Technical Documentation

TORRIX

The magnetostrictive level sensor

HART COMMUNICATION PROTOCOL

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1 Characteristics

The high-precision TORRIX level sensor serves as continuous level measurement of liquid media in containers. The measuring principle used by the sensor exploits the physical effect of magnetostriction and is largely unaffected by temperature. This method is particularly ideal where level measurements are required to be extremely accurate, such as in the chemical industry.

This documentation describes the TORRIX with cable connection on the side of the probe head. The cable connection is an M12 cable gland (or M16 x 1.5 adapter), an M12 male connector, or an M20 resp. ½in NPT female thread.

Another version is the TORRIX M12 with an M12 male connector on top of the probe head cover, see:

Technical documentation TORRIX M12, art. no. 350164

The TORRIX supplies a 4 ... 20 mA output signal that is configured using buttons in the probe head, or a digital output signal as HART® protocol. Probe lengths are possible from 100 mm to 6 m, as Flex version up to 22 m, as well as versions for different temperature and pressure ranges.

It also comes in the following versions:

- TORRIX (with screw-in unit, welded or for stepless positioning)
- TORRIX flange (with process connection flange)
- TORRIX Flex (with flexible probe tube)
- TORRIX Bypass (for installation on a bypass with magnetic float)
- TORRIX 90 (with 90° angled probe head)
- TORRIX 6 (with 6 mm probe tube)
- TORRIX 6B (with 6 mm probe tube and short cable gland)

For the description of the communication with the HART® protocol, see:

Technical documentation TORRIX Hart, art. no. 207095

For the installation of the TORRIX Flex probe, see:

TORRIX Flex Installation Guide multilingual, art. no. 350118

The TORRIX versions can also be supplied as Ex version:

The TORRIX Ex ... level sensor with Ex approval (ATEX, IECEx) can be installed in potentially explosive areas which require equipment protection level Ga (Ex Zone 0), Ga/Gb (Ex Zone 0/1) or Gb (Ex Zone 1) for electrical equipment.

2 Safety instructions

The TORRIX level sensor is intended for level measurement of liquids in containers. The level sensor must be used exclusively for this purpose. The manufacturer accepts no liability for any form of damage resulting from improper use.

The level sensor has been developed, manufactured and tested in accordance with the latest 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 level sensor or add any equipment without the prior consent of the manufacturer.
- The installation, operation and maintenance of the level sensor 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 user guide.

The safety instructions in this user guide are marked as follows:

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

Useful information which ensures continued and correct operation of the TORRIX level sensor and makes your work easier.

3 Design and function

The design of the TORRIX level sensor is illustrated in the version with screw-in unit (see following figure).

Inside probe head (1) of the level sensor, concealed by cap (2), are the protected terminal clamps and configuration buttons. The electrical connection is made on the side of the probe head via an M12 cable gland (or M16 x 1.5 adapter), an M12 male connector, or an M20 resp. ½in NPT female thread and at the bottom of the probe head by the earth connection (4) (see chapters “Installation” and “Adjustment”).

On the probe tube (5) is a screw-in unit (6) (cutting ring fitting or ferrule fitting) for height-adjustable mounting in the container or a flange for fixed installation (not shown). The float (7) serves for continuous measurement of the product filling level or interface level and is held on the probe tube by an adjusting ring (8).

The TORRIX Bypass version is supplied without a process connection and a float.

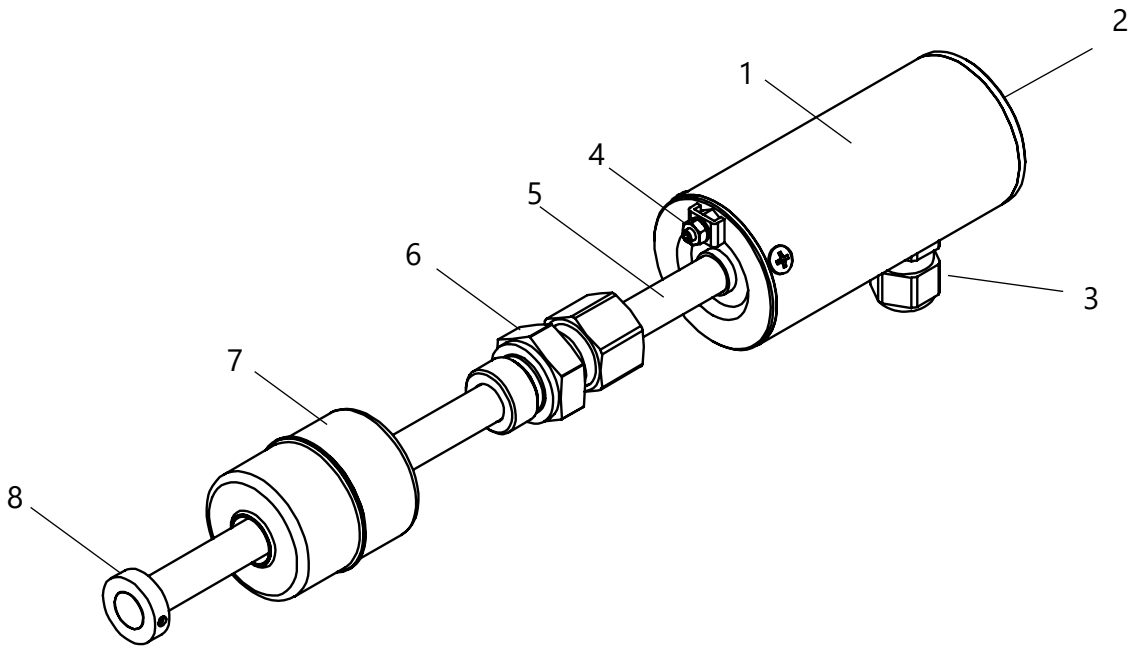
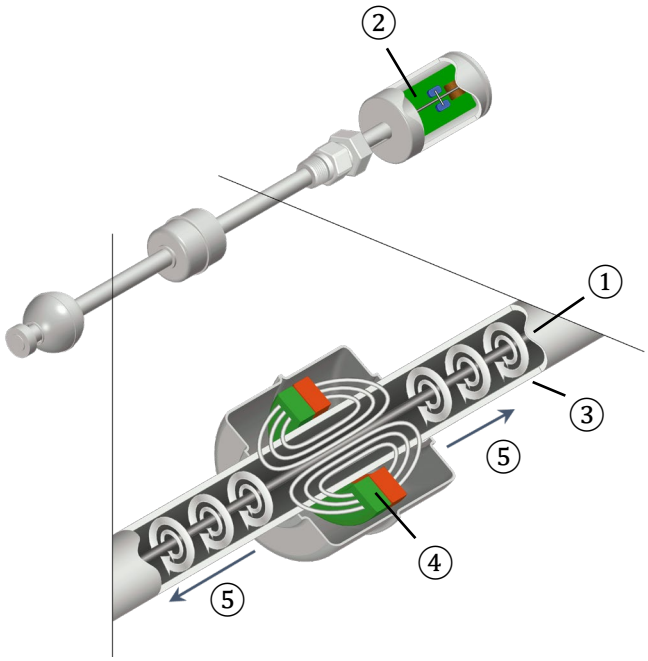


Figure 1: TORRIX level sensor

The measuring principle illustrated in the following figure exploits the physical effect of magnetostriction and is largely unaffected by temperature. The probe tube contains a tensioned wire (1) made of magnetostrictive material. By the sensor electronics current pulses (2) are sent through the wire, which generate a circular magnetic field (3). A magnet (4) inside the float acts as the filling level sensor. Its magnetic field applies an axial magnetic field to the wire. The superposition of the two magnetic fields produces a torsional wave (5) at the float position, which then propagates along the wire in both directions. One wave propagates directly to the probe head, the other propagates down to the bottom of the probe tube and is reflected. The time between the current pulse being transmitted and the wave arriving at the probe head is measured. From these propagation times, it is possible to determine the current position of the float.



1 – Magnetostrictive wire
2 – Current pulses
3 – Circular magnetic field
4 – Magnet
5 – Torsion wave

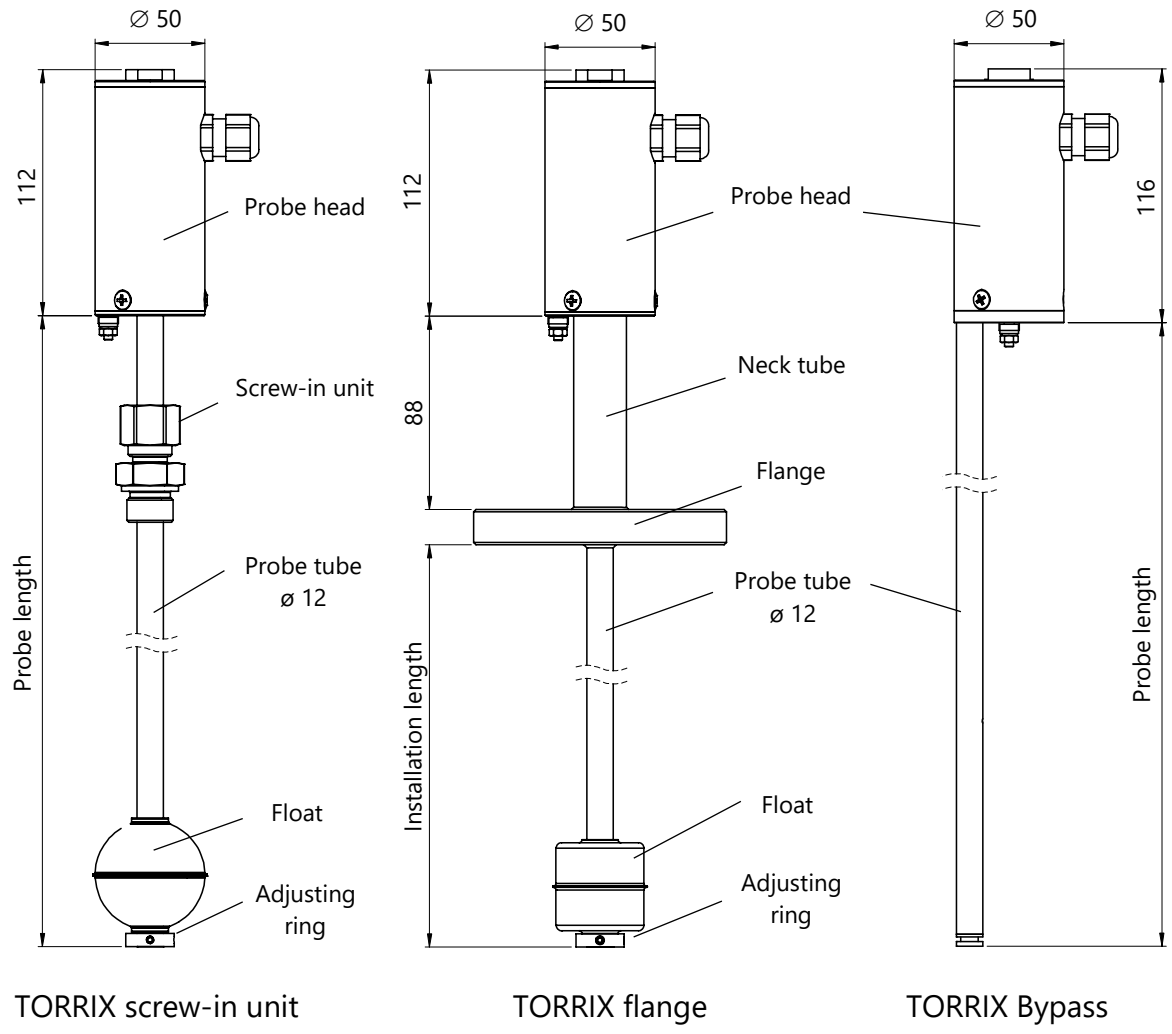
Figure 2: Operating principle of the TORRIX level sensor

4 Installation

When installing and maintaining the level sensor in potentially explosive areas, the national rules must be observed (Explosion Protection Regulations, Industrial Health and Safety Regulations, Equipment Safety Regulations and specific conditions of the EU-Type Examination Certificates). The generally accepted rules of engineering and these operating instructions must be observed.

All applicable local safety and accident prevention regulations not included in this manual must also be observed.

This section describes how to install the level sensor depending on the type (see following figure).



TORRIX screw-in unit TORRIX flange TORRIX Bypass

Figure 3: TORRIX versions

During installation, take great care not to bend the probe tube, and protect the float from shock and impact loads.

Installing a level sensor in areas exposed to a powerful external magnetic field is not permitted because this could impair gauging.

The level sensor can also be fitted into containers from underneath. If the container additionally is pressurized, then the maximum length of the level sensor is 2 m.

If the float is removed during installation, it must be slid back onto the probe tube afterwards with the "TOP" marking oriented towards the probe head to enable correct measurements.

4.1 Installation with screw-in unit

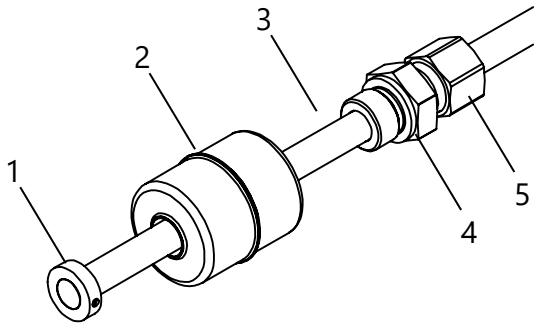


Figure 4: Installation with screw-in unit

Removing the float is necessary only if the float does not fit through the mounting hole in the tank. Otherwise, please proceed directly to steps 3, 6 and, if applicable, 7.

Insert the level sensor into the container (see Figure 4):

(1) Loosen both set screws, remove adjusting ring (1) and float (2) from the probe tube (3).

(2) If necessary, slot screw-in unit (4) onto the probe tube.

(3) Insert the level sensor into the tank, provide screw-in thread (4) with a suitable sealing material, screw it in and tighten.

(4) Slide float (2) back onto probe tube (3).

For correct measurement, the float must be slid onto the probe tube with the "TOP" marking oriented towards the probe head.

(5) Refit adjusting ring (1) on the tube, align the set screws with the groove and tighten.

(6) Adjust the height of the process connection and fix the union nut (5) by hand finger-tight.

(7) Fix the union nut (5) with a wrench by a 1¼ clockwise turn (see following figure).

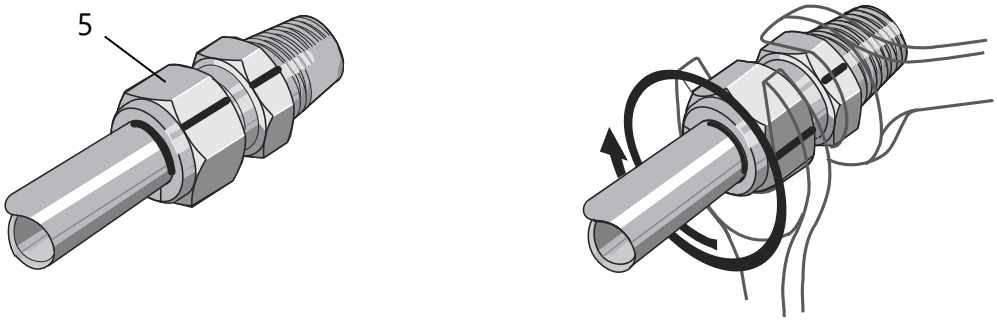


Figure 5: Tightening the compression fitting

4.2 Installation with flange

The probe tube is firmly welded to the flange, so the installation length cannot be changed.

Fasten flange and seal with the flange bolts or nuts. The bolts or nuts and the seals are the responsibility of the operating company and must be selected depending on the fluid. The fasteners and seals must comply with the requirements of the standards EN 1092-1, EN 1514 and EN 1515.

If the float does not fit through the mounting hole, see installation instructions, chapter 4.1.

4.3 Installation on the bypass

The level sensor is mounted at the side of the bypass tube using suitable non-magnetic fasteners.

⚠ *To ensure reliable gauging, the probe tube must be fitted with no deformation on the outside.*

☞ *The distance between the probe and bypass tubes must be as small as possible.*

☞ *Only floats approved by FAFNIR can be used.*

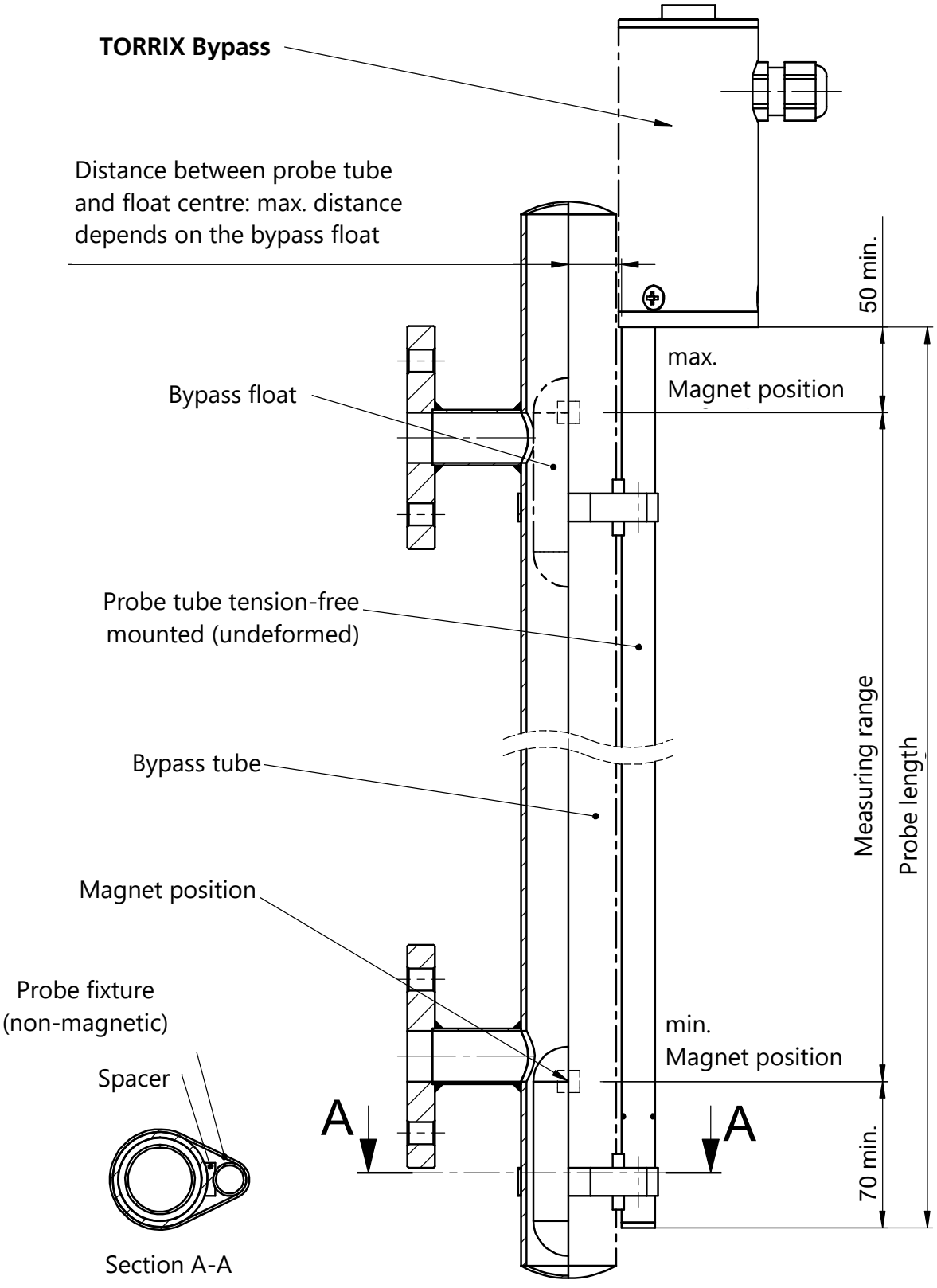


Figure 6: Installation on the bypass

5 Electrical connection

5.1 Wiring diagram TORRIX

The level sensor without Ex approval is installed according to the following wiring diagram:

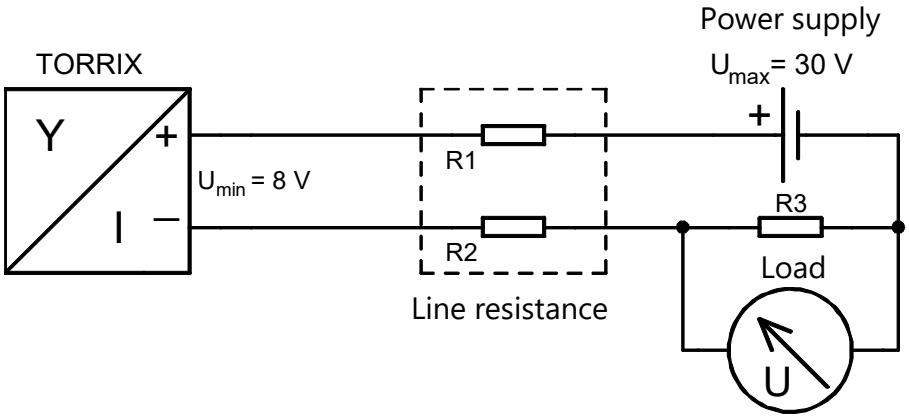


Figure 7: Wiring diagram TORRIX

Power supply: U_{max} = 30 V DC

Minimum supply voltage: U_{min} = 8 V

Permissible total resistance (including cable resistance and load): $\Sigma R = (U - U_{min}) / 0.0215\ A$

☞ *For connection of the cable, see chapter 5.4*

5.2 Wiring diagram TORRIX Ex

The level sensor with Ex approval is installed in a potentially explosive atmosphere according to the following wiring diagram:

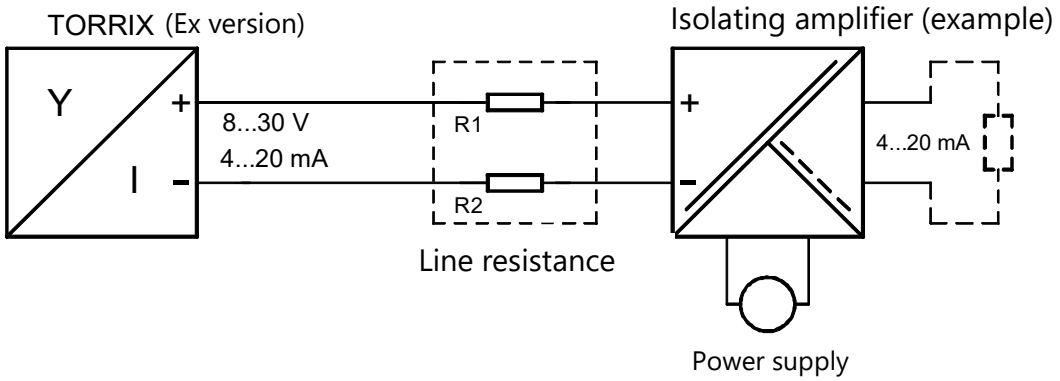


Figure 8: Wiring diagram TORRIX Ex

Power supply: U_{max} = 30 V DC

Minimum supply voltage: U_{min} = 8 V

Permissible total resistance (including cable resistance and load): $\Sigma R = (U - U_{min}) / 0.0215\ A$

The intrinsically safe version of the TORRIX Ex level sensor, when installed in a potentially explosive atmosphere, is permitted to be connected only to isolating amplifiers that have been certified by a recognised inspection authority and offer electrical outputs that meet the following conditions:

$U_0 \leq 30$ V

$I_0 \leq 200$ mA

$P_0 \leq 1$ W

Further data can be found in the EU-Type Examination Certificate (see Annex).

If the level sensor is to be used in a potentially explosive atmosphere, always make sure that the permissible external capacitance (C_0) and inductance (L_0) of the isolating amplifier are not exceeded (refer to the electrical data in the EU-Type Examination Certificate).

Used in an explosion-proof application, the connecting cable to the isolating amplifier must be marked, preferably as a blue cable for intrinsically safe electric circuits.

For connection of the cable, see chapter 5.4

5.3 Cable length

The maximum cable length depends on the total resistance (see chapter 5.1/5.2), composed of the line resistances and the load of connected devices.

The cable (length and cross-section) must be chosen so that the supply voltage will not fall below the sensor-specific minimum voltage (8 V) in the event of a maximum current consumption (21.5 mA).

If the level sensor is to be used in a potentially explosive atmosphere, always make sure that the permissible external capacitance (C_0) and inductance (L_0) of the associated equipment are not exceeded (refer to the electrical data in the EU-Type Examination Certificate).

Because of the voltage drop of 12 V the connection housing HPH Ex d and the safety barrier SB1 can be used with TORRIX only at a supply voltage higher than 20 volts.

The following table shows the maximum total resistances at different supply voltages, and cable resistances at various cross-sections:

Supply voltage [V]	Max. total resistance [Ω]	Cable cross-section [mm²]	Cable resistance per m copper cable [Ω/m]	For connection housing HPH Ex d suitable (yes/no)
12 (-5%)	158	0.5	0.0356	no
		1.0	0.0178	no
		1.5	0.0119	no
24 (-5%)	688	0.5	0.0356	Yes
		1.0	0.0178	Yes
		1.5	0.0119	Yes

The max. cable length is calculated as follows:

$$L = (((U - U_{min}) / I_{max}) - R_B) / R_Q$$

L = Cable length [m]
U = Supply voltage [V] (with negative tolerance value -5%)
U_{min} = Minimum supply voltage [V] = 8 V
I_{max} = Maximum power consumption [A] = 0,0215 A
R_B = Load
R_Q = Cable resistance per m copper cable [Ω/m] at cable cross-section Q [mm²]

Example:
Supply voltage 12 V (± 5%)
Supply voltage U = 11.4 V (12 V - 5%)
Minimum supply voltage U_{min} = 8 V
Maximum power consumption I_{max} = 0.0215 A
Load R_B = 86,8 Ω
Cable resistance per m copper cable R_Q = 0.0356 Ω/m with cable cross-section Q = 0.5 mm²

$$L = (((11,4 - 8) / 0,0215) - 86,8) / 0,0356 = 2000 \text{ m}$$

Thus a cable with forward and return line (2-wire) can be up to 1000 m long.

5.4 Wiring ...

5.4.1 ... with cable gland

The wiring must be carried out only with the power disconnected.

For the wiring of the level sensor, proceed as follows:

(1) Unscrew probe head cover (1) using an open-ended spanner.

(2) Loosen union nut (2) of screwed cable gland (3).

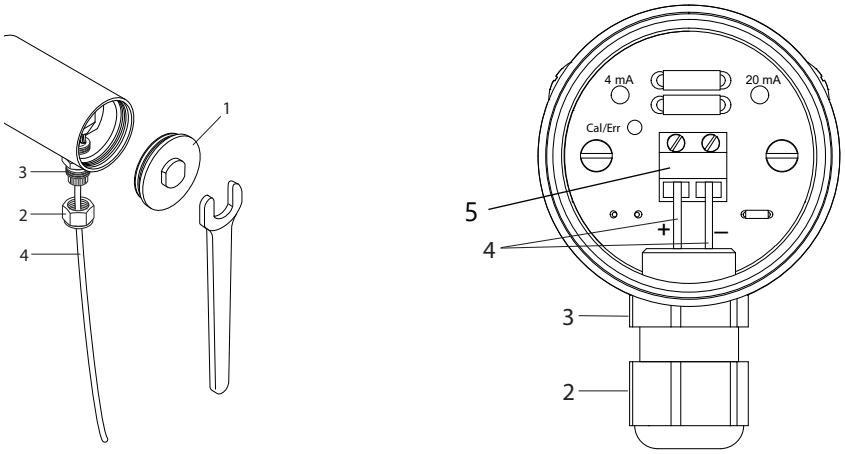


Figure 9: Wiring

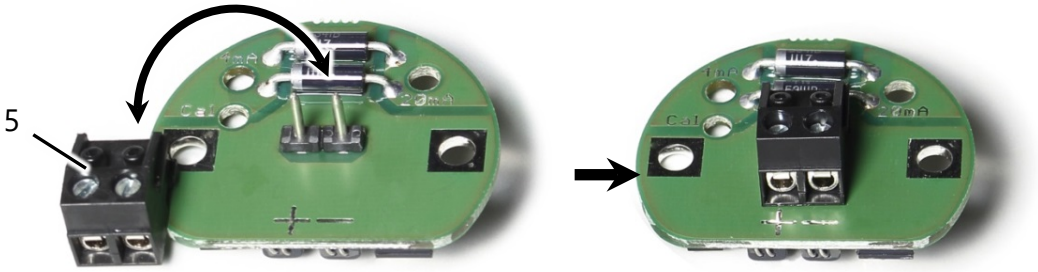


Figure 10: Removable screw terminal

(3) Feed the two-core cable (4) into the union nut (2) and tighten the nut. The outside diameter must be 5 to 10 mm.

(4) Remove screw terminal (5).

(5) Connect the two-core cable (4) to the (+) and (–) marked pols of the screw terminal (5).

(6) Plug the screw terminal (5) back on. The cable must have no traction!

(7) If necessary, set reference points (see chapter 6.1).

(8) Screw probe head cover (1) back on.

The earth connector on the underside of the probe head can be used for earthing or equi-potential bonding.

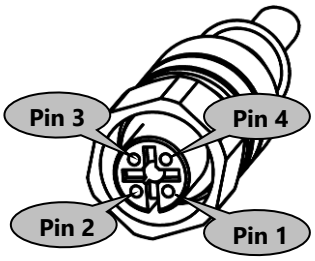
Protect the probe head against the ingress of water. An external cable diameter of 5 to 10 mm ensures reliable sealing of the cable entry. Make sure that the cable glands and the probe head cover are screwed tight.

5.4.2 … with M12 connection

The wiring must be carried out only with the power disconnected.

- If not already connected, plug the M12 female connector of the FAFNIR connection cable onto the M12 male connector of the probe head. First tighten the union nut of the M12 female connector by hand and then use an open-ended spanner to tighten the nut further 180°. The tightening torque should be between 100 … 150 Ncm.
- Connect the cable coming from the central unit with the FAFNIR connection cable, for example using an installation sleeve, in the following pin assignment:

Signal		Colour coding of FAFNIR cables	Assignment of the M12 female connector
Voltage	+	brown	Pin 1
not used		white	Pin 2
Voltage	–	blue	Pin 3
not used		black	Pin 4



Pin assignment of the M12 female connector of the FAFNIR connection cable

The connection cable between the TORRIX … and the associated equipment must have the following properties:

- 2-wire unshielded cable
- For Ex applications colour blue or marked blue (cable for intrinsically safe power circuits)

The earthing or equipotential bonding must be carried out by the installer in accordance with the respective national installation regulations. The earth connector of the probe head can be used for earthing or equipotential bonding requirements.

Also observe the general installation regulations.

6 Adjustment

☞ *The settings described below can also easily be performed remotely for versions with HART® protocol without the probe head having to be opened.*

6.1 Measuring span at the level sensor

To enable configuration of the 4 mA and 20 mA points at the TORRIX level sensor, two buttons and an LED (light emitting diode) are provided near the terminals inside the probe head.

By default, the level sensor is set to maximum measuring span with 4 mA at the sensor base and 20 mA at the probe head. The measuring span is configurable for adaptation to the tank concerned. However, a minimum clearance of 10 mm must be observed.

If this minimum clearance is not observed, the display direction of the level sensor will be reversed automatically (ullage measurement).

Through configuration, it is also possible to have the measured value output inverted: e.g. the level sensor can be set to maximum measuring span with 4 mA at the probe head and 20 mA at the sensor base.

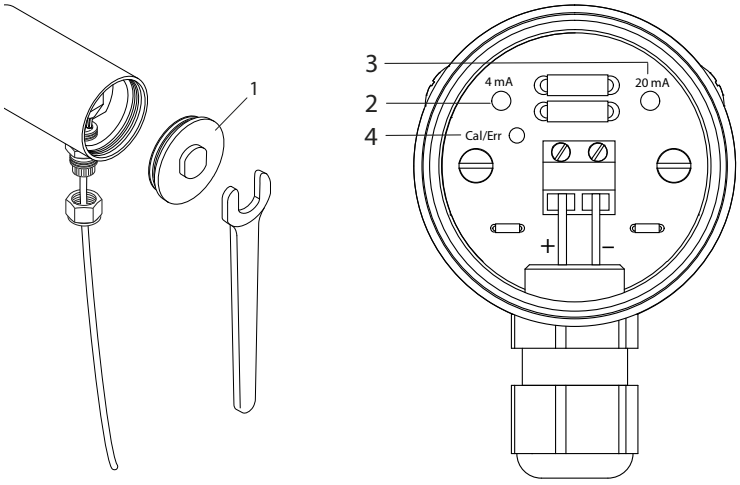


Figure 11: Adjustment of the measuring span

(1) Unscrew probe head cap (1) using an open-ended spanner.

(2) Press and hold 4 mA button (2) or 20 mA button (3) for at least 3 seconds. The green LED begins to flash.

(3) The level sensor is now in configuration mode. The current consumption of the level sensor is 12 mA. If no button is pressed again, the level sensor remains in configuration mode for 20 seconds before reverting to measuring mode and discarding any changes. In configuration mode, the 4 mA or 20 mA reference point, or both, can be modified in any order.

To define a reference point:

(4) Move the float to the desired reference point and

– briefly press (0.1 to 2 seconds) the “4 mA” button (2) to define a current consumption of 4 mA at this position

– briefly press (0.1 to 2 seconds) the “20 mA” button (3) to define a current consumption of 20 mA at this position

When the “4 mA” button is pressed, the LED goes out for 5 seconds. When the “20 mA” button is pressed, the LED lights up permanently for 5 seconds.

The sensor then remains in configuration mode for a further 15 seconds before storing the change and reverting to measuring mode.

The new measuring range configuration is not stored until the level sensor reverts automatically from adjustment mode to configuration mode and the LED goes out. The new configuration is retained even if the level sensor is subsequently disconnected from the power supply.

For “dry” settings to be possible in the case of bypass sensors, a magnetic system with spacer bracket will need to be obtained from the manufacturer of the bypass. Configuration can then be carried out even with the sensor removed.

6.2 Current consumption in failure mode

If a malfunction is preventing the level sensor from recording a plausible float position, i.e. the measured level is incorrect, the sensor will enter the failure mode after a short time. Failure mode signalling conforms to the NAMUR NE43 recommendation. The failure current is set by default to 21.5 mA but this value can also be set to 3.6 mA.

To configure the current consumption in failure mode (see Figure 11).

(1) Unscrew probe head cap (1) using an open-ended spanner.

(2) Press and hold both the “4 mA” (2) and “20 mA” (3) simultaneously for at least 3 seconds.

Green LED (4) “Cal/Err” flashes rapidly. The current consumption of the level sensor is 16 mA. After 5 seconds, the LED stops flashing and indicates the selected failure current consumption for 2.5 seconds. If the LED is on permanently, $I_{failure}$ is 21,5 mA, if the LED turns off, $I_{failure}$ is 3,6 mA.
If no button is pressed again, the level sensor remains in failure mode for a further 2.5 seconds before reverting to measuring mode and discarding any changes.

(3) To set a current consumption

– of 3.6 mA during the dwell time (10 sec) in the failure mode, briefly press the "4 mA" (2) button (0.1 ... 2 seconds).

– of 21.5 mA during the dwell time (10 sec) in the failure mode, briefly press the "20 mA" (3) button (0.1 ... 2 seconds).

⚠ *The new measuring range configuration is not stored until the level sensor reverts automatically from adjustment mode to configuration mode and the LED goes out. The new configuration is retained even if the level sensor is subsequently disconnected from the power supply.*

(4) Screw probe head cap (1) back on.

☞ *If, during operation, the level sensor detects that the level cannot be output correctly due to an insufficient supply voltage, it enters failure mode and sets current consumption to 3.6 mA (regardless of any failure current settings).*

7 Maintenance

7.1 Return shipment

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

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

8 Technical Data

8.1 Sensor

Electrical connection	2-wire terminal 4 ... 20 mA (3.8 ... 20.5 mA) current consumption for level indication 21.5 mA or 3.6 mA current consumption in failure mode
Supply voltage TORRIX TORRIX EX	 8 ... 30 V DC 8 ... 30 V DC
Process connection	Screw-in unit with possibility of variable height adjustment Standard G ½ (compression fitting) Flange on request Material see probe tube Bypass assembly
Probe head	Height 112 mm, Bypass version 116 mm Protection class IP68 (according to TÜV NORD test report 13 993 120483 of 02.09.2013) Material stainless steel Cable diameter 5 ... 10 mm Temperature -40 ... +85 °C
Probe tube	Length 200 to 6,000 mm (to order) Length TORRIX Flex 1.5 m ... 22 m Diameter 12 mm (other diameters on request) Material: 1.4571 standard (Hastelloy, or other materials on request) Measuring range freely adjustable (> 10 mm) Maximum temperature (HHT) -40 °C ... +450 °C High temperature (HT) -40 °C ... +250 °C Normal temperature (NT) -40 °C ... +125 °C Low temperature (LT) -65 °C ... +125 °C
Communication	HART® protocol (optional)

Accuracy Digital component NT/LT	Linearity better than ±0.2 mm or ±0.01 %, better than ±0.001 % per K Repetition accuracy better than 0.05 mm Resolution better than 10 µm
Accuracy Digital component HT/HHT	Linearity better than ±0.5 mm or ±0.025 %, better than ±0.01 % per K Repetition accuracy better than 0.1 mm Resolution better than 50 µm
Accuracy Digital component Bypass	Linearity better than ±0.5 mm or ±0.025 %, better than ±0.001 % per K Repetition accuracy better than 0.05 mm Resolution better than 10 µm
Accuracy Digital component HT/HHT Bypass	Linearity better than ±2 mm or ±0.1 %, better than ±0.01 % per K Repetition accuracy better than 0.5 mm Resolution better than 50 µm
Accuracy Analogue component	Linearity better than ±0.01 % Temperature drift better than ±0.01 % per K Resolution better than 0.5 µA (16 bit)

8.2 Float

The float is an essential component of the level sensor that must be matched to the medium in respect of density, pressure resistance and material durability.

The following floats are exchangeable and can be ordered separately. Other float types and materials are available on request.

☞ *The density and magnet position of floats of the same type may vary slightly, so that a readjustment may be necessary.*

☞ *All floats are also suitable for use at a pressure of -1 bar (vacuum).*

Excerpt from available float range:

Min. density of medium [g/cm³]	Material	Max. operating pressure [bar] at 20 °C *)	Shape [mm]
0.5	Titanium	20	Ball ø 50
0.6	1.4571 / 316 Ti	20	Ball ø 52
0.7	1.4571 / 316 Ti	16	Cylinder ø 53
0.7	C276	10	Cylinder ø 46
0.7	1.4571 / 316 Ti	40	Ball ø 52
0.85	1.4571 / 316 Ti	20	Ball ø 43
0.95	1.4571 / 316 Ti	50	Ball ø 43

*) above 50 °C the maximum operating pressure decreases

⚠ *Pressure resistance is guaranteed for undamaged floats only. Even the most minor and invisible dents, which can occur if, for example, the float is dropped from a bench onto a stone floor, are sufficient to cause a significant deterioration in pressure resistance.*

9 List of figures

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

CE

FAFNIR™

FAFNIR GmbH, Deutschland / Germany / Allemagne / Germania

erklärt als Hersteller in alleiniger Verantwortung, dass die Produkte
declares as manufacturer under sole responsibility that the products
déclare sous sa seule responsabilité en qualité de fabricant que les produits
dichiara sotto la sola responsabilità del produttore, che i prodotti sono

Füllstandsensoren / Filling Level Sensors / Capteurs de Niveau / Sensori di livello

TORRIX ... / VISY-Stick ...

den Vorschriften der europäischen Richtlinien
comply with the regulations of the European directives
sont conformes aux réglementations des directives européennes suivantes
rispetta i 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**
2014/30/EU	**Elektromagnetische Verträglichkeit**	**EMV**
2014/30/EU	**Electromagnetic compatibility**	**EMC**
2014/30/UE	**Compatibilité électromagnétique**	**CEM**
2014/30/UE	**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/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 entsprechen
by applying the harmonised standards
par l'application des normes
applicando le norme armonizzate

RoHS / RoHS / RoHS / RoHS	**EN 50581:2012**
EMV / EMC / CEM / CEM	**EN 61326-1:2013**
ATEX / ATEX / ATEX / ATEX	**EN IEC 60079-0:2018**
	EN 60079-11:2012
	EN 60079-26:2015

Die Produkte sind bestimmt als Elektro- und Elektronikgeräte der RoHS-
The products are determined as electrical and electronic equipment of RoHS
Les produits sont déterminés comme des équipements électriques et électroniques de RoHS
I prodotti sono determinati come apparecchiature elettriche ed elettroniche della 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 Produkte entsprechen den EMV-Anforderungen
The products comply with the EMC requirements
Les produits sont conformes aux exigences CEM
I prodotti sono conformi ai requisiti CEM

Störaussendung / Emission / Émission / L'emissione	**Klasse B / Class B / Classe B / Classe B**
Störfestigkeit / Immunity / D'immunité / Immunità	**Industrielle elektromagnetische Umgebung / Industrial electromagnetic environment / Environnement électromagnétique industriel / Ambiente elettromagnetico industriale**

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

TORRIX Ex ... / VISY-Stick ...	**TÜV 99 ATEX 1496 X**

Hamburg, 30.03.2020
Ort, Datum / Place, Date / Lieu, Date / Luogo, data

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

FAFNIR GmbH • Schnackenburgallee 149 c • 22525 Hamburg • Tel.: +49 / (0)40 / 39 82 07-0 • www.fafnir.de • info@fafnir.de

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 99 ATEX 1496 X** **issue:** 02

(4) for the product: Filling Level Sensor type VISY-Stick ... and type TORRIX Ex ...

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

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

Order number: 8003011045

Date of issue: 2020-02-19

(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. 20 203 254816.

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

EN IEC 60079-0:2018 **EN 60079-11:2012** **EN 60079-26:2015**

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 99 ATEX 1496 X issue 02

(15) Description of product

The filling level sensors are used for continuous measurement of liquid levels within potentially explosive areas. Floaters are used to detect the fluid levels. These slide on a sensor tube. For interface or water detection, a second float can be mounted on the sensor tube. In addition, the density of the liquid can be determined by means of a density module. The temperature measuring chain VISY-Stick ... Temp ... is used to measure temperatures at different heights and does not use any floats.

The filling level sensors type VISY-Stick ... and type TORRIX Ex ... may also be manufactured according to the test documents listed in the ATEX test report. The changes affect the internal structure as well as the change of temperature classes. Furthermore, the equipment was assessed according to the latest standards.

The marking is as follows:

Type TORRIX Ex ...

⟨Ex⟩	II 1 G	Ex ia IIC T6...T4 Ga	resp.	II 1/2 G	Ex ia IIC T6...T4 Ga/Gb	resp.
	II 2 G	Ex ia IIC T6...T4 Gb	resp.	II 1 D	Ex ia IIIC T160 °C Da	

Type TORRIX Ex ...-A resp. TORRIX Ex ... Flex resp. TORRIX Ex ... PL

⟨Ex⟩	II 1 G	Ex ia IIB T6...T4 Ga	resp.	II 1/2 G	Ex ia IIB T6...T4 Ga/Gb	resp.
	II 2 G	Ex ia IIB T6...T4 Gb	resp.	II 1 D	Ex ia IIIC T160 °C Da	

Type VISY-Stick ... resp. VISY-Stick (Flex) Temp resp. TORRIX Ex SC...

⟨Ex⟩	II 1 G	Ex ia IIC T6...T5 Ga	resp.	II 1/2 G	Ex ia IIC T6...T4 Ga/Gb	resp.
	II 2 G	Ex ia IIC T6...T4 Gb	resp.	II 1 D	Ex ia IIIC T135 °C Da	

Type VISY-Stick Advanced ... resp. VISY-Stick ... Flex ... resp.
TORRIX Ex SC...-A resp. TORRIX Ex SC... Flex resp. TORRIX Ex SC... PL

⟨Ex⟩	II 1 G	Ex ia IIB T6...T5 Ga	resp.	II 1/2 G	Ex ia IIB T6...T4 Ga/Gb	resp.
	II 2 G	Ex ia IIB T6...T4 Gb	resp.	II 1 D	Ex ia IIIC T135 °C Da	

Type VISY-Stick ... RS485 resp. VISY-Stick (Flex) Temp RS485 resp.
TORRIX Ex C... resp. TORRIX Ex RS485... resp. TORRIX Ex TAG...

⟨Ex⟩	II 1 G	Ex ia IIC T6...T4 Ga	resp.	II 1/2 G	Ex ia IIC T6...T4 Ga/Gb	resp.
	II 2 G	Ex ia IIC T6...T4 Gb	resp.	II 1 D	Ex ia IIIC T125 °C Da	

Type VISY-Stick ... Advanced RS485 resp. VISY-Stick ... Flex RS485 resp.
TORRIX Ex C...-A resp. TORRIX Ex RS485...-A resp. TORRIX Ex TAG...-A resp.
TORRIX Ex C... Flex resp. TORRIX Ex RS485... Flex resp. TORRIX Ex TAG... Flex resp.
TORRIX Ex C... PL resp. TORRIX Ex RS485... PL resp. TORRIX Ex TAG... PL

⟨Ex⟩	II 1 G	Ex ia IIB T6...T4 Ga	resp.	II 1/2 G	Ex ia IIB T6...T4 Ga/Gb	resp.
	II 2 G	Ex ia IIB T6...T4 Gb	resp.	II 1 D	Ex ia IIIC T125 °C Da	

Schedule to EU-Type Examination Certificate No. TÜV 99 ATEX 1496 X issue 02

Type VISY-Stick ... TLS resp. VISY-Stick (Flex) Temp TLS

II 1 G	Ex ia IIC T4 Ga	resp.	II 1/2 G	Ex ia IIC T4...T3 Ga/Gb	resp.
II 2 G	Ex ia IIC T4...T3 Gb	resp.	II 1 D	Ex ia IIIC T195 °C Da	

Type VISY-Stick ... Advanced TLS resp. VISY-Stick ... Flex TLS

II 1 G	Ex ia IIB T4 Ga	resp.	II 1/2 G	Ex ia IIB T4...T3 Ga/Gb	resp.
II 2 G	Ex ia IIB T4...T3 Gb	resp.	II 1 D	Ex ia IIIC T195 °C Da	

Type designation:

Type VISY-Stick ... (only Ex relevant nomenclatures):

VISY-Stick Sump ...	Environmental sensor (Leakage control)
VISY-Stick Advanced ...	Advanced precision of measurement and temperature sensors
VISY-Stick Flex ...	Flexible sensor tube
VISY-Stick ...	Serial communication
VISY-Stick ... RS485	RS-485 interface
VISY-Stick ... Temp ...	Temperature measuring chain
VISY-Stick ... TLS	TLS interface

Type TORRIX Ex ... (only Ex relevant nomenclatures):

TORRIX Ex ...	4...20 mA interface (with configuration buttons) optionally with HART protocol
TORRIX Ex C...	4...20 mA interface (without configuration buttons) optionally with HART protocol
TORRIX Ex RS485...	RS-485 interface
TORRIX Ex SC...	Serial communication
TORRIX Ex TAG...	TAG interface (communication in accordance with EN 14116)
TORRIX Ex ...-A	Advanced precision of measurement and temperature sensors
TORRIX Ex ... Flex	Flexible sensor tube
TORRIX Ex ... PL	With plastic coating against very aggressive media

Technical data:

Type VISY-Stick ... resp. TORRIX Ex SC...

Signal- and power circuit
(terminals +, -, A, B) in type of protection "Intrinsic Safety" Ex ia IIC/IIB/IIIC
only for the connection to a certified intrinsically safe circuit
Maximum values: U_i = 15 V
I_i = 60 mA
P_i = 100 mW
L_i = 100 µH
C_i = 10 nF

The types VISY-Stick Advanced, VISY-Stick Flex, TORRIX Ex SC...-A, TORRIX Ex SC... Flex and TORRIX Ex SC... PL are only for gas group IIB allowed.

Schedule to EU-Type Examination Certificate No. TÜV 99 ATEX 1496 X issue 02

Type VISY-Stick ... RS485 resp. TORRIX Ex ...
Signal- and power circuit
(terminals +, -, A, B resp. +, -) in type of protection "Intrinsic Safety" Ex ia IIC/IIB/IIIC
only for the connection to a certified intrinsically safe circuit
Maximum values: U_i = 30 V
I_i = 200 mA at $T_a \leq +70$ °C resp.
I_i = 100 mA at $T_a \leq +85$ °C
P_i = 1 W
L_i = 20 µH
C_i = 10 nF
The types VISY-Stick Advanced RS485, VISY-Stick Flex RS485, TORRIX Ex ...-A, TORRIX Ex ... Flex and TORRIX Ex ... PL are only for gas group IIB allowed.

Type VISY-Stick ... TLS
Signal- and power circuit
(terminals +, -) in type of protection "Intrinsic Safety" Ex ia IIC/IIB/IIIC
only for the connection to a certified intrinsically safe circuit
Maximum values: U_i = 13 V
I_i = 200 mA
P_i = 625 mW
L_i = 410 µH
C_i = 20 nF
The types VISY-Stick Advanced TLS and VISY-Stick Flex TLS are only for gas group IIB allowed.

Permissible ambient temperature range:

Use as category 1G apparatus
Type VISY-Stick ... resp. TORRIX Ex SC...

Temperature class	Ambient and Medium temperature range
T6	-20 °C to +50 °C
T1 to T5	-20 °C to +60 °C

Type VISY-Stick ... RS485 resp. TORRIX Ex ...

Temperature class	Ambient and Medium temperature range
T6	$I_i \leq 100$ mA: -20 °C to +40 °C $I_i \leq 200$ mA: -20 °C to +25 °C
T5	$I_i \leq 100$ mA: -20 °C to +55 °C $I_i \leq 200$ mA: -20 °C to +40 °C
T1 to T4	-20 °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.

Schedule to EU-Type Examination Certificate No. TÜV 99 ATEX 1496 X issue 02

Use as category 1/2G apparatus

Type VISY-Stick ... resp. TORRIX Ex SC...

Temperature class	Ambient temperature range	Medium temperature range
T6	-40 °C to +50 °C	-20 °C to +50 °C
T5	-40 °C to +65 °C	-20 °C to +60 °C
T1 to T4	-40 °C to +85 °C	-20 °C to +60 °C

Type VISY-Stick ... RS485 resp. TORRIX Ex ...

Temperature class	Ambient temperature range	Medium temperature range
T6	$I_i \leq 100$ mA: -40 °C to +40 °C $I_i \leq 200$ mA: -40 °C to +25 °C	$I_i \leq 100$ mA: -20 °C to +40 °C $I_i \leq 200$ mA: -20 °C to +25 °C
T5	$I_i \leq 100$ mA: -40 °C to +55 °C $I_i \leq 200$ mA: -40 °C to +40 °C	$I_i \leq 100$ mA: -20 °C to +55 °C $I_i \leq 200$ mA: -20 °C to +40 °C
T1 to T4	$I_i \leq 100$ mA: -40 °C to +85 °C $I_i \leq 200$ mA: -40 °C to +70 °C	-20 °C to +60 °C

Type VISY-Stick ... TLS

Temperature class	Ambient temperature range	Medium temperature range
T4	-40 °C to +75 °C	-20 °C to +60 °C
T1 to T3	-40 °C to +85 °C	-20 °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.

Use as category 2G apparatus

Type VISY-Stick ... resp. TORRIX Ex SC...

Temperature class	Ambient temperature range	Medium temperature range
T6	-40 °C to +50 °C	-40 °C to +85 °C
T5	-40 °C to +65 °C	-40 °C to +100 °C
T4	-40 °C to +85 °C	-40 °C to +135 °C
T3	-40 °C to +85 °C	-40 °C to +200 °C
T2	-40 °C to +85 °C	-40 °C to +300 °C
T1	-40 °C to +85 °C	-40 °C to +450 °C

Type VISY-Stick ... RS485 resp. TORRIX Ex ...

Temperature class	Ambient temperature range	Medium temperature range
T6	$I_i \leq 100$ mA: -40 °C to +40 °C $I_i \leq 200$ mA: -40 °C to +25 °C	-40 °C to +85 °C
T5	$I_i \leq 100$ mA: -40 °C to +55 °C $I_i \leq 200$ mA: -40 °C to +40 °C	-40 °C to +100 °C
T4	$I_i \leq 100$ mA: -40 °C to +85 °C $I_i \leq 200$ mA: -40 °C to +70 °C	-40 °C to +135 °C
T3	$I_i \leq 100$ mA: -40 °C to +85 °C $I_i \leq 200$ mA: -40 °C to +70 °C	-40 °C to +200 °C
T2	$I_i \leq 100$ mA: -40 °C to +85 °C $I_i \leq 200$ mA: -40 °C to +70 °C	-40 °C to +300 °C
T1	$I_i \leq 100$ mA: -40 °C to +85 °C $I_i \leq 200$ mA: -40 °C to +70 °C	-40 °C to +450 °C

Schedule to EU-Type Examination Certificate No. TÜV 99 ATEX 1496 X issue 02

Type VISY-Stick ... TLS

Temperature class	Ambient temperature range	Medium temperature range
T4	-40 °C to +75 °C	-40 °C to +135 °C
T3	-40 °C to +85 °C	-40 °C to +200 °C
T2	-40 °C to +85 °C	-40 °C to +300 °C
T1	-40 °C to +85 °C	-40 °C to +450 °C

Use as category 1D apparatus

Type TORRIX Ex ...

Maximum surface temperature		Ambient temperature T_a
Dust layer ≤ 5 mm	Immersed in dust	
T_a + 75 °C	Observe EN 60079-14	-40 °C to +85 °C

Type VISY-Stick ... resp. TORRIX Ex SC...

Maximum surface temperature		Ambient temperature T_a
Dust layer ≤ 5 mm	Immersed in dust	
T_a + 30 °C	135 °C	-40 °C to +85 °C

Type VISY-Stick ... TLS

Maximum surface temperature		Ambient temperature T_a
Dust layer ≤ 5 mm	Immersed in dust	
135 °C	135 °C	-40 °C to +77 °C
T_a + 110 °C	Observe EN 60079-14	-40 °C to +85 °C

Type VISY-Stick ... RS485 resp. TORRIX Ex C... resp. TORRIX Ex RS485... resp. TORRIX Ex TAG...

Maximum surface temperature		Ambient temperature T_a
Dust layer ≤ 5 mm	Immersed in dust	
I_i ≤ 100 mA: T_a + 40 °C	Observe EN 60079-14	-40 °C to +85 °C
I_i ≤ 200 mA: T_a + 55 °C	Observe EN 60079-14	-40 °C to +70 °C

All further data are valid unchanged.

(16) Drawings and documents are listed in the ATEX Assessment Report No. 20 203 254816

(17) Specific Conditions for Use

1. When using Titanium Floats or Sump Environmental Sensors, the risk of ignition due to impact or friction shall be avoided.
2. When using plastic floats, there is a danger of ignition due to electrostatic discharge. The manufacturer's instructions must be observed.

(18) Essential Health and Safety Requirements

no additional ones

- End of Certificate -

Instructions in accordance with directive 2014/34/EU TÜV 99 ATEX 1496 X

Filling Level Sensors type VISY Stick ... and type TORRIX Ex ... Version: 02.2020

I Range of application

The filling level sensors are designed for continuous measurement of liquid levels. Floats are used to measure the liquid levels. These slide on a sensor tube. For interface or water detection, a second float can be mounted on the sensor tube. In addition, the density of the liquid can be determined via a density module. The temperature measuring chain VISY-Stick ... Temp ... is used to measure temperatures at different heights and does not use any floats.

The power supply for the devices VISY-Stick ... and the forwarding of the measured data to a superordinate evaluation system is provided by isolating amplifier VP-... or VPI or, in the case of the sensor VISY-Stick ... TLS, e. g. by the TLS-... console from Veeder-Root. If an RS-485 interface is used, the sensor VISY-Stick ... RS485 can be used.

The filling level sensors TORRIX Ex ... can be produced with different interfaces. These are, for example, interfaces "4 ... 20 mA" (TORRIX Ex ... and TORRIX Ex C...), "RS-485" (TORRIX Ex RS485...) or TAG (TORRIX Ex TAG...). The filling level sensors TORRIX Ex SC... are connected to the isolating amplifier VP-... or VPI.

II Standards

The device is designed according to the following European standards

EN IEC 60079-0:2018	Equipment – General requirements
EN 60079-11:2012	Equipment protection by intrinsic safety "i"
EN 60079-26:2015	Equipment with Equipment Protection Level (EPL) Ga

III Instructions for safe ...

III.a ... use

The approval applies to equipment types VISY-Stick ... and TORRIX Ex ...

The devices are designed as intrinsically safe apparatuses and are approved for use in potentially explosive areas. The "advanced" (TORRIX Ex ...-A, VISY-Stick Advanced ...) and "flexible" filling level sensors (TORRIX Ex ... Flex, VISY-Stick ... Flex ...) as well as types with plastic coating against very aggressive media (TORRIX Ex ... PL) can be used for all gases of groups IIA and IIB. The temperature measuring chain VISY-Stick ... Temp ... and all other filling level sensors can be used for all gases of groups IIA, IIB and IIC. In addition, all devices can be used for dust groups IIIA, IIIB and IIIC.

To use a non-conductive plastic floats in potentially explosive areas with gases of group IIC the hazard of static charging must be prevented. Here a few conditions need to be observed:

- The use of the float in strongly flowing, non-conductive liquids is forbidden;
- There must be no agitator/mixer in the tank;
- Frictions on non-conductive components are to be avoided;
- The float must not be cleaned in a dry state.

III.b ... assembling and dismantling

The assembly and disassembly must solely be carried out with the power disconnected!

Prior to the installation, it may be necessary that the float/s or the density module is disassembled. During the assembly it must be ensured that the float/s or the module is/are mounted the right way on the sensor tube.

Only with the TORRIX Ex ... with screw terminals the opening of the sensor head is planned. Further disassembly may damage the filling level sensor and void its approval.

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III.c … installation

All wiring operations must solely be carried out with the power disconnected. Special rules and regulations, including EN 60079-14 and local installation regulations, must be observed.

If a device is supplied with screw-in unit, the thread of the screw-in unit must be fitted with a suitable sealing material, screwed into the existing sleeve and tightened. In case of a riser installation the plastic centring aid is plugged onto the sensor head. Then allow the sensor to slide into the riser tube until it stands firmly on the bottom. If the filling level sensor is supplied without process fitting, the installer is responsible for compliance with the Ex requirements.

General information (see also EN 60079-26, Clause 4.3):

If a device is installed into the boundary wall between zone 0 and zone 1, it is essential to ensure that a minimum protection of IP66 or IP67 is achieved after installation.

Through the process connection, there may be an opening in the boundary wall to the area requiring EPL Ga. There is then the risk of the release of flammable gas and the flame entrance.

Flexible filling level sensor (TORRIX Ex … Flex …, VISY-Stick … Flex …)

This type can be produced with different sensor bases to serve for stabilizing the sensor. A base can be a magnetic base. The magnet is then encapsulated in an electricity conducting plastic and can therefore be used in potentially explosive areas.

If this version is manufactured without a fixture, it may only be used in non-flowing liquids or it must be ensured that it does not turn, e. g. by a protective tube or by a weight as a sensor foot.

LPG filling level sensor VISY-Stick … LPG …

The adjustable installation kit for LPG tanks was developed to allow the sensor to be installed and removed at any time without any additional work and without having to open the tank. The adjustable installation kit for LPG tanks consists of a jacket pipe with special LPG float made of BUNA and a ¾" NPT cutting ring fitting. In the case of installation with a cutting ring fitting, the position of the sensor can no longer be altered after the union nut has been tightened.

Environmental sensor VISY-Stick Sump …

This environmental sensor can be fixed with the mounting kit.

When wiring the sensor to the associated apparatus (preferably blue coloured cable), the approved inductance and capacitance of the associated apparatus must not be exceeded. The terminals of the sensor must be connected to the same terminals of the isolating amplifier.

For the filling level sensors with screw terminals type TORRIX Ex ... and TORRIX Ex HART ... the terminal designation is "+" and "-" For devices with M12 plug, the pin assignments are as follows:

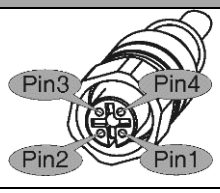
Pin	TORRIX Ex SC … VISY-Stick …	TORRIX Ex C … TORRIX Ex TAG … VISY-Stick … TLS	TORRIX Ex RS485 … VISY-Stick … RS485	M12 cable (female)
1	+	+	+	
2	A		A (+)	
3	-	-	-	
4	B		B (-)	

Table 1: Pin assignment of the sensors

The sensors must be integrated into the potential equalization of the hazardous area. A PA connecting terminal on the sensor head is available for integration of the devices into the potential equalization.

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

Exposed conductive parts need not be separately connected to the equipotential bonding system if they are firmly secured to and are in conductive contact with structural parts or piping which are connected to the equipotential bonding system.

III.d … adjustment

For the operation the sensors, 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 FAFNIR or one of its representatives.

In accordance with the requirements for dielectric strength according to EN 60079-11, Clause 6.3.13 there is compliance with the insulation test between the intrinsically safe circuit and the chassis of the device with a voltage of 500 V_{AC}.

Warning: The type VISY-Stick Sump … and floats made of non-conductive plastic must only be cleaned with a damp cloth, to minimize the risk of electrostatic charging.

IV Equipment marking

1	Manufacturer:	FAFNIR GmbH, 22525 Hamburg
2	Type designation:	TORRIX Ex … / VISY-Stick …
3	Certificate number:	TÜV 99 ATEX 1496 X
4	Ex marking:	
4a	according to directive:	II 1 GD II 1/2 G II 2 G
4b	according to standards:	
	TORRIX Ex …	
		Ex ia IIC T6…T4 Ga Ex ia IIC T6…T4 Ga/Gb Ex ia IIC T6…T4 Gb Ex ia IIIC T160 °C Da
	TORRIX Ex …-A / TORRIX Ex … Flex / TORRIX Ex … PL	
		Ex ia IIB T6…T4 Ga Ex ia IIB T6…T4 Ga/Gb Ex ia IIB T6…T4 Gb Ex ia IIIC T160 °C Da
	TORRIX Ex SC… / VISY-Stick … / VISY-Stick (Flex) Temp	
		Ex ia IIC T6…T5 Ga Ex ia IIC T6…T4 Ga/Gb Ex ia IIC T6…T4 Gb Ex ia IIIC T135 °C Da

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TORRIX Ex SC…-A / TORRIX Ex SC… Flex / TORRIX Ex SC… PL /
VISY-Stick Advanced … / VISY-Stick … Flex …

Ex ia IIB T6…T5 Ga
Ex ia IIB T6…T4 Ga/Gb
Ex ia IIB T6…T4 Gb
Ex ia IIIC T135 °C Da

TORRIX Ex C… / TORRIX Ex RS485… / TORRIX Ex TAG… /
VISY-Stick … RS485 / VISY-Stick (Flex) Temp RS485

Ex ia IIC T6…T4 Ga
Ex ia IIC T6…T4 Ga/Gb
Ex ia IIC T6…T4 Gb
Ex ia IIIC T125°C Da

TORRIX Ex C…-A / TORRIX Ex C… Flex / TORRIX Ex C… PL /
TORRIX Ex RS485…-A / TORRIX Ex RS485… Flex / TORRIX Ex RS485… PL /
TORRIX Ex TAG…-A / TORRIX Ex TAG… Flex / TORRIX Ex TAG… PL /
VISY-Stick Advanced … RS485 / VISY-Stick … Flex … RS485

Ex ia IIB T6…T4 Ga
Ex ia IIB T6…T4 Ga/Gb
Ex ia IIB T6…T4 Gb
Ex ia IIIC T125°C Da

VISY-Stick … TLS / VISY-Stick (Flex) Temp TLS

Ex ia IIC T4 Ga
Ex ia IIC T4…T3 Ga/Gb
Ex ia IIC T4…T3 Gb
Ex ia IIIC T195°C Da

VISY-Stick Advanced … TLS / VISY-Stick … Flex … TLS

Ex ia IIB T4 Ga
Ex ia IIB T4…T3 Ga/Gb
Ex ia IIB T4…T3 Gb
Ex ia IIIC T195°C Da

5	*Warning marking:	WARNING – Potential electrostatic charging hazard – See instructions
6	CE marking:	CE 0044
7	Technical data:	See instructions for technical data

* Warning remark is only valid for Sensor VISY-Stick Sump …

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V Technical data

The following electrical input values apply to the filling level sensors:

Electrical variable		TORRIX Ex SC... VISY-Stick ...	VISY-Stick ... TLS	TORRIX Ex ... TORRIX Ex C... TORRIX Ex RS485... TORRIX Ex TAG... VISY-Stick ... RS485
U_i	≤	15 V	13 V	30 V
I_i	≤	60 mA	200 mA	100 mA / 200 mA*
P_i	≤	100 mW	625 mW	1 W
C_i	<	10 nF	20 nF	10 nF
L_i	<	100 µH	410 µH	20 µH

Table 2: Electrical input data of filling level sensors

When using the equipment in potentially explosive gas atmospheres please consult table 3 to table 5 for the maximum temperatures depending on temperature classes and category respectively equipment protection levels.

Type TORRIX Ex SC... / VISY-Stick ...

Temperature class	T_a	T_F
Category 1G resp. EPL Ga (filling level sensor completely installed in zone 0)		
T6	-20 °C ... +50 °C	
T5, T4, T3, T2, T1	-20 °C ... +60 °C	
Category 1/2G resp. EPL Ga/Gb (sensor head installed in zone 1, Sensor pipe in zone 0)		
T6	-40 °C ... +50 °C	-20 °C ... +50 °C
T5	-40 °C ... +65 °C	-20 °C ... +60 °C
T4, T3, T2, T1	-40 °C ... +85 °C	
Category 2G resp. EPL Gb (filling level sensor completely installed in Zone 1)		
T6	-40 °C ... +50 °C	-40 °C ... +85 °C
T5	-40 °C ... +65 °C	-40 °C ... +100 °C
T4	-40 °C ... +85 °C	-40 °C ... +135 °C
T3		-40 °C ... +200 °C
T2		-40 °C ... +300 °C
T1		-40 °C ... +450 °C

Table 3: Service temperatures of the filling level sensors in basic version (without interface board)

* The permissible input current I_i depends on the ambient temperature T_a

Temperature class	T_a	T_F
Category 1G resp. EPL Ga (filling level sensor completely installed in zone 0)		
T6	I_i ≤ 100 mA: -20 °C ... +40 °C I_i ≤ 200 mA: -20 °C ... +25 °C	
T5	I_i ≤ 100 mA: -20 °C ... +55 °C I_i ≤ 200 mA: -20 °C ... +40 °C	
T4, T3, T2, T1	-20 °C ... +60 °C	
Category 1/2G resp. EPL Ga/Gb (sensor head installed in zone 1, Sensor pipe in zone 0)		
T6	I_i ≤ 100 mA: -40 °C ... +40 °C I_i ≤ 200 mA: -40 °C ... +25 °C	I_i ≤ 100 mA: -20 °C ... +40 °C I_i ≤ 200 mA: -20 °C ... +25 °C
T5	I_i ≤ 100 mA: -40 °C ... +55 °C I_i ≤ 200 mA: -40 °C ... +40 °C	I_i ≤ 100 mA: -20 °C ... +55 °C I_i ≤ 200 mA: -20 °C ... +40 °C
T4, T3, T2, T1	I_i ≤ 100 mA: -40 °C ... +85 °C I_i ≤ 200 mA: -40 °C ... +70 °C	-20 °C ... +60 °C
Category 2G resp. EPL Gb (filling level sensor completely installed in Zone 1)		
T6	I_i ≤ 100 mA: -40 °C ... +40 °C I_i ≤ 200 mA: -40 °C ... +25 °C	-40 °C ... +85 °C
T5	I_i ≤ 100 mA: -40 °C ... +55 °C I_i ≤ 200 mA: -40 °C ... +40 °C	-40 °C ... +100 °C
T4	I_i ≤ 100 mA: -40 °C ... +85 °C I_i ≤ 200 mA: -40 °C ... +70 °C	-40 °C ... +135 °C
T3		-40 °C ... +200 °C
T2		-40 °C ... +300 °C
T1		-40 °C ... +450 °C

Table 4: Service temperatures of the filling level sensors with 4 ... 20 mA, RS-485 or TAG interface

Type VISY-Stick ... TLS

Temperature class	T_a	T_F
Category 1G resp. EPL Ga (filling level sensor completely installed in zone 0)		
T4, T3, T2, T1	-20 °C ... +60 °C	
Category 1/2G resp. EPL Ga/Gb (sensor head installed in zone 1, Sensor pipe in zone 0)		
T4	-40 °C ... +75 °C	-20 °C ... +60 °C
T3, T2, T1	-40 °C ... +85 °C	
Category 2G resp. EPL Gb (filling level sensor completely installed in Zone 1)		
T4	-40 °C ... +75 °C	-40 °C ... +135 °C
T3	-40 °C ... +85 °C	-40 °C ... +200 °C
T2		-40 °C ... +300 °C
T1		-40 °C ... +450 °C

Table 5: Service temperatures of the filling level sensors with TLS interface

For use in category 1G resp. 1/2G, the following applies:

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.

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It must be ensured through appropriate measures that the temperature (T_a) for the respective temperature class is not exceeded at any point on the sensor head.

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

Zone 0 exists only under atmospheric conditions:

Temperature range:	-20 °C … +60 °C
Pressure range:	0.8 bar … 1.1 bar
Oxidants:	Air (oxygen content about 21 %)

When using the equipment in potentially explosive dust atmospheres please consult table 6 for the maximum ambient temperatures depending on the maximum surface temperature and dust layer.

Category 1D resp. equipment protection level Da (filling level sensor installed in zone 20)

Maximum surface temperature		**Ambient temperature T_a**
dust layer ≤ 5 mm	**immersed in dust**	
Types TORRIX Ex SC… / VISY-Stick …		
T_a + 30 °C	135 °C	-40 °C … +85 °C
Types VISY-Stick … TLS		
135 °C		-40 °C … +77 °C
T_a + 110 °C	Observe EN 60079-14*	-40 °C … +85 °C
Types TORRIX Ex C… / TORRIX Ex RS485… / TORRIX Ex TAG… / VISY-Stick … RS485		
I_i ≤ 100 mA: T_a + 40 °C	Observe EN 60079-14*	-40 °C … +85 °C
I_i ≤ 200 mA: T_a + 55 °C		-40 °C … +70 °C
Types TORRIX Ex …		
T_a + 75 °C	Observe EN 60079-14*	-40 °C … +85 °C

Table 6: Service temperatures for potentially explosive dust atmospheres

The filling level sensors achieve a degree of protection:

Protection rating	IP68

VI Special conditions of use

1. When using Titanium Floats or Sump Environmental Sensors, the risk of ignition due to impact or friction shall be avoided.
2. When using plastic floats, there is a danger of ignition due to electrostatic discharge.

* For the assessment of the temperature clause 5.6.3.3 of EN 60079-14:2013 can consult

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ZERTIFIKAT
CERTIFICATE

Hiermit wird bescheinigt, dass das unten beschriebene Produkt der Firma
This certifies that the product mentioned below from company

FAFNIR GmbH
Schnackenburgallee 149 c
22525 Hamburg
Deutschland

die Anforderungen der folgenden Prüfunterlage(n) erfüllt.
fulfills the requirements of the following test regulations.

Geprüft nach: *Tested in accordance with:*	**EN 61508:2010, SIL 2**
Beschreibung des Produktes: (Details s. Anlage 1) *Description of product:* *(Details see Annex 1)*	**Magnetostriktiver Füllstandsensor** *Magnetostrictive Level Sensor*
Typenbezeichnung: *Type Designation:*	**TORRIX ... (Version 4 & 5)** **VISY-Stick ...**
Bemerkung: *Remark:*	**Bitte beachten Sie auch die Hinweise in der Anlage** *Please also pay attention to the Annex*

Dieses Zertifikat bescheinigt das Ergebnis der Prüfung an dem vorgestellten Prüfgegenstand. Eine allgemein gültige Aussage über die Qualität der Produkte aus der laufenden Fertigung kann hieraus nicht abgeleitet werden.
This certifies the result of the examination of the product sample submitted by the manufacturer. A general statement concerning the quality of the products from the series manufacture cannot be derived there from.

Registrier-Nr. / *Registered No.* 44 799 13752002
Prüfbericht Nr. / *Test Report No.* 3523 3926
Aktenzeichen / *File reference* 8000490968

Gültigkeit / Validity
von / *from* 2019-11-13
bis / *until* 2024-11-12

Zertifizierungsstelle der
TÜV NORD CERT GmbH

Essen, 2019-11-13

TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen www.tuev-nord-cert.de technology@tuev-nord.de

Bitte beachten Sie auch die umseitigen Hinweise
Please also pay attention to the information stated overleaf

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Each product must be accompanied by the instructions which are necessary for its operation and installation.

Each product must bear a distinct indication of the manufacturer or importer and a type designation so that the identity of the tested sample maybe determined with the product launched on the market as a standard.

The bearer of the TÜV NORD - Certificate undertakes to regularly supervise the manufacturing of products for compliance with the test specifications and in particular properly carry out the checks which are stated in the specifications or required by the test laboratory.

In case of modifications of the tested product the certification body must be informed immediately.

In case of modifications and expiration of validity the original certificate must be returned to the certification body immediately. The certification body decides if the certificate can be supplemented or whether a new certification is required.

In addition to the conditions stated above, all other provisions of the General Agreement are applicable to the TÜV NORD - Certificate. It will be valid as long as the rules of technology on which the test was based are valid, unless revoked previously pursuant to the provisions of the General Agreement.

This TÜV NORD - Certificate will become invalid and shall be returned to the certification body immediately in the event that it shall expire without delay when it has expired or revoked.

ANLAGE
ANNEX

zum Zertifikat Registrier-Nr. / ***to Certificate Registration No.*** **44 799 13752002**

Produktbeschreibung: *Product description:*	**Siehe auch Seite 1 des Zertifikats** *See also page 1 of the certificate*	
Typbezeichnung: *Type designation:*	**TORRIX ... (Version 4 & 5)** **VISY-Stick ...**	
Technische Daten: *Technical data:*	**Versorgungsspannung:** *Supply voltage:*	**8 V_{DC} ... 50 V_{DC}**
	Umgebungstemperatur: *Ambient temperature:*	**-40 °C ... +85 °C**
	Schutzart: *Degree of Protection:*	**IP68**
Sicherheitsfunktion: *Safety function:*	**Füllstandsmessung** *Level Measurement*	

Zertifizierungsstelle der
TÜV NORD CERT GmbH

Essen, 2019-11-13

ANLAGE
ANNEX

zum Zertifikat Registrier-Nr. / *to Certificate Registration No.* 44 799 13752002

Technische Daten:
Technical data:

1. **Der Einsatz der Sensoren TORRIX ... (Version 4 & 5) und VISY-Stick ... hat unter Beachtung der durch den Hersteller vorgegebenen Sicherheitshinweise in der Technischen Dokumentation und im Sicherheitshandbuch der jeweils aktuellen Fassung zu erfolgen.**
   The safety instructions of the manufacturer in the technical documentation / safety manual in its current valid version must be taken into consideration when using TORRIX ... (Version 4 & 5) and VISY-Stick... .

2. **Für eine vollständige Beurteilung der funktionalen Sicherheit des Gesamtsystems müssen alle Anforderungen der EN 61508 auf alle Teilsysteme – und somit auf die gesamte Sicherheitsfunktion – angewendet werden.**
   To accomplish a complete functional safety assessment of the whole system, all requirements of EN 61508 must be applied to all subsystems – and therefore to the overall safety function.

3. **Die Gültigkeit der Bewertung ist ausschließlich für die im technischen Bericht 3523 3926, vom 08.11.2019 beschriebenen Hard- und Softwareversionen gegeben.**
   The validity of the assessment is only given for the hard- and software versions described in technical report 3523 3926 as of 08.11.2019.

Zertifizierungsstelle der
TÜV NORD CERT GmbH

Essen, 2019-11-13

Safety manual in accordance with series of standards EN 61508

Level sensor type TORRIX ... and type VISY-Stick ... Edition: 11.2019

I Range of application

The level sensors are suitable for areas in which a safety-related subsystem according to EN 61508 with SIL 2 is mandatory.

II Standards

The level sensors are designed in accordance with the following standards

EN 61508:2010, all parts	Functional safety of electrical/electronic/programmable electronic safety-related systems

III Instructions for safe ...

III.a ... use

This safety manual applies to all level sensors from hardware version 4 and from firmware version 4.9 upwards. The version numbers can be read with differences:

TORRIX ... HART ...: The version numbers can be read out using the configuration program FAFNIR HART-Setup.

TORRIX ... RS485 ...: The firmware version can be read out using the MODBUS ASCII protocol.

TORRIX ... SC ... and VISY-Stick ...: The version numbers can be read out using the configuration program VISY-Setup or the FAFNIR protocol Universal Device Protocol (UDP). The respective technical documentation is to be consulted for the use of the named options.

TORRIX ...TAG ...: The firmware version is issued at regular intervals in the identification message. The field name is "Firmware Version" and has a length of two bytes.

In principle, the level sensor indicates the correct fill level (plausibility check) and / or, in the case of a detected error, an error value (safe state), which corresponds to a mode of operation with a continuous requirement. The safe state is reached within ten seconds. The safety function is ensured differently depending on the level sensor.

It must be ensured that there are no strong magnetic fields in the area of the probe tube. In addition, the safe use with adhering liquids is not guaranteed.

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Type	Approval	Electrical design	Struc-ture	Measuring accuracy	Mechanical design	Tempera-ture range	
						HHT	Maximum temperature -40 °C ... +450 °C
						HT	High temperature (HT) -40 °C ... +250 °C
						LLT	Minimum temperature -200 ° C ... +80 °C
						LT	Low temperature -65 °C ... +125 °C
						NT	Normal temperature -40 ° C ... (+85) +125 °C
							Rigid sensor tube with 12 mm diameter
					n		*n* = sensor tube Ø, e.g. 6 (mm)
					*n*B		*n* = sensor tube Ø; Sensor tube not centered on the sensor head
					90B		Sensor tube bent 90° in front of the sensor head and Bypass
					B		Sensor tube not centered on the sensor head (Bypass)
					Flex ...		Flexible sensor tube (... $Ø_{sensor\ tube}$: F = 13 mm; T = 12 mm)
					PL		Plastic coating against very aggressive media
					SP		Sampling tube, e.g. for sampling
						Standard	
				-5T		With five temperature sensors	
				-A5T		Increased measurement accuracy and five temperature sensors	
				-A		Increased measurement accuracy (Advanced)	
					Standard construction		
			VT	Internal structure vibration resistant for portable tanks			
			4 ... 20 mA interface with internal setting button				
		C	4 ... 20 mA interface without internal setting button				
		HART	4 ... 20 mA interface with HART protocol internal setting button				
		HART C	4 ... 20 mA interface with HART protocol and without internal setting button				
		RS485	RS-485 interface				
		SC	Serial communication (for connection to isolating amplifier VP-... or VPI)				
		TAG	TAG interface; signal transmission based on EN 14116				
		Without Ex approval					
	Ex	With Ex approval					
TORRIX	Magnetostrictive level sensor (from version 5) with terminals or connection plug						

Type code III.a1: Level sensor TORRIX ...

System	Type	Accuracy	Sensor tube	Usage	Interface	
						For connection to isolating amplifier VP-... or VPI
					RS485	For connection to an RS-485 interface
					TLS	For connection to a TLS (Veeder-Root)
					Standard level sensor	
				Biodiesel	Level sensor; Biodiesel	
				E15	Level sensor; Ethanol admixture up to 15 %	
				Ethanol	Level sensor; Ethanol	
				Interstitial	Device for monitoring intermediate chambers in double-walled tanks	
				LPG	Level sensor; LPG	
				N	Level sensor; AdBlue	
				Sump Dispenser	Environmental sensor for monitoring the dispenser sump with liquid distinction (product / water)	
				Sump Manhole	Environmental sensor for monitoring the manhole with liquid distinction (product / water)	
				Temp	Temperature measuring chain with up to 32 temperature sensors	
					Rigid sensor tube	
			Flex	Flexible sensor tube		
			Standard			
		Advanced	Increased accuracy			
	Stick	Magnetostrictive level and environmental sensor with up to five temperature sensors in the sensor tube				
VISY-	**V**olume **I**nformation **Sy**stem					

Type code III.a2: Level sensor VISY-Stick ...

III.b ... assembling and dismantling

For level sensors with connection board, only the cover of the connection housing may be removed for electrical installation and - by means of push buttons - for adjusting the level sensor. After installation, the connection housing must be closed again.

Also, the floats may be removed from the probe tube. When mounting the floats, pay attention to the correct orientation.

III.c ... installation

To integrate the devices in the equipotential bonding, a PA terminal is provided on the sensor head. For functional safety, it is relevant that the probes are integrated in the equipotential bonding. For the level sensors with screw terminals, the terminal designation is "+" and "-" For level sensors with M12 male connectors, the pin assignments are as follows:

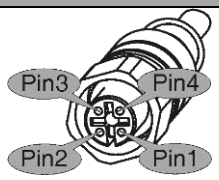
Pin	TORRIX ... SC ... VISY-Stick ...	TORRIX ... C ... TORRIX ... TAG ... VISY-Stick ... TLS	TORRIX ... RS485 ... VISY-Stick ... RS485	M12 Cable (Female)
1	+	+	+	
2	A		A (+)	
3	-	-	-	
4	B		B (-)	

Table III.c: Terminal assignment of the sensors

III.d ... adjustment

No SIL-relevant adjustments are required for operation of the sensors.

III.e ... putting into service

Before putting into service, all devices must be checked of right installation and connection. The electrical supply, as well of connected devices, must be checked.

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

Generally, the level sensor is maintenance-free. In the event of a defect, it must be sent back to the manufacturer or one of its representations.

If an error occurs, e.g. no float on the probe tube, the corresponding diagnostic error is issued. If the error is corrected during active operation, the sensor leaves the error mode.

Level sensors with 4 ... 20 mA interface

In the event of a fault, the residual current flows (3.6 mA or 21.5 mA, whichever is set). If the fault current of 21.5 mA can not flow, e.g. if there is a low supply, the fault current of 3.6 mA is automatically set.

Level sensors with HART protocol

The second data byte of the level sensor response contains the device status. The flag "Device malfunction" (0x80, bit 7) signals a device error. If the "More Status Available" flag (0x10, bit 4) is also set, then device-specific status bits (byte 0) can be queried:

Bit	Fault	Description
0	HART parameters	HART parameters have been changed illegally
1	Sensor parameters	Sensor parameters have been changed illegally
2	Measurement	No measurement possible
3	Error counter	Too many errors during the measurement
4	Undervoltage	Supply voltage is too low

Table III.f1: Device-specific status bits in the HART protocol

Level sensors with DDA protocol:

In the event of an error, the error code "E102" is output in the fill level data field.

Level sensors with H, Modbus, UC and UDP protocol:

In the event of an error, the status code 1 is output.

Level sensors with LC protocol:

In the event of an error, the status bit (bit 7) in the status byte is set to 1.

Level sensors with TAG protocol

In the event of an error, the status bit (bit 23) is set to 1 and the fill level indicates the cause of the error:

Fill level (only bits 22 ... 0)	Status information
0x000000	General problem with the sensor
0x000001	RAM error
0x000002	Parameter error
0x000003	The float is too close to the end
0x000005	The float is upside down
0x000007	Switched ON (power up) or reset (Reset)
0x7FFFFF	Level overflow

Table III.f2: Device-specific status bits in the TAG protocol

Level sensors with TLS interface:

For each measurement, the probes are switched on for approximately 500 ms. If the probe is unable to perform regular measurements, the measurement is marked as invalid by falsification of the parity bit.

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IV Safety related codes

Parameter	Value			
Safety Integrity Level	SIL 2			
Hardware fault tolerance	HFT = 0			
Security related subsystem	Type B			
Failure rate [h^{-1}]	λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}
TORRIX ...	8.53E-09	3.46E-07	8.34E-07	1.38E-07
TORRIX ... C... / TORRIX ... TAG...	4.11E-08	3.13E-07	8.13E-07	1.20E-07
TORRIX ... HART C...	3.95E-08	3.59E-07	8.10E-07	1.16E-07
VISY-Stick ... RS485 / TORRIX ... RS485...	3.95E-08	2.65E-07	7.73E-07	1.10E-07
VISY-Stick ... / TORRIX ... SC...	3.95E-08	1.87E-07	7.25E-07	9.82E-08
VISY-Stick ... TLS	3.95E-08	2.33E-07	8.19E-07	1.15E-07
Mean frequency of dangerous failure per hour, PFH [h^{-1}]	See failure rate λ_{DU}			
Mean Time to Recovery	MTTR = 8 h			
Interval of the retest	T_1 = 1 year			
Architecture	1001			

Table IV: Safety related codes

V Additional requirements for software elements

There are no requirements for software elements.

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Phone/Fax No : **0712 -2510248, Fax-2510577**

Approval No : A/P/HQ/MH/104/6555 (P479308) Dated : **22/09/2020**

To,

M/s. FAFNIR GmbH,
Scnackenburgallee 149 c,Hamburg
22525
GERMANY

Sub : Approval of Filling Level Sensors. under Petroleum Rules 2002- Regarding.

Sir(s),

Please refer to your letter No. **OIN576302** dated **11/09/2020** on the subject.

The following Ex electrical equipment(s) manufactured by you according to **EN 60079-11 : 2012, EN 60079-26 : 2015, EN/IEC 60079-0: 2018,** standards and covered under **TUV NORD CERT GmbH** Test reports mentioned below is/are approved for use in **Zone 0** of Gas **IIB/IIC** hazardous areas coming under the the Petroleum Rules, 2002 administered by this Organization.

Sr. No	Description	Safety Protection	Equipment reference Number	Test Agency			Drawing no
				Name	Certificate No.	Certificate Date	
1	Filling Level Sensor type VISY-Stick.. and type TORRIX Ex...	Ex ia IIC T6..T4 Ga or Ex ia IIB T6..T4 Ga or Ex ia IIC T6..T5 Ga or Ex ia IIB T6..T5 Ga or Ex ia IIC T4 Ga or Ex ia IIB T4 Ga	**P479308/1**	TUV NORD CERT GmbH	TUV 99 ATEX 1496 X Issue 02	19/02/2020	PF025B031 Rev B, PF025B059 Rev C

This Approval is granted subject to observance of the following conditions:-

1)The design and construction of the equipment shall be strictly in accordance with description, condition and drawings as mentioned in the TUV NORD CERT GmbH Test Reports referred to above.

2)The equipment shall be used only with approved type of accessories and associated apparatus.

3)Each equipment shall be marked either by raised lettering cast integrally or by plate attached permanently to the main structure to indicate conspicuously:-
(a) Name of the manufacturer
(b) Name and number by which the equipment is identified.
(c) Number & date of the test report of the TUV NORD CERT GmbH applicable to the equipment.
(d) Equipment reference number of this letter by which use of apparatus is approved.

(e) Protection level.

4) A certificate to the effect that the equipment has been manufactured strictly in accordance with the drawing referred to in the TUV NORD CERT GmbH Test report and is identical with the one tested and certified at TUV NORD CERT GmbH shall be furnished with each equipment.
5) The customer shall be supplied with a copy of this letter, an extract of the conditions and maintenence schedule, if any, recommended by TUV NORD CERT GmbH in their test reports and copy of instructions booklet detailing operation & maintenance of the equipment so as to maintain its Flame Proof characterestics.
6) The After sales service and maintanance of subject equipment shall be looked after by your representative Gilbarco Veeder Root India Pvt Ltd, B-Wing First Floor Art Guild House, Phoenix Market City, Kurla (West), Mumbai 400 070

This approval also covers the permissible variations as approved under the TUV NORD CERT GmbH test reports referred above. This approval is liable to be cancelled if any of the conditions of the approval is violated or not complied with . The approval may also be amended or withdrawn at any time, if considered necessary in the interest of safety.

The field performance report from actual users/your customers of the subject equipment may please be collected and furnished to this office for verification and record on annual basis.

The Approval is Valid upto **31/12/2024**

Yours faithfully,

(Ninad Dattaram Gawade)
Dy. Controller of Explosives
For Chief Controller of Explosives
Nagpur

Copy to :
1. Jt. Chief Controller of Explosives, West Circle, MUMBAI
2. Gilbarco Veeder Root India Pvt Ltd,B-Wing First Floor Art Guild House, Phoenix Market City, Kurla (West), Mumbai 400 070

for Chief Controller of Explosives
Nagpur

(For more information regarding status,fees and other details please visit our website http://peso.gov.in)

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