SCHALLER AUTOMATION

Oil mist detector

Visatron® VN2020

Visatron® VN2020 Ex

- Operating manual -

- 183001 -

Dear customer,

this operating manual is intended for all those who work/will work on/with the system described here. They require knowledge of this operating manual to avoid faults in the system and to operate the system without issues. They must therefore have knowledge of this operating manual.

This operating manual applies to the following devices:

- Visatron® VN2020
- Visatron® VN2020 EX

The operating manual is part of the information for users when the system is placed on the market and must be kept so that it is accessible to the operating company and the operator. If the system is relocated, the operating manual and/or the operating manuals (including those of suppliers) must be provided at the new location.

In all phases of life, all the information in the operating manual and/or the operating manuals (including those of the supplier) must be observed. Please read the applicable sections in the operating manual carefully before starting work.
We accept no liability for damage or malfunctions that are the result of failure to comply with this operating manual. You must specify clearly who is responsible for the machine (the operating company) and who may work on the machine (the operator).

The responsibilities of personnel involved in transport, installation, setup, adjustment, operation, care, maintenance and servicing must be clearly defined.

The original version of the operating manual for the oil mist detector is is written in german.

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Index	Change	Date	Changed by
1.0	Release	19.12.2019	Adams, P. / Höh, S.
1.1	See modification log	13.03.2020	Adams, P. / Höh, S.

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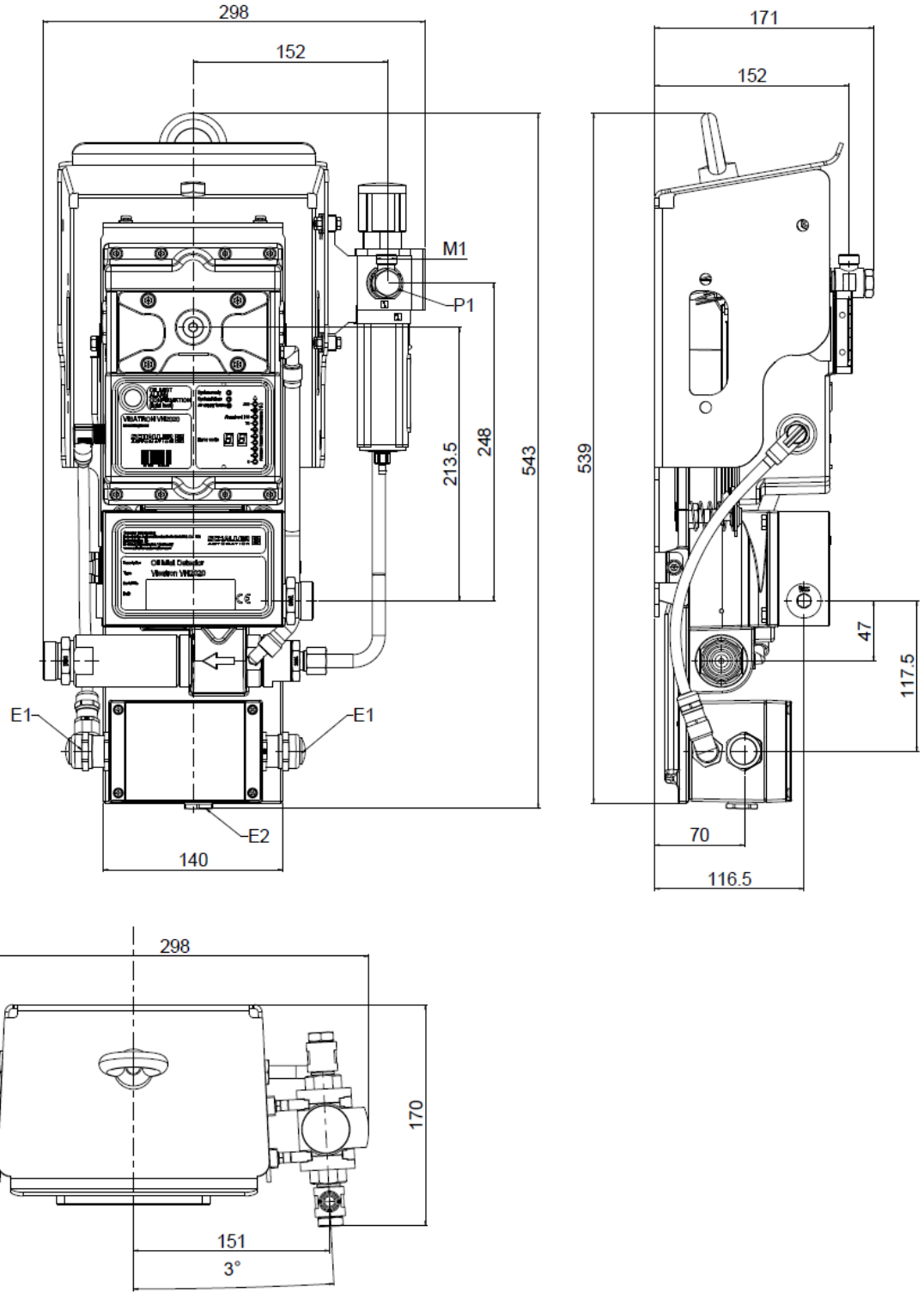
1. Technical data and scope of delivery



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Mechanical interfaces

Dimensions	Approx. 543 x 298 x 171 mm
Weight	12.41 kg
M1	External thread M16x1.5 Pipe connection, Ø10
M2	External thread M30x2 Pipe connection, Ø22
M3	External thread M30x2 Pipe connection, Ø22
M4	Internal thread G1/4
M5	4x through holes for screws M8

Electrical interfaces

Power supply	18 - 31.2 V DC
Nominal voltage	24 V DC
Current consumption	Maximum 2A
Supply E1	24 V DC M25: Cable diameter 8-16mm Grounding via holes in base plate during installation
Supply E2	M20: Cable diameter 5-13mm
Relay outputs	2 × “High Oil Mist Alarm” 1 × “Ready” (ready for operation) 1 × “Oil Mist Pre-Alarm” (max. 60 Volt AC/DC, 1A)
Communication interface with monitoring device	3-wire RS485, electrically isolated / CANopen, electrically isolated
Recommended communication cable	LAPP UNITRONIC-FD CP (TP) plus UL-CSA CABLE

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Pneumatic interfaces

P1	External thread M16x1.5 Pipe connection, Ø10
Compressed air supply	Min. 2 bar Max. 14 bar
Compressed air consumption	1.2 nm^3/h ± 10% Value may vary depending on customer solution
Negative pressure	Position M4 Measure and adjust negative pressure Min. -55mmWc (-5.5 mbar) Nom. -60mmWc (-6 mbar) Max. -65mmWc (-6.5 mbar)
Air quality	ISO 8573-1:2010 - 6-4-4

Environmental conditions

Operating temperature	5 to 70 °C
Storage temperature range	-25 to 80 °C
Relative humidity	up to 95%
Protection rating	IP 54
Vibrations	5 - 25 Hz: 1.6mm peak 25 - 100 Hz: 40m/s^2 peak

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2. Identification

2.1. Product and type designation

This operating manual is for the VISATRON®-branded, series VN2020 oil mist detector.

The oil mist detector is available in two product variants:

- VN2020 for use in environments that are not potentially explosive according to ATEX
- VN2020 Ex for use in potentially explosive environments according to ATEX/IECEX
    - ATEX: II (2G) [Ex op is IIB T4 Gb]
    - IECEx: [Ex op is IIB T4 Gb

2.2. The Manufacturer

Schaller Automation
Industrielle Automationstechnik GmbH & Co. KG
Industriering 14
66440 Blieskastel
Germany

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3. Product description and technical data

3.1. Product description

The VISATRON® VN2020 oil mist detector from SCHALLER AUTOMATION is design to protect large engines (gas, diesel and dual fuel) from oil mist explosions caused by the spontaneous development of oil mist in the crankcase. It is part of a safety system to protect the life and health of operating personnel and it prevents serious consequential damage.

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

The oil mist detector works on the Venturi principle to draw the oil mist atmosphere out of the crankcase.
Monitoring is implemented via an optical measuring track in the device's measuring head.

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

To avoid false alarms from spray oil, the intake system uses special Schaller Automation suction funnels that can be used regardless of the direction of rotation of the motor. One suction funnel is always required per suction point. This protects the system from the ingress of splash oil.

During normal engine operation, the oil mist detector draws in any existing oil mist. This oil mist can settle in the suction pipes.

Schaller Automation uses a drainage concept at this point and returns the excess oil back to the engine crankcase.
Additional draining components ensure that the system operates correctly under all operating conditions.

This includes deployment in stationary power plants, as well as on ships with their static or dynamic inclination angles.

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4. Oil mist detection system

An oil mist detector system, referred to as an installation kit, usually consists of the following for delivery and is configured to customer specifications.

Figure 1 shows the typical installation setups for a VN2020 installation kit for a six-cylinder engine.

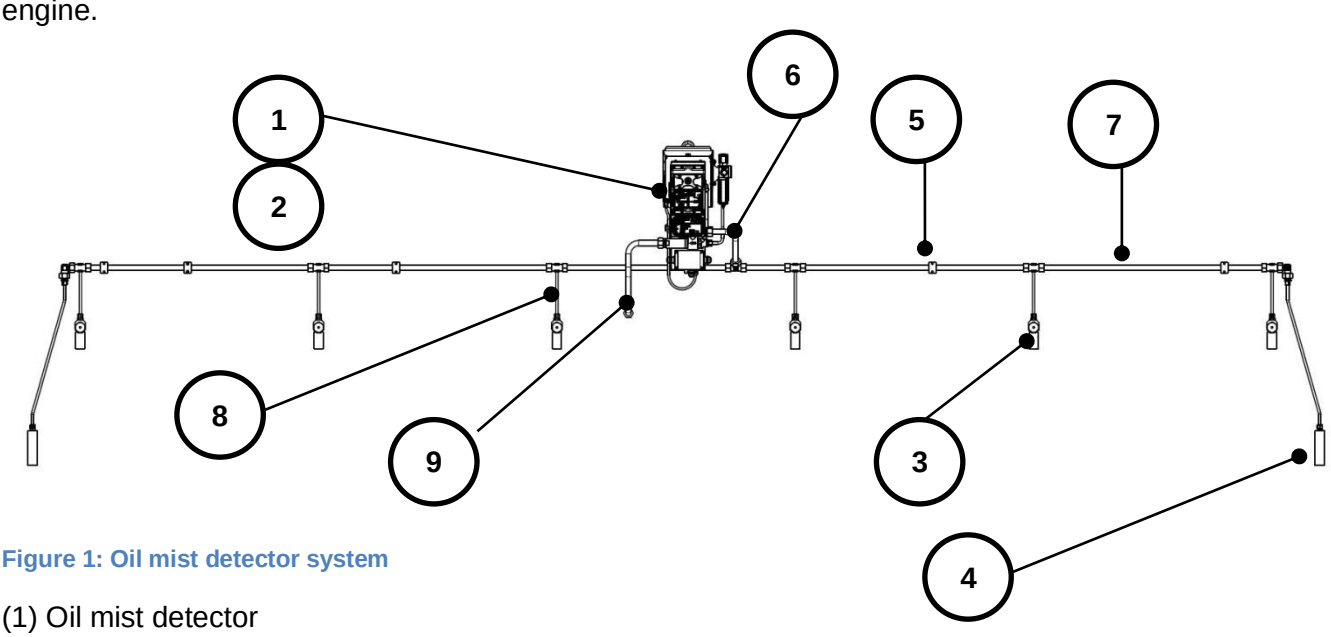

Figure 1: Oil mist detector system

(1) Oil mist detector
(2) Bracket
(3) Engine wall connection
(4) Pipe siphon
(5) Pipe support
(6) Suction line for connection box
(7) Header pipe
(8) Suction pipe
(9) Exhaust pipe

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4.1. Oil mist detector VN2020

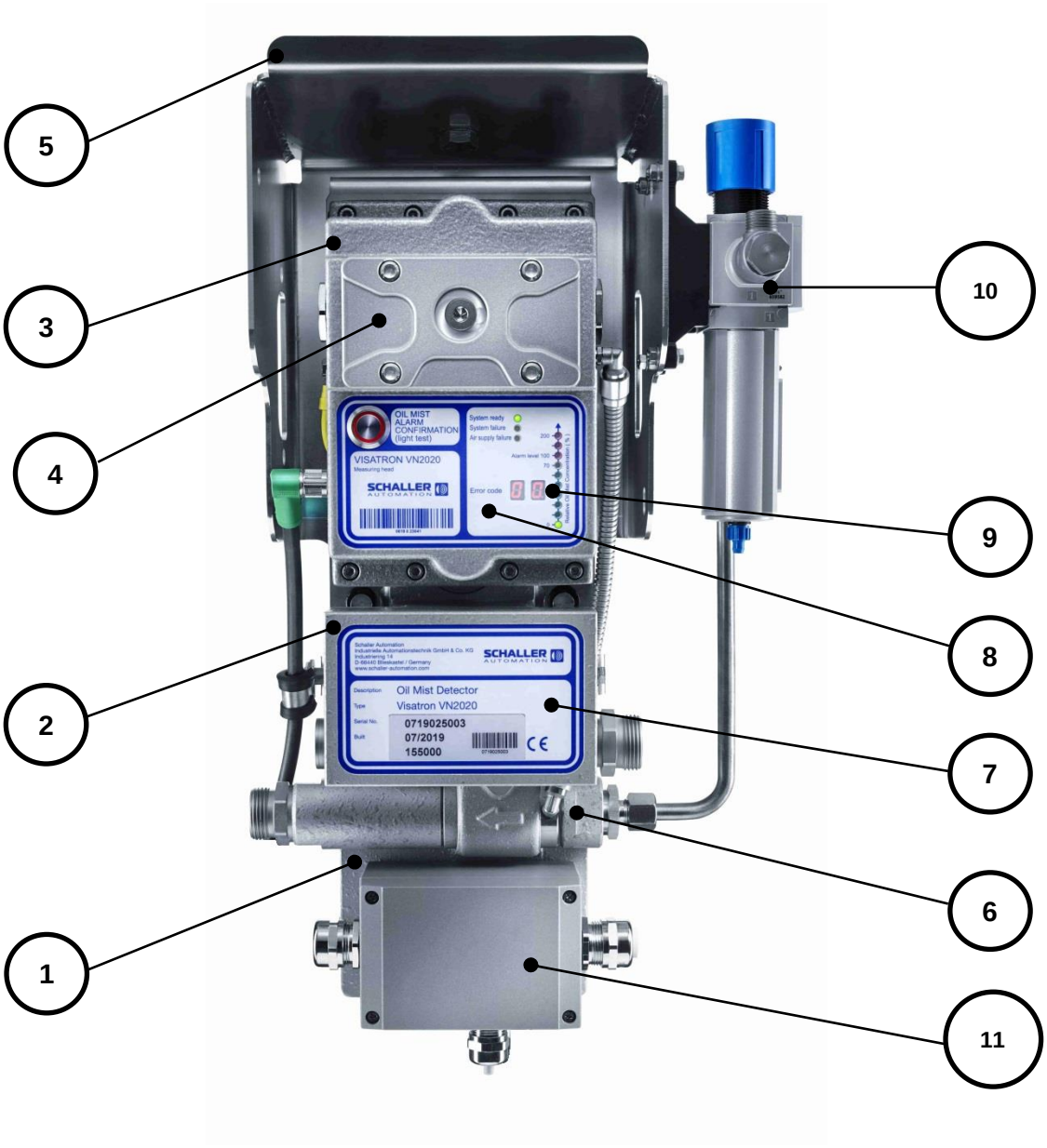

Figure 2: Oil mist detector VN2020

(1) Base plate
(2) Connection box
(3) Measuring head
(4) Inspection cover
(5) Protection cover
(6) Air jet pump (Venturi principle)
(7) Type plate of the oil mist detector
(8) Type plate of the measuring head
(9) Display with error code
(10) Pressure regulator
(11) Terminal box

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Two product variants of the VISATRON® VN2020-series oil mist detector are available:

VN2020

Figure 3: VN2020

VN2020 EX

Figure 4: VN2020 EX

WARNING !
Explosion of the crankcase
Serious injury, including death

➔ The oil mist detector is designed to draw in gases from a potentially explosive atmosphere (for example, the crankcase of a gas engine).

ATTENTION !
Explosion of the crankcase
Serious injury, including death

➔ Only operate the oil mist detector in potentially explosive atmospheres classified as II-/2G (Group II, Category 2G, equipment for atmospheres containing gas). The requirements of IEC/EN 60079-0:2018 and IEC/EN 60079-28:2015 are met.

The differences between the VN2020 EX and the VN2020 are essentially indicated by the following external features:

- Inspection cover: blue
- Type plate of the measuring head: EX symbol and EX marking instead of Schaller logo
- Type plate of the oil mist detector: additional EX symbol

The oil mist detector complies with classification II (2G) [Ex op is IIB T4 Gb].

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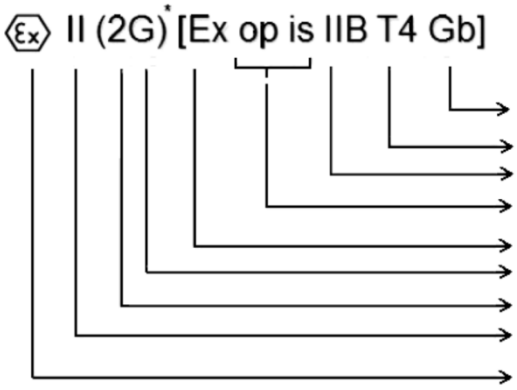

*The brackets indicate, that the device is installed outside the hazardous area () but emits optical radiation into an hazard zone [ ].

Both devices are equipped with a measuring head (3), which includes an optical measuring track under the inspection cover (4) and an LED display (9) to display all the important information for the user under normal operating conditions. The measuring head (3) is attached to the base plate (1) via a vibration-protected mounting plate.

Oil mist containing crankcase atmosphere is drawn out of the crankcases via the engine wall connections by the negative pressure generated in the unit. The oil mist enters the measuring head via the header pipes. This is where the oil mist concentration is then measured in the optical measuring track. The oil mist is then returned to the crankcase via the exhaust line.

The negative pressure for the suction system is generated by an air jet pump (6), which operates on the Venturi principle. The electrical power supply is provided in a terminal box (11).

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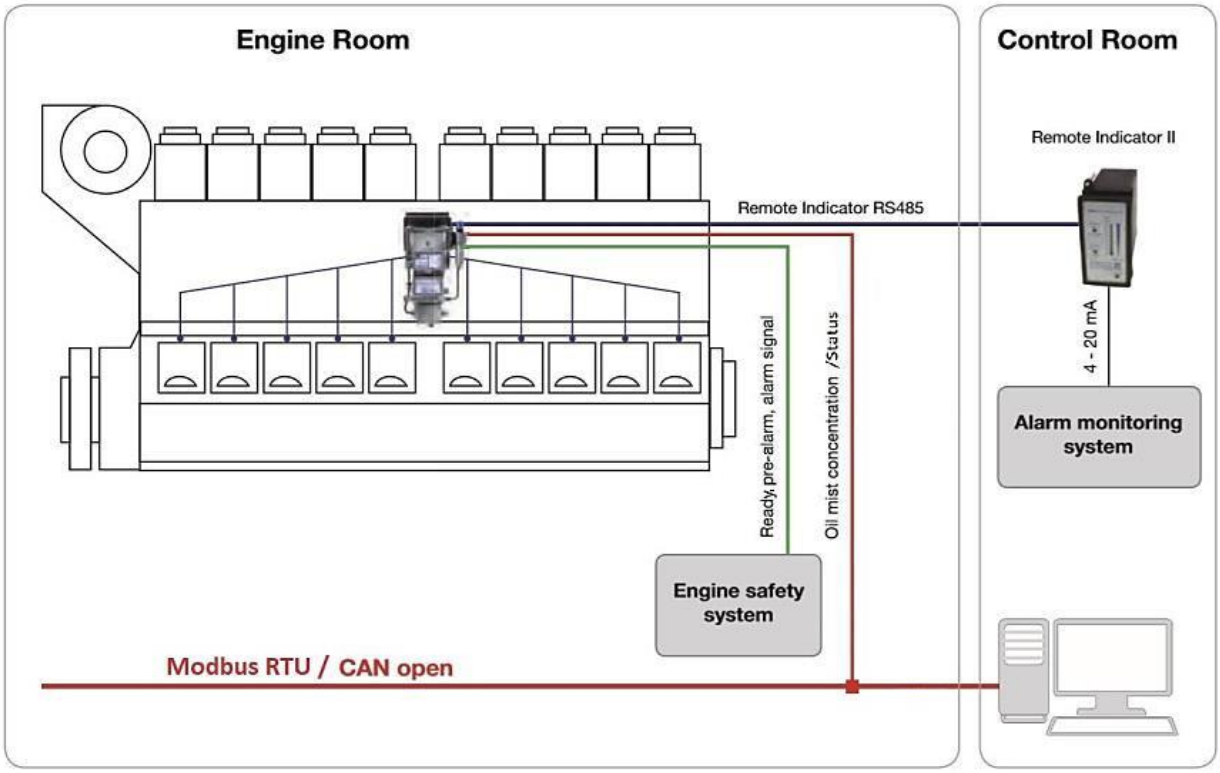

Figure 5: Interface schematic

The device can be connected directly to the engine's safety system. The interface contains two oil mist alarm outputs, a pre-alarm output and a Ready signal.
During normal operation, the crankcase atmosphere is drawn in simultaneously at all suction points and tested in the measuring head.

There are two alarm thresholds. The main alarm threshold can be parameterised using software via the USB interface in the measuring head.
The pre-alarm can also be parameterised. Using the factory setting, it is activated at 70% of the main alarm threshold.

The two device types, VN2020 and VN2020 EX, can be purchased separately as oil mist detectors or as a complete oil mist detector system (installation kit).

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4.2. Bracket

When designing the installation kits, the bracket is adapted to the engine geometry and designed for the applicable application for each customer.

The main task of the bracket is to accommodate the oil mist detector and to connect the oil mist detector system to the engine housing.

4.3. Header pipes

Schaller Automation uses state-of-the-art hydraulic components to draw in and transport oil mist atmospheres. Only tubes according to DIN EN 10305-4 and fittings according to EN ISO 8434-1 are therefore used in the installation kit.

The pipes are supplied in bent and in welded design. Depending on the application, the cutting rings and union nuts for the corresponding screw connections are pre-assembled or supplied loose.

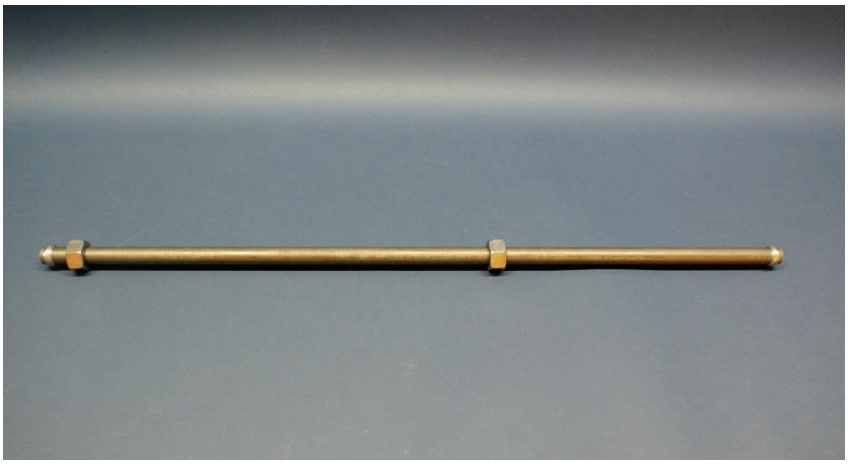

Figure 6: Pipe with cutting rings and union nuts

Pipes are always adapted to the customer's specific engine peripherals.
To be independent of fluctuations in the air pressure in the engine room relative to the pressure in the crankcase, the outlet of the air jet pump (exhaust pipe) must be fed back into the crankcase.

Recirculation of the exhaust air mixed with oil into the engine room must be avoided.

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4.4. Engine wall connection and suction funnel

Each engine wall connection consists of two main components, the engine wall fitting body (1) and the suction funnel (2).

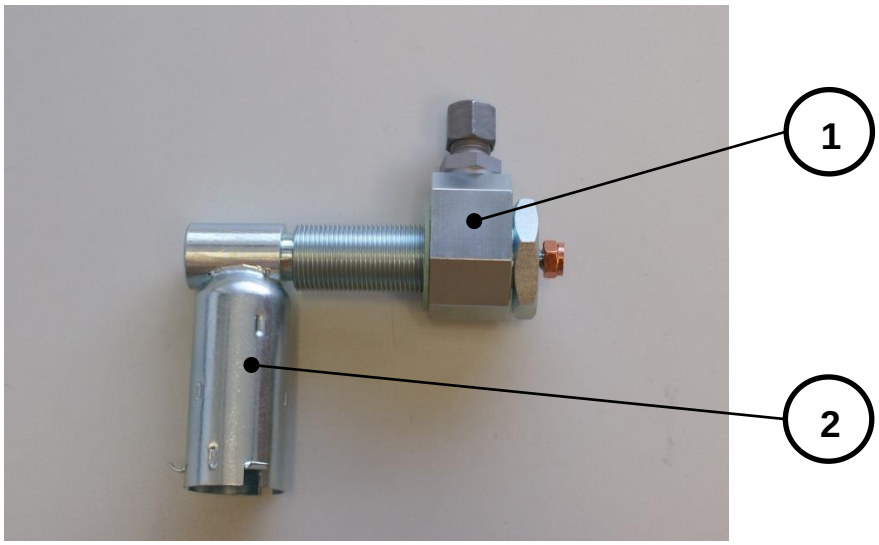

Figure 7: Engine wall screw fitting

The oil mist containing atmosphere is drawn in via the suction funnel and, at the same time, splash oil is prevented from getting into the header pipes. Splash oil can clog the header pipes if it is not properly separated beforehand.

The fitting body allows for angular adjustment to accommodate the suction pipes and forms the connection between the header pipes, suction pipes and the crankcase.

Schaller Automation offers engine wall connectionc in various versions and specifically depending on the engine peripherals.

4.5. Siphon blocks

The blocks are the alternative to the engine wall connections. They are used where a drainage concept using pipe siphons is not possible because of the nature of the peripherals.

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4.6. Hoses

Hoses can also be used as an alternative to the suction and exhaust pipes.
The hoses used by Schaller Automation consist of a hydraulic hose with an additional coating of galvanised wire mesh.

Figure 8: Hoses with wire mesh

The hoses are available with certificates from classification societies and authorities. The certificates can be downloaded from Schaller Automation's homepage (www.schaller-automation.com).

4.7. Pipe siphon

During the suction process for an atmosphere containing oil mist, oil may settle in the suction pipes.

The pipe siphon has the task of draining this settled oil in the header pipes before it clogs or constricts the pipes.

Figure 9: Pipe siphon

At least two pipe siphons are therefore required per installation kit.

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4.8. Optional accessories

4.8.1. Remote monitoring systems

In compliance with IACS UR M10, the oil mist concentration and the status of the oil mist detector can be read from the oil mist detector at a safe location with the Schaller Remote Indicator II (see Figure Figure 10).

The connection to the customer's monitoring systems is via a three-wire RS485 bus line.

Figure 10: Remote Indicator II

Schaller Automation has also integrated the VISATRON® devices into the operator's automation system. A connection is possible via CANopen or MODBUS/RTU.

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5. Safety and protection measures

VN2020-series oil mist detectors are manufactured according to Schaller Automation's high quality standards and are tested in strict factory tests. The safety instructions and warnings must be observed by the operator to ensure that the device operates smoothly and without problems. These instructions are identified in the operating manual with the following symbols.

CAUTION **!**
For safe and proper use, read the operating manual and other documents accompanying the product carefully and keep them for future reference.

5.1. Intended use

The task of the oil mist detector 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 the large engine.
The oil mist detector may only be used for the detection of oil mist in crankcases and to protect against oil mist explosions on large engines (gas, diesel and duel fuel).

When used on large motors that require explosion protection, an oil mist detector with explosion protection marking must be used.

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

The safety instructions must be observed.

5.2. Foreseeable misuse

The oil mist detector must not be installed without the use of suction funnels.

Unauthorised persons must not install or maintain the oil mist detector.

The oil mist detectors must not be used in potentially explosive atmospheres without ATEX approval.

The installation kit components must not be installed other than as shown in this operating manual and the applicable installation kit drawing.

➔ Applications not described in this manual are not allowed!

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5.3. Guide of symbols

This operating manual uses the following symbols in accordance with DIN EN 82079-1.

ATTENTION:
Indicates important information which helps to avoid damage to property.

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

WARNING:
Indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.

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

Ex symbol contains important information for use about explosion protection.
Danger! Personal safety at risk.

The Ex symbol contains important information for action to avoid explosion.

Parts of the oil mist detector may become hot. Make sure they have cooled sufficiently before carrying out maintenance and repair work. Wear thermally insulating gloves if necessary.

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6. Installation

6.1. Safety precautions before use

DANGER!
Explosion of the crankcase
Serious injury, including death
➔ You may only install and remove the oil mist detector system when the engine is switched off.

DANGER!
Explosion of the crankcase
Serious injury, including death
➔ The exhaust pipe of the oil mist detector must always be connected to the crankcase and may not end in the engine room.

DANGER!
Explosion of the crankcase
Serious injury, including death
➔ Observe the permissible ambient temperature T_a (during intended use):
$+5°C \leq T_a \leq +70°C$

DANGER!
Explosion of the crankcase
Serious injury, including death
➔ The oil mist detector is designed for normal operating condition at +/-500 mmWC crankcase pressure when exhaust pipe is connected to the crankcase.

DANGER!
Explosion of the crankcase
Serious injury, including death
➔ Typical gases of ignition protection category T4: T4 maximum surface temperature must be ≤ 135°C.

DANGER!
Zone transfer
Serious injury, including death
➔ The exhaust pipe of the oil mist detector must always be connected to the crankcase. The correct negative pressure in the measuring head should be 60 mmWc.

DANGER!
Explosion of the crankcase
Serious injury, including death
➔ Only qualified personnel are allowed to assembly, install and commission the oil mist detector. The qualified personnel must have knowledge of the type of protection, instructions and regulations for the equipment in explosive atmospheres. Check whether the classification (see type plate) is applicable for this application.

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Parts of the oil mist detector may become hot.
Danger of burning.
➔ Make sure they have cooled sufficiently before carrying out maintenance and repair work. Wear heat-insulating gloves if necessary.

ATTENTION!
Overvoltage at the device
Damage to the device is possible
➔ For welding work on the motor, the oil mist detector must be disconnected from the electrical power supply.

6.2. Unpacking, items included in delivery

When the oil mist detector system is delivered, always check the delivery to ensure that it includes all the components. Schaller Automation provides you with a corresponding parts list for this purpose.
Dispose of the packaging materials in accordance with your local disposal regulations in the containers provided for this purpose.

6.3. Approved drawing for the oil mist detector system

IACS Unified Requirement M10 stipulates that the installation drawings for the oil mist detector system must be approved by the engine manufacturer and SCHALLER AUTOMATION. The oil mist detector system must be installed in accordance with these drawings and the information in this operating manual.

For all installation solutions for an oil mist detector system, written approval from SCHALLER AUTOMATION must be obtained in accordance with IACS UR M10.

6.4. Work and preparations to be completed by the customer

For installation and operation of the oil mist detector system, the customer must provide:
- ➔ one compressed air supply line,
- ➔ an electrical supply line, and
- ➔ a bus line, in accordance with the connection data from the Section 1, to installation location.

6.5. Establishing the compressed air supply

The customer must provide a compressed air supply at a quality in accordance with ISO 8573-1:2010 – 6-4-4 and install it up to the oil mist detector.

ATTENTION!
Premature contamination of the light path
The device may trigger a premature error message
➔ Comply with the quality requirements for compressed air.

The connection to the pressure regulator of the oil mist detector is via interface P1 (see Figure 11).

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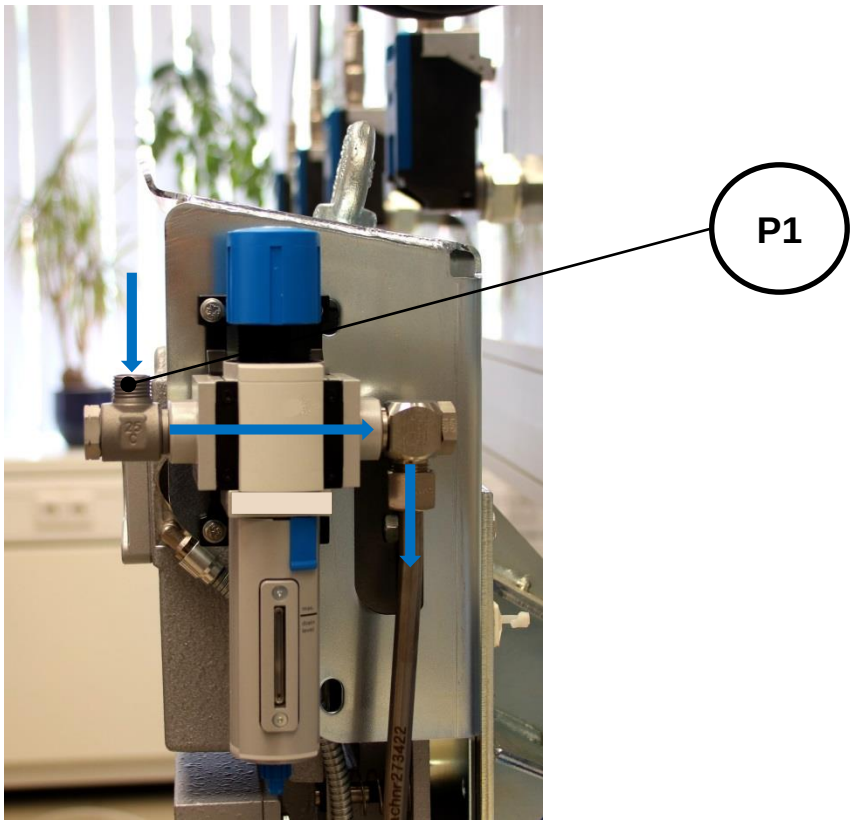

Figure 11: Flow of compressed air at pressure regulator

	P1
Pipe diameter	10mm (L10)
Thread for union nut	M16x1.5
Compressed air supply, min.	2 bar
Compressed air supply, max.	14 bar

WARNING!
Risk of injury from whipping of the connecting hose line
Minor to severe bruises
➔ Check the applied system pressure before connecting the supply pressure.

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6.6. Establishing the electrical power supply

Establish the electrical connection from the customer's mains network to the oil mist detector via interfaces E1 and E2 (see Figure 12).

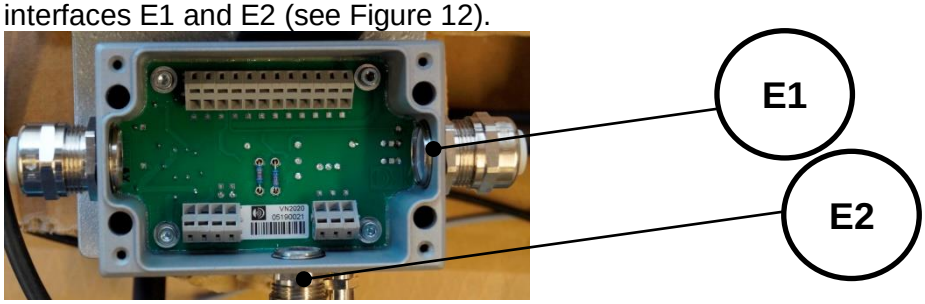

Figure 12: Front view of the terminal box

DANGER!
Risk of electric shock
Risk of injury
➔ Before connecting the electrical power supply lines, you must ensure that there is no voltage.

E1	
Cable gland	M25x1,5
Cable diameter	Ø8 – Ø16mm
Input voltage	24V DC

Alternative sizes of cable glands on request.

6.7. Mounting holes on crankcase

In general, all components of the Schaller Automation oil mist detector system are mounted on the crankcase with a threaded hole. The thread size may vary, depending on the engine manufacturer and engine type.

The standard components from Schaller Automation have a G3/4" thread.

7. Installation of oil mist detector

7.1. Mounting the oil mist detector with pre-mounted bracket

Attach the oil mist detector to the engine using the pre-assembled, engine-specific bracket and with the supplied screws to the mounting holes provided for this purpose. Details of mounting and position can be found in the applicable customer drawing. The recommended side for mounting on the engine is opposite to the side of the explosion protection valves.

A suitable means of transport (e.g. crane) must be used for installation and transport to the installation site. The oil mist detector can be attached to the crane via the eye bolt on the protection cover. Appropriate lifting equipment must be used for transport.

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7.2. Installing the oil mist detector without bracket

Alternatively, the oil mist detector can be installed directly using the four 9mm-diameter through-holes in the base plate on the engine or a bracket provided by the customer, if the engine peripherals allow such installation.

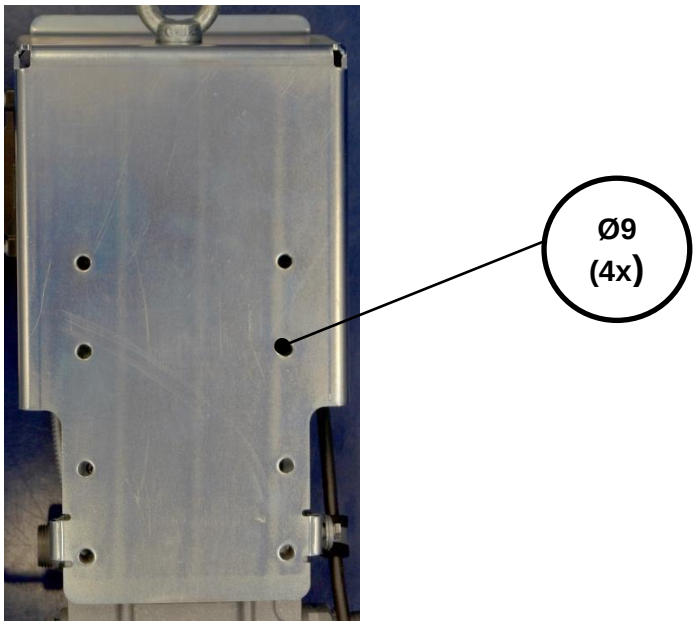

Figure 13: Rear of oil mist detector without bracket and with protective cover

ATTENTION!
Premature contamination of the oil mist detector
Device may report malfunction prematurely
➔ Level the oil mist detector horizontally and vertically during installation.

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7.3. Mounting of engine wall connections and suction funnel

Part number: 270354 (Standard)

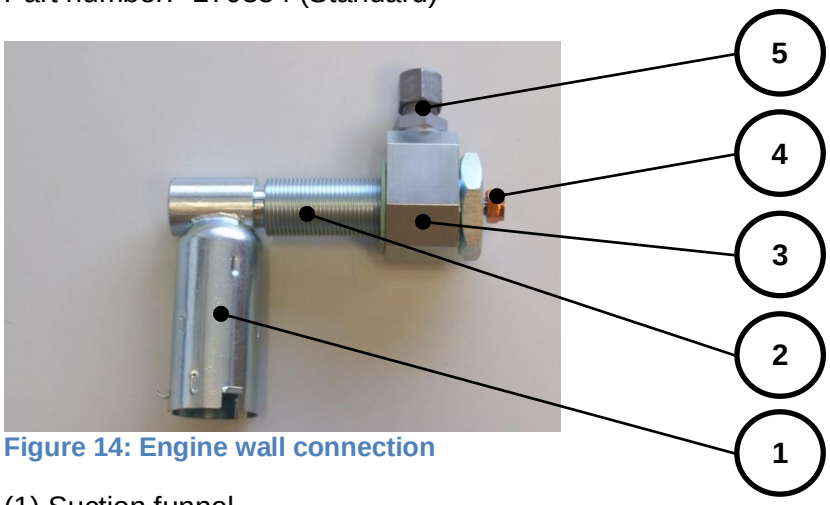

Figure 14: Engine wall connection

(1) Suction funnel
(2) Screw-in sleeve
(3) Housing
(4) Lock nut
(5) Screw fitting

Tools: Open spanner, width across flats 13
Open spanner, width across flats 19
Open spanner, width across flats 22
Open spanner, width across flats 41

ATTENTION!
Danger due to flying parts or collision with the suction funnel
Severe damage to the engine
→Make sure that the suction funnels do not interfere with rotating or moving engine parts.

The suction funnels must be installed according to the customer drawing and always aligned vertically and with the opening pointing towards the bottom of the crankcase.

ATTENTION!
Risk of blockage of the suction funnels
Impaired monitoring of a segment of the crankcase
→Make sure that the suction funnels cannot be flooded by splashing oil.

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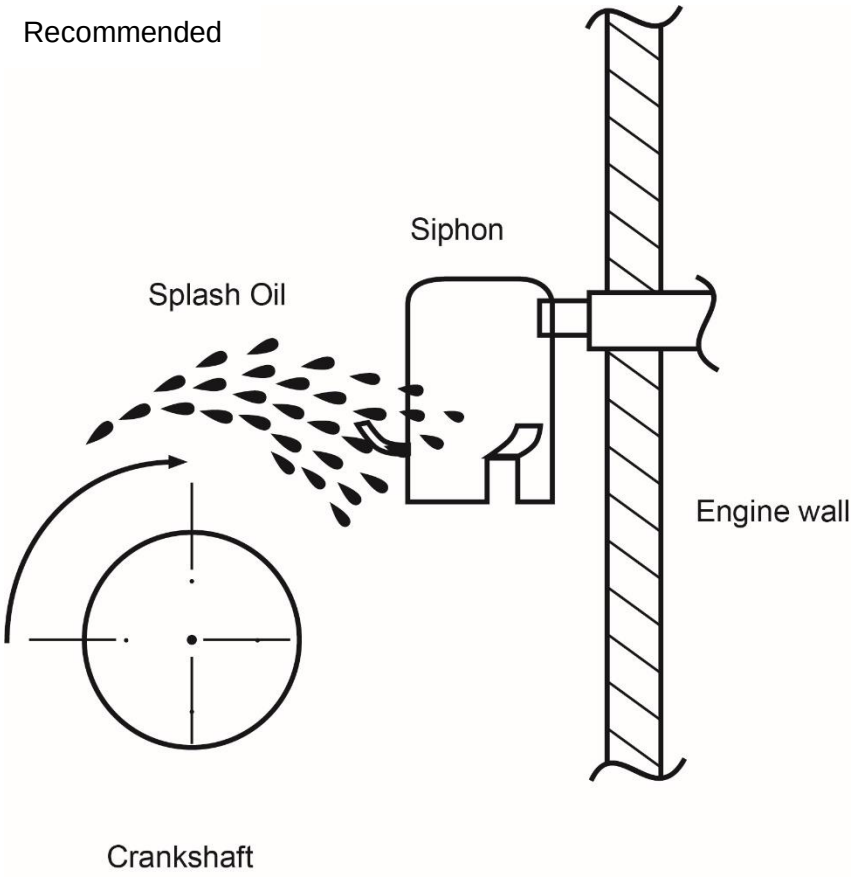

1.

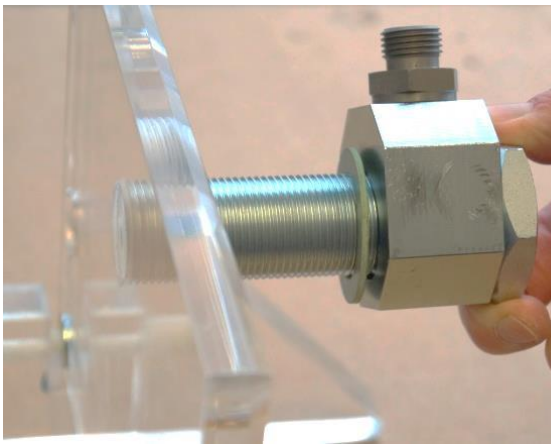

Figure 15: Screw-in sleeve and housing

Screw the screw-in sleeve with flat gasket and housing into the mounting thread of the crankcase. At the same time, align the housing at an angle as per the installation set drawing.

2.

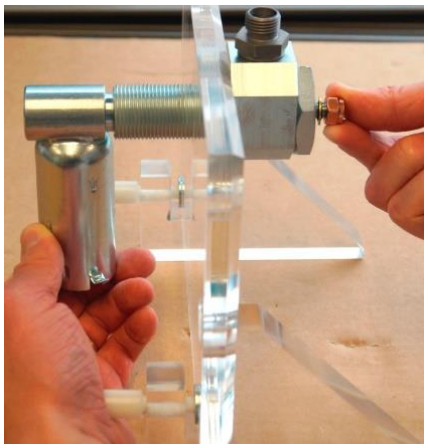

Figure 16: Insert the suction funnel

Insert the suction funnel through the inside of the crankcase into the screw-in sleeve. Tighten the suction funnel with sealing washer and lock nut via the thread.

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3.

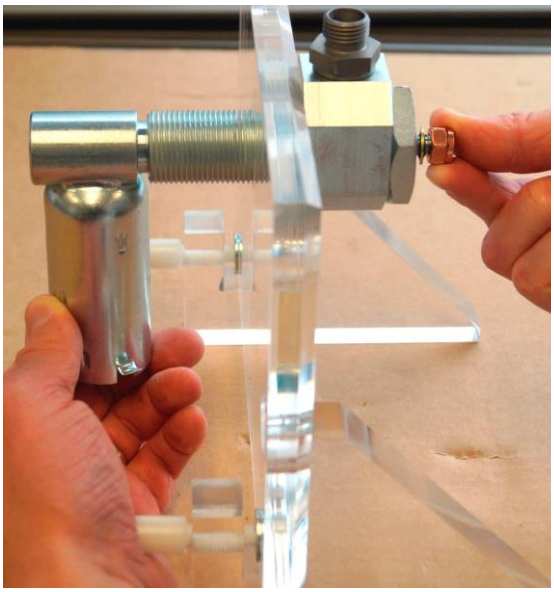

Figure 17: Align the suction funnel

While tightening, align the suction funnel vertically and with the opening pointing to the bottom of the crankcase.

4.

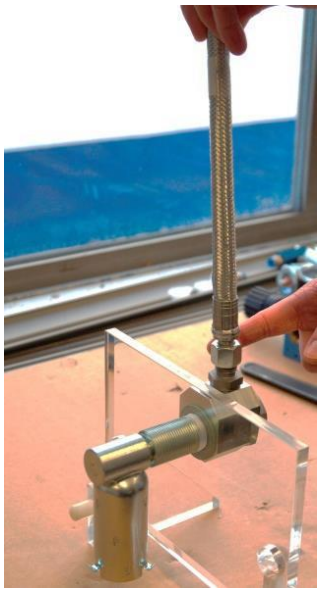

Figure 18: Connect line

Connect the pipe or hose line with the screw-in fitting of the engine wall screw fitting.

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7.4. Mounting siphon block

Part number:
150260 – Siphon block
150166 – Siphon block with measuring connection
270923 – Connection unit 03 Standard
270371 – Filling pump

Figure 19: Siphon block

Tools:
Allen key size 6
Combination spanner, width across flats 10
Combination spanner, width across flats 17
Filling pump with lubrication oil for filling the siphon block

The siphon block consists of two assemblies, the connecting unit and the siphon block.
The siphon block is available in two versions, one with and one without measuring connection.

Figure 20: Connecting unit

Figure 21: Siphon block

Figure 22: Siphonblock with measuring connection

1.

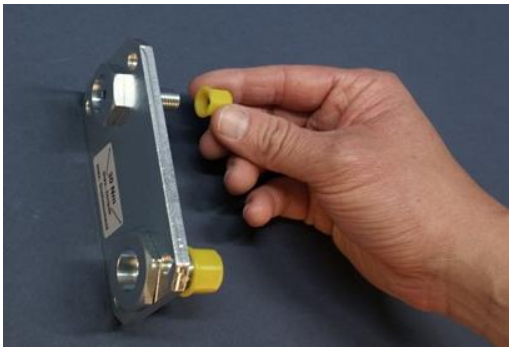

Figure 23: Connection unit

Remove the yellow protective caps of the connecting unit and dispose of them.

2.

Figure 24: Screws with Loctite

Apply Loctite 572 to both screws.

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3.

Figure 25: Installation of connecting unit

Mount the connecting unit on the crankcase. Tightening torque: 30 Nm.

4.

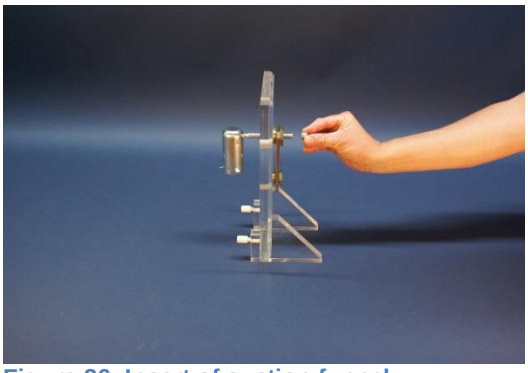

Figure 26: Insert of suction funnel

Insert the suction funnel, starting from the crankcase, into the connecting unit. Place the cutting ring over the pipe. Align the suction funnel vertically and with the opening of the funnel pointing towards the engine floor.

⚠ ATTENTION!
Leakage from the siphon blocks. This impairs monitoring of an engine block.

➔ Make sure the cutting ring is aligned during assembly.

5.

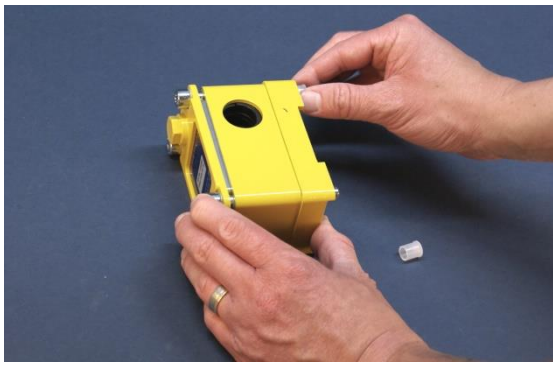

Figure 27: Remove protection caps

Remove the protection caps (4x) from the screws on the siphon block

6.

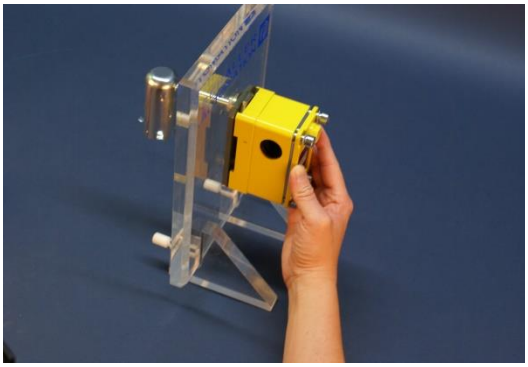

Figure 28:: Guidance of siphon block

Guide the siphon block over the pipe of the suction funnel to the connecting unit.

7.

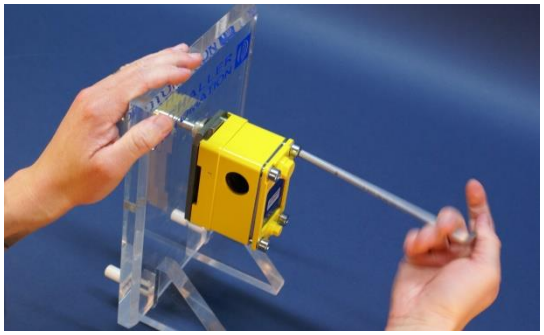

Figure 29: Tightening the screws on the siphon block

Tighten the screws crosswise while pay attention of suction funnel alignment.

8.

Figure 30: Remove the screw plug at the

Remove the bottom screw plug and set aside.

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9.

Figure 31: Filling of pump with lubrication oil

Fill the filling pump with lubrication oil (lubrication oil approved by the engine manufacturer) and operate the pump mechanism until lubrication oil runs out of the side openings of the filling pipe. Insert the filling pump into the oil return hole of the siphon block up to the stop of the filling pipe. Tighten the screw fitting body of the straight screw-in fitting firmly.

10.

Figure 32: Installation of filling pump

Press the filling pump with filling pipe firmly against the oil return hole of the connecting screw and tighten the union nut.

ATTENTION!
The oil return hole of the connection screw must be closed by the tip of the filling pipe, otherwise the lubrication oil will run into the crankcase and not into the ducts of the siphon block.

11.

Figure 33: Pumping of lubrication oil

Perform eight pump strokes.

ATTENTION!
Excess oil can flow into the suction pipe.
This impairs monitoring of an engine block.
➔ Do not pump more than eight times!

12.

Figure 34: Remove filling pump

After filling the siphon block, remove the filling pump and screw in the screw plug again without delay.

When the filling pump is removed, a little oil may escape from the oil return hole. However, this does not affect the function of the siphon. Remove leaking lubrication oil with a cleaning cloth.

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7.5. Mounting pipe siphon

Part number: 150939

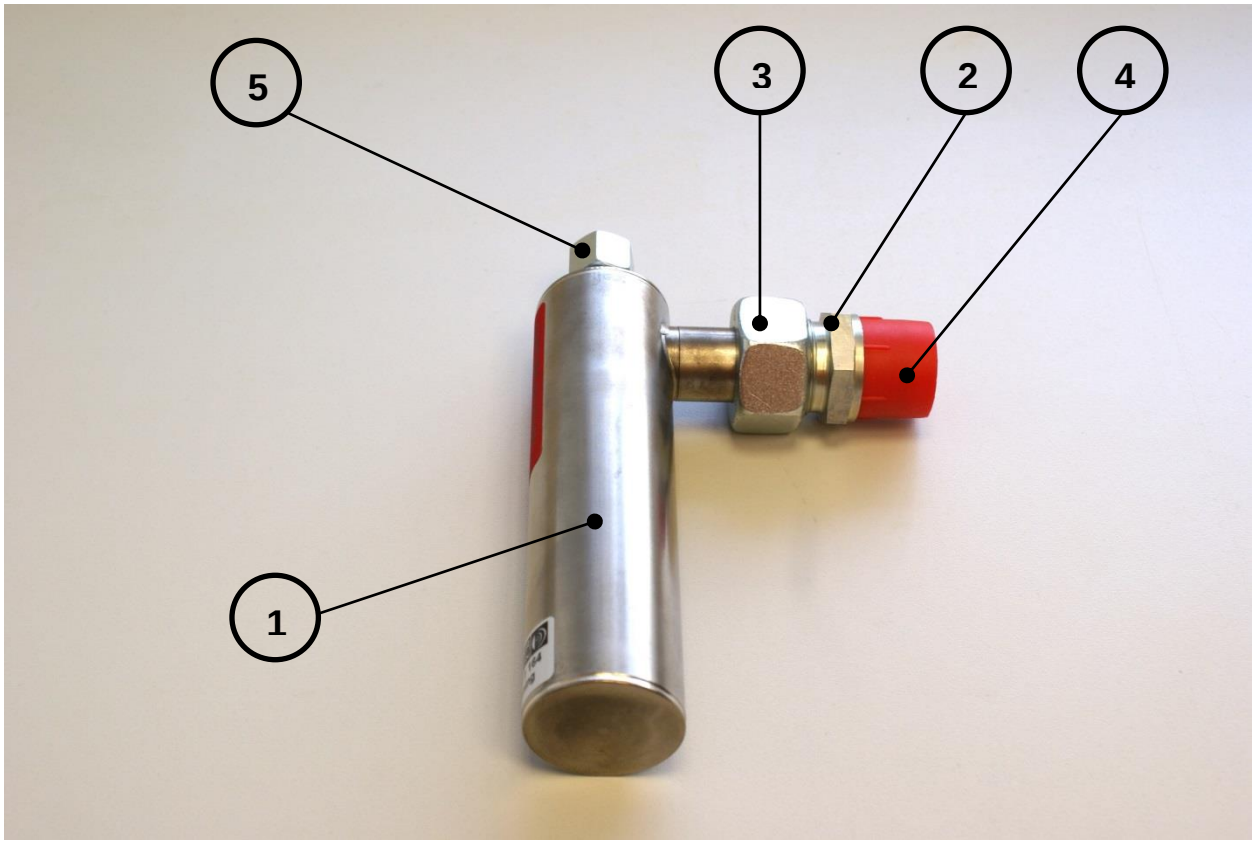

Figure 35: Pipe siphon

(1) Pipe siphon
(2) Straight screw-in socket L22
(3) Union nut
(4) Protective cap
(5) Straight screw-in socket L10

Required tools:
Combination spanner, width across flats 19
Combination spanner, width across flats 32
Combination spanner, width across flats 36
Lubrication oil pump/hand pump with lubrication oil
Funnel for filling the lubricating oil
Torque wrench for torque of 180 Nm
Small spirit level

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1.

Figure 36: Mounting of screw-in socket

Screw the straight screw-in socket (2) into the thread of the crankcase. Tighten to 180 Nm (-10%).

ATTENTION!
Danger of part breaking.
Damage to parts or the engine.
➔ Comply with the specified torque. Torque only applies to steel parts.

2.

Figure 37: Mounting of pipe siphon

Push the pipe siphon (1) flush with the pipe attachment into the screw connection and initially fit the union nut hand-tight.

3.

Figure 38: level of pipe siphon

Use the spirit level to align the pipe siphon horizontally and then tighten the union nut slightly by hand.

4.

Figure 39: Filling the pipe siphon

Fill the pipe siphon via the screw connection (5) with 70 ml of lubrication oil (lubrication oil approved by the engine manufacturer/engine's own lubrication oil).

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5.

Figure 40: Connection of pipe

6.

Figure 41: tightening of fitting

Insert the connecting line flush into the screw-in socket (5) as far as it will go. Tighten the union nut initially by hand.

7.6. Mounting of pipes

Schaller Automation uses standardised fittings in accordance with ISO 8434-1 for its installation kits. The cutting ring fittings used must be assembled and disassembled in accordance with ISO 8434-1.

The pipes in the installation kits differ as follows:

- Pipes with pre-assembled cutting rings and union nuts
- Pipes without cutting rings and nuts
- Pipes with welded fittings including cutting rings and union nuts

Metric pipes with two pipe diameters of 10mm and 22mm are used.
The pipes are attached to the pipe connectors using traditional cutting ring fittings during installation.

For any paintwork, the operator must ensure that paint and piping are compatible. The total length of the pipes must not exceed 9m.

WARNING!
Leaking of the oil mist detector system
Monitoring by oil mist detector is impaired

➔ Install or remove cutting ring fittings according to ISO 8434-1.

The exhaust pipe is used to return the intake crankcase atmosphere to the crankcase and must not exceed an overall length of **4m**.
.

WARNING!
Blockage of the piping system
Monitoring by oil mist detector is impaired

➔ Install and route pipes without U-bends or kinks.

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7.7. Installation of hose lines

The hose lines are installed according to the installation kit drawing.
The length, angle, orientation and position of the lines can vary from engine type to engine type.
The instructions on the applicable installation kit drawing must be observed.

As a general rule, the pipes and hoses should be pre-assembled in a first step, so that they can be installed free of stress as far as possible. Only after an installation kit has been completely installed should all connections be tightened to the corresponding specifications.

WARNING!
Blocking of hose lines due to sagging
Monitoring by oil mist detector is impaired
→Install and assemble the hose lines according to the installation kit drawing

7.8. Installation of electrical connecting cable

The oil mist detector is connected to the operator network and the safety interfaces via the connecting lines as follows. Figure 42 shows is a schematic of the connection between the oil mist detector and the operator.

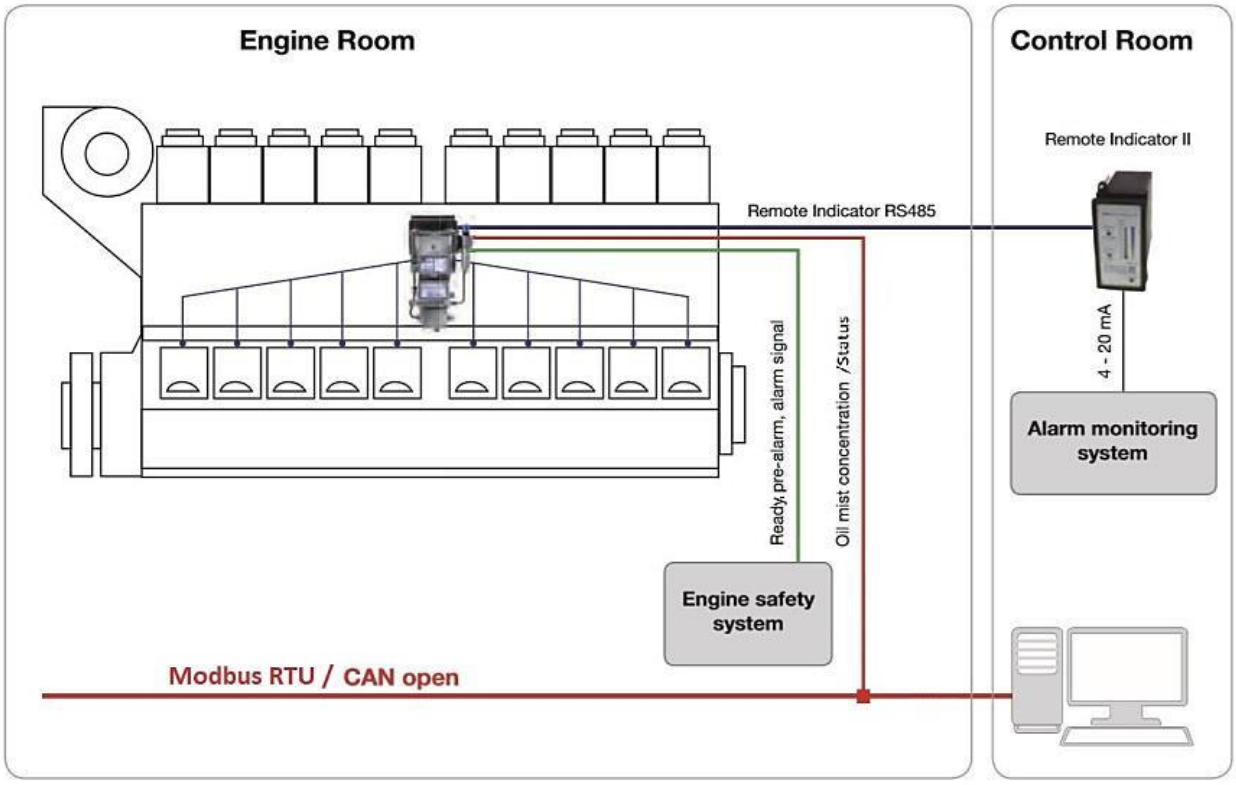

Figure 42: Wiring diagram between OMD terminal box and customer interface

The electrical connection of the oil mist detector is via the terminal box on the bottom side of the base plate. The wire break resistors installed on delivery can be adapted and replaced to customer-specific requirements.

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Required tools:

- Cross-head screwdriver, drive PH 2
- Slotted screwdriver, width 2.5 mm

Procedure for electrical connection in the terminal box:

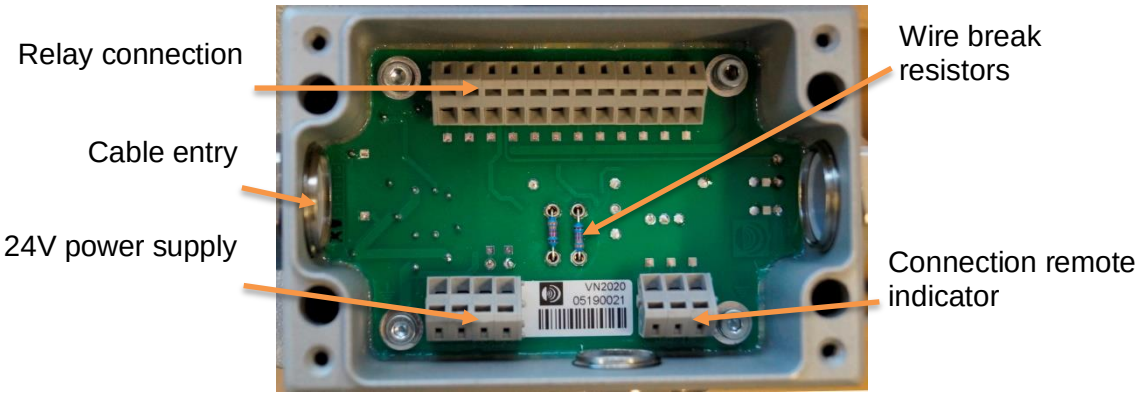

Figure 43: Terminal box

1.

Figure 44: cover and teminal box

Remove the cover of the terminal box and set it aside. The wiring diagram is inside on the back.

2.

Figure 45: Prepared connecting line

Remove the bag of resistors from the terminal box and set aside.

3.

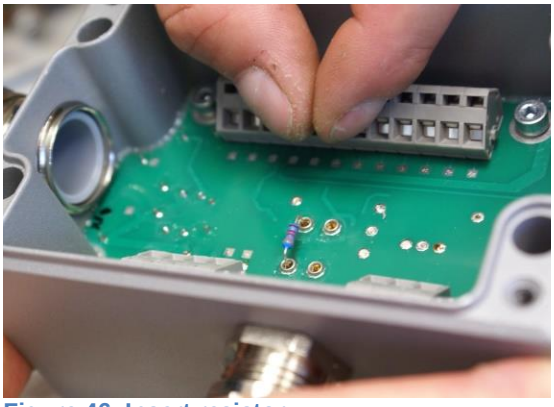

Figure 46: Insert resistor

Select a suitable resistor and replace installed resistors, if necessary.

4.

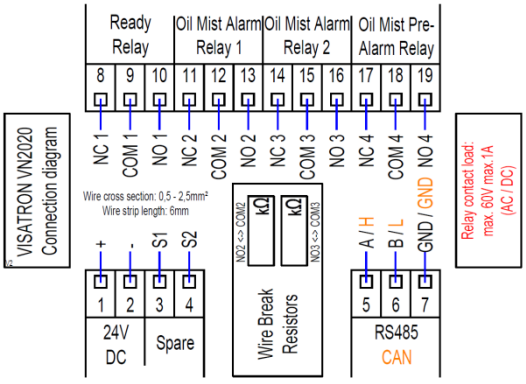

Figure 47: Wiring diagram for the terminal box

Connect the connecting line to the terminal blocks according to the wiring diagram. See table

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5.

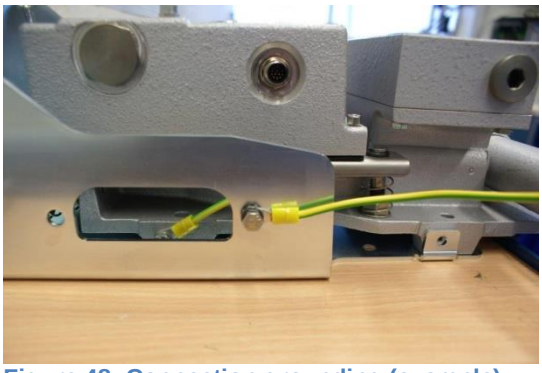

Figure 48: Connection grounding (example)

Grounding connection. Grounding is directly via the attachment of the base plate or the protective cover. The grounding connection must be installed with a permanent, corrosion-free screw connection.

6.

Figure 49: Install the cover on terminal box

Install the cover on the terminal box and tighten the cover screws.

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Clamp Nr.	designation	Connect to	Note/action
1	24 V DC +	Power supply	Voltage range: 18-31.2V
2	24 V DC -		
3	Spare S1		Reserve
4	Spare S2		
5	A / H	Remote indicator	RS485 A/CAN H
6	B / L		RS485 B/CAN L
7	GND		RS485 GND/CAN GND
8	NC1	Alarm system/ safety system	Contacts COM1 and NO1 close in Ready mode
9	COM1		
10	NO1		
11	NC2	Alarm system/ safety system	Contacts COM2 and NO2 close in the event of an oil mist alarm (High Oil Mist Alarm)
12	COM2		
13	NO2		
14	NC3	Alarm system/ safety system	Contacts COM3 and NO3 close in the event of an oil mist alarm (High Oil Mist Alarm)
15	COM3		
16	NO3		
17	NC4	Alarm system/ safety system	Contacts COM4 and NO4 close on pre-alarm (Oil mist pre-alarm). Pre-alarm is triggered from 70% of the high oil mist alarm threshold.
18	COM4		
19	NO4		

Figure 50: Wiring diagram of the terminal blocks

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7.9. Installation of Remote Indicator (Optional)

Part number: 150992

Figure 51: Remote Indicator II

As required by IACS UR M10, the oil mist detector can be connected to the Schaller Remote Indicator II to monitor the oil mist concentration and the status of the oil mist detector from a safe location.

A monitoring device must be used from a safe location (e.g. machine control room) to check the current oil mist concentration, as required by IACS M10. In the event of an oil mist alarm, Schaller Automation strongly recommends that you do not approach the engine until the oil mist concentration that is displayed has dropped to half the value of the LED level indicator (VISATRON® device or Remote Indicator II).

The monitoring devices are connected via a RS485 bus line. If a Remote Indicator II is used, the connection only consists of a two-point connection. The bus system on the oil mist detector must be terminated with a resistor. This is integrated in the measuring head with switch (see Figure 52:)

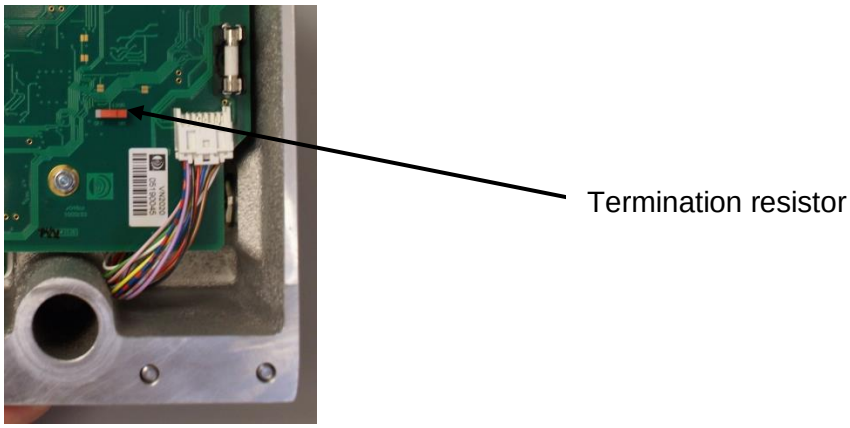

Figure 52: Switchable termination resistor

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Use a communication cable with a twisted and shielded 3-wire cable. SCHALLER AUTOMATION recommends LAPPKABEL UNITRONIC-FD CP (TP) plus UL-CSA.
The cable inlet of the VISATRON® is designed for cable diameters from 5 mm to 13 mm.

The connection between oil mist detector and monitoring device for standard applications is shown in the following wiring diagram (see Figure 53).

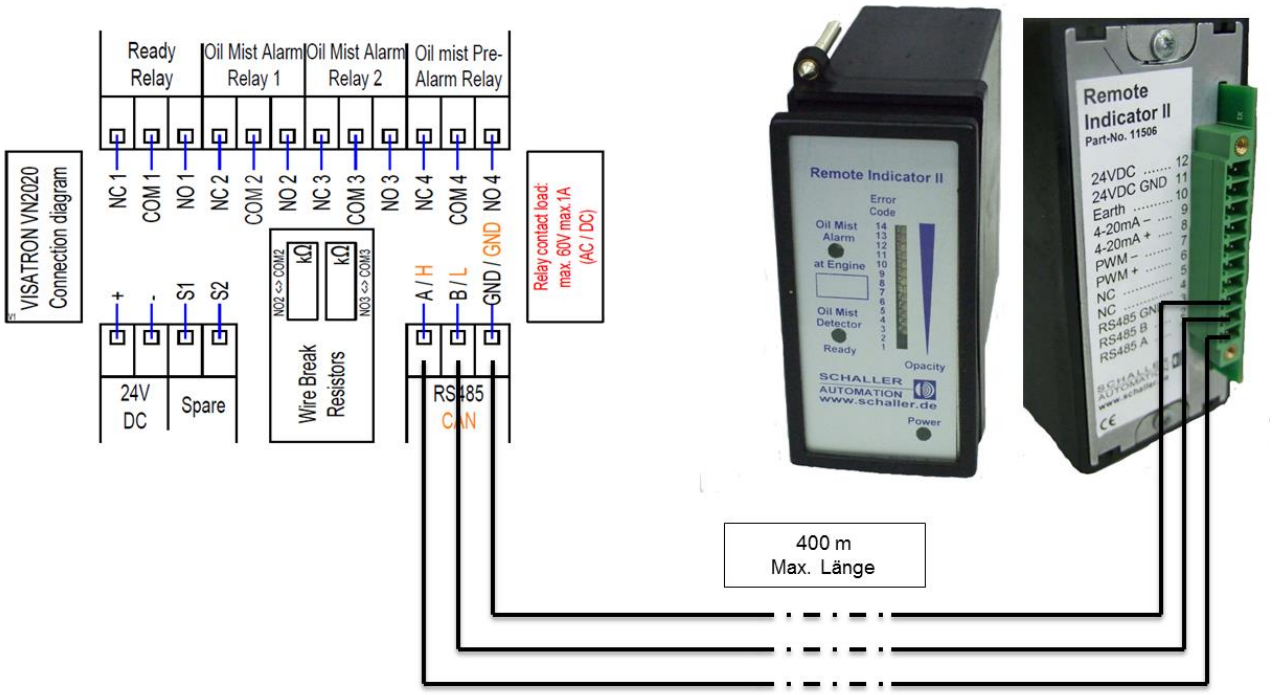

Figure 53: Connection diagram for the VN2020 with Remote Indicator II

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7.10. Initial comissioning

WARNING!
Engine protection not guaranteed
Risk of oil mist explosion

➔ The oil mist detector may only be commissioned after all the components have been completely installed.

7.10.1. Setting of negative pressure on measuring head

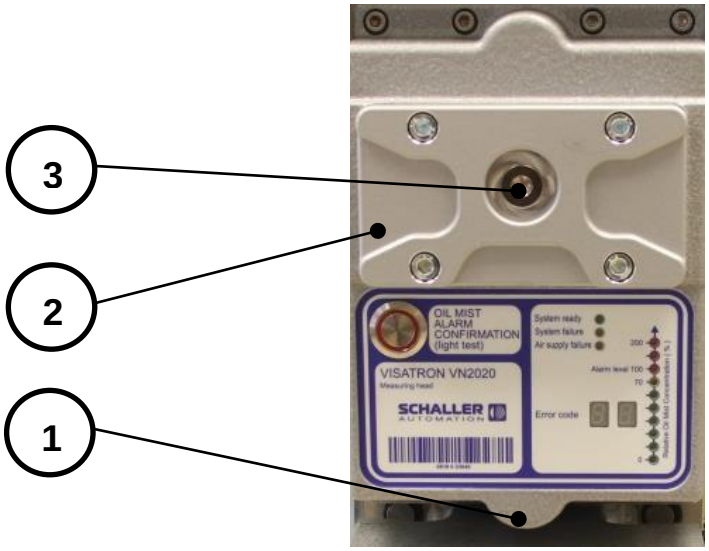

Figure 54: Front view measuring head

(1) Measuring head
(2) Inspection cover
(3) Screw plug
(4) U-tube manometer/digital manometer (270532)
(5) Quick coupling (270532)
(6) Water for U-tube manometer (270532)

To establish protection of the engine, start up the oil mist detector for the first time with the engine stopped.

ATTENTION!
Suction capacity is not reached
Premature fault indication

➔ Set a negative pressure of 60 mmWc.

Required tools: Allen key, sizes 5 & 6
U-tube manometer 270532
Torque wrench for torque of 15 Nm

CAUTION!
The suction pressure of the oil mist detector system is adjusted by adjusting the pressure regulator when the engine is at a standstill.
Make sure that at least one crankcase cover of the engine is open to prevent any influence of crankcase pressure on suction pressure.

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Procedure for setting the negative pressure on the measuring head :

1.

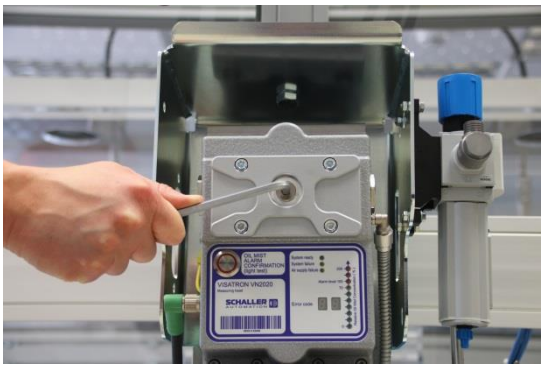

Figure 55: Inspection cover with screw plug

Unscrew the screw plug (3) on the inspection cover (No. 2 on the measuring head (1)) and set aside.

2.

Figure 56: Inspection cover with quick coupling

Screw the quick coupling with sealing ring into the inspection cover and tighten.

3.

Figure 57: Fill U-tube manometer with water

Fill the U-tube manometer (4) with the supplied water (6) up to the mark on the manometer.

4.

Figure 58: U-tube manometer on inspection cover

Insert the U-tube manometer (4) into the quick coupling (5).

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5.

Figure 59: Pressure regulator

Check the supply pressure before applying compressed air to the oil mist detector for the first time. The pressure must be at least 2 bar and max. 14 bar. Switch on the compressed air supply

6.

Figure 59: Negative pressure display on the U-tube manometer

Set 60 mmH20 ±5 mmH20. To do this, adjust the adjusting screw on the pressure regulator until the specified negative pressure is reached on the U-tube manometer.

WARNING!

Risk of explosion due to oil mist. **Severe to fatal injuries.**

➔ Do not set the negative pressure at the measuring head lower or higher than the specified limit values.

.

Once you have successfully completed step (6), remove the U-tube manometer and the quick coupling. If you could not set the negative pressure in step (6), jump to Section XXX. Finally, screw in the screw plug from step (1) again to a torque of 15 Nm.

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7.10.2. Connecting power supply

The power supply must be provided by the operator for the following steps.

(1) Switch on the power supply for the oil mist detector.
(2) The LEDs on the display of the measuring head flash immediately after you switch on the power supply. The oil mist detector now counts down for 30 seconds. After the time has elapsed, the “System ready” LED comes on.

Figure 60: Measuring head display – normal operating mode

If the LED does not light up, please jump to Section 8.2.

7.10.3. Setting the sensitivity of the oil mist detector

The detector determines the oil mist concentration by optical measurement. The calculated value is the relative opacity in percent. 100% opacity means that no light penetrates the oil mist sample.
The LEL (Lower Explosive Limit) corresponds 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 2.5 mg/l at the latest. The lowest sensitivity of all VN2020 oil mist detectors, Alarm Threshold 7, still ensures that an oil mist alarm is output at oil mist concentrations < 2.5 mg/l. This fully complies with the requirements of IACS UR M67.

The customer is responsible for deciding on the sensitivity of the oil mist detector. The oil mist detector is set to sensitivity level 2 at the factory.

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7.10.4. Function test

Once the steps in Section 7.1-7.3 have been successfully completed, the function test can be started.

(1) Remove the smoke tube from the smoke test box (see 13.6) and bend the hose.
(2) Each extraction point is now checked individually. To do this, hold the smoke tube directly under the suction funnel of the individual extraction point and perform at least 3-5 pumping strokes. The resulting smoke should now be drawn out directly via the suction funnels.
(3) After no more than 10 seconds, the oil mist detector should indicate an alarm on the measuring head display. The time to display varies depending on the engine type and the installation kit.

Figure 61: Display with detected oil mist

(4) Cancel the detected alarm using the reset button on the measuring head.
(5) Carry out steps 2-4 at all extraction points of the installation to ensure that all extraction points are functioning correctly.
(6) Finally, dispose of the smoke tube.

The oil mist detector is now ready for operation !

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7.10.5. Checkliste for comissioning

Item No.	Description	☑
1.	Are all suction lines installed as shown in the installation drawing ?	
2.	Are all fittings secured?	
3.	If mounting with siphon blocks: Are all siphon blocks filled with oil and all unused openings closed ?	
4.	If mounting with pipe siphons: Are all the pipe siphons filled with oil ?	
5.	Is the negative pressure at the measuring head set to 60 mmWC ?	
6.	Is the power supply connected to the terminal and is the voltage within the specified range ?	
7.	Is remote monitoring installed (applies only when optional accessories are purchased) ?	
8.	Are the “Alarm” and “Ready” signals connected to the engine control and safety system ?	
9.	Have the correct wire break resistors in the terminal box been adapted to the specifications of the applicable engine manufacturer (default on delivery: 33 kOhm)?	
10.	Functional test performed with smoke tube?	

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7.11. Recommissioning

If an oil mist alarm is triggered, the alarm on the oil mist detector must be manually reset to the Ready state.

➔ Only reset the oil mist detector via the reset button if you have previously made sure that there is no high oil mist concentration left in the crankcase or as soon as the oil mist concentration is below the displayed alarm limit.

8. Operation and application

8.1. Display

If the oil mist concentration is high, the LED indicator will increase and at 70% opacity of the set alarm threshold, the “Oil Mist Alarm” LED comes on. At 100% opacity relative to the set alarm threshold, the “Oil Mist Alarm” LED will start flashing. If the opacity subsequently decreases, the alarm status is saved.

Figure 62: Beispielanzeige LED Display mit Alarm

The opacity is displayed on the LED level indicator on the right. If the top LED comes on, the opacity has reached/exceeded the oil mist alarm threshold.

8.2. Error analyze and troubleshooting

DANGER!
Risk of explosion due to oil mist.
Severe to fatal injuries.

➔ If an oil mist alarm occurs, do not approach the engine again until the oil mist concentration on the LED level indicator on the VN2020 or the remote display has dropped to 0%.

The alarm condition can only be reset by pressing the oil mist alarm reset button.

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Figure 63: Reset buttin on measuring head

If an internal device error or system error occurs, the diagnostic system indicates the error status with flashing LED on the LED level indicator.
The error codes are listed in Table 1. A detected oil mist alarm is indicated at this point by the “Test” LED. In this case, the alarm relay or shutdown relay is not turned on.

The following error codes may occur on your VN2020 oil mist detector:

Error code	Error description	Troubleshooting Section
-	All LEDs off	8.2.1
02	Electronic module faulty	8.2.2
03	Airflow sensor faulty	8.2.3
04	Optical sensor faulty	8.2.4
05 - 07	Internal error	8.2.5
08	Electronics temperature too high (> 75 °C)	8.2.6
09	Electronics temperature too low (< 0 °C)	8.2.7
10	Ambient temperature too high (> 70 °C)	8.2.8
11	Ambient temperature too low (< 0 °C)	8.2.9
12	Internal memory checksum error	8.2.10
13	Optical sensor dirty – cleaning required	8.2.11
14	Supply pressure not within permissible range	8.2.12
15	Optical sensor very dirty– cleaning must be carried out	3.1.28
16	Optical sensor faulty	8.2.4
17	Internal memory checksum error	10.1.1
18	Battery voltage too low	10.1.2
19	Reset button faulty	10.1.1
20-31	Internal error	10.1.1
32	Power supply not within permissible range	7.10
33	Supply pressure too high	6.5
34	CANopen initialisation failed	10.1.1

Table 1: Error codes

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The displayed faults can be resolved by the customer or alternatively by an authorised Schaller service partner.

The error codes and troubleshooting steps are listed in their order of priority below. The specified work steps must be carried out one after the other, if the first work step in each case has not resolved the error code.

8.2.1. Error code – All LEDs off

1. Check power supply
2. Replace fuse in measuring head (Section 10.1.2)
3. Replace measuring head (Section 10.1.1)

8.2.2. Error code 02 – Electronic module faulty

1. Replace measuring head (Section 10.1.1)
2. Contact service partner (see appendix)

8.2.3. Error code 03 – Airflow sensor faulty

1. Replace measuring head (Section 10.1.1)
2. Contact service partner (Section see appendix)

8.2.4. Error code 04 – Optical sensor faulty

1. Clean the infrared filter (Section 9.1.4)
2. Replace measuring head (Section 10.1.1)
3. Contact service partner (see appendix)

8.2.5. Error code 05–07 – Internal error

1. Replace measuring head (Section 10.1.1)
2. Contact service partner (see appendix)

8.2.6. Error code 08 – Electronics temperature too high (> 75 °C)

1. Remove or relocate objects nearby emitting heat
2. Install metallic heat shields to shield again heat radiation

8.2.7. Error code 09 – Electronics temperature too low (< 0 °C)

1. Remove or relocate objects nearby that are cooling

8.2.8. Error code 10 – Ambient temperature too high (> 70 °C)

1. Remove or relocate objects nearby emitting heat
2. Install metallic heat shields to shield again heat radiation

8.2.9. Error code 11 Ambient temperature too low (< 0 °C)

1. Remove or relocate objects nearby that are cooling

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8.2.10. Error code 12 – Internal memory checksum error

1. Replace measuring head (Section 10.1.1)
2. Contact service partner (see appendix)

8.2.11. Error code 13 – Optical sensor dirty – cleaning required

1. Clean the infrared filter glasses (Section 9.1.4)

8.2.12. Error code 14 - Supply pressure not within permissible range

1. Adjust negative pressure (Section 7.9)
2. Replace filter for pressure regulator (Section 9.1.5)
3. Check suction system
4. Replace bellows (Section 10.2)
5. Replace measuring head (Section 10.1.1)

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9. Maintenance and repair

The following warning and safety instructions must always be observed for all maintenance and repair work.

WARNING!
Severe injury due to hot atmosphere escaping from crankcase
Risk of burns
➔ Only carry out maintenance and repair work when the engine is at a standstill.

WARNING!
Hazard from pressure in the device
Risk from escaping compressed air
➔ Switch off the compressed air supply during maintenance and repair work and check the negative pressure in the measuring head (see Section XX) after completing work.

WARNING!
Explosion of the crankcase
Serious injury, including death
➔ Do not confuse mix up any parts between the standard version (VN2020) and the Ex version (VN2020 Ex).

WARNING!
Explosion of the crankcase
Serious injury, including death
➔ The oil mist detector must not be cleaned with a steam cleaner, high pressure cleaner or similar device.

9.1. Maintenance

9.1.1. Maintenance cycles for reliable operation

The following table lists the maintenance cycles for the VN2020 oil mist detector. By conducting regular maintenance, Schaller Automation guarantees that the product will have a long service life.

If the maintenance intervals are not observed, the oil mist detector may fail prematurely.
It is essential that you follow the given sequence for the work.

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Steps	Description	Interval (whatever comes first)					
	Hours	4.000	8.000	12.000	16.000	See chapter	Required parts/tools
	Or Months	6	12	18	24		
1.	Check negative pressure in measuring head : ○ Under 55 mmWC (5,5 mbar) ➔ adjust pressure ○ Between 55 - 65 mmWC ➔ OK ○ Between 65 - 85 mmWC ➔ adjust pressure ○ Over 85 mmWC ➔ check pressure regulator unit	X	X	X	X	7.9	270532 U-tube pressure gauge or 151800 Digital pressure gauge
2.	Clean infrared filters in measuring head	X	X	X	X	9.1.4	151482 Cleaning kit
3.	Functionnal test with smoke test	X	X	X	X	7.12	151780 Smoke test box
4.	Exchange filter in pressure regulator	X	X	X	X	9.1.5	155003 Maintenance kit VN2020
5.	Exchange seal of inspection cover	X	X	X	X	10.1.6	155003 Maintenance kit VN2020
6.	Exchange seal of connection box		X		X	9.1.7	155003 Maintenance kit VN2020
7.	Clean suction system with with compressed air		X		X		Compressed air
8.	Check bellows and suspension system between measuring head and baseplate for damage		X		X	*	Torch
9.	Complete oil mist detector system overhaul				**S**	10.2	155004 Service kit VN2020

Legend:

X – Work to be done
O – Optional, only if water searator is installed
S – By authorized and certified Schaller Service team or partner

*: If the bellows should be damaged please contact a Schaller service partner immediately.

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9.1.2. Maintenance by operator

WARNING!
Risk of explosion
Severe to fatal injuries due to oil mist explosion
➔ Only use Schaller Automation original spare parts.

9.1.3. Maintenance by Schaller service partner

For maintenance (e.g. 16,000 h or inspection), please contact a Schaller Service Partner (https://schaller-automation.com/en/partners/).

9.1.4. Cleaning the light path (4.000 h)

ATTENTION!
Premature failure of the oil mist detector
Dirty parts increase the risk of equipment failure.
➔ Clean parts according to the maintenance schedule.

1.

Figure 64: untighten screws

Loosen captive screws (4x) on the inspection cover and twist of the measuring head.

2.

Figure 65: remove seal

Put the inspection cover aside and dispose of the seal.

3.

Figure 66: cotton bud with fluid

Dip a cotton stick into the cleaning agent.

4.

Figure 67: cleaning transmitter diode

Clean the glass of the transmitter diode.

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5.

Figure 68: cleaning photo diode

Clean the photodiode.

6.

Figure 69: cleaning sealing surface

Clean the sealing surface of the inspection cover seal.

7.

Figure 70: new seal

Position a new seal for the inspection cover on the cleaned sealing surface over the two cylindrical pins (1).

Attention!
A new seal must be used for the inspection cover.
➔ Only use the seal from the service box.

8.

Figure 71: mounting of inspection cover

Place the inspection cover onto the seal. Tighten the captive screws crosswise and hand-tight.

9.

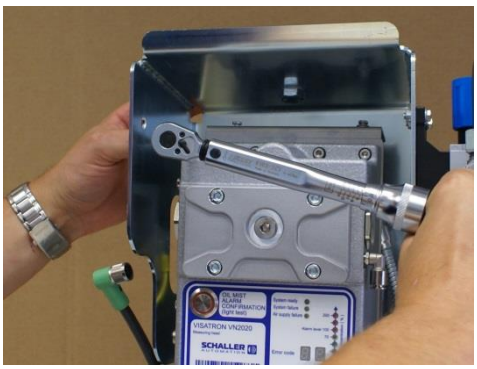

Figure 72: tighten screws of measuring head

Tighten the captive screws crosswise to a torque of 4.5 Nm.

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9.1.5. Filter replacement Pressure Regulator

Part number: 366717

Figure 73: filter for pressure regulator

Tools : none

1.

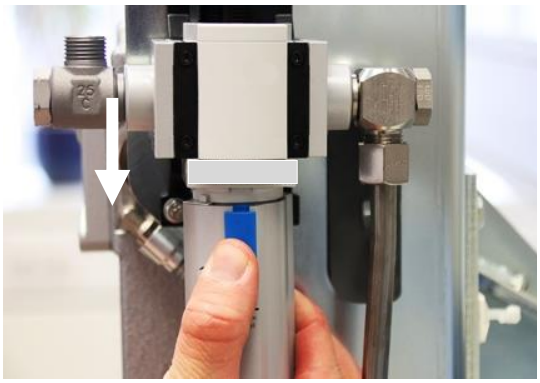

Figure 74: loosen the filter cage

Hold the filter cage with one hand and pull the blue tab down vertically with your thumb.

2.

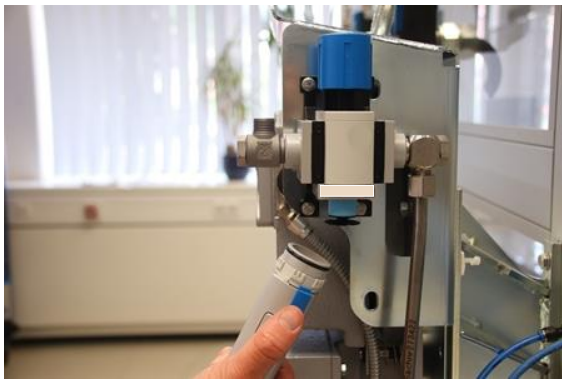

Figure 75: pull out the filter cage

Turn the filter cage clockwise to the stop and pull out vertically downwards.

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3.

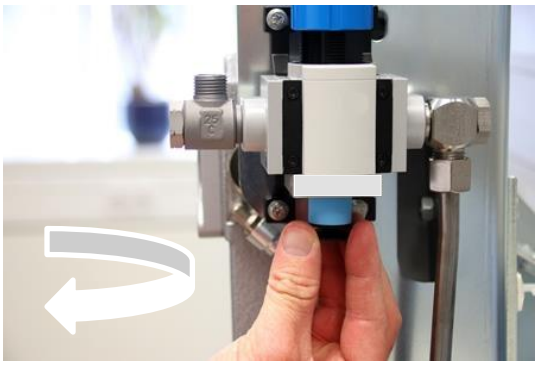

Figure 76: remove the filter

Unscrew the black plastic disc clockwise and remove the filter.

4.

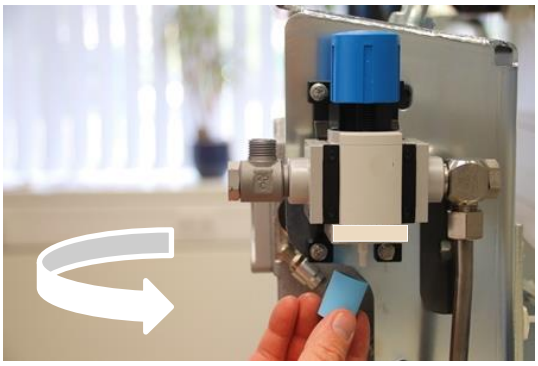

Figure 77: exchange the filter

Screw in the new filter anticlockwise and make sure that it is aligned for installation.

5.

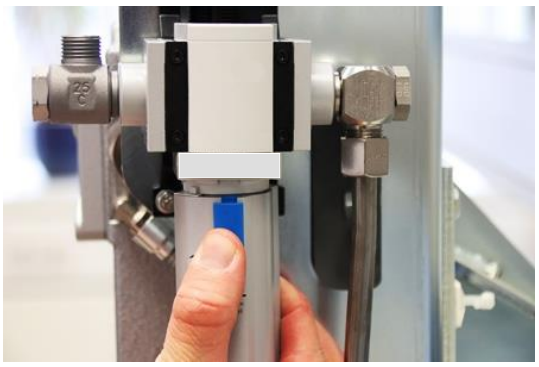

Figure 78: mount filter cage

Mount the filter cage in reverse order of steps 1-2 and make sure that it locks in place.

6.

Figure 79: check negative pressure

Check the negative pressure at the measuring head and readjust if necessary.

9.1.6. Replace connection box seal

Part number: 356950

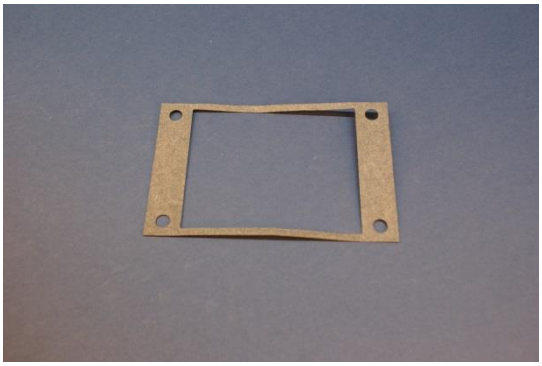

Figure 80: seal for connection box

Tools : Open spanner, width across flats 36
Open spanner, width across flats 10

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1.

Figure 81: switch off compressed air

Switch off the compressed air supply to the oil mist detector

2.

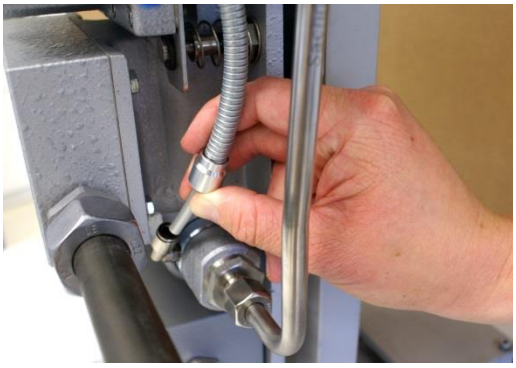

Figure 82: remove compressed air hose

Pull the compressed air hose off the right side of the measuring head and push it to the side.

3.

Figure 83: loosen union nut

Loosen the union nut of the pipe or hose connection on the connection box by turning it anticlockwise.

4.

Figure 84: loosen terminal box

Loosen the four hexagon screws on the rear of the terminal box by turning them anticlockwise. Set the screws aside to reuse them later.

ATTENTION!
The connection box may fall down.
Risk of impact and crushing.
➔ Hold the connection box with one hand while loosening the screws.

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5.

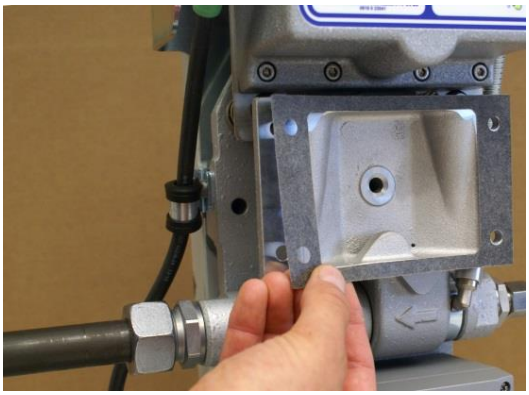

Figure 85: remove seal of connection box

Remove the connection box. Remove the seal.
Dispose of the seal in accordance with local disposal regulations.

6.

Figure 86: clean sealing surface

Clean the connection box and the base plate in the area of the connection box. Carefully clean both sealing surfaces.

7.

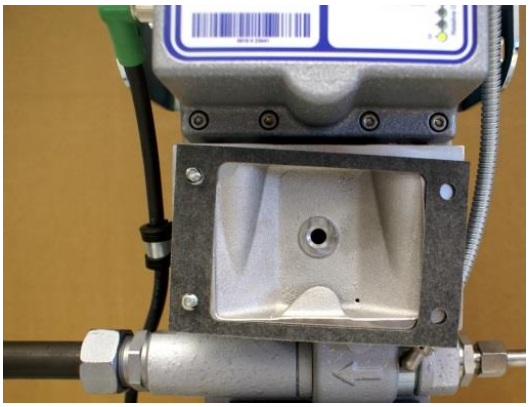

Figure 87: place seal for connection box

Place a new seal on the sealing surface of the base plate. Secure the seal by inserting two of the four hexagon screws on one side.

8.

Figure 88: mounting connection box

Hold the two previously inserted screws tight while placing the connection box on the sealing surface. Hand-tighten the two screws by at least three turns

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9.

Figure 89: mounting of header pipe

Tighten the union nut of the pipe or hose connection by hand until you can feel that it is in contact the screw sleeve, cutting ring and union nut.

WARNING!
If you do not tighten
to the recommended number of turns, the pressure loading capacity and service life of the pipe fitting may be reduced. Leakage and slipping of the pipe may occur.
Risk of explosion.

➔ Screw by the recommended number of turns.

10.

Figure 90: tighten connection box

Hand-tighten the remaining two hexagon screws. Tighten the four hexagon screws crosswise to a torque of 4.5 Nm.

11.

Figure 91: insert compressed air hose

Insert the compressed air hose back into the push-in fitting as far as it will go.

12.

Figure 92: switch on compressed air

Switch on the compressed air supply again.

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9.1.7. Oil Mist Detector - Complete Overhauling

Please contact Schaller Automation or an authorised service partner for a complete overhaul of the oil mist detector. !!!!!!!→ https://schaller-automation.com/en/partners/
! ! ! ! ! → https://www.schaller.sg

10. Repair

WARNING!
The engine must be switched off for all repair work.

10.1. Repair by the operator

10.1.1. Replacing the measuring head

Part number: 290044 – VN2020
290045 – VN2020 EX

Tools: Allen key, size 4mm
Torque wrench, up to 5 Nm

WARNING!
Risk of mixing up
Operation in the explosive atmosphere not safe

➔ Make sure that you have a VN2020 EX measuring head for your VN2020 EX oil mist detector.

See Section 3 for the identifying features.

1. 

Figure 93: switch off electrical power supply

Switch off the compressed air supply and electrical power supply of the oil mist detector.

2. 

Figure 94: remove compressed air hose

Pull the compressed air hose off the right side of the measuring head and push it to the side.

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3.

Figure 95: loosen plug-in connector

Loosen the plug-in connector on the left side by turning it anticlockwise. Move the line to the side..

4.

Figure 96: loosen screw connections

Loosen the eight screw connections. Unscrew the screws and dispose of them.

ATTENTION!
The measuring head may fall down.
Risk of impact and crushing.
➔Hold the measuring head firmly with one hand.

5.

Figure 97: remove measuring head

Remove the measuring head and send it back to Schaller Automation. Remove the flat seal. Dispose of the seal in accordance with local disposal regulations.

6.

Figure 98: place seal for mounting plate

Place the new seal (supplied) on the back of the measuring head. Secure the seal by inserting two of the eight supplied screws through the four outer holes.

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7.

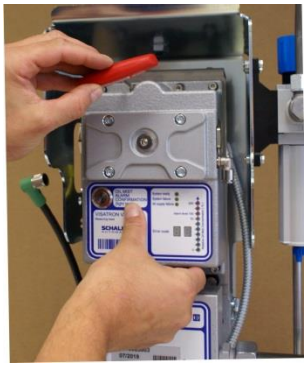

Figure 99: mounting of measuring head

Mount the measuring head with the flat seal. Hand-tighten the eight screws.

8.

Figure 100: tighten screws

Tighten the screws crosswise to a torque of 4.5 Nm.

WARNING!
Too low a torque can have a negative impact on sealing.
Risk of explosion.
➔ Tighten screws to the defined torque.

9.

Figure 101: mounting of plug-in connector

Attach the plug-in connector. Tighten the connector securely by screwing clockwise.

10.

Figure 102: mounting of compressed air hose

Insert the compressed air hose back into the push-in fitting as far as it will go.

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11.

Figure 103: switch on electrical power supply

Switch on the compressed air supply and electrical power supply again.

12.

Figure 104: adjust negative pressure at

Set the negative pressure on the measuring head as per steps in Section 7.9.

10.1.2. Replacing the battery

Part number: **1000045**

Figure 105: battery for measuring head

Tools: Allen key, width across flats 4
Torque wrench, up to 5 Nm

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1.

Figure 106: switch off electrical power supply

Switch off the compressed air supply and electrical power supply of the oil mist detector.

2.

Figure 107: mounting of compressed air hose

Pull the compressed air hose off the right side of the measuring head and push it to the side.

3.

Figure 108: loosen plug-in connector

Loosen the plug-in connector on the left side by turning it anticlockwise. Move the line to the side.

4.

Figure 109: loosen screw connections

Loosen the eight screw connections. Unscrew the screws and dispose of them.

Attention!
The measuring head may fall down.
Risk of impact and crushing.
➔Hold the measuring head firmly with one hand.

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5.

Figure 110: remove measuring head

Remove the measuring head. Remove the flat seal. Dispose of the seal in accordance with local disposal regulations.

6.

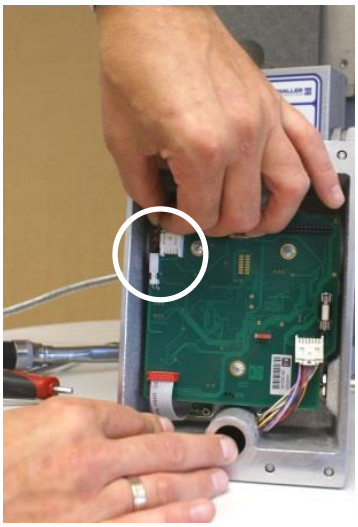

Figure 111: disconnect battery

Disconnect the battery connector on the circuit board.

7.

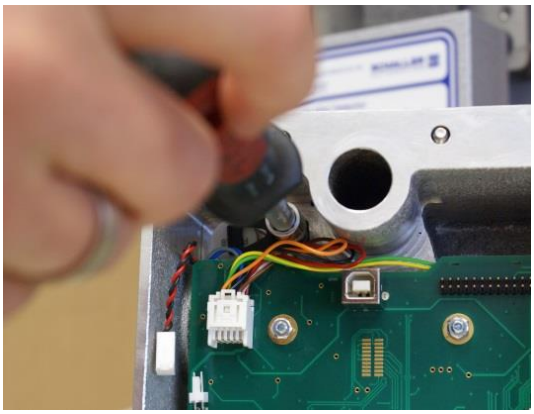

Figure 112: loosen securing clamp

Loosen the screw of the securing clamp. Turn the securing clamp to the side.

8.

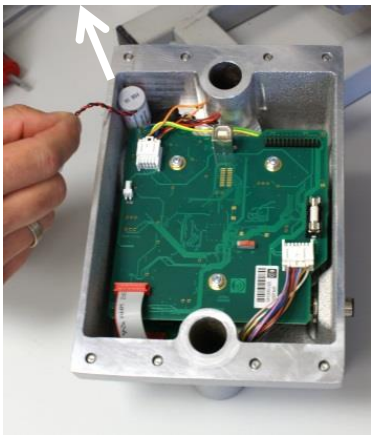

Figure 113: remove battery

Remove the battery. Dispose of the battery properly in accordance with local regulations. Insert a new battery.

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9.

Figure 114: tighten securing clamp

Position the securing clamp over the battery. Tighten the screw connection to 2.6 Nm.

10.

Figure 115: connecting the connector

Connect the battery connector to the circuit board.

11.

Figure 116: place seal for mounting plate

Place a new seal on the back of the measuring head. Secure the seal by inserting two of the eight screws supplied into the outer holes.

12.

Figure 117: mounting of measuring head

Mount the measuring head with the flat seal. Hand-tighten the eight screws.

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13.

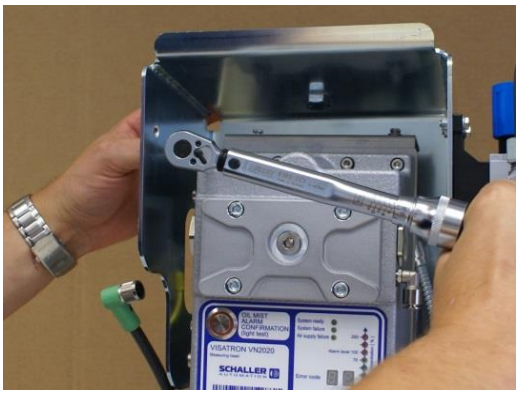

Figure 118: tighten screws

Tighten the screws crosswise to a torque of 4.5 Nm.

WARNING!
Risk of explosion
➔ Too low a torque can have a negative impact on sealing.

14.

Figure 119: connect plug-in connector

Attach the plug-in connector. Tighten the connector securely by screwing clockwise.

15.

Figure 120: mounting of compressed air hose

Insert the compressed air hose back into the push-in fitting as far as it will go.

16.

Figure 121: switch on power supply

Switch on the compressed air supply and electrical power supply again.

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17.

Figure 122: adjust negative pressure

Adjust the negative pressure on the measuring head.

10.1.3. Replacing the terminal box

Part number: 290043

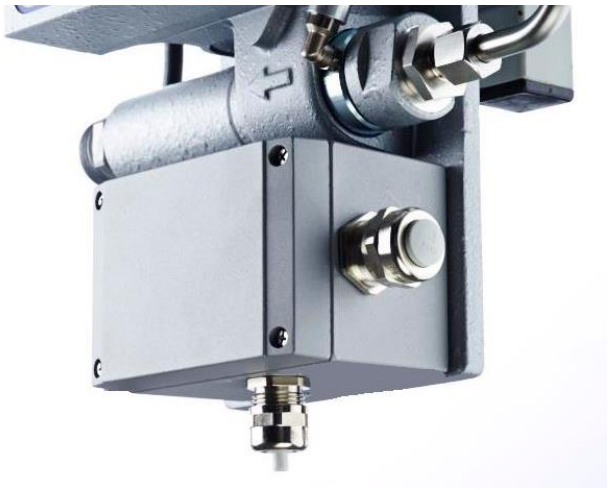

Figure 123: terminal box

Tools: Cross-head screwdriver
Torque wrench, up to 5 Nm

ATTENTION!
Insert the appropriate wire break resistor after replacing the terminal box.

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1.

Figure 124: switch off electrical power supply

Switch off the power supply of the oil mist detector.

2.

Figure 125: loosen plug-in connector

Loosen the plug connection on the left side of the measuring head by turning it anticlockwise. Move the line to the side..

3.

Figure 126: Remove the cover

Remove the cover of the terminal box. Loosen the four cross-head screws to do so

4.

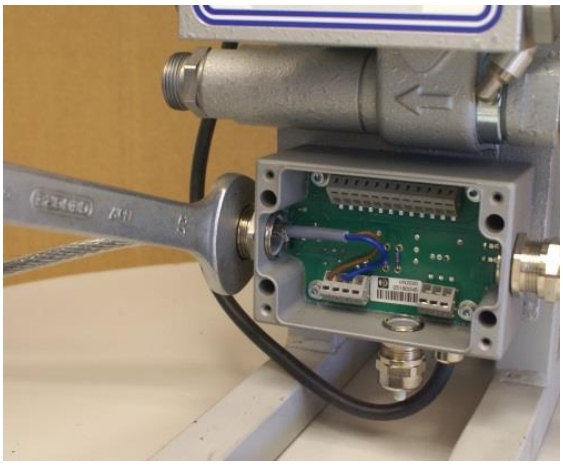

Figure 127: loosen cable glands

Loosen the cable glands.

5.

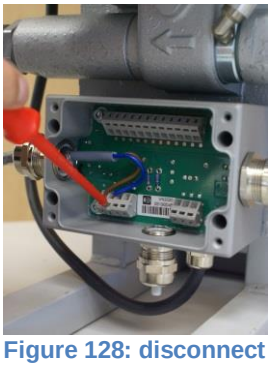

Figure 128: disconnect wires

Disconnect the wires from the terminal blocks.

6.

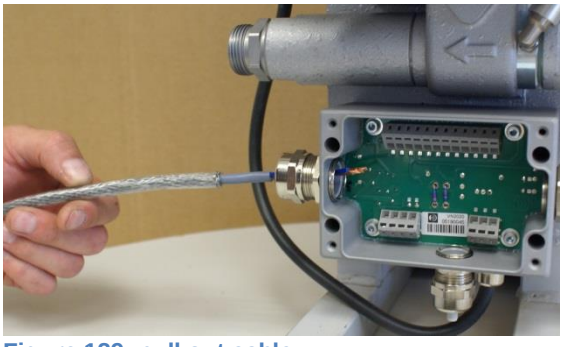

Figure 129: pull out cable

Pull the cables out of the cable glands

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7.

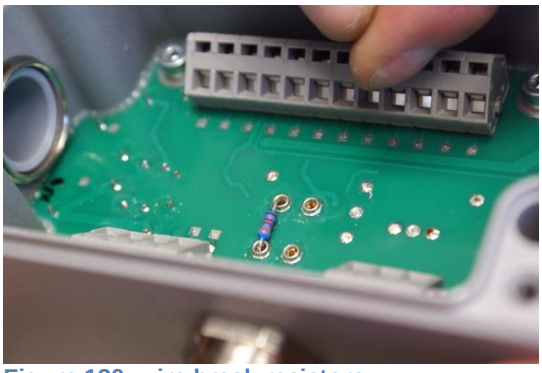

Figure 130: wire break resistors

Make a note of the value of the two wire break resistors.

8.

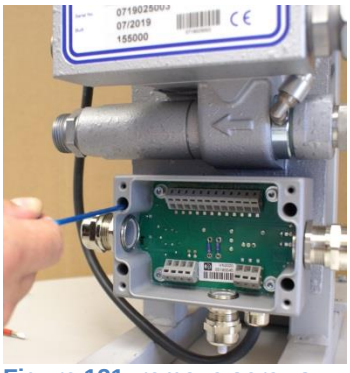

Figure 131: remove screws

Remove the four hexagon socket screws. Remove the terminal box.

ATTENTION!
Terminal box may fall down
Risk of impact/crushing

➔ Maintain terminal box with one hand

9.

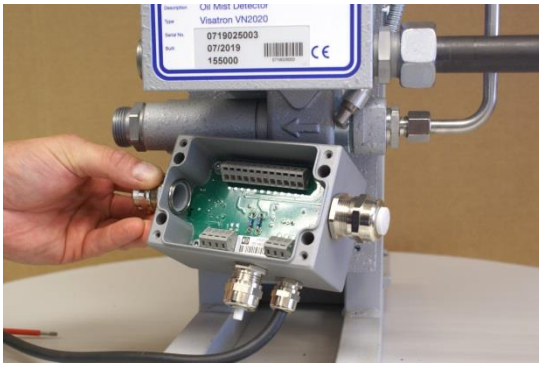

Figure 132: Remove terminal box

Dispose of the terminal box or send it to Schaller Automation.

10.

Figure 133: remove cover

Remove the cover of the new terminal box. Put it to one side to be used later.

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11.

Figure 134: wire break resistors

Take two suitable wire break resistors from the supplied bag.

12.

Figure 135: insert wire break resistors

Insert the two wire break resistors into the circuit board. Make sure that you insert the resistors as far as they will go.

13.

Figure 136: mounting of terminal box

Mount the new terminal box with the supplied washers and screws. Tighten the screw connection to 2 Nm.

14.

Figure 137: mounting of connector

Fit the connector on the measuring head. Tighten the connector securely by screwing clockwise.

15.

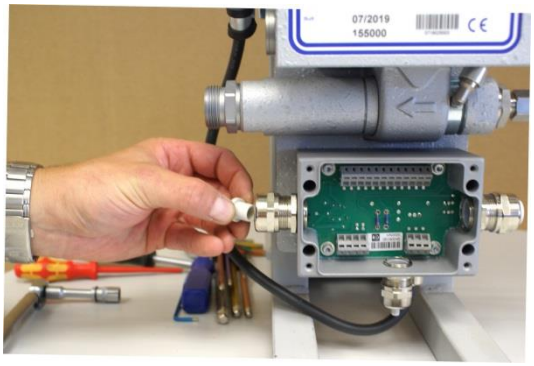

Figure 138: remove dummy plugs

Remove the dummy plugs from the required cable glands.

16.

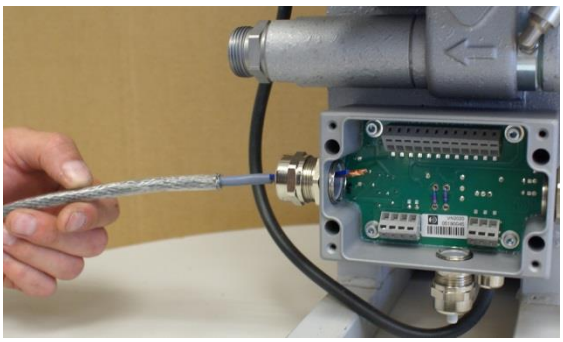

Figure 139: insert cable

Insert the cables through the cable glands

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17.

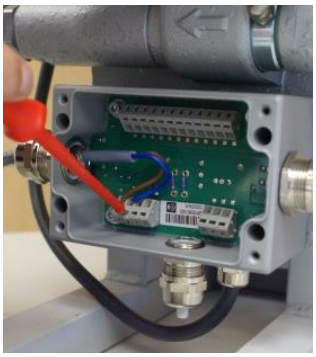

Figure 140: fit of wires

Fit the wires according to the wiring diagram on the back of the cover

18.

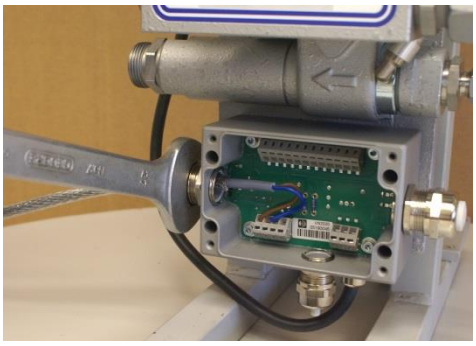

Figure 141: tighten cable glands

Tighten the cable glands. Make sure that the cable does not turn as you tighten them.

19.

Figure 142: mounting of cover

Install the cover of the terminal box. Tighten the four screws.

20.

Figure 143: switch on electrical power supply

Switch the power supply of the oil mist detector back on.

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10.1.4. Replacing the pressure regulator

Part number: 366709

Figure 144: Pressure regulator

Tools: Open spanner, width across flats 19
Open spanner, width across flats 10
Torque wrench, up to 10 Nm

1.

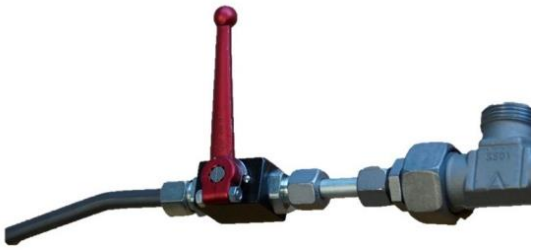

Figure 145: switch off compressed air

Switch off the compressed air supply to the oil mist detector..

2.

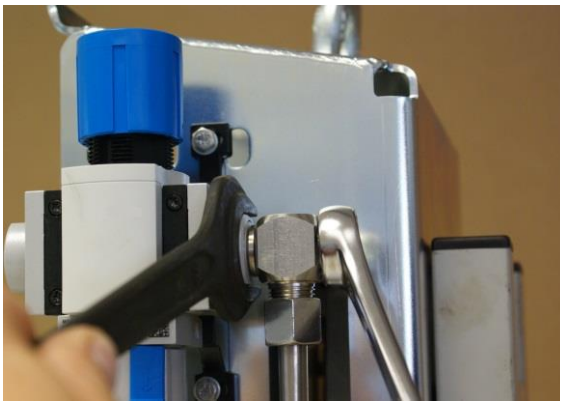

Figure 146: Schwenkverschraubung demontieren

Loosen the two fastening nuts of the swivel fittings on the pressure regulator by turning clockwise.

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3.

Figure 147: loosen pressure regulator

Remove the four screw connections on the protective hood.

4.

Figure 148: remove pressure regulator

Remove the pressure regulator.

5.

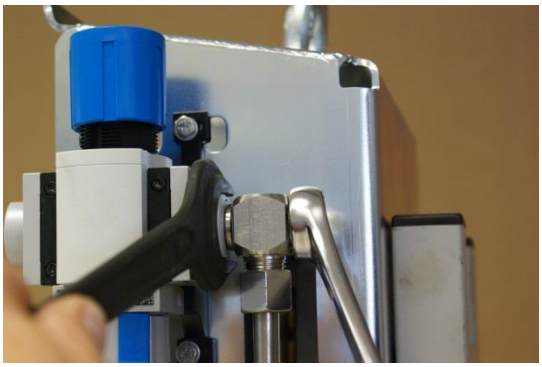

Figure 149: tighten fittings

Tighten the two swivel fittings to a torque of 19 Nm

6.

Figure 150: tighten screws

Tighten the four screws connections to a torque of 7,4 Nm

7..

Figure 151: release pressure

Release pressure in the pressure regulator. To do so, screw the blue cap clockwise out completely.

8.

Figure 152: adjust negative pressure

Set the negative pressure on the measuring head (see Section 7.9).

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10.1.5. Replacing connecting hose

Part number: 290025

Figure 153: Connecting hose

Tools: none

1. 

Figure 154: switch off compressed air

Switch off the compressed air supply to the oil mist detector..

2. 

Figure 155: remove compressed air hose

Pull the compressed air hose off the right side of the measuring head and push it to the side

3. 

Figure 156: mounting compressed air hose

Insert the compressed air hose back into the top push-in fitting as far as it will go.

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10.1.6. Replacing seal of inspection cover

Part number: 356952

Figure 157: Seal inspection cover

Tools: Allen key, width across flats 5
Torque wrench, up to 5 Nm

1.

Figure 158: Release pressure

Release pressure in the pressure regulator. To do so, screw the blue cap clockwise out completely.

2.

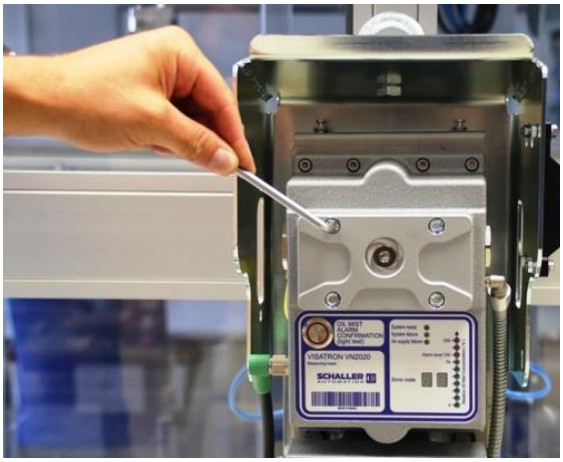

Figure 159: Loosen screws

Loosen captive screws (4x) on the inspection cover and twist of the measuring head.

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3.

Figure 160: remove seal inspection cover

Put the inspection cover to one side. Dispose of the seal in accordance with local disposal regulations.

4.

Figure 161: sealing surface inspection cover

Clean the sealing surface of the inspection cover seal.

5.

Figure 162: mounting of seal for inspection cover

Guide the seal over the two cylindrical pins onto the sealing surface.

6.

Figure 163: mounting of inspection cover

Pre-fit the inspection cover with the captive screws.

7.

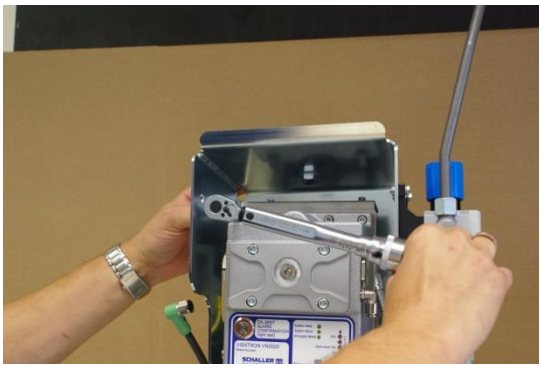

Figure 164: tighten screws

Tighten the captive screws crosswise to a torque of 4.5 Nm.

8.

Figure 165: U-tube manometer on inspection cover

Adjust the negative pressure on the measuring head (see Section 7.9)

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10.1.7. Replacing seal for mounting plate

Part number: 356951

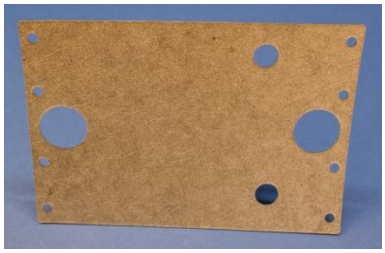

Figure 166: Seal for mounting plate

Tools: Allen key size 5
Torque wrench, up to 5 Nm

1.

Figure 167: switch off electrical power supply

Switch off the compressed air supply and electrical power supply of the oil mist detector.

2.

Figure 168: remove compressed air hose

Pull the compressed air hose off the right side of the measuring head and push it to the side.

3.

Figure 169: loosen plug-in connector

Loosen the plug-in connector on the left side by turning it anticlockwise. Move the line to the side.

4.

Figure 170: loosen screws of measuring head

Loosen the eight screw connections. Unscrew the screws and dispose of them.

ATTENTION!
The measuring head may fall down.
Risk of impact and crushing.

➔ Hold the measuring head firmly with one hand.

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5.

Figure 171: remove measuring head

Remove the measuring head and put it to one side. Remove the flat seal. Dispose of the seal in accordance with local disposal regulations.

6.

Figure 172: place seal for mounting plate

Place the new seal (supplied) on the back of the measuring head. Secure the seal by inserting two of the eight supplied screws through the four outer holes.

7.

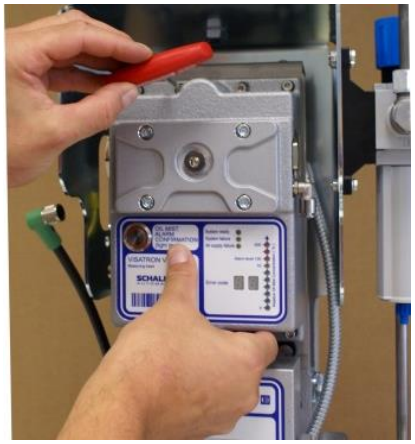

Figure 173: mounting of measuring head

Mount the measuring head with the flat seal. Hand-tighten the eight screws.

8.

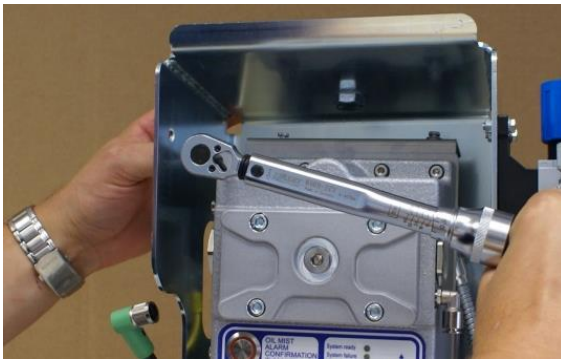

Figure 174: thighten screws

Tighten the screws crosswise to a torque of 4.5 Nm.

Warning!
Too low torque can have a negative impact on sealing.
Risk of explosion.
➔ Tighten screws to torque.

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9.

Figure 175: connecting the plug-in connector

Attach the plug-in connector. Tighten the connector securely by screwing clockwise.

10.

Figure 176: mounting of compressed air hose

Insert the compressed air hose back into the push-in fitting as far as it will go.

11.

Figure 177: switch on electrical power and compressed air supply

Switch on the compressed air supply and electrical power supply again.

12.

Figure 178: adjust negative pressure

Adjust the negative pressure on the measuring head (see chap 7.9).

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10.1.8. Replacing the screw plus

Part number: 366604

Figure 179: Screw plug

Werkzeug: Allen key size 6
Torque wrench, up to 20 Nm

1. 

Figure 180: Inspection cover with screw plug

Unscrew the screw plug (3) on the inspection cover (No. 2 on the measuring head (1)) and set aside.

2. 

Figure 181: Inspection cover with mounted quick coupling cover

Clean the sealing surface for the screw plug of the inspection cover.

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10.2. Repair by Schaller Automation

If a oil mist detector is defective or malfunctions, please contact Schaller Automation or an authorised service partner. Contact details can be found in the appendix.
Visit our homepage to find the closest service partner.!!!→ https://schaller-automation.com/en/partners/
! ! ! ! ! ! ! !!!!!!→ https://www.schaller.sg

10.3. Decommissioning and disassembling

The oil mist detector is taken out of service in the reverse order to commissioning.

11. Storage

Do not store detector below/above -25°C/+80°C.

12. Packaging

The packaging materials must be disposed of by the operator according to the usual national guidelines.

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13. Spare parts

13.1. Spare parts list VN2020

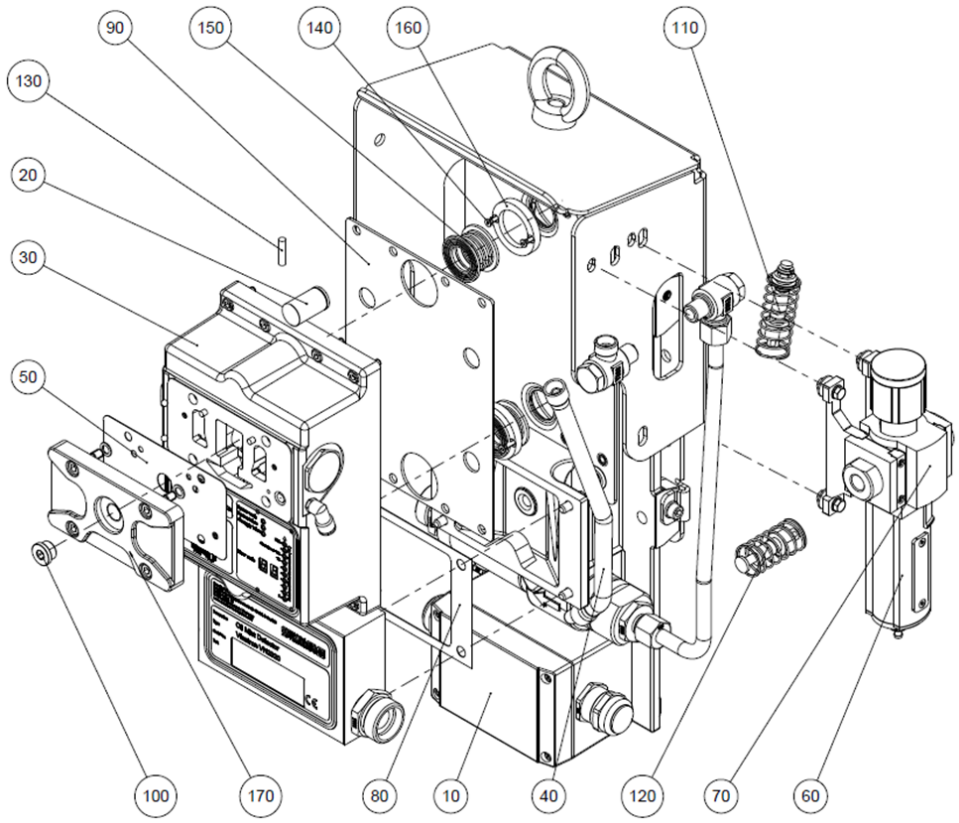

Figure 182: Exploded view VN2020

Spare parts VN2020			
Item	**Part number**	**Description**	**Quantity**
10	290043	Spare parts kit for terminal box	1
20	1000045	Lithium battery	1
30	290044	Spare parts kit for measuring head VN2020	1
40	290025	Spare parts kit for connecting hose	1
50	356952	Seal for inspection cover	1
60	366717	Filter cartridge	1
70	366709	Filter control valve (flow rate left to right)	1
	366755	Filter control valve (flow rate right to left)	1
80	356950	Seal for connection box	1
90	356951	Seal for mounting plate	1
100	366604	Screw plug	1
110	200211	Top spring system	2
120	200212	Bottom spring system	2
130	436513	Fuse	1
140	480824	Counter sunk screw M3x12	4
150	365193	Bellow	2

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13.2. Spare parts list VN2020 Ex

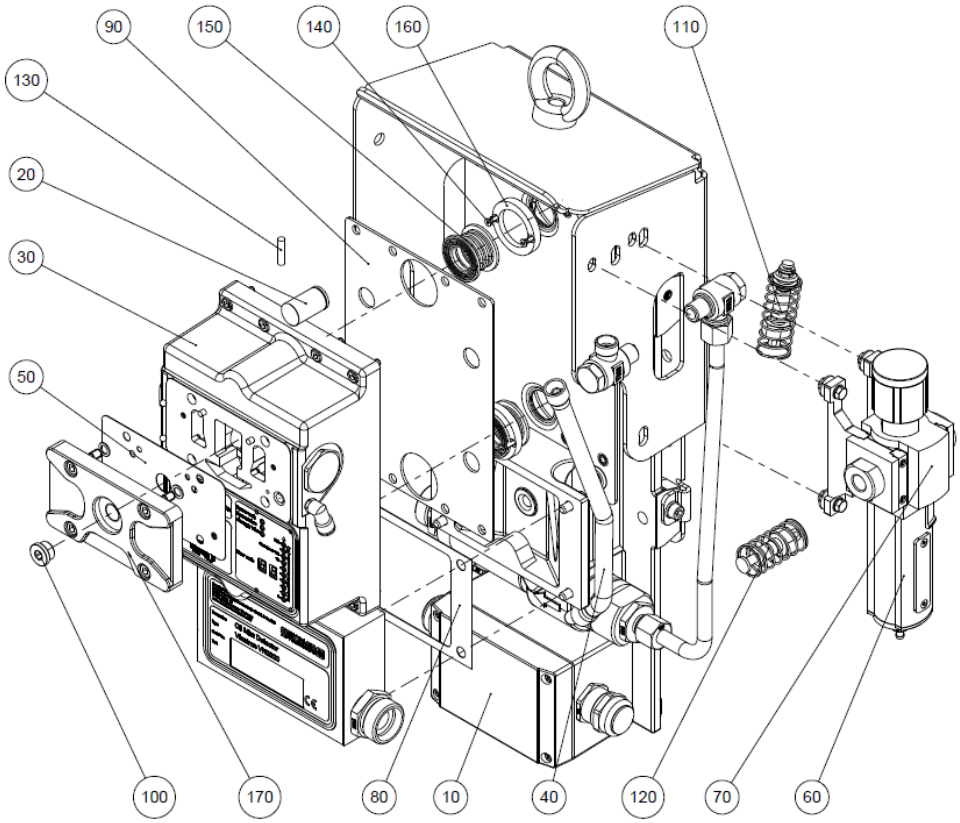

Figure 183: Exploded view VN2020 Ex

Spare parts VN2020 EX			
Item	**Part number**	**Description**	**Quantity**
10	290043	Spare parts kit for terminal box	1
20	1000045	Lithium battery	1
30	290045	Spare parts kit for measuring head VN2020 EX	1
40	290025	Spare parts kit for connecting hose	1
50	356952	Seal for inspection cover	1
60	366717	Filter cartridge	1
70	366709	Filter control valve (flow rate left to right)	1
	366755	Filter control valve (flow rate right to left)	1
80	356950	Seal for connection box	1
90	356951	Seal for mounting plate	1
100	366604	Screw plug	1
110	200211	Top spring system	2
120	200212	Bottom spring system	2
130	436513	Fuse	1
140	480824	Counter sunk screw M3x12	4
150	365193	Bellow	2

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13.3. Maintenance kit (4.000 h / 6 Months)

Part number: 155003

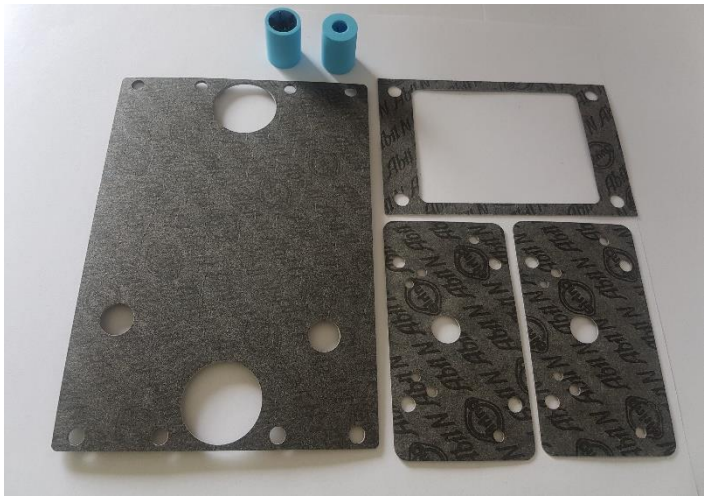

Figure 184: Maintenance kit

Maintenance kit for the VN2020 and VN2020 EX			
Position	**Part number**	**Description**	**Anzahl**
1	366717	Filter cartridge	2
2	356952	Seal for inspection cover	2
3	356950	Seal for connection box	1
4	356951	Seal for mounting plate	1

13.4. Cleaning kit (4.000 h)

Part number: 151482

Figure 185: cleaning kit

Position	Part number	Description	Anzahl
1	190003	Nozzle cleaning needle	1
2	452176	Cotton stick	20
3	270090	10ml bottle with cleaning agent	1

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13.5. Service kit for VN2020 (16.000 h / 24 Monate)

Part number: 155004

ATTENTION!
The device may trigger a premature error message
Premature failure and loss of warranty

➔ The service kit and the associated service work on the oil mist detector may only be carried out by an authorised Schaller service partner or by trained personnel.

.

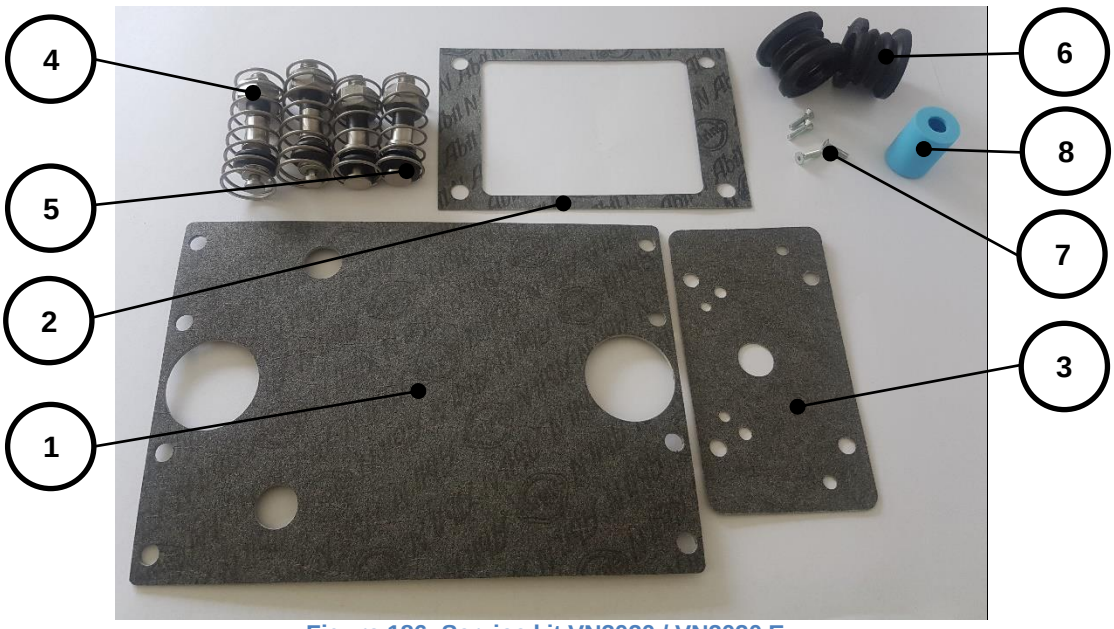

Figure 186: Service kit VN2020 / VN2020 Ex

Service kit for VN2020 / VN2020 Ex

Position	Part number	Description	Qunatity
1	356951	Seal for mounting plate	1
2	356950	Seal for connection box	1
3	356952	Seal for inspection cover	1
4	200211	Top spring system	2
5	200212	Bottom spring system	2
6	365193	Bellows	2
7	480824	Countersunk screw M3x12	4
8	366717	Filter cartridge	1

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13.6. Accessories VN2020 / VN2020 Ex

Accessories VN2020 und VN2020 EX			
Position	**Part number**	**Description**	**Quantity**
1	270532	U-tube manometer	1
2	151800	Differential pressure gauge	1
3	151780	Smoke test box	1
4	272059	Smoke tube (6 pieces)	1

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14. List of figures

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15. Contact

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All our certified partners can be found on our homepage on following link :

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

https://ww.schaller.sg

16. Modification log

Version	Modification	Date	Revised by
1.0	Release	19.12.2019	Adams, P. / Höh, S.
1.1	• Table for modification log added • P.12: Position number 11 displaced • P.14: Position numbers for air jet pump, LED display and terminal box updated • P.22 & 23: Safety instruction added and safety instructions restructured • P.28: Image of suction funnel reworked • P.46: Service-kit replaced by smoke test box • P.53: Maintenance instructions 6-8 removed at 6 and 18 months; indication and note for check of bellows • P.67: Step 9 tightening torque value changed from 2,5 to 2,6 Nm • P.82: Size of Allen key changed from 5 to 6; image updated • P.83: Text added at chapter 10.2 • P.84 & 85: Pos. 70, filter control valve with flow rate right to left added • P.86: Seal for mounting plate added at maintenance kit; quantity of seal for connection box reduced; image updated • P.87: Filter cartridge at service kit added; image updated • P.88: Quantity of smoke tubes for 272059 added • P.93: Graphical rework and update of image of VN2020	13.03.2020	Adams, P. / Höh, S.

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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 Directive 2006/42/EC.

Manufacturer:	SCHALLER AUTOMATION Industrielle Automationstechnik GmbH & Co. KG Industriering 14 66440 Blieskastel
Type of device:	Oil mist detector (OMD)
Type designation:	VISATRON® VN2020/VN2020 EX
Intended use:	Detection and display of oil mist in large engines
Serial number	0719025000 / 1219028000
Year of construction:	2019
Marking:	CE 0637 Ex | | (2G) [Ex op is IIB T4 Gb]

Furthermore, we declare conformity with further Directives applicable to the product, as follows:

- EC Directive 2004/108/EC (EMC Directive)
- EC Directive 2014/34/EU (ATEX Directive)

Applied harmonised standards:

- EN ISO 12100:2010-11
- EN ISO 4414:2010-11
- EN 60529:2014-09
- EN 61000-6-1
- EN 61000-6-2
- EN 61000-6-3
- EN 61000-6-4
- 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

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-Blieskastel 13th March 2020
Place, date

Stephan Schaller
(Managing Director)

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