

## HPH Ex ...

High Pressure Connection Housing

**END OF LIFE**



Edition: 2023-11

Version: 6

Article no.: 350049

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## 1 Characteristics

The HPH Ex ... (High Pressure Housing) is a connection housing with type of ignition protection "Ex d" (pressure resistant encapsulation) or with type of ignition protection "Ex i" (intrinsically safe communication / supply).

The "Ex d" variant, together with the SB 1 Safety Barrier, allows intrinsically safe sensors to be supplied with non-intrinsically safe supply devices.

The "Ex i" variant has no safety barrier and can therefore only be connected to intrinsically safe supply devices.

With the optional display, the output signal of a sensor with 4 to 20 mA interface can be displayed in percent.

## 2 Safety Instructions

Use the HPH Ex ... and, if applicable, the SB 1 only for this purpose. The manufacturer accepts no liability for any form of damage resulting from improper use.

The HPH Ex ... and SB 1 have been developed, manufactured and tested in accordance with up to date good engineering practices and generally accepted safety standards. Nevertheless, hazards may arise from its use. For this reason, the following safety instructions must be observed:

Do not change or modify the HPH Ex ... and SB 1 or add any equipment without the prior consent of the manufacturer.

The installation, operation and maintenance of the measuring HPH Ex ... the SB 1 must be carried out only by expert personnel. Specialised knowledge must be acquired by regular training.

Operators, installers and service technicians must comply with all applicable safety regulations. This also applies to any local safety and accident prevention regulations which are not stated in this guide.

The safety instructions in this guide are marked as follows:



*If these safety instructions are not observed, it may result in the risk of accident or damages to the devices.*

## 3 Installation



*When installing and operating the HPH Ex ... and SB1 in potentially explosive areas, the requirements of the Explosion Protection Regulations, the Industrial Health and Safety Regulations and the Equipment Safety Regulations as well as generally accepted rules of engineering and these operating instructions must be observed. The special conditions of the EU-Type Examination Certificate must be observed.*



*This also applies to the local safety and accident prevention regulations which are not stated in this Instructions.*



*During the mounting of the HPH Ex ... and SB 1 attention must be paid not to damage a connected sensor (see the relevant documentation of the sensor).*

### 3.1 Mounting instructions



*For installation of the HPH Ex d an approved Ex d cable gland with M20 x 1.5 thread is required.*



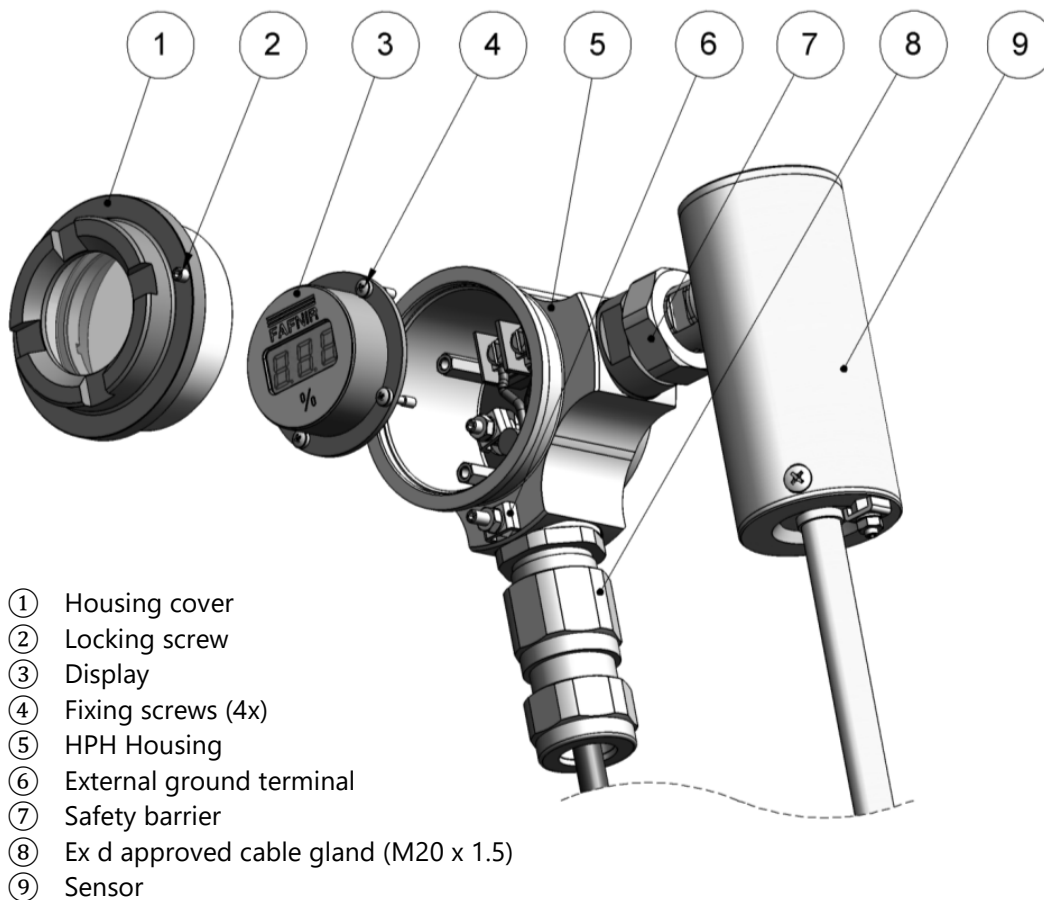
*The threads must not be damaged.*

## 4 Electrical connection

### 4.1 HPH Ex d with a sensor (4 ... 20 mA)

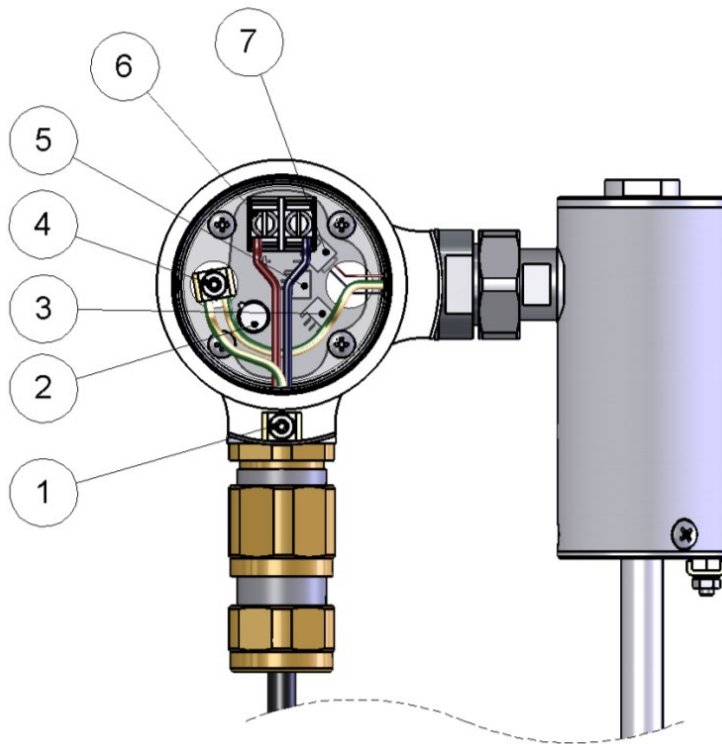
To connect the HPH Ex d unscrew the housing cover, and if applicable, pull out the display (see figure).

- (1) Loosen the locking screw ②
- (2) Unscrew the housing cover ①
- (3) For the version with display ③:
  - Loosen the fixing screws ④
  - Pull out the display ③ carefully (the connector on the display can be disconnected)
- (4) Connect the HPH (pay attention to polarity)
- (5) The external ground terminal must be connected to PA with a 4 mm<sup>2</sup> cable



- ① Housing cover
- ② Locking screw
- ③ Display
- ④ Fixing screws (4x)
- ⑤ HPH Housing
- ⑥ External ground terminal
- ⑦ Safety barrier
- ⑧ Ex d approved cable gland (M20 x 1.5)
- ⑨ Sensor

Figure 1: Design of HPH Ex d



- ① Outer ground terminal
- ② Fuse (T5; T50 mA)
- ③ Safety barrier connector (version with display)
- ④ Inner ground terminal
- ⑤ Display connector
- ⑥ Connection terminal: left (+), right (-)
- ⑦ Safety barrier connector (version without display)

Figure 2: Electrical connection of the HPH Ex d

The safety barrier SB 1 has a voltage drop of max. 8 V.

The display is looped into the positive supply circuit of the sensor and has an additional voltage drop of 4 V. It cannot be configured.

The sum of both voltages must be added to the minimum supply voltage of the sensor.

The measured current is displayed from -2.5 % (3.8 mA) to 103 % (20.5 mA); up to 99.9 % with 1 decimal digit, above 100 % (20 mA) without decimal digit.

The display of "ErL" (3.6 mA) or "ErH" (21.5 mA) indicates measurement errors depending on the sensor configuration.

If the probe shows "----", the current has fallen below 3.5 mA. In this case a measurement is not possible.

The plugged-in fuse (2) serves to protect the safety barrier SB 1.

## 4.2 Wiring diagram HPH Ex d

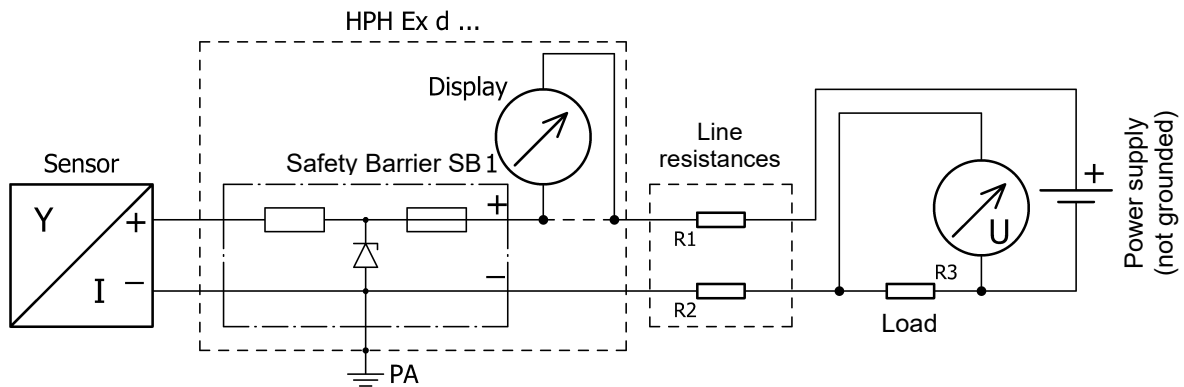


Figure 3: Wiring diagram for HPH Ex d and SB 1 (non-earthed power supply)

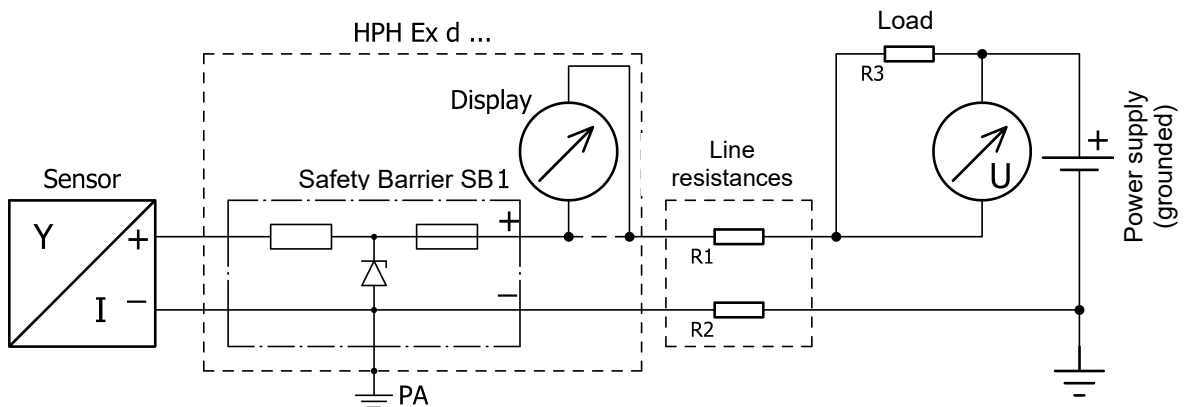


Figure 4: Wiring diagram for HPH Ex d and SB 1 (earthed power supply)

### 4.3 HPH Ex i D with a sensor (4 to 20 mA)

To connect the HPH Ex i D unscrew the housing cover and pull out the display (see figure).

- (1) Loosen the locking screw ②
- (2) Unscrew the housing cover ①
- (3) Loosen the display fixing screws ④
- (4) Pull out the display ③ carefully (the connector on the display can be disconnected)
- (5) Connect the HPH (pay attention to polarity)
- (6) The external ground terminal must be connected to PA with a 4 mm<sup>2</sup> cable

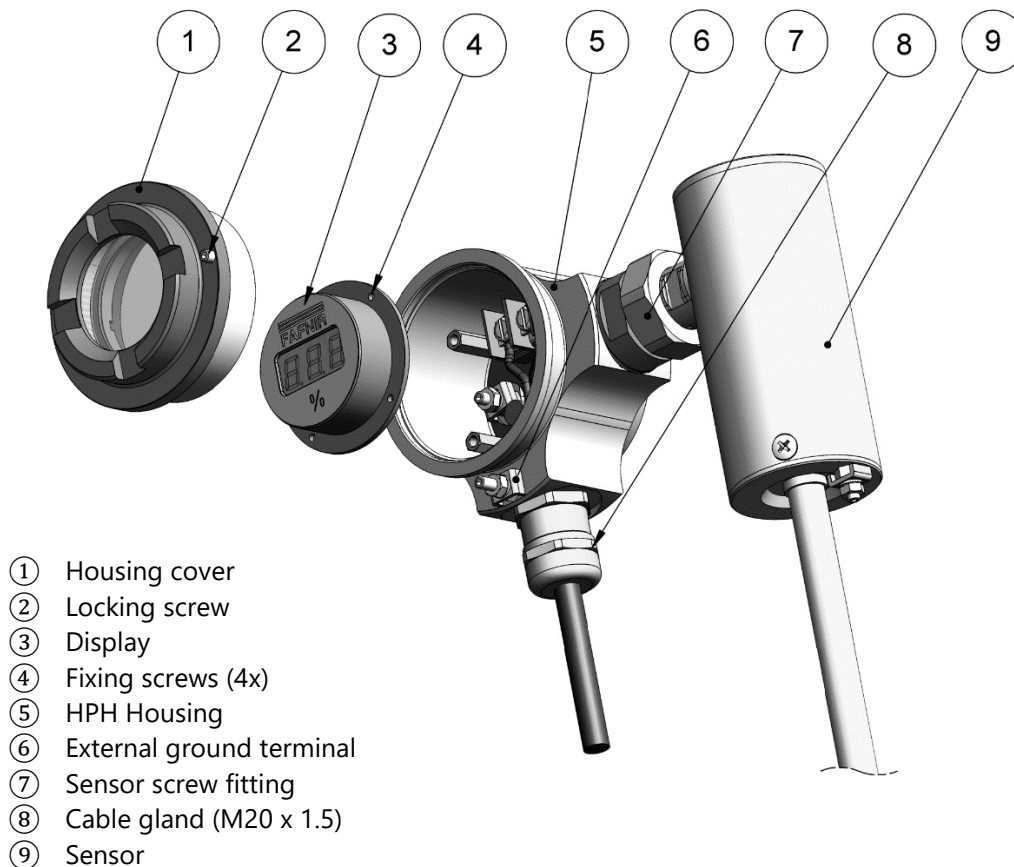
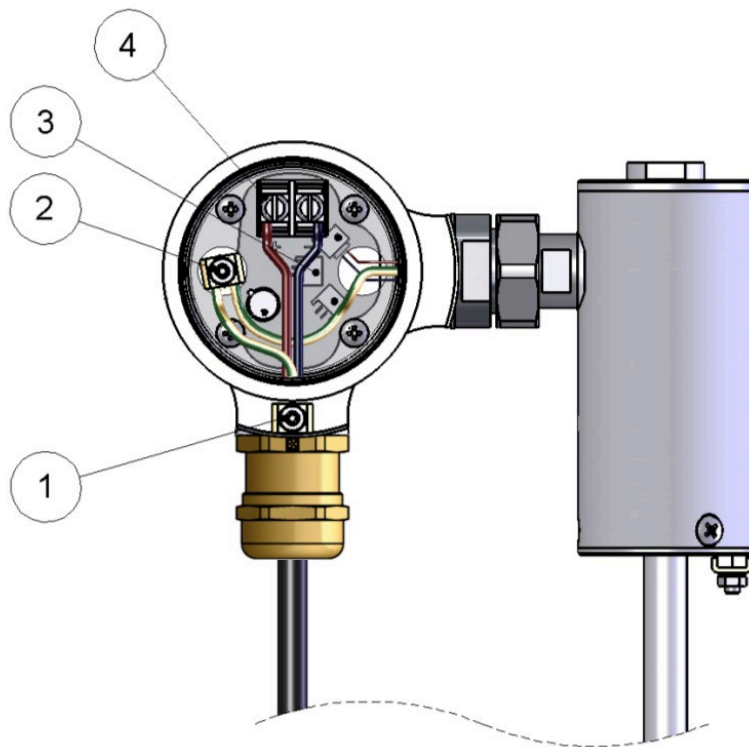


Figure 5: Design of HPH Ex i D





- ① Outer ground terminal
- ② Inner ground terminal
- ③ Display connector
- ④ Connection terminal: left (+), right (-)

Figure 6: Electrical connection of the HPH Ex i D

The display is looped into the positive supply circuit of the sensor and has an additional voltage drop of 4 V. It cannot be configured.

This voltage must be added to the minimum supply voltage of the sensor.

The measured current is displayed from -2.5 % (3.8 mA) to 103 % (20.5 mA); up to 99.9 % with 1 decimal digit, above 100 % (20 mA) without decimal digit.

The display of "ErL" (3.6 mA) or "ErH" (21.5 mA) indicates measurement errors depending on the sensor configuration.

If the probe shows "---", the current has fallen below 3.5 mA. In this case a measurement is not possible.

## 4.4 Wiring diagram HPH Ex i D

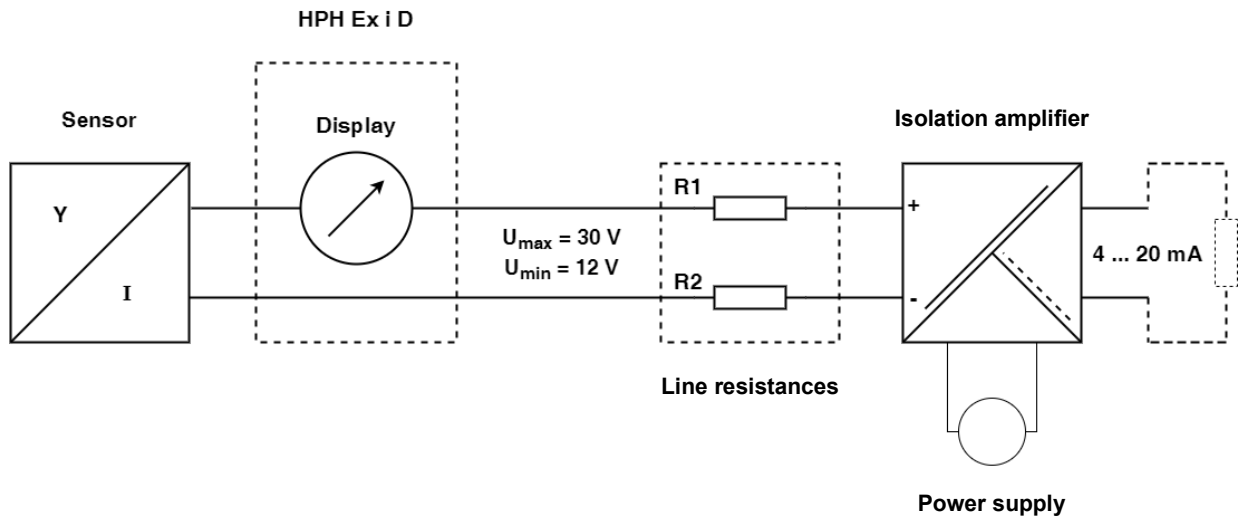


Figure 7: Wiring diagram HPH Ex i D (non-earthed power supply)

## 5 Servicing

### 5.1 Return Shipment

Before returning any FAFNIR equipment, the Return Material Authorization (RMA) by the FAFNIR customer service is required. Please contact your account manager or the customer service to receive the instructions on how to return goods.



*The return of FAFNIR products is only possible after approval by the FAFNIR customer service.*

## 6 Technical Data

### 6.1 HPH Ex ... and SB 1

Dimensions:	Ø 95 x H 71 [mm] with display; (without cable glands and connection unit) Ø 95 x H 66 [mm] without display
Ambient temperature:	-40 °C ... +85 °C
Protection class:	IP68
Power supply:	without display: max. 26 V with display: max. 29 V
Voltage drop:	≤ 8 V (with safety barrier SB 1) ≤ 4 V (with display) ≤ 12 V (with safety barrier SB 1 and display)
Accuracy:	0.1 % (4 mA ... 20 mA)
Display:	3-digit display, 10 mm high, 7 Segment LEDs
Display range:	-9,9 % ... +199 %
Output signal:	4 mA ... 20 mA

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**EU-Konformitätserklärung  
EU Declaration of Conformity  
Déclaration UE de Conformité  
Dichiarazione di Conformità UE**



**FAFNIR GmbH, Deutschland / Germany / Allemagne / Germania**

erklärt als Hersteller in alleiniger Verantwortung, dass das Produkt  
declares as manufacturer under sole responsibility that the product  
déclare sous sa seule responsabilité en qualité de fabricant que le produit  
dichiara sotto la sola responsabilità del produttore, che il prodotto

**Gehäuse mit oder ohne Anzeige / Enclosure with or without Display /  
Boîtier avec ou sans afficheur / Custodia con o senza display  
HPH ...**

den Vorschriften der europäischen Richtlinien  
complies with the regulations of the European directives  
est conforme aux réglementations des directives européennes suivantes  
è conforme ai regolamenti delle direttive europee

2011/65/EU	Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten	RoHS
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment	RoHS
2011/65/EU	Limitation de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques	RoHS
2011/65/EU	Restrizione dell'uso di determinate sostanze pericolose nelle apparecchiature elettriche ed elettroniche	RoHS
2014/30/EU	Elektromagnetische Verträglichkeit	EMV
2014/30/EU	Electromagnetic compatibility	EMC
2014/30/EU	Compatibilité électromagnétique	CEM
2014/30/EU	Compatibilità elettromagnetica	CEM
2014/34/EU	Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen	ATEX
2014/34/EU	Equipment and protective systems intended for use in potentially explosive atmospheres	ATEX
2014/34/EU	Appareils et systèmes de protection destinés à être utilisés en atmosphères explosibles	ATEX
2014/34/EU	Apparecchi e sistemi di protezione destinati a essere utilizzati in atmosfera potenzialmente esplosiva	ATEX

durch die Anwendung folgender harmonisierter Normen entspricht  
by applying the harmonised standards  
par l'application des normes  
applicando le norme armonizzate

<b>RoHS / RoHS / RoHS / RoHS</b>	<b>EN 50581:2012</b>
<b>EMV / EMC / CEM / CEM</b>	<b>EN 61326-1:2013</b>
<b>ATEX / ATEX / ATEX / ATEX</b>	<b>EN IEC 60079-0:2018 / EN 60079-1:2014 / EN 60079-11:2012 / EN 60079-31:2014</b>

Das Produkt ist bestimmt als Elektro- und Elektronikgerät der RoHS-  
The product is determined as electrical and electronic equipment of RoHS  
Le produit est déterminé comme des équipements électriques et électroniques de RoHS  
Il prodotto è determinato come apparecchiatura elettrica ed elettronica di RoHS

<b>Kategorie / Category / Catégorie / Categoria</b>	<b>Überwachungs- und Kontrollinstrumenten in der Industrie / Industrial Monitoring and Control Instruments / Instruments de contrôle et de surveillance industriels / Strumenti di monitoraggio e controllo industriali</b>
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Das Produkt entspricht den EMV-Anforderungen  
The product complies with the EMC requirements  
Le produit est conforme aux exigences CEM  
Il prodotto è conforme ai requisiti CEM

<b>Störaussendung / Emission / Émission / L'emissione Störfestigkeit / Immunity / D'immunité / Immunità</b>	<b>Klasse B / Class B / Classe B / Classe B Industrielle elektromagnetische Umgebung / Industrial electromagnetic environment / Environnement électromagnétique industriel / Ambiente elettromagnetico industriale</b>
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Die notifizierte Stelle TÜV NORD CERT GmbH, 0044 hat eine EU-Baumusterprüfung durchgeführt und folgende Bescheinigung ausgestellt  
The notified body TÜV NORD CERT GmbH, 0044 performed a EU-type examination and issued the certificate  
L'organisme notifié TÜV NORD CERT GmbH, 0044 a effectué examen UE de type et a établi l'attestation  
L'organismo notificato TÜV NORD CERT GmbH, 0044 ha effettuato esame UE del tipo e rilasciato il certificato

**HPH Ex ...** **TÜV 09 ATEX 555395 X**

Hamburg, 11.11.2019  
Ort, Datum / Place, Date / Lieu, Date / Luogo, data

Geschäftsführer / Managing Director / Gérant / Direttore Generale: René Albrecht

Translation

(1) **EU-Type Examination Certificate**

(2) Equipment and protective systems intended for use in potentially explosive atmospheres, **Directive 2014/34/EU**



(3) **Certificate Number** TÜV 09 ATEX 555395 X **issue:** 00

(4) for the product: Enclosure with or without display type HPH Ex ...

(5) of the manufacturer: **FAFNIR GmbH**

(6) Address: Schnackenburgallee 149 c, 22525 Hamburg, Germany

Order number: 8003006585

Date of issue: 2019-10-22

(7) The design of this product and any acceptable variation thereto are specified in the schedule to this EU-Type Examination Certificate and the documents therein referred to.


(8) The TÜV NORD CERT GmbH, Notified Body No. 0044, in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and the Council of 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.  
The examination and test results are recorded in the confidential ATEX Assessment Report No. 19 203 246394.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:  
**EN IEC 60079-0:2018    EN 60079-1:2014    EN 60079-11:2012    EN 60079-31:2014**  
except in respect of those requirements listed at item 18 of the schedule.

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions for Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design, and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the product shall include the following:

 **See item 15 of the schedule**

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body



Roder

Hanover office, Am TÜV 1, 30519 Hannover, Tel. +49 511 998-61455, Fax +49 511 998-61590

### (13) SCHEDULE

(14) EU-Type Examination Certificate No. TÜV 09 ATEX 555395 X issue 00

(15) Description of product

The enclosure with or without display type HPH Ex d ... is preferably used in conjunction with a certified flameproof encapsulated safety barrier, e. g. SB 1, to connect intrinsically safe sensors (two-wire) to non-intrinsically safe circuits and, if necessary, to visualise the measured value.

The enclosure with display type HPH Ex i D is preferably used in intrinsically safe sensor circuits to visualise a measured value.


In the future, the enclosure may also be manufactured in accordance with the test documents listed in the ATEX test report. The changes affect the addition of a new type and the dust explosion protection. Furthermore, the equipment was assessed according to the latest standards.

The marking is as follows:

Type HPH Ex d ...

	II 2 G	Ex db IIC T6...T4 Gb	resp.
	II 1 D	Ex ta IIIC T100 °C Da	

Type HPH Ex i D

	II 1 G	Ex ia IIC T6...T4 Ga	resp.
	II 1 D	Ex ia IIIC T125 °C Da	

#### Type designation:

HPH Ex d	Housing in flameproof enclosure and protection by enclosure without display
HPH Ex d D	Housing in flameproof enclosure and protection by enclosure with display
HPH Ex i D	Enclosure with intrinsically safe display

#### Technical data:

Type HPH Ex d

Signal and supply circuit (terminal -, +)	in type of protection flameproof enclosure Ex db IIC and protection by enclosure Ex ta IIIC
	U = 12 V <sub>DC</sub> ... 26 V <sub>DC</sub>
	I = 4 mA ... 20 mA

Type HPH Ex d D

Signal and supply circuit (terminal -, +)	in type of protection flameproof enclosure Ex db IIC and protection by enclosure Ex ta IIIC
	U = 16 V <sub>DC</sub> ... 29 V <sub>DC</sub>
	I = 4 mA ... 20 mA

**Schedule to EU-Type Examination Certificate No. TÜV 09 ATEX 555395 X issue 00**

Type HPH Ex i D

Signal and supply circuit  
(terminal -, +)

in type of protection intrinsic safety Ex ia IIC/IIIC

Maximum values:

$$U_i = 30 \text{ V}$$

$$I_i = 200 \text{ mA at } T_a \leq +65 \text{ °C resp. } 100 \text{ mA at } T_a \leq +85 \text{ °C}$$

$$P_i = 1 \text{ W}$$

$$L_i = 250 \text{ } \mu\text{H}$$

$$C_i = 25 \text{ nF}$$

Permissible ambient temperature range:

Type HPH Ex d ...

**Used as category 2G equipment**

Temperature class	Ambient temperature
T6	-40 °C to +50 °C
T5	-40 °C to +65 °C
T4	-40 °C to +85 °C
T3	-40 °C to +85 °C
T2	-40 °C to +85 °C
T1	-40 °C to +85 °C

**Used as category 1D equipment**

Maximum surface temperature		Ambient temperature range
dust layer $\leq 5 \text{ mm}$	immersed in dust	
$T_a + 15 \text{ °C}$	$T_a + 15 \text{ °C}$	-40 °C to +85 °C

Type HPH Ex i D

**Used as category 1G equipment**

Temperature class	Ambient temperature range
T6	-40 °C to +40 °C
T5	-40 °C to +55 °C
T4	-40 °C to +60 °C
T3	-40 °C to +60 °C
T2	-40 °C to +60 °C
T1	-40 °C to +60 °C

The process pressure for the media must be between 0.8 bar and 1.1 bar where explosive vapour-air mixtures are present. If no explosive mixtures are present, the equipment may also be operated outside this area according to the manufacturer's specification.

**Used as category 2G equipment**

Temperature class	Ambient temperature range	
	at $I_i \leq 200 \text{ mA}$	at $I_i \leq 100 \text{ mA}$
T6	-40 °C to +40 °C	-40 °C to +40 °C
T5	-40 °C to +55 °C	-40 °C to +55 °C
T4	-40 °C to +65 °C	-40 °C to +85 °C
T3	-40 °C to +65 °C	-40 °C to +85 °C
T2	-40 °C to +65 °C	-40 °C to +85 °C
T1	-40 °C to +65 °C	-40 °C to +85 °C



**Schedule to EU-Type Examination Certificate No. TÜV 09 ATEX 555395 X issue 00**

**Used as category 1D equipment**

Maximum surface temperature		Ambient temperature range
dust layer $\leq 5$ mm	Immersed in dust	
$I_i \leq 200$ mA: $T_a + 55$ °C	observe EN 60079-14	$I_i \leq 200$ mA: -40 °C ... +65 °C
$I_i \leq 100$ mA: $T_a + 40$ °C		$I_i \leq 100$ mA: -40 °C ... +85 °C

All further data are valid unchanged.

(16) Drawings and documents are listed in the ATEX Assessment Report No. 19 203 246394

(17) Specific Conditions for Use

1. If the type HPH Ex i D is mounted in a plastic enclosure, the danger of ignition by electrostatic generated by friction on the enclosure must be avoided.
2. If the type HPH Ex i D is mounted in an aluminium enclosure, an ignition hazard caused by impact or friction must be avoided.
3. For the electrical connection at type HPH Ex d ..., cable glands certified in the type of protection flameproof enclosure must be used.
4. Repair of flameproof joints of enclosure HPH Ex d ... is not planned.
5. The equipotential bonding connection of a metallic enclosure must be connected to the equipotential bonding of the potentially explosive area (an equipotential bonding must exist for the entire intrinsically safe area).

(18) Essential Health and Safety Requirements

no additional ones

- End of Certificate -



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

TÜV 09 ATEX 555395 X

### Enclosure with or without display type HPH Ex ...

Edition: 08.2019

#### I Range of application

The enclosure with or without display type HPH Ex d ... is preferably used in conjunction with a certified flameproof encapsulated safety barrier, e. g. SB 1, to connect intrinsically safe sensors (two-wire) to non-intrinsically safe circuits and, if necessary, to visualise the measured value.

The enclosure with display type HPH Ex i D is preferably used in intrinsically safe sensor circuits to visualise a measured value.

#### II Standards

The equipment is designed according to the following European standards

EN IEC 60079-0:2018	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 enclosure HPH Ex d ... is suitable for use in potentially explosive areas in Zone 1 and Zone 20 as well as for all gas groups (IIA, IIB and IIC) and all dust groups (IIIA, IIIB and IIIC).

The enclosure HPH Ex i D is suitable for use in potentially explosive areas in Zone 0 and Zone 20 as well as for all gas groups (IIA, IIB and IIC) and all dust groups (IIIA, IIIB and IIIC).

The certification applies to the following device versions

HPH Ex d	Housing in flameproof enclosure and protection by enclosure without display
HPH Ex d D	Housing in flameproof enclosure and protection by enclosure with display
HPH Ex i D	Enclosure with intrinsically safe display

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

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

For HPH Ex d ... the approved cable glands must be installed in the enclosure according to the manufacturer's instructions. After wiring, the cover must be firmly screwed back onto the enclosure and secured with the M4 locking screw.

With the HPH Ex d ... a threaded hole, preferably M24 × 1.5, can be used to accommodate an approved flameproof safety barrier. The safety barrier is then used to supply an intrinsically safe (Ex i) sensor.



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

The wiring may only be carried out without voltage. Special regulations such as EN 60079-14 or the local installation regulations must be observed.

To ensure that the flameproof enclosure of the HPH Ex d ... is maintained, the cable entries or entries for conduits must be approved in accordance with EN 60079-1. Two threaded holes are available for this purpose. Possible threads are:

M16 × 1.5; M20 × 1.5; M24 × 1.5; M25 × 1.5; G 3/8; 1/2" NPT; 3/4" NPT

Ensure that the threads are in perfect condition.

A PA connection terminal is provided for integrating the equipment into the equipotential bonding system.

General information (see also EN 60079-14:2013, clause 6.4.1):

Metallic enclosures of intrinsically safe or energy-limited apparatus need not be connected to the equipotential bonding system, unless required by the apparatus documentation or to prevent accumulation of static charge.

### **III.d ... adjustment**

For the operation of the apparatus, no Ex-relevant adjustments are necessary.

### **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.

Repairs to the enclosure HPH Ex d ... may only be carried out by the manufacturer.

If the HPH Ex i D version is installed in a plastic enclosure, it may only be cleaned with a damp cloth to minimise the risk of ignition due to electrostatic charging.

The HPH Ex i D complies with the dielectric strength requirements between the intrinsically safe circuit and a metallic chassis of the display with 500 V<sub>AC</sub> according to EN 60079-11, clause 6.3.13.



#### IV Equipment marking

1	Manufacturer:	FAFNIR GmbH, 22525 Hamburg	
2	Type designation:	HPH Ex ...	
3	Certificate number:	TÜV 09 ATEX 555395 X	
4	Ex marking:	<b><u>HPH Ex d ...:</u></b>	<b><u>HPH Ex i D:</u></b>
4a	acc. to ATEX directive:	⊕ II 2 G      bzw.      II 1 D	⊕ II 1 G      bzw.      II 1 D
4b	according to standards:	Ex db IIC T6...T4 Gb Ex ta IIIC T100 °C Da	Ex ia IIC T6...T4 Ga Ex ia IIIC T125 °C Da
5	Technical data:	See instructions for technical data	
6	Warning marking:	WARNING – DO NOT OPEN WHEN ENERGIZED	*WARNING – Potential electro- static charging hazard – See in- structions
7	CE marking:	CE 0044	

#### V Technical data

The following electrical values are specified:

	HPH Ex d	HPH Ex d D	HPH Ex i D
Voltage	U = 12 V ... 26 V	U = 16 V ... 29 V	U <sub>i</sub> = 30 V
Current	4 mA ... 20 mA (Error mode: 3.6 mA / 21.5 mA)		<sup>†</sup> I <sub>i</sub> = 200 mA / 100 mA
Power			P <sub>i</sub> = 1 W

Table V.a: Electrical values of the subtypes

The external capacitance and inductance of the type HPH Ex i D are as follows

Inner inductance	L <sub>i</sub> ≤ 250 µH
Inner capacitance	C <sub>i</sub> ≤ 25 nF

For use in potentially explosive atmospheres, the maximum temperatures, depending on the temperature class and the category respectively equipment protection level, can be found in the following tables.

#### HPH Ex d ...

Temperature class	Ambient temperature T <sub>a</sub>
<b>Category 2G resp. Equipment protection level Gb</b>	
T6	-40 °C ... +50 °C
T5	-40 °C ... +65 °C
T4, T3, T2, T1	-40 °C ... +85 °C

Table V.b: Temperatures of the flameproof enclosure in potentially 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>		
T <sub>a</sub> + 15 °C		-40 °C ... +85 °C

Table V.c: Temperatures of the flameproof enclosure in potentially explosive dust atmospheres

\* The warning marking is only used if type HPH Ex i D is mounted in a plastic enclosure.

<sup>†</sup> The permissible input current I<sub>i</sub> depends on the ambient temperature T<sub>a</sub>



### HPH Ex i D

Temperature class	Ambient temperature $T_a$	
	@ $I_i \leq 200$ mA	@ $I_i \leq 100$ mA
<b>Equipment protection level Ga</b>		
T6	-40 °C ... +40 °C	
T5	-40 °C ... +55 °C	
T4, T3, T2, T1	-40 °C ... +60 °C	
<b>Equipment protection level Gb</b>		
T6	-40 °C ... +40 °C	
T5	-40 °C ... +55 °C	
T4, T3, T2, T1	-40 °C ... +65 °C	-40 °C ... +85 °C

Table V.d: Temperatures of the intrinsic safety display in potentially explosive gas atmospheres

For use in areas where the equipment protection level Ga is required:

The process pressure of the media must be between 0.8 bar and 1.1 bar if explosive vapour-air mixtures are present. If no explosive mixtures are present, the devices may also be operated outside this area in accordance with their manufacturer's specifications.

Maximum surface temperature		Ambient temperature $T_a$
dust layer $\leq 5$ mm	Immersed in dust	
<b>Equipment protection level Da</b>		
$I_i \leq 200$ mA: $T_a + 55$ °C $I_i \leq 100$ mA: $T_a + 40$ °C	Observe EN 60079-14*	$I_i \leq 200$ mA: -40 °C ... +65 °C $I_i \leq 100$ mA: -40 °C ... +85 °C

Table V.e: Temperatures of the intrinsic safety display in potentially explosive dust atmospheres

General remark (see also EN 60079-0, Clause 1):

Zone 0 resp. 20 is given only under atmospheric conditions:

Temperature range: -20 °C ... +60 °C

Pressure range: 0,8 bar ... 1,1 bar

Oxidant: Air (oxygen content approx. 21 %)

### VI Special conditions of use

1. If the type HPH Ex i D is mounted in a plastic enclosure, the danger of ignition by electrostatic generated by friction on the enclosure must be avoided.
2. If the type HPH Ex i D is mounted in an aluminium enclosure, an ignition hazard caused by impact or friction must be avoided.
3. For the electrical connection at type HPH Ex d ..., cable glands certified in the type of protection flameproof enclosure must be used.
4. Repair of flameproof joints of enclosure HPH Ex d ... is not planned.
5. The equipotential bonding connection of a metallic enclosure must be connected to the equipotential bonding of the potentially explosive area (an equipotential bonding must exist for the entire intrinsically safe area).

\* Clause 5.6.3.3 of EN 60079-14:2014 can be used to assess the temperatures



**EU-Konformitätserklärung  
EU Declaration of Conformity  
Déclaration UE de Conformité  
Dichiarazione di Conformità UE**

**FAFNIR GmbH  
Schnackenburgallee 149 c  
22525 Hamburg  
Deutschland / Germany / Allemagne / Germania**

erklärt als Hersteller in alleiniger Verantwortung, dass das Produkt  
declares as manufacturer under sole responsibility that the product  
déclare sous sa seule responsabilité en qualité de fabricant que le produit  
dichiara sotto la sola responsabilità del produttore, che il prodotto

**Sicherheitsbarriere / Safety Barrier / Barrière de sécurité / Barriera di sicurezza**

**SB ...**

den Vorschriften der europäischen Richtlinien  
complies with the regulations of the European directives  
est conforme aux réglementations des directives européennes suivantes  
è conforme ai regolamenti delle direttive europee

2011/65/EU	Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten	RoHS
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment	RoHS
2011/65/UE	Limitation de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques	RoHS
2011/65/UE	Restrizione dell'uso di determinate sostanze pericolose nelle apparecchiature elettriche ed elettroniche	RoHS
2014/34/EU	Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen	ATEX
2014/34/EU	Equipment and protective systems intended for use in potentially explosive atmospheres	ATEX
2014/34/UE	Appareils et systèmes de protection destinés à être utilisés en atmosphères explosibles	ATEX
2014/34/UE	Apparecchi e sistemi di protezione destinati a essere utilizzati in atmosfera potenzialmente esplosiva	ATEX

durch die Anwendung folgender harmonisierter Normen entspricht  
by applying the harmonised standards  
par l'application des normes  
applicando le norme armonizzate

**RoHS / RoHS / RoHS / RoHS  
ATEX / ATEX / ATEX / ATEX**

**EN 50581:2012  
EN 60079-0:2012 + A11:2013  
EN 60079-1:2014  
EN 60079-11:2012  
EN 60079-31:2014**

Das Produkt ist bestimmt als Elektro- und Elektronikgerät der RoHS-  
The product is determined as electrical and electronic equipment of RoHS  
Le produit est déterminé comme des équipements électriques et électroniques de RoHS  
Il prodotto è determinato come apparecchiatura elettrica ed elettronica di RoHS

**Kategorie / Category / Catégorie / Categoria**

**Überwachungs- und Kontrollinstrumenten in der Industrie /  
Industrial Monitoring and Control Instruments /  
Instruments de contrôle et de surveillance industriels /  
Strumenti di monitoraggio e controllo industriali**

Die notifizierte Stelle TÜV NORD CERT GmbH, 0044 hat eine EU-Baumusterprüfung durchgeführt und folgende Bescheinigung ausgestellt  
The notified body TÜV NORD CERT GmbH, 0044 performed a EU-type examination and issued the certificate  
L'organisme notifié TÜV NORD CERT GmbH, 0044 a effectué examen UE de type et a établi l'attestation  
L'organismo notificato TÜV NORD CERT GmbH, 0044 ha effettuato esame UE del tipo e rilasciato il certificato

**SB ...**

**TÜV 10 ATEX 381296 X**

Hamburg, 28.08.2019

Ort, Datum / Place, Date / Lieu, Date / Luogo, data

Geschäftsführer / Managing Director / Gérant / Direttore Generale: René Albrecht

Translation

(1) **EU-Type Examination Certificate**

(2) Equipment and protective systems intended for use in potentially explosive atmospheres, **Directive 2014/34/EU**



(3) **Certificate Number** TÜV 10 ATEX 381296 X **issue:** 00

(4) for the product: Safety Barrier type SB ...

(5) of the manufacturer: **FAFNIR GmbH**

(6) Address: Schnackenburgallee 149 c, 22525 Hamburg, Germany

Order number: 8003002010

Date of issue: 2019-05-23

(7) The design of this product and any acceptable variation thereto are specified in the schedule to this EU-Type Examination Certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH, Notified Body No. 0044, in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and the Council of 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential ATEX Assessment Report No. 19 203 237353.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN 60079-0:2012 + A11:2013 EN 60079-1:2014 EN 60079-11:2012 EN 60079-31:2014**

except in respect of those requirements listed at item 18 of the schedule.

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions for Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design, and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the product shall include the following:

 **See item 15 of the schedule**

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body

  
Roder

Hanover office, Am TÜV 1, 30519 Hannover, Tel. +49 511 998-61455, Fax +49 511 998-61590

This certificate may only be reproduced without any change, schedule included.  
Excerpts or changes shall be allowed by the TÜV NORD CERT GmbH

(13) **SCHEDULE**

(14) **EU-Type Examination Certificate No. TÜV 10 ATEX 381296 X issue 00**

(15) Description of product

The safety barrier type SB 1 is preferably used in conjunction with a certified flameproof enclosure, e. g. HPH Ex d ..., for connecting 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.


In the future, the safety barriers may also be manufactured in accordance with the test documents listed in the ATEX test report. The changes affect the addition of a new type and the dust explosion protection. Furthermore, the equipment was assessed according to the latest standards.

The marking is as follows:

Type SB 1

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

Type SB 3

 II (1) G [Ex ia Ga] IIC resp.  
 II (1) D [Ex ia Da] IIIC

Type designation:

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

Technical data:

Type SB 1

Supply circuit  $U = 24 V_{DC}$   
 $U_m = 253 V$

Output circuit in type of protection "Intrinsic Safety" Ex ia IIC/IIB/IIIC  
 Maximum values:  $U_o = 28.4 V$   
 $I_o = 100 mA$   
 $P_i = 705 mW$

Characteristic line: linear

Maximum permissible outer capacitance and inductance:

	Ex ia IIC		Ex ia IIB/IIIC	
$L_o$	500 $\mu H$	560 $\mu H$	5 mH	2 mH
$C_o$	71 nF	68 nF	330 nF	400 nF



**Schedule to EU-Type Examination Certificate No. TÜV 10 ATEX 381296 X issue 00**

Type SB 3

Supply circuit

U = 24 V<sub>DC</sub> for channel 1  
 U = 5 V<sub>DC</sub> for channel 2 and 3  
 U<sub>m</sub> = 253 V

Output circuit

in type of protection "Intrinsic Safety" Ex ia IIC/IIB/IIIC

Maximum values: U<sub>o</sub> = 28.4 V  
 I<sub>o</sub> = 95 mA  
 P<sub>i</sub> = 507 mW

Characteristic line: linear

Maximum permissible outer capacitance and inductance:

	Ex ia IIC		Ex ia IIB/IIIC	
L <sub>o</sub>	500 μH	200 μH	5 mH	2 mH
C <sub>o</sub>	72 nF	79 nF	340 nF	410 nF

Permissible ambient temperature range:

The ambient temperature range for SB 3 is -40 °C to +70 °C.

The ambient temperature range for SB 1 is

**Used as Category 2G equipment**

Temperature class	Ambient temperature
T6	-40 °C to +40 °C
T5	-40 °C to +55 °C
T4	-40 °C to +85 °C
T3	-40 °C to +85 °C
T2	-40 °C to +85 °C
T1	-40 °C to +85 °C

**Used as Category 1D equipment**

Maximum surface temperature		Ambient temperature
dust layer ≤ 5 mm	Immersed in dust	
+115 °C	+115 °C	-40 °C to +85 °C

All further data are valid unchanged.

(16) Drawings and documents are listed in the ATEX Assessment Report No. 19 203 237353

**Schedule to EU-Type Examination Certificate No. TÜV 10 ATEX 381296 X issue 00**

**(17) Specific Conditions for 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.

**(18) Essential Health and Safety Requirements**

no additional ones

- End of Certificate -



## 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:                       | <table> <tr> <td>SB 1</td> <td></td> <td>II 2(1) G Ex db [ia Ga] IIC T6...T4 Gb</td> </tr> <tr> <td></td> <td></td> <td>II 1(1) D Ex ta [ia Da] IIIC T115 °C Da</td> </tr> <tr> <td>SB 3</td> <td></td> <td>II (1) G [Ex ia Ga] IIC</td> </tr> <tr> <td></td> <td></td> <td>II (1) D [Ex ia Da] IIIC</td> </tr> </table> | 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 |
| 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:                       |  |      |  |  |  |  |   |      |  |                         |  |  |                          |
| 6    | Technical data:                   | See instructions for technical data  |      |  |  |  |  |   |      |  |                         |  |  |                          |
| 7    | Thread size and type (only SB 1): | M24  |      |  |  |  |  |   |      |  |                         |  |  |                          |



## 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:

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



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**

$$T_a(\text{SB 3}) = -40 \text{ °C} \dots +70 \text{ °C}$$

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.

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