

# VISY-X

## VISY-Stick and VISY-Command (VI-3)



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# 1 Introduction

With the VISY-X system (volume information system), highly precise, continuous filling level measurements in up to 16 tanks are carried out directly at the filling station. The product temperature and the water level on the tank bottom are measured simultaneously.

The system includes one or more VISY-Stick measuring value sensors, the VISY-Command measurement analysis system and the VISY-Setup configuration software.

The robust VISY-Stick measuring value sensor can be installed without difficulty both by means of the screw-in unit with external threads as well as by using a riser installation. 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-Stick measuring value sensors fitted in the tank are linked to the VISY-Command interface system installed in the filling station building.

All parameters are set with a PC (notebook) at the VISY-Command measurement analyser. The parameters for the measuring value sensors and the tanks and, if needed, the measuring tables, 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 measuring value sensors and transmits this on request to a higher-order system (e.g. POS).

In most cases, the data transfer between the VISY-Stick measuring value sensors and the VISY-Command measurement analyser is made by cable. In this case, the power supply of the VISY-Stick measuring value sensor is ensured by the cable.

In cases where there are no more free cable ducts available at the filling station, the radio system (wireless) can be used. In this case, power is supplied to the VISY-Stick measuring value sensors and the VISY-RFT transmitter by a battery. The installation of the radio system is a complex installation procedure and is described in detail in the "VISY-X wireless system" manual.

- Technical documentation for VISY-X wireless system (German) – Art. No. 207115
- Technical documentation for VISY-X wireless system (English) – Art. No. 207116



*If using the radio solution at the filling station, varying reception conditions must be anticipated as a result of the heavy passenger car and 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 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-Sticks and VISY-Command.

These instructions contain a description of all steps needed to install the VISY-Sticks and the VISY-Command system.

The VISY-Command system must be configured by using the VISY-Setup software after installation of the VISY-Sticks and the VISY-Command. Please follow the appropriate instructions in the VISY-Setup instructions.

- Technical Documentation for VISY-Setup (German) – Art. No. 207112
- Technical Documentation for VISY-Setup (English) – Art. No. 207113

## 1.2 Contractor certification requirements

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

## 1.3 Safety precautions

The VISY-X system has been optimised for use at filling stations and may be employed for all conventional fuels. It is used for measuring and evaluating the filling levels in the filling station 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 measuring value sensor and the VISY-Command measurement analyser 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 precautions 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 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 spare parts. These comply with the technical requirements specified by the manufacturer.
- The installation, operation and maintenance of the VISY-Stick measuring value sensor and the VISY-Command measurement analyser must only be carried out by expert, authorised personnel. The VISY-Command measurement analyser may only be installed and serviced by experienced electricians. 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 measurement analyser is not suitable for outdoor installation and not for use in areas subject to explosion hazards. It is only intended for use within the VISY-X system.
- The type VP-1 measuring transducer, and the type VI-... interface included in the VISY-Command measurement analyser must always be undamaged and clean.
- During normal operation, the case cover of the VISY-Command measurement analyser system 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 Components of the VISY-X-System

There are two variants of the VISY-X system which differ in their data transmission technologies, the ...

- ... wired version (standard)
- ... wireless version (radio system)

The different components of the two versions are covered in more detail 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 value sensor – this identical to that of the wireless version
- VISY-Command 2/4/8/16 measurement analyser

### 2.2 Wireless version (radio system)

In cases in which there is no cable link from the VISY-Stick measuring value sensor to the VISY-Command measurement analyser, use can be made of the wireless version of the VISY-X system. In such cases, it is beneficial to install the wireless solution as this involves no excavation work. This version consists of the following components:

- VISY-Stick measuring value sensor – this identical to that of the wired version
- VISY-RFT transmitter
- VISY-Command RF



*If using the radio solution at the filling station, varying reception conditions must be anticipated as a result of the heavy passenger car and 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 updated at the set transmission intervals and that delivery data may, under certain circumstances, be lost.*

### 3 Measuring value sensor VISY-Stick

The VISY-Stick measuring value sensor is identical for the wired version and for the wireless version (radio solution).

We provide the respective, appropriate version of the VISY-Stick for two possible installation methods (the riser installation and the installation in the manhole cover with screw-in unit):

- VISY-Stick V M12 for a pipe installation (riser)
- VISY-STICK M12 for installation in the manhole cover with a screw-in unit, brass R1½" SW 55

#### 3.1 Design and operation

The measuring value sensor consists of the housing (1) and a stainless steel probe tube (2) which is installed in the tank in height-adjustable form using the screw-in unit (3). A float (4) for measuring the product filling level and an additional float (5) for continuous water detection (Figure 1) move on this probe tube.



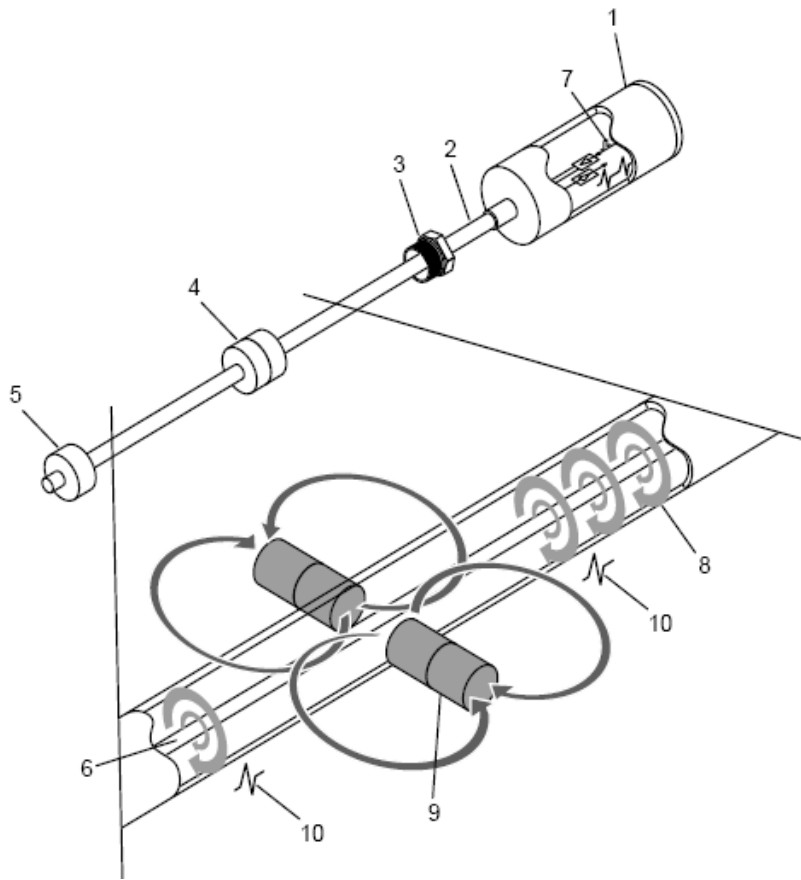
*The screw-in unit (3) is not required for the measuring value sensor for riser installation.*



*A height adjustment is not needed with the pipe installation as the measuring value sensor is on the tank bottom and can move freely within the pipe.*



*The water float must be removed for products with a density greater than 0.9kg/l!*



**Figure 1: Mode of operation of the magnetostrictive measuring principle**

- |                   |                             |                      |
|-------------------|-----------------------------|----------------------|
| 1 – Case          | 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 measuring value sensor 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 probe head is measured and the float position calculated. The position of the water float is calculated by measuring a second pulse.

## 3.2 Installation



**When installing and servicing the VISY-Stick measuring value sensor, the requirements of the expo and BetrSichV regulations 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.**

The VISY-Stick measuring value sensors must only be connected to measuring transducers that have been certified by a recognised European testing authority and the electrical data of which meet the following requirements:

- $U_i \leq 15 \text{ V}$
- $I_i \leq 60 \text{ mA}$
- $P_i \leq 0.1 \text{ W}$

You can connect several VISY-Stick measuring value sensors to the VISY-Command measurement analyser. First of all, however, install the VISY-Stick measuring value sensors in the tanks by positioning the sensors as centrally as possible in the middle of the tank. Height differences between the deepest point of the tank bottom and the end of the probe tube (= installation offset) must be input later in the VISY-Setup configuration program.

Figure 2 shows the height difference for various tank diameters of cylindrical tanks according to DIN 6608, 6616, 6617 and 6624 if the installation is carried out deviating from the longitudinal axis and the probe has direct contact with the tank bottom.



*The value to be input for the installation offset consists of the height difference  $b$  from Figure 2 and the displacement of the probe tube toward the top.*



*During installation, make a note of which measuring value sensor is connected to which port on the VP board. Also write down the corresponding tank and product in which the each measuring value sensor is installed. You will need these data later for the configuration with VISY-Setup.*

Height difference for cylindrical tanks according to DIN 6608, 6616, 6624 deviating from the longitudinal axis.

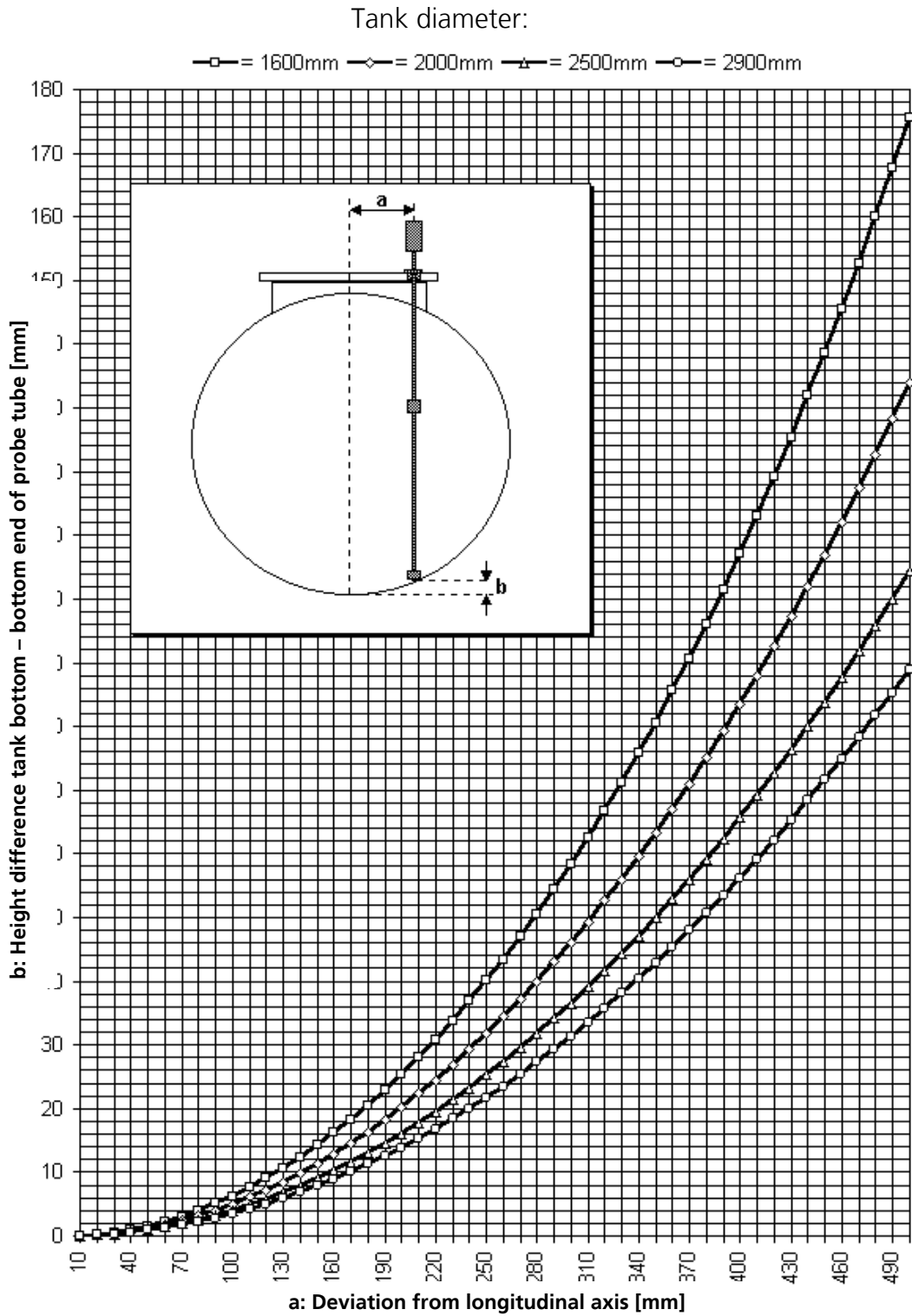


Figure 2: Installation offset for measuring value sensors

### 3.2.1 Tank pipe coupling $\geq 1\frac{1}{2}$ inch (2" for VISY-Stick Advanced)



**During assembly, it is important to make sure that the probe tube is not bent.**

If the tank pipe coupling provided for assembly has an internal thread of at least  $1\frac{1}{2}$  inches, the installation of the probe (see Figure 4) must be carried out in the following steps. For internal threads that are larger than  $1\frac{1}{2}$  inches, the corresponding reduction pieces must be used:

- 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.



*The floats must be pushed onto the probe tube with the marking "TOP" facing upward so that the measurement can be carried out.*

- Use a hexagon socket key (5 mm) to loosen the stuffing box (SW 30, SW = spanner width) and the locking screw so that the screw-in unit can be moved easily on the probe tube.
- Provide the screw-in unit with suitable sealing material and then screw it into the tank thread together with the measuring value sensor.
- Finish assembly by gently pressing the probe tube onto the tank bottom and then pulling it up 5 ... 10 mm.
- Connect earthing and equipotential bonding cables with the exterior earth terminal



*A 1" installation kit is also available as an option. This optional 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.*

### 3.2.2 Pipe installation (riser)



**During the assembly work, it is important to make sure that the probe tube is not bent.**

The usual pipe installation is made with 3" or 4" pipes. Installation of the VISY-Stick V M12 probe (see Figure 4) is made in the following steps:

- 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.



*The floats must be pushed onto the probe tube with the marking "TOP" facing upward so that the measurement can be carried out.*

- Pull the riser installation kit (article no.: 900074) for centering the head of the probe of the VISY-Stick in the installation tube over the probe head and adapt to a 3" pipe if required.
- Connect and secure the supplied VISY-Stick connection cable to the VISY-Stick.
- Let the VISY-Stick measuring value sensor slowly slide into the riser and place carefully on the bottom of the tank.
- Install a suitable cable grommet in the sealing cap of the pipe (riser) and guide the supplied connection cable through this.

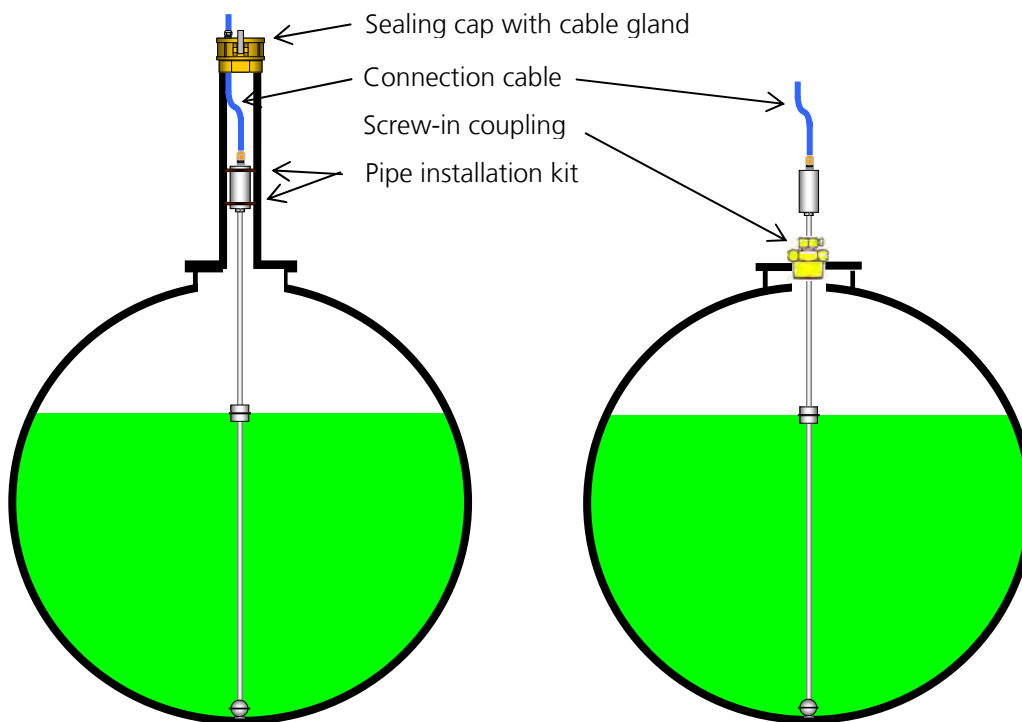


Figure 3: VISY-Stick V M12 installed in pipe and VISY-Stick M12 with screw-in unit

### 3.3 Replacement instructions

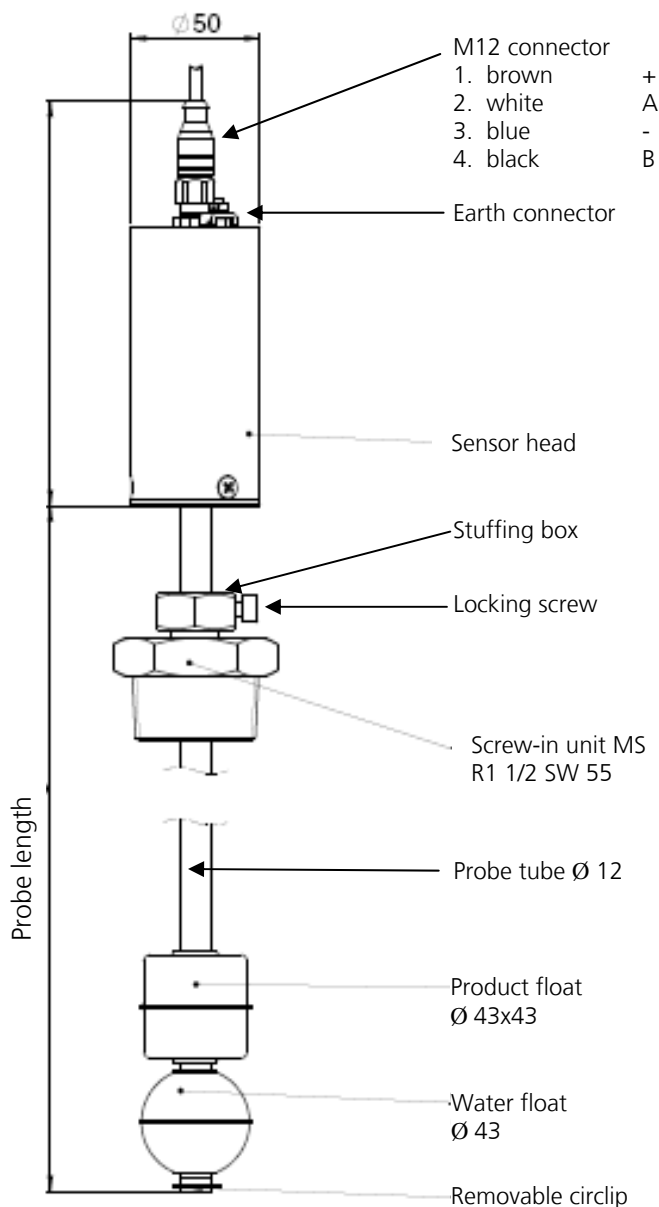
After replacing the VISY-Stick measuring value sensor, the following values must be entered again using VISY-Setup:

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

### 3.4 VISY-Stick measuring value sensor dimensions

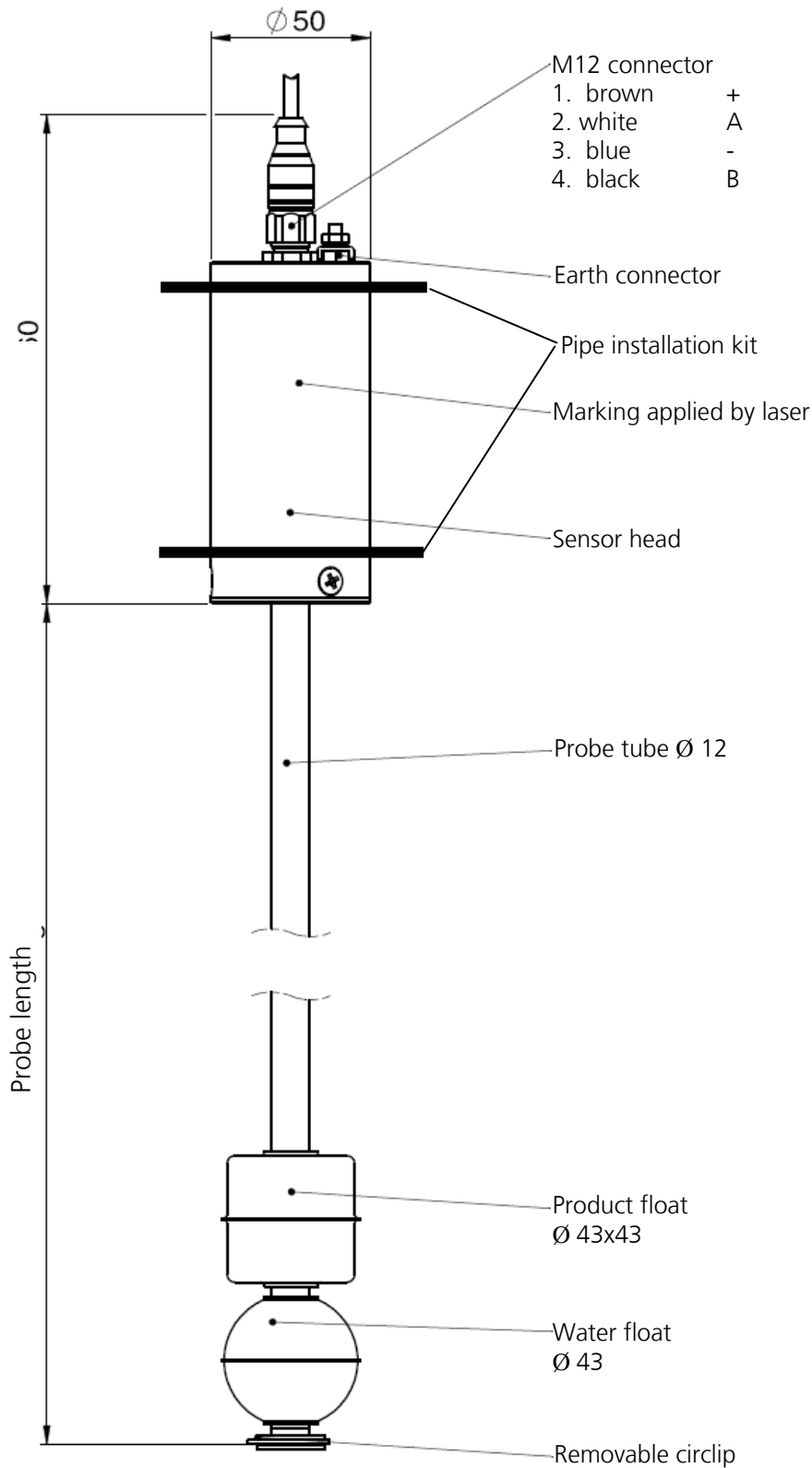
The measuring value sensors are distinguished according to the installation method (pipe installation or installation in the manhole cover) and according to the version (Basic/Standard or Advanced).

#### 3.4.1 Basic/Standard measuring value sensors



Dimensions in mm

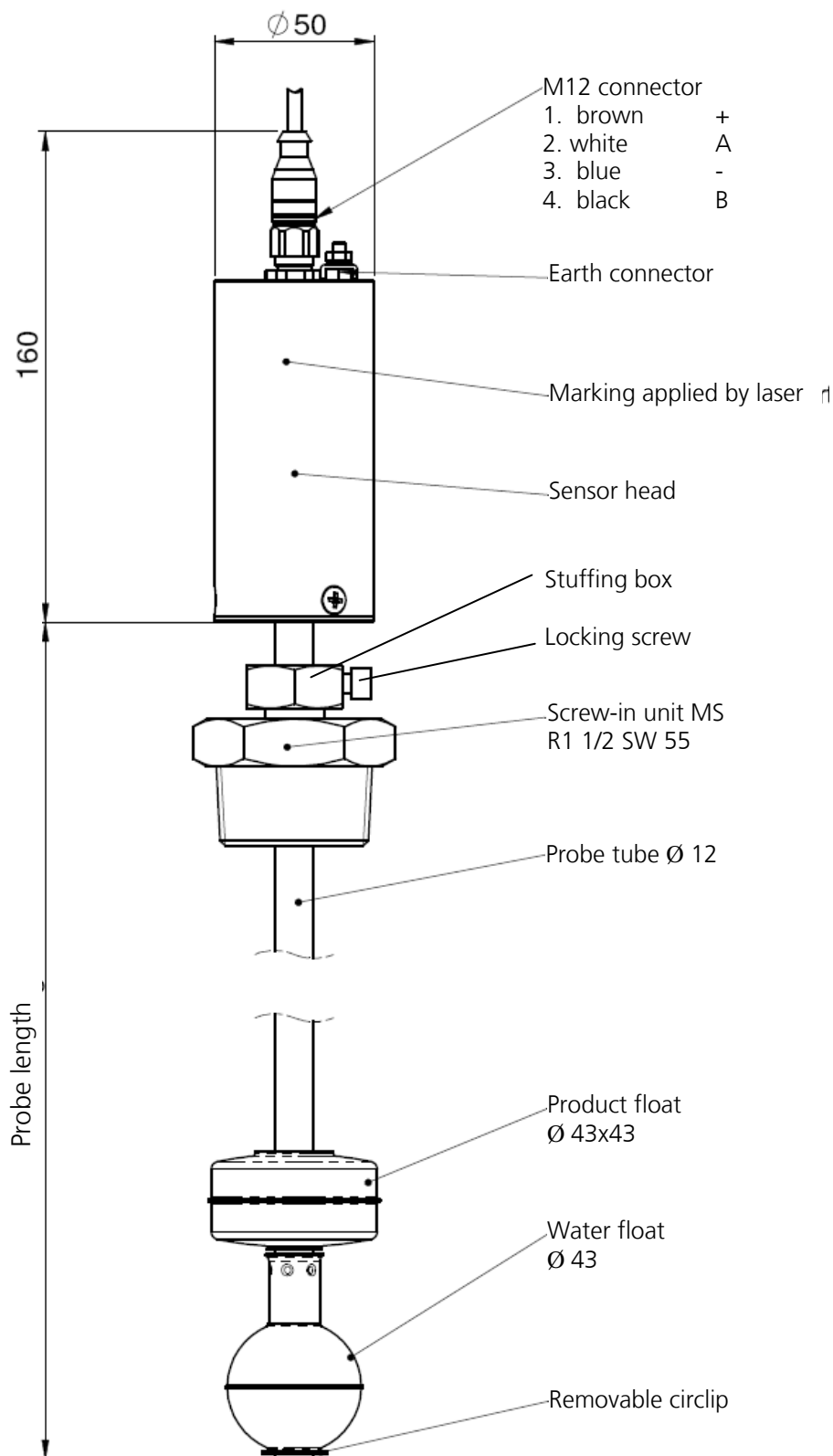
**Figure 4: VISY-Stick M12 advanced for installation in the manhole cover**



Dimensions in mm

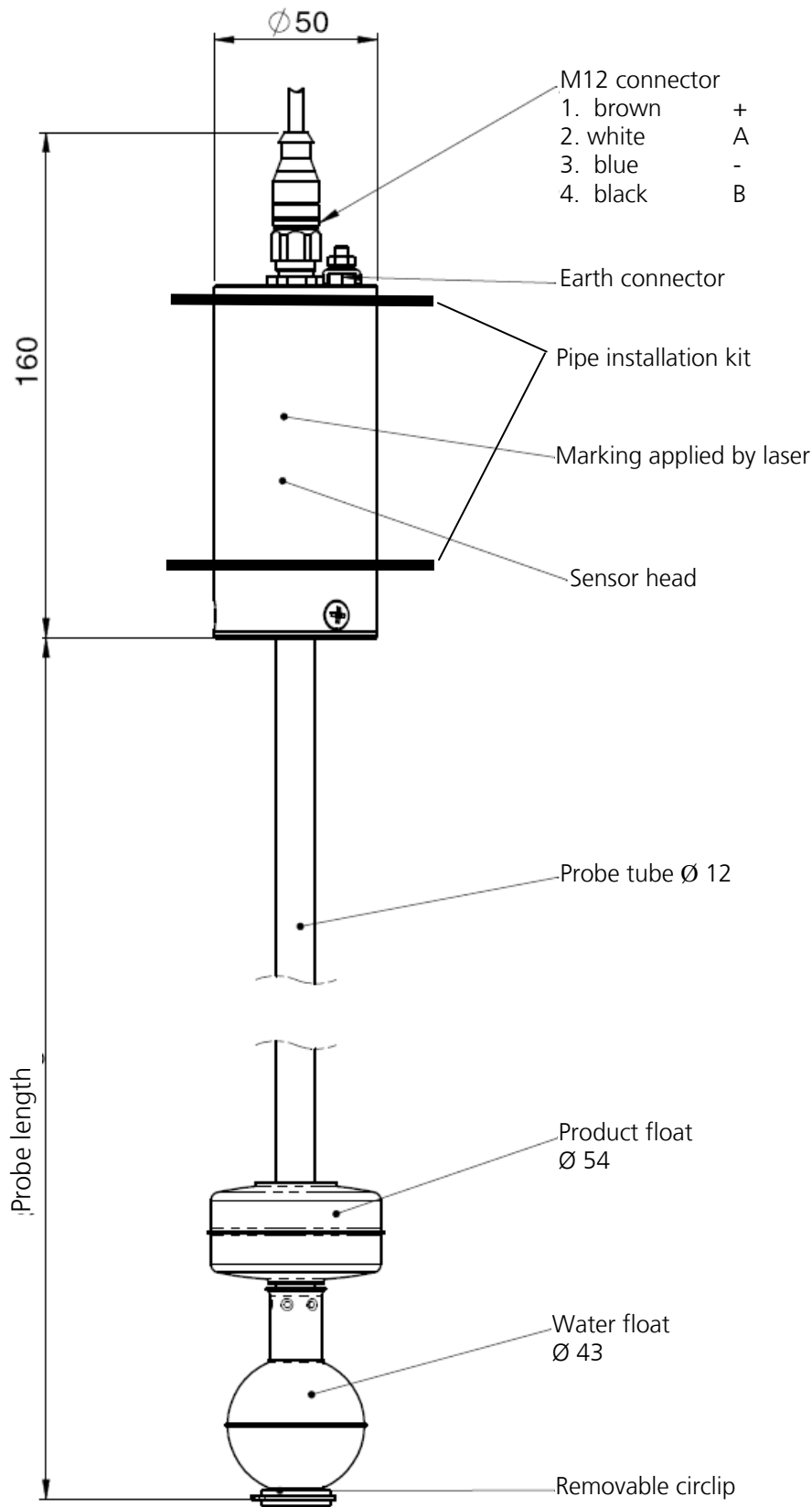
Figure 5: VISY-Stick V M12 advanced for pipe installation

### 3.4.2 Advanced measuring value sensors



Dimensions in mm

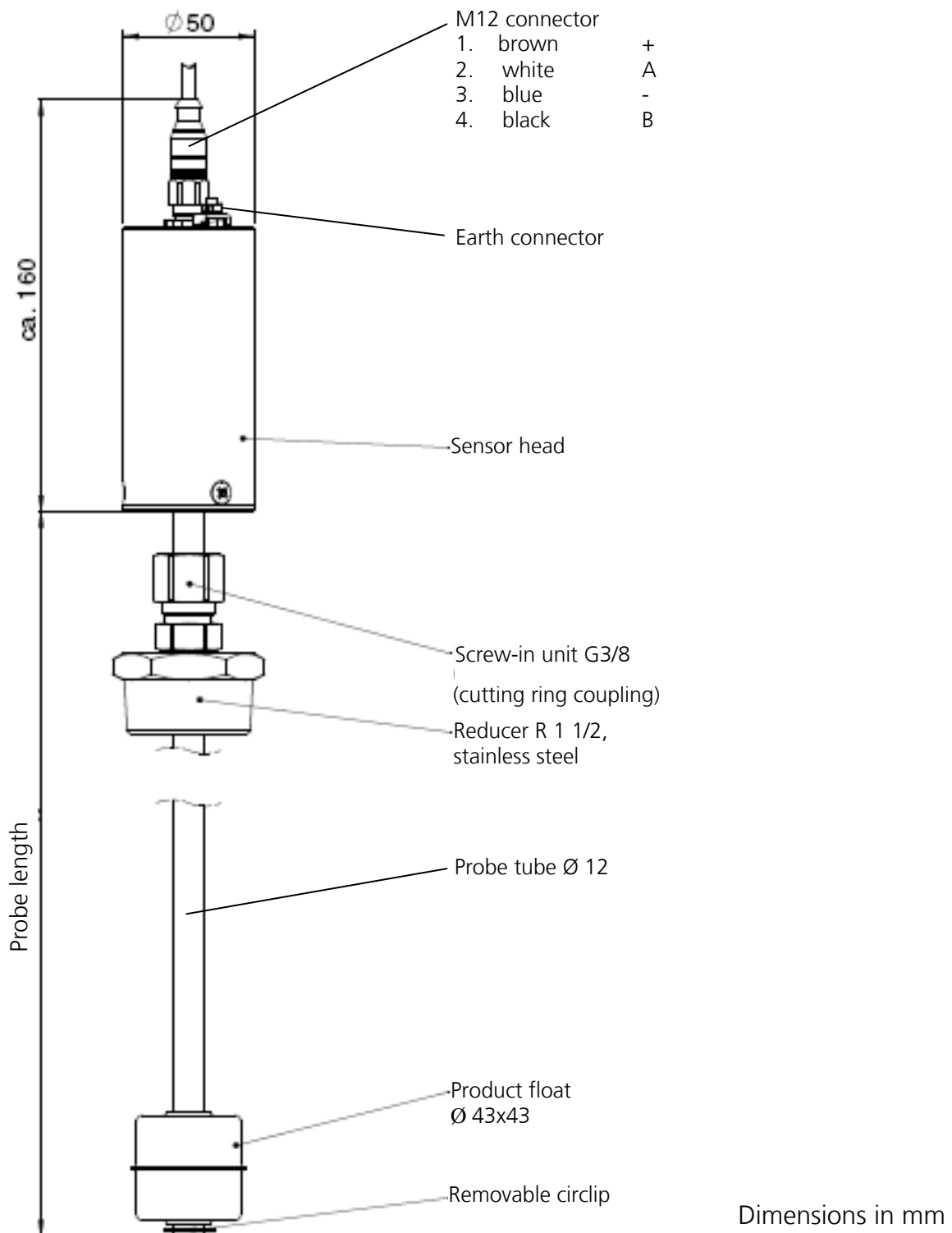
**Figure 6: VISY-Stick M12 Advanced for installation in manhole cover**



Dimensions in mm

**Figure 7: VISY-Stick V M12 Advanced for pipe installation**

### 3.4.3 Measuring value sensor for AdBlue



**Figure 8: VISY-Stick N M12 for AdBlue with screw-in unit for installation in manhole cover**

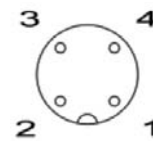
### 3.5 Electrical connection

Proceed as follows for wiring each VISY-Stick measuring value sensor to the VISY-Command measurement analyser.

Supplied connection cable: Connect M12 coupling to M12 connector on the probe head. Connect the other end of the cable to the cable laid in the dome shaft (coming from VISY-Command) e.g. using an installation sleeve.

Note the M12 socket connection labelling of the supplied connection cable in order to connect the connecting cable correctly to the VISY-Command measurement analyser:

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



**Figure 9: Connection assignment of socket**

The connection cable between measuring value sensor and measurement analyser has the following specification:

- Four-core unshielded cable
- Oil-resistant
- Refer to the following table for the required wire cross section:

Cable length	Wire cross section
up to 100 m	4 x 0.5 mm <sup>2</sup>
up to 200 m	4 x 1.0 mm <sup>2</sup>

**Table 1: Cable length and wire cross section**

- The connecting cable to the measurement analyser must be blue or labelled in blue as it is a cable for intrinsically safe electric circuits. The cable is allowed to have a diameter between 6 - 10 mm so that it can still be safely sealed by the cable gland in the VISY-Command unit.

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



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

## 3.6 Specifying the installation offset

### 3.6.1 VISY-Stick with screw-in unit

At the end of the assembly, the probe tube is pressed lightly onto the tank bottom and then pulled up about 10 mm (see also Point 3.2.1). This position must be maintained by tightening down the stuffing box and the locking screw.



**If you do not pull up the probe tube slightly again, it could be bent when the stuffing box is tightened down.**

During later configuration of the individual measuring points with the VISY-Setup program, the installation offset and device number of each probe is required. This data should now be written down together with the tank number and the product.



*The installation offset consists of the distance of the end of the probe from the tank bottom plus the value determined from the table (Figure 2 on page ).*

### 3.6.2 VISY-Stick without screw-in unit (pipe installation)

A possible installation offset results exclusively from the installation position if this could not be carried out in the longitudinal axis of the tank (see also the table in Figure 2 on page 10).

During later configuration of the individual measuring points with the VISY-Setup program, the installation offset and device number of each probe is required. This data should now be written down together with the tank number and the product.

### 3.6.3 VISY-Stick N M12 (for AdBlue) with cutting ring coupling

as per point 3.6.1

### 3.7 Technical data for VISY-Stick measuring value sensor

Explosion protection	EEx ia IIC T6
Approval	TÜV 99 ATEX 1496
Protection class	IP 68
Permissible ambient temperature (probe head)	-25 °C to 75 °C in T4 -25 °C to 65 °C in T5 -25 °C to 50 °C in T6
Connection data	U <sub>i</sub> □ 15 V P <sub>i</sub> □ 0.1 W I <sub>i</sub> □ 60 mA C <sub>i</sub> □ 10 nF L <sub>i</sub> □ 0.1 mH
Probe length	2000 mm (tank diameter 1600 mm) 2400 mm (tank diameter 2000 mm) 2900 mm (tank diameter 2500 mm) 3300 mm (tank diameter 2900 mm)
Probe head	Basic / Standard: Ø 50 mm x 107 mm Advanced:
Product float	Basic / Standard: cylinder Ø 43 mm, height 40 mm Advanced: cylinder Ø 54 mm, height 33 mm
Water float	Ball Ø 43 mm
Connection	Screw-in unit with the option of freely variable height adjustment (standard R 1½)
Measurement accuracy: Product	Basic: ± 2 mm Standard: better than ± 0.5 mm Advanced: ± 0.1 mm
Measurement accuracy: temperature	Basic: ± 1 °C Standard: better than ± 0.3 °C Advanced: better than ± 0.3 °C
Water detection	continuous from 30 mm

**Table 2: Technical data for VISY-Stick measuring value sensor**

### 3.8 Connection diagrams

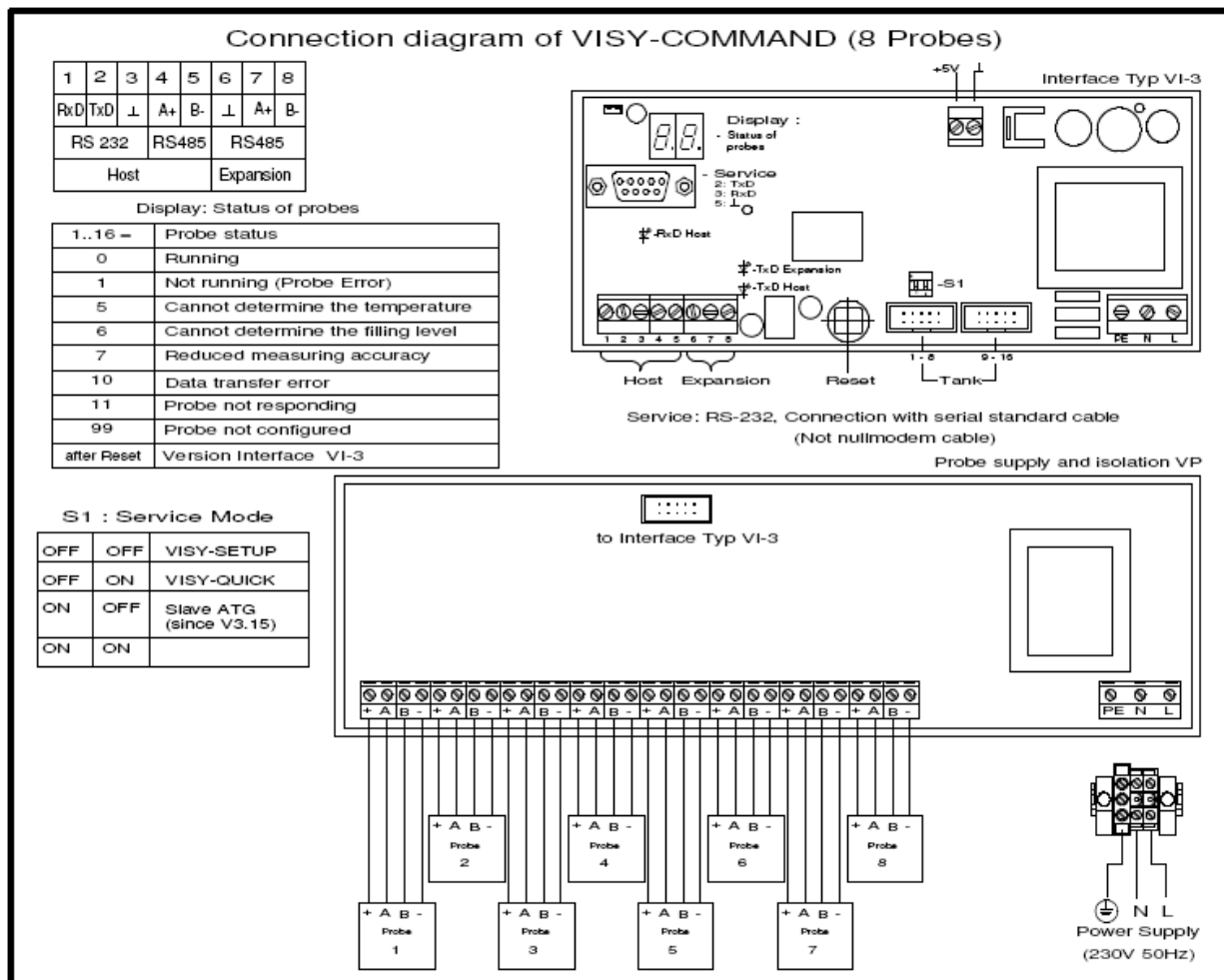


Figure 10: Connection diagram for max. 8 measuring value sensors

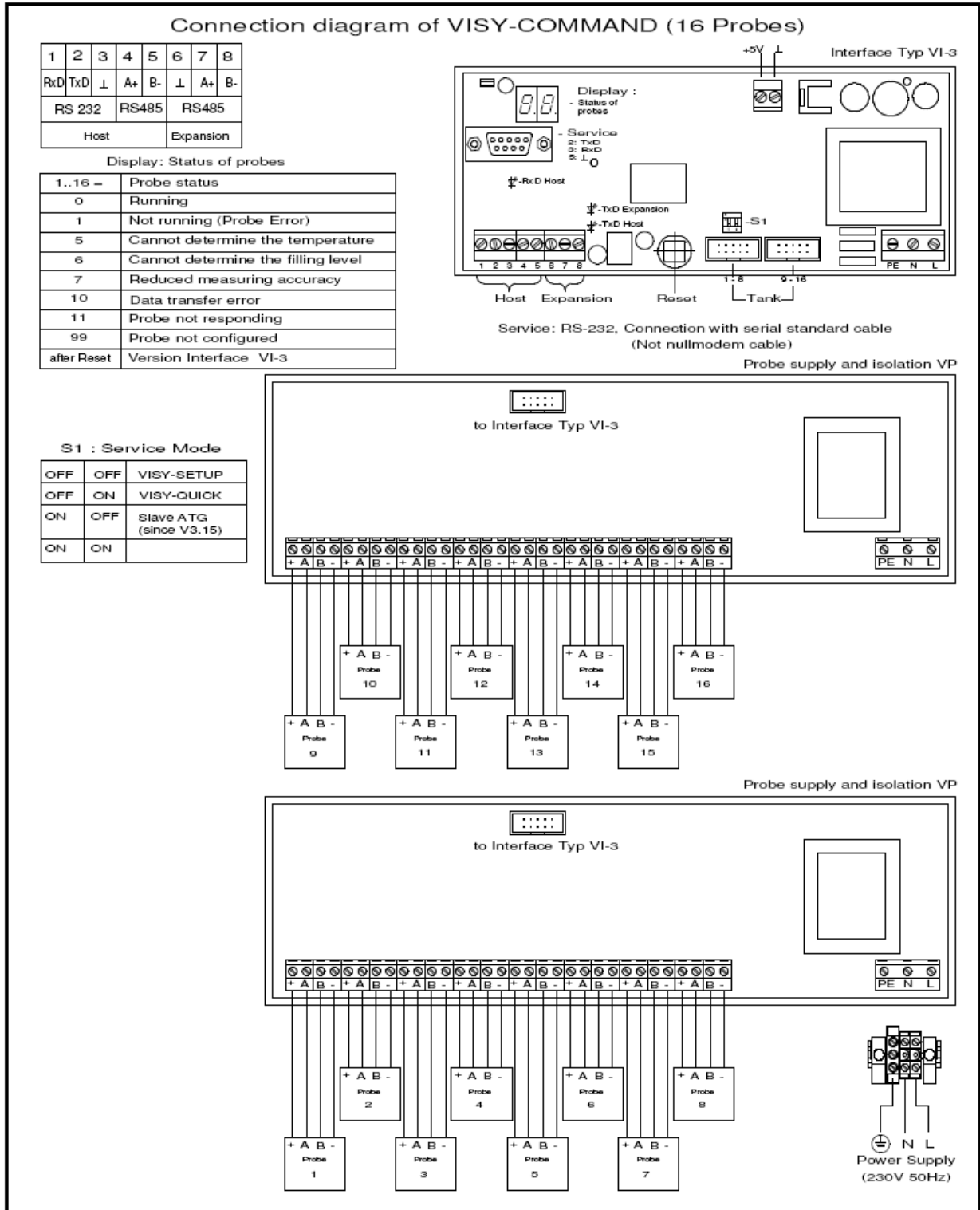


Figure 11: Connection diagram for max. 16 measuring value sensors

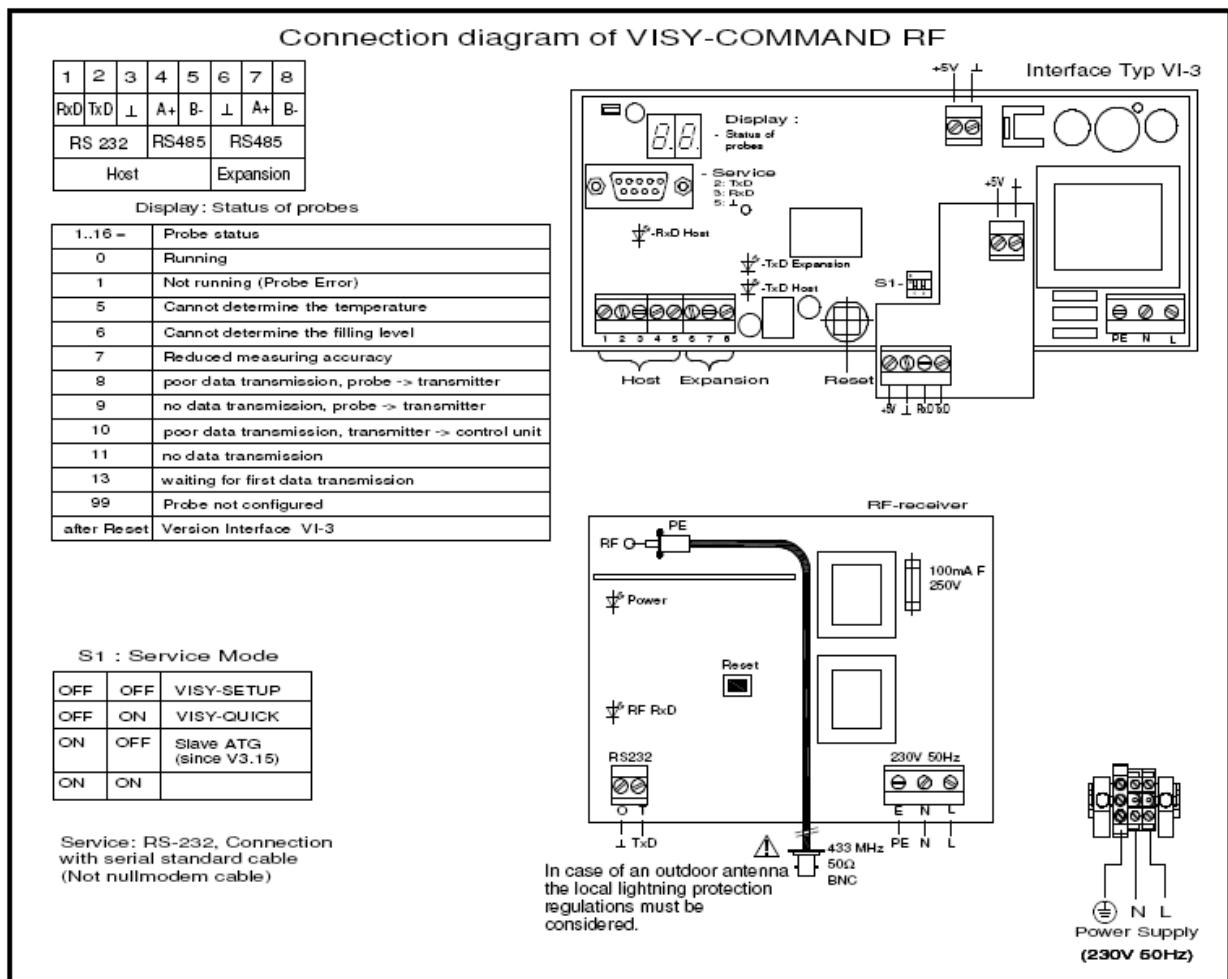


Figure 12: Connection diagram for VISY-Command RF for max. 16 measuring value sensors

## 4 Measurement analysis system VISY-Command 8/16

The VISY-Command units for the VISY-X system in the wired version (standard) and the wireless version (radio solution) are different and have the following designations:

- VISY-Command 2/4/8/16 - for the wired version (standard)
- VISY-Command RF - for the wireless version (radio system)

### 4.1 Design and operation

#### 4.1.1 VISY-Command 2/4/8/16 - wired version (standard)

The VISY-Command 2/4/8/16 measurement analyser is available for connecting up a maximum number of 2/4/8 or 16 VISY-Stick measuring value sensors. It comprises a VI-... interface card and one or two VP-... measuring transducers fitted in an IP 55 control unit.

The measurement analyser electrifies the measuring value sensor. The measurement analyser receives the measured values from the measuring value sensors, 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 RS232 or RS485 (2-wire). There are various reports available for the usual filling station computers.

The EPSI and IFSF/LON interfaces and ethernet are also optionally available.

- IFSF-LON interface converter operating instructions in German, Art.-No. 207090
- IFSF-LON interface converter operating instructions in English, Art.-No. 207092
- EPSI interface converter operating instructions in German, Art.-No. 207117
- EPSI interface converter operating instructions in English, Art.-No. 207118

#### 4.1.2 VISY-Command RF - wireless version (radio solution)

The VISY-Command RF measurement analyser is able to process data from up to 16 VISY-Stick measuring value sensors. It comprises a VI-... interface card and an RF receiver board fitted in an IP 55 control unit.

Each measuring value sensor is supplied with electric power via a VISY-RF transmitter module (connected directly to the VISY-Stick measuring value sensor). The VISY-RF transmitter module reads the data from the VISY-Stick and sends these to the VISY-Command RF measurement analyser. The data received from the 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 RS232 or RS485 (2-wire). There are various reports available for the usual filling station computers.

The EPSI and IFSF/LON interfaces and ethernet are also optionally available. See also point 4.1.1 for the operating instructions.



*If using the radio solution at the filling station, varying reception conditions must be anticipated as a result of the heavy passenger car and 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 updated at the set transmission intervals and that delivery data may, under certain circumstances, be lost.*

## **4.2 VI-... interface card components**

(see Figure 11 and Figure 10)

### **4.2.1 Status display**

After switching on or resetting the VI-... interface card, the software 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. 3 – 1 – 5 corresponds to Version 3.15.

Afterwards, the status of the measuring value sensors 1 to 16 is automatically displayed. First the number (1 to 16) of the measuring value sensor, followed by the equal sign (=) and finally the status (0 to 99; see the connection diagram or the VISY-Setup documentation for the meaning). After a short pause, the status of the next measuring value sensor is shown.

### **4.2.2 Service socket**

The 9-pin D-Sub socket on the serial RS232 interface is used for connecting, e.g. VISY-Setup, VISY-Quick, auxiliary tank content measurement, etc.

### **4.2.3 DIP switch S1**

#### **Service mode**

Activation of the serial RS232 service interface for system configuration using the VISY-Setup program. The DIP switches S11 and S12 must be in the "OFF" position.

#### **VISY-Quick protocol**

To activate the serial RS232 service interface and to link up with the VISY-Quick protocol (FAFNIR protocol): DIP switch S11 must be in the "OFF" position and S12 must be in the "ON" position.

#### **Auxiliary tank content measurement**

To activate the serial RS232 service interface for connecting up an auxiliary tank content measurement: DIP switch S11 must be in the "ON" position and S12 must be in the "OFF" position.

#### 4.2.4 Host

The serial host interface (galvanically isolated) for communication with a higher level system, e.g. filling station computer or PC, is configured as an RS232 and as an RS485 interface (2-wire). Depending on requirements, the host can be connected to the RS232 interface or to the RS485 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 is connected.



**Simultaneous operation of the RS232 interface and the RS485 interface is not possible.**

If the RS485 interface is being used, it is advisable for reasons of interference resistance to use a 3-core cable and in addition to the ports A+ and B- also to connect the interface earth ( $\perp$  - terminal on host interface) of the VISY-Command to the interface earth on the host system (if provided there as connection terminal).

#### 4.2.5 LED - RxD Host

This light-emitting diode (LED) indicates incoming data from the host computer.

#### 4.2.6 LED - TxD Host

This light-emitting diode (LED) indicates data going to the host computer.

#### 4.2.7 Expansion - RS485 interface

Serial RS485 port (galvanically isolated) using which the 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 a shielded cable is used, the cable shield must be placed on the reference earth of the interfaces ( $\perp$  - connection terminal).

#### 4.2.8 LED – TxD expansion

This light-emitting diode (LED) indicates that data is being transmitted via the extension interface.

#### 4.2.9 Reset

This button can be used to effect a reset of the VI-... interface card.

### 4.3 Installation

The VISY-Command measurement analyser must be securely fixed to a wall inside the filling station 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 transducer and the VI-... interface card are already wired at the factory.



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



**When installing/operating the VISY-Command measuring analyser, 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 measuring value sensor in the door of the control unit according to the connection diagram (see Figure 10 and Figure 11). For this, use the blue cable entries, which are provided for the intrinsically safe electric circuits for the measuring value sensors.

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 measuring analysis sensors, you can start configuration (see operating instructions for the VISY-Setup configuration program).

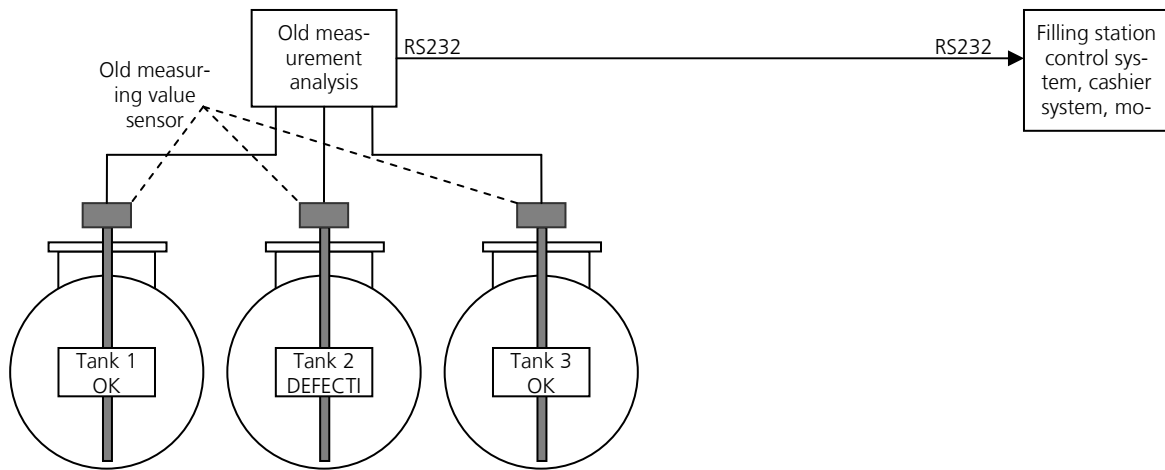
#### 4.3.2 VISY-Command RF - wireless version (radio solution)

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

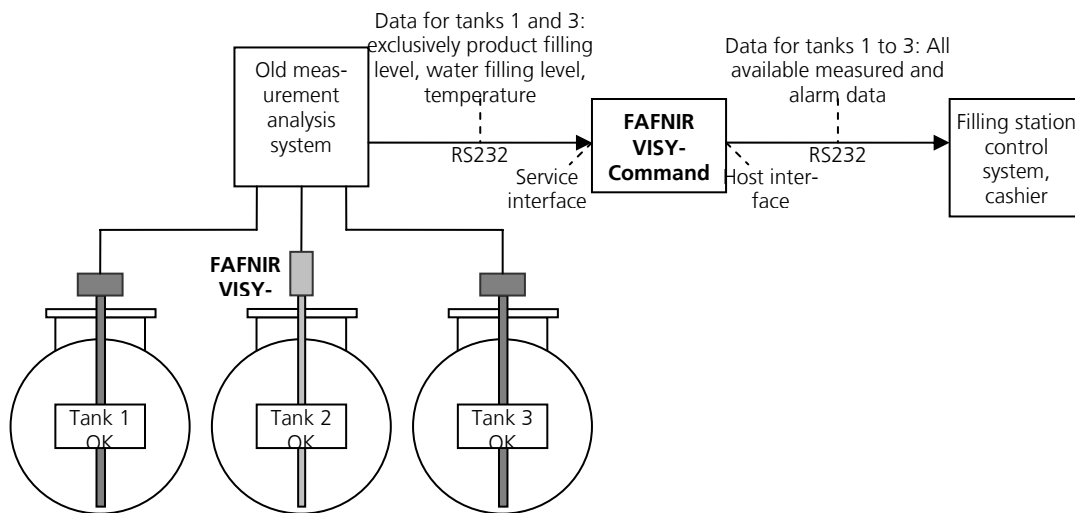
- VISY-X wireless system operating instructions in German – Art. No. 207115.
- VISY-X wireless system operating instructions in English – Art. No. 207116.

## 4.4 Auxiliary tank content measurement

The VISY-X system is able to communicate a lower-order auxiliary tank content measurement to call up filling level and temperature data. The benefit of this function is its ability to continue using older, previously installed tank content measurement systems for which spare parts are no longer available. Normally, a failure of one of the individual measuring value sensors would mean that the complete system would have to be replaced, including all measuring value sensors 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. Only defective measuring value sensors have to be replaced with a VISY-Stick connected to a VISY-Command system. Old measuring value sensors that are still working remain with the existing measurement analysis system. This then no longer supplies data directly to the filling station control system and to the cashier system, but rather to the VISY-Command.



**Figure 13: Tank content measurement with defective measuring value sensor in tank 2**



**Figure 14: Tank content measurement with VISY-Command, VISY-Stick and an old measurement analysis 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 14 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 RS232 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 filling stations.
- The serial interface parameters and data protocol used between the tank content measurement system installed and the cashier system / filling station control 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 measurement analyser, 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 V 3.15 or a later version for it to work with an auxiliary tank content measurement system. Version older than V 3.15 must be updated to the current firmware version.
- The program VISY-Setup Version 3.2 or later is needed for configuring an auxiliary tank content measurement system in VISY-Command.
- If measuring tables 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 filling station control system or cashier system

(1) Install VISY-Stick and VISY-Command as described in Chapter 3.2 Installation.

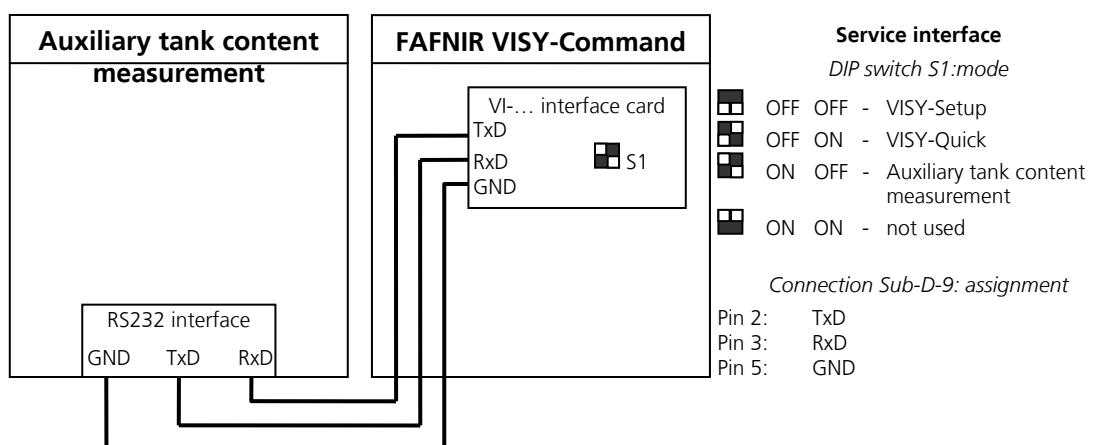
(2) Configure the VISY-Command measurement analyser with the VISY-Setup configuration software.



*If measuring tables 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) Separate the RS232 connection between the filling station control system or cashier system and the old tank content measurement system.

(4) Set up a new RS232 connection between the old tank content measurement system and the service interface (9-pin D-Sub socket on the VI-... card) of VISY-Command with a 3-core cable. FAFNIR is able to supply the D-Sub 9M adapter as an accessory. This is equipped with terminals, eliminating the need to solder a D-Sub connector. 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 an earth point or directly on the housing earth.



**Figure 15: Connecting auxiliary tank content measurement system to VISY-Command**

- (5) Set the DIP switches on the VI-... interface card to the ON OFF position (see Figure 15). 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 filling station control system or cashier system. Delays could arise if the cashier system or filling 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 diagnosis

As soon as configuration has been completed with VISY-Setup, you can monitor the operation of the measuring value sensors using the status display on the VI interface. The display shows, one after the other, the number of a measuring value sensors (e.g. 5 = measuring value sensor on connection 5), an equal sign and the corresponding status (e.g. 0 = in operation). Accordingly, one measuring value sensor 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 Table 3)

Status code	Status of the measuring value sensor
0	in operation
1	not ready for operation
5	temperature measurement not possible
6	filling level measurement not possible
7	reduced measuring accuracy
8 <sup>1)</sup>	data transmission interference between VISY-Stick and VISY-RFT
9 <sup>1)</sup>	no data transmission between VISY-Stick and VISY-RFT
10	data transmission interference
11	no data transmission
13 <sup>1)</sup>	waiting for first radio data transmission
99	not configured
after Reset	firmware version of the VI interface

<sup>1)</sup> Only in the wireless version

**Table 3: Error codes table**

## 4.6 Replacement of components

Only the VI-... interface card or VP-... measuring transducer 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 transducer

Explosion protection	[EEx ia] IIC
EC type approval certificate	TÜV 98 ATEX 1380
Permissible ambient temperatures:	-20 °C to +40 °C
Supply circuit a (terminals L, N, PE)	Alternating voltage 230 V $\pm$ 10 %; approx. 2 VA Maximum voltage for safety reasons $U_m = 253$ 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 4: Technical data for VP-... measuring transducer**

The intrinsically safe sensor electric circuits are safely galvanically separated from the supply circuit (auxiliary power) 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.

## 5 Options

### 5.1 Installation kit for LPG liquid gas

The optional LPG installation kit comprises a jacketed pipe with flange and a special LPG float. After installing the LPG installation kit in the tank, the VISY-Stick filling level sensor (without float) is inserted in the jacketed pipe and screwed tight. This makes it possible to replace the sensor at any time without opening the tank.

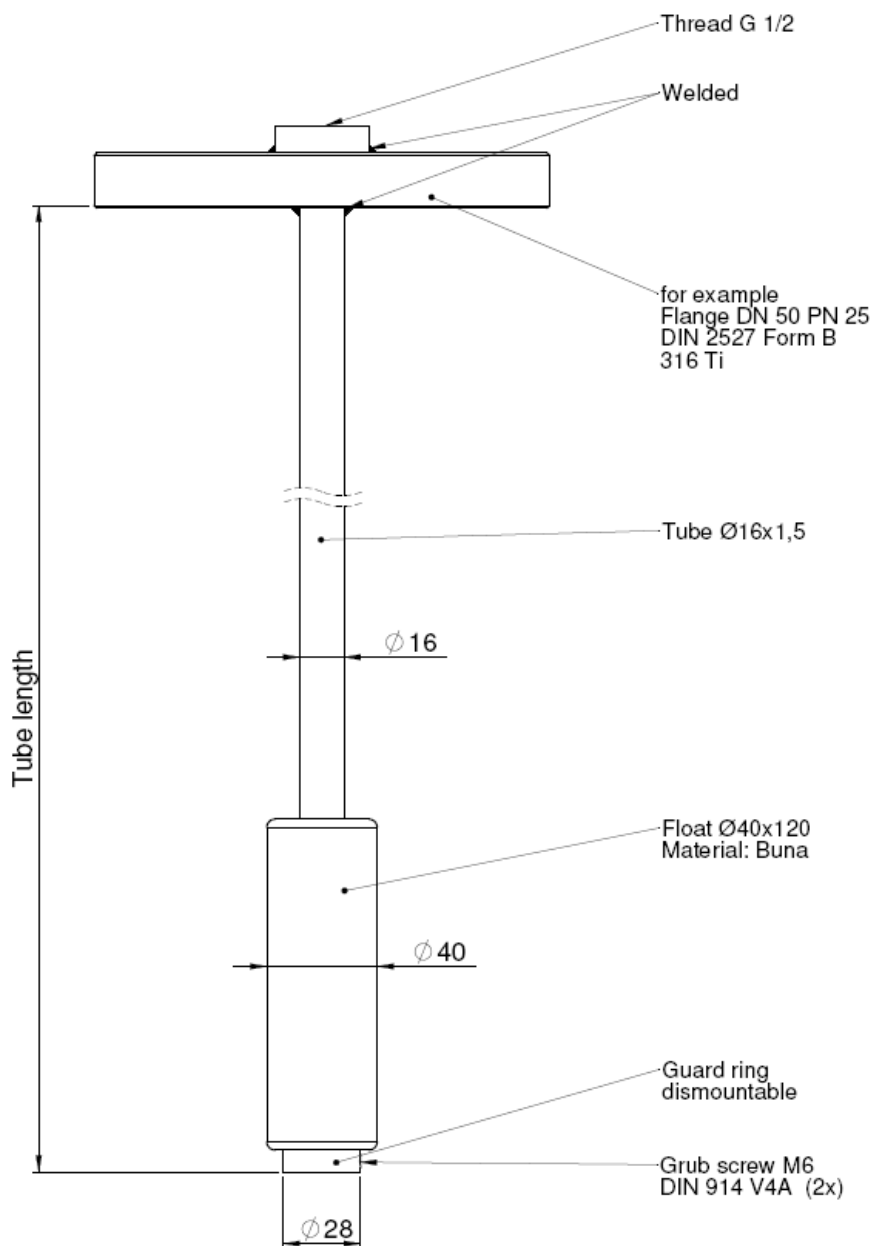


Figure 16: LPG installation kit

Dimensions in mm

## 5.2 1" installation kit

The optional 1" installation kit consists of product and water floats and a 1" screw-in unit. This optional installation kit makes possible the installation of a VISY-Stick using an R1 threaded sleeve.

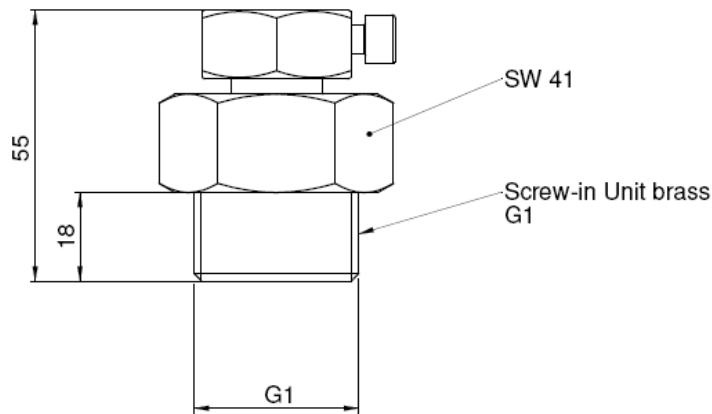


Figure 17: Screw-in unit Ms G1

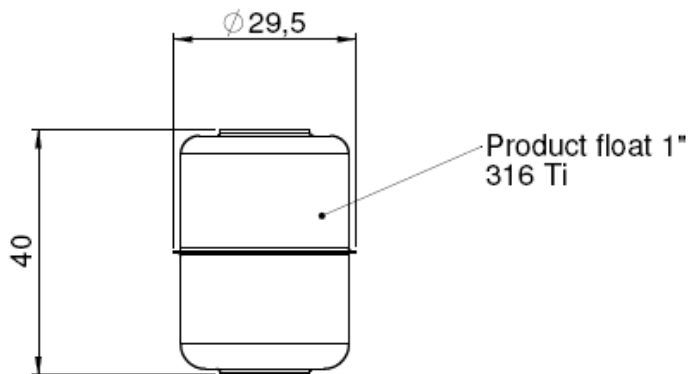


Figure 18: Product float 1"

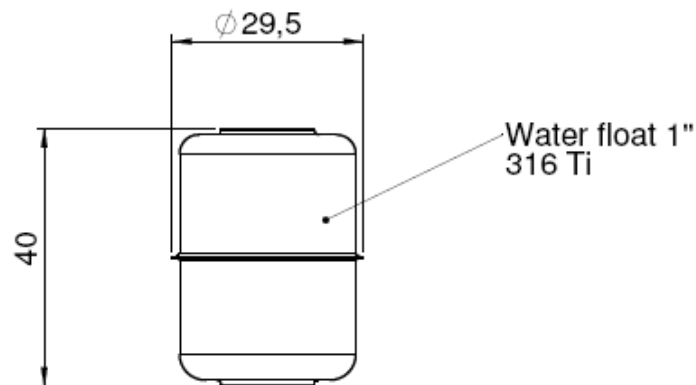


Figure 19: Water float 1"

Dimensions in mm

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## 8 APPENDIX

### 8.1 EU Declaration of Conformity – VISY-Stick



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	

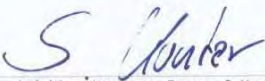
Das Produkt entspricht der EG-Baumusterprüfbescheinigung  
*The above mentioned product is in conformity with EC-Type Examination Certificate*

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*

## 8.2 EU Declaration of Conformity – VP-1, VP-2, VP-4

### 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*

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

FAFNIR VP-1, VP-2 und VP-4

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

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

**TÜV 99 ATEX 1380**

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, 15.01.2002

Ort, Datum / Place, Date



Geschäftsführer / Managing Director: S. Kunter

### 8.3 EU Declaration of Conformity – VI-3



#### **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*

**Interface Typ VI-3  
Interface type VI-3**

**FAFNIR VI-3**

in Übereinstimmung mit nachfolgenden Richtlinien:  
*in accordance with the following directives:*  
EMV-Richtlinie; *EMC Directive 89/336/EWG/EEC*

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

EN 50 081-1; 1992                      EN 61 000-4-3; 1999  
EN 50 082-2; 1995

Hamburg, 22.09.2003

Ort, Datum / Place, Date



Geschäftsführer / Managing Director: S. Kunter

## 8.4 EU type approval certificate – VISY-Stick

**TÜV  
CERT**

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.      Hanover, 30.11.1999  
TÜV CERT-Zertifizierungsstelle  
Am TÜV 1  
D-30519 Hannover

  
Head of the  
Certification Body

**TÜV  
NORD**

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page 1/2



(13)

**SCHEDULE**

(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:

$$U_i = 15 \text{ V}$$

$$I_i = 30 \text{ mA}$$

$$P_i = 100 \text{ mW}$$

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



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

---

(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



Head of the  
Certification Body

## 8.5 EU type approval certificate – VP-1



**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 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.

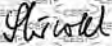
(11) This EC-type examination certificate relates only to the design and construction of the specified equipment or protective system according to Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and placing on the market of this equipment or protective system.


(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

Hannover, 15.12.1998

  
 Head of the  
Certification Body



AFCERTNORD 10/88

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page 1/2



(13)

## SCHEDULE

(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 V  $\pm$  10 %; about 2 VA,  $U_m = 253$  V  
resp.

alternating voltage: 24 V  $\pm$  10 %; about 2 VA,  $U_m = 33$  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:  $U_o = 14,3$  V  
 $I_o = 28$  mA  
 $P_o = 98$  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  $\mu$ F

Measuring- and control circuits  $U \leq 100$  V,  $U_m = 100$  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 Devices 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 Divices 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 supplied with a 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.

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Hannover, 30.05.2002



Head of the  
Certification Body