

INSTRUCTIONS FOR USE

VISATRON® oil mist detector

VN301^{plus}/VN301^{plus} Ex



Version: Version 2.0
Document No.: Part number 180072

The original instructions for use are written in German.
Any translations are based on the original instructions for use.



LEGAL NOTICE

The instructions for use apply to the following products:

- VISATRON[®] VN301^{plus}
- VISATRON[®] VN301^{plus} Ex

Firmware version of the “Central Unit” at the time of publication:
V1.0 dated 07/01/2019

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VERSION HISTORY AND CHANGE NOTES

Version	Change	Date	Author
2.0	Revised entire content against the standard, restructured the sections, plus new layout with revised formatting, based on the existing Version 1.5. Added further sections and topics.	09 December 2022	J. Wahl

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1 Information about the instructions for use

1.1 Validity of the instructions for use

These instructions for use apply to the products:

- VISATRON® VN301^{plus}
- VISATRON® VN301^{plus} Ex

hereafter referred to as the “device”.

1.2 Use and purpose of the instructions for use

The instructions for use are intended for:

- the operator of the device; and
- the qualified personnel responsible for installing, starting up, operating and servicing the device.

These instructions for use will support you to:

- carry out initial assembly and installation as intended;
 - operate the device safely and in accordance with its intended use;
 - avoid hazards;
 - carry out maintenance and repair work as intended and thereby reduce repair costs and long downtimes;
 - guarantee or increase the reliability and service life of the device;
 - select and order spare parts and accessories; and
 - find authorised service partners local to you
- ▶ Hazard warnings, safety regulations and the information in these instructions for use must be observed without exception.
- ▶ You must read, understand and apply the instructions for use in order to operate and work on the device properly and safely.
- ▶ These instructions for use must be read and applied by the fitter and the responsible specialist personnel/operator **before** transport, installation/removal, starting up, operation and maintenance.

1.3 Document storage

- ▶ These instructions, as well as all other applicable documents, must be kept in a central place so that they are always available to the qualified personnel at the place of use.
- ▶ The documents must be handed over in full to subsequent owners.

1.4 Symbols in these instructions for use

Various types of notation and symbols are used in the text of these instructions. These are explained below:

Numbered steps:

- ▶ Required action
 - Result of the sequence of actions
- Symbol for a list
 1. Points of the list

⇒ *Reference to a section or figure*

Display text



Additional information and instructions



Environmental and energy-saving tips



Different warning symbols are used for warnings. Please see the descriptions and instructions in the ⇒ *Section 2 Safety instructions*

1.5 Applicable documents and regulations

Further documents apply in conjunction with these instructions for use.

- ▶ For added components, follow the instructions supplied for those components.
(⇒ *Section 19 Appendix*)
- ▶ When using the device and for all service work, also follow:
 - the recognised technical rules for working safely and correctly;
 - the statutory accident prevention regulations;
 - the statutory environmental protection regulations;
 - the provisions of the employers' liability insurance association;
 - the regulations applicable in other countries and the requirements for the state of the art; and
 - the rules and instructions of the operator.

1.6 Qualifications of personnel

Installation, starting up, operation and maintenance of the device may only be carried out by appropriately qualified personnel.

The operator must therefore ensure that the personnel for the work/activities defined in these instructions for use have the appropriate qualifications and/or are trained and fully understand the contents of these instructions for use.

The following operator qualifications are required for this device:

- completed vocational training as an electronics technician or mechatronics technician, industrial mechanic or equivalent technical training; and
- instruction by the operator on the instructions for the entire installation on site.

Certain maintenance work may only be carried out by authorised specialist personnel. The operator must define and provide rules for the area of responsibility, the authority and the supervision of personnel for such work in advance.

1.7 Operator's obligations

- ▶ Only employed qualified and instructed maintenance and installation personnel.
- ▶ Define rules for the authority and supervision of personnel.
- ▶ Check all safety devices regularly to ensure they are functioning and complete.
- ▶ Ensure that scheduled maintenance is carried out as planned.
- ▶ Inform the manufacturer of any damage that is identified.
- ▶ Provide personnel with the necessary protective equipment.
- ▶ Replace damaged parts.
- ▶ Keep the work areas and escape routes clear and in good condition.
- ▶ Inform yourself of the health and safety regulations applicable at the place of use.
- ▶ In a risk assessment, also identify hazards that arise from the specific working conditions at the place of use.
- ▶ Implement the knowledge gained from the risk assessment in the form of instructions.

1.8 Conformity

The device is safely designed and built according to the applicable technical rules. The device complies with the safety requirements of the following directives:

- Machinery Directive 2006/42/EC
- EMC Directive 2004/108/EC
- ATEX Directive 2014/34/EU

Applied harmonised standards:

- EN ISO 12100:2010-11
- EN ISO 4414:2010-11
- EN 60529:2014-09
- EN 61000-6-1:2007
- EN 61000-6-2:2005
- EN 61000-6-3:2007 + A1:2011
- EN 61000-6-4:2007 + A1:2011
- EN IEC 60079-0:2018
- EN 60079-28:2015

Applied national standards and technical specifications:

- IACS UR M10: Rev.4 2013
- IACS UR M67: Rev.2 2015
- IEC 60079-0 (2017) and IEC 60079-28 (2015)

1.9 Liability for defects

The terms in the order confirmation from Schaller Automation Industrielle Automationstechnik GmbH & Co. KG or the terms agreed in the contract apply.

Claims for personal injury and damage are excluded if they are due to one or more of the following causes:

- use not as intended ⇒ *Section 4.4 Foreseeable misuse*
- foreseeable misuse ⇒ *Section 4.4 Foreseeable misuse*
- technical data ⇒ *Section 3.4 Technical data*
- technical description ⇒ *Section 4.2 Technical description and technical data*

1.10 Terms of warranty

The extent of warranty is defined in the “General Terms and Conditions”.

The warranty is invalidated by the following:

- Incorrect installation, maintenance and servicing of the device, by insufficiently qualified personnel.
- Operating the device with safety devices that are not properly attached or are not functioning.

- Failure to observe the instructions, commands and prohibitions in the instructions for use.
- Unauthorised structural changes to the device.
- Inadequate monitoring of wear parts.
- Maintenance work not carried out correctly and not carried out in good time.
- Modifications to the device may invalidate the warranty.
- Retrofitting and modifications are only allowed after consulting Schaller Automation Industrielle Automationstechnik GmbH & Co. KG.
- Transport damage as a result of incorrect handling.

The following also applies in addition:

- ▶ Statutory regulations must be observed.
- ▶ Do not make any unauthorised changes or manipulate the device.
- ▶ Only use correct and approved materials.
- ▶ Only use approved and suitable spare parts. ⇒ *Section 13.1 Spare parts list*
- ▶ Normal wear and tear is not a malfunction for the purpose of the terms of warranty.

1.11 Version of the instructions for use

This document has been prepared to the best of our knowledge and belief. It represents the technical version of the device as delivered.

Schaller Automation Industrielle Automationstechnik GmbH & Co. KG reserves the right to amend and revise this document, if necessary. The products supplied by Schaller Automation are production devices with long service life, developed and produced according to the current state of the art. There is therefore a range of factors that may require revision of this document, such as:

- Knowledge gained during starting up.
- Knowledge gained during maintenance and repairs.
- Additional requirements from customers and authorities.
- Changes to standards and regulations.
- Modernisation and overhaul of plant.
- Extensions to the scope of the order by the client.
- Knowledge gained by the operator regarding plant safety and plant operation.

The version of the document is indicated by the version date and the version number on the title page and in the footer. The operator must check that the document is up-to-date.

1.12 Variables and units of measurement that are used

The following table list the variables and units of measurement that are currently used in the instructions for use. We reserve the right to add to or change the table, as necessary.

Variable	Unit
Length	mm, m
Volume	m ³ , l
Mass	g, kg
Flow rate, volumetric	l/min, m ³ /min, l/h, nm ³ /h, m ³ /h,
Temperature	°C
Density	kg/m ³
Frequency	Hz
Pressure	mbar, bar, mmH ₂ O
Relative humidity (RH)	%
Oil mist concentration	mg/l
Opacity	%
Acceleration (vibration)	g, m/s ²
Voltage	V (volt)
Current	A (amps)
AC voltage	AC
DC voltage	DC
Torque (M)	Nm

Table 2: Variables and units of measurement that are used

1.13 Legal information about the product

The main function of the product, i.e. the intake and analysis of explosive atmosphere from the crankcase, is protected nationally and internationally by the following patent:

- **EP2615269B1**

For all questions and activities arising in connection with the above patent, please contact SCHALLER Automation in advance:

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2 Safety instructions

These instructions for use contain safety instructions.

2.1 Safety devices and guards

These instructions for use contain instructions for your safety. The following basic safety instructions are instructions that always apply in order to operate the machine safely and keep the machine in a safe condition.

The warnings that relate to specific actions warn you about residual hazards and are provided before any hazardous step.



- ▶ All instructions must be followed to prevent personal injury, environmental damage or property damage.

2.2 Warnings

Warnings indicate potential residual hazards before an action.



2.2.1 Structure of warnings



Warnings are provided before hazardous steps. Warnings have the following structure:

	 SIGNAL WORD
	<p>Nature and source of the hazard! Description of the nature and source of the hazard.</p> <ul style="list-style-type: none"> ▶ Measures to prevent the hazard.

2.2.2 Hazard levels in warnings

The warnings have different levels according to the severity of the hazard. The hazard levels with the corresponding signal words and warning symbols are described below.

	 DANGER
	<p>Immediate risk of death or serious injury.</p> <ul style="list-style-type: none"> ▶ Indicates a high-risk hazard which, if not avoided, will result in death or serious injury.

	 WARNING
	<p>Potential risk of death or serious injury.</p> <ul style="list-style-type: none"> ▶ Indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.

**CAUTION**

Potential risk of minor injury.

- ▶ Indicates a low-risk hazard that, if not avoided, may result in minor or moderate injury.













**NOTICE**

Potential damage to the device or the surroundings.

- ▶ Indicates a potential hazard, with the aim of preventing damage.

2.3 Information, warning and mandatory signs that are used

The following symbols and signs according to DIN EN ISO 7010 and DIN 4844-2 are used in these instructions for use:

Symbol	Description
	General warning sign
	Warning; electricity
	Warning; explosive atmosphere (Atex)
	Warning; explosive atmosphere (Atex; IECEx)
	Warning; hot surface
	Warning; overhead load
	Disconnect before carrying out maintenance or repair
	Connect an earth terminal to the ground
	Wear protective gloves
	Wear ear protection
	Wear eye protection
	Wear head protection





Symbol	Description
	Refer to instruction manual/booklet
	Note: Important information!
	Note: A qualified electrician is required for installation!
	Note: Action required!


Table 3: Information, warning and mandatory signs

2.4 Basic safety instructions



The basic safety instructions are instructions that always apply in order to operate the machine safely and keep the device in a safe condition.

If the following safety instructions are not observed, the following may occur:

- there may be personal injury, environmental damage or damage to property;
- important functions of the device may fail;
- specified methods of maintenance and servicing may fail;
- any claims may fail.
- ▶ Observe the following instructions for your own protection and for the protection of your surroundings.
- ▶ If necessary, draw people's attention to the safety and warning instructions.





CAUTION

Safe and proper use of the device

- ▶ Read the instructions for use and other documents that accompany the product carefully and keep them in a suitable place for later use.
- ▶ For repair and service work, you must follow the instructions in the instructions for use.

NOTICE

Personal protective equipment

Operating the device or working on the device without protective equipment may result in serious injury. For the workplace PPE, the following protective equipment must be used:

- ▶ DIN EN 388:2016 Protective gloves against mechanical risks, 2341X, and DIN EN 407:2004 Protective gloves against thermal risks, X1XXXX
- ▶ Safety glasses in accordance with DIN EN 166 or DIN EN 170
- ▶ Safety helmet in accordance with DIN EN 397 and DIN EN 50365
- ▶ ESD safety shoes according to ESD standard DIN EN 61340-5-1



DANGER
Malfunction

Operating the device with a malfunction creates a risk of death and may cause environmental damage and/or damage to the device.

- ▶ The device must be taken out of operation immediately in the event of a malfunction.



DANGER
Mechanical hazards

There is a risk of serious injury, including death, due to explosion in the crankcase as a result of incorrect assembly or installation.

- ▶ Before starting the engine, the sensor unit must be properly connected to the sensor base plate. Otherwise, an explosive atmosphere may escape from the engine and lead to a risk of explosion.
- ▶ Before starting the engine, the base plate of the sensor unit must be connected to the intake manifold. Otherwise, an explosive atmosphere may escape from the engine and lead to a risk of explosion.
- ▶ Before starting the engine, the intake manifold of the sensor unit must be connected to the engine wall by the engine wall screw fitting. Otherwise, an explosive atmosphere may escape from the engine and lead to a risk of explosion.
- ▶ Before starting the engine, the plug-in connector of the hybrid cable must be connected to the sensor unit and locked. Otherwise, an explosive atmosphere may escape from the engine and lead to a risk of explosion.
- ▶ To carry out a trial mist test of the sensor unit while the engine is running, the mist inlet screw must be opened. Open it as briefly as possible, as an explosive atmosphere can escape and cause an risk of explosion.
- ▶ Only trained specialist personnel are allowed to carry out assembly, installation and starting up of the oil mist detector. The qualified personnel must have knowledge of the type of protection, instructions and regulations for the equipment in potentially explosive atmospheres. Check whether the classification (see type plate) is applicable for this application.
- ▶ The device must be installed in accordance with IACS Unified Requirement UR M10.



DANGER
Pneumatic hazards

Assembly, installation and disassembly of the device must only be carried out when the device is not under pressure.

- ▶ Before starting work, deactivate the compressed air supply to the VISATRON[®] VN301^{plus}/VN301^{plus} Ex central unit.

Risk of asphyxiation or explosion of the crankcase atmosphere in the engine room.

- ▶ The exhaust air from the sensor units must be fed back to the crankcase and must not get into the engine room.

Return of the exhaust air into the crankcase

- ▶ The oil mist detector with return of the crankcase atmosphere into the crankcase is suitable for a crankcase pressure in the range of ± 500 mmH₂O under normal operating conditions.


 **DANGER**
Electrical hazards

Electrical damage to the device from welding work on the engine as a result of overvoltage.

- ▶ Before starting work, disconnect the VISATRON® VN301plus/VN301plus Ex central unit from the power supply.

You may only assemble, install and remove the device when the engine is switched off.

- ▶ Before starting work, disconnect the VISATRON® VN301plus/VN301plus Ex central unit from the power supply.

Repair work on the device

- ▶ Before starting work, disconnect the VISATRON® VN301plus/VN301plus Ex central unit from the power supply and/or ensure that the housing is earthed.


 **DANGER**
Risk of burns

Depending on the media that are used, the installation location and the operating mode, the surfaces of the device and the connected parts of the system may become hot. The heat can cause serious injury.

- ▶ Insulate the device against heat radiation on installation, depending on the wall temperature.
- ▶ Make sure that the surfaces have cooled down sufficiently.
- ▶ Install guards that prevent contact with the device.
- ▶ Observe the permissible ambient temperature T_a (during intended use): $+5^{\circ}\text{C} \leq T_a \leq +70^{\circ}\text{C}$.
- ▶ Typical gases of ignition protection category T4: T4 maximum surface temperature must be $\leq 135^{\circ}\text{C}$.
- ▶ Wear suitable protective gloves.


 **DANGER**
Noise pollution

At the mounting position of the device, there are high noise emissions from running of the engine, which can damage hearing and cause environmental noise pollution.

- ▶ Take measures to protect against noise when installing the device.
- ▶ Wear suitable ear protection during operation.
- ▶ Observe the statutory regulations for protection against noise.





NOTICE

Maintenance and repair work

It is only safe to operate the device when it is in perfect working condition. The operator is responsible for proper and safe condition of the device.

- ▶ Have the specified inspections and maintenance work carried out regularly.
- ▶ Carry out the specified checks before operation.

2.4.1 Safety instructions for potentially explosive atmospheres



DANGER

Hazards in Ex-protected areas

The following basic safety instructions apply to SCHALLER products intended for use in potentially explosive atmospheres:

- ▶ Only personnel trained for potentially explosive atmospheres may handle and install the product.
- ▶ Make that the product is approved for the application ⇒ *Section 3.1 Marking and type description*
- ▶ Always comply with the zoning to install the product in the correct location. ⇒ *Section 3.1 Marking and type description*
- ▶ Only use tools suitable for potentially explosive atmospheres.
- ▶ Note that modifications are not allowed without prior approval from SCHALLER AUTOMATION.
- ▶ Make sure that damaged products are not installed or operated in the potentially explosive atmosphere.
- ▶ Modifications to the device or the electrical connections mean that it is no longer safe to operate and there is no longer protection against explosion.
- ▶ Observe the characteristics and rated operating conditions on the type and data plates.
- ▶ Observe the national and local safety regulations, accident prevention regulations and assembly and installation regulations.
- ▶ Observe the general safety instructions.
- ▶ Observe the generally recognised rules of technology.
- ▶ Observe any additional information signs on the device.

3 Identification

3.1 Marking and type description

These instructions apply to the multi-sensor oil mist detection system under the VISATRON® brand in the VN301^{plus} series.

The multi-sensor oil mist detection system is available in two device variants:

- VISATRON® VN301^{plus}, for use in environments that are **not** potentially explosive according to ATEX and IECEx
- VISATRON® VN301^{plus} Ex, for use in environments that **are** potentially explosive according to ATEX and IECEx
 - ATEX: II -/2G Ex op is IIB T4 -/Gb
 - IECEx: [Ex op is IIB T4 -/Gb]

3.2 Manufacturer's details

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3.3 Type plate

The product is identified by a type plate, which is on the central device and on the sensor unit of the VISATRON® VN301^{plus}.

-  The serial number on the type plate contains information about the product and is important for replacement orders and overhauls. The serial number is assigned once for each product. The manufacturer can use this number to identify all the product data.

3.3.1 Type plate on the VISATRON® VN301^{plus} central unit

The sticker with the serial number (type plate) is attached to the outside on the left side of the central unit, as shown in the figure below.



Fig.: 1 : Type plate, VISATRON® VN301^{plus} central unit

- 1: VISATRON® VN301^{plus} central unit
- 2: Type plate (attached to left side)

The following information is provided on the type plate:

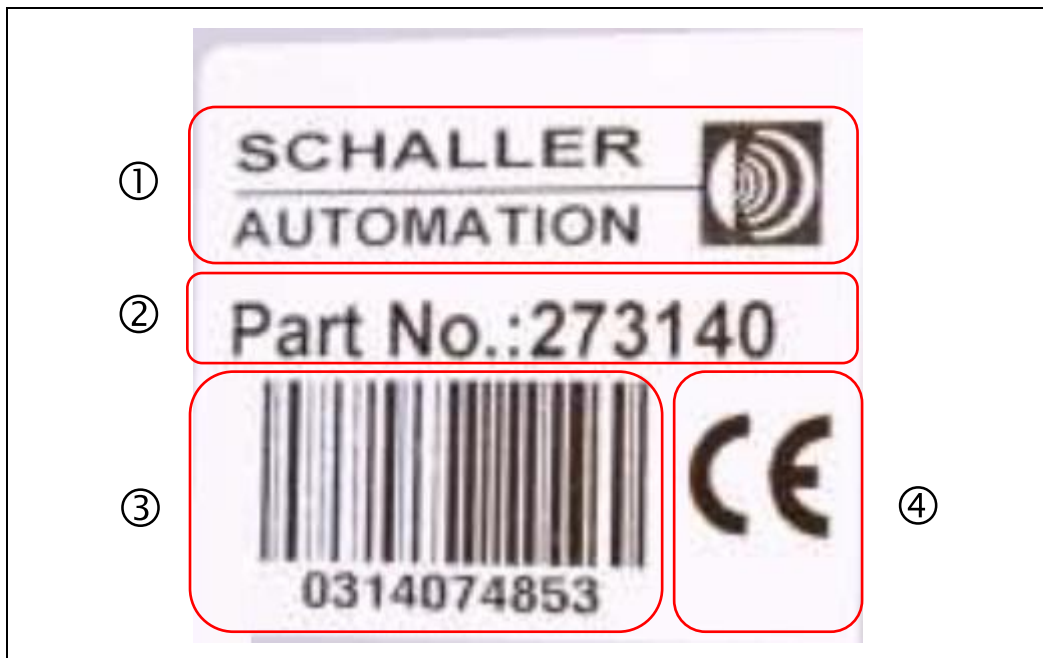


Fig.: 2 : Type plate, VISATRON® VN301^{plus} central unit

- 1: Manufacturer/company logo
- 2: Part number
- 3: Serial number with barcode (example)
- 4: CE marking

3.3.2 Type plate on the VISATRON® VN301^{plus} sensor unit

The serial number (type plate) is attached to the outside on the end cover of the sensor unit.

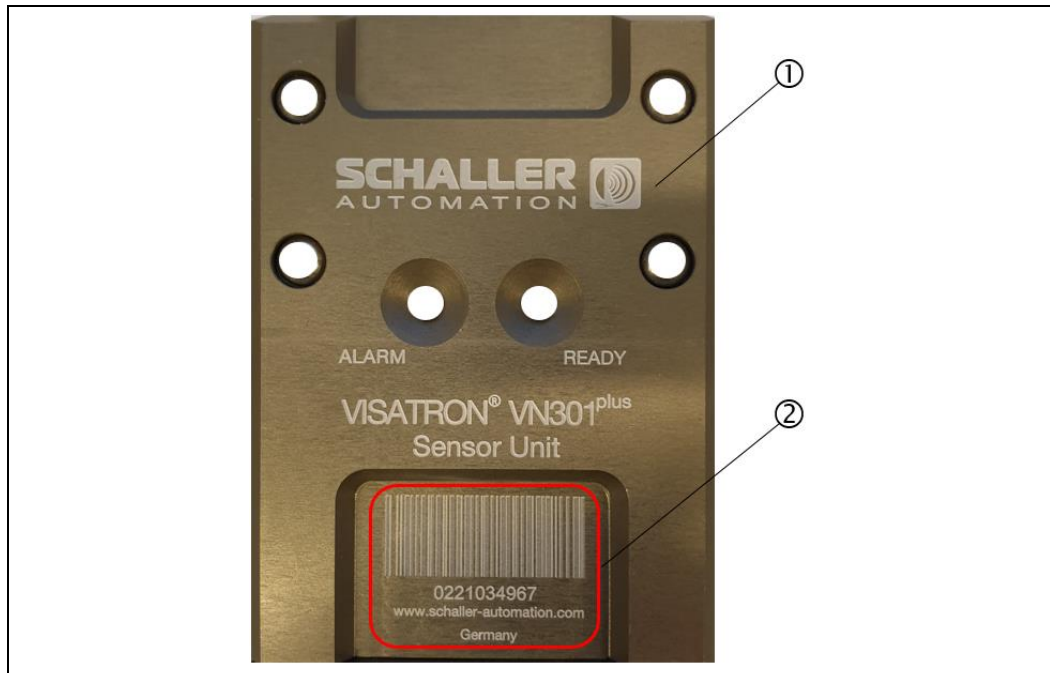


Fig.: 3 : End cover with serial number on the VISATRON® VN301^{plus} sensor unit

- 1: End cover of the VN301^{plus} sensor unit
- 2: Type plate

The following information is provided on the end cover:



Fig.: 4 : Type plate on the VISATRON® VN301^{plus} end cover

- 1: Serial number (example) with barcode
- 2: Manufacturer's details

3.4 Technical data

3.4.1 Mechanical and electrical interfaces

⇒ Section 6.4.3 (Figure 34) Electrical and pneumatic installation of the central unit

VN301^{plus} / VN301^{plus} Ex sensor unit	
Max. dimensions (L x W x H)	approx. 205 x 92 (max. 167) x 70 mm
Weight	Sensor unit: 0.85 kg Intake manifold: 0.35 kg
Max. cable length, sensor unit	30 m
Engine mounting, sensor unit	G3/4 M27 x 1.5
IP protection rating	IP 65

VN301^{plus} central unit	
Dimensions (L x W x H)	approx. 348 x 141 x 265 mm
Weight (with protection cover)	7.0 kg
Power supply	18 Volt to 31.2 Volt (DC), max. 3 A
Nominal voltage	24 Volt DC
Cable inlet for mains cable, cable diameter	M20, diameter: 6 mm to 12 mm
Relay outputs	2 x "High Oil Mist Alarm" (oil mist maximum alarm) 1 "Ready" (ready for operation) 1 x "Oil Mist Pre-Alarm" (max. 60 Volt DC/45 Volt AC, 60 W, 45 VA, 1 A)
Cable inlet for relay outputs, cable diameter	M25, diameter: 11 mm to 17 mm
Communication interface to Remote Indicator II	3-wire RS485, electrically isolated
Cable inlet for Remote Indicator II, cable diameter	M16, diameter: 4.5 mm to 10 mm
Recommended communication cable for Remote Indicator II	LAPP 2170204-1 bus cable UNITRONIC® BUS 2 x 2 x 0.22 mm ² Purple, max. 400 m length
CAN communication interface	4-wire CAN interface using CANopen protocol, electrically isolated
CAN cable inlet, cable diameter	M16, diameter: 4.5 mm to 10 mm
Recommended communication cable for CAN	LAPP 2170276 bus cable UNITRONIC® CAN FD P 2x2x0.34 mm ² , Purple, max. 100 m length

Table 4: Mechanical and electrical interfaces

3.4.2 Environmental conditions

⇒ Section 6.4.3 (Figure 34) Electrical and pneumatic installation of the central unit

Environmental conditions	
Operating temperature	+5°C to +70°C
Storage temperature	-25°C to +50°C
Max. approval-compliant vibrations for the device	5 Hz to 25 Hz: 1.6 mm (max. displacement) 25 Hz to 100 Hz: 4g (max. acceleration)
Supply air pressure reducer	4 bar to 12 bar
Air quality	ISO 8573-1:2010 [6.4.4]
Thread of compressed air reducer inlet	G1/4
Required air	Max. 100 standard litres/h per sensor unit
Relative humidity	up to 95%
IP protection rating	IP 65

Table 5: Ambient conditions and physical characteristics

3.4.3 Type approval

Type approval for closed areas	
	Type approval for closed areas, designed for installation on combustion engines, environmental category D (GL), compliant with IACS UR M67; list of type approvals at www.schaller-automation.com

Table 6: Type approval for closed areas

4 Product overview

4.1 Component overview and dimensions

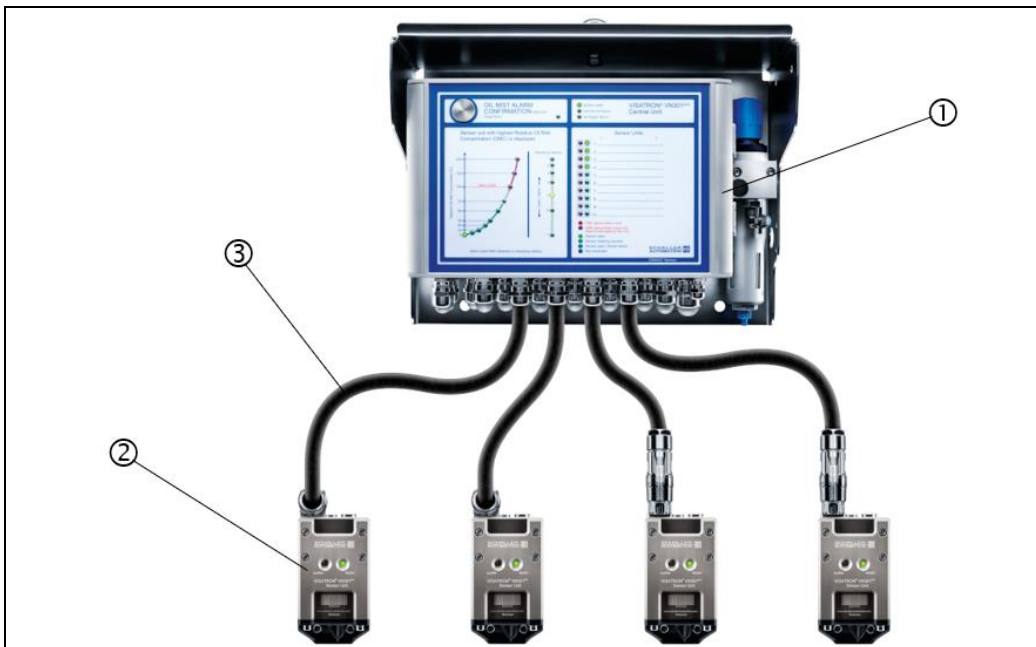


Fig.: 5 : Component overview, VISATRON® VN301plus

- 1: VN301plus central unit
- 2: Sensor unit VN301plus
- 3: Hybrid cable

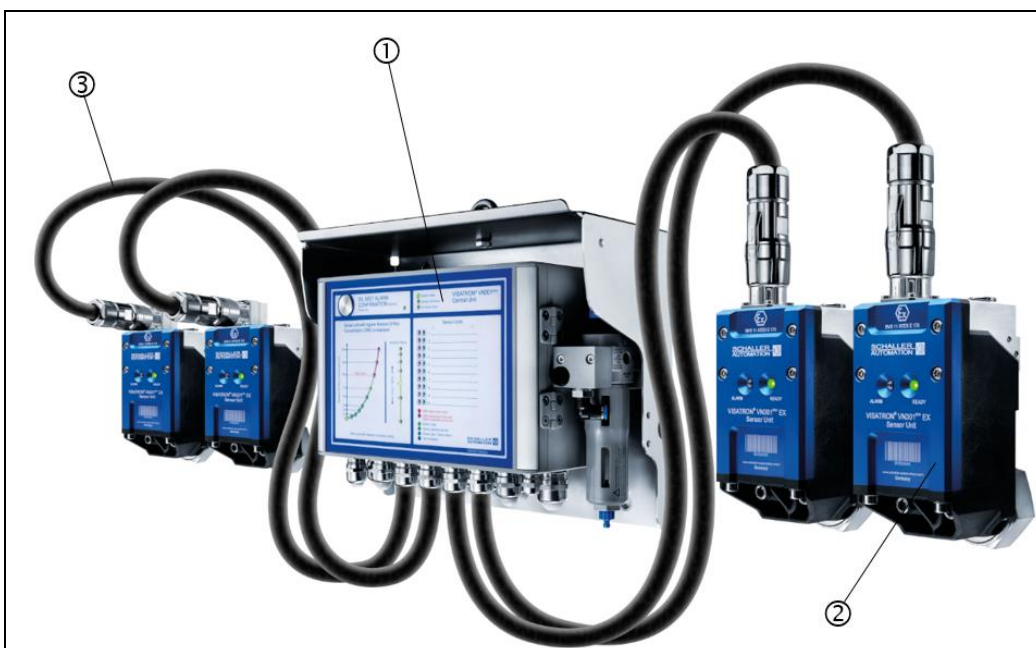


Fig.: 6 : Component overview, VISATRON® VN301plus Ex

- 1: VN301plus central unit
- 2: Sensor unit VN301plus Ex
- 3: Hybrid cable

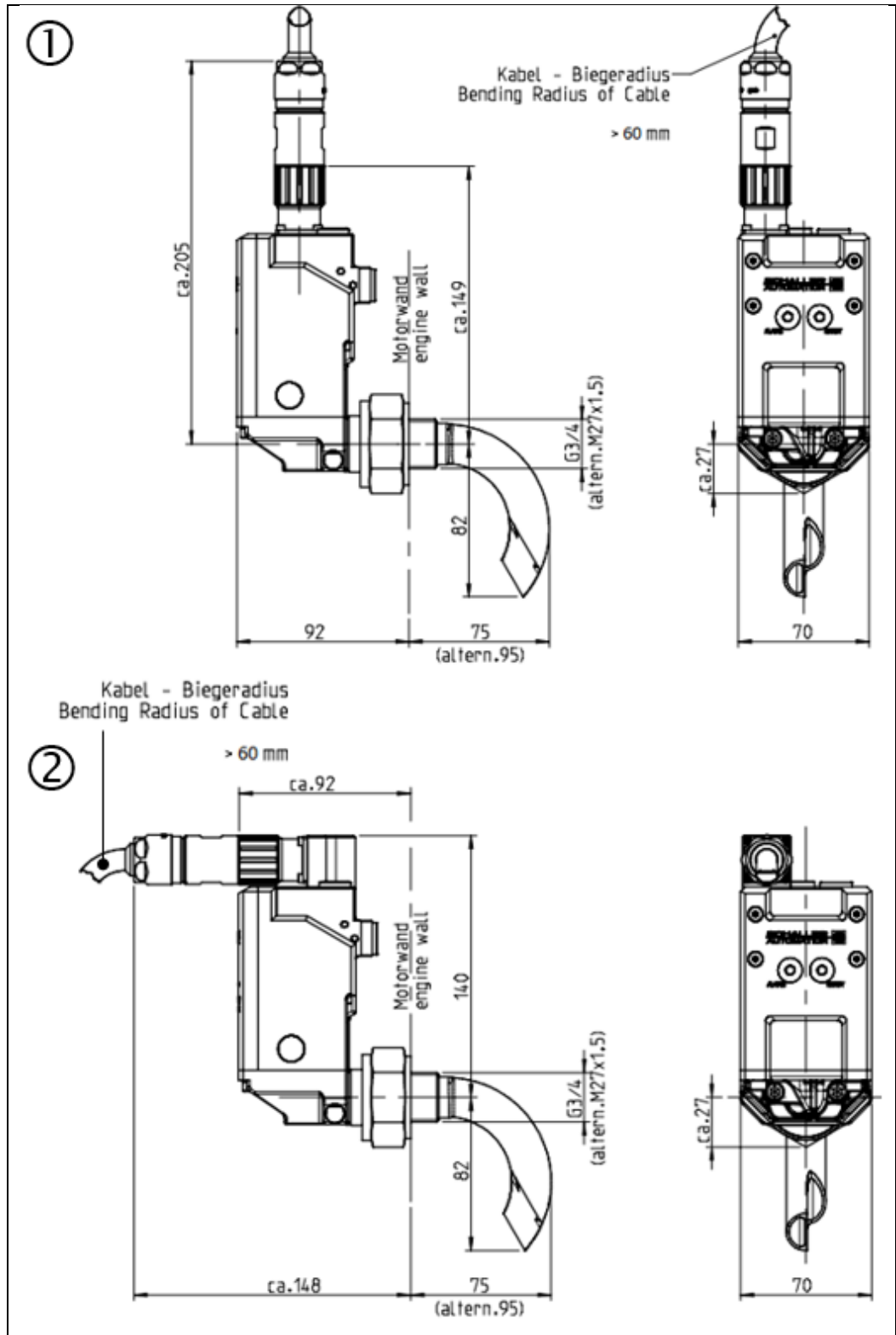


Fig.: 7 : Mechanical dimensions of VN301^{plus}/ VN301^{plus} Ex sensor unit

- 1: Sensor unit VN301^{plus}, vertical
Sensor unit VN301^{plus} Ex, vertical
- 2: Sensor unit VN301^{plus}, horizontal
Sensor unit VN301^{plus} Ex, horizontal

4.2 Technical description and technical data



NOTICE

The illustrations below are for descriptive purposes only.
We reserve the right to vary the size and design of the device and accessories at any time.

4.2.1 Function of the VISATRON® VN301^{plus} / VN301^{plus} Ex oil mist detection system

The VISATRON® VN301plus/VN301plus Ex oil mist detection system from SCHALLER AUTOMATION is designed to protect large engines (gas, diesel and dual fuel) from oil mist explosions caused by the spontaneous development of oil mist in the crankcase. It is part of a safety system to protect the life and health of operating personnel and it prevents serious consequential damage.

The oil mist detection system or sensor unit works on the Venturi principle to draw the oil mist atmosphere out of the crankcase. Detection uses decentralised measurement, i.e. a sensor unit is mounted at a defined position on each cylinder station. Monitoring is implemented via an optical measuring track in the housing of the sensor unit. The measurement data then reach the central unit via a hybrid cable and are analysed by the central unit.

The active and continuous suction of the crankcase atmosphere ensures that there are short response times between the formation of the oil mist and the start of the oil mist alarm.

To avoid false alarms from spray oil, the intake system uses special Schaller Automation intake manifolds that can be used regardless of the direction of rotation of the engine.

During normal engine operation, the oil mist detector draws in any existing oil mist.

The oil mist detector has been developed by SCHALLER AUTOMATION according to the guidelines of the International Association of Classification Societies (IACS) IACS UR M10.

4.2.2 Device variants

When used on large engines that have mandatory explosion protection classification, an oil mist detection system with corresponding ATEX approval must be used in potentially explosive atmospheres.

The VISATRON® VN301^{plus} / VN301^{plus} Ex oil mist detection system from SCHALLER AUTOMATION can be used as follows:

- Non-Ex version of the device; only approved for operation outside of potentially explosive atmospheres
- Ex version of the device; approved for potentially explosive atmospheres.

The device must not be used in potentially explosive atmospheres without ATEX approval.

4.2.3 Function and variants of the sensor unit

The function of the sensor unit has been described in detail above. → Section 4.2.1 Function of the VISATRON® VN301plus / VN301plus E

Features of the sensor unit

- All VISATRON® VN301plus/ VN301plus Ex sensor units are equipped with new, wear-free intake manifolds which continuously suck in the explosive atmosphere in the crankcase and at other points in the engine (e.g. the chain case) via active suction. This delivers faster response times than systems without active suction.
- Using the new intake manifolds avoids false alarms, regardless of the direction of rotation of the engine.
- One intake manifold is always required per intake point or per sensor unit.
- To avoid false alarms, each VISATRON® VN301plus/ VN301plus Ex sensor unit also have the following:
 - Sealing air (from the compressed air system) to protect the optical elements of the measuring range from spray oil and contamination
 - Integrated heating to protect against water vapour

There are four sensor unit configurations in total, as follows:

VN301plus sensor unit, vertical connection



Fig.: 10 : Sensor unit VN301plus, vertical connection

VN301^{plus} sensor unit, horizontal connection



Fig.: 11 : Sensor unit VN301^{plus}, horizontal connection

VN301^{plus} Ex sensor unit, vertical connection



Fig.: 12 : Sensor unit VN301^{plus} EX, vertical connection

VN301^{plus} Ex sensor unit, horizontal connection



Fig.: 13 : Sensor unit VN301^{plus} EX, horizontal connection

4.2.4 Central unit

The central unit of the VISATRON[®] VN301^{plus}/ VN301^{plus} Ex provides the user with the following functions:

- Distribution of the compressed air and power supply to the sensors
- Communication of necessary information about the system status to the operator
- System parameters and settings
- Water separator function (see Figure 15)

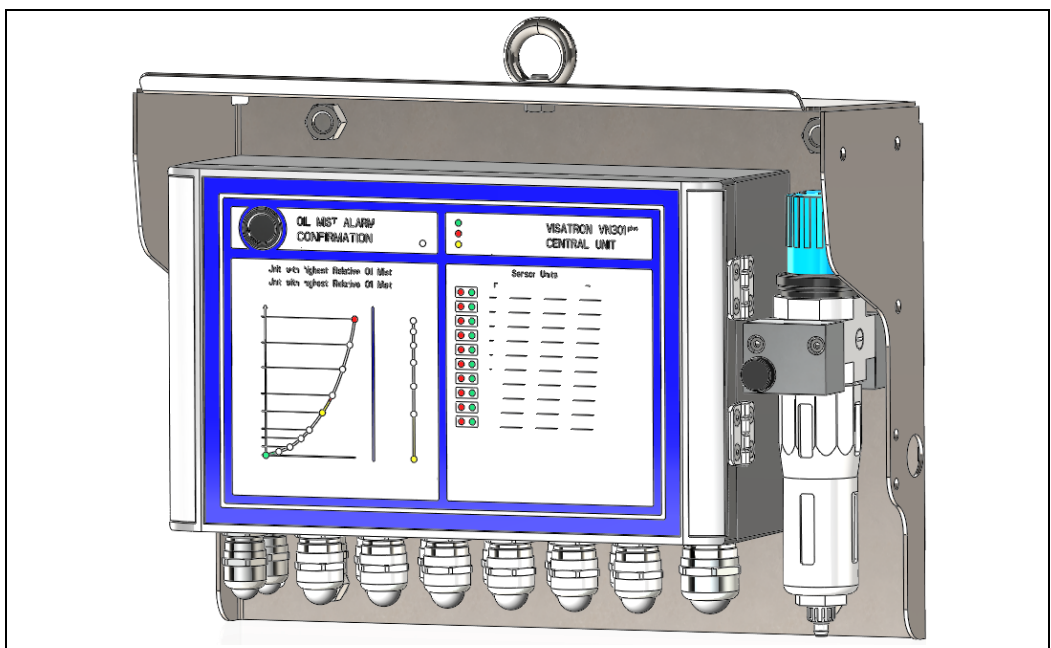


Fig.: 14 : VN301^{plus} central unit (standard version)

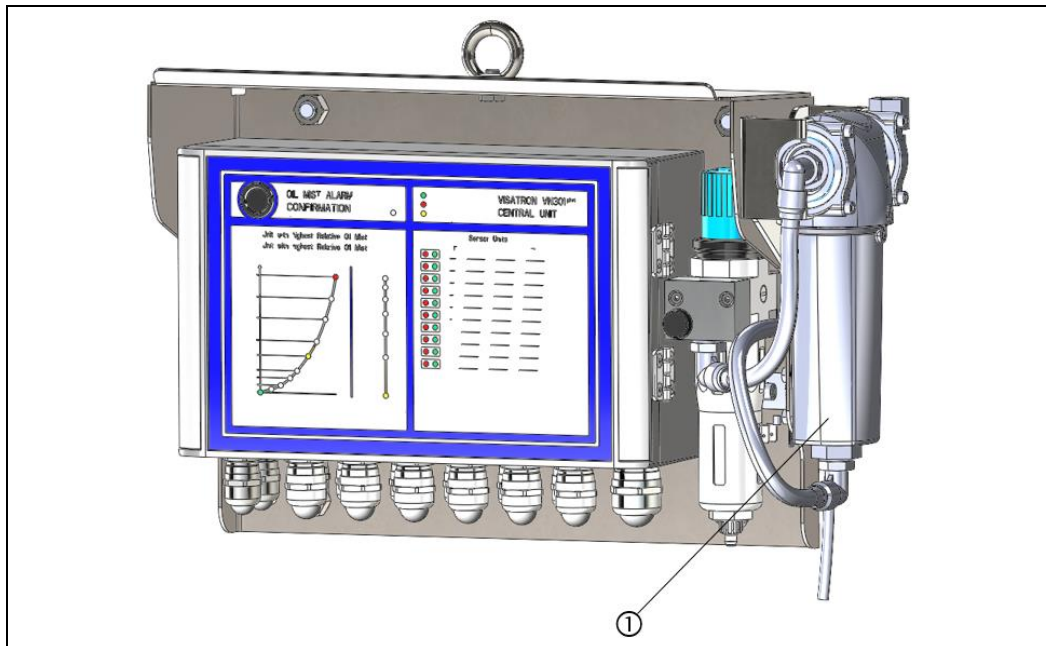


Fig.: 15 : VN301^{plus} central unit, version with water separator

1: Water separator

The central unit is designed to withstand extreme conditions such as vibrations or high temperatures at the engine. All important information is available at a glance. Up to 10 sensor units can be connected to the central unit, and up to 20 sensor units as master-slave version.

The software allows the operator to configure/program the sensor units so that they are always optimally set, depending on engine operation.

The “Floating-Zero Algorithm” adjusts to the operational opacity of the crankcase and thereby actively prevents false alarms.

A Remote Indicator II can optionally be connected to the central unit for remote monitoring, installed in the machine control room.

The central unit can communicate with modern control systems via the ModBus/CANopen protocol or RS485/CAN bus. All data on the system is stored in the central unit for analysis.

The VISATRON[®] VN301^{plus} / VN301^{plus} central unit has the following connections:

- Compressed air 4-12 bar (Air quality: ISO 8573-1:2010 [6.4.4])
- Power supply 18-31.2 V DC
- Up to 10 VISATRON[®] VN301plus/VN301plus Ex sensor units
- Connection to the engine’s safety system via relay contacts:
 - Ready (ready for operation)
 - Oil mist pre-alarm
 - Oil mist alarm
- RS485 interface for Remote Indicator II
- CAN interface for a second VISATRON[®] VN301plus central unit (connection options for up to 20 sensors for one engine)
- CAN interface for automation system (machine control room)

4.2.5 Hybrid cable

The connection between the VISATRON® VN301^{plus} central unit and the VISATRON® VN301^{plus} / VISATRON® VN301^{plus} Ex sensor unit is established using a hybrid cable [1], as shown in the figure below. At the front end of the cable (on the sensor side), there is a hybrid plug [2], which contains the electrical connection and a compressed air connection, and is connected to the sensor unit. The free end is routed to the central unit and then electrically wired to the PCB. → Section 6.4.2 Electrical and pneumatic connection of the sensor unit



Fig.: 16 : Hybrid cable

1: Hybrid cable

3: Free cable end

2: Hybrid plug

4.2.6 Remote Indicator II for VISATRON® VN301^{plus}/ VN301^{plus} Ex (optional)

NOTICE



It is recommended that the VISATRON® VN301^{plus} / VN301^{plus} Ex system is used with a remote monitoring system (the Remote Indicator II) to monitor the oil mist concentration and the status of the VISATRON® VN301^{plus} / VN301^{plus} Ex **system from a safe location in accordance with IACS UR M10.**



Fig.: 17 : Remote monitoring system (Remote Indicator II) for VISATRON® systems (optional)

4.2.7 Setting the oil mist sensitivity

The VISATRON® VN301plus/VN301plus Ex system determines the oil mist concentration using an optical measurement at the applicable sensor units. The values are calculated as the percentage for “opacity”. 100% opacity means that no light penetrates through the oil mist sample. This is equivalent to the light hitting a white (= opaque) surface.

IACS UR M67, requires an oil mist alarm at 5% of the lower explosive limit (LEL). The LEL corresponds to an oil mist concentration of 47 mg/l in the air at a temperature of 25°C. This means that the oil mist detector must output an oil mist alarm at approx. 2.5 mg/l.

The sensitivity is set at the individual sensor units via a USB connection with the central unit. This procedure is described in detail in

⇒ Section 7.1 Adjusting the parameters on the VISATRON® VN301plus central unit.

Sensitivity setting	Alarm-triggering oil mist concentration [mg/l]
1	0.7
2	0.8
3	0.9
4	1.0
5 (Default factory setting)	1.2
6	1.5
7	2.0

Table 7: Setting the oil mist sensitivity

4.3 Intended use

When used on large engines that have mandatory explosion protection classification, an oil mist detection system with corresponding ATEX or IECEx approval must be used in potentially explosive atmospheres.

⇒ Section 3.1 Marking and type description

The task of the oil mist detection system is to prevent explosions in the crankcase of large engines caused by a high concentration of oil mist, such as can occur in the event of bearing damage within a large engine.

The oil mist detection system therefore must only be used for the detection of oil mist in crankcases and to protect against oil mist explosions on large engines (diesel, gas and dual fuel).

When used on large engines with mandatory approval by maritime classification societies, an oil mist detection system with corresponding class approval must be used.

The safety instructions are mandatory and must be observed!

Improper handling or other use of the device is considered to be use not as intended and therefore constitutes an unapproved mode of operation. The manufacturer is not liable for any resulting damage.

4.4 Foreseeable misuse



NOTICE

Applications and methods not referred to or described in these instructions are not allowed!

Installing the VISATRON® VN301^{plus} / VN301^{plus} Ex without using the sensor intake manifolds is not allowed.

Installation and maintenance of the VISATRON® VN301^{plus} / VN301^{plus} Ex by unauthorised persons is not allowed.

Using the VISATRON® VN301^{plus}, without ATEX or IECEx approval, in potentially explosive atmospheres is not allowed.

Installing components other than as shown in these instructions for use and the relevant installation kit drawing approved by the engine manufacturer and the oil mist detector manufacturer is not allowed.

4.5 Descriptions of the control system and indicator(s)

4.5.1 Controls and indicators for the VN301^{plus} central unit

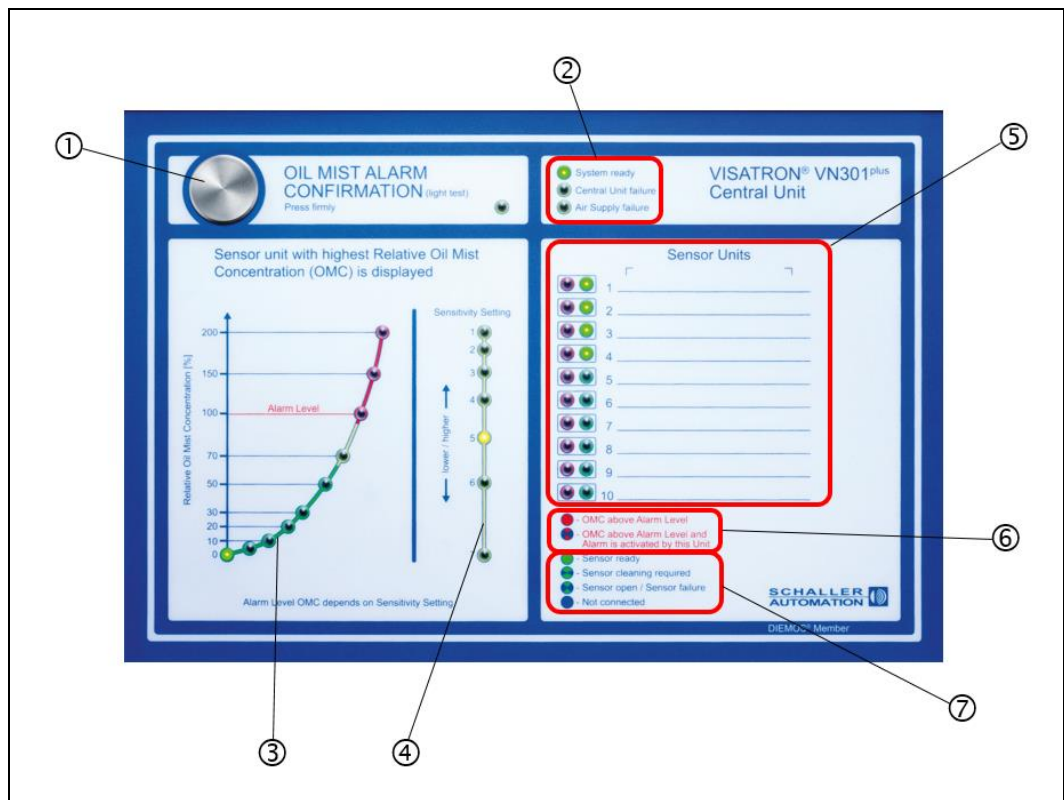


Fig.: 18 : Controls and indicators for the VN301^{plus} central unit

- 1: Confirmation button
- 2: System status, central unit
- 3: Indicator, oil mist concentration
- 4: Indicator, oil mist sensitivity
- 5: Status, sensor units (Nos. 1-10)
- 6: Indicator modes, alarm status (key)
- 7: Indicator modes, sensor unit (key)

4.5.1.1 Fault indicators, VN301^{plus} central unit

As per the figure above, system faults are displayed using the following indicators or are identified specifically using the keys [6] and [7]:

- 2: System status, central unit
- 5: Status, sensor units (Nos. 1-10)

System faults are described in detail in Section 10 "Troubleshooting". ⇒ Section 10 Error diagnosis and troubleshooting

4.5.2 Indicators, VN301^{plus} / VN301^{plus} Ex sensor unit

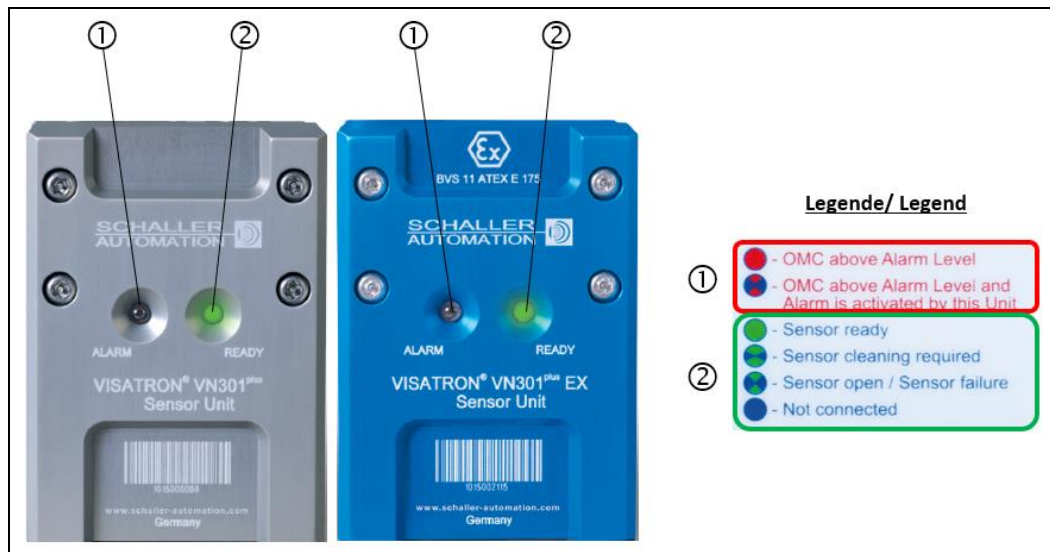


Fig.: 19 : Indicators, VN301^{plus} / VN301^{plus} Ex sensor unit

- 1: Alarm LED (with key)
- 2: Ready LED (with key)

4.5.2.1 Fault indicators, VN301^{plus} / VN301^{plus} Ex sensor unit

As per the figure above, system faults are displayed using the following indicators or are identified specifically using the keys [1] and [2]:

- 1: Alarm status, sensor unit
- 2: Ready status, sensor unit

System faults are described in detail in Section 10 "Troubleshooting". ⇒ Section 10 Error diagnosis and troubleshooting

5 Transport and storage

5.1 Unpacking and items included in delivery

When you receive the VISATRON[®] VN301^{plus} / VN301^{plus} Ex oil mist detection system, check the whole delivery to ensure that it contains all the components. Schaller Automation provides a detailed parts list for you to use for this purpose.



NOTICE

Dispose of the packaging materials in accordance with your local disposal regulations in the containers provided for this purpose.

5.2 Transport

The delivery is ex works in a ready-to-use condition. Delivery is made in accordance with the terms of the contract.

Check the delivery immediately on receipt for any transport damage.



CAUTION

Damaged components can cause damage to machinery and persons.

- ▶ Make sure immediately that the delivery is correct, complete and undamaged. Report any visible transport damage to the responsible transport company immediately.



CAUTION

Damage to the device from improper transport

- ▶ Avoid shocks, vibrations and collisions with other objects by handling the device slowly and in a controlled manner.
- ▶ A collision or falling of the device may cause damage to the internal high-precision components. In such cases, we recommend no longer using the device.

5.3 Storage conditions before starting up


The maximum storage period for the VISATRON[®] VN301^{plus} / VN301^{plus} Ex oil mist detection system is 12 months after receipt of goods in the original packaging.

- ▶ Store the device in a place that meets the following conditions:
 - The room is closed (dry and free from frost and dust)
 - There is no exposure to wind or rain
 - There is no exposure to flammable, volatile or corrosive gases or dust
 - There is no exposure to vibrations
 - The place is stable and free of hazards

Storage temperature range	-25°C to max. 50°C
Relative humidity [RH]	< 85% and avoiding condensation

Table 8: Storage conditions before starting up



 CAUTION
<p>Incorrect storage can damage the device.</p> <ul style="list-style-type: none"> ▶ Keep the storage period for the device to a minimum. ▶ Keep the device in its original packaging. ▶ If stored for a longer period, check the condition of the device regularly and carry out corrosion protection measures, if necessary. ▶ Note the warranty period under the General Terms & Conditions

6 Assembly and installation



WARNING

- ▶ Failure to comply with the safety instructions may result in major damage to property or the environment and in serious injury or death.
- ▶ Familiarise yourself with the basic safety instructions before starting assembly.
⇒ Section 2.4 Basic safety instructions



NOTICE

- ▶ Observe the environmental conditions for assembling the device
⇒ Section 3.4.2 Environmental conditions

6.1 Preparatory steps by the customer



NOTICE

- ▶ For installation and operation of the oil mist detection system, the following must be provided by the customer at the installation site:
 - a supply line for compressed air;
 - a supply line for the electrical power supply;
 - a supply line to transfer the signals of the relay contacts;
 - a bus line for CANopen communication (optional); and
 - a bus line for Remote Indicator II communication (optional, only if the customer uses a remote indicator).

⇒ For details, see Section 3.4.1. Mechanical and electrical interfaces

6.1.1 Establishing the compressed air supply

The compressed air supply must be provided by the customer and have a compressed air quality according to ISO 8573-1:2010 [6.4.4], up to the central unit. The compressed air supply may vary between 4-12 bar for optimum operation.



WARNING

Mild to severe bruising when handling compressed air

Risk of injury from whipping of the compressed air hose line.

- ▶ Before connecting the supply pressure, check the applied system pressure.
⇒ Section 3.4.2 Environmental conditions

6.1.2 Establishing the electrical power supply

The electrical power supply must be provided by the customer up to the central unit:

- Power supply: 18 Volt to 31.2 Volt DC, max. 3 A
- Nominal voltage: 24 Volt DC

DANGER

Electrical hazards

- ▶ Before connecting the electrical supply lines to the VISATRON® VN301^{plus} / VN301^{plus} Ex central unit, the central unit must first be disconnected from the power supply.
- ▶ Before starting work, disconnect the VISATRON® VN301^{plus}/VN301^{plus} Ex central unit from the power supply and/or ensure that the housing is earthed.

6.1.3 Establishing signal transfer from the alarm contacts

Signal transfer must be established by the customer using a suitable standard cable.

⇒ For details, see Section 3.4.1. Mechanical and electrical interfaces

6.1.4 Establishing CANopen communication

Signal transfer must be established by the customer using the recommended bus cable.

⇒ For details, see Section 3.4.1. Mechanical and electrical interfaces

6.1.5 Establishing Remote Indicator II communication (optional)

Signal transfer must be established by the customer using the recommended bus cable.

⇒ For details, see Section 3.4.1. Mechanical and electrical interfaces

6.2 Setting up














NOTICE

Observe the ambient conditions when setting up. (E.g. humidity, vibration, etc.) ⇒ Section 3.4.2 Environmental conditions

- ▶ The VISATRON® VN301^{plus} / VN301^{plus} Ex oil mist detection system may only be installed by qualified or trained personnel!
- ▶ Suitable electrical supply connections must be available at the site.
⇒ Section 6.1 Preparatory steps by the customer
- ▶ Do not operate the VISATRON® VN301^{plus} / VN301^{plus} Ex oil mist detection system in an elevated electromagnetic environment. (Outside standardised limit values)
- ▶ Observe the safety distances when setting up. The VISATRON® VN301^{plus} / VN301^{plus} Ex oil mist detection system (central unit and sensors) must remain accessible for maintenance work.
- ▶ Do not operate the VISATRON® VN301^{plus}/VN301^{plus} Ex oil mist detection system with increased vibrations or outside the permissible limit values
⇒ Section 3.4.2 Environmental conditions

▶ If the oil mist detection system is operated in Ex-protected areas, the relevant safety instructions must be observed. → Section 2.4.1 Safety instructions for potentially explosive atmospheres

6.3 Assembling the system components

	 CAUTION
 	<p>Safe and correct assembly of the device</p> <ul style="list-style-type: none"> ▶ For assemble, read the instructions for use and other documents accompanying the product with care and keep them in a suitable place for later use.
	NOTICE
 	<p>Personal protective equipment</p> <p>Operating the device or working on the device <u>without</u> protective equipment may result in serious injury. For the workplace PPE, the following protective equipment must be used:</p> <ul style="list-style-type: none"> ▶ DIN EN 388:2016 Protective gloves against mechanical risks, 2341X, and DIN EN 407:2004 Protective gloves against thermal risks, X1XXXX ▶ Safety glasses in accordance with DIN EN 166 or DIN EN 170 ▶ Safety helmet in accordance with DIN EN 397 and DIN EN 50365
	 DANGER
 	<p>Hazards during assembly</p> <p>There is a risk of serious injury, including death, due to explosion in the crankcase as a result of incorrect assembly or installation.</p> <ul style="list-style-type: none"> ▶ You may only assemble the oil mist detection system when the engine is switched off and the system has been disconnected from the power supply first! The compressed air supply to the oil mist detection system must also be switched off first. ▶ Before assembly, the housing of the VISATRON[®] VN301^{plus} / VN301^{plus} Ex central unit must be earthed.
	  
	 WARNING
	<p>Failure to comply with the safety instructions may result in major damage to property or the environment and in serious injury or death.</p> <ul style="list-style-type: none"> ▶ Familiarise yourself with the basic safety instructions before starting assembly. ⇒ Section 2.4 Basic safety instructions

6.3.1 Class-compliant assembly and installation according to IACS Unified Requirement UR M10

The oil mist detector has been developed and approved by SCHALLER AUTOMATION in accordance with the requirements of the International Association of Classification Societies (IACS) IACS UR M10 (class-compliant assembly and installation) and M67 (sensitivity of the oil mist detector and determination of the oil mist concentration).



NOTICE	
	<p>Compliance with IACS requirements</p> <ul style="list-style-type: none"> ▶ The IACS Unified Requirement UR M10 specifies that the installation drawings for the oil mist detection system must be approved by the engine builder and SCHALLER AUTOMATION. The oil mist detection system is installed exclusively in accordance with these drawings and the information provided in these instructions for use.


6.3.2 Sensor unit

The sensor unit is assembled in 2 steps:

Step 1: Amounting, alignment and fixing of the intake manifold at the intended position on the engine wall.

Step 2: Mounting the sensor housing on the engine wall screw fitting.



 DANGER	
	<p>Damage to the intake manifold after the assembly process</p> <ul style="list-style-type: none"> ▶ The intake manifold must not come into contact with rotating or moving parts after assembly. <p>Premature contamination of the oil mist detection system by splash oil</p> <ul style="list-style-type: none"> ▶ The intake position of the intake manifold must be outside areas with direct splash oil. <p>Explosion in the crankcase</p> <p>There is a risk of serious injury, including death, from an explosion in the crankcase as a result of incorrect assembly of the sensor unit.</p> <ul style="list-style-type: none"> ▶ Opening the sensor housing is only allowed when the engine is switched off, as an explosive atmosphere can escape from the engine and lead to a risk of explosion.



NOTICE	
	<p>Premature contamination of the oil mist detection system</p> <ul style="list-style-type: none"> ▶ The allowed assembly tolerance is +/- 3 degrees deviation from the horizontal alignment.

6.3.2.1 Assembly procedure for the engine wall screw fitting

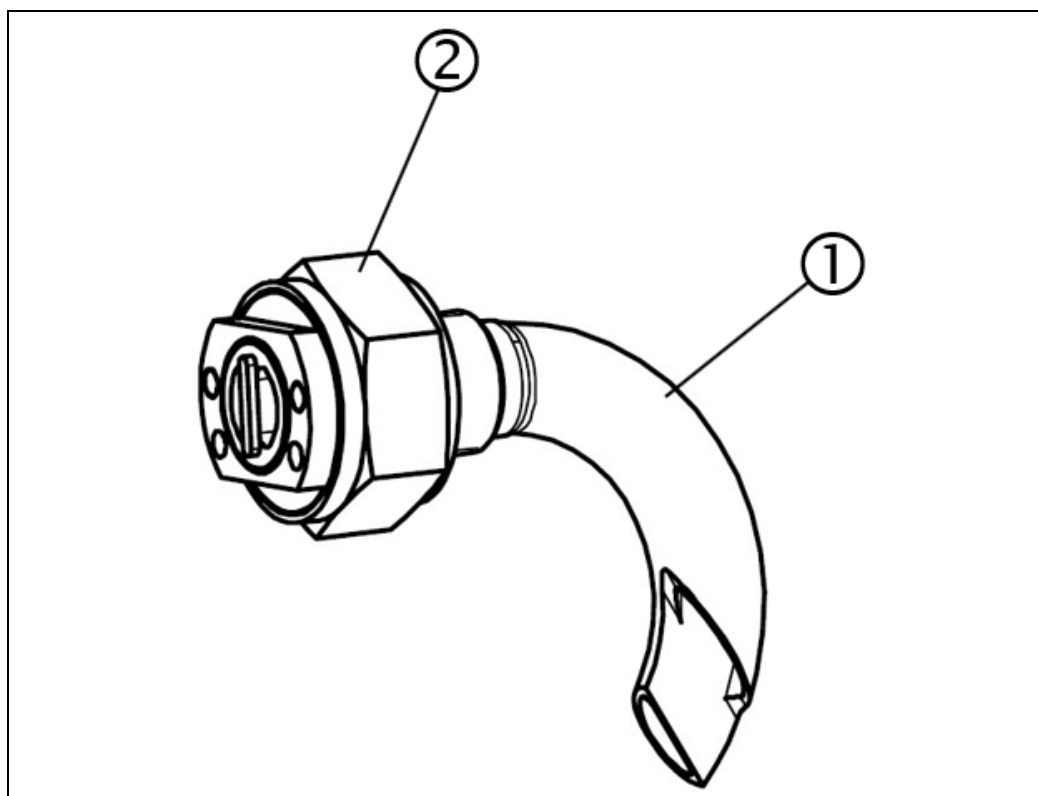
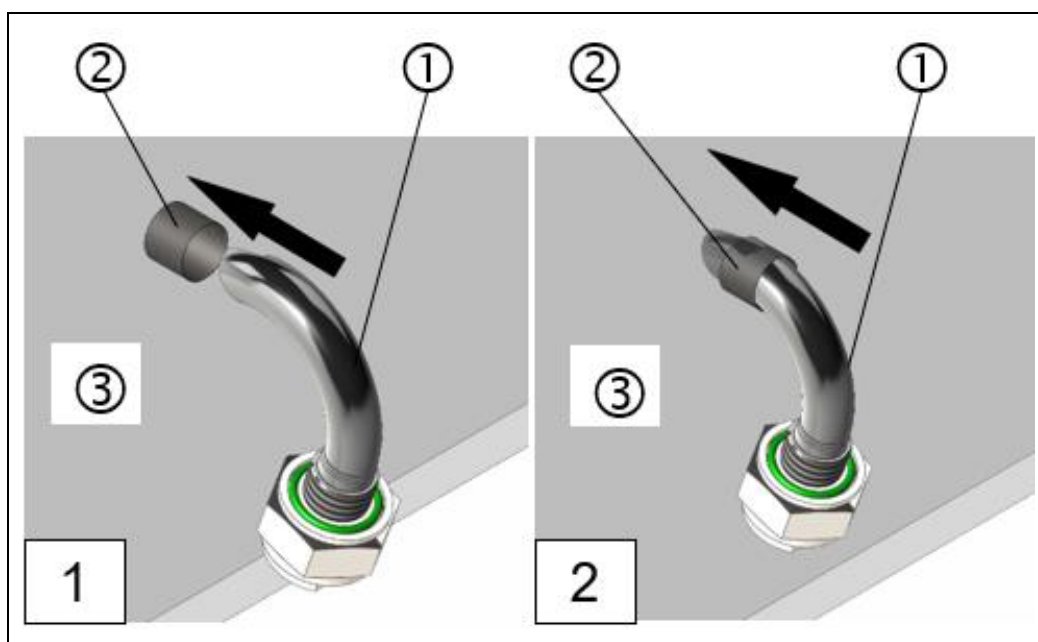
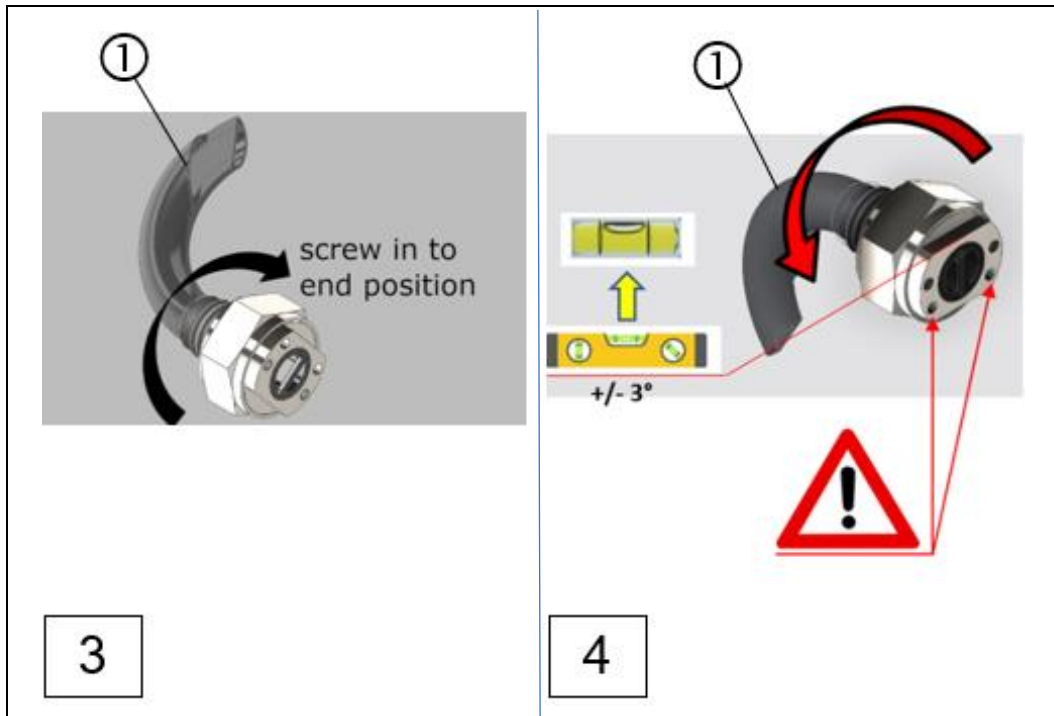


Fig.: 20 : Engine wall screw fitting, VN301^{plus} / VN301^{plus} Ex sensor unit

- 1: Intake manifold
- 2: Union nut (G3/4" or M27x1.5)

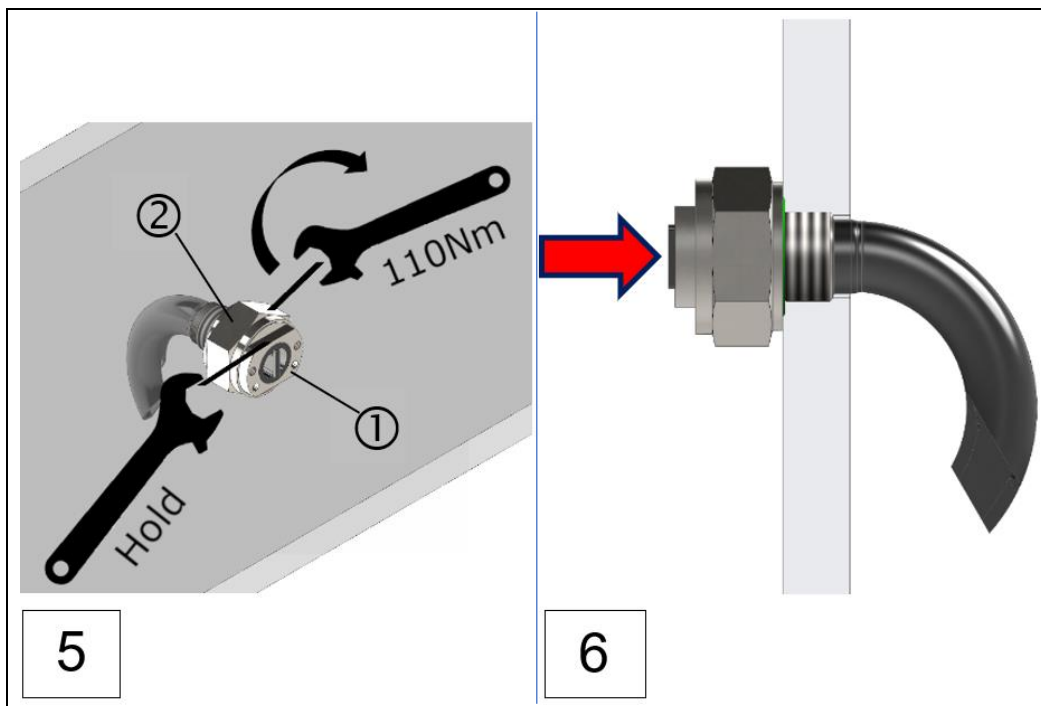


- 1: Intake manifold
- 2: Screw-in thread, engine wall: G3/4" or M27x1.5
- 3: Engine wall



1: Intake manifold

Adjust the horizontal position of the engine wall screw fitting!



1: Intake manifold
2: Union nut

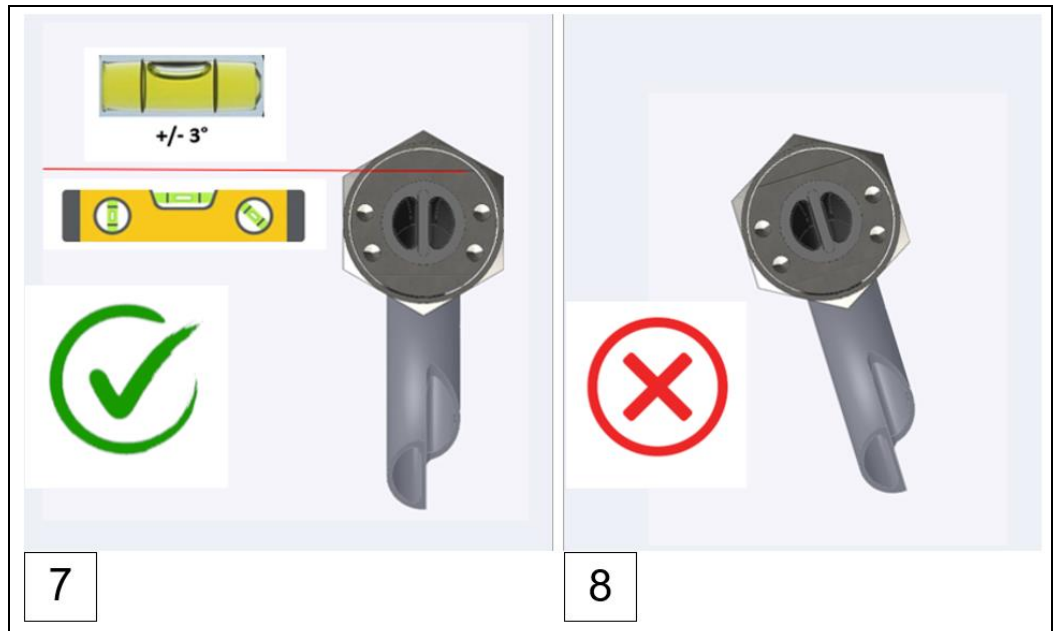


Fig.: 21 : Assembly procedure, engine wall screw fitting VN301^{plus} (steps 1-8)

6.3.2.2 Mounting the VISATRON[®] VN301^{plus} / VN301^{plus} Ex sensor unit on the engine wall screw fitting

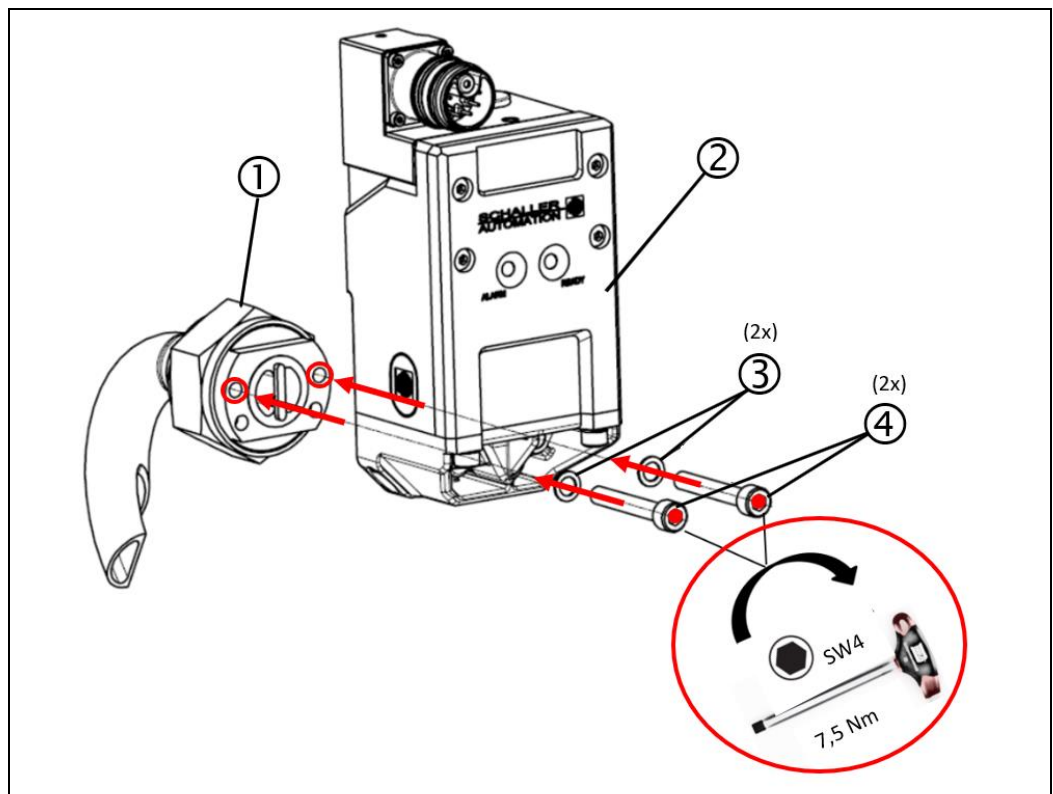


Fig.: 22 : Assembly procedure, VN301^{plus} sensor to engine wall screw fitting

- 1: Engine wall screw fitting
- 2: VN301^{plus} / VN301^{plus} Ex sensor

- 3: x2 lock washers S6, galvanised
- 4: x2 cap screws ISO 4762 - M6 x 40

6.3.3 Central unit

WARNING



Impairment of function and operation of the device

- ▶ The oil mist detection system must not be painted, varnished or otherwise altered.

DANGER



Risk of injury from overhead loads

- ▶ A suitable means of transport must be used for assembly and for transport to the assembly site. The central unit can be attached to the crane using the lifting eye nut on the protective hood. Suitable lifting equipment must be used for transport.
- ▶ Do not step into the area of rotation or under the load.
- ▶ Carefully secure the load before assembly.
- ▶ Use personal protective equipment. → Section 2.4 Basic safety instructions

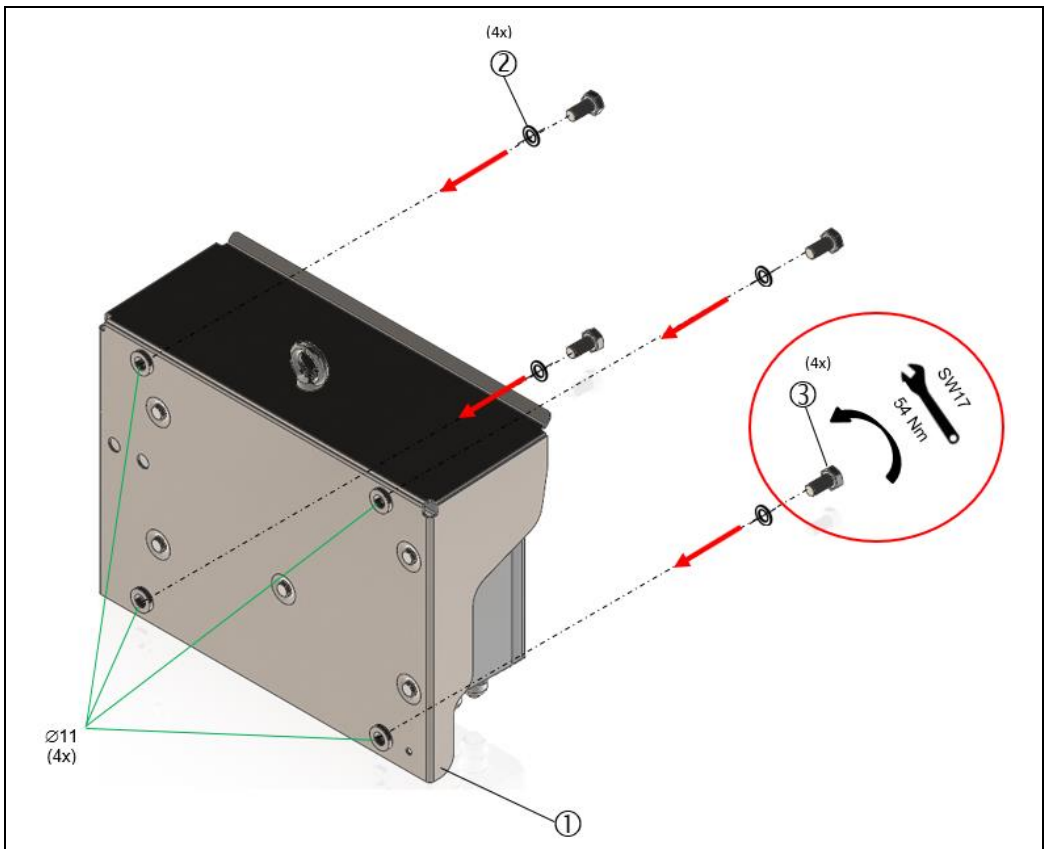


Fig.: 23 : Assembly procedure, VN301^{plus} central unit to engine wall

- 1: VN301^{plus} central unit
- 2: x4 washers S-10, galvanised spring steel (included in delivery)
- 3: x4 hexagon head bolts ISO 4017- M10 x 20 - 8.8 galvanised (included in delivery)

6.3.4 Remote Indicator II for remote monitoring (optional)

The VISATRON® VN301plus / VN301plus Ex system can be connected to the Remote Indicator II for remote monitoring to monitor the oil mist concentration and the system status from a safe location according to IACS UR M10.



Fig.: 24 : Remote Indicator II (optional)

The Remote Indicator II is installed in the machine control room. The user provides specific details of installation location and attachment in each case. The requirements of IACS UR M10.11 must be observed!

6.4 Electrical installation



CAUTION



Safe and correct electrical installation of the device

- ▶ For electrical installation of the system components, read the instructions for use and other documents accompanying the product with care and keep them in a suitable place for later use.




NOTICE






Personal protective equipment

Operating the device or working on the device without protective equipment may result in serious injury. For the workplace PPE, the following protective equipment must be used:

- ▶ DIN EN 388:2016 Protective gloves against mechanical risks, 2341X, and DIN EN 407:2004 Protective gloves against thermal risks, X1XXXX
- ▶ Safety glasses in accordance with DIN EN 166 or DIN EN 170
- ▶ Safety helmet in accordance with DIN EN 397 and DIN EN 50365
- ▶ ESD safety shoes according to ESD standard DIN EN 61340-5-1


 **DANGER**







Mechanical hazards

There is a risk of serious injury, including death, due to explosion in the crankcase as a result of incorrect assembly or installation.

- ▶ Before starting the engine, the hybrid plug of the hybrid cable must be connected to the sensor unit and locked. Failure to do this means that an explosive atmosphere may escape from the engine and lead to a risk of explosion.
- ▶ If the oil mist detection system is operated in Ex-protected areas, the relevant safety instructions must be observed. ⇒ *Section 2.4.1 Safety instructions for potentially explosive atmospheres*




 **DANGER**






Hazards during electrical installation

There is a risk of serious injury, including death, due to explosion in the crankcase as a result of incorrect installation.

- ▶ You may only carry out electrical installation of the oil mist detection system when the engine is switched off and the system has been disconnected from the power supply first! The compressed air supply to the oil mist detection system must also be switched off first.
- ▶ Before starting assembly, the housing of the VISATRON[®] VN301^{plus} / VN301^{plus} Ex central unit must be earthed.
- ▶ When installing electrical and pneumatic lines on the central unit, do not use cable ties to secure lines and bundles of lines! (See AA_7.5_299)

 **WARNING**



Failure to comply with the safety instructions may result in major damage to property or the environment and in serious injury or death.

- ▶ Familiarise yourself with the basic safety instructions before starting electrical installation. ⇒ *Section 2.4 Basic safety instructions*

6.4.1 Operating modes and connection options for the central unit (overview)

The system configuration of the oil mist detection system is defined depending on the installed sensor units and optionally includes two operating modes, as described below. The figures below also show the connection options for signal transfer to external display devices.

6.4.1.1 Operating mode 1: One central unit in use (when using max. 10 sensor units)

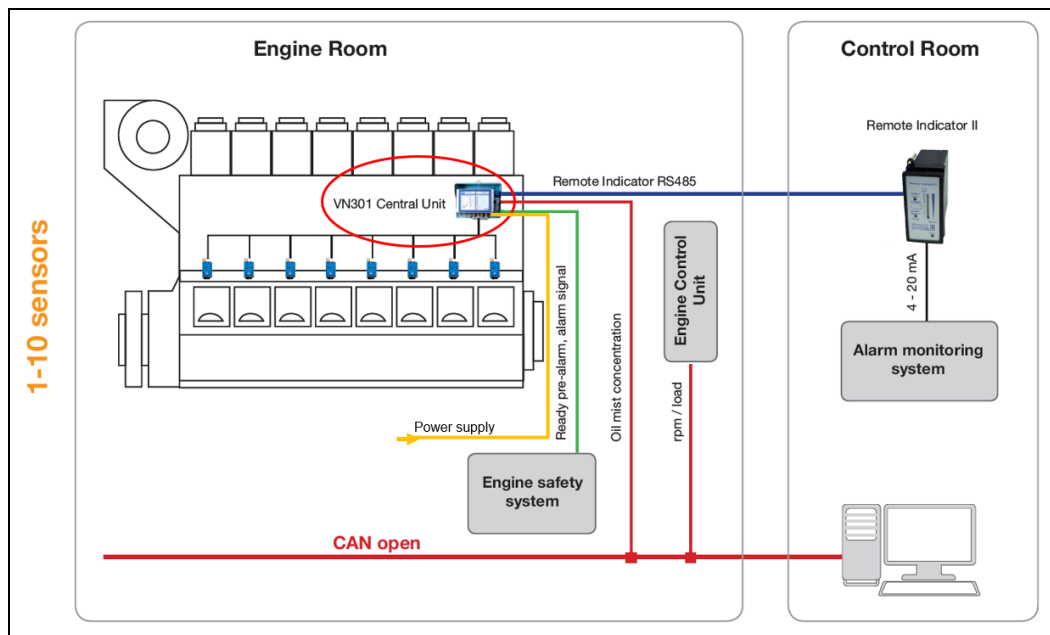


Fig.: 25 : Operating mode 1 "Master", VN301^{plus} central unit

6.4.1.2 Operating mode 2: Two central units in use (for use with 11 ore more sensor units)

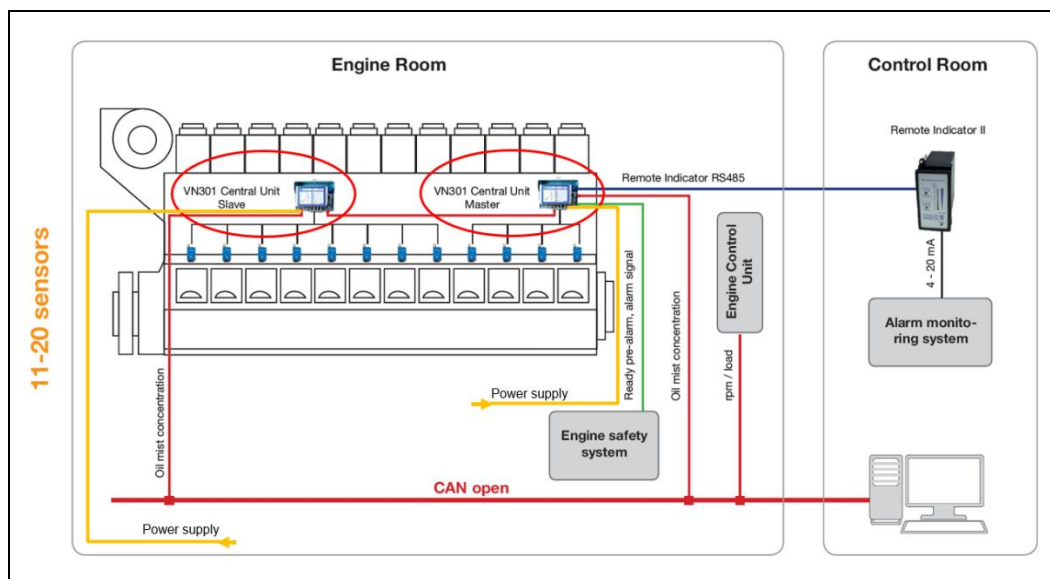


Fig.: 26 : Operating mode 2 "Master/Slave", VN301^{plus} central unit

6.4.2 Electrical and pneumatic connection of the sensor unit

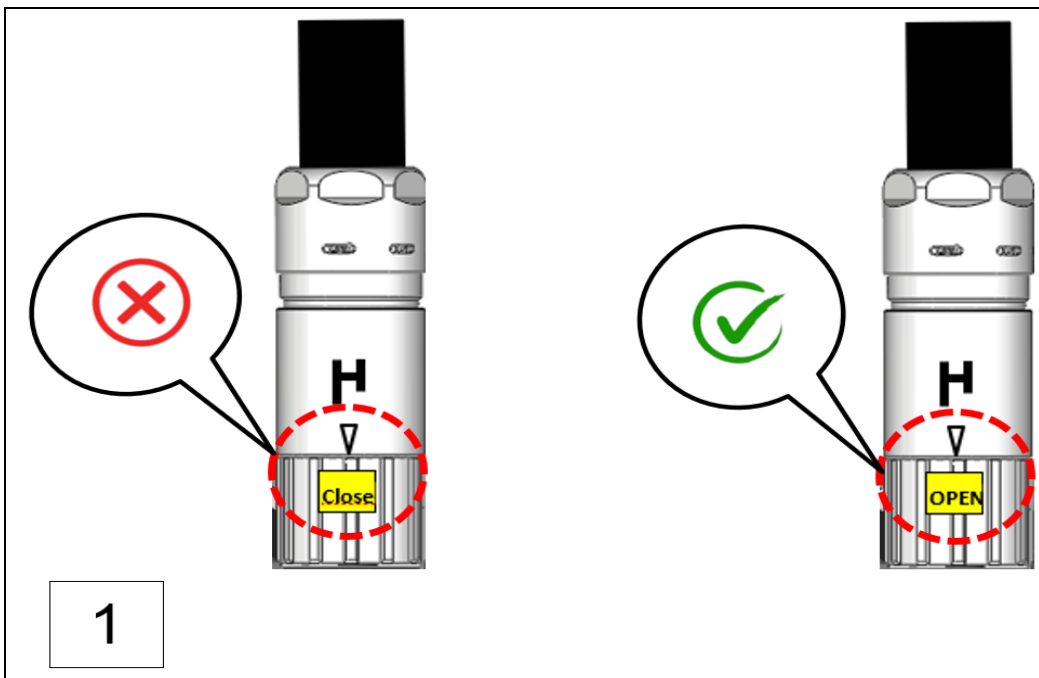
The electrical and pneumatic connection between the VISATRON® VN301^{plus} central unit and sensor unit is established using a hybrid cable [1] as shown in the figure below. At the front end of the cable (on the sensor side), there is a hybrid plug [2], which contains the electrical connection and a compressed air connection, and is connected to the sensor unit. The hybrid plug combines six electrical contact pins and a compressed air connection in one housing. Finally, the free end of the cable [3] is routed to the central unit and connected electrically and pneumatically to the circuit board inside.



Fig.: 27 : Setup of the hybrid cable unit, VN301^{plus}

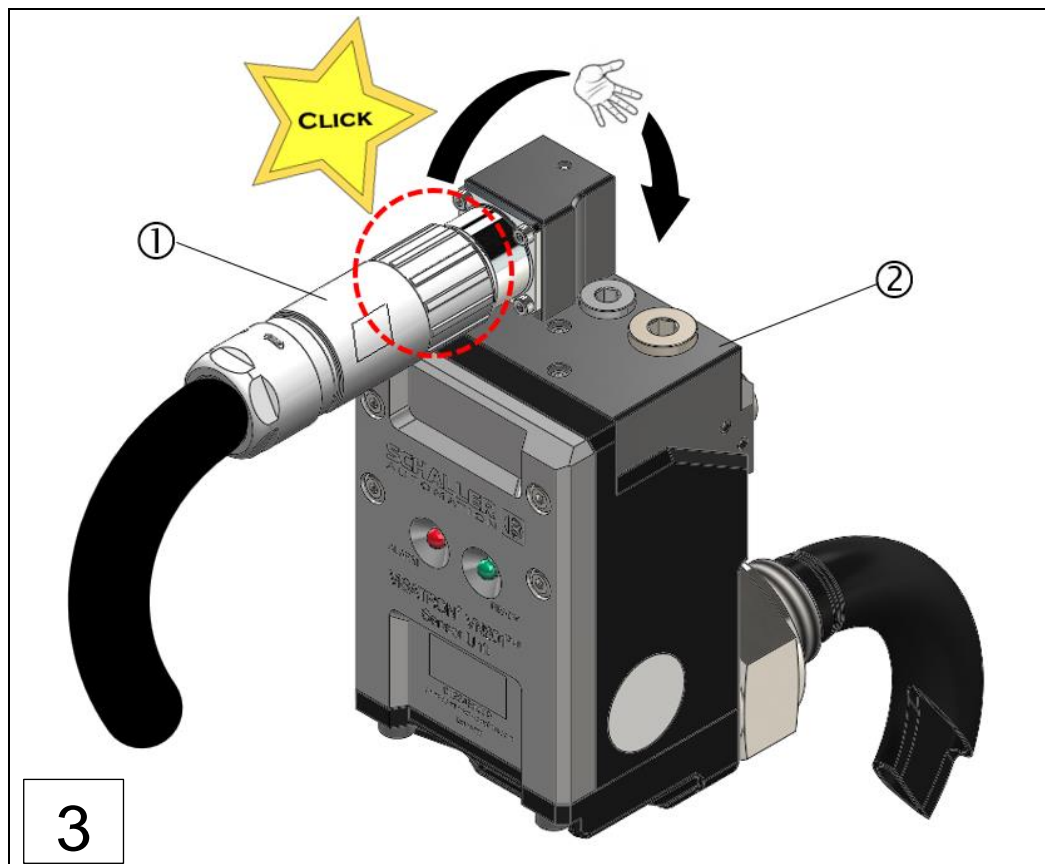
- 1: Hybrid cable
- 2: Hybrid plug
- 3: Free cable end

The electrical and pneumatic connection between the VISATRON® VN301^{plus} central unit and sensor unit is established as per the following installation steps:





1: Hybrid plug
2: Sensor unit VN301^{plus}



1: Hybrid plug
2: VN301^{plus} / VN301^{plus} Ex sensor unit

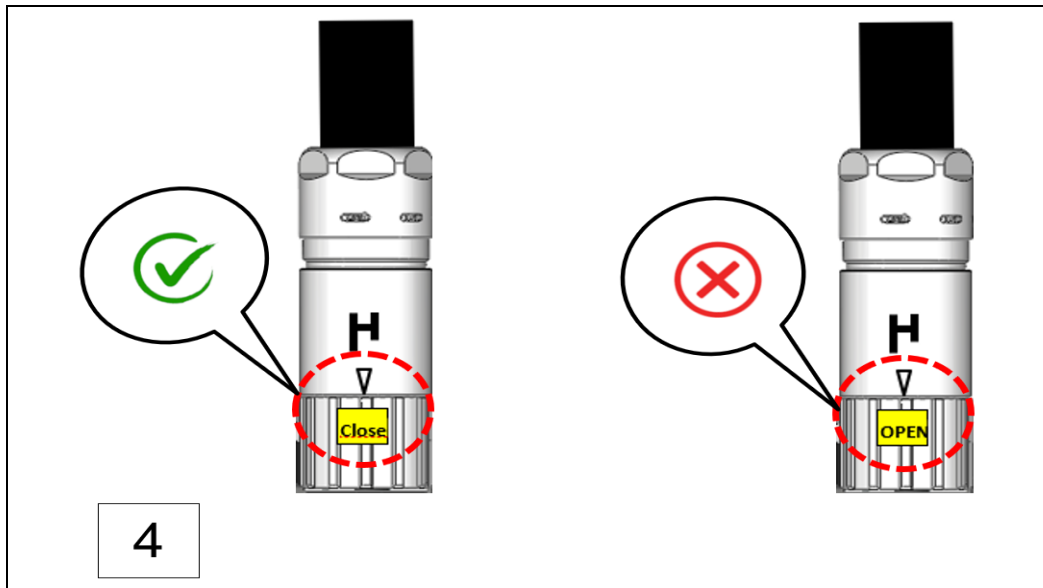


Fig.: 28 : Assembling the hybrid cable on the VN301^{plus} / VN301^{plus} Ex sensor unit (steps 1-4)

6.4.3 Electrical and pneumatic installation of the central unit

All the electrical terminal connections and the pneumatic connections are on the connection board in the central unit, as shown in the figure below; the free end of the hybrid cable unit, the bus and alarm lines and the power supply are connected to the board.

⇒ See also Section 6.4.2 Electrical and pneumatic connection of the sensor unit

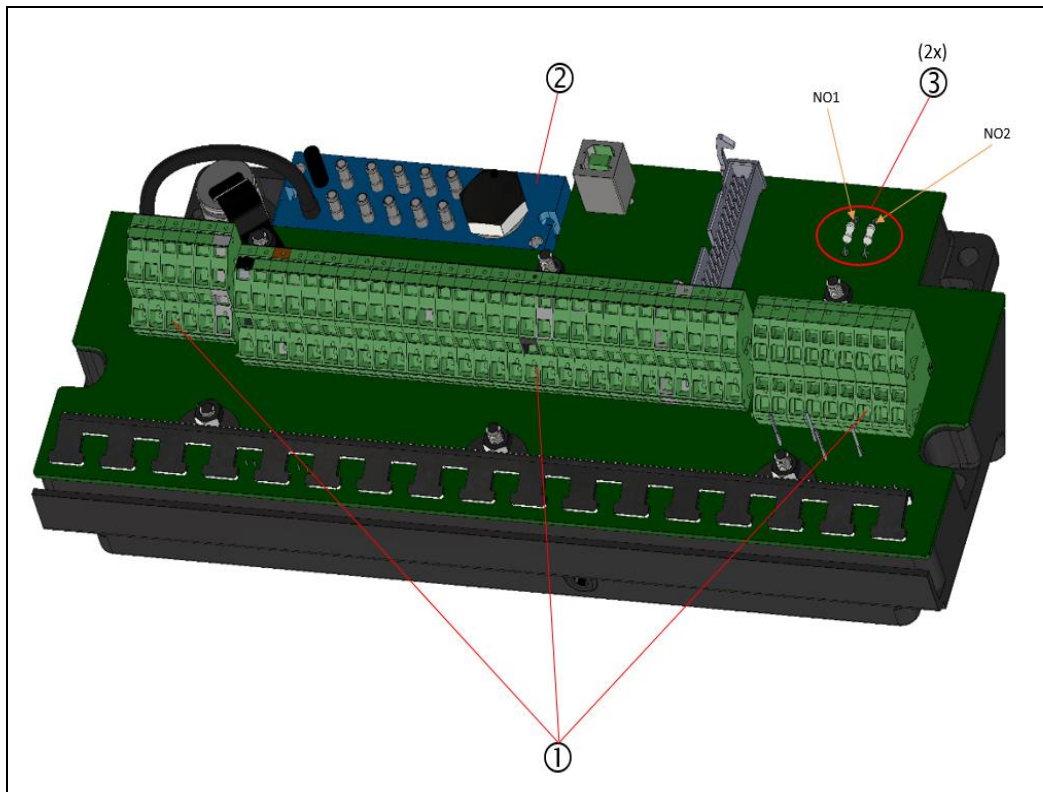


Fig.: 29 : Connection board, VN301^{plus} central unit

1: Electrical terminal strips

2: Pneumatic connection unit

3: Wire break resistors

The electrical and pneumatic connection is established as per the installation steps below:

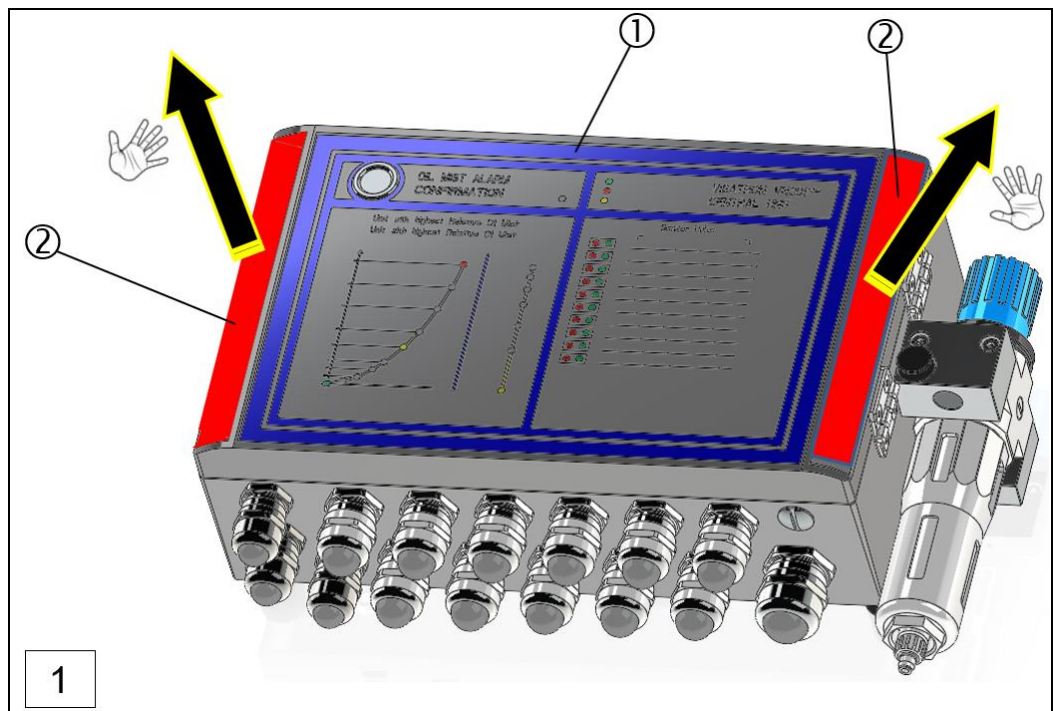


Fig.: 30 : VN301^{plus} central unit; remove the aluminium cover strips on the cover

- 1: VN301^{plus} central unit
- 2: Aluminium cover strip

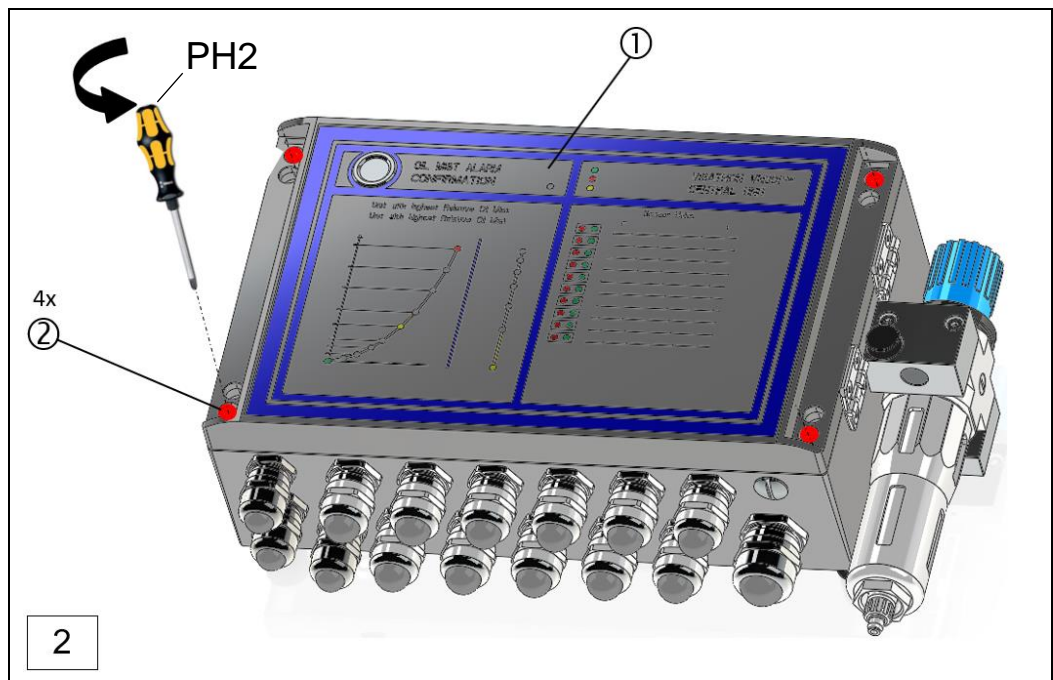


Fig.: 31 : VN301^{plus} central unit; unscrew the screws of the cover.

- 1: Cover, VN301^{plus} central unit
- 2: x4 fixing screws (captive screws)

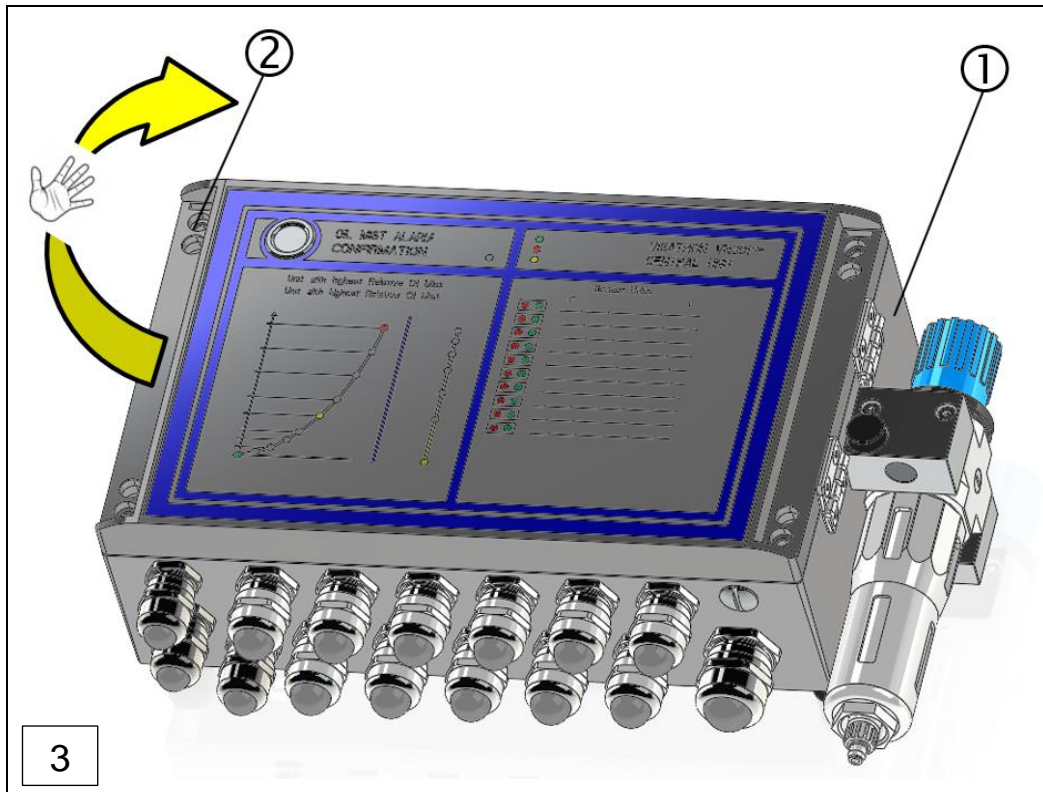


Fig.: 32 : Open the VN301^{plus} central unit

1: Bottom half of housing, VN301^{plus} central unit

2: Cover, VN301^{plus} central unit

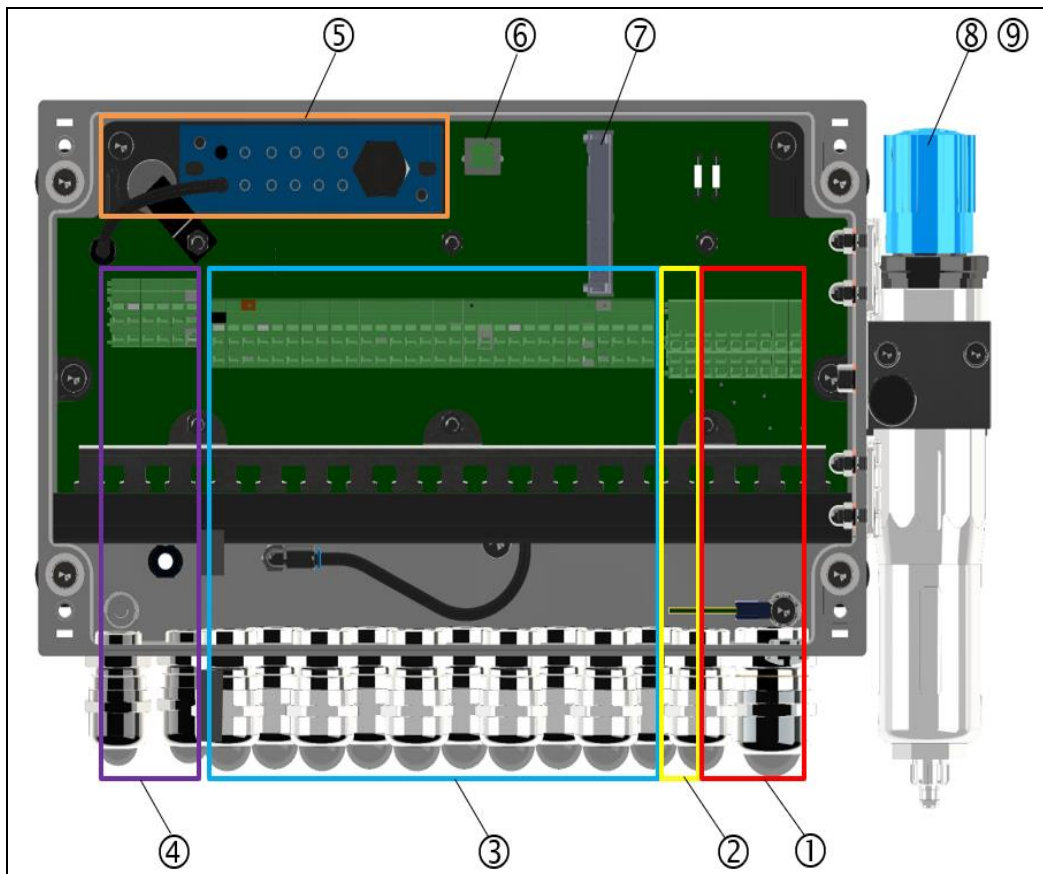


Fig.: 33 : VN301^{plus} central unit, electrical and pneumatic connection (see Fig. 34 for key)

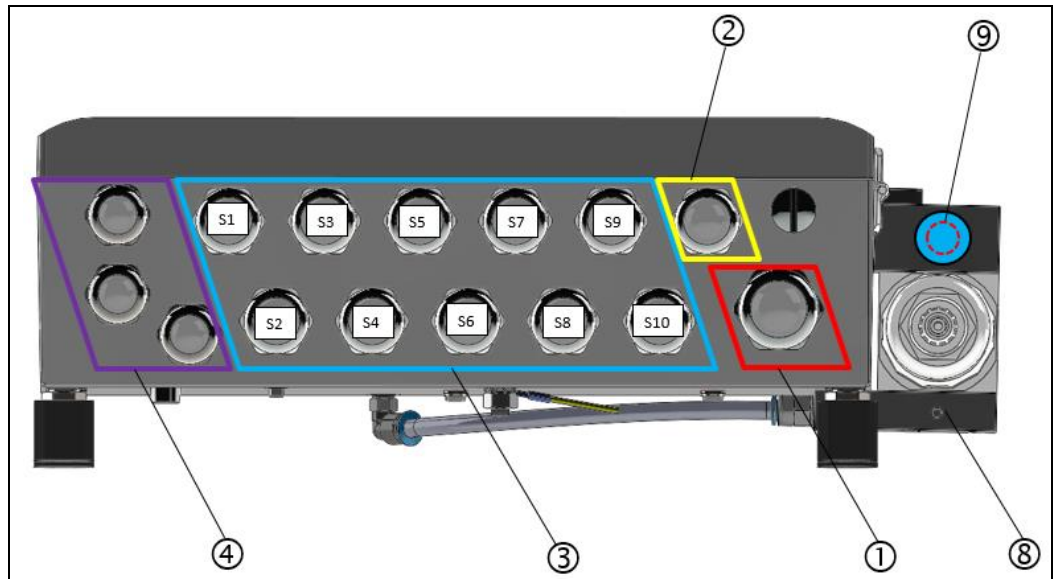


Fig.: 34 : VN301plus central unit, view of cable connection panel

- | | |
|---|---|
| 1: Terminal block for relay contacts (M25) | 5: Compressed air distributor unit |
| 2: Terminal block for power supply (M20) | 6: USB port |
| 3: Terminal block for sensor connection (M20) | 7: Connection for cover of VN301plus central unit |
| 4: Terminal block for communication (M16) | 8: Pressure regulator unit |
| | 9: Threaded connection G1/4 (closed by plug) |

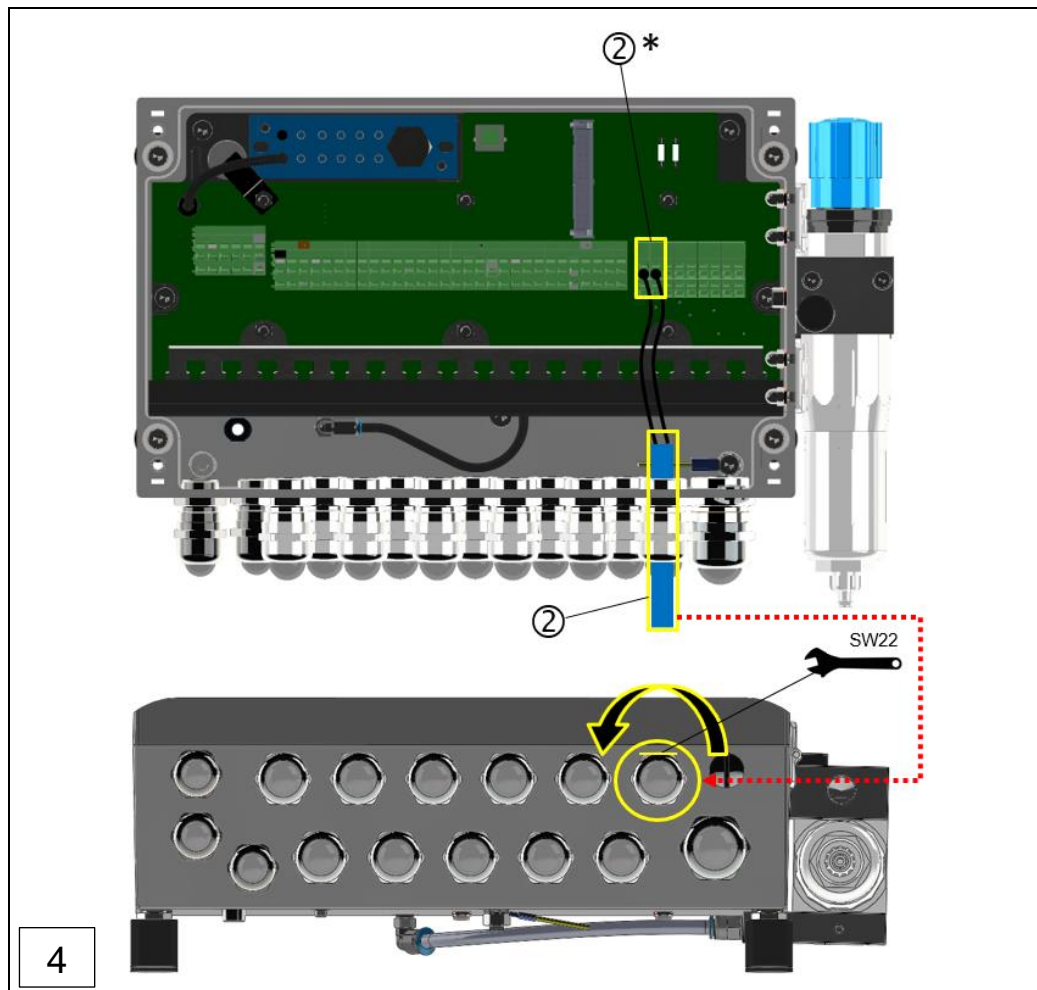


Fig.: 35 : VN301plus central unit; establish power supply

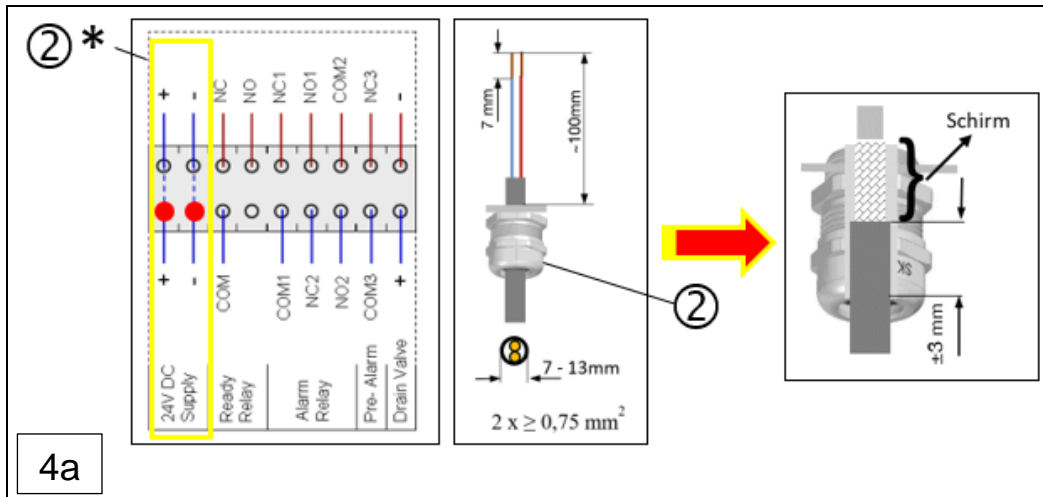


Fig.: 36 : VN301^{plus} central unit; establish power supply (connect contacts)

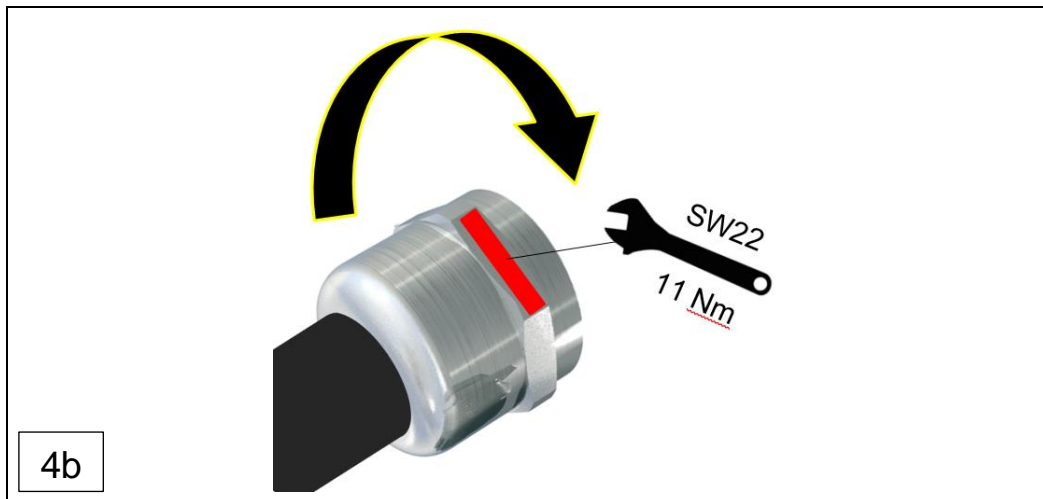


Fig.: 37 : VN301^{plus} central unit; tighten the EMC cable gland

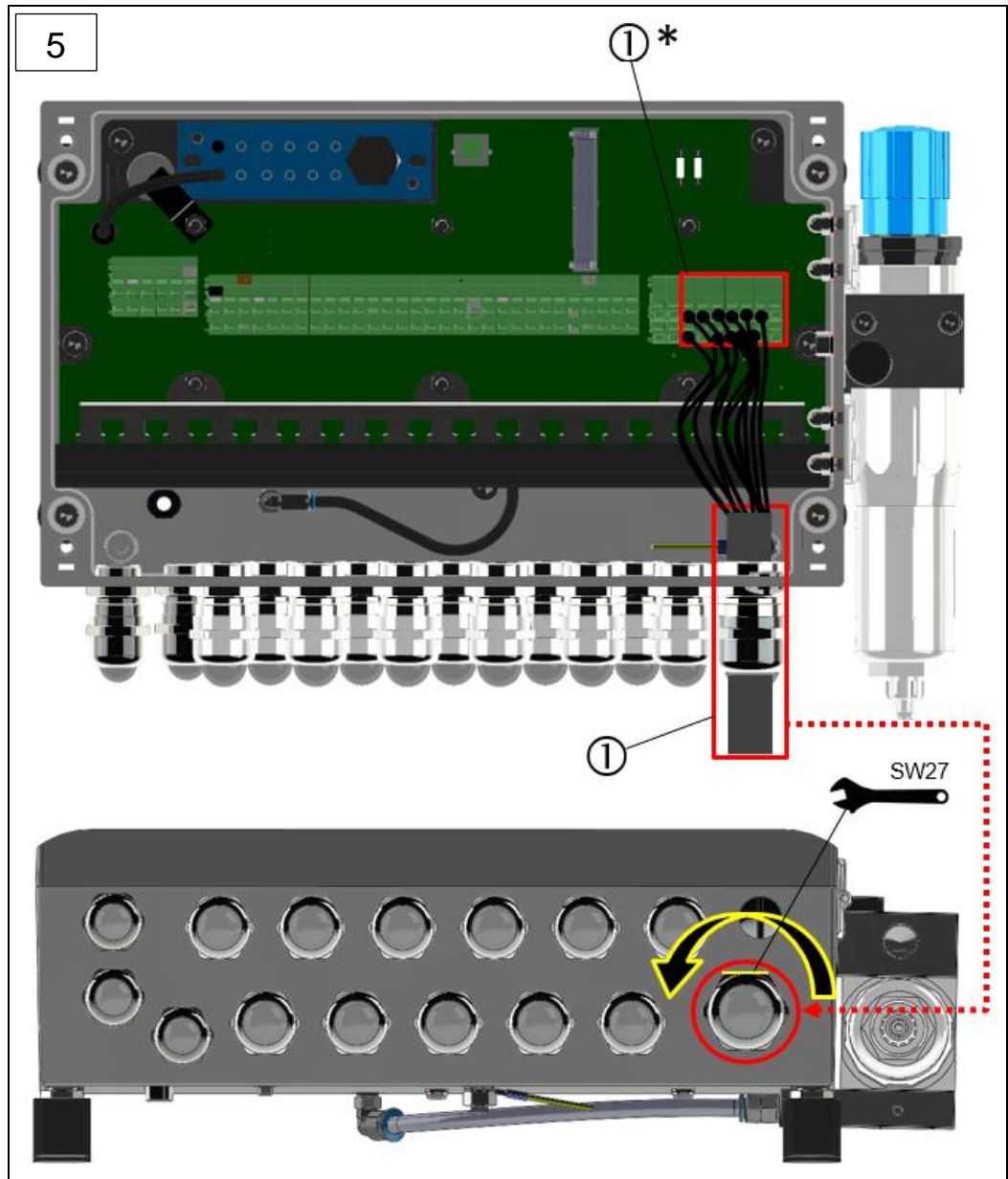


Fig.: 38 : VN301plus central unit; establish alarm

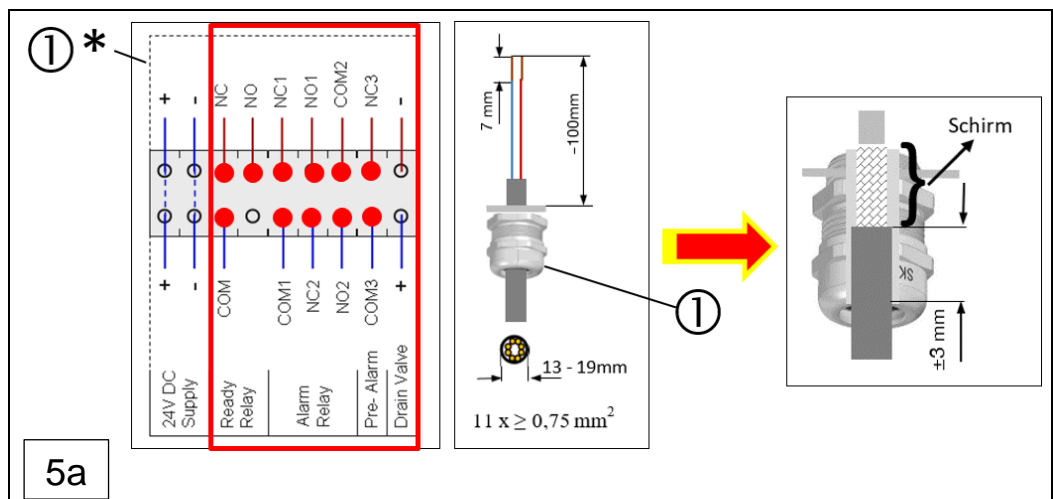


Fig.: 39 : VN301plus central unit; establish alarm (connect contacts)

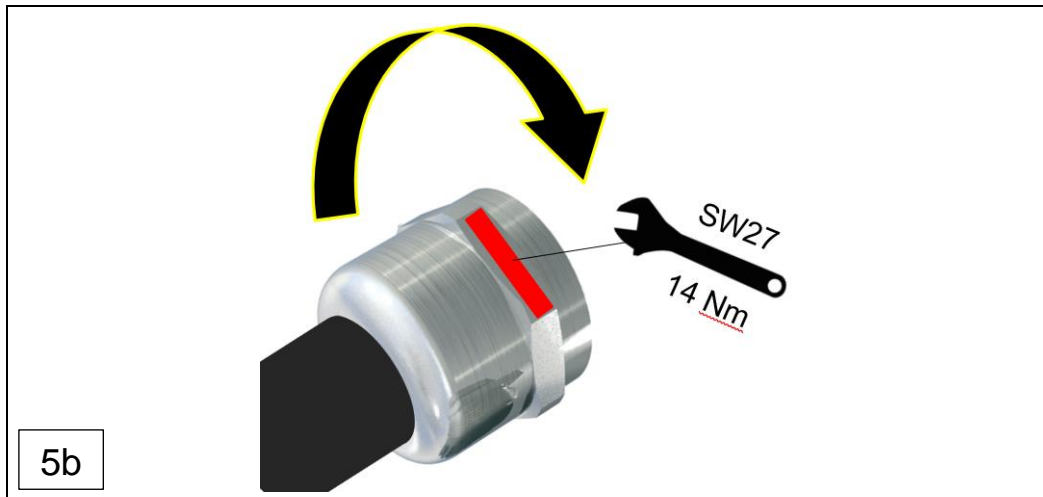


Fig.: 40 : VN301^{plus} central unit; tighten the EMC cable gland

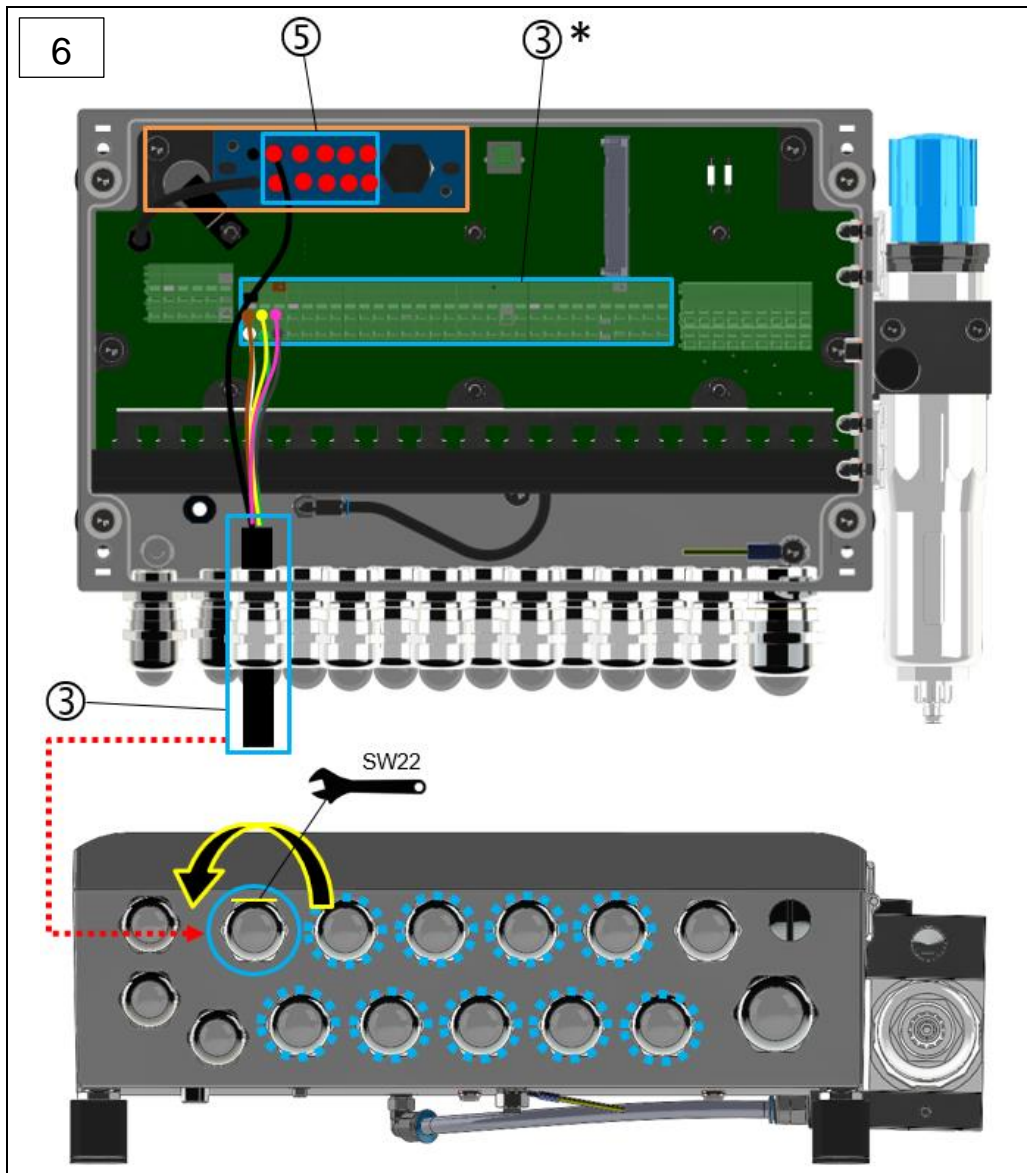


Fig.: 41 : VN301^{plus} central unit sensor connection (electrical/ pneumatic, sensors 1-10)

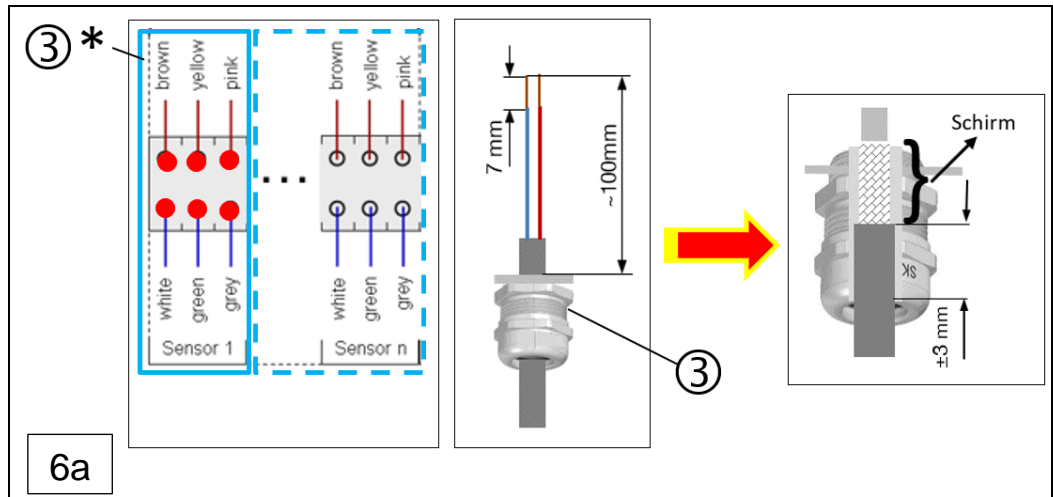


Fig.: 42 : VN301^{plus} central unit sensor connection (connect contacts, sensors 1-10)

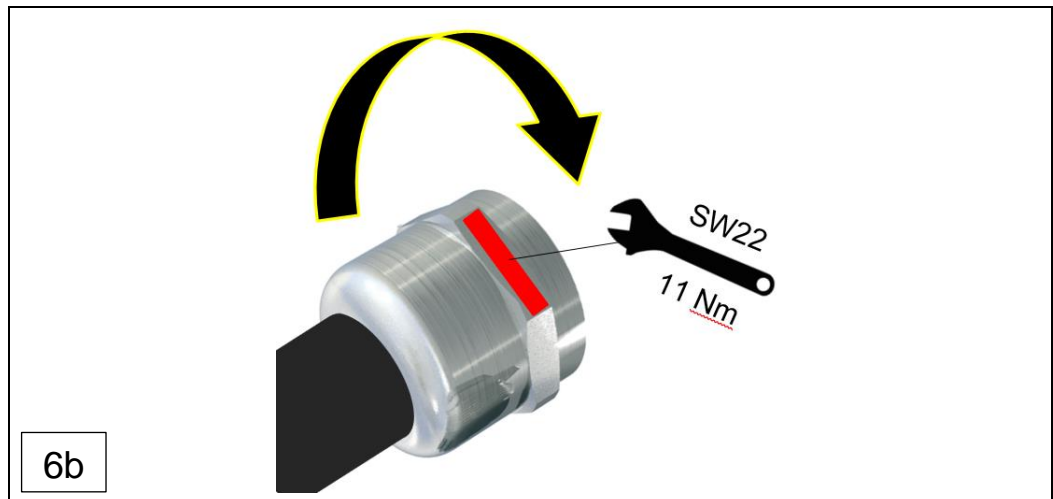


Fig.: 43 : VN301^{plus} central unit; tighten the EMC cable gland

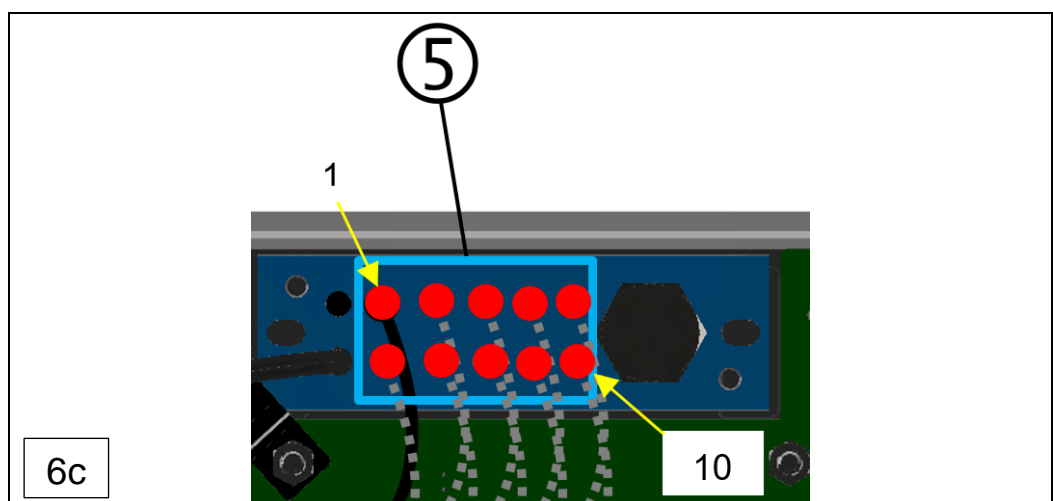


Fig.: 44 : VN301^{plus} central unit; establish compressed air connection (sensors 1-10)

5: Compressed air distributor unit

6.4.3.1 Configuration of the wire break resistors on the VN301^{plus} central unit

⇒ Section 6.4.3 Electrical and pneumatic installation of the central unit

As shown in Figure 29, the standard configuration of the wire break resistors as delivered is 33 kΩ. The wire break resistors can be adapted to customer-specific requirements or swapped out. An range of suitable resistors is included in the delivery.

NOTICE



Swapping out wire break resistors

- ▶ The wire break resistors are only plugged in and permanently secured by the springs inside. No soldering is necessary for the resistors!

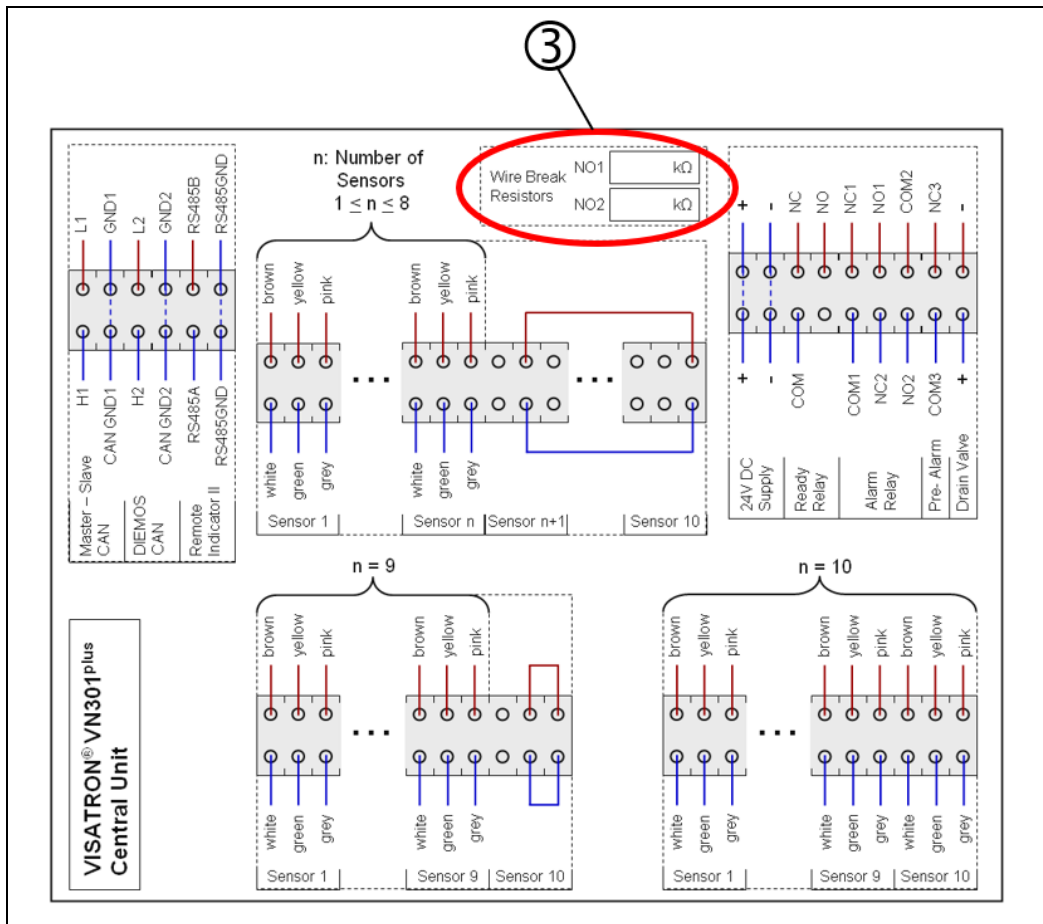
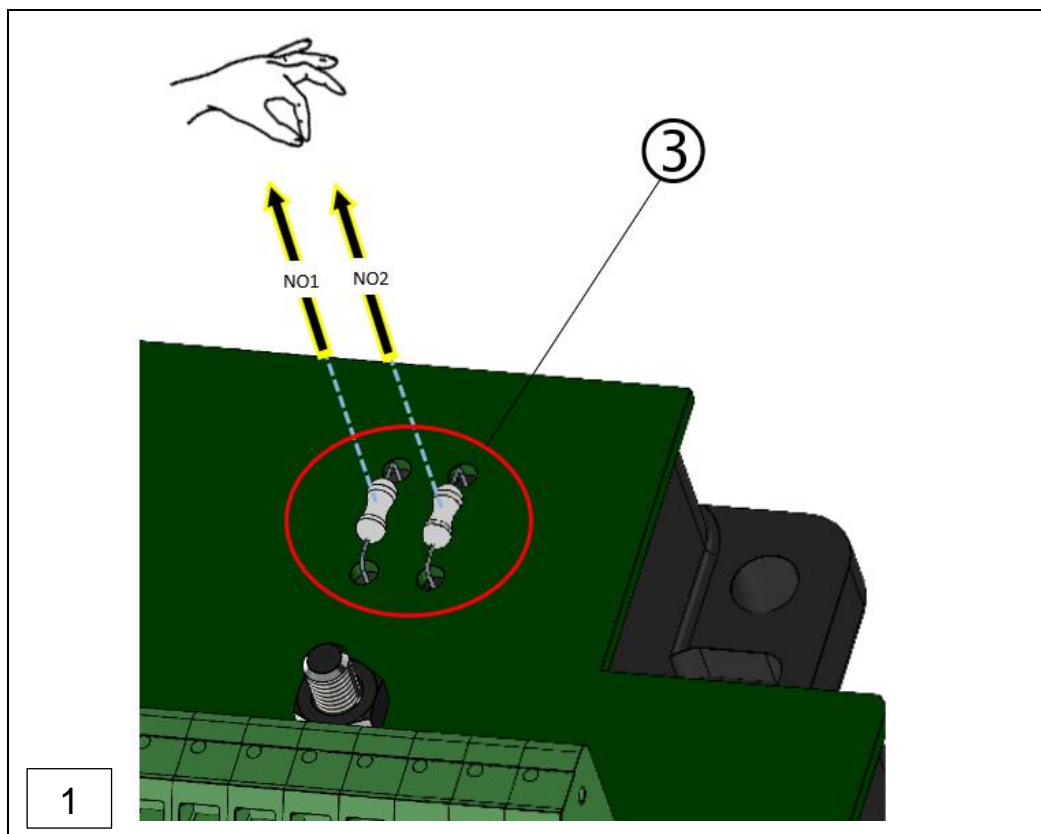
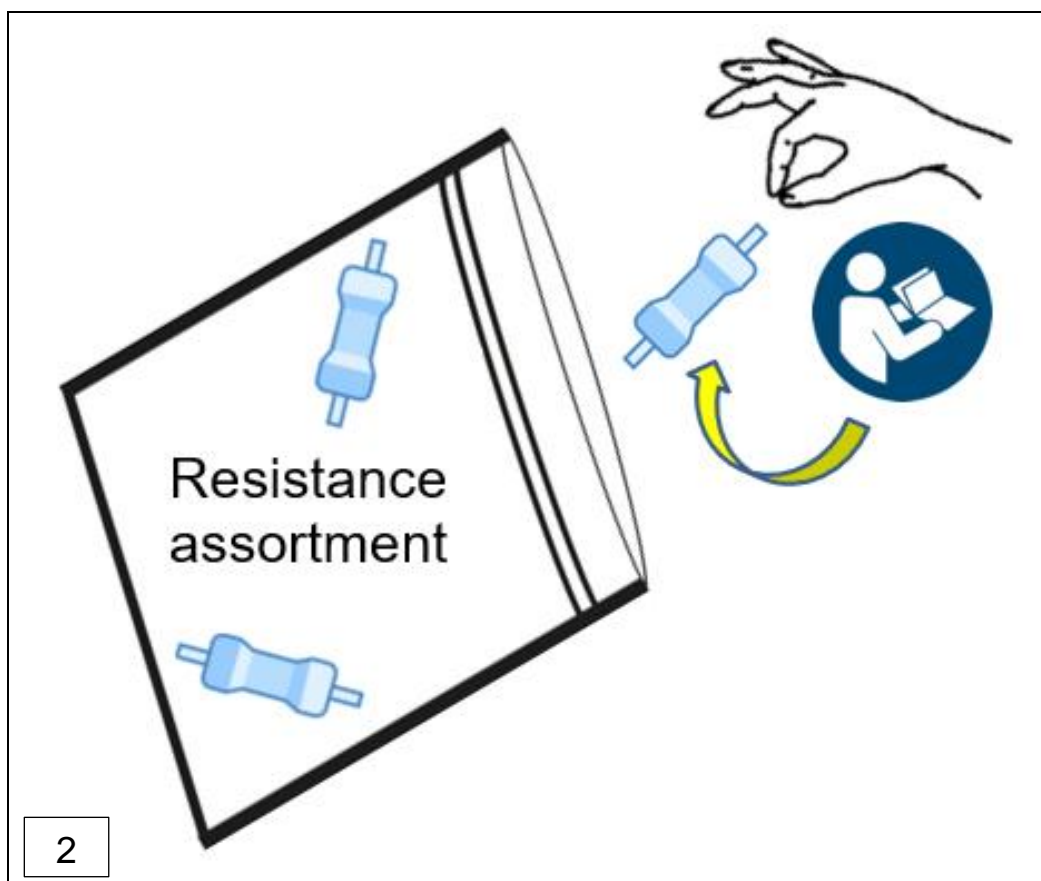


Fig.: 45 : VN301^{plus} central unit: Overview; configuration of the wire break resistors

3: Wire break resistors, NO1, NO2



3: Wire break resistors, NO1, NO2



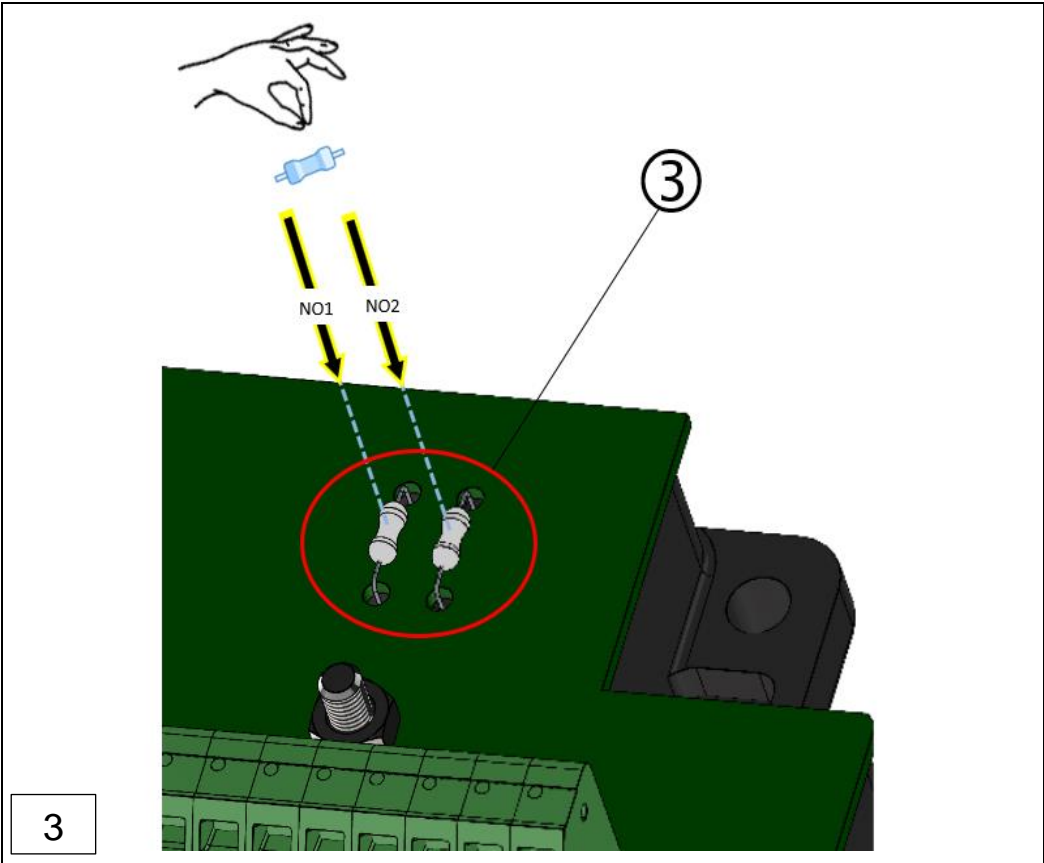


Fig.: 46 : VN301^{plus} central unit: Swap out wire break resistors (steps 1-3)

6.4.3.2 Configuration of the wiring bridges on the VN301^{plus} central unit

⇒ Section 6.4.3 Electrical and pneumatic installation of the central unit

4 sensors

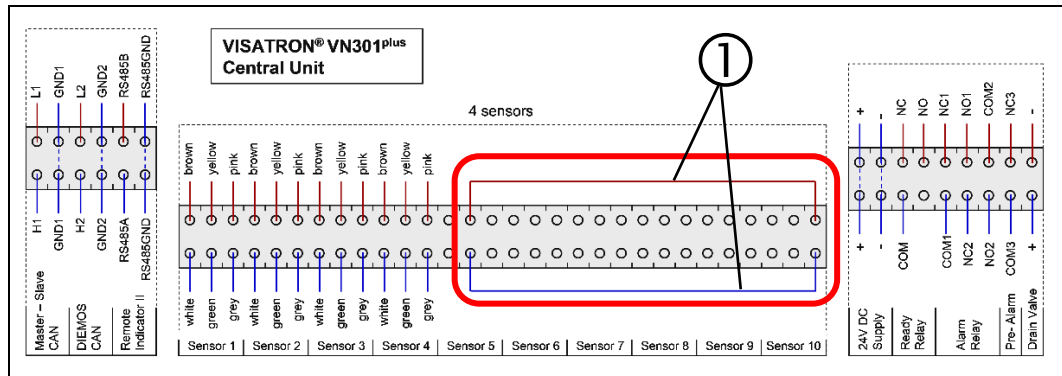


Fig.: 47 : VN301^{plus} central unit: Configuration of the wiring bridges; 4 sensors

1: Wiring bridges

5 sensors

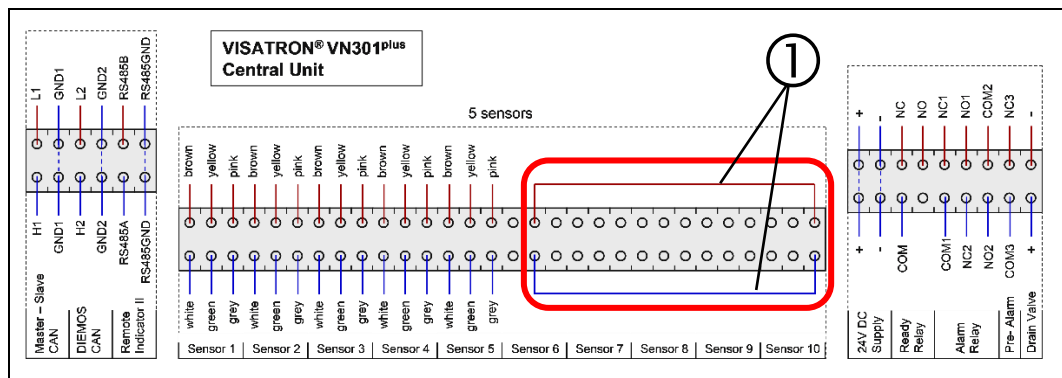


Fig.: 48 : VN301^{plus} central unit: Configuration of the wiring bridges; 5 sensors

1: Wiring bridges

6 sensors

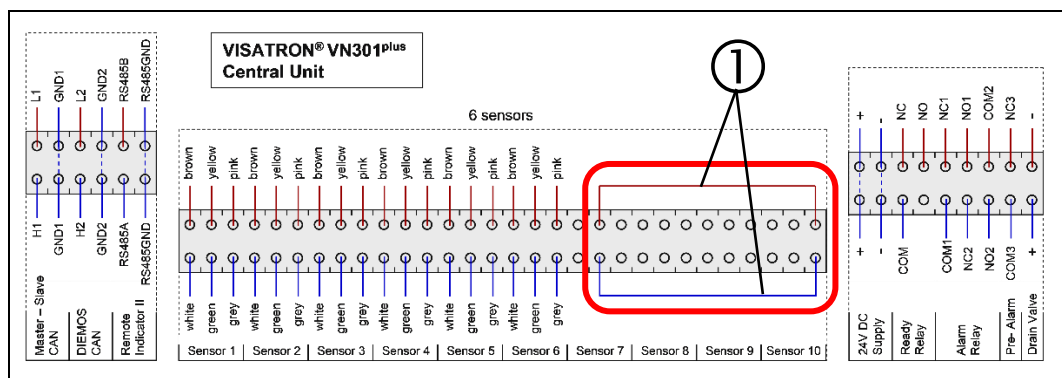


Fig.: 49 : VN301^{plus} central unit: Configuration of the wiring bridges; 6 sensors

1: Wiring bridges

7 sensors

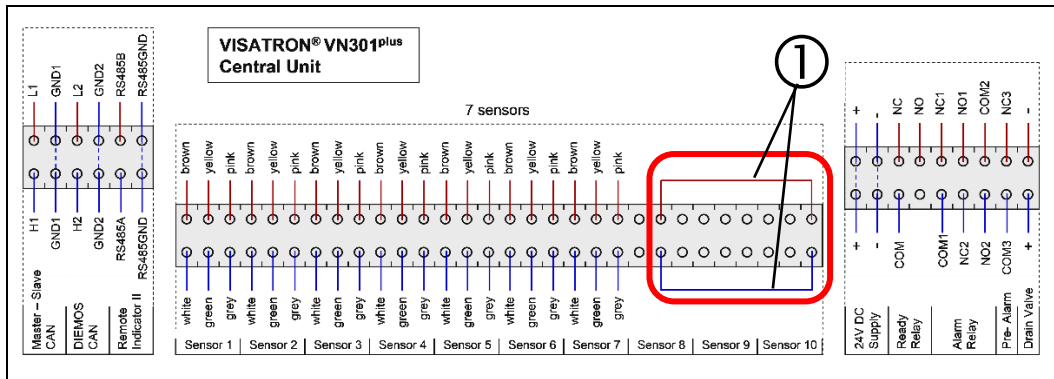


Fig.: 50 : VN301^{plus} central unit: Configuration of the wiring bridges; 7 sensors

1: Wiring bridges

8 sensors

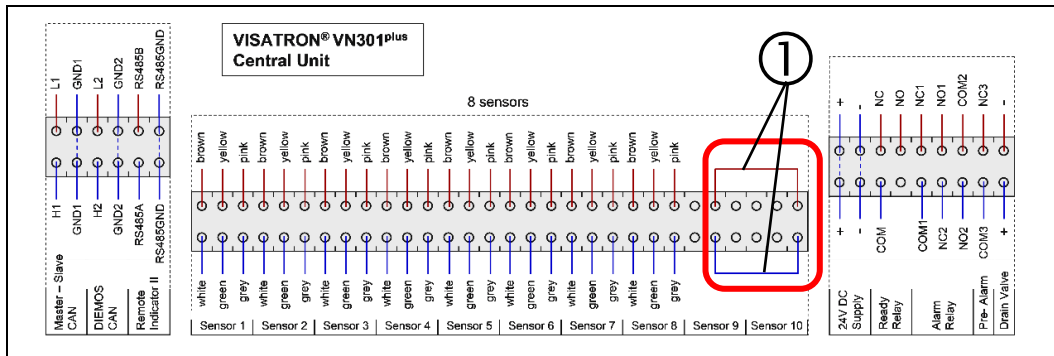


Fig.: 51 : VN301^{plus} central unit: Configuration of the wiring bridges; 8 sensors

1: Wiring bridges

9 sensors

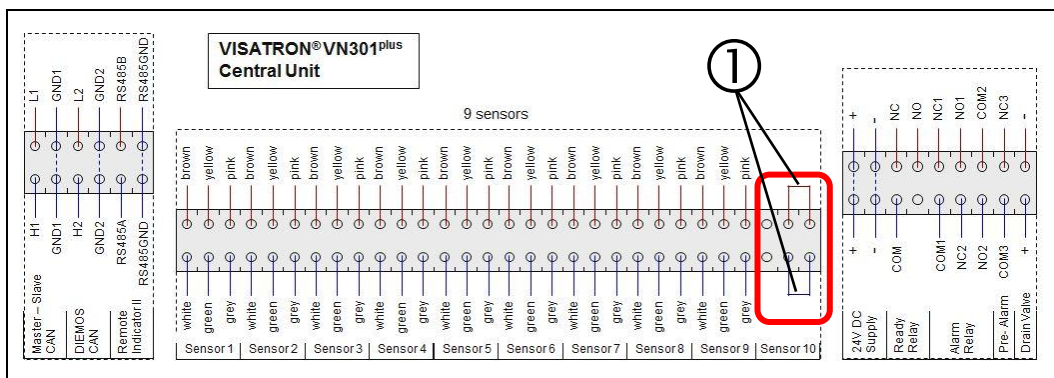


Fig.: 52 : VN301^{plus} central unit: Configuration of the wiring bridges; 9 sensors

1: Wiring bridges

10 sensors

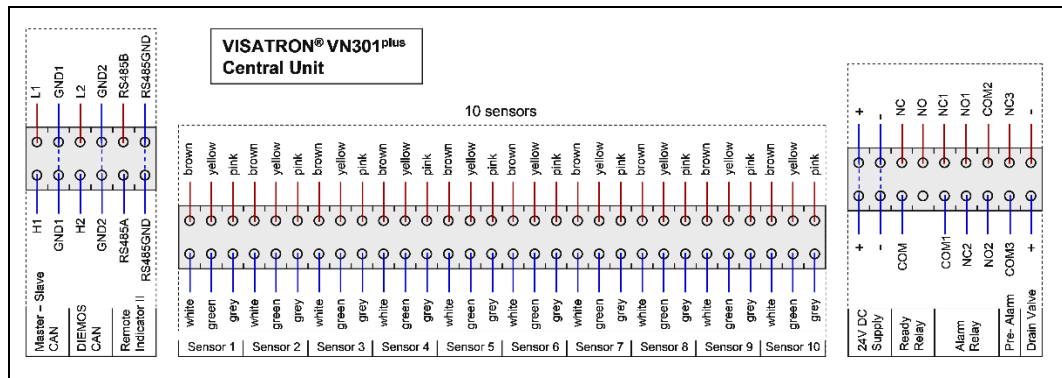


Fig.: 53 : VN301plus central unit: Configuration of the wiring bridges; 10 sensors

6.4.4 Electrical connection of the Remote Indicator II (optional)

→ Section 6.4.3 Electrical and pneumatic installation of the central unit

The VISATRON® VN301plus / VN301plus Ex system can be connected to the Remote Indicator II for remote monitoring to monitor the oil mist concentration and the system status from a safe location according to IACS UR M10.

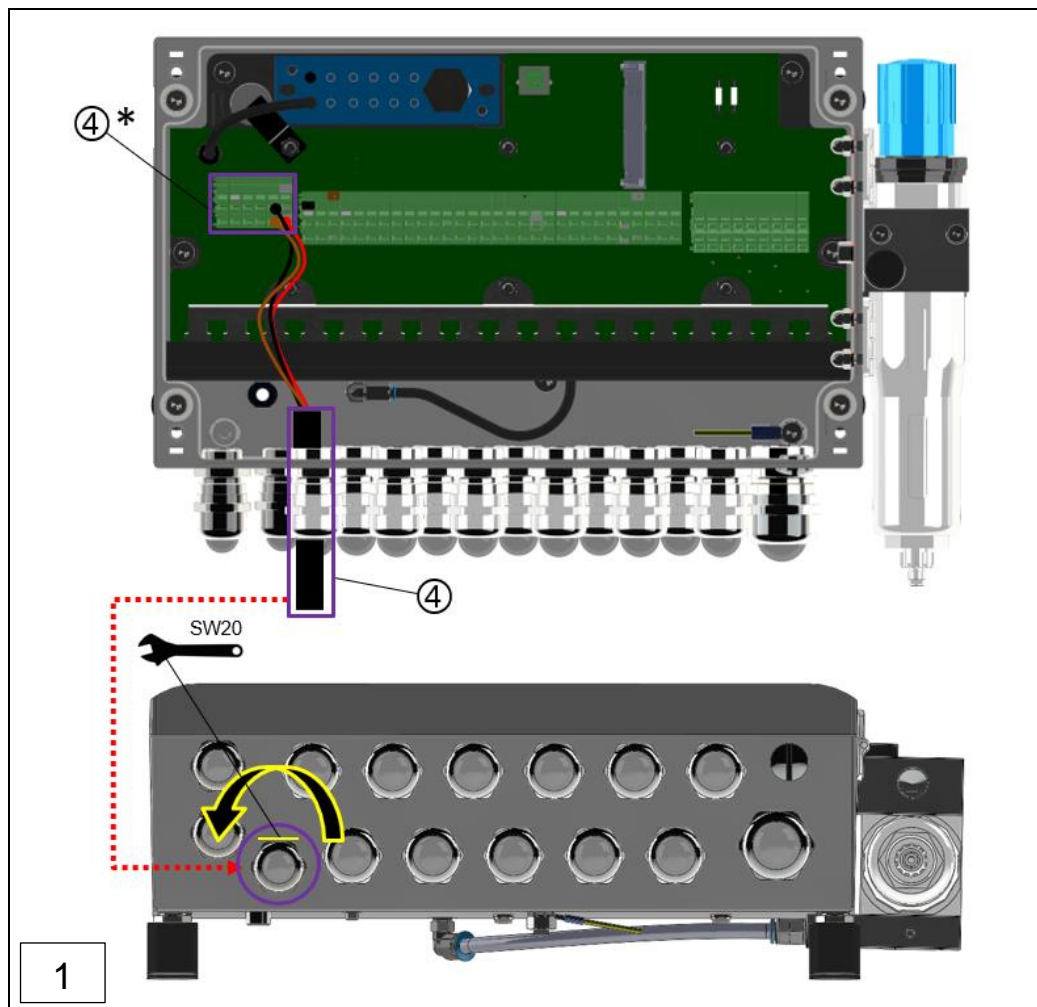


Fig.: 54 : VN301plus central unit; establish communication with Remote Indicator II (optional)

4: Assign sensor connection

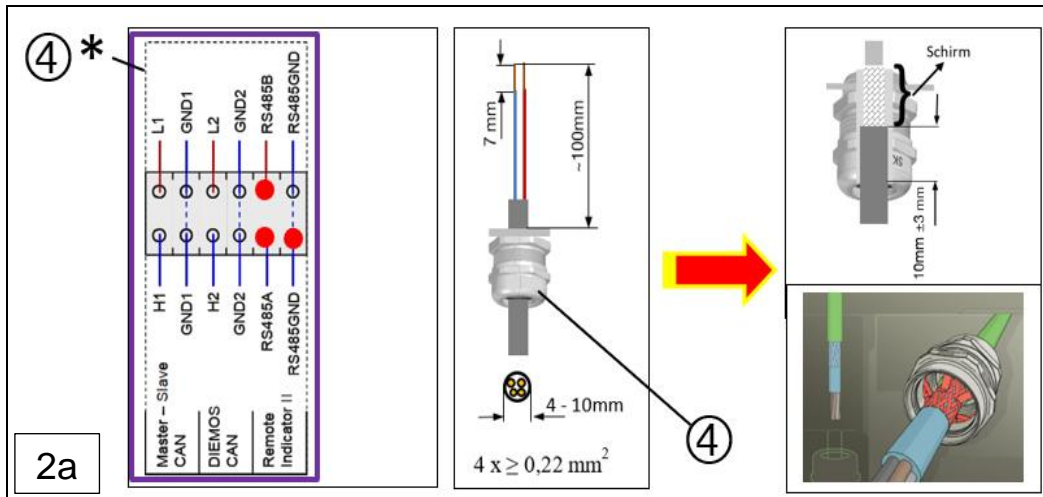


Fig.: 55 : VN301^{plus} central unit; connect contacts with Remote Indicator II (optional)

4: Assign sensor connection

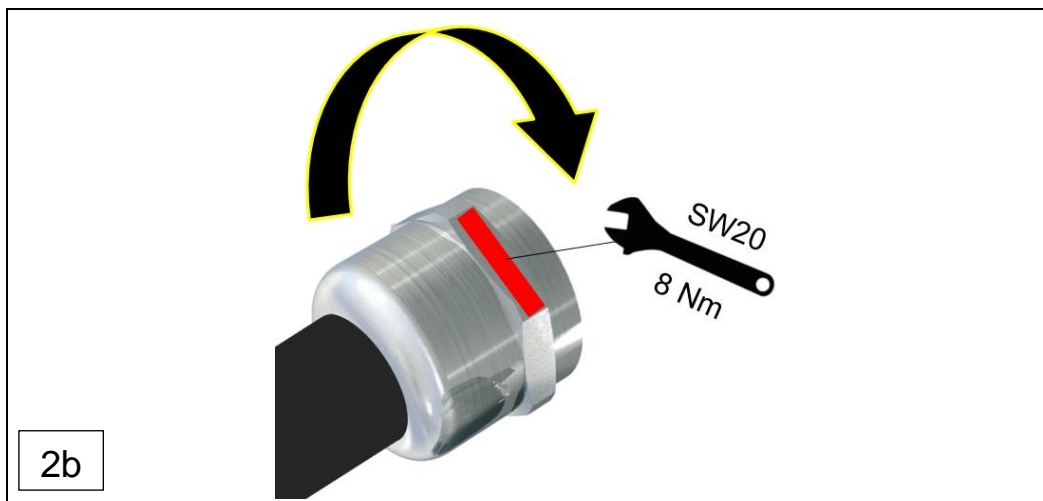


Fig.: 56 : VN301^{plus} central unit; tighten the EMC cable gland

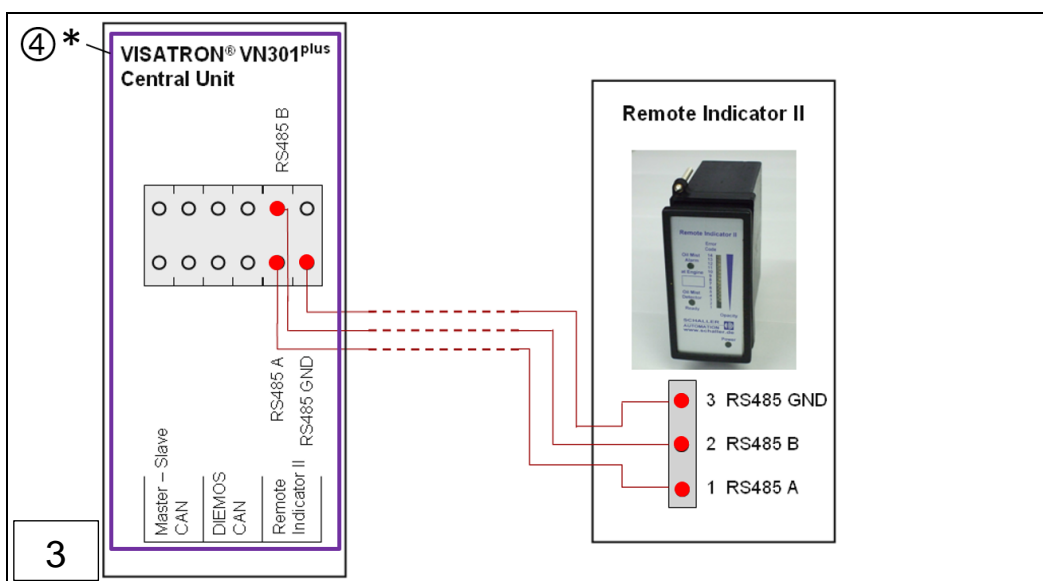


Fig.: 57 : Remote Indicator II, connect contacts (optional)

4: Assign sensor connection

6.4.5 Locking the VN301^{plus} central unit after completing the electrical installation

⇒ Section 6.4.3 Electrical and pneumatic installation of the central unit

After the electrical installation, the central unit is closed again as per the figure below.



NOTICE

Remove cable ties

- ▶ Step 1: Completed by removing the cable ties.
- ▶ Step 3: A screwdriver (size PH2) is used to close the central unit.

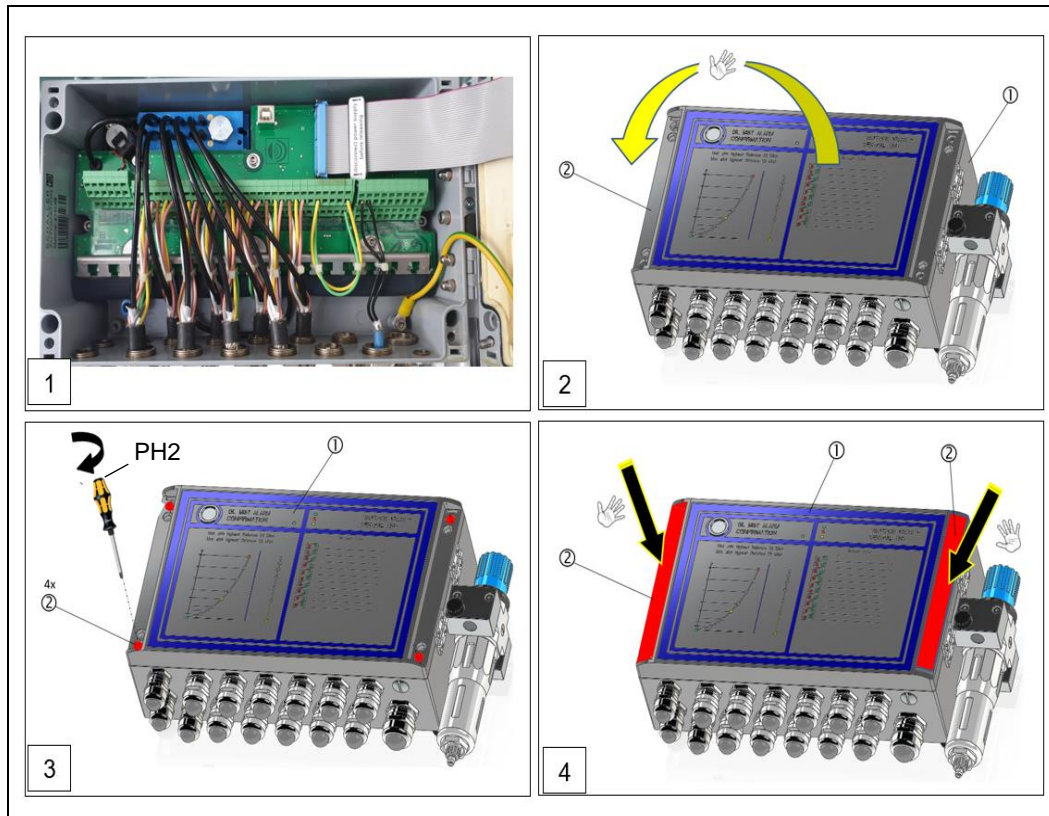


Fig.: 58 : Close the VN301^{plus} central unit (steps 1- 4)

6.4.6 Connection earth to the housing of the VN301^{plus} central unit (optional)

⇒ Section 2.4 Basic safety instructions

DANGER

Electrical hazards

- ▶ Before connecting the housing earthing to the protective cover of the VISATRON[®] VN301^{plus} central unit, the unit must first be disconnected from the power supply.

The optional earth connection between the oil mist detection system and the engine is via an earth connection with a durable corrosion-free screw connection, as per the figure below:

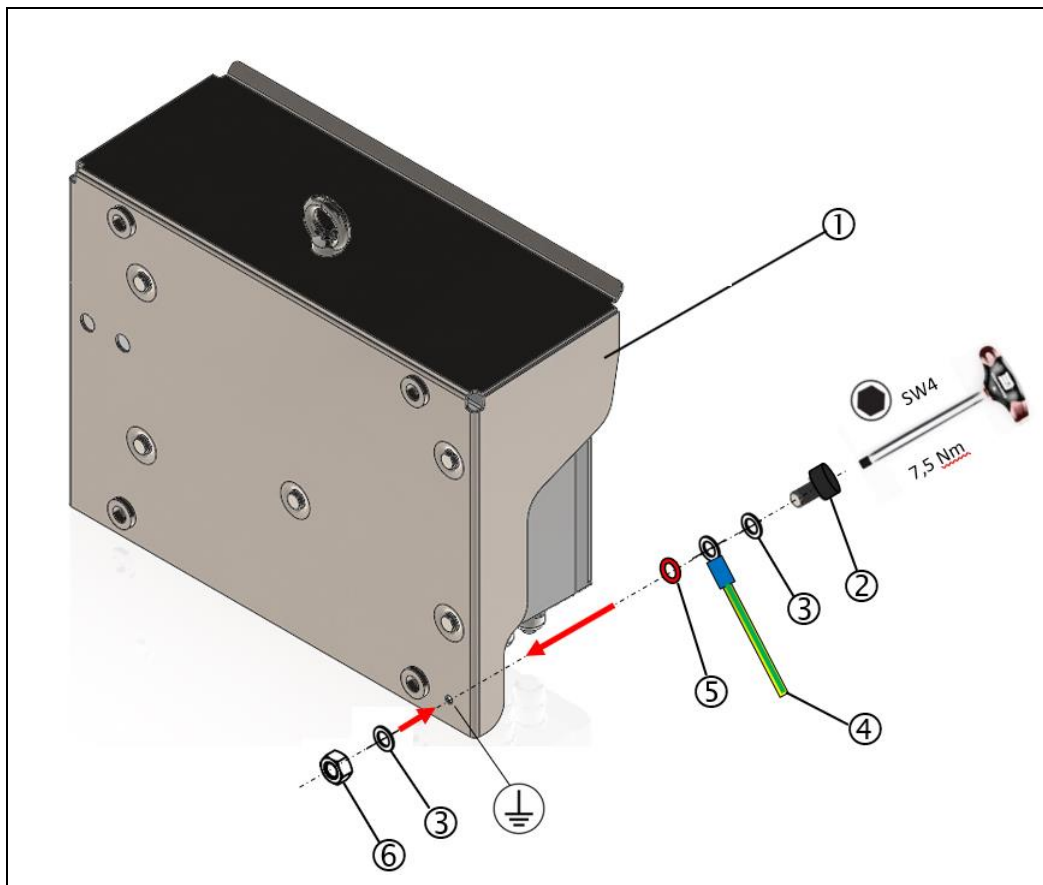


Fig.: 59 : Earth connection to the VN301^{plus} central unit

- | | |
|---|---|
| <ul style="list-style-type: none"> 1: VN301^{plus} central unit, complete 2: M6 screw DIN912, galvanised 3: x2 Schnorr washers | <ul style="list-style-type: none"> 4: Earthing cable with ring eye DN6 (customer-specific) 5: Contact washer M6 with teeth 6: Hexagon nut M6, galvanised |
|---|---|

6.5 Starting up for the first time



WARNING

Risk of oil mist explosion

Engine protection not guaranteed!

- ▶ The oil mist detector may only be started up after all the components have been completely attached
- ▶ To establish protection of the engine, start up the oil mist detector for the first time with the engine stopped.

Failure to comply with the safety instructions may result in major damage to property or the environment and in serious injury or death.

- ▶ Familiarise yourself with the basic safety instructions before starting electrical installation. → *Section 2.4 Basic safety instructions*
- ▶ If the oil mist detection system is operated in Ex-protected areas, the relevant safety instructions must be observed. → *Section 2.4.1 Safety instructions for potentially explosive atmospheres*



CAUTION

Safe and proper use of the device

- ▶ Read the instructions for use and other documents that accompany the product carefully and keep them in a suitable place for later use.
- ▶ For repair and service work, you must follow the instructions in the instructions for use.



NOTICE

Personal protective equipment

Operating the device or working on the device without protective equipment may result in serious injury. For the workplace PPE, the following protective equipment must be used:

- ▶ DIN EN 388:2016 Protective gloves against mechanical risks, 2341X, and DIN EN 407:2004 Protective gloves against thermal risks, X1XXXX
- ▶ Safety glasses in accordance with DIN EN 166 or DIN EN 170
- ▶ Safety helmet in accordance with DIN EN 397 and DIN EN 50365
- ▶ ESD safety shoes according to ESD standard DIN EN 61340-5-1

6.5.1 Checklist for starting up for the first time

If the assembly (⇒ Section 6.3 *Assembling the system components*) and the installation (⇒ Section 6.4 *Electrical installation*) of the oil mist detection system have been completed successfully, we recommend work through the following checklist **before** starting up for the first time:

Item No.	Description	<input checked="" type="checkbox"/>
1	Are the sensor units mounted according to the provided installation drawing?	
2	Are the hybrid cables mounted according to the provided installation drawing?	
3	Is the hybrid cable connection between the sensor units and the central unit properly established?	
4	Are all electrical lines and cables properly and safely routed or tucked away?	
5	Has the optional housing earthing been correctly established on the central unit?	
6	Have the correct wire break resistors in the central unit been adapted to the specifications of the applicable engine manufacturer (default on delivery: 33 kOhm)?	
7	Are all the threaded connections tightened to the specified torque?	
8	Is the power supply correctly connected to the central unit and is the voltage within the specified range?	
9	Is the Remote Indicator II for remote monitoring properly mounted and installed? (only applies if the optional accessories have been purchased)	
10	Are the “Alarm” and “Ready” signals connected to the engine control and safety system?	
11	After the visual inspection, close all the covers that are still open.	

Table 9: Checklist for startup

6.5.2 Connecting the power supply

The power supply has been made available in advance by the operator and installed according to Section 6.4.3. → Section 6.4.3 Electrical and pneumatic installation of the central unit

1. Switch on the power supply for the oil mist detector.
 - ▶ Activates the power supply provided by the customer



NOTICE

When the VISATRON® VN301^{plus} central unit and the VISATRON® VN301^{plus} / VN301^{plus} Ex sensor units are ready for operation

- ▶ All the LEDs on the central unit flash immediately after switching on the power supply. (LED check)
- ▶ As soon as the test of all system components has been completed successfully **and** the supply pressure is 2.5 bar, the system is ready for operation and the “System ready” [①] LED on the central unit turns green.
- ▶ The same status is also displayed on the sensor unit. [②]
- ▶ If the LEDs do not come on as described, please first go to Section 10 of these instructions. → Section 10 Error diagnosis and troubleshooting



Fig.: 60 : System Ready on VN301^{plus} / VN301^{plus} Ex central unit and sensor unit

6.5.3 Setting the supply pressure on the pressure regulator of the VN301^{plus} central unit

The supply pressure to be set on the central unit is 2.5 bar. It is set as follows:

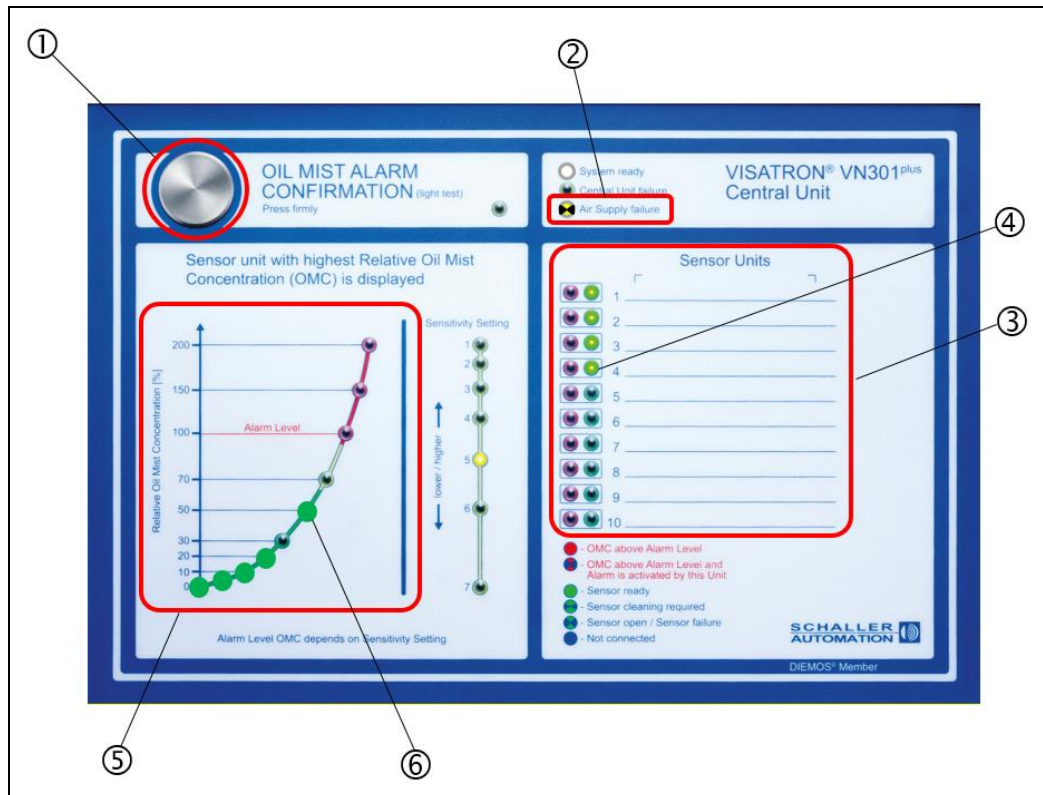


Fig.: 61 : VN301^{plus} central unit: Setting the supply pressure

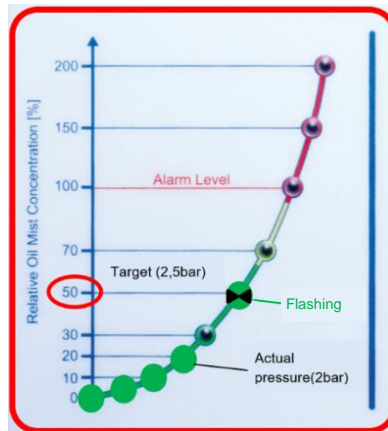
- | | |
|---------------------------------------|---------------------------------|
| 1: Oil mist alarm confirmation button | 4: Last installed sensor |
| 2: "Air supply failure" LED | 5: Oil Mist Concentration (OMC) |
| 3: Sensor units | 6: 50% OMC LED |

1. Press the oil mist alarm confirmation button twice. [①]
 - ▶ Activates the sensor OMC mode and the sensitivity check
2. Repeatedly press the oil mist alarm confirmation button [①] until the last installed sensor [④] is displayed in the sensor units field [③]. In this example, it is sensor 4.

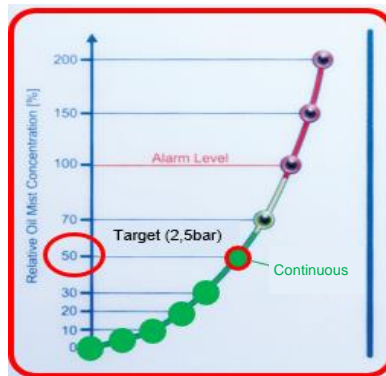
Note: The supply pressure that is displayed between the last and the first installed sensor.

3. Press the oil mist alarm confirmation button again. [①]
 - ▶ The "Supply pressure" display mode is indicated by the LED for "Air Supply failure" [②] flashing.
 - ▶ The current supply pressure level is now displayed on the OMC graph on the left-hand side. [⑤]
 - ▶ The nominal pressure of 2.5 bar is indicated by the LED light for 50% OMC [⑥] turning on continuously.

- ▶ If the supply pressure of 2.5 bar is not achieved, the 50% OMC [⑥] LED flashes, as in the figure below. In this example, the supply pressure is only 2 bar and therefore has to be adjusted.



4. Set the supply pressure to 2.5 bar using the pressure regulator unit [①], as shown in Figure 58:
 - ▶ Unlock the blue adjusting cap [②] on the pressure regulator, i.e. push it upwards.
 - ▶ Turning the blue adjusting cap [②] anticlockwise reduces the pressure, turning it clockwise increases the pressure.
 - ▶ The nominal pressure of 2.5 bar is set correctly when the LED for “50% OMC” turns on continuously.



- ▶ Push the blue adjusting cap [②] on the pressure regulator down again to lock it.

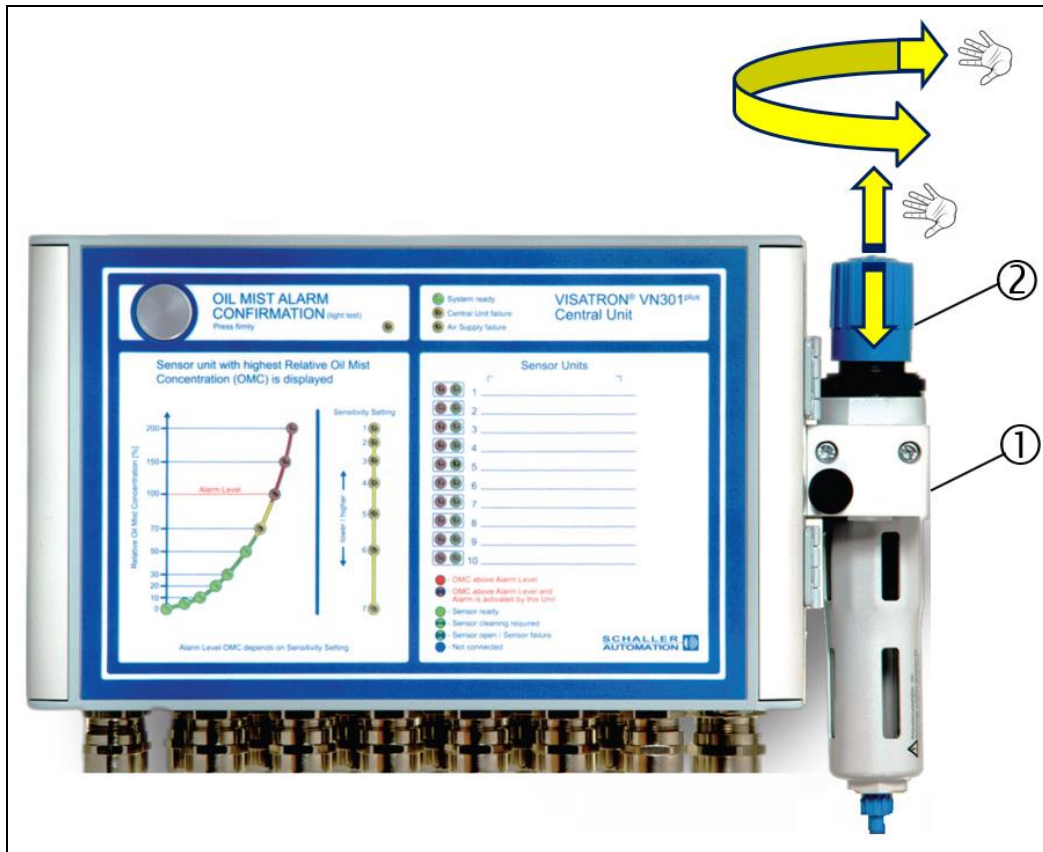


Fig.: 62 : VN301^{plus} central unit: Adjusting the pressure regulator unit

- 1: Pressure regulator unit
- 2: Adjusting cap

6.5.4 Setting the sensor sensitivities on the VN301^{plus} central unit



NOTICE

Setting the sensor sensitivity on the VISATRON® VN301^{plus} central unit

- ▶ The customer is responsible for deciding on the sensitivity of the oil mist detector. The oil mist detector is set to sensitivity **level 5** at the factory.
- ▶ To change the sensitivity of the oil mist detector, follow the instructions in the User Software Manual (on the DVD).



WARNING

Setting the sensor sensitivity on the VISATRON® VN301^{plus} central unit

- ▶ Familiarise yourself with the basic safety instructions before starting electrical installation. → Section 2.4 Basic safety instructions
- ▶ If the oil mist detection system is operated in Ex-protected areas, the relevant safety instructions must be observed. → Section 2.4.1 Safety instructions for potentially explosive atmospheres

The sensor sensitivity is set as follows or according to the figure below:

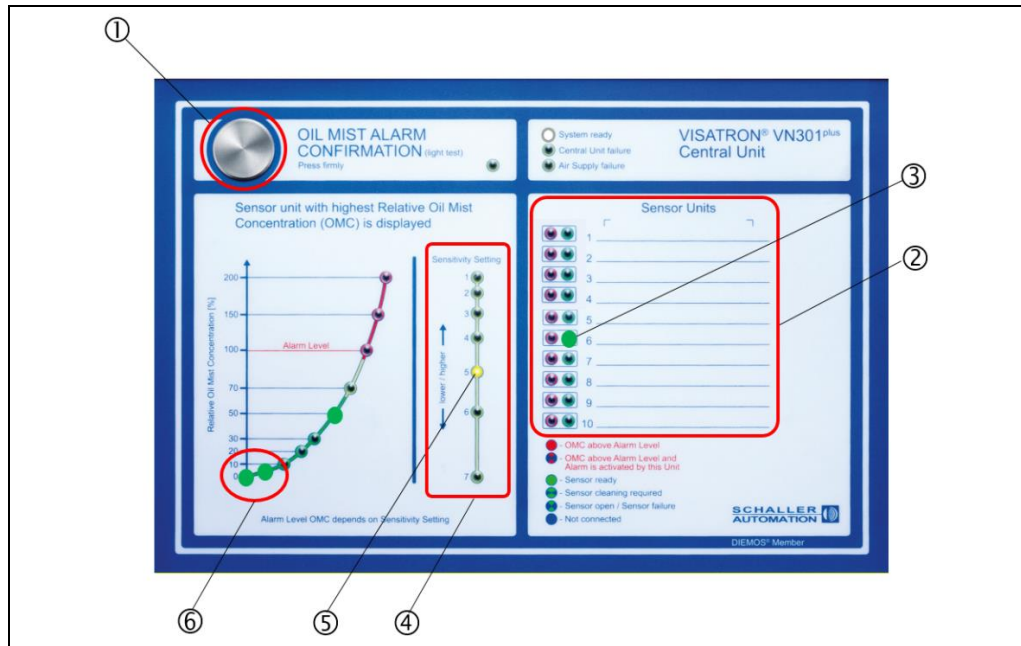


Fig.: 63 : VN301plus central unit: Setting the sensor sensitivity

- 1: Oil mist alarm confirmation button
- 2: Sensor units
- 3: Sensor status, with the highest OMC
- 4: Sensitivity indicator
- 5: Sensitivity of the sensor, with the highest OMC
- 6: OMC for displayed sensor

1. Press the oil mist alarm confirmation button [1] twice (as part of the LED light test).
 - ▶ Activates the sensor OMC mode and the sensitivity check.
 - ▶ LED indicators for the sensor units [2] go off or the LED of the sensor with the highest relative oil mist concentration turns on.
 - ▶ Sensor 6 [3] has a relative oil mist concentration of 5% [6] at the sensitivity setting 5 [5] in the above figure as an example.
2. Repeatedly pressing the oil mist alarm confirmation button [1] displays the next sensor and its status.

6.5.5 Function test when starting up for the first time

WARNING

Risk of oil mist explosion

Engine protection not guaranteed!

- ▶ The oil mist detector may only be started up after all the components have been completely attached
- ▶ To establish protection of the engine, start up the oil mist detector for the first time with the engine stopped.

Failure to comply with the safety instructions may result in major damage to property or the environment and in serious injury or death.

- ▶ Familiarise yourself with the basic safety instructions before starting electrical installation. ⇒ Section 2.4 Basic safety instructions

► If the oil mist detection system is operated in Ex-protected areas, the relevant safety instructions must be observed. ⇒ Section 2.4.1 Safety instructions for potentially explosive atmospheres

Once the steps in Sections 6.5.1 to 6.5.5 have been successfully completed, you can start the function test. Please carry out the steps below:

1. Each extraction point is checked individually.
 - The smoke tube is installed and the function test is carried out as described in Section 9.1.4.
⇒ Section 9.1.4 Accessories for VN301plus/VN301plus Ex
2. After a short time, the central unit displays an alarm as shown in the figure below. The time to display the alarm varies depending on the engine type and assembly configuration.
 - The alarm light flashes red to indicate the sensor [③] where the alarm concentration has been exceeded first.
 - The alarm concentration may have then been exceeded at other sensors. These sensors are indicated by a continuous red alarm light.
3. Confirm a detected alarm using the oil mist alarm confirmation button on the central unit [①] as soon as the relative oil mist concentration is < 70% [②].
4. Carry out steps 1-3 at all extraction points for the installation, thereby ensuring that the whole system is functioning.
5. Dispose of the used smoke tubes as per Section 11.1 ⇒ Section 11.1 Disposal

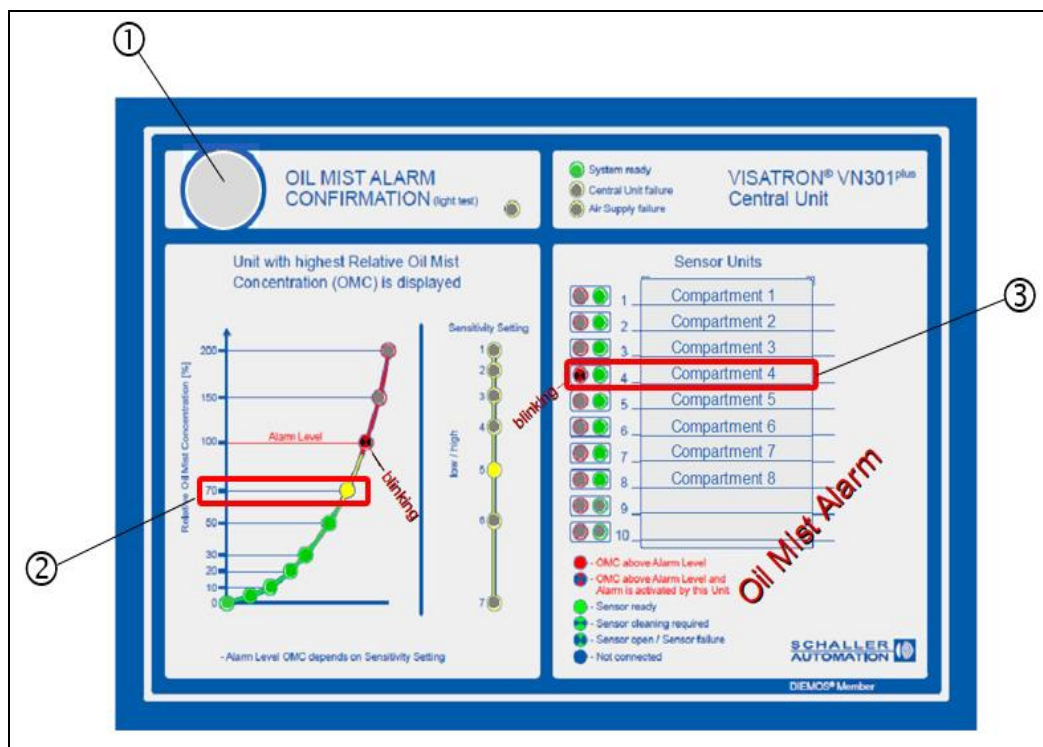


Fig.: 64 : VN301plus central unit: Function test, starting up for the first time

- 1: Oil mist alarm confirmation button
- 2: Oil mist concentration at 70%
- 3: Sensor alarm, compartment 4

**NOTICE****Starting up for the first time, VISATRON® VN301^{plus} central unit**

- ▶ In the figure above, the alarm was triggered by sensor 4 (flashing red LED).
- ▶ The above steps apply in the same way for future function tests
- ▶ If the LED does not come on, please go to Section 10 of these instructions first. ⇒ *Section 10 Error diagnosis and troubleshooting*

- The VISATRON® VN301^{plus} oil mist detection system is now ready for operation!**

7 Manufacturer settings

7.1 Adjusting the parameters on the VISATRON® VN301^{plus} central unit

The VISATRON® VN301^{plus} / VN301^{plus} Ex oil mist detection system has two available alarm thresholds.

The main alarm threshold can be adjusted using the software and the USB port on the central unit as shown in the figure below. The pre-alarm can also be adjusted.

Using the factory setting, it is activated at 70% of the main alarm threshold.

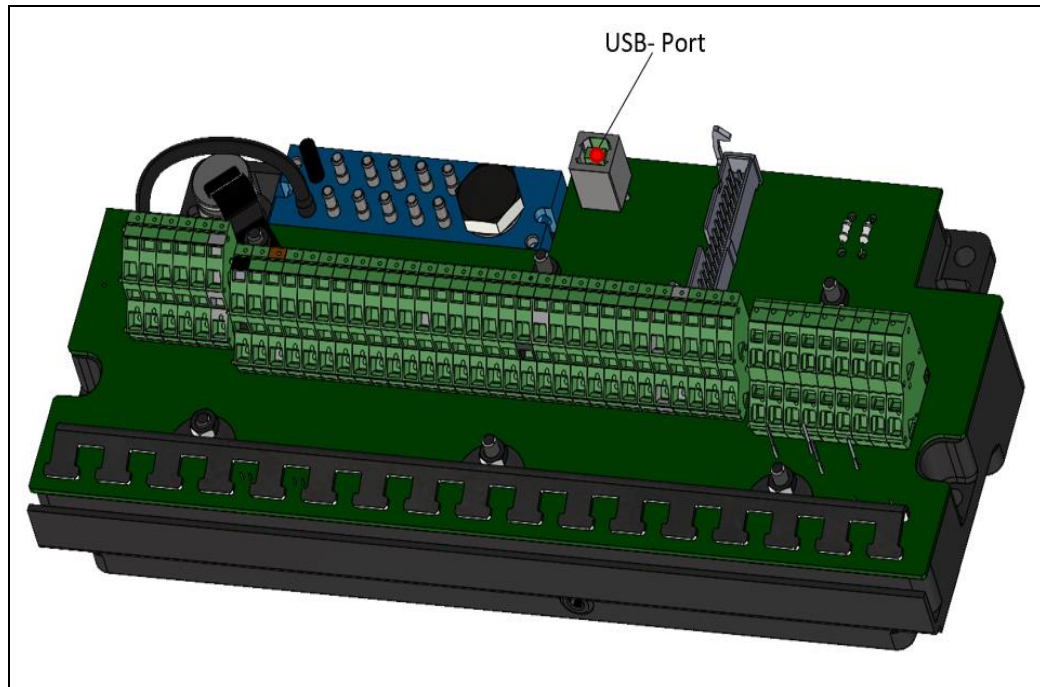


Fig.: 65 : VN301^{plus} central unit USB port



CAUTION

Safe and correct parameterisation of the central unit

- ▶ When adjusting the parameters of the central unit, read the instructions for use and other documents that accompany the product carefully and keep them in a suitable place for later use.



NOTICE

Personal protective equipment

Operating the device or working on the device without protective equipment may result in serious injury. For the workplace PPE, the following protective equipment must be used:

- ▶ Safety glasses in accordance with DIN EN 166 or DIN EN 170
- ▶ Safety helmet in accordance with DIN EN 397 and DIN EN 50365
- ▶ ESD safety shoes according to ESD standard DIN EN 61340-5-1





DANGER

- ▶ You may only adjust the parameters of the central unit with the engine switched off. The compressed air supply to the oil mist detection system must also be switched off first.
- ▶ Before starting to adjust parameters, the housing of the VISATRON® VN301^{plus} / VN301^{plus} Ex central unit must be earthed.
⇒ Section 6.4.6 Connection earth to the housing of the VN301^{plus} central unit (optional)



The following components are required for parameterisation:

- Service laptop/netbook (provided by the user)
 - ▶ The minimum system requirements are described in detail in the “Operation manual for VN301^{plus} End- user software (part number 180104)” under the **System Requirements**.
- USB A/B connection cable -> connector **A** to connector **B** (provided by the user)
- Service software, for parameterisation (included in the delivery)
 - ▶ The service software must be installed on the laptop first, as per the above manual.
 - ▶ Also see the manual for how to use the software.

To access the USB port on the central unit, the unit has to be opened. See Section 6.4.3, steps 1- 3, in these instructions for how to open the central unit. ⇒ Section 6.4.3 *Electrical and pneumatic installation of the central unit*

The laptop and the central unit are connected as shown in the figure below:

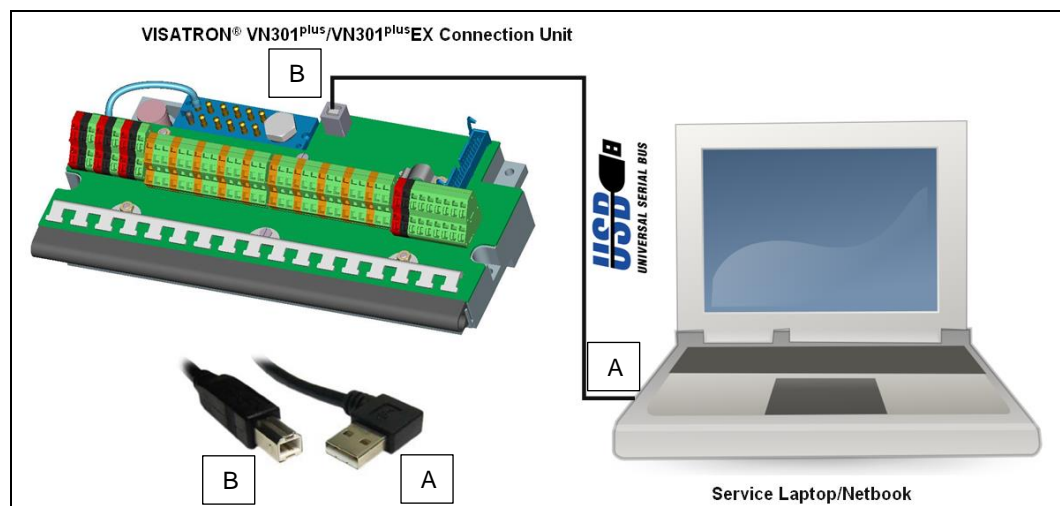


Fig.: 66 : Establishing the USB connection between the VN301^{plus} central unit and the service PC

The parameters are entered using the parameter list below:

Parameter set	Input values
Number of VN301plus central units	1 or 2
Number of sensors for the central unit	1 to 10
Oil mist alarm threshold	
Sensitivity setting 1	0.7 mg/l Oil mist concentration
Sensitivity setting 2	0.8 mg/l Oil mist concentration
Sensitivity setting 3	0.9 mg/l Oil mist concentration
Sensitivity setting 4	1.0 mg/l Oil mist concentration
Sensitivity setting 5	1.2 mg/l Oil mist concentration (default)
Sensitivity setting 6	1.5 mg/l Oil mist concentration
Sensitivity setting 7	2.0 mg/l Oil mist concentration
Date	Automatically entered by the system
Time	Automatically entered by the system

Table 10: Parameter list



NOTICE	
Adjusting the parameters of the VISATRON® VN301^{plus} central unit	
▶	Adjusting the parameters always only sets the parameters for the central unit that is connected. -> No distinction between master/slave
▶	Sensitivity 5 is the factory setting

Parameterisation of the VISATRON® VN301^{plus} central unit has been completed successfully!

After parameterisation, the central unit is closed again as described in Section 6.4.5
 ⇒ Section 6.4.5 Locking the VN301plus central unit after completing the electrical installation

8 Operation and use

This section describes how to operate the product. This section covers all the operating modes available on the product, as well as how to restart the product after a system failure, and also warns of hazardous situations that may arise during operation.



WARNING

Risk of oil mist explosion

Failure to comply with the safety instructions may result in major damage to property or the environment and in serious injury or death.

- ▶ Safe operation is conditional on no explosive atmosphere escaping into the engine room. An explosive atmosphere that escapes can cause a risk of explosion.
- ▶ Familiarise yourself with the basic safety instructions for working with the oil mist detection system in advance. ⇒ *Section 2.4 Basic safety instructions*
- ▶ If the oil mist detection system is operated in Ex-protected areas, the relevant safety instructions must be observed. ⇒ *Section 2.4.1 Safety instructions for potentially explosive atmospheres*



CAUTION

Safe and proper use of the device

- ▶ Read these instructions for use and other documents that accompany the product carefully and keep them in a suitable place for later use.



NOTICE

Personal protective equipment

Operating the device or working on the device without protective equipment may result in serious injury. For the workplace PPE, the following protective equipment must be used:

- ▶ DIN EN 388:2016 Protective gloves against mechanical risks, 2341X, and DIN EN 407:2004 Protective gloves against thermal risks, X1XXXX
- ▶ Safety glasses in accordance with DIN EN 166 or DIN EN 170
- ▶ Safety helmet in accordance with DIN EN 397 and DIN EN 50365
- ▶ ESD safety shoes according to ESD standard DIN EN 61340-5-1

8.1 Check every time before operation

The oil mist detection system must be checked according to the checklist in Section 6.5.1 every time before it is started up. ⇒ *Section 6.5.1 Checklist for starting up for the first time*

If the checklist has open points after the check, you must work through all of Sections 6.5.2 to 6.5.5 again.

⇒ *Section 6.5.2 Connecting the power supply*

⇒ *Section 6.5.3 Setting the supply pressure on the pressure regulator of the VN301plus central unit*

⇒ *Section 6.5.4 Setting the sensor sensitivities on the VN301plus central unit*

⇒ *Section 6.5.5 Function test when starting up for the first time*

- ☑ **The oil mist detection system is functioning and ready for operation when the checklist has been completed successfully.**

For further information, please see Section 10 of these instructions.
⇒ Section 10 Error diagnosis and troubleshooting

8.2 Operation under correct conditions

The operating temperature of the VN301^{plus} EX ( II -/2G Ex op is IIB T4 -/Gb) sensor unit is:

- ☑ **System operating temperature: 5°C to 70°C**

The conditions in Section 3.4.2 must also be observed for safe and correct operation!
⇒ Section 3.4.2 Environmental conditions

8.3 Switching the device on and off

The oil mist detection system is switched on and off by switching on and off the power supply, which is provided by the operator. The other steps for starting up are described in detail in Section 6.5.2.

⇒ Section 6.5.2 Connecting the power supply

- ☑ **The oil mist detection system is switched on and ready for operation!**

8.4 Normal operation

The figure below shows the display of the VISATRON® VN301^{plus} / VN301^{plus} Ex central unit in normal operation; in this example, in combination with 8 sensors.

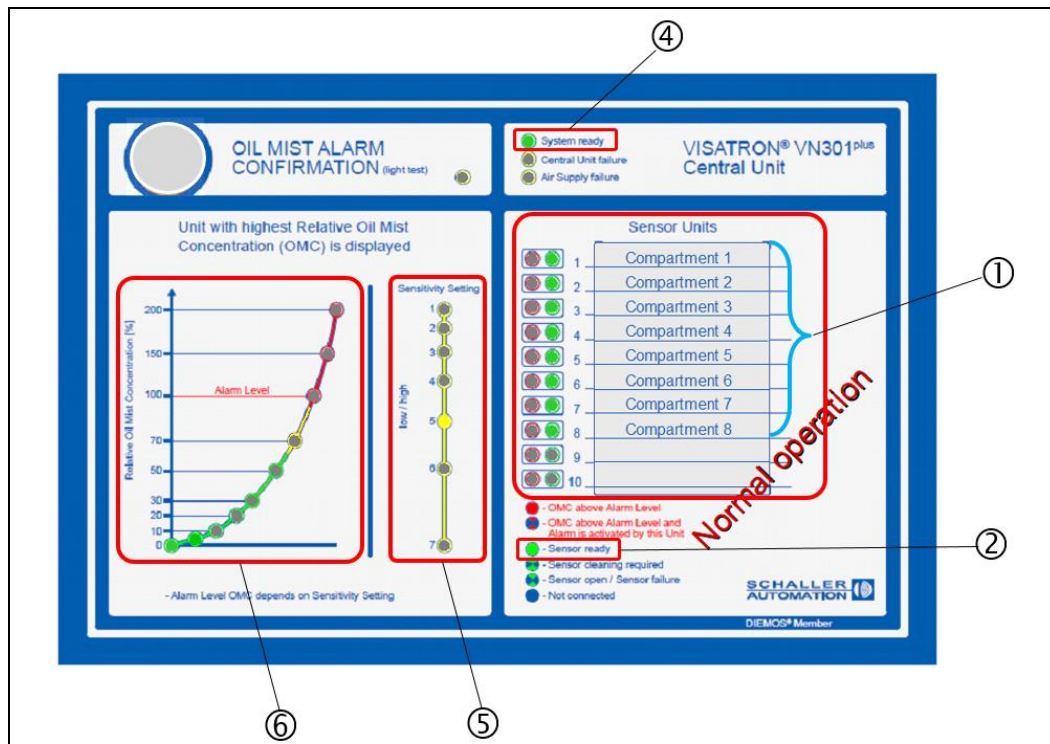


Fig.: 67 : VN301^{plus} central unit: Display in normal operation (no oil mist alarm, no error)



Fig.: 68 : "Sensor Ready" status indicator on the VN301^{plus} / VN301^{plus} Ex sensor unit

- | | |
|--|---|
| 1: Sensor units | 4: "System Ready" status indicator (central unit) |
| 2: "Sensor Ready" key (central unit) | 5: "Sensor sensitivity" status indicator |
| 3: "Sensor Ready" status indicator (sensor unit) | 6: "Oil mist concentration" status indicator |

The 8 sensors are installed in Compartment 1 up to and including Compartment 8 [Figure 63, ①]. The sensor status is displayed by the green LED (ready for operation) [②]. The status is also displayed on the sensor unit. [Figure 64, ③]

The VISATRON® System VN301^{plus} / VN301^{plus} Ex is ready for operation, indicated by the green "System ready" light at the top right. [④]

The sensor sensitivity [⑤] and the relative oil mist concentration [⑥] of the sensor with the highest relative oil mist concentration are displayed at the bottom left.

- The oil mist detection system is in normal operation and is ready for use!**

8.5 LED check

An LED check can be run for the VISATRON® System VN301^{plus} / VN301^{plus} Ex central unit at any time to check that it is functioning and to check the display.



NOTICE

Exception for the LED check

- ▶ The light test can only be carried out when there is no oil mist alarm!

The LED check is carried out as follows:



Fig.: 69 : VN301^{plus} central unit: LED check (light test)

1: Oil mist alarm confirmation button

1. Press the oil mist alarm confirmation button on the central unit. [①]
 - ▶ Then all the LEDs come on as a test and flash for 2 seconds. The previous status is then displayed again.
 - ▶ If there is an oil mist alarm, this button confirms the alarm.

LED check carried out successfully!

8.6 Checking the supply pressure, sensor OMC and sensitivity

To carry out these checks, please see the following sections in these instructions:

⇒ Section 6.5.3 Setting the supply pressure on the pressure regulator of the VN301plus central unit

⇒ Section 6.5.4 Setting the sensor sensitivities on the VN301plus central unit

Sensitivity check and supply pressure check completed successfully!

8.7 “Oil mist pre-alarm” status indicator

When a high relative oil mist concentration is reached for at least one sensor, the LED bar indicator comes on. [①]

At a relative oil mist concentration of 70%, the pre-alarm relay is activated and the pre-alarm is triggered. As per the figure below, the LED indicator flashes yellow in this case. [②]

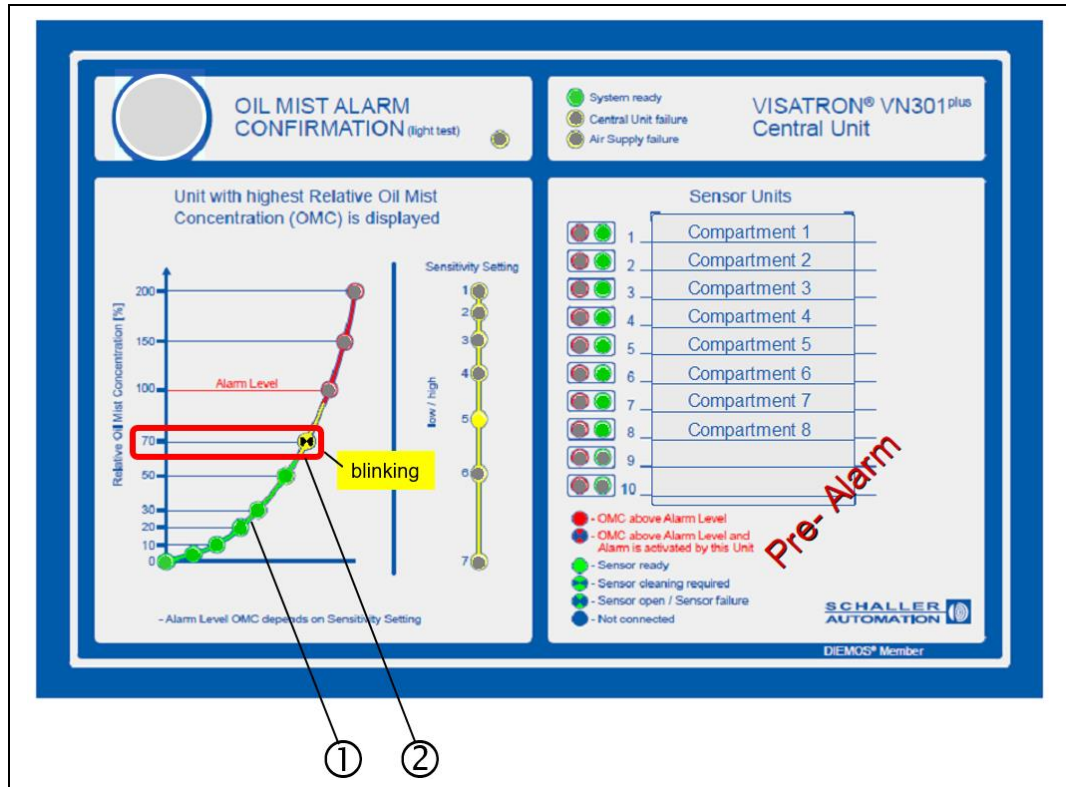


Fig.: 70 : VN301plus central unit: “Pre-alarm” status indicator at 70% OMC

8.8 “Oil mist alarm” status indicator

DANGER

Risk of death

There is a risk of serious injury, including death, due to explosion in the crankcase as a result of incorrect installation.

- ▶ In the event of an oil mist alarm, do not approach the engine again until the alarm threshold has dropped to at least < 50% relative oil mist concentration.
- ▶ The manufacturer recommends that only approach the engine again when the alarm threshold has dropped to 0% relative oil mist concentration.
- ▶ If a Remote Indicator II is used for remote monitoring, it must be used to continuously check the current oil mist concentration.
- ▶ Familiarise yourself with the basic safety instructions before starting to operate the device. ⇒ Section 2.4 Basic safety instructions
- ▶ If the oil mist detection system is operated in Ex-protected areas, the relevant safety instructions must be observed. ⇒ Section 2.4.1 Safety instructions for potentially explosive atmospheres

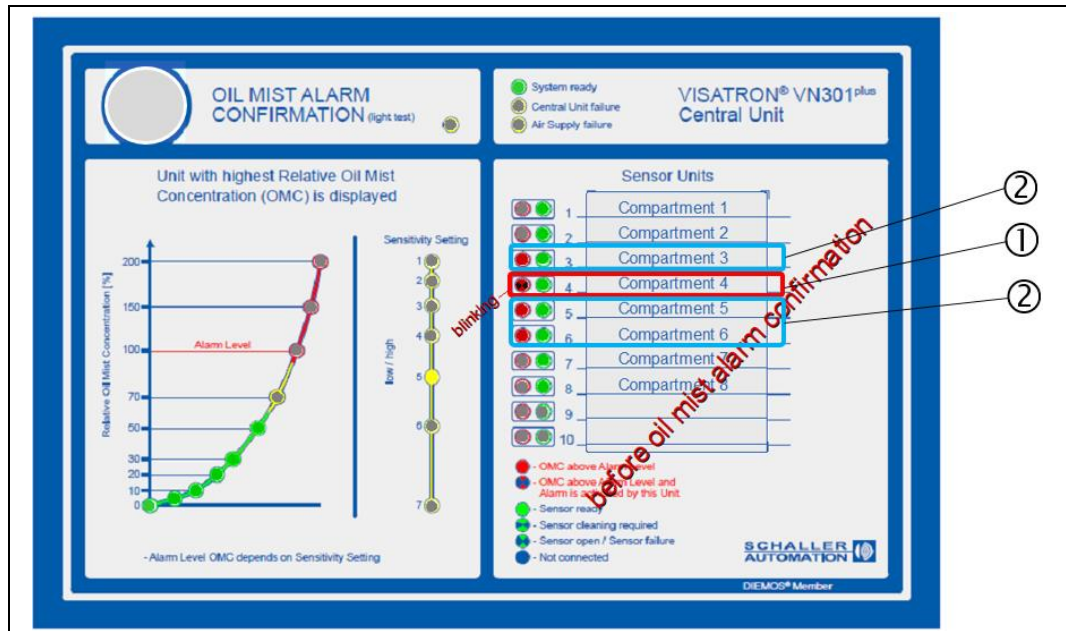


Fig.: 72 : VN301plus central unit: "Alarm" status indicator at 100% OMC (example)

8.9 Confirming an oil mist alarm

DANGER

Risk of death

There is a risk of serious injury, including death, due to explosion in the crankcase as a result of incorrect installation.

- ▶ In the event of an oil mist alarm, do not approach the engine again until the alarm threshold has dropped to at least < 50% relative oil mist concentration.
- ▶ The manufacturer recommends that only approach the engine again when the alarm threshold has dropped to 0% relative oil mist concentration.
- ▶ If a Remote Indicator II is used for remote monitoring, it must be used to continuously check the current oil mist concentration.
- ▶ Familiarise yourself with the basic safety instructions before starting to operate the device. → Section 2.4 Basic safety instructions
- ▶ If the oil mist detection system is operated in Ex-protected areas, the relevant safety instructions must be observed. → Section 2.4.1 Safety instructions for potentially explosive atmospheres

NOTICE

Action in the event of an oil mist alarm

- ▶ The sensor that first triggered the alarm is indicated by a flashing red LED (where the error has occurred).

CAUTION

Confirming an oil mist alarm

- ▶ Only confirm the oil mist alarm using the oil mist alarm confirmation button if you have previously made sure that there are no more high oil mist



concentrations in the crankcase, **or** as soon as the concentration is below the alarm limit displayed (<70%).

1. The oil mist alarm message must be confirmed by pressing the oil mist alarm confirmation button [①] on the VISATRON® VN301plus central unit.



Fig.: 73 : VN301plus central unit: Confirm the oil mist alarm (only < 70% OMC)

1: Oil mist alarm confirmation button

After confirming with the oil mist alarm confirmation button, all the red sensor alarms are reset.

Example use case

CAUTION

Accessing the engine after oil mist alarm and confirmation

- ▶ When the oil mist concentration in the engine has dropped below the alarm threshold again (< 50 % relative oil mist concentration), you may approach the engine again.
- ▶ The oil mist alarm message must be confirmed by pressing the oil mist alarm confirmation button on the VISATRON® VN301plus central unit. (see figure above)



The figures below show the situation with reduced oil mist concentration (50%) before (Figure 70) and after (Figure 71) confirming the oil mist alarm by pressing the confirmation button.

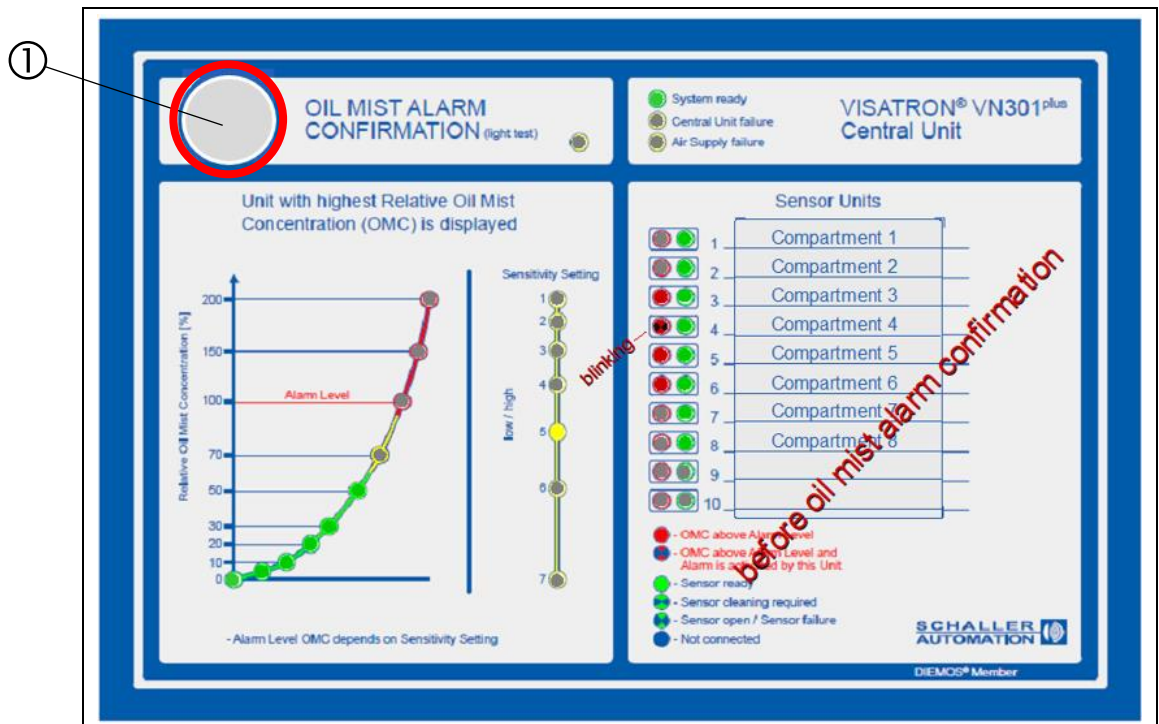


Fig.: 74 : VN301^{plus} central unit: "Alarm" status indicator at 50% OMC (example)

1: Oil mist alarm confirmation button



Fig.: 75 : VN301^{plus} central unit: Status display after confirming the oil mist alarm

1: Oil mist alarm confirmation button

9 Maintenance and repair



WARNING

Warning – risk of oil mist explosion during maintenance work

- ▶ Safe operation is conditional on no explosive atmosphere escaping into the engine room. An explosive atmosphere that escapes can cause a risk of explosion.
- ▶ Only carry out maintenance and repair work when the engine is stopped.
- ▶ The power and compressed air supply must be switched off before starting maintenance and repair work.
- ▶ Do not mix up any components from the standard version (VISATRON® VN301^{plus}) with the Ex version (VN301^{plus} Ex).
- ▶ The oil mist detection system must not be cleaned with a steam cleaner, high-pressure cleaner or similar equipment.
- ▶ Also familiarise yourself with the basic safety instructions for working with the oil mist detection system. ⇒ *Section 2.4 Basic safety instructions*
- ▶ If the oil mist detection system is operated in Ex-protected areas, the relevant safety instructions must be observed. ⇒ *Section 2.4.1 Safety instructions for potentially explosive atmospheres*



CAUTION

Safe and correct maintenance of the device

- ▶ Read these instructions for use and other documents that accompany the product carefully first and keep them in a suitable place for later use.



NOTICE

Personal protective equipment

Operating the device or working on the device without protective equipment may result in serious injury. For the workplace PPE, the following protective equipment must be used:

- ▶ DIN EN 388:2016 Protective gloves against mechanical risks, 2341X, and DIN EN 407:2004 Protective gloves against thermal risks, X1XXXX
- ▶ Safety glasses in accordance with DIN EN 166 or DIN EN 170
- ▶ Safety helmet in accordance with DIN EN 397 and DIN EN 50365
- ▶ ESD safety shoes according to ESD standard DIN EN 61340-5-1

9.1 Maintenance by the operator

Maintenance is intended maintain the device in a condition ready for operation and to prevent premature wear. Maintenance is divided into:

- Cleaning and care
- Maintenance/inspection
- Repair

To ensure that the device is in proper working condition, the operating personnel must:

- regularly check that the required safety equipment are functioning correctly;
- ensure that the safety equipment is effective; and
- carry out recurring inspections.
 - ▶ Follow the intervals and instructions for inspection and maintenance for the supplied parts.
 - ▶ Keep and archive a record of inspection.
 - ▶ Report identified safety defects to the plant operator.
 - ▶ Carry out the maintenance work according to the following maintenance table at the specified maintenance intervals.



WARNING

Risk of serious injury or death from oil mist explosion during maintenance work

- ▶ Only use original spare parts from Schaller Automation for maintenance and repair work!



All the maintenance work is described in the following sections.

9.1.1 Maintenance cycles for reliable operation

The table below list the maintenance cycles for the VISATRON[®] VN301^{plus} and VN301^{plus} Ex oil mist detection system.

If the maintenance intervals are not observed, the oil mist detection system may fail early.

It is essential that you follow the given sequence for the work.

Item No./ action	Description	Interval quarterly or after 2,000 operating hours (whichever occurs first)					
		2,000	4,000	8,000	16,000	See Section	Required parts/ tools
		Or months	3	6	12		
1.	Check the supply pressure setting on the central unit: <ul style="list-style-type: none"> ▪ Supply pressure < 2.25 bar → Adjust supply pressure ▪ Supply pressure between 2.25 bar and 2.75 bar → OK ▪ Supply pressure > 2.75 bar → Adjust supply pressure 	X	X	X	X	6.5.3	-
2.	Carry out maintenance measure under “ Item No. 1 ” quarterly	X	X	X	X	-	-
3.	Clean sensor measuring area (glass measuring window)		X	X	X	9.1.2	Cleaning kit (151482) VN301 ^{plus} toolbox (151781)
4.	Replace the air filter in the pressure regulator unit		X	X	X	9.1.3	VN301 ^{plus} maintenance kit (155003)
5.	Carry out maintenance measure under “ Item Nos. 2 to 4 ” every six months		X	X	X	-	-
6.	Function test of all connected sensors by using function test with smoke tube (mist test)			X	X	9.1.4	VN301 ^{plus} service box (151779)

7.	Inspection of the whole system				S		
<p><u>Key to maintenance measures:</u></p> <p>X - Work that must be carried out by trained on-board personnel or by Schaller Service</p> <p>S - Work that may only be carried out by authorised and certified Schaller Service technicians</p>							

Table 11: Maintenance cycles

9.1.2 Cleaning the measuring track area on the sensor unit (4,000 hrs.)

NOTICE



Cleaning and care of system components

For cleaning system components of the VN301^{plus} oil mist detection system, the following **optional** products are recommended or supplied by the manufacturer:

- ▶ Cleaning kit including cleaning fluid (151482)
- ▶ VN301^{plus} toolbox, complete (151781)

When cleaning of the sensor light measuring track area is necessary, this is indicated by flashing (long on, short off) of the green LEDs on the central unit [①, ②] and on the VISATRON® VN301^{plus}/ VN301^{plus}Ex sensor units [③], as in the figures below.

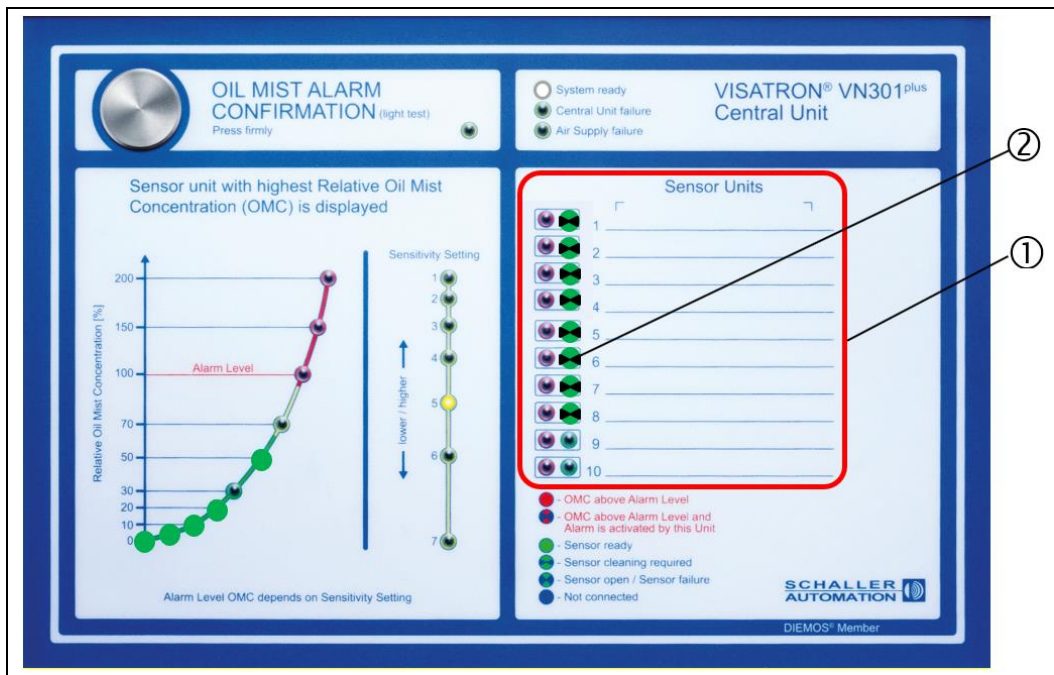


Fig.: 76 : “Sensor cleaning” status indicator, VN301^{plus} central unit

1: Sensor units

3: “Sensor” status indicator on the sensor unit

2: “Sensor” status indicator on the central unit



Fig.: 77 : “Sensor cleaning” status indicator on the VN301^{plus} / VN301^{plus} Ex sensor unit

When the above indicator is displayed for the first time, the sensor has a degree of contamination on the sensor measuring track area of approx. 80%. Experience has shown that there is sufficient time for intensive cleaning of the sensor (before it fails completely (when the upper contamination limit (100%) is reached). (indicated by a flashing green LED, on/off at equal intervals)

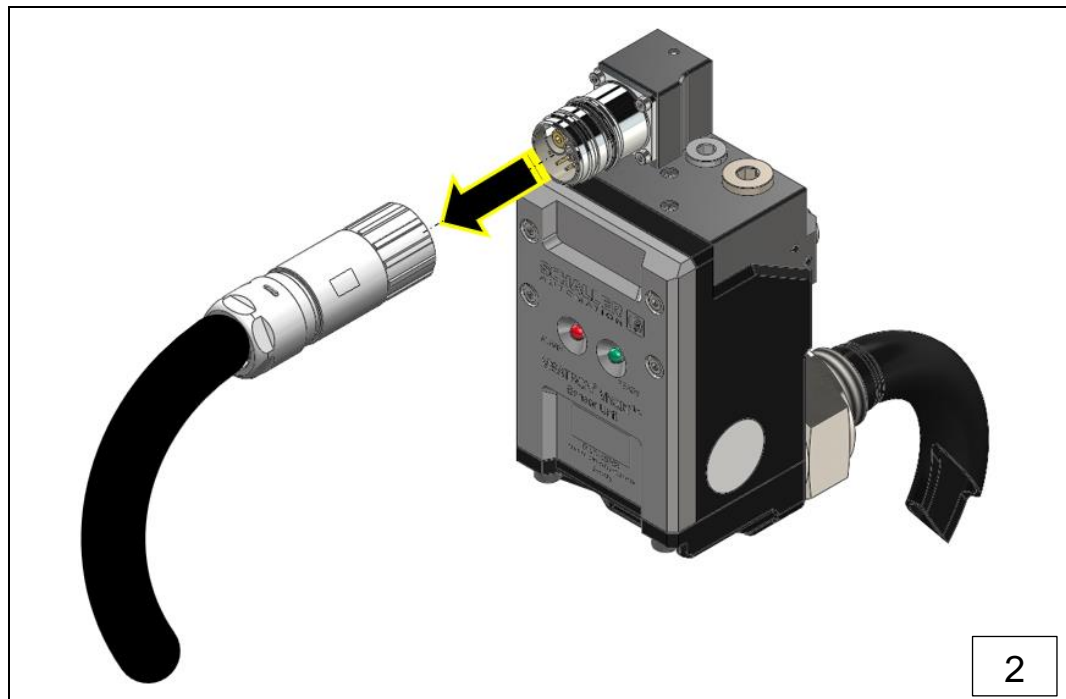
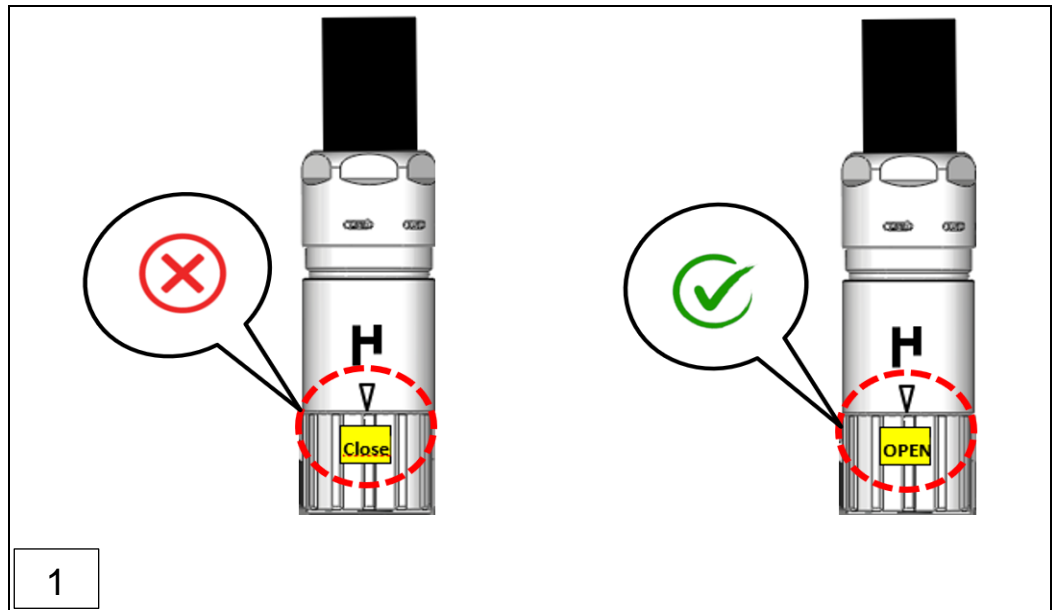
The measuring track area on the sensor unit is cleaned as follows:

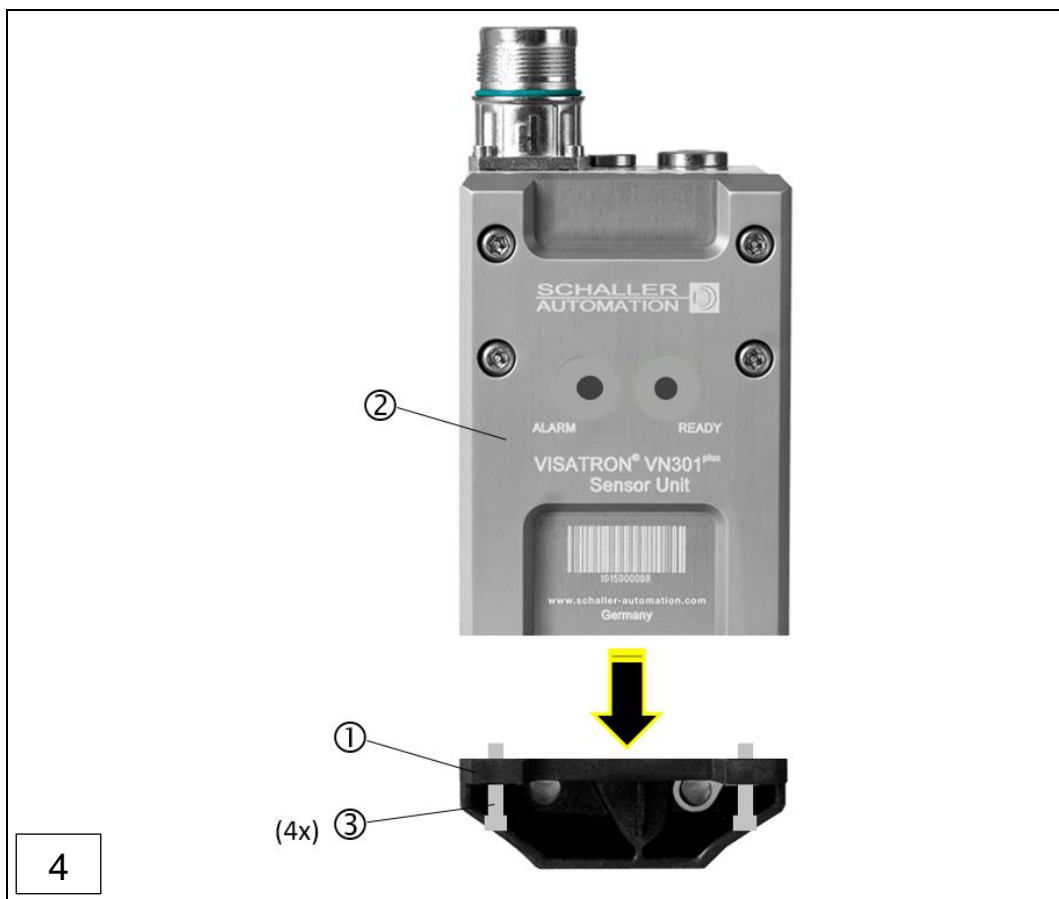
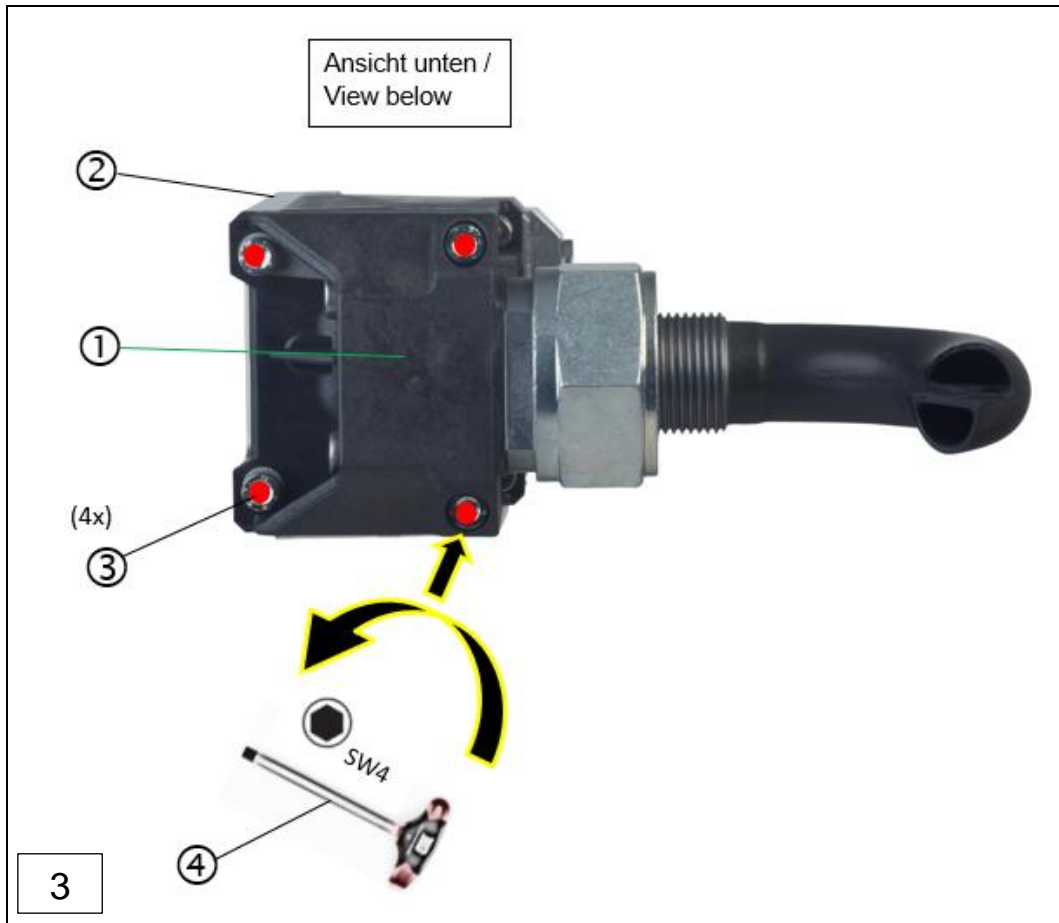


NOTICE

Before you start cleaning the VN301^{plus} / VN301^{plus} Ex sensor unit, we recommend disconnecting the hybrid plug from the sensor housing.

- ▶ Observe the safety instructions in Section 9.
⇒ Section 9 Maintenance and repair





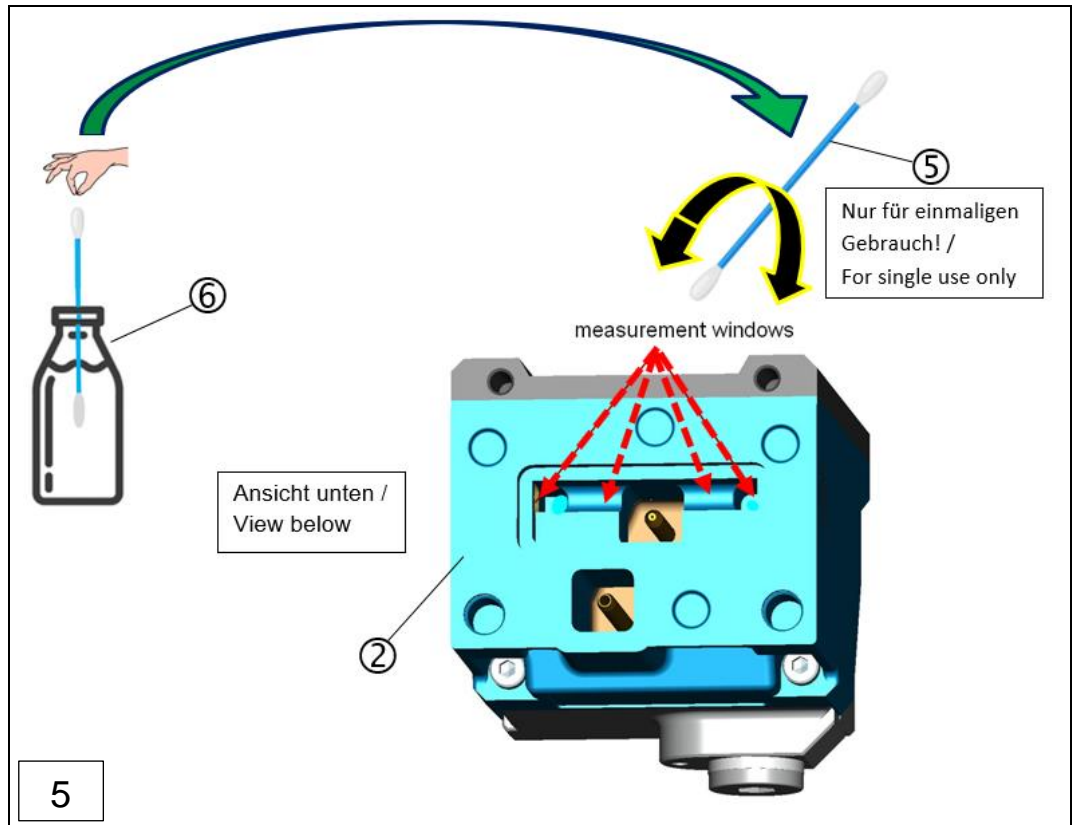
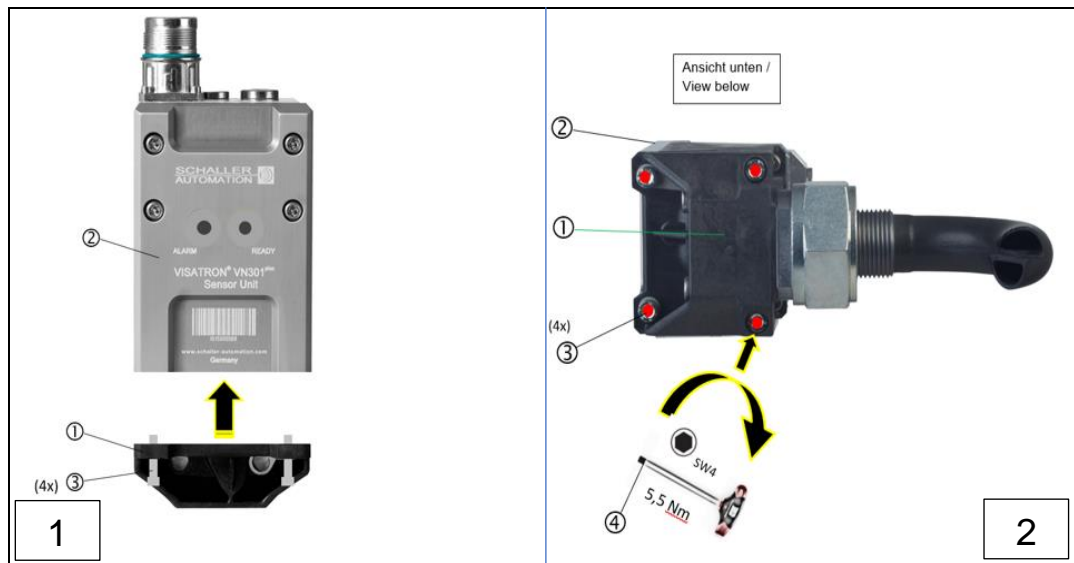


Fig.: 78 : Disassembly and cleaning the VN301^{plus} / VN301^{plus} Ex sensor unit (steps 1-5)

- | | |
|--|-------------------------------|
| 1: Holding bracket | 3: M5 fixing screws (captive) |
| 2: Sensor | 4: Allen key, 4.0 mm |
| 5: Cleaning buds from the cleaning kit | 6: Cleaning kit |

After cleaning the sensor has been completed successfully, reassembly is carried out in reverse order as follows:



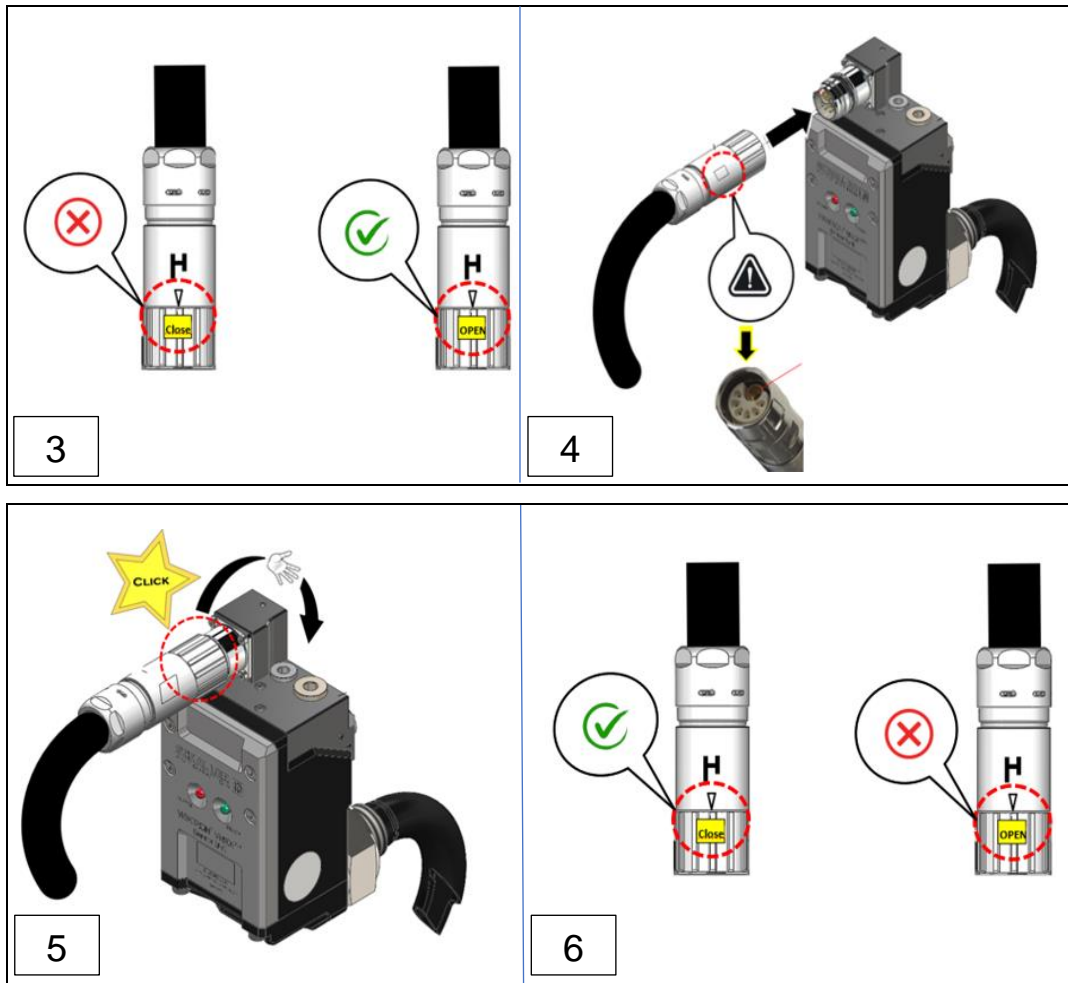


Fig.: 79 : Reassembly after cleaning the VN301^{plus} / VN301^{plus} Ex sensor unit (steps 1-6)

9.1.3 Replacing the air filter element on the pressure reducer unit (4,000 hrs.)

To ensure reliable operation of the VN301^{plus} central unit, the air filter element in the pressure regulator unit must be replaced every six months or after 4,000 operating hours at the latest. The air filter element (366717) is part of the Schaller maintenance kit (155003) and can also be ordered separately from Schaller Automation if required.

NOTICE



Maintenance work on the oil mist detection system

- ▶ Observe the safety instructions in Section 9 ⇒ Section 9 Maintenance and repair

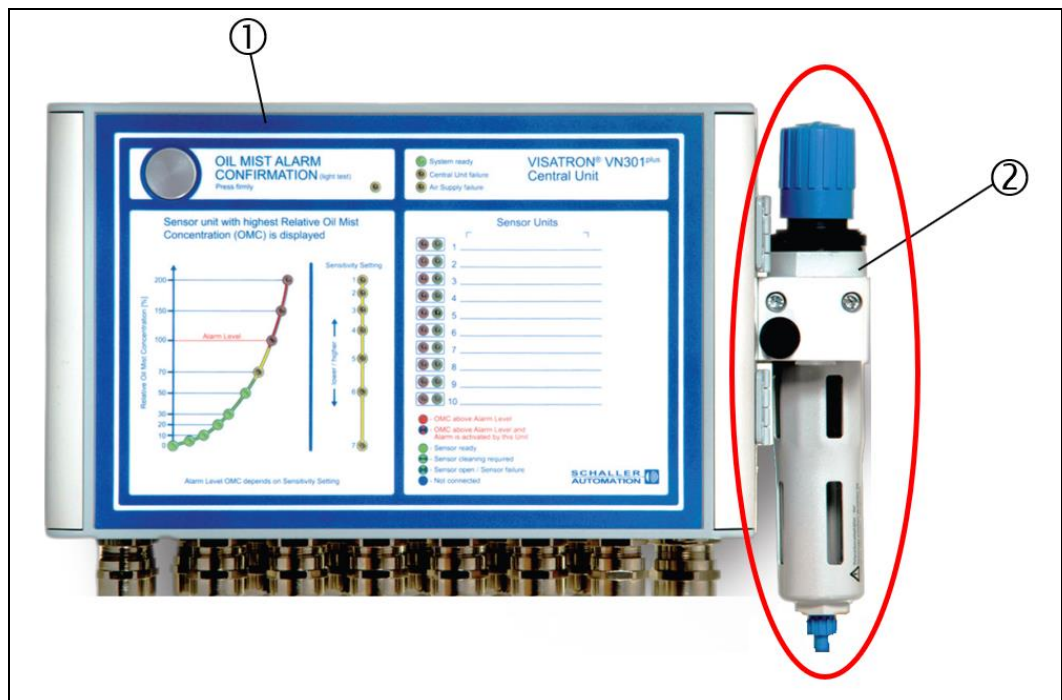


Fig.: 80 : Pressure regulator unit on the VN301^{plus} central unit

- 1: VN301^{plus} central unit
- 2: Pressure regulator unit
- 3: Plastic disc
- 4: Air filter element

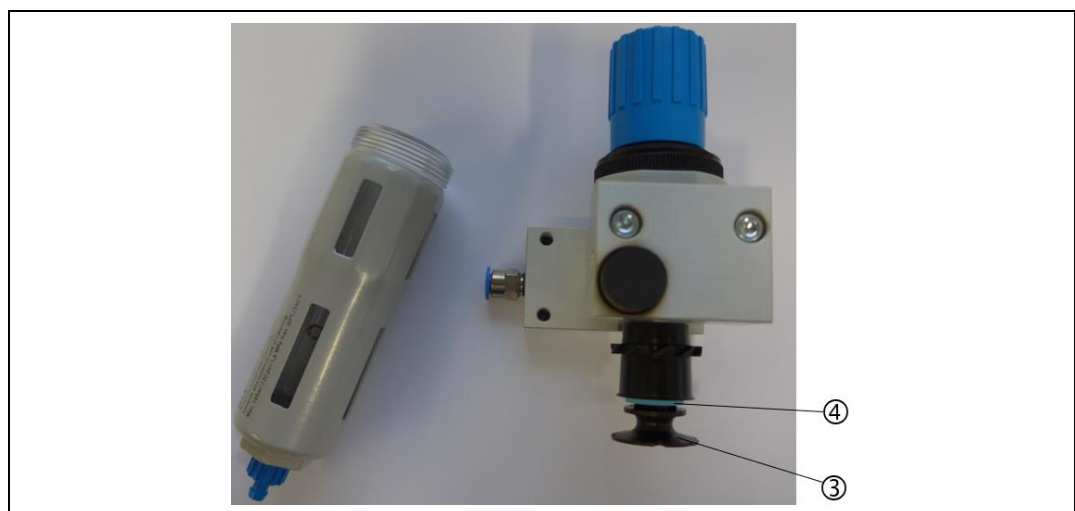
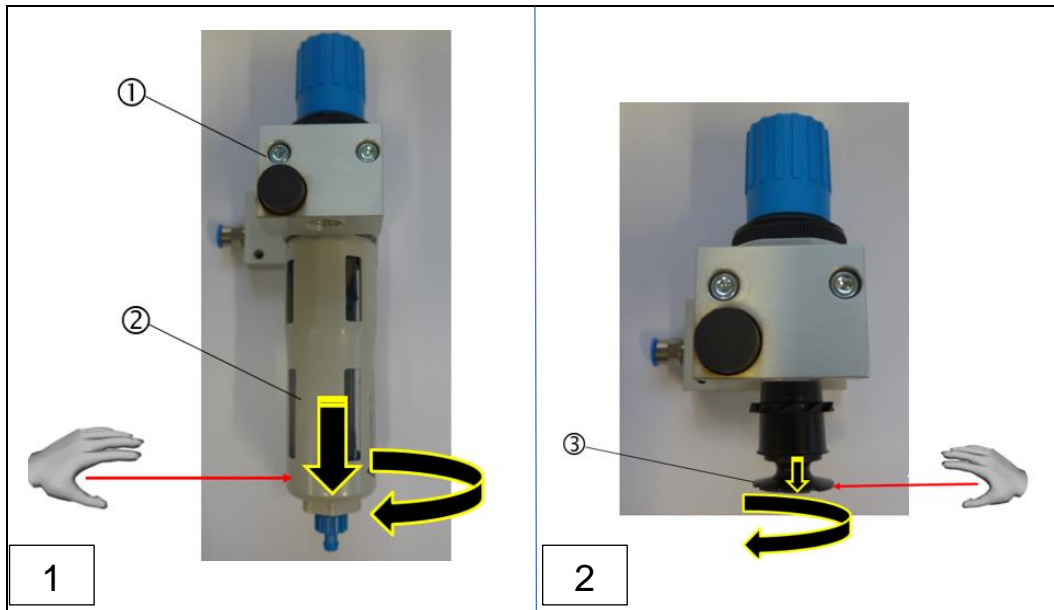


Fig.: 81 : Replacing the air filter element on the pressure regulator unit

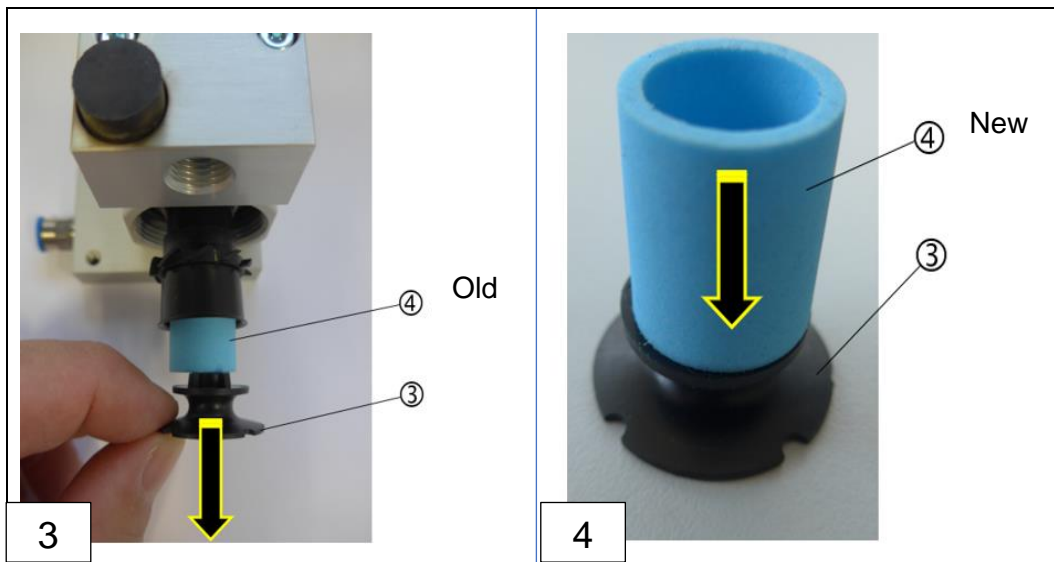
The air filter element is replaced according to the following steps:



1: VN301^{plus} central unit
2: Pressure regulator unit

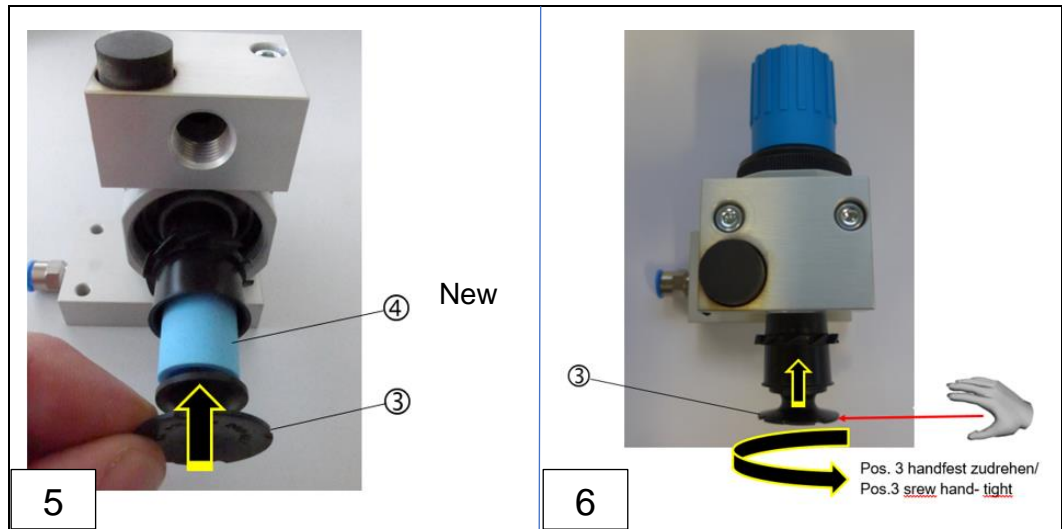
3: Plastic disc

1. Note on step 1: First unscrew the air filter cover [②]. Then pull the air filter cover down.
2. Note on step 2: First unscrew the plastic disc [③]. Then pull the plastic disc down



1: VN301^{plus} central unit
2: Pressure regulator unit

3: Plastic disc
4: Change the air filter element Old -> New!



3: Plastic disc
4: Air filter element **NEW!**

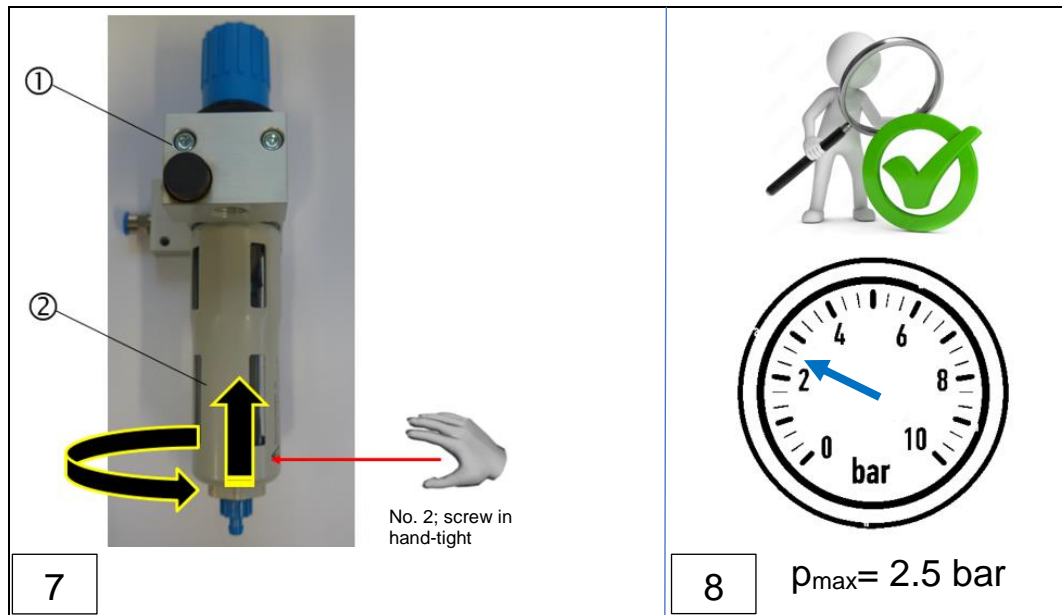


Fig.: 82 : Replacing the air filter element on the pressure regulator unit (steps 1-8)

1: VN301^{plus} central unit
2: Pressure regulator unit

NOTICE



Check supply pressure on the oil mist detection system

- ▶ After completing step 7, the supply pressure on the VN301^{plus} central unit must be checked again and, if necessary, adjusted.
- ▶ See Section 6.5.3 ⇒ Section 6.5.3 *Setting the supply pressure on the pressure regulator of the VN301plus central unit*

9.1.4 Function test of the sensor units using smoke tube (8,000 hrs.)

To ensure reliable operation of the VN301^{plus} / VN301^{plus} Ex sensor units, a function test with a **smoke tube mist test** must be carried out annually or after 8,000 operating hours at the latest. To carry out the function test, you need either the VN301^{plus} toolbox (151781) or the VN smoke test box (151780).



WARNING

Engine is switched off

- ▶ Before a function test, the operator must make sure that the oil mist detection system has been properly maintained first.
- ▶ For the function test, the safety instructions for handling the oil mist detection system must be always observed. ⇒ Section 2.4 Basic safety instructions
- ▶ If the oil mist detection system is operated in Ex-protected areas, the additional safety instructions must be observed. ⇒ Section 2.4.1 Safety instructions for potentially explosive atmospheres



NOTICE

Assembling the smoke tube

- ▶ See the manuals for the VN301^{plus} toolbox or the VN smoke test box for how to assemble the smoke tube with the hand pump.

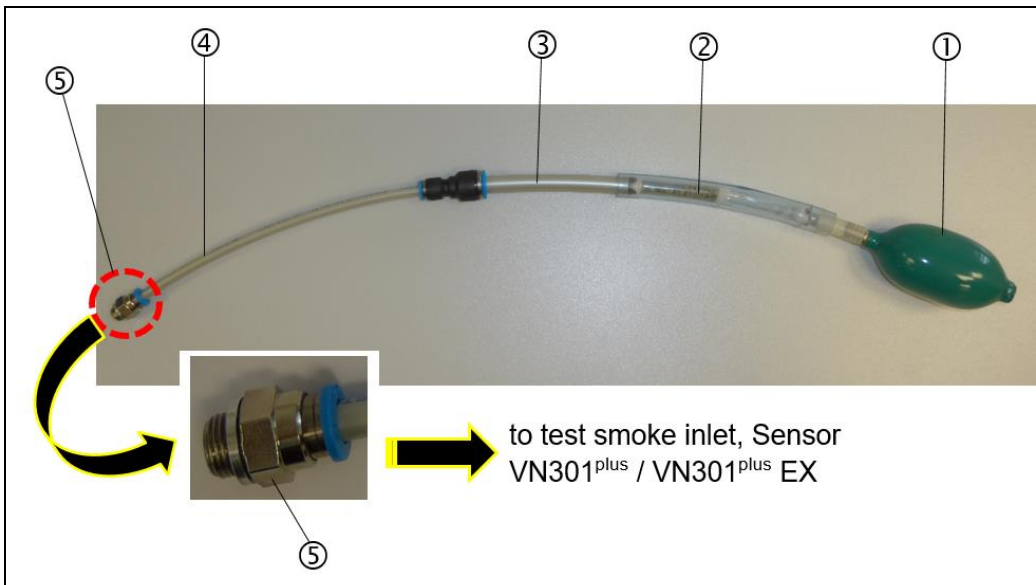
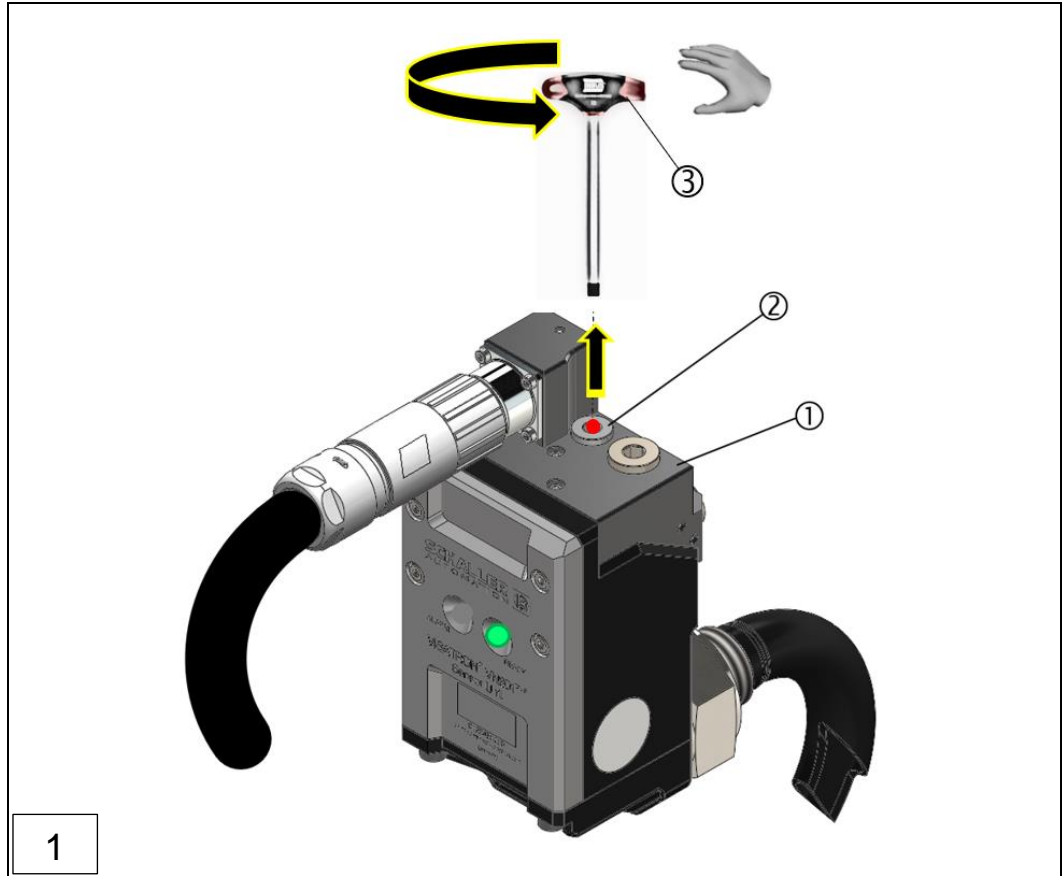


Fig.: 83 : Smoke tube with hand pump (assembled)

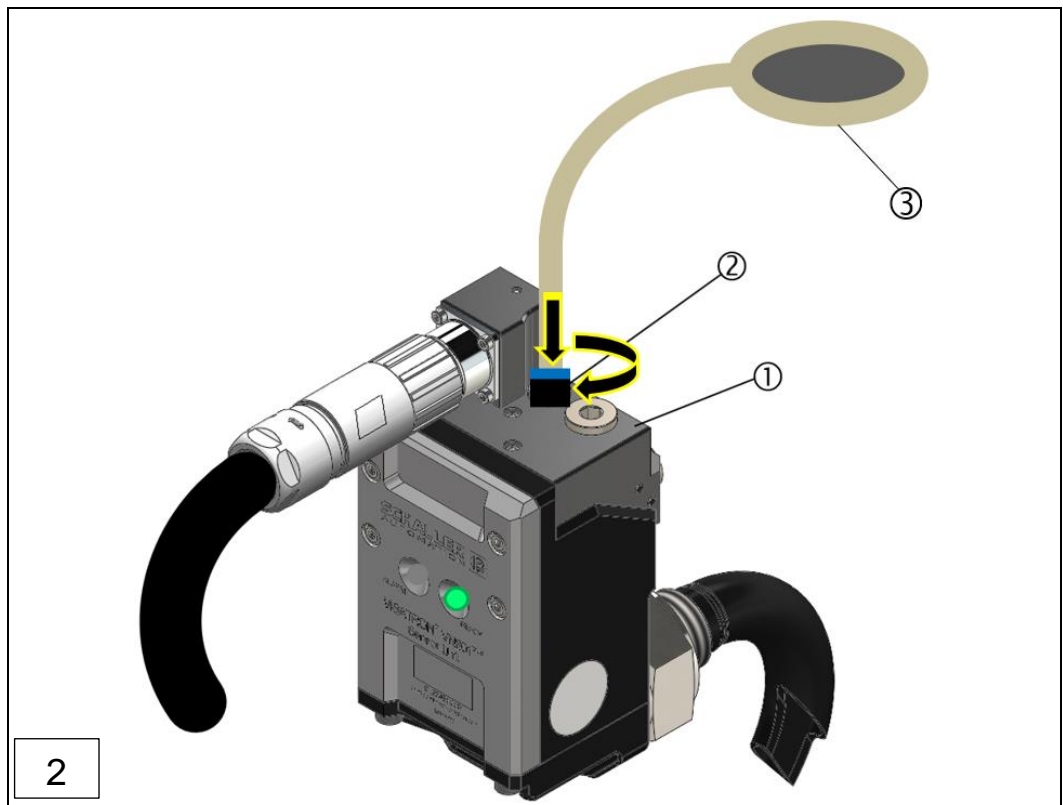
- | | |
|---------------------------|--------------|
| 1: Hand pump | 3: Adapter |
| 2: Smoke tube | 4: Flex hose |
| 5: Quick-release coupling | |

The function test is carried out according to the following steps:



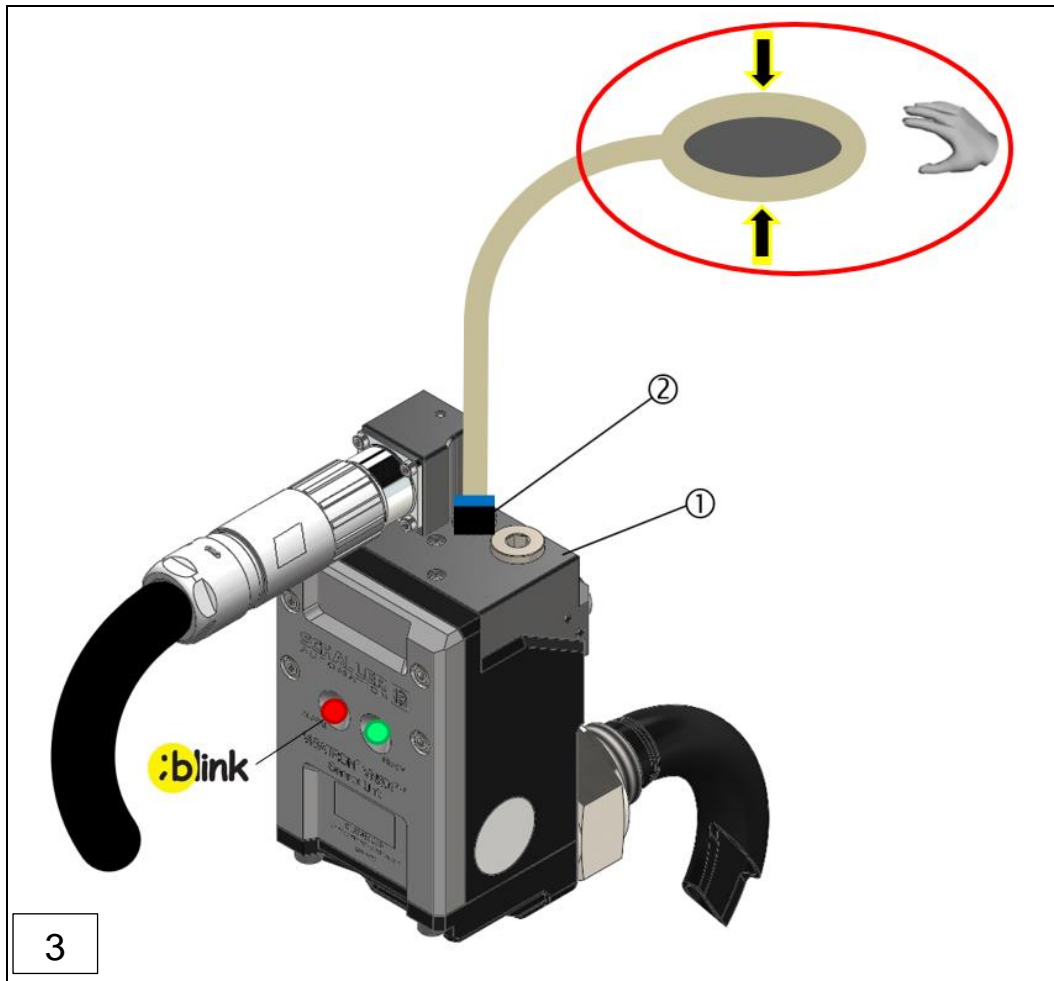
1: Sensor
2: "Test mist inlet" screw plug

3: Allen key, 5.0 mm



1: Sensor
2: Quick-release coupling

3: Smoke tube with hand pump



1: Sensor

2: Smoke tube with hand pump

3: Red LED flashes when function test is successful



Fig.: 84 : Function test with smoke tube (mist test, steps 1-4)

After a successful function test, the sensor is returned to its initial state. To do this, repeat steps 1-2 in reverse order. Then confirm the alarm on the central unit.

9.2 Inspection of the oil mist detection system (16,000 hrs. or after 24 months)

To ensure that the device is in proper working condition, defined maintenance and inspection work must be carried out by authorised and instructed specialist personnel.

In this case, an inspection by a Schaller service partner is required after 16,000 operating hours or after 24 months. See Section 12 (⇒ *Section 12 Contact*) in these instructions for suitable partners or go to <https://schaller-automation.com/en/partners/>.

9.3 Repair by the operator



WARNING

Warning – risk of oil mist explosion during maintenance work

- ▶ When carrying out repair work, observe the safety instructions in Section 9 ⇒ *Section 9 Maintenance and repair*
- ▶ Also familiarise yourself with the basic safety instructions for working with the oil mist detection system. ⇒ *Section 2.4 Basic safety instructions*
- ▶ If the oil mist detection system is operated in Ex-protected areas, the relevant safety instructions must be observed. ⇒ *Section 2.4.1 Safety instructions for potentially explosive atmospheres*

Repair work includes replacing and repairing components and is only necessary if components have been damaged by wear or external circumstances.

Authorised specialist personnel must:

- ▶ carry out necessary repair work professionally according to the rules of technology and in accordance with the applicable regulations;
- ▶ observe the instructions for repairing the supplied parts in the relevant instructions supplied with the delivery;
- ▶ not make improvised repairs to worn or damaged components;
- ▶ replace worn or damaged components with spare parts; and
- ▶ only use suitable spare parts. ⇒ *Section 13 Spare parts for VN301plus/VN301plus Ex*

The most important repair work is described below.

9.3.1 Replacing the VN301^{plus} central unit

To replace the central unit, carry out the steps in Section 6.3.3 ⇒ *Section 6.3.3 Central unit* and Section 6.4.3 ⇒ *Section 6.4.3 Electrical and pneumatic installation of the central unit.*

9.3.2 Replacing the VN301^{plus} / VN301^{plus} Ex sensor unit

To replace the sensor unit, carry out the steps in Section 6.3.2 ⇒ *Section 6.3.2 Sensor unit* and Section 6.4.2 ⇒ *Section 6.4.2 Electrical and pneumatic connection of the sensor unit.*

9.3.3 Replacing the hybrid cable

To replace the hybrid cable, carry out the steps in Section 6.4.2. ⇒ *Section 6.4.2 Electrical and pneumatic connection of the sensor unit*

9.4 Repair by Schaller Automation

If your oil mist detection system is defective or malfunctions, please contact Schaller Automation or an authorised service partner immediately.

See Section 12 (⇒ *Section 12 Contact*) in these instructions for suitable partners or go to <https://schaller-automation.com/en/partners/>.








9.5 Taking out of service and disassembly

The oil mist detection system is taken out of service in the reverse order to starting up.
⇒ *Section 6.5 Starting up for the first time*

9.6 Starting up for again

The oil mist detection system is started up again in the same way as it is started for the first time. ⇒ *Section 6.5 Starting up for the first time*

10 Error diagnosis and troubleshooting

  	<div style="background-color: #e67e22; color: white; padding: 5px;">WARNING</div> <p>Risk of oil mist explosion</p> <p>Failure to comply with the safety instructions may result in major damage to property or the environment and in serious injury or death.</p> <ul style="list-style-type: none"> ▶ Familiarise yourself with the basic safety instructions for working with the oil mist detection system in advance. → <i>Section 2.4 Basic safety instructions</i> ▶ If the oil mist detection system is operated in Ex-protected areas, the relevant safety instructions must be observed. → <i>Section 2.4.1 Safety instructions for potentially explosive atmospheres</i>
 	<div style="background-color: #f1c40f; color: black; padding: 5px;">CAUTION</div> <p>Working safely and correctly with the oil mist detection system</p> <ul style="list-style-type: none"> ▶ Read these instructions for use and other documents that accompany the product carefully and keep them in a suitable place for later use.
 	<div style="background-color: #2980b9; color: white; padding: 5px;">NOTICE</div> <p>Personal protective equipment</p> <p>Working on the device <u>without</u> protective equipment may result in serious injury. For the workplace PPE, the following protective equipment must be used:</p> <ul style="list-style-type: none"> ▶ DIN EN 388:2016 Protective gloves against mechanical risks, 2341X, and DIN EN 407:2004 Protective gloves against thermal risks, X1XXXX ▶ Safety glasses in accordance with DIN EN 166 or DIN EN 170 ▶ Safety helmet in accordance with DIN EN 397 and DIN EN 50365 ▶ ESD safety shoes according to ESD standard DIN EN 61340-5-1

10.1 Behaviour of the oil mist detection system in the event of a fault

The “System ready for operation” relay is switched off whenever a component of the VISATRON® VN301^{plus} / VN301^{plus} Ex system malfunctions. In this case, the operator must correct the fault as soon as possible.

If oil mist or an oil mist alarm is generated, a limited function of the VISATRON® VN301^{plus} / VN301^{plus} Ex system is used to generate the alarm. This is possible as long as at least one sensor is still functioning.


Example use case

Sensor No. 4 is defective (sensor error); “System ready for operation” is switched off. Sensors No. 1, 2, 3, 5, 6 and 7 are still in operation. A bearing fault occurs in the compartment monitored by sensor 7. The developing oil mist (due to overheating) is first detected by sensor 7, triggering a pre-alarm and then an alarm. The pre-alarm relay and also the alarm relay are switched (the fault at sensor 4 is ignored) to prevent the immediate hazard caused by the rising oil mist concentration.


After correcting the error (e.g. by replacing the bearing) and confirming the alarm, "System ready for operation" is switched off again, as there is still the fault at sensor 4.

10.1.1 Sensor defect



 WARNING	
	<p>Replacing defective sensors</p> <p>Failure to comply with the safety instructions may result in major damage to property or the environment and in serious injury or death.</p> <ul style="list-style-type: none"> ▶ Familiarise yourself with the basic safety instructions for working with the oil mist detection system in advance. ⇒ <i>Section 2.4 Basic safety instructions</i> ▶ If the oil mist detection system is operated in Ex-protected areas, the relevant safety instructions must be observed. ⇒ <i>Section 2.4.1 Safety instructions for potentially explosive atmospheres</i>



 DANGER	
	<p>Hazards in Ex-protected areas, when replacing defective sensors</p> <p>Further safety instructions must be followed for SCHALLER products intended for use in potentially explosive atmospheres, as follows:</p> <ul style="list-style-type: none"> ▶ For an installed VN301^{plus} Ex system, e.g. on dual-fuel engines, the sensor unit must be disassembled and assembled in the shortest possible time, as explosive atmosphere can escape into a non-explosion-proof area, i.e. outside the engine. ▶ Disassembly and assembly are only allowed with the engine switched off! <p>There is a risk of serious injury, including death, due to explosion in the crankcase as a result of incorrect assembly or installation.</p> <ul style="list-style-type: none"> ▶ You may only assemble the system components of the oil mist detection system when the engine is switched off and the system has been disconnected from the power supply first! The compressed air supply to the oil mist detection system must also be switched off first. ▶ Before starting assembly, the housing of the VISATRON[®] VN301^{plus} / VN301^{plus} Ex central unit must be earthed.

A sensor defect is indicated by:

- sensor unit; the green ready-to-operate LED flashing at regular intervals
- central unit; the green ready-to-operate LED of the defective sensor flashing at regular intervals

The oil mist detection system is declared by the Classification Societies to be the primary safety system. In the event of a sensor defect, the operator must correct the defect as quickly as possible. The easiest way to do this is to replace the faulty sensor unit. Schaller Automation generally recommends that the operator keeps up to two spare sensor units in storage at all times.

10.2 Troubleshooting

The displayed errors can be corrected by the customer or alternatively by an authorised Schaller service partner. In this case, contact service at Schaller Automation Industrielle Automationstechnik GmbH & Co KG. ⇒ *Section 12 Contact*

The error codes (on the display on the Remote Indicator II) and how to correct them are listed below in order. The specified work steps must be carried out one after the other, if the previous work step in each case has not cancelled the error code.

Code/ fault	Indicator/ possible causes	Solution
01/ Start phase	All LEDs are flashing/-	System test! No action required
02/ Electronic module is defective	All LEDs are off/ <ul style="list-style-type: none"> ▪ No power supply ▪ Fuse is defective/missing ▪ Central unit is faulty/defective 	1. Check the power supply 2. Replace the central unit (Section 9.3.1) 3. Contact service partner
03/ Pressure supply sensor faulty	Green LED on the applicable sensor and on the central unit is flashing at regular intervals/ <ul style="list-style-type: none"> ▪ No compressed air available ▪ Central unit is faulty/defective 	1. Check the compressed air supply 2. Check cable and hose connections on the sensor and the central unit. (Section 6.4.2 , Section 6.4.3) 3. Replace the central unit (Section 9.3.1) 4. Contact service partner
04/ Sensor defective	Green LED on the applicable sensor and on the central unit is flashing at regular intervals/ <ul style="list-style-type: none"> ▪ Sensor is not working 	1. Section 10.1.1 2. Section 6.3.2 , Section 6.4.2
05/ Sensor base plate disassembled	Green LED on the applicable sensor and on the central unit is flashing at regular intervals/ <ul style="list-style-type: none"> ▪ Sensor is not working 	1. Section 9.1
06/ Supply voltage not within allowed range	LEDs do not come on	1. Check the power supply 2. Contact service partner
07/ Battery voltage on the central unit is too low	"Central unit failure" LED is on/ <ul style="list-style-type: none"> ▪ Sensor is not working 	1. Contact service partner
08/ "Sensor heating" temperature measurement defective	Green LED on the applicable sensor and on the central unit is flashing at regular intervals/ <ul style="list-style-type: none"> ▪ Sensor is not working 	1. Section 10.1.1 2. Section 6.3.2 , Section 6.4.2

Code/ fault	Indicator/ possible causes	Solution
09/ "Sensor electronics" temperature measurement is defective	Green LED on the applicable sensor and on the central unit is flashing at regular intervals/ <ul style="list-style-type: none"> ▪ Sensor is not working 	<ol style="list-style-type: none"> 1. Section 10.1.1 2. Section 6.3.2, Section 6.4.2
10/ Ambient temperature too high	"Central unit failure" LED is on/ <ul style="list-style-type: none"> ▪ Sensor is not working 	<ol style="list-style-type: none"> 1. Observe allowed ambient temperatures (Section 3.4) 2. Remove or relocate objects nearby emitting heat 3. Install metallic heat shields to shield against heat radiation
11/ Ambient temperature too low	"Central unit failure" LED is on/ <ul style="list-style-type: none"> ▪ Sensor is not working 	<ol style="list-style-type: none"> 1. Observe allowed ambient temperatures (Section 3.4) 2. Remove or relocate objects nearby that are cooling
12/ Ambient temperature too low	Empty	Empty
13/ Optical sensor is dirty	Green LED on the applicable sensor and on the central unit is flashing at regular intervals/ <ul style="list-style-type: none"> ▪ Sensor is not working 	<ol style="list-style-type: none"> 1. Section 9.1
14/ Supply pressure too low	"Air supply failure" LED is on/ Green LED on the applicable sensor and on the central unit is flashing at regular intervals/ <ul style="list-style-type: none"> ▪ Sensor is not working 	<ol style="list-style-type: none"> 1. Adjust negative pressure (Section 6.5.3) 2. Check the filter on the pressure regulator Section 9.1 2. Replace central unit (Section 9.3.1) 3. Section 6.3.3, Section 6.4.3

Table 12: Error diagnosis and troubleshooting

11 Final shutdown and disposal



WARNING

Warning – risk of oil mist explosion when shutting down the oil mist detection system

- ▶ For final shutdown and disposal, observe the safety instructions for handling the oil mist detection system. ⇒ *Section 2.4 Basic safety instructions*
- ▶ If the oil mist detection system is operated in Ex-protected areas, the additional safety instructions must be observed. ⇒ *Section 2.4.1 Safety instructions for potentially explosive atmospheres*
- ▶ Do not dispose of product in fire.
- ▶ Do not open the product by force.

11.1 Disposal



NOTICE

Disposal of the product

- ▶ This product must not be disposed of as residential waste. It is therefore marked with the symbol on the left.
- ▶ Schaller Automation takes back this product free of charge. Information about this is available from the national sales organisations and Schaller Automation. ⇒ *Section 12 Contact*

11.2 Final shutdown

Final shutdown of the oil mist detection system is carried out according to Section 9.5 of these instructions. ⇒ *Section 9.5 Taking out of service and disassembly*

12 Contact

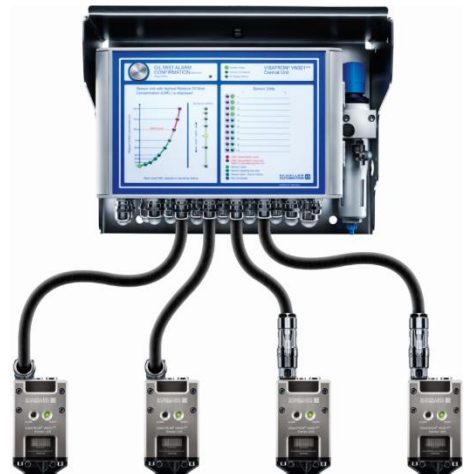
You can use the following contact details to contact customer service at Schaller Automation Industrielle Automationstechnik GmbH & Co. KG:

SCHALLER Automation (Headquarters)
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Industriering 14
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Email: info@schallerchina.cn



You can also find all our certified partners on our homepage at:

<https://schaller-automation.com/partner/>

13 Spare parts for VN301plus/VN301plus Ex



WARNING

Using unapproved spare parts may affect the safety of the installation. Original spare parts are necessary for the device to operate correctly and are designed for your safety. Using other parts may exclude liability for the consequences.

- ▶ Only use original spare parts from Schaller Automation!

13.1 Spare parts list

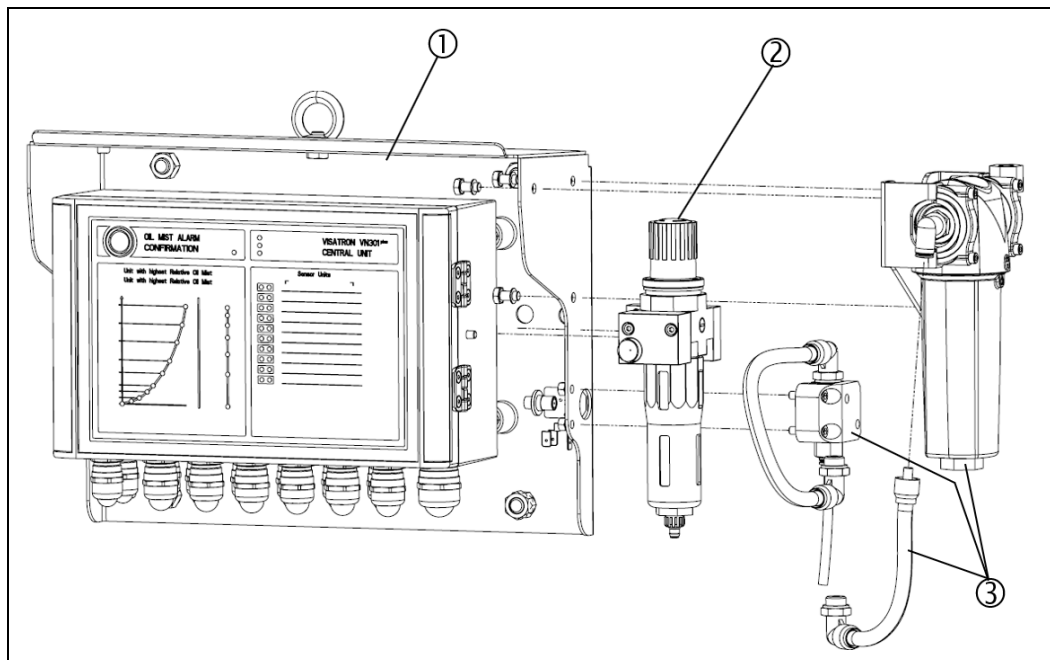


Fig.: 85 : Overview of the positions of spare parts for the VISATRON® VN301plus central unit

- 1: VN301plus central unit, (273150)
- 2: VN301plus pressure reducer, complete (273102)
- 3: VN301plus water separator, complete (273118)

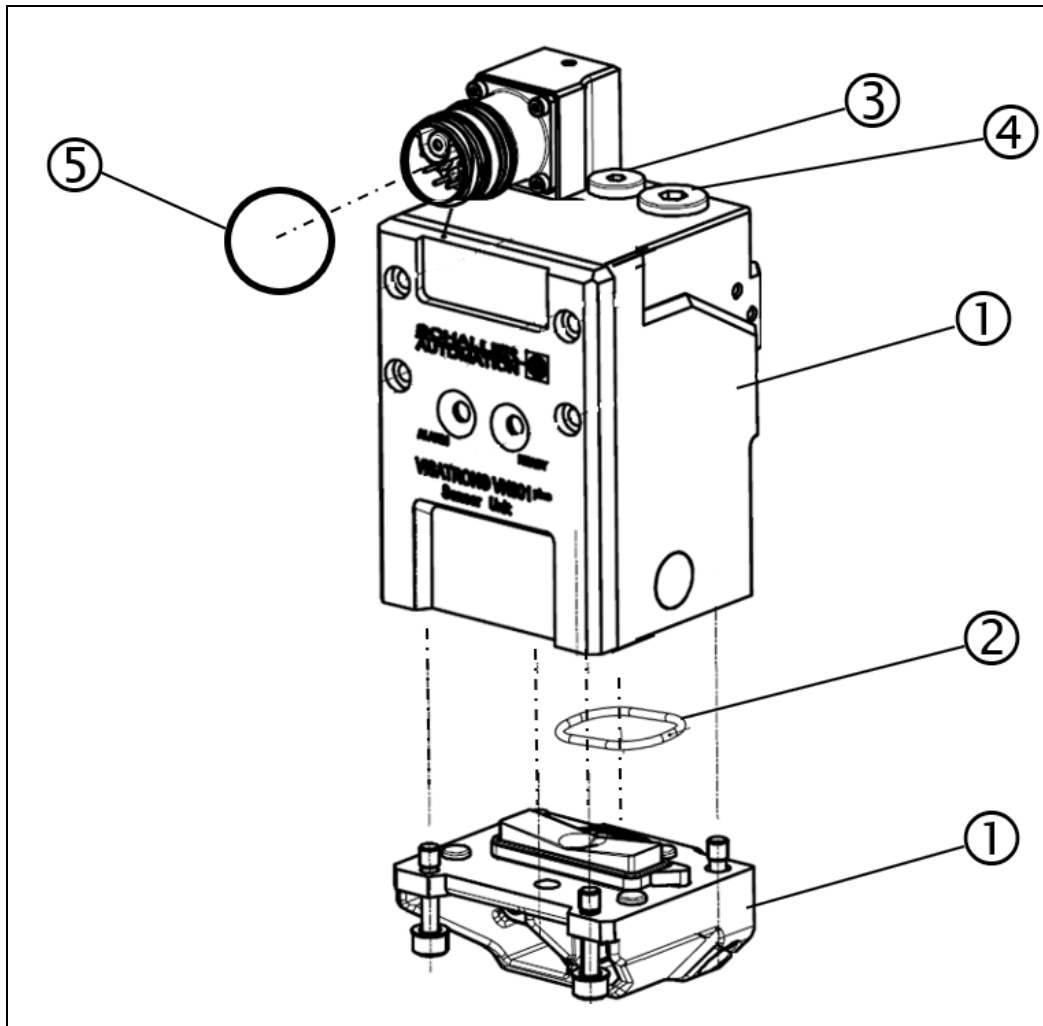


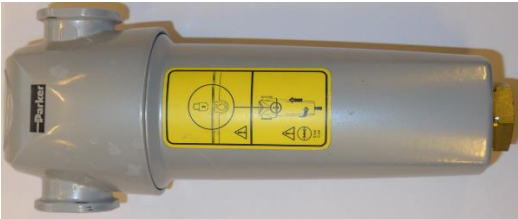
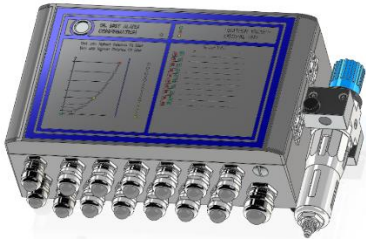
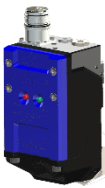







Fig.: 86 : Overview of the positions of spare parts for the VISATRON® VN301plus sensor unit

- 1: VN301plus and VN301plus Ex sensor unit (153050, 153060, 153070, 153080)
- 2: Service kit O-ring (273136)
- 3: Service kit plug screw G1/8 (273139)
- 4: Service kit plug screw G1/4 (273138)
- 5: Service kit O-ring (273137)

Part Number	Discription	per	Qty
273136	Service- Kit O-ring seal 19 x 1,5 Viton (10pc)	pc	1
273137	Service- Kit O-ring seal 20 x 1,3 Viton (10pc)	pc	1
273138	Service- Kit Plug screw G1/4 (10pc)	pc	1
273139	Service- Kit Plug screw G1/8 (10pc)	pc	1
272059	MSA smoke tube spare part- Kit (6pc) 	pc	1

Part Number	Discription	per	Qty
273102	Pressure reducer VN301 ^{plus} complete 	pc	1
273114	Filter cartridge pressure reducing valve	pc	1
273118	Water separator with filter- element 	pc	1
273119	Filter cartridge for water separator	pc	1
273150	Central unit VN301 ^{plus} REPLACEMENT <ul style="list-style-type: none"> • Without steel cover • Pressure reducer mounted 	pc	1
273129	Solenoid valve kit	pc	1
153050	Sensor VN301 ^{plus} Ex vertikal REPLACEMENT: <ul style="list-style-type: none"> • Sensor packed in an individual shipping box • manual on cd 	pc	1

Part Number	Discription	per	Qty
153060	Sensor VN301 ^{plus} Ex horizontal REPLACEMENT: <ul style="list-style-type: none"> • Sensor packed in an individual shipping box • manual on cd 	pc	1
153070	Sensor VN301 ^{plus} vertikal REPLACEMENT: <ul style="list-style-type: none"> • Sensor packed in an individual shipping box • manual on cd 	pc	1
153080	Sensor VN301 ^{plus} horizontal REPLACEMENT: <ul style="list-style-type: none"> • Sensor packed in an individual shipping box • manual on cd 	pc	1
151482	Spare part kit 2 (Cleaning kit) 	pc	1
273202	Hybrid cable VN301 ^{plus} – 2m 	pc	1

Part Number	Discription	per	Qty
273204	Hybrid cable VN301 ^{plus} – 4m 	pc	1
273206	Hybrid cable VN301 ^{plus} – 6m 	pc	1
273208	Hybrid cable VN301 ^{plus} – 8m 	pc	1
273210	Hybrid cable VN301 ^{plus} – 10m 	pc	1
273215	Hybrid cable VN301 ^{plus} – 15m 	pc	1
273220	Hybrid cable VN301 ^{plus} – 20m 	pc	1
273225	Hybrid cable VN301 ^{plus} – 25m 	pc	1
273230	Hybrid cable VN301 ^{plus} – 30m 	pc	1

Table 13: Spare parts list

14 Accessories for VN301plus/VN301plus Ex

WARNING

Using unapproved accessories may affect the safety of the installation. Original accessories are necessary for the device to operate correctly and are designed for your safety. Using other parts may exclude liability for the consequences.

- ▶ Only use original accessories from Schaller Automation!



Part Number	Discription	per	Qty	List Price
151779	<p>VN301^{plus} service box</p> <p>The service box contains all the parts needed for maintenance and checking of the oil mist detection system. The service box includes a manual on CD or DVD.</p> 	pc	1	On request!
151781	<p>VN301^{plus} toolbox, complete</p> <p>The box contains all the tools needed to install the oil mist detection system. The box is recommended for prime sales, service partners and end customers.</p> 	pc	1	On request!

Table 14: List of accessories

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17 Glossary

Term	Description
VN301 ^{plus}	Oil mist detection system, designed to protect large engines (gas, diesel and dual fuel)
Central unit	Provides the functionality of the oil mist detection system and is used to parameterise measured variables
Sensor unit	Design suck in and detect the oil mist atmosphere from the crankcase
Hybrid cable	Electrical and pneumatic connection between the VISATRON® VN301 ^{plus} central unit and the VISATRON® VN301 ^{plus} / VISATRON® VN301 ^{plus} sensor unit
Mounting position	Position at which the central unit and sensor unit is attached to the engine
Oil mist concentration	Volume-specific components of the atmosphere sucked in from the crankcase
Opacity	Degree in [%] to which the atmosphere sucked in from the crankcase is opaque
Intake position	Position at which the gas to be measured is sucked in from the crankcase or the central exhaust.
Crankcase atmosphere	Atmosphere (potentially explosive in part) which is permanently present in the crankcase of a large engine
Lower explosive limit (LEL)	Lower explosive limit of a gas or gas mixture
Upper explosive limit (UEL)	Upper explosive limit of a gas or gas mixture
Oil mist detection	Detection and analysis of oil mist concentrations previously taken from the crankcase of a large engine
IACS	I nternational A ssociation of C lassification S ocieties Umbrella organisation for various classification societies
M10	Class-compliant assembly and installation according to the IACS requirements
M67	Sensitivity of the oil mist detector and determination of the oil mist concentration according to IACS requirements
Communication interface	Interface for data transfer, depending on suitable data protocols (e.g. CAN, RS485 etc.)
Remote Indicator II	Remote monitoring system for displaying oil mist concentration and the status of VISATRON® oil mist detection systems.
Non-potentially explosive atmosphere	Areas in which no explosive atmosphere can arise
Potentially explosive atmosphere	Areas in which a potentially explosive atmosphere can occur permanently

18 EC Declaration of Conformity

EC Declaration of Conformity

We, the manufacturer:

SCHALLER AUTOMATION
Industrielle Automationstechnik GmbH & Co. KG
Industriering 14
66440 Blieskastel
Germany
Phone: +49 6842 5080
Fax: +49 6842 508260

declare on our sole responsibility that the product:

Type of device: **Oil Mist Detector (OMD)**

Type designation: **VISATRON® VN301^{plus}**

to which this declaration refers and which is used exclusively for the detection and display of oil mist for diesel engines, complies with the following EC directives:

Machinery Directive 2006/42/EC
EMC Directive 2004/108/EC

and also complies with the following standards:

EN ISO 4414: 2010	EN 61000 Part 6-1: 2007
EN 60529: 1991+ A1: 2000	EN 61000 Part 6-2: 2005
EN 55022: 2010	EN 61000 Part 6-3: 2007+ A1: 2011
EN ISO 12100: 2010	EN 61000 Part 6-4: 2007+ A1: 2011
CSPRI 16-1	
CSPRI 16-2	
CSPRI 16-4	
IACS UR M10: Rev.4 2013	
IACS UR M67: Rev.2 2015	

Complete technical documentation is available. The original version of the instructions for use for the oil mist detectors is available.

66440 Blieskastel, 2019/06/11



Stephan Schaller
- Managing Director -

EC Declaration of Conformity

We, the manufacturer:

SCHALLER AUTOMATION
Industrielle Automationstechnik GmbH & Co. KG
Industriering 14
66440 Blieskastel
Germany
Phone: +49 6842 5080
Fax: +49 6842 508260

declare on our sole responsibility that the product:

Type of device: **Oil Mist Detector (OMD)**
 Type designation: **VISATRON® VN301^{plus} Ex**
 Marking: **CE0637  II -/2G Ex op is IIB T4 -/Gb**

to which this declaration refers and which is used exclusively for the detection and display of oil mist for diesel engines, complies with the following EC directives:

Machinery Directive 2006/42/EC
EMC Directive 2004/108/EC
ATEX Directive 2014/34/EU

and also complies with the following standards:

EN ISO 4414: 2010	EN 61000 Part 6-1: 2007
EN 60529: 1991+A1: 2000	EN 61000 Part 6-2: 2005
EN 55022: 2010	EN 61000 Part 6-3: 2007+A1: 2011
EN ISO 12100: 2010	EN 61000 Part 6-4: 2007+A1: 2011
CISPR 16-1	EN IEC 60079-0: 2018
CISPR 16-2	EN 60079-28: 2015
IACS UR M10: Rev.4 2013	IACS UR M67: Rev.2 2015

Complete technical documentation, including EC type examination certificate, is available. EC certificate BVS 11 ATEX E 175 was issued by DEKRA EXAM GmbH, D 44809 Bochum, Germany. The original version of the instructions for use for the oil mist detectors is available.

66440 Blieskastel, 2019/06/11



Stephan Schaller
- Managing Director -

19 Appendix

19.1 Description of error on the VN301^{plus} / VN301^{plus} Ex sensor unit

Why is the sensor unit faulty?

If your sensor unit is defective or malfunctions, please contact Schaller Automation or one of our authorised service partners immediately. Please fill in the following form in full and send it to us immediately together with the defective sensor unit.

See Section 12 (⇒ Section 12 Contact) in these instructions for suitable partners or go to <https://schaller-automation.com/en/partners/> for the contact details of Schaller Automation and other partners near you.

We are also available to answer any questions you may have about using the product. Please also use the form below for this purpose and ask your question(s) in detail. Please send the form to us by email, fax or post and we will reply as soon as possible.

Name	
Ship/factory	
IMO number (only for ships)	
Shipowner/company	
Phone	
Fax	
Email	

Please enter your data for product identification:

Type of sensor unit: (Please select)

VN301^{plus} VN301^{plus} Ex

Serial number (See label on the front)

□	□	□	□	□	□	□	□	□	□
---	---	---	---	---	---	---	---	---	---

Sensor unit installed on:

Main machine Auxiliary machine/power unit

Engine manufacturer: _____

Engine type: _____



1. Condition of the sensor unit:

Sensor unit mechanically damaged: Not functioning when operated

- 2. **Is suction at the sensor unit is working correctly?** Yes No
- 3. **Is the condition of the hybrid cable OK?** Yes No
- 4. **Is the condition of the hybrid plug OK?** Yes No
- 5. **Are none of the LEDs on the sensor unit coming on?** Yes No

Check whether the central unit is ready for operation
 Check the supply line (hybrid cable)
 Check the power supply at the central unit (check with multimeter)

Minimum voltage: 18 V

Maximum voltage: 31.2 V Measured voltage: V

6. Problems with performance:

Emergency shutdown following oil mist alarm for no apparent reason.

- **Sensor unit issues oil mist alarm from time to time , or permanently**

<u>During:</u>	Engine start	<input type="checkbox"/>	Warm-up	<input type="checkbox"/>
	Increase in load	<input type="checkbox"/>	Decrease in load	<input type="checkbox"/>
	Engine stop	<input type="checkbox"/>	In various states	<input type="checkbox"/>

Have you checked the crankcase? Yes No

If yes, did you find damage? Yes No

Did you find water leakage? Yes No

Did you find condensation? Yes No

- **Have you checked the hybrid cable is OK and the cable routing?**

Yes No

If yes: Is cable routing OK? Yes No

Is there condensate in the hybrid hose? Yes No

- **Check sensor optics and clean if necessary**

Is the light measuring track wetted with oil? Yes No

Is there Condensate on light measuring track? Yes No

- **Check the working pressure at the central unit and check the pressure section**

Set value for pressure supply at the central unit: **2.5 bar**

Measured pressure at the central unit: , bar

Is the working pressure between the central unit and the sensor unit completely or partially interrupted?

Yes No

See also Section 10.2 ⇒ *Section 10.2 Troubleshooting* -> Code 03

If yes, please check as follows:

Is there no compressed air available? Yes No

If there is, is there enough compressed air available?
(compared to neighbouring sensors) Yes No

Is the green LED on the relevant sensor flashing
at regular intervals? Yes No

Additional information from customer:

19.2 Description of error on the VN301^{plus} central unit

Why is the central unit faulty?

If your central unit is defective or malfunctions, please contact Schaller Automation or one of our authorised service partners immediately. Please fill in the following form in full and send it to us immediately together with the defective central unit (complete or just the bottom half or the cover with display).

See Section 12 (⇒ Section 12 Contact) in these instructions for suitable partners or go to <https://schaller-automation.com/en/partners/> for the contact details of Schaller Automation and other partners near you.

We are also available to answer any questions you may have about using the product. Please also use the form below for this purpose and ask your question(s) in detail. Please send the form to us by email, fax or post and we will reply as soon as possible.

Name	
Ship/factory	
IMO number (only for ships)	
Shipowner/company	
Phone	
Fax	
Email	

Please enter your data for product identification:

Central unit:

VN301^{plus}, complete



Please enter your data for product identification:

Serial number (Label on left side of housing)

--	--	--	--	--	--	--	--	--	--	--

Central unit installed on:

Main machine Auxiliary machine/power unit

Engine manufacturer: _____

Engine type: _____

1. Condition of the central unit:

Central unit mechanically damaged: Yes No

Not functioning when operated Yes No

Is the condition of the electrical and pneumatic lines OK? Yes No

Condition of the reset button:

Button damaged No response when the button is pressed

2. Are none of the LEDs on the display coming on? Yes No

Check whether the central unit is ready for operation
Check the power supply at the central unit (check with multimeter)

Minimum voltage: 18 V

Maximum voltage: 31.2 V Measured voltage: V

3. Problems with the functions of the central unit:

- **Is the working pressure at the central unit set correctly?**

Set value for pressure supply at the central unit: **2.5 bar**

Measured pressure at the central unit: , bar

If not: Check the compressed air supply
Set the working pressure at the central unit to p= 2.5 bar
Check pressure section

See also Section 6.5.3 ⇒ Section 6.5.3 Setting the supply pressure on the pressure regulator of the VN301plus central unit

- **Is the sensitivity set correctly on the central unit?**
(Default setting: Sensitivity level 5)

Yes No

- **Is the central unit parameterised according to customer requirements?**

Yes No

Additional information from customer:

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