

# VISY-X

## VISY-RF II wireless system



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## Introduction

The VISY-X system is a tank gauging system for fuel tanks at petrol stations. It comprises a series of VISY-Stick sensors, which are fitted in the tank and linked to the VISY-Command measurement analysis unit installed in the petrol station building. The VISY-Command gathers data from the sensors and transmits this on request to a higher-order system (e.g. POS).

In most cases, the VISY-Stick sensors will be linked electrically to the VISY-Command measurement analysis unit by cable. With this set-up, the cable also supplies the VISY-Stick level sensors with power, which ensures a high level of data safety.

Sometimes, however, it may be that there are no more unused cable ducts available between the manhole and VISY-Command. In this situation, the wireless system including the VISY-Command RF evaluation unit is an attractive alternative because no excavation work is required. With the wireless system, a battery is used to supply power to the VISY-Stick level sensors and the VISY-RFT-L transmitters. The installation procedure for the VISY-RF wireless system is described on the pages that follow.

### 1.1 In this manual ...

... you are guided through the installation and set-up of the VISY-RF wireless system.

These instructions contain a description of all the steps needed to perform the installation and commissioning of the wireless system.

During installation of the VISY-RF wireless system, it is necessary to configure the VISY-Command RF using the VISY-Setup configuration software. Please follow the appropriate instructions mentioned in the VISY-Setup manual.



*Useful tips and information in this manual, you should observe, appear in italics and are identified by this symbol.*



*If these safety instructions are not observed, it may result in the risk of accident or damage to the VISY-X system.*

### 1.2 Requirements of service engineers

All parts of the VISY-RF wireless system should be installed only by trained service engineers.

### 1.3 Safety precautions

Observe and follow all product safety notes and operating instructions. The following safety precautions must be observed in order to reduce the risk of injury, electric shocks, fire or damage to the equipment:

- This product should only be used in conjunction with FAFNIR components.
- Opening the cover on the VISY-Command RF unit could expose you to the risk of electric shock.
- In the interests of explosion safety, only the use of original FAFNIR batteries is permitted.
- The VISY-RFT-L transmitting module must never be operated without the transmitter antenna connected.
- Where external antennas are installed, all applicable rules and regulations governing lightning and surge voltage protection must be observed.
- Make sure that the VISY-RFT-L transmitter in the manhole is never submerged in water.

### 1.4 Recommended tools

- Laptop, RS 232 communication cable, VISY-Setup
- VISY-RF Meter, portable field-strength meter portable, 433.92 MHz, Art. No. 900090

The VISY-RF Meter enables you to check for the presence and strength of a 433 MHz radio signal. During installation of the VISY-RF wireless system, this instrument is a useful means of determining the optimum position for the receiver antenna, of evaluating the signal strength of the VISY-RFT-L transmitter to be installed, and of identifying whether other radio signals may be present (interference radiation).



*Use of the VISY-RF Meter in potentially explosive atmospheres is strictly prohibited.*

To switch on the meter, press the button briefly. The instrument switches off automatically after two minutes. The series of LEDs indicate radio activity in the local area. The measured maximum field strength value is displayed for 1 second. The green area of the LED display indicates the presence of a strong radio signal, the red area of a weak radio signal.

The VISY-RF Meter is powered by a 9 V square battery (6LR61).



Figure 1: VISY-RF Meter

## 2 Components

The following components are required for the VISY-RF wireless system:

- VISY-Stick
- VISY-RFT-L transmitting module
- VISY-Command RF with Interface VI-... and VISY-RFR receiver module

The **VISY-RFT-L transmitting module** is powered by an intrinsically safe battery pack. The data from the VISY-Stick sensor is sent by the **VISY-RFT-L transmitting module** to the VISY-RFR receiver module which then forwards the data to the Interface VI-... . The VISY-RFR receiver module has a built-in 230 VAC power supply.

For installation of the **VISY-Stick** and the **VISY-Command RF**, please refer to the most current edition of the following operating instructions:

- Technical Documentation VISY-Stick VISY-Reed, art. no. 207194
- Technical documentation VISY-Command, art. no. 207184

## 3 Intended use

The VISY-RFT-L transmitting module is approved for use in potentially explosive atmospheres.

VISY-Command RF must be installed outside the explosion hazard zone.

## 4 System installation

### 4.1 General installation diagram

Below the Figure 2 shows a typical petrol station layout. VISY-Stick sensor (1) is fitted inside the tank. The sensor is linked to VISY-RFT-L transmitting module (2) and receives its power from an intrinsically safe battery inside the VISY-RFT-L transmitting module. The transmitting module generates radio signals, represented in the diagram by a series of arcs. These radio signals are received by an antenna (3) and are forwarded to VISY-Command RF (4) along a 50-ohm coaxial cable. For viewing, the evaluated data can be forwarded to other peripheral equipment (VISY-View, POS, BOS, etc.).

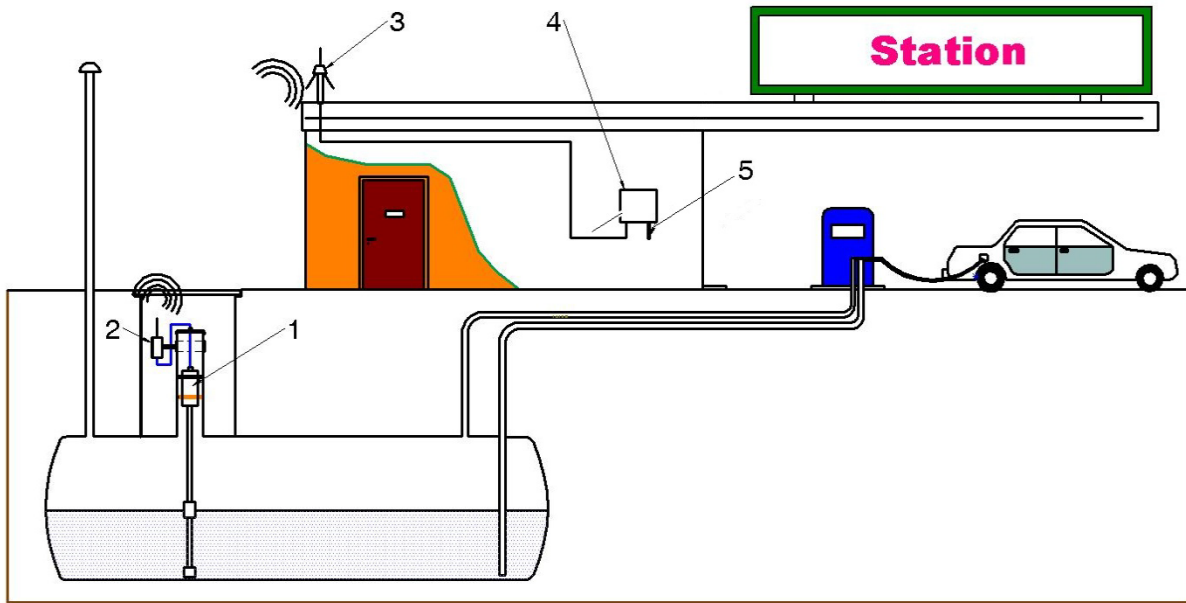


Figure 2 Typical layout of a petrol station

- 1 – VISY-Stick
- 2 – VISY-RFT-L transmitting unit
- 3 – External VISY antenna (accessory)
- 4 – VISY-Command RF
- 5 – Connector for second antenna



*In any installation, you should determine the optimum position for the transmitter and receiver antennas so that the maximum possible field strength is achieved.*

## 4.2 Transmitter installation

The VISY-RFT-L transmitting module should be as unshielded as possible and fitted at the highest point possible inside the manhole so that the module remains functional even when there is water in the manhole. Figure 3 to 6 show the propagation patterns of radio waves under typical conditions.



*The VISY-RFT-L transmitting module must never be operated without the transmitter antenna connected.*



#### 4.2.1 VISY-Stick pipe installation (riser)

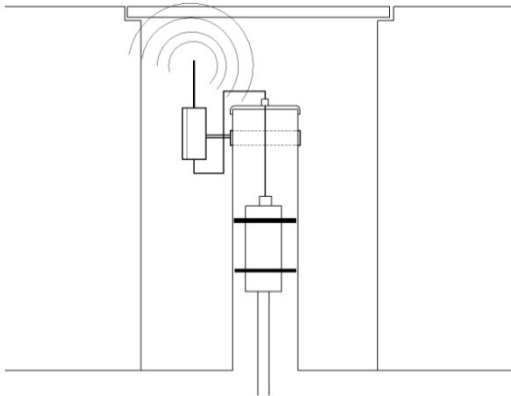


Figure 3: manhole with plastic cover  
Radio transmission with minimal attenuation

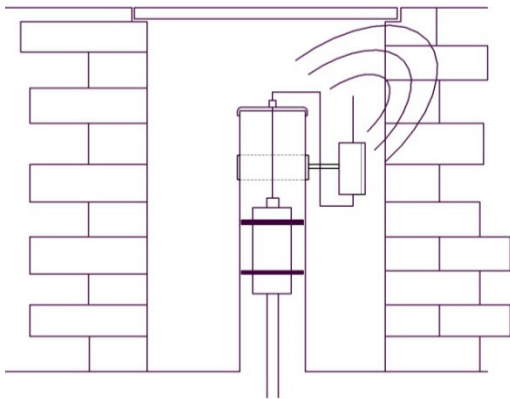


Figure 4: walled manhole with metal cover  
Radio transmission with significant attenuation

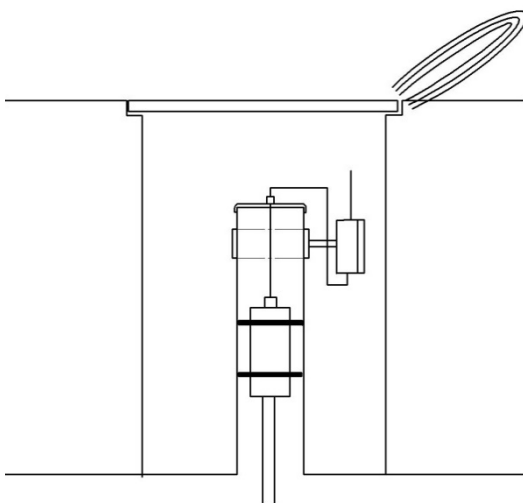


Figure 5: welded (metal) manhole with metal cover  
Strong shielding (Faraday cage); only a small part of the radio signal finds passage if a slot is present

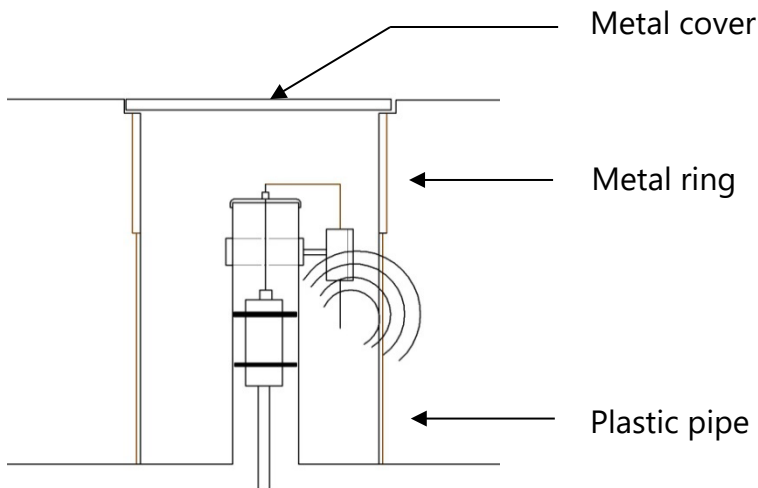


Figure 6: manhole with metal ring and metal cover  
Radio signal passes through the plastic pipe underneath the metal ring, moderate attenuation

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

Figure 3 to Figure 6 similarly apply to installation of the VISY-RFT-L transmitting unit in conjunction with the VISY-Stick with screw-in unit.

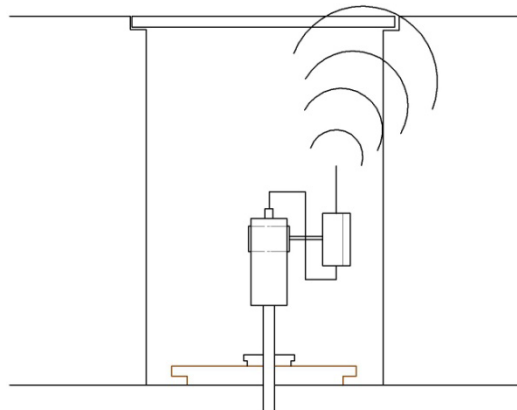


Figure 7: manhole with plastic cover  
Radio transmission with minimal attenuation

To install the VISY-Stick and the VISY-RFT-L, proceed as follows:

- Fit the VISY-Stick inside the pipe (riser) in the tank or using the screw-in unit (R 1½).

#### 4.2.3 Commissioning the VISY-RFT-L transmitting module

- The VISY-RFT-L transmitting module is equipped with a 4-core cable and M12 connector.
- For installations with screw-in unit, the M12 connector can be connected directly 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.

- For installations with pipe installation (riser), there must be a cable gland present in the seal cap of the pipe cover. The connection cable can be disconnected from the transmitting module and fed through the cable gland in the pipe cover.
- Screw the transmitter antenna into the relevant thread on the transmitting module.
- Open the cover of the VISY-RFT-L transmitting module and connect the battery connector to the appropriate contacts (see Figure 9). Check that the LED lights up for three seconds as soon as the connector is connected. Place the silica gel back inside the housing and close the cover.
- It is possible to attach the VISY-RFT-L radio transmitter to a pipe using the VISY-RFT installation kit (Art. No. 910040). At first, the antenna should be aligned vertically. Final antenna alignment and orientation of the housing will be determined by the quality of radio transmission (see following section).

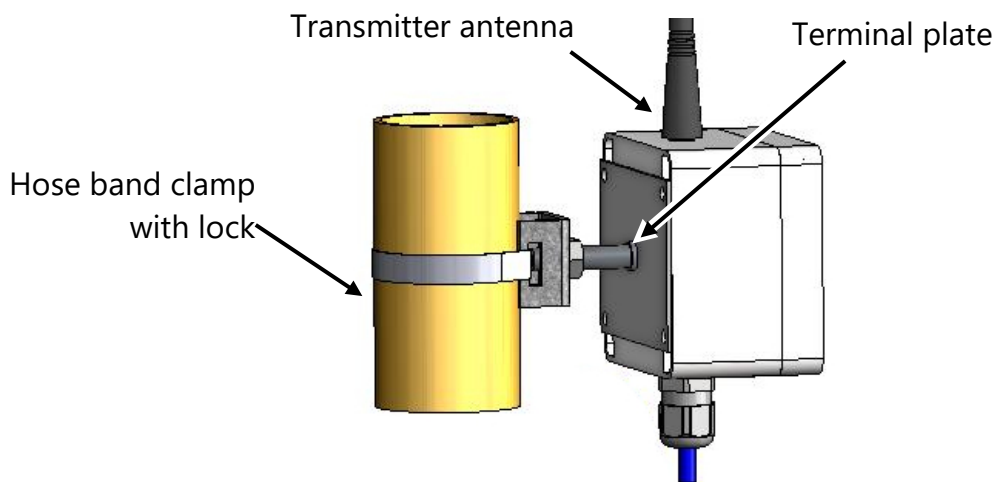


Figure 8: Installation Kit VISY-RFT



*Make sure that the dessicant (silica gel) has been placed inside the VISY-RFT-L transmitting module to prevent corrosion of the printed circuit boards.*



*In the interests of minimising data transmission interference, the radio path between transmitting module and receiver antenna should be clear and unobstructed.*

	Transmitting Antenna	Battery connector (protected against polarity reversal)
Sealing		

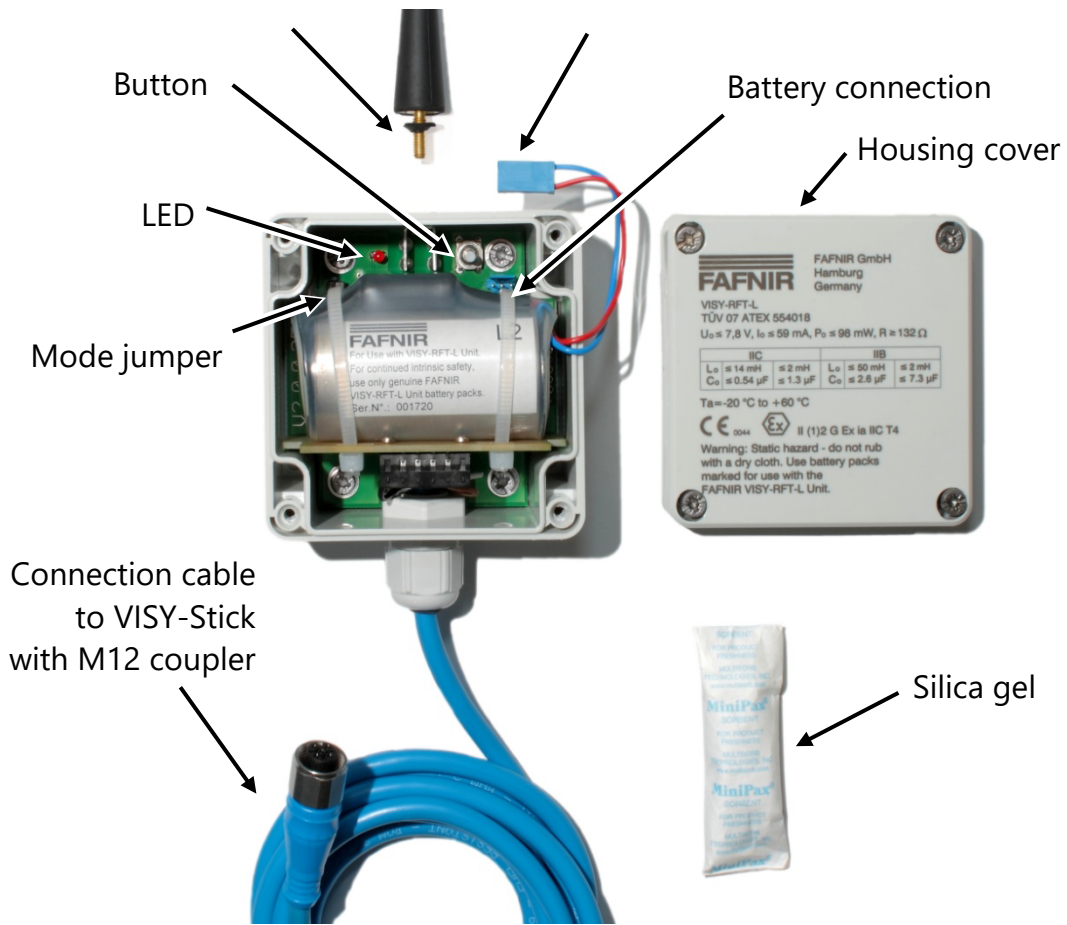



Figure 9: VISY-RFT-L transmitting module with cover removed

### 4.3 VISY-Command RF installation

The VISY-RFR receiver module is built into VISY-Command RF (4). An antenna (3) can be directly plugged into the BNC connector. To improve the reliability of transfer and on large installations, it is advisable to install a second antenna to the antenna connector (5).

 *Observe local building regulations concerning external antennas.*

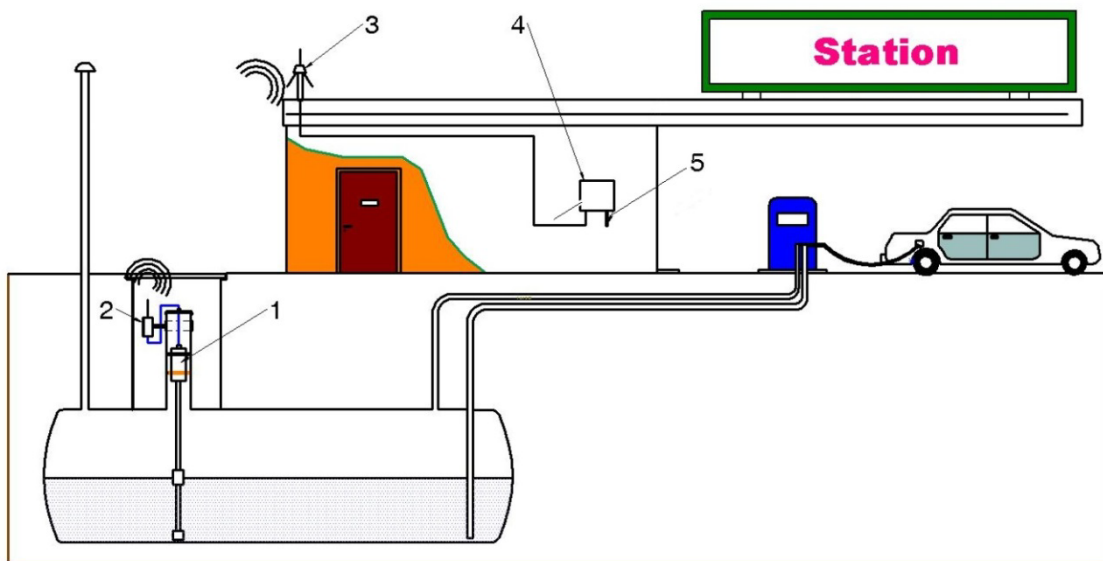


Figure 10: RF receiver module with directly connected receiver antenna

#### 4.3.1 Antenna for the receiver

The external VISY-Antenna (Art. No. 900072) with spherical directional characteristic is supplied with a 2.5 m, 50 ohm coaxial cable.



Figure 11: VISY-Antenna

The antenna can be mounted on a wall near the VISY-Command RF and positioned for optimum reception (see Figure 12).

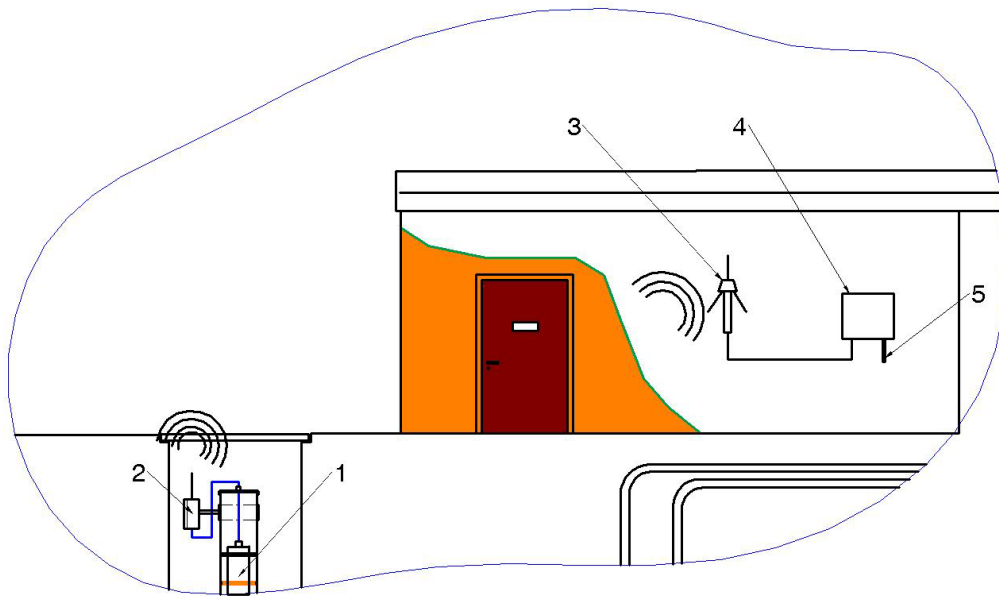


Figure 12: Receiving antenna with standard cable

If this situation proves unsatisfactory, it is possible to site the antenna inside or outside the building as close as possible to the location of the VISY-RFT-L transmitting modules as shown in the diagram below (see Figure 13).

A coaxial cable extension may be required. The maximum permissible attenuation of the coaxial cable should not exceed 30 dB. To establish the connection, we recommend the use of the special 50  $\Omega$  low-attenuation antenna cable RG 213 (art. no.: 900082) with BNC crimp connector and adapter (art. no.: 900083).

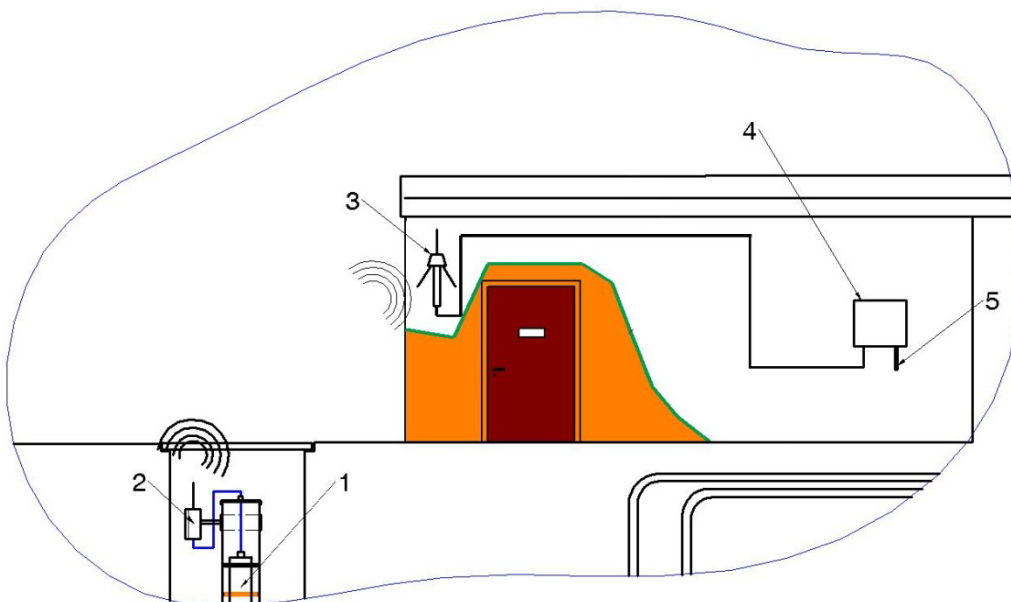


Figure 13: Receiving antenna with coaxial cable extension

The reception quality can be improved by a second receiving antenna. This additional antenna could, for example, be mounted on the petrol station building or canopy (see Figure 14).

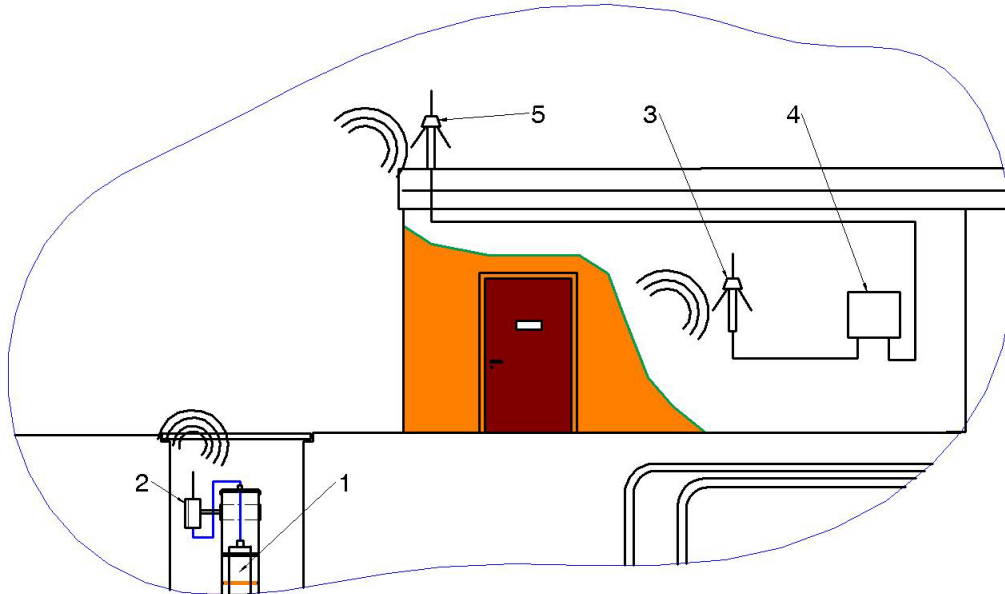


Figure 14: Two receiving antennas

## 5 Commissioning

### 5.1 VISY-RFT-L transmitting unit

The VISY-RFT-L transmitting unit features two modes of operation:

- Service mode
- Normal mode with two transmission intervals (every minute or every five minutes).



*Pressing the button toggles between service mode and normal mode.*

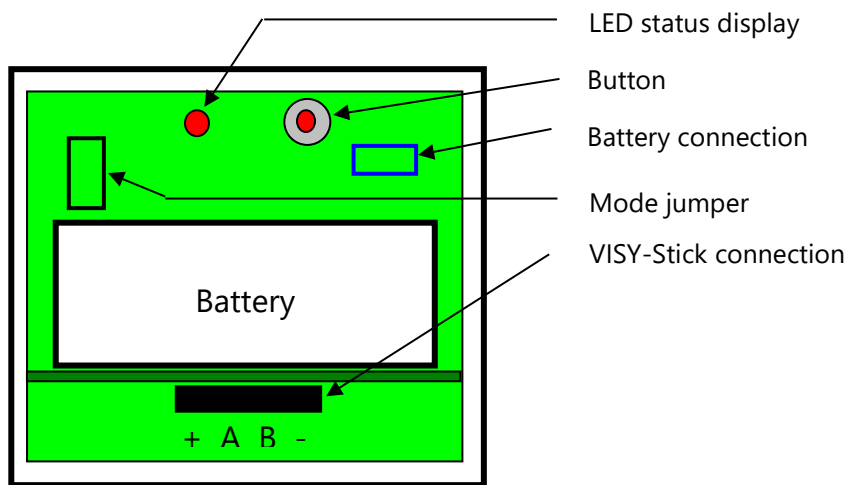
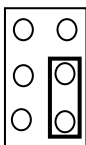


Figure 15: VISY-RFT-L transmitting unit; schematic diagram without cover

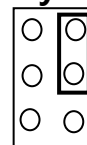
#### 5.1.1 Mode jumper

1 minute Mode



5 minutes mode

**(Factory setting)**



Transmits 3 data packets every minute

Transmits 6 data packets every five minutes



### 5.1.2 Service mode

After the system has been fully installed, it is necessary to check the quality of radio transmission. To do so, set the VISY-RFT-L transmitting unit to service mode by pressing the button. The locations of the button and LED indicator are shown in Figure 15.

As soon as you have pressed the button, service mode is indicated by the LED lighting up for two seconds. In this operating mode, one data packet is transmitted every two to five seconds. These short radio transmission intervals make it easier to check and correct the position of the antennas for optimum reception. Before each radio transmission, the LED flashes depending on the status of the transmitting unit (see Table 1).

After approximately 30 minutes, the VISY-RFT-L transmitting unit quits service mode automatically and returns to normal mode.

The system normally has more than one VISY-RFT-L transmitting unit installed. A collision of radio data packets is for the most part prevented by the VISY-RFT-L software.

### 5.1.3 Normal operation

In this mode of operation, the values measured by the VISY-Stick are transmitted either once every one or five minutes, depending on the position of the mode jumper (section 5.1.1).

In the 1 minute mode, the VISY-RFT-L transmitting unit sends 3 identical radio data packets.

In the 5 minute mode, the VISY-RFT-L transmitting unit sends 6 identical radio data packets.

The system normally has more than one VISY-RFT-L transmitting unit installed. A collision of radio data packets is for the most part prevented by the VISY-RFT-L software.

### 5.1.4 Status code

LED flashes ...	VISY-RFT-L transmitting unit status	VISY-Command RF status
1x	In operation	0
2x	No VISY-Stick connected	9
3x	Communication error	8
4x	VISY-Stick fault	1, 5, 6 or 7

Table 1: Status message of the VISY-RFT-L transmitting unit

## 5.2 Procedure for checking the radio signal quality

The field strength of the transmitters can be checked directly by viewing the status of VISY-Command RF in the VISY-Setup software application (based on the age of measured values and field strength parameters) (see Figure 16).

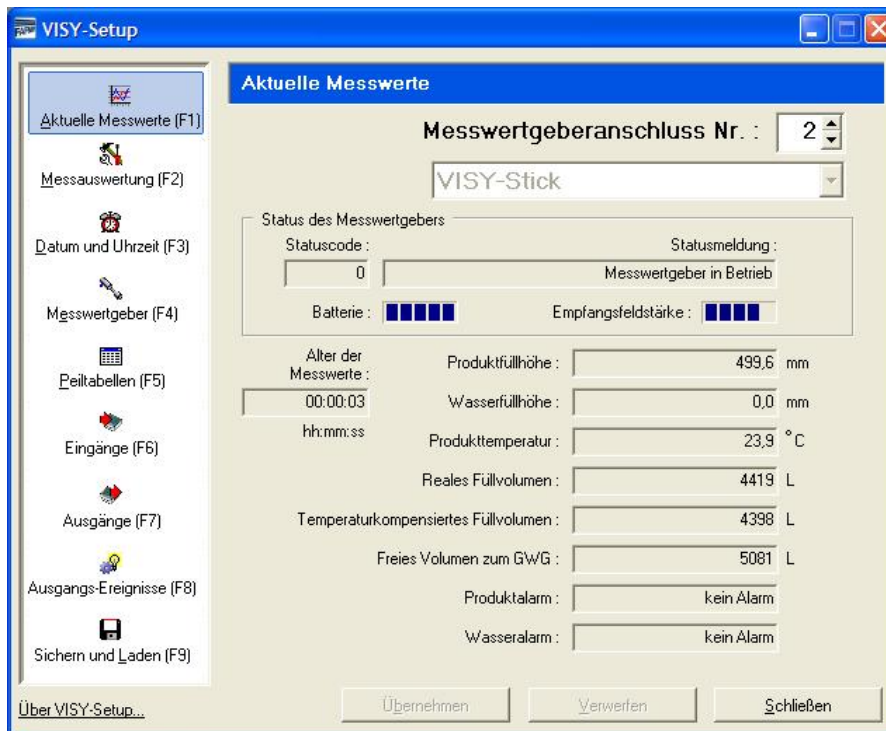


Figure 16: “Current Values” menu in VISY-Setup showing “Age of measured values”, “RF Field Strength” and “Battery”

If the RF Field Strength field is showing at least one bar, the system is working correctly. Now start the first transmitter in service mode and close the cover on the manhole concerned. If the data are still being received, this means that the reception conditions for this transmitter are satisfactory. It is now possible to check the field strength using the VISY-RF Meter. An input sensitivity of  $-80$  dBm is recommended, but a minimum input sensitivity of  $-97$  dBm is required.

If a satisfactory field strength is not detected, the receiver antenna is sited too far away or it is too heavily shielded. In this event, it will be necessary to find a better position inside or outside the building using the VISY-RF Meter (see section 1.4).

Figure 10 to Figure 13 in section 4.3 show the various possibilities. At this stage, the receiver antenna should be secured only provisionally because the reception conditions vary for each underground tank and must be acceptable for **all** transmitters.

Transmitters for which the minimum prerequisites are not fulfilled when the manhole cover is closed should be relocated inside the manhole or have their antenna alignment adjusted.

The potential for improving the quality of transmission from the manhole depends on the design (see section 4.2).

At the first attempt, the antenna should be fitted vertically (parallel to the receiver antenna). If the manhole has a metal cover, a horizontal antenna alignment may be more suitable. In this event, the horizontal antenna should always be aligned 90° to the line of sight first. Due to the abundance of possible reflections that occur inside an enclosed manhole, it may be that an antenna alignment angle other than 90° results in a stronger signal being received at the location of the receiver antenna.

- Masonry/concrete manhole with metal cover and frame: Due to the shielding effect of the metal cover, it may be better to site the transmitter deeper down the manhole. If this measure does not lead to any success, we recommend the use of an approved plastic cover.
- Manhole made of plastic tube with metal cover and metal tube in the upper part: Due to the shielding effect of the metal tube, the transmitter should be placed beneath the metal tube end. If this measure does not prove satisfactory, we recommend the use of an approved plastic cover.
- Manhole in welded steel with metal cover and frame:  
Weaker signals from the manhole should be expected with this type of construction. One possible solution could be to replace the cover with an approved plastic cover. Another possibility would be to place the receiving antenna as close as possible to the transmitter antenna, i.e. on the canopy immediately above the cover, or to install the VISY-RFT-L transmitting unit outside the manhole (Figure 18). If the desired effect is still not achieved, it will be necessary to route a cable.



*If an extension to the connection cable is required, the junction joining the cable ends must be established safely, i.e. with protection against water ingress. We recommend the use of our IP68 cable connector (Art. No.: 910035), for example.*



Figure 17: IP68 cable connector

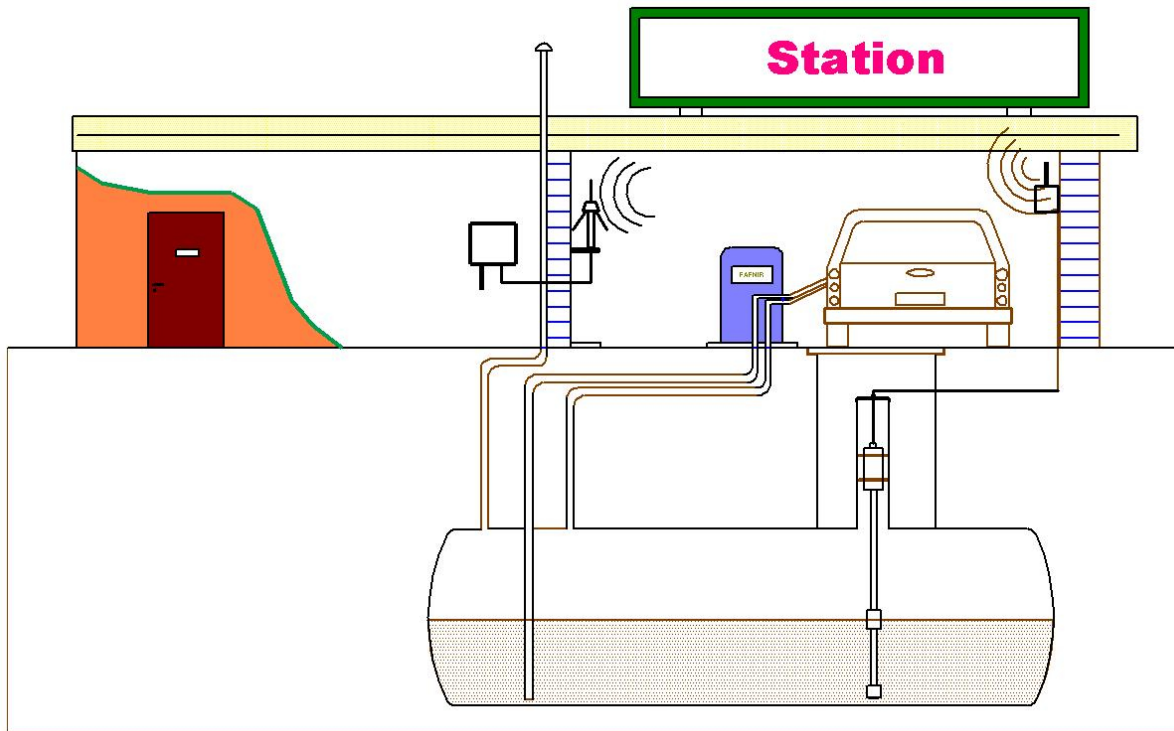




Figure 18: VISY-RFT-L transmitting unit installed outside the manhole

-  *Reception quality can be seriously affected by the presence of ice and snow on the manhole cover.*
-  *Reception quality can be seriously affected if the line of sight between manhole and receiver antenna is blocked by a vehicle.*

The procedure described should help to achieve satisfactory transfer properties in the majority of cases. When the data transfer quality of each sensor has been checked, it is necessary to fix all components of the VISY-RF wireless system in their final position.

## **6 General notes and troubleshooting**

### **6.1 Radio signal losses**

Radio signals are influenced by the presence of objects along the propagation path. This must be taken into consideration when deciding on the optimum position for siting the antennas. Whenever a radio signal encounters an object, signal power is reduced because some of the signal is absorbed or reflected by the object and the wanted signal is weakened. This attenuation can vary with the type of object penetrated by the radio signal. Losses are significantly increased by objects that have a high metal content, for example.

- Price towers, dispensers, and other objects common to petrol stations, can lead to losses of 5 – 15 dB, depending on object size and material.
- Walls can cause losses of 10 – 30 dB, depending on type of construction.
- Bushes, trees or earth can be responsible for losses of 10 – 30 dB.

### **6.2 Radio line of sight**

Radio line of sight refers to the clear, unimpeded signal path between transmitter and receiver. For the VISY-RF wireless system, the receiver antenna should be placed in direct line of sight to the manhole.

### **6.3 Interference radiation**

Radio interference distorts or completely overlaps the received signal with the effect that it becomes impossible to evaluate. Interference radiation can be caused by devices nearby, e.g. transmitters on the same frequency.

### **6.4 Equipment location**

The VISY-RFT-L transmitters should be mounted as high as possible in the manhole.

The receiver antenna should be installed in a position within direct line of sight of the manholes to enable unimpeded transfer of the radio signal. If possible, the antenna should be mounted in a corner to exploit the parabolic effect and improve reception.

## 6.5 Error codes and troubleshooting tips


The error codes below may be displayed by the VISY-Setup software application (see Figure 16). In VISY-Command RF, the same error codes are represented by the two 7-segment LED displays.


Error code	Description	Suggested solution
1-7	Problem with the VISY-Stick probe	See "VISY-Stick and VISY-Command" technical documentation
8	Bad connections between VISY-RFT-L and VISY-Stick	Check cable connections (M12 connectors)
9	No sensor connected to VISY-RFT transmitter	Check connections and functional condition of VISY-Stick
10	No data available	Check connections inside VISY-Command RF between VISY-RFR and VI-Board
11	Communication fault	Check all components
13	Waiting for first data transfer	


Table 2: List of error codes


## 6.6 Battery

The status of the battery can be checked using VISY-View or the VISY-Setup software application (see Figure 16). Five bars indicate that the battery is fully charged. Even if only one bar is displayed for the battery, the battery should still have sufficient charge to last a few weeks. However, the next battery change should be scheduled immediately to prevent failure of the VISY-RFT-L transmitter. If no bars are displayed, the battery has completely expired.

 *Battery performance is temperature-dependent. The battery operates only in the temperature range of -20 to +60 °C.*

 *The battery should be replaced if the display is reporting battery flat ( $\leq 1$  bar).*

 *It is permissible to replace the battery within the potentially explosive atmosphere (zone 1).*

 *In the interests of explosion safety, only the use of original FAFNIR batteries (art. no. 900095) is permitted.*



Separate collection:  
The batteries must be disposed of as special waste.



## 7 Technical Data

### 7.1 General data

Frequency	433.92 MHz
Signal path (line of sight)	max. 250 m

### 7.2 VISY-RFT-L transmitter

Radio power output	+8 dBm
Antenna	Lambda ¼ antenna with M4 set screw
Battery pack	Lithium
Battery capacity	VISY-RFT-L2 = 19 Ah
Expected battery life-time at 20 °C ambient temperature and average tank filling of 30 minutes/day	
	4 years (5 minutes mode)
	2 years (1 minute mode)
Battery art. no.	900095
Housing	80 x 82 x 55 [mm]
Protection class	IP 67
Operating temperature range	-20 ... +60 °C

### 7.3 VISY-RFR receiver (in VISY-Command RF)

Sensitivity	-107 dBm
Antenna connection	2 x BNC
Supply voltage	230 VAC ±10 %; 50 – 60 Hz
Power:	1 W
Dimensions	137 x 75 x 52 [mm]



**EU-Konformitätserklärung  
EU Declaration of Conformity  
Déclaration UE de Conformité**

**FAFNIR GmbH  
Schnackenburgallee 149 c  
22525 Hamburg  
Deutschland / Germany / Allemagne**

erklärt als Hersteller in alleiniger Verantwortung, dass das Produkt  
declares as manufacturer under sole responsibility that the product  
déclare sous sa seule responsabilité en qualité de fabricant que le produit

**Funksender / Radio Transmitter / Émetteur radioélectrique**

**VISY-RFT-L**

den Vorschriften der europäischen Richtlinien  
complies with the regulations of the European directives  
est conforme aux réglementations des directives européennes suivantes

2011/65/EU	<b>Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten</b>	<b>RoHS</b>
2011/65/EU	<b>Restriction of the use of certain hazardous substances in electrical and electronic equipment</b>	<b>RoHS</b>
2011/65/UE	<b>Limitation de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques</b>	<b>RoHS</b>
2014/34/EU	<b>Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen</b>	<b>ATEX</b>
2014/34/EU	<b>Equipment and protective systems intended for use in potentially explosive atmospheres</b>	<b>ATEX</b>
2014/34/UE	<b>Appareils et systèmes de protection destinés à être utilisés en atmosphères explosibles</b>	<b>ATEX</b>
2014/53/EU	<b>Bereitstellung von Funkanlagen auf dem Markt und zur Aufhebung der Richtlinie 1999/5/EG</b>	<b>FAR</b>
2014/53/EU	<b>Making available on the market of radio equipment and repealing Directive 1999/5/EC</b>	<b>RED</b>
2014/53/UE	<b>Mise à disposition sur le marché d'équipements radioélectriques et abrogeant la directive 1999/5/CE</b>	<b>DER</b>

durch die Anwendung folgender harmonisierter Normen entspricht  
by applying the harmonised standards  
par l'application des normes

**RoHS / RoHS / RoHS  
ATEX / ATEX / ATEX**

**EN 50581:2012  
EN 60079-0:2012 + A11:2013  
EN 60079-11:2012  
EN 300 220-2 V3.1.1**

**FAR / RED / DER**

Das Produkt ist bestimmt als Elektro- und Elektronikgerät der RoHS-  
The product is determined as electrical and electronic equipment of RoHS  
Le produit est déterminés comme des équipements électriques et électroniques de RoHS

**Kategorie / Category / Catégorie**

**IT- und Telekommunikationsgeräte  
IT and telecommunications equipment  
Équipements informatiques et de télécommunications**

Die notifizierte Stelle TÜV NORD CERT GmbH, 0044 hat eine EU-Baumusterprüfung durchgeführt und folgende Bescheinigung ausgestellt  
The notified body TÜV NORD CERT GmbH, 0044 performed a EU-type examination and issued the certificate  
L'organisme notifié TÜV NORD CERT GmbH, 0044 a effectué examen UE de type et a établi l'attestation

**VISY-RFT-L**

**TÜV 07 ATEX 554018 X**

Das Produkt entspricht dem FAR-Konformitätsbewertungsverfahren und den FAR-Anforderungen  
The product complies with the RED conformity assessment procedure and the RED requirements  
Le produit est conforme avec la procédure d'évaluation de la conformité DER et des exigences DER

**VISY-RFT-L  
Sender / Transmitter / Émetteur**

**Modul A / Module A / Module A  
Auslastungsgrad < 10 % / Duty cycle < 10 % / Cycle de service < 10 %**

Hamburg, 14.08.2017  
Ort, Datum / Place, Date / Lieu, Date

  
Geschäftsführer / Managing Director / Gérant: René Albrecht





**EU-Konformitätserklärung  
EU Declaration of Conformity  
Déclaration UE de Conformité**

**FAFNIR GmbH  
Schnackenburgallee 149 c  
22525 Hamburg / Germany**

erklärt als Hersteller in alleiniger Verantwortung, dass das Produkt  
declares as manufacturer under sole responsibility that the product  
déclare sous sa seule responsabilité en qualité de fabricant que le produit

**Funkempfänger  
Radio Receiver  
Récepteur radioélectrique  
VISY-RFR-D**

den Vorschriften der europäischen Richtlinien  
complies with the regulations of the European directives  
est conforme aux réglementations des directives européennes suivantes

2011/65/EU	Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten	RoHS
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment	RoHS
2011/65/UE	Limitation de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques	RoHS
2014/30/EU	Elektromagnetische Verträglichkeit	EMV
2014/30/EU	Electromagnetic compatibility	EMC
2014/30/UE	Compatibilité électromagnétique	CEM
2014/35/EU	Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt	NSRL
2014/35/EU	Making available on the market of electrical equipment designed for use within certain voltage limits	LVD
2014/35/UE	Mise à disposition sur le marché du matériel électrique destiné à être employé dans certaines limites de tension	DBT
2014/53/EU	Bereitstellung von Funkanlagen auf dem Markt und zur Aufhebung der Richtlinie 1999/5/EG	FAR
2014/53/EU	Making available on the market of radio equipment and repealing Directive 1999/5/EC	RED
2014/53/UE	Mise à disposition sur le marché d'équipements radioélectriques et abrogeant la directive 1999/5/CE	DER

durch die Anwendung folgender harmonisierter Normen entspricht  
by applying the harmonised standards  
par l'application des normes

<b>RoHS / RoHS / RoHS</b>	<b>EN 50581:2012</b>
<b>EMV / EMC / CEM</b>	<b>ETSI EN 300 220-1 V2.4.1</b>
<b>NSRL / LVD / DBT</b>	<b>EN 61010-1:2010</b>
<b>FAR / RED / DER</b>	<b>ETSI EN 300 220-2 V2.4.1</b>

Das Produkt ist bestimmt als Elektro- und Elektronikgerät der RoHS-  
The product is determined as electrical and electronic equipment of RoHS  
Le produit est déterminés comme des équipements électriques et électroniques de RoHS

**Kategorie / Category / Catégorie** **Überwachungs- und Kontrollinstrumenten in der Industrie /  
Industrial Monitoring and Control Instruments /  
Instruments de contrôle et de surveillance industriels**

Das Produkt entspricht den EMV-Anforderungen  
The product complies with the EMC requirements  
Le produit est conforme aux exigences CEM

**Empfänger / Receiver / Récepteur** **Kategorie 2 / Category 2 / Catégorie 2**

Das Produkt entspricht dem NSRL- und FAR Konformitätsbewertungsverfahren  
The product complies with the LVD and RED conformity assessment procedure  
Le produit est conforme avec la procédure d'évaluation DBT et DER de la conformité

**VISY-RFR-D** **Modul A / Module A / Module A**

Hamburg, 13.06.2016  
Ort, Datum / Place, Date / Lieu, Date

Geschäftsführer / Managing Director / Gérant: René Albrecht

Translation

(1) **EU-Type Examination Certificate**

- (2) Equipment and protective systems intended for use in potentially explosive atmospheres, **Directive 2014/34/EU**



- (3) **Certificate Number** TÜV 07 ATEX 554018 X **issue:** 00
- (4) for the product: Radio Transmitter type VISY-RFT-L
- (5) of the manufacturer: **FAFNIR GmbH**
- (6) Address: Schnackenburgallee 149 c, 22525 Hamburg, Germany
- Order number: 8000468089
- Date of issue: 2017-07-28

- (7) The design of this product and any acceptable variation thereto are specified in the schedule to this EU-Type Examination Certificate and the documents therein referred to.

- (8) The TÜV NORD CERT GmbH, Notified Body No. 0044, in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and the Council of 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential ATEX Assessment Report No. 17 203 193457.

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

**EN 60079-0:2012 + A11:2013** **EN 60079-11:2012**

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

- (10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions for Use specified in the schedule to this certificate.
- (11) This EU-Type Examination Certificate relates only to the design, and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.
- (12) The marking of the product shall include the following:

 **II 1 G Ex ia IIC T4 Ga**

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body

  
Andreas Meyer

Hanover office, Am TÜV 1, 30519 Hannover, Tel. +49 511 998-61455, Fax +49 511 998-61590

**(13) SCHEDULE**

**(14) EU-Type Examination Certificate No. TÜV 07 ATEX 554018 X issue 00**

(15) Description of product

The radio transmitter type VISY-RFT-L is an intrinsically safe device for category 1 (zone 0) for the transmission of data from the level measurement from category 1 (zone 0). The radio transmitter polls periodically the sensor according to its data and sends it via a unidirectional radio link. The radio transmitter is operated with a replaceable battery pack.

Type designation:

VISY-RFT-L Radio transmitter  
 L0 Battery pack with small capacity  
 L1 Battery pack with medium capacity  
 L2 Battery pack with large capacity

Technical data:

Auxiliary power Nominal voltage 3.6 V  
 from battery pack type L0, L1 or L2 from Co. FAFNIR GmbH

Sensor circuit in type of protection "Intrinsic Safety" Ex ia IIC/IIB  
 (terminals +, A, B, -) Maximum values:  
 $U_o = 7.8 \text{ V}$   
 $I_o = 59 \text{ mA}$   
 $P_o = 98 \text{ mW}$

Characteristic line: linear

$C_i$  negligibly small  
 $L_i$  negligibly small

The maximum permissible values for the external inductance ( $L_o$ ) and capacitance ( $C_o$ ) shall be taken from the following table:

	Ex ia IIC		Ex ia IIB	
	$L_o$	10 mH	5 mH	50 mH
$C_o$	0.69 $\mu\text{F}$	0.95 $\mu\text{F}$	2.6 $\mu\text{F}$	4 $\mu\text{F}$

The aforementioned maximum values of  $L_o$  and  $C_o$  consider the coincidental appearance of capacitance and inductance with the intention to allow the use of long connecting cables. When the radio transmitter is used in a potentially explosive atmosphere, the concentrated inductance of the connected sensor must not exceed a value of 90  $\mu\text{H}$  for Group IIC respectively 390  $\mu\text{H}$  for Group IIB.

Permissible range of ambient temperature range: -40 °C to + 60 °C.

For application in zone 0 (1G) when potentially explosive atmosphere exists it must be considered the standard atmospheric conditions of a temperature from -20 °C to +60 °C and pressure from 0.8 bar to 1.1 bar. If no potential explosive atmosphere exists, the devices may also be operated at the aforementioned permissible ambient temperature range.

**Schedule to EU-Type Examination Certificate No. TÜV 07 ATEX 554018 X issue 00**

(16) Drawings and documents are listed in the ATEX Assessment Report No. 17 203 193456.

(17) Specific Conditions for Use

The radio transmitter is built in a plastic enclosure. The risk of ignition by static electricity due to friction on the enclosure has to be avoided. The equipment shall be cleaned only with damp or antistatic cloth.

(18) Essential Health and Safety Requirements

no additional ones

- End of Certificate -

## 8.4 Operating Instructions VISY-RFT-L...

Operating Instructions according to Directive 2014/34/EU TÜV 07 ATEX 554018 X

Wireless transmitter type VISY-RFT-L

Status: 07.2017

### I Range of application

The VISY-RFT-L radio transmitter is an intrinsically safe device for transmitting data of level measurements in potentially explosive atmospheres. The radio transmitter is operated with a replaceable battery unit.

### II Standards

The radio transmitter is designed in accordance with the following European standards

EN 60079-0:2012 + A11:2013	Equipment - General requirements
EN 60079-11:2012	Equipment protection by intrinsic safety "i"

### III Instructions for safe ...

#### III.a ... use

The radio transmitter serves as intrinsically safe equipment and is suitable for use in potentially explosive area (Zone 0). The intrinsically safe sensor circuit can be installed in Ex Zone 0 and is suitable for all gas groups (IIA, IIB and IIC).

The approval applies to the device version VISY-RFT-L with the battery unit "L0", "L1" or "L2".

#### III.b ... assembling and dismantling

To install the radio transmitter or make changes to it such as changing the battery unit, it is necessary to disassemble the upper housing part from the lower housing part. To do this, loosen the four screws on the upper housing part. After the work, the housing must be closed again with the four screws.

#### III.c ... Installation

Special rules and regulations, including EN 60079-14 and local installation regulations, must be observed.

The radio transmitter is suitable for wall mounting. In order to reach the mounting holes, the housing must be dismantled.

For the wiring (preferably blue cable) from the radio transmitter to the sensor, the permissible inductance and capacitance under item V must not be exceeded.

#### III.d ... adjustment

No Ex-relevant equipment is required for operating the radio transmitter.

#### III.e ... putting into service

Before putting into service, all devices must be checked of right connection and fitting.

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

The radio transmitter is generally maintenance-free. In case of a defect, it must be send back to FAFNIR or one of its representations.

Warning: The cleaning of the housing must only be carried out with a damp cloth.

There is compliance with the requirements for the dielectric strength between the intrinsically safe circuit and the chassis of the radio transmitter in accordance with EN 60079-11, section 6.3.13.

Only FAFNIR battery units (L0, L1 or L2) may be used when replacing the battery unit. Replacing the battery unit does not require the exclusion of an explosive atmosphere.

### IV Device marking

1	Manufacturer:	FAFNIR GmbH, 22525 Hamburg
2	Type designation:	VISY-RFT-L
3	Certificate number:	TÜV 07 ATEX 554018 X
4	Ex marking:	⊕ II 1 G Ex ia IIC T4 Ga
5	Warning label:	WARNING – Potential electrostatic charging hazard – See instructions
6	CE marking:	CE 0044
7	Battery using:	Use only replaceable battery pack FAFNIR L0, L1 or L2
8	Technical Data	See instructions for technical data

Additionally the battery unit is characterized as follows:

1	Manufacturer:	FAFNIR GmbH, 22525 Hamburg
2	Type designation:	L0, L1 or L2
3	Use:	Use only on VISY-RFT-L

## V Technical data

Only the FAFNIR battery units L0, L1 or L2 may be used as auxiliary energy for the radio transmitter!

The electric circuit of the sensor is designed with "intrinsic safety" (ia) ignition protection class with a linear output characteristic. The output values are:

Output voltage	$U_o \leq 7,8 \text{ V}$
Output current	$I_o \leq 59 \text{ mA}$
Output power	$P_o \leq 98 \text{ mW}$
Internal inductance	$L_i$ negligibly small
Internal capacitance	$C_i$ negligibly small

The permissible external inductance and capacitance are:

	IIC		IIB	
$L_o \leq$	10 mH	5 mH	50 mH	20 mH
$C_o \leq$	690 nF	950 nF	2.6 $\mu\text{F}$	4 $\mu\text{F}$

The maximum values of the parameter pairings may simultaneously be used as concentrated capacitance and concentrated inductance.

The maximum temperature is:

Ambient temperature:	$T_a = -40 \text{ }^\circ\text{C} \dots +60 \text{ }^\circ\text{C}$
----------------------	---

For use in category 1G:

The process pressure for the media must be between 0.8 bar and 1.1 bar where explosive vapour-air mixtures are present. If no explosive mixtures are present, the equipment may also be operated outside this area according to the manufacturer's specification.

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

Zone 0 exists only under atmospheric conditions:	
Temperature range:	20 $^\circ\text{C}$ ... +60 $^\circ\text{C}$
Pressure range:	0.8 bar ... 1.1 bar
Oxidants:	Air (oxygen content approx. 21 %)

The radio transmitter achieves a housing protection degree of:

Degree of protection:	$\leq \text{IP66}$
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## VI Special conditions for use

The radio transmitter is built in a plastic housing. The risk of ignition by static electricity due to friction on the housing is to be avoided.

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