

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 slides on a sensor tube. For water detection, a second float is mounted on the sensor tube. In addition, the density of the liquid can be determined via a density module.

The power supply for the filling level sensors VISY-Stick ... and the forwarding of the measured data to a superordinate evaluation system is provided by measurement converter 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 C...), "RS-485" (TORRIX Ex RS485...) or TAG (TORRIX Ex TAG...). The filling level sensors TORRIX Ex SC... are connected to the measurement converter VP-... or VPI.

II Standards

The filling level sensors are designed in accordance to the following standards

ABNT NBR IEC 60079-0:2013	Equipment – General requirements
ABNT NBR IEC 60079-11:2013	Equipment protection by intrinsic safety "i"
ABNT NBR IEC 60079-26:2016	Equipment with Equipment Protection Level (EPL) Ga

III Instructions for safety

III.a Use

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

The filling level sensors are designed as intrinsically safe apparatuses and are approved for use in potentially explosive areas. The "advanced" types (TORRIX Ex ...-A, VISY-Stick Advanced ...) and the "flexible" types (TORRIX Ex ... Flex, VISY-Stick ... Flex ...) can be used for all gases of groups IIA and IIB. All other filling level sensors can be used for all gases of groups IIA, IIB and IIC. In addition, all filling level sensors can be used for dust groups IIIA, IIIB and IIIC.

To use a non-conductive plastic floats in potentially explosive areas 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 floats / the module are/is mounted the right way on the sensor tube.

The housing (sensor head) must not be opened! Disassembly may damage the filling level sensor and void its approval.

III.c Installation

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

If the filling level sensor 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 centering 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 ABNT NBR IEC 60079-26, clause 4.3):

If the filling level sensor 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.

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.

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 3/4" 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 measuring transducer (preferably blue coloured cable), the approved inductance and capacitance of the associated equipment must not be exceeded. The terminals of the sensor must be connected to the same terminals of the transducer.

Pin assignment:

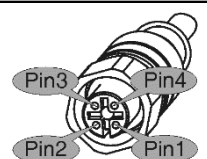
Pin	Wire	M12 (Female)
1	+	
2	A	
3	-	
4	B	

Table 1: Pin assignment of the sensors

A PA connecting terminal on the sensor head is available for integration of the filling level sensors into the potential equalization.

III.d Adjustment

To operate the sensors, safety settings are not necessary.

III.e Putting into service

Before putting into service, all equipment must be checked to ensure it is properly connected and installed. The power supply, as well of connected equipment, must be checked.

III.f Maintenance, overhaul and repair

In general, the filling level sensors are maintenance-free. In case of a defect it must be send back to FAFNIR or one of his representations.

In accordance with the requirements for dielectric strength according to ABNT NBR IEC 60079-11, clause 6.3.13 there is compliance with the insulation test between the intrinsically safe circuit and the chassis of the filling level sensors 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, Hamburg
- 2 Type designation: VISY-Stick ... resp. TORRIX Ex ...
- 3 Certificate number: UL-BR 17.0706
- 4 Ex marking:

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

Ex ia IIC T4 Ga
 Ex ia IIC T6...T4 Ga/Gb
 Ex ia IIC T6...T4 Gb
 Ex ia IIIC T135 °C Da

Type TORRIX Ex SC...-A / TORRIX Ex SC... Flex / VISY-Stick Advanced ... / VISY-Stick ... Flex ...

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

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

Ex ia IIC T4 Ga
 Ex ia IIC T4...T3 Ga/Gb
 Ex ia IIC T4...T3 Gb
 Ex ia IIIC T140 °C Da

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

Ex ia IIB T4 Ga
 Ex ia IIB T4...T3 Ga/Gb
 Ex ia IIB T4...T3 Gb
 Ex ia IIIC T140 °C Da

Type VISY-Stick ... TLS

Ex ia IIC T4 Ga
 Ex ia IIC T4...T3 Ga/Gb
 Ex ia IIC T4...T3 Gb
 Ex ia IIIC T230 °C Da

Type 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 T230 °C Da

- 5 * Warning: WARNING – Potential electrostatic charging hazard – See instructions
 6 Technical data: See instruction manual for technical data

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 C... TORRIX Ex RS485... TORRIX Ex TAG... VISY-Stick ... RS485
$U_i \leq$	15 V	13 V	30 V
$I_i \leq$	60 mA	200 mA	200 mA
$P_i \leq$	100 mW	625 mW	1 W
$C_i <$	10 nF	20 nF	10 nF
$L_i <$	100 μ H	410 μ H	20 μ H

Table 2: Electrical input data of filling level sensors

When using the equipment in potentially explosive gas atmospheres please consult table 3 and table 4 for the maximum temperatures depending on temperature classes and equipment protection levels.

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

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

* Warning applies only to sensor VISY-Stick Sump ... and sensors with plastic parts, e. g. floats

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

Temperature class	T _a	T _F
EPL Ga (filling level sensor completely installed in zone 0)		
T4, T3, T2, T1	-20 °C ... +60 °C	
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	
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 4: Service temperatures of the filling level sensors with 4 ... 20 mA, RS-485 or TAG interface

For use in EPL Ga resp. Ga/Gb, 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.

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 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 5 for the maximum ambient temperatures depending on the maximum surface temperature and dust layer.

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		
T _a + 145 °C	135 °C	-40 °C ... +77 °C
T _a + 145 °C	Observe ABNT NBR IEC 60079-14*	-40 °C ... +85 °C
Types TORRIX Ex C... / TORRIX Ex RS485... / TORRIX Ex TAG... / VISY-Stick ... RS485		
T _a + 55 °C	Observe ABNT NBR IEC 60079-14*	-40 °C ... +85 °C

Table 5: Service temperatures for potentially explosive dust atmospheres

The filling level sensors achieve a degree of protection:

Protection rating IP68

VI Specific conditions of use

The environmental sensors VISY-Stick Sump ... are enclosed in a protective tube made of aluminium. The risk of ignition due to impact or friction is to be avoided.

* For the assessment of the temperatures clause 5.6.3.3 of ABNT NBR IEC 60079-14:2009 can consult