OPERATING MANUAL

VISATRON® Oil Mist Detection System

VN301plus / VN301plus EX

Version date: 07/07/2025

Version: Version 2.2

Document No.: Part number 180072

The original operating manual is written in German.
Any translations are based on the original operating manual.

SCHALLER AUTOMATION

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LEGAL NOTICE

The operating manual applies to the following products:

- VISATRON® VN301plus
- **VISATRON® VN301plus EX**

Firmware version of the “Central Unit” at the time of publication:
V1.21 dated 24/04/2020

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VERSION HISTORY AND CHANGE NOTES

Version	Change	Date	Author
1.0	• Release (first version)	07/11/2013	J. Hönninger / S. Höh
1.1	• Safety instructions, terminology and positions of parts added • Revision of graphics and text	13/10/2014	J. Hönninger / S. Höh
1.2	• Safety instructions, terminology and positions of parts added • Revision of graphics and text	20/04/2015	J. Hönninger / S. Höh
1.3	• Photos and positions of parts added or replaced • Error code corrected • Revision of text in some sections	11/06/2019	J. Hönninger
1.4	• Photos and positions of parts added or replaced • New maintenance kits added • Spare parts tables added	06/01/2020	J. Hönninger
1.5	• Terminology and positions of parts added • Revision of graphics and text	25/01/2021	J. Hönninger
2.0	• Revised all content against the standard • Restructured the sections, plus new layout with revised formatting, based on the existing Version 2.1. • Added further sections and topics.	07/06/2023	J. Wahl
2.1	• Layout updated/customised • Text blocks updated/adapted • Amended/added/new sections: 1.5, 1.6, 1.8, 1.10, 1.12 - 1.14 (New), 2.3 (New), 2.5.1, 3.1, 3.3, 3.3.2, 3.3.3 (New), 3.4 (including sensor left), 3.4.1, 3.4.2, 3.4.3, 3.4.5 (New), 4.2 - 4.3.3 (New, or sensor left added), 4.4 - 4.5, 4.6 (New), 6.3.1, 6.3.2, 6.3.4, 6.4.2, 6.4.3, 6.4.6, 6.5.4, 6.5.5, 9.1.4, 10.1, 10.1.1, 13.1	24/01/2024	J. Wahl
2.2	• Section 4.3.4 added: Central unit not using all the connections • Section 6.4.2: (step 3) added: pictogram inserted • Section 6.4.3: inserted as new section: Optional hybrid connector • Section 6.4.6: Torque added • Section 8.7 (graphic): LED changed from “blinking” to “shining” • Section 9.1.1: Part number for filter and service box changed • Section 9.1.1: Note on SAE40 lubrication oil added • Section 9.1.4: “Smoke tube” user manual added • Section 9.3.4: inserted as new section: Replacing the hybrid connector on the hybrid cable • Section 13.1: “Spare parts” table – added “Hybrid cable with screw lock”; photos cleaned up • Section 13.2: inserted as new section: Recommendation for storage at customer • In general: Layout updated/customised/cleaned up	07/07/2025	J. Wahl

Table 1: Version history and change notes

Table of contents

1 Information about the operating manual

1.1 Symbols in this operating manual

Various types of notation and symbols are used in the text of this manual. They are used as follows:

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 Section ⇨. *Section 2 Safety instructions*

1.2 Validity of the operating manual

This operating manual applies to the following products:

- **VISATRON® VN301plus**
- **VISATRON® VN301plus EX**,

hereafter referred to as the “device”.

1.3 Use and purpose of the operating manual

The operating manual is intended for:

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

This operating manual 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 this operating manual must be observed without exception.
- You must read, understand and apply the operating manual in order to operate and work on the device properly and safely.
- This operating manual must be read and applied by the fitter and the responsible specialist personnel/operator **before** transport, installation/removal, starting up, operation and maintenance.

1.4 Document storage

- This manual, 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.

1.5 Applicable documents and regulations

Further documents apply and must be observed in conjunction with this operating manual:

- Additional installation instructions for VISATRON® VN301^{plus} "**MA VN301^{plus}**", currently valid version (Document No.: Part Number 180537_DE, 180547_EN, available on the supplied DVD)
- User manual for VISATRON® VN301^{plus} "**end-user software**", currently valid version (Document No.: Part Number 180103_DE, 180104_EN, available on the supplied DVD)
- For additional components, the manuals supplied with them must be observed.
- 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 this operating manual have the appropriate qualifications and/or are trained and fully understand the contents of this operating manual.

The following operator qualifications are required for this device:

- completed vocational training as an electrician (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 (caused by delivery or incorrect use).
- ▶ 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 (2018) 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 4.5 Foreseeable misuse*
- foreseeable misuse ⇨ *Section 4.5 Foreseeable misuse*
- technical data ⇨ *Section 3.4 Technical data*
- technical description ⇨ *Section 4.3 Technical description and technical data*

1.10 Terms of warranty

The terms of warranty are part of the “General Terms and Conditions” or the purchase contract.

The warranty provided by Schaller Automation Industrielle Automationstechnik GmbH & Co. KG does not apply in the following cases:

- 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 operating manual.
- Unauthorised structural changes to the device.
- Inadequate monitoring of wear parts.
- Maintenance work not carried out correctly **or** not carried out on time.
- Unauthorised modifications to the device may invalidate the warranty.
- Retrofitting and modifications to the device or installation kit 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 purposes of the terms of warranty.

1.11 Version of the operating manual

This document has been prepared to the best of our knowledge and belief. It matches 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. The version number can also be found in the footer on every page of this document. The operator must check that the document is up-to-date.

1.12 Digital operating manual (online operating manual)

The current version of this operating manual is also available online and can be accessed at any time. You can find the manual under:

Operating manual | Schaller Automation (schaller-automation.com)

To access the manual, select the manual for your product on our online portal and then start downloading by clicking the  icon. The document then opens automatically in your browser.

1.13 Variables and units of measurement that are used

The following table lists the variables and units of measurement that are currently used in the operating manual. We reserve the right to add to or change the table, as necessary.

Variable	Unit
Lengths	mm, m
Volume	m^3, l
Standard volume flow, according to DIN 1343 [at 1013 mbar and 273.15 K (0 °C)]	Nm^3/h, Nm^3/min, Nm^3/s
Volume flow	l/min, m^3/min, l/h, m^3/h
Mass	g, kg
Temperature	°C, K
Density	kg/m^3
Frequency	Hz
Pressure	mbar, bar, mmWC

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

1.14 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 legal questions and activities arising in connection with the above product, please contact SCHALLER Automation in advance:

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2 Safety instructions

This operating manual contains safety instructions.

2.1 Safety devices and guards

This manual contains 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

Nature and source of the hazard!

Description of the nature and source of the hazard.

- 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

Immediate risk of death or serious injury.

- Indicates a high-risk hazard which, if not avoided, will result in death or serious injury.

WARNING

Potential risk of death or serious injury.

- 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.

NOTE

Potential damage to the device or the surroundings.

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

2.3 Important information about retrofitting or converting engines

The installation and starting up of the device when retrofitting or converting engines **that are not new engines** may only be carried out by authorised Schaller service partners.

Trained, qualified personnel of the customer are also allowed to assemble, install and start up the device on new engines.

Operation and maintenance of the device may also be carried out by qualified personnel of the customer. However, the operator must ensure for this purpose that the personnel for the work/activities defined in these installation instructions have the appropriate qualifications and/or are trained and fully understand the contents of these installation instructions.

2.4 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 this operating manual:

Symbol	Explanation
	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	Explanation
	Refer to operating manual/instructions
	Note: Important information!
	Note: A qualified electrician is required for installation!
	Note: Action required!

Table 3: Information, warning and mandatory signs

2.5 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 instructions and warnings.

⚠ CAUTION

Safe and proper use of the device

▶ Read the operating manual and other documents that accompany the product carefully and keep them in a suitable place for future reference.

▶ For repair and service work, you must follow the instructions in the operating manual.

NOTE

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 407:2020-06, 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, from 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 via the engine wall connection. 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 detection system. 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 name 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.

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 detection system with return of the crankcase atmosphere into the crankcase is suitable for a crankcase pressure in the range of ±500 mmWC 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.

Electrical damage to the device on when installing and removing the engine.

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

Electrical damage during 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 allowed ambient temperature Ta (during intended use): +5 °C ≤ Ta ≤ +70 °C.
- Typical gases of ignition protection category T4: T4 maximum surface temperature must be ≤ 135 °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.

NOTE

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, which means:

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

2.5.1 Safety instructions for potentially explosive atmospheres

DANGER

Explosion of the crankcase, for dual-fuel or gas engines

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

- The oil mist detection system is designed to draw in gases from a potentially explosive atmosphere (for example, the crankcase of a gas engine). The device **without** ATEX approval must therefore never be used in potentially explosive atmospheres.

DANGER

Hazards in potentially explosive atmospheres

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. (Avoid zone carryover) ⇨ *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

This operating manual applies to the multi-sensor oil mist detection system under the VISATRON® brand in the VN301plus series.

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

- VISATRON® VN301plus, for use in environments that are **not** potentially explosive according to ATEX and IECEx
- VISATRON® VN301plus EX, for use in environments that **are** potentially explosive with gas engine operation according to ATEX and IECEx:
  - ☑ ATEX: II -/2G Ex op is IIB T4 -/Gb
  - ☑ IECEx: [Ex op is IIB T4 -/Gb]

Gaseous fuels, such as biogas, natural gas, landfill gas, mine gas or wood gas as engine fuel, consist of up to 90% methane gas

The VISATRON® VN301plus EX is designed to draw in gases (mainly methane gas) from a potentially explosive atmosphere, for example, from the crankcase of a gas engine. However, the sensor units themselves must not be installed in a potentially explosive environment (classified as II-/2G EX zone) if an EX zone can develop in the sensor units at the time of detection.

The differences between the VISATRON® VN301plus EX sensor units and the VN301plus sensor units are primarily in the following external features:

- End cover: Painted in “blue” colour
- Name plate on the end cover of the sensor unit: EX icon with BVS and ATEX designation in the upper area of the end cover and EX marking after the VISATRON® VN301plus series designation

3.2 Manufacturer's details

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3.3 Name plate

The product is identified by a name plate

- for the sensor unit (on the end cover of the VISATRON® VN301plus - / VN301plus EX sensor unit)

  and

- for the central unit (as a sticker on the left side of the VISATRON® VN301plus central unit)

The serial number on the name 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 Name plate for the VISATRON® VN301plus central unit

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

Fig.: 1 : Name plate, VISATRON® VN301plus central unit

1: VISATRON® VN301plus central unit
2: Name plate (attached to left side)

The following information is provided on the name plate:

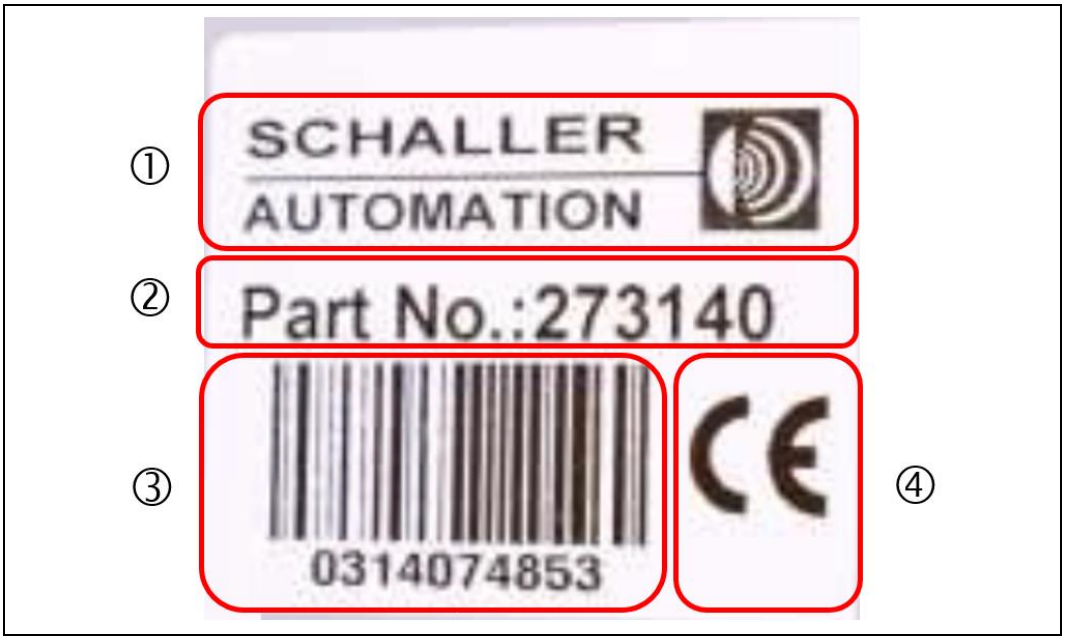


Fig.: 2 : Name plate, VISATRON® VN301plus central unit

1: Device type and designation
2: Part number
3: Barcode with serial number (example)
4: CE marking

3.3.2 Name plate for the VISATRON® VN301plus sensor unit

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

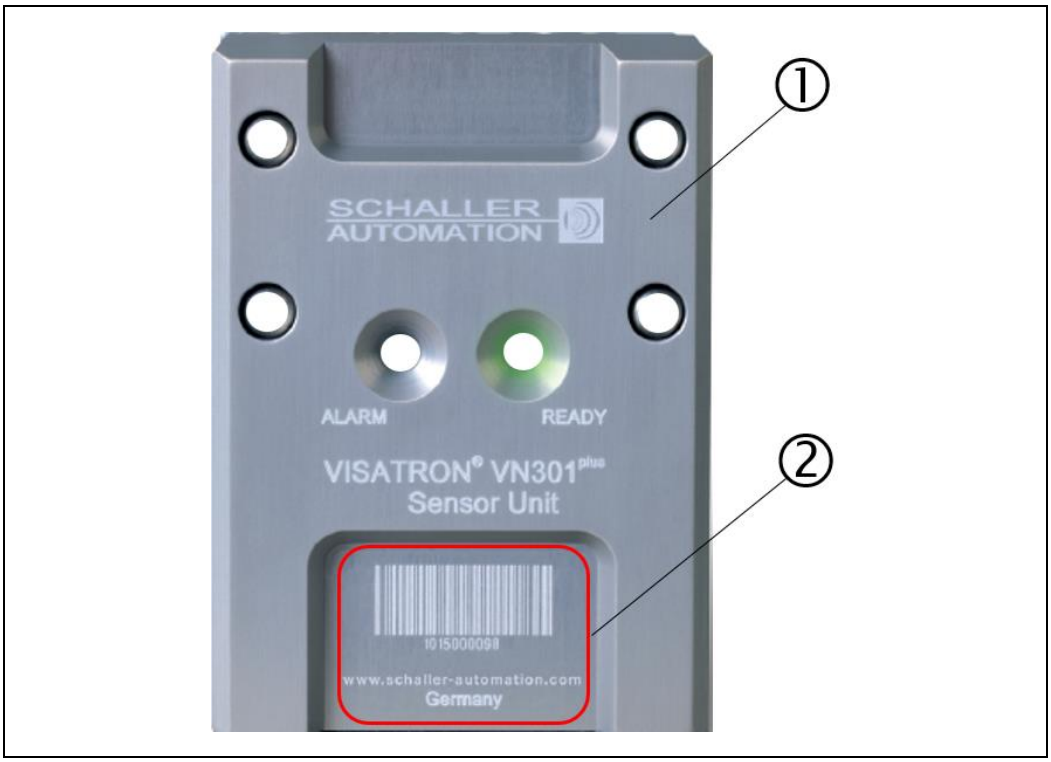


Fig.: 3 : End cover with serial number on the VISATRON® VN301plus sensor unit

1: End cover of the VN301plus sensor unit
2: Name plate

The following information is provided on the end cover:

Fig.: 4 : Name plate on the VISATRON® VN301plus end cover

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

3.3.3 Name plate for the VISATRON® VN301plus EX sensor unit

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

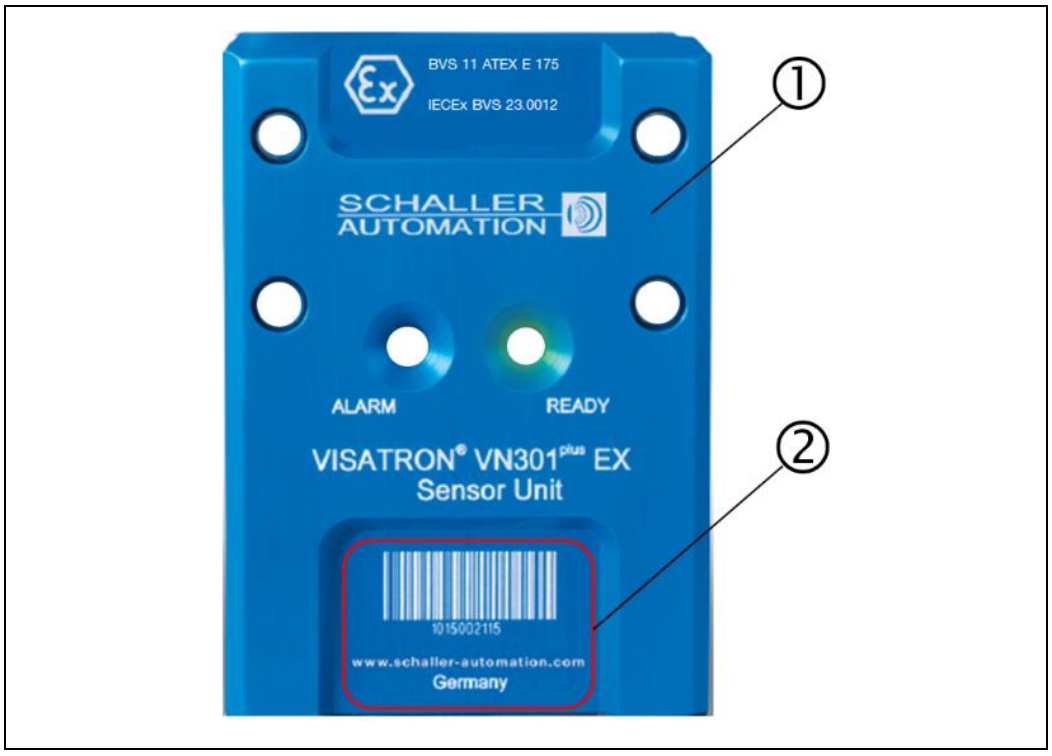


Fig.: 5 : End cover with serial number on the VISATRON® VN301plus EX sensor unit:

1: End cover of the VN301plus EX sensor unit 2: Name plate

The following information is provided on the end cover:

Fig.: 6 : Name plate on the VISATRON® VN301plus EX end cover

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

3.4 Technical data

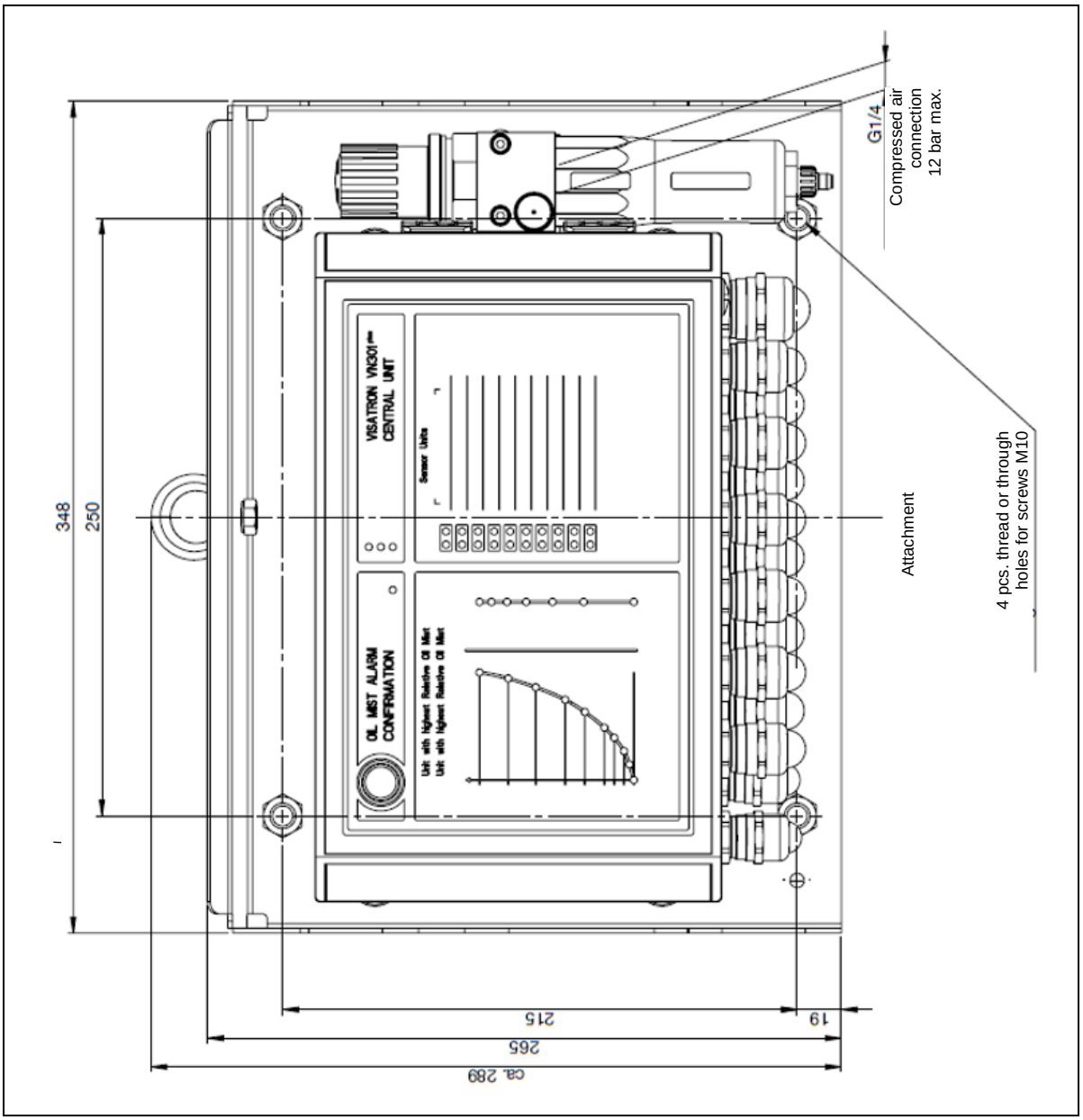


Fig.: 7 : Mechanical dimensions of the VISATRON® VN301plus central unit

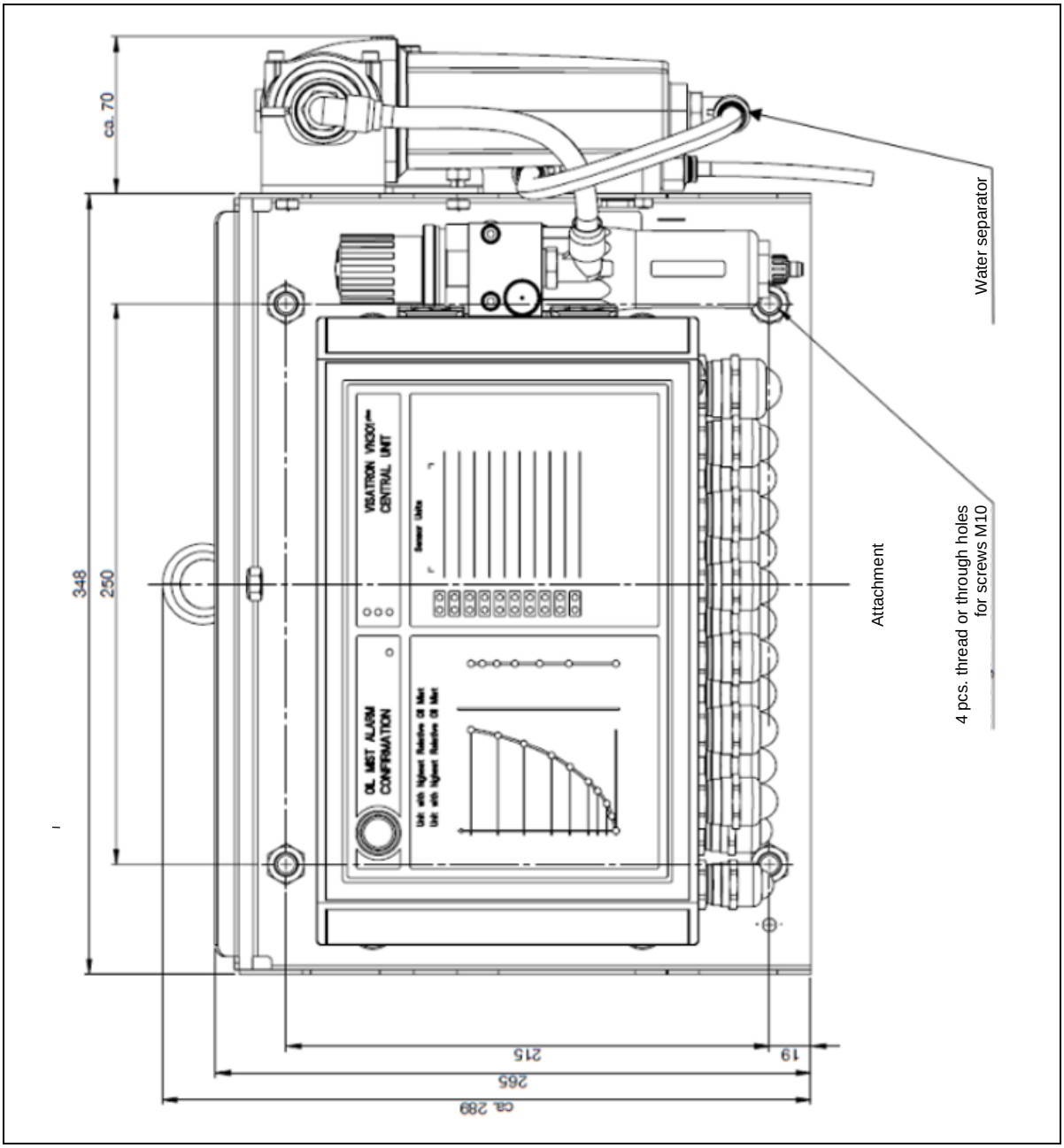
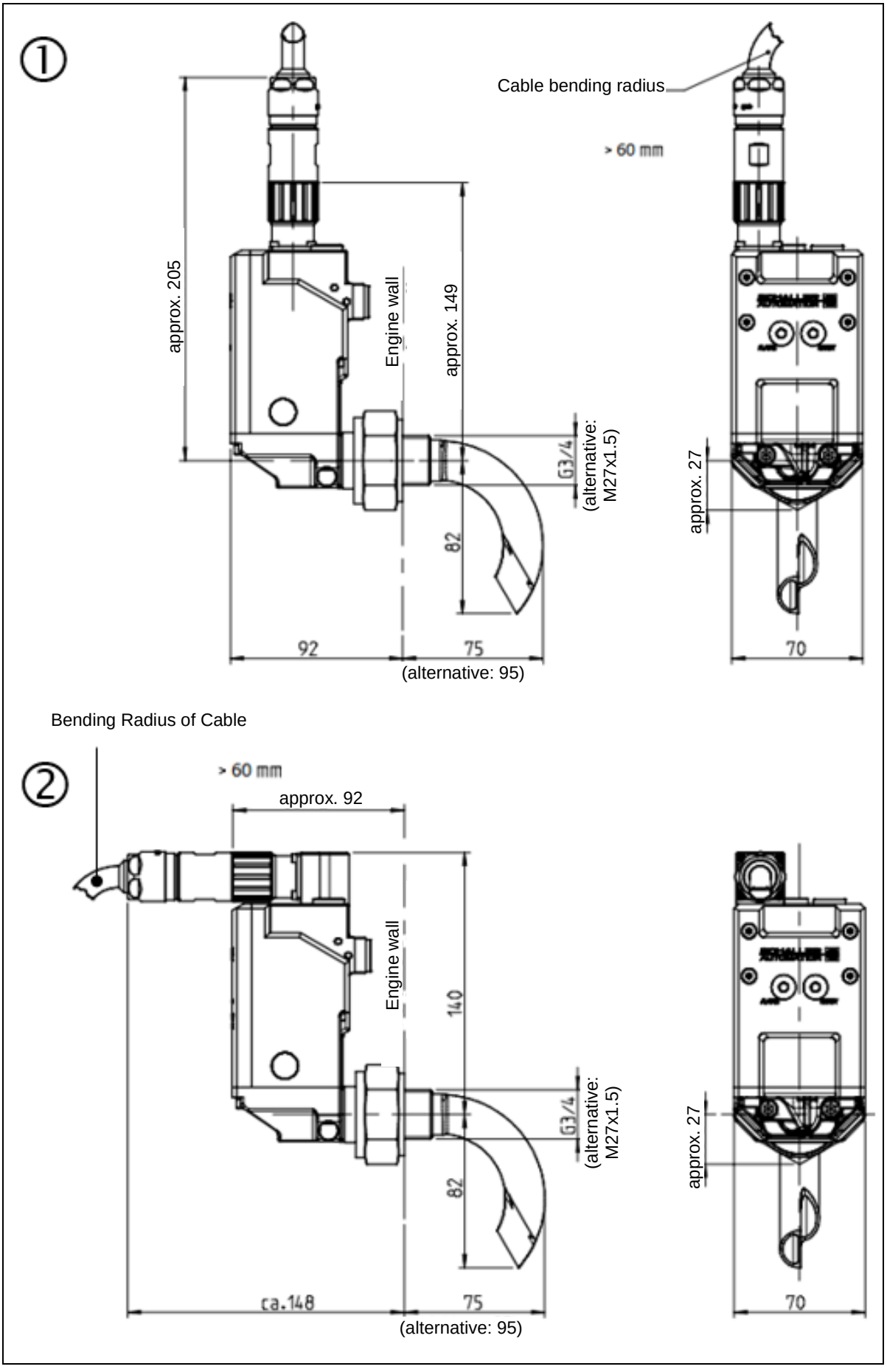


Fig.: 8 : Mechanical dimensions of VN301^{plus} central unit; version with water separator


①
Cable bending radius
> 60 mm
approx. 205
Engine wall
approx. 149
G3/4
(alternative:
M27x1.5)
82
92
75
(alternative: 95)
approx. 27
70
Bending Radius of Cable
②
> 60 mm
approx. 92
Engine wall
140
G3/4
(alternative:
M27x1.5)
82
ca.148
75
(alternative: 95)
approx. 27
70

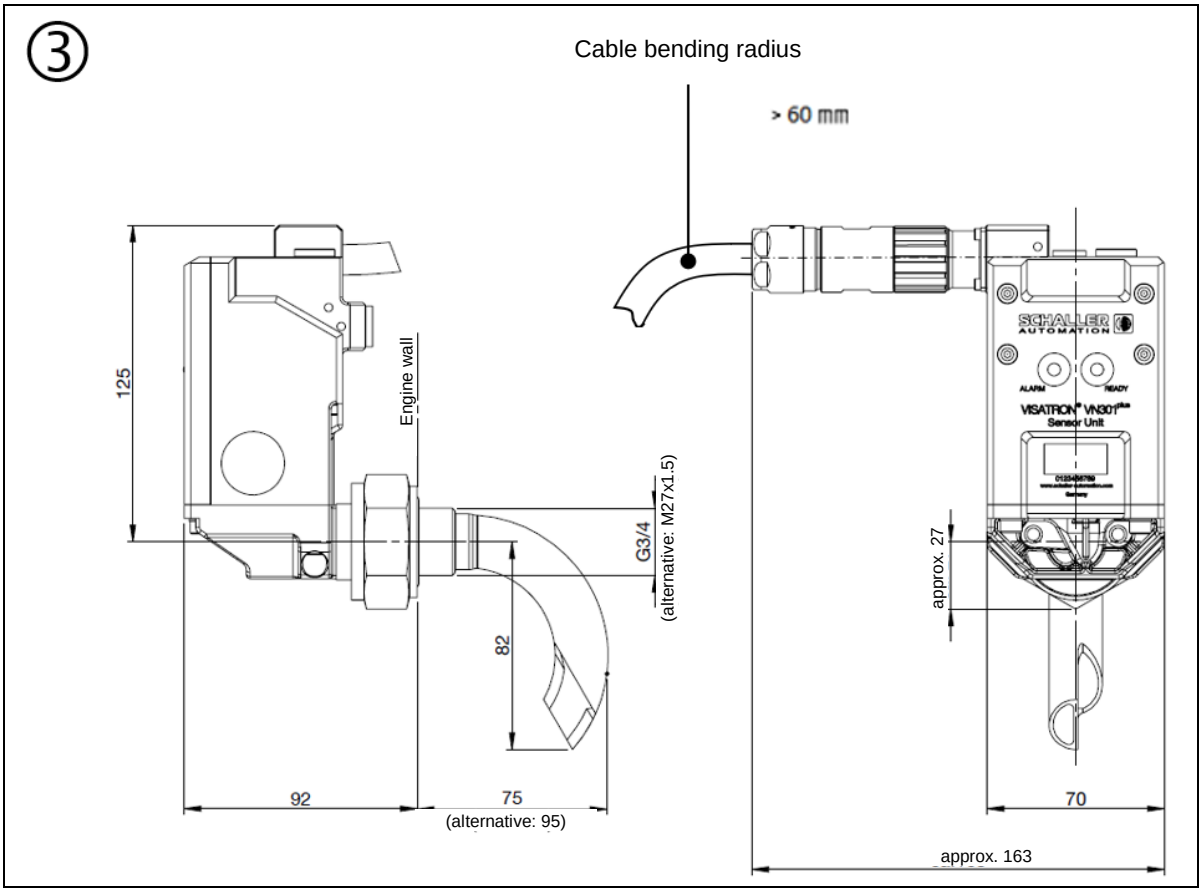


Fig.: 9 : Mechanical dimensions of the VN301^{plus} / VN301^{plus} EX sensor unit

1: Sensor unit VN301^{plus}, vertical
Sensor unit VN301^{plus} EX, vertical
2: Sensor unit VN301^{plus}, horizontal
Sensor unit VN301^{plus} EX, horizontal
3: Sensor unit VN301^{plus}, left
Sensor unit VN301^{plus} EX, left

3.4.1 Mechanical interfaces (M)

⇨ *Section 6.3.2 Sensor unit*

⇨ *Section 6.3.3 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

Table 4: Mechanical interfaces of VN301^{plus} / VN301^{plus} EX sensor unit

VN301^{plus} central unit	
Dimensions (L x W x H)	approx. 348 x 141 x 265 mm
Weight (with protection cover)	7.0 kg
IP protection rating	IP 65

Table 5: Mechanical interfaces of VN301^{plus} central unit

3.4.2 Electrical interfaces (E)

⇨ *Section 6.4.4 Electrical and pneumatic installation of the central unit*

VN301^{plus} central unit	
Power supply	18 - 31.2 V DC
Nominal voltage	24 V DC
Current consumption	Maximum 3 A
Mains power cable	24 V DC M20: Cable diameter: 6 - 12 mm; earthing via holes in protective cover during installation Possible wire cross-sections: 0.08 ≤ ∅ ≤ 2.5 (mm²)
Relay outputs	M25: Cable diameter 11 - 17 mm Possible wire cross-sections: 0.08 ≤ ∅ ≤ 2.5 (mm²)
Communication interface with monitoring device	3-wire RS485, electrically isolated/CANopen, electrically isolated Possible wire cross-sections: 0.08 ≤ ∅ ≤ 2.5 (mm²)

Recommended communication cable	LAPP bus cable UNITRONIC® BUS 2 x 2 x 0.22 mm² Colour: Purple, max. 400 m length The bus cable can be purchased from: • LAPP: Part No.: 2170204, or • Schaller Automation: Part No.: 230140
CAN communication interface	4-wire CAN interface with CANopen protocol, electrically isolated
CAN cable inlet	M16: Cable diameter 4.5 - 10 mm
Recommended communication cable for CAN	LAPP bus cable UNITRONIC® CAN FD P 2 x 2 x 0.34 mm² Colour: Purple, max. 100 m length The bus cable can be purchased from: • LAPP: Part No.: 2170276

Table 6: Electrical interfaces for VN301plus central unit

VN301plus hybrid hose	
Wire • White • Brown	Applicable wire cross-section: ∅ 0.75 mm²
Wire • Green • Yellow • Grey • Pink	Applicable wire cross-section: ∅ 0.50 mm²

Table 7: Electrical interfaces for VN301plus hybrid hose

3.4.3 Pneumatic interfaces (P)

⇨ *Section 6.4.2 Electrical and pneumatic connection of the sensor unit (standard)*

⇨ *Section 6.4.3 Electrical and pneumatic connection of the sensor unit (optional)*

⇨ *Section 6.4.4 Electrical and pneumatic installation of the central unit*

VN301plus central unit	
Supply air pressure reducer	Min. 4 bar Max. 12 bar
Compressed air consumption/sensor unit	100 standard litres/h ± 10% (according to DIN 1343)
Compressed air quality	ISO 8573-1:2010 - 6-4-4

Table 8: Pneumatic interfaces for VN301plus central unit

3.4.4 Environmental conditions

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 (40 m/s²) (max. acceleration)
Relative humidity	up to 95%
IP protection rating	IP 65

Table 9: Ambient conditions and physical characteristics

3.4.5 Type approval

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

Table 10: Type approval for closed areas

4 Product overview

4.1 Component overview, VISATRON® VN301plus

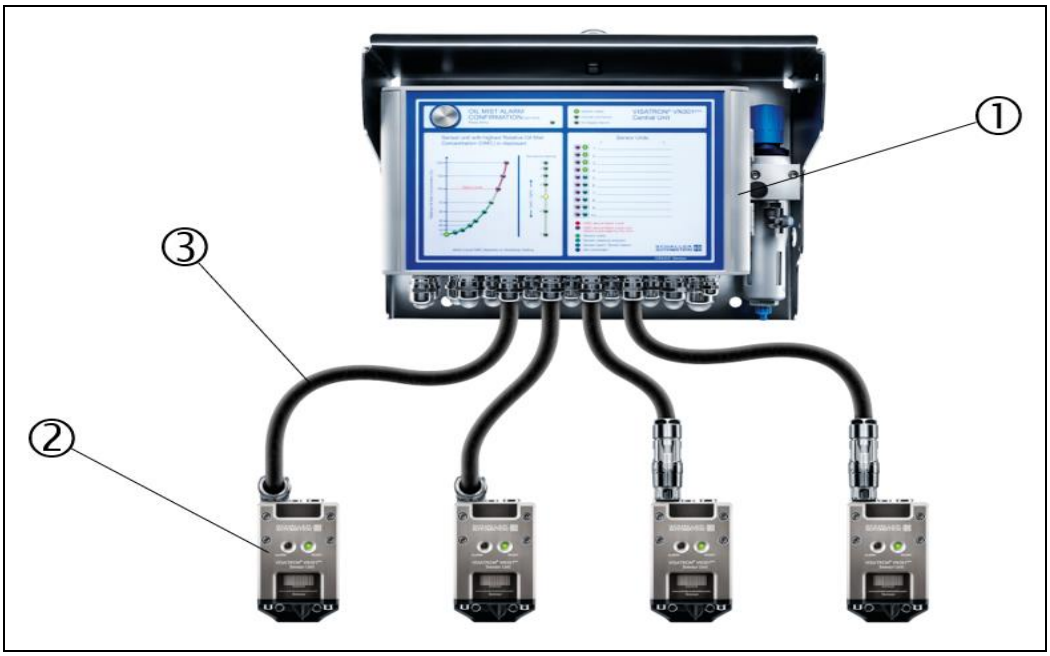


Fig.: 10 : Component overview, VISATRON® VN301plus

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

4.2 Component overview, VISATRON® VN301plus EX

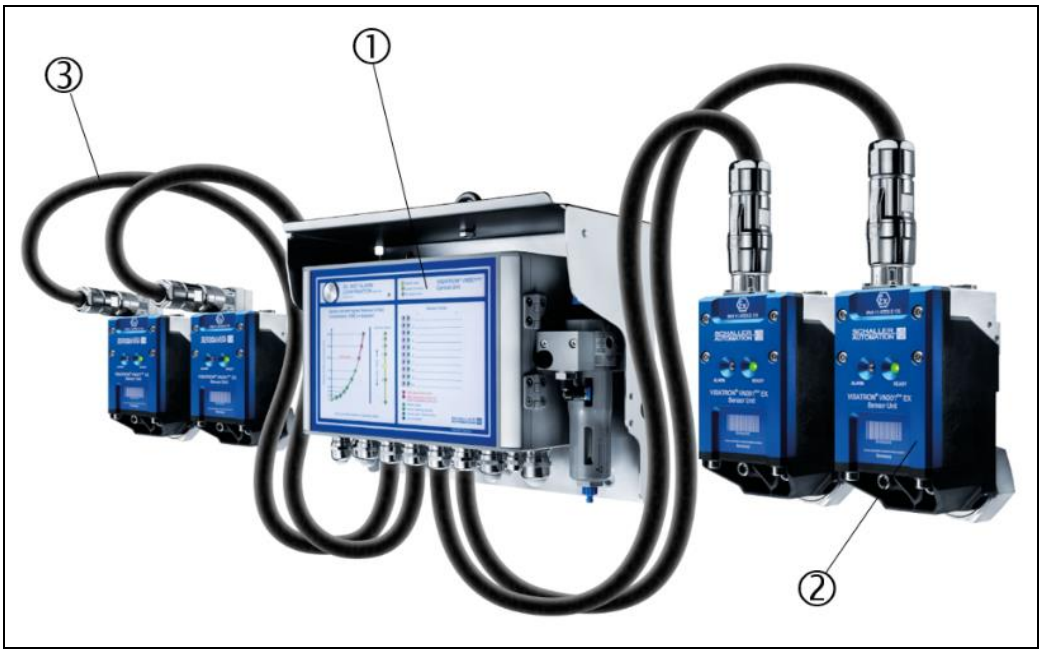


Fig.: 11 : Component overview, VISATRON® VN301plus EX

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

4.3 Technical description and technical data

NOTE

The figures below are for descriptive purposes only.

We reserve the right to vary the size and design of the device and accessories at any time.

4.3.1 Function of the VISATRON® VN301plus / VN301plus 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 permanently prevents serious consequential damage.

The central part of the oil mist detection system, as shown in Figures 10 and 11, is the sensor unit (2), which includes an optical measuring track under the end cover, and LEDS to display important information for the user under normal operating conditions. The central unit (1) is attached to the engine wall via a protective cover to protect it from vibration.

The oil mist detection system uses 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 (3) and are analysed by the central unit (1), as shown in Figures 10 and 11.

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

To avoid false alarms in the crankcase, such as from spray oil, the intake system uses intake manifolds specially developed by Schaller Automation that can always be used, regardless of the direction of rotation of the engine. Where possible, Schaller Automation recommends installing as shown in Section 6.3.2.1 of this manual.
⇨ *Section 6.3.2.1 Assembly procedure for the engine wall connection*

One intake manifold is always required per sampling point, which is directly connected to the sensor unit.

The measures described for the device to function correctly mean that the VISATRON® VN301plus / VN301plus EX oil mist detection system can be used primarily in maritime applications, i.e. on ships with their static or dynamic angle of inclination, as well as in stationary applications such as power stations.

The oil mist detection system has been developed by Schaller Automation according to IACS UR M10 guidelines.

4.3.2 Device variants

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

The VISATRON® VN301plus / VN301plus 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 device, approved for operation **in** potentially explosive atmosphere

DANGER

Explosion of the crankcase, for dual-fuel or gas engines

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

▶ The oil mist detection system is designed to draw in gases from a potentially explosive atmosphere (for example, the crankcase of a gas engine). The device **without** ATEX or IECEx approval must therefore never be used in potentially explosive atmospheres.

4.3.3 Function and variants of the sensor unit

The function of the sensor unit has been described in detail above.

⇨ *Section 4.3.1 Function of the VISATRON® VN301plus / VN301plus EX oil mist detection system*

Features of the sensor unit

- All VISATRON® VN301^{plus} / VN301^{plus} 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 intake manifold 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® VN301^{plus} / VN301^{plus} EX sensor unit also has 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

A distinction is made between a total of six variants of the sensor units as follows:

VN301plus sensor unit, vertical connection

Fig.: 12 : Sensor unit VN301plus, vertical connection

VN301plus EX sensor unit, vertical connection

Fig.: 13 : Sensor unit VN301plus EX, vertical connection

VN301plus sensor unit, horizontal connection

Fig.: 14 : Sensor unit VN301plus, horizontal connection

VN301plus EX sensor unit, horizontal connection

Fig.: 15 : Sensor unit VN301plus EX, horizontal connection

VN301plus sensor unit, left connection

Fig.: 16 : Sensor unit VN301plus, left connection

VN301plus EX sensor unit, left connection

Fig.: 17 : Sensor unit VN301plus EX, left connection

4.3.4 Central unit

The central unit of the VISATRON® VN301plus / VN301plus 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 19)

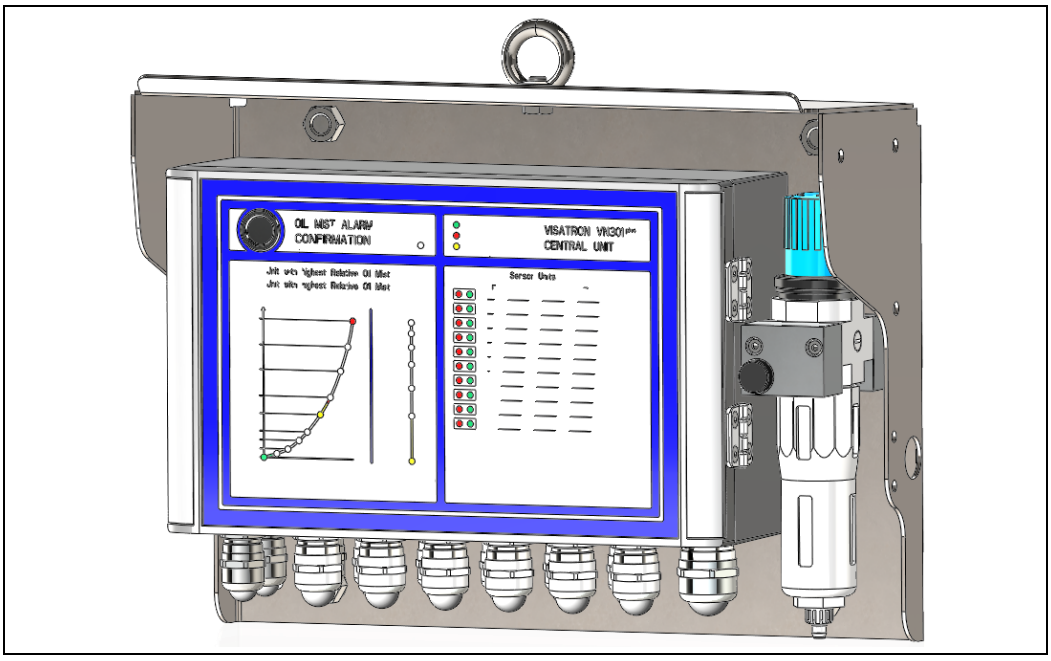


Fig.: 18 : VN301plus central unit (standard version)

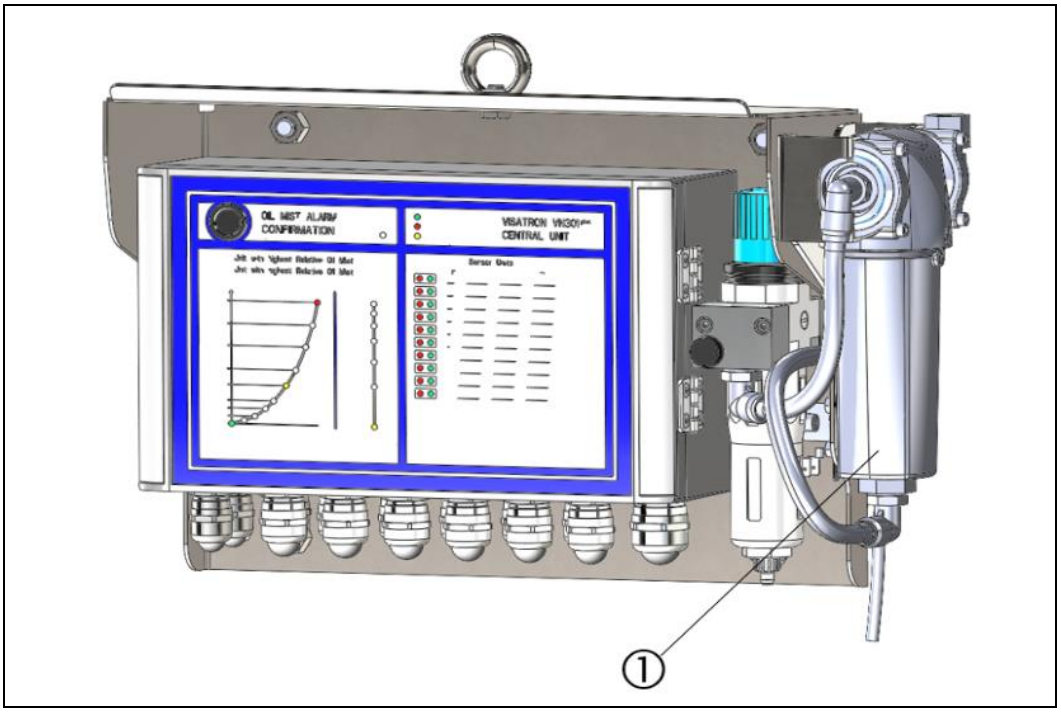


Fig.: 19 : VN301plus central unit, version with water separator

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 (all connections used) can be connected to the central unit, and up to 20 sensor units as master-slave version (all connections used).

As an alternative to using all the connections with connected sensor units, the central unit can also be operated with some connections not used (up to 9 sensor units). In the following example, a total of 5 sensor units are connected to connections S1-S5 [①]. The remaining connections that are not used [②] are fitted with M20x1.5 blanking plugs at the factory. Please note here that the number of sensor units used must be indicated when ordering.

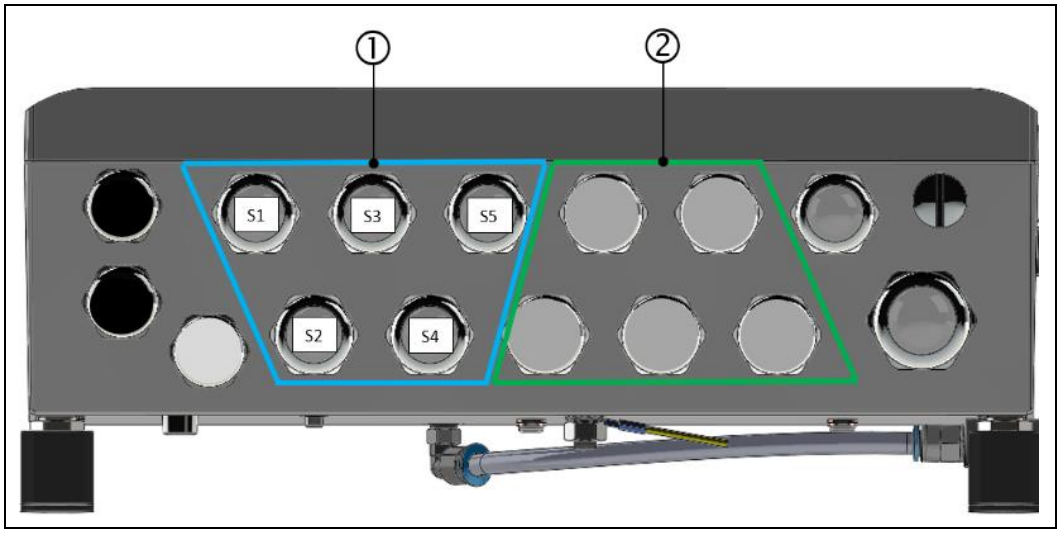


Fig.: 20 : Example of a VN301^{plus} central unit with some connections not used

1: Connections that are being used (sensor units 1 - 5)

2: Connections that are not being used (M20x1.5 blanking plugs)

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} central unit also has the following connections/interfaces:

- 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)

The complete technical data for the VISATRON® VN301plus central unit can be found in Section 3.4. ⇨ *Section 3.4 Technical data*

4.3.5 Hybrid cable

The connection between the VISATRON® VN301plus central unit and the VISATRON® VN301plus / VISATRON® VN301plus 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 connector [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.

Fig.: 21 : Hybrid cable

1: Hybrid cable
2: Hybrid connector (-> sensor unit)
3: Free cable end (-> central unit)

NOTE

Two variants of the hybrid cable for the VISATRON® VN301plus / VN301plus EX system are available. The variants are each for the type of lock on the hybrid connector [②].

⇨ *Section 6.4.4 Electrical and pneumatic installation of the central unit*

Variant 1: Hybrid cable with standard hybrid connector (bayonet lock)

⇨ *Section 6.4.2 Electrical and pneumatic connection of the sensor unit (standard)*

Variant 2: Hybrid cable with optional hybrid connector (screw sleeve lock)

⇨ *Section 6.4.3 Electrical and pneumatic connection of the sensor unit (optional)*

Replacing the hybrid connector on the hybrid cable (if necessary)

⇨ *Section 9.3.4 Replacing the hybrid connector on the hybrid cable*

4.3.6 Remote Indicator II for VISATRON® VN301plus / VN301plus EX (optional)

NOTE

It is recommended that the VISATRON® VN301plus / VN301plus 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® system **from a safe location in accordance with IACS UR M10.**

Fig.: 22 : Remote monitoring system (Remote Indicator II) for VISATRON® systems (optional)

4.3.7 Setting the device 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 detection system 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

⇨ *Section 7.1 Parameter settings for 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 11: Setting the oil mist sensitivity

4.4 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.

4.5 Foreseeable misuse

NOTE

Applications and actions not referred to or described in this manual are not allowed!

- Installing the VISATRON® VN301plus / VN301plus EX without using the sensor intake manifolds is not allowed.
- Installation and maintenance of the VISATRON® VN301plus / VN301plus EX by unauthorised persons is not allowed.
- Using the VISATRON® VN301plus, without ATEX or IECEx approval in potentially explosive atmospheres is not allowed.
- Installing components other than as shown in this operating manual and the relevant installation kit drawing approved by the engine manufacturer and the oil mist detector manufacturer is not allowed.

Exception:

- It is possible to install the VISATRON® VN301plus / VN301plus EX in general **non-engine applications**, such as grinding machines, test benches etc., but **prior** consultation with and approval by Schaller Automation is required.

4.6 Descriptions of the controls and indicators

4.6.1 Controls and indicators for the VN301plus central unit

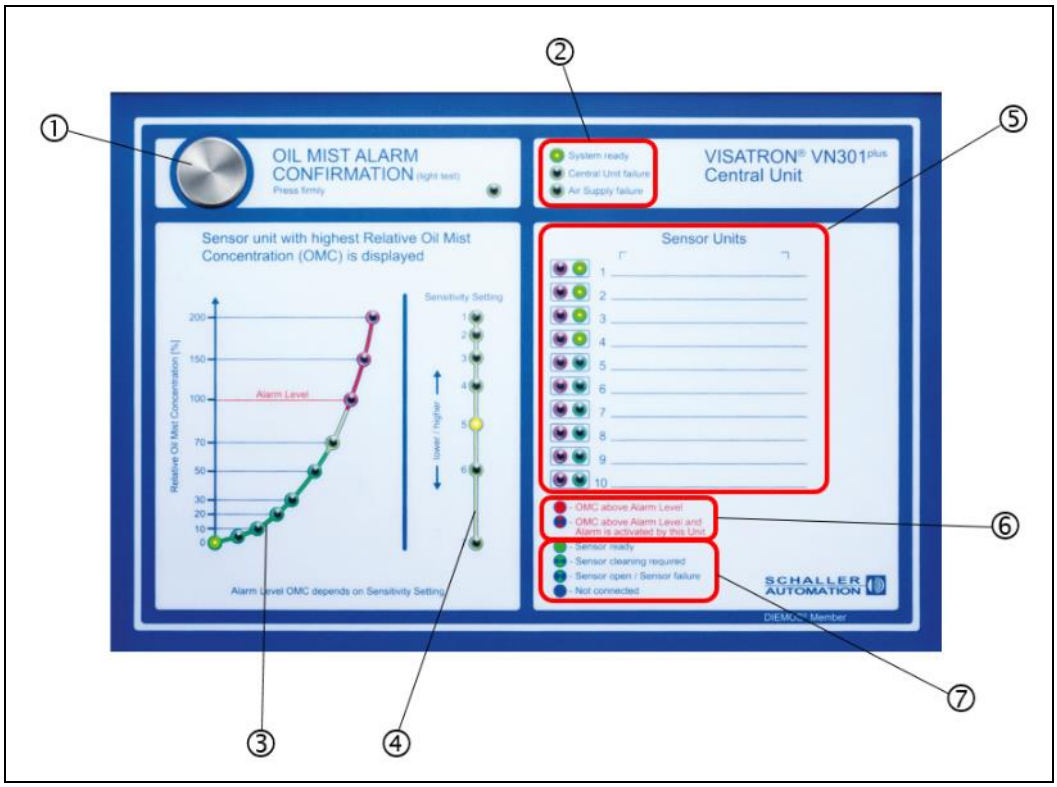


Fig.: 23 : Controls and indicators for the VN301plus central unit

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)

4.6.1.1 Fault indicator, VN301plus 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*

4.6.2 Indicators, VN301plus / VN301plus EX sensor unit

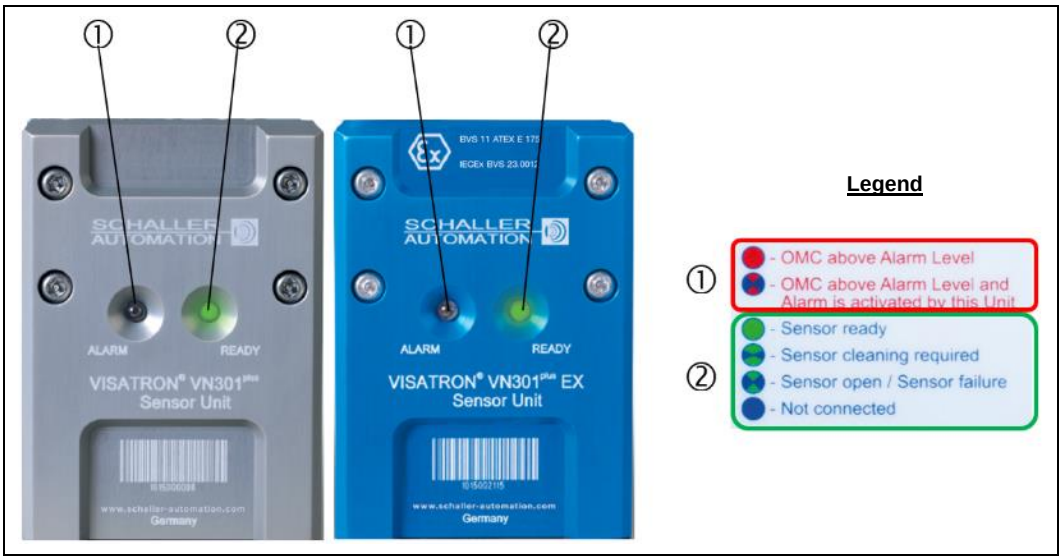


Fig.: 24 : Indicators, VN301plus / VN301plus EX sensor unit

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

4.6.2.1 Fault indicators, VN301plus / VN301plus 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® VN301plus / VN301plus 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.

NOTE

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® VN301plus / VN301plus 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 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 12: Storage conditions before starting up

CAUTION

Incorrect storage can damage the device.

- 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

NOTE

- Observe the environmental conditions for assembling the device
  ⇨ Section 3.4.4 Environmental conditions

6.1 Preparatory steps by the customer

NOTE

- 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 supply line for CANopen communication (optional); and
  - ☑ a bus supply line for RS485 communication (optional, only if the customer uses a remote indicator) for Remote Indicator II.

  ⇨ For details, see Section 3.4.1. Mechanical interfaces (M)

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.
  ⇨ For details, see Section 3.4.3. Pneumatic interfaces (P)

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® VN301plus central unit, they must first be disconnected from the power supply.
- Before starting work, disconnect the VISATRON® VN301plus central unit from the power supply and/or ensure that the housing is earthed.

6.1.3 Preparation for signal transfer from the alarm contacts

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

⇨ *For details, see Section 3.4.2. Electrical interfaces (E)*

6.1.4 Preparation for CANopen communication (optional)

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

⇨ *For details, see Section 3.4.2. Electrical interfaces (E)*

6.1.5 Preparation for RS485 communication (optional, e.g. for Remote Indicator II)

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

⇨ *For details, see Section 3.4.2. Electrical interfaces (E)*

6.2 Setting up

NOTE

Observe the ambient conditions when setting up. (E.g. humidity, vibration, etc.)
⇨ *Section 3.4.4 Environmental conditions*

- The VISATRON® VN301plus / VN301plus 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® VN301plus / VN301plus EX oil mist detection system in an elevated electromagnetic environment. (Outside standardised limit values)
- Observe the safety distances when setting up. The VISATRON® VN301plus / VN301plus EX oil mist detection system (central unit and sensor units) must remain accessible for maintenance work.
- Do not operate the VISATRON® VN301plus / VN301plus EX oil mist detection system with increased vibrations or outside the permissible limit values ⇨ *Section 3.4.4. Environmental conditions*

- If the oil mist detection system is operated in potentially explosive atmospheres, the relevant safety instructions must be observed.
  ⇨ *Section 2.4.1 Safety instructions for potentially explosive atmospheres*

6.3 Assembling the system components

CAUTION

Safe and correct assembly of the device

- For assembly, read the operating manual and other documents accompanying the product with care and keep them in a suitable place for future reference.

NOTE

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

DANGER

Hazards during assembly

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

- 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® VN301plus / VN301plus EX central unit must be earthed.

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*

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

The oil mist detection system 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 detection system and determination of the oil mist concentration).

NOTE

Compliance with IACS requirements

- The IACS Unified Requirement UR M10 specifies that the installation drawings for the oil mist detector 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 this operating manual.

6.3.2 Sensor unit

DANGER

Accumulation of dangerous gas concentration at the sensor unit, when fitted on dual-fuel or gas engines

There is a risk of serious injury, including death, from hazardous accumulation of gas concentrations in the sensor unit, as a result of incorrect assembly or installation. The following instructions must therefore be observed, in particular when installing VN301^{plus} EX sensor unit:

- The VN301^{plus} EX sensor unit must **not** be installed in a recess that could allow gas to accumulate!
- The VN301^{plus} EX sensor unit must **not** be fitted with an enclosure by the customer!

WARNING

Impairment of function and operation of the device

- The VN301^{plus} / VN301^{plus} EX sensor unit must not be painted, varnished or otherwise altered.

NOTE

Premature contamination of the sensor unit

- The allowed assembly tolerance is +/- 3 degrees deviation from the horizontal alignment.

6.3.2.1 Assembly procedure for the engine wall connection

DANGER

Damage to the intake manifold after the assembly process

- The intake manifold must not come into contact with rotating or moving parts after assembly.

Premature contamination of the oil mist detection system by splash oil

- The intake position of the intake manifold must be outside areas with direct splash oil. (see Fig. 26)

Explosion in the crankcase

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.

- 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.

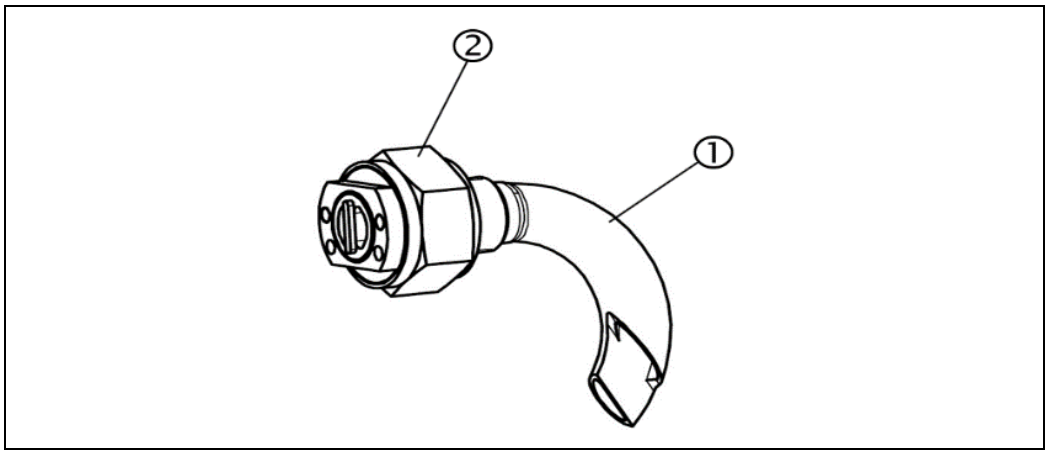
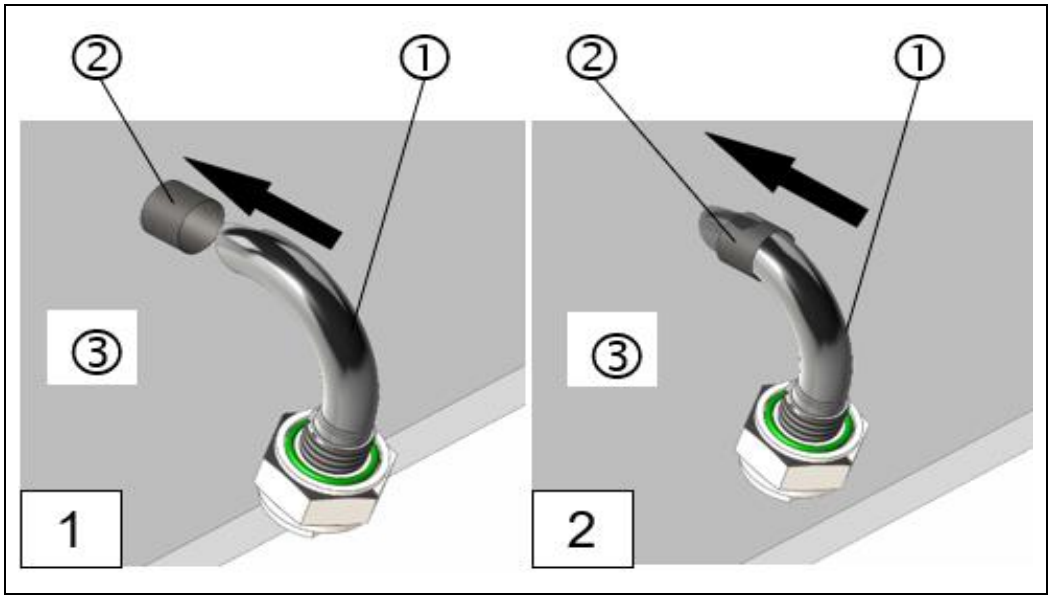
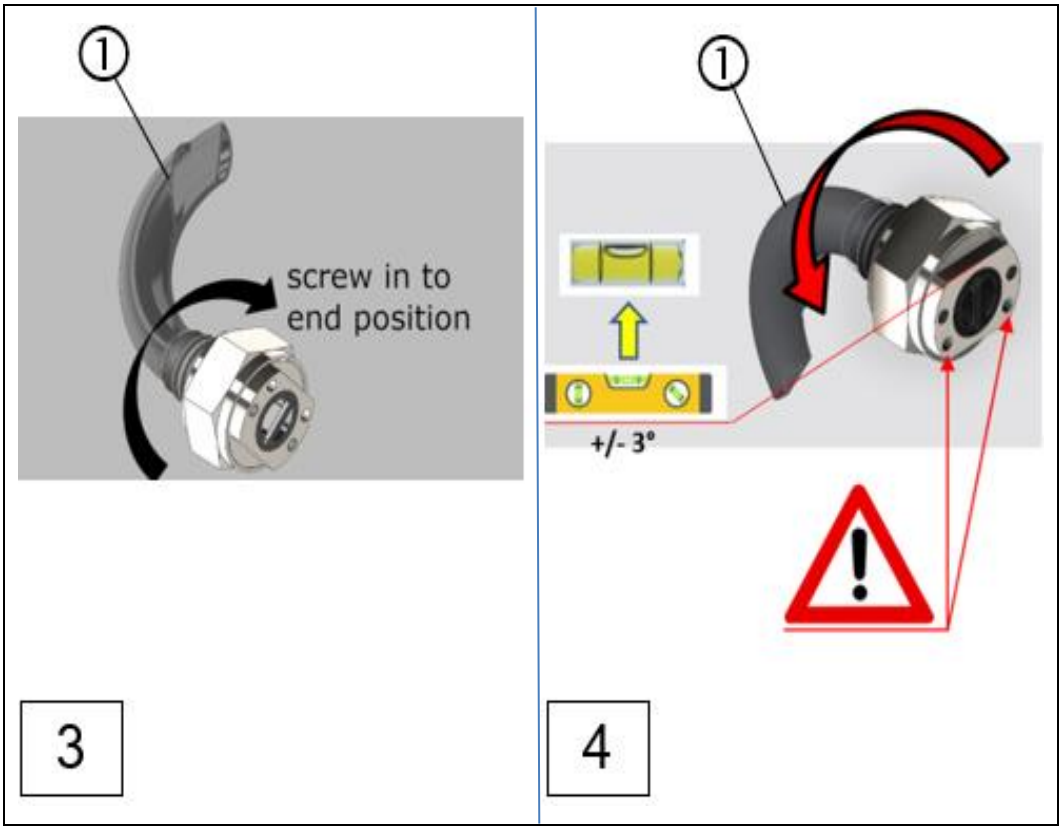


Fig.: 25 : Engine wall connection, VN301^{plus} / VN301^{plus} EX sensor unit

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

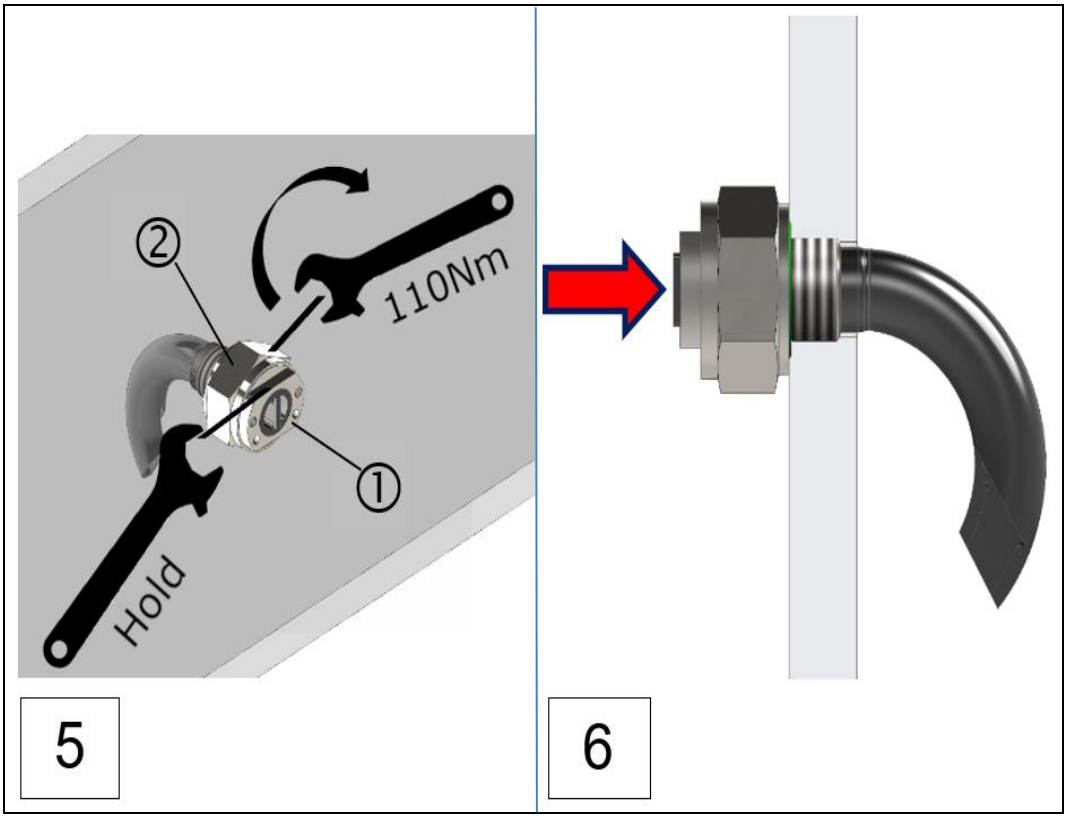


1: Intake manifold
2: Screw-in thread for engine wall: G3/4" or M27x1.5
3: Engine wall



1: Intake manifold

Adjust the horizontal position of the engine wall connection!



1: Intake manifold

2: Union nut

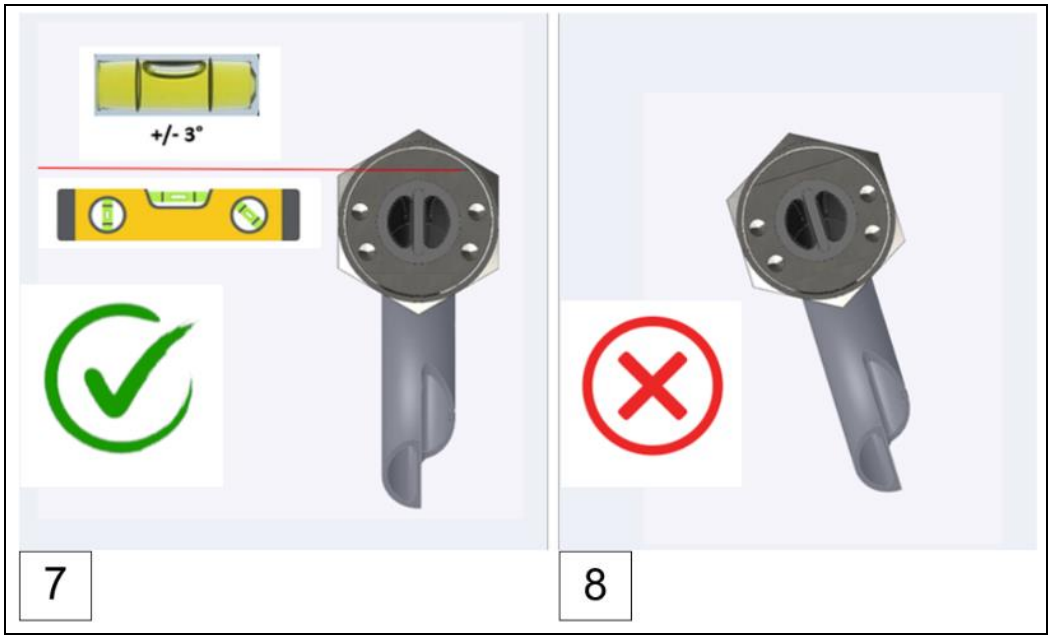


Fig.: 26 : Installing the engine wall connection for VN301^{plus} (steps 1 - 8)

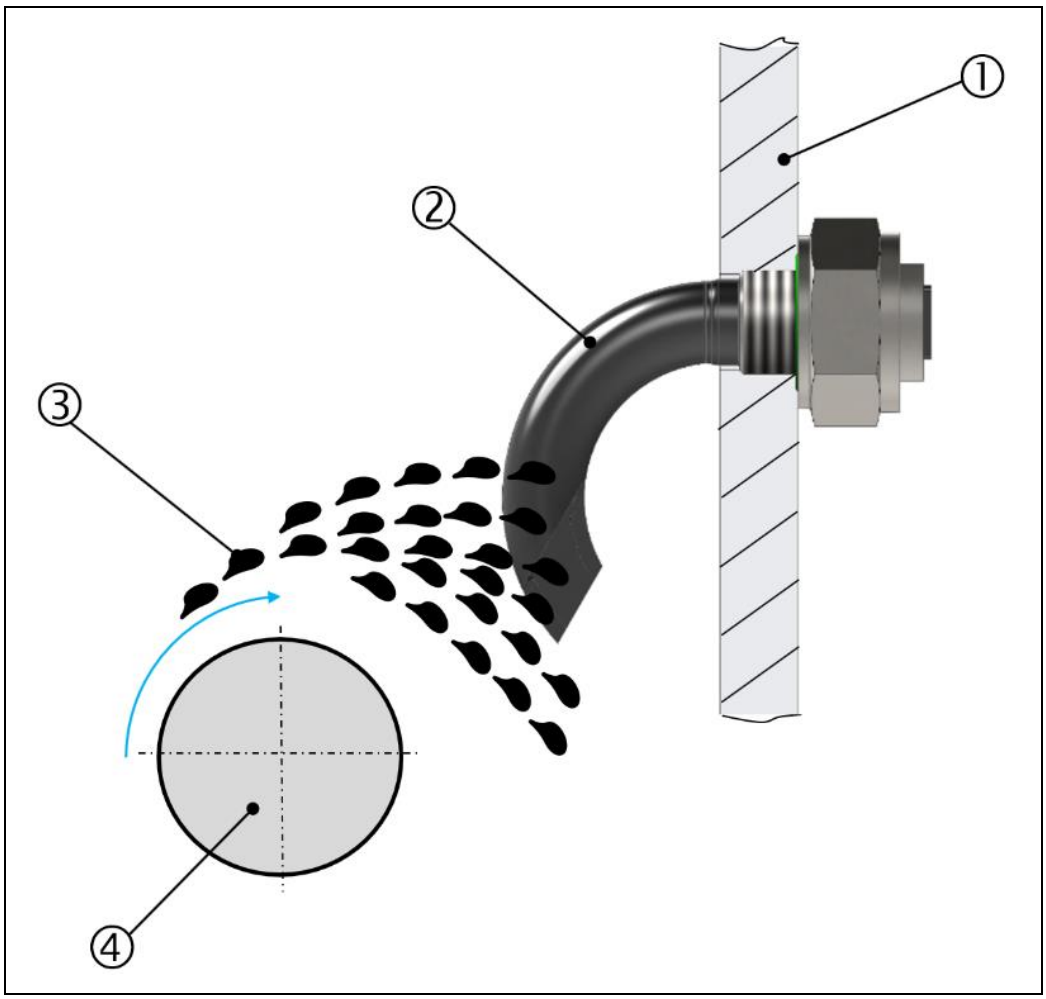


Fig.: 27 : Recommended installation for the engine wall connection (view from the crankshaft end)

1: Intake manifold (engine wall connection)
2: Engine wall
3: Splashing oil
4: Rotating crankshaft

6.3.2.2 Installing the VISATRON® VN301plus / VN301plus EX sensor unit on the engine wall connection

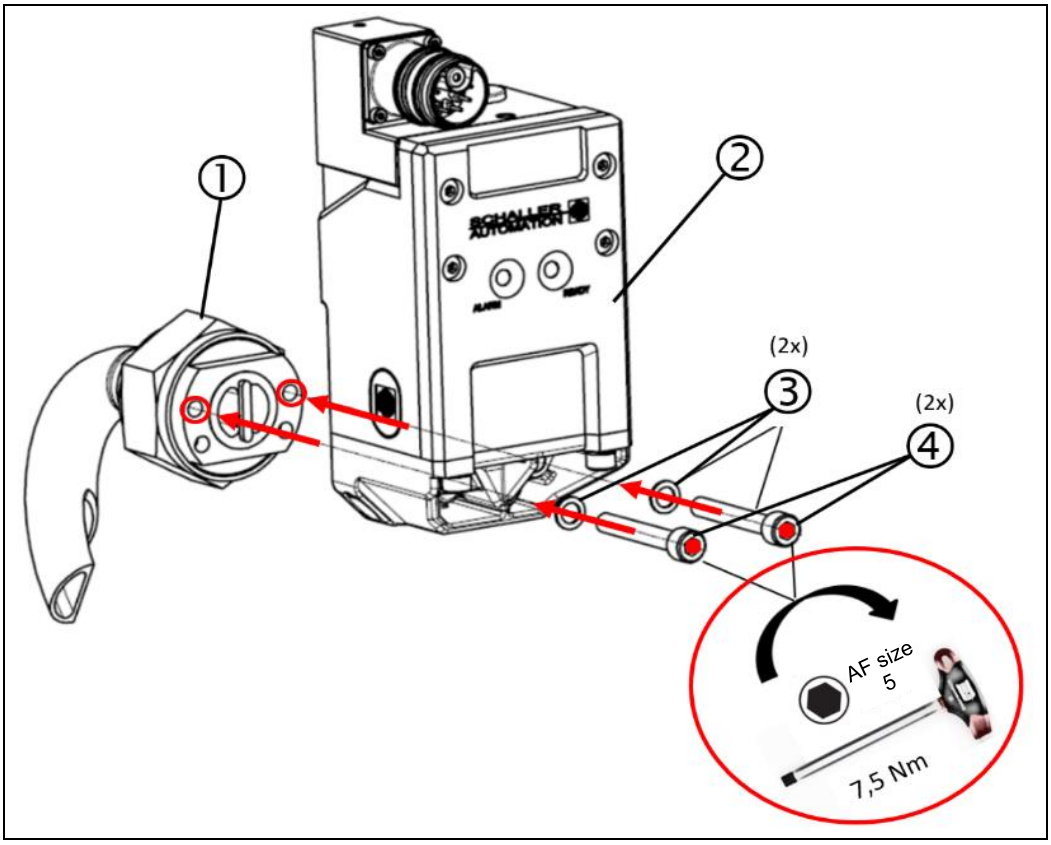


Fig.: 28 : Installing the VN301plus / VN301plus EX sensor on the engine wall connection

1: Engine wall connection (EWC)
2: VN301plus / VN301plus EX sensor
3: 2 pcs. lock washers S6, galvanised
4: 2 pcs. cap screws ISO 4762 - M6 x 40

6.3.3 Central unit

WARNING

Impairment of function and operation of the device

- The central unit must not be painted, varnished or otherwise altered in any other way.



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 cover. 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 2.5 Basic safety instructions*

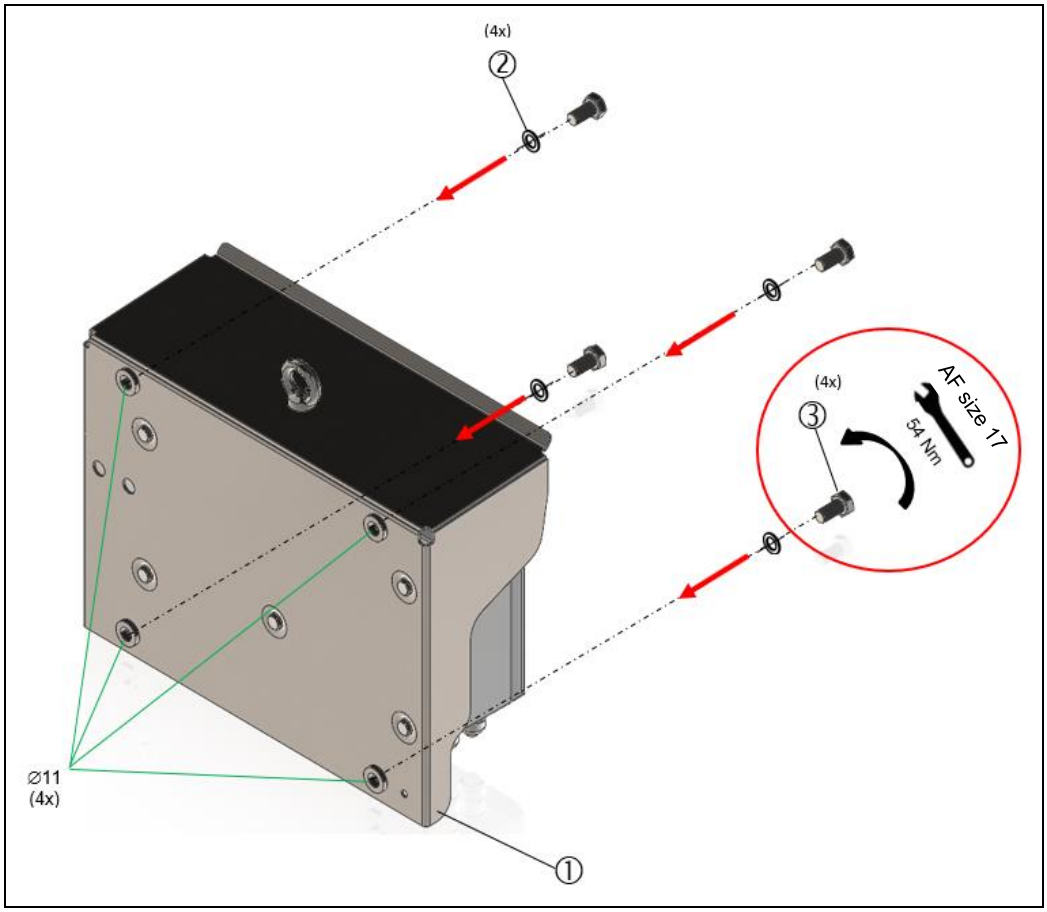


Fig.: 29 : Assembly procedure, VN301^{plus} central unit to engine wall

1: VN301^{plus} central unit

2: 4 pcs. washers S-10, galvanised spring steel (included in delivery)

3: 4 pcs. 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® VN301^{plus} / VN301^{plus} 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.

NOTE

Installing the Remote Indicator II

- The Remote Indicator II is installed in the machine control room.
- The installation space required for installation is based on the latest version of the DIN IEC 61554 standard.

Fig.: 30 : Remote Indicator II (optional)

The user provides specific details about the installation location and attachment in each case. The requirements of IACS UR M10.11 must always be observed in this case!

Dimensions for the installation space: (L x W x 2L) = **92**+0.8 mm **x 45**+0.6 mm **x 184**+0.8 mm

Basic description of the installation steps:

Step 1: Produce the required installation space, according to Figure 30

Step 2: Select and install the appropriate front glass panel (vertical or horizontal) in Remote Indicator II

Step 3: Insert Remote Indicator II into the previously prepared installation space and fit the retaining brackets

Step 5: Insert the fixing screws

Step 6: Secure Remote Indicator II with the fixing screws

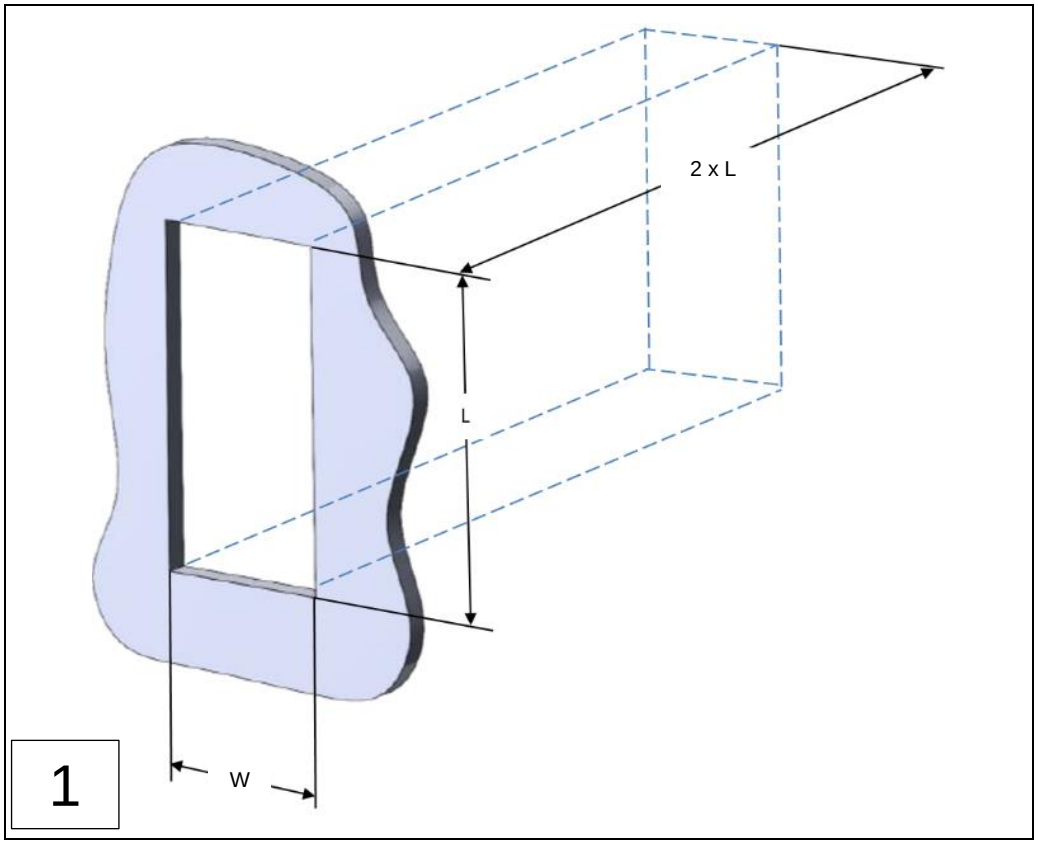
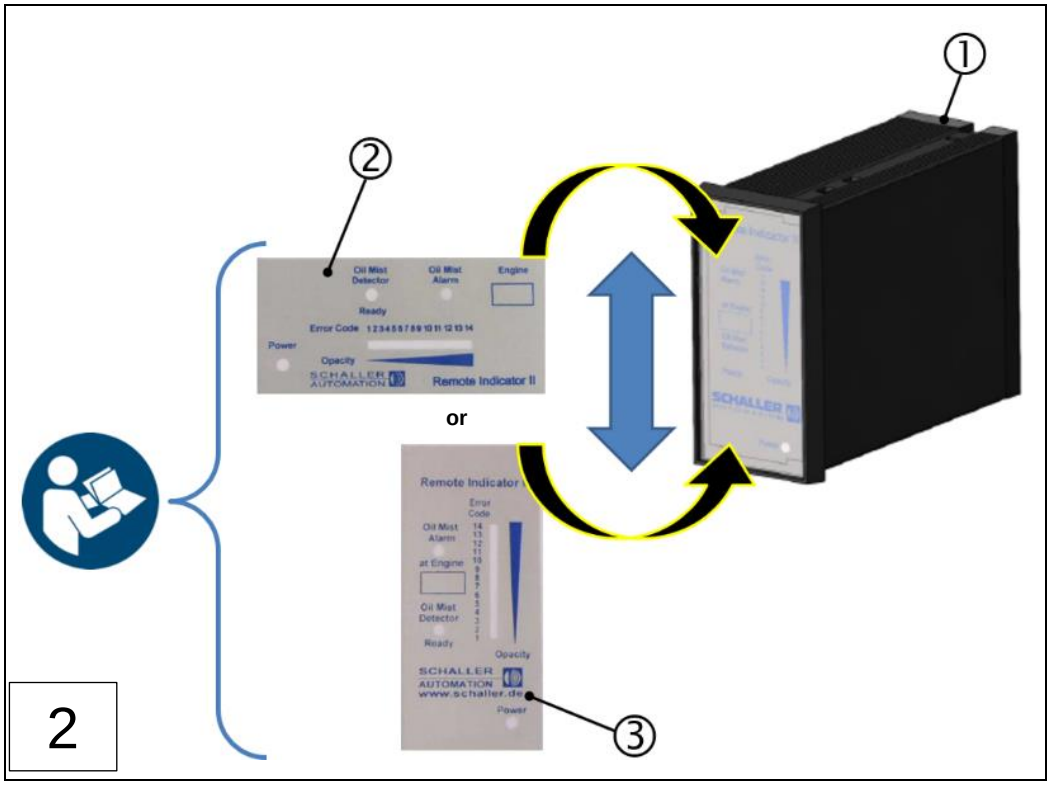


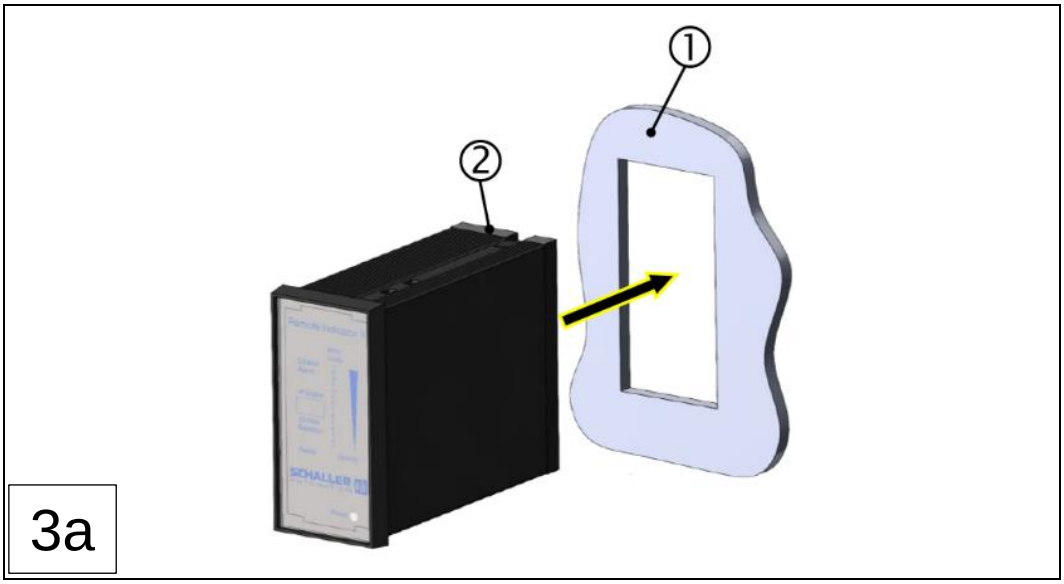
Fig.: 31 : Dimensions of installation space for Remote Indicator II



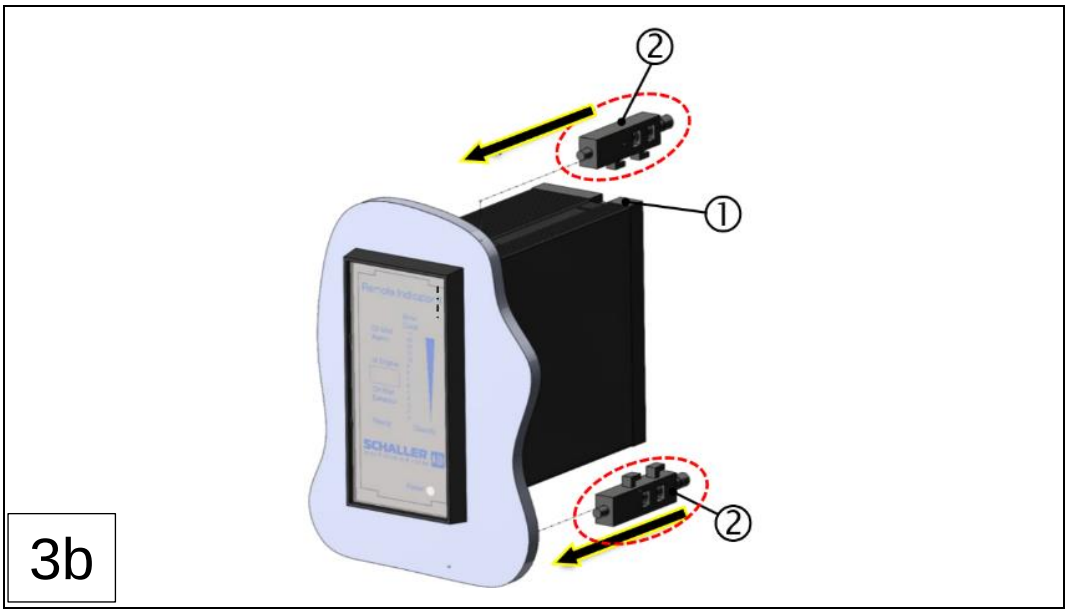
1: Remote Indicator II

2: Front glass panel for VN2020, horizontal

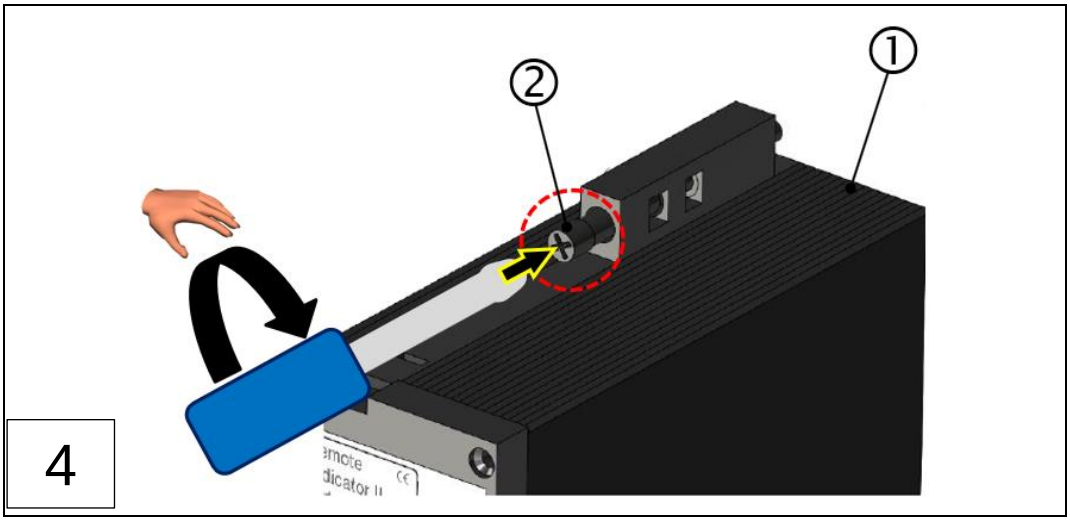
3: Front glass panel for VN2020, vertical



1: Previously prepared installation space 2: Remote Indicator II



1: Remote Indicator II 2: Retaining bracket (2 pcs.)



1: Remote Indicator II 2: Fixing screws (2 pcs.)

Fig.: 32 : Installing Remote Indicator II (installation steps 1 - 4)

6.4 Electrical installation

CAUTION

Safe and correct electrical installation of the device

- For electrical installation of the system components, read the operating manual and other documents accompanying the product with care and keep them in a suitable place for future reference.

NOTE

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, from explosion in the crankcase as a result of incorrect assembly or installation.

- Before starting the engine, the hybrid connector 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 potentially explosive atmospheres, 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® VN301plus / VN301plus EX central unit must be earthed in accordance with Section 6.4.7.

  ⇨ Section 6.4.7 Connection of earth to the housing of the VN301plus central unit

- 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)

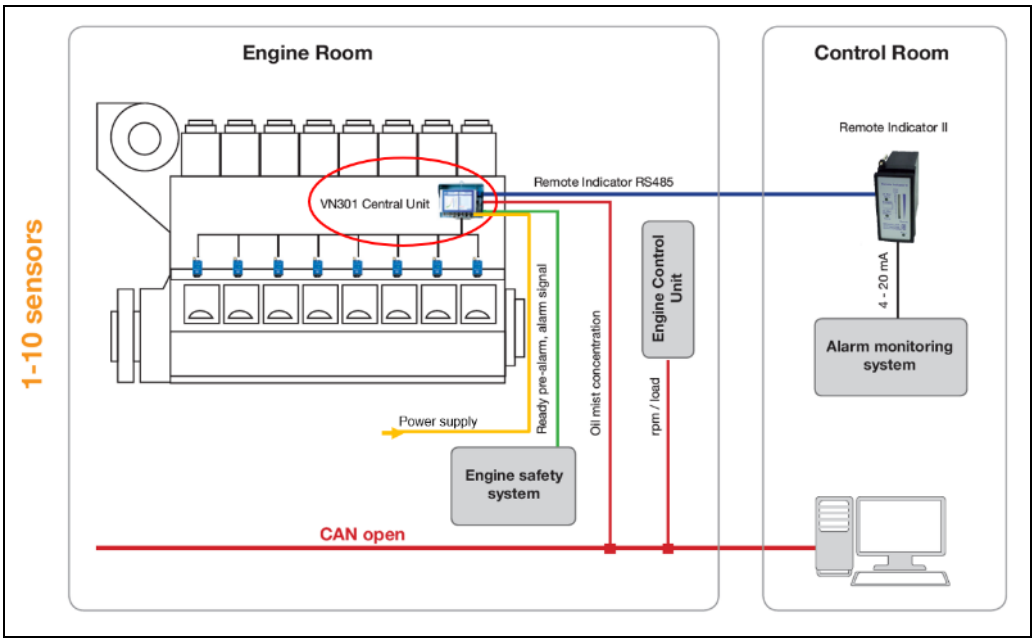


Fig.: 33 : Operating mode 1 “Master”, VN301^{plus} central unit

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

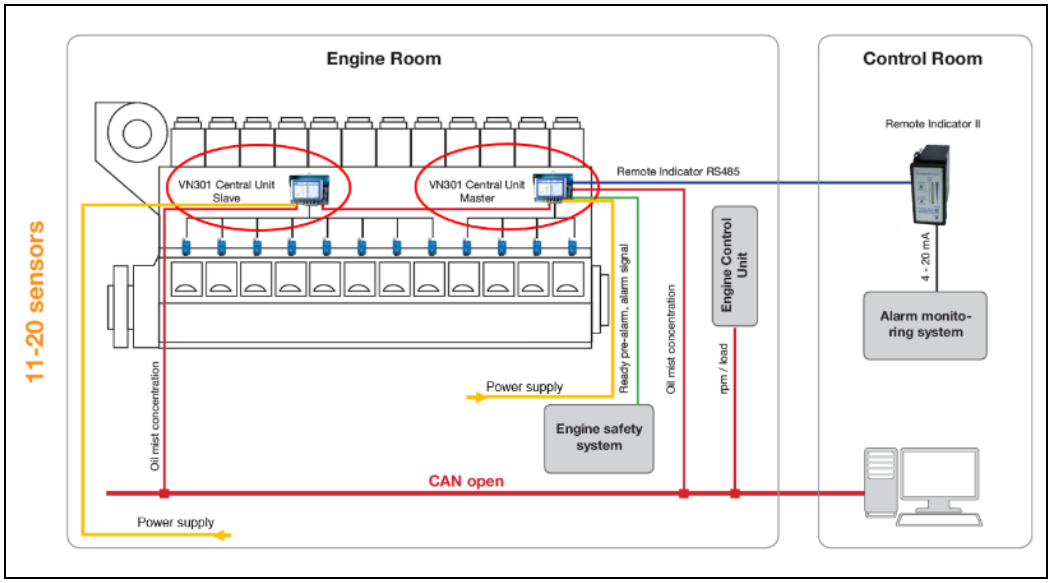


Fig.: 34 : Operating mode 2 “Master/Slave”, VN301^{plus} central unit

6.4.2 Electrical and pneumatic connection of the sensor unit (standard)

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), the standard version has a hybrid connector with a quick-release lock (a bayonet lock) [②], which contains the electrical connection and a compressed air feed-through, and is connected to the sensor unit. The hybrid connector 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 to the PCB inside and pneumatically to the distribution block.

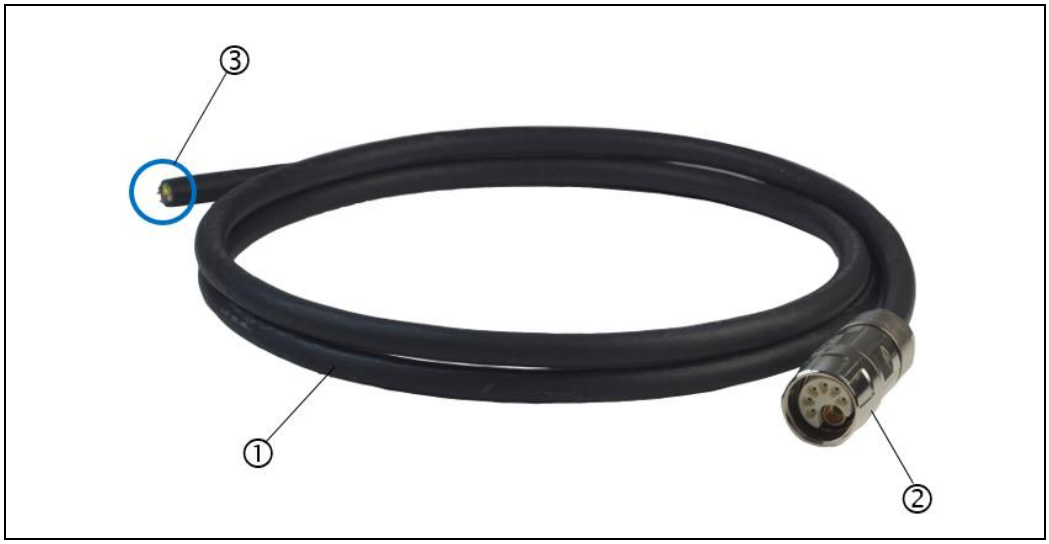
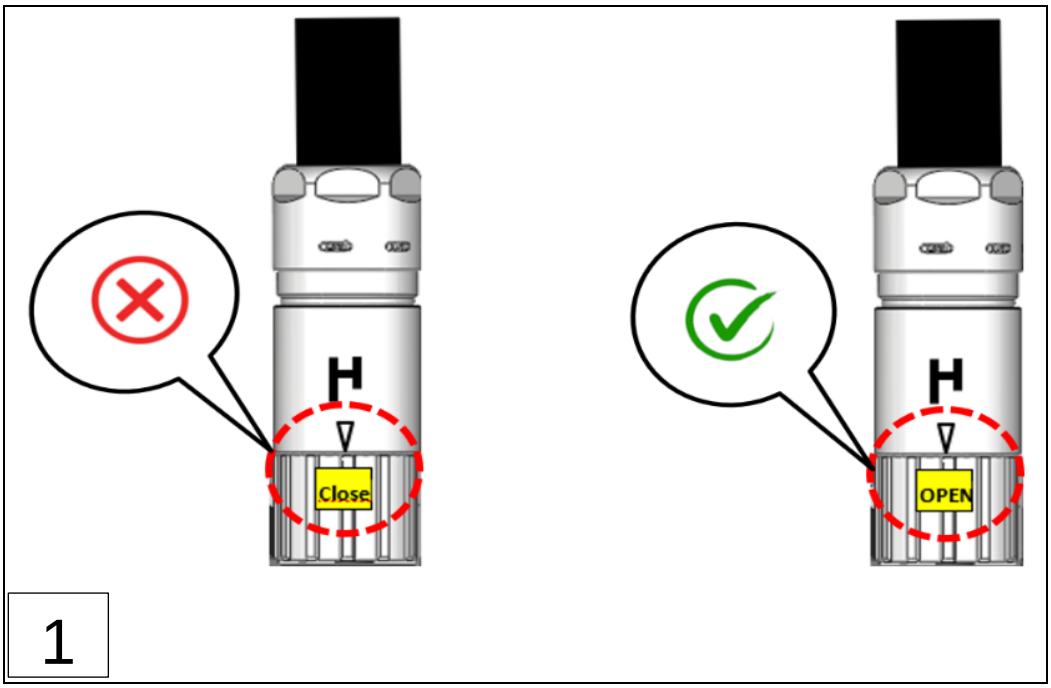
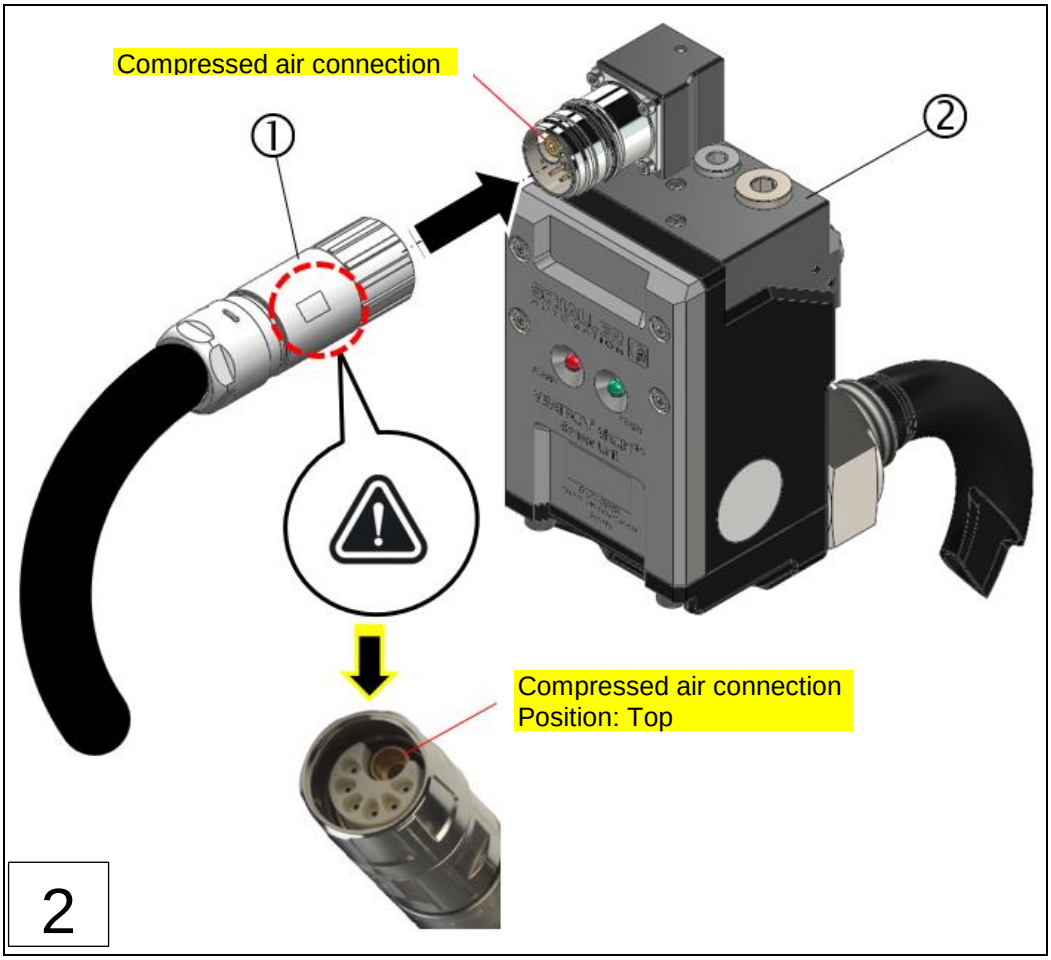


Fig.: 35 : Setup of hybrid cable unit (standard), VN301^{plus}

1: Hybrid cable
2: Hybrid connector (quick-release lock)
3: Free cable end

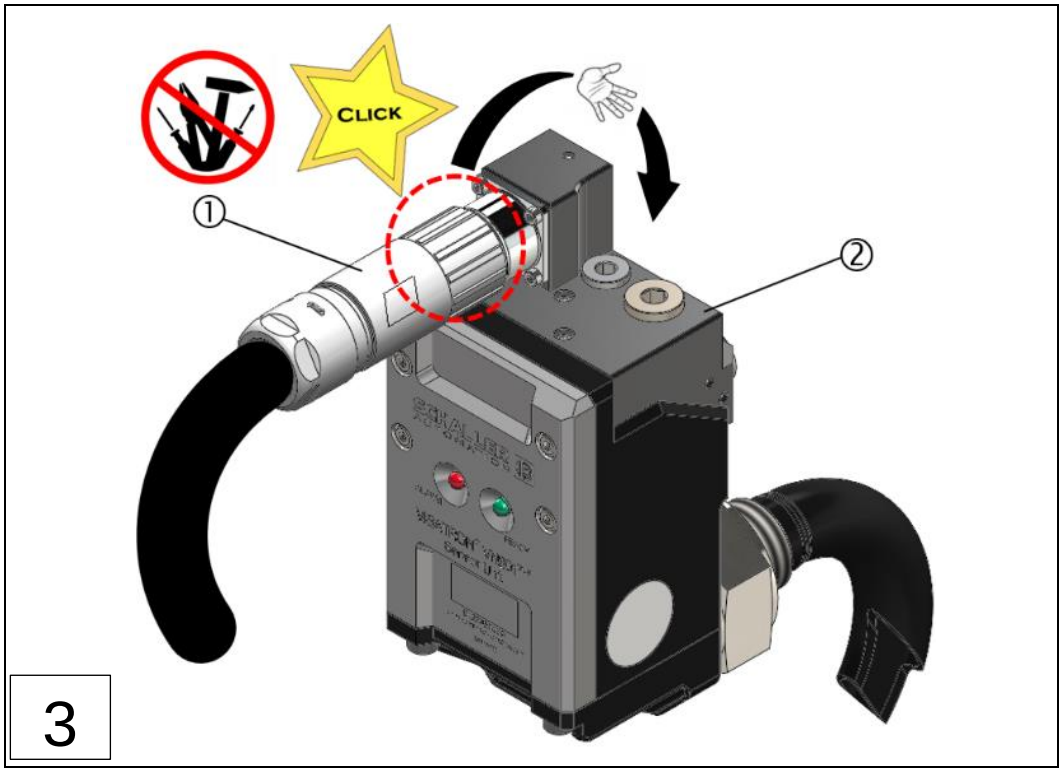
The electrical and pneumatic connection between the VISATRON® VN301plus central unit and sensor unit is established as per the following installation steps:





1: Hybrid connector (quick-release lock)

2: VN301^{plus} / VN301^{plus} EX sensor unit



1: Hybrid connector (quick-release lock)

2: VN301^{plus} / VN301^{plus} EX sensor unit

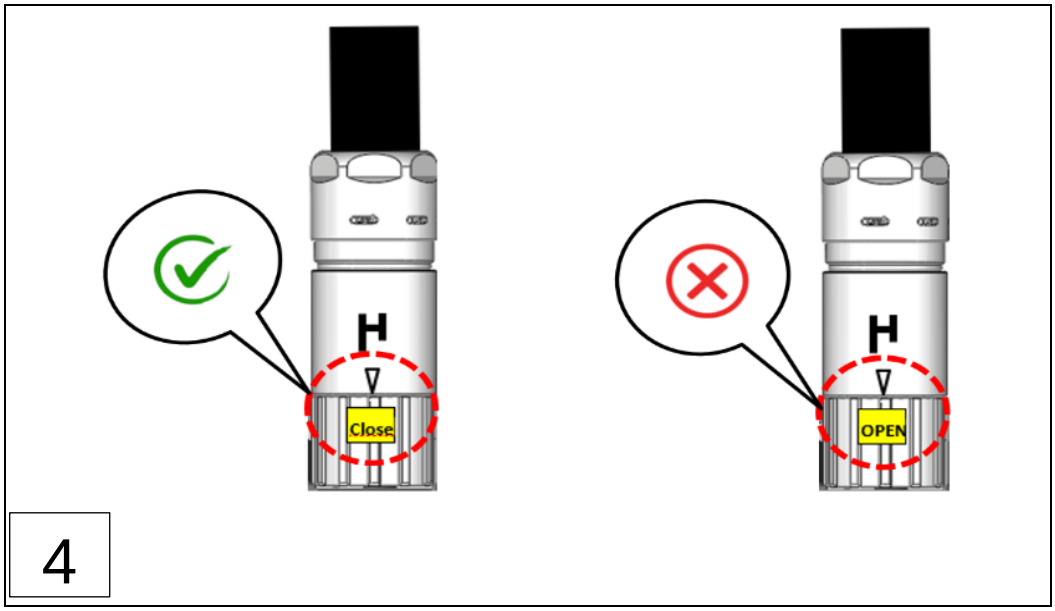


Fig.: 36 : Installing the hybrid cable on the VN301^{plus} / VN301^{plus} EX sensor unit (steps 1 - 4)

WARNING

To prevent incorrect use and failures, the hybrid connector on the sensor unit is **only** locked **manually** or as shown in the figure above. Tools (e.g. pliers) must not be used for this purpose.

To replace the hybrid connector [①], follow the instructions and steps in Section 9.3.4 of these instructions.

⇨ *Section 9.3.4 Replacing the hybrid connector on the hybrid cable*

6.4.3 Electrical and pneumatic connection of the sensor unit (optional)

As an option instead of the standard sensor line as per Section 6.4.2, the electrical and pneumatic connection between the VISATRON® VN301plus central unit and sensor unit can also be via a hybrid connector with screw lock [②]. In contrast to the standard variant, the hybrid connector is locked by a screw thread. This has advantages over the standard locking mechanism where there is increased vibration load during engine operation, and in particular when installing the connector. The connector specification and the electrical and pneumatic function are identical to the standard version.

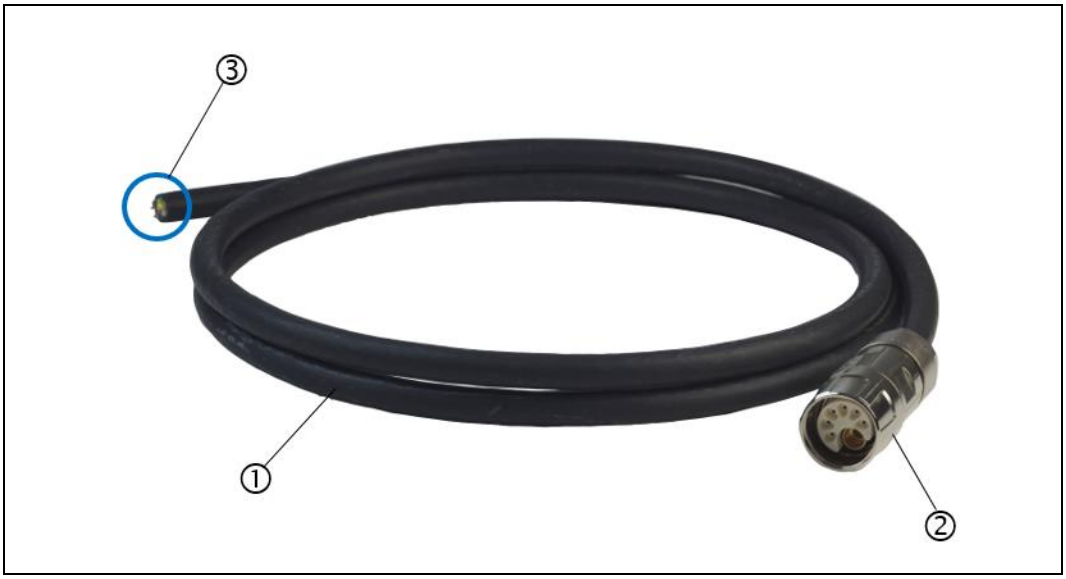
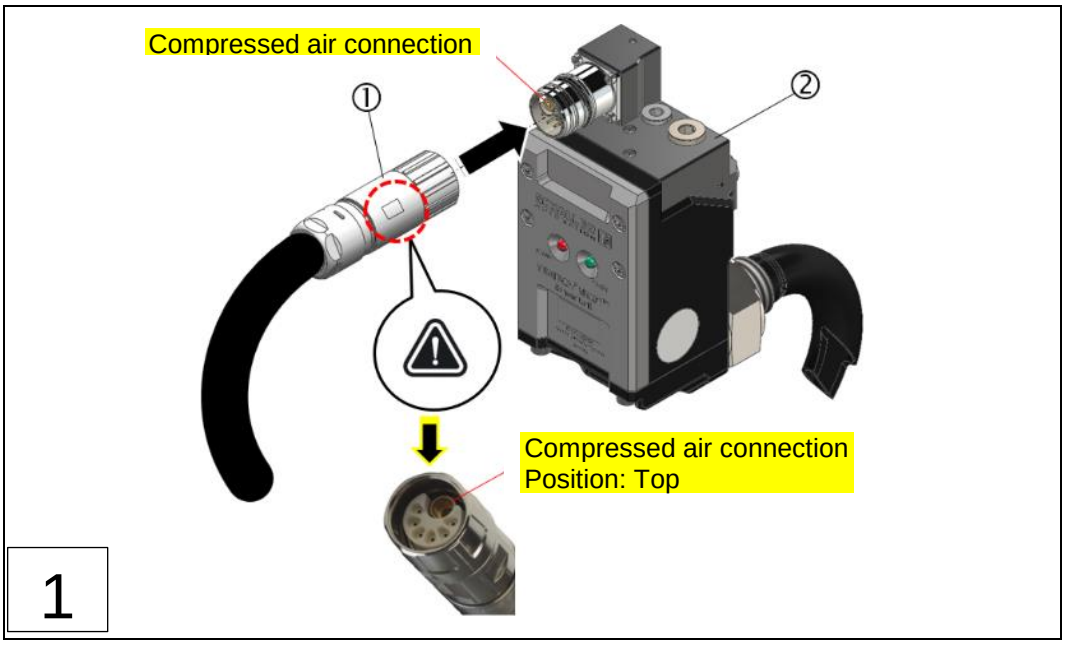


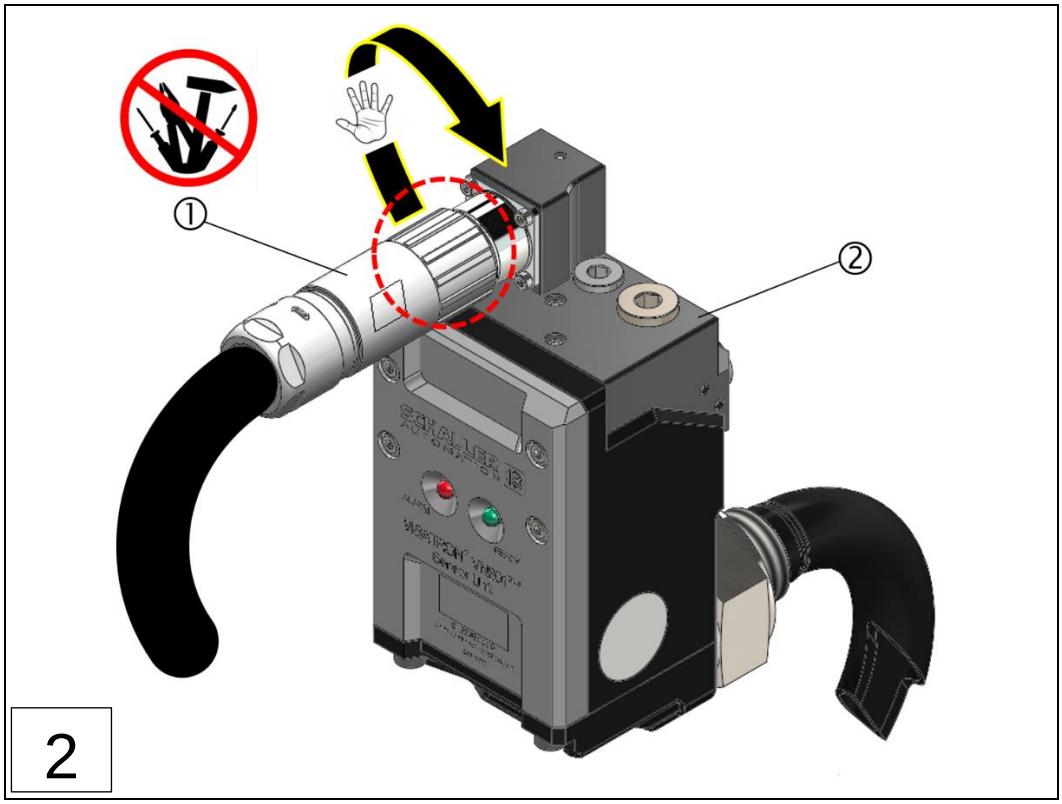
Fig.: 37 : Setup of hybrid cable unit, VN301plus

1: Hybrid cable
2: Hybrid connector (screw lock)
3: Free cable end

The electrical and pneumatic connection between the VISATRON® VN301plus central unit and sensor unit is established as per the following installation steps:



1: Hybrid connector (screw lock)
2: VN301plus / VN301plus EX sensor unit



1: Hybrid connector (screw lock)

2: VN301^{plus} / VN301^{plus} EX sensor unit

- Tighten the screw lock (marked red) **to block**

WARNING

To prevent incorrect use and failures, the hybrid connector on the sensor unit is **only** locked **manually** or as shown in the figure above. Tools (e.g. pliers) must not be used for this purpose.

To replace the hybrid connector [①], follow the instructions and steps in Section 9.3.4 of these instructions.

⇨ *Section 9.3.4 Replacing the hybrid connector on the hybrid cable*

NOTE

Mechanical safety

The screw lock has been installed correctly in accordance with step 2 and the figure below.

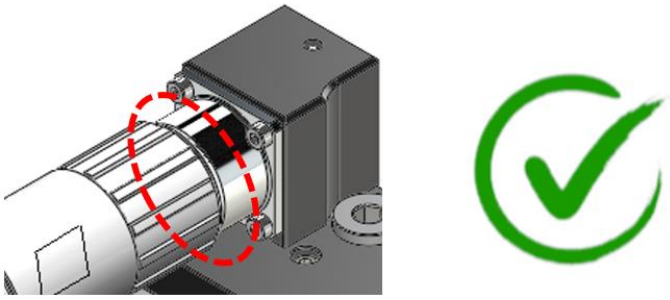


Fig.: 38 : Installing the hybrid cable on the VN301^{plus} / VN301^{plus} EX sensor unit (steps 1 - 2)

6.4.4 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 cables and the power supply are connected to the board.

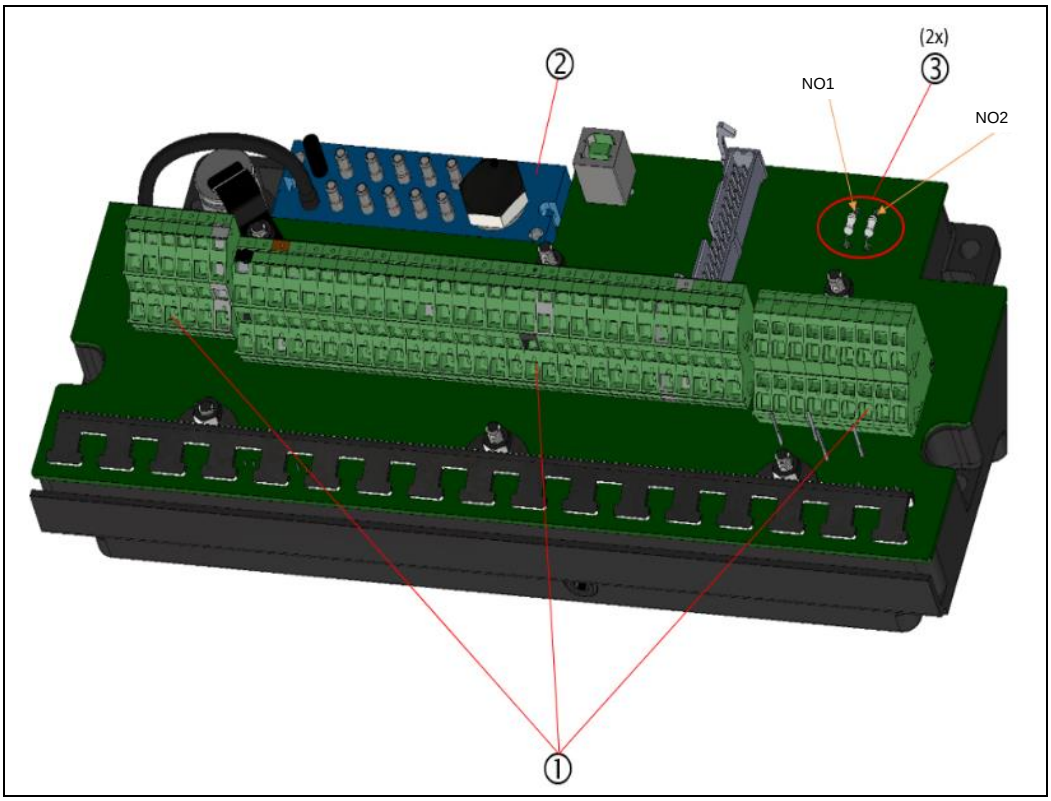


Fig.: 39 : Connection board, VN301^{plus} central unit

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:

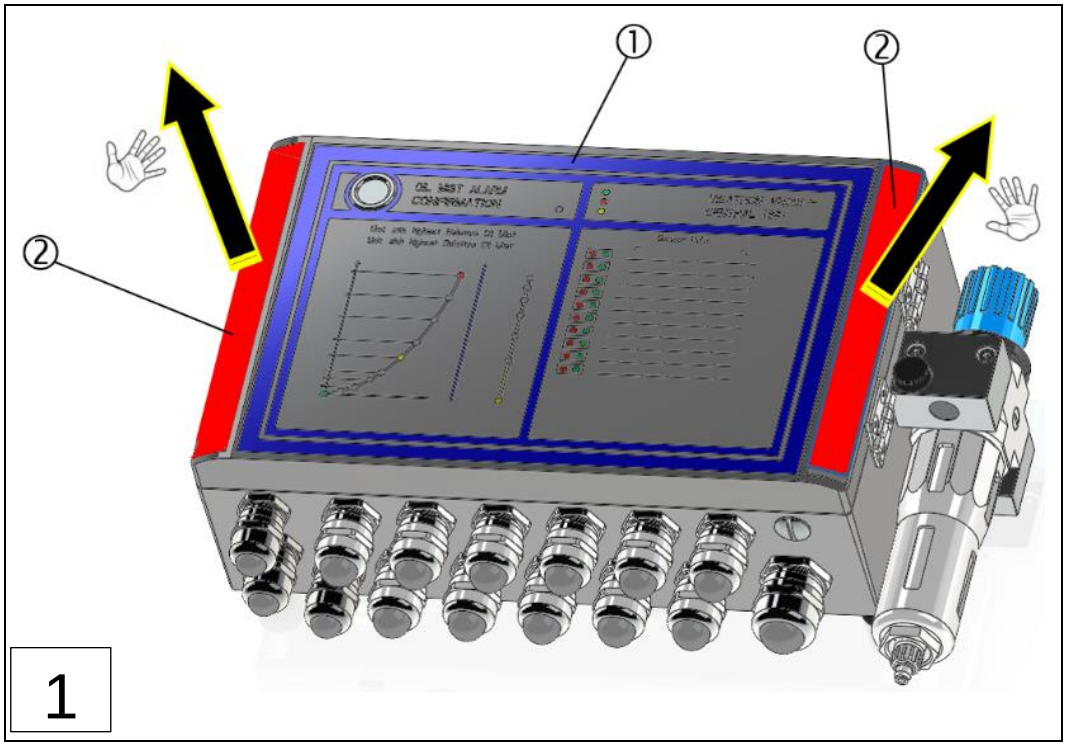


Fig.: 40 : VN301^{plus} central unit; remove the aluminium cover strips on the cover

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

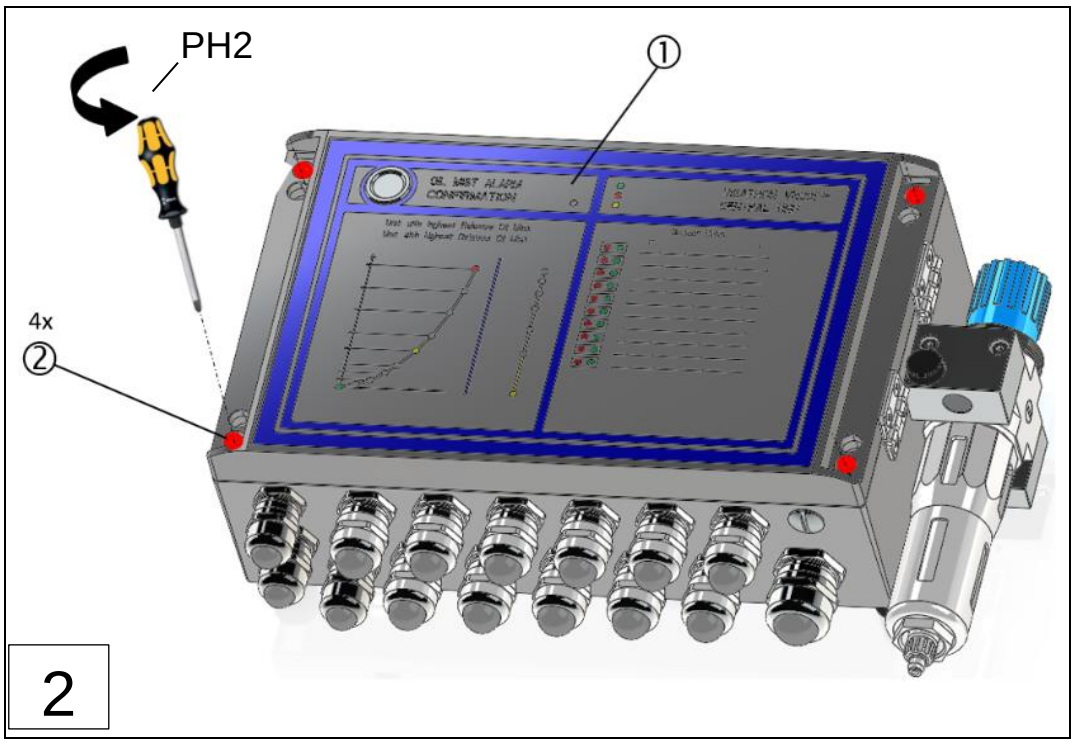


Fig.: 41 : VN301^{plus} central unit, loosen the cover screws

1: Cover, VN301^{plus} central unit
2: 4 pcs. fixing screws (captive screws)

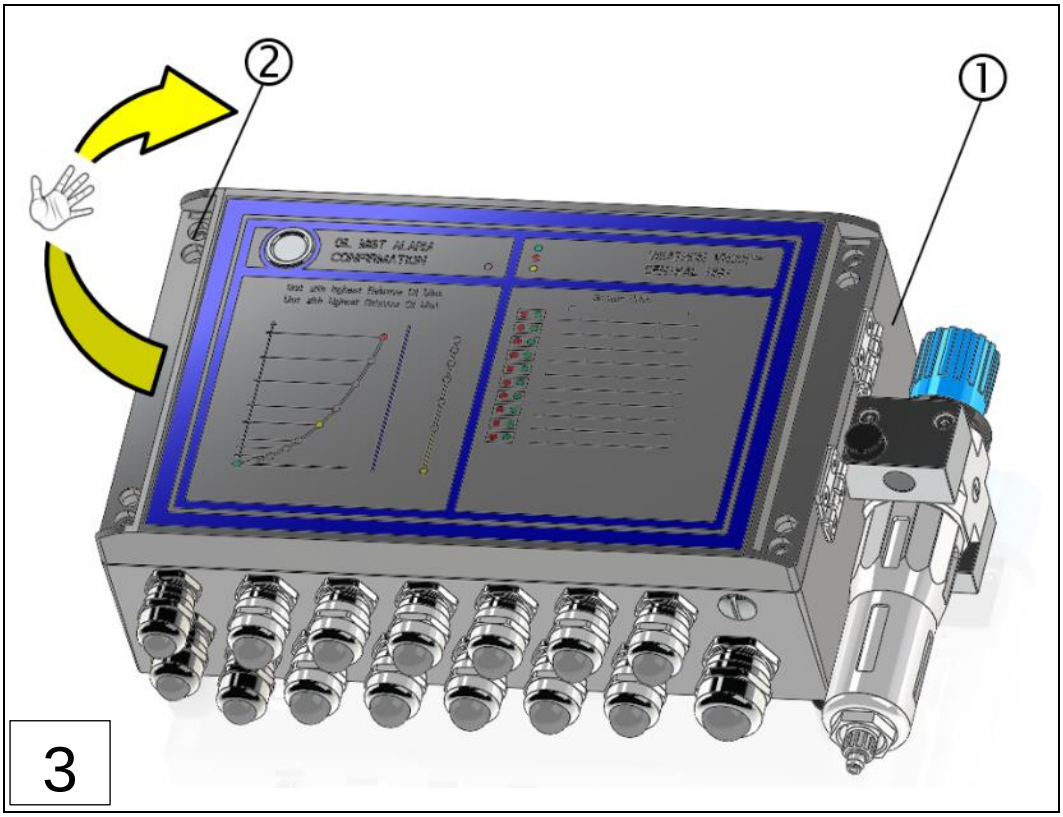


Fig.: 42 : Open the VN301^{plus} central unit

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

2: Cover, VN301^{plus} central unit

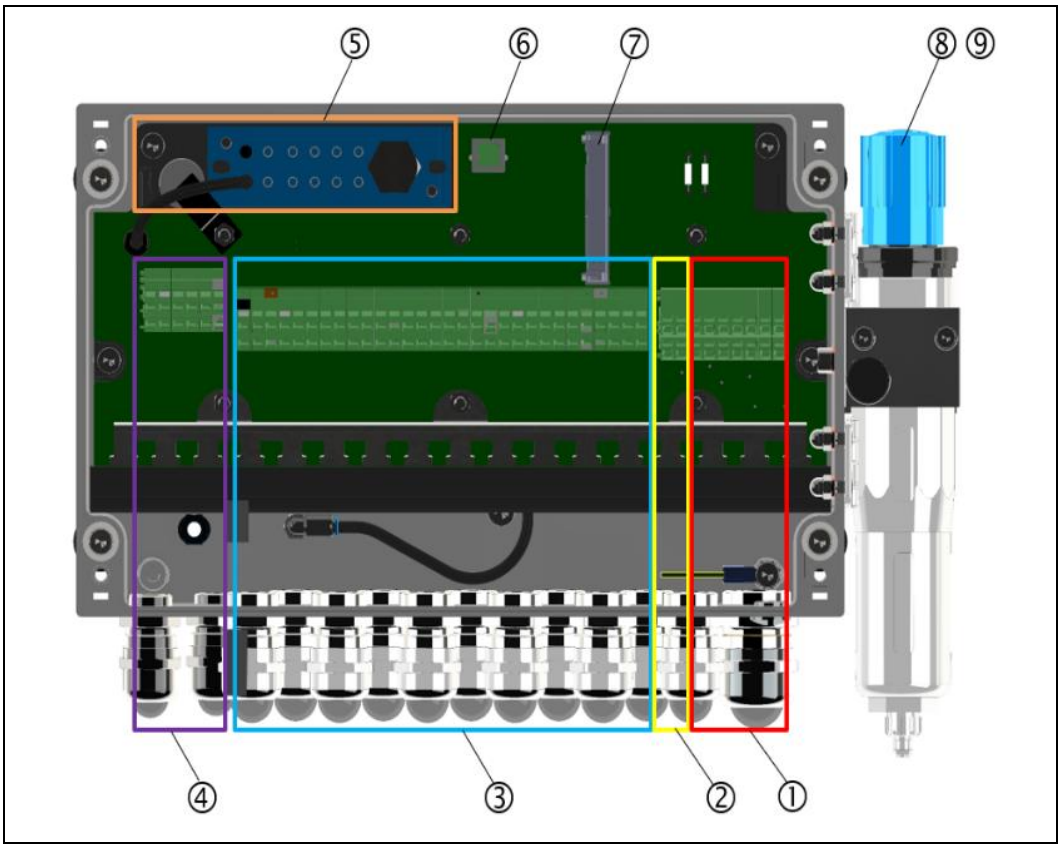


Fig.: 43 : VN301^{plus} central unit, electrical and pneumatic connection (see Fig. 44 for key)

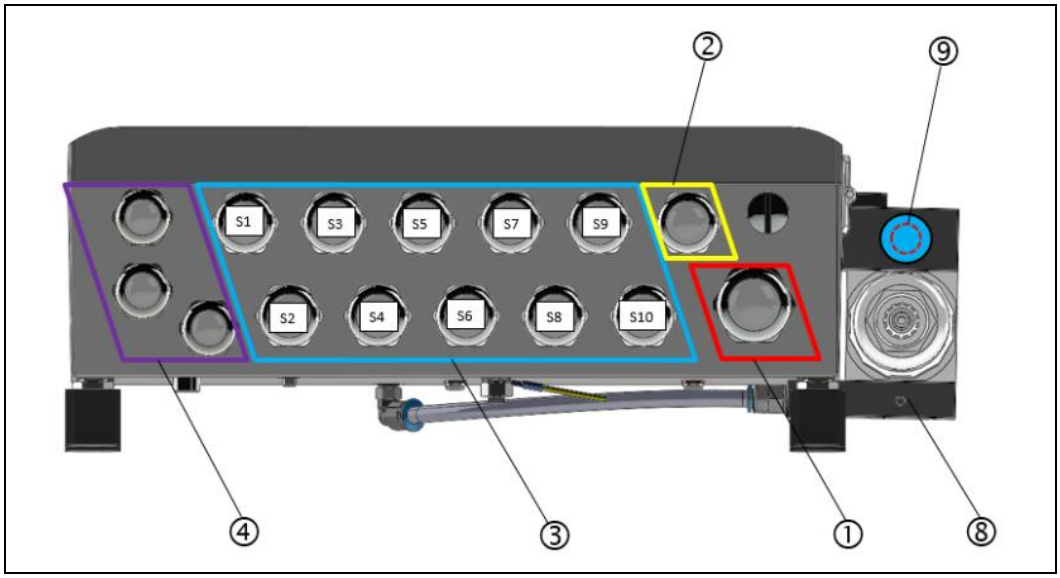


Fig.: 44 : VN301^{plus} central unit, view of cable connection panel

1: Terminal block for relay contacts (M25)
2: Terminal block for power supply (M20)
3: Terminal block for sensor connection (M20)
4: Terminal block for communication (M16)
5: Compressed air distributor unit
6: USB port
7: Connection for cover of VN301^{plus} central unit
8: Pressure regulator unit
9: Threaded connection G1/4 (closed by plug)

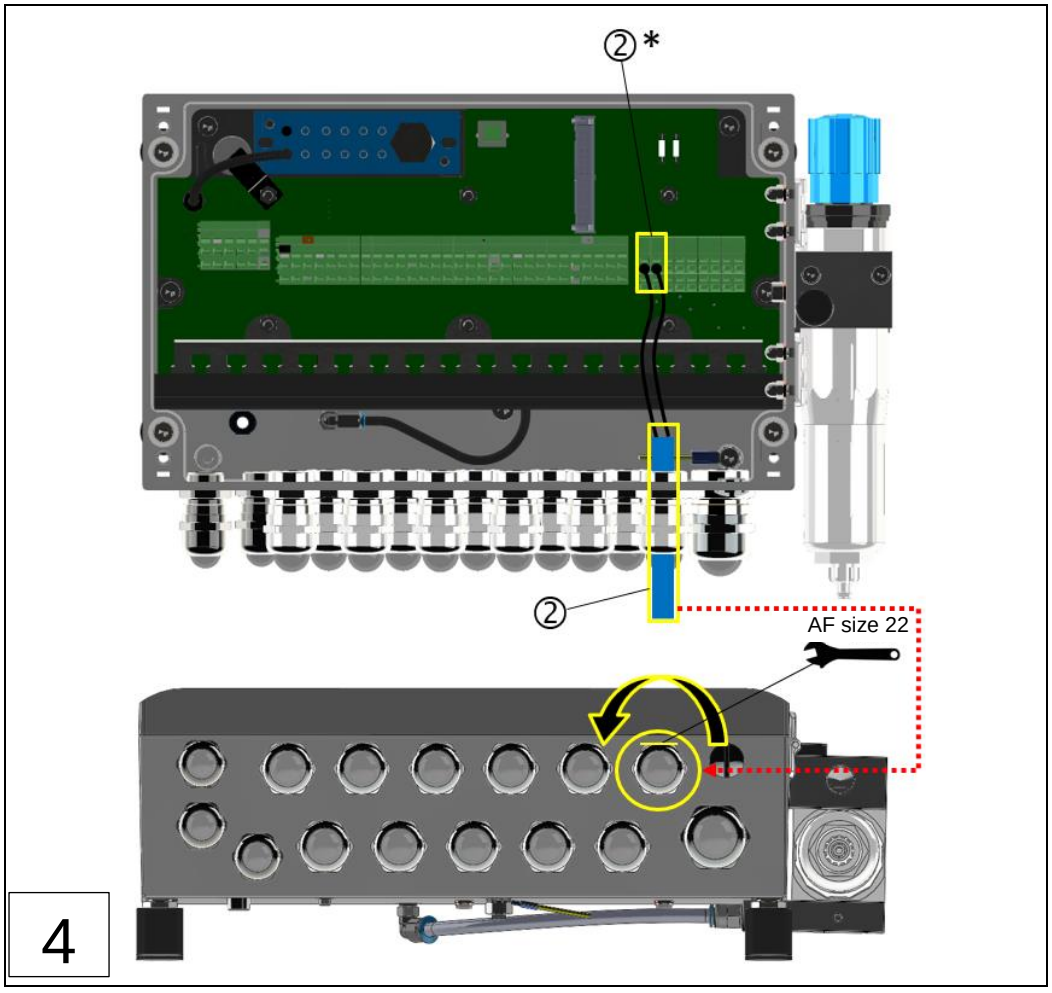


Fig.: 45 : VN301^{plus} central unit; establish power supply

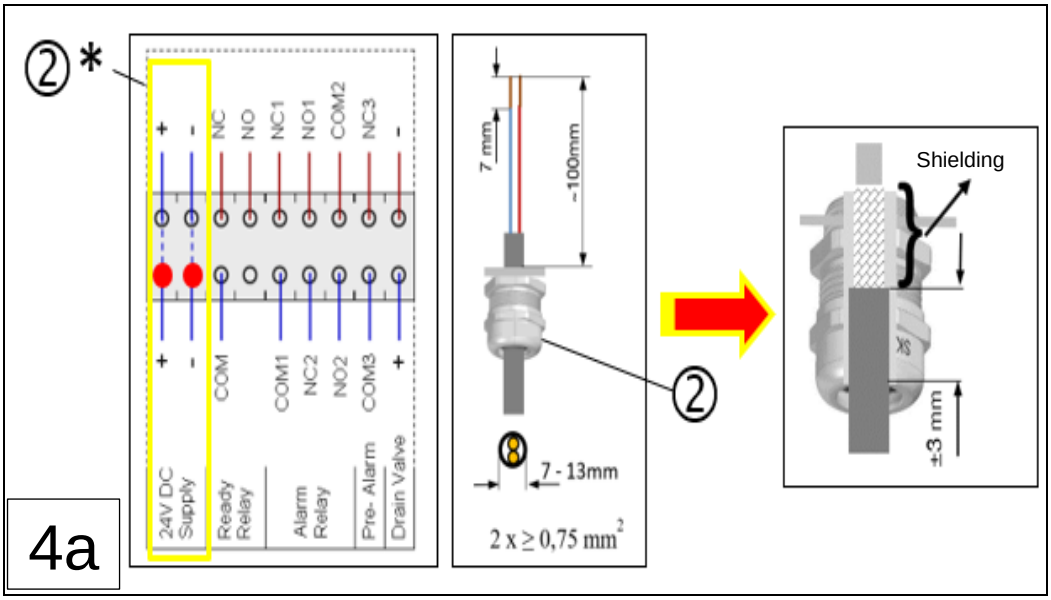


Fig.: 46 : VN301plus central unit; establish power supply (connect contacts)

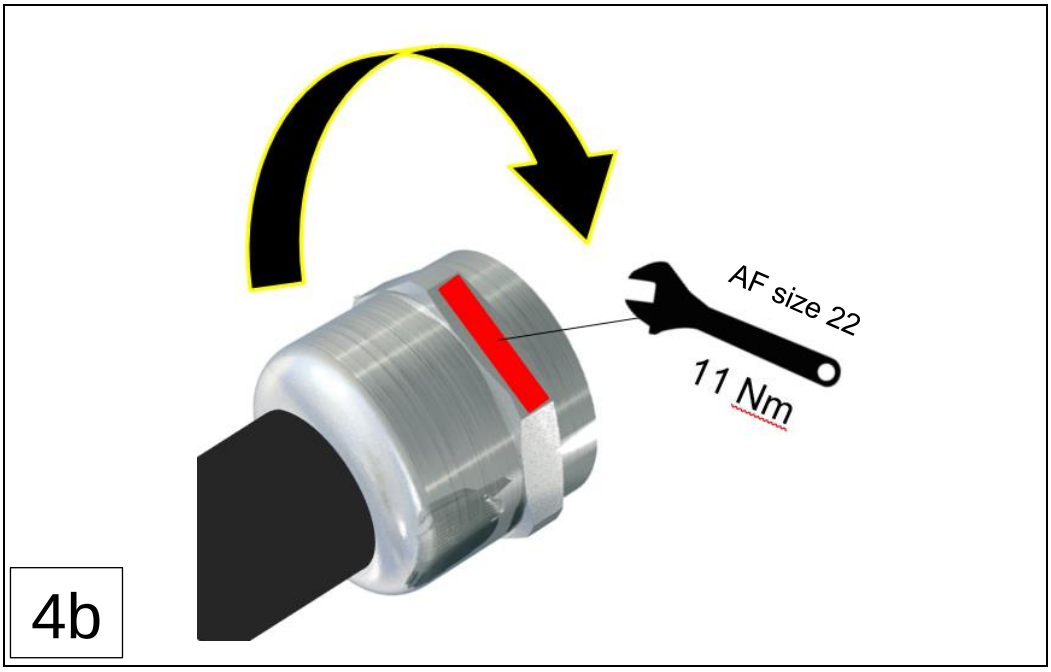


Fig.: 47 : VN301plus central unit; tighten the EMC cable gland

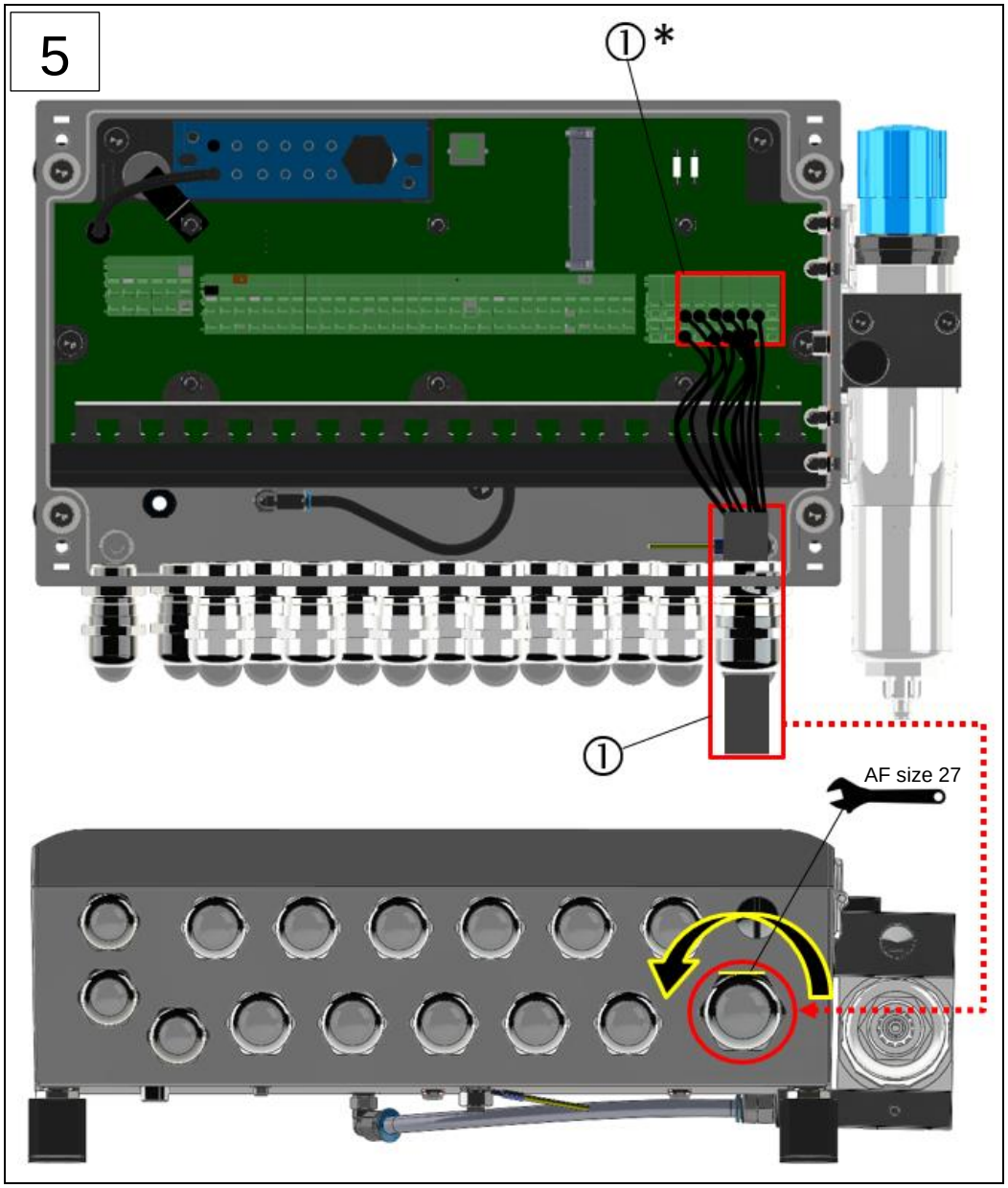


Fig.: 48 : VN301plus central unit; establish alarm

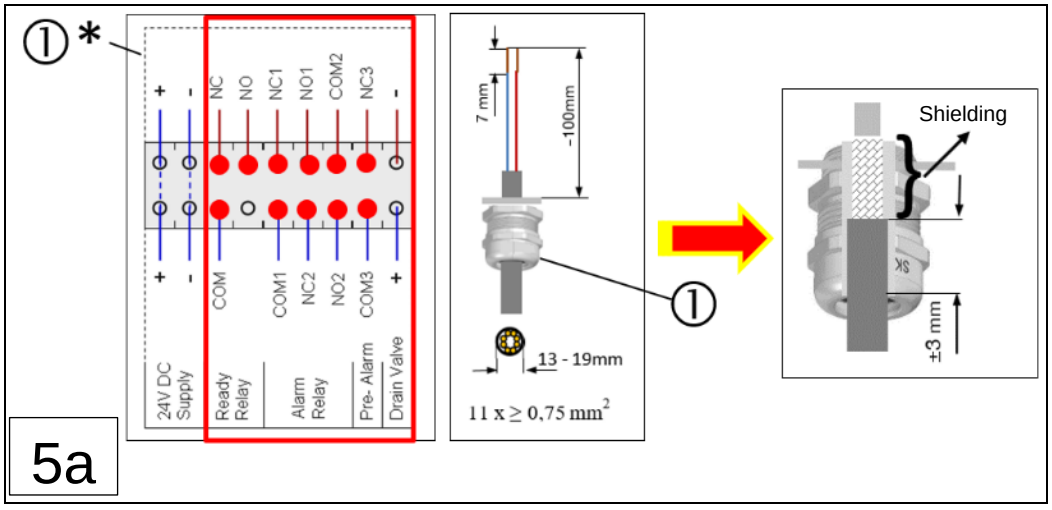


Fig.: 49 : VN301plus central unit; establish alarm (connect contacts)

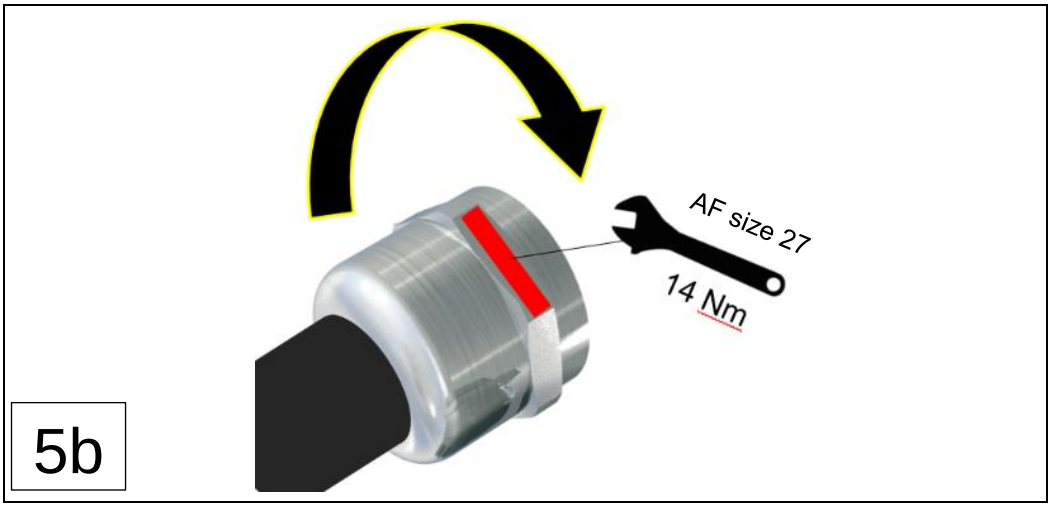


Fig.: 50 : VN301^{plus} central unit; tighten the EMC cable gland

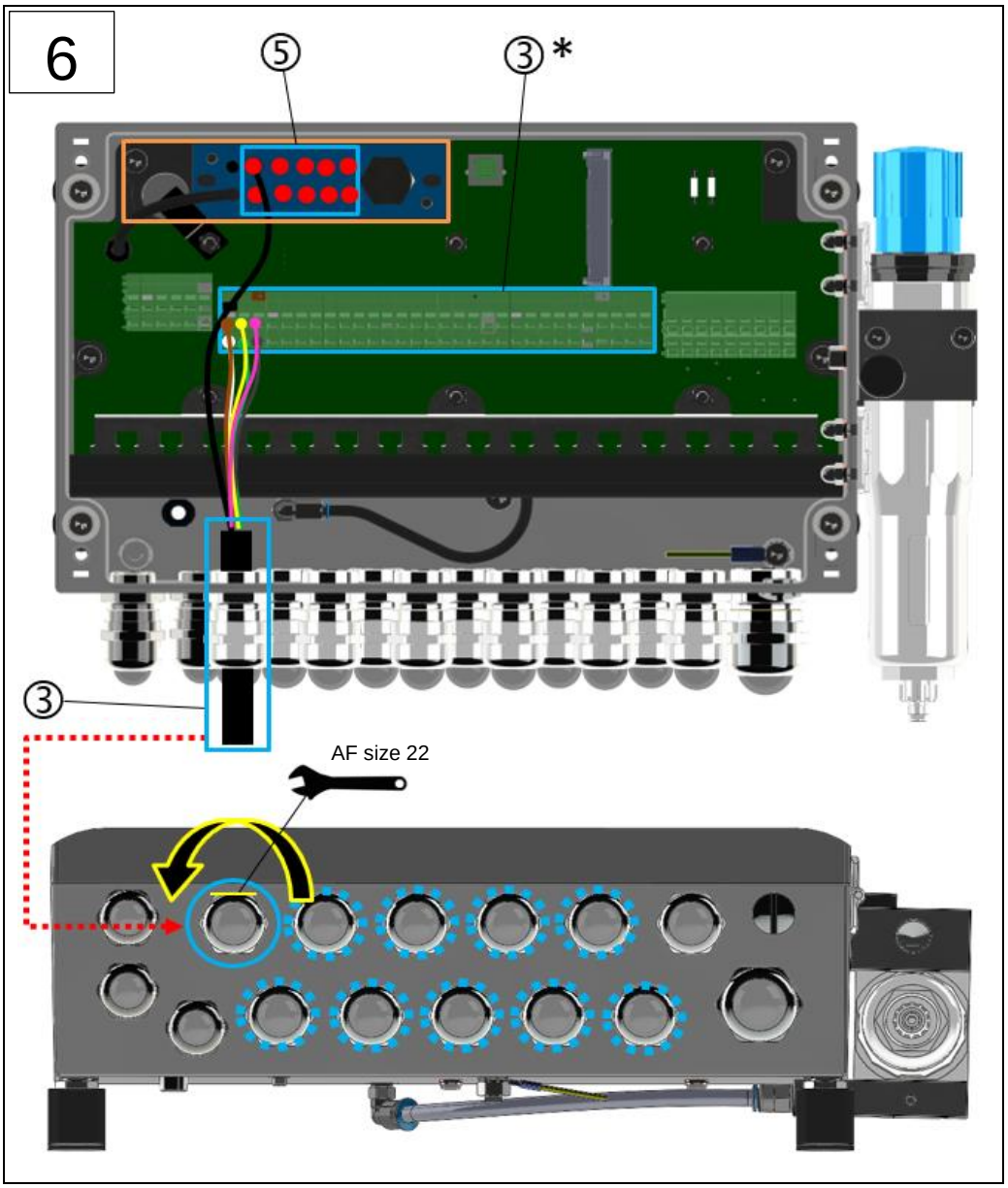


Fig.: 51 : VN301^{plus} central unit sensor connection (electrical/ pneumatic, sensors 1 - 10)

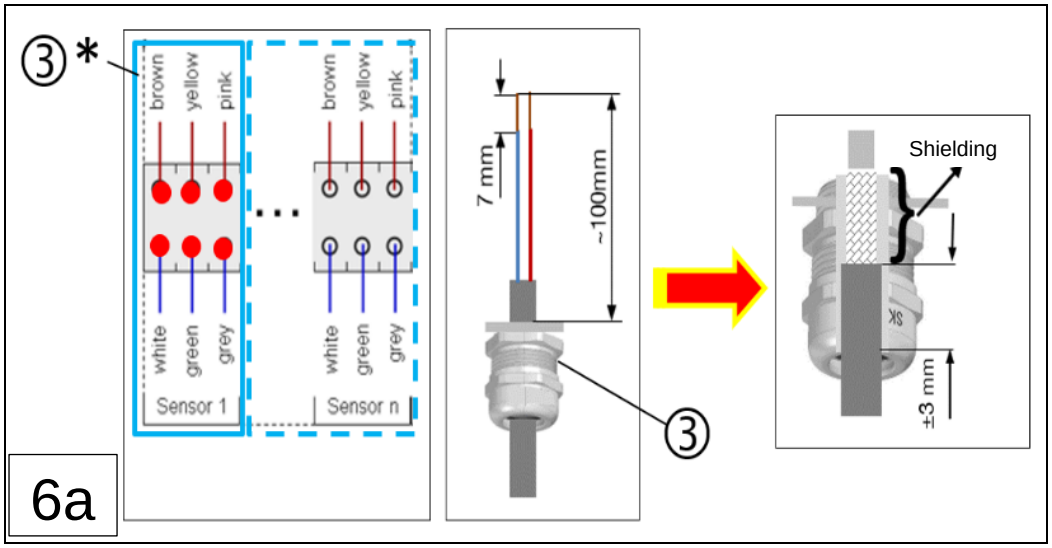


Fig.: 52 : VN301plus central unit sensor connection (connect contacts, sensors 1 - 10)

VN301plus hybrid hose (sensor connection)	
Wire • White • Brown	Applicable wire cross-section: ∅ 0.75 mm²
Wire • Green • Yellow • Grey • Pink	Applicable wire cross-section: ∅ 0.50 mm²

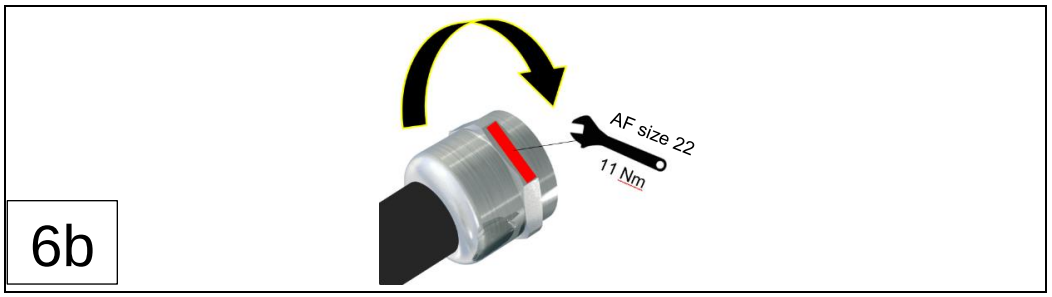


Fig.: 53 : VN301plus central unit; tighten the EMC cable gland

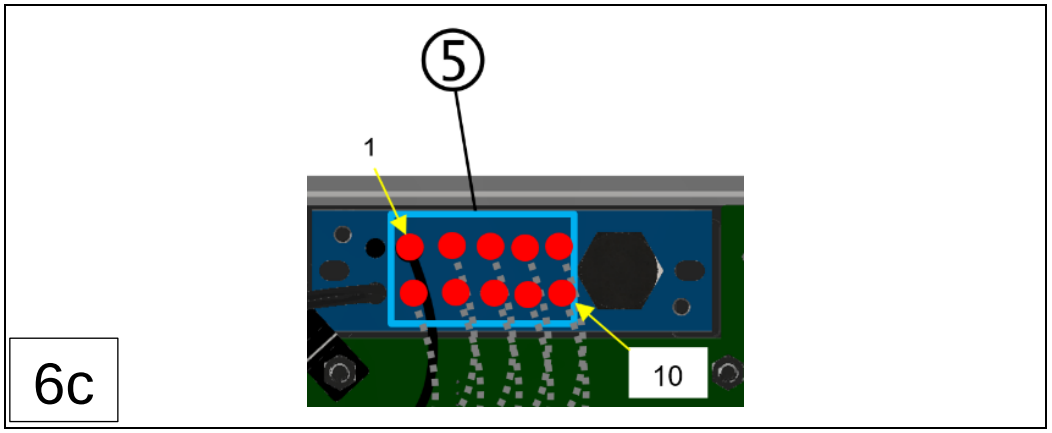
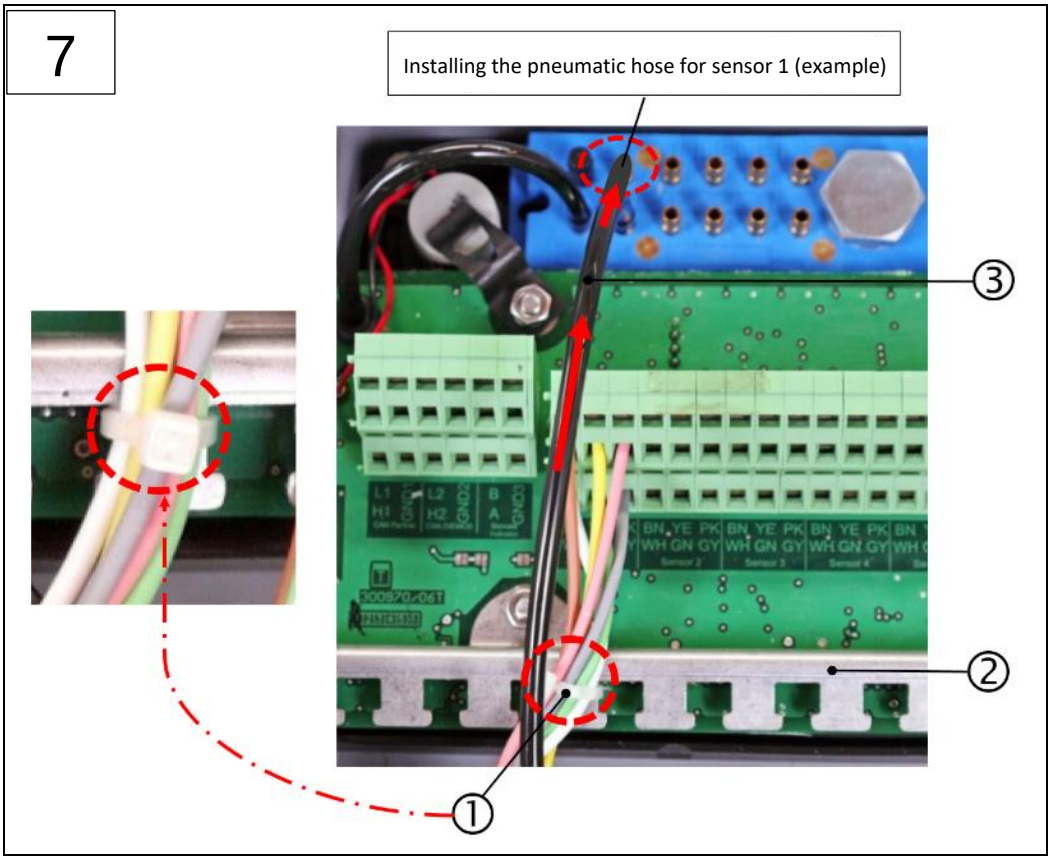


Fig.: 54 : VN301plus central unit; establish compressed air connection (sensors 1 - 10)

5: Compressed air distributor unit



- 1. Secure the electrical cables with cable ties [①] on the cable tie retaining plate [②]
- Do not secure the compressed air hose

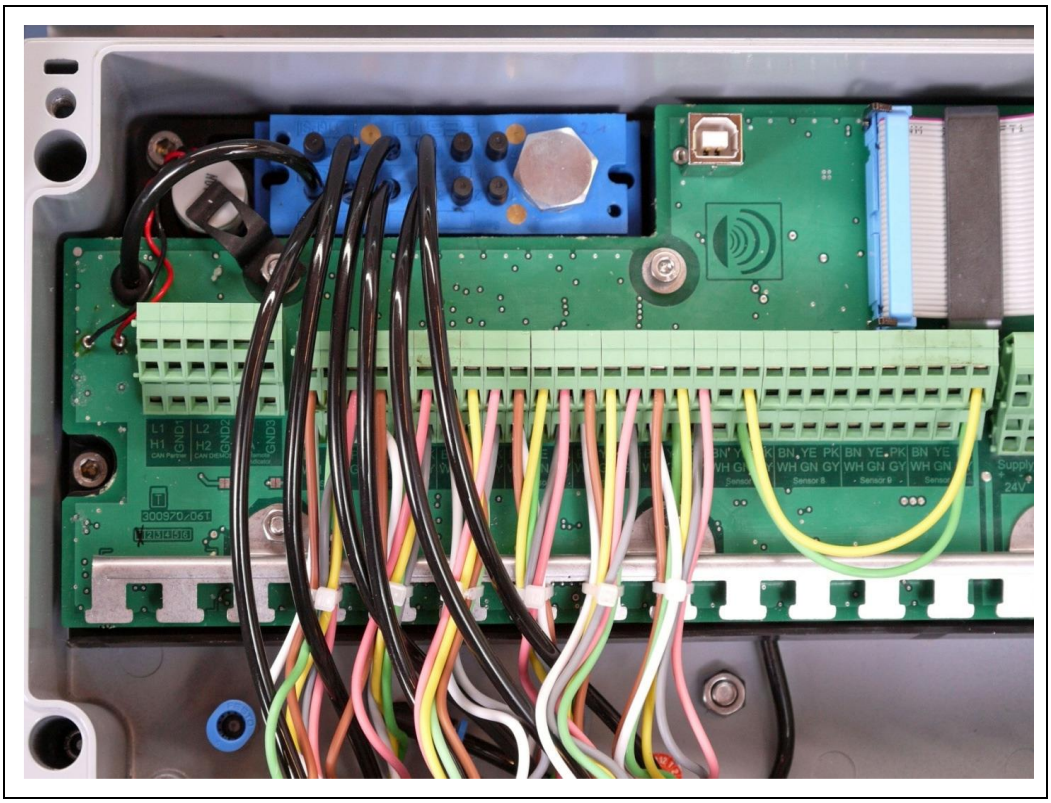


Fig.: 55 : Assembly and installation complete (steps 1 - 7; example with 6 hybrid hoses)

6.4.4.1 Configuration of the wire break resistors on the VN301plus central unit

As shown in the figure below, 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. A set of suitable resistors is included in the delivery.

NOTE

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!

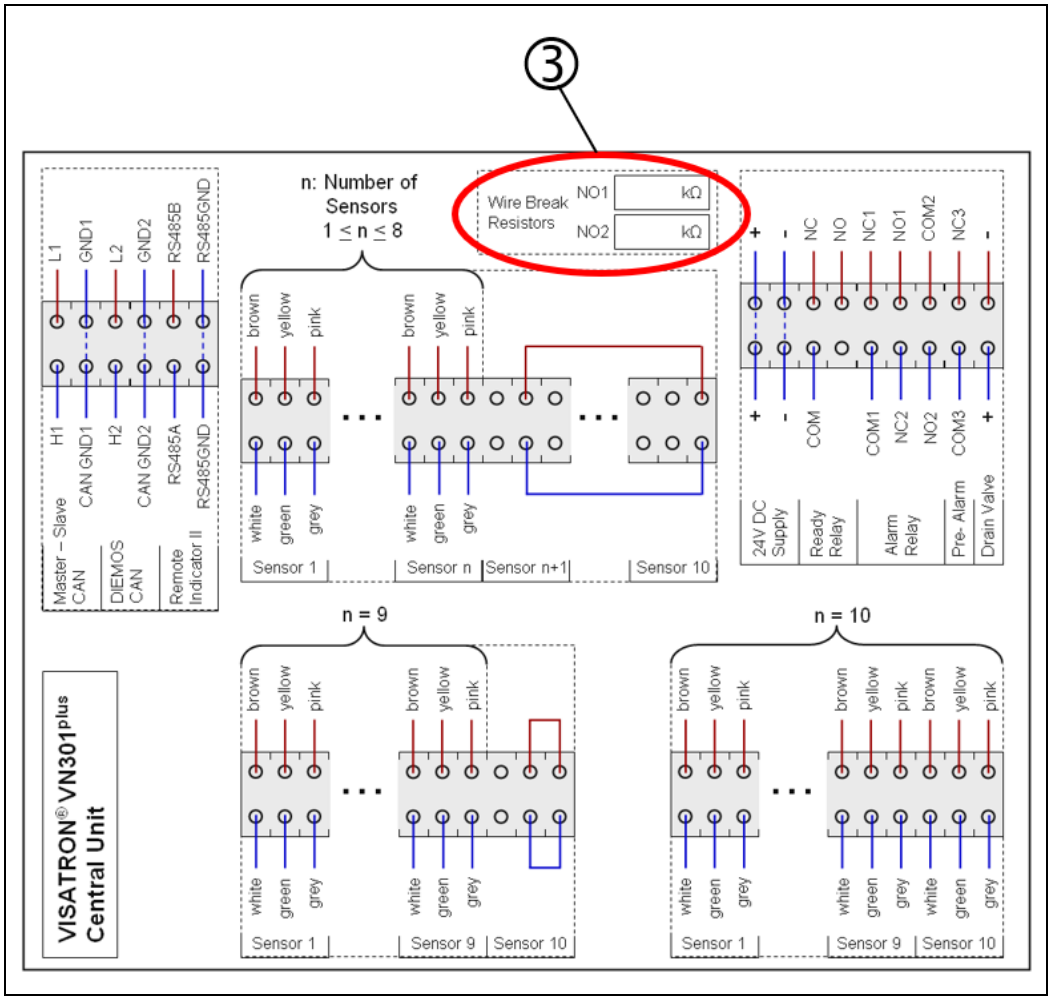
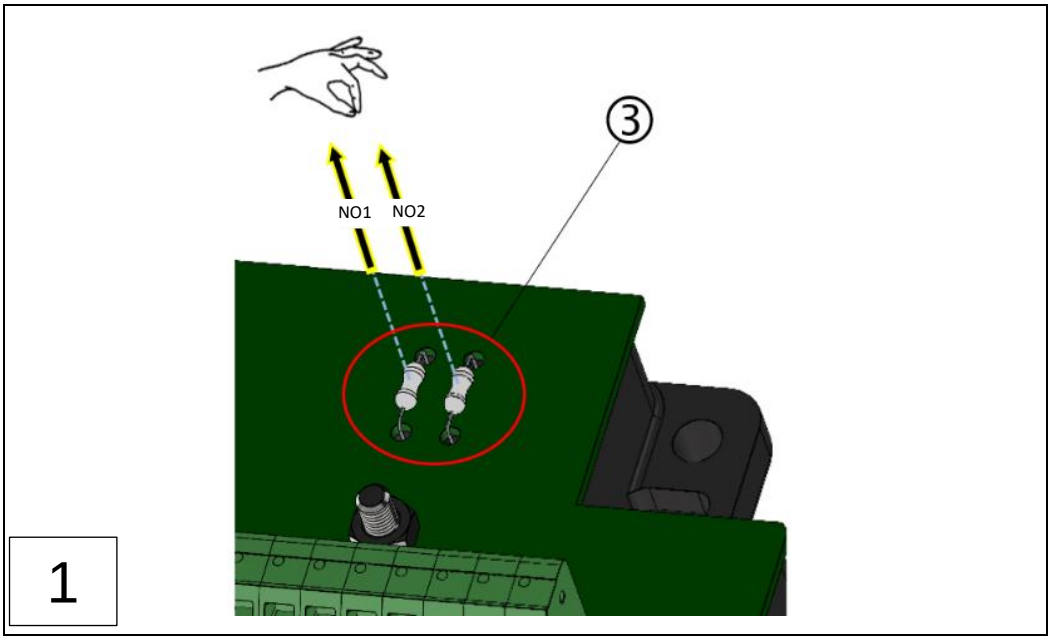
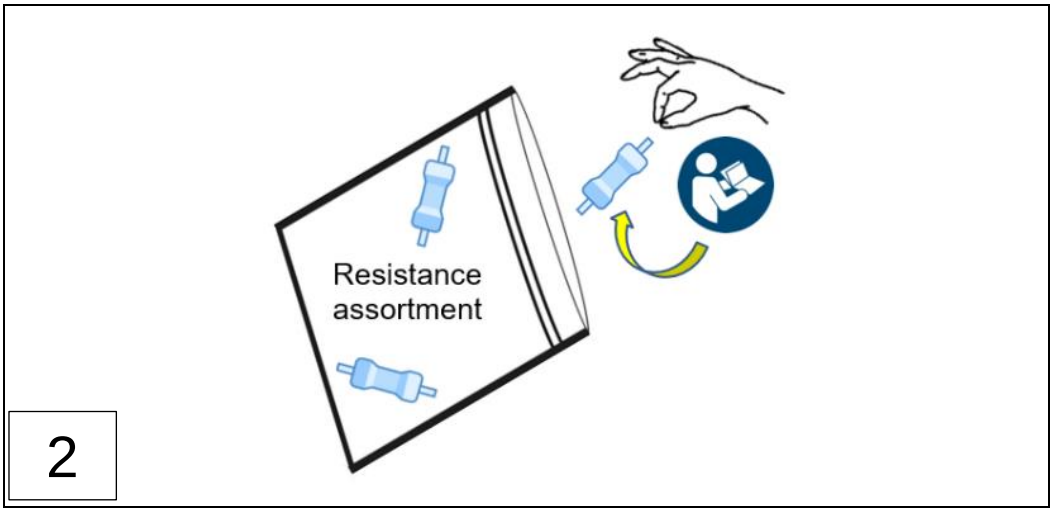


Fig.: 56 : VN301plus central unit: Overview; configuration of the wire break resistors

3: Position of wire break resistors NO2 and NO3



3: Wire break resistors, NO1, NO2



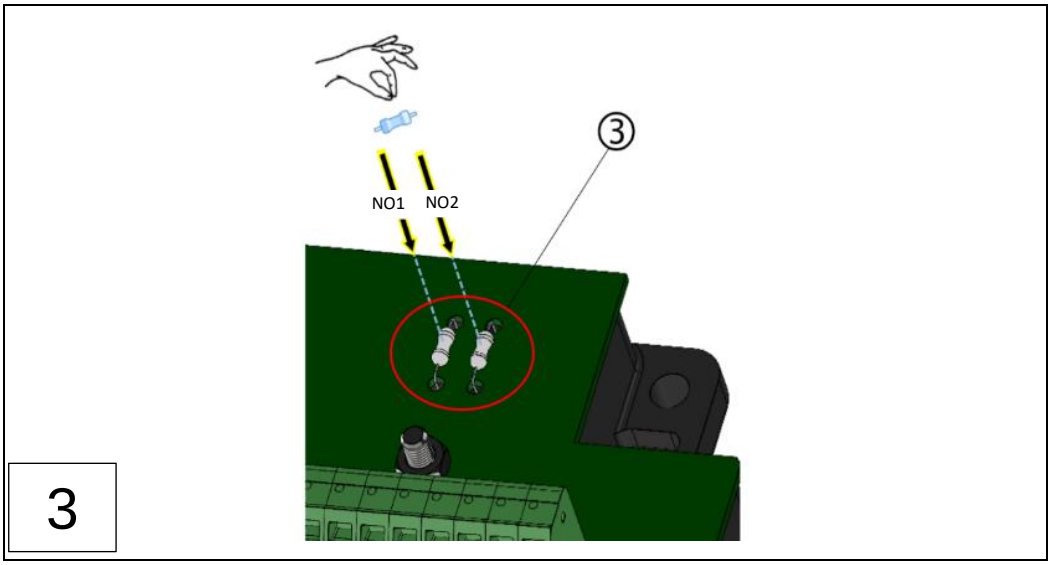


Fig.: 57 : VN301^{plus} central unit: Insert wire break resistors (installation steps 1 - 3)

3: Wire break resistors, NO1, NO2

6.4.4.2 Configuration of the wiring bridges on the VN301plus central unit

4 sensors

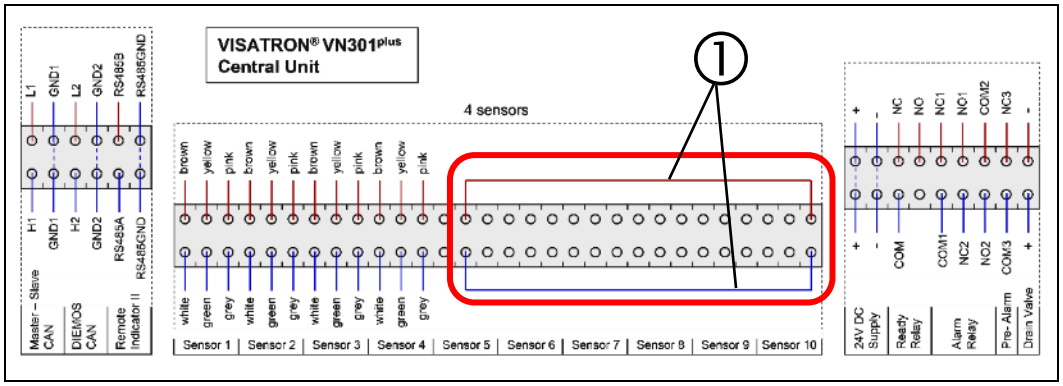


Fig.: 58 : VN301plus central unit: Configuration of the wiring bridges; 4 sensors

1: Wiring bridges

5 sensors

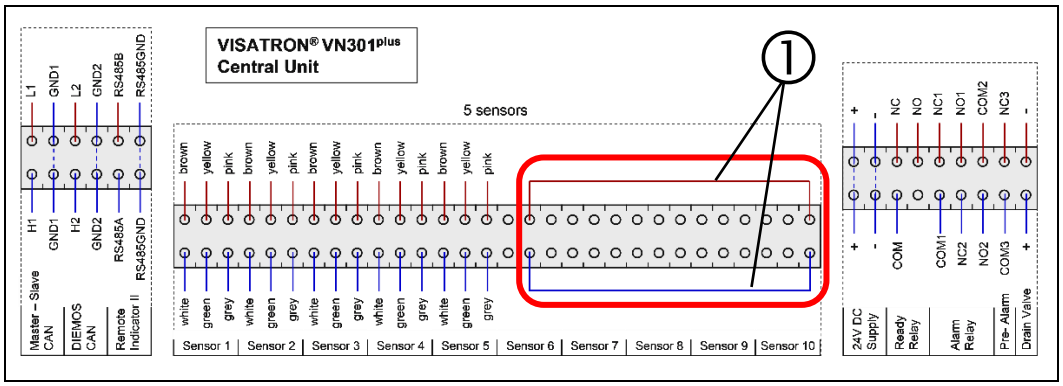


Fig.: 59 : VN301plus central unit: Configuration of the wiring bridges; 5 sensors

1: Wiring bridges

6 sensors

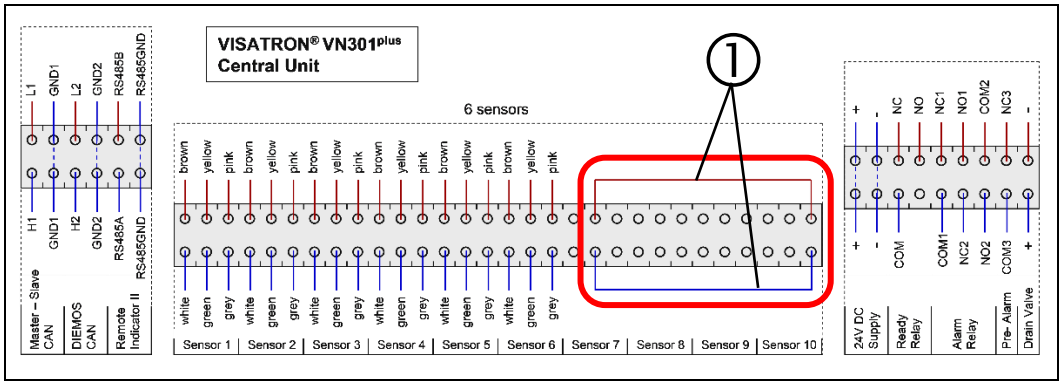


Fig.: 60 : VN301plus central unit: Configuration of the wiring bridges; 6 sensors

1: Wiring bridges

7 sensors

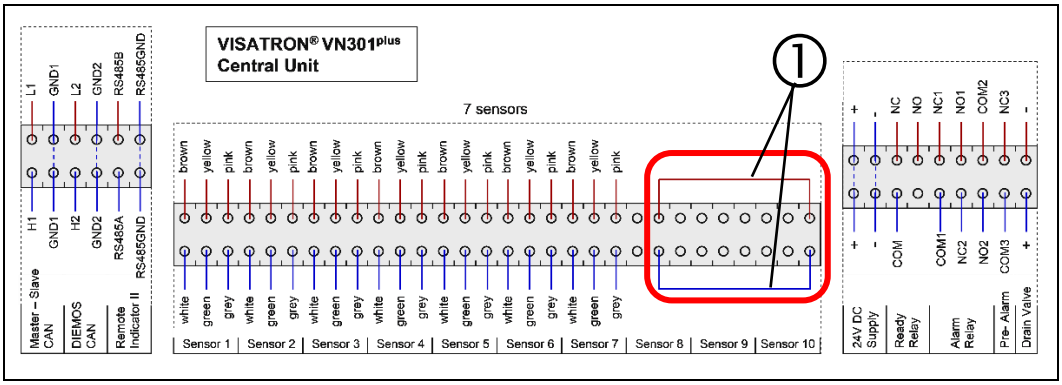


Fig.: 61 : VN301plus central unit: Configuration of the wiring bridges; 7 sensors

1: Wiring bridges

8 sensors

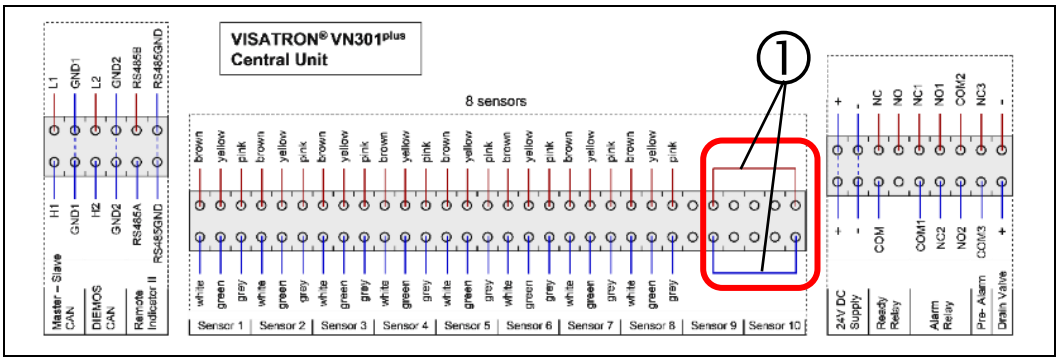


Fig.: 62 : VN301plus central unit: Configuration of the wiring bridges; 8 sensors

1: Wiring bridges

9 sensors

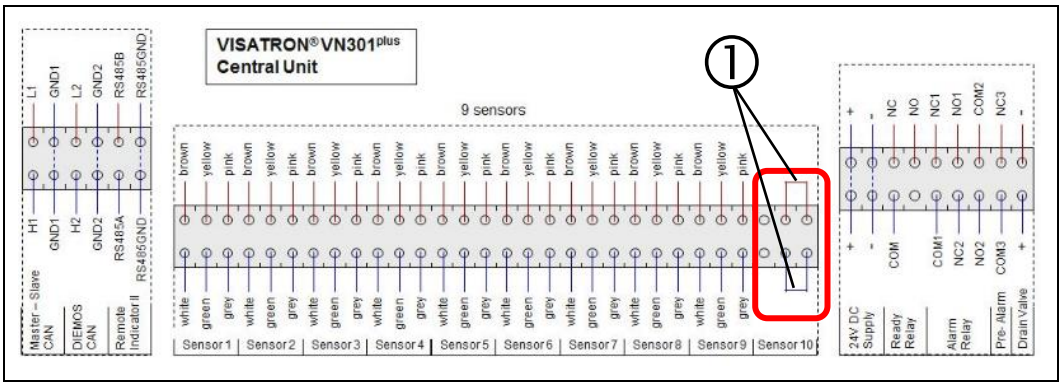


Fig.: 63 : VN301plus central unit: Configuration of the wiring bridges; 9 sensors

1: Wiring bridges

10 sensors

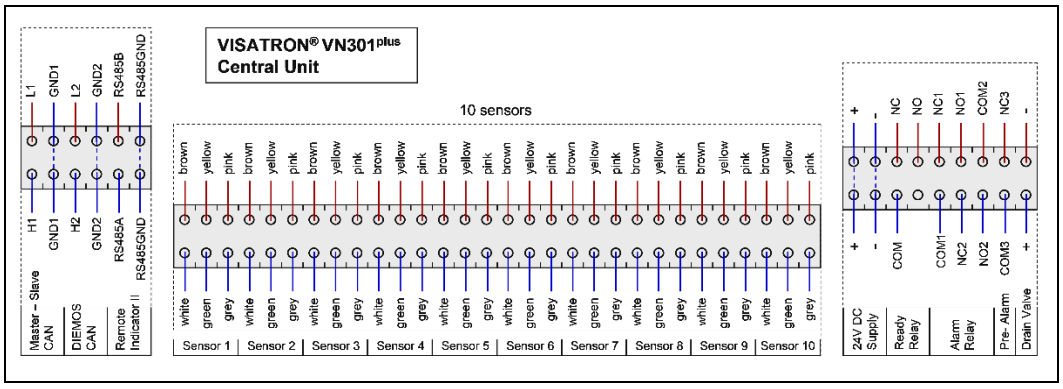


Fig.: 64 : VN301plus central unit: Configuration of the wiring bridges; 10 sensors

6.4.5 Electrical connection of the Remote Indicator II (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.

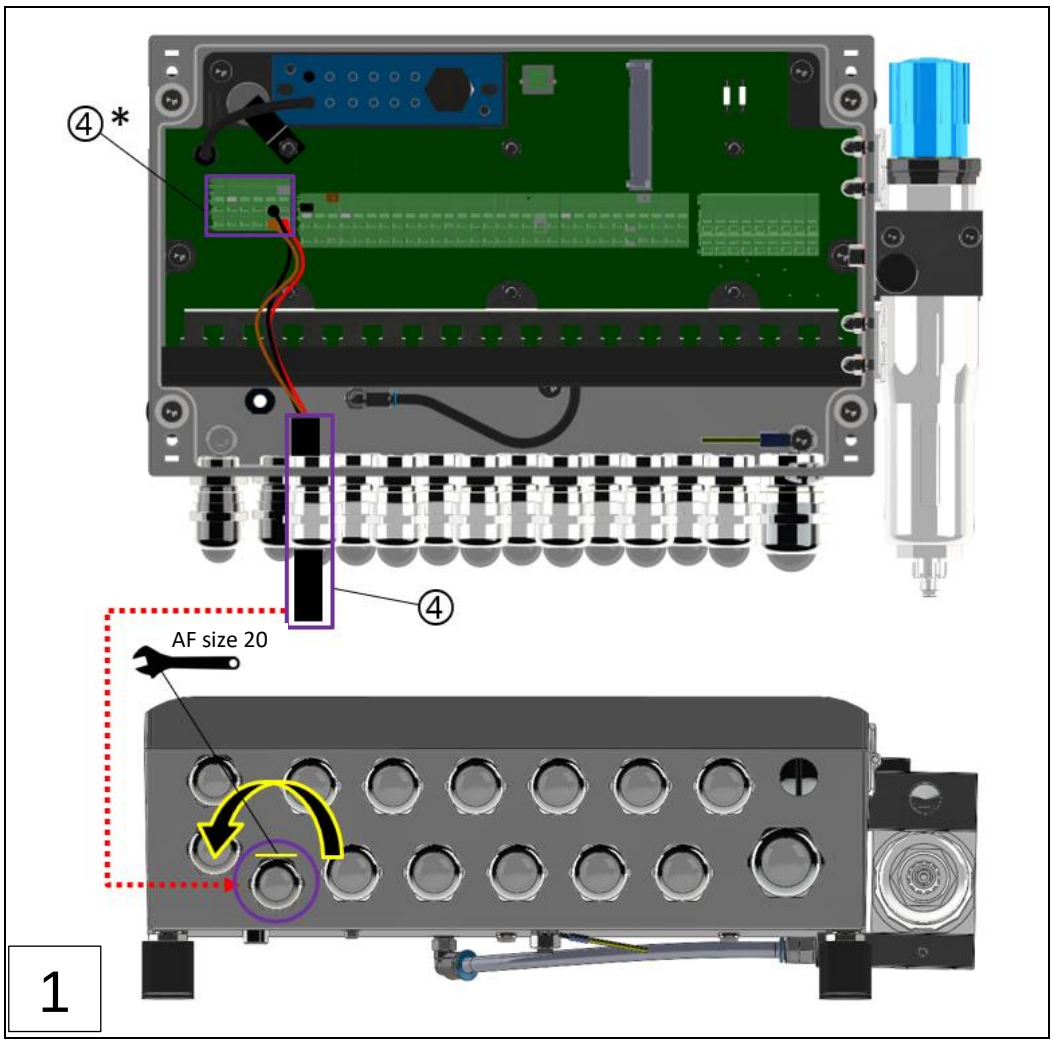


Fig.: 65 : VN301plus central unit; establish communication with Remote Indicator II (optional)

4: Assign sensor connection

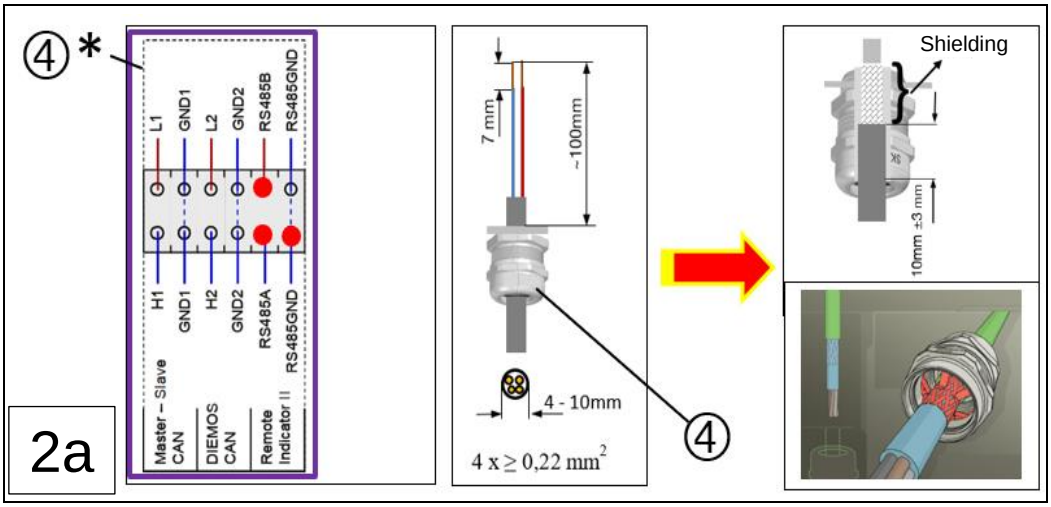


Fig.: 66 : VN301plus central unit; connect contacts with Remote Indicator II (optional)

4: Assign sensor connection

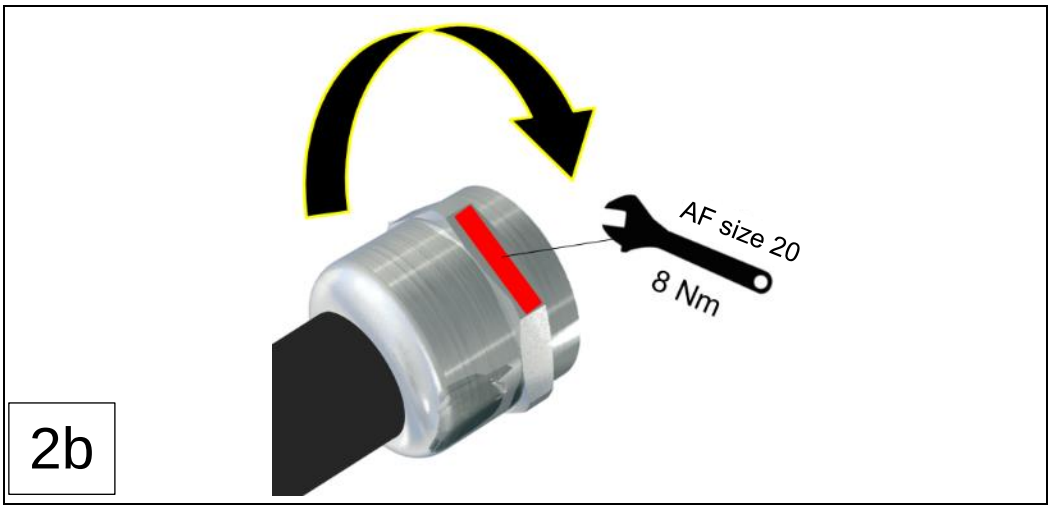


Fig.: 67 : VN301plus central unit; tighten the EMC cable gland

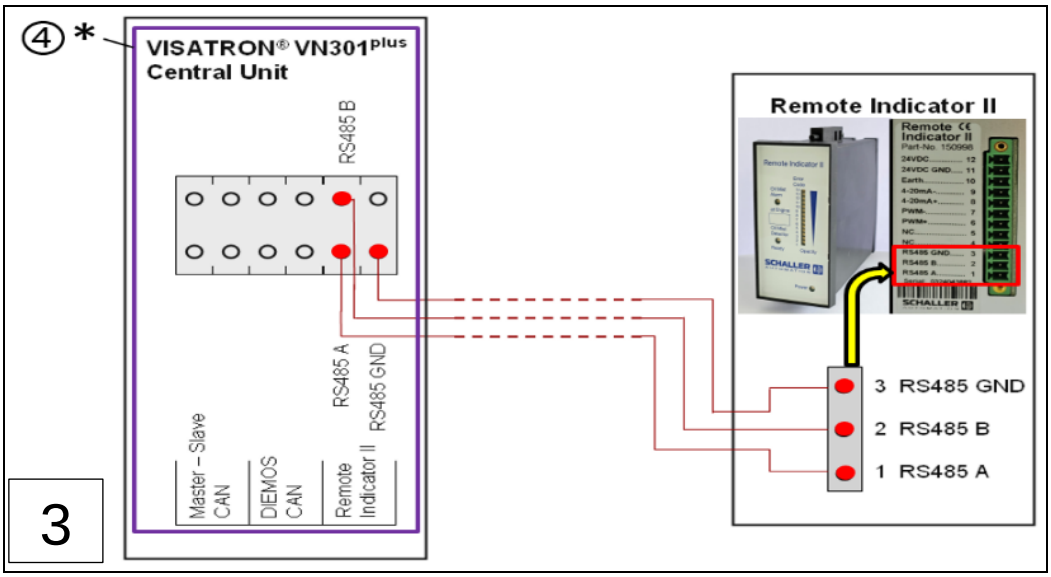


Fig.: 68 : Remote Indicator II, connect contacts (optional)

4: Assign sensor connection

6.4.6 Locking the VN301plus central unit after completing the electrical installation

After the electrical installation is complete, the central unit is closed again as per the figure below. In this case, installation steps 1 - 3 as described in Section 6.4.4 are carried out in reverse order.

⇨ *Section 6.4.4 Electrical and pneumatic installation of the central unit*

NOTE

Remove cable ties

- Note on step 1: Completed by removing the cable ties.

Closing the central unit

- Note on step 3: A torque spanner (size PH2) is used to close the central unit. Tightening torque: **3 Nm**

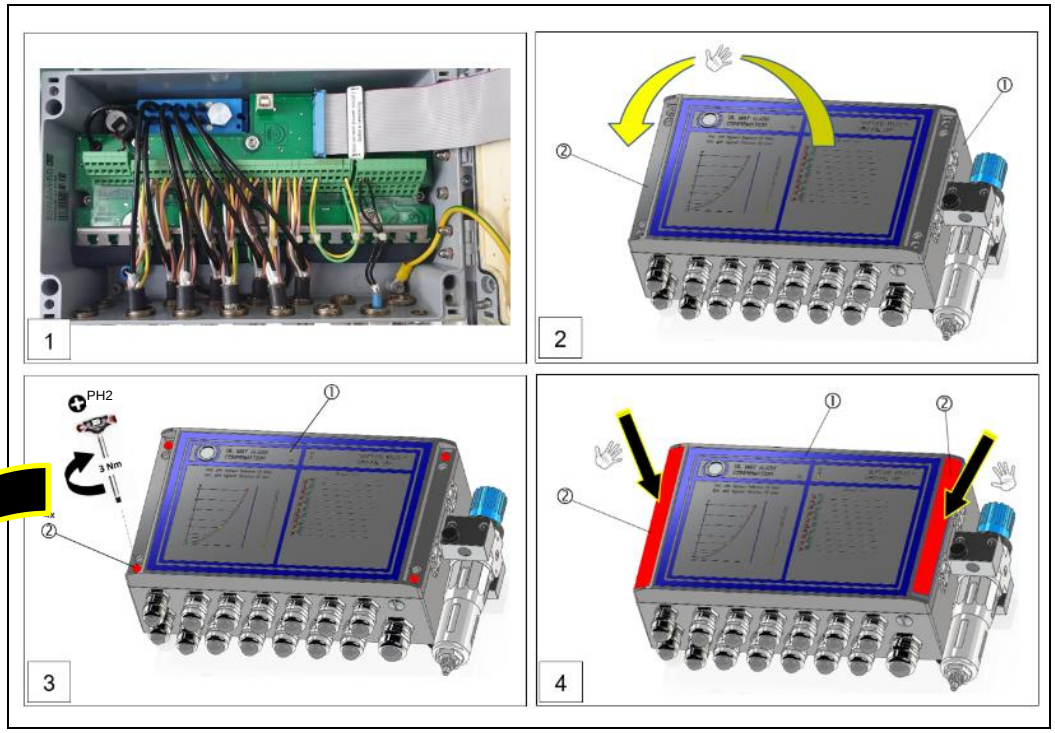


Fig.: 69 : Close the VN301plus central unit (steps 1 - 4)

6.4.7 Connection of earth to the housing of the VN301plus central unit

⇨ *Section 2.4 Basic safety instructions*

DANGER

Electrical hazards

- The VISATRON® VN301plus central unit has to be disconnected from the power supply first, before the housing is earthed between the protective cover of the device and the engine.

The earth connection on the protective cover of the VN301plus central unit is established via earthing with a permanent corrosion-free screw connection, as shown in the following figures. The free end of the earth connection is then assembled as per customer specifications and connected to the engine. The above instructions must be followed when installing the earth connection.

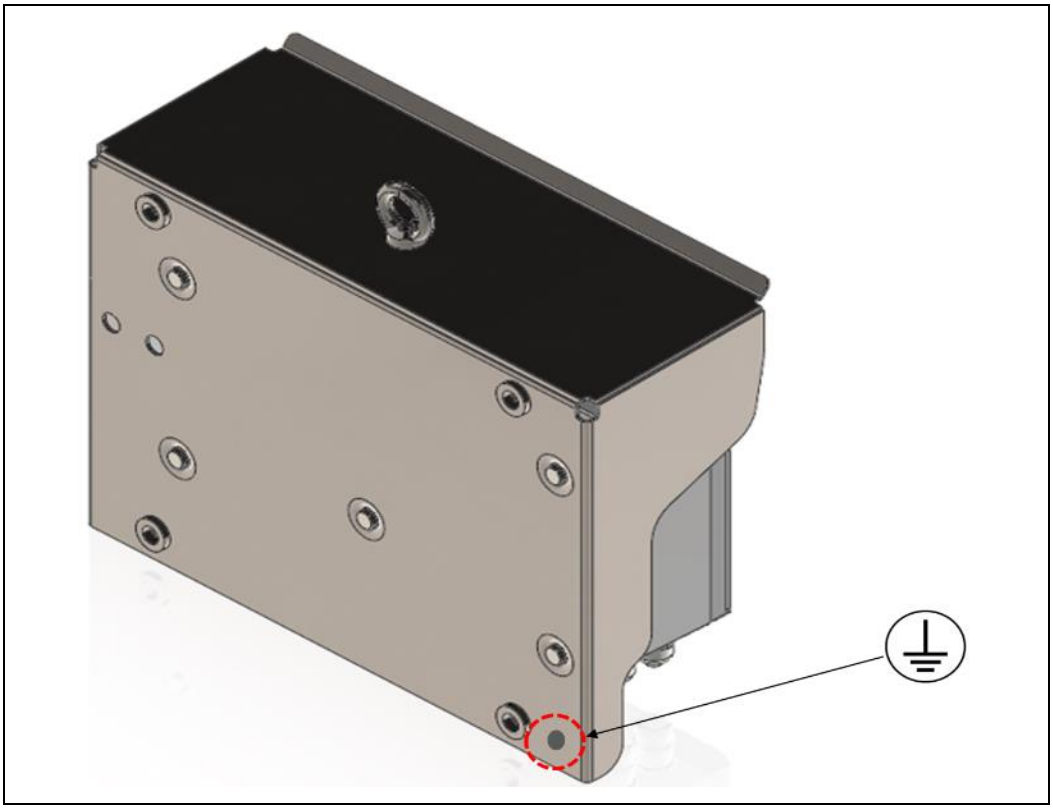


Fig.: 70 : Position of earth connection on protective cover of VN301plus

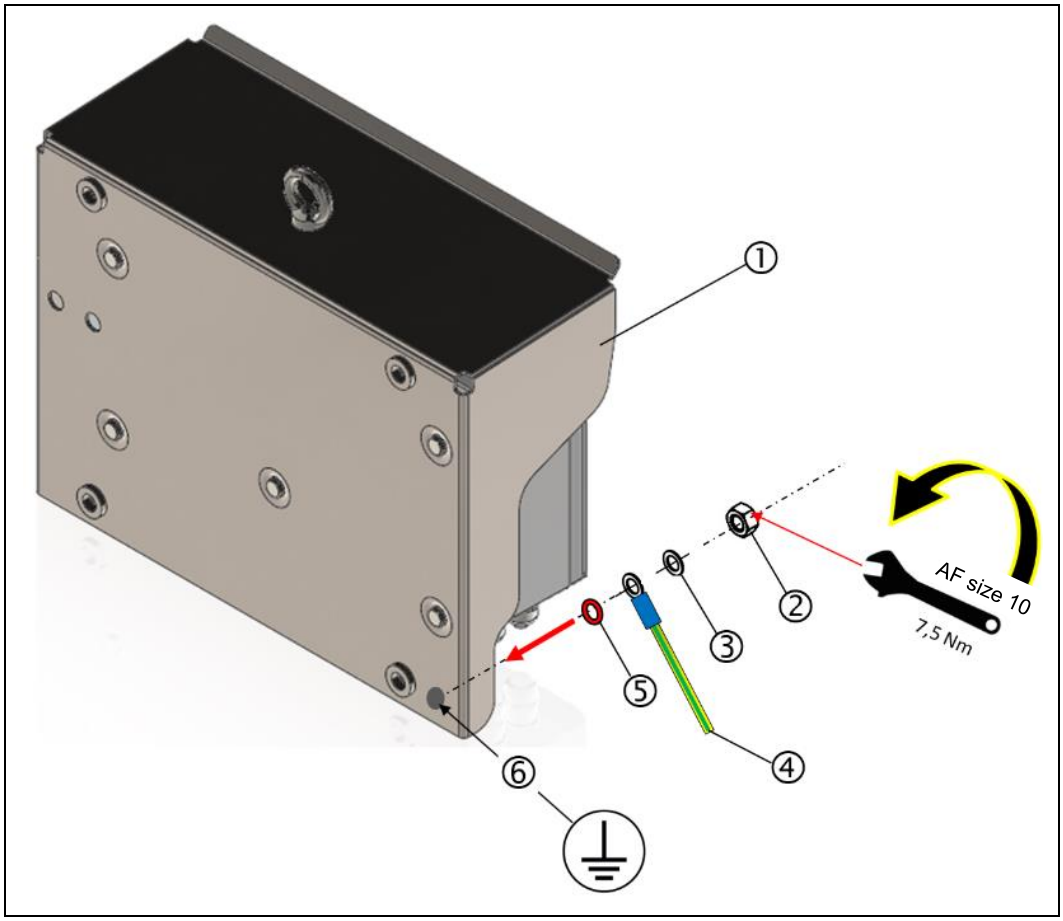


Fig.: 71 : Installing the earth connection on the VN301^{plus} central unit

1: Protective cover VN301^{plus}
2: M6 hexagon nut DIN934, galvanised
3: Schnorr washer
4: Earthing cable with ring eye DN6 (customer-specific)
5: Contact washer M6 with teeth
6: Welding screw M6 x16 (factory-fitted)

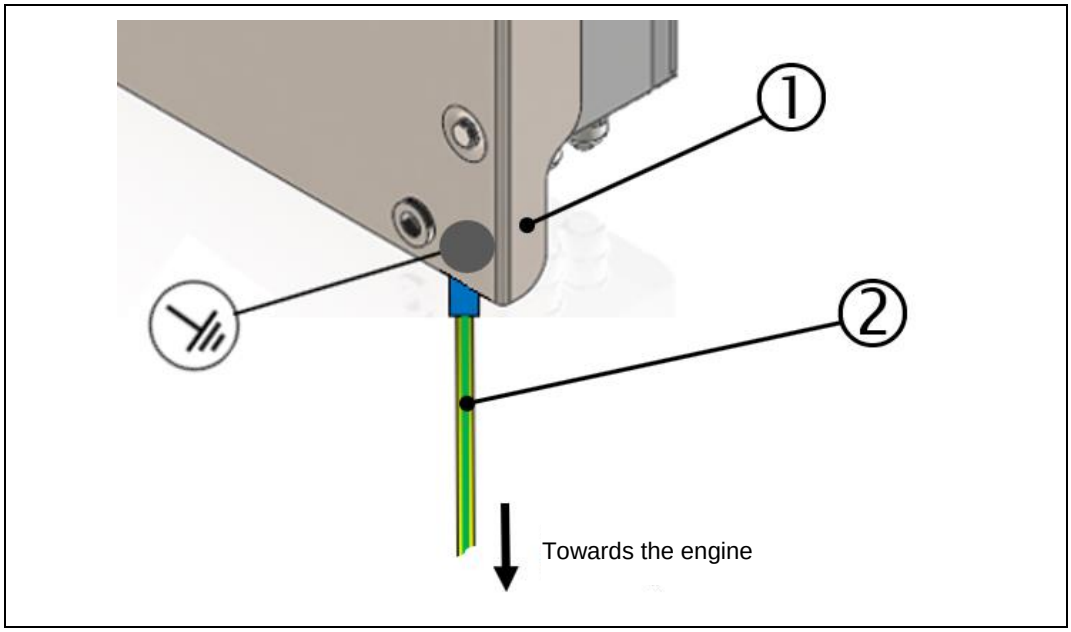


Fig.: 72 : Earth connection, VN301^{plus} central unit

1: Protective cover, VN301^{plus} (cut-out)
2: Earthing cable fully assembled

6.5 Starting up for the first time

WARNING

Risk of oil mist explosion

Engine protection not guaranteed!

- The oil mist detection system may only be started up after all the components have been completely installed.
- To establish protection of the engine, start up the oil mist detection system 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 potentially explosive atmospheres, 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 operating manual and other documents that accompany the product carefully and keep them in a suitable place for future reference.
- For repair and service work, you must follow the instructions in the operating manual.

NOTE

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	☑
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 13: Checklist for startup

6.5.2 Connecting the power supply

The power supply on the VISATRON® VN301plus central unit has been provided in advance by the operator and installed according to Section 6.4.4.

⇨ Section 6.4.4 Electrical and pneumatic installation of the central unit

Switch on the power supply for the oil mist detection system.

- Activates the power supply provided by the customer

NOTE

When the VISATRON® VN301plus central unit
VISATRON® VN301plus / VN301plus EX sensor units

- 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.: 73 : System Ready on VN301plus / VN301plus EX central unit and sensor unit

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

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

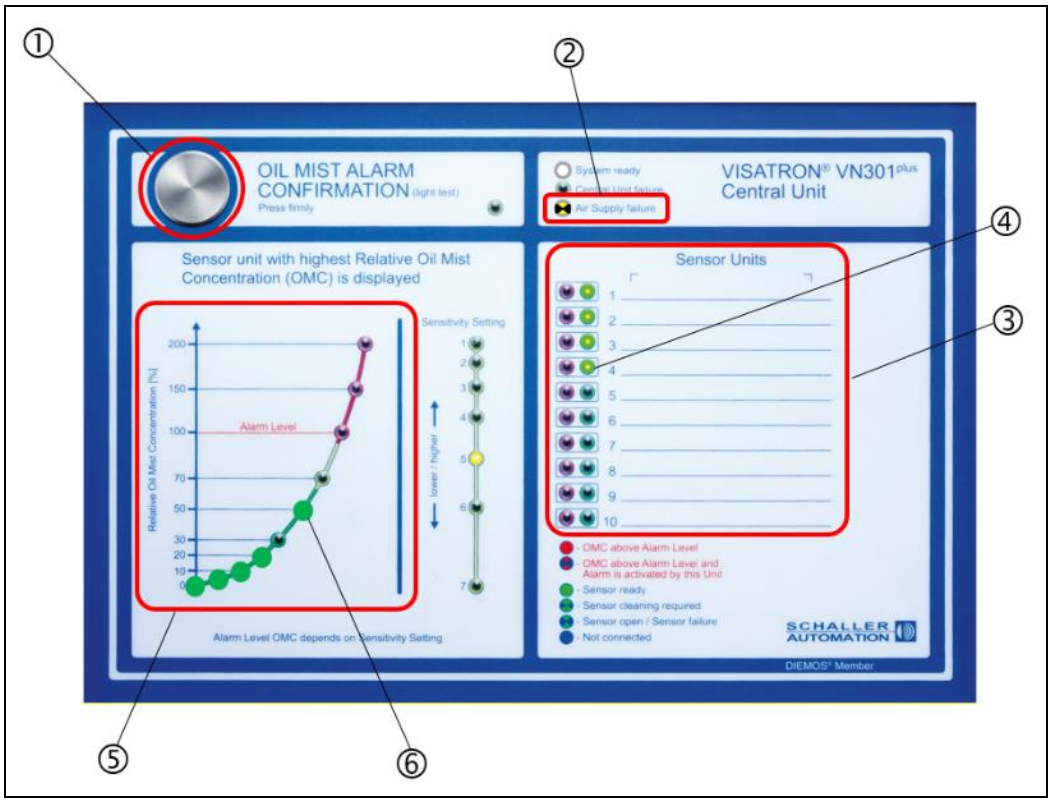


Fig.: 74 : VN301plus central unit: Setting the supply pressure

1: Oil mist alarm confirmation button
2: “Air supply failure” LED
3: Sensor units
4: Last installed sensor
5: **O**il **M**ist **C**oncentration (OMC)
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 74:

- 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.

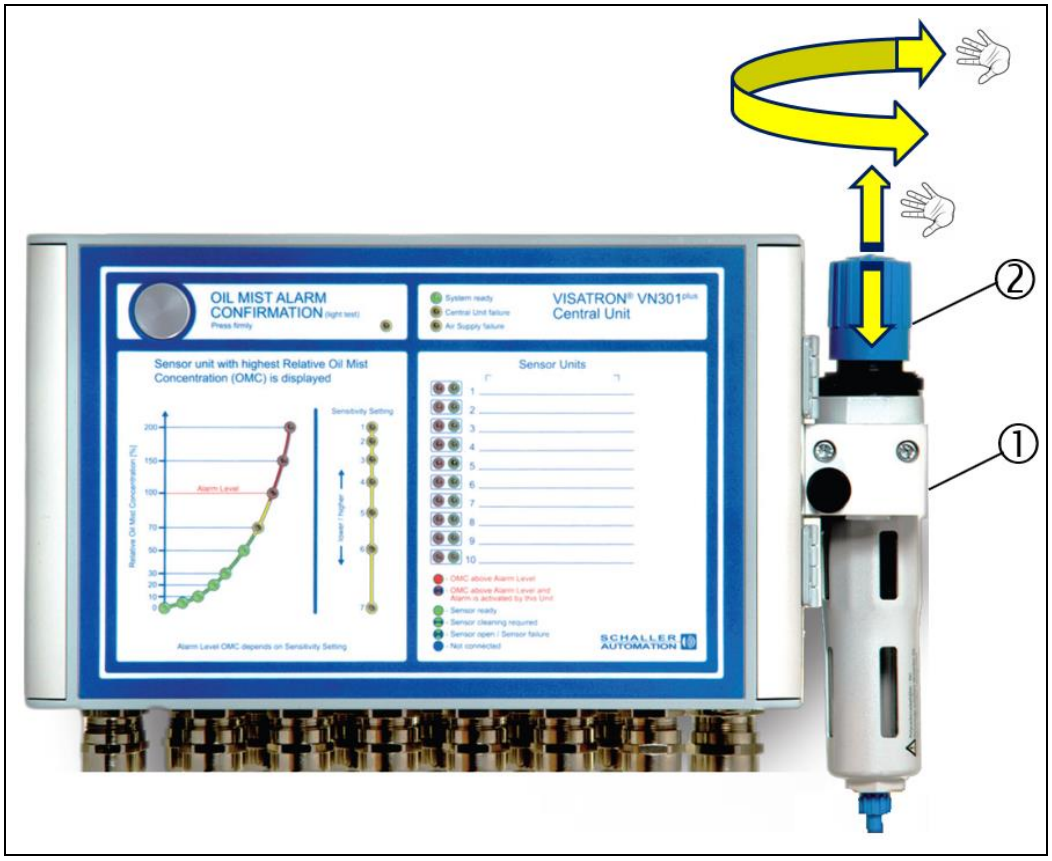


Fig.: 75 : VN301^{plus} central unit: Adjusting the pressure regulator unit

1: Pressure regulator unit
2: Adjusting cap

6.5.4 Displaying and setting the sensitivity on the VN301plus central unit

The sensor unit determines the oil mist concentration by optical measurement. The calculated value is the opacity in percent. 100% opacity means that no more light penetrates through the oil mist sample because of maximum turbidity.

The lower explosive limit (LEL) to an oil mist concentration of 47 mg/l in the air at a temperature of 25 °C. The regulations of IACS UR M67 require that oil mist detectors output an oil mist alarm at approx. 2.5 mg/l at the latest. The lowest sensitivity of all VN301plus oil mist detection system, sensitivity setting 7, still ensures that an oil mist alarm is output at oil mist concentrations < 2.0 mg/l. This fully complies with the requirements of IACS UR M67.

NOTE

Setting the sensitivity on the oil mist detection system

- The customer is responsible for deciding the sensitivity level to be set on the oil mist detection system. The oil mist detection system is set to sensitivity **level 5** at the factory.
- To change the sensitivity of the oil mist detection system, follow the complete instructions in the VN301plus end-user software manual. The instructions are supplied on the DVD with the software as well.

WARNING

Setting the sensitivity on the oil mist detection system

- 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 potentially explosive atmospheres, the relevant safety instructions must be observed.
  ⇨ *Section 2.4.1 Safety instructions for potentially explosive atmospheres*

The following table shows the assignment of the set sensitivity to the oil mist concentration in [mg/l]:

VN301plus Sensitivity setting [Sensitivity]	Alarm level Oil mist concentration [mg/l]
1	0.70
2	0.80
3	0.90
4	1.00
5 (Default factory setting)	**1.20**
6	1.50
7	2.00

Table 14: Assignment table (sensitivity/alarm level)

You can display the sensitivities of all connected sensor units on the central unit as shown in the following figure and instructions. If necessary, you can change the sensor sensitivity, if the VN301plus end-user software has been installed and configured on your PC/laptop first and a data connection to your oil mist detection system has been established.

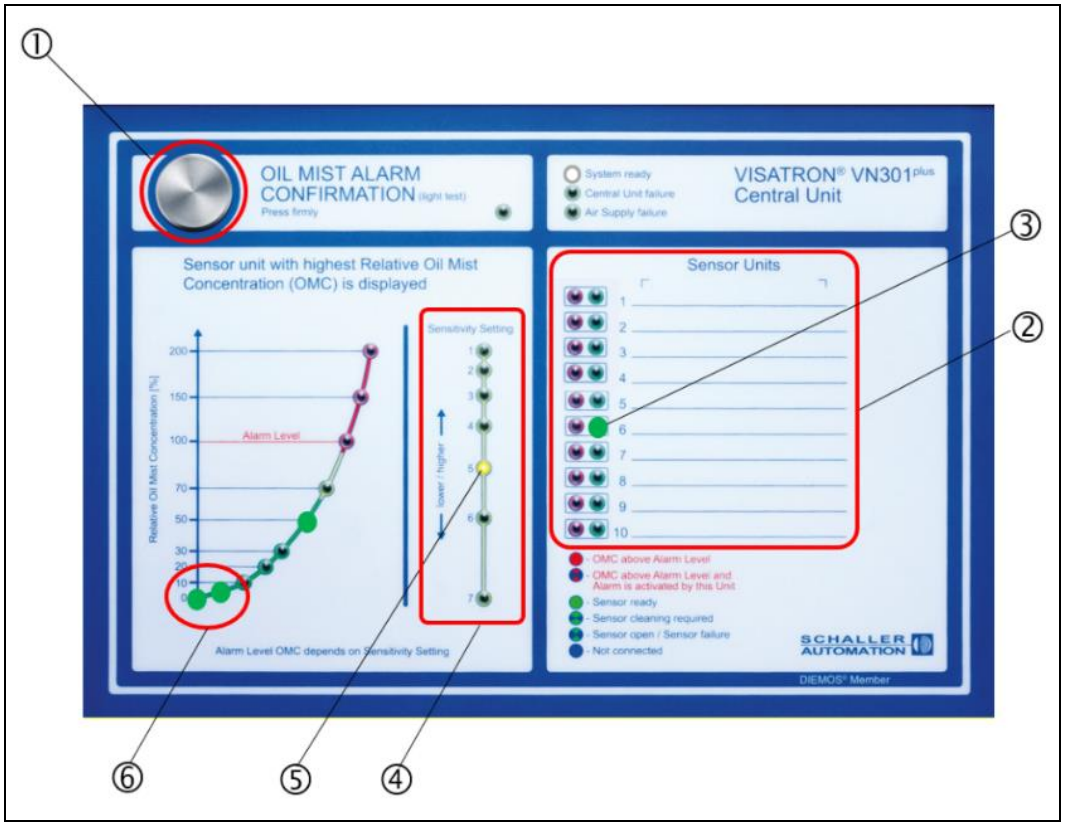


Fig.: 76 : VN301^{plus} central unit: Setting the sensor sensitivity

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 detection system may only be started up after all the components have been completely installed.
- To establish protection of the engine, start up the oil mist detection system 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 potentially explosive atmospheres, the relevant safety instructions must be observed.
  ⇨ *Section 2.4.1 Safety instructions for potentially explosive atmospheres*

IMPORTANT INFORMATION

Using smoke tubes correctly

- The smoke tubes approved for use have an expiry date and **must therefore be used at the latest within 3 months of delivery**.
- Smoke tubes that have already reached their expiry date must be properly disposed of. ⇨ *Section 11.1 Disposal*
- Recommended storage conditions:
  Temperature: 0 °C to 40 °C
  Humidity: up to max. 70% RH at 40 °C

Once the steps in Sections 6.5.1 to 6.5.4 (inclusive) have been successfully completed, you can start the function test. Please carry out the steps below:

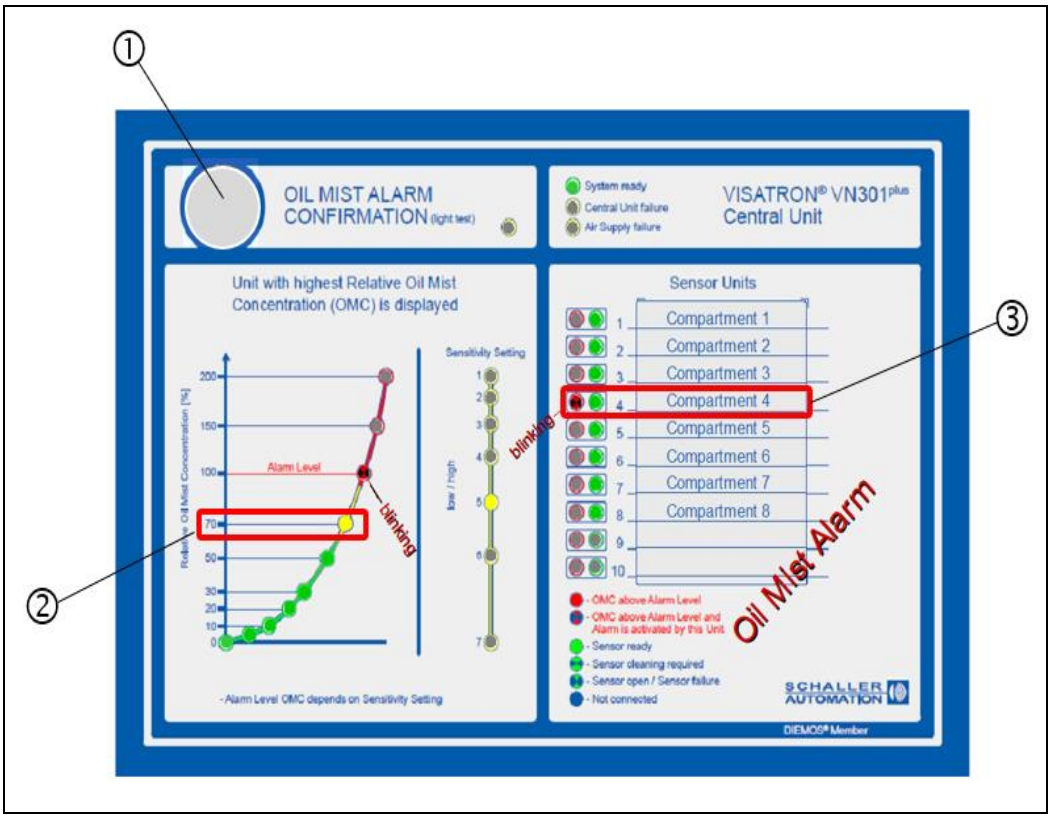


Fig.: 77 : Function test on starting up for the first time for the VN301^{plus} central unit

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

1. Each suction point is checked separately.
   - ▶ The smoke tube is installed and the function test is carried out as described in Section 9.1.4.
     ⇨ Section 9.1.4 Function test of the sensor units using smoke tube (8,000 hrs.)
2. After a short time, the central unit displays an alarm as shown in the figure above. 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 suction points of 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

NOTE

Starting up for the first time, VISATRON® VN301plus 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® VN301plus oil mist detection system is now ready for operation!**

7 Manufacturer settings

7.1 Parameter settings for the VISATRON® VN301plus central unit

The VISATRON® VN301plus / VN301plus 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.

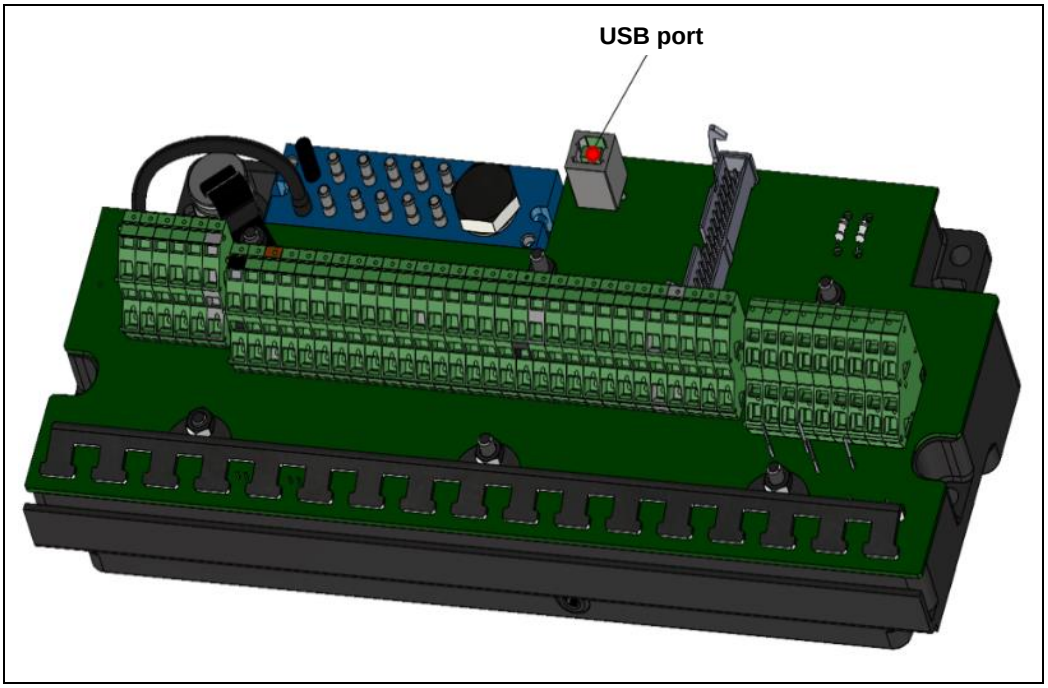


Fig.: 78 : VN301plus central unit, USB port

CAUTION

Adjusting the parameters of the central unit safely and correctly

- To adjust the parameters of the central unit, read this operating manual and the user manual for the VN301plus end-user software (part number 180103 [DE] / 180104 [EN]), the latest versions. Please also comply with the other documents accompanying the product, read them carefully and keep them in a suitable place for future reference.

NOTE

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® VN301plus / VN301plus EX central unit must be earthed.
  ⇨ Section 6.4.7 Connection of earth to the housing of the VN301plus central unit

The following components are required for adjusting the parameters:

- Service laptop/netbook (provided by the user)
  - The minimum system requirements are described in detail in the “Operation manual for VN301plus end-user software (part number 180103/180104)” under the **System Requirements**.
- USB A/B connection cable -> connector **A** to connector **B** (provided by the user)
- Service software, for adjusting the parameters (included in the delivery)
  - The service software (the end-user software) must be installed on the laptop first, as per the above manual.
  - Also see the above manual for how to use the service software.

To access the USB port on the central unit, the unit has to be opened. See Section 6.4.4, steps 1 - 3, in these instructions for how to open the central unit.
⇨ Section 6.4.4 Electrical and pneumatic installation of the central unit

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

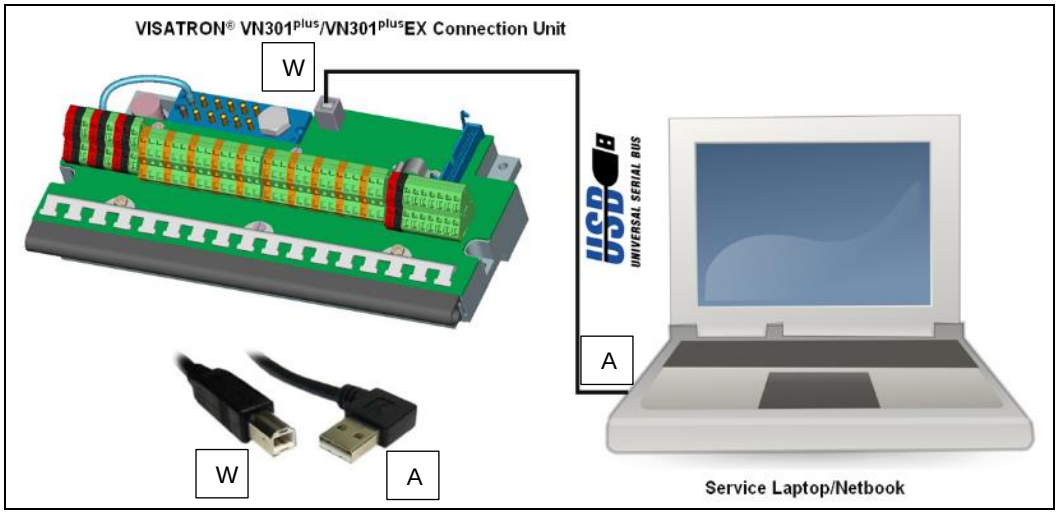


Fig.: 79 : Establishing the USB connection between the VN301plus central unit and the service PC

NOTE

Adjusting the parameters of the VISATRON® VN301plus central unit

- Adjusting the parameters always only sets the parameters for the central unit that is connected. -> No distinction between master/slave
- Sensitivity level 5 is the factory setting.

The parameters are entered as per the parameter list below:

Parameter set	Input value
Number of VN301plus central units	1 or 2
Number of sensors for the central unit	1 to 10
Oil mist alarm threshold	**Oil mist concentration**
1	0.70 mg/l
2	0.80 mg/l
3	0.90 mg/l
4	1.00 mg/l
5 (Default factory setting)	**1.20 mg/l**
6	1.50 mg/l
7	2.00 mg/l
Date	Automatically entered by the system
Time	Automatically entered by the system

Table 15: Parameter list

Once adjusting the parameters has been completed successfully, close the central unit again as follows:

⇨ *Section 6.4.4 Electrical and pneumatic installation of the central unit*

CAUTION

Safe and proper use of the device

- Read the operating manual and other documents that accompany the product carefully and keep them in a suitable place for future reference.
- For repair and service work, you must follow the instructions in the operating manual.

NOTE

Remove cable ties

- Note on step 1: Completed by removing the cable ties.

Closing the central unit

- Note on step 3: A torque spanner (size PH2) is used to close the central unit. Tightening torque: **3 Nm**

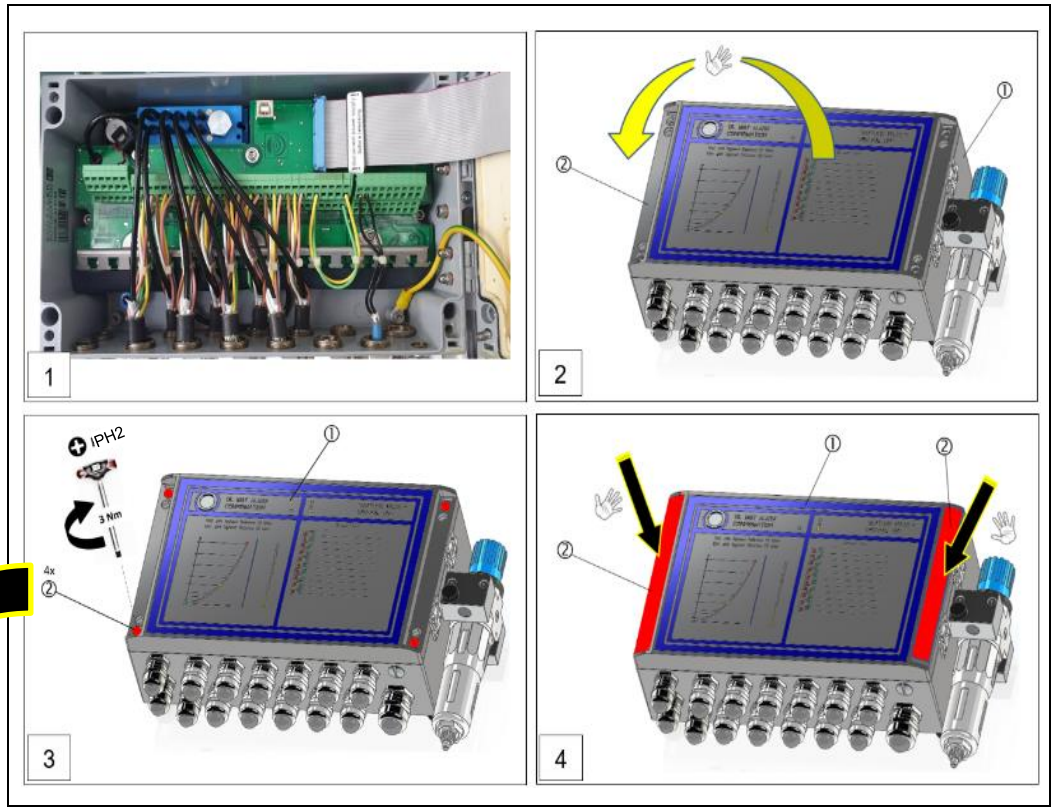


Fig.: 80 : Close the VN301^{plus} central unit (steps 1 - 4)

Finally, re-establish all electrical and pneumatic connections to the central unit.

☑ **Adjusting the parameters of the VISATRON® VN301^{plus} central unit has been completed successfully!**

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 potentially explosive atmospheres, 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 this operating manual, the user manual for the end-user software and the other documents that accompany the product carefully and keep them in a suitable place for future reference.

NOTE

Personal protective equipment

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:

- 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 Displaying and setting the sensitivity 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 this manual. ⇨ *Section 10 Error diagnosis and troubleshooting*

8.2 Operation under correct conditions

The operating temperature of the VN301plus EX sensor unit
CE 0637 Ex II -/2G Ex op is IIB T4 -/Gb is:

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

The conditions in Section 3.4.4 must also be observed for safe and correct operation!
⇨ *Section 3.4.4 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® VN301plus / VN301plus EX central unit in normal operation; in this example, in combination with 8 sensors.

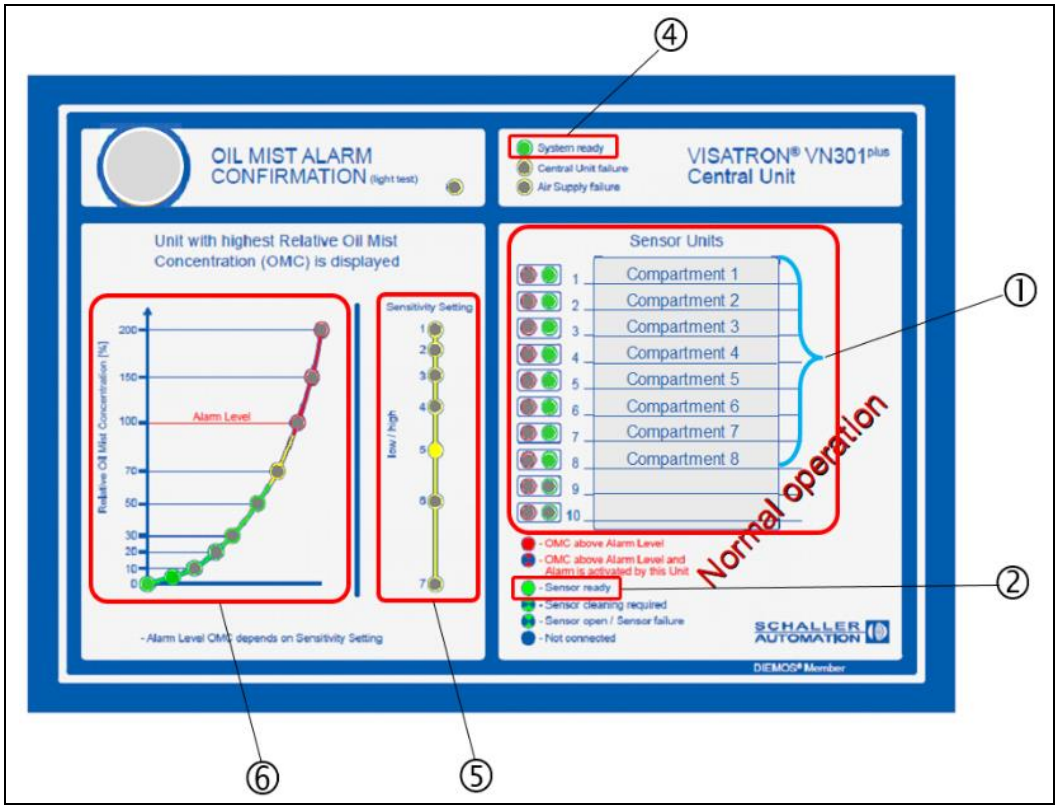


Fig.: 81 : VN301plus central unit: Display in normal operation (no oil mist alarm, no error)

Fig.: 82 : "Sensor Ready" status indicator on the VN301plus / VN301plus EX sensor unit

1: Sensor units
2: "Sensor Ready" key (central unit)
3: "Sensor Ready" status indicator (sensor unit; Fig. 78)
4: "System Ready" status indicator (central unit)
5: "Sensor sensitivity" status indicator
6: "Oil mist concentration" status indicator

The 8 sensors are installed in Compartment 1 up to and including Compartment 8 [Figure 81, ①]. The sensor status is displayed by the green LED (ready for operation) [②]. The status of the sensor unit is also indicated by a green LED. [Figure 82, ③]

The VISATRON® VN301plus / VN301plus EX system is ready for operation, indicated by the green "System ready" LED at the top right. [Figure 81, 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 operation!**

8.5 LED check

An LED check can be run for the VISATRON® System VN301plus / VN301plus EX central unit at any time to check that it is functioning and to check the display.

NOTE

Exception for the LED check

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

The LED check is run as follows:

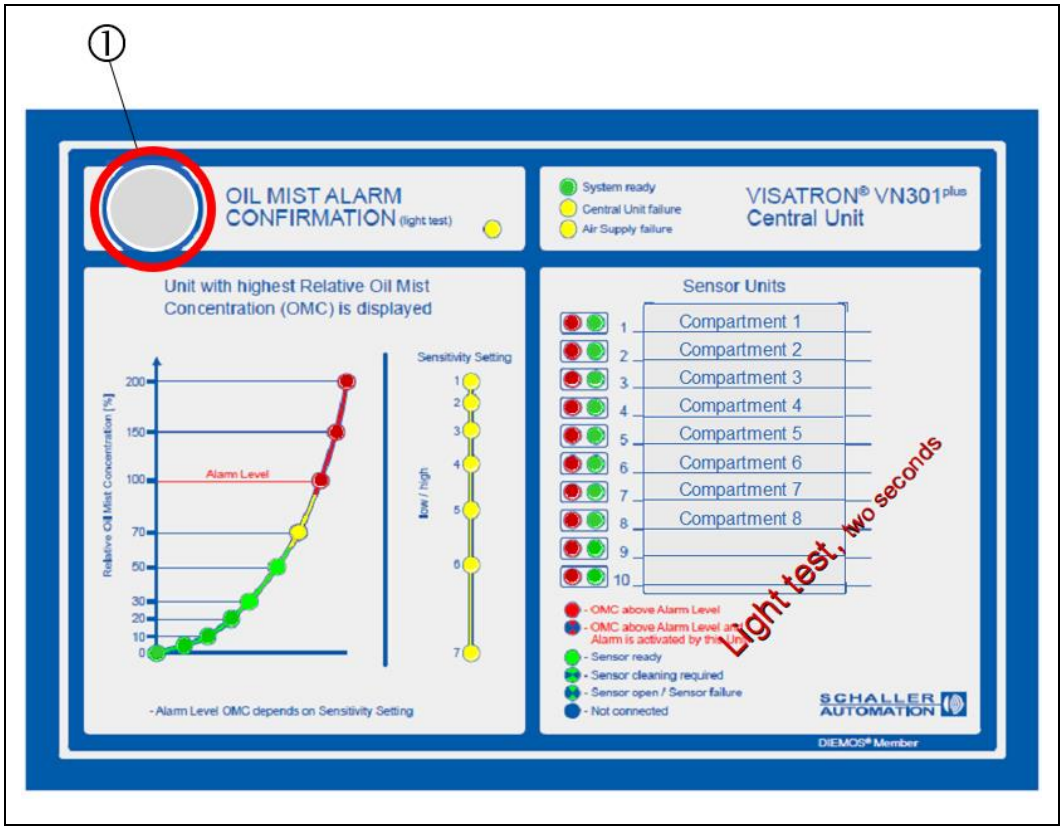


Fig.: 83 : VN301^{plus} central unit: LED check (light test)

1: Confirmation button

1. Press the oil mist alarm confirmation button [①] on the central unit display.

   ▶ 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.

☑ **The LED check has been run successfully!**

8.6 Checking the supply pressure, sensor OMC and sensitivity

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

⇨ Section 6.5.3 Setting the supply pressure on the pressure regulator of the VN301plus central unit
⇨ Section 6.5.4 Displaying and setting the sensitivity on the VN301plus central unit

☑ **The sensitivity check and supply pressure check have been completed successfully!**

8.7 “Oil mist pre-alarm” status indicator

When high relative oil mist concentrations are reached at a minimum of one sensor unit, the LED bar display [①] comes on or the LED indicator increases steadily.

Example use case:

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 “70” [②] comes on yellow.

The “System ready” LED indicator [③] stays green.

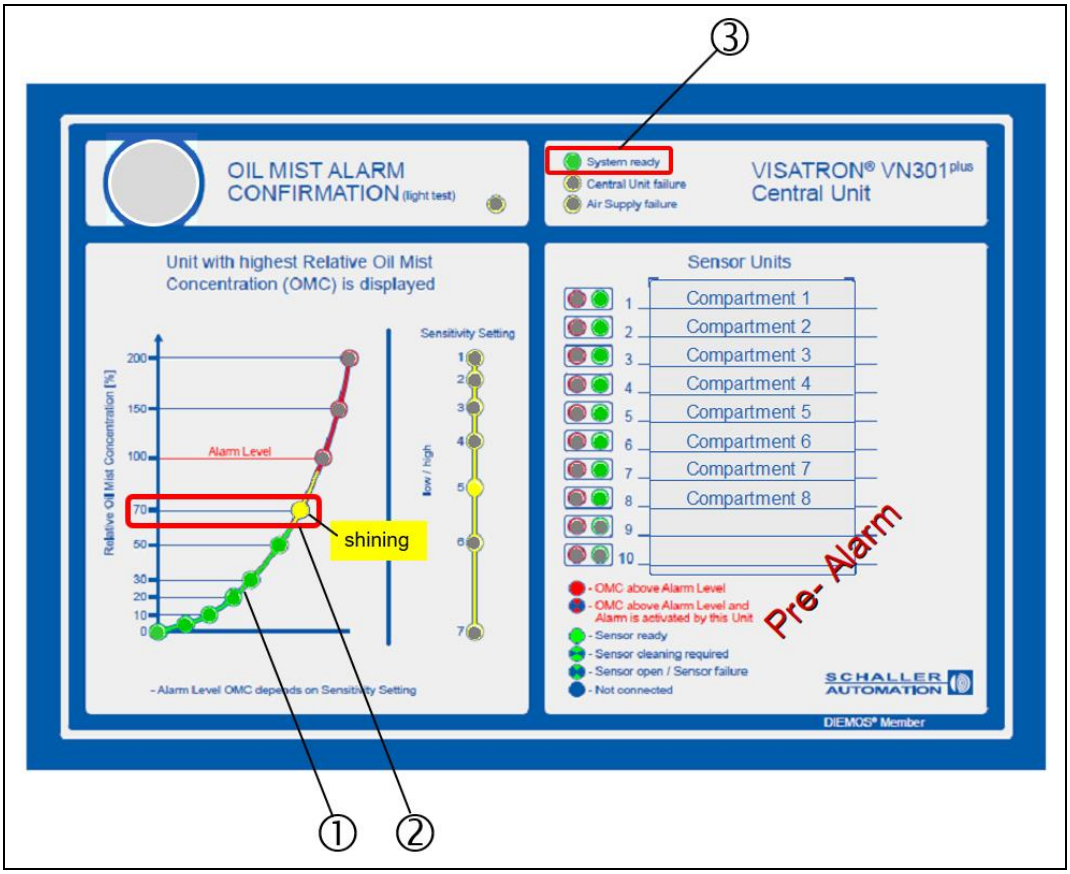


Fig.: 84 : VN301plus central unit: “Pre-alarm” status indicator at 70% OMC

1: Oil mist concentration characteristic curve
2: Relative oil mist concentration 70% indicator
3: “System ready” indicator

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 of the oil mist detection system or the remote indicator has fallen again.

- 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 potentially explosive atmospheres, the relevant safety instructions must be observed.
  ⇨ *Section 2.4.1 Safety instructions for potentially explosive atmospheres*

NOTE

Action in the event of an oil mist alarm

- The sensor unit that first triggered the alarm is indicated by a flashing red LED (where damage has occurred).
- The oil mist alarm message must be confirmed by pressing the oil mist alarm confirmation button on the VISATRON® VN301plus central unit.
- The relative oil mist concentration (opacity) is displayed by the LED characteristic curve on the central unit display (left).

In the event of damage to the main or big end bearing, it can be assumed that the relative oil mist concentration will reach the defined alarm threshold in a very short time.

Example use case 1:

- The oil mist alarm is triggered at a relative oil mist concentration ≥ 100%, as shown in the figure below. In this case, the 100% LED indicator flashes red. [①]

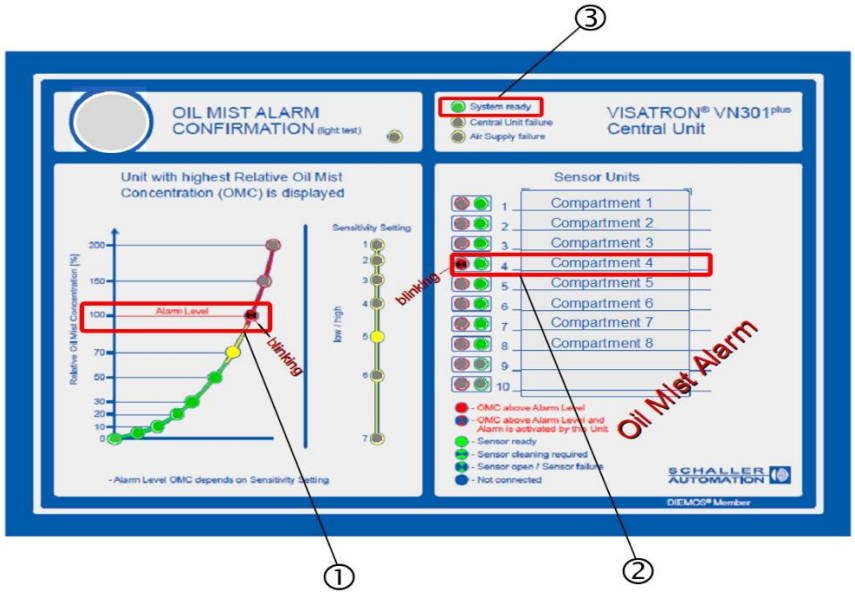


Fig.: 85 : VN301plus central unit: “Alarm” status indicator at 100% OMC (example 1)

1: Relative oil mist concentration 100% indicator 2: Display, compartment 4 (alarm)
3: “System ready” indicator

- At the same time, a flashing red LED indicates the sensor at which the alarm concentration was first exceeded. [②] In this example, the alarm concentration was first detected in compartment 4.

- The “System ready” LED indicator [③] stays green.
- If the opacity subsequently decreases, the alarm status is saved.

Example use case 2:

In the figure below, the alarm was triggered by sensor 4 [①] (flashing red LED). The alarm threshold was then exceeded at sensors 3, 5 and 6 [②], indicated by a continuous LED.

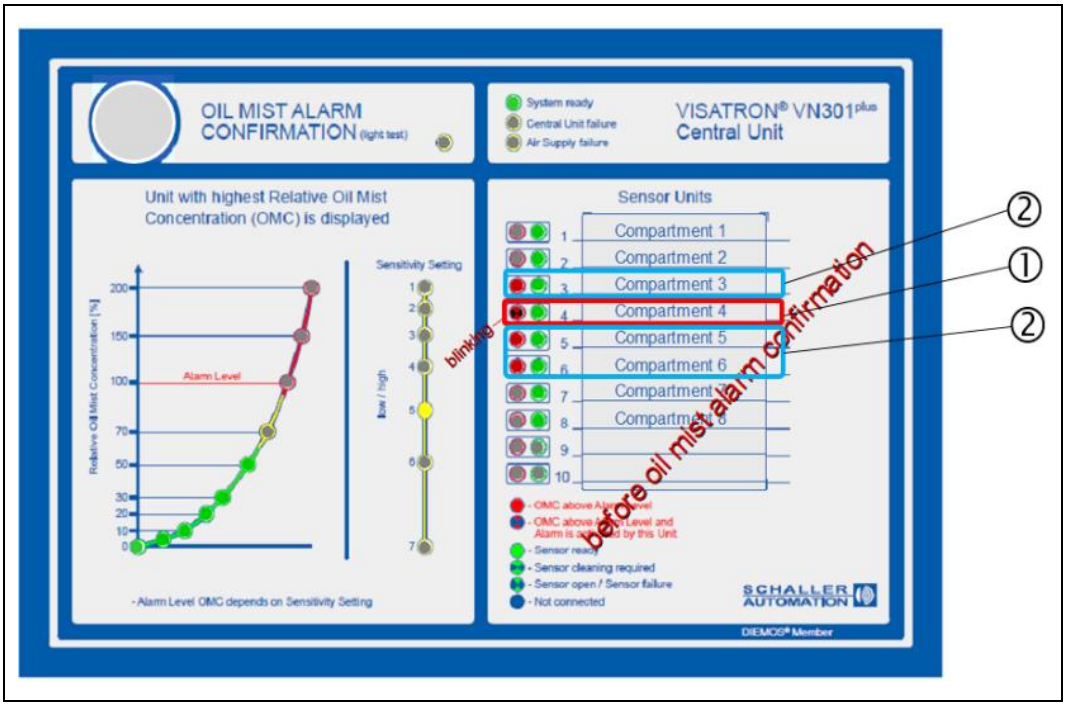


Fig.: 86 : VN301plus central unit: “Alarm” status indicator at 100% OMC (example 2)

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 potentially explosive atmospheres, the relevant safety instructions must be observed.
  ⇨ *Section 2.4.1 Safety instructions for potentially explosive atmospheres*

CAUTION

Confirming an oil mist alarm

- Only confirm the oil mist alarm using the 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%).

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

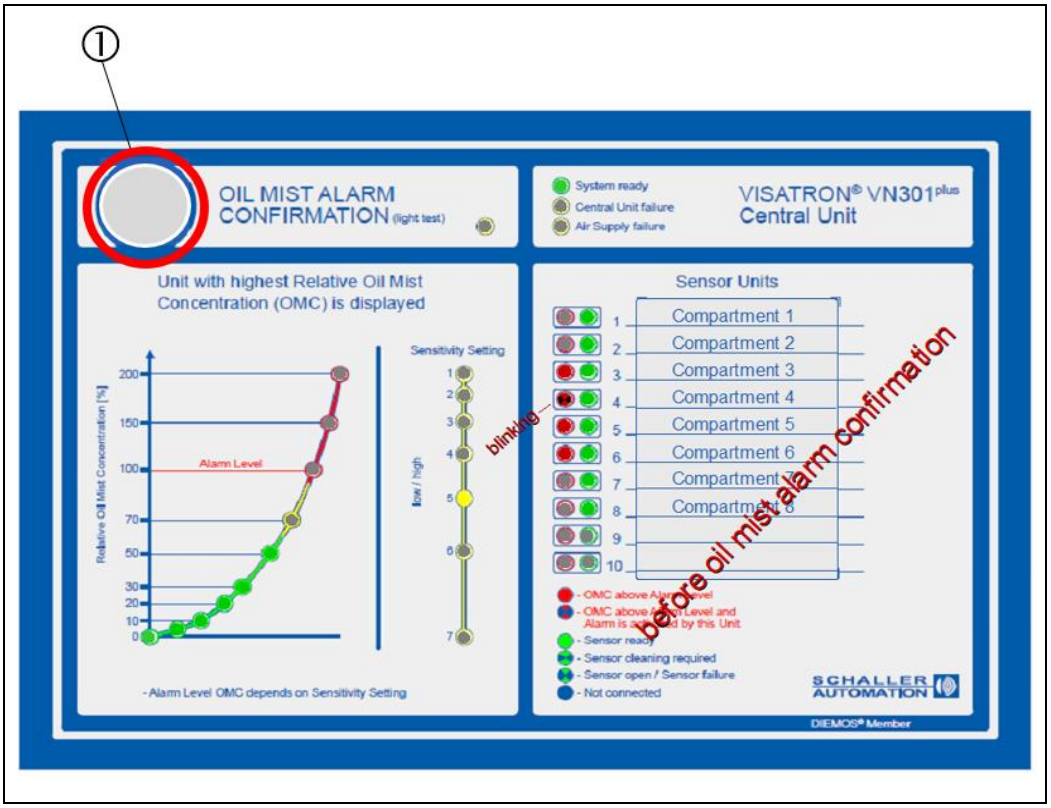


Fig.: 87 : VN301plus central unit: Confirm the oil mist alarm (only < 70% OMC)

1: Oil mist alarm confirmation button

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 [①] on the VISATRON® VN301plus central unit. (see figure above)

Example use case

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

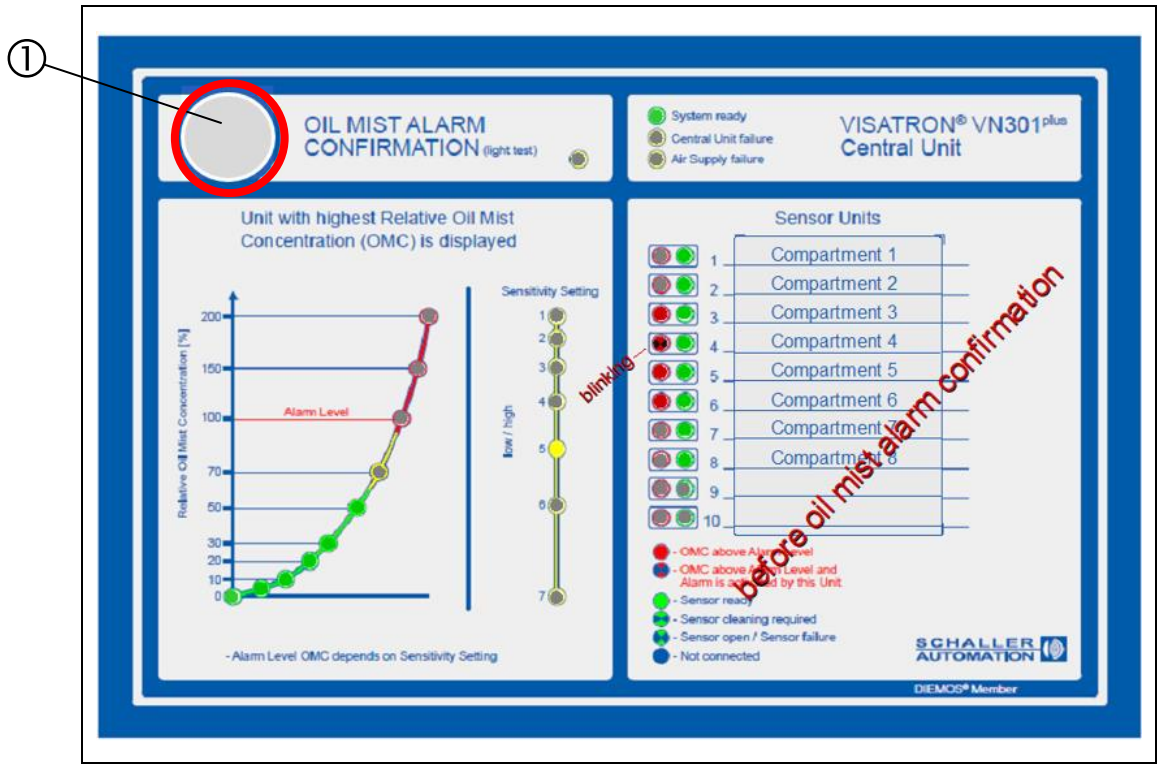


Fig.: 88 : VN301^{plus} central unit: “Alarm” status indicator at 50% OMC (example)

1: Oil mist alarm confirmation button

Fig.: 89 : VN301^{plus} central unit: Status indicator 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® VN301plus) with the EX version (VN301plus 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 potentially explosive atmospheres, 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 this operating manual and other documents that accompany the product carefully first and keep them in a suitable place for future reference.

NOTE

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 tables below list the maintenance cycles for the VISATRON® VN301plus and VN301plus 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.

CAUTION

Safe and correct maintenance of the device

▶ The specified maintenance cycles apply to engine operation with mineral SAE 40 lubrication oil. If other lubricants are used, contact the service department at Schaller Automation Industrielle Automationstechnik GmbH & Co. KG, as per Section 12 (Contact) in these instructions.

⇨ *Section 12 Contact*

No./action	Description	Interval quarterly or after 2,000 operating hours (whichever occurs first)					
	Hours	2,000	4,000	8,000	16,000	See Section	Required parts/ tools
	Or months	3	6	12	24		
1.	Check the supply pressure setting on the central unit: ▪ 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) VN301plus toolbox (151781)
4.	Replace the air filter (5 µm filter cartridge) in the pressure regulator unit		X	X	X	9.1.3	VN301plus service box, (151779)
5.	Carry out maintenance measure under "**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	VN301plus service box, (151779)
7.	Inspection of the whole system				S		

Key to maintenance measures:

X - Work that must be carried out by trained on-board personnel or by Schaller Service
S – Work that must only be carried out by authorised and certified Schaller Service

Table 16: Maintenance cycles

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

NOTE

Cleaning and care of system components

For cleaning system components of the VN301plus oil mist detection system, the following **optional** products are recommended or supplied by the manufacturer:

- Cleaning kit including cleaning fluid (151482)
- VN301plus toolbox, complete (151781)

When cleaning of the sensor light path 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® VN301plus / VN301plusEX sensor units [③], as in the figures below.

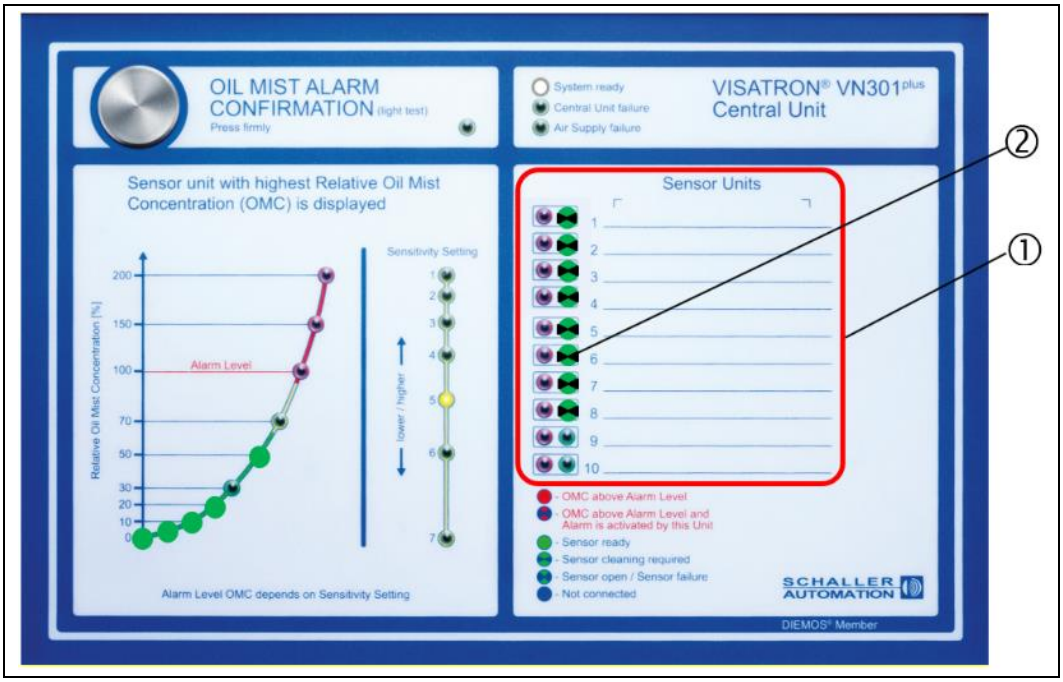


Fig.: 90 : "Sensor cleaning" status indicator, VN301plus central unit

1: Sensor units
2: "Sensor" status indicator on the central unit
3: "Sensor" status indicator on the sensor unit

Fig.: 91 : "Sensor cleaning" status indicator on the VN301plus / VN301plus EX sensor unit

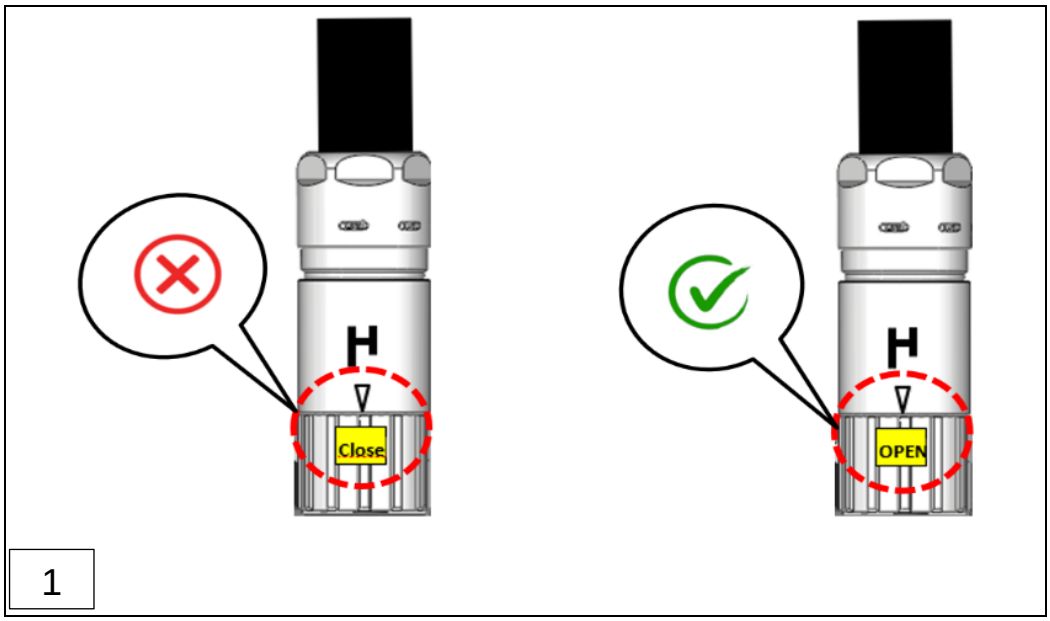
When the above indicator is displayed for the first time, the sensor has a degree of contamination on the sensor measuring track area of approx. 80%. Experience has shown that there is sufficient time for intensive cleaning of the sensor before it fails completely (when the upper contamination limit (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:

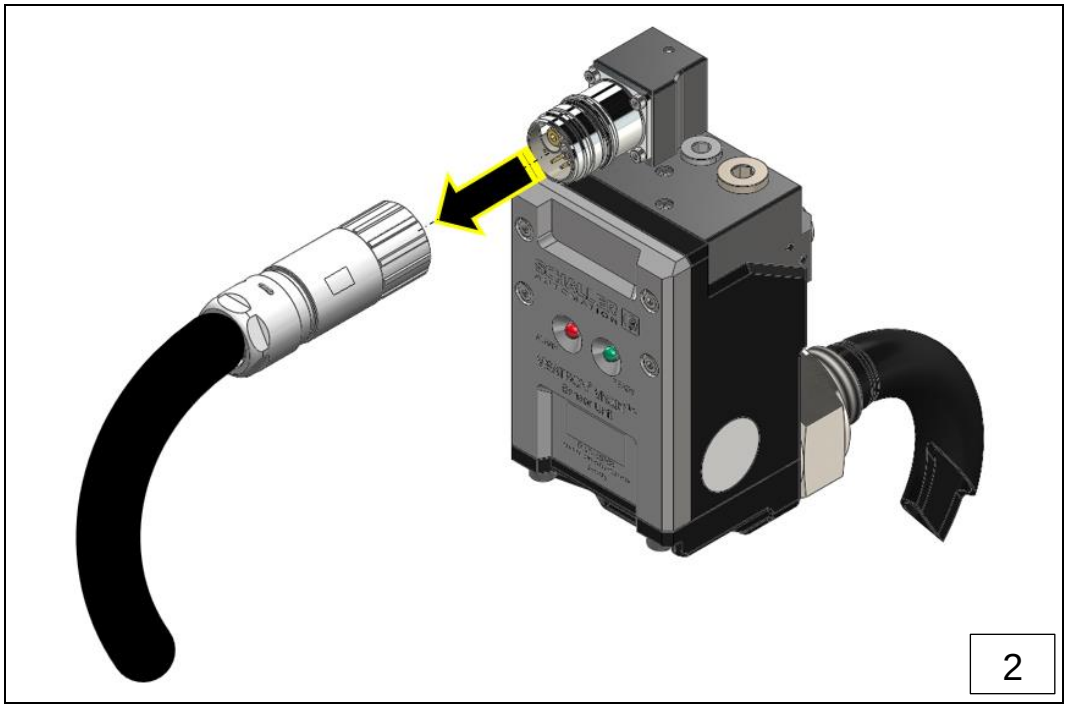
NOTE

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

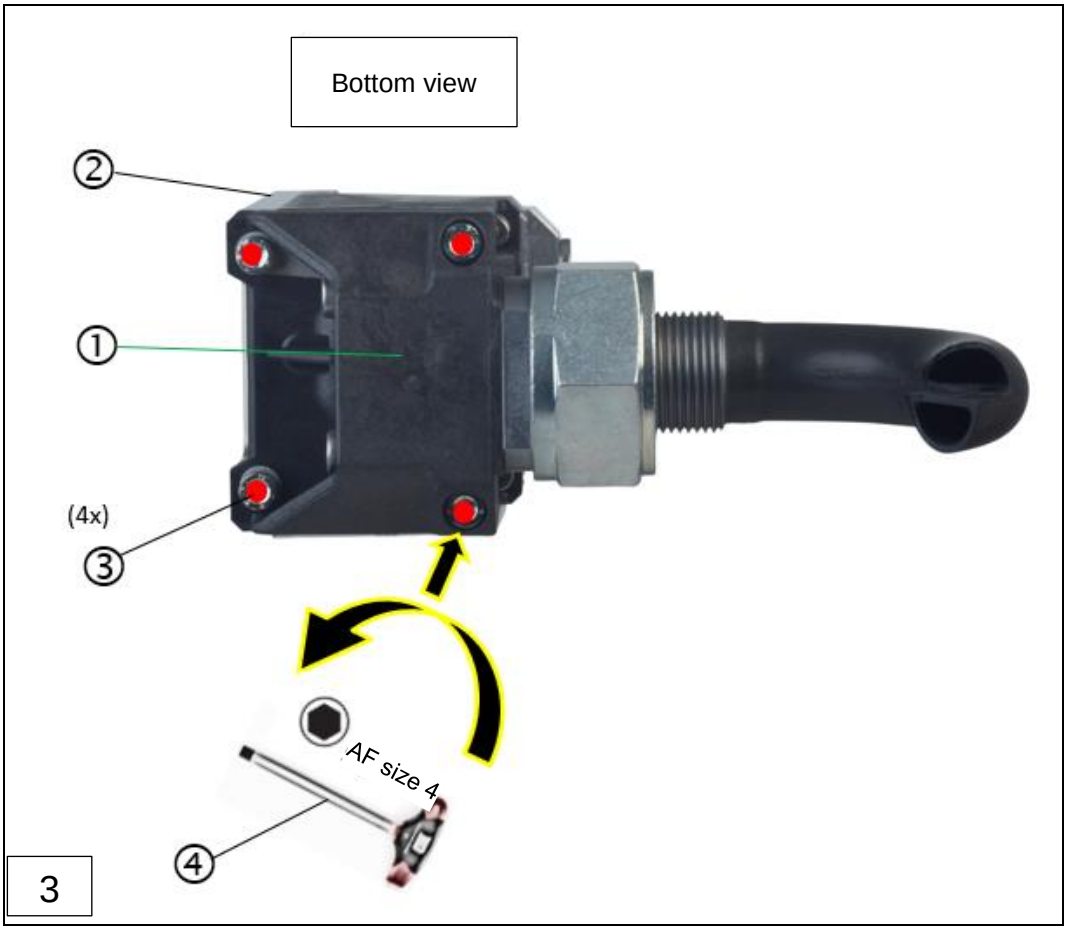
- ▶ Observe the safety instructions in Section 9.
  ⇨ *Section 9 Maintenance and repair*



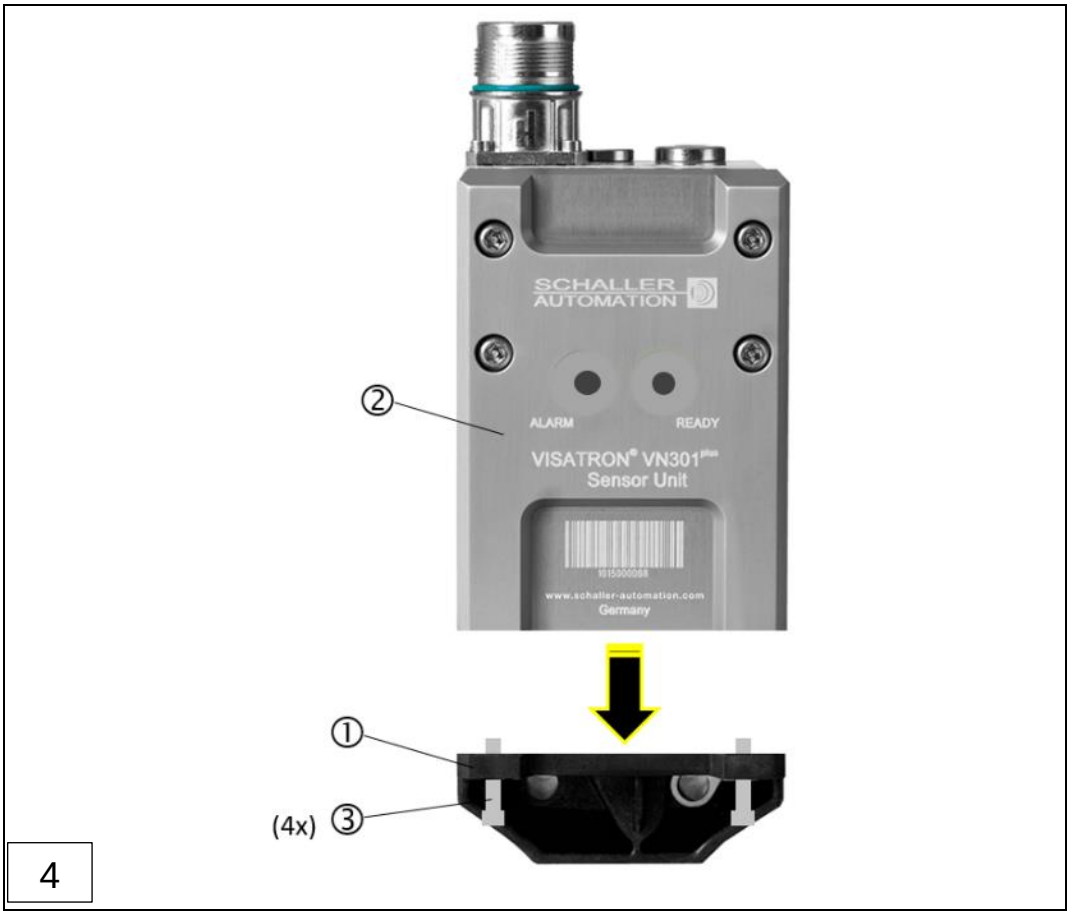
1



2


Bottom view
②
①
(4x)
③
AF size 4
④

3


SCHALLER AUTOMATION
②
ALARM
READY
VISATRON® VN301plus
Sensor Unit
www.schaller-automation.com
Germany
①
(4x)
③

4

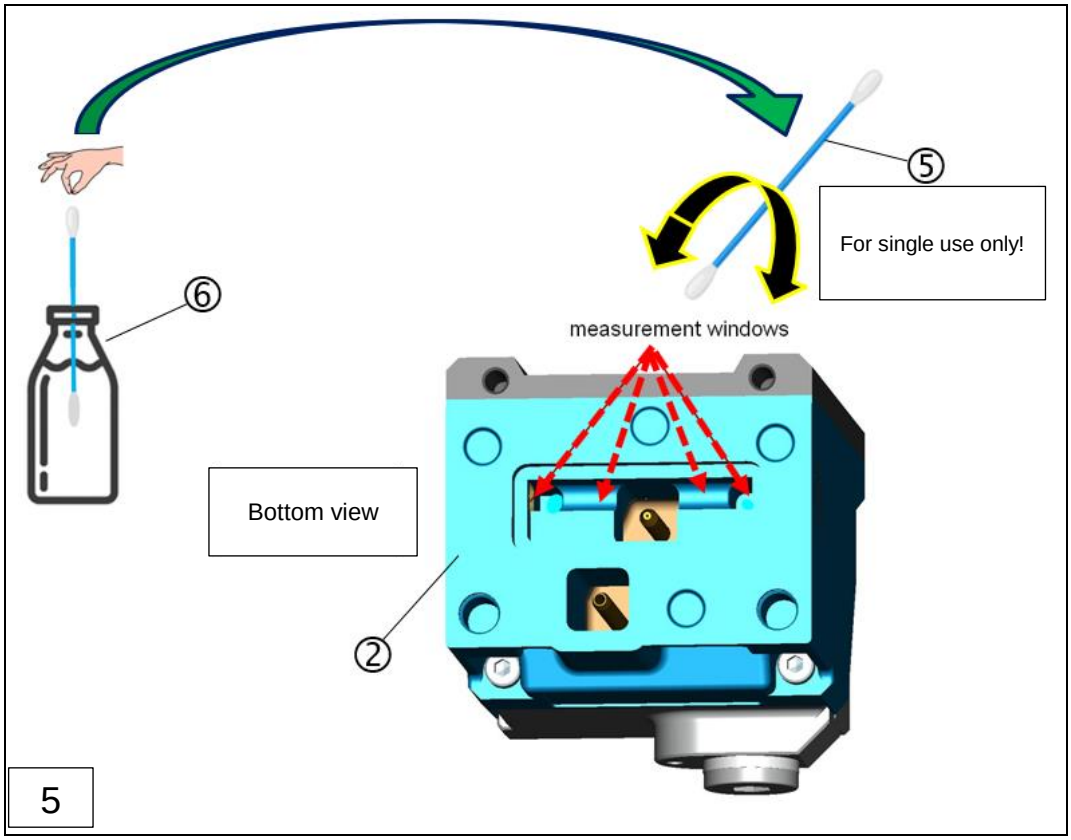
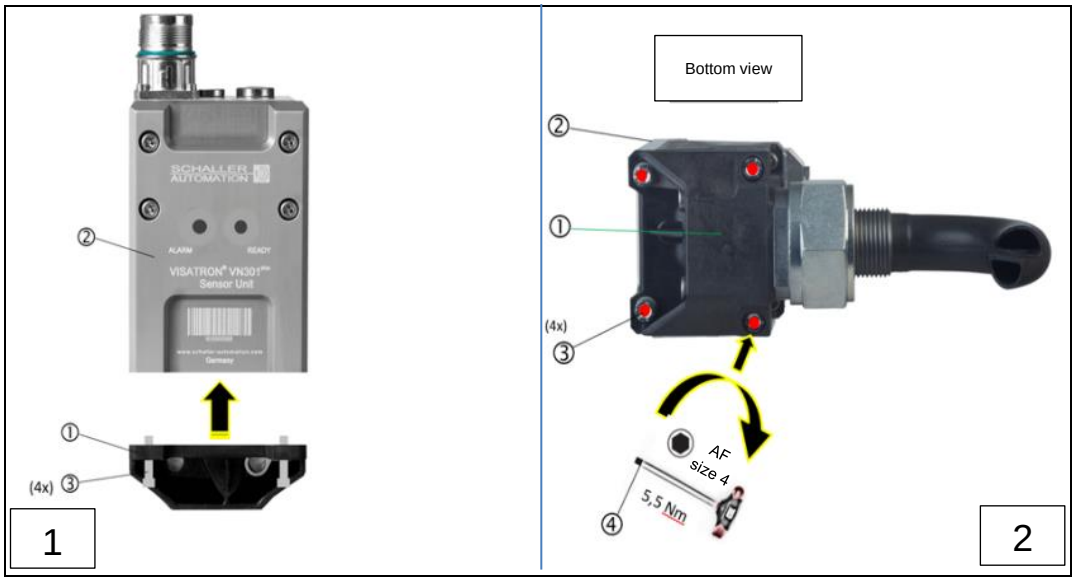


Fig.: 92 : Disassembly and cleaning of the VN301plus / VN301plus EX sensor unit (steps 1 - 5)

1: Holding bracket
2: Sensor
3: M5 fixing screws (captive)
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:



The following steps for installing the hybrid connector are for the following hybrid connector variants:

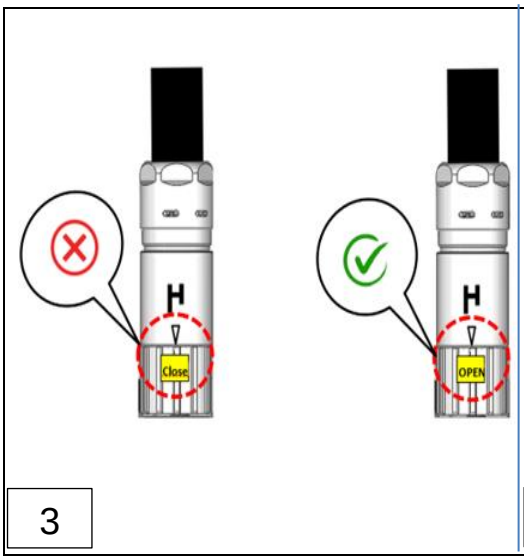
- Standard variant, hybrid connector with quick-release lock

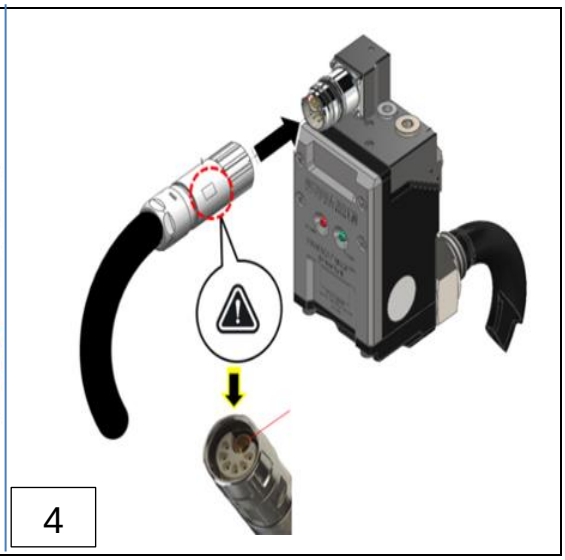
  ⇨ Section 6.4.2 Electrical and pneumatic connection of the sensor unit (standard)

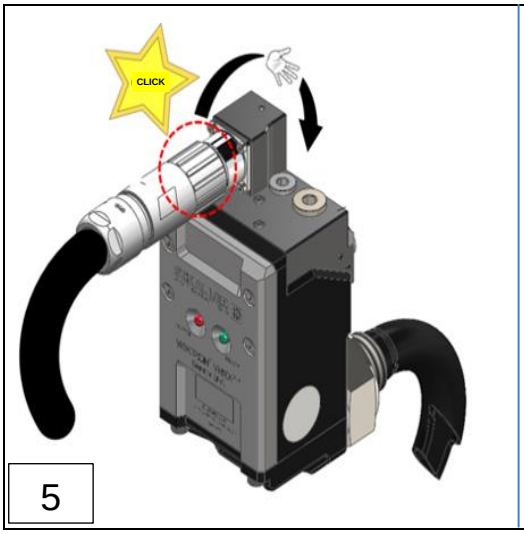
- Optional variant, hybrid connector with screw lock

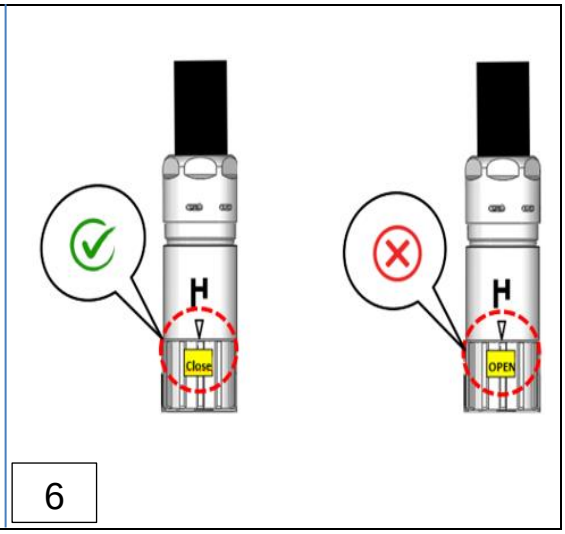
  ⇨ Section 6.4.3 Electrical and pneumatic connection of the sensor unit (optional)

Installing the standard variant, hybrid connector with quick-release lock:









or, instead of steps 5 and 6:

Installing the optional variant, hybrid connector with screw lock:

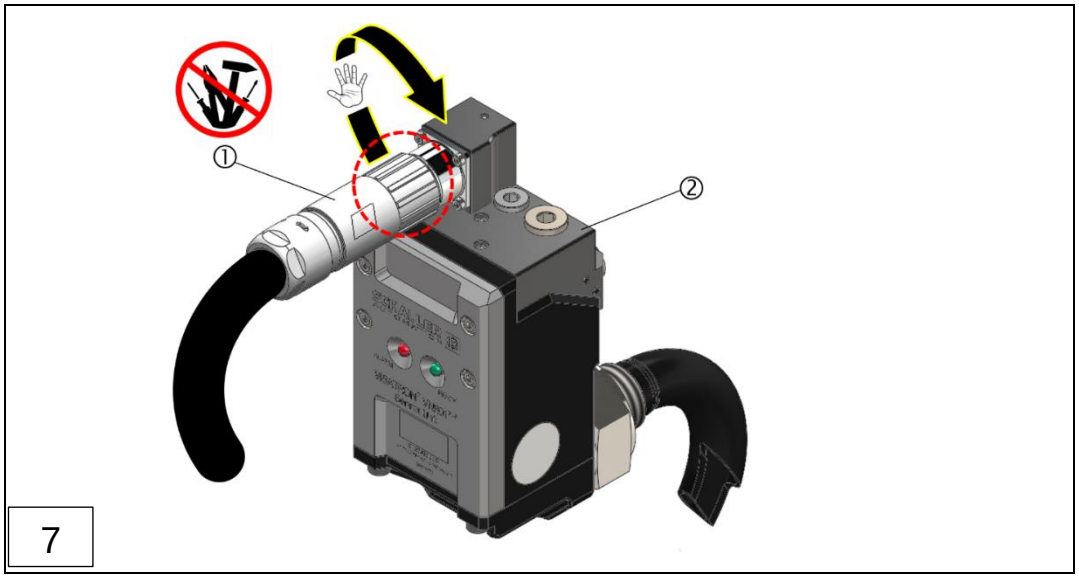


Fig.: 93 : Assembly after cleaning the VN301^{plus} / VN301^{plus} EX sensor unit (steps 1 - 7)

- ▶ Tighten the screw lock (marked red) **to block**

WARNING

To prevent incorrect use and failures, the hybrid connector on the sensor unit is **only** locked **manually** or as shown in the figure above. Tools (e.g. pliers) must not be used for this purpose.

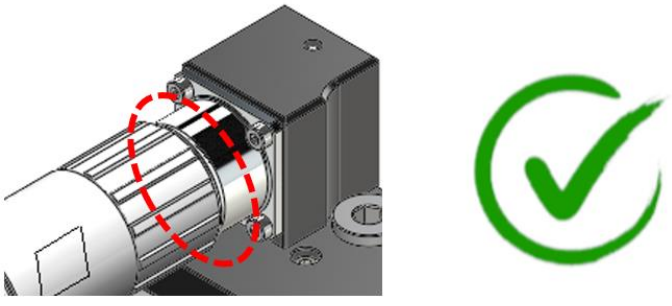
To replace the hybrid connector [①], follow the instructions and steps in Section 9.3.4 of these instructions.

⇨ Section 9.3.4 Replacing the hybrid connector on the hybrid cable

NOTE

Mechanical safety

The screw lock has been installed correctly in accordance with the figure below.



☑ **The device is ready for operation!**

9.1.3 Replacing the air filter element on the pressure regulator unit (4,000 hours)

To ensure reliable operation of the VN301^{plus} central unit, the air filter element (5 µm filter cartridge) in the pressure regulator unit must be replaced every six months or after 4,000 operating hours at the latest. The air filter element (366784) is part of the Schaller VN301plus service box, complete" (151779) and can also be ordered separately from Schaller Automation if required.

NOTE

Maintenance work on the oil mist detection system

- Observe the safety instructions in Section 9 ⇨ *Section 9 Maintenance and repair*
- The power and compressed air supply must be switched off before starting maintenance and repair work.

DANGER

Risk of injury

- The power and compressed air supply must be switched off before starting maintenance and repair work.

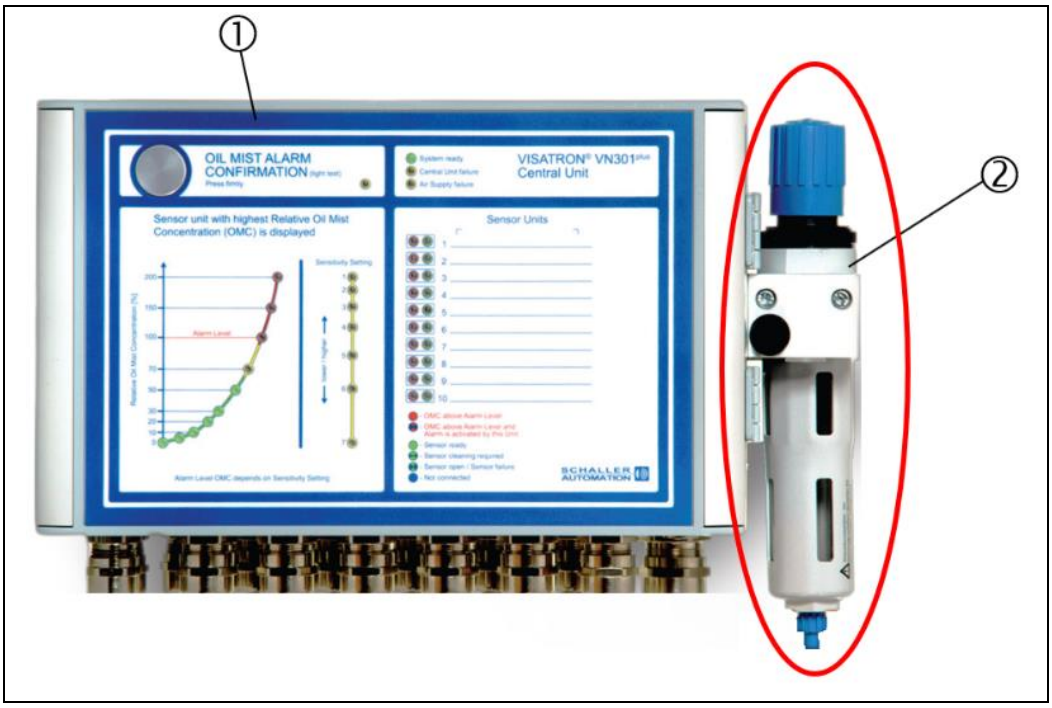


Fig.: 94 : Pressure regulator unit, VN301^{plus} central unit

1: VN301^{plus} central unit

2: Pressure regulator unit

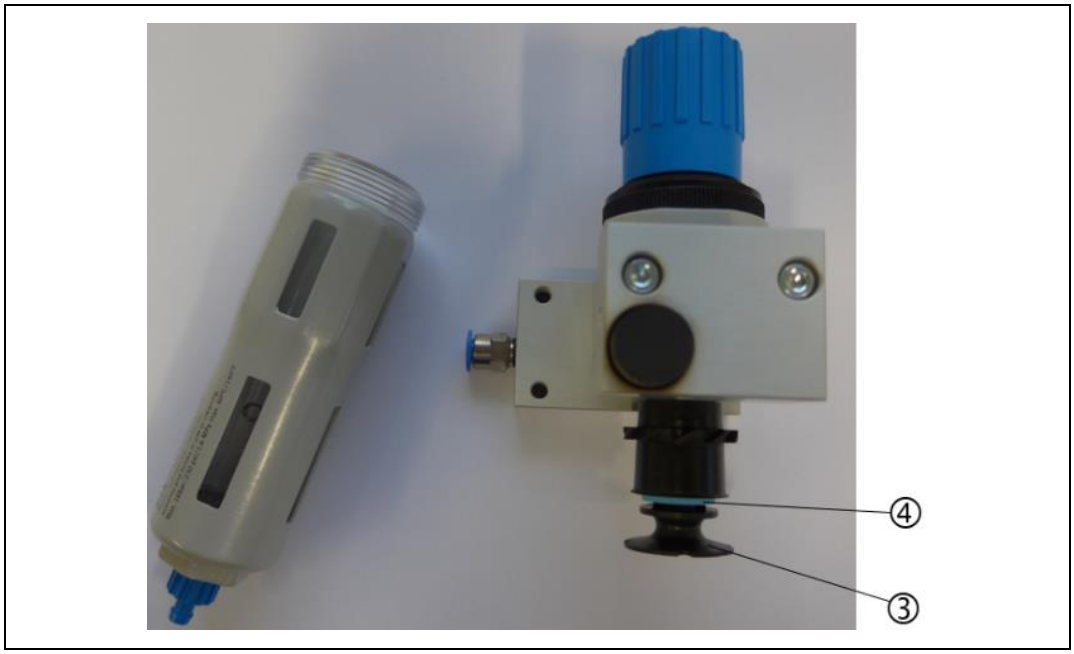
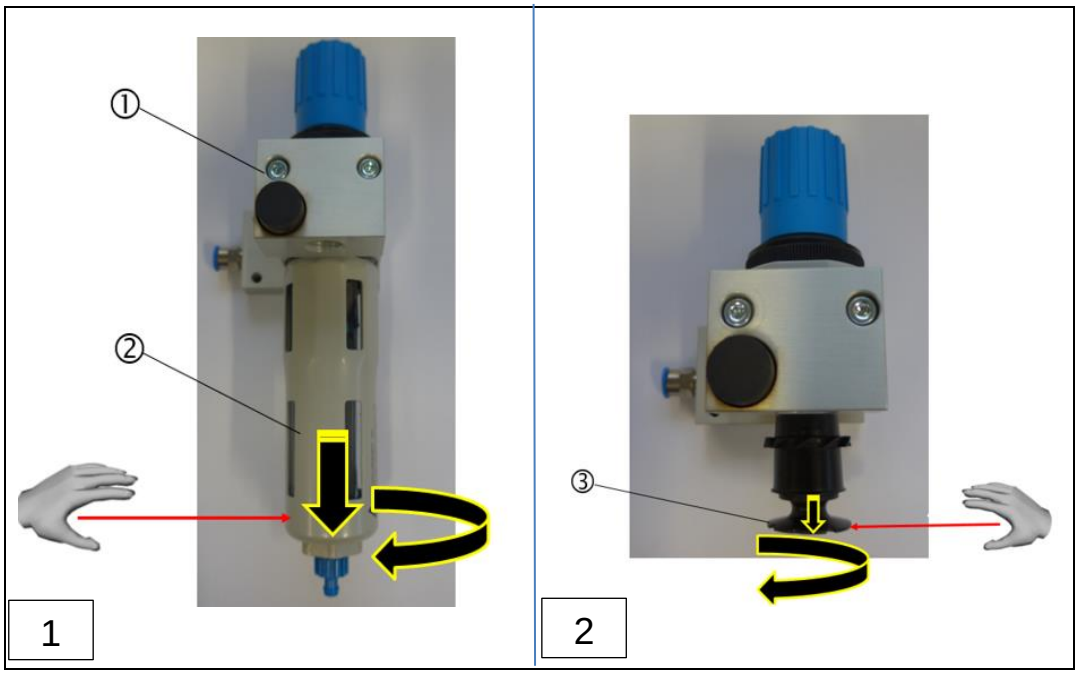


Fig.: 95 : Replacing the air filter element, pressure regulator unit

3: Plastic disc

4: Air filter element

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

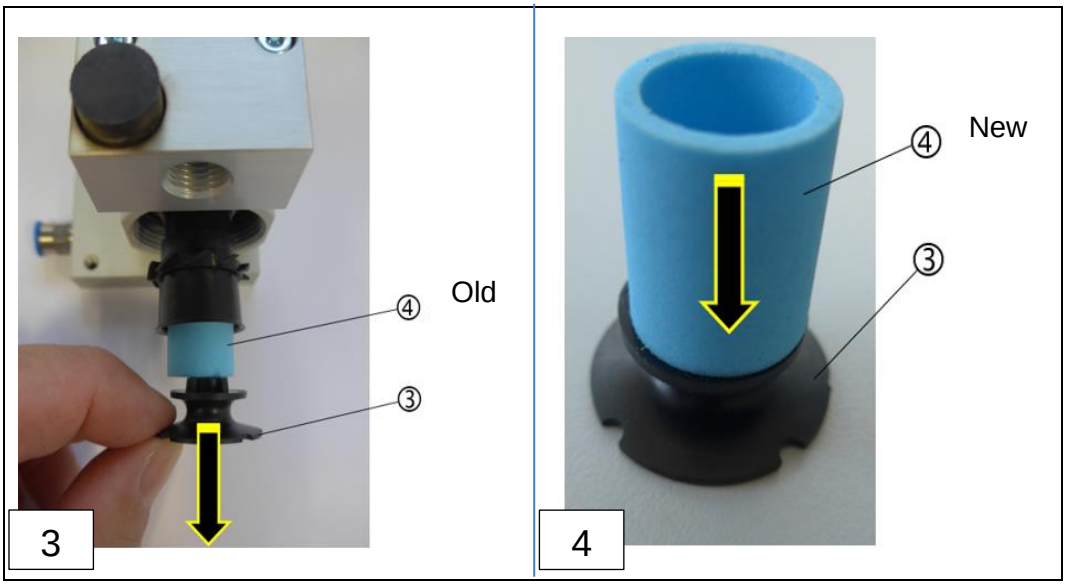


1: VN301^{plus} central unit

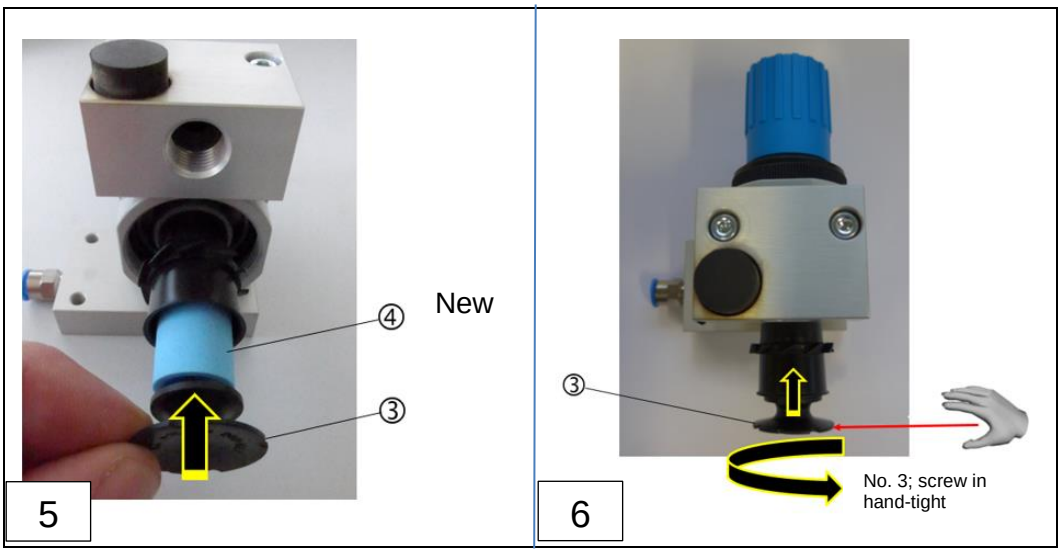
2: Pressure regulator unit

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!

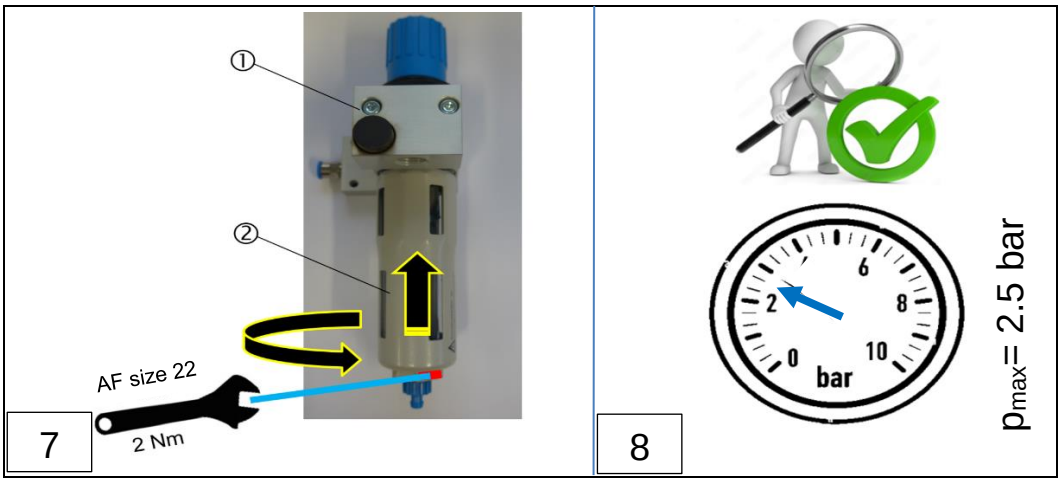


Fig.: 96 : Replacing the air filter element, pressure regulator unit (steps 1 - 8)

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

NOTE

Check supply pressure on the oil mist detection system

- After completing step 7, the supply pressure on the VN301plus 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 VN301plus / VN301plus 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 VN301plus toolbox (151781) or the VN smoke test box (151780).

WARNING

Engine is switched off

- For the function test, the safety instructions for handling the oil mist detector must be always observed. ⇨ *Section 2.4 Basic safety instructions*
- If the oil mist detection system is operated in potentially explosive atmospheres, the relevant safety instructions must be observed.
  ⇨ *Section 2.4.1 Safety instructions for potentially explosive atmospheres*

Illustration of an assembled and operational smoke tube (① - ⑤)

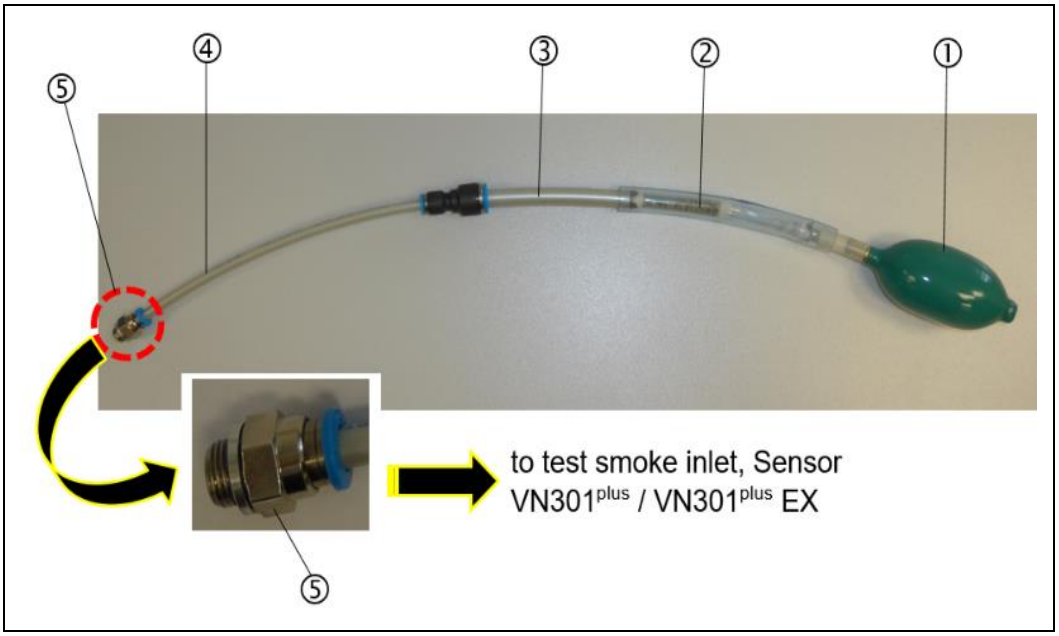


Fig.: 97 : Mounted smoke tube with manual smoke pump

1: Manual smoke pump
2: Smoke tube
3: Adapter
4: Flexible hose
5: Quick-release coupling

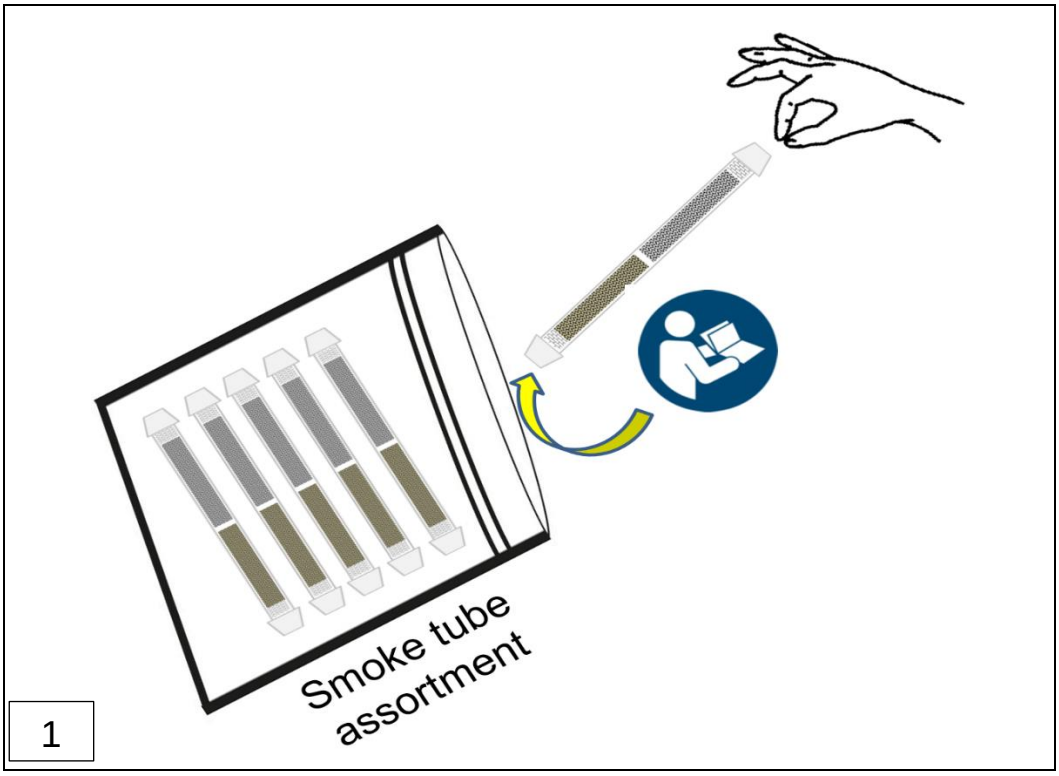
NOTE

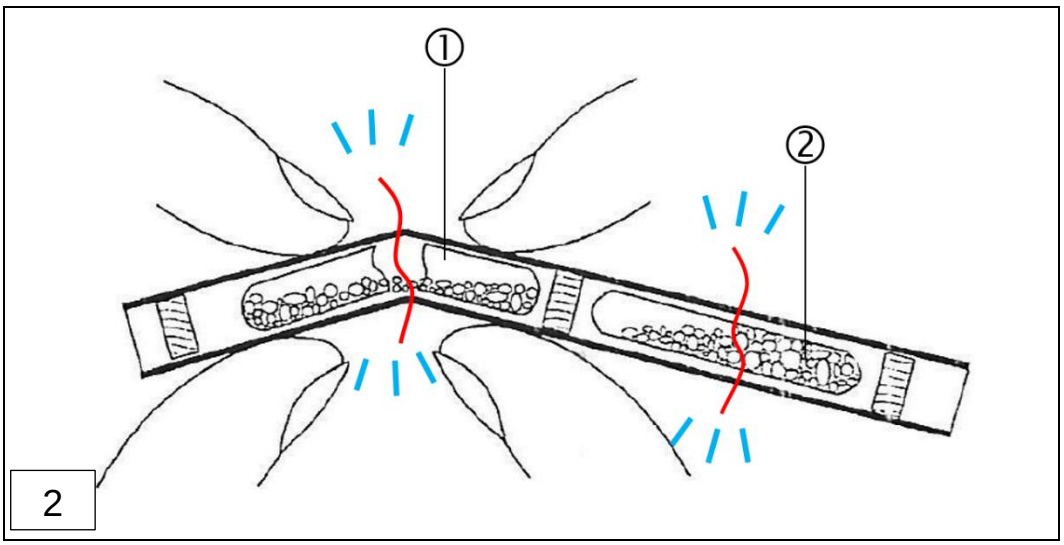
Installation (assembly) of the smoke tube

- **IMPORTANT**: The smoke tube (②) must first be activated **before** installation. (See the following steps)
- The smoke tube (① - ⑤) is installed according to the instructions in the VN301^{plus} toolbox or the VN smoke test box, or according to the figure above.

a) Activating the smoke tube

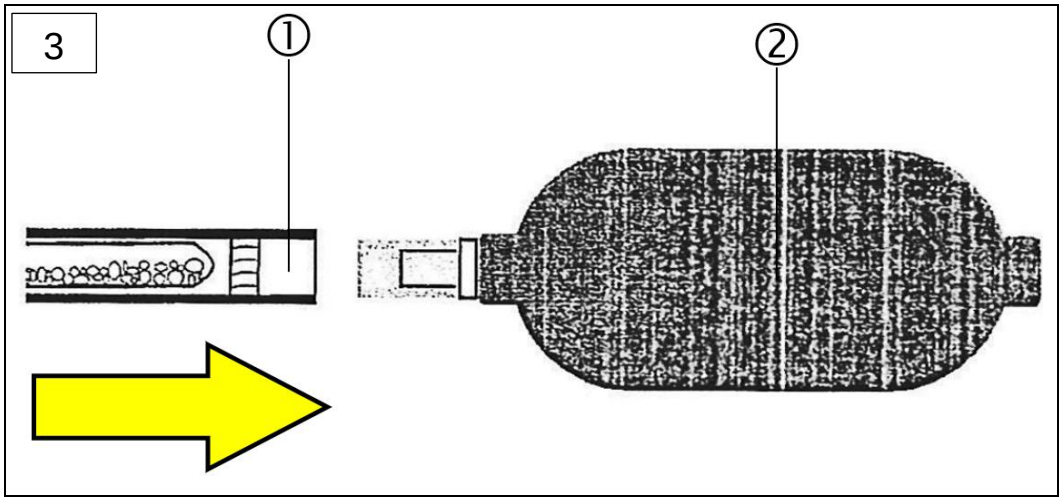
The smoke tube is activated via the following steps:





1: Ampoule 1 2: Ampoule 2

- Break **both** ampoules (① and ②) in the smoke tube as described in step 2 by bending and breaking the tube.



1: Smoke tube
2: Manual smoke pump

- Connect the smoke tube (①) to the hose section of the manual smoke pump (②) so that the ampoule with the white granulate is pointing towards the pump.

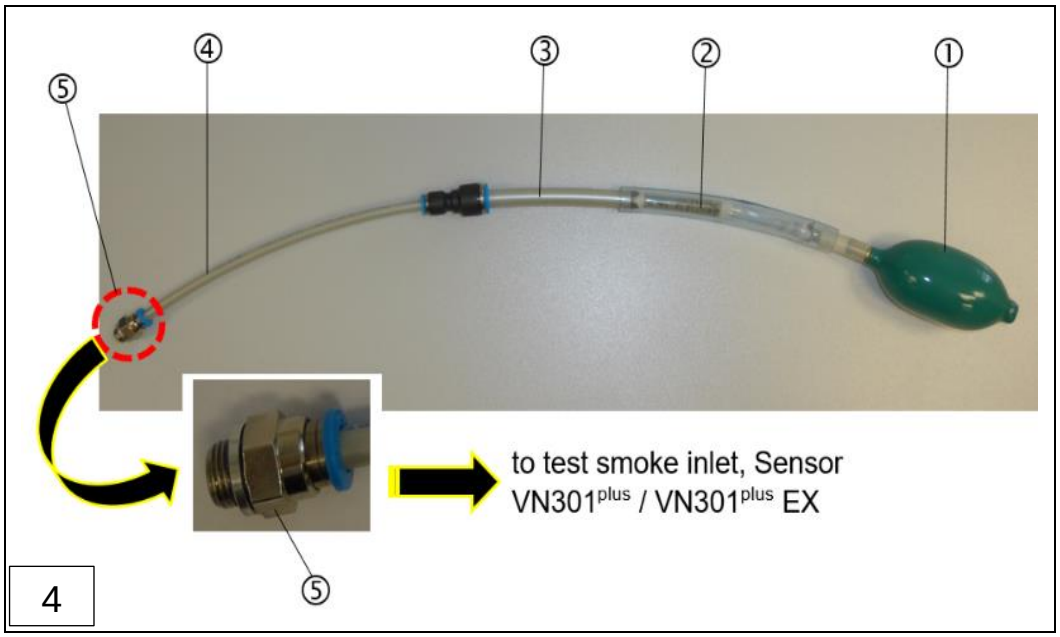


Fig.: 98 : Assembling the smoke tube (steps 1 - 4)

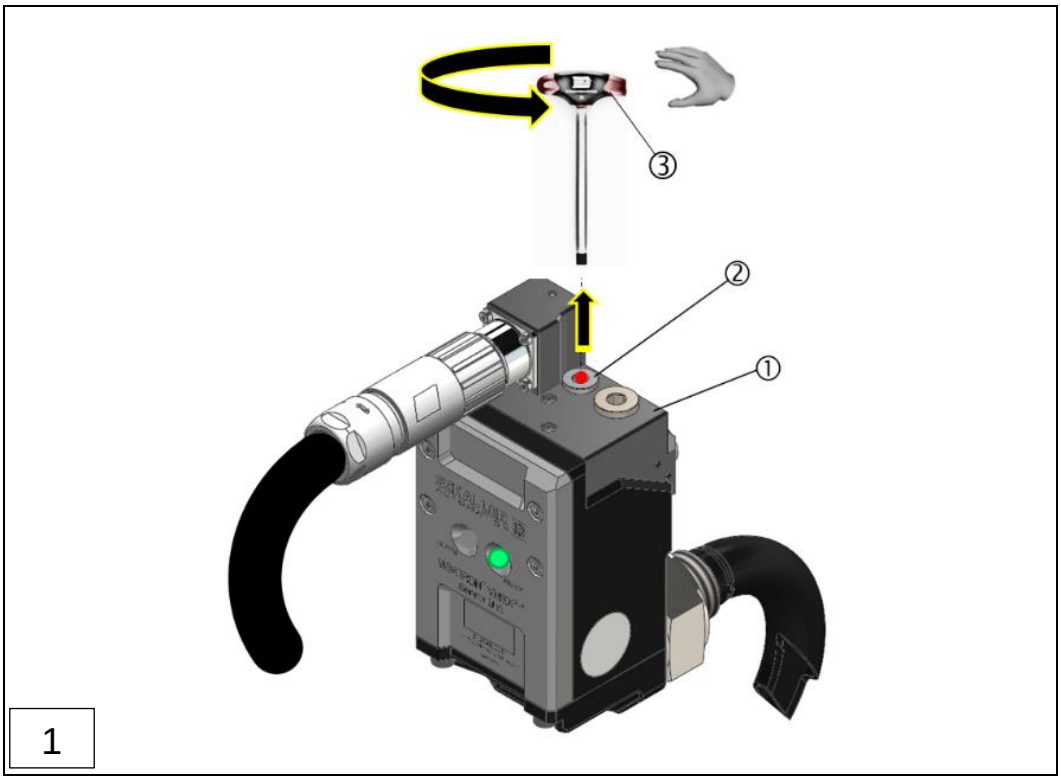
1: Manual smoke pump
2: Smoke tube
3: Adapter
4: Flexible hose
5: Quick-release coupling

- Finally, install the parts ③ to ⑤ onto the smoke tube (②).

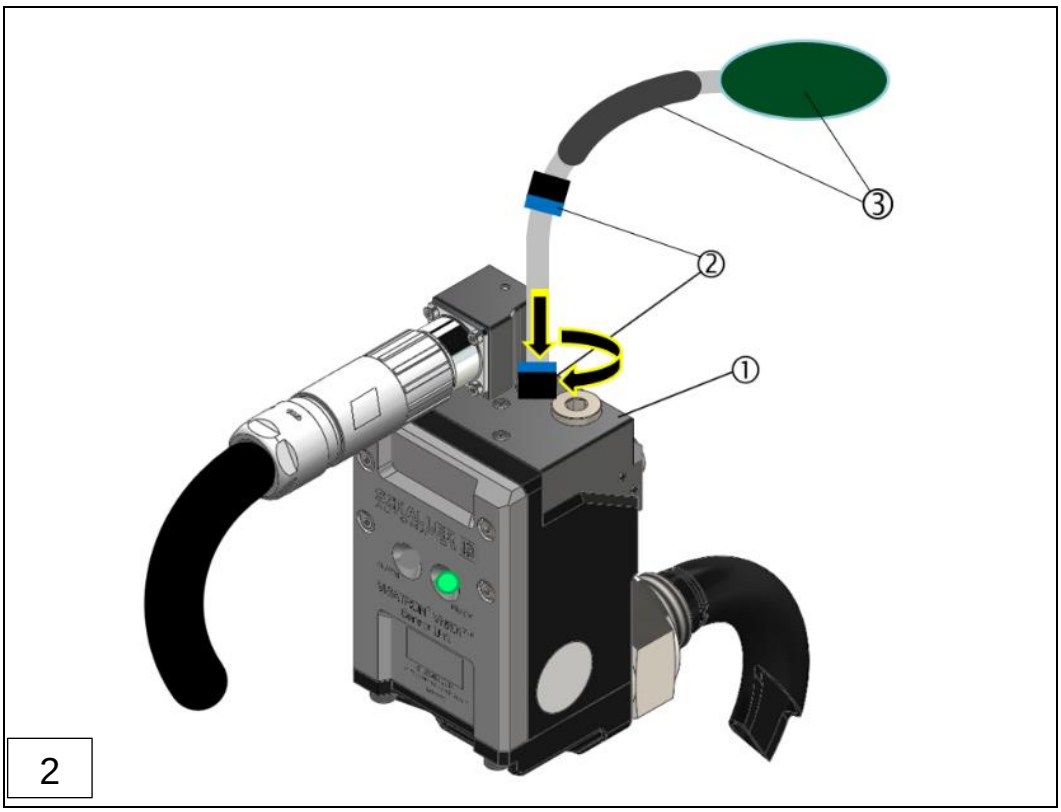
☑ **The smoke tube is fully installed and ready for operation, as described in step 4!**

b) Running the function test

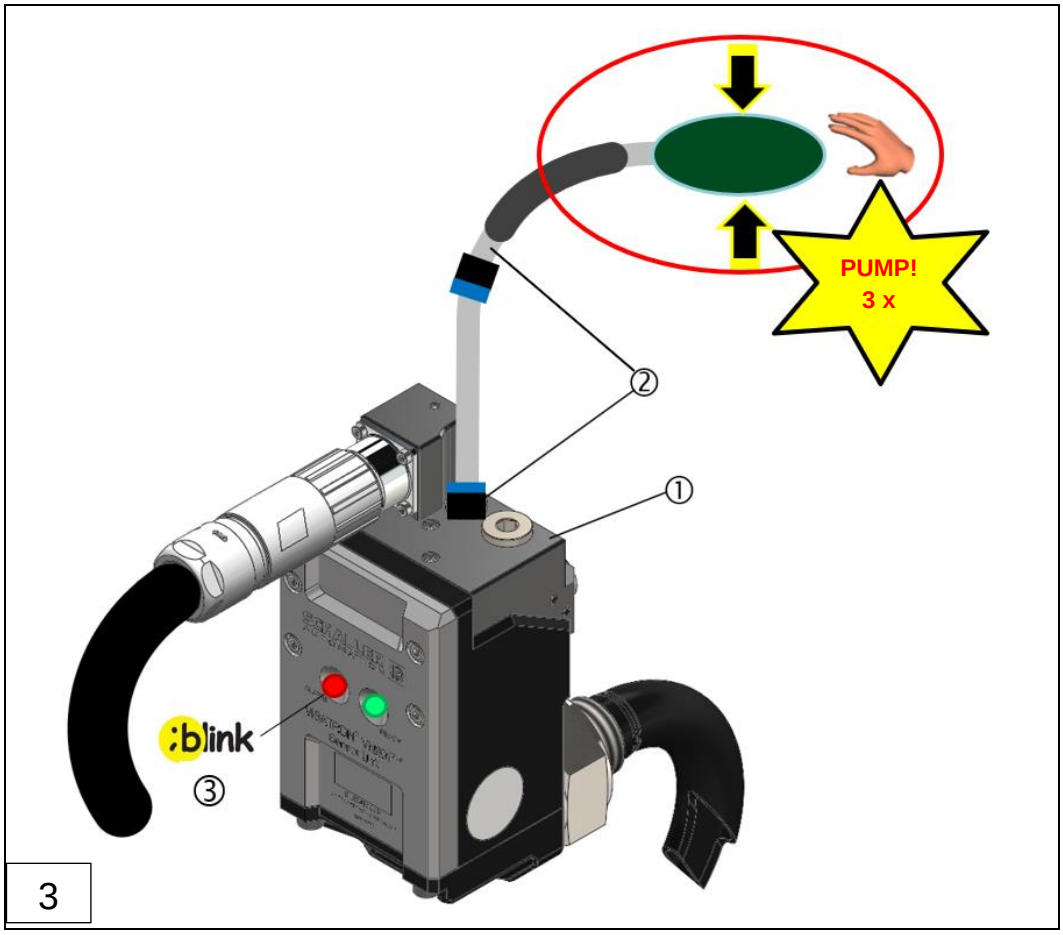
The function test is run as per the described steps:



1: Sensor
2: “Test mist inlet” screw plug
3: Allen key, AF size 5.0 mm



1: Sensor
2: Quick-release coupling
3: Smoke tube with hand pump

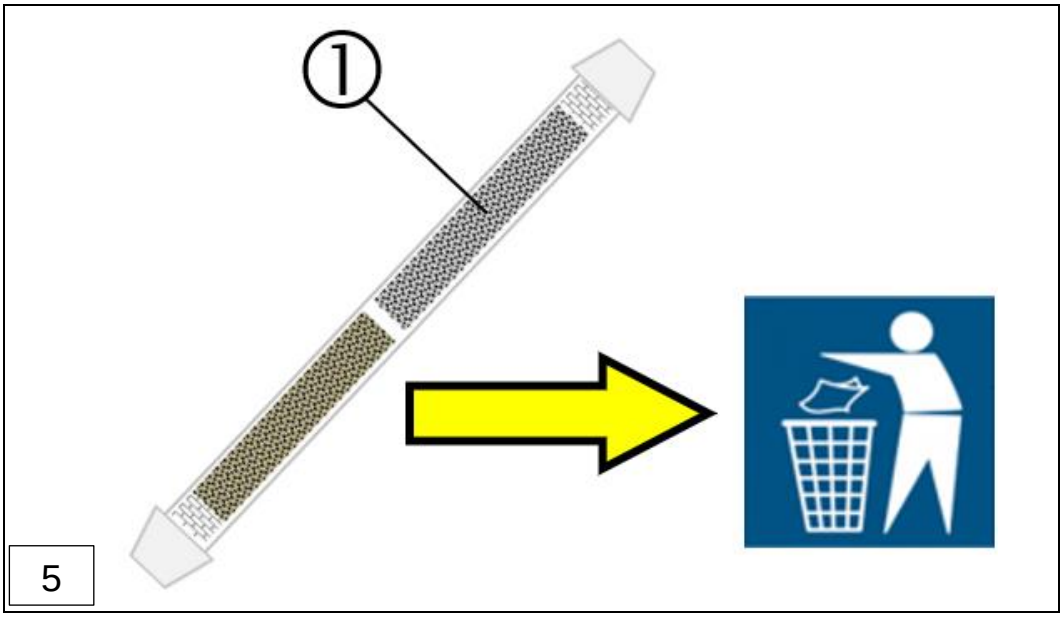


1: Sensor
2: Smoke tube with hand pump
3: Red LED flashes when function test is successful

3: Red LED flashes when function test is successful

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

- **IMPORTANT**: At temperatures < 4 °C, we recommend warming the smoke tube slightly (e.g. hand warmth) for better smoke development.



1: Smoke tube (used)

- Place used smoke tubes in a container with water for a few hours and then dispose of them. ⇨ *Section 11.1 Disposal*

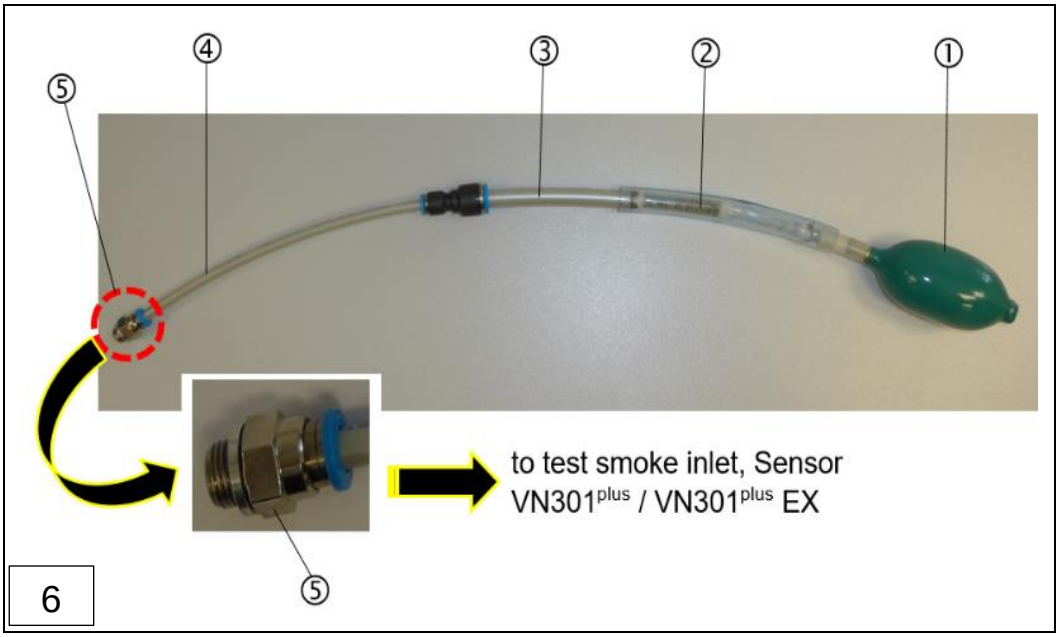


Fig.: 99 : Function test with smoke tube (mist test, steps 1 - 6)

1: Manual smoke pump
2: Smoke tube
3: Adapter
4: Flexible hose
5: Quick-release coupling

- Finally, remove the smoke tube again (① to ⑤) and store the parts back in the relevant box.

☑ **The sensor unit or the device is ready for operation!**

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 hits manual 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 potentially explosive atmospheres, 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 operating manuals 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 VN301plus / VN301plus EX spare parts*

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 6.4.4

⇨ *Section 6.4.4 Electrical and pneumatic installation of the central unit*

9.3.2 Replacing the VN301plus / VN301plus EX sensor unit

To replace the sensor unit, carry out the steps in Section 6.3.2,

⇨ Section 6.3.2 Sensor unit

9.3.3 Replacing the hybrid cable

To replace the hybrid cable, carry out the steps in Section 6.4.2 and in Section 6.4.3.

⇨ Section 6.4.2 Electrical and pneumatic connection of the sensor unit (standard)

⇨ Section 6.4.3 Electrical and pneumatic connection of the sensor unit (optional)

Please also refer to Section 9.3.4 below in this regard.

9.3.4 Replacing the hybrid connector on the hybrid cable

The following steps for replacing the hybrid connector are for the following hybrid connector variants:

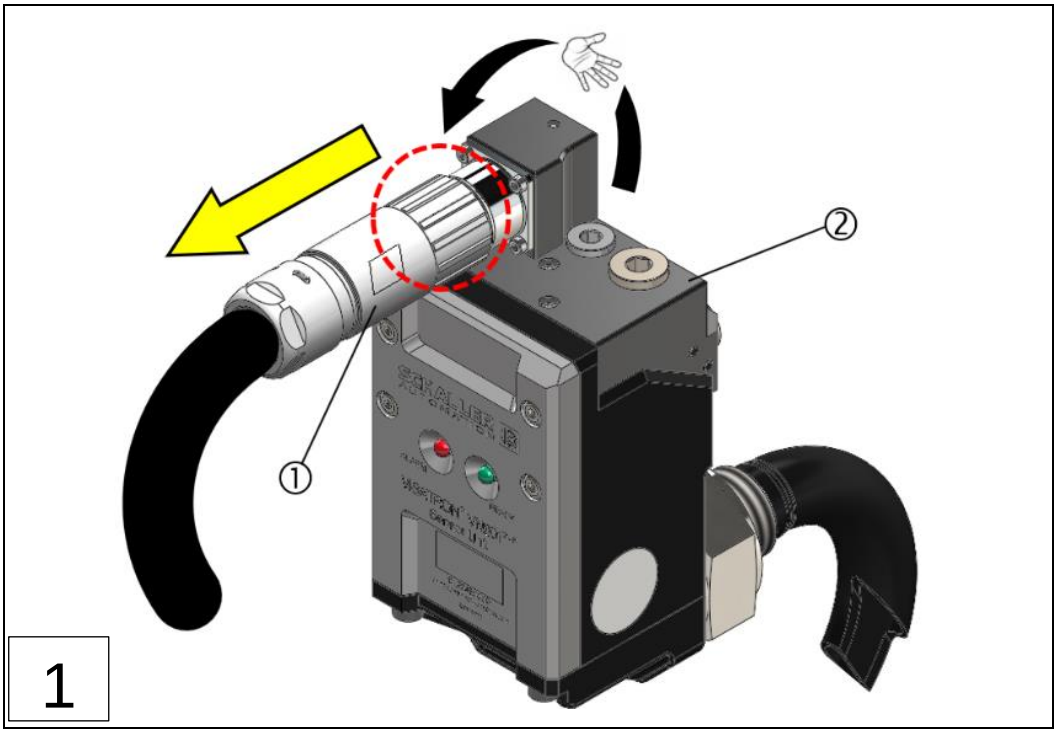
- Standard variant, hybrid connector with quick-release lock (Schaller part number 273201)

  ⇨ Section 6.4.2 Electrical and pneumatic connection of the sensor unit (standard)

- Optional variant, hybrid connector with screw lock (Schaller part number 273200)

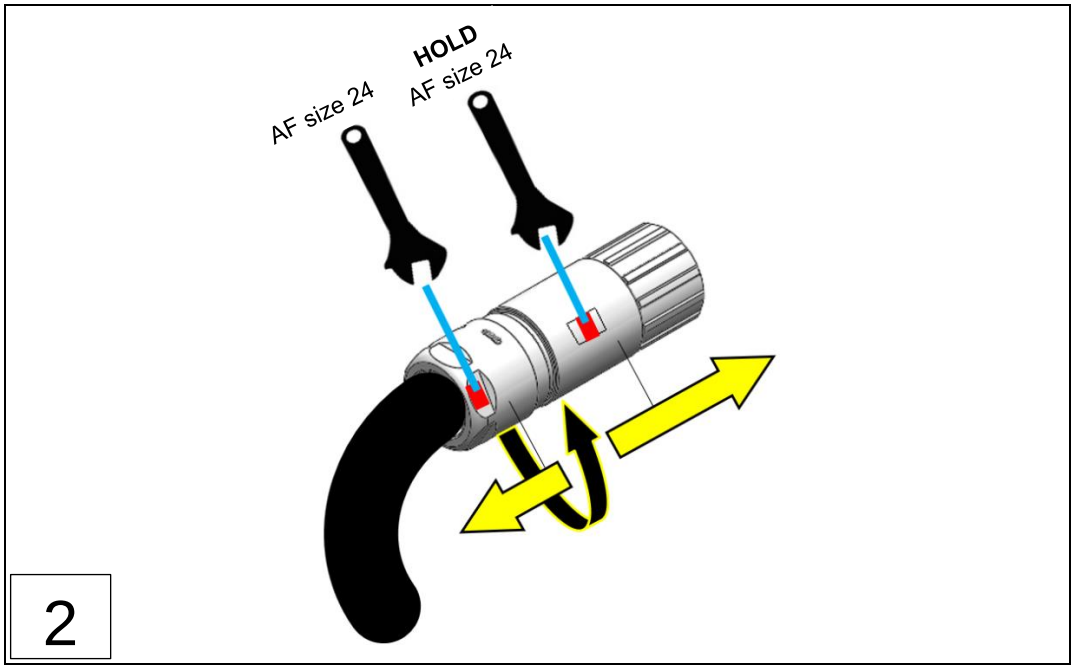
  ⇨ Section 6.4.3 Electrical and pneumatic connection of the sensor unit (optional)

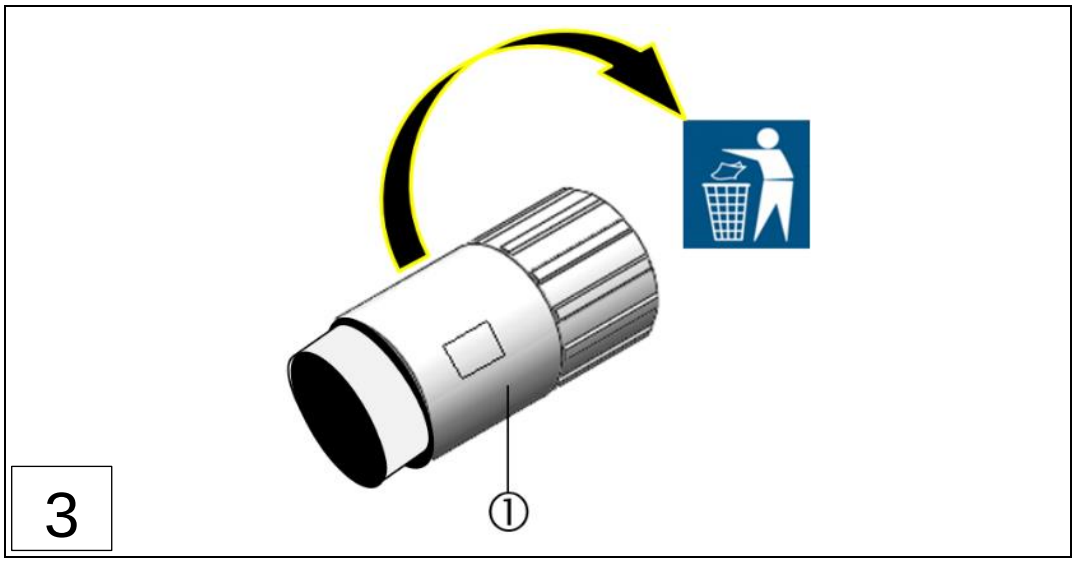
To replace the hybrid connector, carry out the following steps:



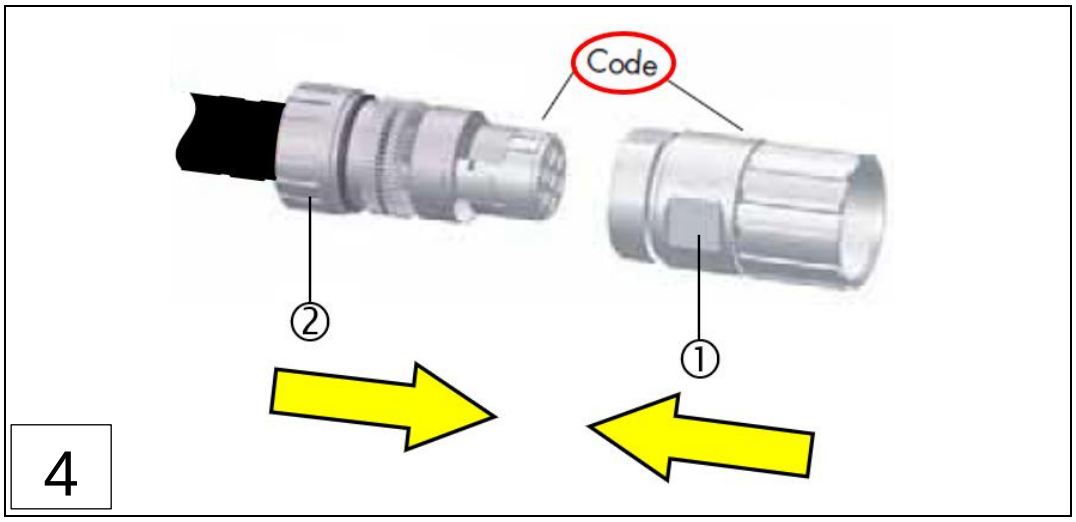
1: Hybrid connector

2: VN301plus / VN301plus EX sensor unit

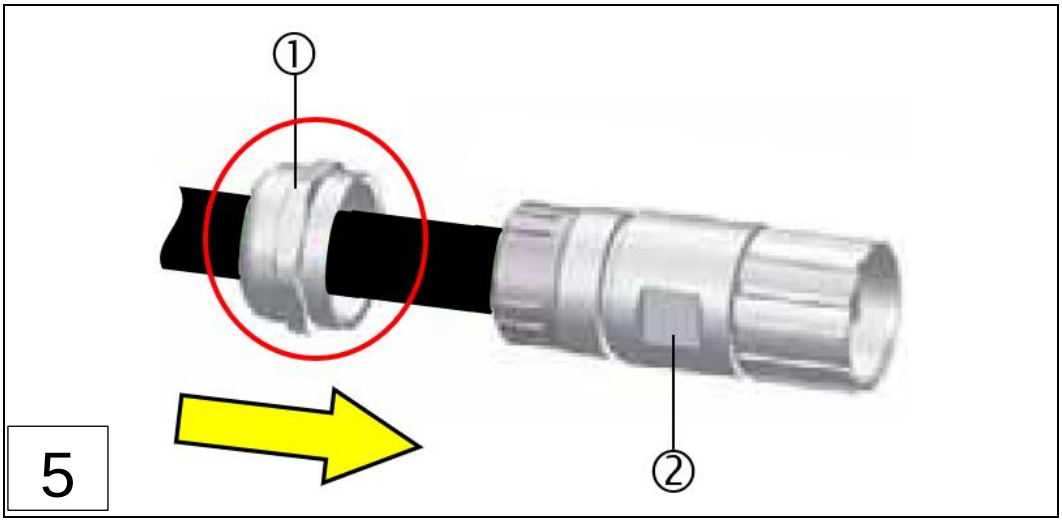




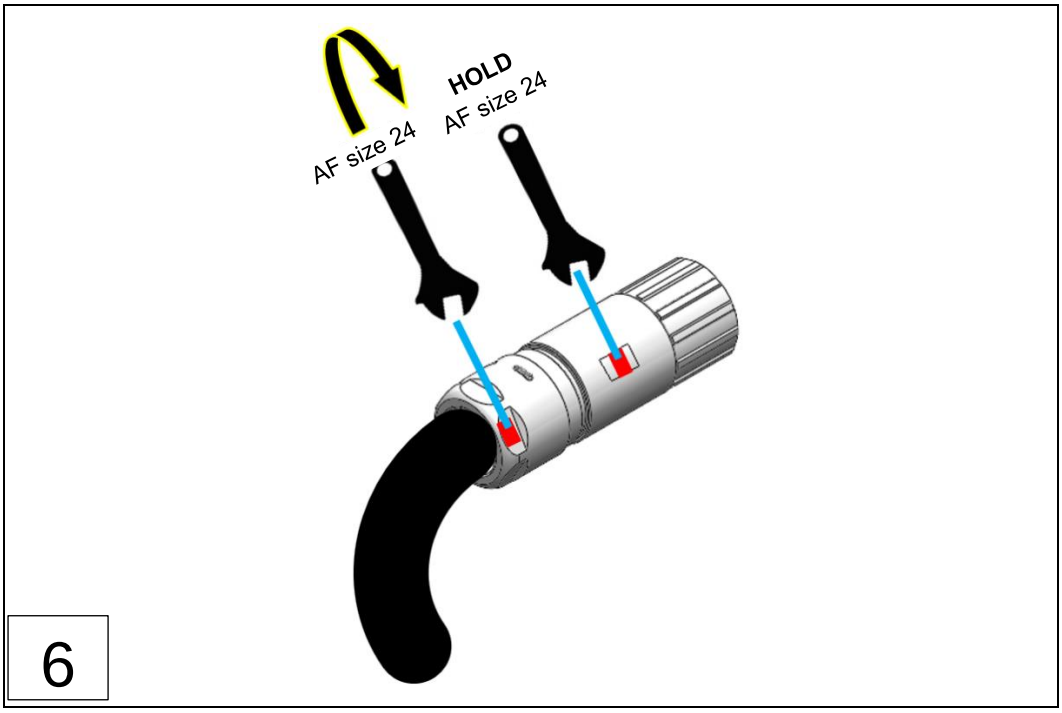
1: Locking sleeve, hybrid connector (old)



1: Locking sleeve, hybrid connector (new) 2: Connector insert, complete



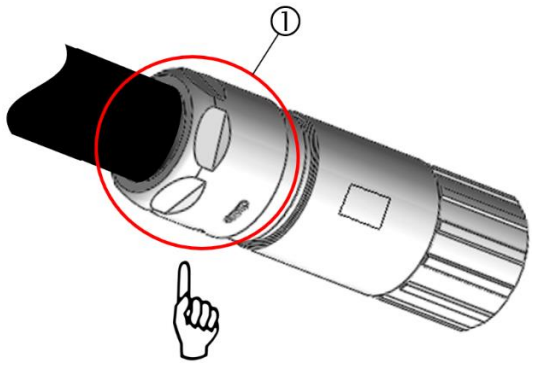
1: Cap nut 2: Hybrid connector (new)



NOTE

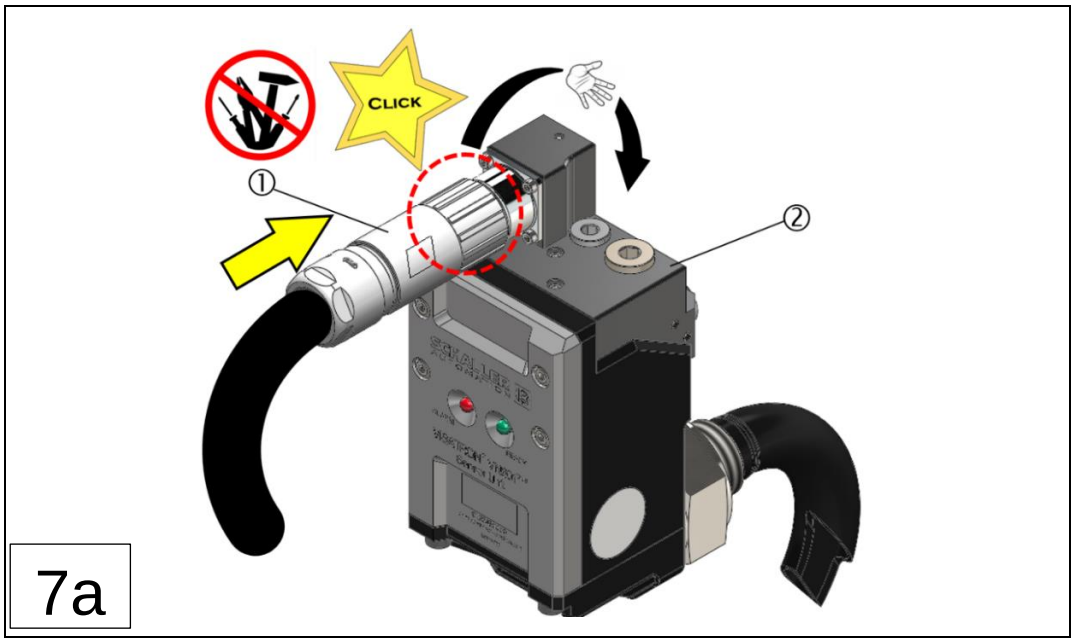
Mechanical safety

- Tighten the cap nut [①] onto the block as described in step 6.



Installing the standard variant, hybrid connector with quick-release lock (Schaller part number 273201)

⇨ *Section 6.4.2 Electrical and pneumatic connection of the sensor unit (standard)*



1: Hybrid connector (quick-release lock) 2: VN301^{plus} / VN301^{plus} EX sensor unit

Installing the optional variant, hybrid connector with screw lock (Schaller part number 273200)

⇨ *Section 6.4.3 Electrical and pneumatic connection of the sensor unit (optional)*

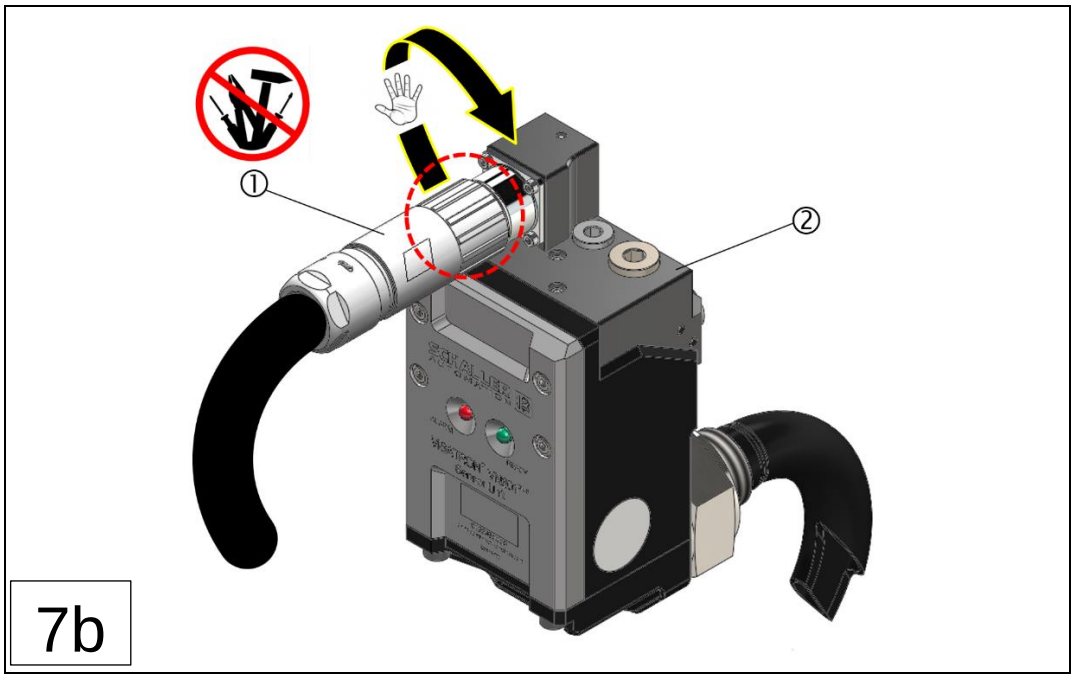


Fig.: 100 : Replacing the hybrid connector (standard/optional) (steps 1 - 7 a-b)

1: Hybrid connector (screw lock) 2: VN301^{plus} / VN301^{plus} EX sensor unit

☑ **The sensor unit is ready for operation!**

9.4 Repair by Schaller Automation

If you 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 this manual 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 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

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.

- 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 potentially explosive atmospheres, the relevant safety instructions must be observed.
  ⇨ *Section 2.4.1 Safety instructions for potentially explosive atmospheres*

CAUTION

Working safely and correctly with the oil mist detection system

- Read this operating manual and other documents that accompany the product carefully and keep them in a suitable place for future reference.

NOTE

Personal protective equipment

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

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

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

A device or component defect can be identified as follows:

If an internal device or system error occurs, the “System ready” relay of the ® VN301^{plus} / VN301 ^{plus} EX system is switched off. As shown in the figure below, the green “System ready” LED [①] on the central unit display goes off at the same time.

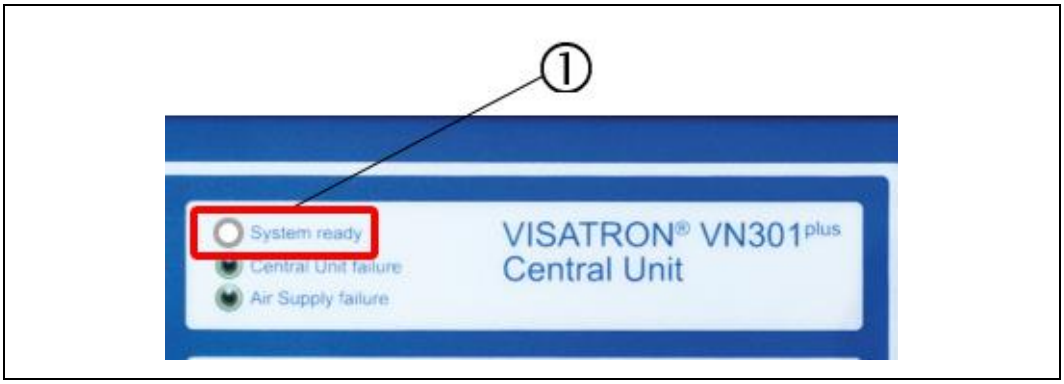


Fig.: 101 : VN301plus central unit: “System Ready” status LED indicator

1: “System ready” LED indicator

However, if oil mist or an oil mist alarm is generated in the meantime, a limited function of the VISATRON® VN301plus / VN301plus EX system is used to generate an oil mist alarm, provided that at least **one sensor** is still functional.

Example use case

The oil mist detection system consists of a total of 7 sensor units and a central unit.

Sensor No. 4 has suddenly become defective because of a sensor error. The green “System ready” LED [①] on the central unit display goes off at the same time, as per the above figure.

Sensors No. 1, 2, 3, 5, 6 and 7 are still in operation and fully functioning.

A bearing defect now also occurs in the compartment monitored by sensor 7. The resulting oil mist (due to overheating, for example) is first detected by sensor 7, triggering a pre-alarm or an alarm. In this case, the pre-alarm relay and also the alarm relay are switched or the fault at sensor 4 is ignored to prevent the immediate hazard caused by the rising oil mist concentration.

After correcting the bearing defect (e.g. replacing the bearing) and confirming the alarm [①, as shown in the figure below] by pressing the oil mist alarm confirmation button:

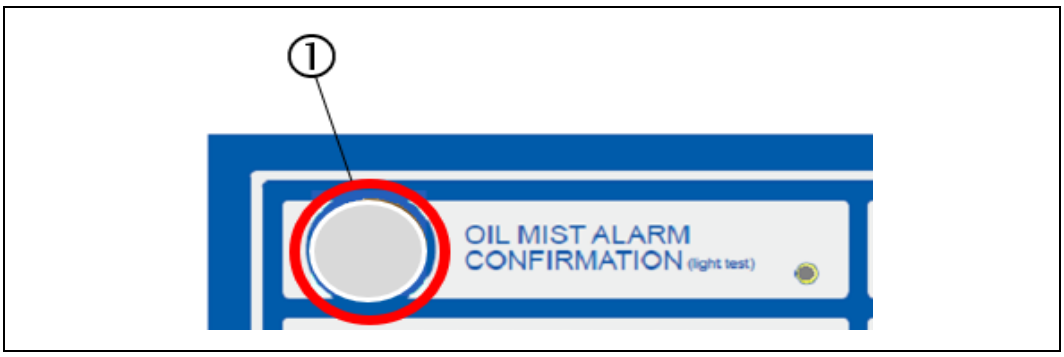


Fig.: 102 : VN301plus central unit: “System Ready” status LED indicator

1: Oil mist confirmation button

the green “System ready” LED is switched off again, as there is still the fault at sensor 4.

10.1.1 Defect on the sensor unit

WARNING

Replacing a defective sensor unit

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 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 potentially explosive atmospheres, the relevant safety instructions must be observed.
  ⇨ *Section 2.4.1 Safety instructions for potentially explosive atmospheres*

DANGER

Hazards in potentially explosive atmospheres, when replacing defective sensor units

Further safety instructions must be followed for SCHALLER products intended for use in potentially explosive atmospheres, as follows:

- For an installed VN301^{plus} EX oil mist detection system, e.g. on gas or 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!

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

- 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 in accordance with Section 6.4.7.

A sensor defect is indicated by:

- Sensor unit: Green “Ready” LED [①] is flashing at regular intervals:

Fig.: 103 : VN301^{plus} / VN301^{plus} EX sensor unit: “Ready” status LED indicator

1: “Ready” LED indicator

- Central unit: “System ready” LED [②] is off:

Fig.: 104 : VN301^{plus} central unit: “System Ready” status LED indicator

2: “System Ready” LED indicator

NOTE

Function failure in the event of an error

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

10.2 Troubleshooting

The displayed faults can be resolved 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 of priority. 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/ ▪ 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/ ▪ 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, Section 6.4.4) 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/ ▪ Sensor is not working	1. Section 10.1.1 2. Section 6.3.2, Section 6.4.2, Section 6.4.3
05/ Sensor base plate disassembled	Green LED on the applicable sensor and on the central unit is flashing at regular intervals/ ▪ 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/ ▪ 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/ ▪ Sensor is not working	1. Section 10.1.1 2. Section 6.3.2, Section 6.4.2, Section 6.4.3

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/ ▪ Sensor is not working	1. Section 10.1.1 2. Section 6.3.2, Section 6.4.2, Section 6.4.3
10/ Ambient temperature too high	"Central unit failure" LED is on/ ▪ Sensor is not working	1. Observe allowed ambient temperatures (Section 3.4.4) 2. Remove or relocate objects nearby emitting heat 3. Install metallic heat shields to shield again heat radiation
11/ Ambient temperature too low	"Central unit failure" LED is on/ ▪ Sensor is not working	1. Observe allowed ambient temperatures (Section 3.4.4) 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/ ▪ Sensor is not working	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/ ▪ Sensor is not working	1. Adjust negative pressure (Section 6.5.3) 1. Check the filter on the pressure regulator Section 9.1.3 2. Replace central unit (Section 9.3.1) 3. Section 6.3.3, Section 6.4.4

Table 17: 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 potentially explosive atmospheres, the relevant 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

NOTE

Disposal of the product

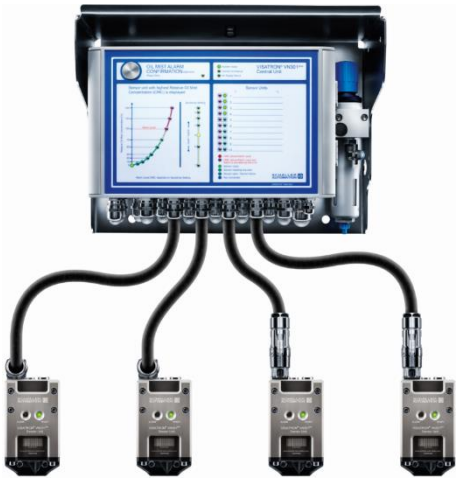
- This product must not be disposed of as residential waste. It is therefore marked with the symbol on the left.
- Schaller Automation takes back this product free of charge. Information about this is available from the national sales organisations and Schaller Automation.
  ⇨ *Section 12 Contact*

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)
Industrielle Automationstechnik GmbH & Co. KG
Industriering 14
66440 Blieskastel, Germany
Phone: +49 6842 508 0
Fax: +49 6842 508 260
Email: info@schaller.de
Website: www.schaller-automation.com

Schaller Automation LP
811 Shotgun Road
Sunrise, FL 33326
United States of America
Phone: +1 954 794 1950
Mobile: +1 561 289 1495
Fax: +1 954 794 1951
Email: info@schalleramerica.com

Schaller Automation Pte Ltd.
114 Lavender Street
#09-93 CT Hub 2
Singapore 338729
Phone: +65 6643 5151
Mobile: +65 9788 7550
Fax: +65 6643 5150
Email: info@schallersingapore.com
Website: www.schaller.sg

Schaller Automation – China
Room 401, Juyang Mansion No. 1200
Pudong Avenue,
Shanghai 200135, P.R.China
Phone: +86 21 5093 7566
Mobile: +86 1390 1890 736
Fax: +86 21 5093 7556
Email: info@schallerchina.cn

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

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

13 VN301plus / VN301plus EX spare parts

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

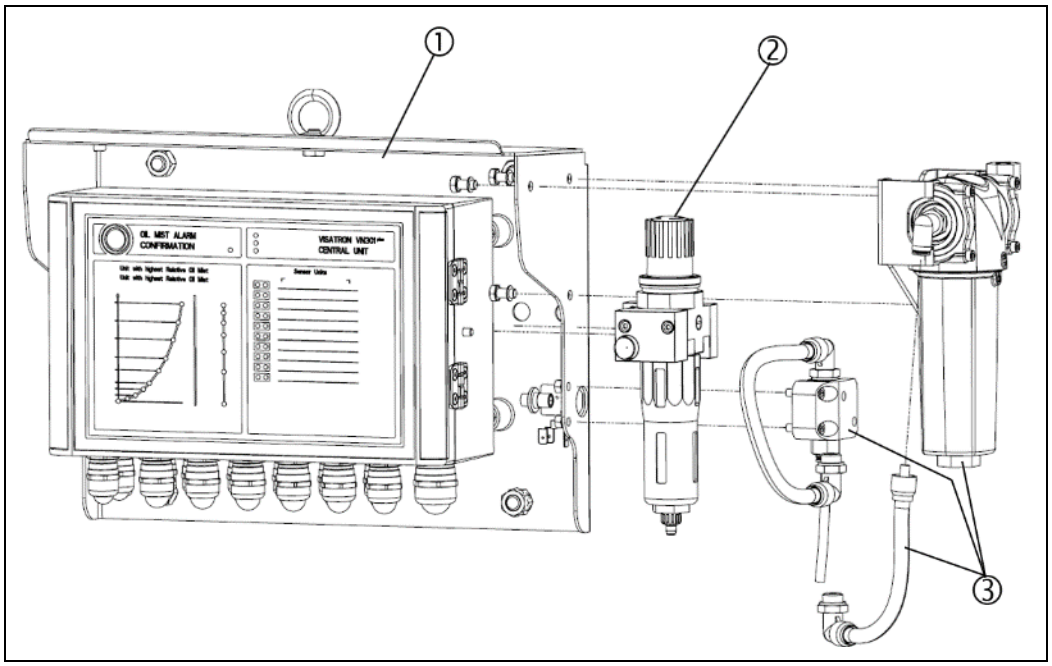


Fig.: 105 : Overview of the positions of spare parts for the VISATRON® VN301plus central unit

1: VN301plus central unit, (273150)

2: VN301plus pressure reducer, complete (273102)

3: VN301plus water separator, complete (273118)

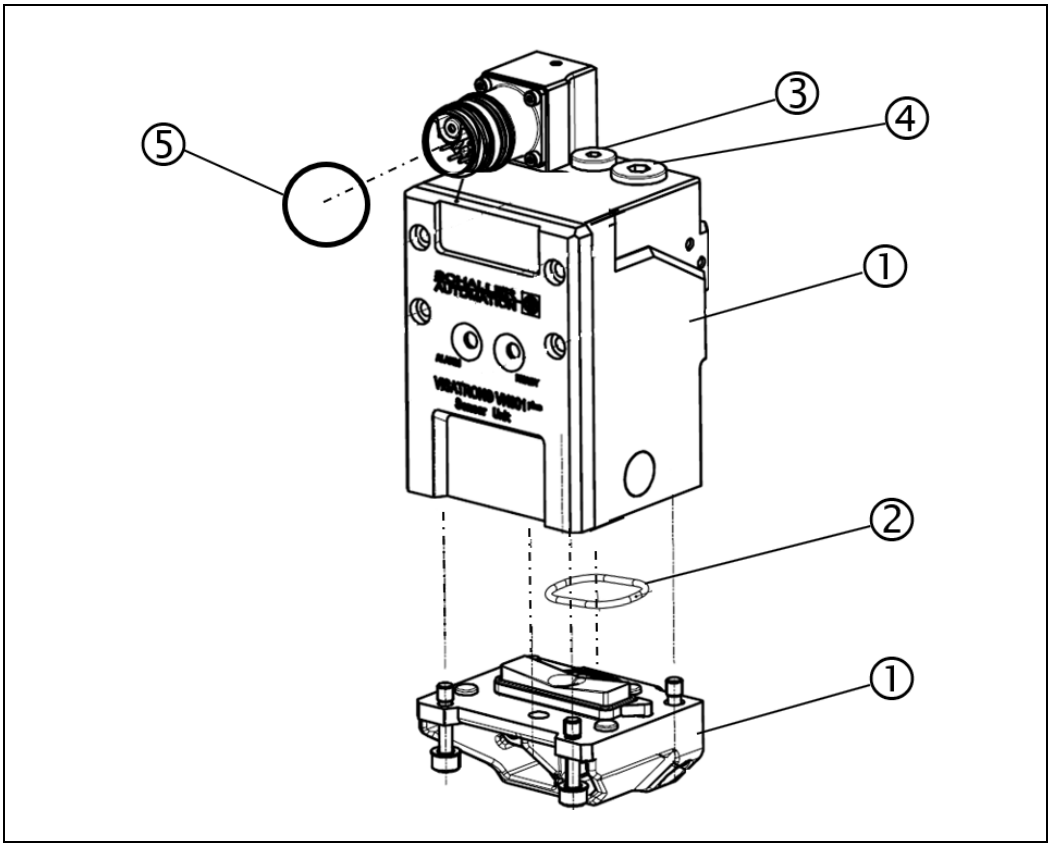
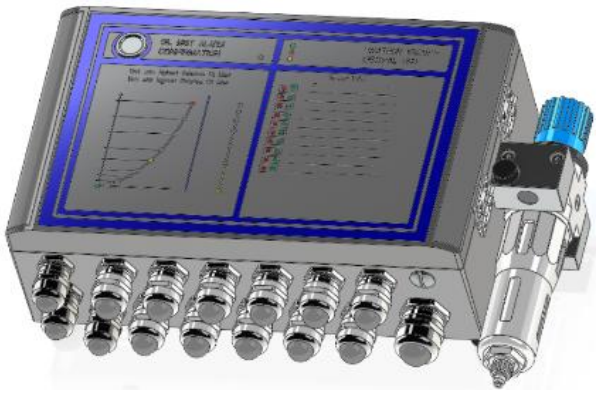


Fig.: 106 : Overview of the positions of spare parts for the VISATRON® VN301plus sensor unit

1: VN301plus and VN301plus EX sensor unit (153025, 153024, 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	Description	per	Qty
273136	Service kit O-ring seal 19 x 1.5 Viton (10 pcs.)	pc	1
273137	Service kit O-ring seal 20 x 1.3 Viton (10 pcs.)	pc	1
273138	Service kit plug screw G1/4 (10 pcs.)	pc	1
273139	Service kit plug screw G1/8 (10 pcs.)	pc	1
272059	MSA smoke tube spare part kit (6 pcs.) 	pc	1

Part Number	Description	per	Qty
273102	Pressure reducer VN301^{plus} complete 	pc	1
273114	Filter cartridge pressure reducing valve 	pc	1
273119	Filter cartridge for water separator 	pc	1
273150	Central unit VN301^{plus} **REPLACEMENT** • Without steel cover • Pressure reducer mounted 	pc	1
273129	Solenoid valve kit	pc	1

Part Number	Description	per	Qty
153025	Sensor VN301^{plus} **EX left REPLACEMENT**: • Sensor packed in an individual shipping box • Manual on CD 	pc	1
153050	Sensor VN301^{plus} **EX vertical REPLACEMENT**: • Sensor packed in an individual shipping box • Manual on CD 	pc	1
153060	Sensor VN301^{plus} **EX horizontal REPLACEMENT**: • Sensor packed in an individual shipping box • Manual on CD 	pc	1
153024	Sensor VN301^{plus} **left REPLACEMENT**: • Sensor packed in an individual shipping box • Manual on CD 	pc	1
153070	Sensor VN301^{plus} **vertical REPLACEMENT**: • Sensor packed in an individual shipping box • Manual on CD 	pc	1

Part Number	Description	per	Qty
153080	Sensor VN301^{plus} **horizontal REPLACEMENT**: • Sensor packed in an individual shipping box • Manual on CD 	pc	1
151482	Spare part kit 2 (Cleaning kit) 	pc	1

Part Number	Description	per	Qty
273202	**Hybrid cable VN301plus – 2m** 	pc	1
273204	Hybrid cable VN301^{plus} – **4 m** 	pc	1
273206	Hybrid cable VN301^{plus} – **6 m** 	pc	1
273208	Hybrid cable VN301^{plus} – **8 m** 	pc	1
273210	Hybrid cable VN301^{plus} – **10 m** 	pc	1
273215	Hybrid cable VN301^{plus} – **15 m** 	pc	1
273220	Hybrid cable VN301^{plus} – **20 m** 	pc	1
273225	Hybrid cable VN301^{plus} – **25 m** 	pc	1
273230	Hybrid cable VN301^{plus} – **30 m** 	pc	1
273201	Replacement connector, hybrid cable VN301^{plus} (standard) 	pc	1

Part Number	Description	per	Qty
273602	**Threaded connector**, hybrid cable VN301^{plus} – **2m** 	pc	1
273604	**Threaded connector**, hybrid cable VN301^{plus} – **4m** 	pc	1
273606	**Threaded connector**, hybrid cable VN301^{plus} – **6m** 	pc	1
273608	**Threaded connector**, hybrid cable VN301^{plus} – **8m** 	pc	1
273610	**Threaded connector**, hybrid cable VN301^{plus} – **10m** 	pc	1
273615	**Threaded connector**, hybrid cable VN301^{plus} – **15m** 	pc	1
273620	**Threaded connector**, hybrid cable VN301^{plus} – **20m** 	pc	1
273625	**Threaded connector**, hybrid cable VN301^{plus} – **25m** 	pc	1
273630	**Threaded connector**, hybrid cable VN301^{plus} – **30m** 	pc	1
273200	Replacement **threaded** connector, hybrid cable VN301^{plus} (optional) 	pc	1

Table 18: Spare parts list

13.2 Recommendation for storage at customer

Schaller Automation recommends that its customers keep the following spare parts*) in storage at all times:

- For proper storage of spare parts, please follow the instructions for storage as per Section 5.3. ⇨ *Section 5.3 Storage conditions before starting up.*

*) The recommendation for storage is for one engine.

Part Number	Description	per	Qty
153080	Sensor VN301plus **horizontal REPLACEMENT**: • Sensor packed in an individual shipping box • Manual on CD 	pc	1
153070	Sensor VN301plus **vertical REPLACEMENT**: • Sensor packed in an individual shipping box • Manual on CD 	pc	1
153050	Sensor VN301plus **EX vertical REPLACEMENT**: • Sensor packed in an individual shipping box • Manual on CD 	pc	1
153060	Sensor VN301plus **EX horizontal REPLACEMENT**: • Sensor packed in an individual shipping box • Manual on CD 	pc	1
273230	Hybrid cable VN301plus – **30 m** (Cable must be adapted to the required length by the customer) 	pc	1

Table 19: Recommended “spare parts” to be kept in storage for the customer

14 Accessories 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	Description	per	Qty	List Price
151779	**Service box for VN301plus / VN301plus EX** The service box contains all the tools and parts required to maintain and check the oil mist detection system. The service box includes a contents list and manual on CD or DVD. 	pc	1	On request!
151781	**VN301plus toolbox, complete** 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. 	pc	1	On request!

Table 20: List of accessories

15 List of figures

16 List of tables

17 Glossary

Term	Description
VN301plus / VN301plus EX	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 adjust parameters of measured variables
Sensor unit, non-EX/EX	Designed to suck in and detect the oil mist atmosphere from the crankcase
Hybrid cable	Electric and pneumatic connection between the VISATRON® VN301plus central unit and the VISATRON® VN301plus / VISATRON® VN301plus EX sensor unit
Mounting position	Position at which the central unit and sensor unit is attached to the engine
Bracket	Used to hold the central unit and connect it to the engine housing
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 taken in from the crankcase or the central suction system.
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® OMD systems
Not potentially explosive atmosphere	Areas in which no explosive atmosphere can arise
Potentially explosive atmosphere	Areas in which a permanent potentially explosive atmosphere can occur

18 EC Declaration of Conformity

EC Declaration of Conformity

According to the EC Machinery Directive 2006/42/EC
Annex II A

We hereby declare that the design of the machine described below and the version we have placed on the market fulfils the essential health and safety requirements of EC Machinery Directive 2006/42/EC.

Manufacturer:	**SCHALLER AUTOMATION** Industrielle Automationstechnik GmbH & Co. KG Industriering 14 D-66440 Blieskastel, Germany
Type of device:	Oil mist detector (OMD)
Type designation:	VISATRON® VN301plus
Intended use:	Detection and display of oil mist in large engines
Year of construction:	2011

We declare the product complies with further Directives applicable to the product, as follows:

- EMC Directive 2004/108/EC

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 60079-28:2015

Applied national standards and technical specifications:

- IACS UR M10: Rev.4 2013
- IACS UR M67: Rev.2 2015

This EC declaration of conformity shall no longer be valid if:

- the machine is rebuilt, modified or used for purposes other than those for which it is intended without our written consent;
- the instructions in the operating manual are not followed.

D-66440 Blieskastel, Germany 2019-06-11

Stephan Schaller
(Managing Director)

EC Declaration of Conformity

According to the EC Machinery Directive 2006/42/EC
Annex II A

We hereby declare that the design of the machine described below and the version we have placed on the market fulfils the essential health and safety requirements of EC Machinery Directive 2006/42/EC.

Manufacturer:	**SCHALLER AUTOMATION** Industrielle Automationstechnik GmbH & Co. KG Industriering 14 D-66440 Blieskastel, Germany
Type of device:	Oil mist detector (OMD)
Type designation:	VISATRON® VN301plus EX
Intended use:	Detection and display of oil mist in large engines
Year of construction:	2011
Marking:	CE 0637 Ex II -/2G Ex op is IIB T4 -/Gb

We declare the product complies with further Directives applicable to the product, as follows:

- 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 (2018) and IEC 60079-28 (2015)

This EC declaration of conformity shall no longer be valid if:

- the machine is rebuilt, modified or used for purposes other than those for which it is intended without our written consent;
- the instructions in the operating manual are not followed.

D-66440 Blieskastel, Germany 2019-06-11

Stephan Schaller
(Managing Director)

19 Attachments

19.1 Description of error on the VN301plus / VN301plus 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 part.

See Section 12 (⇨ *Section 12 Contact)* in this manual 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)

VN301plus ☐ VN301plus EX ☐

Serial number: (See label on the front)

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Sensor unit installed on: (Please select)

Main machine ☐ Auxiliary machine/power unit ☐

Engine manufacturer:_____

Engine type:_____

- **Condition of the sensor unit:**
  Sensor unit mechanically damaged: ☐ Not functioning when operated ☐
- **Is suction at the sensor unit working correctly?** Yes ☐ No ☐
- **Is the condition of the hybrid cable OK?** Yes ☐ No ☐
- **Is the condition of the hybrid plug OK?** Yes ☐ No ☐
- **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

- **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** ☐

    During: Engine start ☐ Warm-up ☐
    Increase in load ☐ Decrease in load ☐
    Engine stop ☐ In various states ☐

  - **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 path wetted with oil? Yes ☐ No ☐
    Is there condensate in the light path? Yes ☐ No ☐

  - **Check the supply pressure at the central unit and pressure section**

    Has the supply pressure on the central unit been set in accordance with Section 6.5.3?
    ⇨ Section 6.5.3 Setting the supply pressure on the pressure regulator of the VN301plus central unit
    Yes ☐ No ☐

    Is the supply pressure between the central and sensor unit completely or partially interrupted?
    Yes ☐ No ☐

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

If yes, please proceed as follows:

1. Disconnect the hybrid connector from the applicable sensor unit
   ⇨ *Section 9.3.2 Replacing the VN301plus / VN301plus EX sensor unit*

   Check whether there is no compressed air at the hybrid plug. Yes ☐ No ☐

   If no, is there too little compressed air?
   (compared to neighbouring sensors) Yes ☐ No ☐

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

2. Connect the hybrid connector to the relevant sensor unit
   ⇨ *Section 9.3.2 Replacing the VN301plus / VN301plus EX sensor unit*

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).

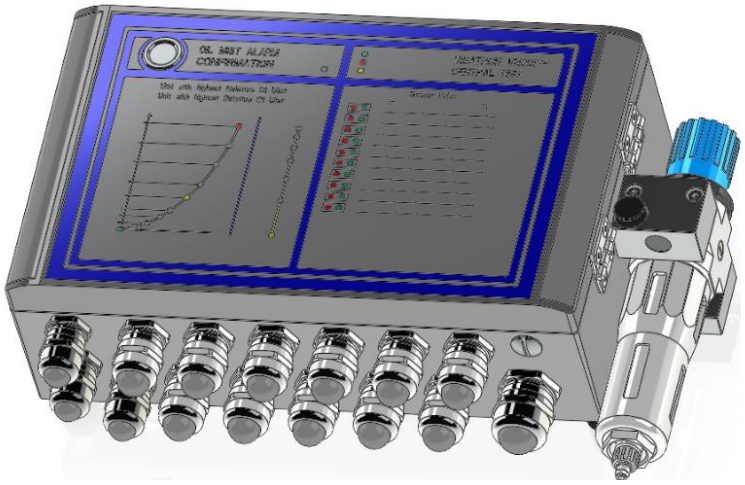
See Section 12 (⇨ *Section 12 Contact)* in this manual for suitable partners or go to https://schaller-automation.com/en/partners/ for the contact details of Schaller Automation and other partners near you.

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 ☐

   Conditions 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**:

   - **Has the supply pressure on the central unit been set in accordance with Section 6.5.3?** ⇨ *Section 6.5.3 Setting the supply pressure on the pressure regulator of the VN301plus central unit*

     Yes ☐ No ☐

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

     Yes ☐ No ☐

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

     If yes, please proceed as follows:

     1. Disconnect the hybrid connector from the applicable sensor unit ⇨ *Section 9.3.2 Replacing the VN301plus / VN301plus EX sensor unit*

        Check whether there is no compressed air at the hybrid plug. Yes ☐ No ☐

If no, is there too little compressed air?
(compared to neighbouring sensors) Yes ☐ No ☐

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

2. Connect the hybrid connector to the relevant sensor unit ⇨ *Section 9.3.2 Replacing the VN301plus / VN301plus EX sensor unit*

3. **What is the current sensitivity set on the central unit?**
⇨ *Section 7.0 Manufacturer settings*

(Default setting: sensitivity level 5)

Sensitivity level: ☐ Not known ☐

NOTE

Checking the sensitivity level

- To check the sensitivity level, you need the VN301^{plus} end-user software. This is available on the supplied product DVD.
- Use a PC or laptop to install the VN301^{plus} end-user software. Please note the system requirements in the user manual for the VN301^{plus} end-user software.
⇨ *Section 7.0 Manufacturer settings*

Additional information from customer:

20 Notes

Notes

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