



## Instructions in accordance with directive 2014/34/EU

TÜV 10 ATEX 381296 X

### Safety Barrier type SB ...

Edition: 05.2019

#### I Range of application

The safety barrier type SB 1 is preferably used in conjunction with a certified flameproof enclosure, e.g. HPH Ex d ..., for the connection of intrinsically safe sensors (two-wire) to non-intrinsically safe circuits.

The safety barrier type SB 3 is used to connect intrinsically safe sensors (four-wire) to non-intrinsically safe circuits.

#### II Standards

The safety barriers are designed according to the following European standards

EN 60079-0:2012 + A11:2013	Equipment – General requirements
EN 60079-1:2014	Equipment protection by flameproof enclosures "d"
EN 60079-11:2012	Equipment protection by intrinsic safety "i"
EN 60079-31:2014	Equipment dust ignition protection by enclosure "t"

#### III Instructions for safe ...

##### III.a ... use

The safety barrier type SB 1 serves as flameproof encapsulated intrinsically safe equipment and is suitable for use in hazardous areas. The safety barrier type SB 3 serves as associated equipment and is not suitable for use in hazardous areas. The intrinsically safe sensor circuits may be routed into Zone 0 or Zone 20 and can be used for all gas groups or dust groups.

The approval applies to the following device versions

SB 1	Single channel safety barrier potted in a bushing
SB 3	Three-channel safety barrier in a wall enclosure

##### III.b ... assembling and dismantling

The assembly or disassembly may only be carried out without voltage!

Only the dismantling of the wall enclosure is intended so that the safety barrier type SB 3 can be installed. After installation, the enclosure must be closed again.

##### III.c ... installation

The wiring may only be done de-energized. Special regulations e.g. EN 60079-14 or the local installation regulations must be observed.

When wiring from intrinsically safe equipment to a safety barrier (preferably blue cable), the inductance and capacitance permitted under point V must not be exceeded.

##### SB 1

The external thread M24 × 1.5 on the input side is preferably intended for screwing into an approved flameproof enclosure. The connection of an intrinsically safe sensor (output) takes place via an external thread M28 × 1.5. The safety barrier can be installed in approved flameproof enclosures. When installing in an enclosure, make sure that there is a clearance and creepage distance of > 50 mm between the input and output terminals.

Three individual cables are provided for the connection of the non-intrinsically safe auxiliary energy. The green-yellow cable must be securely connected to the equipotential bonding (PA). The supply voltage is connected to the blue (-) and red (+) cable.

The intrinsically safe output has two cables (blue and red) to which an intrinsically safe sensor is connected.



The enclosure of the safety barrier is not connected to the circuit. It must therefore be installed in a metallic enclosure which is integrated in the equipotential bonding system.

The side of the safety barrier SB 1 on which the potting can be seen must be operated protected from light (e.g. daylight, artificial lighting).

#### SB 3

The safety barrier is suitable for wall mounting and must be installed outside the hazardous area.

The safety barrier is provided with connection terminals at the input and output. The non-intrinsically safe input side is provided with a non-blue cable gland and the intrinsically safe output side with a light blue cable gland. The safety barrier must be integrated into the equipotential bonding system. A connection terminal is provided on the outside of the enclosure for this purpose.

#### III.d ... adjustment

No Ex-relevant adjustments are required to operate the safety barriers.

#### III.e ... putting into service

Before putting into service, all devices must be checked for correct connection and installation. The electrical supply, including the connected devices, must be checked.

#### III.f ... maintenance (servicing and emergency repair)

The apparatus is generally maintenance-free. In the case of a defect, this must be returned to the manufacturer or one of its representatives.

There is non-compliance with the dielectric strength requirements according to EN 60079-11, Clause 6.3.13 of the safety barriers.

#### SB 1

The repair of the flameproof joints (M24 external thread) is not intended.


#### SB 3


If a fuse is defective, it may be replaced. It must be ensured that the following fuse values are adhered to (values are also on the type plate):

Nominal current	$I_n \leq 32 \text{ mA}$
Breaking Capacity	$I_{BC} \geq 35 \text{ A}$
Melting Integral	$I^2t \leq 0,004 \text{ A}^2\text{s}$

#### IV Equipment marking

- 1 Manufacturer: FAFNIR GmbH, 22525 Hamburg
- 2 Type designation: SB ...
- 3 Certificate number: TÜV 10 ATEX 381296 X
- 4 Ex marking:

SB 1  II 2(1) G Ex db [ia Ga] IIC T6...T4 Gb  
II 1(1) D Ex ta [ia Da] IIIC T115 °C Da

SB 3  II (1) G [Ex ia Ga] IIC  
II (1) D [Ex ia Da] IIIC

5 CE marking:  0044

6 Technical data: See instructions for technical data



## V Technical data

The nominal voltage for SB 1 and SB 3, channel 1 is:

$$U = 24 V_{DC}$$

The nominal voltage for SB 3, channel 2 (A) and channel 3 (B) is:

$$U = 5 V_{DC}$$

The maximum safety voltage is:

$$U_m = 253 V$$

The sensor circuits are designed in the ignition protection type "intrinsic safety" (ia) with a linear output characteristic. The output values per circuit are as follows

		<b>SB 1</b>	<b>SB 3</b>
Output voltage	$U_o \leq$	28.4 V	
Output current	$I_o \leq$	99.5 mA	95.5 mA
Output power	$P_o \leq$	705 mW	507 mW
Inner inductance	$L_i$	negligible small	
Inner capacitance	$C_i$	negligible small	

The permissible external inductance and capacitance are as follows:

	<b>IIC</b>	<b>SB 1</b>		<b>SB 3</b>	
$L_o \leq$	500 $\mu$ H	560 $\mu$ H	500 $\mu$ H	200 $\mu$ H	
$C_o \leq$	71 nF	68 nF	72 nF	79 nF	
	<b>IIB/IIIC</b>				
$L_o \leq$	5 mH	2 mH	5 mH	2 mH	
$C_o \leq$	330 nF	400 nF	340 nF	410 nF	

The maximum values of the value pairs may be used simultaneously as concentrated capacitance and concentrated inductance.

The data of the Ex d connection thread of the SB 1 on the input side are as follows:

Thread size:	M24
Thread pitch:	1,5
Tolerance:	6g
Turns:	8
Screw-in depth:	16 mm

The maximum permissible explosion pressure which may act on the SB 1 safety barrier is as follows:

$$p_{\max}(\text{SB 1}) = 30 \text{ bar}$$



The safety barriers may be used in the following ambient temperature range:

**Type SB 1**

Temperature Class	Ambient Temperature T <sub>a</sub>
<b>Category 2G resp. Equipment Protection Level Gb</b>	
T6	-40 °C ... +40 °C
T5	-40 °C ... +55 °C
T4, T3, T2, T1	-40 °C ... +85 °C

Table 1: Service temperatures for potential explosive gas atmospheres

Maximum Surface Temperature		Ambient Temperature T <sub>a</sub>
dust layer ≤ 5 mm	immersed in dust	
<b>Category 1D resp. Equipment Protection Level Da</b>		
+115 °C	+115 °C	-40 °C ... +85 °C

Table 2: Service temperatures for potential explosive dust atmospheres

**Type SB 3**

T<sub>a</sub>(SB 3) = -40 °C ... +70 °C

The safety barriers achieve a degree of protection of the housing of:

- SB 1: IP68
- SB 3: IP67

**VI Special conditions of use**

1. The side of the safety barrier SB 1, where the encapsulation can be seen, must be operated protected against UV light.
2. The safety barrier SB 1 has no terminal compartment. It must be installed in an enclosure that corresponds to a suitable type of protection. In addition, it can only be installed in zone 1 in conjunction with a flameproof enclosure (such as HPH Ex d ...).
3. Repair of flameproof joints of SB 1 is not planned.
4. The equipotential bonding connection must be connected to the equipotential bonding of the potentially explosive area (an equipotential bonding must exist for the entire intrinsically safe area). Therefore, the safety barriers do not meet the dielectric strength requirements. When carrying out an insulation test on the intrinsically safe circuit, the device must therefore be disconnected from equipotential bonding.
5. The maximum permissible pressure of SB 1 is 30 bar.