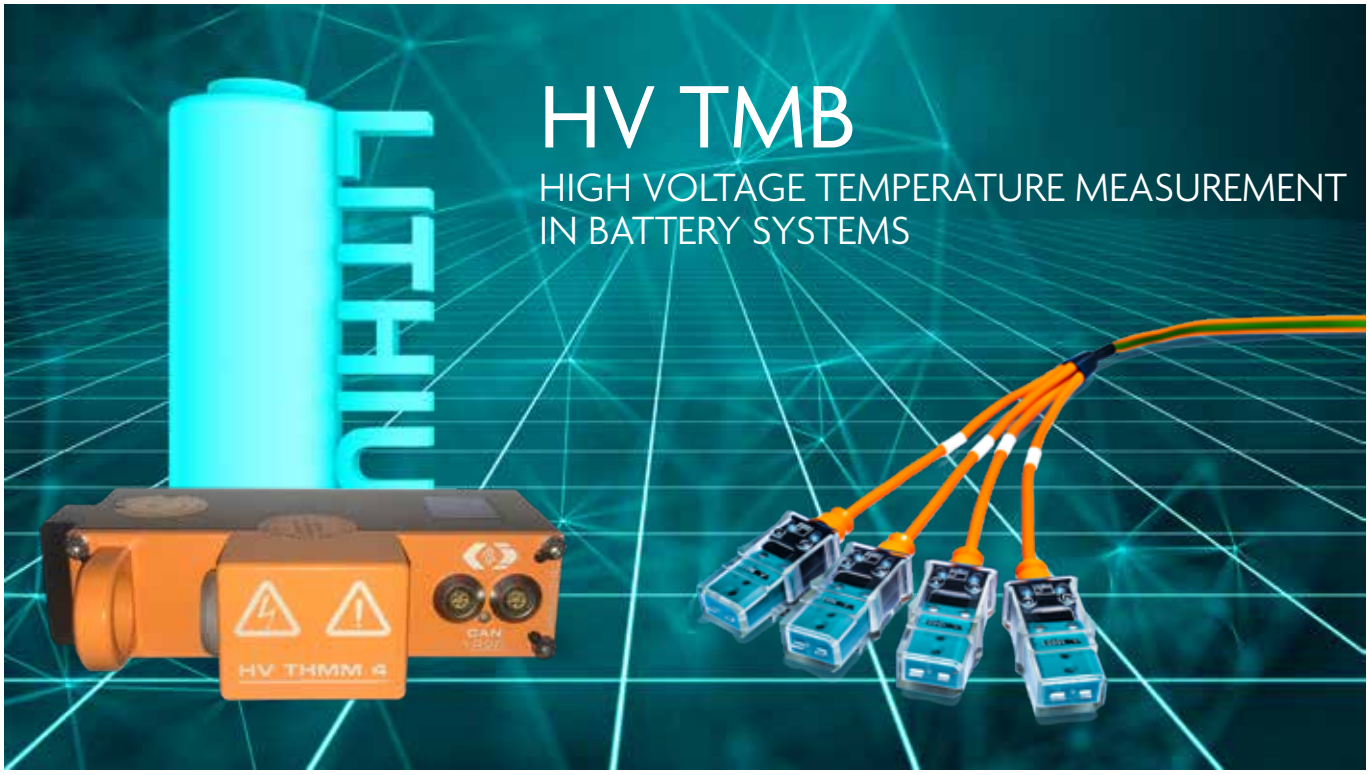
High-performance batteries need to fulfill a list of strict requirements in the e-mobility sector. Short-charging times with high currents along with large capacities for large ranges when driving are the main objective. However, supplying power to other components used in e-mobility can push battery systems and other components to their limits.

In the process, the majority of energy provided is converted into heat, which needs to be monitored, controlled and regulated. When it comes to developing innovative battery systems and the associated high operating voltages, special measuring systems subject to certain strict safety requirements come into play.

Rössel-Messtechnik offers ready-to-connect sensor cables for measuring temperatures in high-voltage components used in the e-mobility sector. Our TÜV-Süd accredited high-voltage cables can be directly connected to high-voltage modules, including CSM, and therefore provide intuitive sensor technology for measurements within and outside of battery components.

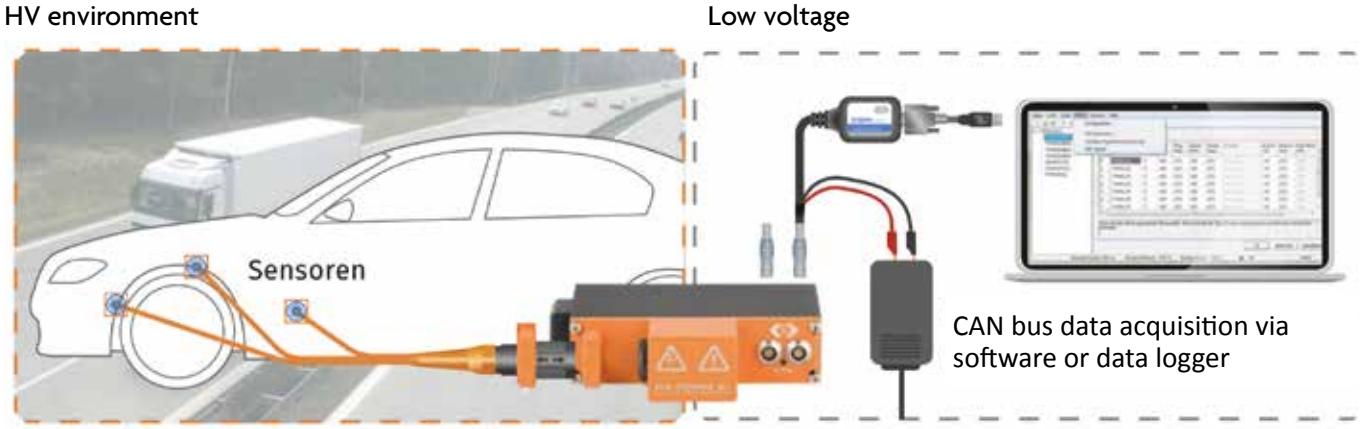
PARTICULAR ADVANTAGES:

- Application temperature: -40 to 150 °C
- Dielectric strength: 3.7 kV AC to 6 kV DC
- Outer sheath: PUR
- Documented HV testing
- Routine testing



Each sensor cable is tested with AC and DC voltages in a high-voltage test bath as part of a defined testing procedure. The results are recorded and documented. Each sensor cable is given a unique serial number, allowing it to be traced back to the production process. The cables are delivered in individually packaged and sealed PVC bags with safety instructions.

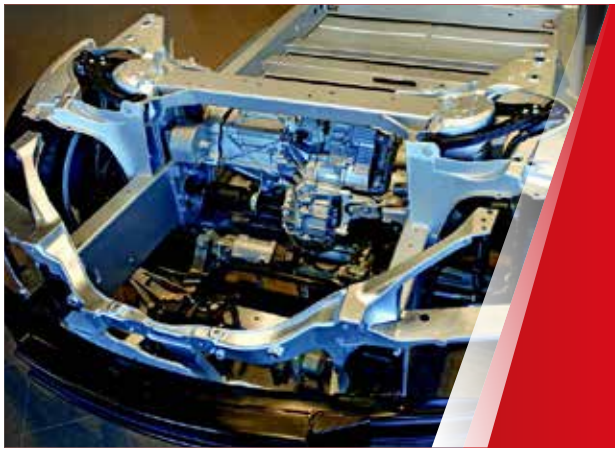
The specially developed HV cables are touch-safe and robust. The orange PUR outer sheath identifies he cables as products designed for use in the high-voltage range in vehicle electrical systems. Due to their small diameter, they offer the ideal solution when space is at a premium. As cables are frequently exposed to abrasion points on bodywork, the HV cables feature a blue intermediate sheath. If the blue sheath is visible, this signifies that the cables are no longer safe to use. The special coded and fully insulated connector also offers additional touch protection, even when the cables aren't connected to the measuring modules.



▶ Example: Measurement setup in HV environment with CSM measuring system

HIGH-VOLTAGE TRACTION BATTERY

The drive trains in e-vehicles are completely different to those found in vehicles with internal combustion engines. Battery systems and electric motors may be the main components, but components like power electronics, the dynamo, radiator and gearbox also play a major role in the vehicle. At this point in time, e-vehicles are solely powered by lithium-ion batteries, which offer an impressively long service life and high energy density. Each battery block contains thousands of lithium ion cells.



HIGH-VOLTAGE DRIVE MOTORS

As a drive element, the electric motor plays a key role. However, the term electric motor isn't technically correct, as the drive element can also be used as a generator for energy recuperation.

HIGH-VOLTAGE VOLTAGE TRANSFORMER

The power electronics are responsible for controlling the voltage changes when driving and charging. They convert the electrical energy into the voltage waveform required by the corresponding consumers. The high-voltage electrical system that connects all components is one of the main features.

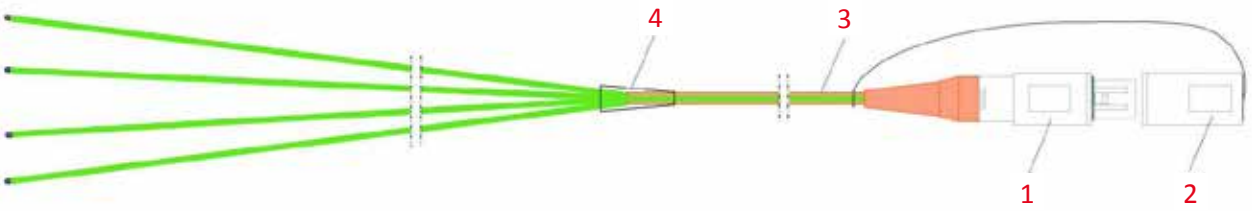
HIGH-VOLTAGE THERMOCOUPLE
TYPE 4-CH-HV-T-K

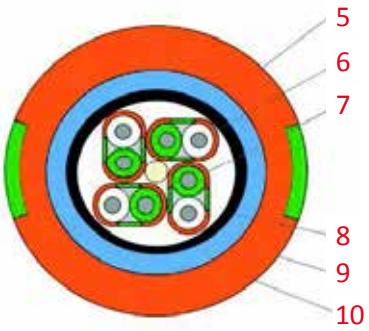
General product features

Application temperature	-40 °C to +150 °C (3000 h)
Minimum bending radius	12 x cable diameter
Dielectric strength	3.7 kV AC to 6 kV DC
Inner sheath	FEP
Outer sheath	Polyurethane (PUR)
ISO version	Measuring tips insulated with heat shrink tubing
N-ISO version	Measuring tips exposed 3 mm

Other versions available on request.

Schematic





1 Lemo 8 pin connector
2 Cap
3 High-voltage cable 4-CH-HV-T-K
4 Heat shrink tubing black
5 Outer sheath dia. 6.1 mm
6 Thermocouples type K 2 x 0.2 mm
7 FEP cable 1.1 x 1.9 mm
8 FEP insulation 0.4 mm thickness
9 Individually insulated green(+), white (-)
10 HV TC marking

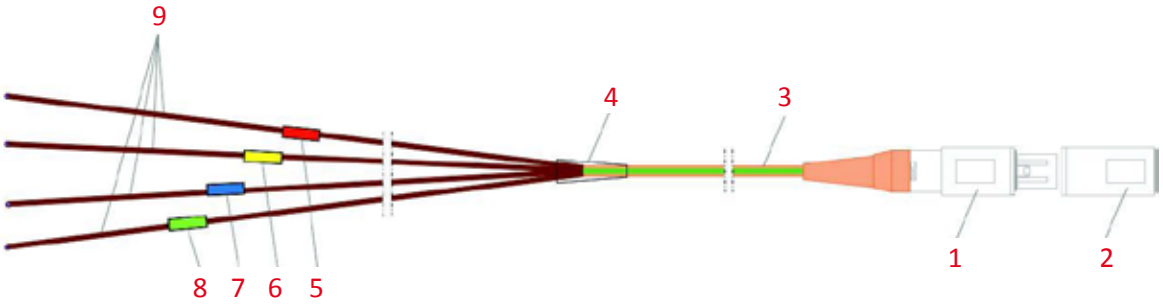
HIGH-VOLTAGE EXTENSION CABLE
TYPE 4-CH-HV-KN-K

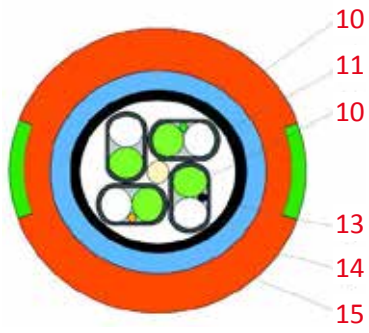
General product features

Application temperature	-40 °C to +150 °C (3000 h)
Minimum bending radius	12 x cable diameter
Dielectric strength	3.7 kV AC to 6 kV DC
Inner sheath	FEP
Outer sheath	Polyurethane (PUR)
ISO version	Measuring tips insulated with heat shrink tubing
N-ISO version	Measuring tips exposed 3 mm

Other versions available on request.

Schematic





1 Lemo 8 pin connector
2 Cap
3 High-voltage cable 4-CH-HV-KN-K
4 Heat shrink tubing, black
5 Heat shrink tubing, red
6 Heat shrink tubing, yellow
7 Heat shrink tubing, blue
8 Heat shrink tubing, green
9 Heat shrink tubing, transparent
10 Outer sheath dia. 4.5 mm
11 Thermocouples type K 2 x 0.2 mm
12 Kapton cable 0.7 x 1.1 mm
13 TEP insulation 0.4 mm thickness
14 3 x color fiber
15 HV TC marking

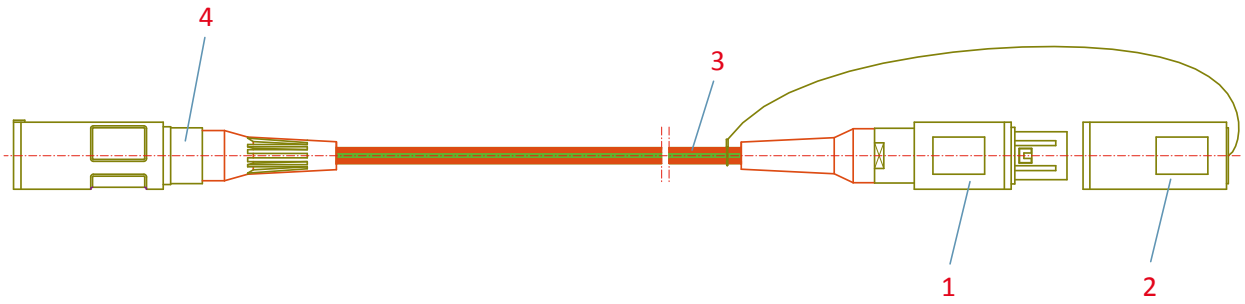
HIGH-VOLTAGE THERMO ADAPTER
ADAPTER TYPE 4-CH-HV-KN-K

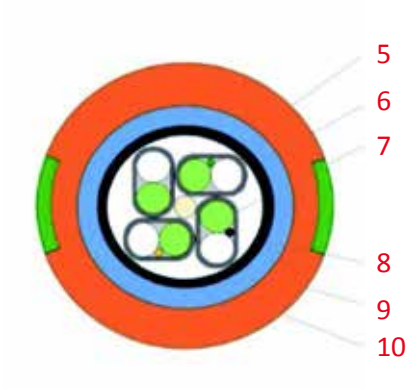
General product features

Application temperature	-40 °C to +150 °C (3000 h)
Minimum bending radius	12 x cable diameter
Dielectric strength	3.7 kV AC to 6 kV DC
Inner sheath	FEP
Outer sheath	Polyurethane (PUR)

Other versions available on request.

Schematic





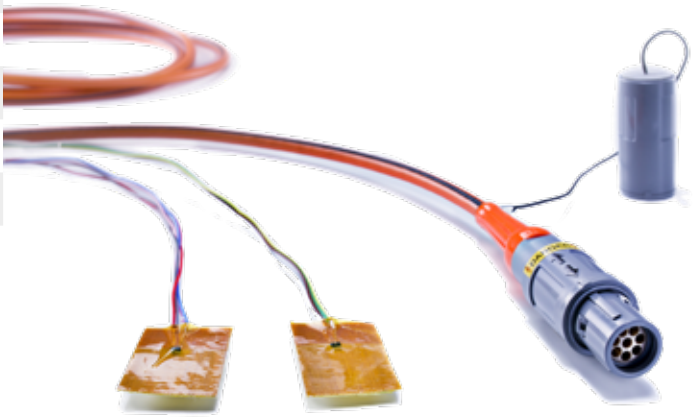
1 Lemo
8 pin connector
2 Cap
3 High-voltage cable
4-CH-HV-KN-K
4 Lemo 8 pin coupler
5 Outer sheath dia. 4.5 mm
6 Thermocouples type K
2 x 0.2 mm
7 Kapton cable
0.7 x 1.1 mm
8 FEP insulation
0.4 mm thickness
9 3 x color fiber
10 HV TC marking

HIGH-VOLTAGE RESISTANCE THERMOMETER
TYPE 2-CH-HV-T-PT

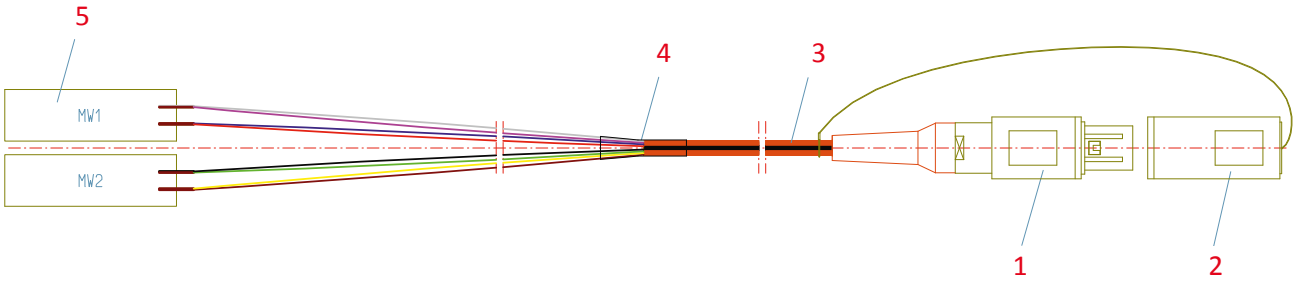
General product features

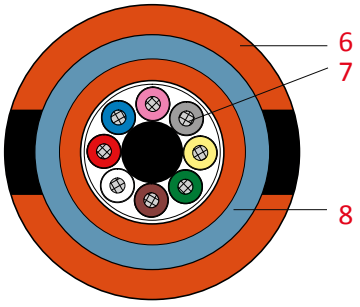
Application temperature	-40 °C to +150 °C (3000 h)
Minimum bending radius	12 x cable diameter
Dielectric strength	3.7 kV AC to 6 kV DC
Inner sheath	FEP
Outer sheath	Polyurethane (PUR)
Resistor dimensions	15 x 50 x 0.3 mm

Other versions available on request.



Schematic





1 Lemo 8 pin connector
2 Cap
3 High-voltage cable 4-CH-HV-T-PT
4 Heat shrink tubing black
5 Flat precision resistor pt100
6 Outer sheath dia. 5 mm
7 Copper wire
8 Colored FEP marking insulation

MULTI-SPLIT CONNECTOR
TMB TYPE MULTI SC

General product features

Application temperature	-40 °C to +150 °C (3000 h)
Protection class	IP 67 as per EN 60529
Material	PC, PA, TPE-V
Special features	Easy to retrofit Integrated strain relief Separable

Other versions available on request.

Image

- 4-component split feedthrough connector system
- Easy to install, even with pre-assembled wiring
- Cable feedthroughs can be plugged with bolts
- Also available with spreading pliers for simpler cable entry

RÖSSEL MESSTECHNIK

RÖSSEL Messtechnik GmbH
Seidnitzer Weg 9
D-01237 Dresden

+49 351 312 25-10

info@roessel-messtechnik.de
www.roessel-messtechnik.de

RÖSSEL MESSTECHNIK

RÖSSEL Messtechnik GmbH
Lohstraße 2
D-59368 Werne

+49 2389 409-0

info@roessel-messtechnik.de
www.roessel-messtechnik.de

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