

HV CABLES

FOR HYBRID AND BATTERY VEHICLES





More than 75 years of experience in cable and wire manufacturing as well as in **measurement technology** turned a one-man business into a company with more than 550 employees. We prove our strength every year with **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 safety and health 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!

FOUNDATION

- » 1947 by Peter Bröckskes Sr.
- » an independent, medium-sized company

MANAGEMENT

- » Peter Bröckskes and Sabine Bröckskes-Wetten

EMPLOYEES

- » 574 employees worldwide, approx. 430 at the plant in Viersen

PRODUCTS

- » Special Cables
- » Measurement Technology
- » Cable Harnessing

YEARLY SALES

- » over 134 Mio. € worldwide

PLANT AND LOCATION

- » in Viersen (Lower Rhine), 110.000 m² company site
- » own production in Germany from copper conductor to outer sheath
- » VDE approved burnchamber and laboratory within the company

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 Safety and Health Management System acc. to NLF/ILO-OSH and DIN ISO 45001
- » Energy management system acc. to DIN EN ISO 50001
- » UL, CSA, CE, EAC, VDE, HAR, IEC, EN, ISO, DNV, LR, ABS, RINA, RMRS, BSI



1947 - 1989

Peter Bröckskes Sr.

Proactive visionary: Peter Bröckskes Sr. was a successful company founder with determination, diligence and a pioneering spirit. He started in 1947 as a one-man business with the building of alarm systems and continuously developed new products. In the course of his entrepreneurial activity, he overcame setbacks and repeatedly managed to identify gaps in the market and develop new products.

1989 - 2017

Peter Bröckskes

After studying business administration, Peter Bröckskes joined the company in 1980 as sales manager and takes over the management in 1989. Under his leadership, the company's strategy shifted. Away from the trading business, towards becoming a special cable manufacturer and problem solver. Despite economic challenges, the company grows.

since 2011

Sabine Bröckskes-Wetten

After her apprenticeship as a cable production mechanic and studies to become an industrial engineer, Sabine Bröckskes-Wetten joined the company in 2007. She became a departmental management position in production and later assumed overall responsibility for the technical area. In 2011 Sabine Bröckskes-Wetten became the new owner of SAB Bröckskes and successfully focussed on expansion, quality and service.



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HV 1000 C - SC

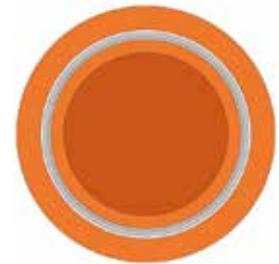
robust, flexible high-voltage single conductor with overall copper screen

Application

These high-voltage cables can be used in high-voltage applications e.g. in the fields of agricultural vehicles, construction vehicles and special vehicles. The HV 1000 C - SC is used e.g. between inverters and electric motors.



Marking for HV 1000 C SC 39100163:
SAB BRÖCKSKES · D-VIERSEN · HV 1000 C - SC 1x25mm² 3910-0163 CE



Construction

| | |
|------------------|---------------------------------------|
| Conductor: | bare copper strands, extra fine wires |
| Insulation: | TPFP |
| Colour code: | orange |
| Screen: | alu foil and tinned copper braiding |
| Wrapping: | non-woven tape |
| Sheath material: | TPE-U |
| Sheath colour: | orange (RAL 2003) |

Outstanding features



- » extremely high mechanical strength
- » high protection against environmental influences
- » 100% oil resistance acc. to standard
- » application range from -50°C to +125°C

Technical Data

| | |
|---|---|
| Nominal voltage: | U ₀ /U max. 0,6/1 kV AC/DC |
| Testing voltage: | core/screen 5000 V |
| Min. bending radius: | fixed laying: 5 x d flexible application: 10 x d |
| Temperature range: | fixed laying: -50/+90 °C flexible application: -40/+90 °C limited time of use: +125 °C (2000 h) |
| Low temperature resistance: | -50°C acc. to DIN EN 60811-506 |
| Fire performance: | flame retardant and self-extinguishing acc. to IEC 60332-1-2 + VDE 0482-332-1-2 |
| Oil resistance: | very good - TMPU acc. to EN 50363-10-2 + VDE 0207-363-10-2 |
| MUD resistance: | very good - acc. to IEC 60092-360, IEC 61892-4, NEK TS 606 |
| UV resistance: | acc. to HD 605 |
| Ozone resistance: | acc. to DIN EN 50396 |
| Saltwater resistance: | acc. to UL 1309 |
| Mechanical characteristics by the outer sheath: | high tensile strength ✓ high tear strength ✓ high abrasion resistance ✓ high notch resistance ✓ high shear strength ✓ |
| Absence of harmful substances: | acc. to RoHS directive of the European Union |

Certifications



Construction, materials and tests with reference to:

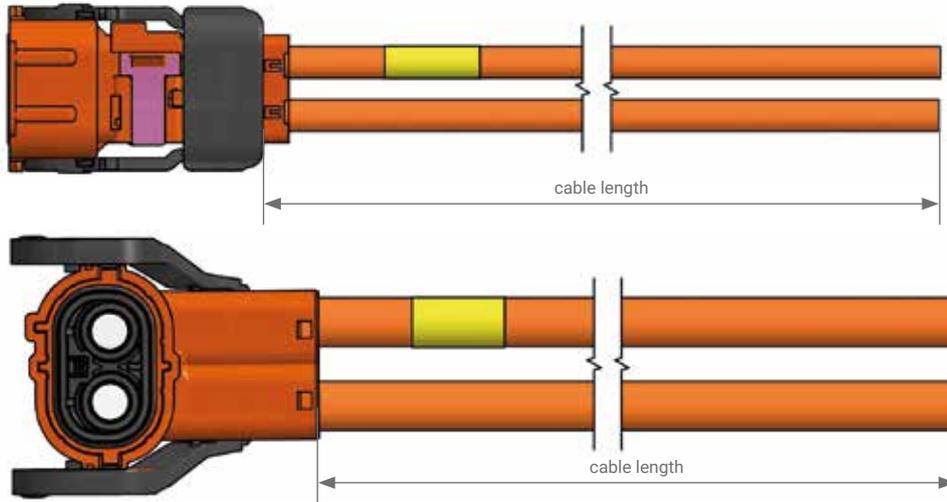
- ✓ DIN EN 60228
- ✓ DIN EN 50525
- ✓ DIN EN 50290-2-30
- ✓ DIN EN 50620
- ✓ DIN EN 60811

In individual cases, the specific application must be agreed with SAB Bröckskes.

| item no. | nominal cross-section mm ² | largest single wire Ø mm | outer-Ø max. mm | copper figure kg/km | cable weight ≈ kg/km | ohmic resistance at 20 °C max. Ω/km |
|----------|---------------------------------------|--------------------------|-----------------|---------------------|----------------------|-------------------------------------|
| 39100140 | 4,00 | 0,21 | 5,8 | 63,2 | 75 | 4,95 |
| 39100160 | 6,00 | 0,21 | 6,5 | 85,5 | 99 | 3,30 |
| 39100161 | 10,00 | 0,21 | 8,8 | 134,5 | 172 | 1,91 |
| 39100162 | 16,00 | 0,21 | 10,2 | 201,0 | 246 | 1,21 |
| 39100163 | 25,00 | 0,21 | 12,2 | 317,2 | 363 | 0,78 |
| 39100164 | 35,00 | 0,21 | 14,4 | 427,4 | 506 | 0,554 |
| 39100165 | 50,00 | 0,21 | 15,8 | 586,3 | 671 | 0,386 |
| 39100166 | 70,00 | 0,21 | 18,2 | 796,7 | 900 | 0,227 |
| 39100167 | 95,00 | 0,21 | 20,9 | 1097,7 | 1212 | 0,206 |

HV 1000 C - SC cable harness

robust, flexible high-voltage single conductor with overall copper screen and thermo connector



Application range

e.g. in the fields of agricultural, construction and special vehicles

Connection end

| | |
|-------------------|------------------|
| Outer sheath: | TPE-U |
| Connection end 1: | thermo connector |
| Connection end 2: | cut smoothly |
| Screen: | cut smoothly |

Cable data

| | |
|--------------------|---|
| Connection cable: | bare copper strands, extra fine wires, screened |
| Core insulation: | TPFP |
| Screen: | alu foil and tinned copper braiding |
| Outer sheath: | TPE-U |
| Sheath colour: | orange |
| Outer diameter: | see table on page 6 |
| Nominal voltage: | Uo/U max. 0,6/1 kV AC/DC |
| Temperature range: | fixed laying: -50/+90 °C flexible application: -40/+90 °C limited time of use: +125 °C (2000 h) |

Certifications



Construction, materials and tests with reference to:

- ✓ DIN EN 60228
- ✓ DIN EN 50525
- ✓ DIN EN 50290-2-30
- ✓ DIN EN 50620
- ✓ DIN EN 60811

In individual cases, the specific application must be agreed with SAB Bröckskes.

By the way ...



... also available in versions with Amphenol plugs!

Configuration examples

| item no. | connector | connection cable length | stripping | cross section mm ² |
|------------------|------------------|-------------------------|--------------|-------------------------------|
| S3910-2001-00200 | HVP 800, A-coded | 2000 mm | cut smoothly | 50,00 |
| S3910-2002-00200 | PCON12, B-coded | 2000 mm | cut smoothly | 16,00 |

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

SAB identification:
item number, batch number



HV 1000 C - MC

robust, flexible high-voltage multi-core cable with overall copper screen

Application

These high-voltage cables can be used in high-voltage applications e.g. in the fields of agricultural vehicles, construction vehicles and special vehicles. The HV 1000 C - MC is used as a connection cable e.g. for cabin heating, the electric compressor, the high-voltage heat pump in electric and hybrid vehicles.



S · D-VIERSEN · HV 1000 C - MC 2x4,0mm² 3910-0240 CE



Marking for HV 1000 C MC 39100240:
SAB BRÖCKSKES · D-VIERSEN · HV 1000 C - MC 2x4,0mm² 3910-0240 CE

Construction

| | |
|----------------|--|
| Conductor: | bare copper strands acc. to IEC 60228, VDE 0295, class 5 |
| Insulation: | TPFP |
| Colour code: | red, black, from 3 cores acc. to HD 308 or acc. to customer request |
| Stranding: | together |
| Inner sheath: | Besilen® |
| Stranding: | together |
| Wrapping: | non-woven tape |
| Sheath colour: | orange (RAL 2003) |

Outstanding features



- » extremely high mechanical strength
- » high protection against environmental influences
- » 100% oil resistance acc. to standard
- » application range from -50°C to +125°C

Technical Data

| | |
|---|---|
| Nominal voltage: | U ₀ /U max. 0,6/1 kV AC/DC |
| Testing voltage: | core/core 5000 V core/screen 5000 V |
| Min. bending radius: | fixed laying: 5 x d flexible application: 10 x d |
| Temperature range: | fixed laying: -50/+90 °C flexible application: -40/+90 °C limited time of use: +125 °C (2000 h) |
| Low temperature resistance: | -50°C acc. to DIN EN 60811-506 |
| Fire performance: | flame retardant and self-extinguishing acc. to IEC 60332-1-2 + VDE 0482-332-1-2 |
| Oil resistance: | very good - TMPU acc. to EN 50363-10-2 + VDE 0207-363-10-2 |
| MUD resistance: | very good - acc. to IEC 60092-360, IEC 61892-4, NEK TS 606 |
| UV resistance: | acc. to HD 605 |
| Ozone resistance: | acc. to DIN EN 50396 |
| Saltwater resistance: | acc. to UL 1309 |
| Mechanical characteristics by the outer sheath: | high tensile strength ✓ high tear strength ✓ high abrasion resistance ✓ high notch resistance ✓ high shear strength ✓ |
| Absence of harmful substances: | acc. to RoHS directive of the European Union |

Certifications



Construction, materials and tests with reference to:

- ✓ DIN EN 60228
- ✓ DIN EN 50525
- ✓ DIN EN 50290-2-30
- ✓ DIN EN 50620
- ✓ DIN EN 60811

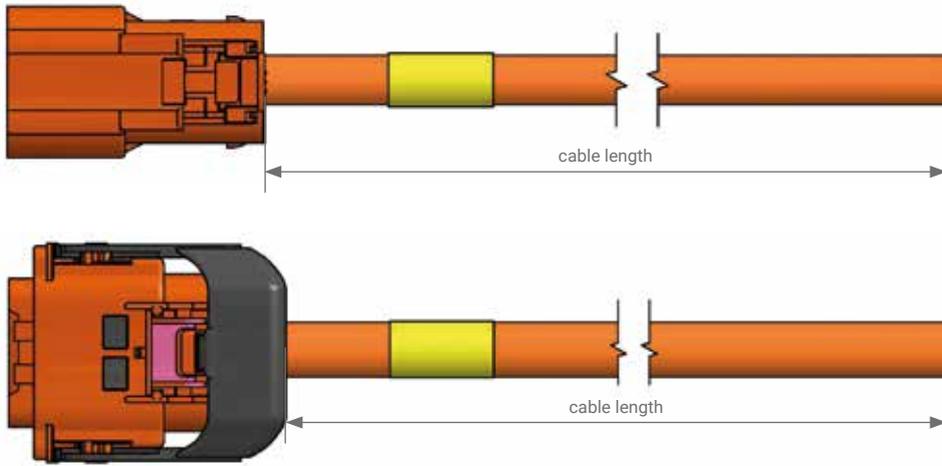
In individual cases, the specific application must be agreed with SAB Bröckskes.

| item no. | no. of cores x dimension n x mm ² | largest single wire Ø mm | outer-Ø max. mm | copper figure kg/km | cable weight ≈ kg/km | ohmic resistance at 20 °C max. Ω/km |
|----------|---|-----------------------------|--------------------|------------------------|-------------------------|--|
| 39100225 | 2 x 2,50 | 0,26 | 9,9 | 93,4 | 147 | 7,98 |
| 39100325 | 3 x 2,50 | 0,26 | 10,4 | 117,3 | 181 | 7,98 |
| 39100240 | 2 x 4,00 | 0,31 | 11,3 | 133,7 | 206 | 4,95 |
| 39100340 | 3 x 4,00 | 0,31 | 12,1 | 171,5 | 252 | 4,95 |
| 39100260 | 2 x 6,00 | 0,31 | 12,8 | 175,8 | 266 | 3,10 |
| 39100360 | 3 x 6,00 | 0,31 | 14,1 | 261,3 | 366 | 3,10 |
| 39100460 | 4 x 6,00 | 0,31 | 15,1 | 325,3 | 433 | 3,10 |
| 39100560 | 5 x 6,00 | 0,31 | 16,3 | 393,5 | 515 | 3,10 |



HV 1000 C - MC cable harness

robust, flexible high-voltage multi-core cable with overall copper screen and thermo connector



Application range

e.g. in the fields of agricultural, construction and special vehicles

Connection end

| | |
|-------------------|------------------|
| Outer sheath: | TPE-U |
| Connection end 1: | thermo connector |
| Connection end 2: | cut smoothly |
| Screen: | cut smoothly |

Cable data

| | | |
|--------------------|---------------------------------------|------------------|
| Connection cable: | bare copper strands screened | |
| Core insulation: | TPFP | |
| Inner sheath: | Besilen® | |
| Screen: | alu foil and tinned copper braiding | |
| Outer sheath: | TPE-U | |
| Sheath colour: | orange | |
| Outer diameter: | see table on page 8 | |
| Nominal voltage: | U ₀ /U max. 0,6/1 kV AC/DC | |
| Temperature range: | fixed laying: | -50/+90 °C |
| | flexible application: | -40/+90 °C |
| | limited time of use: | +125 °C (2000 h) |

Certifications



Construction, materials and tests with reference to:

- ✓ DIN EN 60228
- ✓ DIN EN 50525
- ✓ DIN EN 50290-2-30
- ✓ DIN EN 50620
- ✓ DIN EN 60811

In individual cases, the specific application must be agreed with SAB Bröckskes.

By the way ...



... also available in versions with Amphenol plugs!

Configuration examples

| item no. | connector | connection cable length | stripping | dimension mm ² |
|------------------|------------------|-------------------------|--------------|---------------------------|
| S3910-4001-00200 | HVA 280, B-coded | 2000 mm | cut smoothly | 2 x 4,00 |
| S3910-4003-00200 | HVA 280, E-coded | 2000 mm | cut smoothly | 2 x 4,00 |
| S3910-4004-00200 | HVA 280, A-coded | 2000 mm | cut smoothly | 2 x 4,00 |
| S3910-4005-00200 | HVA 630, A-coded | 2000 mm | cut smoothly | 5 x 6,00 |

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

SAB identification:
item number, batch number



Electrical bonding

S 910 P continuously flexible TPE/PUR single conductor

Application



TPE/PUR single conductor with very good flexibility for use in hybrid and battery vehicles for earthing.



Marking for S 910 P 37681362:

SAB BRÖCKSKES · D-VIERSEN · 37681362 16,0 mm² S 910 P 6 AWG 37680601 AWM Style 10456 80°C 600V CSA AWM I/II A/B 80°C 1000V FT1 FT2 CE

Construction

| | |
|------------------|---|
| Conductor: | bare copper strands acc. to IEC 60228, VDE 0295, class 6 |
| Insulation: | TPE, green-yellow |
| Wrapping: | non-woven tape |
| Sheath material: | PUR, TPU acc. to EN 50363-10-2 + VDE 0207-363-10-2 with mat surface |
| Sheath colour: | black (RAL 9005) |

Outstanding features



- » highly flexible single conductor for use in cable tracks
- » good chemical resistance
- » high abrasion resistance
- » halogen-free

Technical Data

| | | |
|--------------------------------|--|----------------------|
| Nominal voltage: | U ₀ /U 0,6/1 kV | |
| Voltage: | UL: 600 V | CSA: 1000 V |
| Min. bending radius: | continuously flexible: 7,5 x d | |
| Radiation resistance: | 1 x 10 ⁷ cJ/kg | |
| Temperature range: | DIN VDE: | UL/CSA: up to +80 °C |
| | fixed laying: | -50/+90 °C |
| | flexible application: | -40/+90 °C |
| Fire performance: | flame retardant and self-extinguishing acc. to IEC 60332-1-2 + VDE 0482-332-1-2 | |
| 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, UL/CSA FT1, FT2 | |
| Oil resistance: | very good - TPU acc. to EN 50363-10-2 + VDE 0207-363-10-2 | |
| Chem. resistance: | good against acids, alkalines, solvents, hydraulic liquids etc. | |
| Continuous flexibility: | very good | |
| Absence of harmful substances: | acc. to RoHS directive of the European Union | |

| item no. | nominal cross-section mm ² | largest single wire ø mm | AWG/MCM | outer-ø ± 5% mm | copper figure kg/km | cable weight ≈ kg/km |
|----------|---------------------------------------|--------------------------|-------------------|-----------------|---------------------|----------------------|
| 37681140 | 4,00 | 0,16 | 12 (224/34) | 6,6 | 38,4 | 69 |
| 37681160 | 6,00 | 0,21 | 10 (186/32) | 7,5 | 57,6 | 94 |
| 37681161 | 10,00 | 0,21 | 8 (320/32) | 8,4 | 96,0 | 138 |
| 37681162 | 16,00 | 0,21 | 6 (512/32) | 9,9 | 153,6 | 206 |
| 37681163 | 25,00 | 0,21 | 4 (798/32) | 11,1 | 240,0 | 296 |
| 37681164 | 35,00 | 0,21 | 2 (1083/32) | 12,6 | 336,0 | 390 |
| 37681165 | 50,00 | 0,31 | 1 (703/28) | 14,7 | 480,0 | 554 |
| 37681166 | 70,00 | 0,31 | 2/0 (988/28) | 17,0 | 672,0 | 771 |
| 37681167 | 95,00 | 0,31 | 3/0 (1340/28) | 20,4 | 912,0 | 1024 |
| 37681168 | 120,00 | 0,31 | 4/0 (1680/28) | 23,0 | 1152,0 | 1318 |
| 37681169 | 150,00 | 0,31 | 250 MCM (2122/28) | 25,7 | 1440,0 | 1649 |
| 37681170 | 185,00 | 0,41 | 350 MCM (1472/26) | 27,6 | 1776,0 | 2020 |

Other dimensions and colours are possible on request.

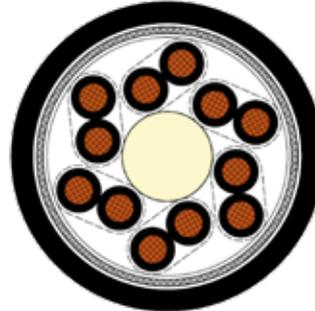


Resolver cables

Flexible and robust data cable for use on resolver



Marking for L0390-9696:
SAB BRÖCKSKES · D-VIERSEN · Special Cable
5x2x0,50mm² 0390-9696 CE (SAB Ident. Nr.)



Marking for L0390-9721:
SAB BRÖCKSKES · D-VIERSEN · Special Cable
6x2x0,50mm² 0390-9721 CE (SAB Ident. Nr.)

Construction

| | |
|------------------|--|
| Conductor: | bare copper strands, extra fine wires, class 6 acc. to IEC 60228 |
| Insulation: | SABIX® |
| Colour code: | L0390-9696: DIN 47100 1 – 10 L0390-9721: black cores with consecutive numbers 1 - 12 |
| Stranding: | cores twisted to pairs + optimized twisting of pairs in layers, filler in centre |
| Screen: | laminated alu foil with overlap wrapping, tinned copper braiding, optical coverage ≥ 85% |
| Banding: | overlapping non-woven tape |
| Sheath material: | PUR |
| Sheath colour: | black (similar RAL 9005) |

Technical Data

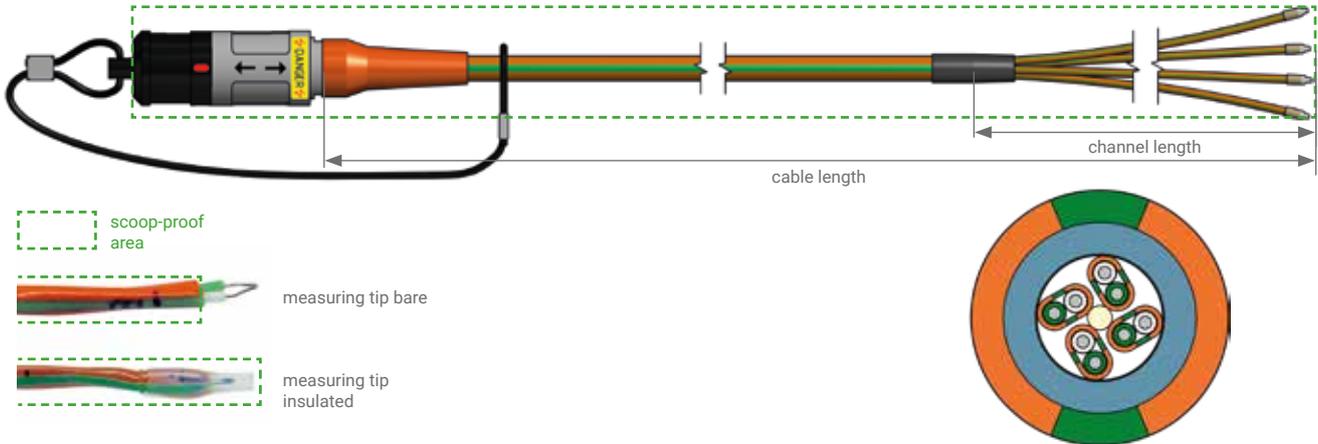
| | |
|---|---|
| Peak operating voltage: | max. 350 V |
| Testing voltage: | core/core 1500 V core/screen 1200 V |
| Min. bending radius: | fixed laying: 5 x d flexible application: 10 x d |
| Temperature range: | fixed laying: -50/+90 °C flexible application: -40/+90 °C limited time of use: +125 °C (2000 h) |
| Low temperature resistance: | -50°C acc. to DIN EN 60811-506 |
| Fire performance: | acc. to IEC 60332-1-2 |
| Halogen-free: | acc. to IEC 60754-1 |
| Oil resistance: | very good - TMPU acc. to EN 50363-10-2 + VDE 0207-363-10-2 |
| MUD resistance: | very good - acc. to IEC 60092-360, IEC 61892-4, NEK TS 606 |
| UV resistance: | acc. to HD 605 S1 |
| Ozone resistance: | acc. to DIN EN 50396 |
| Saltwater resistance: | acc. to UL 1309 |
| Mechanical characteristics by the outer sheath: | high tensile strength ✓ high tear strength ✓ high abrasion resistance ✓ high notch resistance ✓ high shear strength ✓ |
| Absence of harmful substances: | acc. to RoHS directive of the European Union |

| item no. | core-Ø ≈ mm | Conductor-Ø ≈ mm | outer-Ø ±0,5 mm | copper figure kg/km | cable weight ≈ kg/km | ohmic resistance bei 20 °C / max. Ω/km |
|------------|----------------|---------------------|--------------------|------------------------|-------------------------|---|
| L0390-9696 | 1,50 | 1,00 | 9,50 | 77,8 | 104 | 39,0 |
| L0390-9721 | 1,50 | 1,00 | 9,50 | 85,5 | 118 | 39,0 |

Other dimensions and colours are possible on request.

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 |
| Ansprechzeiten: | on request |

Cable data

| | |
|----------------------|--|
| Connection cable: | HV thermo cable type K |
| Isolation: | 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: -50/+150 °C flexible application: -40/+150 °C |

Outstanding features

- » mechanically rugged
- » contact protection of individual channels

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 | insulated |
| T141-061-124 | 3000 | 500 | 500 | 500 | 500 | insulated |

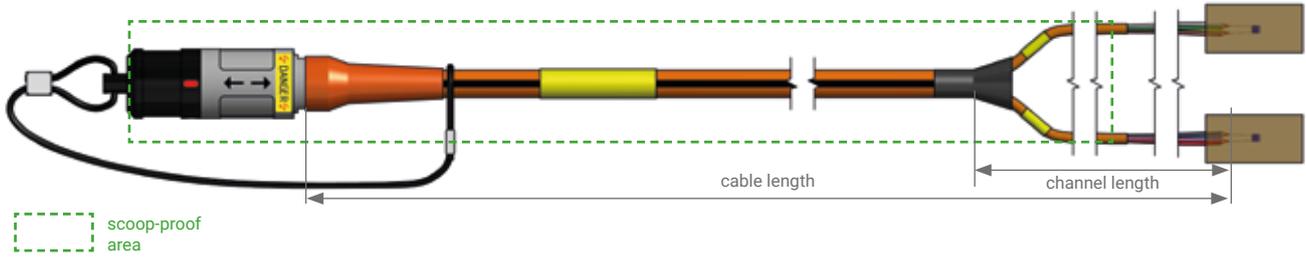
Total cable and channel lengths can be realised on customer's request.

SAB identification:
item number, batch number



HV temperature sensor 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

| | |
|-----------------------------------|---|
| Thermocouple: | 2 x PT100 |
| Limit deviation: | class A |
| Wire circuit: | 4-wire |
| Measuring point: | embedded in PI foil 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

| | | |
|----------------------|--|--|
| Designation: | HV measuring cable – 1 x 8 cores | HV measuring cable – 4 x 2 cores |
| Isolation: | 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: -40/+150 °C flexible application: -40/+150 °C | fixed laying: -40/+150 °C flexible application: -40/+150 °C |

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

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.



HV measuring cable (DC)

for DC voltage measurement



Application

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.



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

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



- » high flexibility
- » high abrasion resistance
- » easy harnessing
- » temperature resistance -50 °C up to +150 °C (up to 3000 hours)

Technical Data

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

By the way ...



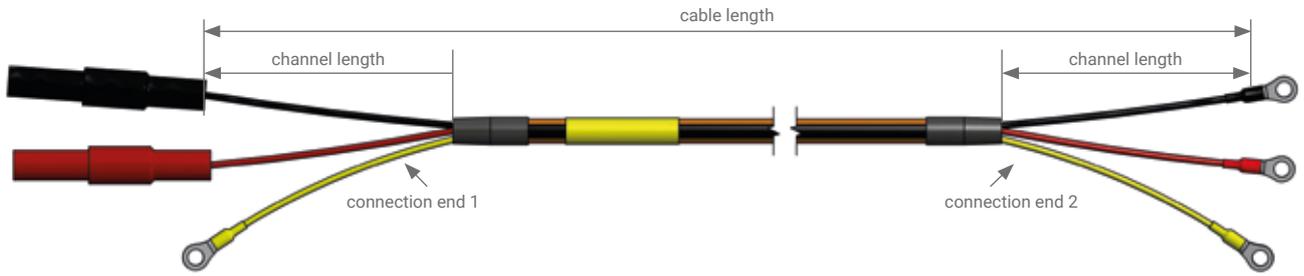
... also as harnessed measuring cable with connected lab plugs to collect the voltage at HV components.

| item no. | no. of cores x dimension n x mm ² | outer-ø max. 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.

HV measuring cable (DC) cable harness

for DC voltage measurement



Application range

Safe HV measurement of DC voltages

Connector

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 14 | |
| 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: | -40°C / +150°C (up to 3000 h) |

Configuration examples

| 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



Application

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.



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

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 – blau acc. to RAL 5024 |
| Outer sheath: | PUR |
| Sheath colour: | orange with black vertical stripes |

Outstanding features



- » high flexibility
- » high abrasion resistance
- » easy harnessing
- » temperature resistance -50 °C up to +150 °C (up to 3000 hours)

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 AC |
| Testing voltage: | core/core: 5000 V AC core/screen: 5000 V AC |
| Min. bending radius: | fixed laying: 5 x d flexible application: 10 x d |
| Temperature range: | fixed laying: -50/+125 °C flexible application: -40/+125 °C short time use: +150 °C (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 |

By the way ...



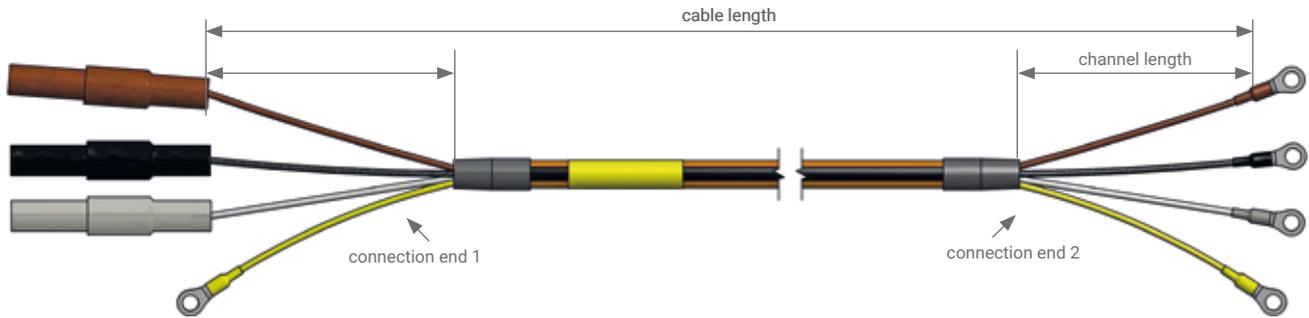
... also as harnessed measuring cable with connected lab plugs to collect the voltage at HV components.

| item no. | no. of cores x dimension n x mm ² | outer-ø max. 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.

HV measuring cable (AC) **cable harness**

for AC voltage measurement

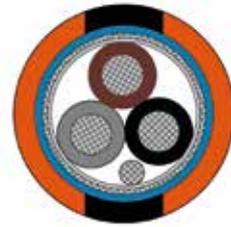


Application range

Safe HV measurement of AC voltages

Connector

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: | FEP – blue acc. to RAL 5024 | |
| Outer sheath: | PUR | |
| Sheath colour: | orange with black vertical stripes | |
| Outer diameter: | see table on page 16 | |
| Scoop-proof: | 1000 V DC over blue inner sheath | |
| Betriebsspannung: | 1800 V DC | |
| Temperature range: | fixed laying: | -50/+125 °C |
| | flexible application: | -40/+125 °C |
| | short time use: | +150°C (up to 3000h) |

Configuration examples

| item no. | connection cable length [mm] | single channel length [mm] | | |
|--------------|------------------------------|----------------------------|-----------|----------------------------------|
| | | channel 1 | channel 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



B 110 C

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

Application

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.



Style 30123 AWM I/II A/B 150°C 3000V FT1 FT2



Marking for B 110 C 01109507:

SAB BRÖCKSKES · D-VIERSEN · B 110 C U_o/U_i 1,8/3,0 kV AC 95,0mm² cULus AWM Style 30123 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, 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) |

Technical Data

| | |
|---------------------------------------|--|
| Nominal voltage: | U _o /U _i 1,8/3,0 kV AC U _o /U _i 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: 6 x d flexible application: 10 x d |
| Temperature range: | DIN VDE: cULus: up to +150 °C fixed laying: -40/+180 °C flexible application: -25/+180 °C short time use: +200 °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 |

Outstanding features



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

| item no. | nominal cross-section mm ² | 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 |

Other dimensions and colours are possible on request.



B 107

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

Application

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.



1,8/3 kV 95,0mm² cULus AWM Style 30122 AWM I A/B 150°C 3000V FT2



Marking for B 107 01079507:

SAB BRÖCKSKES · D-VIERSEN · B 107 U_o/U 1,8/3 kV 95,0mm² cULus AWM Style 30122 AWM I A/B 150°C 3000V FT2

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)

Technical Data

Nominal voltage: U_o/U 1,8/3,0 kV AC
 U_o/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: DIN VDE: cULus: up to +150 °C
 fixed laying: -40/+180 °C
 flexible application: -25/+180 °C
 short time use: +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

Outstanding features



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

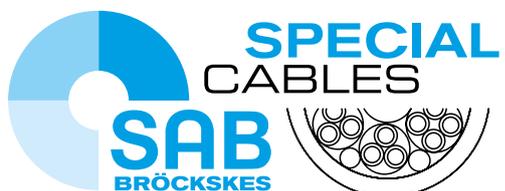
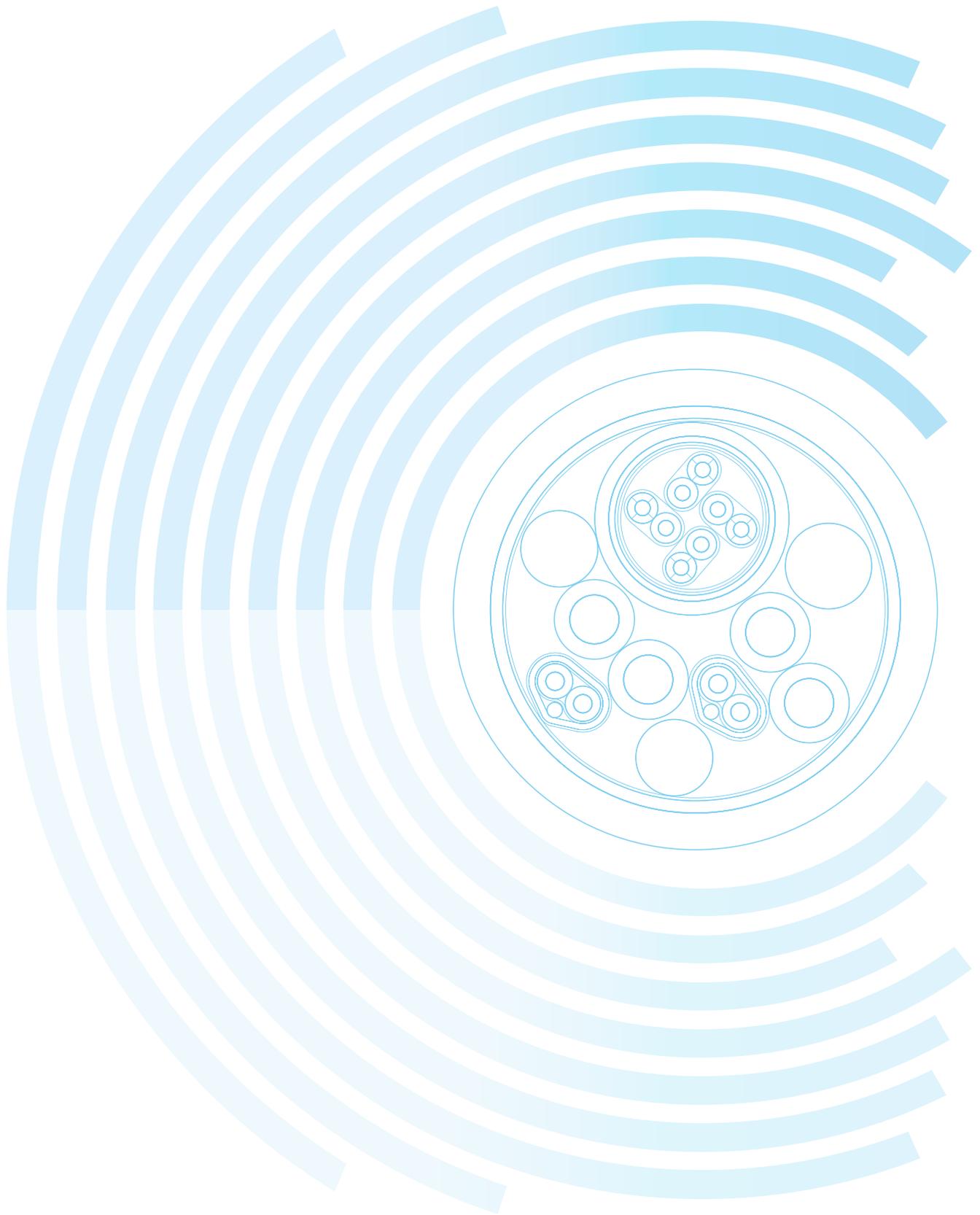
By the way ...



... suitable for E-Mobility
 HV test benches.

| item no. | nominal cross-section mm ² | largest single wire ø mm | ø over inner sheath approx. mm | outer-ø approx. mm | copper figure kg/km | cable weight ≈ kg/km |
|----------|--|-----------------------------|-----------------------------------|-----------------------|------------------------|-------------------------|
| 01070107 | 1,00 | 0,07 | 4,3 | 9,6 | 25 | 70 |
| 01070157 | 1,50 | 0,07 | 4,7 | 14,4 | 32 | 81 |
| 01070257 | 2,50 | 0,07 | 5,2 | 24,0 | 43 | 96 |
| 01070407 | 4,00 | 0,07 | 5,9 | 38,4 | 60 | 118 |
| 01070607 | 6,00 | 0,07 | 6,3 | 57,6 | 80 | 143 |
| 01071007 | 10,00 | 0,07 | 9,0 | 96,0 | 144 | 222 |
| 01071607 | 16,00 | 0,07 | 9,3 | 153,6 | 194 | 273 |
| 01072507 | 25,00 | 0,10 | 12,0 | 240,0 | 314 | 416 |
| 01073507 | 35,00 | 0,10 | 13,8 | 336,0 | 433 | 548 |

Other dimensions and colours are possible on request.



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