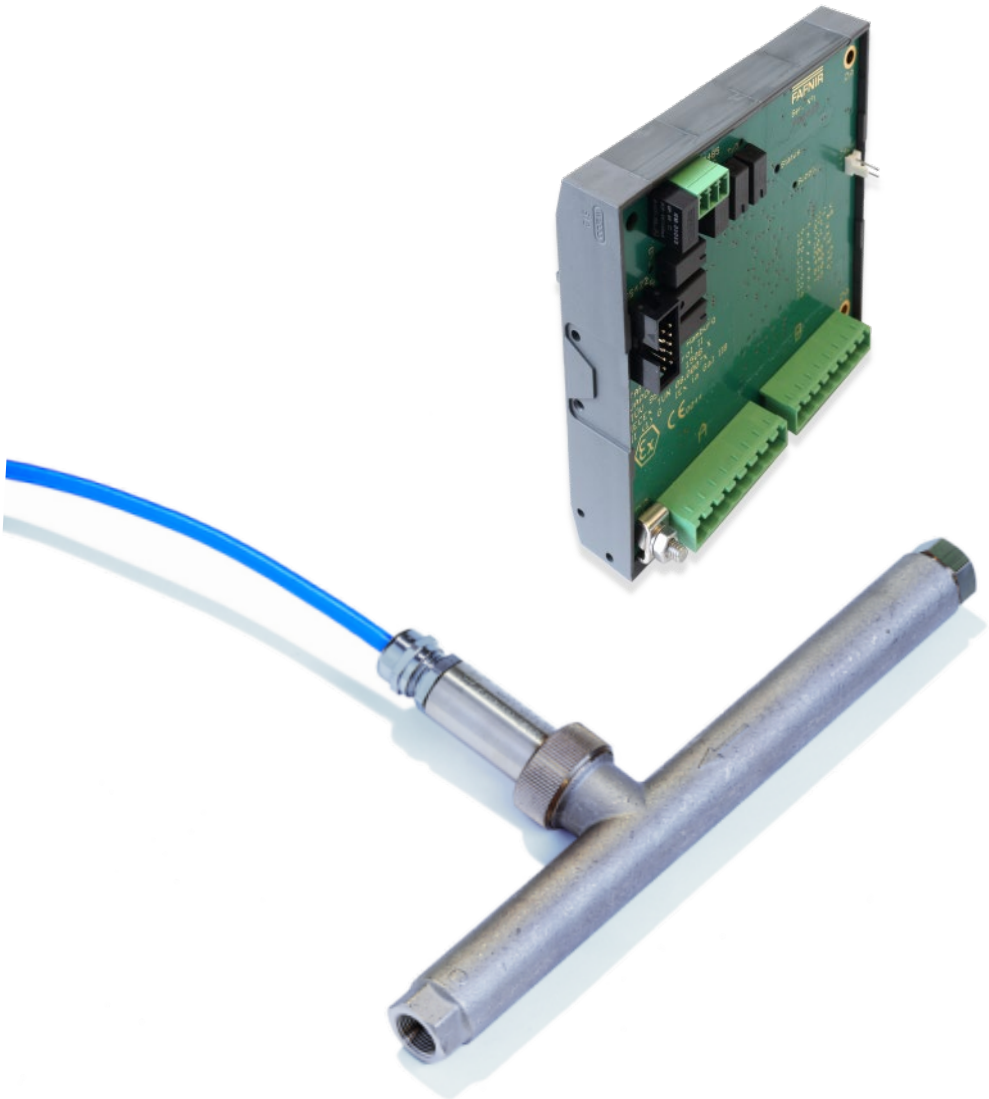
Technical Documentation

VAPORIX

VAPORIX-Flow and VAPORIX-Control II



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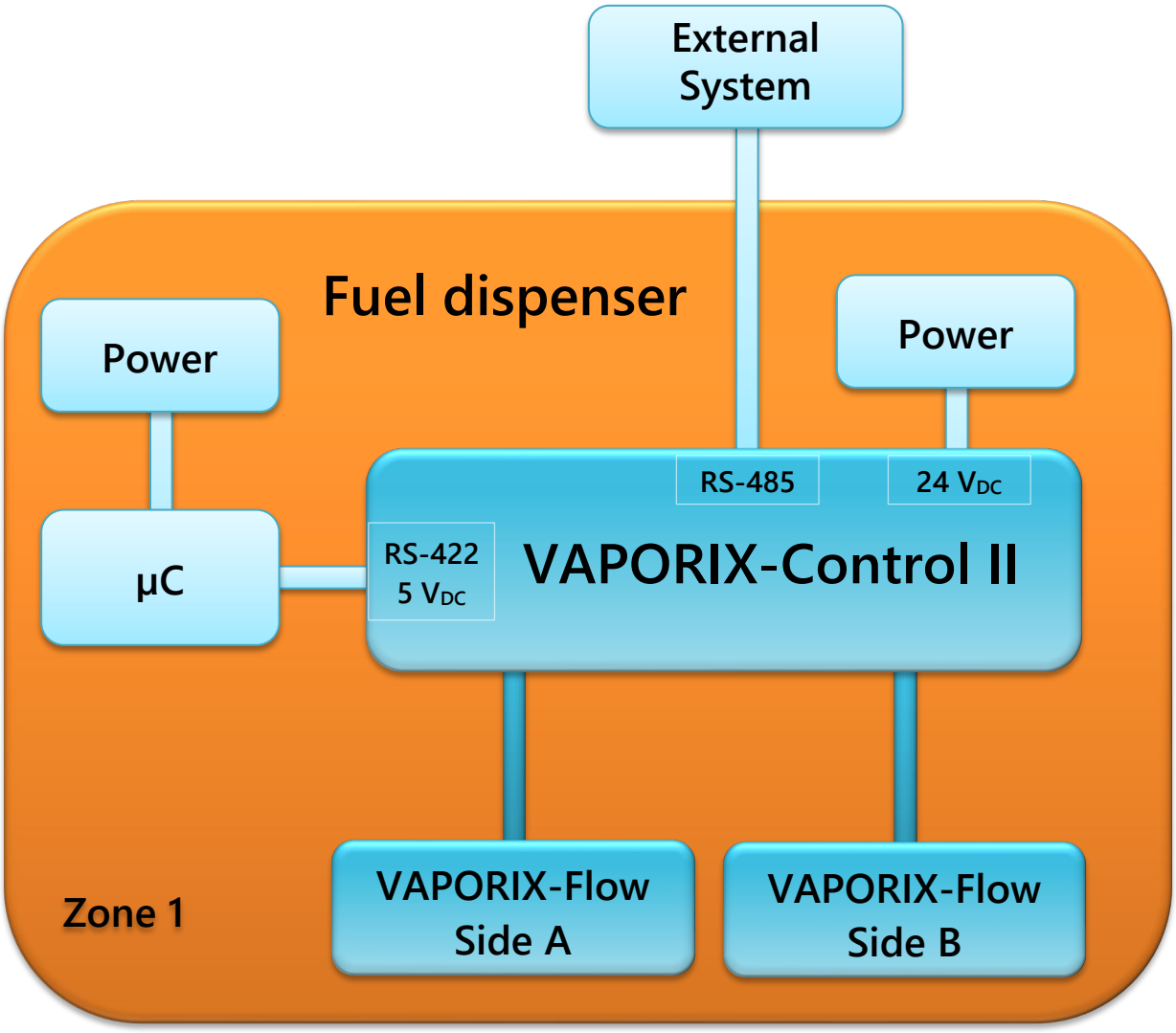
1 Properties of the VAPORIX system

The VAPORIX system (vapor recovery information system) is an automatic monitoring device to check the function of the vapor recovery systems (Stage II) at filling stations. The VAPORIX system is approved in compliance with the German 21th Federal Immission Control Ordinance and the European Directives 2009/126/EC and 2014/99/EU.

During the fuelling process the vapour flow is registered together with the fuel flow of the according fuelling point. After the fuelling process has been completed, an evaluation is performed and the status of the vapour recovery system is sent to a master system signalled with an LED.

A VAPORIX system consists of two VAPORIX-Flow transmitters for monitoring both sides of the dispenser and one VAPORIX-Control II evaluation unit. The VAPORIX-Flow transmitter is fitted into the vapour recovery pipe. The VAPORIX-Control II evaluation unit is mounted in the computer head of the dispenser. The transmitters, the data cable and the auxiliary power supply are connected to the evaluation unit. The system is maintenance-free.

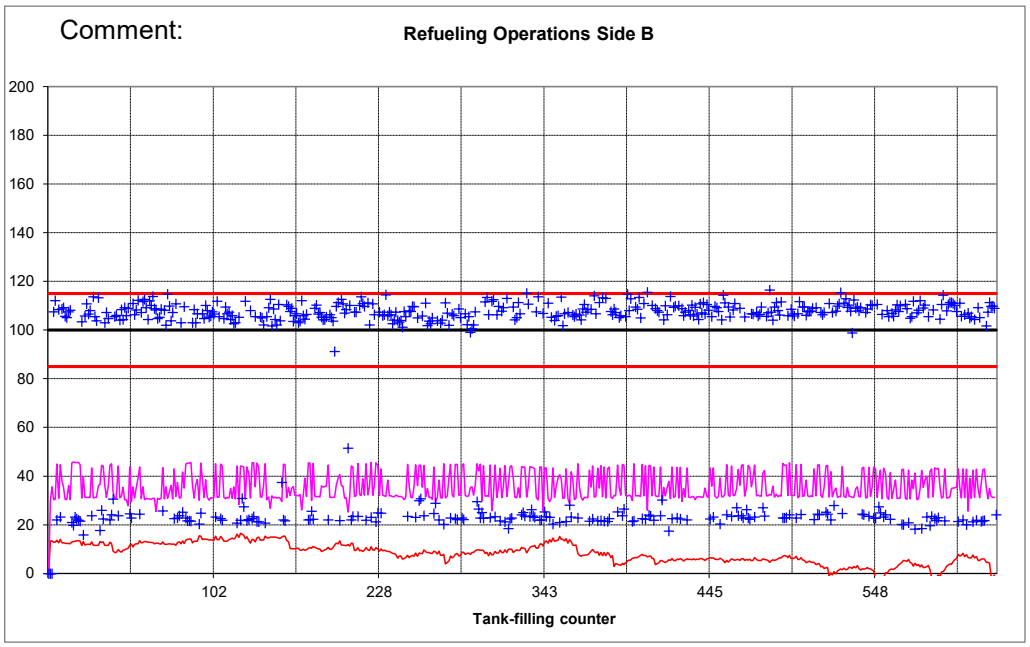


In addition, the evaluation unit can be extended by the following VAPORIX components:

- SECON with SECON-Vap

  Signalling device to indicate the function status of the vapour recovery and the VAPORIX system (displays faults, saves and acknowledges), see technical documentation SECON Client, art. no. 350076; technical documentation SECON-Vap User guide, art. no. 350113; and technical documentation SECON-Vap Administrator, art. no. 350134

- VAPORIX-Diagnostics



  Excel-based program for automatic reading and graphical representation of the VAPORIX history data of both dispenser sides
  (see technical documentation VAPORIX-Diagnostics, art. no. 207155)

2 Safety instructions

The VAPORIX system is designed for measuring and evaluating the vapour flow of vapour recovery systems at petrol stations. The system must be used exclusively for this purpose. The manufacturer accepts no liability for any form of damage resulting from improper use.

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

For this reason, the following safety instructions must be observed:

- 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, use and maintenance of the transmitter and the evaluation unit must be carried out only by expert personnel. Specialised knowledge must be acquired by regular training.
- Operators, installers and service technicians must observe all applicable safety regulations. This also applies to any local safety and accident prevention regulations which are not stated in this user guide.
- VAPORIX-Flow and VAPORIX-Control II are subject to explosion protection and environmental approvals and are therefore only allowed to be repaired by FAFNIR or companies authorized by FAFNIR. In case of failure, always the entire transmitter or the entire evaluation unit must be replaced.
- The VAPORIX-Control II evaluation unit is exclusively intended for mounting in the protective casing of the dispenser computer and not to be used in hazardous areas. It is only intended for use within the VAPORIX system.

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

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

Useful information which ensures continued and correct operation of the system and makes your work easier.

3 VAPORIX-Flow transmitter

3.1 Design and function

The VAPORIX-Flow transmitter is a calorimetric flow sensor with integrated vapour concentration sensor, which supplies accurate results even in case of changing vapour concentrations.

VAPORIX-Flow consists of a measuring tube with inlet section (1), outlet section (2) and side-fitted sensor support (3) (see Figure 1).

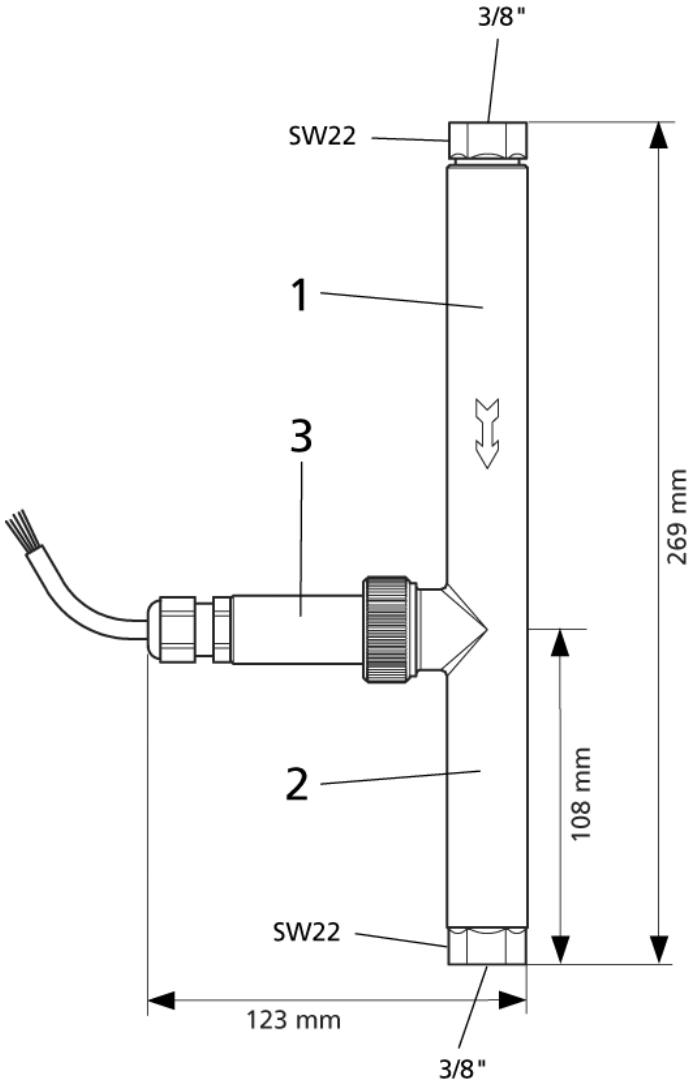


Figure 1: VAPORIX-Flow transmitter

In the sensor support (3) there are three sensors. A temperature sensor to measure the vapour temperature, a heat dissipating sensor to determine the flow and a heat dissipating sensor to measure the vapour concentration.

The measurement of flow rate and vapour concentration is based on the calorimetric principle. Here, the heat dissipation of the electrically heated sensor into the flowing medium is utilized as a measuring effect. The vapour concentration is required for precise evaluation of the flow rate.

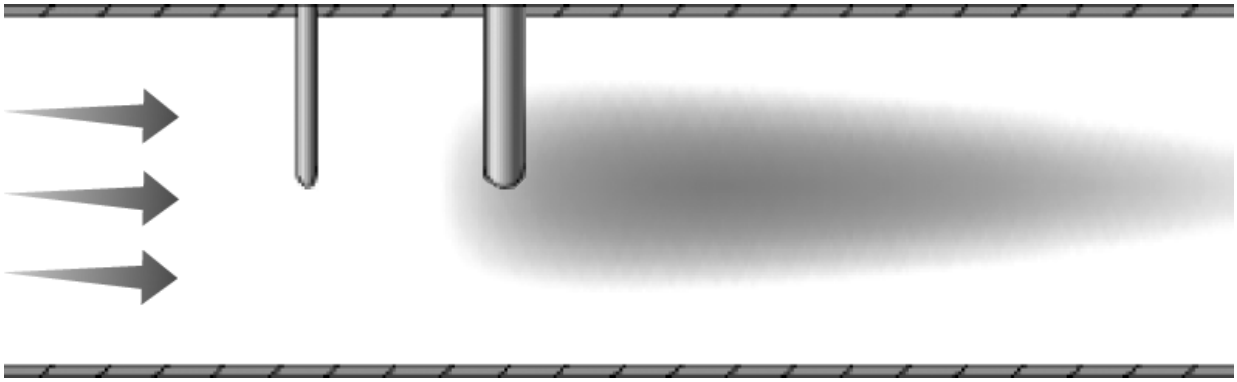


Figure 2: Function principle of the VAPORIX-Flow

The grey tail represents the heat dissipation into the flowing medium.

3.2 Installation

⚠ *When working with the transmitter, the national safety and accident prevention regulations and safety instructions in this manual must be observed.*

⚠ *When installing and operating the transmitter, the national requirements of Explosion Protection Regulations, Industrial Health and Safety Regulations and Equipment Safety Regulations as well as generally accepted rules of engineering and these operating instructions must be observed.*

⚠ *VAPORIX-Flow and VAPORIX-Control II are subject to explosion protection and environmental approvals and are therefore only allowed to be repaired by FAFNIR or companies authorized by FAFNIR. In case of failure, always the complete transmitter must be replaced.*

3.2.1 Installation of VAPORIX-Flow in the dispenser

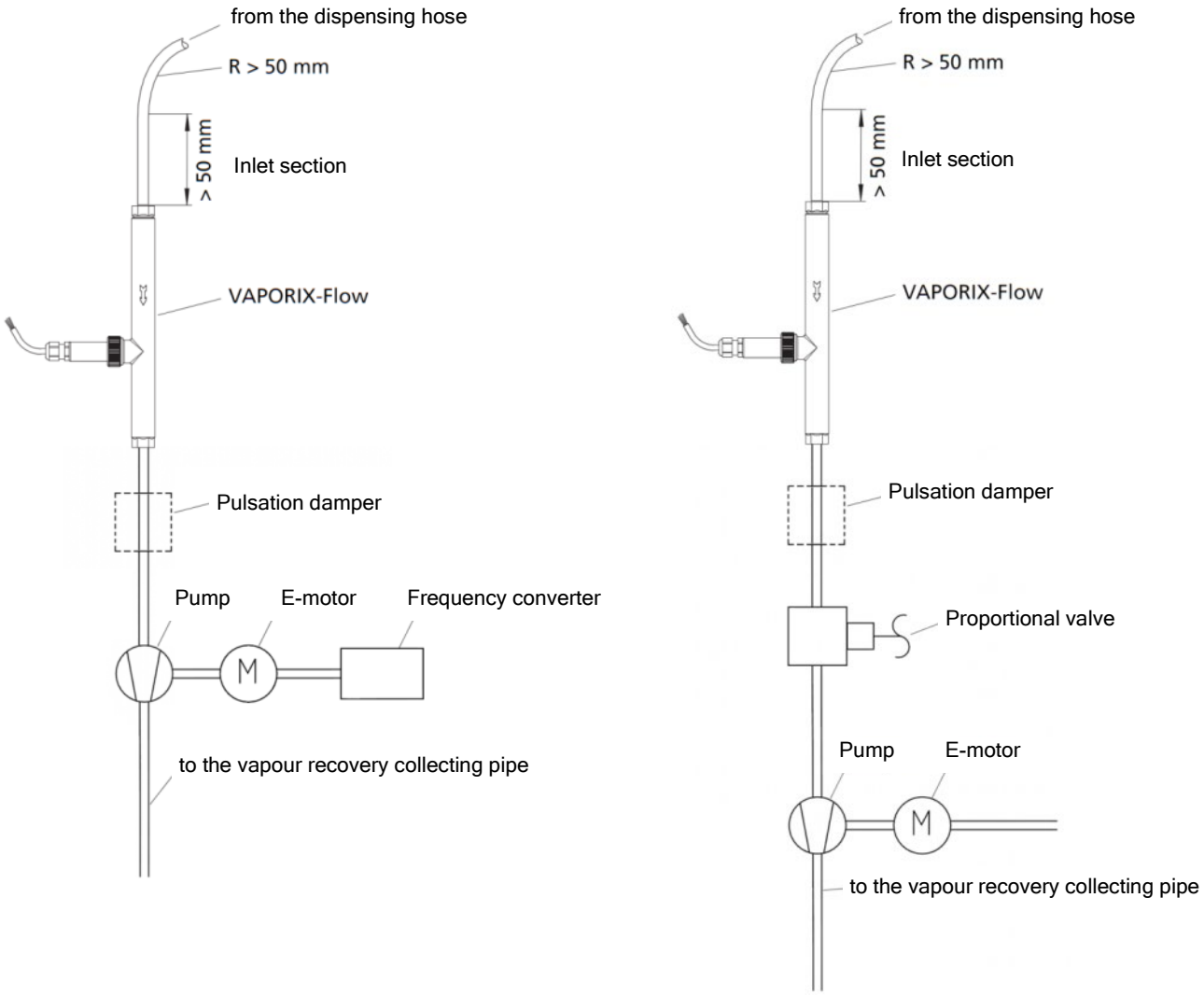


Figure 3: Examples - Installation positions of VAPORIX-Flow

When installing the VAPORIX-Flow the following installation conditions must be fulfilled (see Figure 3):

- The installation of the VAPORIX-Flow is done in the vapour recovery pipe up-stream of the pump and any existing control valve.
- The mounting position is vertical with the inlet section on top. The flow direction is embossed on the sensor casing.

⚠ *The flow direction arrow must point from the top to the bottom.*

- In front of the transmitter a straight vapour pipe (inlet section), smooth or corrugated, is required with a length of minimum 50 mm and an inner diameter of 8 … 12 mm.
- The inflow into the inlet section may be done with a minimum radius of 50 mm.
- The inlet section can be connected using a standard fitting.
- The connection to the outlet section of the transmitter can be done in any form. The direct mounting of a 90° degree fitting is also permitted.
- The casing of the VAPORIX-Flow is to be attached vertically in the dispenser with the help of clamps.

⚠ *Different installation conditions are permitted only after prior review and written approval by FAFNIR.*

⚠ *The VAPORIX-Flow is not allowed to be operated with low-volatile media.*

3.2.2 Measures in case of pulsation

Due to the pumping process, most vapour recovery pumps in vapour recovery systems produce pressure surges which result in a pulsating flow behaviour. This pulsation is very prominent in piston and diaphragm pumps. With dual-piston pumps, these effects are much smaller than with single-cylinder piston or single-cylinder diaphragm pumps. With vane pumps, the pulsation is usually negligible.

Within the pipeline system, the pressure surges result in reflections and thus can cause resonances. The accuracy of the VAPORIX system is affected by the pulsation. The magnitude of a possible effect depends on the pulsation amplitude, the average flow velocity and the vapour concentration.

To guarantee the accuracy of VAPORIX system, the following additional installation steps for the vapour recovery system must be carried out:

- Diaphragm or piston pumps with proportional valve control
  The pulsation is largely shielded by the proportional valve. However, a minimum pipe volume of approximately 50 cc should be complied. This corresponds to a total pipe length of approximately 80 cm between sensor and vapour recovery pump, with an inner diameter of 9 mm.

- Double piston pumps with speed control
  Here, a minimum pipe volume of approximately 50 cc should also be provided. This corresponds to a total pipe length of approximately 80 cm between sensor and vapour recovery pump, with an inner diameter of 9 mm.

- Diaphragm or piston pumps with speed control
  Here, the pulsation directly affects the VAPORIX-Flow. Therefore, a pulsation damper should be mounted in the line between sensor and pump. Approximately 10 times of the displacement volume of the pump should be used as pulsation damper, which is typically 250 cc. This can easily be realized by a damper pot. The FAFNIR condensate separator is a well-proven pulsation damper.

- Pump systems with liquid-controlled proportional valve integrated in the nozzle
  The pulsation of the pump running at full speed directly affects the VAPORIX-Flow. Therefore, a pulsation damper should be mounted in the line between sensor and pump. Approximately 10 times of the displacement volume of the pump should be used as pulsation damper, which is typically 250 cc. This can easily be realized by a damper pot. The FAFNIR condensate separator is a well-proven pulsation damper.

3.2.3 Connection of the VAPORIX-Flow to the VAPORIX-Control II

The 8-core connecting cable (4 m long, Ø approx. 6 mm) is an integral part of the sensor. To pull the cable through suitable cable glands up to the installation point of the VAPORIX-Control II in the head of the dispenser, the plug must be disconnected first and again connected finally as shown in the diagram above.

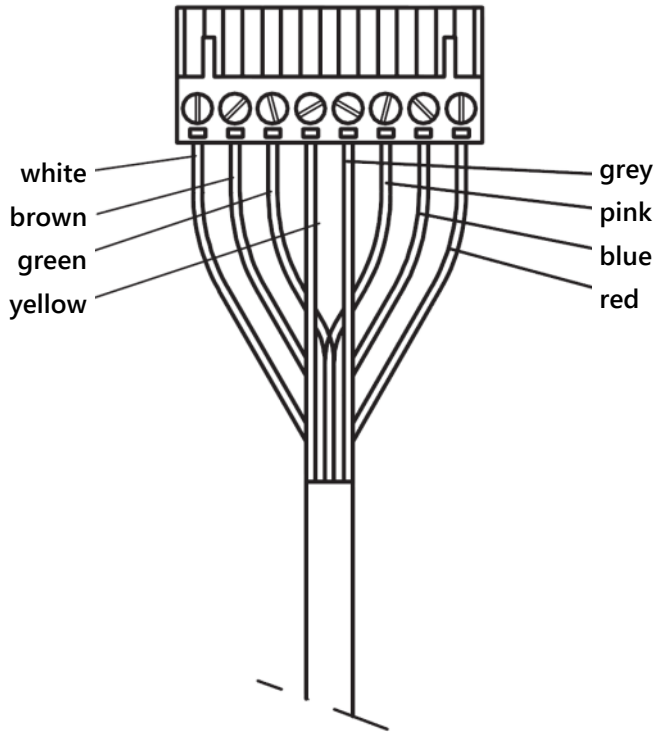


Figure 4: Pin assignment of the connecting cable for VAPORIX-Flow - VAPORIX-Control II

⚠ *The cable must not be shortened.*

☞ *The cable of the VAPORIX-Flow, which is installed in the vapour recovery pipe of the dispenser with the lower fuelling point number, should be labelled with letter A for easy identification at the upper end and should be connected accordingly to the side A of the evaluation unit. Equally, mark the cable of the second VAPORIX-Flow with B for connection to the side B.*

⚠ *After installation and before first use, please read our tips and recommended actions from chapter "Error prevention and troubleshooting".*

3.3 Technical Data

Explosion protection:	II 1 G Ex ia IIB T4 Ga II 1/2 G Ex ia IIB T4 Ga/Gb
Approval:	TÜV 99 ATEX 1509, IECEx TUN 08.0008
Index of protection	IP68
Perm. ambient temperature:	-40 °C to +65 °C
Perm. operating pressure:	max. ATM
Max. test pressure:	300 kPa
Connection:	Only to the VAPORIX-Control II evaluation unit
Connecting thread:	3/8“ internal thread
Connection cable:	PVC - partly fuel resistant
Length:	269 mm
Weight:	approximately 1100 g
Material of media wetted parts:	Brass, stainless steel 1.4401 and 1.4436, zinc plated steel

4 VAPORIX-Control II evaluation unit

4.1 Design and function

The VAPORIX-Control II evaluation unit is supply and central unit for two VAPORIX-Flow transmitters, which are fitted with their 8-pin connectors to the connectors A and B.

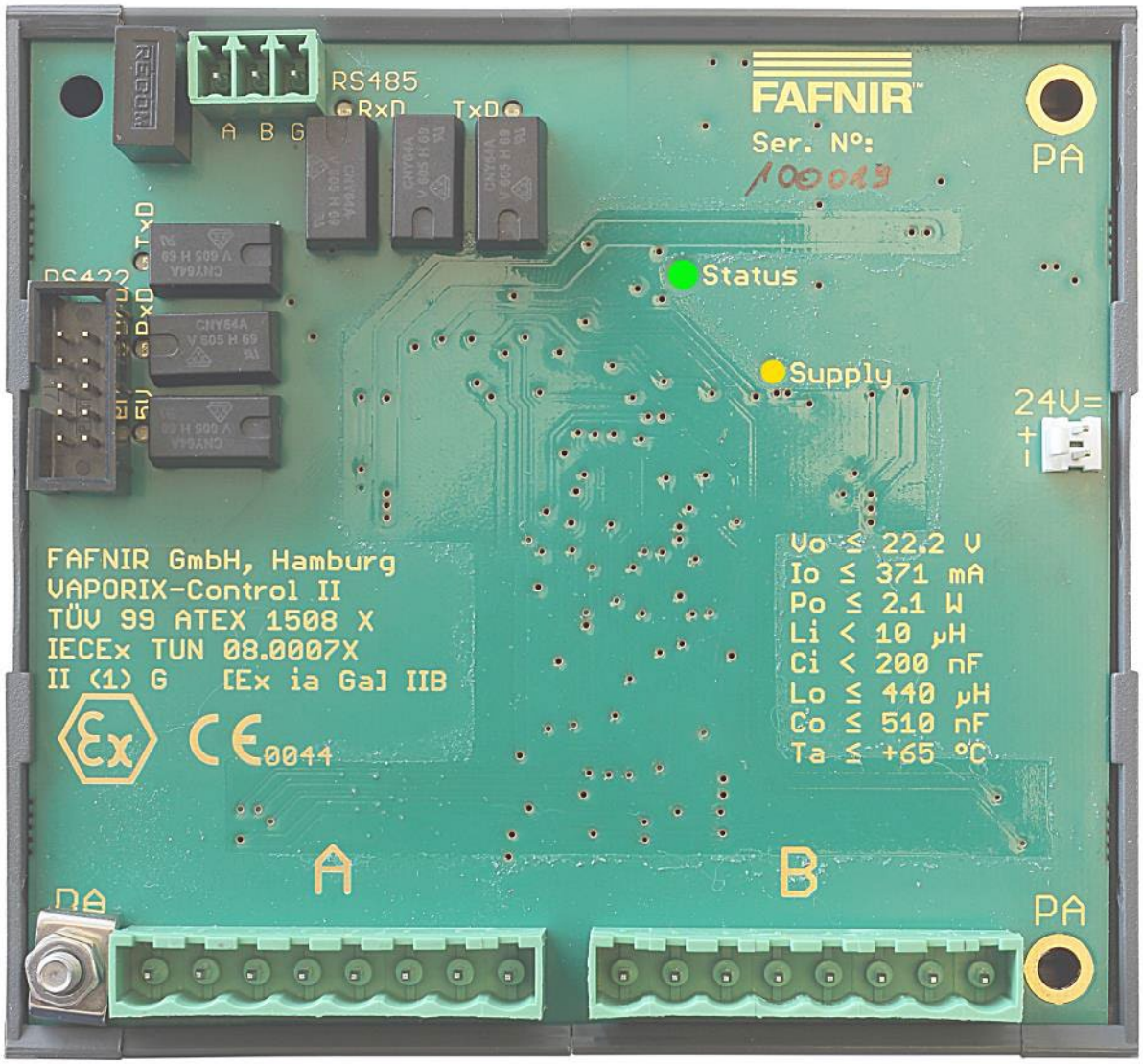


Figure 5: VAPORIX-Control II central unit

The VAPORIX-Control II determines temperatures, gas concentrations and gas flow rates of the fuelling points from the measured values of VAPORIX-Flow.

The dispenser computer delivers the fuel flow as reference values.

The VAPORIX-Control II compares these data with the vapour flow and outputs a status signal, which is signalled by a tricolour LED (see Figure 6).

4.1.1 Status indication

The condition of the evaluation unit, the vapour recovery and the monitoring system (see Fig. 6) is indicated by the Status LED and Supply LED with different colours and blinking codes.

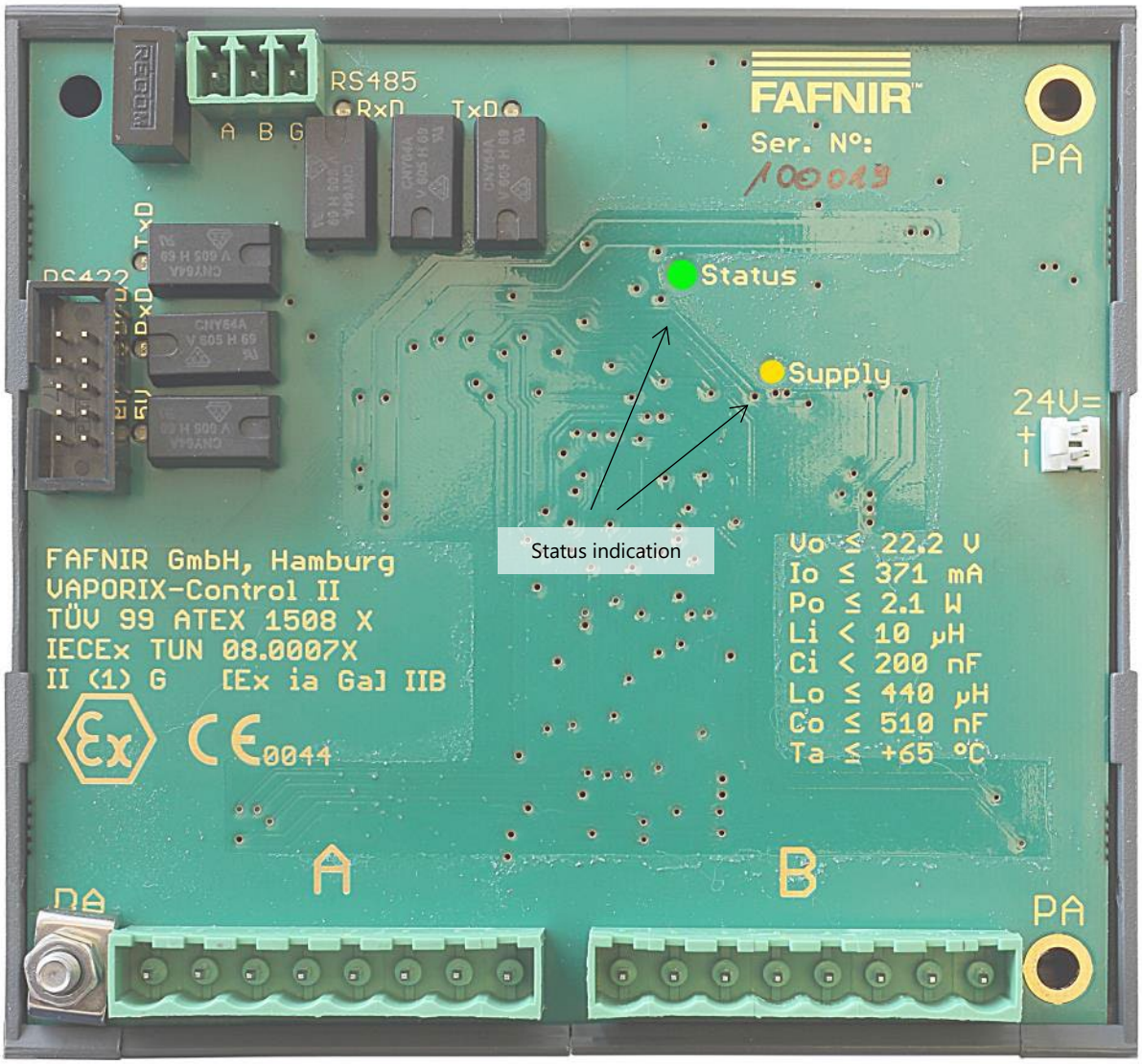


Figure 6: VAPORIX-Control II status indication

Status LED

The blinking of the status LED with pauses shows the set number of days until shutdown. If it blinks 3 or 7 times with a subsequent pause, then VAPORIX is in operating mode 2, and the fuel dispenser is being switched off after 3 and 7 days in case of remaining failures. If the LED blinks continuously without a subsequent pause, then VAPORIX is in operating mode 3 and evaluates the individual refueling process only.

Colour codes

In mode 2, the colour of the LED indicates the status of the monitoring system:

- If the LED is green at the 1st blinking, side A of the vapour recovery system is intact. There is no fault.
- If the LED is green at the 2nd blinking, side B of the vapour recovery system is intact. There is no fault.
- If the LED is orange at the 1st blinking, there is an error on side A of the vapour recovery system, which must be rectified within the country-specific time (3 or 7 days).
- If the LED is orange at the 2nd blinking, there is an error on side B of the vapour recovery system, which must be rectified within the country-specific time (3 or 7 days).
- If the LED is red at the 1st blinking, the time limit has expired at side A and a signal is output that switches off the respective dispenser side.
- If the LED is red at the 2nd blinking, the time limit has expired at side B and a signal is output that switches off the respective dispenser side.

Blink codes

LED is blinking slowly with a subsequent pause:	System operates in mode 2
LED is blinking slowly without a subsequent pause:	System operates in mode 3
LED is blinking quickly:	Fuel flow is detected
LED is blinking very quickly:	Vapour flow without fuel flow is detected (e.g. Transmitter connected to wrong dispenser side A or B). Immediately patch the fault, otherwise an alarm is triggered after 10 refuellings.

Colour codes of the Supply LED (yellow)

- If the LED lights permanently, the evaluation unit is ready for operation. There are no faults.
- If the LED is blinking slowly, the supply voltage is too low.
- If the LED is blinking rapidly, the internal supply voltage is too high due to a defect. There is a device error. The evaluation unit must be replaced immediately.

⚠ *In case of a device error the VAPORIX-Control II must be replaced immediately.*

4.2 Installation

⚠ *When installing and operating the evaluation unit, the national requirements of Explosion Protection Regulations, Industrial Health and Safety Regulations and Equipment Safety Regulations as well as generally accepted rules of engineering and these operating instructions must be observed.*

⚠ *The evaluation unit is not suitable for outdoor installation.*

⚠ *It is essential to provide the proper potential equalisation (PA) of the VAPORIX-Control II. For this, the equipotential terminal on the PCB must be used.*

⚠ *The VAPORIX-Control II is subject to national construction approvals and is therefore only allowed to be repaired by FAFNIR or companies authorized by FAFNIR. In case of failure, always the complete evaluation unit must be replaced.*

The evaluation unit must be placed outside the potentially explosive area in the dispenser head in a suitable position clipped onto a DIN rail.

☞ *When installing the evaluation unit, note that all plug-in connectors and the LED for the event of a service are fully visible and accessible.*

Connect the power supply, the transmitters, and data cable from the SECON or the dispenser to the VAPORIX-Control II interfaces (see Figure 7). For connecting the switching off outputs, please refer to the specifications by the manufacturers of the respective dispensers.

⚠ *Only transmitters certified by a recognized European inspection authority may be connected.*

☞ *After installation and before first use, please read our tips and recommended actions from chapter "Error prevention and troubleshooting".*

⚠ *The VAPORIX-Control II may only be operated in atmospheric environments. The operation in flame proof enclosures, such as natural gas dispensers is not allowed.*

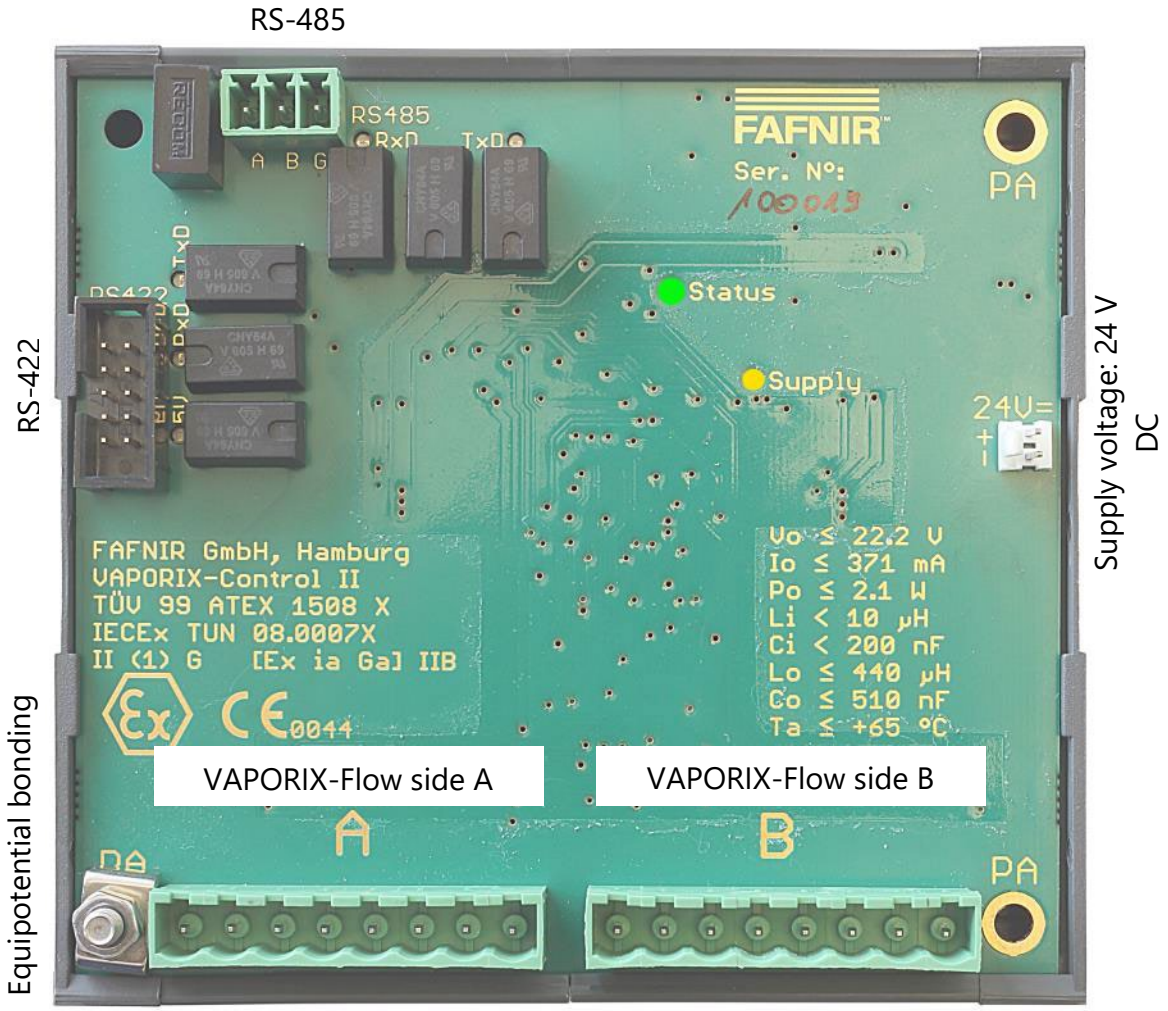


Figure 7: VAPORIX-Control II Connections

4.3 Technical Data

Explosion protection:	⟨Ex⟩ II (1) G [Ex ia Ga] IIB
Approval:	TÜV 99 ATEX 1508 X, IECEx TUN 08.0007X
Perm. ambient temp.:	-20 … +65 °C
Power supply:	24 V DC ±5 %
Connection data per sensor circuit:	with ignition protection class Ex ia IIB U_0 ≤ 22.2 V I_0 ≤ 371 mA P_0 ≤ 2.1 W L_0 ≤ 440 µH C_0 ≤ 510 nF L_i < 10 µH C_i < 200 nF

☞ *For equipotential bonding the terminal clamp of the PCB must be used.*

RS-485 2-wire:	Data bus for up to 32 filling points, 8N1, 9600 baud, supply (galvanically isolated) via the RS-422 connection
RS-422 4-wire:	RS-422 for dispenser communication, 8E1, 9600 baud,
Pin assignment:	Pin 1, 2, 9, 10: not used Pin 3: TxD B Pin 4: TxD A Pin 5: RxD B Pin 6: RxD A Pin 7: Supply (-) Ground Pin 8: Supply +5 V, 50 mA (green LED)
PCB dimensions:	114 x 104 x 40 mm

5 Fault prevention and troubleshooting (after installation)

FAFNIR recommends carrying out the following measures before the automatic monitoring system is put into operation.

5.1 Checking the dispenser settings

The fuel flow speed must not exceed the maximum gas flow speed specified in the certificate of the vapour recovery system.

Consider in this context that, after replacing a fuel filter the fuel flow speed can increase.

5.2 Checking the vapour recovery system

Make sure that:

- the vapour recovery system is gas-tight (pressure test according to the manufacturer's specification)
- there is no fluid leakage to the vapour recovery system
- at MPDs (Multi Product Dispenser) the open-close valves for selection of the vapour channel open and close correctly under all circumstances
- at MPDs the assignment of the vapour recovery is properly adjusted (vapour recovery pump must start for all Petrol fuels, but must not start for Diesel fuel)

5.3 Check measurements with monitoring system

FAFNIR recommends carrying out the following measures after installation of the automatic monitoring system:

- Adjust the vapour recovery system (dry adjustment according to manufacturer's specifications). Use only properly maintained instruments, which are in perfect condition. For dry adjustment, the vapour recovery system must be free of hydrocarbons.
- Check the adjustment by means of a simulation measurement.
- By means of the status indicator on the VAPORIX-Control (LED blink and colour-codes) check the function of the automatic monitoring system and the vapour recovery system (see section "Design and function" in chapter “VAPORIX-Control II evaluation unit").

☞ *Carry out some sample fillings (> 20 s and > 25 l/min) or wait for some customer fillings and then check the history data using the SECON or the VAPORIX-Diagnostic program (see separate manual).*

5.4 Troubleshooting

To facilitate the troubleshooting and fault analysis, FAFNIR recommends using the FAFNIR PC program "VAPORIX-Diagnostic" together with the FAFNIR-Diagnostic-Compendium.

5.5 History data

The history data of VAPORIX-Control II can be read with a PC. This requires the "VAPORIX USB adapter".

Plug the adapter into the USB port of the PC and the RS-422 interface of VAPORIX-Control II. The drivers are installed automatically from Windows 7 or higher.

This creates a virtual COM port, of which the number must be entered in VAPORIX diagnostics.

6 Maintenance

6.1 Return shipment

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

☞ *The return of FAFNIR equipment is possible only with authorization by the FAFNIR customer care.*

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FAFNIR™

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

Messwertgeber / Transmitter / Capteur de mesure

VAPORIX-Flow

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**
2014/34/EU	**Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen**	**ATEX**
2014/34/EU	**Equipment and protective systems intended for use in potentially explosive atmospheres**	**ATEX**
2014/34/UE	**Appareils et systèmes de protection destinés à être utilisés en atmosphères explosibles**	**ATEX**

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

RoHS / RoHS / RoHS	**EN 50581:2012**
EMV / EMC / CEM	**EN 61326-1:2013**
ATEX / ATEX / ATEX	**EN 60079-0:2012 + A11:2013**
	EN 60079-11:2012
	EN 60079-26:2015

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

Störaussendung / Emission / Émission	**Klasse B / Class B / Classe B**
Störfestigkeit / Immunity / D'immunité	**Grundlegende elektromagnetische Umgebung / Basic electromagnetic environment / Environnement électromagnétique ordinaire**

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

VAPORIX-Flow	**TÜV 99 ATEX 1509**

Hamburg, 14.05.2018
Ort, Datum / Place, Date / Lieu, Date

Geschäftsführer / Managing Director / Gérant: René Albrecht

CE

FAFNIR™

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
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Messauswertung / Evaluation Unit / Unité d'analyse

VAPORIX-Control ...

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

RoHS / RoHS / RoHS	**EN 50581:2012**
EMV / EMC / CEM	**EN 61326-1:2013**
ATEX / ATEX / ATEX	**EN 60079-0:2012 + A11:2013**
	EN 60079-11:2012

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Das Produkt entspricht den EMV-Anforderungen
The product complies with the EMC requirements
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Störaussendung / Emission / Émission	**Klasse B / Class B / Classe B**
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VAPORIX-Control ...	**TÜV 99 ATEX 1508 X**

Hamburg, 25.08.2016
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 99 ATEX 1509** **issue:** 00

(4) for the product: Transmitter type VAPORIX-Flow

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

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

Order number: 8000482538

Date of issue: 2018-02-27

(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. 18 203 218423.

(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** **EN 60079-26:2015**

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

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions for Use specified in the schedule to this certificate.

11) This EU-Type Examination Certificate relates only to the design, and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the product shall include the following:

Ex **II 1 G Ex ia IIB T4 Ga** **II 1/2 G Ex ia IIB T4 Ga/Gb**

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

The head of the notified body

Roder

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

(13) **SCHEDULE**

(14) **EU-Type Examination Certificate No. TÜV 99 ATEX 1509 issue 00**

(15) Description of product

The transmitter is used to measure gas flow as part of an automatic monitoring device to check the function of the vapour recovery systems at filling stations.

The transmitter type VAPORIX-Flow may in future also be manufactured in accordance with the test documents listed in the ATEX test report. The changes concern the change of temperature class, the marking as well as the change of the address of the manufacturer.

Type designation:

VAPORIX-Flow	Transmitter for connection to VAPORIX-Control ...

Technical data:

Sensor circuits "1" to "8"	in type of protection "Intrinsic Safety" Ex ia IIB only for the connection to the associated evaluation unit type VAPORIX-Control ... according to EU-type examination certificate No. TÜV 99 ATEX 1508 X

Permissible ambient temperature range:
-40 °C to +65 °C

(16) Drawings and documents are listed in the ATEX Assessment Report No. 18 203 218423

(17) Specific Conditions for Use

none

(18) Essential Health and Safety Requirements

no additional ones

- End of Certificate -

Instructions in accordance with directive 2014/34/EU TÜV 99 ATEX 1509

Transmitter type VAPORIX-Flow Edition: 02.2018

I Range of application

The transmitter is used to measure gas flow as part of an automatic monitoring device to check the function of the vapour recovery systems at filling stations.

II Standards

The equipment 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"
EN 60079-26:2015	Equipment with Equipment Protection Level (EPL) Ga

III Instructions for safe …

III.a … use

The transmitter serves as intrinsically safe apparatus and is suitable for use in potentially explosive atmospheres. The transmitter is suitable for gases of groups IIA and IIB with temperature classes T1, T2, T3 and T4.

The transmitter may only be connected to the evaluation unit type VAPORIX-Control ... (TÜV 99 ATEX 1508 X).

III.b … assembling and dismantling

Disassembly of the transmitter is not intended. A disassembly would also damage the transmitter and the certificate expiry!

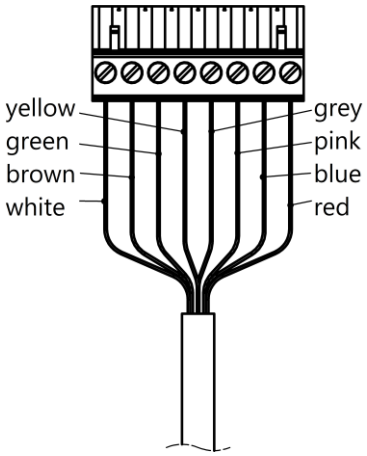
III.c … installation

The wiring may only be done de-energized. Special regulations i. a. EN 60079-14 or the local installation regulations must be observed.

The pipe threads are to be provided with suitable sealing material and inserted into the pipe system.

When wiring from the transmitter to the evaluation unit (preferably blue cable), the permissible inductance and capacity of the evaluation unit must not be exceeded.

Connector pin assignment:



General remark (see also EN 60079-14:2014, Clause 6.4.1):

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

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III.d … adjustment

For the operation of the transmitter, no Ex-relevant adjustments are necessary.

III.e … putting into service

Before putting into service, all devices must be checked for correct connection and installation. The electrical supply, including the connected devices, must be checked.

III.f … maintenance (servicing and emergency repair)

The apparatus is generally maintenance-free. In the case of a defect, this must be returned to the manufacturer FAFNIR or one of its representatives.

It is in conformance with the dielectric strength requirements between the intrinsically safe circuit and the chassis of the transmitter with 500 V_{AC} in accordance with EN 60079-11, Clause 6.3.13.

IV Equipment marking

1	Manufacturer:	FAFNIR GmbH, 22525 Hamburg
2	Type designation:	VAPORIX-Flow
3	Certificate number:	TÜV 99 ATEX 1509
4	Ex marking:	II 1 G Ex ia IIB T4 Ga II 1/2 G Ex ia IIB T4 Ga/Gb
5	CE marking:	CE 0044
6	Technical data:	T_a = -40 °C … +65 °C

V Technical data

The transmitter must only be connected to the certified evaluation unit type VAPORIX-Control ... in accordance with the EU-type examination certificate TÜV 99 ATEX 1508 X. The electrical input data of the transmitter are adapted to the evaluation unit and are not listed here.

The transmitter may be used in the following ambient temperature range:

T_a = -40 °C … +65 °C

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

Zone 0 is given only under atmospheric conditions:

Temperature range:	-20 °C … +60 °C
Pressure range:	0,8 bar … 1,1 bar
Oxidant:	Air (oxygen content approx. 21 %)

The transmitter achieves a degree of protection of:

Degree of protection: IP68

VI Special conditions of use

None.

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Translation

(1) # EU-Type Examination Certificate

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

(3) **Certificate Number** **TÜV 99 ATEX 1508 X** **issue:** 00

(4) for the product: Evaluation Unit type VAPORIX-Control ...

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

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

Order number: 8000 460585

Date of issue: 2016-05-25

(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. 16 203 181780.

(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:

Ex **II (1) G [Ex ia Ga] IIB**

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

Schwedt

Karl-Heinz Schwedt

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

(13) **S C H E D U L E**

(14) **EU-Type Examination Certificate No. TÜV 99 ATEX 1508 X issue 00**

(15) Description of product

The evaluation unit is a part of an automatic monitoring device to check the function of the vapour recovery systems at petrol stations. The evaluation unit must only be installed outside of potential explosive atmosphere. Two intrinsic safety sensors as maximum can connected to every evaluation unit.

The evaluation unit type VAPORIX-Control ... may also be manufactured according to the ATEX test documents listed in the test report.
The changes concern the extension of type VAPORIX-Control II as well as the change of the manufacturer address.

Type designation:

VAPORIX-Control	Evaluation unit in a top hat rail enclosure
VAPORIX-Control Basic	Evaluation unit in a top hat rail enclosure without RS-485 communication
VAPORIX-Control II	Evaluation unit in a built-on enclosure

Technical data:

Type VAPORIX-Control and Type VAPORIX-Control Basic

Supply circuit „230V~“ (terminals L, N, PE)	U = 115/230 V a. c. ± 10 %, 50 ... 60 Hz, about 18 VA U_m = 130 V at 115 V a. c. U_m = 253 V at 230 V a. c.
Sensor circuits „B“ and „A“ (terminals 1 to 8)	in type of protection “Intrinsic Safety” Ex ia IIB Maximum values per circuit: U_o = 23.9 V I_o = 325 mA P_o = 1.9 W R = 76 Ω Characteristic line: linear L_o = 380 µH C_o = 480 nF Aforementioned maximum values are valid at coincidental appearance of concentrated capacitance and inductance.
Clock input „Pulse“ (terminals –B+, -A+)	U = 5 V ... 30 V U_m = 134 V
Control outputs „Out B“ and „Out A“ (terminals –2+, -1+)	U ≤ 30 V I ≤ 200 mA U_m = 134 V
Voltage output „5V“ (terminals –, +)	U = 5 V I ≤ 50 mA
Two-wire RS-485 „RS485“ (terminals G, B, A)	U < 12 V U_m = 134 V
Four-wire RS-485 „RS485-4“ (plug connector)	U < 12 V U_m = 134 V
RS-232 interface „Service“ (Sub D socket)	U ≤ 12 V U_m = 134 V

Schedule to EU-Type Examination Certificate No. TÜV 99 ATEX 1508 X issue 00

Type VAPORIX-Control II

Supply circuit „24V=“ (terminals +, -)	U = 24 V d. c. ± 5 %, ca. 9 W U_m = 253 V
Sensor circuits „A“ and „B“ (terminals 1 to 8)	in type of protection “Intrinsic Safety” Ex ia IIB Maximum values per circuit: U_o = 22.2 V I_o = 371 mA P_o = 2.1 W R = 60 Ω Kennlinie: linear L_i = 10 µH C_i = 200 nF L_o = 440 µH C_o = 510 nF Aforementioned maximum values are valid at coincidental appearance of concentrated capacitance and inductance.
RS-422 „RS422“ (plug connector)	U < 12 V U_m = 134 V
RS-485 „RS485“ (terminals A, B, G)	U < 12 V U_m = 134 V

Permissible ambient temperature range:
-20 °C to +65 °C

All further data are valid unchanged.

(16) Drawings and documents are listed in the ATEX Assessment Report No. 16 203 181780

(17) Specific Conditions for Use

1. The evaluation unit type VAPORIX-Control II must installed in an enclosure with a degree of protection provided by enclosure according to IEC 60529 of at least IP20.

2. The potential equalization terminal (PA) on the evaluation unit type VAPORIX-Control II must bonded to the potential equalization system of the potential explosive area.

(18) Essential Health and Safety Requirements

no additional ones

- End of Certificate -

Instructions in accordance with directive 2014/34/EU TÜV 99 ATEX 1508 X

Evaluation Unit type VAPORIX-Control … Edition: 05.2016

I Range of application

The evaluation unit is a part of an automatic monitoring device to check operation of vapour recovery systems at petrol stations.

II Standards

The evaluation unit 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 evaluation unit serves as associated equipment and is not approved for use in potentially explosive areas. The intrinsically safe electric circuits of the evaluation unit may be routed to Zone 0 and can be used for gas groups IIA and IIB.

The approval is valid for the device versions

VAPORIX-Control	Evaluation unit in DIN rail housing
VAPORIX-Control Basic	Evaluation unit in DIN rail housing without RS-485 communication
VAPORIX-Control II	Evaluation unit in modular housing

III.b … assembling and dismantling

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

The housing of the top hat rail enclosure must not be opened!

The evaluation unit type VAPORIX-Control II can be operated in a modular housing. Then there must be an equipotential terminal on the board. Should the board be fixed on another bracket/housing a secure connection must be established for potential equalization on at least one of the three PA connections.

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III.c … installation

Wiring work may only be performed with the power disconnected. Special rules and regulations, including EN 60079-14 and local installation regulations, must be observed.

The evaluation unit in DIN rail housing is suitable for DIN rail and wall mounting. The evaluation unit in modular housing must be installed in a housing with a degree of protection of at least IP20. The evaluation unit must be installed outside potentially explosive atmospheres/areas. If the evaluation unit is mounted outdoors, the casing protection class must be at least IP54.

The wiring from the sensor (VAPORIX-Flow) to the evaluation unit (preferably blue coloured cable) must not exceed the permissible inductance and capacitance according to section V.

Terminal designation:

Connection	Terminal	Contacts
Auxiliary power	230V~	PE, N and L
Sensor circuits	B resp. A	1 to 8 as appropriate
Pulse input	Pulse	-B+ resp. –A+
Control outputs	Out B resp. Out A	-2+ resp. -1+ as appropriate
Voltage output	5V	- and +
RS-485 two-wire cable	RS485	G, B and A
RS-485 four-wire cable	RS485-4	(Cradle connector)
RS-232 interface	Service	(Sub D jack)

Table III.c1: Terminal labelling on the evaluation unit VAPORIX-Control

Connection	Terminal	Contacts
Auxiliary power	230V~	PE, N and L
Sensor circuits	B resp. A	1 to 8 as appropriate
Pulse input	Pulse	-B+ resp. –A+
Control outputs	Out B resp. Out A	-2+ resp. -1+ as appropriate
Voltage output	5V	- and +
RS 232 interface	Service	(Sub D jack)

Table III.c2: Terminal labelling on the evaluation unit VAPORIX-Control Basic

Connection	Terminal	Contacts
Auxiliary power	24V=	- and +
Sensor circuits	A resp. B	1 to 8 as appropriate
RS-422	RS422	(Cradle connector)
RS-485	RS485	A, B and G
Equipotential bonding	PA	PA

Table III.c3: Terminal labelling on the evaluation unit VAPORIX-Control II

The evaluation unit VAPORIX-Control II must be bonded in the potential equalization of the hazardous area.

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III.d … adjustment

To operate the evaluation unit no safety-related facilities are required.

III.e … putting into service

Before putting into service, all devices must be checked for correct connection and installation. The electrical supply, including the connected devices, must be checked.

III.f … maintenance (servicing and emergency repair)

In general, the evaluation unit is maintenance-free. If there is a defect, it must be sent back to the manufacturer FAFNIR or one of its representatives.

The evaluation units VAPORIX-Control and VAPORIX-Control Basic are in compliance with the requirements for dielectric strength according to EN 60079-11, Clause 6.3.13 between the intrinsically safe sensor circuits and the power supply, the communication terminals and the outputs.

The evaluation unit VAPORIX-Control II is in compliance with the requirements for dielectric strength according to EN 60079-11, Clause 6.3.13 between the intrinsically safe sensor circuits and the communication terminals. No compliance is between the intrinsically safe sensor circuits and the power supply.

IV Equipment marking

1	Manufacturer:	FAFNIR GmbH, Hamburg
2	Type designation:	VAPORIX-Control …
3	Certificate number:	TÜV 99 ATEX 1508 X
4	Ex marking:	Ex II (1) G [Ex ia Ga] IIB
5	CE marking:	CE 0044
6	Technical data:	

VAPORIX-Control VAPORIX-Control Basic	VAPORIX-Control II
$U_o \leq$ 23.9 V	$U_o \leq$ 22.2 V
$I_o \leq$ 325 mA	$I_o \leq$ 371 mA
$P_o \leq$ 1.9 W	$P_o \leq$ 2.1 W
$L_o \leq$ 380 µH	$L_o \leq$ 440 µH
$C_o \leq$ 480 nF	$C_o \leq$ 510 nF
$T_a \leq$ +65 °C	$C_i <$ 200 nF
	$L_i <$ 10 µH
	$T_a \leq$ +65 °C

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V Technical data

The power supply for the evaluation unit, depending on model

Power Supply		VAPORIX-Control VAPORIX-Control Basic	VAPORIX-Control II
Voltage	U	115 V_{AC} ± 10 % resp. 230 V_{AC} ± 10 %	24 V_{DC} ± 5 %
Frequency	F	50 Hz … 60 Hz	-
Input Power	P	~ 18 VA	< 9 W
Maximum Safety Voltage	U_m	134 V @ U = 115 V_{AC} 253 V @ U = 230 V_{AC}	253 V

The evaluation unit VAPORIX-Control II may only be connected to power supply networks, where the expected AC does not exceed a value of 1.5 kA.

The electric circuits of the sensors have "Intrinsic safety" [ia] ignition protection class with a linear output characteristic. Output values per electric circuit are

Sensor circuit		VAPORIX-Control VAPORIX-Control Basic	VAPORIX-Control II
Output Voltage	U_o	≤ 23.9 V	≤ 22.2 V
Output Current	I_o	≤ 325 mA	≤ 371 mA
Output Power	P_o	≤ 1.9 W	≤ 2.1 W
Inner Capacitance	C_i	-	< 200 nF
Inner Inductance	L_i	-	< 10 µF

The permissible external inductance and capacitance are:

	IIB	VAPORIX-Control / VAPORIX-Control Basic				VAPORIX-Control II			
L_o	≤	**380 µH**	200 µH	100 µH	50 µH	**440 µH**	200 µH	100 µH	50 µH
C_o	≤	**480 nF**	620 nF	800 nF	940 nF	**510 nF**	680 nF	880 nF	1.1 µF

The maximum values of the parameter pairings may simultaneously be used as concentrated capacitance (minus C_i) and concentrated inductance (minus L_i).

The values written in bold can be found also in the equipment marking.

The intrinsically safe sensor circuits of the evaluation units type VAPORIX-Control and type VAPORIX-Control Basic are safely galvanically isolated from the power supply circuit up to a peak value of a nominal voltage 375 V.

The intrinsically safe sensor circuits, if available, are galvanically isolated from the pulse inputs, control outputs, communication interfaces, and voltage output safely up to a peak of 190 V nominal voltage.

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As a reference, the corresponding pulse output of the fuel dispenser computer must be connected to the pulse inputs (Pulse). The admissible voltage signal is between

$U = 5\ V \ldots 30\ V$

The control outputs (Out) can be loaded with following electrical values

$U = 30\ V$
$I = 200\ mA$

The signal voltage of the communication interfaces (RS-422, RS-485, RS-485-4 and Service) is

$U \leq 12\ V$

The maximum safety voltage of the pulse inputs, the control outputs, the voltage outputs and the communication interfaces is

$U_m = 134\ V$

The voltage output supplies the following electrical values

$U = 5\ V$
$I \leq 50\ mA$

The evaluation unit can be used in the following ambient temperature range:

$T_a = -20\ °C \ldots +65\ °C$

The evaluation unit achieves a protection rating of

VAPORIX-Control	IP20
VAPORIX-Control Basic	IP20
VAPORIX-Control II	IP00

VI Special conditions of use

1. The evaluation unit type VAPORIX-Control II must installed in an enclosure with a degree of protection provided by enclosure according to EN 60529 of at least IP20.
2. The potential equalization terminal (PA) on the evaluation unit type VAPORIX-Control II must bonded to the potential equalization system of the potential explosive area.

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Government of India
Ministry of Commerce & Industry
Petroleum & Explosives Safety Organisation (PESO)
5th Floor, A-Block, CGO Complex, Seminary Hills,
Nagpur - 440006

E-mail : **explosives@explosives.gov.in**
Phone/Fax No : **0712 -2510248, Fax-2510577**

Approval No : A/P/HQ/TN/104/5964 (P501903) Dated : **29/04/2021**

To,

M/s. Fafnir GmbH,
Schnackenburgalle 149c,Hamburg
22525
GERMANY

Sub : Approval of Intrinsically Safe Type Equipment under Petroleum Rules 2002- Regarding.

Sir(s),

Please refer to your letter No. **OIN779434** dated **09/04/2021** on the subject.

The following Ex electrical equipment(s) manufactured by you according to **EN 60079-0 : 2012/A11 : 2013, EN 60079-11 : 2012,** standards and covered under **TUV NORD CERT GmbH** Test reports mentioned below is/are approved for use in of Gas **SafeArea** hazardous areas coming under the the Petroleum Rules, 2002 administered by this Organization.

Sr. No	Description	Safety Protection	Equipment reference Number	Test Agency			Drawing no
				Name	Certificate No.	Certificate Date	
1	Evaluation Unit type VAPORIX-Control...	[Ex ia Ga] IIB (Approved for installation in safe area only)	**P501903/1**	TUV NORD CERT GmbH	TUV 99 ATEX 1508 X Issue 0	25/05/2016	XO 014 43 10-..., XO 014 4311-..., XO 014 43 12-...

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

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

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

3)Each equipment shall be marked either by raised lettering cast integrally or by plate attached permanently to the main structure to indicate conspicuously:-

(a) Name of the manufacturer
(b) Name and number by which the equipment is identified.
(c) Number & date of the test report of the TUV NORD CERT GmbH applicable to the equipment.
(d) Equipment reference number of this letter by which use of apparatus is approved.
(e) Protection level.

4) A certificate to the effect that the equipment has been manufactured strictly in accordance with the drawing referred to in the TUV NORD CERT GmbH Test report and is identical with the one tested and certified at TUV NORD CERT GmbH shall be furnished with each equipment.
5) The customer shall be supplied with a copy of this letter, an extract of the conditions and maintenence schedule, if any, recommended by TUV NORD CERT GmbH in their test reports and copy of instructions booklet detailing operation & maintenance of the equipment so as to maintain its Flame Proof characterestics.
6) The After sales service and maintanance of subject equipment shall be looked after by your representative Gilbarco Veeder Root India Pvt. Ltd., PDP Manufacturing Facility SF No-628/2 & 627/2, W-4-Coimbatore Campus, Eachanari, Chettipalayam Road, Malumichampatti, Coimbatore 641 021

Conditions of the Approval:-
This component is approved for installation in non hazardous areas (safe area) only.
The approval for above equipment is subject to validity of Production Quality Assurance Notification TUV 98 ATEX 1374 Q.

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

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

The Approval is Valid upto **31/12/2025**

Yours faithfully,

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

Copy to :
1. Jt. Chief Controller of Explosives, South Circle Office, CHENNAI
2. Gilbarco Veeder Root India Pvt. Ltd.,PDP Manufacturing Facility SF No-628/2 & 627/2, W-4-Coimbatore Campus, Eachanari, Chettipalayam Road, Malumichampatti, Coimbatore 641 021

for Chief Controller of Explosives
Nagpur

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

This is System Generated document. Signature is not required.

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Certificate No. **AM VR2 – 1507 – 120 EU**

Industrie Service

TÜV SÜD Industrie Service GmbH, Test Body for Vapour Recovery Systems,
Westendstr. 199, D-80686 Munich

hereby certifies that it has tested the following automatic monitoring system for petrol vapour recovery systems according to EN 16321-1, Appendix D:

Type of system:	Basic configuration of an "Automatic monitoring system"	
Product name:	**VAPORIX II**	
Manufacturer:	FAFNIR GmbH, Hamburg, Germany	
System components:	Gas flow sensor:	**VAPORIX-Flow**
	Evaluation board:	**VAPORIX-Control II**
Obligatory other components:	Alternative:	• **Dispenser computer head /** • **Site controller** • **VAPORIX-PCM 2**

These obligatory other components are needed for:
De-activation time control, alarm signals, de-activation of fuelling point

De-activation time:	To be set by the manufacturer only:	E. g. 72 h; 168 h; other
Indication of de-activation time:	Flashing green LED "Status" on "VAPORIX-Control II" board. The number of consecutive flashes multiplied by 24 shows the de-activation time in hours. (E. g. 3 consecutive flashes = 72 h; 7 consecutive flashes = 168 h)	

Based on ID "AM VR2 – 1507 – 120 EU VAPORIX II"

The monitoring system for vapour recovery systems corresponds to the state of the art as defined in "Directive 2009/126/EC" last amended by Directive 2014/99/EU".

This certificate is only valid in conjunction with a valid supplementary certificate for one of the obligatory components as specified above.

Germany, Munich, 06/10/2022

Expiration date for placing on the market 05/10/2027

TÜV SÜD Industrie Service GmbH rubber stamp

Test Body for Vapour Recovery Systems

Peter Szalata

TÜV®

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