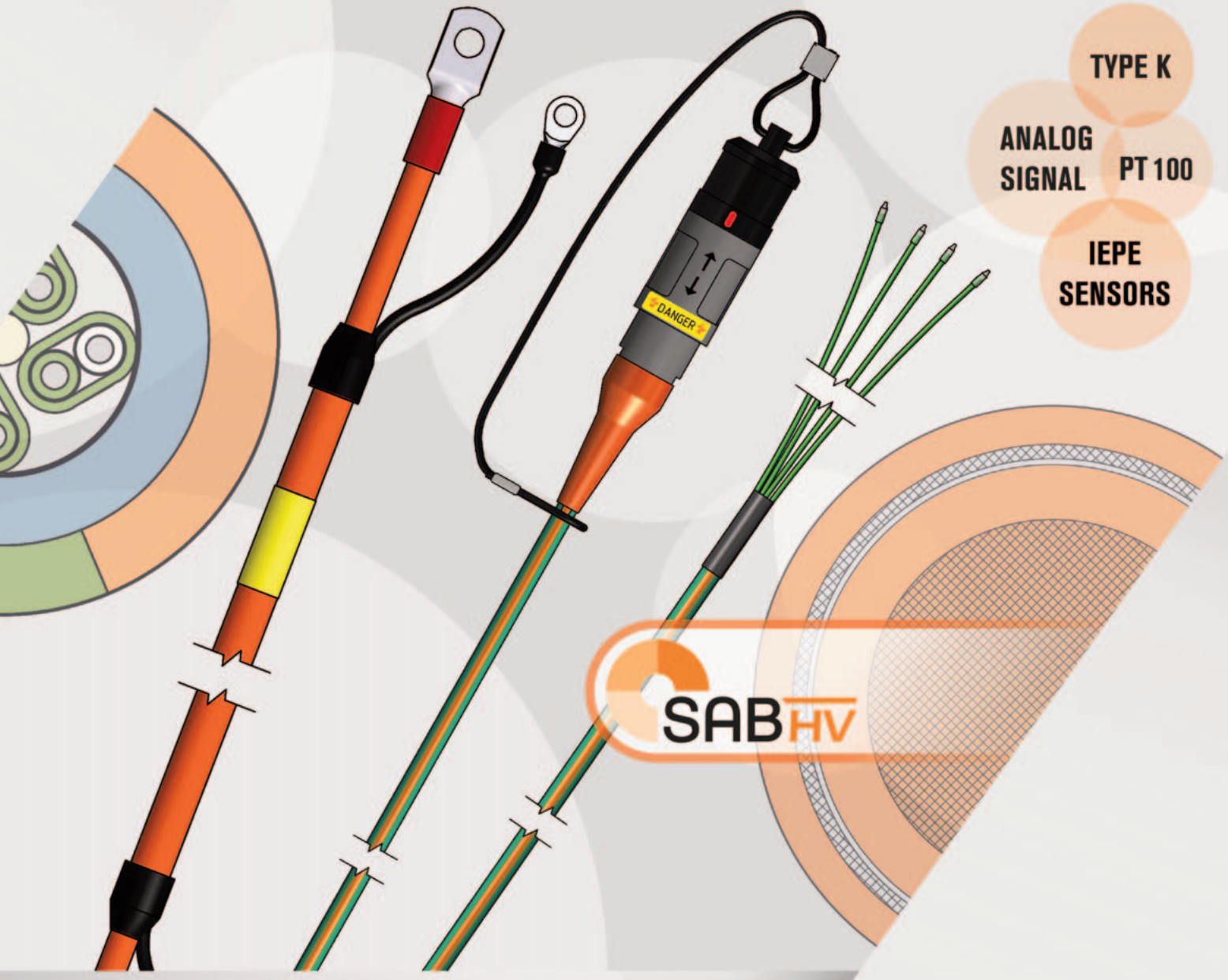
E-MOBILITY

HIGH VOLTAGE MEASUREMENT TECHNOLOGY



www.sab-cable.com

SPECIAL CABLES
SAB BRÖCKSKES

Family business in the third generation

75 years of experience in cable and wire manufacturing as well as in temperature measurement technology turned a one-man business into a company with more than 550 employees. We prove our strength every year with more than 1500 special products according to customers' requirements. Each product is a new challenge for our creative technical team. We at SAB see ourselves as a manufacturer and a service provider – in the sense of true partnership and the greatest possible customer orientation.

Today, the quality of our products is known and appreciated in more than 100 countries around the world. In all product ranges, we are certified according to DIN EN ISO 9001. Furthermore, we have implemented an environmental management system for our company according to DIN EN ISO 14001, an occupational health and safety management system according to NLF/ILO-OSH and DIN ISO 45001, and an energy management system according to DIN EN ISO 50001.

And also for the future, our slogan is: "WE GO FORWARD!"

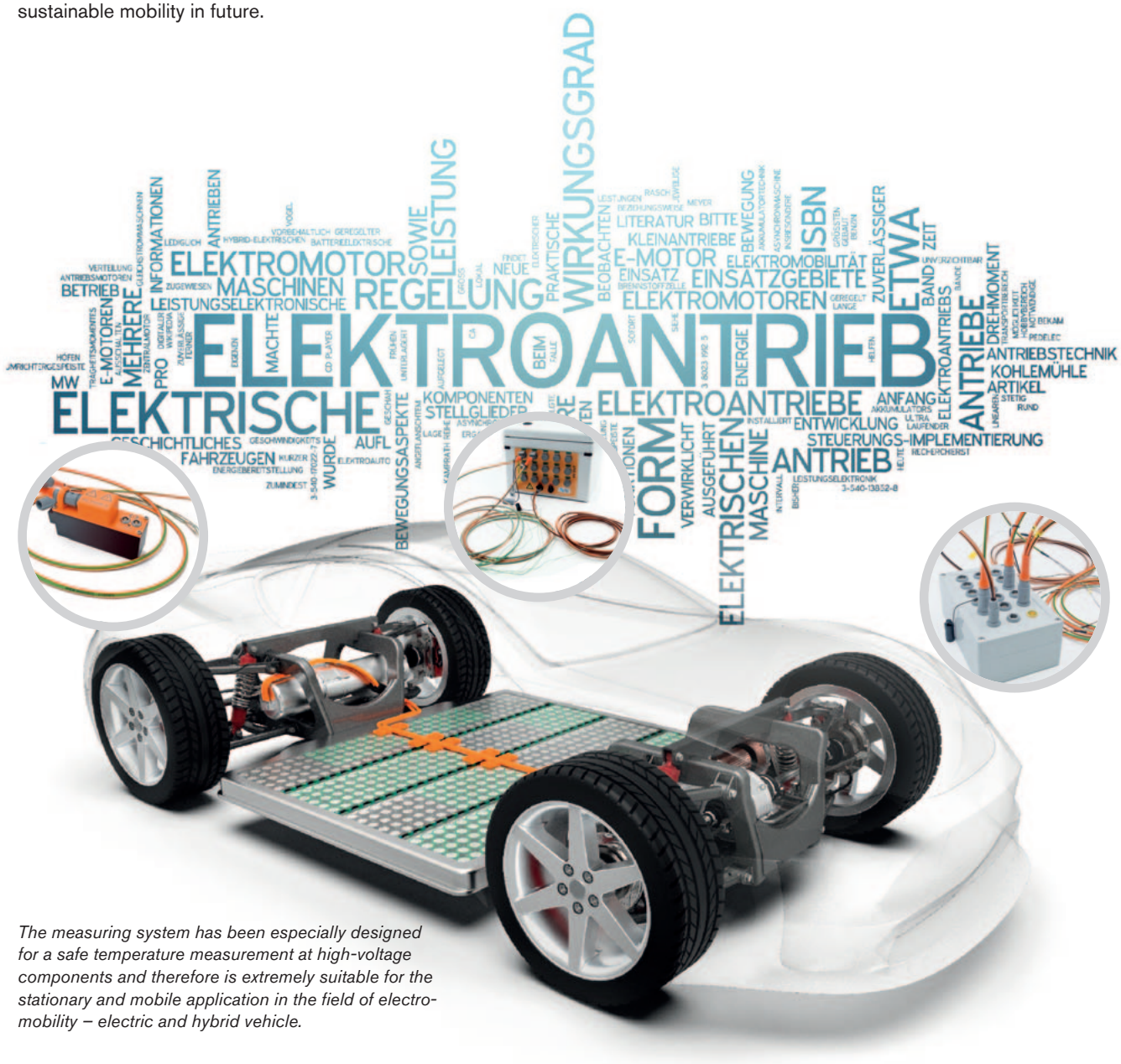
FOUNDED:	1947 by Peter Bröckskes sen. an independent, medium-sized company.
CEO:	Peter Bröckskes and Sabine Bröckskes-Wetten
PLANT/LOCATION:	In Viersen (Lower Rhine) 110.000 m² company site. Own manufacturing from copper conductor to outer sheath. VDE approved burnchamber and laboratory within the company.
EMPLOYEES/WORKERS:	Approx. 430 at the plant in Viersen, 550 worldwide
YEARLY SALES:	Approx. 134 Mio. € worldwide
PRODUCTS:	Special Cables Measurement Technology Cable Harnessing
CERTIFICATES AND APPROVALS:	Quality management system acc. to DIN EN ISO 9001 for every manufacturing field Environmental management system acc. to DIN EN ISO 14001 Occupational health and safety management acc. to NLF/ILO-OSH and DIN ISO 45001 Energy management system acc. to DIN EN ISO 50001

VDE HAR
EN IEC ISO

Content

Reliable temperature measurement at HV components

For more than 10 years SAB Bröckskes as a worldwide leading cable manufacturer is confronted with the challenges of development and optimization of high-voltage cables as well as high-voltage measurement technology for components in electro-mobility. As a leading manufacturer we optimize our products with regard to the steadily changing requirements and develop continuously new products in the range of temperature measurement technology and wiring for a better and sustainable mobility in future.



The measuring system has been especially designed for a safe temperature measurement at high-voltage components and therefore is extremely suitable for the stationary and mobile application in the field of electro-mobility – electric and hybrid vehicle.

The transport sector is the third biggest polluter with greenhouse gases after the energy sector and industry with approximately 20 percent CO2-emission (2019). The biggest part of transport pollution (94 percent) is caused by traffic. Fuel and diesel powered cars are responsible for 59 percent thereof".

(German government)

This is the reason why the development of electric drives are of greatest importance for the transport sector. E-mobility has become much more than a niche market.

Fotos: Thomas Söllner - stock.adobe.com / XtravaganT - stock.adobe.com

Safe and efficient measurement with CSM measurement technology

A safe and precise collection of temperatures (thermocouples and PT sensors) and analogue measuring signals can be realized by CSM HV measuring modules in HV environments. CSM HV measuring modules offer tested safety acc. to DIN EN 61010 and due to the multi-level safety concept a measuring chain is set up between sensor and data collection by special sensor cables and HV measuring modules. Furthermore, also standard sensors of LV environments can be used for HV applications.

The measuring modules are appropriate for use in road tests or for test benches as 19 “ insert module.

CSM

For more information, plese see
www.csm.de

T141 / T151
page 8-14

HV TH4 evo / HV TH8 evo
temperature measurement with thermocouples: NiCr-Ni temperature input (type K)

T641 **page 15**

HV PT2 / HV PT8
temperature measurement with PT100- and PT1000 resistance thermometers

T642
page 17

HV IEPE3 FL100
safe measurement of acceleration, power and pressure with IEPE sensors

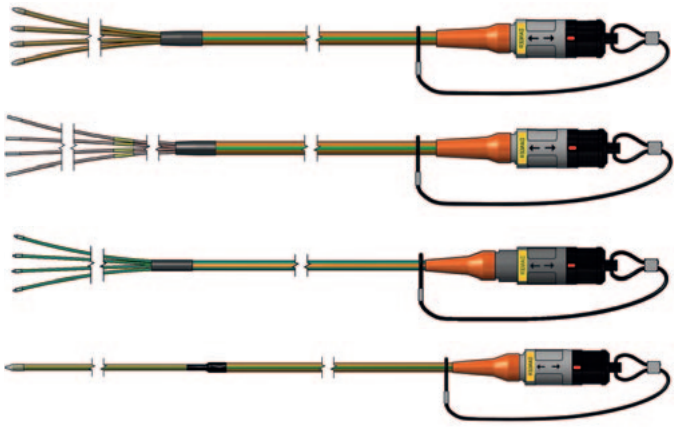
T644 **page 18**

HV STG4 pro BS20
for measurements with strain gauges

T641/T645 **page 19-21**

HV CAN and ECAT AD measuring modules
for direct voltage measurement and standard sensors (analogue measurements)

Product presentation

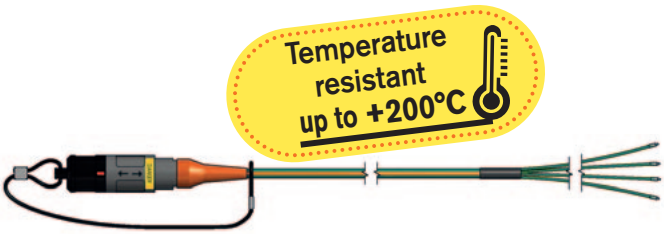


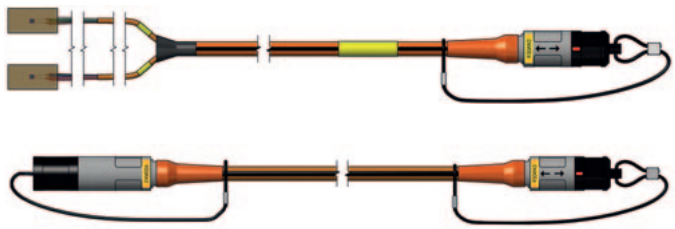
HV SENSORS TYPE K

The use of HV type K sensors in HV environments is wide-ranging in vehicle technology and guarantees a safe measurement especially wherever a robust sensor and an exact temperature collection is needed. The sensors are used in HV components as for example inverters, electric motors, HV batteries and power electronics. The HV sensors are appropriate for the stationary as well as for mobile test drives.

HV SENSORS TYPE K HT

HV type K sensors with high temperature design can be used in HV environments of vehicle technology as well as the standard HV sensors especially whenever high process temperatures are expected in the whole environment. This can be for example a thermal hardening process of insulating materials in E-units or other HV components.



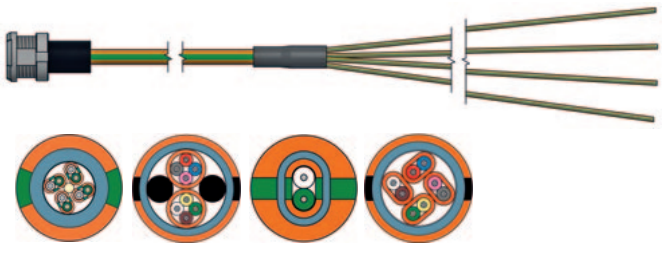


HV SENSORS PT100/1000

The use of HV PT sensors in HV environments is wide ranging in vehicle technology especially whenever a small thermal mass, short response times by full-surface contact as well as a thin construction combined with an exact measurement are required. The application includes among others the temperature collection between the individual cells of a HV battery.

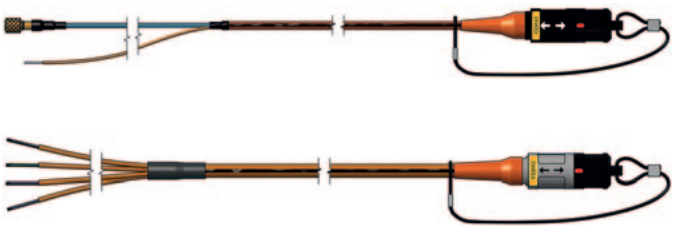
HV TEST ADAPTER

HV test adapters are used for the adaptation of HV sensors in fixed installation and are available for all sensor types in high voltage environments. The test adapter is among others appropriate to test installed sensors for potential equalisation measurements or the fixed mounting in empty housings.



Product presentation

HV SENSOR CABLE ACCELERATION & STRAIN GAUGES

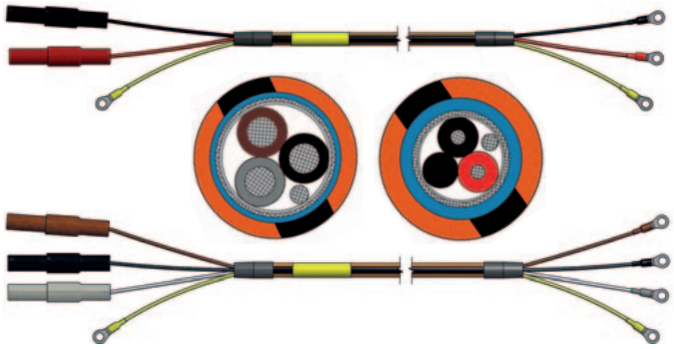


In order to measure acceleration and mechanical tension (strain gauge), HV sensor cables are needed. By the use of these special sensor cables for example tri-axial IEPE acceleration sensors and strain gauges in full and half bridge of the standard low voltage ranges can be used. In combination with the CSM measuring modules HV IEPE3 FL100 and HV STG4 pro BS20 reliable measurements in stationary as well as mobile application for example at test benches can be realised.

HV ANALOGUE MEASURING CABLE AND VOLTAGE MEASURING CABLE

The analogue and voltage measuring cable are especially appropriate for the creation of safe HV measuring chains for example between sensors with analogue voltage output and the CSM measuring modules of series HV AD. By the use of these HV measuring cables combined with the suitable measuring module a voltage up to 90 V and a high voltage up to 1000 V in the stationary test field or mobile road test can be measured.

HV VOLTAGE MEASUREMENT



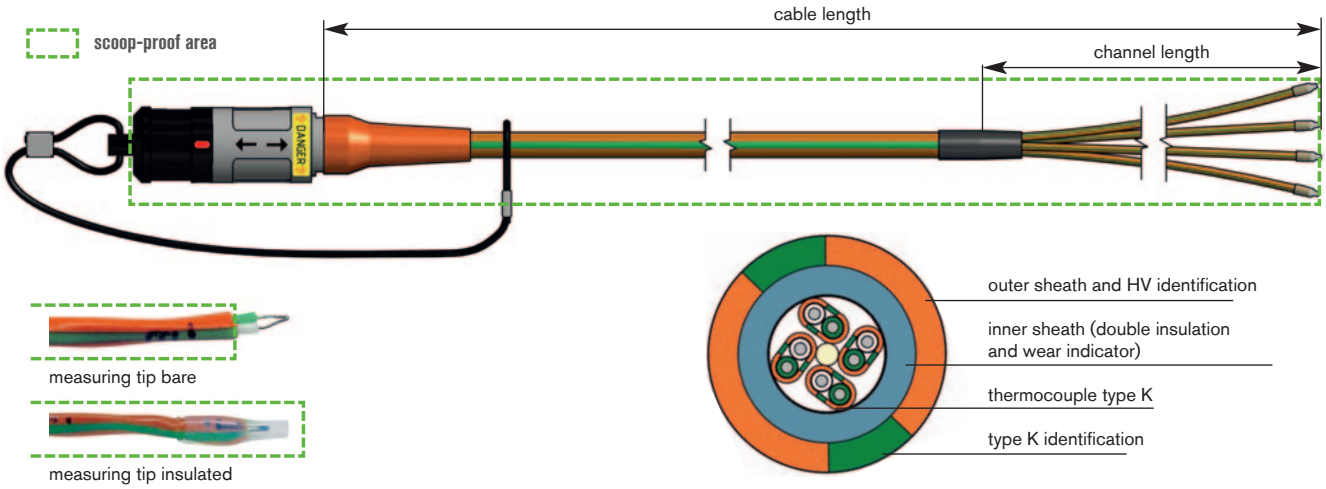
By the use of HV measuring cables (two of three core types) reliable measurements of DC and AC voltage in HV environments can be made. The measuring cables are designed for an operating voltage of up to 1800 V. Furthermore, the cores are colour coded acc. to the voltage type - red and black for plus and minus pole as well as brown, black and grey for the phases L1, L2 and L3.

HIGHLY FLEXIBLE HV CABLES

Our highly flexible HV single cores and sensor cables are especially appropriate for the laying at HV test benches. The HV single cores are an optimal feed line for electric motors or battery systems. By the use of silicone as insulating material combined with a fine stranding, the cables can be installed easily. The screened HV single core offers a 100% EMC protection by a double screening of braid and aluminium foil.

HV temperature sensor type K

HV 4-channel thermocouple with FEP insulated thermo channels



Application range:

Safe HV temperature measurement in HV environments

Connector:

Lemo Redel male connector with orange kink protection sleeve and black protecting cap, 8-pin, B-coded
1000 V AC voltage-stable – IP 67 when connected

Sensor:

Thermocouple:	4 x type K
Limit deviation:	class 1
Measuring point:	bare or electrically insulated (1000 V)
Temperature range single channel:	-40°C / +180°C
Response time:	on request

Cable data:

Connection cable:	HV thermo cable type K
Insulation:	FEP – green and white
Pair sheath:	FEP – orange with green vertical stripes
Inner sheath:	FEP – blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with green vertical stripes
Stranding:	paired construction (for EMC)
Outer diameter:	approx. 6,1 mm
Dielectric strength:	1000 V AC over single channel
Temperature range fixed laying: flexible application:	 -50°C / +150°C -40°C / +150°C
Special characteristics:	contact protection of individual channels ✓ mechanically rugged ✓

Tests:

▶ Cable test
over single channel in water bath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ Sensor test
routine test of harnessed connector
with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

Issue of HV test certificate with reference to batch number due to optimum traceability

Optional: Test and repair of already used sensors on request

CONFIGURATION EXAMPLES

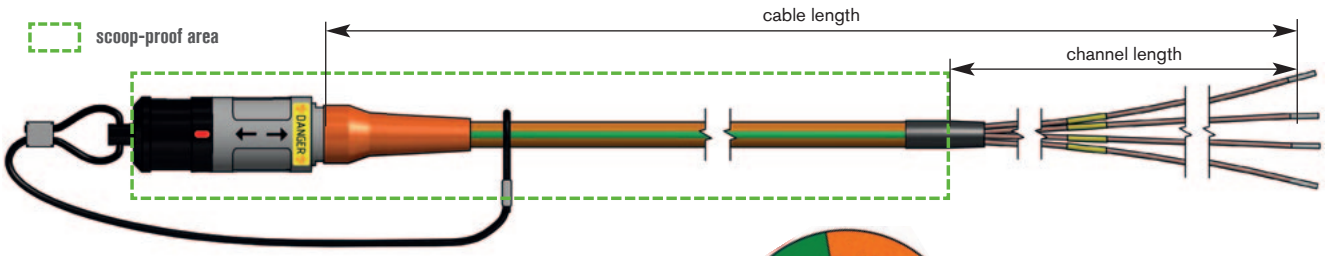
item no.	connection cable length [mm]	single channel length [mm]				type of measuring tip
		channel 1	channel 2	channel 3	channel 4	measuring tip
T141-056-330	2400	400	400	400	400	insulated
T141-051-650	2400	400	400	400	400	bare
T141-061-909	3000	580	560	575	355	insulated

Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

HV temperature sensor type K

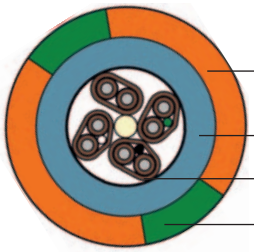
HV 4-channel thermocouple with PI (polyimide) insulated thermo channels




measuring tip bare


measuring tip insulated
(open shrinkable sleeve)/channel oil resistant


measuring tip bare/channel oil resistant



Application range:

Safe HV temperature measurement in HV environments

Connector:

Lemo Redel male connector with orange kink protection sleeve and black protecting cap, 8-pin, B-coded
1000 V AC voltage-stable – IP 67 when connected

Sensor:

Thermocouple:	4 x type K
Limit deviation:	class 1
Measuring point:	bare or electrically insulated (1000 V)
Temperature range single channel:	-40°C / +250°C
Response time:	on request

Cable data:

Connection cable:	HV thermo cable type K
Insulation:	PI foil
Pair sheath:	PI foil
Inner sheath:	FEP – blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with green vertical stripes
Stranding:	optimised in layers
Outer diameter:	approx. 4,5 mm
Dielectric strength:	1000 V AC over inner sheath
Temperature range	
fixed laying:	-50°C / +150°C
flexible application:	-40°C / +150°C
Special characteristics:	small cable diameter for narrow spaces ✓

Tests:

▶ Cable test
over inner sheath in water bath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ Sensor test
routine test of harnessed connector
with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

Issue of HV test certificate with reference to batch number due to optimum traceability

Optional: Test and repair of already used sensors on request

CONFIGURATION EXAMPLES

item no.	connection cable length [mm]	single channel length [mm]				type of measuring tip
		channel 1	channel 2	channel 3	channel 4	measuring tip
T141-058-907	2400	400	400	400	400	bare / channel oil resistant
T141-051-415	2400	400	400	400	400	bare
T141-060-960	3000	570	620	560	385	insulated

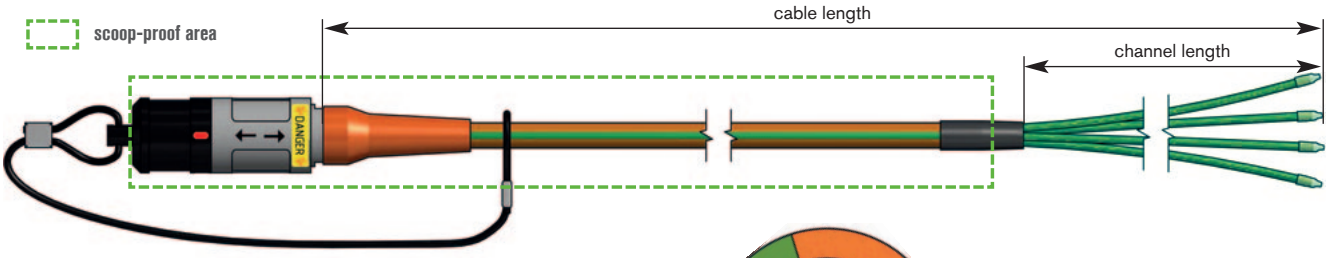
Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

HV temperature sensor type K

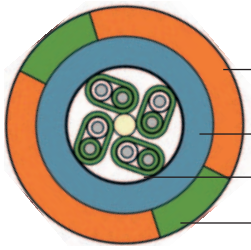
HV 4-channel thermocouple with PFA insulated thermo channels

NEW



measuring tip bare

measuring tip insulated



Application range:

Safe HV temperature measurement in HV environments

Connector:

Lemo Redel male connector with orange kink protection sleeve and black protecting cap, 8-pin, B-coded
1000 V AC voltage-stable – IP 67 when connected

Sensor:

Thermocouple:	4 x type K
Limit deviation:	class 1
Measuring point:	bare or electrically insulated (1000 V)
Temperature range single channel:	-40°C / +250°C
Response time:	on request

Cable data:

Connection cable:	HV thermo cable type K
Insulation:	PFA – green and white
Pair sheath:	PFA – green acc. to RAL 6018
Inner sheath:	FEP – blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with green vertical stripes
Stranding:	paired construction (for EMC)
Outer diameter:	approx. 4,4 mm
Dielectric strength:	1000 V AC over inner sheath
Temperature range fixed laying: flexible application:	-50°C / +150°C -40°C / +150°C
Special characteristics:	small cable diameter for narrow spaces ✓

Tests:

▶ Cable test
over single channel in water bath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ Sensor test
routine test of harnessed connector
with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

Issue of HV test certificate with reference to batch number due to optimum traceability

Optional: Test and repair of already used sensors on request

CONFIGURATION EXAMPLES

item no.	connection cable length [mm]	single channel length [mm]				type of measuring tip
		channel 1	channel 2	channel 3	channel 4	measuring tip
T141-063-016	2400	400	400	400	400	bare
T141-063-018	3000	500	500	500	500	bare
T141-063-019	2400	400	400	400	400	insulated
T141-063-020	3000	500	500	500	500	insulated

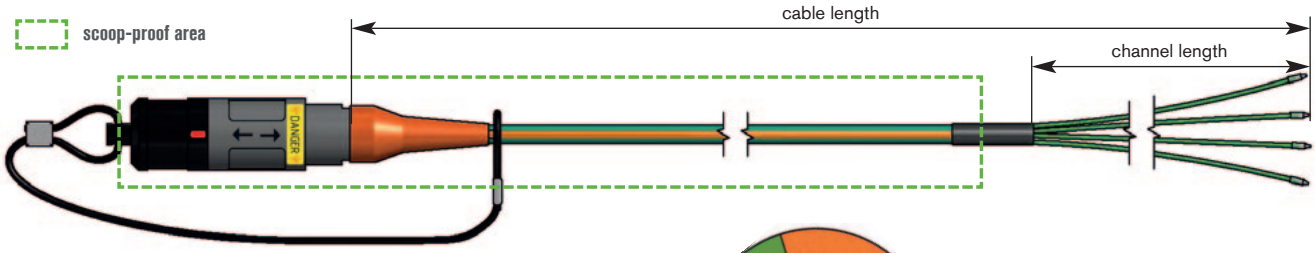
Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

HV temperature sensor type K

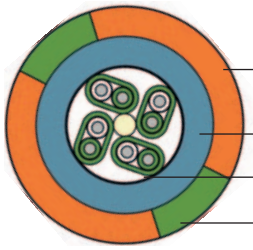
HV 4-channel thermocouple as high temperature version

Temperature resistant up to +200°C



measuring tip bare

measuring tip insulated



Application range:

Safe HV temperature measurement with ambient temperatures up to + 200°C (for example in hardening processes of impregnated motor windings)

Connector:

Lemo Redel male connector with orange kink protection sleeve and black protecting cap, 8-pin, B-coded
1000 V AC voltage-stable – IP 67 when connected

Sensor:

Thermocouple:	4 x type K
Limit deviation:	class 1
Measuring point:	bare or electrically insulated (1000 V)
Temperature range single channel:	-40°C / +250°C
Response time:	on request

Cable data:

Connection cable:	HV thermo cable type K HT
Insulation:	PFA – green and white
Pair sheath:	PFA – green acc. to RAL 6018
Inner sheath:	FEP – blue acc. to RAL 5024
Outer sheath:	Besilen®
Sheath colour:	orange with green vertical stripes
Stranding:	paired construction (for EMC)
Outer diameter:	approx. 4,4 mm
Dielectric strength:	1000 V AC over inner sheath
Temperature range fixed laying: flexible application:	-40°C / +220°C -25°C / +220°C
Special characteristics:	high temperature resistant ✓ highly flexible ✓ small cable diameter for narrow spaces ✓

Tests:

▶ Cable test
over blue inner sheath in water bath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ Sensor test
routine test of harnessed connector
with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

Issue of HV test certificate with reference to batch number due to optimum traceability

Optional: Test and repair of already used sensors on request

CONFIGURATION EXAMPLES

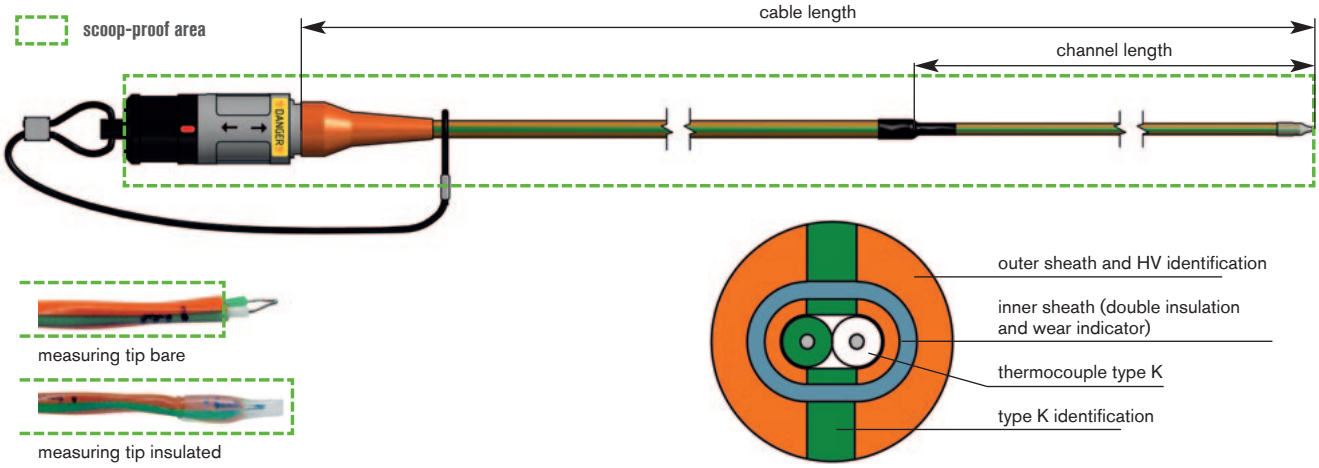
item no.	connection cable length [mm]	single channel length [mm]				type of measuring tip
		channel 1	channel 2	channel 3	channel 4	measuring tip
T151-061-737	3000	500	500	500	500	insulated
T151-061-736	3000	500	500	500	500	bare

Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

HV temperature sensor type K

HV 1-channel thermocouple



Application range:

Safe HV temperature measurement in HV environments

Connector:

Lemo Redel male connector with orange kink protection sleeve and black protecting cap, 2-pin, C-coded
1000 V AC voltage-stable – IP 67 when connected

Sensor:

Thermocouple:	1 x type K
Limit deviation:	class 1
Measuring point:	bare or electrically insulated (1000 V)
Temperature range single channel:	-40°C / +180°C
Response time:	on request

Cable data:

Connection cable:	HV thermo cable type K
Insulation:	FEP – green and white
Pair sheath:	FEP – orange with green vertical stripes
Inner sheath:	FEP – blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with green vertical stripes
Stranding:	paired construction (for EMC)
Outer diameter:	approx. 3,4 mm
Dielectric strength:	1000 V AC over single channel
Temperature range fixed laying: flexible application:	 -50°C / +150°C -40°C / +150°C
Special characteristics:	contact protection over single channel ✓

Tests:

▶ **Cable test**
over pair sheath in water bath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ **Sensor test**
routine test of harnessed connector with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

Issue of HV test certificate with reference to batch number due to optimum traceability

Optional: Test and repair of already used sensors on request

CONFIGURATION EXAMPLES

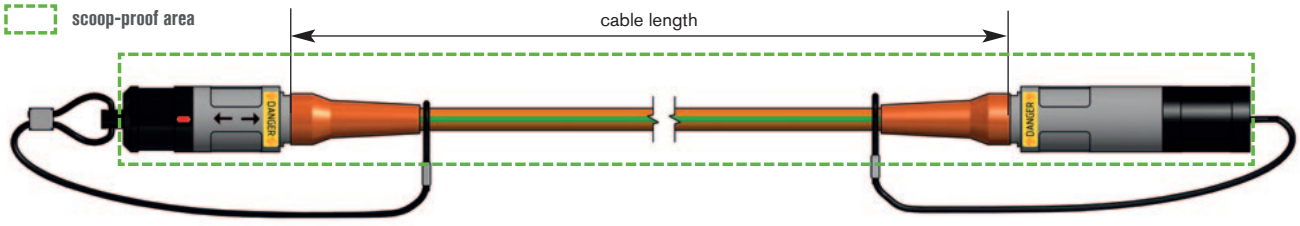
item no.	connection cable length [mm]	single channel length [mm]	type of measuring tip
		channel 1	measuring tip
T141-059-052	2400	400	insulated
T141-058-124	3000	400	bare

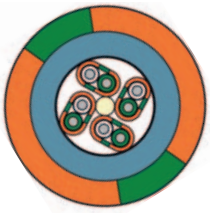
Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

HV extension cable type K

HV 4- and 1-channel extension cable with FEP insulated thermo channels





Application range:

Extension of 4- or 1-channel high voltage sensors type K

Connectors:

Lemo Redel connector -
male and female,
with orange kink protection sleeve and black protecting cap
4-channel:
8-pin, B-coded
1000 V AC voltage-stable -
IP 67 when connected

2-channel:
2-pin, C-coded
1000 V AC voltage-stable -
IP 67 when connected

Cable data:

	4-channel	1-channel
Connection cable:	HV thermo cable type K	HV thermo cable type K
Insulation:	FEP – green and white	FEP – green and white
Pair sheath:	FEP – orange with green vertical stripes	FEP – orange with green vertical stripes
Inner sheath:	FEP – blue acc. to RAL 5024	FEP – blue acc. to RAL 5024
Outer sheath:	PUR	PUR
Sheath colour:	orange with green vertical stripes	orange with green vertical stripes
Stranding:	paired construction (for EMC)	paired construction (for EMC)
Outer diameter:	approx. 6,1 mm	approx. 3,4 mm
Dielectric strength:	1000 V AC	1000 V AC over single channel
Temperature range fixed laying: flexible application:	 -50°C / +150°C -40°C / +150°C	 -50°C / +150°C -40°C / +150°C
Special characteristics:	contact protection over all components ✓	contact protection over all components ✓

Tests:

▶ Cable test
over pair sheath in water bath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ Product test
routine test of harnessed connector
with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

Issue of HV test certificate with reference to batch number due to optimum traceability

Optional: Test and repair of already used sensors on request

CONFIGURATION EXAMPLES

item no.	connection cable length [mm]	channels
T141-054-030	1000	4
T141-054-143	2000	4
T141-058-575	3000	4
T141-058-576	5000	4

Total lengths can be realised on customer's request.

CONFIGURATION EXAMPLES

item no.	connection cable length [mm]	channels
T141-062-840	1000	1
T141-062-843	3000	1
T141-062-844	5000	1

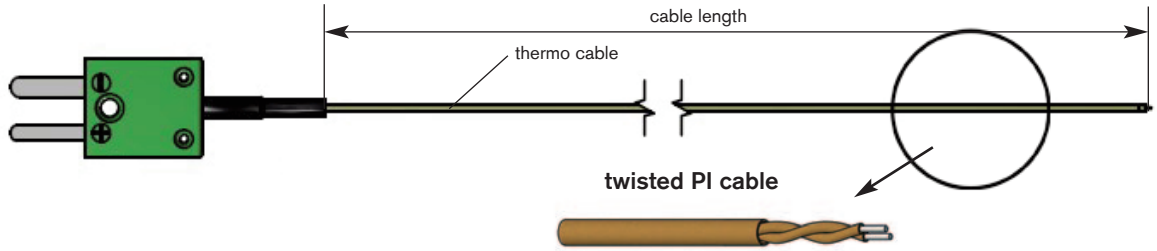
Total lengths can be realised on customer's request.

SAB identification:

item number, batch number, length

Special thermocouple type K

surface thermocouple made of twisted thermo cable



Application range:

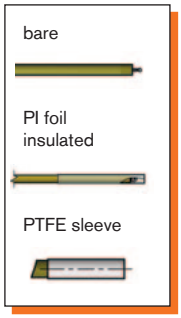
for example for temperature collection at Hairpin windings in the stator of E-drives. The scattering effect of electromagnetic radiation from the surrounding copper windings shall not distort the measuring result.

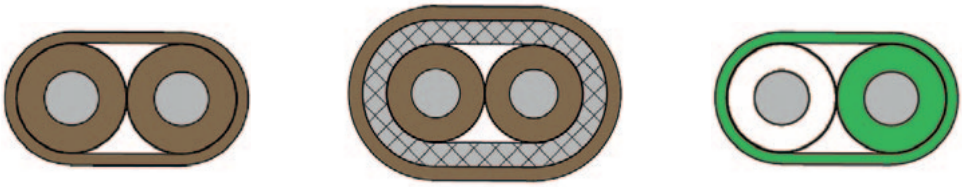
Connector:

e.g. miniature thermo plug type K (as shown in the figures)

Sensor:

Thermocouple:	1 x type K
Limit deviation:	class 1
Measuring point:	see Illustration of measuring tips
Temperature range single channel:	-40°C / +250°C
Response time:	on request





Cable data:

	PI (polyimide)	PI (polyimide)	PFA
Designation:	twisted PI thermo cable	screened and twisted PI thermo cable	twisted PFA thermo cable
Insulation:	PI foil insulation	PI foil insulation	PFA
Outer sheath:	PI foil insulation	PI foil insulation	PFA
Stranding:	paired construction (for EMC)	paired construction (for EMC)	paired construction (for EMC)
Outer diameter:	approx. 0,85 mm	approx. 1,05 mm	approx. 0,80 mm
Temperature range fixed laying: flexible application:	 -40°C / +250°C -40°C / +250°C	 -40°C / +250°C -40°C / +250°C	 -40°C / +250°C -40°C / +250°C

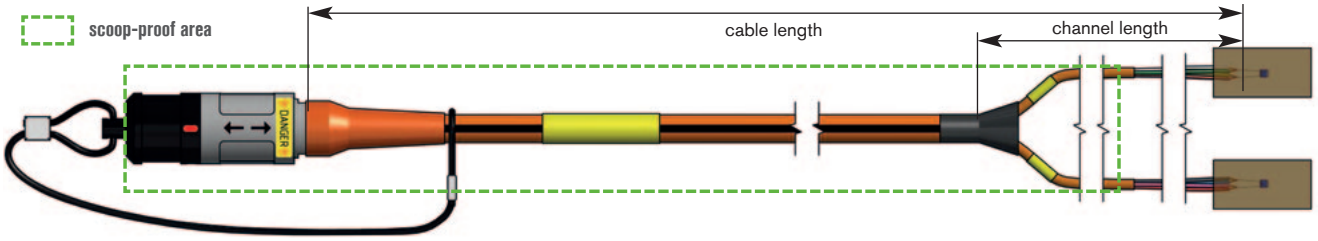
CONFIGURATION EXAMPLES

item no.	type	measuring tip	cable	cable length m	connection end
T100-061-046	K	PTFE sleeve	2 x 0,20 mm PI twisted	1.5	miniature thermoplug
T100-061-998	K	PI foil	2 x 0,20 mm PI twisted	2.0	bare
T100-060-628	K	bare	2 x 0,20 mm PI twisted	2.0	miniature thermoplug
T100-060-629	K	bare	2 x 0,20 mm PI twisted	3.0	miniature thermoplug
T100-061-276	K	bare	2 x 0,20 mm PI twisted	1.0	bare

SAB identification:
item number, batch number

HV temperature sensor PT100/PT1000

HV 2 x PT100/PT1000 resistance thermometer



Application range:

Safe HV temperature measurement in HV environments

Connector:

Lemo Redel male connector with orange kink protection sleeve and black protecting cap, 8-pin, C-coded
1000 V AC voltage-stable – IP 67 when connected

Sensor:

Type of sensor:	2 x PT100
Limit deviation:	class A
Wire circuit:	4-wire
Measuring point:	embedded in Pi adhesive pad
Dimension of sensor:	for example 2,3 mm x 2,0 mm x 0,47 mm (appropriate for pouch cells) or 3,0 mm x 0,80 mm x 0,60 mm
Temperature range single channel:	-30°C / +180°C

Cable data:

	FEP	FEP
Designation:	HV measuring cable – 1 x 8 cores	HV measuring cable – 4 x 2 cores
Insulation:	FEP – acc. to DIN 47100 1-8 (core-Ø 0,45 mm)	FEP – acc. to DIN 47100 1-8
Outer sheath:	PUR	PUR
Stranding:	optimised in layers	optimised in layers
Outer diameter:	approx. 4,6 mm	approx. 7,3 mm
Dielectric strength:	1000 V AC over orange inner sheath	1000 V AC over orange bundle sheath
Temperature range fixed laying: flexible application:	-40°C / +150°C -40°C / +150°C	-40°C / +150°C -40°C / +150°C

Tests:

▶ **Cable test**
core/core – 2500 V AC - 5 min
over orange bundle sheath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ **Sensor test**
routine test of harnessed connector
with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

Issue of HV test certificate with reference to batch number due to optimum traceability

Optional: Test and repair of already used sensors on request

CONFIGURATION EXAMPLES

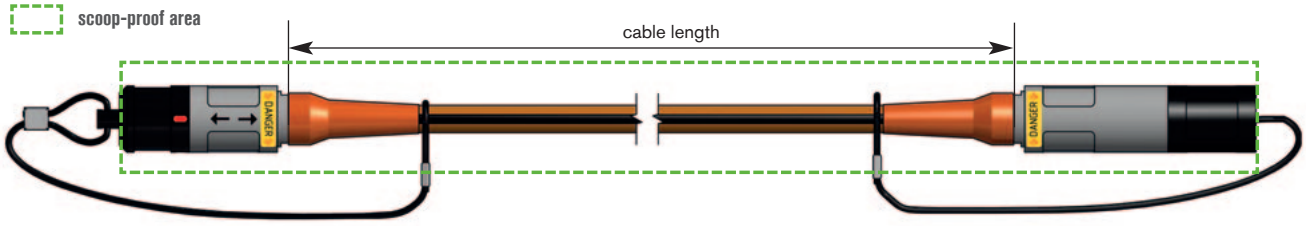
item no.	connection cable length [mm]	single channel length [mm]	
		channel 1	channel 2
T641-060-817	2000	70	70
T641-060-870	5000	700	700

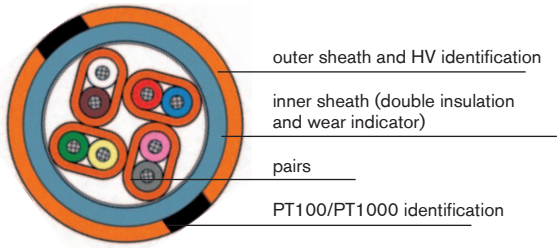
Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

HV extension cable PT100/PT1000

HV 2 x PT100/PT1000 extension cable





Application range:

Extension of HV 2 x Pt 100 sensors

Connectors:

Lemo Redel male connector -
male/female connector with orange kink protection sleeve and black protecting cap, 8-pin, C-coded
1000 V AC voltage-stable – IP 67 when connected

Cable data:

Connection cable:	HV measuring cable
Insulation:	FEP – acc. to DIN 47100 1-8
Pair sheath:	FEP – orange acc. to RAL 2004
Inner sheath:	PUR – blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with green vertical stripes
Stranding:	optimised in layers
Outer diameter:	approx. 7,4 mm
Dielectric strength:	1000 V AC over pair sheath
Temperature range fixed laying: flexible application:	 -40°C / +150°C -40°C / +150°C
Special characteristics:	contact protection over all components ✓

CONFIGURATION EXAMPLES

item no.	connection cable length [mm]
T641-056-497	1000
T641-058-117	3000
T641-058-574	5000

Total cable and channel lengths can be realised on customer's request.

Tests:

▶ **Cable test**
core/core – 2500 V AC - 5 min
over pair sheath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ **Product test**
routine test of harnessed connector
with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

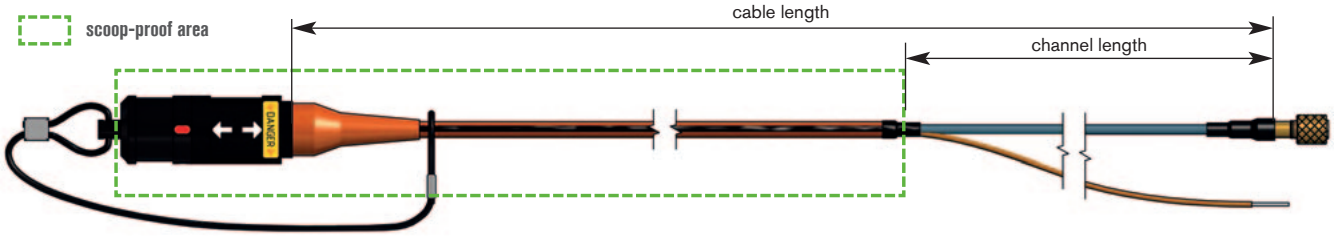
Issue of HV test certificate with reference to batch number due to optimum traceability

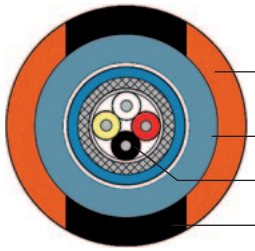
Optional: Test and repair of already used sensors on request

SAB identification:
item number, batch number, length

HV connecting cable

for acceleration sensors (IEPE)





Application range:

Safe HV acceleration measurement for example with CSM HV IEPE3 FL 100 measuring module

Connector:

Lemo Redel male connector with orange kink protection sleeve and black protecting cap, 8-pin, C-coded
1000 V AC voltage-stable – IP 67 when connected

Sensor connection side:

Connector:	4-pin ¼-28 UNF socket for the connection of a triaxial IEPE acceleration sensor (also with 4-pin 8-36 UNF and 4-pin M4,5)
Screen:	led out in bundle and insulated with shrinkable sleeve
Temperature range bundle channel:	-55°C / +250°C

Cable data:

Connection cable:	HV IEPE sensor cable
Core insulation:	PFA – red, white, black, yellow
Bundle sheath:	PFA – blue acc. to RAL 5015
Inner sheath:	PUR – blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with black vertical stripes
Stranding:	optimised in layers
Outer diameter:	approx. 4,3 mm
Dielectric strength:	1000 V AC over second inner sheath
Temperature range fixed laying: flexible application:	 -50°C / +150°C -40°C / +150°C
Special characteristics:	contact protection see presentation ✓

Tests:

▶ **Cable test**
core/core – 600 V AC - 1 min - acc. to IEC 60584-1
over second inner sheath in water bath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ **Product test**
routine test of harnessed connector
with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

Issue of HV test certificate with reference to batch number due to optimum traceability

Optional: Test and repair of already used sensors on request

CONFIGURATION EXAMPLES

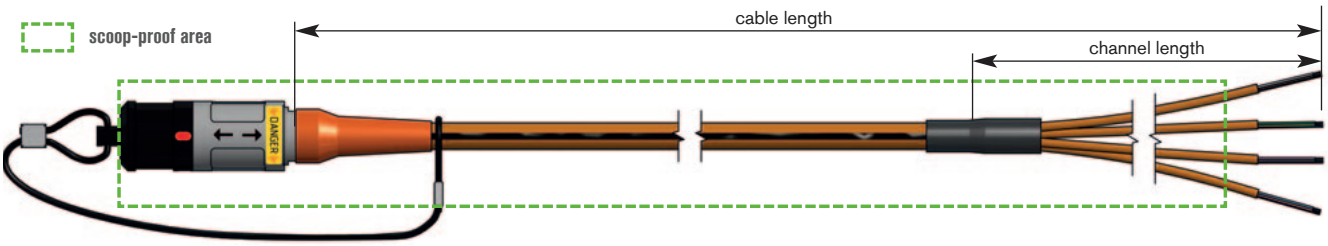
item no.	connection cable length [mm]	single channel length [mm]		male connector
		channel 1	grounding	
T642-062-666	3000	100	200	4-Pin ¼ -28 UNF
T642-062-794	6000	100	200	4-Pin ¼ -28 UNF
T642-062-635	3000	100	200	4-Pin 8-36 UNF

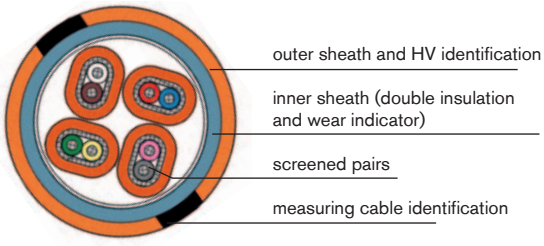
Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

HV connecting cable

for strain gauges





Application range:

Safe HV strain gauge measurement (full / half bridge) for example with CSM HV STG4 pro BS20 measuring module

Connector:

Lemo Redel male connector with orange kink protection sleeve and black protecting cap, 8-pin, E-coded
1000 V AC voltage-stable – IP 67 when connected

Connection end:

Outer sheath:	122 mm stripped
Pair sheath:	22 mm
Open end:	2 mm
Connection:	tinned
Screen:	small cable diameter for narrow spaces
Temperature range single channel:	-55°C / +180°C

Cable data:

Connection cable:	HV strain gauge sensor cable
Core insulation:	FEP – acc. to DIN 47100 1-8 (core-Ø 0,55 mm)
Screen:	tinned copper braiding incl. drain wire
Pair sheath:	FEP – orange acc. to RAL 2004
Inner sheath:	PUR – blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with black vertical stripes
Stranding:	paired construction (for EMC)
Outer diameter:	approx. 7,4 mm
Dielectric strength:	1000 V AC over pair sheath
Temperature range	
fixed laying:	-50°C / +150°C
flexible application:	-40°C / +150°C

Tests:

▶ Cable test
core/core – 600 V AC - 1 min - acc. to IEC 60584-1
over pair sheath in water bath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ Product test
routine test of harnessed connector
with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

Issue of HV test certificate with reference to batch number due to optimum traceability

Optional: Test and repair of already used sensors on request

CONFIGURATION EXAMPLES

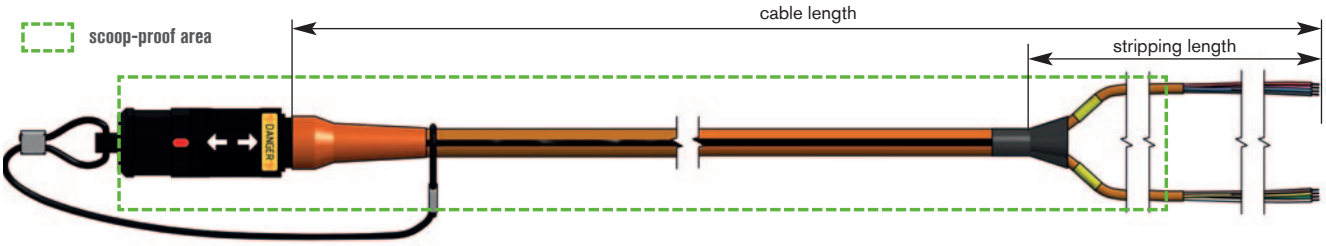
item no.	connection cable length [mm]	single channel Length [mm]			connection type
		Length sheath	Length pair	Length core	connection
T644-061-009	2000	122	22	2	tinned
T644-061-014	3000	122	22	2	tinned

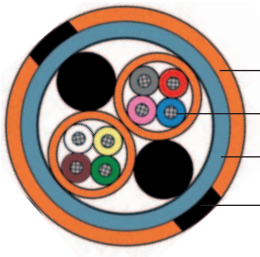
Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

HV analogue measuring cable

HV 2-channel analogue measuring cable for CSM measurement technology (90 V)





Application range:

Safe HV analogue measurements with standard sensors combined with CSM measuring modules HV AD2 IF20, HV AD4 IF20 & HV AD4 IF1000

Connector:

Lemo Redel male connector with orange kink protection sleeve and black protecting cap, 8-pin, C-coded
1000 V AC voltage-stable – IP 67 when connected

Connection end:

(stripping lengths)

Outer sheath:	100 mm
Pair sheath:	10 mm
Open end:	2 mm
Connection:	tinned

Cable data:

Connection cable:	HV measuring cable
Core insulation:	FEP – acc. to DIN 47100 1-8
Pair sheath:	FEP – orange acc. to RAL 2004
Inner sheath:	PUR – blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with black vertical stripes
Stranding:	optimised in layers
Outer diameter:	approx. 7,3 mm
Dielectric strength:	1000 V AC over orange bundle sheath
Temperature range	
fixed laying:	-50°C / +150°C
flexible application:	-40°C / +150°C

Tests:

▶ **Cable test**
core/core – 600 V AC - 1 min - acc. to IEC 60584-1
over orange bundle sheath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ **Product test**
routine test of harnessed connector
with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

Issue of HV test certificate with reference to batch number due to optimum traceability

Optional: Test and repair of already used sensors on request

CONFIGURATION EXAMPLES

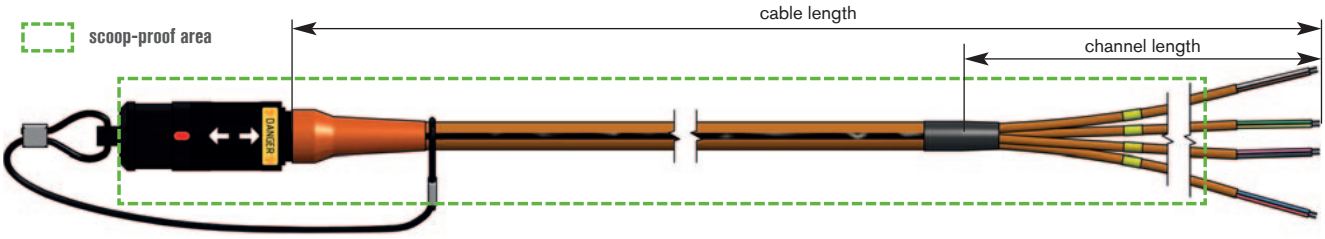
item no.	connection cable length [mm]	single channel length [mm]		
		sheath	pair	core
T641-056-710	2000	100	10	2
T641-056-711	3000	100	10	2

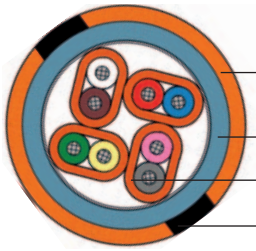
Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

HV voltage measuring cable (90 V)

HV 4-channel voltage measuring cable for CSM measurement technology (90 V)





Application range:

Safe HV measurements of analogue voltage combined with CSM measuring modules HV AD4 OW20, HV AD8 OW20 & HV AD4 OW1000*

*test bench & road test

Connector:

Lemo Redel male connector with orange kink protection sleeve and black protecting cap, 8-pin, B-coded
1000 V AC voltage-stable – IP 67 when connected

Connection end:

	(stripping lengths)
Outer sheath:	122 mm stripped
Pair sheath:	22 mm
Open end:	2 mm
Connection:	tinned
Temperature range single channel:	-55°C / +180°C

Cable data:

Connection cable:	HV measuring cable
Core insulation:	FEP – acc. to DIN 47100 1-8
Pair sheath:	FEP – orange acc. to RAL 2004
Inner sheath:	PUR – blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with black vertical stripes
Stranding:	paired construction (for EMC)
Outer diameter:	approx. 7,4 mm
Dielectric strength:	1000 V AC over pair sheath
Temperature range	
fixed laying:	-50°C / +150°C
flexible application:	-40°C / +150°C
Special characteristics:	contact protection also over individual channels ✓

Tests:

▶ **Cable test**
core/core – 2500 V AC - 5 min
over pair sheath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ **Product test**
routine test of harnessed connector
with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

Issue of HV test certificate with reference to batch number due to optimum traceability

Optional: Test and repair of already used sensors on request

CONFIGURATION EXAMPLE

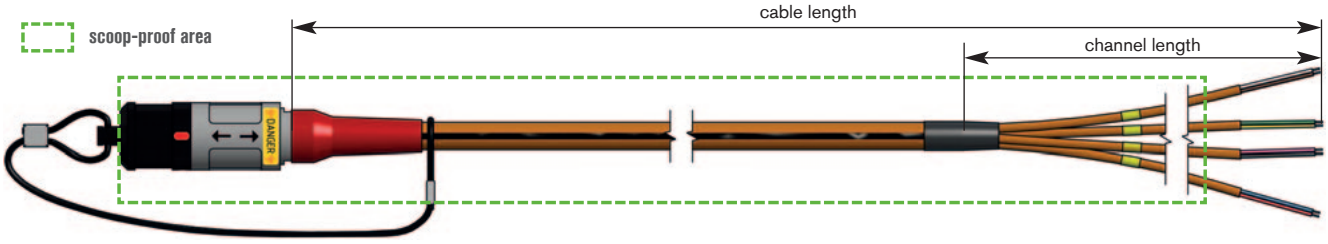
item no.	connection cable length [mm]	single channel length [mm]			connection type
		sheath	pair	core	connection
T645-062-738	2000	122	22	2	tinned

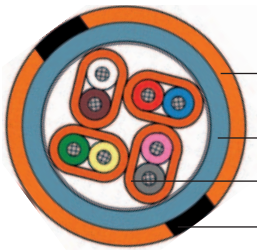
Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

HV voltage measuring cable (1000 V)

HV 4-channel voltage measuring cable for CSM measurement technology (1000 V)





Application range:

Safe HV measurements of high voltage combined with CSM measuring modules HV AD4 XW1000* & HV AD4 XW20

*test bench & road test

Connector:

Lemo Redel male connector with red kink protection sleeve and black protecting cap, 8-pin, D-coded
1000 V AC voltage-stable – IP 67 when connected

Connection end:

	(stripping lengths)
Outer sheath:	122 mm stripped
Pair sheath:	22 mm
Open end:	2 mm
Connection:	tinned
Temperature range single channel:	-55°C / +180°C

Cable data:

Connection cable:	HV measuring cable
Core insulation:	FEP – acc. to DIN 47100 1-8
Pair sheath:	FEP – orange acc. to RAL 2004
Inner sheath:	PUR – blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with black vertical stripes
Stranding:	paired construction (for EMC)
Outer diameter:	approx. 7,4 mm
Dielectric strength:	1000 V AC over pair sheath
Temperature range	
fixed laying:	-50°C / +150°C
flexible application:	-40°C / +150°C
Special characteristics:	contact protection also over individual channels ✓

Tests:

▶ **Cable test**
core/core – 2500 V AC - 5 min
over pair sheath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ **Product test**
routine test of harnessed connector with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

Issue of HV test certificate with reference to batch number due to optimum traceability

Optional: Test and repair of already used sensors on request

CONFIGURATION EXAMPLE

item no.	connection cable length [mm]	single channel length [mm]			connection type
		sheath	pair	core	connection
T645-062-695	2000	122	22	2	tinned
T645-063-151	3000	122	22	2	tinned

Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

HV measuring cable (DC)

for DC voltage measurement

Marking for HV connecting cable 38339800:
SAB BRÖCKSKES · D-VIERSEN · HV-Messleitung (2x0,25mm²)

Application range: The high voltage measuring cable is used in the development of electric vehicles where scoop-proof testing and measuring of up to 1800 V DC operating voltage and application in the HV environment of electromobility take place. Examples of applications are HV power electronics, HV batteries, electric motors, inverters, etc. High voltage measuring cables are used on the test benches and in test vehicles.

Construction:

Conductor:	tinned copper strands, extra fine wires
Core insulation:	FEP
Colour code:	red and black
Stranding:	together with tinned copper drain wire, AWG 24
Screen:	alu foil and tinned copper braiding
Inner sheath:	FEP - blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with black vertical stripes

Outstanding features:

- **temperature resistance up to +150 °C (up to 3000 hours)**
- **high flexibility**
- **high abrasion resistance**
- **easy harnessing**

Technical data:

Scoop-proof:	1000 V DC over blue inner sheath
Testing voltage:	5000 V AC over blue inner sheath
Operating voltage Uo:	1000 V DC
Operating voltage U:	1800 V DC
Testing voltage:	core/core 5000 V AC core/screen 5000 V AC
Min. bending radius fixed laying: flexible application:	 5 x d 10 x d
Temperature range fixed laying: flexible application: short time use:	 -50/+125 °C -40/+125 °C +150 °C (up to 3000 h)
Absence of harmful substances:	acc. to RoHS directive of the European Union

item no.	no. of cores x cross section n x mm²	outer-ø approx. mm	copper figure kg/km	cable weight ≈ kg/km	ohmic resistance max. Ω/km
3833-9800	2 x 0,25	6,5	21,3	58	80,0
3833-9819	2 x 0,34	6,7	24,9	63	58,8
3833-9801	2 x 0,50	7,1	28,1	70	40,1
3833-9802	2 x 1,00	7,8	42,5	90	20,0
3833-9803	2 x 1,50	8,4	55,8	108	13,7

Other dimensions and colours are possible on request.

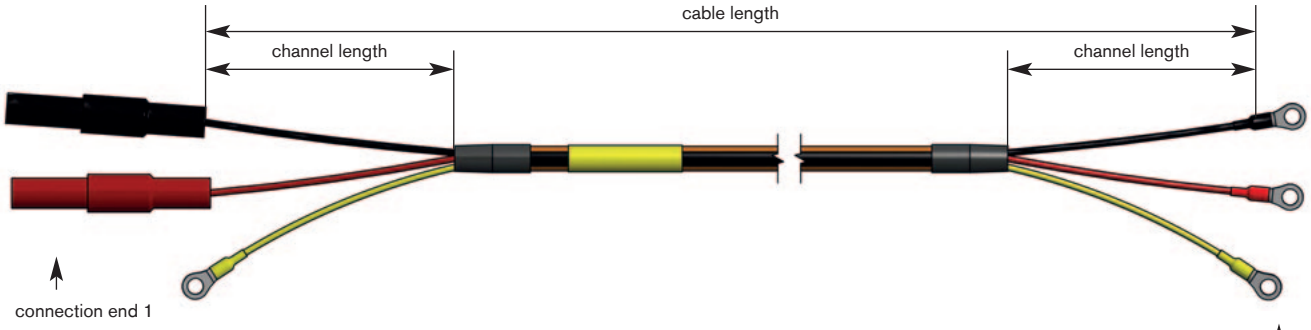
Possible on request:

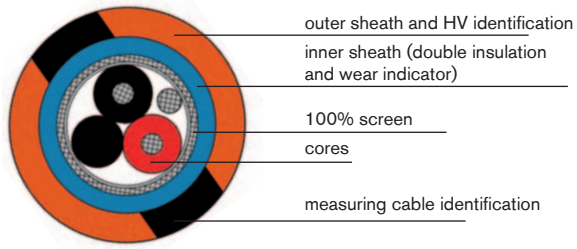
As harnessed measuring cable with connected lab plugs to collect the tension at HV components

- see next page -

HV measuring cable (DC)

for DC voltage measurement (as cable harness)





Application range:

Safe HV measurement of DC voltages

Connectors:

Safety lab plugs 1000 V, CAT III,
red and black, 4 mm cable lug M4

Connection end:

Stripping length:	250 mm
Screen:	led out with filler and insulated with shrinkable sleeve
Temperature range of single core:	-55°C / +180°C

Cable data:

Connection cable:	HV measuring cable
Core insulation:	FEP – red and black
Stranding:	together with tinned copper drain wire, AWG 24
Screen:	100% screen with alu foil and braiding
Inner sheath:	PUR – blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with black vertical stripes
Outer diameter:	see table on page 22
Scoop-proof:	1000 V DC over blue inner sheath
Operating voltage:	1800 V DC
Temperature range	
fixed laying:	-50°C / +125°C
flexible application:	-40°C / +125°C
short time use:	+150°C (up to 3000 h)

CONFIGURATION EXAMPLE

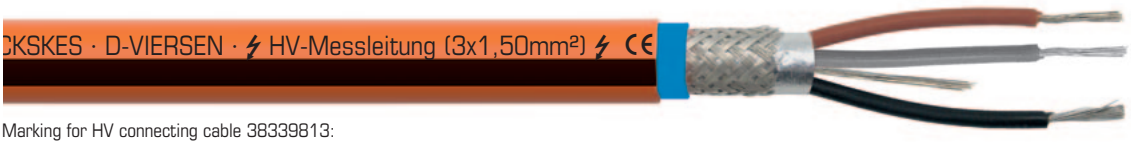
item no.	connection cable length [mm]	single channel length [mm]		
		channel 1	channel 2	safety lab plugs + M4 cable lugs
T645-062-912	6500	250	250	

Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

HV measuring cable (AC)

for AC voltage measurement



Marking for HV connecting cable 38339813:
SAB BRÖCKSKES · D-VIERSEN · HV-Messleitung (3x1,50mm²)

Application range: The high voltage measuring cable is used in the development of electric vehicles where scoop-proof testing and measuring of up to 1800 V DC operating voltage and application in the HV environment of electromobility take place. Examples of applications are HV power electronics, HV batteries, electric motors, inverters, etc. High voltage measuring cables are used on the test benches and in test vehicles.

Construction:

Conductor:	tinned copper strands, extra fine wires
Core insulation:	FEP
Colour code:	brown, black, grey
Stranding:	together with tinned copper drain wire, AWG 24
Screen:	alu foil and tinned copper braiding
Inner sheath:	FEP - blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with black vertical stripes

Outstanding features:

- **temperature resistance up to +150 °C (up to 3000 hours)**
- **high flexibility**
- **high abrasion resistance**
- **easy harnessing**

Technical data:

Scoop-proof:	1000 V DC over blue inner sheath
Testing voltage:	5000 V AC over blue inner sheath
Operating voltage:	core/core 1800 V DC core/core 1000 V ASC
Testing voltage:	core/core 5000 V AC core/screen 5000 V AC
Min. bending radius fixed laying: flexible application:	 5 x d 10 x d
Temperature range fixed laying: flexible application: short time use:	 -50/+125 °C -40/+125 °C +150 °C (up to 3000 h)
Temperature range of cores:	up to +180 °C (short time use up to +205 °C)
Oil resistance:	very good - TMPU acc. to EN 50363-10-2 + VDE 0207-363-10-2
Absence of harmful substances:	acc. to RoHS directive of the European Union

item no.	no. of cores x cross section n x mm²	outer-ø approx. mm	copper figure kg/km	cable weight ≈ kg/km	ohmic resistance max. Ω/km
38339820	3 x 0,25	6,8	25,5	66	80,0
38339816	3 x 0,34	7,0	28,3	71	58,8
38339815	3 x 0,50	7,4	34,5	81	40,1
38339814	3 x 1,00	8,1	53,3	106	20,0
38339813	3 x 1,50	8,8	71,7	130	13,7

Other dimensions and colours are possible on request.

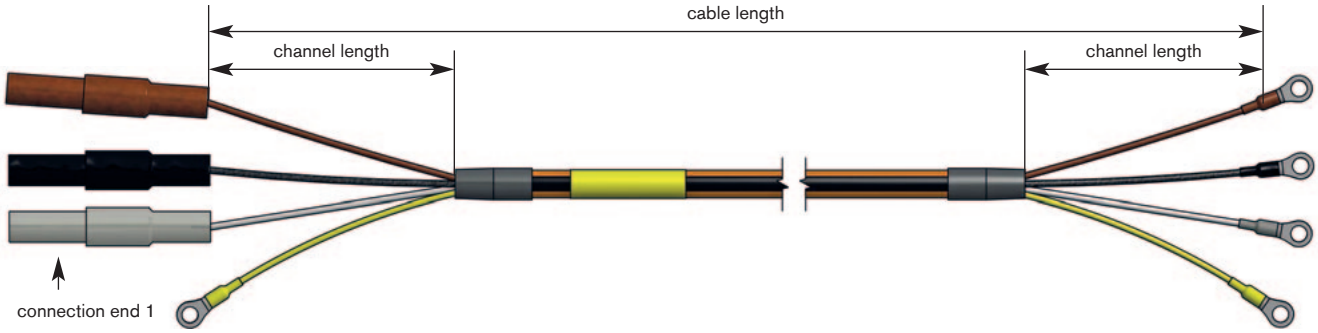
Possible on request:

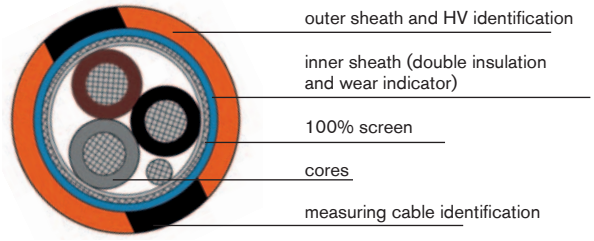
As harnessed measuring cable with connected lab plugs to collect the voltage at HV components

- see next page -

HV measuring cable (AC)

for AC voltage measurement (as cable harness)





Application range:

Safe HV measurement of AC voltages

Connectors:

Safety lab plugs 1000 V, CAT III,
brown, grey and black, 4 mm cable lug M4

Connection end:

Stripping length:	250 mm
Screen:	led out with filler and insulated with shrinkable sleeve
Temperature range of single core:	-55°C / +180°C

Cable data:

Connection cable:	HV measuring cable
Core insulation:	FEP – brown, black and grey
Stranding:	together with tinned copper drain wire, AWG 24
Screen:	100% screen with alu foil and braiding
Inner sheath:	PUR – blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with black vertical stripes
Outer diameter:	see table on page 24
Scoop-proof:	1000 V DC over blue inner sheath
Operating voltage:	1800 V DC
Temperature range	
fixed laying:	-50°C / +125°C
flexible application:	-40°C / +125°C
short time use:	+150°C (up to 3000 h)

CONFIGURATION EXAMPLE

item no.	connection cable length [mm]	stripping length [mm]		
		connection 1	connection 2	safety lab plugs + M4 cable lugs
T645-062-913	6500	250	250	

Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

Nominal voltage up to
Uo/U 1.8/3 kV AC

B 110 C

highly flexible Besilen® HV single core, shielded, cULus recognized

c UL us RoHS

Marking for B 110 C 01109507:
SAB BRÖCKSKES · D-VIERSEN · B 110 C Uo/U 1,8/3 kV 95,0mm² c UL us AWM Style 30123 AWM I/II A/B 150°C 3000V FT1 FT2

Application range: The connection cable is for example appropriate to connect converters to electric-mobility test benches. Due to the high voltage rating, the cable can be used for various components and power electronics. The extremely flexible cable design enables an easy laying.

Construction:

Conductor:	bare copper strands, extra fine wires
Core insulation:	Besilen® EI2 acc. to EN 50363-1 + VDE 0207-363-1, orange
Screen:	alu foil and tinned copper braiding
Sheath material:	Besilen® EM9 acc. to EN 50363-2-1 + VDE 0207-363-2-1
Sheath colour:	orange (similar RAL 2004)

Outstanding features:

- **extremely flexible**
- **good EMC characteristics**
- **halogen-free**
- **heat resistant**
- **flexible at low temperatures**
- **flame retardant and self-extinguishing**
- **weather resistant**
- **cULus recognized**

Technical data:

Nominal voltage:	Uo/U 1,8/3,0 kV AC Uo/U 2,7/5,4 kV DC
Voltage cULus:	3000 V
Testing voltage:	6500 V
Current-carrying capacity:	acc. to VDE 0298-4
Min. bending radius fixed laying: flexible application:	 6 x d 10 x d
Temperature range fixed laying: flexible application: short time use:	**DIN VDE** **cULus:** up to +150 °C -40/+180 °C -25/+180 °C +250 °C
Halogen-free:	acc. to IEC 60754-1 + VDE 0482-754-1
Fire performance:	flame retardant and self-extinguishing acc. to IEC 60332-1-2 + VDE 0482-332-1-2, cULus FT1, FT2
Corrosiveness of conflagration gases:	IEC 60754-2 + VDE 0482-754-2 - no development of corrosive conflagration gases
Weather resistance:	very good
Absence of harmful substances:	acc. to RoHS directive of the European Union

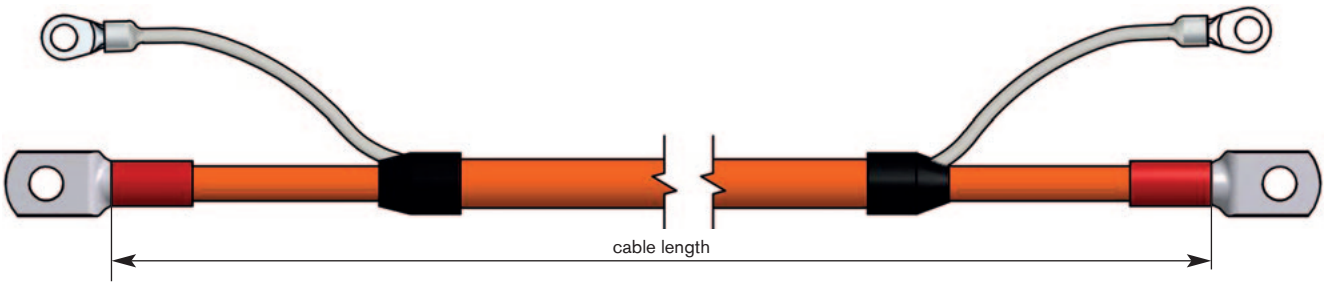
item no.	nominal cross section mm²	largest single wire ø mm	ø over inner sheath approx. mm	outer-ø approx. mm	copper figure kg/km	cable weight ≈ kg/km
01100107	1,00	0,07	4,3	7,6	27,2	70
01100157	1,50	0,07	4,7	8,0	34,4	81
01100257	2,50	0,07	5,2	8,5	44,6	96
01100407	4,00	0,07	5,9	9,2	61,3	118
01100607	6,00	0,07	6,3	9,6	83,8	143
01101007	10,00	0,07	8,2	11,7	147,7	222
01101607	16,00	0,07	8,5	12,0	205,7	273
01102507	25,00	0,10	10,9	14,7	307,4	416
01103507	35,00	0,10	12,6	16,3	432,6	548
01105007	50,00	0,10	14,5	18,2	593,6	725
01107007	70,00	0,10	16,5	20,4	804,4	954
01109507	95,00	0,10	18,4	22,3	1064,5	1244
01101207	120,00	0,10	20,1	24,2	1311,0	1514
01101507	150,00	0,10	23,3	27,4	1627,6	1873
01101857	185,00	0,15	24,9	29,2	1970,9	2231
01102407	240,00	0,15	27,5	32,0	2511,2	2841
01103007	300,00	0,15	30,0	34,7	3108,6	3354

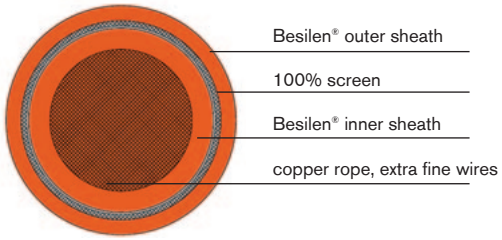
Other dimensions and colours are possible on request.

Nominal voltage up to
Uo/U 1.8/3 kV AC

B 110 C

highly flexible Besilen® HV single core, shielded, cULus recognized (as cable harness)





c UL us RoHS

Application range:

for example at HV test benches
for the transmission of high current load

Connection end:

Outer sheath:	50 mm stripped
Connection end 1+2:	tube cable lug (single core) and ring cable lug (screen)
Screen:	led out, twisted and insulated with shrinkable sleeve

Cable data:

Connection cable:	highly flexible HV single core, screened
Core insulation:	Besilen®
Screen:	100% screen with alu foil and braiding
Outer sheath:	Besilen®
Sheath colour:	orange
Outer diameter:	see table on page 26
Nominal voltage:	Uo/U 1,8/3,0 kV AC Uo/U 2,7/5,4 kV DC
Voltage cULus:	3000 V
Temperature range fixed laying: flexible application: short time use:	**DIN VDE** -40/+180 °C -25/+180 °C +250 °C
	cULus: up to +150 °C

CONFIGURATION EXAMPLE

item no.	connection cable length [mm]	stripping lengths + conductor cross section		
		side 1	side 2	cross section
S0110-1006-00075	750	50 mm	50 mm	16 mm²

Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number

Nominal voltage up to
Uo/U 1.8/3 kV AC

B 107

highly flexible Besilen® HV single core, unshielded, cULus recognized

Marking for B 107 01079507:
SAB BRÖCKSKES · D-VIERSEN · B 107 Uo/U 1,8/3 kV 95,0mm² c us AWM Style 30122 AWM I A/B 150°C 3000V FT2

Application range: The highly flexible single core is particularly appropriate for the application on electric test benches. Due to the fine stranding and the resulting flexibility, the cable can be installed easily. The high voltage single core is designed for a voltage range up to 1,8/3 kV. In this way it fulfils the increasing demands within the voltage class.

Construction:

Conductor:	bare copper strands, extra fine wires
Core insulation:	Besilen® EI2 acc. to EN 50363-1 + VDE 0207-363-1
Sheath colour:	orange (similar RAL 2004)

Outstanding features:

- **extremely flexible**
- **halogen-free**
- **heat resistant**
- **flexible at low temperatures**
- **flame retardant and self-extinguishing**
- **weather resistant**
- **cULus recognized**

Technical data:

Nominal voltage:	Uo/U 1,8/3,0 kV AC Uo/U 2,7/5,4 kV DC
Voltage cULus:	3000 V
Testing voltage:	6500 V
Current-carrying capacity:	acc. to VDE 0298-4
Min. bending radius:	5 x d
Temperature range fixed laying: flexible application: short time use:	**DIN VDE** **cULus:** up to +150 °C -40/+180 °C -25/+180 °C +250 °C
Halogen-free:	acc. to IEC 60754-1 + VDE 0482-754-1
Fire performance:	flame retardant and self-extinguishing acc. to IEC 60332-1-2 + VDE 0482-332-1-2, cULus FT2
Corrosiveness of conflagration gases:	IEC 60754-2 + VDE 0482-754-2 - no development of corrosive conflagration gases
Weather resistance:	very good
Absence of harmful substances:	acc. to RoHS directive of the European Union

item no.	nominal cross section mm²	largest single wire ø mm	outer-ø approx. mm	copper figure kg/km	cable weight ≈ kg/km
01070107	1,00	0,07	4,3	9,6	25
01070157	1,50	0,07	4,7	14,4	32
01070257	2,50	0,07	5,2	24,0	43
01070407	4,00	0,07	5,9	38,4	60
01070607	6,00	0,07	6,3	57,6	80
01071007	10,00	0,07	9,0	96,0	144
01071607	16,00	0,07	9,3	153,6	194
01072507	25,00	0,10	12,0	240,0	314
01073507	35,00	0,10	13,8	336,0	433
01075007	50,00	0,10	15,7	480,0	592
01077007	70,00	0,10	17,7	672,0	794
01079507	95,00	0,10	18,8	912,0	1033
01071207	120,00	0,10	20,5	1152,0	1282
01071507	150,00	0,10	23,7	1440,0	1604
01071857	185,00	0,15	25,3	1776,0	1938
01072407	240,00	0,15	27,9	2304,0	2511
01073007	300,00	0,15	30,8	2880,0	3005

Other dimensions and colours are possible on request.

for E-Mobility
HV test benches

Nominal voltage up to
Uo/U 1.8/3 kV AC

B 110 C Sense Cable

halogen-free Besilen® Sense cable, shielded, cULus recognized

Marking for B 110 C Sense Cable:
SAB BRÖCKSKES · D-VIERSEN · B 110 C Sense Cable 2x1,0mm² 0110-9001 c us AWM Style 4659 AWM I/II A/B 150°C 3000V FT1 FT2

Construction:

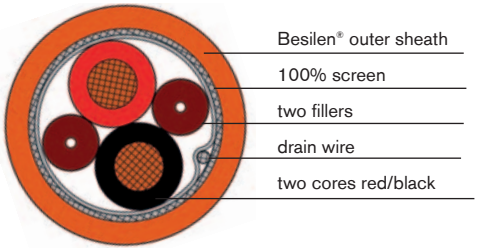
Conductor:	bare copper strands, extra fine wires
Core insulation:	Besilen® EI2 acc. to EN 50363-1 + VDE 0207-363-1
Colour code:	black and red
Stranding:	together with , AWG 26
Screen:	alu foil, tinned copper drain wire and tinned copper braiding
Sheath material:	Besilen® EM9 acc. to EN 50363-2-1 + VDE 0207-363-2-1
Sheath colour:	orange (similar RAL 2004)

Outstanding features:

- **extremely flexible**
- **good EMC characteristics**
- **halogen-free**
- **heat resistant**
- **flexible at low temperatures**
- **flame retardant and self-extinguishing**
- **weather resistant**
- **cULus recognized**

Technical data:

Nominal voltage:	Uo/U 1,8/3,0 kV AC Uo/U 2,7/5,4 kV DC
Voltage cULus:	3000 V
Testing voltage:	4000 V
Current-carrying capacity:	acc. to VDE 0298-4
Min. bending radius fixed laying: flexible application:	 6 x d 10 x d
Temperature range fixed laying: flexible application: short time use:	**DIN VDE** **cULus:** up to +150 °C -40/+180 °C -25/+180 °C +250 °C
Halogen-free:	acc. to IEC 60754-1 + VDE 0482-754-1
Fire performance:	flame retardant and self-extinguishing acc. to IEC 60332-1-2 + VDE 0482-332-1-2, cULus FT1, FT2
Corrosiveness of conflagration gases:	IEC 60754-2 + VDE 0482-754-2 - no development of corrosive conflagration gases
Weather resistance:	very good
Absence of harmful substances:	acc. to RoHS directive of the European Union



item no.	no. of cores x cross section n x mm²	core-ø max. mm	outer-ø approx. mm	outer-ø max. mm	copper figure kg/km	cable weight ≈ kg/km	ohmic resistance at 20 °C max. Ω/km
01109006	2 x 0,25	3,50	10,2	10,7	32,8	112	80,0
01109007	2 x 0,34	3,60	10,6	11,1	53,5	130	58,8
01109008	2 x 0,50	3,80	11,1	11,7	57,3	142	39,0
01109001	2 x 1,00	4,35	12,1	12,7	72,7	170	20,0
01109002	2 x 1,50	4,75	12,9	13,5	90,1	198	13,3
01109003	2 x 2,50	5,25	13,9	14,6	111,0	238	7,98
01109004	2 x 4,00	5,95	15,3	16,1	146,5	297	4,95
01109005	2 x 6,00	6,35	16,3	17,1	216,3	365	3,3

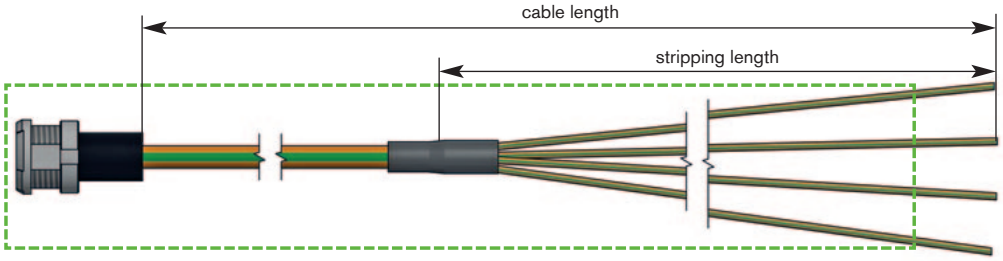
Other dimensions and colours are possible on request.

Possible on request:

As harnessed cable
acc. to customer's specification

HV test adapter

scoop-proof area



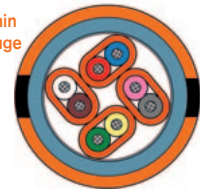
For all sensor types available!
e.g. HV test adapter for HV 4-channel type K sensors

4-channel type K

1-channel type K

2-channel PT100

strain gauge



Application range: The HV test adapter is used for the adaptation of HV sensors in fixed installation and are available for all sensor types in high voltage environments. The connection to test installed sensors for potential compensating measurements or the fixed installation in empty housings are only some of the application fields for which a test adapter can be used.

Application range:

for example to test installed HV sensors

Connector:

Lemo Redel 2P apparatus socket with black potting sleeve, 8-pole, coding acc. to sensor type

1000 V AC voltage-proof
– only suitable for fixed installation.

Connection end:

stripping length acc. to customer`s request /
open end: 2 mm

dimensions for mounting cut-out on request

Cable data:

Description:	high voltage cable acc. to sensor type
Core insulation:	FEP
Inner sheath:	PUR – blue acc. to RAL 5024
Outer sheath:	PUR
Sheath colour:	orange with vertical stripes (black or green)
Stranding:	paired construction (for EMC)
Outer diameter:	depending on the used cable
Dielectric strength:	1000 V AC – depending on the used cable
Temperature range fixed laying: flexible application:	 -50°C / +150°C -40°C / +150°C

Tests:

▶ **Cable test**
core/core – 600 V AC - 1 min - acc. to IEC 60584-1
over pair sheath/inner sheath in water bath –
5000 V AC – 5 min – with reference to EN 50264-2-1

▶ **Product test**
routine test of harnessed connector
with reference to standard 61010-1 for measuring devices as well as VDE indications in our in-house ball bath (released by VDE). Control of contact protection towards outside – 3000 V/1 min AC

Issue of HV test certificate with reference to batch number due to optimum traceability

Optional: Test and repair of already used sensors on request

CONFIGURATION EXAMPLES

item no.	connection cable length	single channel length	type
T141-056-583	115 mm	100 mm	4 x type K
T141-055-568	200 mm	50 mm	1 x type K
T641-057-773	150 mm	100 / 50 mm	2 x PT100/PT1000 analogue (90V)
T644-062-235	115 mm	100 mm	strain gauge
T645-xxx-xxx	115 mm	100 mm	voltage (90V)
T645-xxx-xxx	155 mm	100 mm	voltage (1000V)

SAB identification:
item number, batch number

Total cable and channel lengths can be realised on customer's request.

Accessories

Application range: HV cap

**HV cap black,
universally coded with fixing cord
for HV connector.**

CONFIGURATION EXAMPLES

item no.	configuration
T021-061-745	plug
T021-062-719	socket

Application range: dual shrinkable sleeve

**Dual shrinkable sleeve natural, PTFE/FEP, Ø before shrinking 1,65 mm - Ø after shrinking 0,00 mm
-190°C up to +200°C (for example for the later insulation of measuring tips)**

CONFIGURATION EXAMPLE

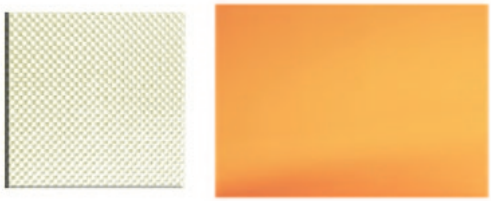
item no.	configuration
T020-024-319	1000 mm

Application range: spare pads

**Replacement of adhesive pads
to apply the measuring tip on surfaces.**

CONFIGURATION EXAMPLES

item no.	configuration
T095-044-258	glass cloth 25 x 25
T095-056-403	PI foil 12,5 x 25



Application range: automatic hinged cover

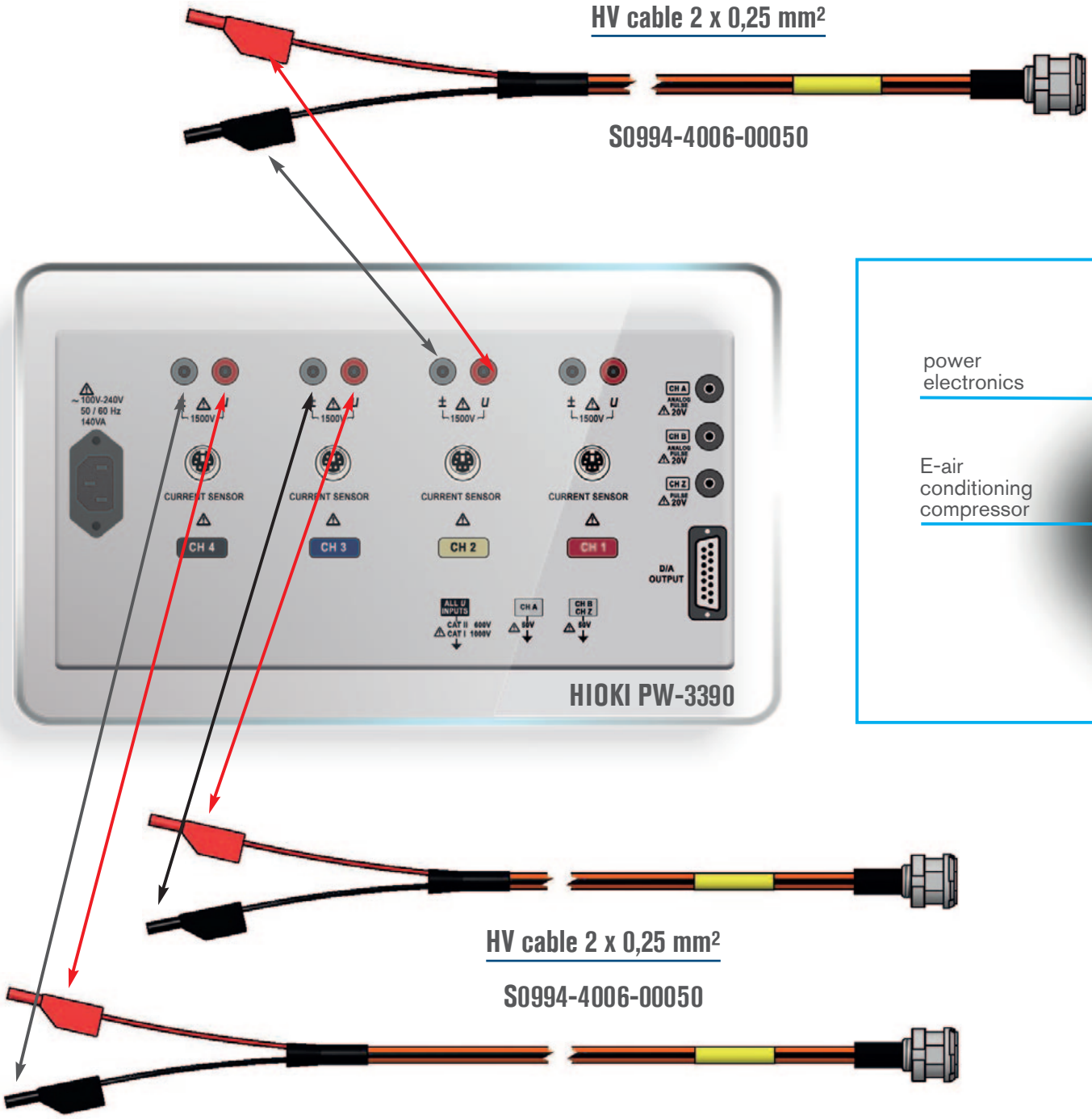
**Conversion kit to automatic hinged cover
for Redel socket / size 2P
to protect the socket from dust,
dirt and moisture**

CONFIGURATION EXAMPLE

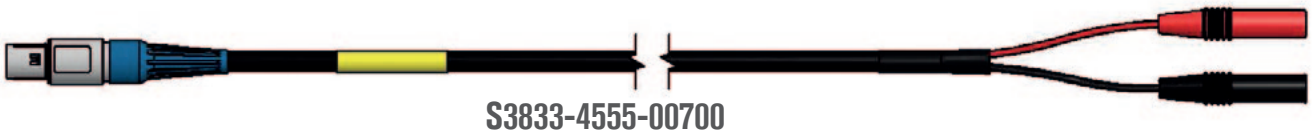
item no.	configuration
T021-060-467	conversion kit

Application example

for high voltage measuring cables

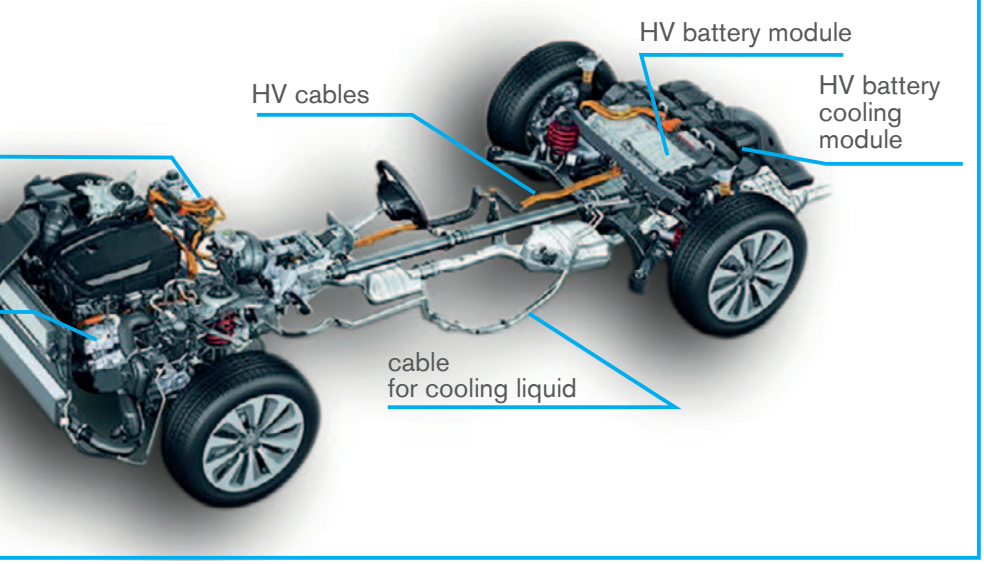


LV cable 2 x 0,5 mm² screened



S3833-4555-00700

ELECTRIC VEHICLE



LV connection

(e.g. 12V vehicle battery)

HV adapter with clamping points

(vehicle specific)

HV cable 2 x 0,25 mm² screened

S3833-3002-00015

connection box with Redel socket and 2 connection cables with Redel plug

HV cable 2 x 0,25 mm² screened

T641-060-343

extension

T641-061-127

S3833-3003-00025

connection box with Redel socket and 3 connection cables with Redel plug

SALES AND SERVICE

From our central stock in Viersen-Süchteln or our external stocks, we supply standard lengths as well as special dimensions, often within 24 hours. It is our strength to be at different places at the same time. This shows also our wide product range. Being always ready to deliver our products of constant quality is our strength at SAB Bröckskes. Challenge, obligation - but also guarantee at the same time. This is your advantage - we are present whenever you need our assistance.

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