

# VISY-X

## VISY-Stick and VISY-Command (VI-4)



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## 1 Introduction

The VISY-X system (volume information system), is a highly precise, continuous level measurement in up to 16 tanks. The product temperature and the water level on the tank bottom are measured simultaneously.

The system includes one or more VISY-Stick probes, the VISY-Command control unit and the VISY-Setup configuration software.

The robust VISY-Stick can be installed without difficulty both by means of the screw-in unit with external threads as well as by using a pipe installation (riser). The freely adjustable height of the screw-in unit variant provides optimum adaptation to suit the onsite conditions. The probes can be used in ex-zone 0.

The VISY-Sticks fitted in the tanks are linked to the VISY-Command control unit installed in the petrol station building.

Before use, the VISY-Command has to be configured from a PC or notebook using the VISY-Setup software application. The parameters of the probes, the tanks, and the dip charts, if needed, are input or calculated using the easy to use VISY-Setup software. The temperature-compensated filling volume can also be calculated.

VISY-Command gathers data from the probes and transmits this on request to a higher-order system (e.g. PoS).

In most cases, data are transferred between the VISY-Stick and VISY-Command by cable. This cable is also the means by which power is supplied to the VISY-Stick probe.

If there are no more free cable ducts available at the petrol station, the wireless system can be used. In this case, power is supplied to the VISY-Sticks and to the VISY-RFT radio transmitter by a battery. The installation of the radio system is a complex installation procedure and is described in detail in the VISY-RF wireless system manual.

- Technical documentation VISY-RF wireless system (English) – Art. No. 207116



*If using the VISY-RF wireless version at the petrol station, varying reception conditions must be anticipated as a result of the heavy passenger car or lorry traffic encountered there. This could, under certain circumstances, cause data reception in the VISY-Command to fail for some time. This would mean that the tank data are not always updated at the set transmission intervals and that delivery data may, under certain circumstances, be lost.*

## 1.1 In this manual...

... you are guided through the installation and set-up of the VISY-X system, including the VISY-Stick probes and the VISY-Command control unit.

These instructions contain a description of all the steps needed to perform the installation.

After the installation of the VISY-X system the VISY-Command control unit must be configured by using the VISY-Setup software. Please follow the appropriate instructions in the VISY-Setup manual.

- Technical documentation VISY-Setup V4... (English) – Art. No. 207158

## 1.2 Requirements of service engineers

The installation of the whole VISY-X system should only be performed by trained service engineers.

## 1.3 Safety instructions

The VISY-X system has been optimised for use at petrol stations and may be employed for all conventional fuels. It is used for measuring and evaluating the filling levels in the tanks. Please only use the system for this purpose. Observe and follow all product safety notes and operating instructions. The manufacturer accepts no liability for any form of damage resulting from improper use!

The VISY-Stick probes and the VISY-Command control unit have been developed, manufactured and tested in accordance with state-of-the-art technology and with recognised safety rules and regulations. Nevertheless, hazards may arise from their use.

The following instructions must be observed in order to reduce the risk of injury, the risk of electric shocks, fire or damage to the equipment:

- Opening or removing the housing cover from the VISY-Command could result in a risk of electric shock.
- Do not change or modify the system or add any equipment without the prior consent of the manufacturer.
- Only use original parts. These comply with the technical requirements specified by the manufacturer.
- The installation, operation and maintenance of the VISY-Sticks and the VISY-Command must be carried out by expert personnel only. Specialised knowledge must be obtained by undergoing regular training.
- Operators, installers and service technicians must comply with all applicable safety regulations. This also applies to any local safety regulations and accident prevention regulations which are not stated in these operating instructions.

- The VISY-Command is not suitable for outdoor installation and not for use in areas subject to explosion hazards.
- The measuring transmitter VP-... and the VI-... interface card included in the VISY-Command must always be undamaged and clean.
- During normal operation, the housing of the VISY-Command must be closed.
- The product should only be powered with the permissible auxiliary power supply.

The safety instructions in this manual are labelled as follows:



**If you do not observe these safety instructions, risk of an accident exists or the VISY-X system could be damaged.**



*Useful information in these instructions that should be observed is printed in italics are marked with this symbol.*

## 2 Versions of the VISY-X system

Two versions of the VISY-X System are available, each supporting a different data transmission protocol:

- The wired version (standard)
- The wireless version (radio system / RF radio frequency)

The components of the two versions are covered in the points 2.1 and 2.2.

### 2.1 Wired version (standard)

The wired version of the VISY-X system is the standard version. This version consists of the following components:

- VISY-Stick measuring probe, identical to that of the wireless version
- VISY-Command 2, ...4, ...8, or ...16 control unit

### 2.2 Wireless version (radio system)

If no free cable duct for the connection of the VISY-Stick probe and the VISY-Command control unit is available, use can be made of the wireless version of the VISY-X system. In such cases, it is beneficial to install the radio system as this involves no excavation work.

The radio system consists of the following components:

- VISY-Stick measuring probe, identical to that of the wired version
- VISY-RFT radio transmitter
- VISY-Command RF control unit



*If using the VISY-RF wireless version at the petrol station, varying reception conditions must be anticipated as a result of the heavy passenger car or lorry traffic encountered there. This could, under certain circumstances, cause data reception in the VISY-Command to fail for some time. This would mean that the tank data are not always updated at the set transmission intervals and that delivery data may, under certain circumstances, be lost.*

## 3 VISY-Stick

The VISY-Stick probe is identical for the wired version and for the wireless version (radio system) of the VISY-X System. Depending on the installation method, the following version of probe may be supplied:

- VISY-Stick for pipe installation (riser)
- VISY-Stick with screw-in unit for installation in the tank lid

### 3.1 Design and mode of operation

The probe comprises a sensor head (1) and probe tube (2) in stainless steel. The probe tube is fitted in the tank with a screw-in unit (3) for height adjustment. For pipe installation (riser), the screw-in unit is not required. A float (4) for measuring the product filling level and an additional float (5) for continuous water detection move on this probe tube. In the case of products having a density greater than 0.9 kg/l, water detection cannot take place and the water float must be removed.

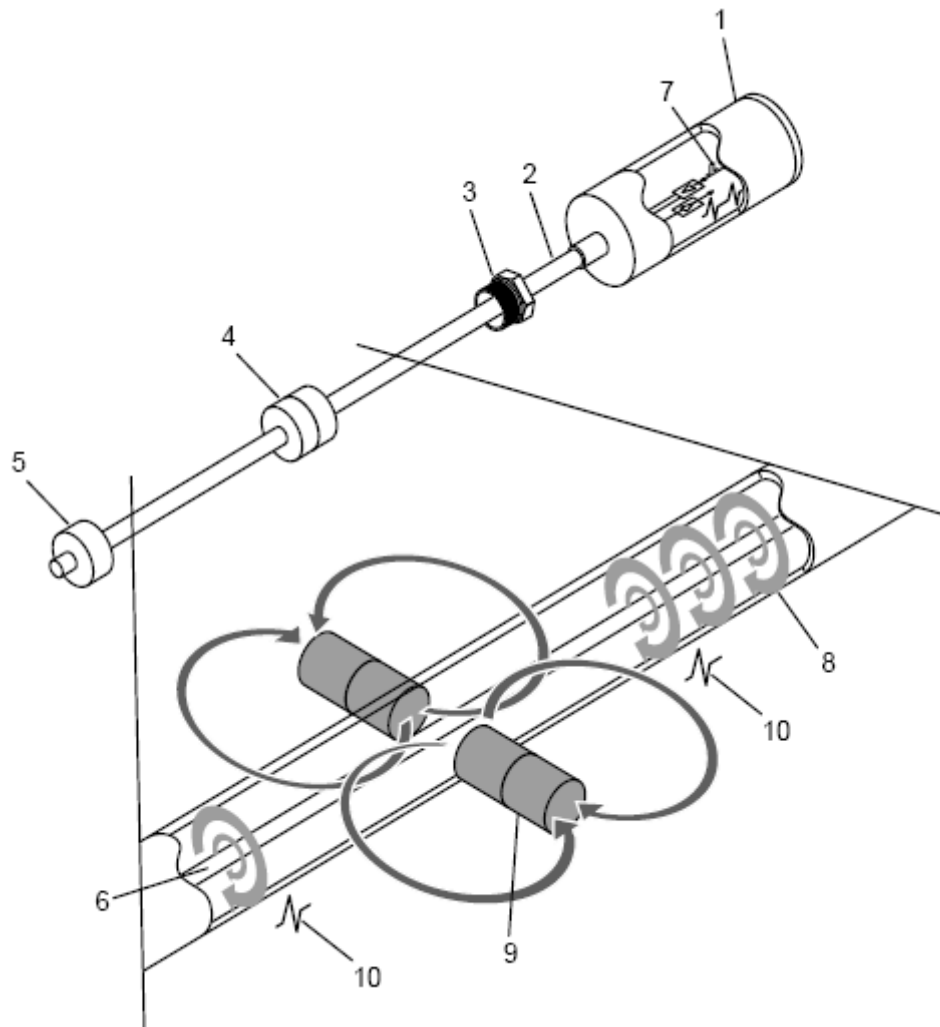


Figure 1: Mode of operation of the magnetostrictive measuring principle

- |                   |                             |                      |
|-------------------|-----------------------------|----------------------|
| 1 – Sensor head   | 5 – Water float             | 9 – Permanent magnet |
| 2 – Probe tube    | 6 – Magnetostrictive wire   | 10 – Torsion pulse   |
| 3 – Screw-in unit | 7 – Sensor electronics      |                      |
| 4 – Product float | 8 – Circular magnetic field |                      |

The probe operates according to the magnetostrictive measuring principle. The probe tube contains a wire (6) made of magnetostrictive material. The sensor electronics transmit pulses through the wire that generate a circular magnetic field (8). Permanent magnets (9) are used as filling level sensors and are installed in both the product float and the water float. The magnetic fields of the float magnets axially magnetise the wire in this area. Due to the overlapping of the two magnetic fields, a torsion pulse (10), which runs in both directions through the wire from the float position, is created in the area of the float magnets. One torsion pulse runs directly to the probe head and the other one is reflected at the bottom end of the probe tube. The time between the current pulse being transmitted and the two torsion pulses arriving at the sensor head is measured and the float position calculated. The position of the water float is calculated by measuring a second pulse.

### **3.2 Probe types**

Different types of VISY-Stick probe are available.

They differ in their:

- (1) Installation method (pipe installation (riser), screw-in unit),
- (2) Accuracy (Basic, Standard, Advanced)
- (3) Product measurement (fuel, Ad Blue, Interstitial or Sump).







### 3.2.4 VISY-Stick Ethanol

The VISY-Stick Ethanol probe is suitable for measuring the filling level of petrol/ethanol mixtures having an ethanol content of more than 10%. Basic and Standard versions are available for pipe installation (riser) and for installations requiring the screw-in unit.

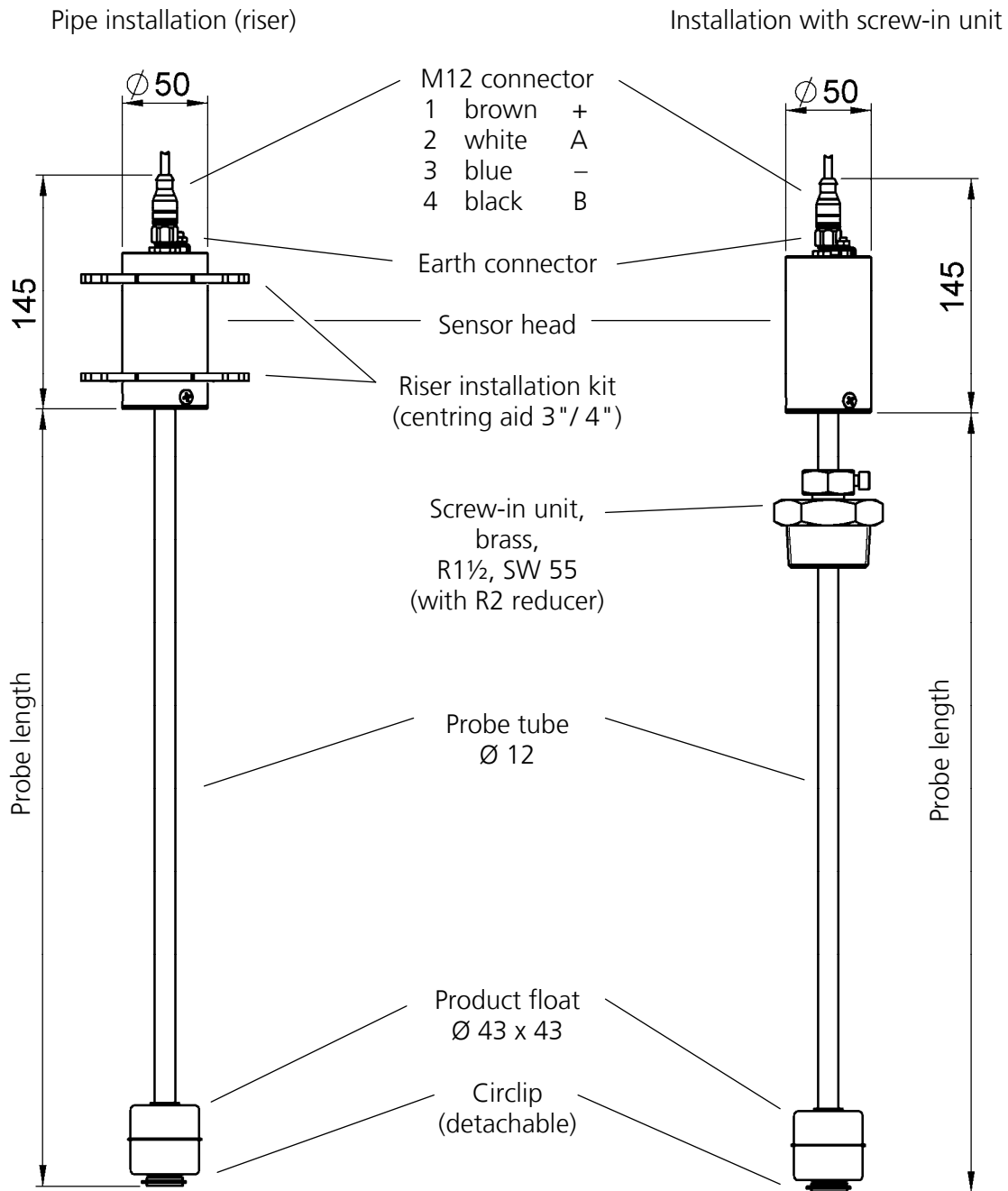


Figure 5: VISY-Stick Ethanol

Dimensions in mm

### 3.2.5 VISY-Stick N for AdBlue

The VISY-Stick N probe is designed for measuring the filling level of AdBlue.

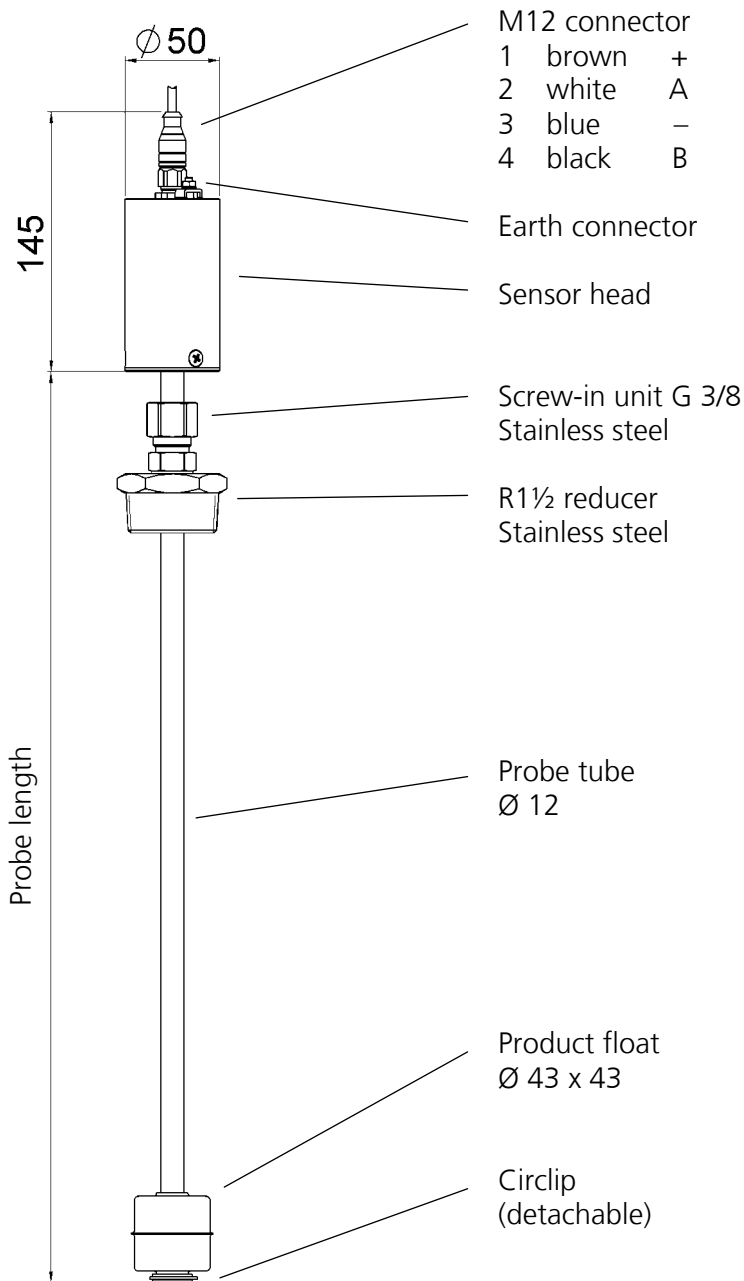


Figure 6: VISY-Stick N for AdBlue

Dimensions in mm



### 3.2.7 VISY-Stick LPG

The VISY-Stick LPG probe is designed for measuring the filling level of liquefied petroleum gas.

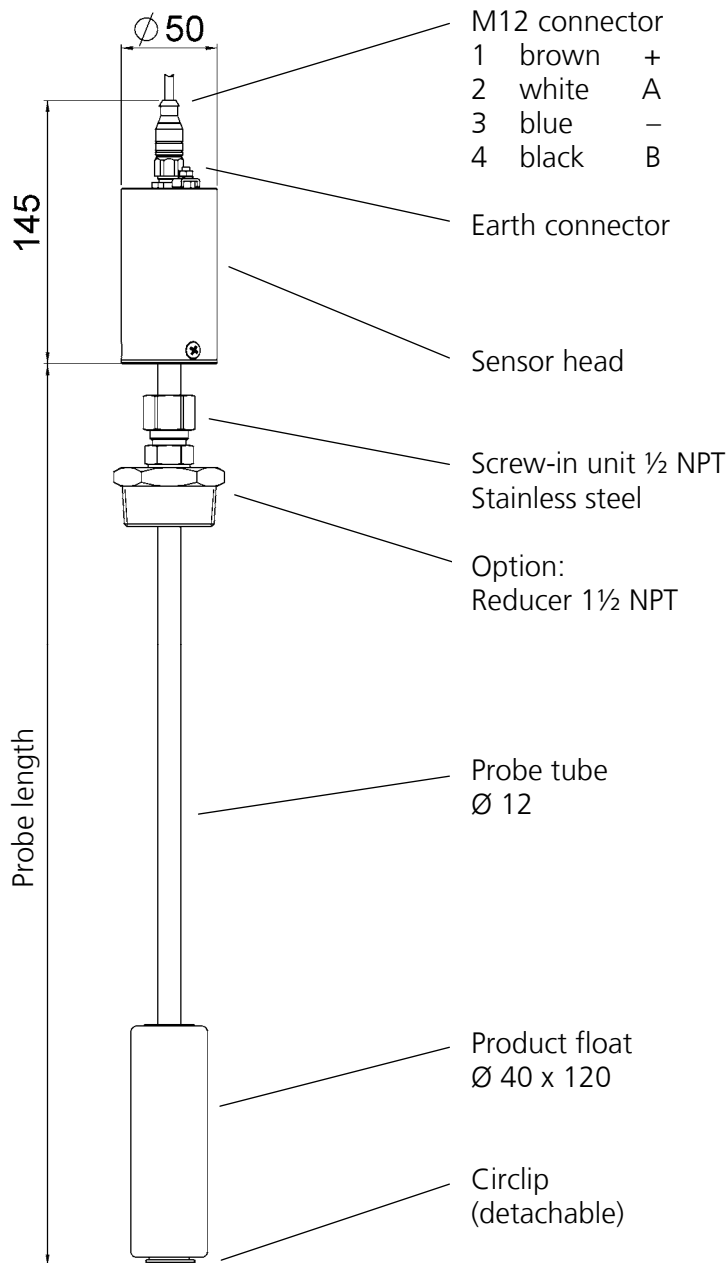


Figure 8: VISY-Stick LPG

Dimensions in mm

### 3.2.8 VISY-Stick Sump

The VISY-Stick Sump probe is designed for monitoring the manhole and the dispenser sump. The probe detects fluids that could potentially accumulate there. It is capable of distinguishing between water and fuel rapidly and accurately. The probe is tamper-proofed. An installation kit is available (art. no. 910036).

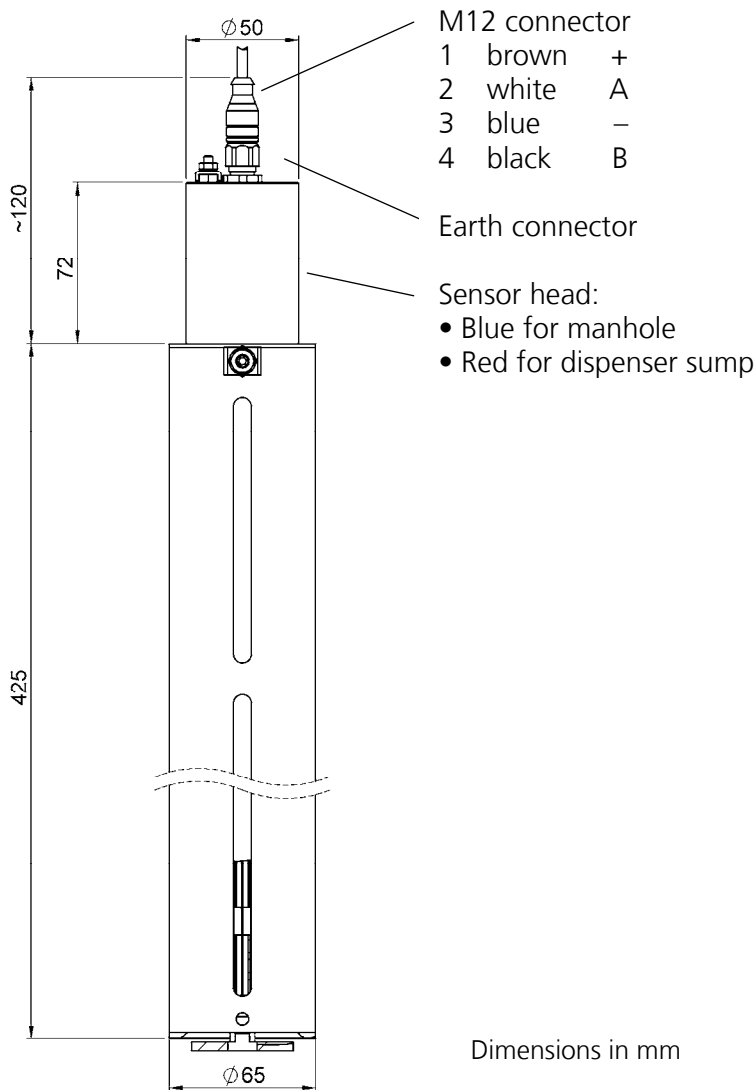


Figure 9: VISY-Stick Sump

### 3.3 Technical data for VISY-Stick probes

Probe	VISY-Stick Basic / Standard	VISY-Stick Advanced	VISY-Stick Interstitial
Explosion protection	II 1/2 G EEx ia IIC T6 II 1 G EEx ia IIC T4		
Approvals	TÜV 99 ATEX 1496, NEPSI, IECEx		
Permissible ambient temperature (sensor head)	-25 °C to 75 °C in T4 -25 °C to 65 °C in T5 -25 °C to 50 °C in T6		
Protection class	IP 68		
Material	1.4301/304 (probe tube), 1.4305/303 (sensor head)		
Probe lengths (Standard) Other lengths on request	2.00 m (tank ø 1.60 m) 2.40 m (tank ø 2.00 m) 2.90 m (tank ø 2.50 m) 3.30 m (tank ø 2.90 m)		Custom
Process connection	Screw-in unit R1½, brass, for continuously variable height adjustment, with R2 reducer, steel		
Option	<ul style="list-style-type: none"> <li>- R1 installation kit (not for biodiesel)</li> <li>- Screw-in unit, Stainless steel</li> <li>- Pipe installation (riser)</li> <li>- Conduit G¾ adapter</li> </ul>	<ul style="list-style-type: none"> <li>- Screw-in unit, Stainless steel</li> <li>- Pipe installation (riser)</li> <li>- Conduit G¾ adapter</li> </ul>	<ul style="list-style-type: none"> <li>- R1 installation kit</li> <li>- Screw-in unit, Stainless steel</li> <li>- Pipe installation (riser)</li> <li>- Conduit G¾ adapter</li> </ul>
Electrical connection	M12 connector for cable terminal		
Option	Battery-powered transmitter for wireless transfer to the control unit		—
Connection data	$U_i \leq 15 \text{ V}$ , $P_i \leq 0.1 \text{ W}$ , $I_i \leq 60 \text{ mA}$ , $C_i \leq 10 \text{ nF}$ , $L_i \leq 0.1 \text{ mH}$		
Sensor head	ø 50 mm x 92 mm		
Product float	ø 43 mm x 43 mm	ø 54 mm x 33 mm	ø 43 mm x 43 mm
Water float	ø 43 mm	ø 43 mm x 62 mm	—
Measurement accuracy: Product	±2.0 mm (Basic) ±0.5 mm (Standard)	±0.25 mm	±0.5 mm
Accuracy: Water	±2.0 mm		—
Water detection	continuous from 30 mm for gasoline, continuous from 23 mm for diesel		—
Accuracy: Temperature	±2.0 °C (20 °C) (Basic) ±1.0 °C (20 °C) (Standard)	±0.3 °C (20 °C)	±2.0 °C (20 °C)

Table 1: Technical data for VISY-Stick Basic / Standard / Advanced / Interstitial

Probe	VISY-Stick Sump	VISY-Stick LPG	VISY-Stick Ethanol (>10%)
Explosion protection	II 1/2 G EEx ia IIC T6		II 1/2 G EEx ia IIC T6 II 1 G EEx ia IIC T4
Approval	TÜV 99 ATEX 1496, NEPSI, IECEx		
Permissible ambient temperature (sensor head)	-25 °C to 75 °C in T4 -25 °C to 65 °C in T5 -25 °C to 50 °C in T6		
Protection class	IP 68		
Material	1.4301/304 (probe tube), Al (conduit), PET	1.4301/304 (probe tube), 1.4305/303 (sensor head)	
Probe lengths (Standard) Other lengths on request	Ø 65 mm x 550 mm (Total length including connectors), available with this version only	1.40 m (tank ø 1.25 m) 2.00 m (tank ø 1.60 m)	2.00 m (tank ø 1.60 m) 2.40 m (tank ø 2.00 m) 2.90 m (tank ø 2.50 m) 3.30 m (tank ø 2.90 m)
Process connection	—	Screw-in unit ½" NPT, stainless steel	Screw-in unit R1½, brass, for continuously variable height adjustment, (with R2 reducer, steel)
Option	- Installation kit - Conduit	- Reducer, ½" NPT, stainless steel - LPG installation kit with flange and G½ - Conduit G¾ adapter	- R1 installation kit - Screw-in unit, Stainless steel - Pipe installation (riser) - Conduit G¾ adapter
Electrical connection	M12 connector for cable terminal		
Option	—	Battery-powered transmitter for wireless transfer to the control unit	
Connection data	$U_i \leq 15 \text{ V}$ , $P_i \leq 0.1 \text{ W}$ , $I_i \leq 60 \text{ mA}$ , $C_i \leq 10 \text{ nF}$ , $L_i \leq 0.1 \text{ mH}$		
Sensor head	built-in	Ø 50 mm x 92 mm	Ø 50 mm x 92 mm
Product float	built-in	Ø 40 mm x 120 mm	Ø 43 mm x 43 mm
Water float	built-in	—	—
Measurement accuracy: Product	±1.0 mm	±2.0 mm	±2.0 mm (Basic) ±0.5 mm (Standard)
Accuracy: Water	±2.0 mm	—	—
Accuracy: Temperature	±2.0 °C (20 °C)	±1.0 °C (20 °C)	±2.0 °C (20 °C) (Basic) ±1.0 °C (20 °C) (Standard)

Table 2: Technical data for VISY-Stick Sump / LPG / Ethanol

## 3.4 Installing the VISY-Sticks

### 3.4.1 Installation and safety instructions



When installing and servicing the VISY-Stick probes, the requirements of ExVo (German Ordinance on Explosion Protection) and BetrSichV (German Ordinance on Industrial Safety and Health) and of equipment safety law must be observed, as must the generally accepted technical regulations and these operating instructions.



Also observe any local safety regulations and accident prevention regulations which are not stated in these operating instructions.



During assembly, it is important to make sure that the probe tube is not bent. Protect the floats from knocks at all times. Moisture must not be allowed to enter the M12 connector.



Before you install the VISY-Stick, move the float to the bottom end of the probe tube, otherwise it will slip down suddenly when you erect the VISY-Stick and could be damaged when it strikes the circlip.



*During installation, you will need to make a note of the following data relating to the VISY-Sticks, tanks and products:*

- Serial numbers of the probes,
- Tank assignment of the probes,
- Tank assignment of the product types,
- Terminal assignment of the probes in the VISY-Command,
- Probe offset from central vertical axis (see section 3.4.9.)

*These data are required for configuration of VISY-Command.*



*For identification purposes, the probe heads of the special VISY-Stick models are wrapped in a coloured net, which must be removed prior to installation:*

<i>VISY-Stick N for AdBlue:</i>	<i>blue marking</i>
<i>VISY-Stick Interstitial:</i>	<i>brown marking</i>
<i>VISY-Stick LPG:</i>	<i>yellow marking</i>
<i>VISY-Stick Biodiesel:</i>	<i>green marking</i>
<i>VISY-Stick Ethanol (&gt;10%):</i>	<i>orange marking</i>
<i>VISY-Stick E10 (5-10%):</i>	<i>neutral marking</i>
<i>VISY-Stick Standard / Basic / Advanced:</i>	<i>neutral marking</i>

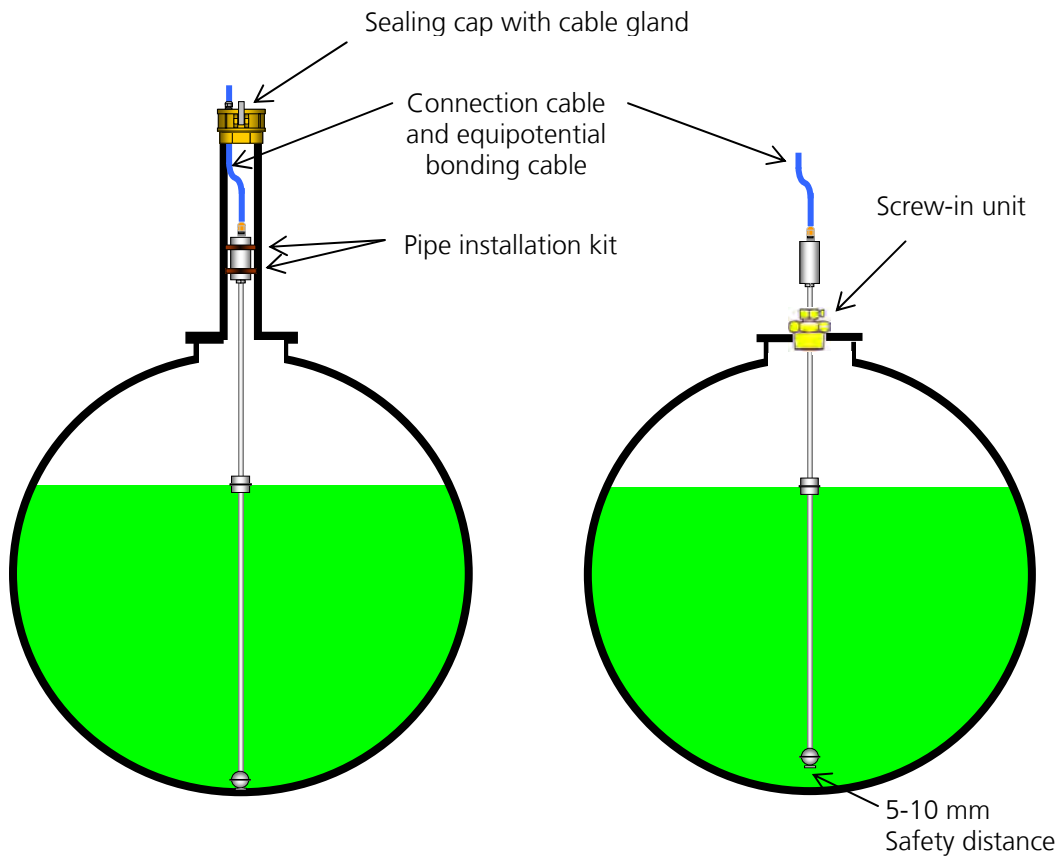


Figure 10: VISY-Stick pipe installation (riser) and screw-in unit installation

### 3.4.2 Installation with screw-in unit

For installation of the VISY-Stick Basic or Standard probe, the tank pipe coupling must have an internal thread of at least 1½"; for the VISY-Stick Advanced sensor, it must have an internal thread of at least 2".

The procedure for installing probes with screw-in units (see Figure 10) is described below. For tank pipe couplings with an internal thread larger than 1½", reducers of the appropriate size will also be required:

- (1) Check that the circlip on the end of the probe tube is securely located so that the float is unable to fall off into the tank.
- (2) The floats must be pushed onto the probe tube with the marking "TOP" facing the sensor head.
- (3) Use a hexagon socket key (5 mm) to loosen the locking screw and stuffing box (SW 30, SW = spanner width) so that the screw-in unit can be moved easily on the probe tube.
- (4) Provide the screw-in unit with suitable sealing material and then screw it into the tank pipe coupling together with the VISY-Stick.
- (5) Press the probe tube gently onto the bottom of the tank and then lift it 5 to 10 mm to incorporate an appropriate safety distance. To secure the probe tube, first tighten the stuffing box and then the locking screw.



**If there is no safety distance between the probe tube and the bottom of the tank, the tube could be bent and damaged by the tightening process.**

- (6) Connect earthing and equipotential bonding cables to the exterior earth terminal.
- (7) Connect the supplied M12 connection cable to the VISY-Stick. First tighten the union nut of the M12 connector by hand and then tighten it further through 180° using a spanner. The tightening torque should be in the range of 100 ... 150 Ncm.



*A 1" installation kit is also available as an option. This installation kit consists of product and water floats and a screw-in unit. It makes possible the installation of a VISY-Stick using an R1 threaded sleeve.*

### 3.4.3 Pipe installation (riser)

The usual pipe installation (riser) is made with 3" or 4" pipes (the diameter of the pipes must be at least 2" cast or 2.5" welded) The VISY-Stick for risers (see Figure 10) is installed as follows:

- (1) Check that the circlip on the end of the probe is securely located so that the float is unable to fall off into the tank.
- (2) The floats must be pushed onto the probe tube with the marking "TOP" facing the sensor head.
- (3) Pull the riser installation kit (article no. 900074) for centering the sensor head of the VISY-Stick in the installation tube over the sensor head and adapt to the pipe if required.
- (4) Connect earthing and equipotential bonding cables to the exterior earth terminal.
- (5) Connect the supplied M12 connection cable to the VISY-Stick. First tighten the union nut of the M12 connector by hand and then tighten it further through 180° using a spanner. The tightening torque should be in the range of 100 ... 150 Ncm.
- (6) Let the VISY-Stick probe slowly slide into the riser and place carefully on the bottom of the tank.
- (7) Install a suitable cable grommet in the sealing cap of the pipe (riser) and guide the M12 connection cable and the equipotential bonding cable through it.



*If the riser protrudes into the tank, a coaxial arrangement must be employed inside the pipe during installation of the VISY-Stick probe. The float must be able to move freely and must not come into contact with the pipe.*

### 3.4.4 Installing VISY-Stick N and VISY-Stick LPG without installation kit

As section 3.4.2, but the cutting ring coupling is loosened and retightened.

### 3.4.5 Replacement instructions

After replacing the VISY-Stick probe, the following values must be entered again using VISY-Setup:

- The device number of the new VISY-Stick probe
- Check the installation offset value and correct as necessary

### 3.4.6 Installation kit for VISY-Stick Sump

An installation kit (art. no.: 910036) is available for securing the VISY-Stick Sump.

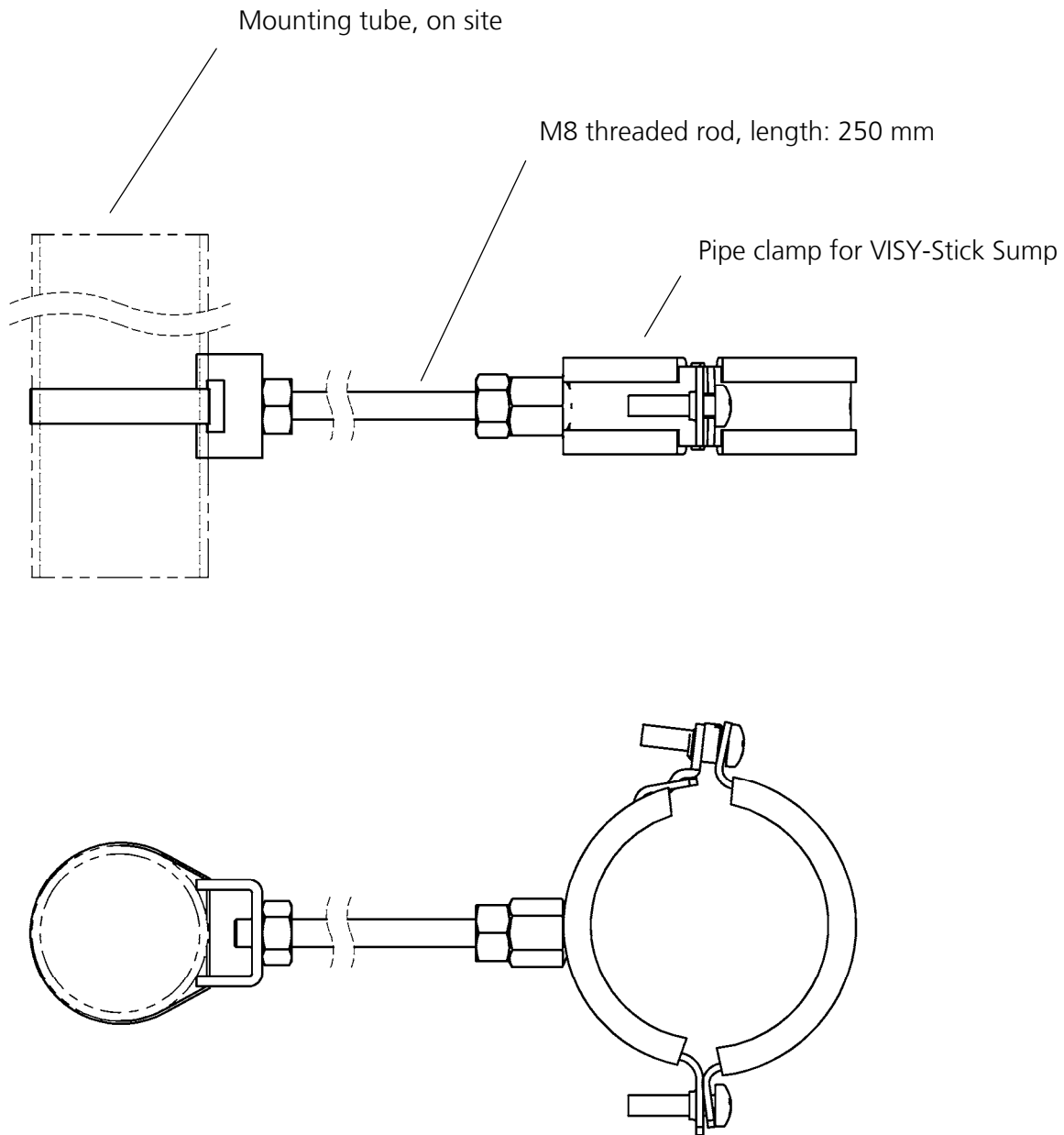


Figure 11: Installation kit for VISY-Stick Sump

### 3.4.7 Installation kit for liquefied petroleum gas (LPG)

The optional LPG installation kit (art. no.: 910019) comprises a jacketed pipe with flange and a special float. After installing the LPG installation kit in the tank, the VISY-Stick LPG probe (without float) is inserted into the jacketed pipe and screwed tight. The probe is located outside the pressurised zone of the tank. This makes it possible to replace the probe at any time without having to open the tank. The materials used are stainless steel, while the float is made from buna.

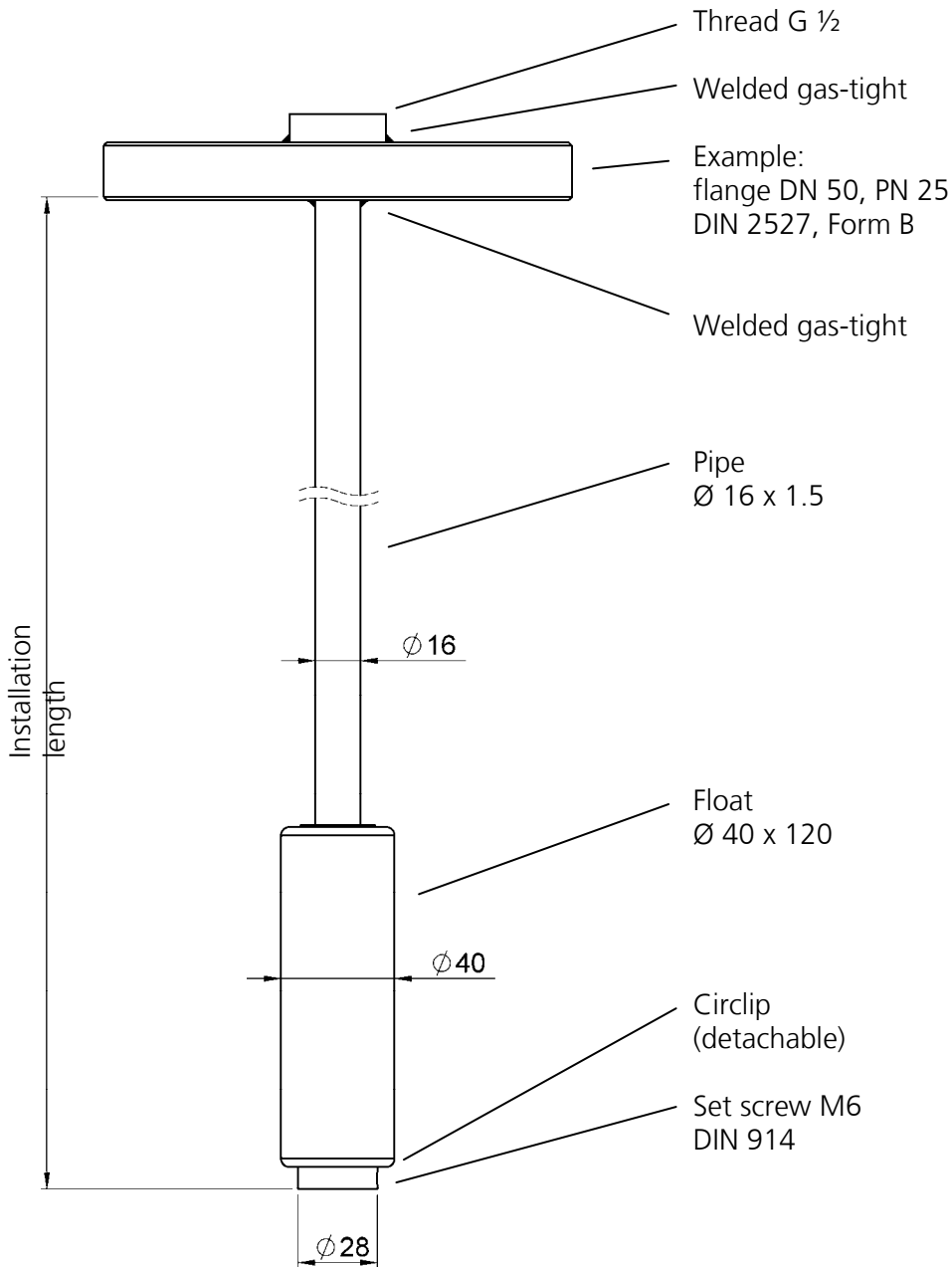


Figure 12: LPG installation kit

Dimensions in mm

### 3.4.8 1" installation kit

The optional 1" installation kit (art. no.: 908484) makes possible the installation of a VISY-Stick probe using an R1 threaded sleeve.

**⚠ The 1" installation kit is not suitable for biodiesel**

The installation kit consists of a 1" screw-in unit, a 1" product float and a 1" water float. A stainless-steel version of the screw-in unit is available as an option.

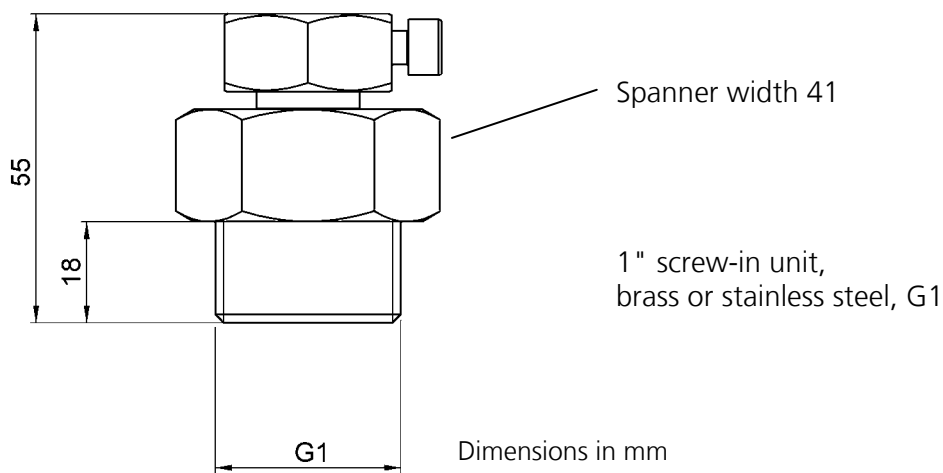


Figure 13: Screw-in unit

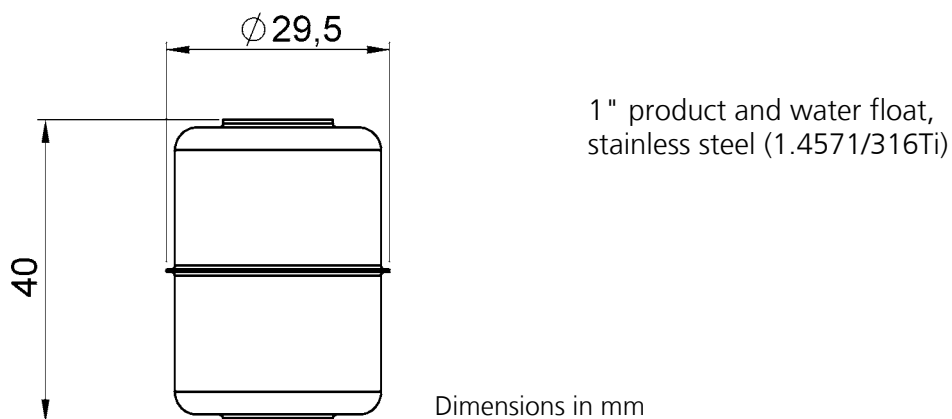


Figure 14: Product and water floats

### 3.4.9 Installation offset

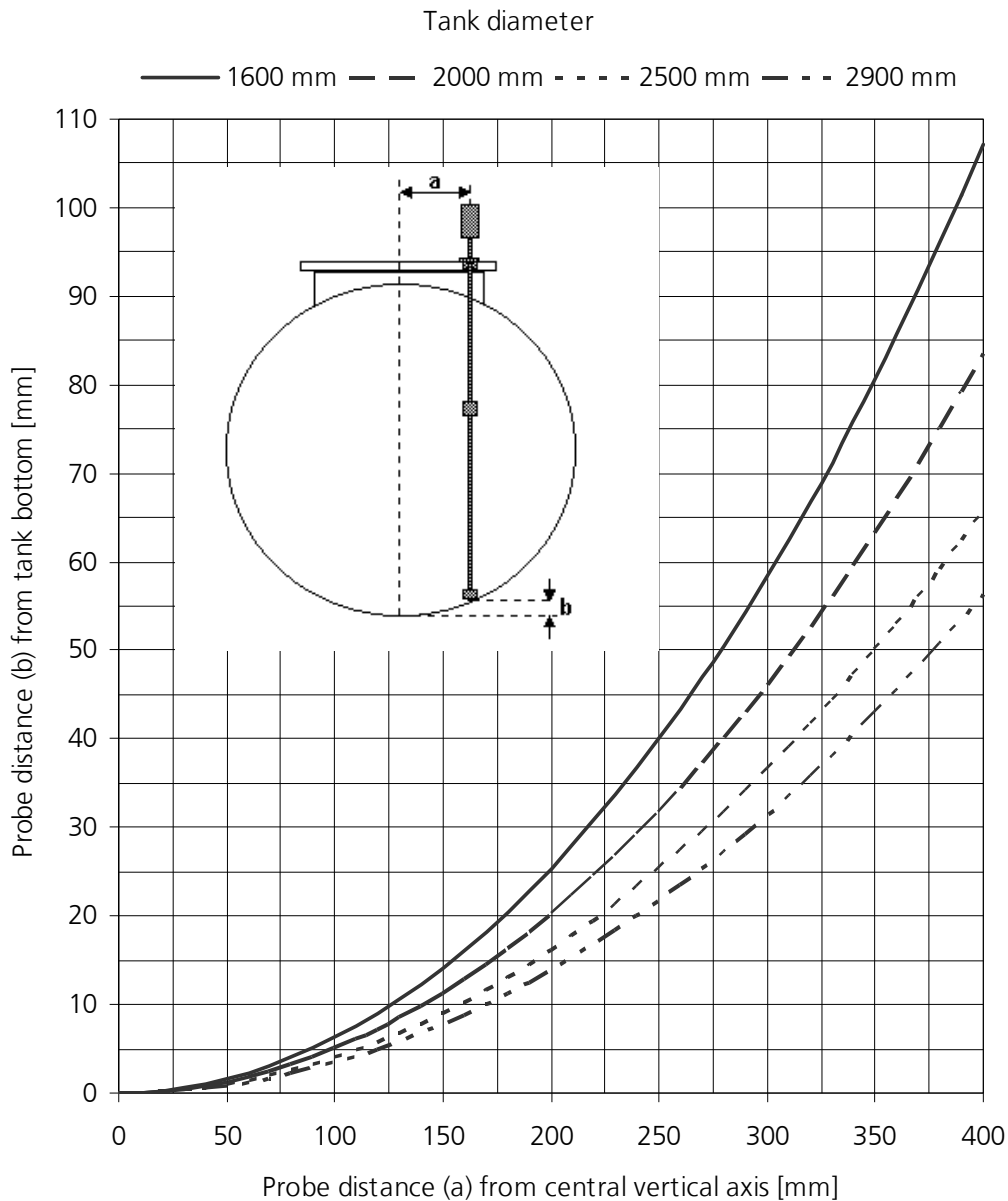


Figure 15: Installation offset

The VISY-Sticks are installed vertically in the tanks as close as possible to the central vertical axis. Afterwards, it will be necessary to configure the respective positions of the probes in VISY-Command using the installation offset. The offset is equal to probe distance (b) (see Figure 15) plus the probe tube safety distance set during installation. The installation offset is transmitted to VISY-Command during configuration of the individual measuring points using the VISY-Setup software application.

Figure 15 shows probe distance (b) from the lowest point on the tank bottom for cylindrical tanks conforming to DIN 6608, 6616, 6617, and 6624 depending on probe distance (a) from the central vertical axis when the probe is in contact with the tank wall.

### 3.5 Electrical connection

Always ensure that the power has been disconnected before you wire up the VISY-Stick probes to the VISY-Command control unit. Proceed as follows:

- If not already connected, slot the coupling of the supplied connection cable onto the M12 connector of the sensor head. First tighten the union nut of the M12 connector by hand and then tighten the nut further through 180° using an open-ended spanner. The tightening torque should be in the range of 100 ... 150 Ncm.
- Connect the cable routed to the manhole (originating from VISY-Command) with the connection cable, e.g. using an installation sleeve. Pin assignment as follows:

Pin 1	brown	+
Pin 2	white	A
Pin 3	blue	-
Pin 4	black	B

Table 3: Pin assignment for the connector on the sensor head

The connection cable between the VISY-Stick and VISY-Command must have the following properties:

- Four-core unshielded cable, oil-resistant
- Line cross section (4 x 0.5 mm<sup>2</sup> up to 100 m and 4 x 1.0 mm<sup>2</sup> up to 200 m)
- All blue or with blue markings (cable for intrinsically safe electrical circuits)
- Maximum diameter 6–10 mm for reliable sealing by the cable gland in VISY-Command.



**The earthing or equipotential bonding must be carried out by the installer in accordance with the national installation regulations applicable in each case. The earth connector of the sensor head can be used for earthing or equipotential bonding requirements.**



**Please comply with general installation regulations concerning equipotential bonding.**

#### 3.5.1 Voltage surge protection

To protect the VISY-Stick probes from voltage surges, we recommend that you install the BA 350 Duo voltage surge protector directly upstream of the probe in the manhole or in the dispenser sump. The BA 350 Duo voltage surge protector can be installed between the supplied cable with the M12 coupling and the on-site cable routed to the VISY-Command (art. no. 903313).

## 4 VISY-Command

The full VISY-Command designation depends on the quantity of possible probe terminals (2, 4, 8 or 16: wired version) or the transmission technology (RF: wireless version):

- VISY-Command 2, ...4, ...8, or ...16 is the wired standard version (e.g. VISY-Command 2 for the connection of two VISY-Stick probes)
- VISY-Command RF is the wireless version (radio system) for connecting up to 16 VISY-Stick probes

### 4.1 Design and mode of operation

#### 4.1.1 VISY-Command – wired version (standard)

The wired version (standard) of VISY-Command has either 2, 4, 8, or 16 probe terminals.

At each probe terminal, it is possible to connect up to a total of three **different types of probe** (e.g. one VISY-Stick, one VISY-Stick Interstitial and one VISY-Stick Sump) for parallel operation. These three types of probe can be connected to each other directly at the measuring point. This means that only one cable (four-core) is required for connection to VISY-Command.



*Three different types of probe can be connected to the VISY-Command control unit by a single cable (four-core).*



*Connecting multiple probes of the same type (e.g. 3 x VISY-Sticks) to the same probe terminal is not permitted.*

The VISY-Command control unit comprises a VI-... interface card and one or two VP-... measuring transmitters installed in a control cabinet with IP 55 protection rating. One VP-... measuring transmitter is installed in VISY-Command 2, 4, or 8; two VP-... measuring transmitters are installed in VISY-Command 16.

The VISY-Sticks are supplied with power by VISY-Command. VISY-Command receives the measured values, stores these data temporarily and makes the data available to a higher level system (e.g. central computer). Communication runs via a serial interface, either the RS-232 or RS-485. For the transmission of data to the petrol station computers, a range of protocols is available.

The IFSF/LON and Ethernet interfaces are available as an option.

- Technical documentation IFSF-LON interface converter (English), Art.-No. 207092

- Technical documentation STEC-1 Ethernet interface converter (English), Art.-No. 207142

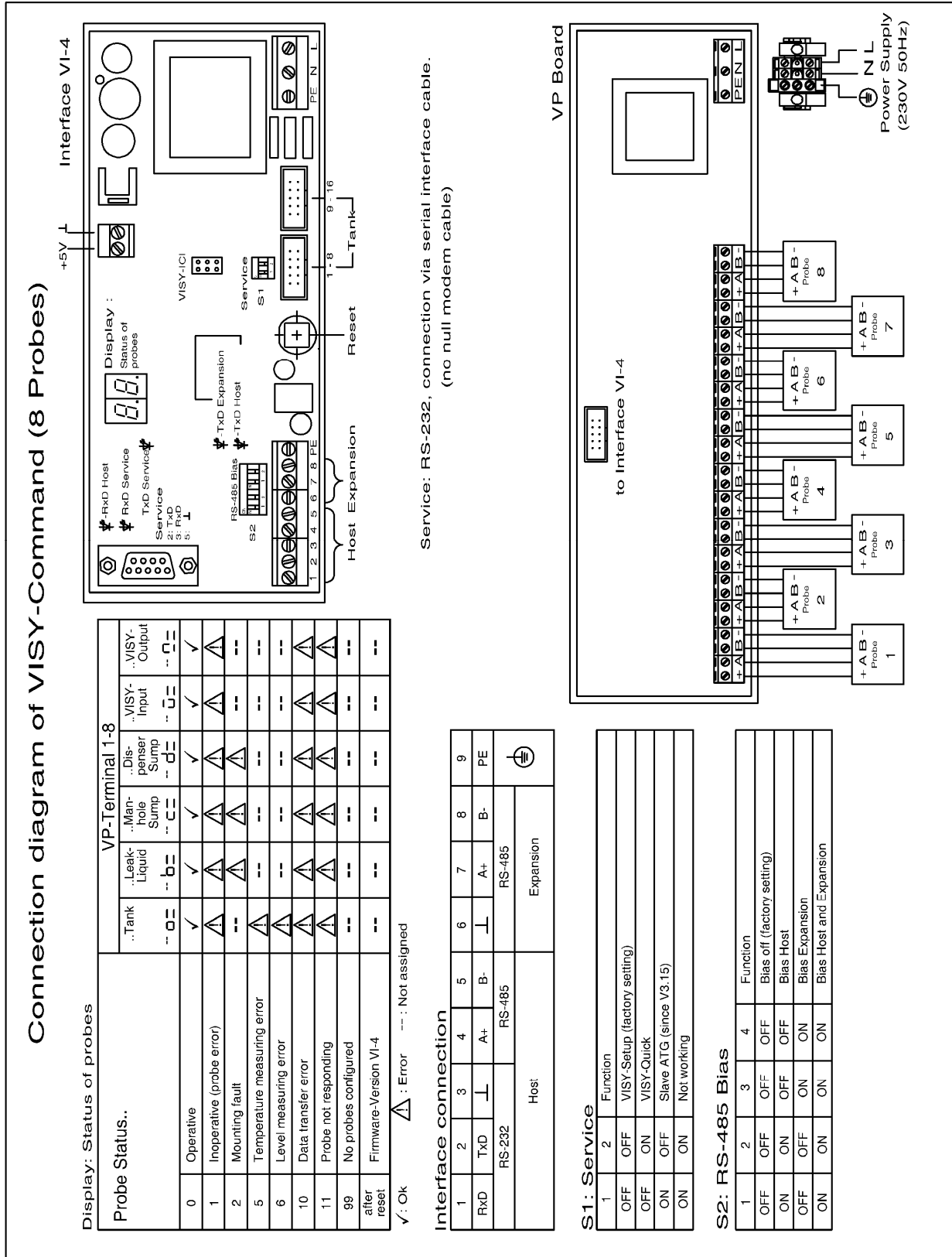


Figure 16: Terminal diagram for VISY-Command 8

#### 4.1.2 VISY-Command RF – wireless version (radio system)

With the wireless version (radio system), each VISY-Stick probe is connected to a VISY-RFT radio transmitter, which transfers the measuring data to the VISY-Command RF system.

Up to 16 VISY-Stick probes can be operated using VISY-Command RF. Each VISY-Stick is supplied with power by a battery in the VISY-RFT transmitter.



*For improved wireless communication, VISY-Command RF should be equipped with two reception aerials.*



**The VISY-RFT transmitter must not be operated without an aerial.**

VISY-Command RF comprises a VI-... interface card and an RF receiver PCB installed in a control cabinet with index of protection IP 55. The data received from VISY-Command RF are evaluated, stored temporarily and made available to a higher level system (e.g. central computer). Communication runs via a serial interface, either the RS-232 or RS-485. For the transmission of data to the petrol station computers, a range of protocols is available.

The IFSF/LON and Ethernet interfaces are available as an option. See also point 4.1.1 for the operating instructions.



*If the wireless version (radio system) is used at the petrol station, varying reception conditions must be anticipated as a result of the heavy passenger car or lorry traffic encountered there. This could, under certain circumstances, cause data reception in the VISY-Command to fail for some time and tank data would not always be updated at the set transmission intervals. Delivery data could be lost.*

The installation of the radio system is a complex installation procedure and is described in detail in the "VISY-RF radio system" manual.

- Technical documentation VISY-RF wireless system (English) – Art. No. 207116

## Connection diagram of VISY-Command RF

**Display: Status of probes**

Probe Status..	..Tank
0	Operative
1	Inoperative (probe error)
2	Mounting fault
5	Temperature measuring error
6	Level measuring error
8	RFT probe data error
9	RFT probe data missing
10	Data transfer error
11	Probe not responding
13	Waiting for first data
99	No probes configured
after reset	Firmware-Version VI-4

✓ : Ok    ⚠ : Error    -- : Not assigned

**Interface connection**

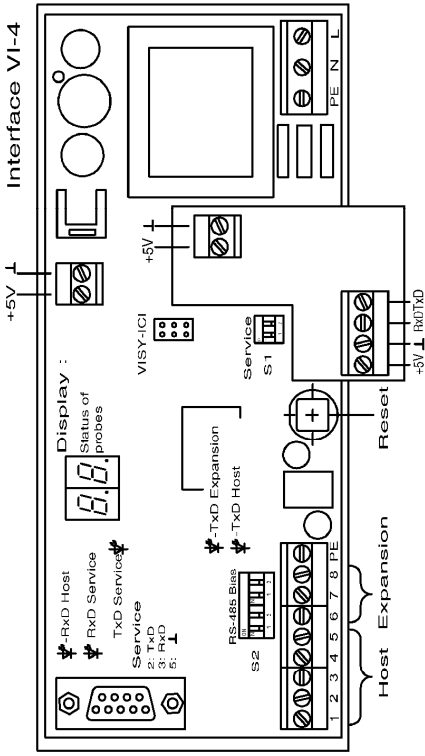
1	2	3	4	5	6	7	8	9
RxD	TxD	A+	B-	RS-485	RS-485	A+	B-	PE
Host				Expansion				

**S1: Service**

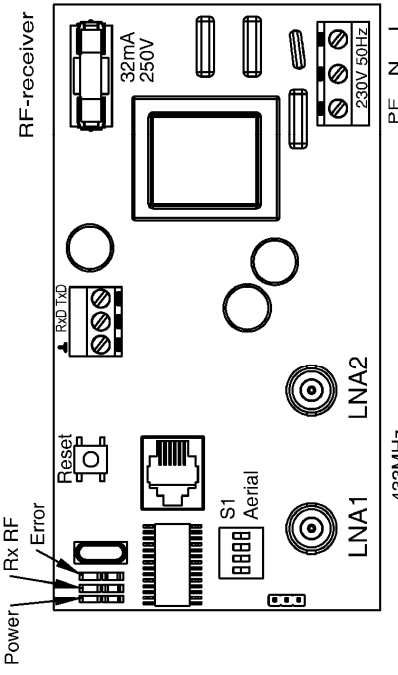
1	2	Function
OFF	OFF	VISY-Setup (factory setting)
OFF	ON	VISY-Quick
ON	OFF	Slave ATG (since V3.15)
ON	ON	Not working

**S2: RS-485 Bias**

1	2	3	4	Function
OFF	OFF	OFF	OFF	Bias off (factory setting)
ON	ON	OFF	OFF	Bias Host
OFF	OFF	ON	ON	Bias Expansion
ON	ON	ON	ON	Bias Host and Expansion



Service: RS-232, connection via serial interface cable. (no null modem cable)



S1 Aerial: not working  
If outside aerials are used, local lightning protection regulations must be observed.







Figure 17: Terminal diagram for VISY-Command RF

## 4.2 VI-... interface card components

### 4.2.1 Status display

After switching on or resetting the VI-... interface card, the firmware version of the interface card is initially shown. This is represented by three numbers which appear one after the other on the display, e.g. 4 – 0 – 1 corresponds to Version 4.01.

If no probe has been configured yet, this sequence is followed by a fixed 99. If probes have been configured, the terminal number (1 to 8 or 1 to 16) for each and every configured terminal of the measuring transmitter is displayed first one after the other and then a letter symbol followed by an equals sign:

-  VISY-Stick fitted in the tank
-  VISY-Stick Interstitial for monitoring the leak-detection fluid level
-  VISY-Stick Sump for monitoring the manhole
-  VISY-Stick Sump for monitoring the dispenser sump
-  VISY Input
-  VISY Output



*In the case of VISY-Command RF, only the status of the VISY-Stick probe is displayed (by the letter "a").*

Finally, the status of the probe is displayed as a digit (see section 4.5 Fault diagnostics).

### 4.2.2 Service interface and DIP switch S1

The serial RS-232 interface (9-pin Sub-D socket) can be used for the connection of three different service applications:

- Configuring VISY-Command using the VISY-Setup software application:  
Interface activated by setting DIP switch positions **S11=OFF** and **S12=OFF**.
- Connection to VISY-Quick (FAFNIR protocol):  
Interface activated by setting DIP switch positions **S11=OFF** and **S12=ON**.
- Connection to an auxiliary measuring system:  
Interface activated by setting DIP switch positions **S11=ON** and **S12=OFF**.

The **green LED (RxD)** on the service interface indicates data coming in through the service interface; the **green LED (TxD)** indicates data going out through the service interface.

### 4.2.3 Host computer

The serial host interface (galvanically isolated) for communication with a higher level system, e.g. petrol station computer or PC, is designed to function as an RS-232 interface or as an RS-485 interface. Depending on requirements, the host computer can be connected to the RS-232 interface or to the RS-485 interface. The data protocol used by the interface is selected with the VISY-Setup software using the input of the host code. The VI-... interface card automatically recognises the interface to which the host computer is connected.



**Simultaneous operation of the RS-232 interface and the RS-485 interface is not possible.**

To improve immunity to interference where the RS-485 interface is being used, it is advisable to use a 3-core cable so that, in addition to terminals A+ and B-, it is also possible to connect the interface earth ( $\perp$  terminal clamp of the host interface) of VISY-Command to the interface earth of the host system (if present in the form of a terminal clamp).

If shielded lines are used, the shield must be placed on the PE connection. Also observe the installation instructions of the device to be connected to the interface. If the shield cannot be fitted on both sides, it is possible to work with a shield fitted to one side of the VISY-Command.



**Do not place the line shield on reference earth ( $\perp$  / GND)**



*Please note that the longer the line length, the greater the probability of equipotential currents flowing through a line shield earthed on both sides. Where necessary, an additional equipotential bonding conductor must be provided between the connected devices in accordance with local rules and regulations.*

#### 4.2.4 Host interface and DIP switch S2

Using DIP switches 2.1 / 2.2 (host interface) or 2.3 / 2.4 (expansion interface), it is possible to bias the RS-485 interfaces accordingly in order to achieve a significant improvement in reliability of communication. Both switches of the respective interface (2.1 AND 2.2 and 2.3 AND 2.4) should be set to the ON position.

In an RS-485 network, only the one bias point is permitted. For this reason, leave the switches in the OFF position if another device is already biasing the network.

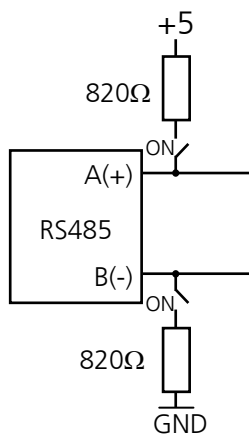


Figure 18: DIP switch S2

The **red Host LED (RxD)** indicates incoming data from the host computer.

The **red Host LED (TxD)** indicates outgoing data to the host computer.

#### 4.2.5 Expansion interface (RS-485)

The expansion interface is a galvanically isolated serial RS-485 port through which data can be transmitted to other system components (e.g. VISY-View if the host interface is busy). This interface is unidirectional. This means that data are only sent from the VISY-Command to the system components connected there. The system components receive the data without having to send a request. This means that, in contrast to bidirectional interfaces, it is possible to connect several system components (e.g. several VISY-Views) to the expansion interface in parallel. Theoretically, up to 31 system components can be connected to this interface.

This interface is deactivated at the factory. It can be activated with the VISY-Setup program. Please refer to the technical documentation supplied with the device being connected to determine whether other settings are required.

If shielded lines are used, the shield must be placed on the PE connection. Also observe the installation instructions of the device to be connected to the interface. If the shield cannot be fitted on both sides, it is possible to work with a shield fitted to one side of the VISY-Command.



**Do not place the line shield on reference earth (⊥ / GND)**



*Please note that the longer the line length, the greater the probability of equipotential currents flowing through a line shield earthed on both sides. Where necessary, an additional equipotential bonding conductor must be provided between the connected devices in accordance with local rules and regulations.*

The **yellow LED (TxD)** of the expansion interface indicates data going out through the expansion interface.

#### 4.2.6 Reset button

This button can be used to effect a reset of the VI-... interface card. All stored settings are retained.

## 4.3 Installation

The VISY-Command control unit must be securely fixed to a wall inside a building. The supply of auxiliary power (electrical connection) requires a permanent installation (no plug assembly) and is made via the bottom right cable entry (grey). Connect the supply voltage to the terminal blocks provided. The VP-... measuring transmitter and the VI-... interface card are already wired at the factory.



**The VISY-Command is not suitable for outdoor installation.**



**When installing/operating the VISY-Command, the requirements of the ExVo and BetrSichV regulations and of equipment safety law must be observed, as must the generally accepted technical regulations and these operating instructions.**

### 4.3.1 VISY-Command – wired version (standard)

Connect up the VISY-Stick probe in the door of the control cabinet according to the connection diagram (see Figure 16: Terminal diagram for VISY-Command 8). For this, use the blue cable glands designed for intrinsically safe electrical circuits.



**The maximum external inductance including the cable must not exceed 40 mH and the maximum capacitance must not exceed 680 nF (see data sheet of the cable used).**

Connect the “Host” terminal with the host computer as shown in the connection diagram.

After connecting the VISY-Stick probes, you can start configuration (see operating instructions for the VISY-Setup configuration program).

### 4.3.2 VISY-Command RF – wireless version (radio system)

The installation of the radio system is a complex installation procedure and is described in detail in the manual:

- Technical documentation VISY-RF radio system (English) – Art. No. 207116

## 4.4 Auxiliary tank content measurement

The VISY-X system is able to expand an existing measuring system and communicate with it in order to retrieve filling level and temperature data. The benefit of this function is the ability to continue using older, already installed tank content measurement systems for which spare parts are no longer available. Normally, a failure of one of the individual probes would mean that the complete system would have to be replaced, including all probes that are still working. The function of the auxiliary tank content measurement allows old tank content measurement components that are still working to remain in use. It is simply a case of replacing the defective probe with a VISY-Stick and then connecting this to VISY-Command. Old probes that are still working remain with the existing control unit. This then no longer supplies data directly to the petrol station computer and to the cash system, but rather to the VISY-Command.

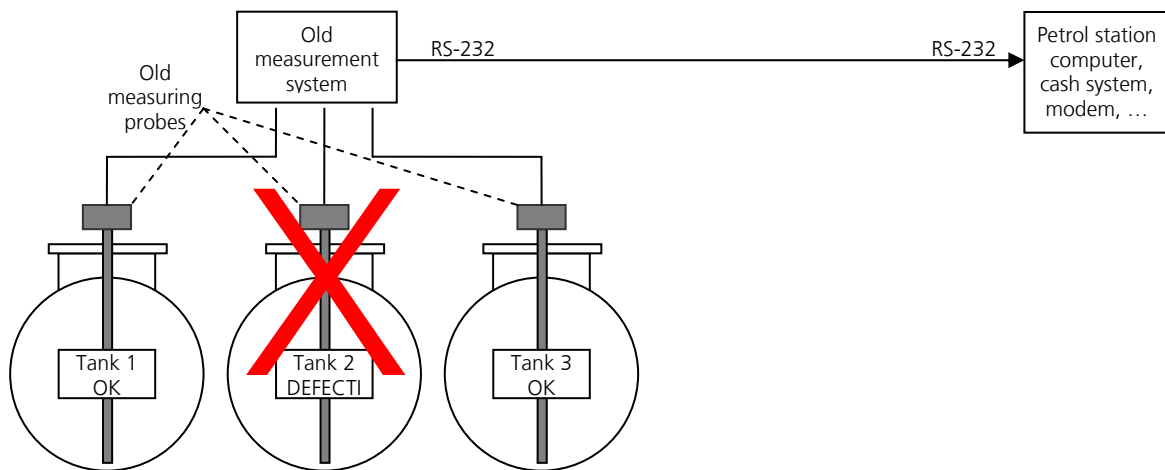


Figure 19: Old tank content measuring system

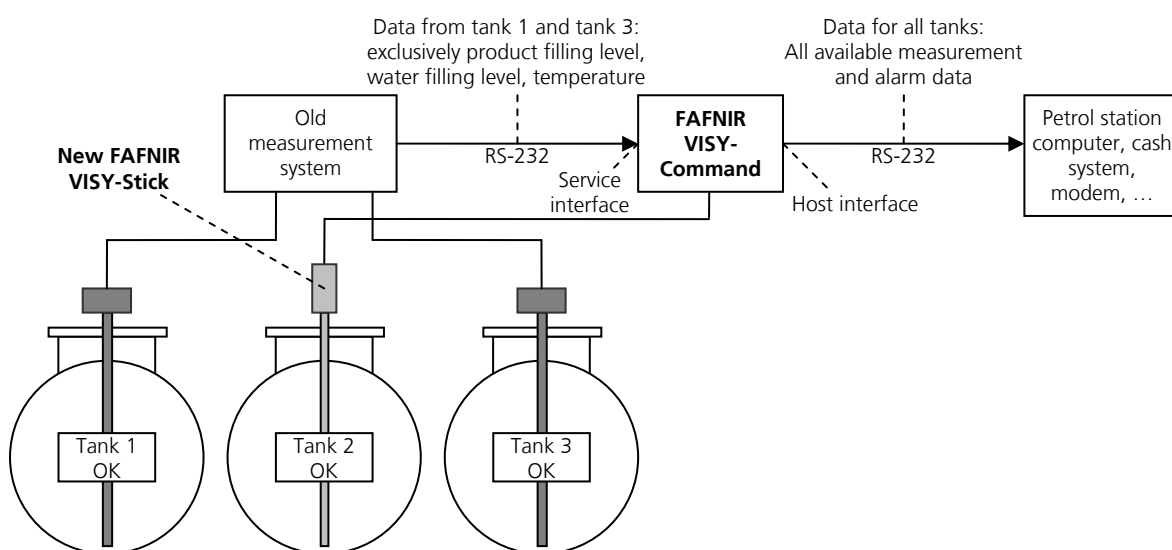


Figure 20: New tank content measuring system

#### 4.4.1 Necessary conditions

The following fundamental conditions must be fulfilled to install and operate an auxiliary tank content measurement system such as the one described in Figure 20 with a VISY-Command system.

- For an installed tank content measurement system to be operated as an auxiliary tank content measurement at the VISY-Command, it must be equipped for data communication via an RS-232 interface that can work in 3-wire mode (RxD, TxD, GND) without control wires (hardware handshake).
- For an installed tank content measurement system to be operated as an auxiliary tank content measurement at the VISY-Command, it must support one of the serial data protocols that are commonly used in the field of petrol stations.
- The serial interface parameters and data protocol used between the tank content measurement system installed and the petrol station computer/cash system must be known and supported by the VISY-X system. If this is not known, the interface parameters and the data protocol can be identified with the aid of the "FAFNIR Serial Monitor" program. This requires technical experience in using serial interfaces and knowledge of the ASCII character set, in particular regarding the control characters.
- The auxiliary tank content measurement system is connected to the service interface of the VISY-Command control unit, ruling out any other special function for the service interface, e.g. for connecting up a modem or ethernet converter. (modem or ethernet converter can only be connected to the host interface.)
- The VI-... interface card in the VISY-Command system must be equipped with firmware version VI-4.01 or a later version for it to work with an auxiliary tank content measurement system. Versions with firmware older than VI-4.01 must be updated to the current firmware version.
- The program VISY-Setup Version V4.00 or later is needed for configuring an auxiliary tank content measurement system in VISY-Command.
- If dip charts and/or alarm settings are stored in the auxiliary tank content measurement system, it must be possible to read these out or off so that they can be transmitted to VISY-Command via VISY-Setup.

#### 4.4.2 Installation

The following additional documentation must be noted during installation:

- VISY-Setup technical documentation
  - FAFNIR Serial Monitor
  - Technical documentation for old tank content measurement system
  - Technical documentation for petrol station computer or cash system
- (1) Install VISY-Stick and VISY-Command as described in Chapter 3.4.

- (2) Configure the VISY-Command control unit with the VISY-Setup configuration software.



*If dip charts and/or alarm thresholds are configured in the auxiliary tank content measurement system, the same settings must be made for VISY-Command with VISY-Setup.*

- (3) Disconnect the RS-232 connection between the petrol station computer or cash system and the old tank content measurement system.
- (4) Using a 3-core cable, set up a new RS-232 connection between the old tank content measurement system and the service interface (9-pin D-Sub socket on the VI-... card) of VISY-Command. To eliminate the need for soldering on a Sub-D connector, a Sub-D-9M adapter (art. no. 115599) featuring terminal clamps is available separately. A cable length of 12 metres should not be exceeded. Screening of VISY-Command is not necessary. If the auxiliary tank content measurement system requires a screened cable, the screening should be located in VISY-Command on the earth point (PE) or directly on the housing earth.

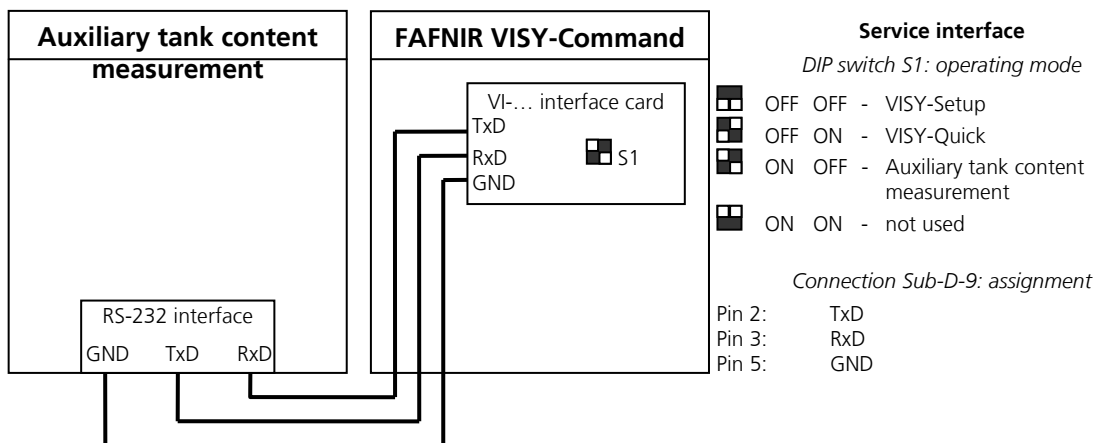


Figure 21: Connection of auxiliary tank content measurement to VISY-Command

- (5) Set the DIP switches on the VI-... interface card to the ON OFF position (see Figure 21). The interface card now starts data interrogation of the auxiliary tank content measurement system. If everything is correctly wired and configured, the data for all tanks should now be available in the petrol station control system or cash system. Delays could arise if the cash system or petrol station control system only occasionally interrogates the tank content measurement system data.
- (6) If you want to check whether data from the auxiliary tank content measurement system has been correctly read by VISY-Command, set the DIP switches back to the OFF / OFF position (service interface mode = VISY-Setup) and connect VISY-Setup to the service interface again. When doing this, make sure that the DIP switches are in the OFF / OFF position before you disconnect the cable to the auxiliary tank content measurement system. By observing this sequence, the data read from the auxiliary tank content measurement system remain in VISY-Command for as long as it has been defined in VISY-Setup, configuration item

“Timeout...”. If you were to disconnect the cable first, VISY-Command would continue trying to interrogate and then delete the data as it would no longer receive a reply (status code: 11).

## 4.5 Fault diagnostics

As soon as configuration has been completed with VISY-Setup, you can monitor the operation of the probes using the status display on the VI-... interface card. The display shows, one after the other, the number of a probes (e.g. 5 = probe on connection 5), an equal sign and the corresponding status (e.g. 0 = in operation). Accordingly, one probe after another is interrogated in a continuous loop operation. The meanings of the status reports are explained in the door of the control unit, see below:

Probe Status..		VP-Terminal 1-8					
		..Tank -- o =	..Leak-Liquid -- b =	..Man-hole Sump -- c =	..Dis-penser Sump -- d =	..VISY-Input -- u =	..VISY-Output -- n =
0	Operative	✓	✓	✓	✓	✓	✓
1	Inoperative (probe error)	⚠	⚠	⚠	⚠	⚠	⚠
2	Mounting fault	--	⚠	⚠	⚠	--	--
5	Temperature measuring error	⚠	--	--	--	--	--
6	Level measuring error	⚠	--	--	--	--	--
10	Data transfer error	⚠	⚠	⚠	⚠	⚠	⚠
11	Probe not responding	⚠	⚠	⚠	⚠	⚠	⚠
99	No probes configured	--	--	--	--	--	--
after reset	Firmware-Version VI-4	--	--	--	--	--	--

✓: Ok      ⚠ : Error      -- : Not assigned

Table 4: Status of probes



*For VISY-Command RF, only the status of the VISY-Stick probes are displayed (column “tank a=“)*

## 4.6 Replacement of components

Only the VI-... interface card or VP-... measuring transmitter can be replaced. These must be replaced as complete assembly groups. The printed circuit boards are mounted on a support rail from which they can be easily detached with a screwdriver.

## 4.7 Technical data for VP-... measuring transmitter

Explosion protection	[EEx ia] IIC
EC type approval certificate	TÜV 98 ATEX 1380
Permissible ambient temperature:	-20 °C to +40 °C
Power supply (terminals L, N, PE)	Alternating voltage 230 V $\pm$ 10%; approx. 2 VA, $U_m = 253$ V Alternating voltage 115 V $\pm$ 10%; approx. 2 VA, $U_m = 126.5$ V Alternating voltage 24 V $\pm$ 10%; approx. 2 VA, $U_m = 33$ V
Sensor circuits (terminals + A B -)	in ignition protection class intrinsic safety EEx ia IIC (linear output characteristic) Maximum values $U_o = 14.3$ V $I_o = 28$ mA $P_o = 98$ mW Maximum permitted external inductance 40 mH Maximum permitted external capacitance 680 nF
Measurement and control circuits (plug connector S1)	Interface electric circuit $U_N = 5$ V Maximum voltage for safety reasons $U_m = 100$ V

Table 5: Technical data for VP-... measuring transmitter

The intrinsically safe sensor circuits are safely galvanically separated from the supply circuit (power supply) up to a peak rated voltage value of 375 V. The measurement and control circuits are safely galvanically separated up to a peak rated voltage value of 190 V.

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## 7 Appendix



### EG – Konformitätserklärung EC – Declaration of Conformity

In Übereinstimmung mit EN 45 014; 1998 - *In accordance with EN 45 014; 1998*

FAFNIR GmbH  
Bahrenfelder Str. 19  
D-22765 Hamburg

erklärt in eigener Verantwortlichkeit, dass das Produkt  
*declare under sole responsibility that the product*

Magnetostriktiver Füllstandmesser  
*Magnetostrictive Tank Level Gauge*

FAFNIR VISY-Stick

in Übereinstimmung mit nachfolgenden Richtlinien:  
*in accordance with the following directives:*

EMV-Richtlinie; *EMC Directive 89/336/EWG/EEC*  
Ex-Richtlinie; *Ex Directive 94/9/EG/EC*

nach folgenden Vorschriften (Normen) entwickelt und gefertigt wurden:  
*has been designed and manufactured to the following specifications:*

EN 50 014; 1997                      EN 61 000-4-3; 1999  
EN 50 020; 1994                      EN 50 284; 1999  
EN 50 081-1; 1992  
EN 50 082-2; 1995

Das Produkt entspricht der EG-Baumusterprüfbescheinigung  
*The above mentioned product is in conformity with EC-Type Examination Certificate*

TÜV 99 ATEX 1496

Die Prüfung erfolgte durch die benannte Stelle Nr.: 0032  
*The inspection was carried out by the notified body No 0032*

TÜV NORD CERT GmbH & Co. KG  
TÜV CERT-Certification Body  
Am TÜV 1  
D – 30519 Hannover

Hamburg, 22.09.2003

Ort, Datum / Place, Date

Geschäftsführer / Managing Director: S. Kunter

EG – Konformitätserklärung  
*EC – Declaration of Conformity*

FAFNIR GmbH  
Bahrenfelder Str. 19  
22765 Hamburg

erklärt in eigener Verantwortlichkeit, dass die Produkte  
*declare under sole responsibility that the products*

Messumformer für Füllstandmessgeräte  
*Measuring Transmitter for Tank Level Measuring Devices*

VP-1, VP-2 und VP-4

in Übereinstimmung mit nachfolgenden Richtlinien  
*in accordance with the following directives*

EMV-Richtlinie; EMC Directive 2004/108/EG/EC

Ex-Richtlinie; *Ex Directive 94/9/EG/EC*

und folgenden Vorschriften (Normen) entwickelt und gefertigt wurden  
*and designed and manufactured to the following specifications*

EMV; *EMC:*

EN 55011:2007 + A2:2007 Emission: Klasse B / *Class B*

EN 61326-1:2006 Immission: Industrieumgebung / *Industrial Environment*

Ex:

EN 50014:1997; EN 50020:1994

Die Produkte entsprechen der EG-Baumusterprüfbescheinigung

*The above mentioned products is in conformity with EC-Type Examination Certificate*

TÜV 99 ATEX 1380

Die Prüfung erfolgte durch die benannte Stelle Nr.: 0044

*The inspection was carried out by the notified body No: 0044*

TÜV NORD CERT GmbH & Co. KG

Am TÜV 1

30519 Hannover

Hamburg, 25.02.2010

Ort, Datum / *Place, Date*



Geschäftsführer / *Managing Director: R. Albrecht*

EG – Konformitätserklärung  
*EC – Declaration of Conformity*

FAFNIR GmbH  
Bahrenfelder Str. 19  
22765 Hamburg

erklärt in eigener Verantwortlichkeit, dass das Produkt  
*declare under sole responsibility that the product*

Interface für Füllstandmessgeräte  
*Interface Transmitter for Tank Level Measuring Devices*

VI-4

in Übereinstimmung mit nachfolgenden Richtlinien  
*in accordance with the following directives*

EMV-Richtlinie; *EMC Directive 2004/108/EG/EC*

Niederspannungsrichtlinie; *Low Voltage Directive 2006/95/EG/EC*

und folgenden Vorschriften (Normen) entwickelt und gefertigt wurden  
*and designed and manufactured to the following specifications*

EMV; *EMC:*

EN 55011:2007 + A2:2007 Emission: Klasse B / *Class B*

EN 61326-1:2006 Immission: Industrieumgebung / *Industrial Environment*

NSR; *LVD:*

EN 61326-1

Hamburg, 25.02.2010

Ort, Datum / *Place, Date*



Geschäftsführer / *Managing Director*: R. Albrecht



Translation

(1) **EC TYPE-EXAMINATION CERTIFICATE**

(2) Equipment or Protective System intended for use in potentially explosive atmospheres - **Directive 94/9/EC**



(3) EC-Type Examination Certificate Number

**TÜV 99 ATEX 1496**

(4) Equipment: Magnetostrictive Tank Level Gauge VISY-Stick

(5) Manufacturer: Fafnir GmbH

(6) Address: Bahrenfelder Strasse 19  
D – 22765 Hamburg

(7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The TÜV Hannover/Sachsen-Anhalt e.V., TÜV CERT-Certification Body, notified body number N° 0032 in accordance with Article 9 of the Council Directive of the EC of March 23, 1994 (94/9/EC), certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential report N° 99/PX22990.

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

**EN 50 014: 1997**

**EN 50 020: 1994**

**EN 50284:1997**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type examination certificate relates only to the design and construction of the specified equipment or protective system according to Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and placing on the market of this equipment or protective system.

(12) The marking of the equipment or protective system must include the following:

 II 1/2 G EEx ia IIC T6

TÜV Hannover/Sachsen-Anhalt e.V.  
TÜV CERT-Zertifizierungsstelle  
Am TÜV 1  
D-30519 Hannover

Hannover, 30.11.1999

Head of the  
Certification Body





## SCHEDULE

(13)

(14) **EC-TYPE EXAMINATION CERTIFICATE N° TÜV 99 ATEX 1496**

(15) Description of equipment

The Magnetostrictive Tank Level Gauge VISY-Stick is used for the detection of filling levels in hazardous explosive areas.

In the area of the category 1 (Zone 0) it is only allowed to arrange the sensor pipe and the floaters.

The maximal permissible ambient temperature has to be taken from the following table:

	T6	T5	T4
max. ambient temperature	50 °C	65 °C	75 °C

### Electrical data

Signal- and supply circuit ..... in type of protection „Intrinsic Safety“ EEx ia IIC  
(terminals +, A, B, -) only for the connection to certified intrinsically safe  
circuits with the following maximum values:

$$\begin{aligned}U_i &= 15 \text{ V} \\I_i &= 30 \text{ mA} \\P_i &= 100 \text{ mW}\end{aligned}$$

The maximum effective internal inductance is 0,1 mH.  
The maximum effective internal capacitance is 10 nF.

(16) Test documents consisting of 10 sheets, drawings and part list are listed in the test report.

(17) Special conditions for safe use

none

(18) Essential Health and Safety Requirements

no additional ones

Translation



**1. SUPPLEMENT to**

**EC TYPE-EXAMINATION CERTIFICATE No. TÜV 99 ATEX 1496**

of the company: FAFNIR GmbH  
Bahrenfelder Strasse 19  
D-22765 Hamburg

In the future, the Magnetostrictive Tank Level Gauge VISY-Stick may also be manufactured and operated according to the test documents listed in the test report.

The amendments concern the mechanical design of the device. Moreover the marking and the ambient temperature has been supplemented.

In the case of the erection of the complete tank level gauge in areas that require apparatus of category 1 the marking is: II 1 G EEx ia IIC T4.

The maximum permissible ambient temperature is +60 °C in this case.

The electrical data and all other data apply unchanged.

Test documents are listed in the test report N° 02YEX133817.

TÜV Hannover/Sachsen-Anhalt e.V.  
TÜV CERT-Zertifizierungsstelle  
Am TÜV 1  
D-30519 Hannover

Hannover, 2002-02-13

A handwritten signature in black ink, appearing to read 'Strobel'.

Head of the  
Certification Body

Translation

2. SUPPLEMENT to

EC TYPE-EXAMINATION CERTIFICATE No. TÜV 99 ATEX 1496

Test object: **Filling level sensor VISY-Stick**  
Client: **FAFNIR GmbH**  
Address: **Bahrenfelder Straße 19**  
**D-22765 Hamburg**

Alterations:

In the future the filling level sensor VISY-Stick may also be manufactured and operated according to the test documents listed in the test report.

The modifications refer to the mechanical construction of the item. Further the electrical data have been changed. From now on they read:

Signal and Supply Circuit: in ignition protection type intrinsic safety EEx ia IIB/IIC  
only for connection to a certified intrinsically safe electric circuit  
with the following maximum values:  
maximum values:  $U_i = 15\text{ V}$   
 $I_i = 60\text{ mA}$   
 $P_i = 100\text{ mW}$   
 $C_i = 10\text{ nF}$   
 $L_i = 0,1\text{ mH}$

All further information also applies in unaltered form to this supplement.

The test object, including this 2. supplement, also fulfils the requirements of the following standards:

**EN 50 014:1997+A1+A2**      **EN 50 020:2002**      **EN 50 284:1999**

(16) Test documents are listed in the test report N° 06 YEX 333058-1.

(17) Special conditions for safe use

none

## 2. Supplement to EC Type-Examination Certificate No. TÜV 99 ATEX 1496

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(18) Essential Health and Safety Requirements

no additional ones

TÜV NORD CERT GmbH & Co. KG  
Am TÜV 1  
D-30519 Hannover  
Tel.: +49 (0) 511 986-1455  
Fax: +49 (0) 511 986-1590

Hanover, 2006-03-23

A handwritten signature in black ink, appearing to read "K. F. W. Müller".

Head of the  
Certification Body

## 7.4.1 Operating instructions

Edition: 05.2008

### VISY-Stick ... level sensor

#### Mode of operation

The purpose of the level sensor is to provide continuous monitoring of liquid levels. Floats are used for the actual detection of the liquid level. These move up and down the sensor tube.

The sensor operates on the principle of magnetostriction. The float contains a magnet, and a wire made from magnetostrictive material is clamped inside the sensor tube. The magnetic field of the float deforms the wire. A second, temporary magnetic field is produced along the wire by a current pulse. The superposition of both magnetic fields triggers a mechanical wave on the wire. At the end of the wire, inside the sensor head, the mechanical wave is converted into an electrical signal by a piezoceramic transducer. The point of origin of the mechanical wave, and thus the position of the float, is then calculated by measurement of propagation time.

For water detection, a second float is fitted to the sensor tube. This float (magnet) generates a second pulse.

The propagation times of the pulses are measured by a microcontroller inside the sensor head, checked for plausibility and forwarded to an analysis unit in digital form. The temperature of the sensor is transmitted at the same time. The power supply for the level sensors is supplied by the VISY-VP ... control unit, which is also responsible for forwarding measuring data to the superordinate analysis system. The sensor has a four-line connection.

#### System versions

A number of system versions exist. The electrical connection is provided by an M12 plug-in connection. The VISY-Stick Raiser version is installed in a pipe with no process connection.

The VISY-Stick-Advanced level sensor is equipped with special floats and a series of temperature sensors integrated into the sensor tube. It is used for extremely precise level measurements.

The VISY-Stick-Sump version is suitable for use in either the manhole or in the dispenser sump. In both cases, it is used to trigger an alarm in the presence of product and/or water. To avoid the build-up of static charge on plastic parts, it must be ensured that any significant flow of non-conductive liquids cannot occur and that plastic parts are only ever cleaned using a damp cloth.

## Use of plastic floats in zone 0

### Special conditions

If plastic floats are used in zone 0, the risk of static charge must be prevented. Attention to these special conditions is drawn by a sign supplied with each float. This sign must be affixed to the sensor in a visible position and a note to the same effect made on the type plate.

**Caution**

**Plastic float**

**The risk of static electricity must be prevented.**

- The use of the float in non-conductive, powerfully flowing liquids is prohibited.
  - The tank must not contain an agitator.
- The float must be cleaned using a wet cloth only, never a dry cloth.
- Avoid exposing the float to friction against non-conductive components.

## Use of VISY-Stick-Sump ... in explosion-risk areas

### Special conditions

The VISY-Stick-Sump ... must be set up in such a way that any significant flow of non-conductive liquids cannot occur. Plastic parts must be cleaned using a wet cloth only, never a dry cloth. Attention to these special conditions is drawn by a sign or by the conduit itself.

**Caution**

**Plastic parts**

**The risk of static electricity must be prevented.**

- Use in non-conductive, powerfully flowing liquids is prohibited.
- Plastic parts must be cleaned using a wet cloth only, never a dry cloth.
- Avoid exposing the float to friction against non-conductive components.

## Technical data

Voltage	$U_i \leq 15 \text{ V DC}$
Current	$I_i \leq 60 \text{ mA}$
Power input	$P_i \leq 0.1 \text{ W}$
Inductance (effective external):	$L_i < 0.1 \text{ mH}$
Capacitance (effective external):	$C_i < 10 \text{ nF}$
Type of protection	II 1 G EEx ia IIC T4 or II 1/2 G EEx ia IIC T6
Index of protection	IP 68

## Field of application

The maximum permissible ambient temperature is specified in the following table:

### Category 1/2

Temperature class	$T_{\text{ambient}}$	$T_{\text{liquid}}$
T6	-20 °C to +50 °C	to 60 °C
T5	-20 °C to +65 °C	to 60 °C
T4	-20 °C to +75 °C	to 60 °C

### Category 1

Temperature class	$T_{\text{ambient}}$	$T_{\text{liquid}}$
T4	-20 °C to +60 °C	to 60 °C

## Installation

All wiring operations must be carried out with the power disconnected. The special rules and regulations of the German Association for Electrical, Electronic and Information Technologies (VDE) (or equivalent bodies) and local building regulations must be observed. The level sensor is connected to the power supply source using a four-core cable (preferably blue in explosion-risk zones). The terminals +, - A and B on the level sensor must be connected to the same terminals on the control unit.

## Operating instructions

The level sensor is generally maintenance-free provided it is operated in accordance with its intended purpose.

Before commissioning, all devices must be checked to determine that they are correctly connected and working properly. The power supply, including that of downstream devices, must also be checked.

The general operating and safety instructions for the devices used must be observed.



Translation

**EC TYPE-EXAMINATION CERTIFICATE**

(1)

(2) Equipment or Protective System intended for use in potentially explosive atmospheres - **Directive 94/9/EC**



(3) EC-Type Examination Certificate Number

**TÜV 98 ATEX 1380**

(4) Equipment: Measuring Transmitter for Tank Level Measuring Devices type VP-1

(5) Manufacturer: Fafnir GmbH

(6) Address: Bahrenfelder Strasse 19  
D - 22765 Hamburg

(7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The TÜV Hannover/Sachsen-Anhalt e.V., TÜV CERT-Certification Body, notified body number N° 0032 in accordance with Article 9 of the Council Directive of the EC of March 23, 1994 (94/9/EC), certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential report N° 98/PX31280.

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

**EN 50 014: 1997**

**EN 50 020: 1994**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type examination certificate relates only to the design and construction of the specified equipment or protective system according to Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and placing on the market of this equipment or protective system.

(12) The marking of the equipment or protective system must include the following:

II (1) G [EEx ia] IIC

TÜV Hannover/Sachsen-Anhalt e.V.  
TÜV CERT-Zertifizierungsstelle  
Am TÜV 1  
D-30519 Hannover

Hanover, 15.12.1998

Head of the  
Certification Body



AP/CERTNORD 10.98

This certificate may only be reproduced without any change, schedule included.  
Excerpts or changes shall be allowed by the TÜV Hannover/Sachsen-Anhalt e.V.

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## SCHEDULE

(13)

(14) **EC-TYPE EXAMINATION CERTIFICATE N° TÜV 98 ATEX 1380**

(15) Description of equipment

The measuring transmitter is an associated apparatus which is used for the transmission of electrical signals of up to eight sensors from the hazardous explosive area to the non hazardous explosive area. It is designed as a module of a tank level measuring system.

### Electrical data

Supply circuit  
(terminals L, N and SL)

alternating voltage:  $230\text{ V} \pm 10\%$ ; about 2 VA,  $U_m = 253\text{ V}$   
resp.

alternating voltage:  $24\text{ V} \pm 10\%$ ; about 2 VA,  $U_m = 33\text{ V}$

Sensor circuit(s)  
(terminals

in type of protection „Intrinsic Safety“ EEx ia IIC

1A, 1B, 1+ and 1- resp.  
2A, 2B, 2+ and 2- resp.  
3A, 3B, 3+ and 3- resp.  
4A, 4B, 4+ and 4- resp.  
5A, 5B, 5+ and 5- resp.  
6A, 6B, 6+ and 6- resp.  
7A, 7B, 7+ and 7- resp.  
8A, 8B, 8+ and 8-)

maximum values:  $U_o = 14,3\text{ V}$   
 $I_o = 28\text{ mA}$   
 $P_o = 98\text{ mW}$

characteristic line: linear

The effective internal inductances and capacitances are negligibly small.

maximum effective external inductance 40 mH  
maximum effective external capacitance 0,68  $\mu\text{F}$

Measuring- and control circuits  $U \leq 100\text{ V}$ ,  $U_m = 100\text{ V}$

(16) Test documents consisting of description (7 sheets) and drawings (4 sheets) are listed in the test report.

(17) Special conditions for safe use

none

(18) Essential Health and Safety Requirements

no additional ones



Translation

## 1. SUPPLEMENT to

### EC-Type Examination Certificate No. TÜV 98 ATEX 1380

of the company: FAFNIR GmbH  
Bahrenfelder Strasse 19  
D-22765 Hamburg

In the future, the Measuring Transmitter for Tank Level Measuring Divices type VP-\* may also be manufactured in the following variations

type VP-1 (maximal 8 sensors)  
type VP-2 (maximal 2 sensors)  
type VP-4 (maximal 4 sensors)

according to the test documents listed in the test report. The modifications refer to the inner structure of the device. The variations differ in the number of maximal sensors.

#### Electrical data

The intrinsically safe sensor circuits are safely galvanically separated from the supply circuit (terminals L, N, SL) up to a peak crest value of the voltage of 375 V and from the measuring- and control circuits (connector S1) up to a peak crest value of the voltage of 190 V.

All other data and details apply unchanged.

Test documents are listed in the test report No. 01YEX144312.

TÜV Hannover/Sachsen-Anhalt e.V.  
TÜV CERT-Zertifizierungsstelle  
Am TÜV 1  
D-30519 Hannover

Hannover, 21.12.2001

Head of the  
Certification Body



Translation

## 2. SUPPLEMENT to

### EC-Type Examination Certificate No. TÜV 98 ATEX 1380

of the company: FAFNIR GmbH  
Bahrenfelder Strasse 19  
D-22765 Hamburg

In the future, the Measuring Transmitter for Tank Level Measuring Devices type VP-1, VP-2 resp. VP-4 may also be manufactured according to the test documents listed in the test report. The modifications refer to the supply circuit of the Measuring Transmitter, which can also be supplied with an alternating voltage of 115V / 50-60Hz.

#### Electrical data

Supply circuit  
(terminals L, N and SL)

alternating voltage: 230 V  $\pm$  10 %; about 2 VA,  $U_m = 253$  V

resp.

alternating voltage: 115 V  $\pm$  10 %; about 2 VA,  $U_m = 126,5$  V

resp.

alternating voltage: 24 V  $\pm$  10 %; about 2 VA,  $U_m = 33$  V

The intrinsically safe sensor circuits are safely galvanically separated from the supply circuit (terminals L, N, SL) up to a peak crest value of the voltage of 375 V and from the measuring- and control circuits (connector S1) up to a peak crest value of the voltage of 190 V.

All other data and details apply unchanged.

Test documents are listed in the test report No. 02YEX170887.

TÜV NORD CERT GmbH & Co. KG  
TÜV CERT-Zertifizierungsstelle  
Am TÜV 1  
D-30519 Hannover  
Tel.: 0511 986-1470  
Fax: 0511 986-2555

Hannover, 30.05.2002

Head of the  
Certification Body

## 7.5.1 Operating instructions

Edition: 04.2002

### VP-... measuring transmitter

#### Mode of operation

The purpose of the VP-... measuring transmitter is to supply electronic level sensors with power and to forward measuring data to a higher level analysis system.

#### System versions

Three system versions exist. They differ in the quantity of connectable level sensors that they are able to support. Up to eight level sensors can be connected to a VP 1 measuring transmitter, up to two to a VP 2 measuring transmitter, and up to four to a VP 4 measuring transmitter. Each level sensor is connected by four terminal clamps. Two clamps are dedicated to the intrinsically safe power supply, the other two are for the transmission of measuring data. At the same time, the VISY-VP ... measuring transmitter provides a means for the safe separation of intrinsically safe and non-intrinsically safe circuits. The intrinsically safe sensor circuits are galvanically isolated from the auxiliary power supply circuit safely up to a peak of 375 V nominal voltage and from the measuring and control circuits up to a peak voltage of 190 V. The non-intrinsically safe measuring and control circuits are cabled to a common 10-pin connector. This connector establishes the connection with a VISY-VI interface card. The measuring transmitter and the interface form a single unit, VISY-Command, and are integrated into the same housing. The interface connects this unit to a higher level data processing system.

#### Technical data

##### Electrical data

###### Power supply

Voltage 24 V ( $U_m = 33$  V), 115 V ( $U_m = 126.5$  V) and 230 V ( $U_m = 253$  V),  
50 - 60 Hz

Power input  $\leq 2$  VA

Terminals L, N and SL

###### Sensor circuits

intrinsic safety type of protection [EEx ia] IIC  
(linear output curve)

Voltage  $\leq 14.3$  V

Current  $\leq 28$  mA

Power  $\leq 98$  mW

Inductance (external)  $\leq 40$  mH

Capacitance (external)  $\leq 0.68$   $\mu$ F

Type of protection [EEx ia] IIC

Terminals (1A, 1B, 1+, 1-); (2A, 2B, 2+, 2-); (3A, 3B, 3+, 3-); (4A, 4B, 4+, 4-);  
(5A, 5B, 5+, 5-); (6A, 6B, 6+, 6-); (7A, 7B, 7+, 7-); (8A, 8B, 8+, 8-)

###### Measuring and control circuit $U \leq 100$ V

(connector S1) maximum safe voltage  $U_m = 100$  V



The intrinsically safe sensor circuits are galvanically isolated from the auxiliary power supply circuit safely up to a peak of 375 V nominal voltage.

The intrinsically safe sensor circuits are galvanically isolated from the measuring and control circuits safely up to a peak of 190 V nominal voltage.

## Labelling

EC type-approval certificate no. TÜV 98 ATEX 1380

in accordance with EC Directive 94/9:

 0044  II (1) G [EEx ia] IIC

## Field of application

The maximum permissible ambient temperature is 40 °C. The measuring transmitter must be installed in a housing having an index of protection of at least IP 54.

## Installation

All wiring operations must be carried out with the power disconnected. The special rules and regulations of the German Association for Electrical, Electronic and Information Technologies (VDE) (or equivalent bodies) and local building regulations must be observed. The level sensor is connected to the control unit using a four-core cable (preferably blue). The terminals +, - A and B on the level probe must be connected to the same terminals on the control unit. Before commissioning, all devices must be checked to determine that they are correctly connected and working properly. The power supply, including that of downstream devices, must also be checked.