400Hz & 28V DC

Flexible Cables
for Ground Power Supply

SABGSE

SPECIAL CABLES
SAB BRÖCKSKES

Customised connection solutions - quality & innovation since 1947

For three generations, SAB Bröckskes has stood for customised connection solutions in cable and measurement technology. Having grown from a one-man operation, we now employ approx. 550 people and realise more than 1,500 customer-specific special constructions every year. Our strength lies in the development and production of customised solutions that are perfectly tailored to our customers' requirements.

As a manufacturer and service provider, we combine technological expertise with maximum flexibility and genuine partnership. Our products are in use in more than 100 countries and fulfil the highest quality standards, certified in accordance with DIN EN ISO 9001. In addition, we set a clear example of sustainability and responsibility with environmental, labour and energy management systems in accordance with international standards.

The same applies to us today as in the future:

WE GO FORWARD!

FOUNDATION

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

MANAGEMENT

» Peter Bröckskes and Sabine Bröckskes-Wetten

EMPLOYEES

» approx. 550 employees worldwide, approx. 430 at the location in Viersen

PRODUCTS

» Special Cables
» Measurement Technology
» Cable Harnessing

YEARLY SALES

» over 134 Mio. € worldwide

HEAD OFFICE & PRODUCTION

» in Viersen-Süchteln (Lower Rhine), with a floor area of 110,000 m²
» own manufacturing in Germany from copper conductor to outer sheath
» VDE approved burnchamber and technical centre with own test laboratory

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, VDE, HAR, IEC, EN, ISO, DNV, ABS, BSI

Family business in the third generation

1947 - 1989
Peter Bröckskes sen.

Visionary with a thirst for action: Peter Bröckskes Senior was a successful company founder with determination, hard work and a pioneering spirit. He started out in 1947 as a one-man alarm system company and continuously developed new products. In the course of his entrepreneurial career, he overcame setbacks and repeatedly managed to recognise 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 took over the management in 1989. Under his leadership, the company's strategy shifted away from trading to speciality cable manufacturing and problem solving. Despite economic challenges, the company grows.

since 2011
Sabine Bröckskes-Wetten

After training as a cable production mechanic and studying industrial engineering, Sabine Bröckskes-Wetten joined the company in 2007. She becomes head of the production department and later has overall responsibility for the technical area. In 2011, she became the owner of the company and successfully focussed on expansion, quality and service.

400Hz & 28V DC Cables

Content

400Hz & 28V DC Cables

Reliable and safe Ground Power Supply

Introducing our range of 400Hz and 28V DC cables designed specifically for the harsh airport environment where high frequency and high reliability are required. Our flexible cables for ground power supply offer both first-class performance and the reliable quality that our demanding customers expect.

High-frequency power	» Our GSE cables ensure efficient and safe power transmission and are ideal for use in flexible and fixed ground power supplies.
Robust construction	» The cables are resistant to mechanical stress, abrasion and environmental influences to ensure a long service life.
Flexible application	» They are available in various dimensions and cross-sections to meet the different requirements of our customers. Customised solutions are also possible!
Easy handling	» Thanks to their relatively low weight, these cables are easy to transport and simple to lay.
Made in Germany	» Each cable is produced in Germany and fulfils the highest quality and CE safety standards.
Plug'n'Play solutions	» Thanks to our in-house assembly, we can offer our customers plug'n'play solutions. You decide which plug is to be used with which cable.
Application	» Ideal for use on aircraft ground power supply systems such as mobile GPUs, PIT systems and reeling applications.
Quality and certifications	» All our SAB cables meet the highest quality standards and are certified to the relevant standards and regulations to ensure safety and reliability.

Please contact us for further information or individual solutions! Phone: +49 (0) 2162 / 898 - 129 e-mail: h.joosten@sab-cable.com

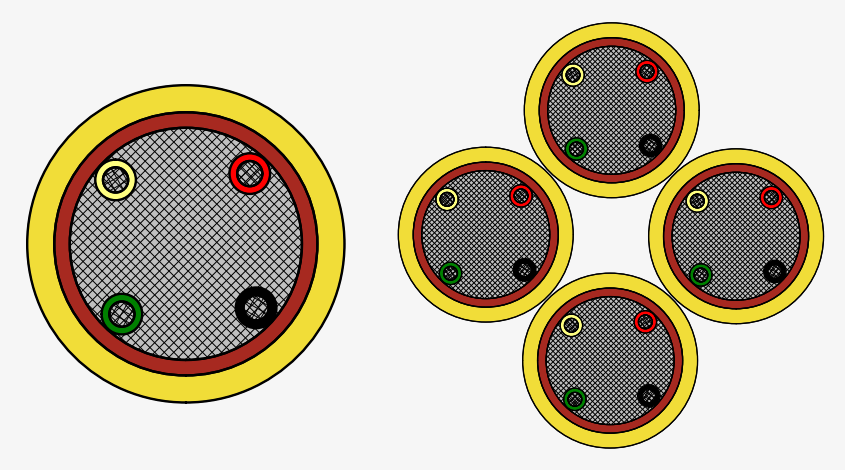
400Hz Cables

GP 400 SC
Supply cable - SingleCore - PUR

GP 400 QF
Supply cable - QuadFlex - PUR

Application

For use in flexible applications, e.g. on mobile GPUs, PIT systems and as a connecting cable between sleeve and plug in reeling applications.



Outstanding features

- low capacity insulation
- abrasion-resistant PUR jacket
- cold flexible
- halogene free
- oil resistant
- with wear indicator

Construction

Conductor:	tinned copper strands, fine wires acc. to IEC 60228 class 5
Insulation:	SABIX®
Colour code:	control cores: red, black, green, yellow power supply cores: red
Stranding:	control cores within the power supply core
Sheath material:	PUR, yellow
Stranding:	**GP 400 QF**: open stranded
Marking example: GP 400 SC	SAB BRÖCKSKES · D-Viersen · GP 400 SC 1x(70,0mm²+4x1,0mm²) 3400-0053 CE and continuous meter marking
GP 400 QF	SAB BRÖCKSKES · D-Viersen · GP 400 QF 4x(70,0mm²+4x1,0mm²) 3400-0050 N CE and continuous meter marking

Current carrying capacity data will follow!

Technical Data

Nominal voltage:	Uo/U 115/200 V
Max. permissible operating voltage:	Uo/U 0,6/1 kV
Testing voltage:	core/core 4000 V AC 50 Hz
Min. bending radius *fixed laying:* *flexible application:*	 4 x d 6 x d
Temperature range *fixed laying:* *flexible application:* *limited time of use:*	 -50/+90 °C -40/+90 °C +110 °C (7500 h)
Halogen-free:	acc. to IEC 60754-1
Fire performance:	sheath material: UL 94 V2
Oil resistance:	very good - acc. to EN 50363-10-2
Chem. resistance:	good against acids, alkalines, solvents, hydraulic liquids, etc.
Weather resistance:	very good - acc. to HD 605 (VDE 0276-605)
Salt water resistance:	very good - acc. to UL 1309
Hydrolysis and microbial resistance:	very good - acc. to EN 50360-10-2
MUD resistance:	very good - acc. to IEC 60092-360
Ozone resistance:	very good- acc. to EN 50396
Abrasion:	acc. to UL 2556-2021 and JIS C3005
Fuel resistant:	petrol, diesel and kerosene (Jet A-1)
Mechanical resistance:	characteristics of 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.	no. of cores x cross section n x mm²	outer-ø mm	copper figure kg/km	cable weight ≈ kg/km	ohmic resistance max. Ω/km
GP 400 SC - PUR					
34000052	1 x (50,0 + 4 x 1,0)	min. 16 - max. 16,5	524,0	603	50,0 mm²: 0,393 | 1,0 mm²: 20,0
34000053	1 x (70,0 + 4 x 1,0)	max. 17,5	739,2	792	70,0 mm²: 0,277 | 1,0 mm²: 20,0
34000059	1 x (70,0 + 6 x 1,0)	max. 17,9	729,6	810	70,0 mm²: 0,277 | 1,0 mm²: 20,0
GP 400 QF - PUR					
34000050	4 x (50,0 + 4 x 1,0)	max. 39,9 (core min. 16 - max. 16,6)	2096,0	2436	50,0 mm²: 0,393 | 1,0 mm²: 20,0
34000051	4 x (70,0 + 4 x 1,0)	approx. 42,5 (core max. 17,9)	2957,0	3174	70,0 mm²: 0,277 | 1,0 mm²: 20,0
34000057	4 x (70,0 + 6 x 1,0)	approx. 42,5 (core max. 17,9)	2918,0	3241	70,0 mm²: 0,277 | 1,0 mm²: 20,0

400Hz Cables

GP 400 SC
Supply cable - SingleCore - special compound

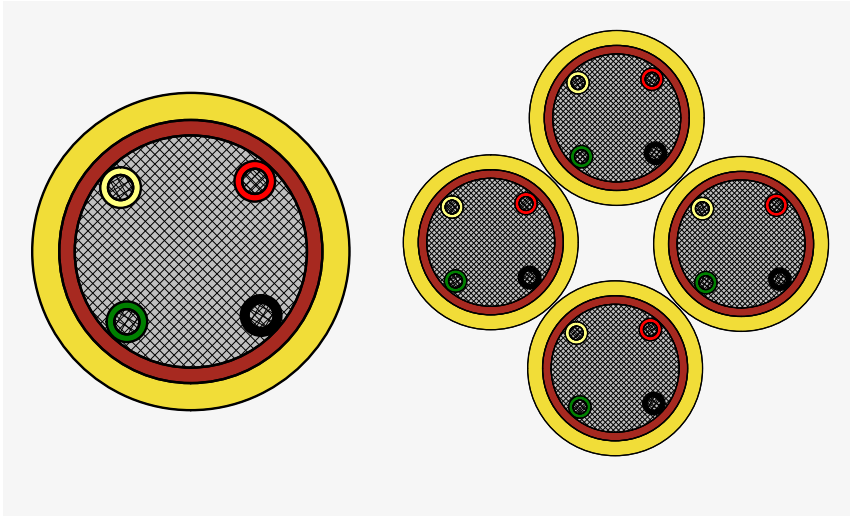
GP 400 QF
Supply cable - QuadFlex - special compound

Application

For use in flexible applications, e.g. on mobile GPUs, PIT systems and as a connecting cable between sleeve and plug in reeling applications.

Outstanding features

- low capacity insulation
- more flexible than polyurethane cables
- cold flexible
- oil resistant
- with wear indicator



Construction

Conductor:	tinned copper strands, fine wires acc. to IEC 60228 class 5
Insulation:	SABIX®
Colour code:	control cores: red, black, green, yellow power supply cores: red
Stranding:	control cores within the power supply core
Sheath material:	special polymer, yellow
Stranding:	**GP 400 QF**: open stranded
Marking example: GP 400 SC	SAB BRÖCKSKES · D-Viersen · GP 400 SC 1x(70,0mm²+4x1,0mm²) 3400-0004 CE and continuous meter marking
GP 400 QF	SAB BRÖCKSKES · D-Viersen · GP 400 QF 4x(70,0mm²+4x1,0mm²) 3400-0002 N CE and continuous meter marking

Current carrying capacity data will follow!

Technical Data

Nominal voltage:	Uo/U 115/200 V
Max. permissible operating voltage:	Uo/U 0,6/1 kV
Testing voltage:	core/core 4000 V AC 50 Hz
Min. bending radius *fixed laying:* *flexible application:*	 4 x d 6 x d
Temperature range *fixed laying:* *flexible application:*	 -40/+70 °C -30/+70 °C
Fire performance:	acc. to IEC 60332-1-2
Oil resistance:	good - acc. to EN 50290-2-22
Chem. resistance:	good against acids, alkalines, solvents, hydraulic liquids, etc.
Weather resistance:	good
Salt water resistance:	good
Hydrolysis and microbial resistance:	good
Ozone resistance:	good
Abrasion:	acc. to UL 2556-2021 and JIS C3005
Fuel resistant:	petrol, diesel and kerosene (Jet A-1)
Mechanical resistance:	characteristics of 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.	no. of cores x cross section n x mm²	outer-ø mm	copper figure kg/km	cable weight ≈ kg/km	ohmic resistance max. Ω/km
GP 400 SC - special polymer					
34000003	1 x (50,0 + 4 x 1,0)	min. 16 - max. 16,5	524,0	603	50,0 mm²: 0,393 | 1,0 mm²: 20,0
34000004	1 x (70,0 + 4 x 1,0)	max. 17,5	739,2	792	70,0 mm²: 0,277 | 1,0 mm²: 20,0
GP 400 QF - special polymer					
34000001	4 x (50,0 + 4 x 1,0)	max. 39,9 (core min. 16 - max. 16,6)	2096,0	2436	50,0 mm²: 0,393 | 1,0 mm²: 20,0
34000002	4 x (70,0 + 4 x 1,0)	approx. 42,5 (core max. 17,9)	2957,0	3174	70,0 mm²: 0,277 | 1,0 mm²: 20,0

400Hz Cables

GP 400 SF

Supply cable - SymmetricalFlex

Plug'n'Play see page 18

SABGSE

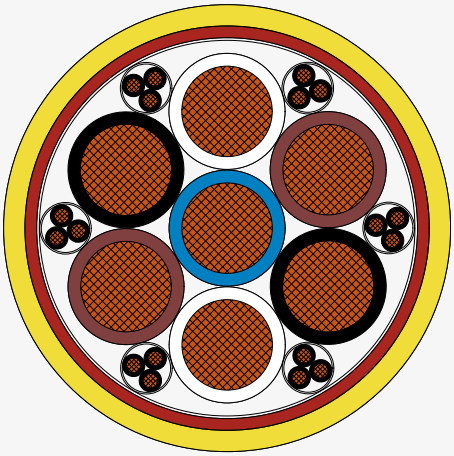
CE RoHS

Application

For flexible use on mobile GPUs, in PIT systems, on frequency converters and as a flexible extension for operating lengths over 25 metres.

Outstanding features

- low capacity insulation
- very flexible and smooth handling
- very good installation in narrowest spaces
- good resistance
- low wear
- with wear indicator



Construction

Conductor:	tinned copper strands, fine wires acc. to IEC 60228 class 5
Insulation:	SABIX®
Colour code:	1,0 mm²: black with numbers 35,0 mm²: blue, 2 x (white, brown, black)
Stranding:	35,0 mm²: blue, 2 x (white, brown, black)
Stranding:	1,0 mm²: cores twisted to triples, wrapped with non-woven tape. All elements optimized stranded in layers, wrapped with non-woven tape
Inner sheath:	special polymer, red
Outer sheath:	special polymer, yellow
Marking example:	SAB BRÖCKSKES · D-Viersen · GP 400 SF 7x35,0mm²+6x3x1,0mm² 3400-0101 CE and continuous meter marking

Current carrying capacity

With reference to LV112-3 and based on an application-related current-time profile and the following operating conditions:

- ambient temperatures up to max. 52°C
- two phases of the same colour connected to one conductor
- other cores (35mm² bl and 1mm²) unloaded
- laying individually on or on surfaces

- 286 A for max. 10 min.
- 325 A for max. 5 min.
- 364 A for max. 10 s
- 520 A for max. 2 s

Technical Data

Nominal voltage:	1,0 mm²: Uo/U max. 115/200 V 35,0 mm²: Uo/U 0,6/1 kV
Testing voltage:	core/core 4000 V AC 50 Hz
Min. bending radius *fixed laying:* *flexible application:* *for one single bend:*	 4 x d 6 x d 3 x d
Temperature range *fixed laying:* *flexible application:*	 -40/+70 °C -30/+70 °C
Fire performance:	acc. to IEC 60332-1-2
Oil resistance:	good - acc. to EN 50290-2-22
Chem. resistance:	good against acids, alkalines, solvents, hydraulic liquids, etc.
Weather resistance:	good
Salt water resistance:	good
Hydrolysis and microbial resistance:	good
Ozone resistance:	good
Abrasion:	acc. to UL 2556-2021 and JIS C3005
Fuel resistant:	petrol, diesel and kerosene (Jet A-1)
Mechanical resistance:	characteristics of 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

Installation instructions for PIT systems see page 19

item no.	no. of cores x cross section n x mm²	outer-ø mm	copper figure kg/km	cable weight ≈ kg/km	ohmic resistance max. Ω/km
34000100	7 x 25,0 + 6 x 3 x 1,0	ca. 37,5 - max. 38,5	1853	2569	25,0 mm²: 0,78 | 1,0 mm²: 19,5
34000102	7 x 25,0 + 6 x 4 x 1,0	ca. 38,0 - max. 39,5	1910	2634	25,0 mm²: 0,78 | 1,0 mm²: 19,5
34000101	7 x 35,0 + 6 x 3 x 1,0	ca. 42,2 - max. 44,0	2525	3235	35,0 mm²: 0,554 | 1,0 mm²: 19,5
34000103	7 x 35,0 + 6 x 4 x 1,0	ca. 42,2 - max. 44,0	2583	3320	35,0 mm²: 0,554 | 1,0 mm²: 19,5

400Hz Cables

GP 400 TF DR

Supply cable - TrippleFlex drum

Plug'n'Play see page 17

SABGSE

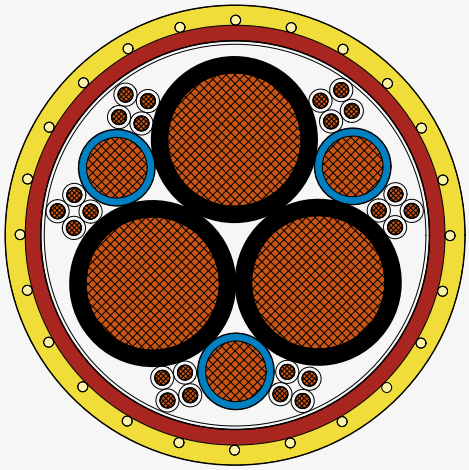
CE RoHS

Application

Cable for use on motorised cable reels, from a core diameter of min. 600 mm or in cable carrier (crocodile).

Outstanding features

- low capacity insulation
- abrasion-resistant PUR jacket
- cold flexible
- halogene free
- oil resistant
- weather resistant
- with wear indicator



Construction

Conductor:	tinned copper strands, fine wires acc. to IEC 60228 class 5
Insulation:	SABIX®
Colour code:	1,0 mm²: white cores with numbers 1-24 12,0 mm²: 3 x blue 70,0 mm²: black cores with numbers 1-3
Stranding:	1,0 mm²: cores twisted as quad, wrapped with overlapping non-woven tape
Stranding:	all elements optimized stranded in layers, wrapped with overlapping non-woven tape
Inner sheath:	PUR, red
Supporting screen:	aramid
Outer sheath:	PUR, yellow
Marking example:	SAB BRÖCKSKES · D-Viersen · GP 400 TF DR 3x70,0mm²+3x12,0mm²+6x4x1,0mm² 3400-0203 CE and continuous meter marking

Current carrying capacity

With reference to LV112-3
and based on an application-related current-time profile
and the following operating conditions:

- ambient temperatures up to max. 30°C
- two phases of the same colour connected to one conductor
- other cores (12mm² bl and 1mm²) unloaded
- laying individually on or on surfaces

- 260 A for max. 2 h
- 286 A for max. 10 min.
- 325 A for max. 5 min.
- 364 A for max. 10 s
- 520 A for max. 2 s

Technical Data

Nominal voltage:	Uo/U 115/200 V
Max. permissible operating voltage:	Uo/U 0,6/1 kV
Testing voltage:	core/core 4000 V AC 50 Hz
Min. bending radius *fixed laying:* *flexible application:* *guided on pulleys:* *drum:*	 4 x d 7,5 x d for repeated winding action 10 x d min. 600 mm inner diameter
Min. tensile strength:	4050 N (15 N/mm²)
Halogen-free:	acc. to IEC 60754-1
Temperature range *fixed laying:* *flexible application:*	 -40/+90 °C -30/+90 °C
Fire performance:	sheath material: UL 94 V2
Oil resistance:	very good - acc. to EN 50363-10-2
Chem. resistance:	good against acids, alkalines, solvents, hydraulic liquids, etc.
Weather resistance:	very good - acc. to HD 605 (VDE 0276-605)
Ozone resistance:	very good - acc. to EN 50396
Salt water resistance:	very good - acc. to UL 1309
MUD resistance:	very good - acc. to IEC 60092-360
Hydrolysis and microbial resistance:	very good - acc. to EN 50363-10-2
Abrasion:	acc. to UL 2556-2021 and JIS C3005
Fuel resistant:	petrol, diesel and kerosene (Jet A-1)
Mechanical resistance:	characteristics of the PUR outer sheath: ▸ very high tensile strength ▸ very high tear strength ▸ very high abrasion resistance ▸ very high notch resistance ▸ very high shear strength
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 mm	copper figure kg/km	cable weight ≈ kg/km	ohmic resistance max. Ω/km
34000203	3 x 70,0 + 3 x 12,0 + 6 x 4 x 1,0	approx. 39,0 - max. 40,0	2592	3112	70,0 mm²: 0,277 | 12,0 mm²: 1,63 | 1,0 mm²: 19,5
34000204	3 x 70,0 + 3 x 16,0 + 6 x 4 x 1,0	approx. 39,8 - max. 40,0	2707	3221	70,0 mm²: 0,277 | 12,0 mm²: 1,21 | 1,0 mm²: 19,5

400Hz Cables

GP 400 SF DR

Supply cable - Symmetrical Flex drum

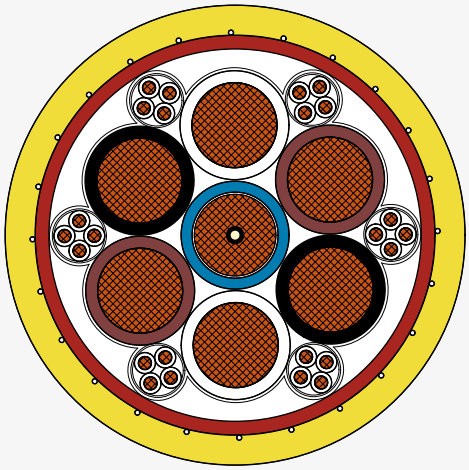
Plug'n'Play see page 17

Application

Cable for use on motorised cable reels, from a core diameter of min. 600 mm or in cable carrier (crocodile).

Outstanding features

- low capacity insulation
- abrasion-resistant PUR jacket
- cold flexible
- oil resistant
- weather resistant
- with wear indicator



Construction

Conductor:	tinned copper strands, fine wires acc. to IEC 60228 class 5
Insulation:	SABIX®
Colour code:	11,0 mm²: white cores with numbers 1 - 24 35,0 mm²: blue, 2 x white, 2 x brown, 2 x black
Stranding:	1,0 mm²: cores twisted as quad, wrapped with overlapping foil 35,0 mm²: cores wrapped with overlapping foil
Stranding:	all elements optimized stranded in layers, wrapped with overlapping non-woven tape
Inner sheath:	PUR, red
Supporting screen:	aramid
Outer sheath:	PUR, yellow
Marking example:	SAB BRÖCKSKES · D-Viersen · GP 400 SF DR 7x35,0mm²+6x4x1,0mm² 3400-0228 CE and continuous meter marking

Current carrying capacity data will follow!

Technical Data

Nominal voltage:	Uo/U 115/200 V
Max. permissible operating voltage:	Uo/U 0,6/1 kV
Testing voltage:	core/core 4000 V AC 50 Hz
Min. bending radius *fixed laying:* *flexible application:* *guided on pulleys:* *drum:*	 4 x d 6 x d for repeated winding action 7,5 x d min. 600 mm inner diameter
Min. tensile strength:	4035 N (15 N/mm²)
Temperature range *fixed laying:* *flexible application:*	 -50/+90 °C -40/+90 °C
Fire performance:	sheath material: UL 94 V2
Oil resistance:	very good - acc. to EN 50363-10-2
Chem. resistance:	good against acids, alkalines, solvents, hydraulic liquids, etc.
Weather resistance:	very good - acc. to HD 605 (VDE 0276-605)
Ozone resistance:	very good - acc. to EN 50396
Salt water resistance:	very good - acc. to UL 1309
MUD resistance:	very good - acc. to IEC 60092-360
Hydrolysis and microbial resistance:	very good - acc. to EN 50363-10-2
Abrasion:	acc. to UL 2556-2021 and JIS C3005
Fuel resistant:	petrol, diesel and kerosene (Jet A-1)
Mechanical resistance:	characteristics of the outer sheath: ▸ very high tensile strength ▸ very high tear strength ▸ very high abrasion resistance ▸ very high notch resistance ▸ very high shear strength
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 mm	copper figure kg/km	cable weight ≈ kg/km	ohmic resistance max. Ω/km
34000228	7 x 35,0 + 6 x 4 x 1,0	approx. 42,3 - max. 42,9	2592	3374	35,0 mm²: 0,55 | 1,0 mm²: 19,5

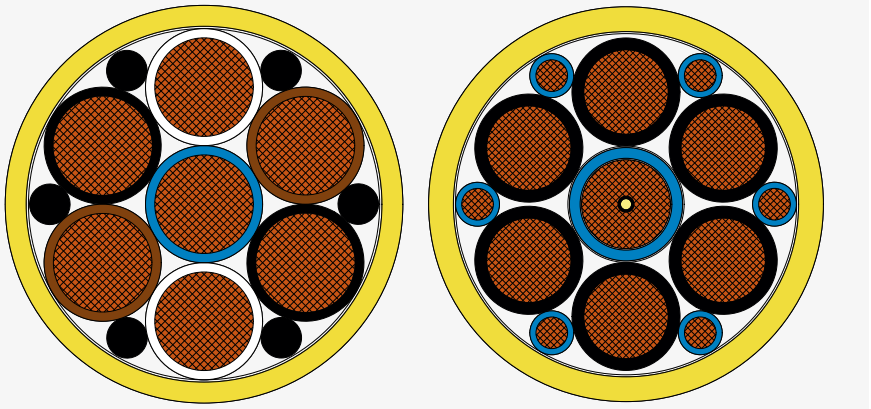
400Hz Cables

GP 400 SF S Power

Supply cable - Drag chain Power

Application

Supply cable for use in drag chains and as a festoon cable on passenger boarding bridges.



Outstanding features

- low capacity insulation
- cold flexible
- halogene free
- torsion resistant
- good ozone, sunlight and weather resistance
- good oil and fuel resistance
- no flame propagation
- flame retardant and self-extinguishing
- good acid and alkalines resistance

Construction

Conductor:	bare copper strands, fine wires acc. to IEC 60228 class 5
Insulation:	SABIX®
Colour code:	blue, white, white, brown, brown, black, black
Stranding:	cores twisted in layers, blue core in the centre, filler in interstices, wrapped with non-woven tape
Stranding:	all elements optimized stranded in layers, wrapped with overlapping non-woven tape
Outer sheath:	SABIX®, yellow
Marking example:	SAB BRÖCKSKES · D-Viersen · GP 400 SF S Power 7x35,0mm² CE and continuous meter marking

Technical Data

Nominal voltage:	Uo/U 0,6/1 kV
Testing voltage:	core/core 4000 V AC 50 Hz
Min. bending radius *fixed laying:* *flexible application:* *continuously flexible:*	 4 x d 6 x d 12 x d
Torsion angle:	± 60°/1 m
Temperature range *fixed laying:* *flexible application:*	 -50/+90 °C -40/+90 °C
Fire performance:	no flame propagation acc. to IEC 60332-3-24 + VDE 0482-332-3-24 resp. IEC 60332-3-25 + VDE 0482-332-3-25 und EN 50305 + VDE 0260-305 section 9.1.2. Flame retardant and self-extinguishing acc. to IEC 60332-1-2 + VDE 0482-332-1-2. Flame retardant acc. to ISO 6722 (UN/ECE R118)
Halogen-free:	acc. to EN 50306-1 + EN 50264-1. Development of HCl is < 0,5% acc. to IEC 60754-1. pH-value is > 4,3 acc. to IEC 60754-2. Conductivity is < 10,0 µS/mm acc. to IEC 60754-2. Fluoric content < 0,1% acc. to IEC 60684-2
Smoke density:	acc. to IEC 61034 + VDE 0482-1034
Toxicity:	acc. to EN 50305 + VDE 0260-305
Oil and fuel resistance:	acc. to EN 50264-1 + VDE 0260-264-1
Flexibility:	very good
Free-hanging length for festoon application:	50 m
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 mm	copper figure kg/km	cable weight ≈ kg/km	ohmic resistance max. Ω/km
34000250	7 x 35,0	approx. 34,3	2352	2888	35,0 mm²: 0,55
34000251	7 x 35,0 + 6 x 6,0	approx. 38,7 - max. 40,0	2707	3405	35,0 mm²: 0,55 | 6,0 mm²: 3,3

GP 400 SF S Control

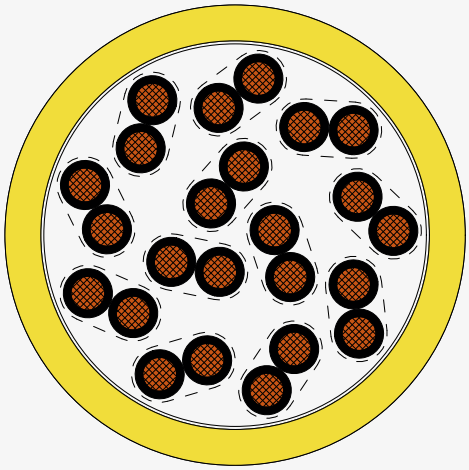
Control cable

Application

Control cable for use in drag chains and as a festoon cable on passenger boarding bridges.

Outstanding features

- low capacity insulation
- cold flexible
- halogene free
- torsion resistant
- good ozone, sunlight and weather resistance
- good oil and fuel resistance
- no flame propagation
- flame retardant and self-extinguishing
- good acid and alkalines resistance



Construction

Conductor:	bare copper strands, fine wires acc. to IEC 60228 class 5
Insulation:	SABIX®
Colour code:	black with numbers 1 - 24
Stranding:	cores twisted to pairs, pairs stranded in layers, wrapped with non-woven tape
Stranding:	all elements optimized stranded in layers, wrapped with overlapping non-woven tape
Outer sheath:	SABIX®, yellow
Marking example:	SAB BRÖCKSKES · D-Viersen · GP 400 SF S Control 12x2x1,5mm² CE and continuous meter marking

Technical Data

Nominal voltage:	Uo/U 0,6/1 kV
Testing voltage:	core/core 4000 V AC 50 Hz
Min. bending radius *fixed laying:* *flexible application:* *continuously flexible:*	 4 x d 6 x d 12 x d
Torsion angle:	± 60°/1 m
Temperature range *fixed laying:* *flexible application:*	 -50/+90 °C -40/+90 °C
Fire performance:	no flame propagation acc. to IEC 60332-3-24 + VDE 0482-332-3-24 resp. IEC 60332-3-25 + VDE 0482-332-3-25 und EN 50305 + VDE 0260-305 section 9.1.2. Flame retardant and self-extinguishing acc. to IEC 60332-1-2 + VDE 0482-332-1-2. Flame retardant acc. to ISO 6722 (UN/ECE R118)
Halogen-free:	acc. to EN 50306-1 + EN 50264-1. Development of HCl is < 0,5% acc. to IEC 60754-1. pH-value is > 4,3 acc. to IEC 60754-2. Conductivity is < 10,0 µS/mm acc. to IEC 60754-2. Fluoric content < 0,1% acc. to IEC 60684-2
Smoke density:	acc. to IEC 61034 + VDE 0482-1034
Toxicity:	acc. to EN 50305 + VDE 0260-305
Oil and fuel resistance:	acc. to EN 50264-1 + VDE 0260-264-1
Flexibility:	very good
Free-hanging length for festoon application:	50 m
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 mm	copper figure kg/km	cable weight ≈ kg/km	ohmic resistance max. Ω/km
34000252	12 x 2 x 1,5	approx. 20,7 - max. 22,0	346	529	1,5 mm²: 13,3

400Hz Cables

GP 400 Sy - PUR

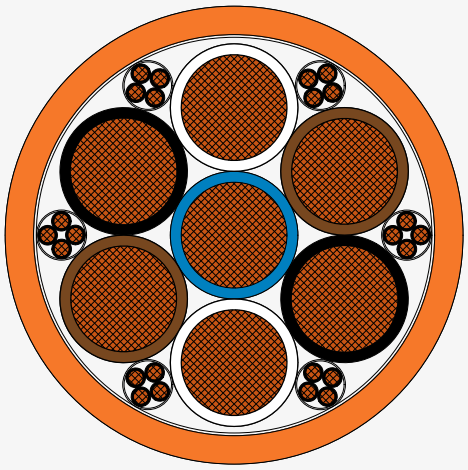
Supply cable - Symmetrical

Application

For use as a permanently installed supply cable in 400Hz systems, e.g. between 400Hz generator and cable dispenser.

Outstanding features

- price optimised
- low capacity insulation



Construction

Conductor:	tinned copper strands, fine wires acc. to IEC 60228 class 5
Insulation:	SABIX®
Colour code:	1,0 mm²: black with numbers 1 – 24 35,0 mm² resp. 50,0 mm²: blue, 2 x white, 2 x brown, 2 x black
Stranding:	1,0 mm²: each four cores twisted in layers, wrapped with non-woven tape elements and 50,0 mm² cores twisted in layers, blue core in the centre, wrapped with non-woven tape
Outer sheath:	PUR, orange
Marking example:	SAB BRÖCKSKES · D-Viersen · GP 400 Sy 7x50,0mm²+6x4x1,0mm² 3400-0453 CE and continuous meter marking

Technical Data

Nominal voltage:	1,0 mm²: Uo/U 115/200 V 50,0 mm²: Uo/U max. 0,6/1 kV
Testing voltage:	core/core 4000 V AC 50 Hz
Min. bending radius *fixed laying:* *flexible application:* *for one single bend:*	 4 x d 6 x d 3 x d
Halogen-free:	acc. to IEC 60754-1
Temperature range *fixed laying:* *flexible application:*	 -50/+90 °C -40/+90 °C +110 °C (bis 7500 h) limited time of use
Fire performance:	sheath material: UL 94 V2
Chem. resistance:	good against acids, alkalines, solvents, hydraulic liquids, etc.
Hydrolysis and microbial resistance:	very good - acc. to EN 50363-10-2
Salt water resistance:	very good - acc. to UL 1309
Oil resistance:	very good - acc. to EN 50363-10-2
MUD resistance:	very good - acc. to IEC 60092-360
Weather resistance:	very good - acc. to HD 605 (VDE 0276-605)
Ozone resistance:	very good - acc. to EN 50396
Abrasion:	acc. to UL 2556-2021 and JIS C3005
Fuel resistant:	petrol, diesel and kerosene (Jet A-1)
Mechanical resistance:	characteristics of the PUR 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.	no. of cores x cross section n x mm²	outer-ø mm	copper figure kg/km	cable weight ≈ kg/km	ohmic resistance max. Ω/km
34000452	7 x 35,0 + 6 x 4 x 1,0	min. 40 - max. 41,9	2583	3219	35,0 mm²: 0,554 | 1,0 mm²: 19,5
34000453	7 x 50,0 + 6 x 4 x 1,0	min. 40 - max. 41,9	3590	4123	50,0mm²: 0,386 | 1,0 mm²: 20,0

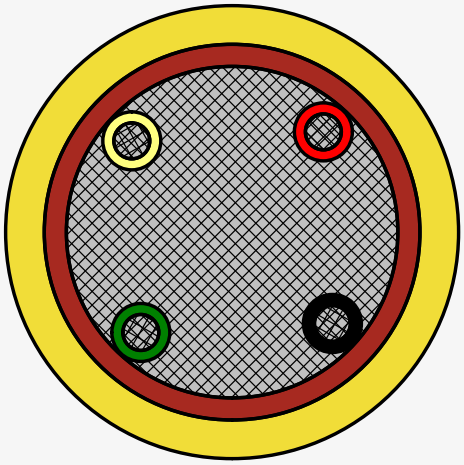
28V DC Cables

GP 28V DC SC

Supply cable - 28V DC SingleCore

Application

For use in flexible applications, e.g. on mobile GPUs.



Outstanding features

- low capacity insulation
- abrasion-resistant PUR jacket
- control cores symmetrically arranged
- cold flexible
- halogene free
- oil resistant
- weather resistant
- with wear indicator

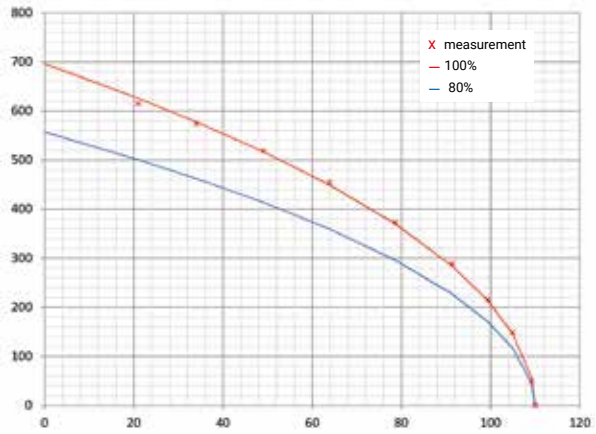
Construction

Conductor:	tinned copper strands, fine wires, acc. to IEC 60228 class 5
Insulation:	SABIX®
Colour code:	1,0 mm²: control cores: red, black, green, yellow, Ø: nom. 1,8 ± 0,2mm 120,0 mm²: power supply core: red
Stranding:	control cores within the power supply core
Outer sheath:	PUR, yellow
Marking example:	SAB BRÖCKSKES · D-Viersen · GP 28V DC SC (120,0mm²+4x1,0mm²) 3400-0350 CE and continuous meter marking

Current carrying capacity

- acc. to VDE 0298-4, up to +50°C: 344 A

Determination of the derating curve with reference to LV112-3



Technical Data

Nominal voltage:	Uo/U 28V DC
Testing voltage:	core/core 600 V 50 Hz
Min. bending radius *fixed laying:* *flexible application:*	 4 x d 6 x d
Halogen-free:	acc. to IEC 60754-1
Temperature range *fixed laying:* *flexible application:*	 -50/+90 °C -40/+90 °C +110 °C (bis 7500 h) limited time of use
Fire performance:	sheath material: UL 94 V2
Chem. resistance:	good against acids, alkalines, solvents, hydraulic liquids, etc.
Hydrolysis and microbial resistance:	very good - acc. to EN 50363-10-2
Salt water resistance:	very good - acc. to UL 1309
Oil resistance:	very good - acc. to EN 50363-10-2
MUD resistance:	very good - acc. to IEC 60092-360
Weather resistance:	very good - acc. to HD 605 (VDE 0276-605)
Ozone resistance:	very good - acc. to EN 50396
Abrasion:	acc. to UL 2556-2021 and JIS C3005
Fuel resistant:	petrol, diesel and kerosene (Jet A-1)
Mechanical resistance:	characteristics of 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

Reference values of current carrying capacity from derating curve

for 20°C ambient temperature, taken from 80% curve: **500 A**

for 20°C ambient temperature, taken from 100 % curve: **600 A**

precondition: laying separately free in air

item no.	no. of cores x cross section n x mm²	outer-ø mm	copper figure kg/km	cable weight ≈ kg/km	ohmic resistance max. Ω/km
34000350	1 x (120,0 + 4 x 1,0)	approx. 22,0 - max. 23,0	1296	1339	40,0 mm²: 0,50 | 1,0 mm²: 20,0

28V DC Cables

GP 28V DC SF

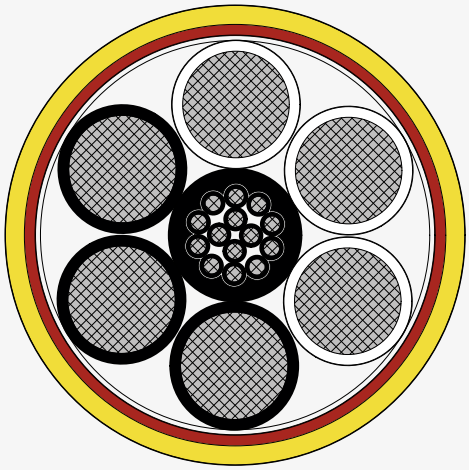
Supply cable - 28V DC SymmetricalFlex

Application

For flexible use on GPUs. Alternative construction for 2 x (120,0 mm² + 4 x 1,0 mm²) or 4 x (70,0 mm² + 4 x 1,0 mm²) as all-in-one cable solution.

Outstanding features

- low capacity insulation
- very flexible and smooth handling
- very good installation in narrowest spaces
- good resistance
- low wear
- with wear indicator



Construction

Conductor:	tinned copper strands, fine wires acc. to IEC 60228 class 5
Insulation:	SABIX®
Colour code:	1,0 mm²: black cores with numbers 1 - 14 40,0 mm²: black cores with numbers 1 – 3, white cores with numbers 1 - 3
Stranding:	1,0 mm²: cores optimized stranded in layers
Inner sheath:	special polymer, black
Stranding:	core 40,0 mm² optimized stranded in layers, element (14 x 1,0 mm²) in the centre, wrapped with overlapping non-woven tape
Inner sheath:	special polymer, red
Outer sheath:	special polymer, yellow
Marking example:	SAB BRÖCKSKES · D-Viersen · GP 28V DC SF 6x40,0mm²+14x1,0mm² 3400-0300 CE and continuous meter marking

Technical Data

Nominal voltage:	Uo/U 28V DC
Testing voltage:	core/core 600 V AC/DC 50 Hz
Min. bending radius *fixed laying:* *flexible application:*	 4 x d 6 x d
Temperature range *fixed laying:* *flexible application:*	 -40/+70 °C -30/+70 °C
Fire performance:	acc. to IEC 60332-1-2
Chem. resistance:	good against acids, alkalines, solvents, hydraulic liquids, etc.
Hydrolysis and microbial resistance:	good
Salt water resistance:	good
Oil resistance:	good - acc. to EN 50290-2-22
Weather resistance:	good
Ozone resistance:	good
Abrasion:	acc. to UL 2556-2021 and JIS C3005
Fuel resistant:	petrol, diesel and kerosene (Jet A-1)
Mechanical resistance:	characteristics of 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.	no. of cores x cross section n x mm²	outer-ø mm	copper figure kg/km	cable weight ≈ kg/km	ohmic resistance max. Ω/km
34000300	6 x 40,0 + 14 x 1,0	approx. 22,2 - max. 23,0	2438	3112	120,0 mm²: 0,164 | 1,0 mm²: 20,0

Harnessed Cables

Cable Harnessing for Ground Power Supply

Customised solutions according to customer specifications | ready harnessed with plug | directly from the manufacturer

Whether standard or customised cable assemblies - we design and manufacture high-quality cables and wires, right through to the fully connected plug. As a manufacturer of 400Hz/28V DC cables, we offer you a wide range of different cable assemblies and complete cable sets that are specially customised to your individual requirements and specifications.

Our cable assemblies, including 400Hz/28V DC cables, are used in a wide range of industries. These include ground power supply for aeroplanes and helicopters (aviation industry), the automotive industry, mechanical and plant engineering as well as the electrical and household appliance industries. Our 400Hz/28V DC cable assemblies are used worldwide by manufacturers of ground power units (GPU), frequency converter manufacturers, airports, airlines, military and airport service companies.

Varied cable harnessing for your requirements

Thanks to the wide selection of connector types such as the P400, PD400, PDS400 and P28 connectors from LPA Connection Systems, various other connection components such as PJS400 connection sleeves, SAB Bröckskes offers customised solutions for your specific applications. Before we start assembling, we work closely with you to develop the optimum connection solution for your area of application.

Highest quality and precision

We are ISO 9001 certified in all areas of our production. certified. We also have an environmental management system in accordance with ISO 14001, an occupational health and safety management system in accordance with NFL/ILO-OSH and OHSAS 18001 and an energy management system in accordance with DIN EN ISO 50001. This ensures that our cable assemblies always meet the highest quality standards. Precision and reliability are particularly important when assembling 400Hz/28V DC cables in order to fulfil the high requirements of these special applications.

Your customised solution

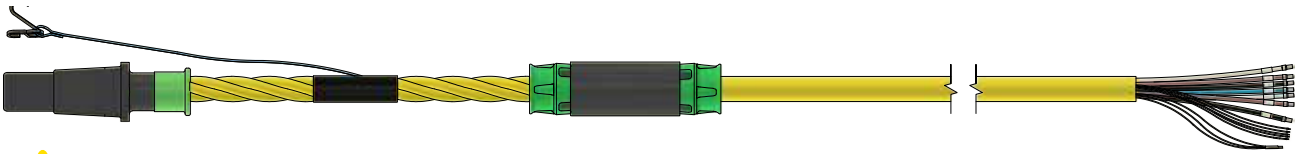
From planning to delivery, we offer you a comprehensive solution - from the cable to the assembly to the connector. Through constant quality controls, we ensure that your assembly is precisely tailored to your requirements.

On request, we can provide you with a test report with details of the insulation resistance > 1 MOhm at 500 V DC and the high-voltage test at 1500 V AC.

Harnessed Cables

Cable harnessing design enquiry form

Enquiry form for reeling cables



Note

If you assemble your own cables, please ensure that the cables are unrolled at least 12 hours before assembly.

This serves to prevent possible stresses and increase service life.

Cable on drum

- ☐ GP 400 TF DR 3 x 70,0 mm² + 3 x 12,0 mm² + 6 x 4 x 1,0 mm²
- ☐ GP 400 SF DR 7 x 35,0 mm² + 6 x 4 x 1,0 mm²

Cable length

_____ m

Connection cable

- ☐ GP 400 QF 4 x (50,0 mm² + 4 x 1,0 mm²)
- ☐ GP 400 QF 4 x (70,0 mm² + 4 x 1,0 mm²)

Cable length

_____ m

Complete cable length

_____ m

Note

Please send us an existing occupancy plan or let us know the desired PIN assignment.

Side 2

- ☐ wire end sleeves _____
- ☐ pin terminals _____
- ☐ ring cable lugs _____

Further accessories

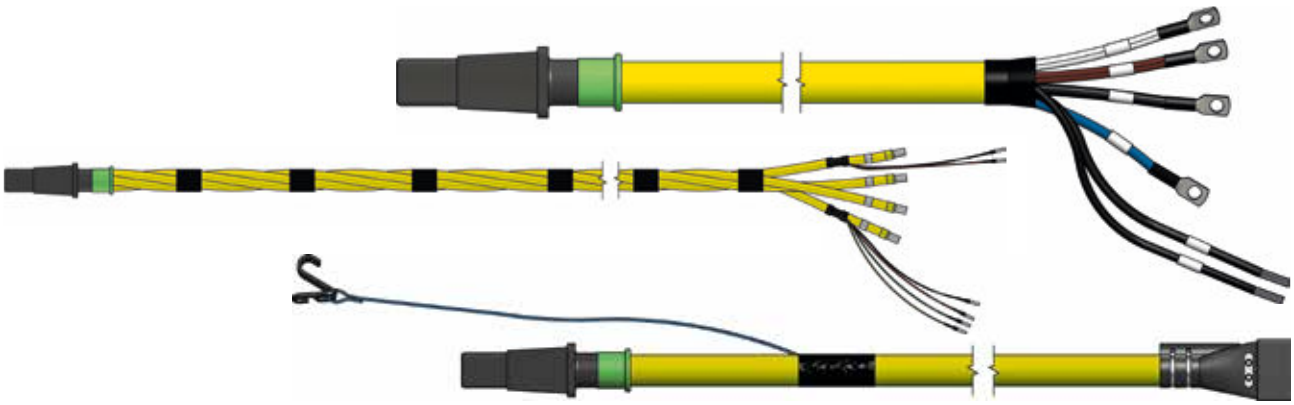
- ☐ with 90% switch ☐ PIN E ☐ PIN F ☐ PIN E+F
- ☐ push buttons ☐ red ☐ green ☐ black ____
- ☐ LED ☐ red ☐ green ____ ☐ yellow ____
- ☐ thermocouple ☐ PT100 ☐ PTC120 ☐ PTC100
- ☐ with strain relief _____ mm behind connector end

Remarks

Harnessed Cables

Cable harnessing design enquiry form

Enquiry form for Ground Power supply cables for flexible applications



Supply cable

☐ GP 400 QF	4 x (50,0 + 4 x 1,0) - PUR
☐ GP 400 QF	4 x (70,0 + 4 x 1,0) - PUR
☐ GP 400 QF	4 x (50,0 + 4 x 1,0) - Special polymer
☐ GP 400 QF	4 x (70,0 + 4 x 1,0) - Special polymer
☐ GP 400 SF	7 x 25,0 + 6 x 3 x 1,0
☐ GP 400 SF	7 x 35,0 + 6 x 3 x 1,0

Side 1

☐ plug	PD400
☐ plug	PDS400
☐ plug	P400

Further accessories

☐ with 90% switch	☐ PIN E ☐ PIN F ☐ PIN E+F
☐ push buttons	☐ red ☐ green ☐ black ____
☐ LED	☐ red ☐ green ____ ☐ yellow ____
☐ thermocouple	☐ PT100 ☐ PTC120 ☐ PTC100
☐ with strain relief	_____ mm behind connector end

Note

If you assemble your own cables, please ensure that the cables are unrolled at least 12 hours before assembly.

This serves to prevent possible stresses and increase service life.

Side 2

☐ wire end sleeves	_____
☐ pin terminals	_____
☐ ring cable lugs	_____
☐ plug	PPM 400P + PPM 400S socket

Cable length

_____ m

Note

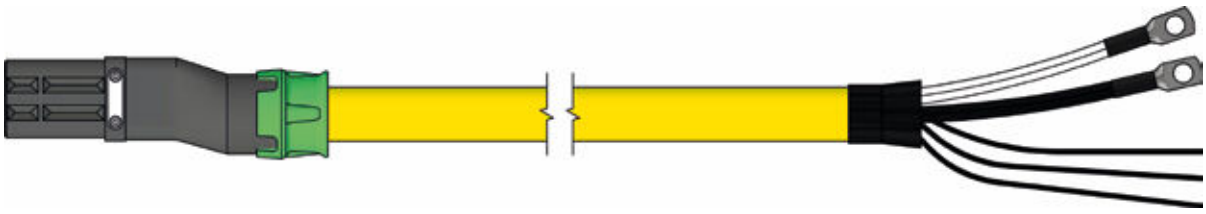
Please send us an existing occupancy plan or let us know the desired PIN assignment.

Remarks

Harnessed Cables

Cable harnessing design enquiry form

Enquiry form for Ground Power 28V DC supply cables for flexible applications



Note

If you assemble your own cables, please ensure that the cables are unrolled at least 12 hours before assembly.

This serves to prevent possible stresses and increase service life.

Supply cable

- ☐ GP 28V DC SC — 1 x (120,0 + 4 x 1,0)
- ☐ GP 28V DC SF — 6 x 40,0 + 14 x 1,0

Side 1

- ☐ plug — P28

Further accessories

- ☐ with 90% switch
- ☐ thermocouple — ☐ PT100 ☐ PTC120 ☐ PTC100
- ☐ with strain relief — _____ mm behind connector end

Side 2

- ☐ wire end sleeves _____
- ☐ pin terminals _____
- ☐ ring cable lugs _____

Cable length

_____ m

Note

Please send us an existing occupancy plan or let us know the desired PIN assignment.

Remarks

General information

Assembly instructions

for the installation of the cable in PIT systems

1. Planning of cable route

» Start by planning the exact route of the cable. This is crucial for the optimum function and longevity of the installation.

2. Check the specification

» Check whether the specification of the cable matches your desired application.

3. Laying out the cable

» Lay the cable in a straight line on the floor. It is best to use a cable dispenser to make handling easier.

» Make sure that the cable is not twisted.

4. Mounting the plug

» Fit the plug at the end of the cable if it is not already attached.

5. Examination of the chamber

» Before inserting the cable into the PIT system, check the chamber for damage and sharp-edged components.

6. Introducing the cable

» Insert the unassembled end of the cable into the PIT system without forcing or twisting it.

7. Condition of guide rollers

» Ensure that the guide rollers are in good condition and can be moved easily.

8. Inserting the cable

» Before connecting the cable, make sure that the cable is inserted as shown in the schematic diagram.

» With the GP 400 SF cable, the cable must be inserted anticlockwise due to the direction of lay. This is important in order to be able to attach the cable clamps in the correct position.

9. Fitting the cable clamps

» When attaching the cable clamps, make sure that the cable is fastened without constraint or twisting.

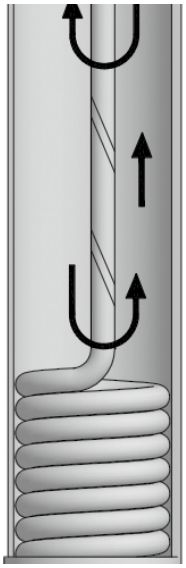
10. Connection to switch box

» Connect the cable to the switch box.

11. Final check

» After connecting the cable, pull it out once along its entire length and reinsert it to ensure that everything is installed correctly.

schematic diagram



The cable is pulled out of the PIT system **in clock direction.** The cable is turned up!

The cable is inserted **against clock direction** without twisting.

Maintenance notes

To ensure the longevity of the cable, maintenance is required at least once a month, depending on use. The cable should be fully laid out and the following steps carried out:

- turn back any axial twists in the cable
- visually check the cable for damage
- check roller packs for free movement
- check the cable clamps

Assembly instructions

for reeling cables

1. Reeling the cable

» The cable shall be wound directly from the supplied drum to the reeling drum. The complete unwinding of the cable isn' t necessary. A straight torsion-free guiding has to be observed. Equally the cable has to be fixed and connected torsion-free. The indicated min. bending radius has to be adhered to.

2. Windings of the cable

» In case of complete extension of the cable at least 2 windings shall remain on the reeling drum. For fixing the other cable end Kellem grips or large surface clamp connections can be used.

3. Mounting the cable

» The installation of reeling cables has to be done carefully. They have to be protected against external damage during installation and operation.

4. Stranding direction of the cable

» The start of winding of reeling cables on cylinder drums shall be made in stranding direction. Cables with right stranding direction (Z-lay) shall be operated to the right side and vice versa (see page 9 and 10). If the stranding direction isn't known, please contact our technical support for any information.

5. Tensile load limit values

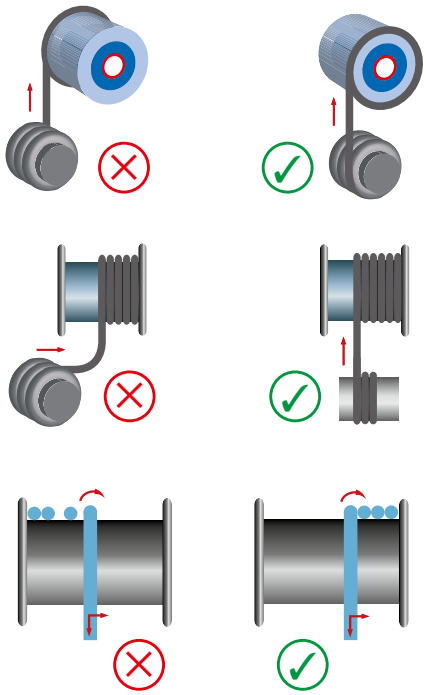
» Without special notice in our catalogue, the tensile stress of the copper conductors shall not exceed 15 N/mm² (DIN VDE 0298-3). In case of higher tensile stress, we recommend to contact our technical support to align the cable construction to the requirements. The max. allowed limit deviations of the tensile stress are to be understood as the sum of the static and dynamic stress.

6. Torsional stress

» Reeling cables are generally not appropriate for torsion stress. During operation, however, torsion stress can't be avoided. As a consequence the exceeding of the limit values (generally >± 25°/m) lead to a considerable reduction of service life.

7. Bending radii

» In case of undercutting the smallest allowed min. bending radius, the service life of the cable is reduced.



Maintenance notes

To ensure the longevity of the cable, maintenance is required at least once a month, depending on use. The pipe should be fully laid out and the following steps carried out:

- turn back any axial twists in the cable
- visually check the cable for damage
- check roller packs for free movement
- check the connection side

General information

400Hz Cables

In industry, the frequency of alternating current networks is usually 50 Hz (e.g. in Europe and Asia) or 60 Hz (e.g. in North America). In civil and military aviation, however, a frequency of 400Hz is used in aircraft electrical systems. The reason for this is that transformers and motors that are operated at 400Hz can be built much smaller and lighter than those with a mains frequency of 50 or 60 Hz.

But why is that so?

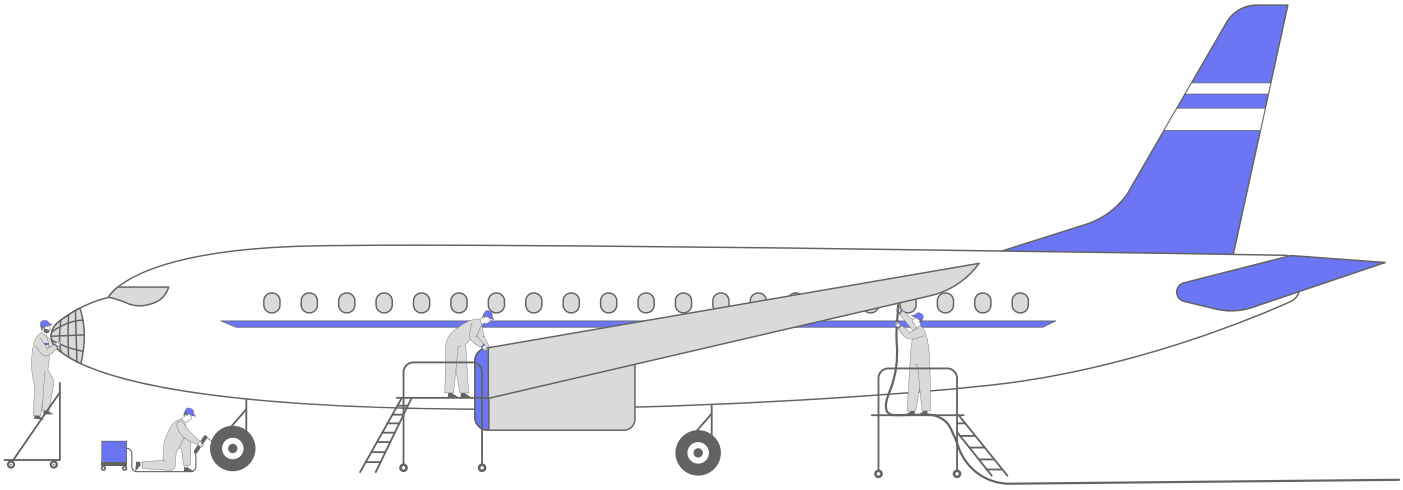
An engineer would explain it as follows: The electromotive force (EMF) generated in a coil is proportional to the magnetic flux and frequency. Higher frequencies require a lower magnetic flux, so less iron is needed in the core of the transformer. The number of primary and secondary windings, i.e. the amount of wire wound around the core, can also be reduced at higher frequencies. This reduces both the size and the weight.

However, a high frequency such as 400Hz has the disadvantage that electrical current cannot be transported efficiently over longer distances. As electricity supply companies are dependent on low-loss transmission, there is an international consensus on lower grid frequencies of 50 Hz or 60 Hz, which offer a good compromise between the requirements for motors and transformers and transmission efficiency.

Some railway networks, including that of Deutsche Bahn, still operate at 16.7 Hz. This comparatively low frequency is the result of the technological possibilities of the first electrical machines at the beginning of the 20th century, which made it possible to build powerful machines with low losses at low frequencies. Although this is no longer technically necessary today, the switch to higher frequencies was not made for economic reasons.

The use of 400Hz networks is therefore limited to applications with shorter distances, such as in aeroplanes. In addition, the power of 400Hz applications is usually in the range of a few hundred kilowatts. The main advantage of 400Hz is the more compact design and lower weight of the electrical equipment, which is particularly important in aviation to minimise weight and maximise range per unit of fuel.

In accordance with international standards (DFS 400 and ISO 6858), the electrical power supply for aircraft is currently fed from the low-voltage network (400 V / 230 V, 50 Hz) and converted to 200 V / 115 V at 400Hz for the on-board network. 400Hz converters with an output of up to 90 kVA are available as standard.



Technical Data

General information

28V DC / 270 V DC / 115/200 V AC

Why do aeroplanes work with 28V DC or 270 V DC and how do DC applications differ from 115/200 V AC at 400Hz?

By using multiple voltage levels, an optimal compromise between weight, efficiency, safety and performance can be achieved for different aviation requirements.

28V DC is the standard, especially for smaller aircraft and many on-board devices. 28V DC provides sufficient voltage to efficiently operate standard equipment such as lighting, avionics, hydraulic systems and low to medium power electric motors.

Compared to 12 V DC (e.g. in motor vehicles), less current flows at 28V DC for the same power, which reduces cable cross-sections and weight. On-board batteries and battery-backed emergency power supplies are also operated with 24 V DC, which makes operation and charging during flight more efficient.

28V DC was standardised early on in aviation, particularly in the military sector, and this standard has been transferred to civil aviation for smaller aircraft and helicopters. Low voltage is synonymous with safe operation: 28V DC is below the voltage limit classified as dangerous for humans, which increases safety during maintenance and operation.

Key facts 28V DC

» **safe, lightweight, battery compatible**

» **ideal for low power requirements**

270 V DC is used in larger or heavily electrified aircraft in which hydraulic and pneumatic systems have been replaced by electrical systems. Here, the current can be significantly reduced for the same power. This enables thinner and lighter cables, lower heat losses in the lines and more efficient energy transmission over greater distances in the aircraft compared to 28V DC.

Many high-performance devices such as actuators, electric drives for flight control or air conditioning systems work more efficiently with higher voltages.

Conversion losses are lower at the DC voltage level: devices that require high voltages can be operated directly at 270 V DC in parallel with the 28V DC system (standard for avionics systems) without a converter. This saves weight.

Key facts 270 V DC

» **efficient for high-performance applications**

» **reduces weight and cable losses in heavily electrified aircraft**

» **270 V DC harbours risks and is potentially life-threatening and therefore requires special handling rules**

Technical Data

General information

28V DC / 270 V DC / 115/200 V AC

115/200 V AC 115/200 V AC (400Hz) alternating current is used in aviation for higher power requirements, especially for larger aircraft and systems that require high efficiency and reliability. It enables the supply of devices with higher power requirements compared to 270V DC and is the most widely used standard in aviation

Key facts 115/200 V AC (400Hz)

» **offers high performance and efficiency for large electrical systems**

» **enables the use of use of (standard) AC consumers, which are also widely used in aviation**

Key facts DC systems

(Direct Current)

» **for the stable and reliable operation of avionics and emergency systems**

» **DC systems often require less complex devices such as transformers that would be required for AC systems**

» **DC systems enable lighter power power supply and distribution components**

» **DC systems are less susceptible to electromagnetic interference (EMC) than alternating current systems (important for the electronically sensitive environment of an aircraft)**

» **Aircraft use batteries as an emergency power source. Batteries inherently provide direct current, so direct use of DC systems reduces losses and complexity**

Key facts AC systems

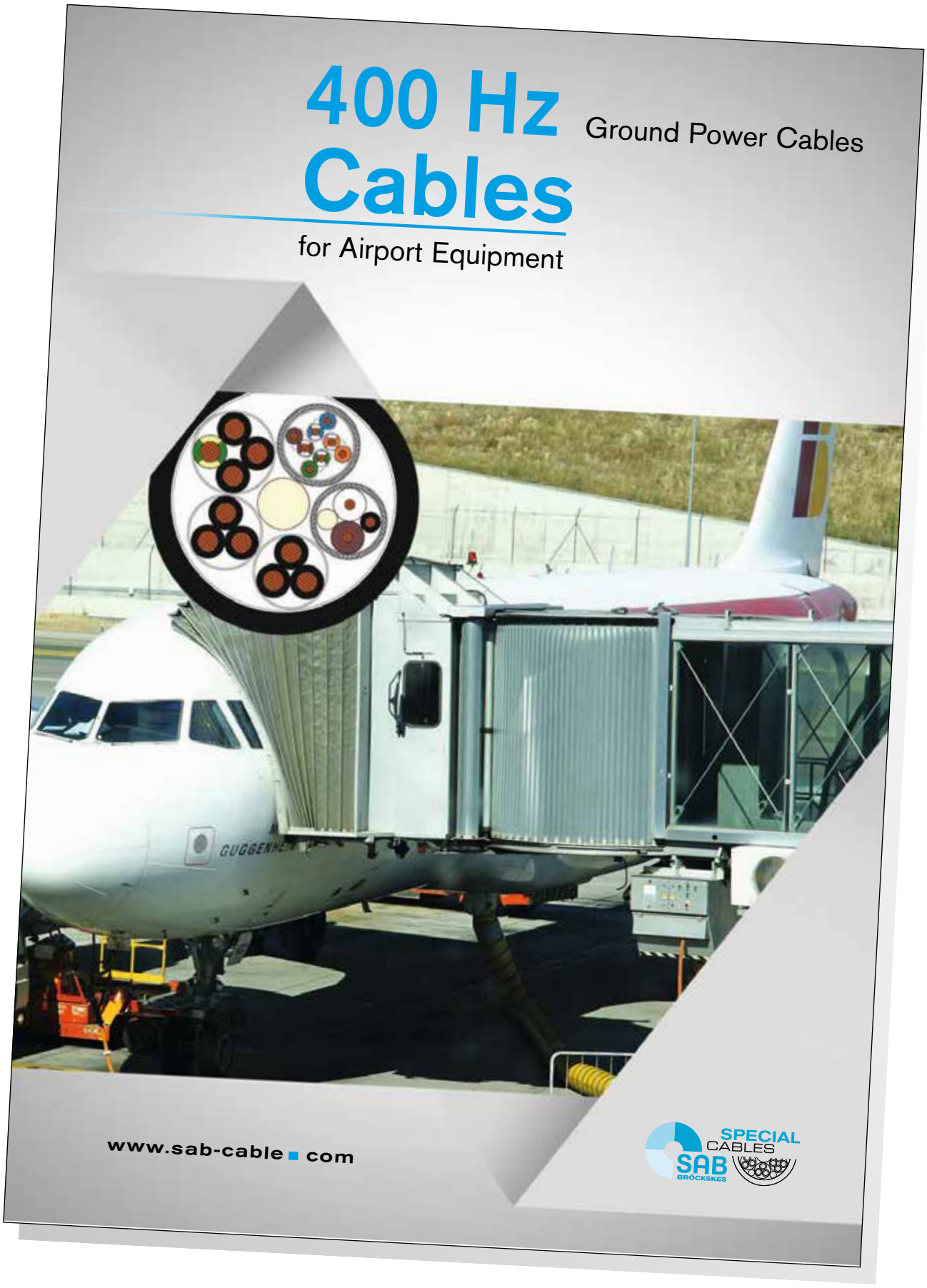
(Alternating Current)

» **For high power devices and systems. Alternating current requires additional converters to supply devices with different voltages or frequencies, which increases weight and complexity**

Cables for Airport Equipment

Please also take note of our brochure

„Cables for Airport Equipment"



Cables for Airport Equipment

Content

SPECIAL CABLES

SAB BRÖCKSKES

SAB Bröckskes GmbH & Co. KG
Grefrather Str. 204 - 212 b | 41749 Viersen | GERMANY
Tel.: +49/2162/898-0 | www.sab-cable.com | info@sab-cable.com

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