

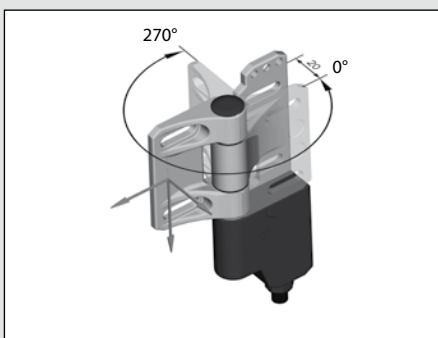
Safety Switches for Hinged Protective Equipment

Safety Hinge Switch – SHS3



With the SHS3 safety hinge switch BERNSTEIN presents the logical further development of the SHS series and a solution that makes it unnecessary to replace the safety hinge switch when equipment such as safety gates are damaged as the result of mechanical stress, such as after being bumped by a fork-lift truck for instance. Even after the switching point has been set, if need be, the user can now correct the hinge setting with the aid of the integrated fine adjustment system. The SHS3 hinge switch is reusable even when the entire system needs to be converted: With the aid of a change kit, the user can redefine the switching point without using the high protection rating of IP67.

The SHS3 has a swivel range from 0° to 270°. The switching point is also freely selectable within this range.



The SHS3 hinge switch has virtually no limits in terms of its installation flexibility. Not only does the SHS3 enable front and interior installation, right-hinged or left-hinged mounting or freely selectable direction of electric connection, but thanks to the switching point which can be set in an angle range of 270°, this hinge switch can also be installed in places that were previously not possible.

Safe:

With suitable system layout, the switch can be used up to performance level e. Following variants are available:

- 2 positive opening safety contacts
- 2 positive opening safety contacts with additional normally-open signalling contact
- With integrated AS interface Safety at Work.

Flexible:

- Freely and repeatedly adjustable switching point
- Switching point freely adjustable by user over a range of 270°
- Uncomplicated re-adjustment even of set switching point by $\pm 1.5^\circ$ thanks to integrated fine adjustment system
- Slots for mounting on sections and welded structures

- In addition to the plug connection version, an SHS with fixed cable connection at the rear is also available
- Right and left hinged systems possible for optimum cable routing
- Mounting between sections while maintaining the required finger guard gap

Fast:

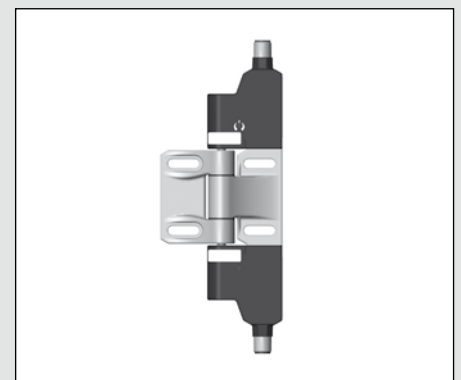
To connect the SHS3 even more efficiently, the two contacts are designed as normally-closed contacts with Ultra-Lock technology, thus enabling connection with an M12 cable.

Reliable:

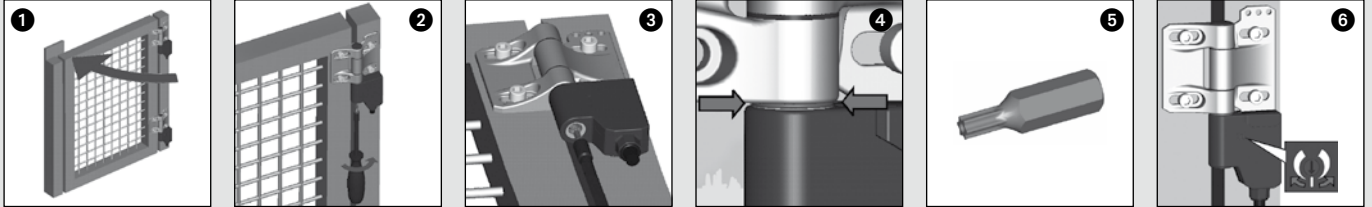
- The protection rating is IP67
- The load-bearing hinge is made from stainless steel while the switching system is housed in a high quality plastic enclosure

Double hinge

Thanks to its two switching elements on one hinge, the BG (occupational health and safety)-approved variant of the SHS3 provides two independently adjustable switching points. This arrangement not only makes it possible to monitor the opening of a safety guard but also the direction of opening of swing doors.



SHS3 – Setting the switching point



On delivery, the SHS3 hinge switch allows for all possible settings. With your specific application you define and lock the safe status of the hinged safety equipment (the closed position) (Fig. 1).

The adjusting screw located in axial direction in the switching system is then tightened with the special bit supplied with the hinge switch. The arrangement of the adjusting screw makes it possible to adjust the switching point in all installation positions (Fig. 2+3)

After establishing a form-fit connection, a green ring in the gap between the stainless steel hinge and switch enclosure indicates that the switching point has been set correctly at a min. torque of 2 Nm/+10% (Fig. 4).

A red ring at this point additionally indicates wear, e.g. caused by abrasive substances. With the same special bit you can not only freely adjust the switching point to suit your application but you can also change the mounting arrangement of your safety equipment from right-hinged to left-hinged (Fig. 5).

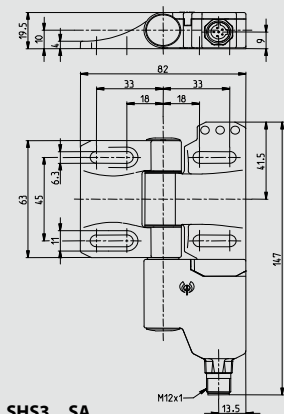
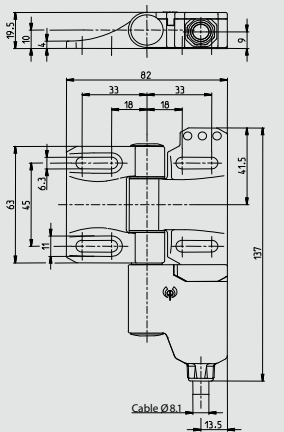
Fine adjustment

The set switching point can be subsequently varied by up to $\pm 1.5\%$ by turning the adjusting screw in the corresponding direction (Fig. 6).

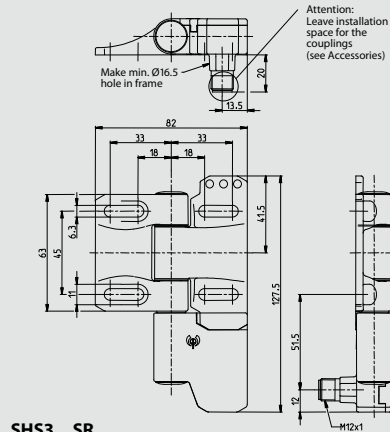
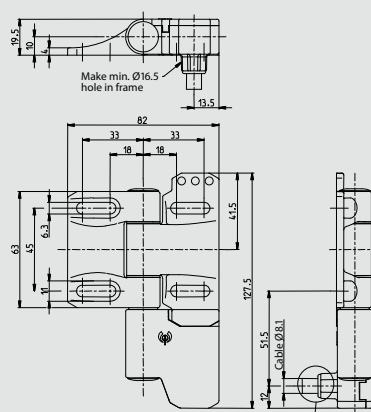
In many cases this fine adjustment makes it unnecessary to replace the switch or readjust the switching point due to mechanical deformation of the safety guard. The switching angle should generally be selected as small as possible.

Dimensioned drawings

SHS3...KA...



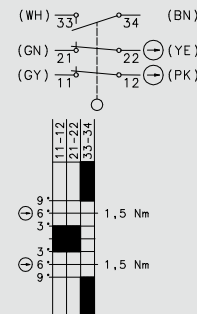
SHS3...KR...



Dimensioned drawings

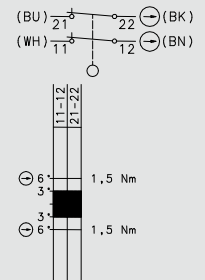
U15Z

2 NC contacts,
2 NO contacts (Zb)



A2Z

2 NC contacts (Zb)



Setting point freely selectable in range from 0°... 270° and 0°... 180°

Tolerances:

Switching angle (opening) $\pm 1.5^\circ$
Positive opening torque 10 %
Positive opening angle $\pm 1.5^\circ$

Safety Switches for Hinged Protective Equipment

Product selection

Article number	Designation	Switching contact	Max. switching voltage	Type of voltage	Type of connection and direction		Required cable coupling / type	Mounting
					radial	axial		
6019390023	SHS3-U15Z-KA 5 L	2NC/1NO	230 V	AC/DC		Cable		Left
6019390022	SHS3-U15Z-KA 5 R	2NC/1NO	230 V	AC/DC		Cable		Right
6019390025	SHS3-U15Z-KR 5 L	2NC/1NO	230 V	AC/DC		Cable		Left
6019390024	SHS3-U15Z-KR 5 R	2NC/1NO	230 V	AC/DC		Cable		Right
6019390035	SHS3-U15Z-SA L	2NC/1NO	230 V	AC/DC			M12 D	Left
6019390034	SHS3-U15Z-SA R	2NC/1NO	230 V	AC/DC			M12 D	Right
6019390037	SHS3-U15Z-SR L	2NC/1NO	230 V	AC/DC		M12	D	Left
6019390036	SHS3-U15Z-SR R	2NC/1NO	230 V	AC/DC		M12	D	Right
6019390040	SHS3-A2Z-SA-R	2NC	230 V	AC/DC			M12 E	Right
6019390041	SHS3-A2Z-SA-L	2NC	230 V	AC/DC			M12 E	Left
6019390044	SHS3-A2Z-SR-R	2NC	230 V	AC/DC		M12	E	Right
6019390042	SHS3-U1Z-SA-R	1NC/1NO	230 V	AC/DC			M12 E	Right
6019390043	SHS3-U1Z-SA-L	1NC/1NO	230 V	AC/DC			M12 E	Left
6019390045	SHS3-U1Z-SR-R	1NC/1NO	230 V	AC/DC		M12	E	Right
6019390046	SHS3-2-SA/2-SA	2 x 2NC	230 V	AC/DC			M12 2 x E	Both sides
6019390047	SHS3-5-SA/5-SA	2 x 1NC/1NO	230 V	AC/DC			M12 2 x E	Both sides
6019390048	SHS3-7-KA5/7-KA5	2 x 1NC/1NO	230 V	AC/DC		Cable		Both sides
6019390039	SHS3-7-SA/7-SA	2 x 1NC/1NO	230 V	AC/DC			M12 2 x D	Both sides
6019390038	SHS3-HINGE (blank hinge)							Both sides

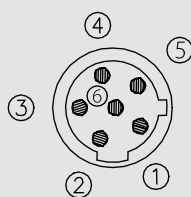
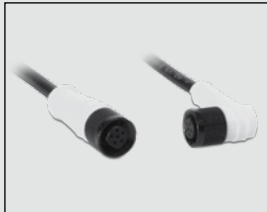
Technical data

Electrical data		
Rated insulation voltage	U_i max.	250 V
Rated operating voltage	U_e max.	230 V AC; 24 V DC
Conventional thermal current	I_{the}	5 A
Utilization category	U_e / I_e	AC-15, U_e / I_e 230 V / 3 A; DC-13 U_e / I_e 24 V/1A
Short-circuit protection		4 A gL/gG
Protection class		II, Insulated
Mechanical data		
Switch	PBT / Hinge G-X22 Cr Ni 17	
Ambient temperature	-25°C to +70°C (Connection cable installed)	
Mechanical service life	10 ⁶ switching cycles	
Switching frequency max.	max. 300 switching cycles/hour	
Mounting	4 x M6 Screws DIN EN ISO 7984	
B10d	2 mill.	
Type of connection	Fixed connection cable, 6 x 0.75 mm ² , minimum bending radius = 60 mm	
Weight	approx. 0.7 kg (cable variant)	
Installation position	Any	
Protection class	IP67 conforming to IEC/EN 60529	
Switching angle	± 3° from setting point	
Positive opening angle	± 6° + 2	
Positive opening torque	1.5 Nm	
Mechanical load	F_{R1} = max. 1200 N, F_{R2} = max. 500 N, F_A = max. 1200 N	
Standards		
VDE 0660 T100, DIN EN 60947-1, IEC 60947-1		
VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1		

SHS3 Cable Type D

Article number	Designation	Cable length	Connector type	Number of pins	Special feature
3251006291	AN-KAB.SH53 2M STRAIGHT	2 m	Straight	6	M12 BG version
3251006292	AN-KAB.SH53 5M STRAIGHT	5 m	Straight	6	M12 BG version
3251006293	AN-KAB.SH53 10M STRAIGHT	10 m	Straight	6	M12 BG version
3251006294	AN-KAB.SH53 2M ELBOW	2 m	Elbow	6	M12 BG version
3251006295	AN-KAB.SH53 5M ELBOW	5 m	Elbow	6	M12 BG version
3251006296	AN-KAB.SH53 10M ELBOW	10 m	Elbow	6	M12 BG version

Contact assignments, AC/DC versions



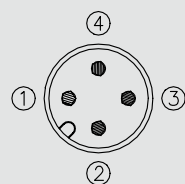
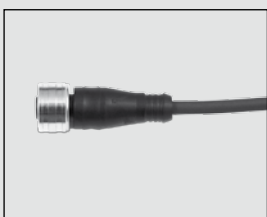
- 1 = White
- 2 = Brown
- 3 = Green
- 4 = Yellow
- 5 = Grey
- 6 = Pink

Core insulation/sheathing material:	PVC (∅ 5.6 mm)
Moulding/contact carrier material:	PUR Elastollan R3000
Max. rated voltage:	250 V AC
Max. current carrying capacity:	2.5 A (at 70 °C)
Min./max. temperature range:	-5 °C to +105 °C (moved) -40 °C to +105 °C (moved firmly)
Cable configuration mm ² :	LiYwUL2517 6 x 0.34
Protection class when assembled:	IP68

SHS3 Cable Type E

Article number	Designation	Cable length	Connector type	Number of pins	Special feature
3251004310	AN-KAB.SH53 4P 2M STRAIGHT	2 m	Straight	4	M12 BG version
3251004311	AN-KAB.SH53 4P 5M STRAIGHT	5 m	Straight	4	M12 BG version
3251004312	AN-KAB.SH53 4P 10M STRAIGHT	10 m	Straight	4	M12 BG version
3251004313	AN-KAB.SH53 4P 2M ELBOW	2 m	Elbow	4	M12 BG version
3251004314	AN-KAB.SH53 4P 5M ELBOW	5 m	Elbow	4	M12 BG version
3251004315	AN-KAB.SH53 4P 10M ELBOW	10 m	Elbow	4	M12 BG version
3251004316	AN-KAB.SH53 4P U.L. 2M STRAIGHT	2 m	Straight	4	Ultra Lock BG version
3251004317	AN-KAB.SH53 4P U.L. 5M STRAIGHT	5 m	Straight	4	Ultra Lock BG version
3251004318	AN-KAB.SH53 4P U.L. 10M STRAIGHT	10 m	Straight	4	Ultra Lock BG version
3251004319	AN-KAB.SH53 4P U.L. 2M ELBOW	2 m	Elbow	4	Ultra Lock BG version
3251004320	AN-KAB.SH53 4P U.L. 5M ELBOW	5 m	Elbow	4	Ultra Lock BG version
3251004321	AN-KAB.SH53 4P U.L. 10M ELBOW	10 m	Elbow	4	Ultra Lock BG version

Contact assignments, AC/DC versions



- 1 = White
- 2 = Brown
- 3 = Blue
- 4 = Black

Core insulation/sheathing material:	Heat resistant PVC UL 1731 / UL 2517 black
Moulding/contact carrier material:	APEX 7500-85 / R3000 Elastollan R3000 neutral
Max. rated voltage:	250 V
Max. current carrying capacity:	4 A
Min./max. temperature range:	At rest -25 °C to +105 °C Moved -5 °C to +105 °C
Protection class when assembled:	IP68

Change kit for re-adjusting switching point



Article number	Designation
3991990161	SHS3 change kit
Containing:	
2 replacement caps	
1 special bit	
1 plastic ring	

Installation tool



Article number	Designation
191000005	Bit holder 1/4" flexible stem

Safety Switches for Hinged Protective Equipment

Safety Hinge Switch – SHS

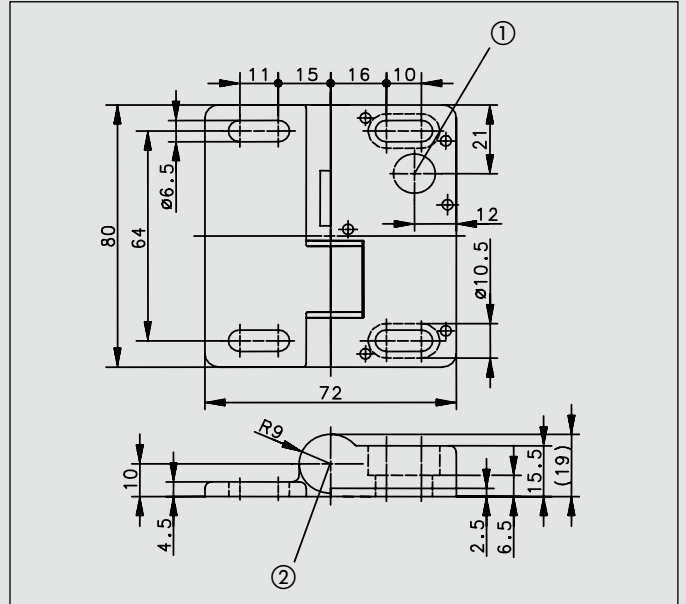


Illustration showing fixed pin and shearing bolt sheared off

- ① Position of connection variant 2, 5 and 6.
- ② Position of connection variant 1, 3 and 4.

Protective hoods and safety guards on machines such as gates in safety gate systems are often pivot mounted with hinges.

Since BERNSTEIN presented the world's first safety hinge switch SHS in 2002 it is hard to imagine modern production installations without it. It combines a hinge and safety switch in one single functional unit.

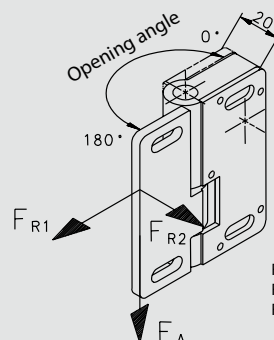
The design of the SHS safety hinge switch has been optimised to allow its effective use on aluminium section systems. Its shallow depth, even when fully opened, makes it ideally suited for use in constricted installation conditions on machines. Safety switches with separate actuators are often subjected to high mechanical stresses, especially when they are mounted on closing edges. The SHS hinge switch sets new standards. The safety guard is monitored directly in the hinge.

The concealed arrangement of the safety switch provides a high degree of protection against tampering. One or several SHS switches can be used depending on control requirements.

In many applications the conventional load bearing hinge can be replaced by a blank hinge with identical design features as the safety hinge. This has significant rationalisation benefits. The only parameter you need to take into account is the maximum extension of the hinged safety equipment that results from the switching angle and the permissible safe opening in the area of the closing edges. The SHS hinge switch provides maximum anti-tamper protection as, once set, the switching point can no longer be changed.

Safe:

- 2 SHS hinge switches, each equipped with a positively opening safety contact, allows you to configure a system up to performance level e



$F_{R1} = \text{max. } 1000 \text{ N}$
 $F_{R2} = \text{max. } 500 \text{ N}$
 $F_A = \text{max. } 750 \text{ N}$

Flexible:

- The angle range extends from 0 to 225°
- A safety device ensures positive locking after the switch has been set
- In addition to the plug connection version, an SHS with fixed cable connection at the rear is also available

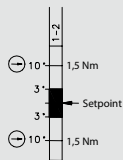
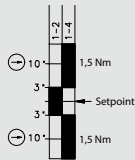
Fast:

- Plug connector and fixed cable connections are available for axial and radial (rear) connection
- An AC/DC version (up to 250 V) or a DC version (up to 60 V) is available, depending on the configuration of the safety circuit

Reliable:

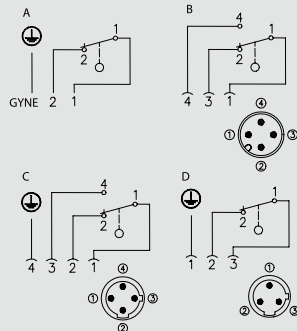
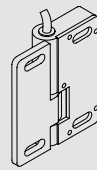
- A pressure die-cast zinc enclosure allows versatile use of the SHS switch in varied applications
- When used as a load bearing hinge, the SHS takes up loads of up to 750 N in axial direction and 1000 N in radial direction after the switching point has been finally set
- The protection rating is IP67

Switching diagram

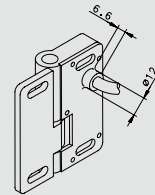
 1 NC contact
(Type B)

 1 Changeover contact
(Type C)

 Setting point freely selectable
in range from 0°... 225°

 Tolerances:
Switching angle (opening) +2.0°/-1.5°
Positive opening torque 10 %
Positive opening angle +0.5°/-3°

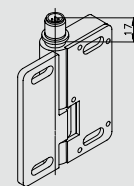
 Switching angle hysteresis (closing of normally-closed contact -1.0°)
from typical hinge switch-off point

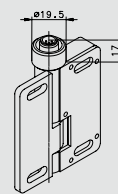
Connection drawing

Connection variant 1


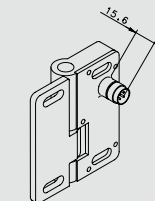
Cable, PVC

Connection variant 2


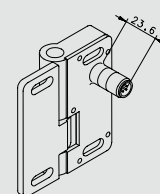
Cable, PVC

Connection variant 3

 Connector M12 x 1,
metal thread

Connection variant 4

 Connector M12 x 1,
metal thread

Connection variant 5


Connector M12 x 1

Connection variant 6


Connector M12 x 1

Product selection

Article number	Designation	Switching contact	Max. switching voltage	Type of voltage	Type of connection and direction	Required cable coupling/type	Remarks
6019261011	SHS-A1Z-KA 5	1NC	230 V	AC/DC	radial		BG approval
6019261014	SHS-A1Z-KR 5	1NC	230 V	AC/DC		Cable	BG approval
6019261017	SHS-A1Z-SA-BG	1NC	230 V	AC/DC		M12	BG approval
6019261018	SHS-A1Z-SR-BG	1NC	230 V	AC/DC		M12	BG approval
6019261009	SHS-A1Z-SA	1Changeover contact	230 V	AC/DC		M12	C
6019261010	SHS-A1Z-SR	1Changeover contact	60 V	DC		M12	B
6019261015	SHS-A1Z-SA	1Changeover contact	60 V	DC		M12	B
6019261016	SHS-A1Z-SR	1Changeover contact	230 V	AC/DC		M12	C
6019291013	SHS-OZ						Blank hinge

Technical data

Electrical data		
Rated insulation voltage	U_i	250 V
Rated surge voltage strength	U_{imp}	2.5 kV
Thermal current	I_{the}	3 A
Rated operating voltage	U_e	230 V AC; 60 V DC
Utilization category		AC-15, 230 V AC/1.5 A;
Positive opening	\rightarrow	conforming to IEC/EN 60947-5-1, Addendum K
Short-circuit protection		Fuse 4 A gL/gG
Mechanical data		
Switch		GD-Zn
Ambient temperature		-25°C to +70°C (Connection cable installed)
Mechanical service life		10 ⁶ switching cycles
B10d		2 mill.
Switching frequency		max. 1200 switching cycles/hour
Mounting		4x M6 screws DIN 7984 or DIN 6912
Type of connection		Fixed connection cable, 3 x 0.5 mm ² x 5 m (AWG20), minimum bending radius = 25 mm
Weight		approx. 0.7 kg (cable variant) approx. 0.4 kg (connector and blank hinge variant)
Installation position		Any
Protection class		IP67 as per IEC/EN 60529
Switching angle		± 3° from setting point
Positive opening angle		± 10° from setting point
Positive opening torque		1.5 Nm
Mechanical load		F_{R1} = max. 1000 N, F_{R2} = max. 500 N, F_A = max. 750 N
Standards		
VDE 0660 T100, DIN EN 60947-1, IEC 60947-1		
VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1		

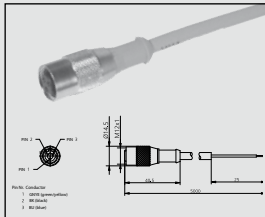
Safety Switches for Hinged Protective Equipment

SHS Cable Type A

Article number	Designation	Cable length	Connector type	Number of pins	Special feature
3251103234	AN-KAB.SHS 5M AC GERADE	5 m	Straight	3	AC/ DC BG version
3251103236	AN-KAB.SHS 5M AC WINKEL	5 m	Elbow	3	AC/ DC BG version

Contact assignments, AC/DC versions

- 1 = Green/yellow
- 2 = Black
- 3 = Blue



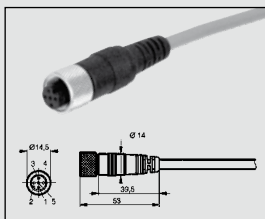
Core insulation/sheathing material:	PVC (UL)/PVC (UL)
Moulding/contact carrier material:	PUR (UL)/PUR (UL)
Max. rated voltage:	300 V AC
Max. current carrying capacity:	3 A
Min./max. temperature range:	-25 °C/+70 °C
	-13 °F/+158 °F
Cable configuration mm ² :	3 x 0.5
Protection class when assembled:	IP67

SHS Cable Type B

Article number	Designation	Cable length	Connector type	Number of pins	Special feature
3251003221	AN-KAB.SHS 2M DC STRAIGHT	2 m	Straight	3	DC approval
3251003222	AN-KAB.SHS 5M DC STRAIGHT	5 m	Straight	3	DC approval
3251003223	AN-KAB.SHS 10M DC STRAIGHT	10 m	Straight	3	DC approval
3251003224	AN-KAB.SHS 2M DC ELBOW	2 m	Elbow	3	DC approval
3251003225	AN-KAB.SHS 5M DC ELBOW	5 m	Elbow	3	DC approval
3251003226	AN-KAB.SHS 10M DC ELBOW	10 m	Elbow	3	DC approval

Contact assignments, DC versions

- 1 = Brown
- 2 = -
- 3 = Blue
- 4 = Black



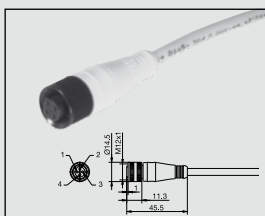
Core insulation/sheathing material:	PVC/PVC
Moulding/contact carrier material:	PUR/PUR
Max. rated voltage:	60 V AC/75 V DC
Max. current carrying capacity:	1.5 A
Min./max. temperature range:	-25 °C/+70 °C
	-13 °F/+158 °F
Cable configuration mm ² :	3 x 0.34
Protection class when assembled:	IP67

SHS Cable Type C

Article number	Designation	Cable length	Connector type	Number of pins	Special feature
3251004219	AN-KAB.SHS 5M AC STRAIGHTE	5 m	Straight	4	AC/DC-approval
3251004220	AN-KAB.SHS 5M AC ELBOWE	5 m	Elbow	4	AC/DC-approval

Contact assignments, AC/DC versions

- 1 = Brown
- 2 = Black
- 3 = Blue
- 4 = Green/yellow



Core insulation/sheathing material:	PVC/PVC
Moulding/contact carrier material:	PUR/Nylon 6.6
Max. rated voltage:	300 V AC
Max. current carrying capacity:	4.0 A
Min./max. temperature range:	-5 °C/+70 °C
	-13 °F/+158 °F
Cable configuration mm ² :	4 x 0.34
Protection class when assembled:	IP68