



Oil mist detector
Visatron[®] VN2020
Visatron[®] VN2020 Ex



- Operating manual -
- 183001 -



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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 provided.



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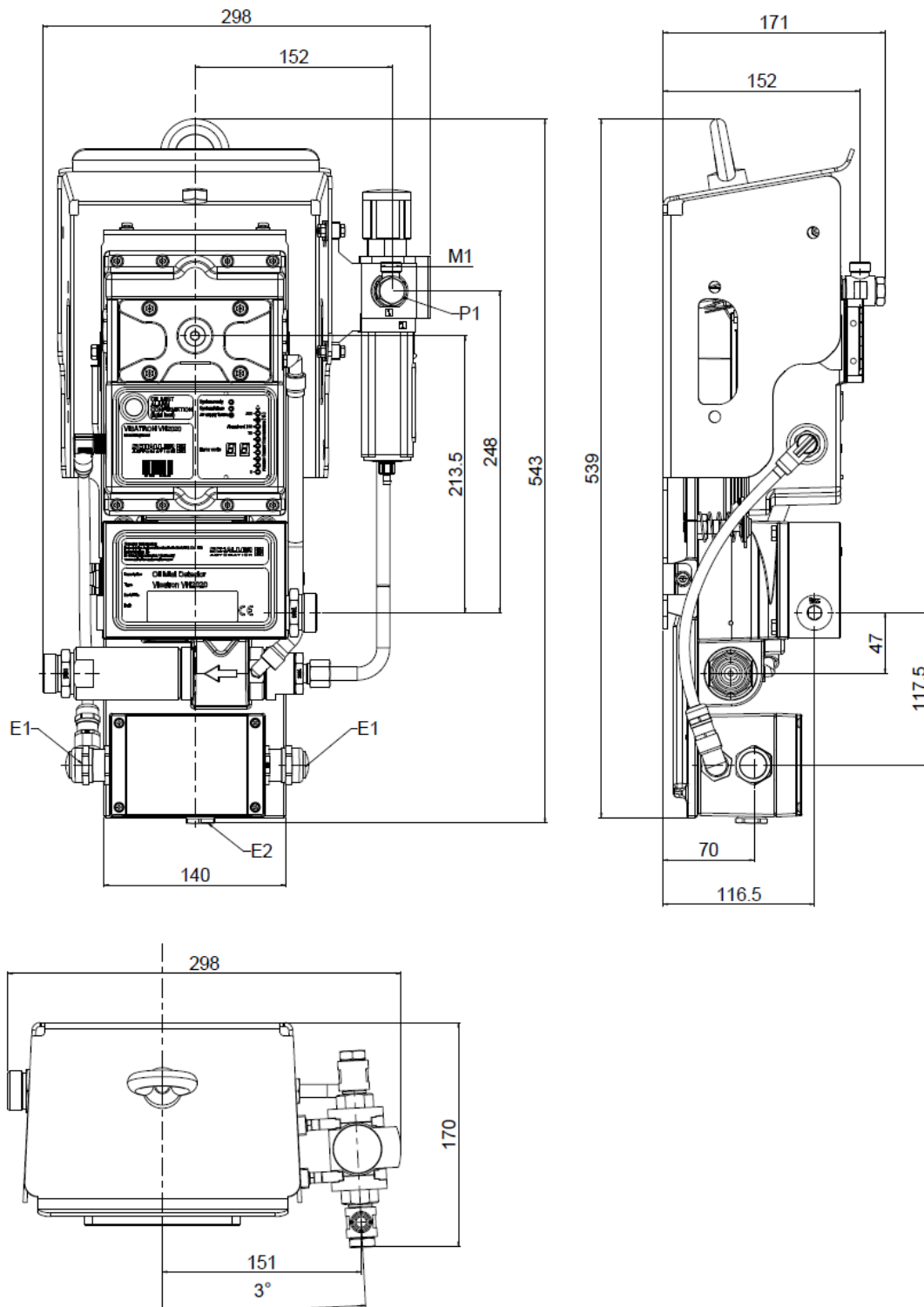
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Index	Change	Date	Changed by
1.0	Release	19 December 2019	Adams, P./Höh, S.
1.1	See change history	13 March 2020	Adams, P./Höh, S.
2.0	See change history	01 December 2021	G. Kornatz
2.1	See change history	27 June 2022	J. Hönninger



1. Technical data and scope of delivery



Mechanical interfaces

Dimensions	Approx. 539 x 298 x 171 mm
Weight	12.41 kg
M1	External thread M16x1.5 Pipe connection, diameter size 10
M2	External thread M30x2 Pipe connection, diameter size 22
M3	External thread M30x2 Pipe connection, diameter size 22
M4	Internal thread G1/4
M5	x4 through holes for screws M8

Electrical interfaces

Power supply	18 - 31.2 V DC
Nominal voltage	24 V DC
Current consumption	Maximum 2 A
Supply E1	24 V DC M25: Cable diameter 8-16 mm Earthing via holes in base plate during installation
Supply E2	M20: Cable diameter 5-13mm
Relay outputs	2 x "High Oil Mist Alarm" 1 x "Ready" (ready for operation) 1 x "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



Pneumatic interfaces

P1	External thread M16x1.5 Pipe connection, diameter size 10
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. -55mmH ₂ O (-5.5 mbar) Nom. -60mmH ₂ O (-6 mbar) Max. -65mmH ₂ O (-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



2. Identification

2.1. Product brand 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. Manufacturer

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



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 lines.

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.



4. Oil mist detection system

An oil mist detection 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 setup for a VN2020 installation kit for a six-cylinder engine.

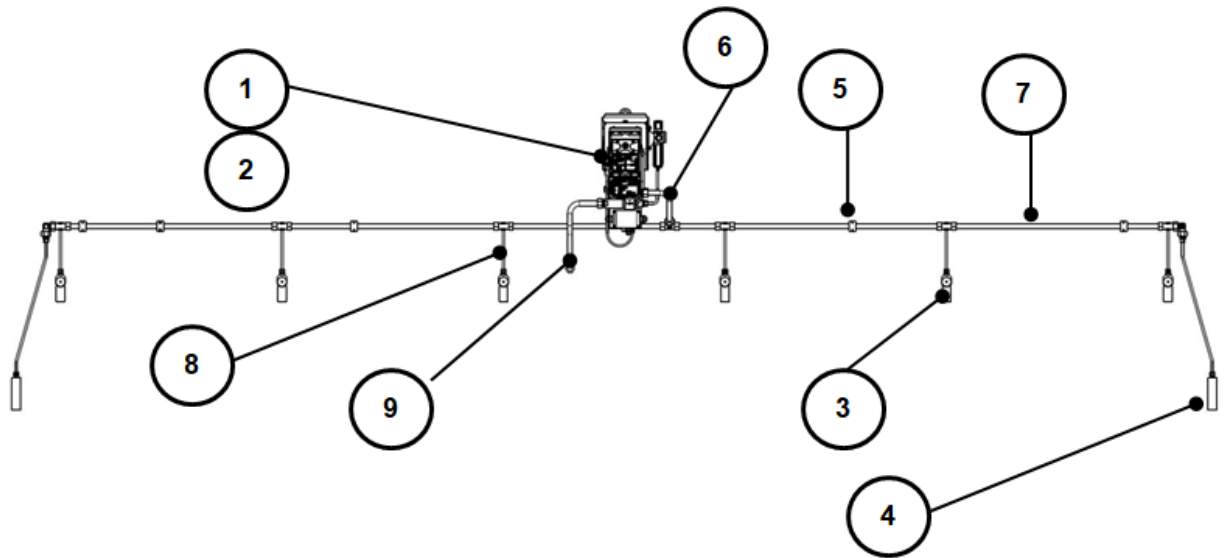


Figure 1: Oil mist detection system VN2020

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



4.1. Oil mist detector VN2020

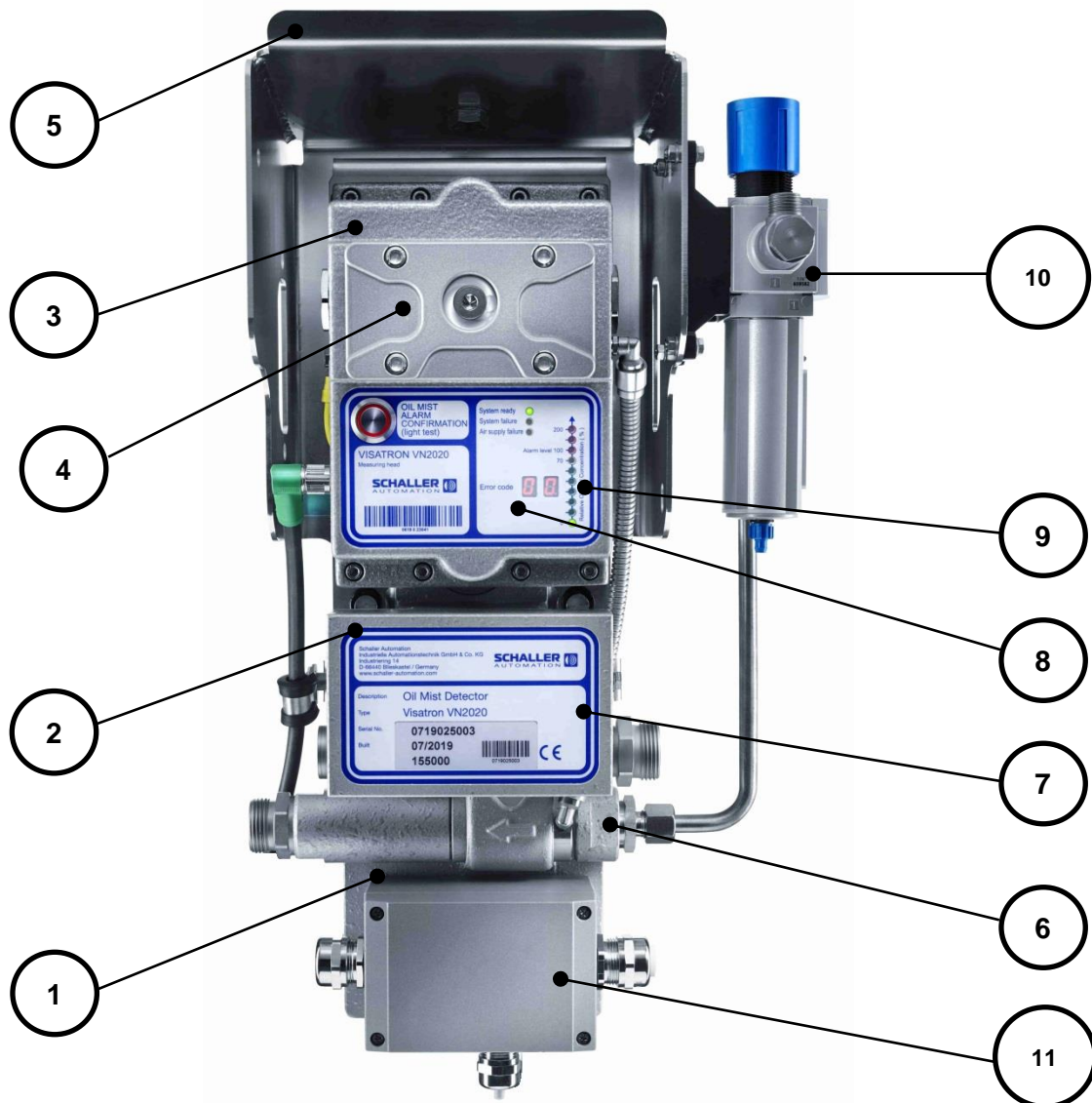


Figure 2: Oil mist detector VN2020

- (1) Base plate
- (2) Connection box
- (3) Measuring head
- (4) Inspection cover
- (5) Protective hood
- (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) Filter control valve
- (11) Terminal box



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

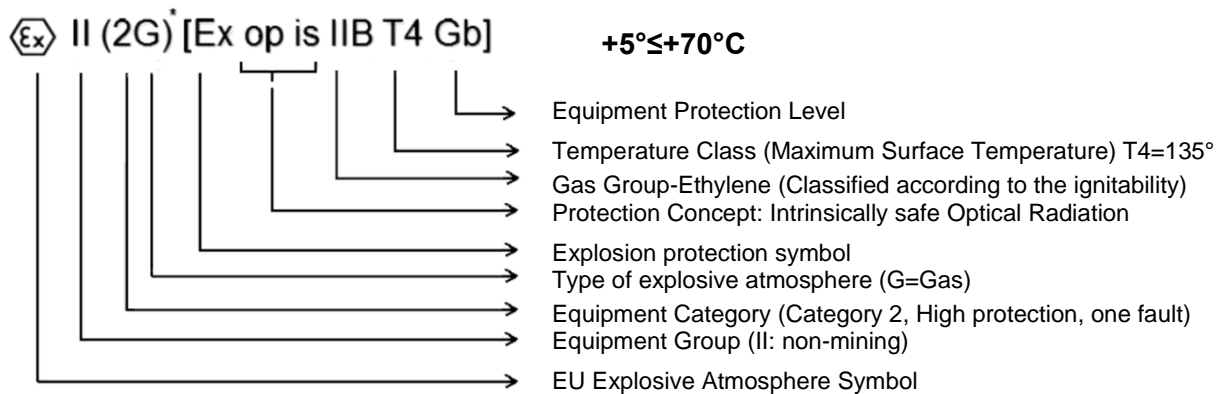
- Only operate the oil mist detector in potentially explosive atmospheres classified as II-/2G (Group II, Category 2G, equipment for atmospheres containing gas). The requirements of IEC/EN 60079-0:2018 and IEC/EN 60079-28:2015 are met.

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].



*The brackets indicate that the device is installed outside the hazardous area () but emits optical radiation into a 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 screw fittings 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).



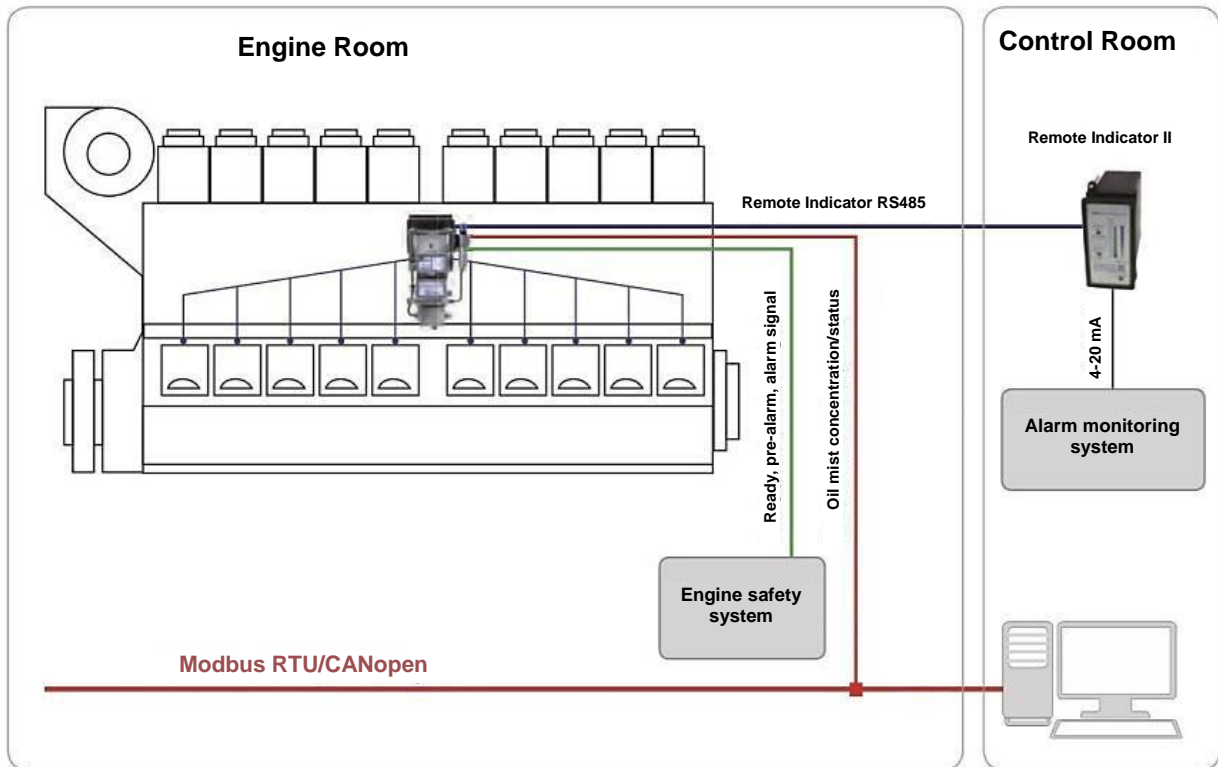


Figure 5: Interface schematic

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 detection system (installation kit).



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 detection 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.

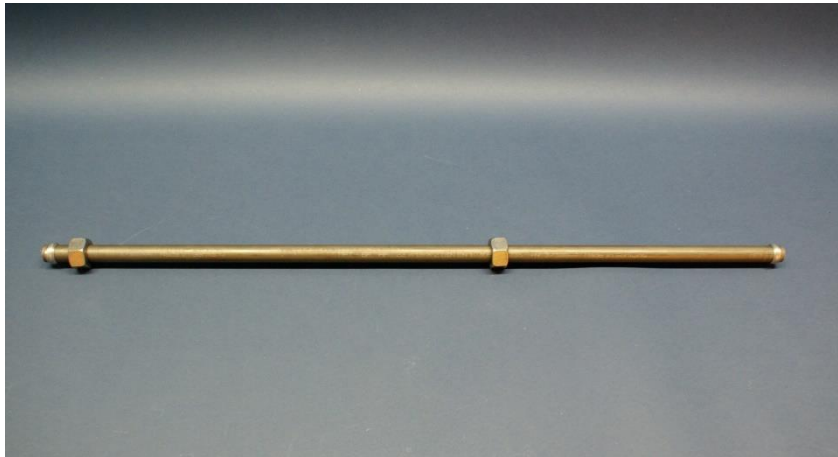


Figure 6: Pipe with cutting rings and union nuts

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.



4.4. Engine wall screw connection and suction funnel

An engine wall screw fitting essentially consists of two main components: the fitting body (1) and a suction funnel (2).

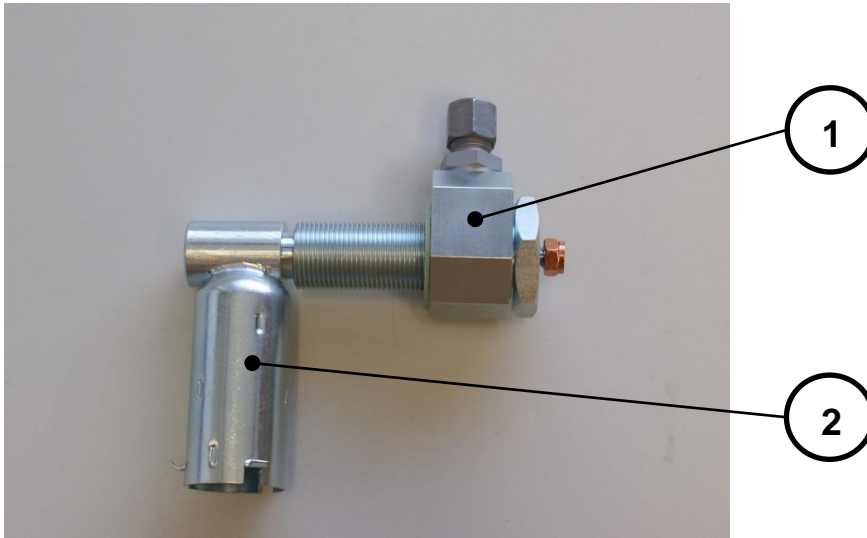


Figure 7: Engine wall screw fitting

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. Spray oil can clog the header pipes if it is not properly separated beforehand.

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

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

4.5. Siphon blocks

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



4.6. Hose lines

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



Figure 8: Hose line with wire mesh

The hose lines 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. Canister siphon

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

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



Figure 9: Canister siphon

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



4.8. Optional accessories

4.8.1. Remote monitoring system

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 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.



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 dual 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!



5.3. Guide to 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 regarding 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.



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 detection system when the engine is switched off.



DANGER!

Explosion of the crankcase

Serious injury, including death

- The exhaust air from the venturi injector must be returned to the crankcase and must not enter the engine room.



DANGER!

Explosion of the crankcase

Serious injury, including death

- Observe the permissible ambient temperature T_a (during intended use): $+5^\circ\text{C} \leq T_a \leq +70^\circ\text{C}$



DANGER!

Explosion of the crankcase

Serious injury, including death

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



DANGER!

Explosion of the crankcase

Serious injury, including death

- Typical gases of ignition protection category T4: T4 maximum surface temperature must be $\leq 135^\circ\text{C}$.



DANGER!

Pumping action between zones/entrainment

Serious injury, including death

- The exhaust air pipe of the oil mist detector must always be connected to the crankcase (closed circuit). The correct negative pressure in the measuring head should be 60 mmH₂O.



DANGER!

Explosion of the crankcase

Serious injury, including death

- Only qualified personnel are allowed to assemble, install and start up 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.





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 detection 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 detection system

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

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

6.4. Approved drawing for the oil mist detection system

For installation and operation of the oil mist detection 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. Connecting 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 filter control valve of the oil mist detector is via interface P1 (see Figure 11).

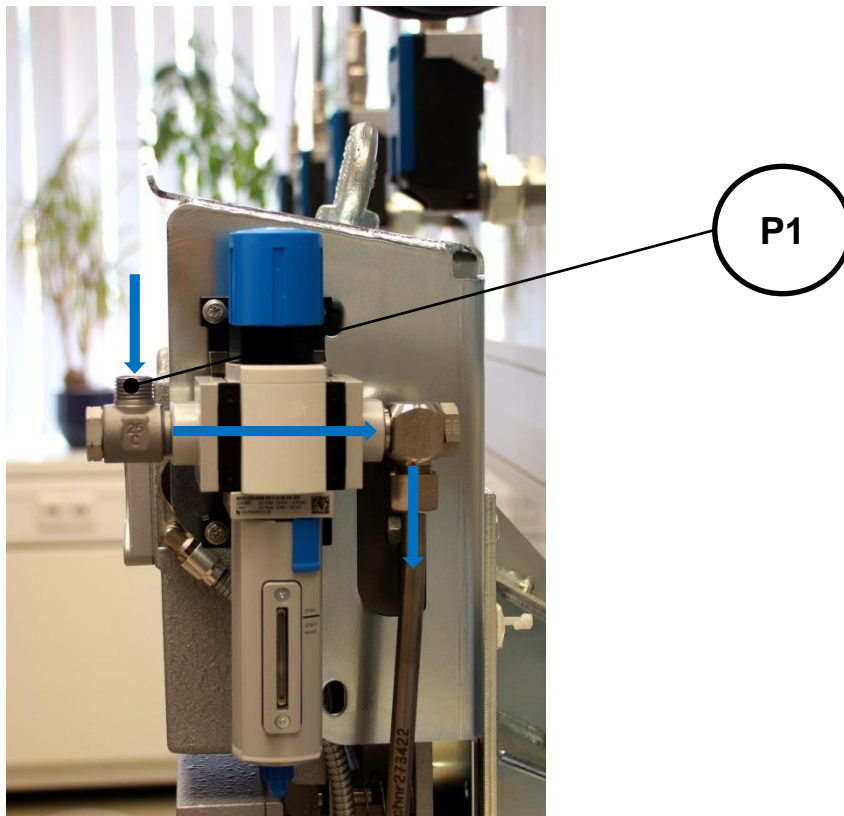


Figure 11: Direction of flow of compressed air at filter control valve (273456)

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.



6.6. Connecting the electrical power supply

Connect the electrical power from the customer's mains network to the oil mist detector via interfaces E1, E2 and E3 (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	24 V DC

Alternative sizes of cable glands on request.

6.7. Mounting holes on crankcase

In general, all components of the Schaller Automation oil mist detection 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 the oil mist detector

7.1. Installing the oil mist detector with pre-assembled 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.



ATTENTION!

The oil mist detector must not be painted, varnished or otherwise altered.

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 lifting eye nut on the protective hood. Suitable lifting equipment must be used for transport.

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.

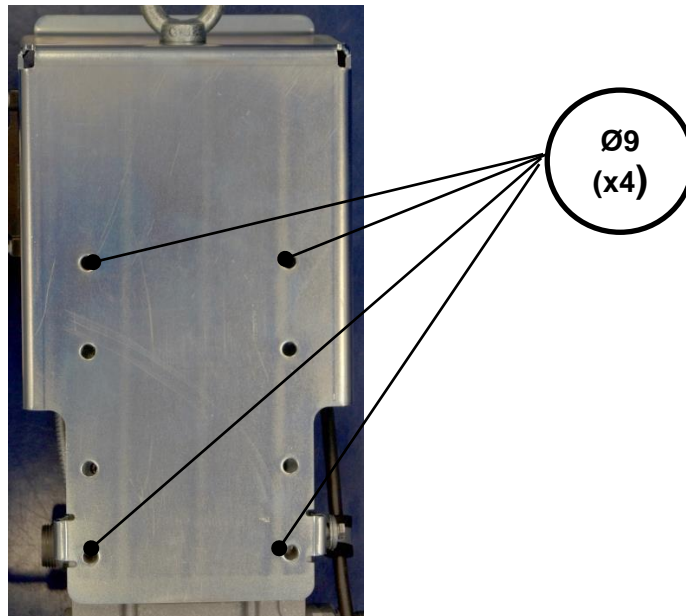


Figure 13: Rear of oil mist detector without bracket and with protective cover



ATTENTION!

Premature contamination of the oil mist detector

Device may report malfunction prematurely

→ Level the oil mist detector horizontally and vertically during installation.



7.3. Installing the engine wall screw fittings and suction funnel

Material number: 270354 (standard)

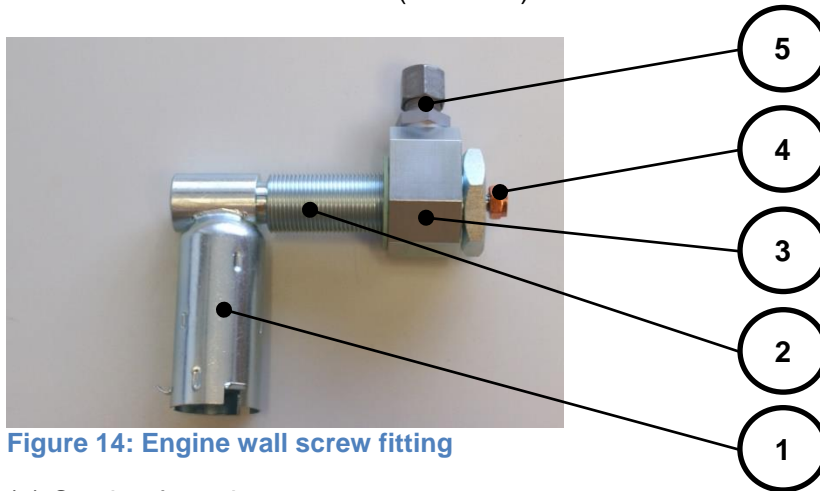


Figure 14: Engine wall screw fitting

- (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 collide 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!

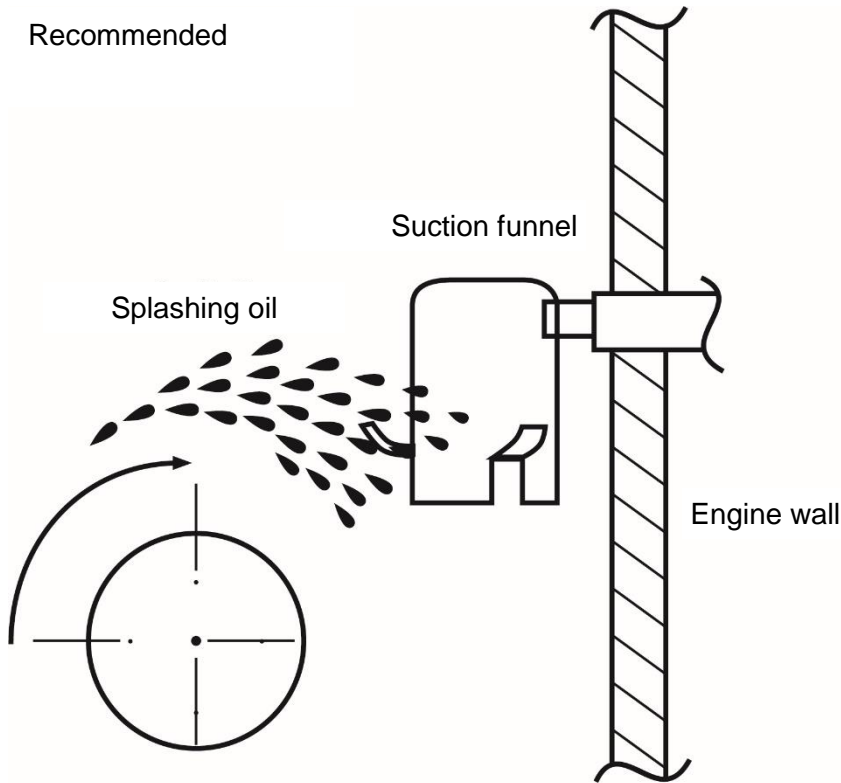
Risk of blockage of the suction funnels.

Impaired monitoring of a segment of the crankcase.

- Make sure that the suction funnels cannot be flooded by splashing oil:



Recommended



Crankshaft

1.

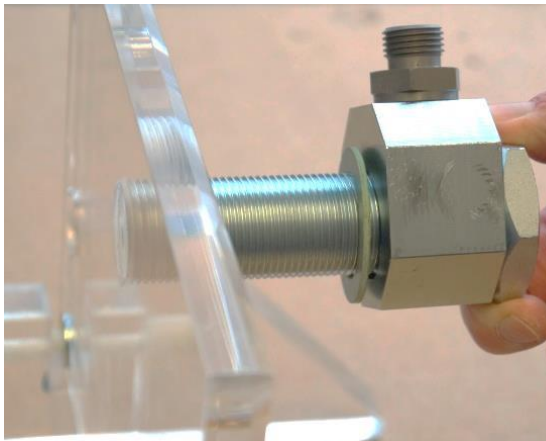


Figure 15: Screw-in sleeve and housing

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.

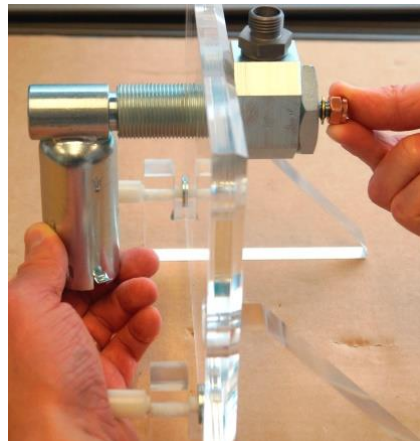


Figure 16: Insert the suction funnel

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.



3.

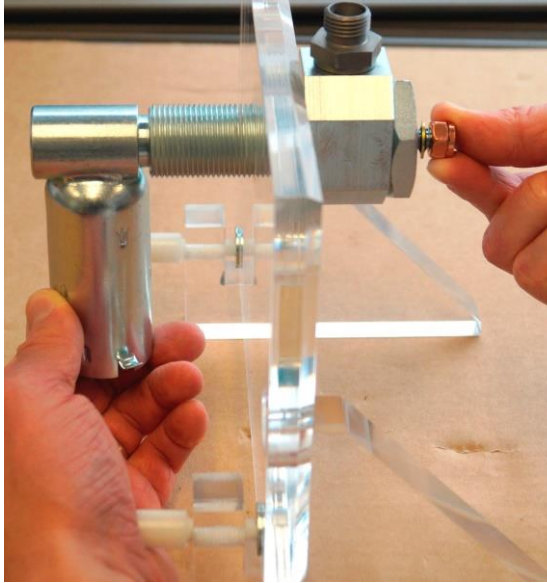


Figure 17: Align the suction funnel

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.



7.4. Installing the siphon block

Material numbers: 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.



ATTENTION!

When installing, make sure that there is sufficient clearance around the lower screw plug and the measuring connection. The two connections must be freely accessible for maintenance purposes



Figure 20: Connecting unit



Figure 21: Siphon block without measuring connection



Figure 22: Siphon block with measuring connection



1.



Figure 23: Connecting unit

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

3.

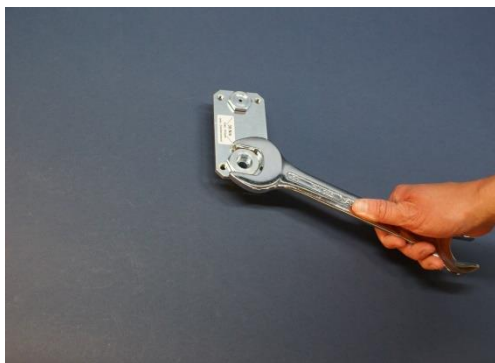


Figure 25: Mount the connecting unit

Mount the connecting unit on the crankcase.

2.



Figure 24: Screws with Loctite 243

Apply Loctite 243 to both threads.

4.

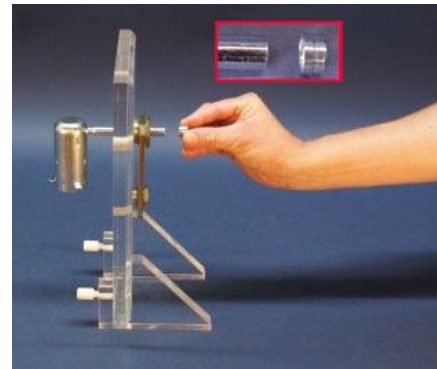


Figure 26: Insert the suction funnel

Insert the suction funnel, starting from the inside of 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 installation.



5.

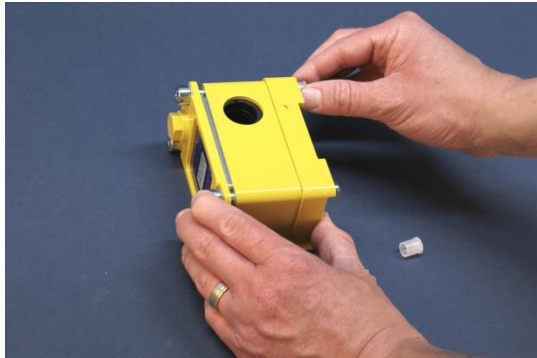


Figure 27: Remove protective caps

Remove the protective caps (x4) from the screws on the siphon block and dispose of them.

6.

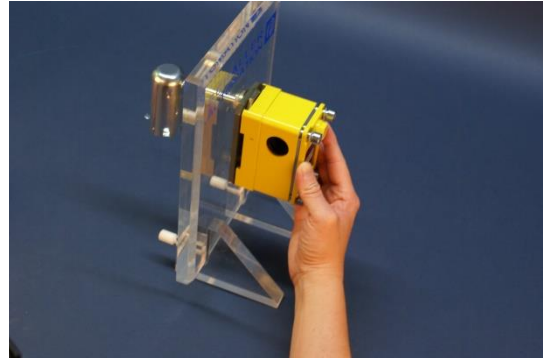


Figure 28: Push in the siphon block

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

7.

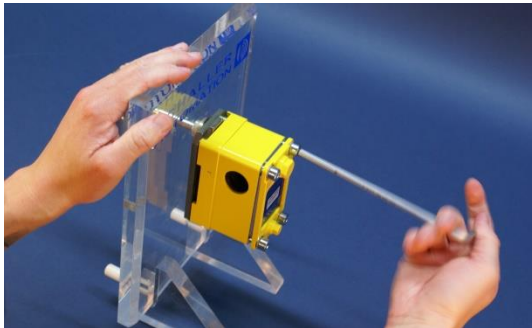


Figure 29: Tighten the screws on the siphon block

Tighten the screws crosswise, paying attention to the alignment of the suction funnel.

8.



Figure 30: Remove the screw plug at the bottom.

Remove and retain the lower screw plug of the oil return hole.



9.



Figure 31: Fill lubrication oil into filling pump

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.

10.



Figure 32: Mount filling pump

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 screw fitting on the 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: Pump lubrication oil

Perform eight slow and steady 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.



7.5. Installing the canister siphon

Material number: 150939

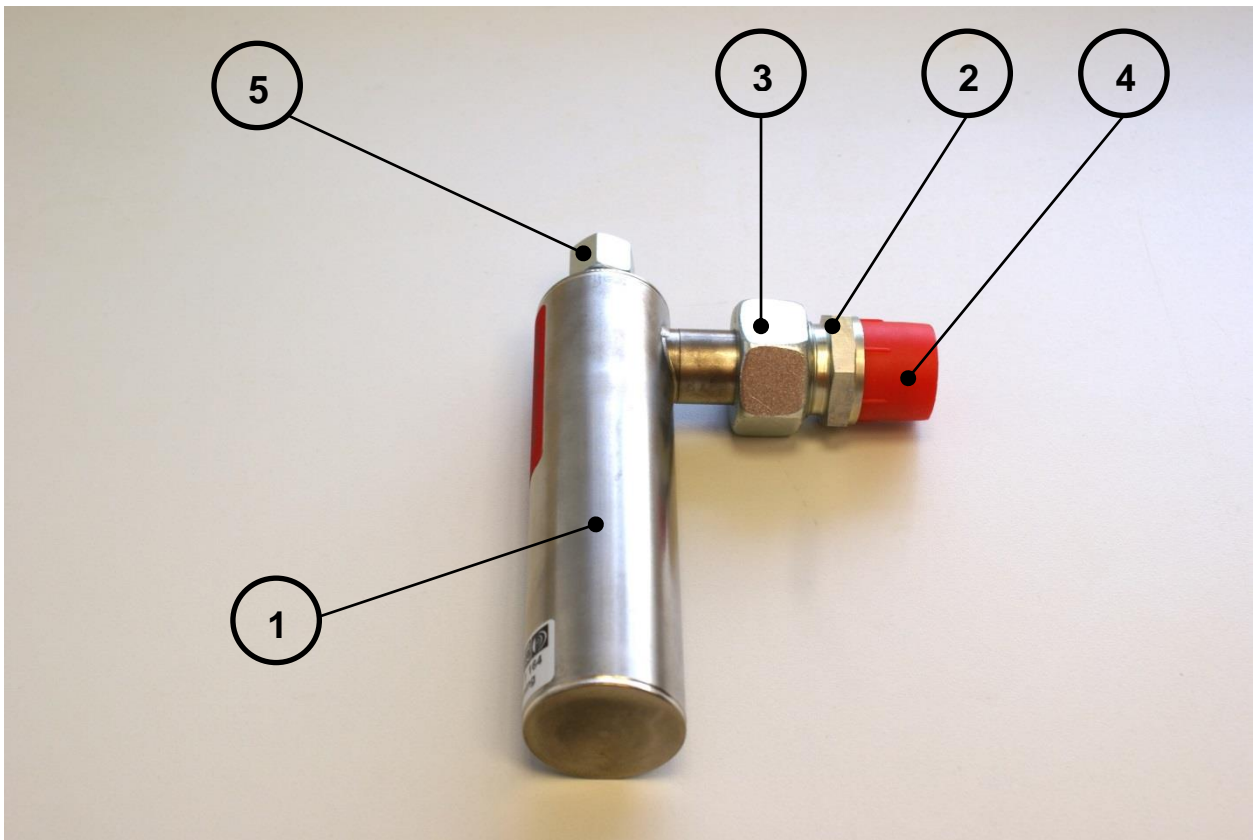


Figure 35: Canister siphon

- (1) Canister 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 lubrication oil
- Torque spanner for torque up to 180 Nm
- Small spirit level





Figure 36: Mount screw-in socket

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



ATTENTION!

Danger of part breaking.

Damage to parts or the engine.

→Comply with the specified torque. Torque only applies to steel parts.



Figure 37: Mount canister siphon

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



Figure 38: Align the canister siphon

Tighten union nut slightly by hand. Use a spirit level to align the canister siphon horizontally and then tighten the union nut (see Section 4.3).

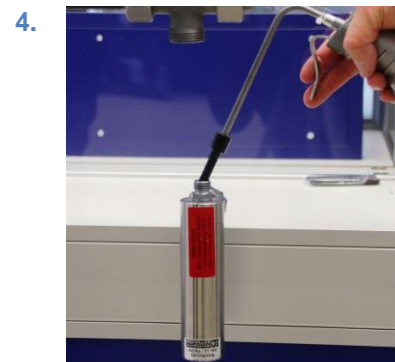


Figure 39: Fill the canister siphon

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





Figure 40: Connect pipe

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



Figure 41: Tighten screw connection

Tighten the screw-in socket (see Section 4.3).

7.6. Installing the 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 extraction line must not exceed **9m per side**.

WARNING!

Leaking of the oil mist detection 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.



7.7. Installation of the 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. Installing the 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.

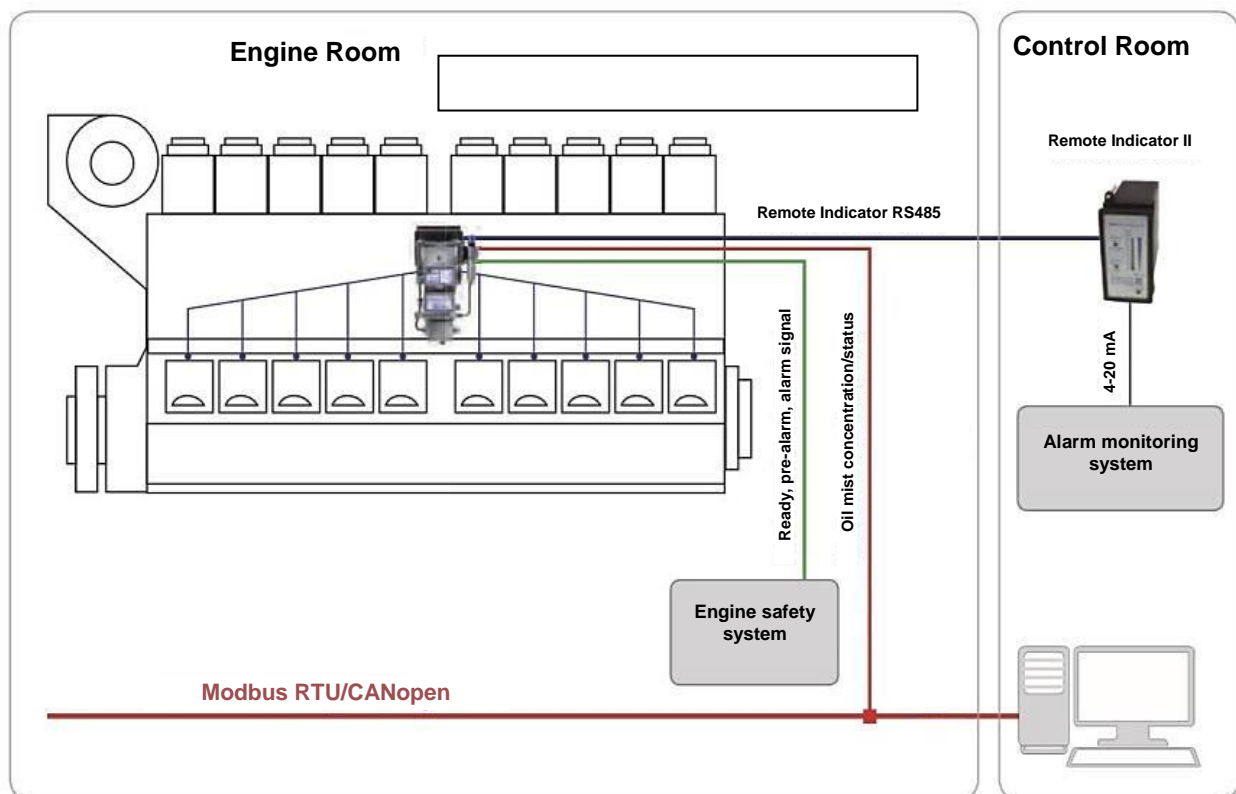


Figure 42: Wiring diagram for oil mist detector terminal box and customer interface

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.



Required tools:

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

Procedure for connecting the connecting line to the terminal box:

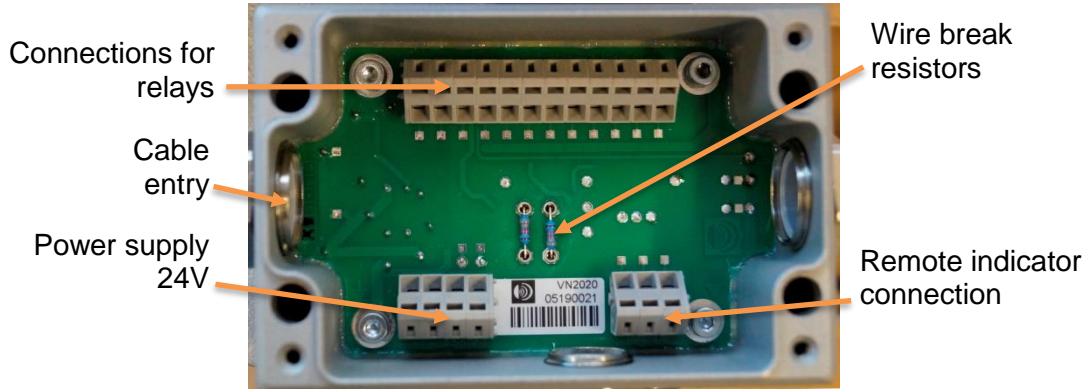


Figure 43: Terminal box front view

1.



Figure 44: Cover and terminal 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.

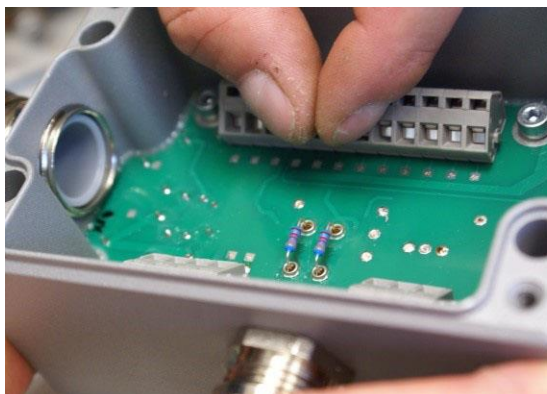


Figure 46: Insert resistors

4.

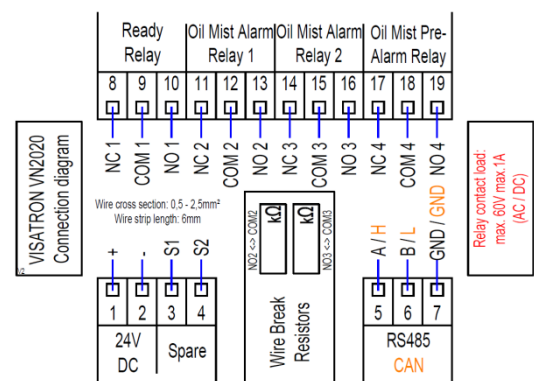


Figure 47: Wiring diagram for the terminal box



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

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

See

5.

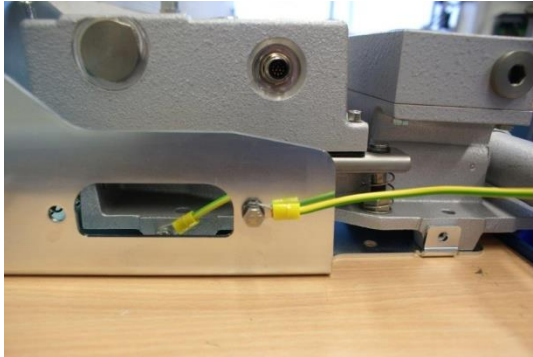


Figure 48: Connecting earth (example)

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

6.

Table 1.



Figure 49: Install the cover of the terminal box

Install the cover of the terminal box. Tighten the four screws crosswise to 2.5 Nm.



Terminal No.	Terminal	Connect to	Note/action
1	24 V DC +	Power supply	Voltage range: 18-31.2 V
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		

Table 1: Wiring diagram of the terminal blocks



7.9. Installing the Remote Indicator (optional)

Material number: 150998



Figure 50: Remote Indicator II

In compliance with IACS UR M10.11, it must be possible to read the operating and alarm status of the oil mist detector remotely from the engine at a safe location (e.g. in the engine control room). The Schaller Remote Indicator II can be connected as a monitoring device for this purpose.

In the event of an oil mist alarm, Schaller Automation strongly recommends (as described in IACS UR M10.7) not to approach the engine or carry out inspection work on the crankcase until it has cooled down sufficiently after the engine has stopped. The oil mist alarm can only be cancelled at the earliest after the level falls below the pre-alarm threshold.

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. When the oil mist detector is delivered, the bus system is terminated with a resistor as standard. This is integrated in the measuring head with switch (see Figure 51: Switchable termination resistor)



Termination resistor

Figure 51: Switchable termination resistor

Use a communication cable with a twisted and shielded 3-wire cable. SCHALLER AUTOMATION recommends LAPPKABEL UNITRONIC-FD CP (TP) plus UL-CSA. Maximum cable length of 400 m.

The connection between oil mist detector and monitoring device for standard applications is shown in the following wiring diagram (see Figure 52).

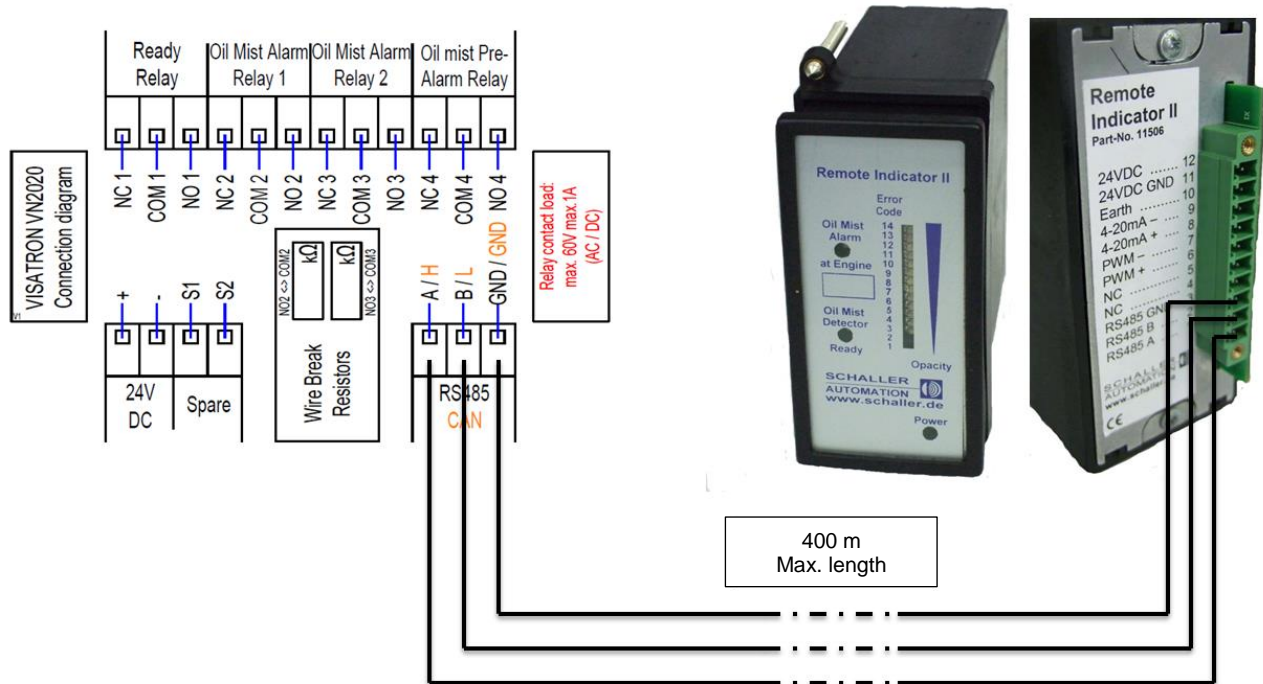


Figure 52: Connection diagram for the VN2020 with Remote Indicator II



7.10. Starting up for the first time

WARNING!

Engine protection not guaranteed

Risk of oil mist explosion

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

7.10.1. Setting the negative pressure at the measuring head

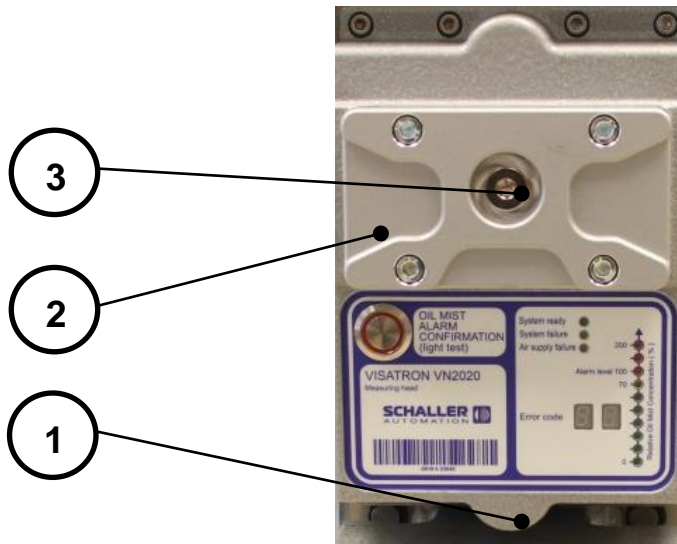


Figure 53: Front view of measuring head

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

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



ATTENTION!

Suction power is not reached

Premature error message

- ➔ Set a negative pressure of $60 \text{ mmH}_2\text{O} \pm 5 \text{ mmH}_2\text{O}$.

Required tools: Allen key size 6
 U-tube manometer 270532/differential pressure gauge 151800
 Torque wrench for torque of 15 Nm

CAUTION!

The suction pressure of the oil mist detection system is adjusted by adjusting the filter control valve 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.



Procedure for setting the negative pressure on the measuring head:



Figure 54: Inspection cover with screw plug

Unscrew the screw plug (3) on the inspection cover (2) of the measuring head (1) and set aside.



Figure 55: Inspection cover with quick-release coupling

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



Figure 56: Fill U-tube manometer with water

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



Figure 57: U-tube manometer on inspection cover

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



5.



Figure 58: Pressure indicator

Switch on the compressed air supply. Observe the permissible supply pressure. This pressure must be between **2 bar and 14 bar**.

6.



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

Set 60 mmH₂O \pm 5 mmH₂O. To do this, adjust the adjusting screw on the filter control valve 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-release coupling. If you could not set the negative pressure in step (6), jump to Section 10.4. Finally, screw in the screw plug from step (1) again to a torque of 15 Nm.



7.10.2. Connecting the 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, in 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 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.

To change the sensitivity of the oil mist detector, follow the instructions in the User Software Manual (on the DVD).



7.10.4. Function test during startup

Once the steps in Sections 7.10.1 to 7.10.3 have been successfully completed, you can start the function test.

- (1) Remove the smoke tube from the Smoketest Box (Section 14.3) and bend the smoke tube.
- (2) You can now test each extraction point individually. To do this, hold the smoke tube directly under the suction funnel of the specific extraction point and perform 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!



7.10.5. Checklist for startup

Item No.	Description	<input checked="" type="checkbox"/>
1.	Are all lines and pipes installed as shown in the installation drawing?	
2.	Are all screw connections tightened to the correct torque?	
3.	If mounting with siphon blocks: Are all siphon blocks filled with oil and all unused openings closed?	
4.	If mounting with canister siphons: Are all the canister siphons filled with oil?	
5.	Is the negative pressure at the measuring head set to 60 mmH ₂ O?	
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?	



8. Operation and application

8.1. Display and alarm reset

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: Example LED display with 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.

If an oil mist alarm is triggered, the alarm on the oil mist detector must be cancelled manually (Figure 62).

- ➔ 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.

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%.



8.2. Error diagnosis and troubleshooting

If an internal device error or system error occurs, the diagnostic system displays the error code via the 2-LED numerical display. The "Ready" LED is switched off by the system and any potential oil mist is **not** detected in this status!

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

Error code	Error description	Ready for operation	System failure LED
None	All LEDs off or no output	No	Off
00	Oil mist detector in operation	Yes	Off
02	Internal error	No	On
03	Internal error	No	On
04	Internal error	No	On
06	Supply voltage not within permissible range	No	On
07	Internal error	No	On
08	Electronics temperature too high (> 85 °C)	No	On
09	Electronics temperature too low (< 0 °C)	No	On
12	Battery voltage too low	Yes	Off
14	Supply pressure too low	No	On
15	Optical sensor very dirty– cleaning must be carried out	No	On
16	Internal error	No	On
30	Internal error	No	On
33	Supply pressure too high	No	On
34	Internal error	No	On

Table 2: Error codes



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 previous work step in each case has not cancelled the error code.

8.2.1. Error code – All LEDs off

1. Check the power supply
2. Check the fuse in the measuring head and replace if necessary
3. Replace the measuring head (Section 10.1.1)

8.2.2. Error code 02 – Internal error

1. Replace the measuring head (Section 10.1.1)
2. Contact service partner (Section 16)

8.2.3. Error code 03 – Internal error

1. Replace the measuring head (Section 10.1.1)
2. Contact service partner (Section 16)

8.2.4. Error code 04 – Internal error

1. Replace the measuring head (Section 10.1.1)
2. Contact service partner (Section 16)

8.2.5. Error code 06 – Supply voltage not within permissible range

1. Check the power supply
2. Replace the measuring head (Section 10.1.1)
3. Contact service partner (Section 16)

8.2.6. Error code 07 – Internal error

1. Replace the measuring head (Section 10.1.1)
2. Contact service partner (Section 16)

8.2.7. Error code 08 – Electronics temperature too high (> 85 °C)

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

8.2.8. Error code 09 – Electronics temperature too low (< -2 °C)

1. Bring within permissible range of operating temperature

8.2.9. Error code 12 – Battery voltage too low

1. Contact service partner (Section 16)

8.2.10. Error code 14 – Supply pressure too low

1. Adjust negative pressure (Section 7.10.1)
2. Replace filter for filter control valve (Section 9.1.5)
3. Replace the measuring head (Section 10.1.1)



8.2.11. Error code 15 – Optical sensor very dirty, cleaning must be carried out

1. Cleaning the light path (Section 9.1.3)
2. Replace the measuring head (Section 10.1.1)

8.2.12. Error code 16 – Internal error

1. Replace the measuring head (Section 10.1.1)
2. Contact service partner (Section 16)

8.2.13. Error code 30 – Internal error

1. Replace the measuring head (Section 10.1.1)
2. Contact service partner (Section 16)

8.2.14. Error code 33 – Supply pressure too high

1. Adjust negative pressure (Section 7.10.1)
2. Replace filter for filter control valve (Section 9.1.5)
3. Replace the measuring head (Section 10.1.1)

8.2.15. Error code 34 – Internal error

1. Replace the measuring head (Section 10.1.1)
2. Contact service partner (Section 16)



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 before maintenance and repair work and check the negative pressure in the measuring head (see Section 7.10.1) after completing work.



WARNING!

Hazard due to electric current

Switch off the power supply before carrying out maintenance and repair 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/VN2020 Ex oil mist detector.

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.



Steps	Description	Interval (whichever occurs first)				See Section	Required parts/tools
		4,000	8,000	12,000	16,000		
	Hours						
	Or months	6	12	18	24		
1.	Check negative pressure in the measuring head: → below 55 mmH2O (5.5mbar) → Adjust negative pressure → Between 55 mmH2O and 65 mmH2O → OK → Between 65 mmH2O and 85 mmH2O → Adjust negative pressure → Above 85 mmH2O → Check the pressure at the filter control valve	X	X	X	X	7.10.1	270532 U-tube manometer Or 151800 Digital manometer
2.	Clean the light path in the measuring head	X	X	X	X	9.1.3	151482 Cleaning kit
3.	Function test with smoke tube	X	X	X	X	9.1.4	151780 Smoke Test Box
4.	Replace filter in filter control valve	X	X	X	X	9.1.5	155006 Maintenance kit for the VN2020
5.	Replacing the inspection cover seal	X	X	X	X	9.1.3	155006 Maintenance kit for the VN2020
6.	Replace connection box seal		X		X	9.1.6	155006 Maintenance kit for the VN2020
7.	Clean the suction system with compressed air		X		X		Compressed air max. 6 bar
8.	Replacing the mounting plate seal		X		X	10.1.6	155006 Maintenance kit for the VN2020
9.	Check the bellows and spring systems between the base plate and the measuring head for damage		X		X	*	May need a torch
10.	Complete overhaul of the oil mist detection system				S	10.2	155004 Service kit for the VN2020

Key to maintenance measures:
 X – Work that must be completed
 S – Only by authorised and certified Schaller Service.
 * If the bellows are damaged, please contact Schaller Service immediately.

Table 3: Maintenance cycles



9.1.2. Maintenance by the operator



WARNING!

Risk of explosion

Severe to fatal injuries due to oil mist explosion

→ Only use Schaller Automation original spare parts.

9.1.3. 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 63: Remove screws

Loosen captive screws (x4) on the inspection cover and twist out of the measuring head.

2.



Figure 64: Remove seal

Put the inspection cover aside and dispose of the seal.

3.



Figure 65: Cotton stick with liquid

Dip a cotton stick into the cleaning agent.

4.



Figure 66: Clean transmitter diode

Clean the glass of the transmitter diode.



5.



Figure 67: Clean photodiode

Clean the photodiode.

6.



Figure 68: Clean sealing surface

Clean the sealing surface of the inspection cover seal.

7.



Figure 69: New inspection cover seal

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

8.



Figure 70: Fit the inspection cover

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



ATTENTION!

A new seal must be used for the inspection cover.

→ Only use the seal from the service box.



9.



Figure 71: Tighten the inspection cover screws

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



9.1.4. Function test with smoke tube

ATTENTION!



Before a function test, you must make sure that the oil mist detector has been correctly maintained. Only carry out the function test with the engine at a standstill (if the engine is running, it will automatically stop or go into slow-down mode).



Figure 72: Remove the screw plug

Unscrew the screw plug on the inspection cover of the measuring head and put it aside.



Figure 73: Fit the adapter hose

Screw the quick-release coupling with sealing ring into the inspection cover and tighten by hand (Smoke Test Box 151780).



Figure 74: Fit the flex hose

Connect the flex hose from the Smoke Test Box (151780) to the adapter



Figure 75: Connect the smoke tube and pump

Fit the activated smoke tube and hand pump to the flex hose.



5.



Figure 76: Pump smoke into the measuring head

Use the hand pump to pump the smoke into the measuring head

6.



Figure 77: Wait for the Alarm LED to come on

The **LED ALARM** should come on within a few seconds.

7.



Figure 78: Remove smoke tube and pump

Remove the smoke tube and hand pump from the measuring head

8.



Figure 79: Screw in the screw plug

Check that the seal on the screw plug is not damaged. If the seal is damaged, replace the screw plug.

Screw the screw plug into the inspection cover and tighten it to a torque of 15 Nm.





Figure 80: Cancel alarm

Cancel the alarm by pressing the reset button on the measuring head. Dispose of the smoke tube according to the instructions.



Figure 81: Device is ready for operation

Device is ready for operation



9.1.5. Replacing the filter of the filter control valve

Material number: 366717



Figure 82: Filter control valve

Tools: none

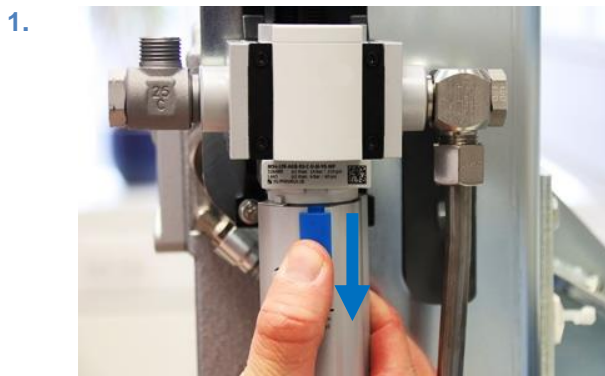


Figure 83: Loosen the filter cage

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

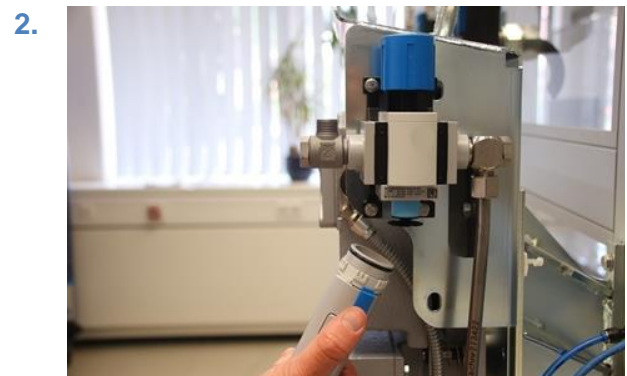


Figure 84: Pull out the filter cage

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



3.

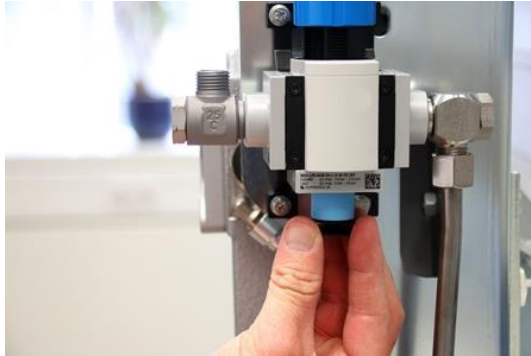


Figure 85: Remove the filter
Unscrew the black plastic disc clockwise and remove the filter.

4.

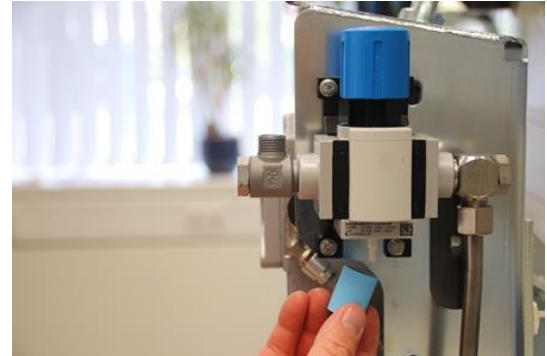


Figure 86: Replace the filter
Screw in the new filter anticlockwise and make sure that it is aligned for installation.

5.

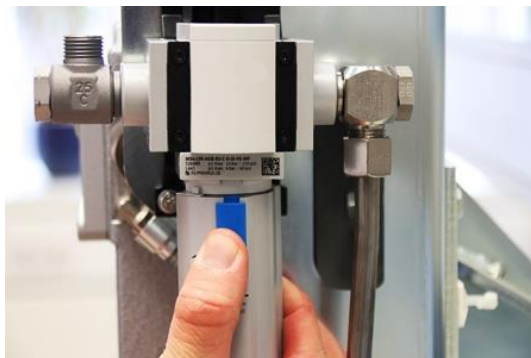


Figure 87: Mount the filter cage
Mount the filter cage in reverse order of steps 1-2 and make sure that it locks in place.

6.



Figure 88: Check the negative pressure
Check the negative pressure at the measuring head and readjust if necessary as per the steps in Section 7.10.1.

9.1.6. Replace connection box seal

Material number: 356950



Figure 89: Seal for connection box

Tools: Open spanner, width across flats 10/27/36





Figure 90: Switch off compressed air

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



Figure 91: Detach the connecting hose from the venturi injector

Pull the compressed air hose off the right side of the venturi injector and push it to the side.



Figure 92: Loosen the screw connection

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



Figure 93: Loosen the connection box

Loosen the four hexagon screws on the rear of the connection 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.



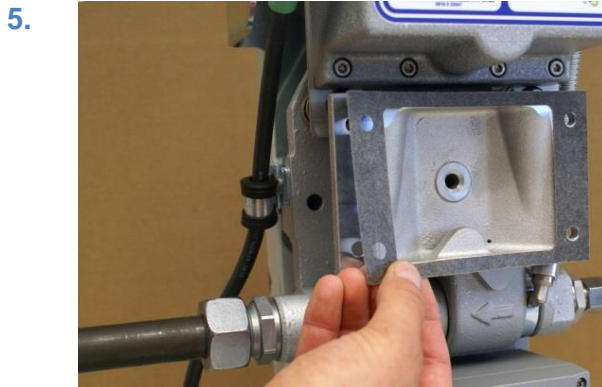


Figure 94: Remove the seal from the connection box

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



Figure 95: Clean sealing surface

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

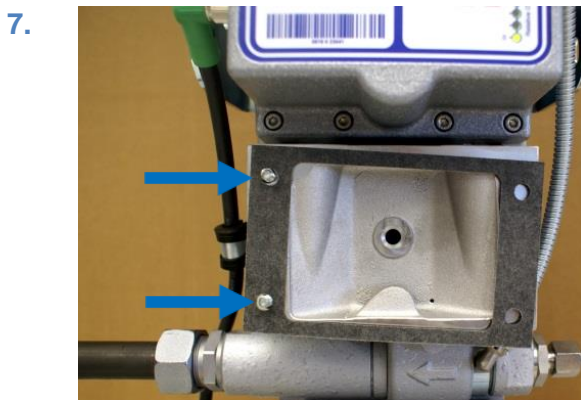


Figure 96: Remove the connection box seal

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



Figure 97: Mount the connection box

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





Figure 98: Fit the suction 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.



Figure 99: Tighten the connection box

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

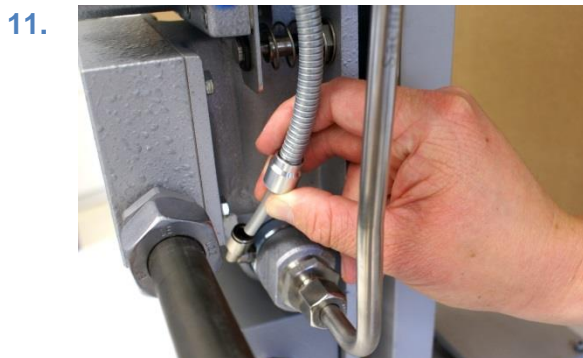


Figure 100: Fit the connecting hose

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



Figure 101: Switch on compressed air

Switch on the compressed air supply again.



9.1.7. Inspection of the oil mist detection system (16,000 h)

For maintenance inspection at 16,000 h, please contact a Schaller Service Partner (Section 16) or go to <https://schaller-automation.com/en/partners/>.

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

Material number: 290044 – VN2020
290045 – VN2020 EX

The information on the type plate must be provided for queries regarding measuring head spare parts. Please use the return form to send us the necessary information.

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



WARNING!

Risk of mixing up

Operation in the potentially explosive atmosphere not safe.

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

See Section 4.1 for the identifying features.

1.



Figure 102: Switch off power supply

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

2.



Figure 103: Remove the connecting hose

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



3.



Figure 104: Unplug plug-in connector

Loosen the union nut of the plug-in connector on the left side by turning it anticlockwise and unplug the connector.

4.



Figure 105: Loosen screw connections

Loosen the eight screws.



ATTENTION!

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

→ Hold the measuring head firmly with one hand.

5.



Figure 106: Remove the 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 107: Place the mounting plate seal in position

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



7.

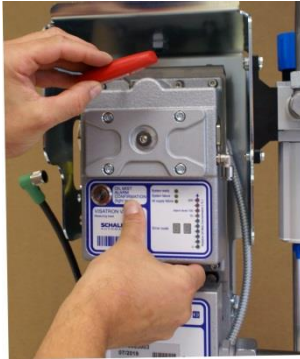


Figure 108: Mount the measuring head

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

8.



Figure 109: Tighten the screw connection

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 110: Plug in the plug-in connector

Attach the plug-in connector. Tighten the union nut on the plug-in connector clockwise.

10.



Figure 111: Fit the connecting hose

Pull back the protective hose and insert the compressed air hose back into the push-in fitting as far as it will go.



11.



Figure 112: Switch on the power supply

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

12.



Figure 113: Setting the negative pressure at the measuring head

Set the negative pressure at the measuring head as per the steps in Section 7.10.1.



10.1.2. Replacing the terminal box

Material number: 290043



Figure 114: Terminal box

Tools:
Cross-head screwdriver
Torque spanner up to 5 Nm for screw connection M16
Torque spanner up to 10 Nm for screw connection M20

ATTENTION!

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





Figure 115: Switch off the power supply

Switch off the power supply of the oil mist detector.



Figure 116: Unplug plug-in connector

Loosen the union nut of the plug-in connector on the left side by turning it anticlockwise and unplug the connector.



Figure 117: Remove the cover

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

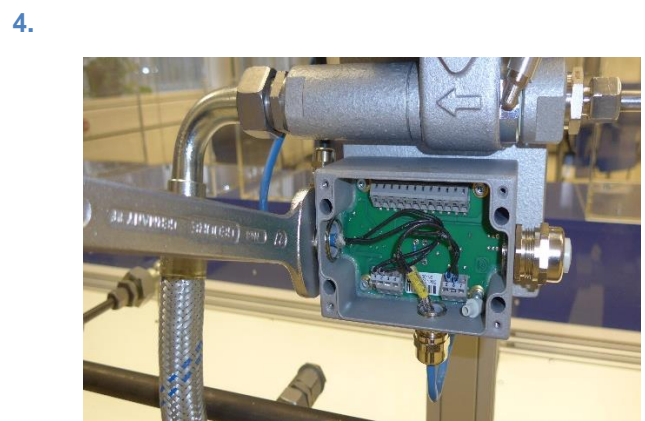


Figure 118: Loosen the cable gland

Make a note of the terminal assignment. Loosen the cable glands.

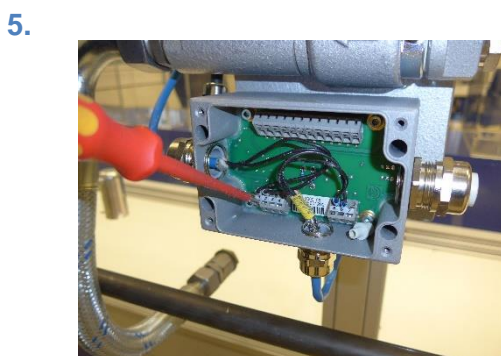


Figure 119: Disconnect the wires

Disconnect the wires from the terminal blocks.

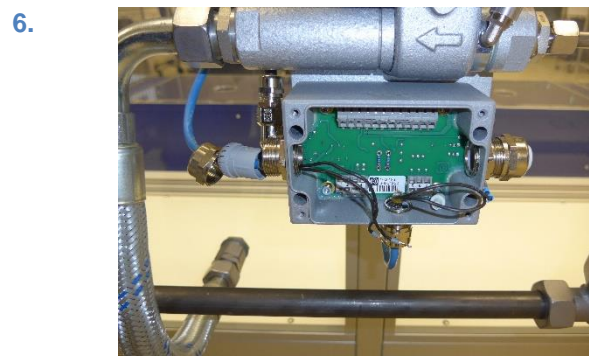


Figure 120: Remove the cable

Pull the cables out of the cable glands. Remove the four 3 glands/plugs



7.

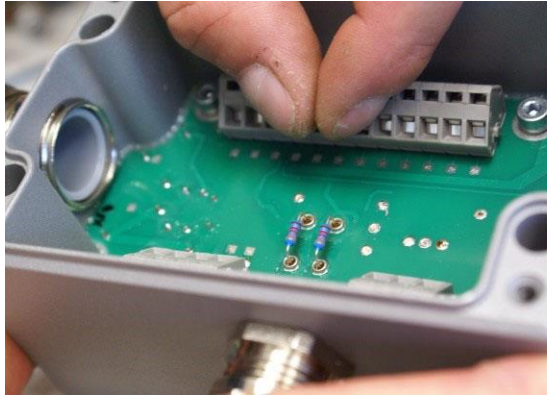


Figure 114: Wire break resistors

Make a note of the value/colour coding of the two wire break resistors.

8.

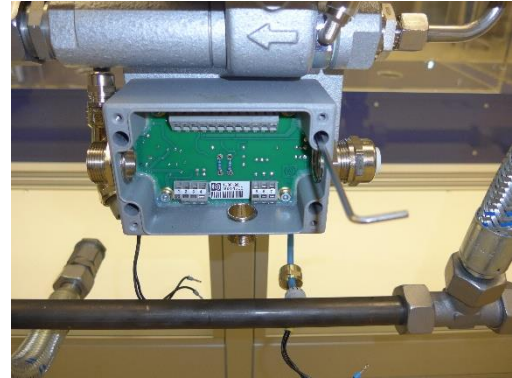


Figure 122: Remove screws

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



CAUTION!

Terminal box may fall down
Risk of impact/crushing

→ Hold the terminal box firmly with one hand.

9.



Figure 115: Remove the terminal box

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

10.



Figure 116: Remove the cover

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



11.



Figure 117: Remove the wire break resistors

Take two suitable wire break resistors (see step 7) from the supplied bag.

12.

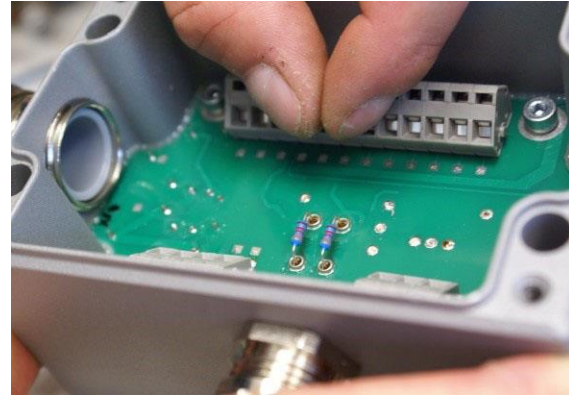


Figure 118: Insert the wire break resistors

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

13.

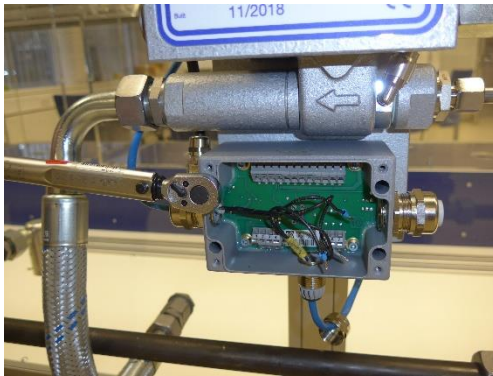


Figure 119: Install the terminal box

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

14.



Figure 120: Attach the plug-in connector

Attach the plug-in connector. Tighten the union nut on the plug-in connector clockwise.



15.

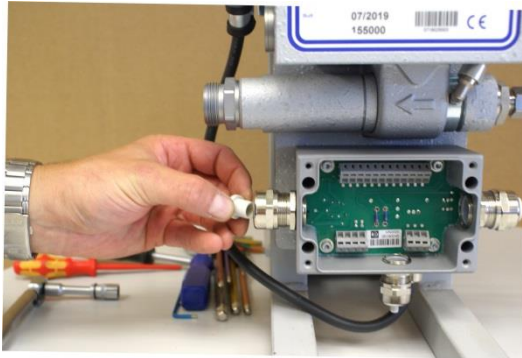


Figure 121: Installing the glands/plugs

Assemble the original glands/plugs on the new terminal box. For torque specifications, see start of Section 10.1.2

16.

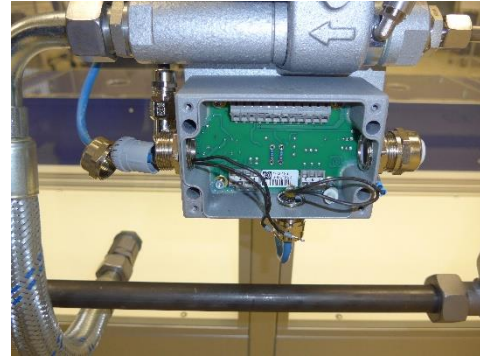


Figure 122: Insert the cable

Insert the cables through the cable glands.

17.

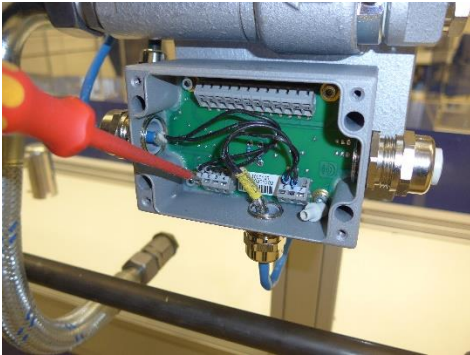


Figure 123: Place the wires in position

Fit the wires according to the wiring diagram on the back of the cover (see step 4).

18.

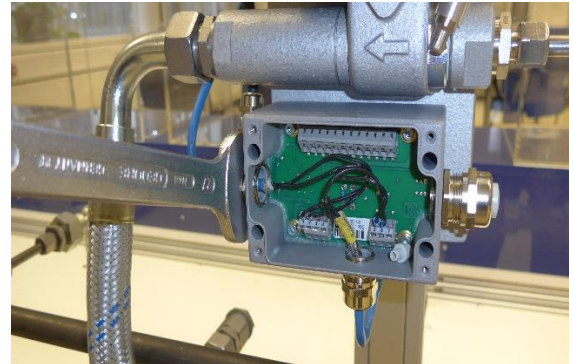


Figure 124: Tighten the cable glands

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

19.



Figure 125: Fit the cover

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

20.



Figure 126: Switch on the power supply

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



10.1.3. Replacing the filter control valve

Material number: 273456/273461



Figure 127: Filter control valve

Tools: Open spanner, width across flats 19
Open spanner, width across flats 10
Torque spanner up to 10 Nm and up to 20 Nm

1.



Figure 128: Switch off the compressed air supply

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

2.



Figure 129: Remove the swivel fitting

Loosen the two fastening nuts of the swivel fittings at the inlet/outlet of the filter control valve.



3.



Figure 130: Disassemble the filter control valve

Remove the four screw connections on the protective hood.
Remove the defective filter control valve.



CAUTION!

The filter control valve may fall down.

Risk of impact/crushing

- ➔ Hold the filter control valve firmly with one hand.

4.

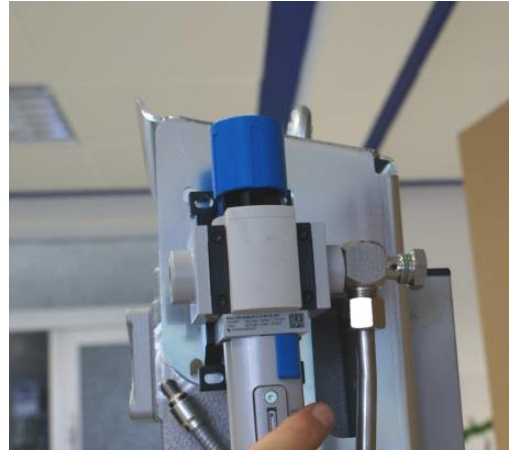


Figure 131: Remove the filter control valve

Mount the new filter control valve on the protective hood. Only tighten the 4 screw connections hand-tight.

5.



Figure 132: Tighten the swivel fitting

Align the filter control valve.
Tighten the two swivel fittings to a torque of 19 Nm.

6.



Figure 133: Tighten the screw connection

Tighten the four screw connections to a torque of 7.4 Nm.



7.



Figure 134: Release pressure in the filter control valve

Release pressure in the filter control valve. To do so, screw the blue cap anticlockwise all the way out.

8.



Figure 135: Set negative pressure

Switch on the compressed air supply to the oil mist detector.
Set the negative pressure on the measuring head (see Section 7.10.1).



10.1.4. Replacing the connecting hose

Material number: 290025



Figure 136: Connecting hose

Tools: None



Figure 137: Switch off the compressed air supply

Switch off the compressed air supply.



Figure 138: Remove the connecting hose

Pull off the connecting hose to be replaced on the right side of the measuring head and on the venturi injector.



Figure 139: Fit the connecting hose

Insert the new connecting hose back into the two push-in fittings as far as it will go.



Figure 140: Switch on compressed air

Switch on the compressed air supply again.



10.1.5. Replacing the seal for the inspection cover

Material number: 356952

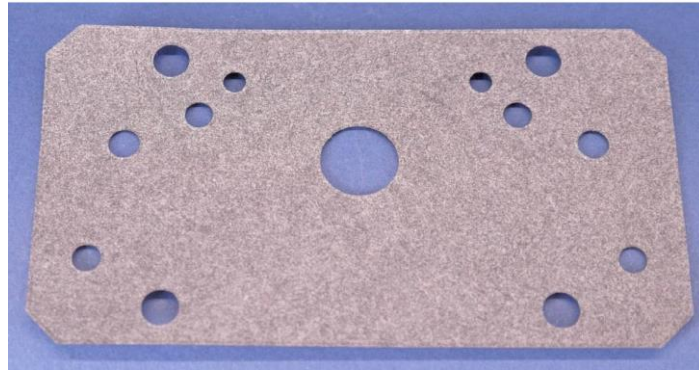


Figure 141: Seal for inspection cover

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



Figure 142: Switch off the compressed air supply

Switch off the compressed air supply.



Figure 143: Loosen screw connection

Loosen captive screws (x4) on the inspection cover and twist out of the measuring head.



3.



Figure 144: Remove the inspection cover seal

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

4.



Figure 145: Sealing surface of inspection cover

Clean the sealing surface of the inspection cover seal.

5.



Figure 146: Place the inspection cover seal in position

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

6.



Figure 147: Fit the inspection cover

Pre-fit the inspection cover with the captive screws.

7.



Figure 148: Tighten the screw connection

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

8.



Figure 149: U-tube manometer on inspection cover

Switch on the compressed air supply to the oil mist detector. Set the negative pressure on the measuring head (see Section 7.10.1).



10.1.6. Replacing the seal for the mounting plate

Material number: 356951



Figure 150: Seal for mounting plate

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



Figure 151: Switch off the power supply



Figure 152: Remove the connecting hose

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

Pull the connecting hose the measuring head and push it to the side.



Figure 153: Unplug plug-in connector

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



Figure 154: Loosen screws of the measuring head

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



5.



Figure 155: Remove the 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.



ATTENTION!

The measuring head may fall down.

Risk of impact and crushing.

→ Hold the measuring head firmly with one hand.

6.



Figure 156: Place the seal in position

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.

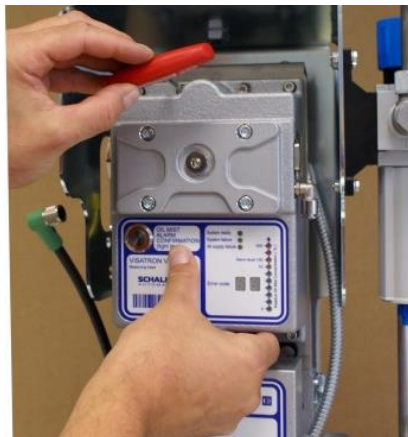


Figure 157: Mount the measuring head

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

8.



Figure 158: 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 torque.



9.



Figure 159: Tighten plug-in connector

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

10.



Figure 160: Fit the connecting hose

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

11.



Figure 161: Switch on power & compressed air supply

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

12.



Figure 162: U-tube manometer

Set the negative pressure on the measuring head (see Section 7.10.1).



10.1.7. Replacing the screw plug

Material number: 366604



Figure 163: Screw plug

Replace the screw plug if there is visible wear on the installed O-ring.

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

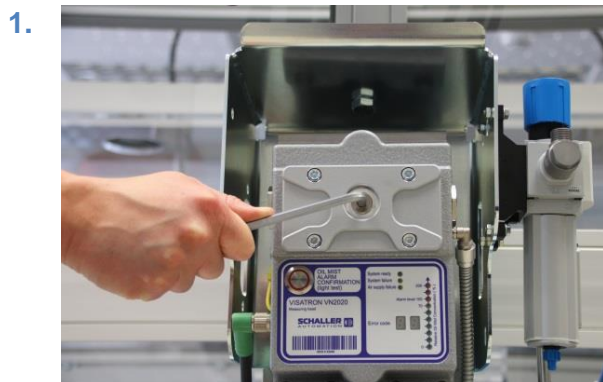


Figure 164: Remove the screw plug

Unscrew the screw plug on the inspection cover of the measuring head and dispose of it in accordance with local disposal regulations.



Figure 165: Screw in the screw plug

Screw the new screw plug into the inspection cover and tighten it to a torque of 15 Nm.



10.2. Repair by Schaller Automation

If a oil mist detector is defective or malfunctions, please contact Schaller Automation or an authorised service partner. See the Appendix for contact details. Visit our homepage and find your nearest service partner.

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

10.3. Taking out of service and disassembly

The oil mist detector is taken out of service in the reverse order to starting up (see Section 7).

11. Storage

See Section 1 Technical data and scope of delivery.

12. Packaging

The packaging materials must be disposed of by the operator in accordance with local disposal regulations.



13. Spare parts

13.1. Spare parts list VN2020

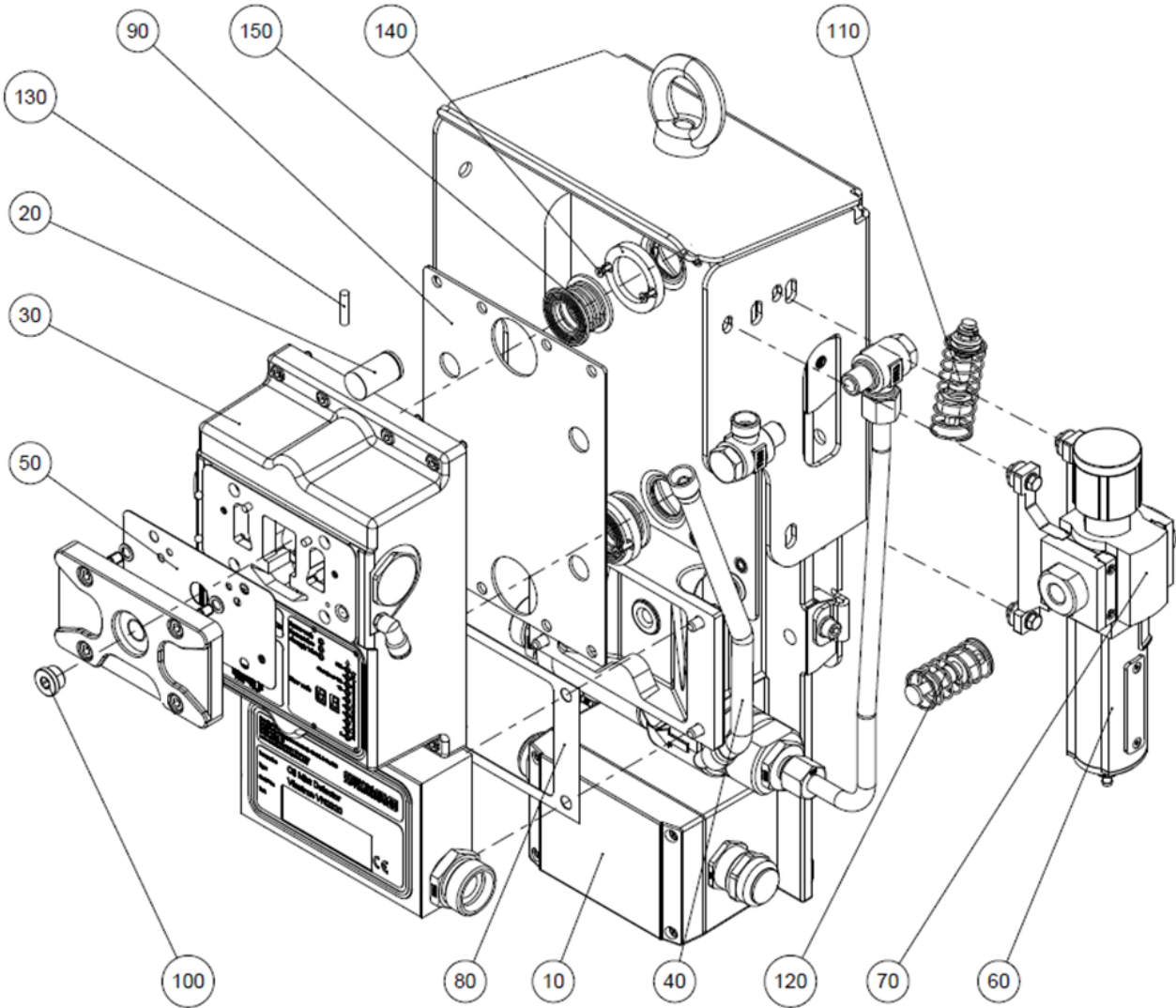


Figure 166: Overview of the location of spare parts on the VN2020



Spare parts for the VN2020				
Item	Material number	Description	Quantity	Kit No.
10	290043	Spare parts kit for terminal box	1	-
20	270045	Lithium battery w/ Diode	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	155006 / 155004
60	366717	Filter cartridge	1	155006 / 155004
70	273456	Filter control valve (flow left to right)	1	-
	273461	Filter control valve (flow right to left)	1	-
80	356950	Seal for connection box	1	155006 / 155004
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	Countersunk screw M3x12	4	
150	365193	Bellows	2	

(*) : Please complete the form to provide your device data when requesting a measuring head spare part and send it to Schaller Automation or an authorised service partner. See the Appendix for contact details. Visit our homepage and find your nearest service partner.

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



13.2. Spare parts list VN2020 Ex

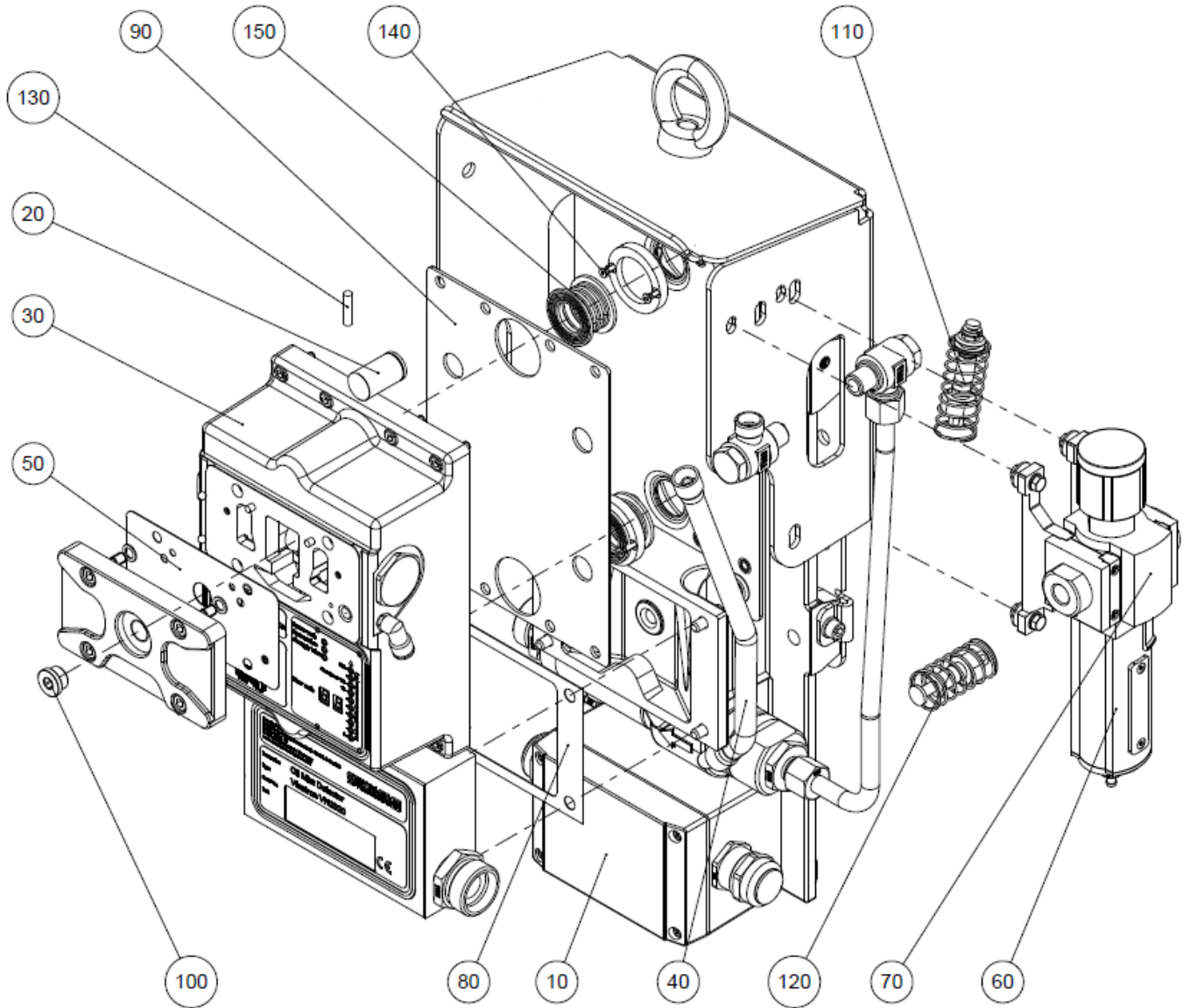


Figure 167: Overview of the location of spare parts on the VN2020 Ex



Spare parts VN2020 EX				
Item	Material number	Description	Quantity	Kit No.
10	290043	Spare parts kit for terminal box	1	-
20	270045	Lithium battery w/ Diode	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	155006 / 155004
60	366717	Filter cartridge	1	155006 / 155004
70	273456	Filter control valve (flow left to right)	1	
	273461	Filter control valve (flow right to left)	1	
80	356950	Seal for connection box	1	155006 / 155004
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	Countersunk screw M3x12	4	
150	365193	Bellows	2	

(*) : Please complete the form to provide your device data when requesting a measuring head spare part and send it to Schaller Automation or an authorised service partner. See the Appendix for contact details. Visit our homepage and find your nearest service partner.

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



13.3. Maintenance kit (4,000/8,000/12,000 hours)

Material number: 155006

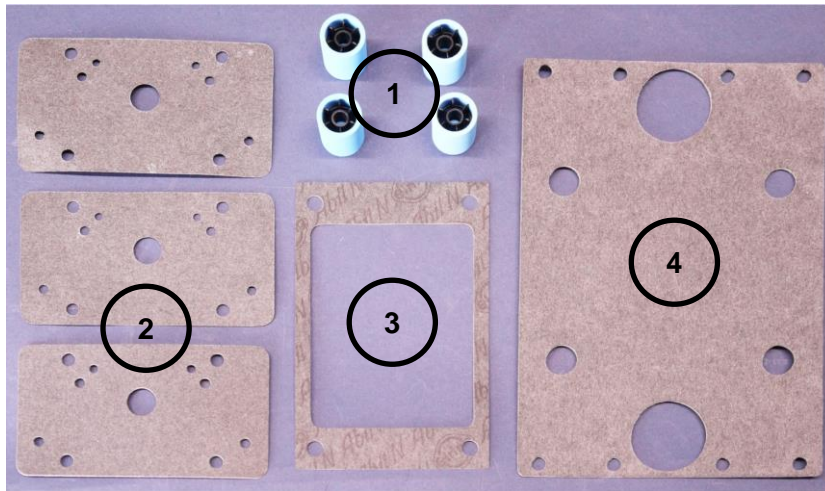


Figure 168: Maintenance kit

Maintenance kit for the VN2020 and VN2020 EX

Item	Material number	Description	Quantity
1	366717	Filter cartridge	4
2	356952	Seal for inspection cover	3
3	356950	Seal for connection box	1
4	356951	Seal for mounting plate	1

13.4. Cleaning kit

Material number: 151482



Figure 169: Cleaning kit

Item	Material number	Description	Quantity
1	190003	Injector cleaning needle *	1
2	452176	Cotton stick	20
3	270090	10ml bottle with cleaning agent	1

(*) Must not be used for VN2020



13.5. Service kit for VN2020 (16,000 hours/24 months)

Material 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.

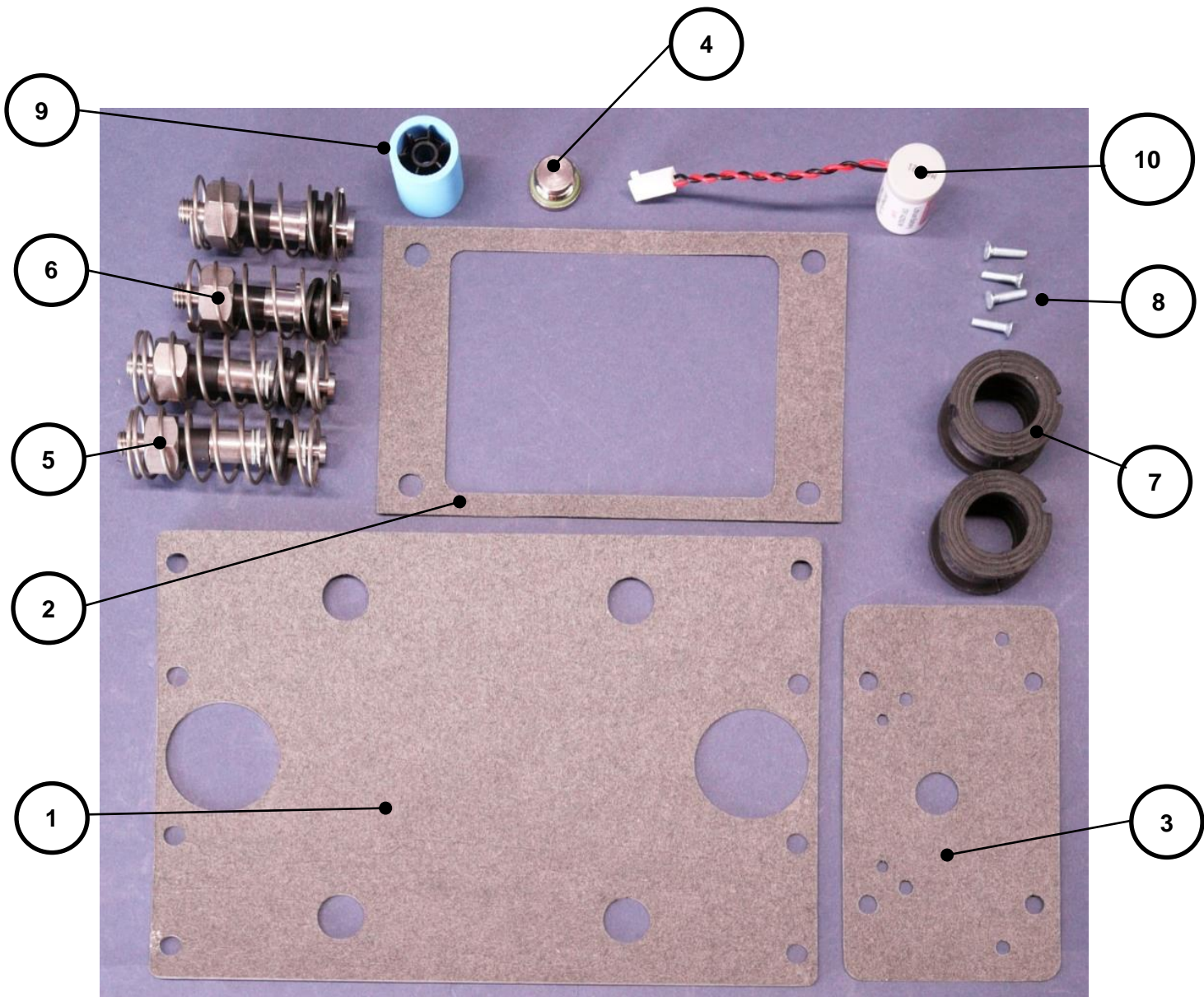


Figure 170: Service kit for the VN2020/VN2020 Ex



Service kit for the VN2020/VN2020 Ex

Item	Material number	Description	Quantity
1	356951	Seal for mounting plate	1
2	356950	Seal for connection box	1
3	356952	Seal for inspection cover	1
4	366604	Screw plug	1
5	200211	Top spring system	2
6	200212	Bottom spring system	2
7	365193	Bellows	2
8	480824	Countersunk screw M3x12	4
9	366717	Filter cartridge	1
10	270045	Lithium battery w/ diode	1



14. Accessories for VN2020/VN2020 Ex

14.1. U-pipe manometer

Material number: 270532



Figure 171: U-pipe manometer

Item	Material number	Description	Quantity
1	270539	Manometer connecting hose (1m)	1
2	365580	Quick connectors, type ACK-1/4-PK6	1
3	365283	Quick-release coupling NW 7.2 G1/4	1
4	200548	U-tube manometer II	1
5	270089	100ml bottle with low surface tension water	1

14.2. Differential pressure gauge

Material number: 151800



Figure 172: Differential pressure gauge

Item	Material number	Description	Quantity
1	436100	Differential pressure gauge	1
2	270808	Connecting hose	1

Quick-release coupling (365283) can be ordered separately if not available.

14.3. Smoke test box

Material number: 151780

To refill with smoke tubes, order part No. **272059**.



Figure 173: Smoke test box



14.4. Service box for VN2020

Material number: 151906

The box contains all the tools needed for startup and maintenance. To refill with smoke tubes, order part No. **272059**.

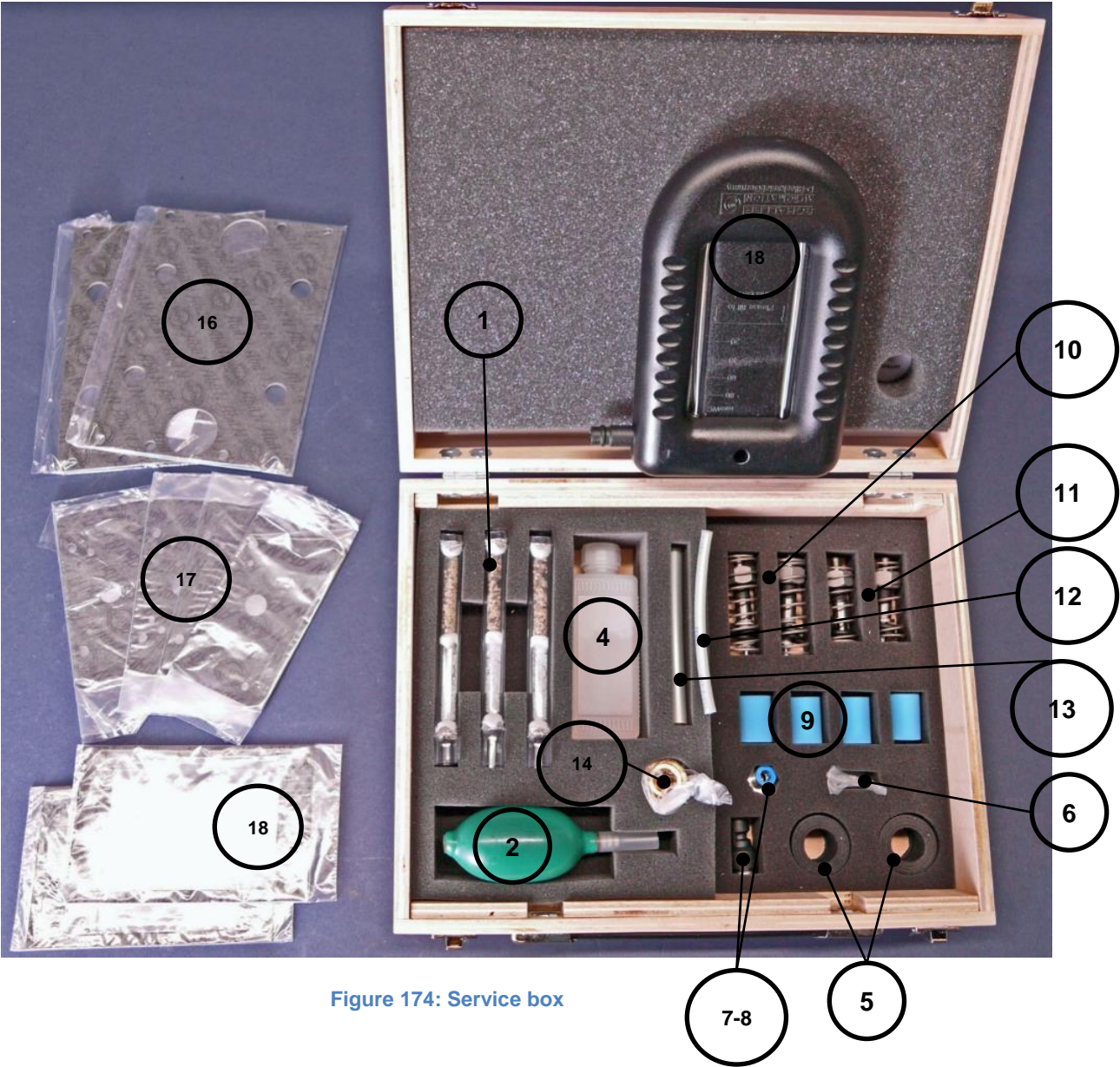


Figure 174: Service box



Item	Material number	Description	Quantity
1	450420	Smoke tube	6
2	450421	Smoke hand pump	1
3	185303	Operating manual for smoke tubes	1
4	270089	100ml bottle with low surface tension water	1
5	365193	Bellows	2
6	480824	Cheese head screw ISO 10642 - M3 x 12	4
7	366655	Push-in fitting QS-G¼-6	1
8	366633	Push-in fitting QS-10-6	1
9	366717	Filter cartridge 5µm	4
10	200211	Spring system for top of measuring head	2
11	200212	Spring system for bottom of measuring head	2
12	270704	Piece of rugged hose, length: 100mm; diameter 6mm	1
13	270705	Piece of rugged hose, length: 100mm; diameter 10mm	1
14	270493	Quick-release coupling set	1
15	356950	Seal for connection box	2
16	356951	Seal for mounting plate	2
17	356952	Seal for inspection cover	4
18	200548	U-tube manometer II	1



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17. Change history

Version	Change	Date	Changed by
1.0	Release	19 December 2019	Adams, P./ Höh, S.
1.1	<ul style="list-style-type: none"> • Added table for change history • p. 12: Item number 11 moved • p. 14: Item numbers for air jet pump, LED display and terminal box updated • p. 22 & 23: Safety instruction supplemented and safety instructions restructured • p. 28: Suction funnel figure revised • p. 46: Service kit replaced by smoke test box • p. 53: Maintenance steps 6-8 at 6 and 18 months removed; instruction and notice for checking bellows inserted • p. 67: Step 9 torque specification changed from 2.5 to 2.6 Nm • p. 82: Size of Allen key changed from 5 to 6; image updated • p. 83: Text and address of homepage added in Section 10.2 • p. 84 & 85: Item 70, filter control valve with flow direction right to left added • p. 86: Seal for mounting plate added to maintenance kit; number of connection box seals reduced; image updated • p. 87: Filter cartridge added to the service set; image updated • p. 88: Number of smoke tubes added for 272059 • p. 93: Graphical revision and image of VN2020 updated • p. 95: Correction of EC to EG for EC Directive 2004/108/EC [not applicable to English translation] 	13 March 2020	Adams, P./ Höh, S.
1.2	<ul style="list-style-type: none"> • p. 84: Items 160 and 170 removed from image, spare parts list adapted • p. 85: Items 160 and 170 removed from image, spare parts list adapted • p. 88: Added images for accessories • p. 36 Removed "Komma" text • p. 40: Text for display of relative opacity adapted • p. 49+50: Correction of the error codes and revision of the text about the test LED; this passage was copied cover the old system but not adapted 	01 June 2021	Hönninger, J.



2.0	<ul style="list-style-type: none"> • All pages, page format and layout • General changes to the format of text and images • p. 53: Section Fehler! Verweisquelle konnte nicht gefunden werden.& Fehler! Verweisquelle konnte nicht gefunden werden. information updated • p. 54: Section Fehler! Verweisquelle konnte nicht gefunden werden. & Fehler! Verweisquelle konnte nicht gefunden werden. updated • p. 56: Updated service table • p. 57: Section 9.1.3 images & text revised • p. 60: Section 9.1.4 added • p. 63: Section 9.1.5 images & text revised • p. 64 : Section 9.1.6 images & text revised • p. 68 : Section 9.1.7 Text revised • p. 68: Section 10.1.1 images & text revised • p. 72: Section 10.1.2 images & text revised • p. 77: Section 10.1.3 images & text revised • p. 80: Section 10.1.4 images & text revised • p. 81: Section 10.1.5 images & text revised • p. 83: Section 10.1.6 images & text revised • p. 86: Section 10.1.7 images & text revised • p. 88-89: Updated the spare parts table for the VN2020 • p. 96-97: Updated the spare parts table for the VN2020 EX • p. 92: New maintenance kit 155006 added • p. 93: New service set 155004 updated • p. 95: U-tube manometer spare part added • p. 96: TN 151800 and 151780 added • p. 97: Service box 151906 added • p90/92/95 : TN 1000045 replaced by TN 270045 	01 December 2021	G. Kornatz
2.1	<ul style="list-style-type: none"> • P. 52: Section 8.2 revised • P. 53 - 54: section 8.2.1 - 8.2.15 revised and supplemented 	27 June 2022	J. Hönninger



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:

- EG 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
- IEC 60079-0 (2017) and IEC 60079-28 (2015)

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

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

Blieskastel, Germany, 19/12/2019
Place, date


Stephan Schaller
(Managing Director)

