HPH Ex d

Pressure resistant encapsulated housing with SB 1 safety barrier
1 Overview

The HPH Ex d (High Pressure Housing) is a housing with type of protection "Ex d" (pressure resistant encapsulation).
Together with the safety barrier SB 1 it allows the supply of intrinsically safe sensors with a non-intrinsically safe power supply unit.
With the optional display, the output signal of a sensor with 4 ... 20 mA interface can be displayed in percent.

2 Safety information

Use HPH Ex d and SB 1 exclusively for this purpose. The manufacturer accepts no liability for any form of damage resulting from improper use!
The HPH Ex d 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 information must be observed:
Do not change or modify the HPH Ex d and SB 1 or add any equipment without the prior consent of the manufacturer.
The installation, operation and maintenance of the HPH Ex d and SB 1 must be carried out only by expert personnel. Specialised knowledge must be acquired by regular training.
Operators, installers and service technicians must observe all applicable safety regulations. This also applies to any local safety and accident prevention regulations which are not stated in these operating instructions.
The safety instructions in this manual are marked as follows:

⚠️ If these safety instructions are not observed, it may result in the risk of accident or damages to the HPH Ex d housing.
3 Installation

⚠️ When installing and operating the HPH Ex d and SB 1 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 EC type-examination certificate must be observed.

⚠️ All applicable local safety regulations and accident prevention guidelines not included in these operating instructions must also be observed.

⚠️ During the mounting of the HPH Ex d and SB 1 it has to be paid attention that a connected sensor is not damaged (see the relevant documentation of the sensor).

⚠️ Installing the HPH Ex d in areas exposed to a powerful external magnetic field is not permitted because this could impair gauging.

3.1 Mounting instructions

⚠️ For installation of the HPH Ex d an approved Ex d cable entry 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 unscrew the casing cover and pull out the display (see following fig.).

1. Loosen the locking screw (2)
2. Remove the casing cover (1)
3. In the version with display (3):
   - Loosen the fixing screws (4)
   - Remove the display (3) carefully (the plug of the display can be removed)
4. Connect the HPH (check polarity)
5. The external ground terminal must be connected via a 4 mm² cable with PA

![Electrical connection diagram]

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

Figure 1: Electrical connection
The SB 1 safety barrier has a voltage drop of max. 8 V.
The display is inserted into the positive power supply connection of the sensor and has a voltage drop of 4 V. It cannot be configured.
It converts the measured current into a display of 0 % (4 mA) to 100 % (20 mA); up to 99 % with 1 decimal place (99.9 %), above without decimal (100 %).
The display of “-2.5 %” (3.6 mA) or “109 %” (21.5 mA) indicates measurement error depending on sensor configuration.
The fuse (2) serves as protection the SB 1 safety barrier.
4.2 Sensor wiring diagram

Figure 3: Wiring diagram for HPH Ex d and SB 1 with not-grounded power supply

Figure 4: Wiring diagram for HPH Ex d and SB 1 with grounded power supply
5 Maintenance

5.1 Return shipment

Before returning any FAFNIR equipment the returned goods authorization by the FAFNIR customer care is required. Please contact your account manager or the customer care to get the instructions for the return of goods.

The return of FAFNIR equipment is possible only with authorization by the FAFNIR customer care.

6 Technical data

6.1 HPH Ex d and SB 1

Dimensions: Ø 95 x H 71 [mm] with display; Ø 95 x H 66 [mm] without display

Ambient temperature: -40 °C … +85 °C

Casing protection class: IP68

Power supply: without display: max. 26 V
with display: max. 29 V

Voltage drop: ≤ 8 V (with safety barrier SB 1)
≤ 12 V (with safety barrier SB 1 and with 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
7 List of figures

Figure 1: Electrical connection ........................................................................................ 3
Figure 2: HPH Ex d and SB 1 with sensor ........................................................................ 4
Figure 3: Wiring diagram for HPH Ex d and SB 1 with not-grounded power supply .......... 5
Figure 4: Wiring diagram for HPH Ex d and SB 1 with grounded power supply ............. 5
erklärt als Hersteller in alleiniger Verantwortung, dass das Produkt
declares as manufacturer under sole responsibility that the product
declare 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

Hamburg, 11.11.2019

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

EU-Type Examination Certificate

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

Certificate Number: TÜV 09 ATEX 555395 X issue: 00

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

of the manufacturer: FAFNIR GmbH

Address: Schnackenburgerallee 149 c, 22525 Hamburg, Germany

Order number: 8003006585

Date of issue: 2019-10-22

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.

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.

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


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

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.

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.

The marking of the product shall include the following:

See item 15 of the schedule

TÜV NORD CERT GmbH, Langemarkstraße 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

Röder

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 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 ...

\[\text{Ex II 2 G } \quad \text{Ex db IIC T6...T4 Gb resp.} \]
\[\text{Ex II 1 D } \quad \text{Ex ta IIC T100 °C Da} \]

Type HPH Ex i D

\[\text{Ex II 1 G } \quad \text{Ex ia IIC T6...T4 Ga resp.} \]
\[\text{Ex II 1 D } \quad \text{Ex ia IIC T125 °C Da} \]

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 IIC | U = 12 VDC ... 26 VDC | 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 IIC | U = 16 VDC ... 29 VDC | 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:

- \( U_i = 30 \text{ V} \)
- \( I_i = 200 \text{ mA at } T_a \leq +65 \degree \text{C resp. } 100 \text{ mA at } T_a \leq +85 \degree \text{C} \)
- \( P_i = 1 \text{ W} \)
- \( L_i = 250 \mu \text{H} \)
- \( C_i = 25 \text{ nF} \)

Permissible ambient temperature range:

Type HPH Ex d ...

**Used as category 2G equipment**

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-40 °C to +50 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-40 °C to +65 °C</td>
</tr>
<tr>
<td>T4</td>
<td>-40 °C to +85 °C</td>
</tr>
<tr>
<td>T3</td>
<td>-40 °C to +85 °C</td>
</tr>
<tr>
<td>T2</td>
<td>-40 °C to +85 °C</td>
</tr>
<tr>
<td>T1</td>
<td>-40 °C to +85 °C</td>
</tr>
</tbody>
</table>

**Used as category 1D equipment**

<table>
<thead>
<tr>
<th>Maximum surface temperature</th>
<th>Ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface dust layer ≤ 5 mm</td>
<td>-40 °C to +85 °C</td>
</tr>
<tr>
<td>Ta + 15 °C</td>
<td>Ta + 15 °C</td>
</tr>
</tbody>
</table>

**Used as category 1G equipment**

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-40 °C to +40 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-40 °C to +55 °C</td>
</tr>
<tr>
<td>T4</td>
<td>-40 °C to +60 °C</td>
</tr>
<tr>
<td>T3</td>
<td>-40 °C to +60 °C</td>
</tr>
<tr>
<td>T2</td>
<td>-40 °C to +60 °C</td>
</tr>
<tr>
<td>T1</td>
<td>-40 °C to +60 °C</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Ambient temperature range at ( I_i \leq 200 \text{ mA} )</th>
<th>Ambient temperature range at ( I_i \leq 100 \text{ mA} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-40 °C to +40 °C</td>
<td>-40 °C to +40 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-40 °C to +55 °C</td>
<td>-40 °C to +55 °C</td>
</tr>
<tr>
<td>T4</td>
<td>-40 °C to +65 °C</td>
<td>-40 °C to +85 °C</td>
</tr>
<tr>
<td>T3</td>
<td>-40 °C to +65 °C</td>
<td>-40 °C to +85 °C</td>
</tr>
<tr>
<td>T2</td>
<td>-40 °C to +65 °C</td>
<td>-40 °C to +85 °C</td>
</tr>
<tr>
<td>T1</td>
<td>-40 °C to +65 °C</td>
<td>-40 °C to +85 °C</td>
</tr>
</tbody>
</table>

**Used as category 1D equipment**

<table>
<thead>
<tr>
<th>Maximum surface temperature</th>
<th>Ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface dust layer ≤ 5 mm</td>
<td>-40 °C to +85 °C</td>
</tr>
<tr>
<td>Ta + 15 °C</td>
<td>Ta + 15 °C</td>
</tr>
</tbody>
</table>

**Used as category 1G equipment**

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-40 °C to +40 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-40 °C to +55 °C</td>
</tr>
<tr>
<td>T4</td>
<td>-40 °C to +60 °C</td>
</tr>
<tr>
<td>T3</td>
<td>-40 °C to +60 °C</td>
</tr>
<tr>
<td>T2</td>
<td>-40 °C to +60 °C</td>
</tr>
<tr>
<td>T1</td>
<td>-40 °C to +60 °C</td>
</tr>
</tbody>
</table>
Used as category 1D equipment

<table>
<thead>
<tr>
<th>Maximum surface temperature</th>
<th>Immersed in dust</th>
<th>Ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>dust layer ≤ 5 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I ≤ 200 mA: $T_a + 55 ^\circ C$</td>
<td></td>
<td>I ≤ 200 mA: -40 °C ... +65 °C</td>
</tr>
<tr>
<td>I ≤ 100 mA: $T_a + 40 ^\circ C$</td>
<td></td>
<td>I ≤ 100 mA: -40 °C ... +85 °C</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN IEC 60079-0:2018</td>
<td>Equipment – General requirements</td>
</tr>
<tr>
<td>EN 60079-1:2014</td>
<td>Equipment protection by flameproof enclosures “d”</td>
</tr>
<tr>
<td>EN 60079-11:2012</td>
<td>Equipment protection by intrinsic safety “i”</td>
</tr>
<tr>
<td>EN 60079-31:2014</td>
<td>Equipment dust ignition protection by enclosure “t”</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Device Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPH Ex d</td>
<td>Housing in flameproof enclosure and protection by enclosure without display</td>
</tr>
<tr>
<td>HPH Ex d D</td>
<td>Housing in flameproof enclosure and protection by enclosure with display</td>
</tr>
<tr>
<td>HPH Ex i D</td>
<td>Enclosure with intrinsically safe display</td>
</tr>
</tbody>
</table>

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 ¾; ½” NPT; ¾” 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\text{AC} 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: **HPH Ex d ...:**

4a acc. to ATEX directive: II 2 G bzw. II 1 D
4b according to standards: Ex db IIC T6...T4 Gb
Ex ta IIIC T100 °C Da

5 Technical data: See instructions for technical data
6 Warning marking: WARNING – DO NOT OPEN WHEN ENERGIZED

7 CE marking: CE 0044

V Technical data

The following electrical values are specified:

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

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 \( L_i \leq 250 \mu H \)
- Inner capacitance \( C_i \leq 25 nF \)

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 ...**

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Ambient temperature ( T_a )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 2G resp. Equipment protection level Gb</td>
<td></td>
</tr>
<tr>
<td>T6</td>
<td>-40 °C ... +50 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-40 °C ... +65 °C</td>
</tr>
<tr>
<td>T4, T3, T2, T1</td>
<td>-40 °C ... +85 °C</td>
</tr>
</tbody>
</table>

Table V.b: Temperatures of the flameproof enclosure in potentially explosive gas atmospheres

<table>
<thead>
<tr>
<th>Maximum surface temperature</th>
<th>Ambient temperature ( T_a )</th>
</tr>
</thead>
<tbody>
<tr>
<td>dust layer ≤ 5 mm</td>
<td>Immersed in dust</td>
</tr>
<tr>
<td>Category 1D resp. Equipment protection level Da</td>
<td></td>
</tr>
<tr>
<td>( T_a + 15 °C )</td>
<td>-40 °C ... +85 °C</td>
</tr>
</tbody>
</table>

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

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* The warning marking is only used if type HPH Ex i D is mounted in a plastic enclosure.
† The permissible input current \( I \) depends on the ambient temperature \( T_a \)
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.

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/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 |
| 2014/34/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 explosives | 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 361296 X

Hamburg, 28.08.2019

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

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

Seite / Page / Page / Pagina 1/1
Translation

EU-Type Examination Certificate

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

Certificate Number: TÜV 10 ATEX 381296 X

for the product: Safety Barrier type SB ...

of the manufacturer: FAFNIR GmbH

Address: Schnackenburgallee 149 c, 22525 Hamburg, Germany

Order number: 8003002010

Date of issue: 2019-05-23

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.

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.

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


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

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.

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.

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

- \(U = 24 \text{ V}_{bc}\)
- \(U_m = 253 \text{ V}\)

Output circuit

in type of protection “Intrinsic Safety” Ex ia IIC/IIB/IIC

Maximum values:

- \(U_o = 28.4 \text{ V}\)
- \(I_o = 100 \text{ mA}\)
- \(P_i = 705 \text{ mW}\)

Characteristic line: linear

Maximum permissible outer capacitance and inductance:

<table>
<thead>
<tr>
<th></th>
<th>Ex ia IIC</th>
<th>Ex ia IIB/IIIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L_o)</td>
<td>500 (\mu\text{H})</td>
<td>560 (\mu\text{H})</td>
</tr>
<tr>
<td>(C_o)</td>
<td>71 nF</td>
<td>68 nF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>5 mH</th>
<th>2 mH</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C_o)</td>
<td>330 nF</td>
<td>400 nF</td>
</tr>
</tbody>
</table>
Schedule to EU-Type Examination Certificate No. TÜV 10 ATEX 381296 X issue 00

Type SB 3

Supply circuit

\[
U = 24 \text{ VDC for channel 1} \\
U = 5 \text{ VDC for channel 2 and 3} \\
U_m = 253 \text{ V}
\]

Output circuit

in type of protection “Intrinsic Safety” Ex ia IIC/II/B/IIIC

Maximum values:

\[
\begin{align*}
U_o &= 28.4 \text{ V} \\
I_o &= 95 \text{ mA} \\
P_l &= 507 \text{ mW}
\end{align*}
\]

Characteristic line: linear

Maximum permissible outer capacitance and inductance:

<table>
<thead>
<tr>
<th></th>
<th>Ex ia IIC</th>
<th>Ex ia II/B/IIIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L_o)</td>
<td>600 (\mu\text{H})</td>
<td>200 (\mu\text{H})</td>
</tr>
<tr>
<td>(C_o)</td>
<td>72 (\text{nF})</td>
<td>79 (\text{nF})</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-40 °C to +40 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-40 °C to +55 °C</td>
</tr>
<tr>
<td>T4</td>
<td>-40 °C to +85 °C</td>
</tr>
<tr>
<td>T3</td>
<td>-40 °C to +85 °C</td>
</tr>
<tr>
<td>T2</td>
<td>-40 °C to +85 °C</td>
</tr>
<tr>
<td>T1</td>
<td>-40 °C to +85 °C</td>
</tr>
</tbody>
</table>

**Used as Category 1D equipment**

<table>
<thead>
<tr>
<th>Maximum surface temperature</th>
<th>Immersed in dust</th>
<th>Ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>dust layer ≤ 5 mm</td>
<td>+115 °C</td>
<td>-40 °C to +85 °C</td>
</tr>
<tr>
<td>+115 °C</td>
<td>+115 °C</td>
<td></td>
</tr>
</tbody>
</table>

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

Safety Barrier type SB...

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 $I_n \leq 32$ mA
- Breaking Capacity $I_{BC} \geq 35$ A
- Melting Integral $I^2t \leq 0,004$ A²s

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 $\mathbb{E}x$ 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 $\mathbb{E}x$ II (1) G [Ex ia Ga] IIC
   II (1) D [Ex ia Da] IIIC
5 CE marking: $\mathbb{C}$ 0044
6 Technical data: See instructions for technical data
Technical data

The nominal voltage for SB 1 and SB 3, channel 1 is:
\[ U = 24 \text{ V}_{\text{DC}} \]

The nominal voltage for SB 3, channel 2 (A) and channel 3 (B) is:
\[ U = 5 \text{ V}_{\text{DC}} \]

The maximum safety voltage is:
\[ U_m = 253 \text{ V} \]

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:

<table>
<thead>
<tr>
<th></th>
<th>SB 1</th>
<th>SB 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output voltage</td>
<td>( U_o \leq 28.4 \text{ V} )</td>
<td></td>
</tr>
<tr>
<td>Output current</td>
<td>( I_o \leq 99.5 \text{ mA} )</td>
<td>( 95.5 \text{ mA} )</td>
</tr>
<tr>
<td>Output power</td>
<td>( P_o \leq 705 \text{ mW} )</td>
<td>( 507 \text{ mW} )</td>
</tr>
<tr>
<td>Inner inductance</td>
<td>( L_i ) negligible small</td>
<td></td>
</tr>
<tr>
<td>Inner capacitance</td>
<td>( C_i ) negligible small</td>
<td></td>
</tr>
</tbody>
</table>

The permissible external inductance and capacitance are as follows:

<table>
<thead>
<tr>
<th></th>
<th>SB 1</th>
<th>SB 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIC</td>
<td>( L_o \leq 500 \mu \text{H} )</td>
<td>( 560 \mu \text{H} )</td>
</tr>
<tr>
<td></td>
<td>( C_o \leq 71 \text{ nF} )</td>
<td>( 68 \text{ nF} )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>SB 1</th>
<th>SB 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIIB/IIIC</td>
<td>( L_o \leq 5 \text{ mH} )</td>
<td>( 2 \text{ mH} )</td>
</tr>
<tr>
<td></td>
<td>( C_o \leq 330 \text{ nF} )</td>
<td>( 400 \text{ nF} )</td>
</tr>
</tbody>
</table>

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:

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Thread size:</td>
</tr>
<tr>
<td>Thread pitch:</td>
</tr>
<tr>
<td>Tolerance:</td>
</tr>
<tr>
<td>Turns:</td>
</tr>
<tr>
<td>Screw-in depth:</td>
</tr>
</tbody>
</table>

The maximum permissible explosion pressure which may act on the SB 1 safety barrier is as follows:
\[ p_{\text{max}}(\text{SB 1}) = 30 \text{ bar} \]
The safety barriers may be used in the following ambient temperature range:

**Type SB 1**

<table>
<thead>
<tr>
<th>Temperature Class</th>
<th>Ambient Temperature $T_a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 2G resp. Equipment Protection Level Gb</td>
<td></td>
</tr>
<tr>
<td>T6</td>
<td>-40 °C ... +40 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-40 °C ... +55 °C</td>
</tr>
<tr>
<td>T4, T3, T2, T1</td>
<td>-40 °C ... +85 °C</td>
</tr>
</tbody>
</table>

Table 1: Service temperatures for potential explosive gas atmospheres

<table>
<thead>
<tr>
<th>Maximum Surface Temperature</th>
<th>Ambient Temperature $T_a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>dust layer ≤ 5 mm</td>
<td></td>
</tr>
<tr>
<td>immersed in dust</td>
<td></td>
</tr>
<tr>
<td>Category 1D resp. Equipment Protection Level Da</td>
<td></td>
</tr>
<tr>
<td>+115 °C</td>
<td>+115 °C</td>
</tr>
</tbody>
</table>

Table 2: Service temperatures for potential explosive dust atmospheres

**Type SB 3**

$T_d(SB \, 3) = -40 °C ... +70 °C$

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.