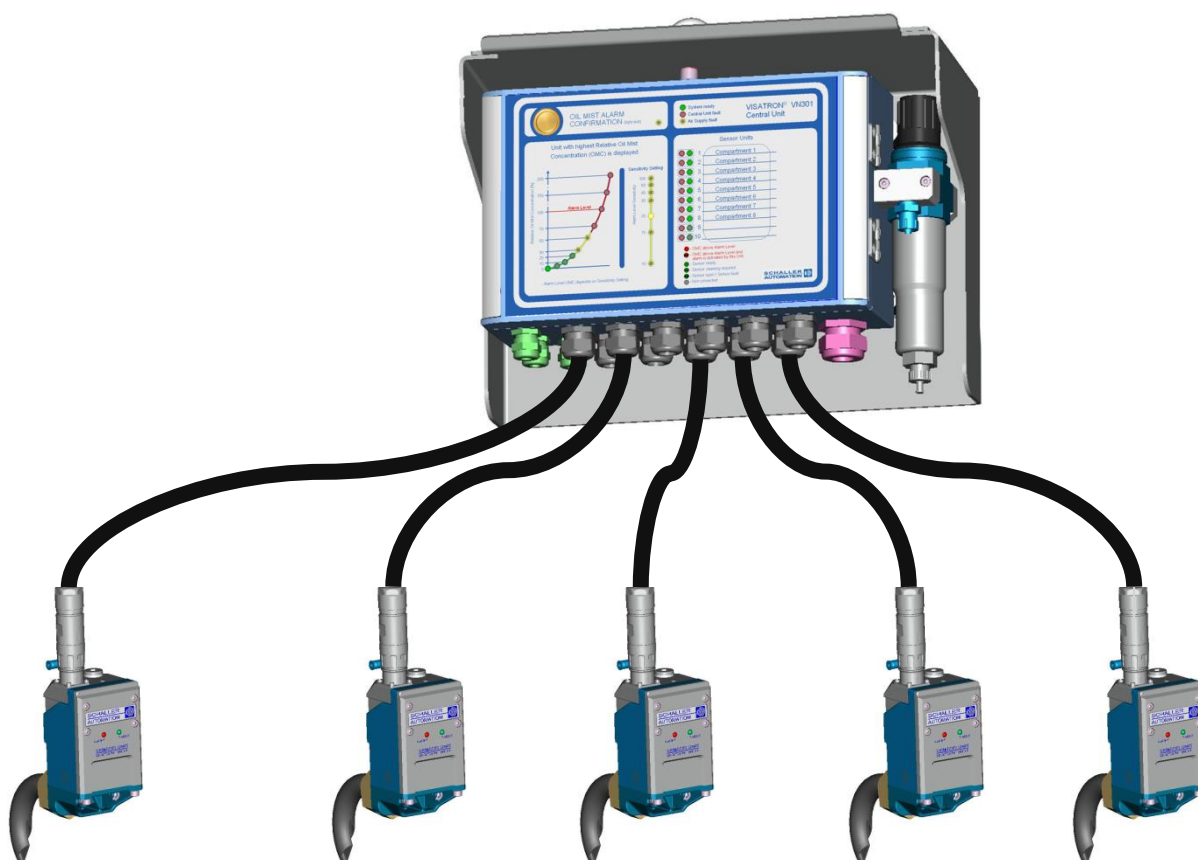


Operation Manual

Version 1.2

Visatron® VN301^{plus}/VN301^{plus}EX

IACS UR M67/M10 type approved



EC Declaration of Conformity

We, the manufacturer

SCHALLER AUTOMATION
Industrielle Automationstechnik GmbH & Co. KG
Industriering 14
D-66440 Blieskastel
Germany
Tel.: 06842 / 508-0
Fax: 06842 / 508-260

declare on our own responsibility, that the product:

Kind of equipment: **Oil Mist Detector**

Type-designation: **VISATRON® VN301plus**

to which this declaration relates exclusively used for the detection and signaling of oil mist in diesel aggregates and complies with the following EG-directives

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

is in compliance with following standards:

EN ISO 4414: 2010
EN 60529: 1989+ A1: 1999
EN 55022: 2010
EN ISO 12100: 2010
CSPRI 16-1
CSPRI 16-2
CSPRI 16-4
IACS UR M10
IACS UR M67

EN 61000-part 6-1: 2007
EN 61000-part 6-2: 2005
EN 61000-part 6-3: 2007+ A1: 2011
EN 61000-part 6-4: 2007+ A1: 2011

A technical documentation is completely available. The operating manual according to the oil mist detectors is available in the original version.

D-66440 Blieskastel, 2013/11/05



Stephan Schaller
- Managing Director -



EC Declaration of Conformity

We, the manufacturer

SCHALLER AUTOMATION
Industrielle Automationstechnik GmbH & Co. KG
Industriering 14
D-66440 Blieskastel
Germany
Tel.: 06842 / 508-0
Fax: 06842 / 508-260

declare on our own responsibility, that the product:

Kind of equipment: **Oil Mist Detector**

Type-designation: **VISATRON® VN301plus EX**

Marking: **CE0637  II (2G) [Ex op is IIB Gb] T4**

to which this declaration relates exclusively used for the detection and signaling of oil mist in diesel aggregates and complies with the following EG-directives

Machinery directive 2006/42/EC
EMC directive 2004/108/EC
ATEX Equipment Directive 1994/9/EC

is in compliance with following standards:

EN ISO 4414: 2010
EN 60529: 1989+A1: 1999
EN 55022: 2010
EN ISO 12100: 2010
CSPRI 16-1
CSPRI 16-2
CSPRI 16-4
IACS UR M10
IACS UR M67

EN 61000-part 6-1: 2007
EN 61000-part 6-2: 2005
EN 61000-part 6-3: 2007+A1: 2011
EN 61000-part 6-4: 2007+A1: 2011
EN 60079-0: 2012
EN 60079-28: 2007

A technical documentation, including EC- type examination, is completely available. The EC certificate BVS 11 ATEX E 175 was passed at DEKRA EXAM GmbH, D 44809 Bochum. The operating manual according to the oil mist detectors is available in the original version.

D-66440 Blieskastel, 2013/11/05



Stephan Schaller
- Managing Director -






Table of Contents

1	Safety instructions.....	5
2	About this Manual.....	5
3	Terms and conditions of sale	6
4	Oil Mist Alarm Confirmation	7
5	Functional overview	7
6	Installation instructions	10
6.1	Number and position of suction points	10
6.2	Mechanical installation.....	12
6.2.1	Sensor Unit mechanical installation.....	12
6.3	Electrical installation	13
6.3.1	Sensor Unit electrical installation.....	14
6.3.2	Central Unit electrical installation	14
6.3.3	Monitoring device electrical installation (Remote Indicator II).....	24
7	Parameter setting, VISATRON® VN301^{plus} /VN301^{plus}EX Central Unit.....	24
8	Operation instructions	25
8.1	VN301 ^{plus} EX Sensor Unit, operation in accordance with regulations	25
8.2	Normal operation	26
8.3	Light test.....	27
8.4	Sensor OMC- and sensitivity check, Supply pressure check	28
8.5	Oil Mist Pre- Alarm.....	30
8.6	Oil Mist Alarm.....	31
8.7	Oil Mist Alarm Confirmation	32
8.8	Failure behaviour	33
8.9	Failure readout, Service PC	34
8.9.1	Sensor defect	34
9	Maintenance	35
9.1	Cleaning the section of measurement	35
9.2	Maintenance procedures.....	36
9.3	Spare parts	36
9.4	Sensor mist test	37
10	Technical data	38
11	Service Partners.....	42



1 Safety instructions

The VISATRON® VN301PLUS/VN301^{plus}EX system is manufactured according to the high quality standards of SCHALLER AUTOMATION and must pass stringent factory tests. In order to keep the device in a problem free operation, the user has to take note of the warning and danger information. In the operation manual they are marked with the following symbols.

Used symbols	
	Danger! Personnel safety can be endangered or the device can be damaged if information is neglected.
	WARNING! Important information, not to be neglected.
	Information is relevant for the explosion protection of the system VN301 ^{plus} EX

In addition VN301^{plus}EX is designed as an explosion protected system (free of ignition sources) to be used with “dual fuel” engines, where during the use of LNG as a fuel a potentially explosive gas atmosphere may occur inside the engine enclosure.

2 About this Manual

This operation manual was designed to answer your questions concerning the handling, operation and maintenance of the Oil Mist Detector (OMD) VISATRON® VN301^{plus}.



- CAUTION! Unplug the VN301^{plus} Central Unit from power during welding processes on the engine (the system will be damaged)



- Incorrect maintenance and operation errors can cause unsafe operation and system failure



- During engine operation the Sensor Unit has to be connected to the base plate. Otherwise explosive atmosphere may emit from the engine causing an explosion hazard.



- During engine operation the Sensor Unit base plate has to be connected to the suction manifold. Otherwise explosive atmosphere may emit from the engine causing an explosion hazard.



- During engine operation the Sensor Unit suction manifold has to be connected to the engine wall. Otherwise explosive atmosphere may emit from the engine causing an explosion hazard.



- During engine operation the cable connector of the Sensor Unit has to be connected to the sensor. Otherwise explosive atmosphere may emit from the engine causing an explosion hazard.
- To perform a Sensor Unit mist test during engine operation the mist





inlet screw has to be opened. Keep the opening time as short as possible, explosive atmosphere may emit causing an explosion hazard.



- Please read this manual thoroughly and acquaint yourself with the correct installation, operation and maintenance of your VISATRON® VN301^{plus} /VN301^{plus}EX system.



- Safety and reliability of OMD VN301^{plus} /VN301^{plus}EX system is ensured by operation in accordance with this manual



- Installations of the VISATRON® VN301^{plus} /VN301^{plus}EX system have to be in accordance to the IACS UR M10 if applicable.



- Use the VISATRON® VN301^{plus} system only for the purpose described in the operation manual.



- The maintenance of the VISATRON® VN301^{plus} system is reserved to authorised staff.



- This operation manual must be available at the place of installation at all times.

Should you encounter any interruption or breakdown of your VISATRON® VN301^{plus} system please contact:

- your local representative, refer to chapter 0, Service Partners
- www.schaller.de
- Schaller Automation, Industrielle Automationstechnik GmbH & Co. KG
Industriering 14
66440 Blieskastel
Germany

3 Terms and conditions of sale

The standard terms and conditions of sale of SCHALLER AUTOMATION shall apply to all VISATRON® and related products.

SCHALLER AUTOMATION Industrielle Automationstechnik GmbH & Co. KG warrants that under proper use, handling and maintenance OMD VISATRON® VN301^{plus} /VN301^{plus}EX system is free from defects in material, design and/or workmanship. Claims of buyers/operators, in particular compensation for damage, which does not arise at OMD VISATRON® VN301^{plus} /VN301^{plus}EX System itself or for natural wear and tear of consumable supplies, e.g. filters etc., are excluded. SCHALLER AUTOMATION Industrielle Automationstechnik GmbH & Co. KG is not responsible for defects which arise as a result of:



- natural wear and tear, improper commissioning, improper use/handling, use of unsuitable power supply, welding processes on the engine as well as non-observance of commissioning, installation, operating and service instructions as given in this Operation Manual
- components and design other than the OMD VISATRON® VN301^{plus} /VN301^{plus}EX System
- alterations or modifications of the OMD VISATRON® VN301^{plus} /VN301^{plus}EX System carried out by the buyer/operator or third parties without written authorization of SCHALLER AUTOMATION Industrielle Automationstechnik GmbH & Co. KG
- incorrect combination of devices and/or components or operation of devices and/or components which are not certified to be compatible or not permitted by the manufacturer - SCHALLER AUTOMATION Industrielle Automationstechnik GmbH & Co. KG

4 Oil Mist Alarm Confirmation



Danger of life in engine zone due to possible explosion, indicated by Oil Mist Alarm of VISATRON® VN301^{plus}/VN301^{plus}EX system

Ensure that the oil mist concentration has fallen under the Alarm Level before confirming oil mist alarm by pressing the Oil-Mist Alarm Confirmation pushbutton on VISATRON® VN301^{plus} Central Unit.

Use the monitoring device Remote Indicator II (which must be installed at a safe location, e.g. ECR) to check for the actual oil mist alarm concentration.

Schaller Automation strongly recommends to approach the engine only if:

- Relative Oil Mist Concentration is equal or below 50%, for VN301^{plus} Central Unit
- not more than five lamps burning (LED chain) at bar indicator of Remote Indicator II

Follow the instructions of engine builder, ship yard and ship owner!

5 Functional overview

The Oil Mist Detector (OMD) VISATRON® VN301^{plus} /VN301^{plus}EX System from SCHALLER AUTOMATION protect large diesel engines against oil mist explosion, caused by spontaneously occurring oil mist. It is part of a safety system that secures the life and health of the operating staff and prevents heavy damages to the engine.

SCHALLER AUTOMATION developed this device to meet the IACS UR M10.



It is not possible to directly monitor all potential sources of oil mist inside a large diesel engine. There are main bearings, large end bearings, pistons, liners, sliders, pumps, camshaft bearings, chains, gears or even tools left behind from installation – all of these parts could produce oil mist e.g. in case of lubrication problems. Therefore the philosophy is to use the SCHALLER AUTOMATION OMD-system detecting the primary origin of the danger, the oil mist itself, to prevent the engine securely from oil mist explosions.

The VISATRON® VN301^{plus} / VN301^{plus}EX System consist of following parts:

- 1 to 2 VISATRON® VN301^{plus} Central Units including compressed air supply system and protection cover
- 1 to 20 VISATRON® VN301^{plus} Sensor Units
- Ready made hybrid cables (electric and air supply)
- Monitoring device Remote Indicator II (optional)

Four different Sensor Units are available (Figure 1):

- VN301^{plus} Sensor Unit, vertical connection
- VN301^{plus} Sensor Unit, horizontal connection
- VN301^{plus}EX Sensor Unit, vertical connection
- VN301^{plus}EX Sensor Unit, horizontal connection



VN301^{plus} Sensor Unit,
vertical connection



VN301^{plus} Sensor Unit,
horizontal connection



VN301^{plus}EX Sensor Unit,
vertical connection



VN301^{plus}EX Sensor Unit,
horizontal connection

Figure 1: VISATRON® VN301^{plus} / VN301^{plus}EX Sensor Unit.

Each VISATRON® VN301^{plus} /VN301^{plus}EX Sensor Unit is equipped with the approved wear-free suction system to continuously extract the atmosphere of the crankcase compartments or other engine locations, resulting in faster reaction time compared to systems without active suction (only waiting for oil mist clouds).

To avoid false alarms each VISATRON® VN301^{plus} /VN301^{plus}EX Sensor Unit is equipped with:

- sealing air (from the compressed air system) to protect the optical elements of the section of measurement against splash oil and contamination
- integrated heater to protect against condensing water vapour

The connections of the VISATRON® VN301^{plus} /VN301^{plus} Central Unit (Figure 2) are:

- 4-12bar compressed air input (Air Quality: ISO8473-1:2010 – “6-4-4”)
- 18-31V DC Power input
- up to 10 VISATRON® VN301^{plus} /VN301^{plus}EX Sensor Units
- connection to the engine safety system with signals:
 - Ready
 - Pre-Alarm
 - Alarm
- RS485 interface for Remote Indicator II
- CAN interface for a second VISATRON® VN301^{plus} Central Unit (resulting in up to 20 sensors for one engine)
- CAN open interface for automation system (computer)



Figure 2: VISATRON® VN301^{plus} Central Unit



The VISATRON® VN301^{plus} /VN301^{plus}EX System should be connected to the monitoring devices Remote Indicator II (Figure 3) to **monitor** the oil mist concentration and the status of the VISATRON® VN301^{plus} /VN301^{plus}EX System **from a safe location as requested by IACS UR M10**





Figure 3: Remote Indicator II for VISATRON® VN301^{plus} / VN301^{plus}EX System.

Oil Mist Sensitivity

The detector determines the oil mist concentration by an optical measurement. The calculated values have the unit 'opacity'. 100% opacity means that no light is transmitted through the oil mist sample. This is equivalent to a complete white wall.

The IACS UR 67 requires an oil mist alarm at 5% of the Lower Explosion Level (LEL). The LEL is equal to 47mg/l oil mist concentration in air at a temperature of 25 °C, which means that the OMD is required to indicate an oil mist alarm at approx. 2.5mg/l.

The setting of the sensitivity for each sensor is done via a USB Connection with the central unit. This procedure is described in Chapter 7

Sensitivity setting	Alarm oil mist concentration [mg / l]
1	0.75
2	0.9
3	1.1
4	1.2
5	1.3
6	1.5
7	2.0

6 Installation instructions

6.1 Number and position of suction points

There are multiple sources for oil mist generation due to defects, for example:

- main bearings,
- connecting rod bearings,
- piston seizures,



- chains,
- pump cover.

For each of these individual sources the "optimum" suction point could be determined. To find out a safe and economic solution to monitor oil mist SCHALLER AUTOMATION recommends the OMDEA-test (Oil Mist Detection Efficiency Approval).



SCHALLER AUTOMATION recommends a final OMDEA (Oil Mist Detection Efficiency Approval) test per engine type

Recommended number of suction points:



- one suction point per compartment



- one suction point per chain drive



- minimal one suction point per supply unit



- one suction point per gear drive



- additional suction point at the camshaft bed

Rules for definition of suction point position:



- Avoid the position of the splash oil disk of the crankshaft bearings



- Select points in the upper area of the crankcase, as oil mist tends to rise upwards



- Sensor Unit should be mounted on the engine side opposite to the crankcase relief valves, to reduce danger to the crew during an Oil Mist Alarm situation

According to the IACS unified requirement M10 the installation drawings have to be approved from engine builder and SCHALLER AUTOMATION. The installations have to be executed in compliance with these drawings and the contents of this manual.





6.2 Mechanical installation

6.2.1 Sensor Unit mechanical installation

The Sensor Unit base plate has to be fitted to the engine wall in vertical direction (**Figure 4**). The allowed installation tolerance is +/- 3 degree deviation from vertical orientation.

To mount the Sensor Unit screw the engine wall connection with a 30mm wrench into the threat of the engine wall and align it vertically. Then secure the connection with the big hexagonal nut using a 46mm wrench and a torque of 110Nm.

The Sensor Unit is then fixed via the base plate with 2 screws to the engine wall connection.

DANGER	<ul style="list-style-type: none"> Make sure that suction manifold do not interfere with rotating or moving parts of the engine
	<ul style="list-style-type: none"> It has to be ensured that the suction position is beside areas of direct splash oil e.g. produced by the bearings or cooling oil returning from piston.
	<ul style="list-style-type: none"> Do not open the Sensor (by removing the 4 base plate screws) during engine operation. Explosive atmosphere may emit from the engine causing an explosion hazard.

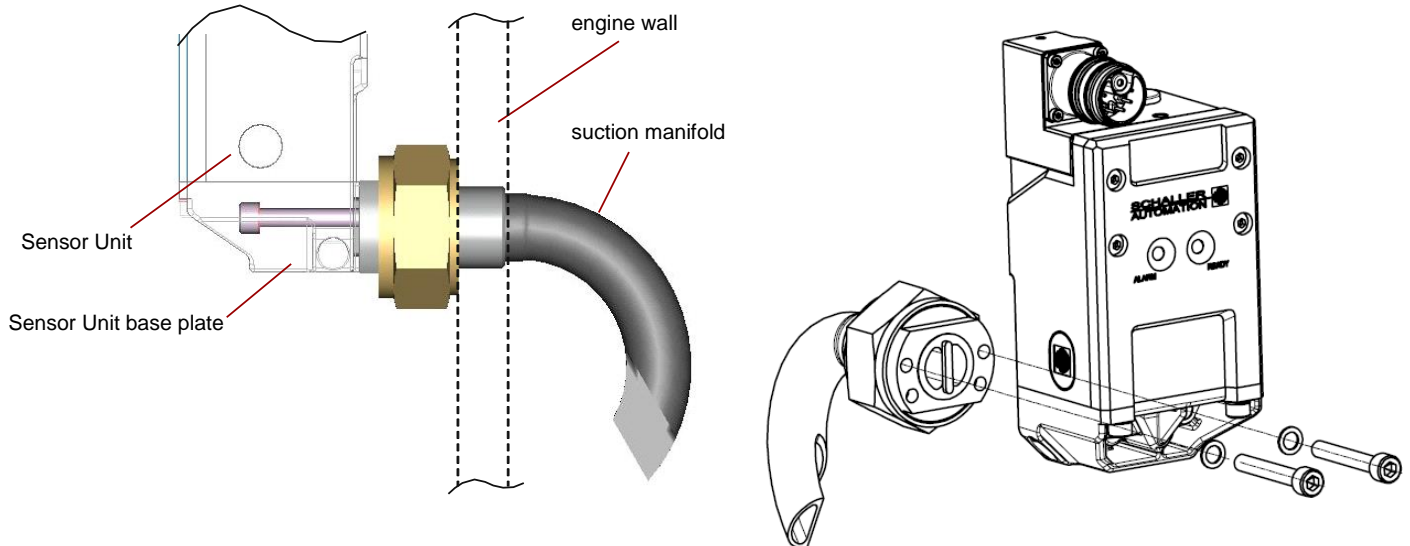


Figure 4: VISATRON® VN301^{plus} / VN301^{plus}EX Suction system with suction manifold and base plate for sensor unit.

6.3 Electrical installation

An overview of the complete electrical installation is shown in **Figure 5**.

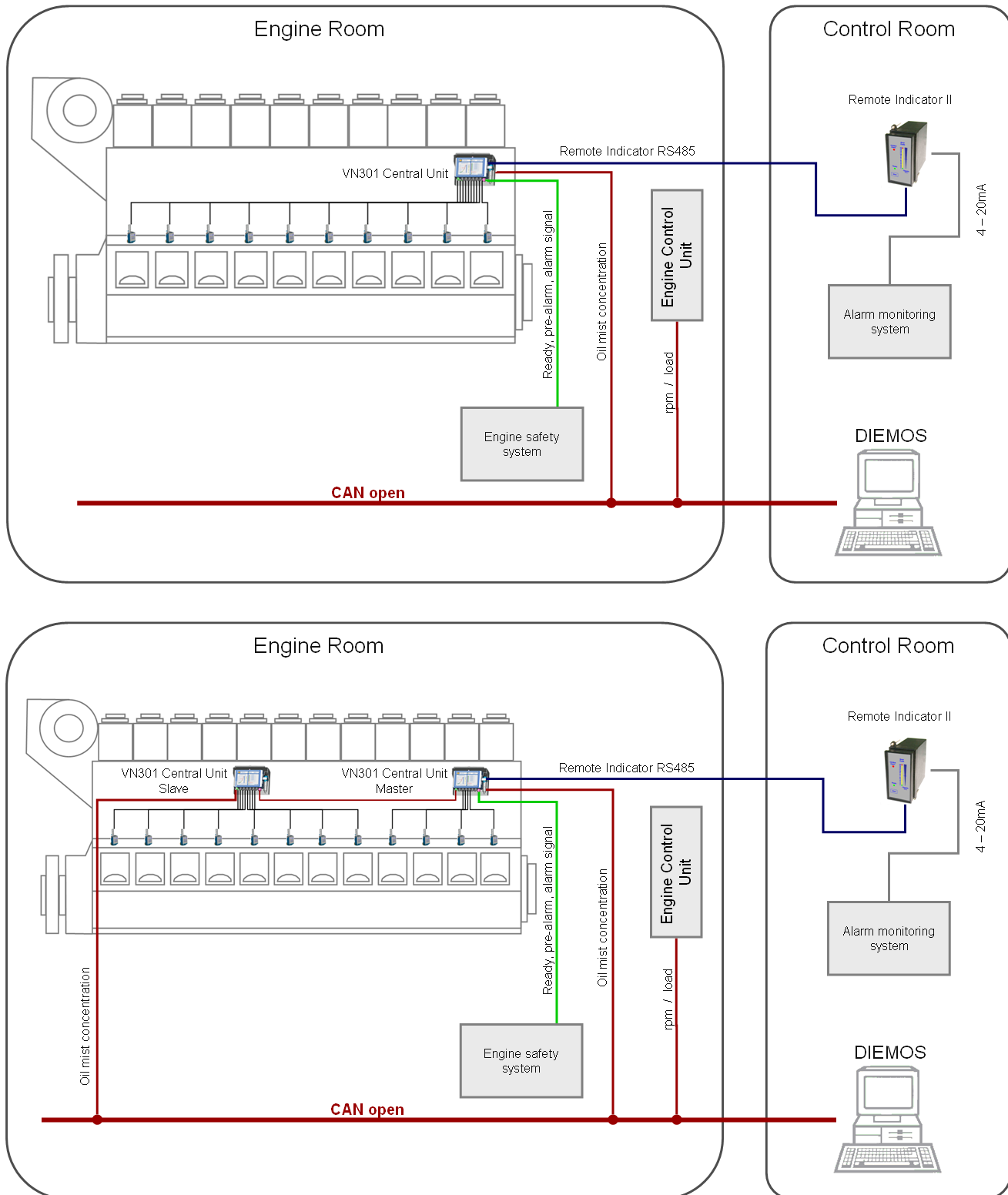


Figure 5: VISATRON® VN301^{plus} / VN301^{plus}EX electrical system installation overview.

6.3.1 Sensor Unit electrical installation

The only connection with the Sensor Unit is done by a hybrid plug.

This connector contains 6 electrical pins and one pneumatic connection in one housing (**Figure 6**).



- During engine operation the cable connector of the Sensor Unit has to be connected to the sensor. Otherwise explosive atmosphere may emit from the engine causing an explosion hazard.



Figure 6: Electrical connector of VN301^{plus} /VN301^{plus}EX Sensor Unit

6.3.2 Central Unit electrical installation

The electrical terminals are inside the Central Unit (**Figure 8**) on the base printed circuit board. The pin assignment is specified in Figure 12 and also listed on the inner side of the top cover. The assignment is also printed directly to the circuit board.

The two wire break resistors are located underneath the ribbon cable, connecting the lower with the upper circuit board. For replacing these resistors, remove the mentioned ribbon cable and the black bracket, which holds the resistors in place.

Do not forget to write the resistor value on the top cover with a permanent marker.

The wire break resistors are connected between COM and NO of each Alarm relay.



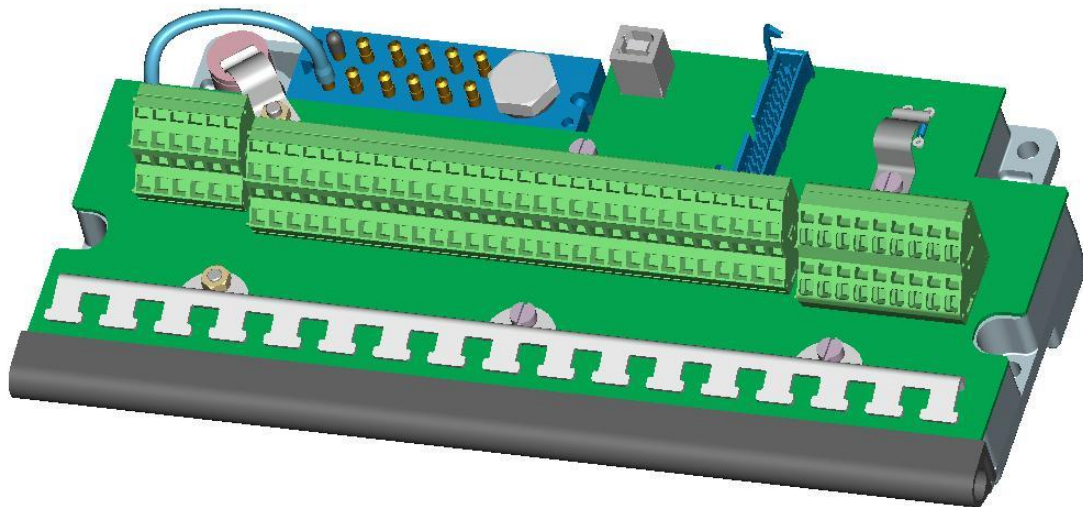


Figure 7: VISATRON® VN301^{plus} /VN301^{plus}EX Central Unit electrical wiring.

According to the pin assignment connect the device to the 24 Volts power supply. The supply voltage can be potential free or not. The earth connection between the OMD and the engine is carried out via the mechanical connection of the protection cover with the engine. There is no separate earth connection necessary.

Additionally connect one alarm relay output to the safety system of the engine. As specified by the classification societies the 'Alarm' relay (Suffix 1) must be connected either to the shutdown or to the slow-down input.

The second 'Alarm' output (Suffix 2) must be connected to separate channels on the alarm monitoring system of the vessel or power plant.

During normal operation the alarm relay is switched off (COM and NC connected). In case of an oil mist alarm the relay is switched on, which leads to COM and NO connected.

The optional pre-alarm output can be used to initiate either a pre-warning signal or slow-down signal. The pre-alarm relay is switched on when the oil mist concentration has risen up to 70% of the alarm level. Depending on the characteristics of an oil mist occurrence the time between 'Pre-alarm' and 'Alarm' could be only a fraction of a second.

The six electrical wires from each Sensor Unit are connected with the middle terminal block. Therefore connect the coloured wires with the matching terminal block. The shielding of each sensor cable has to be connected to the cable gland.

The plastic hose which is inside each Sensor cable is pushed over the pins of the pneumatic distribution rack located on the upper left of the Central Unit. Spare pins have to be sealed with covers.

Figures 9 to 15 show the electrical connections for 4 to 10 Sensor Units installed.

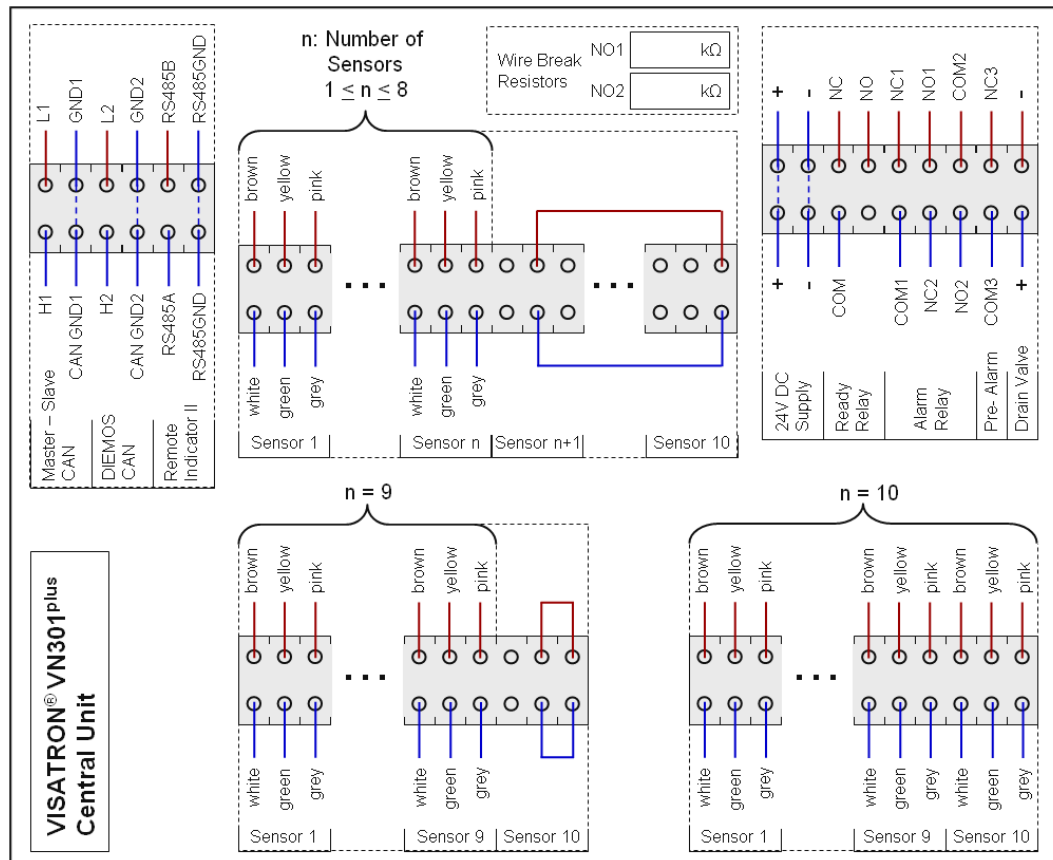


Figure 8: VISATRON® VN301^{plus} / VN301^{plus}EX Central Unit electrical wiring. Wire Break Resistors

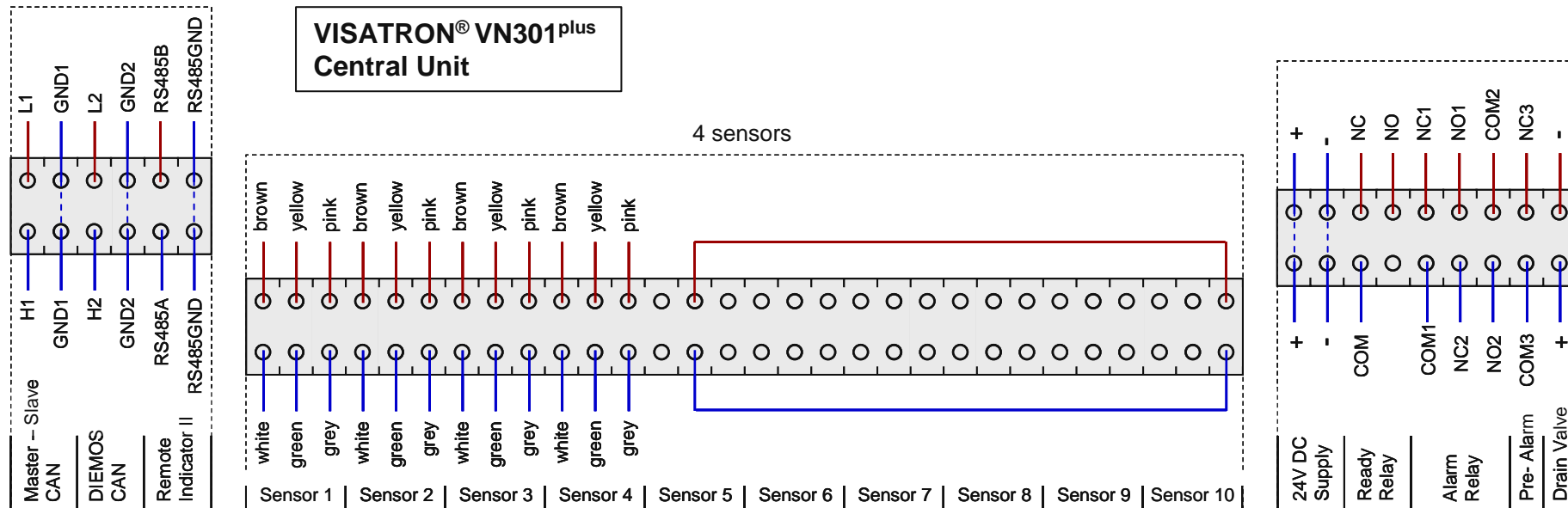


Figure 9: VISATRON® VN301^{plus} / VN301^{plus}EX Central Unit electrical wiring for four sensors.



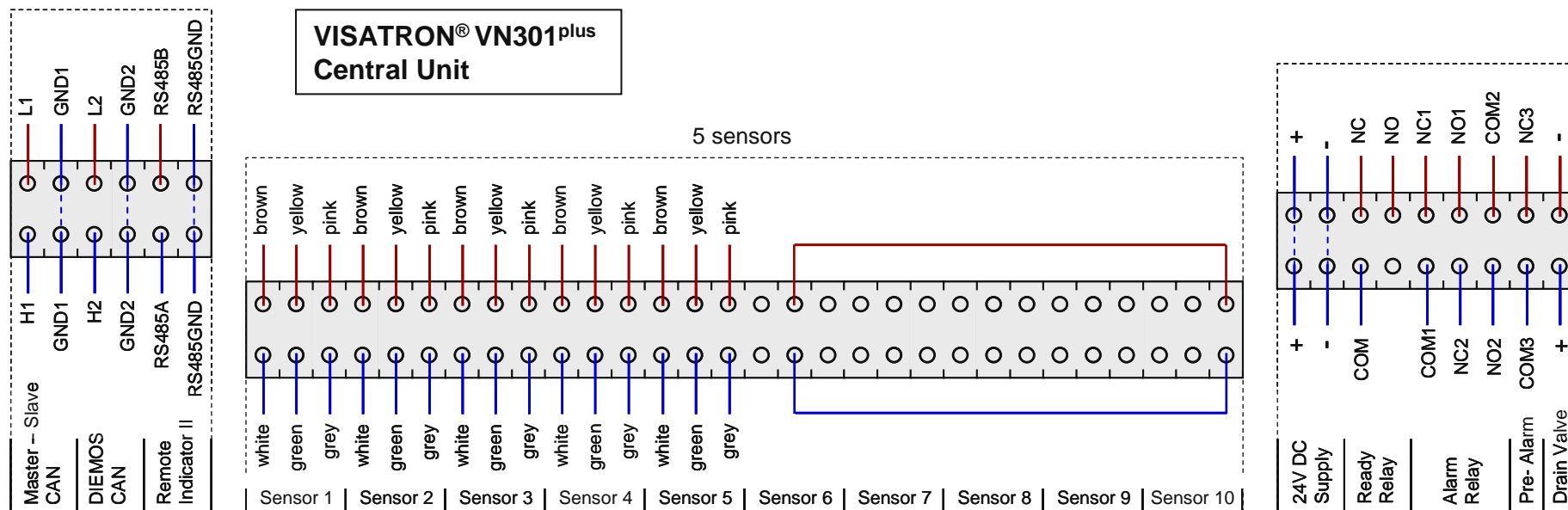


Figure 10: VISATRON® VN301^{plus} / VN301^{plus}EX Central Unit electrical wiring for five sensors.



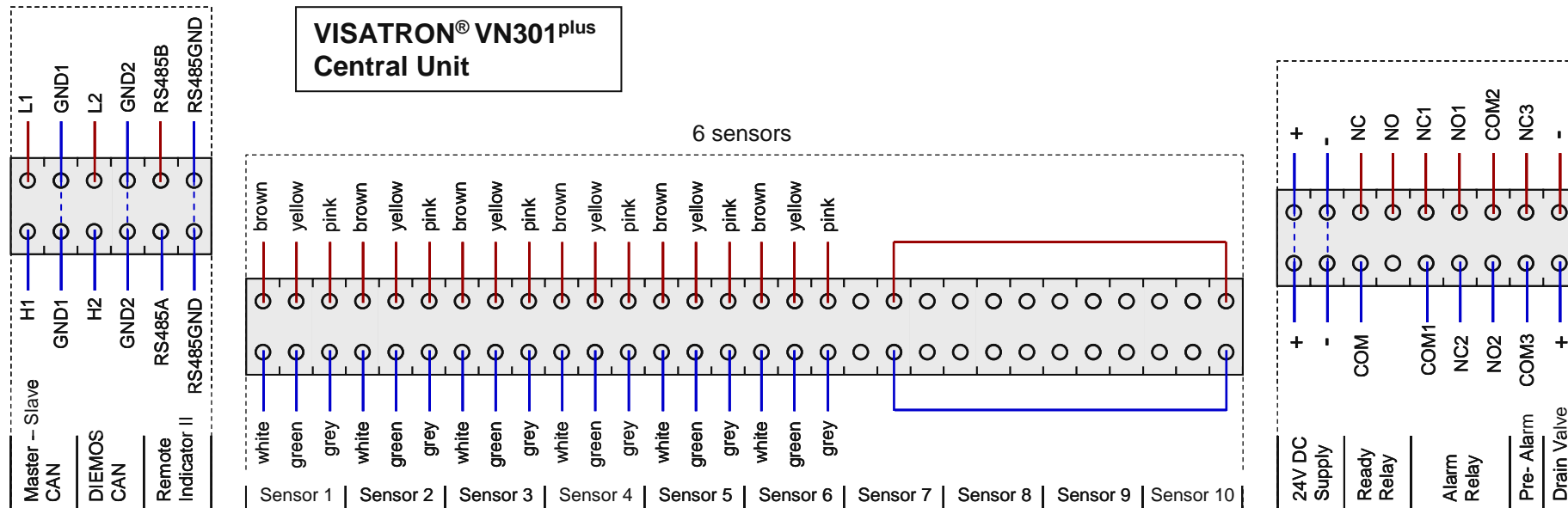


Figure 11: VISATRON® VN301^{plus} / VN301^{plus}EX Central Unit electrical wiring for six sensors.



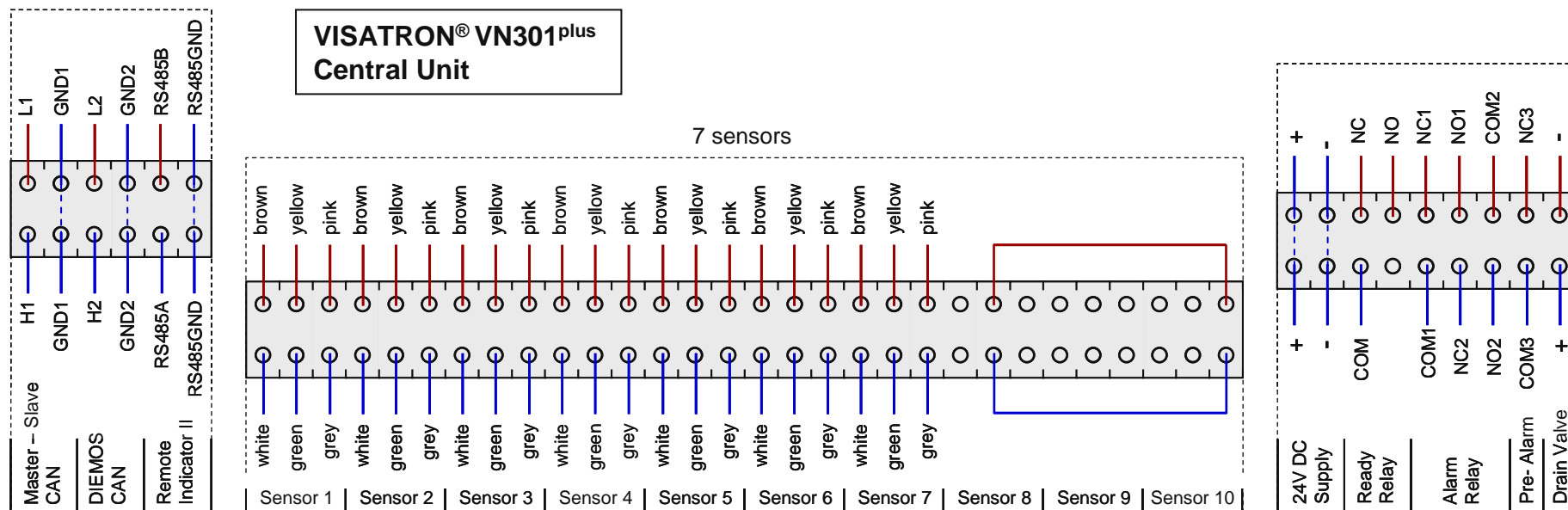


Figure 12: VISATRON® VN301^{plus} /VN301^{plus}EX Central Unit electrical wiring for seven sensors.



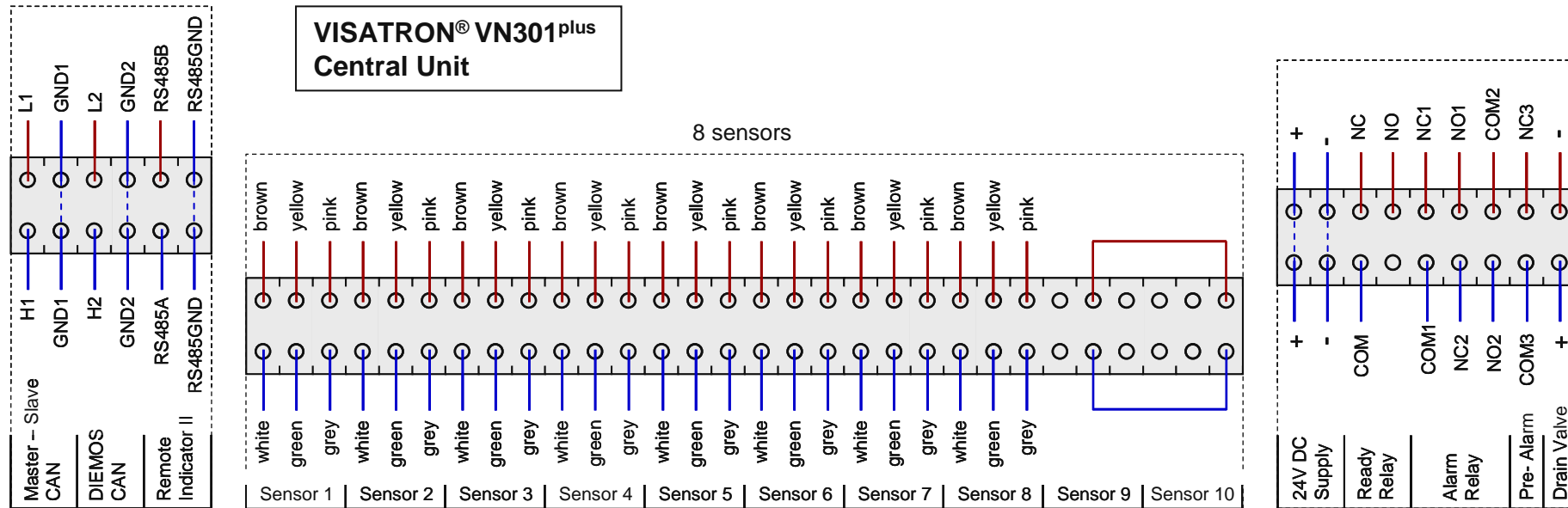


Figure 13: VISATRON® VN301^{plus} / VN301^{plus}EX Central Unit electrical wiring for eight sensors.



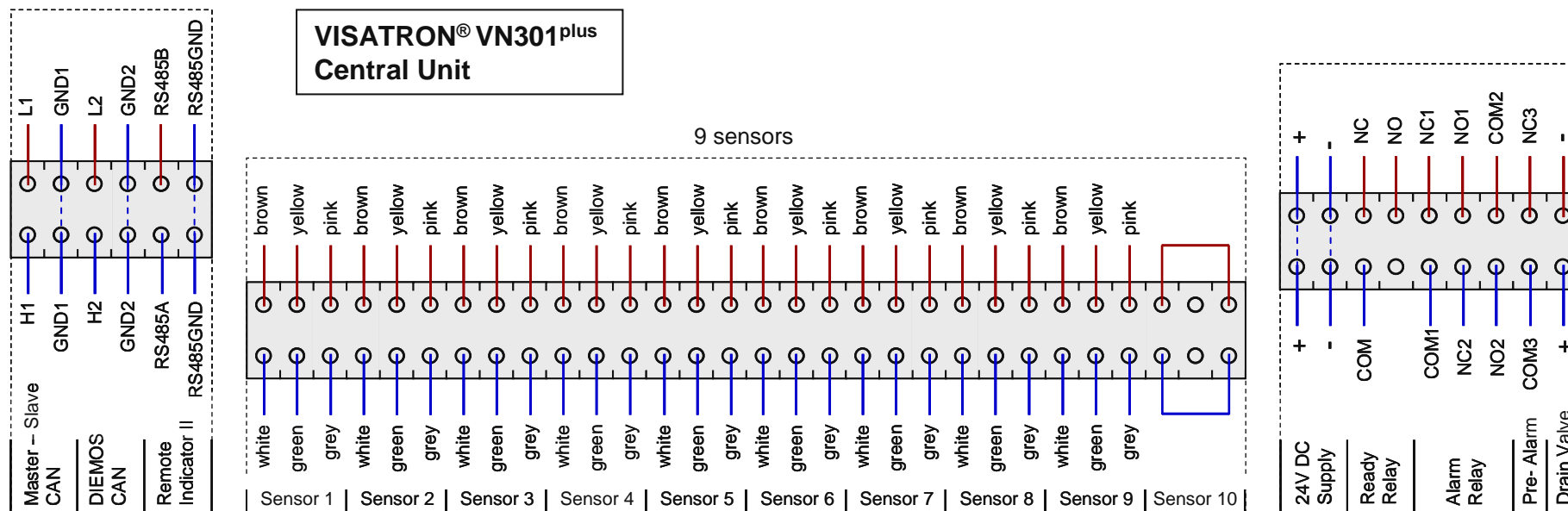


Figure 14: VISATRON® VN301^{plus} / VN301^{plus}EX Central Unit electrical wiring for nine sensors.





6.3.3 Monitoring device electrical installation (Remote Indicator II)

The VISATRON® VN301^{plus} /VN301^{plus}EX System can be connected to the Remote Indicator II to monitor the oil mist concentration and the system status from a safe location, as required by IACS UR M10

The electrical connection to the Remote Indicator II is the three-wire bus RS485. A shielded twisted pair cable must be used, for example LAPPKABEL UNITRONIC-FD CP (TP) plus UL-CSA, AWG20. The total bus length is limited to 400 m.

The cable entry for connecting the Remote Indicator II to the VISATRON® VN301^{plus} /VN301^{plus}EX Central Unit is designed for a cable diameter from 4.5 to 10.0 mm (M16 x 1.5)



- The shield must be electrically connected with the cable gland (Figure 16)

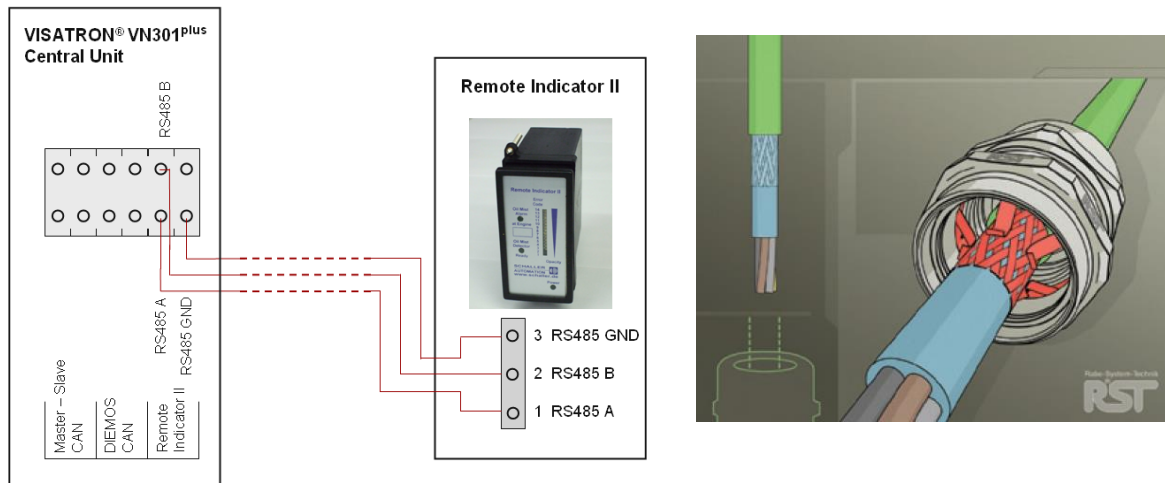


Figure 16: VISATRON® VN301^{plus} /VN301^{plus}EX. Electrical connection of Remote Indicator II with shield and cable gland.

7 Parameter setting, VISATRON® VN301^{plus} /VN301^{plus}EX Central Unit

The Service PC has to be connected by USB-cable with the VISATRON® VN301^{plus} /VN301^{plus}EX Central Unit. The Central Unit has to be opened to get access to the USB-plug of the Connection Unit.

On the Service PC the VISATRON® VN301^{plus} /VN301^{plus}EX Service Software must be installed.

The Service Software allows the setting of the parameters listed in Table 1.



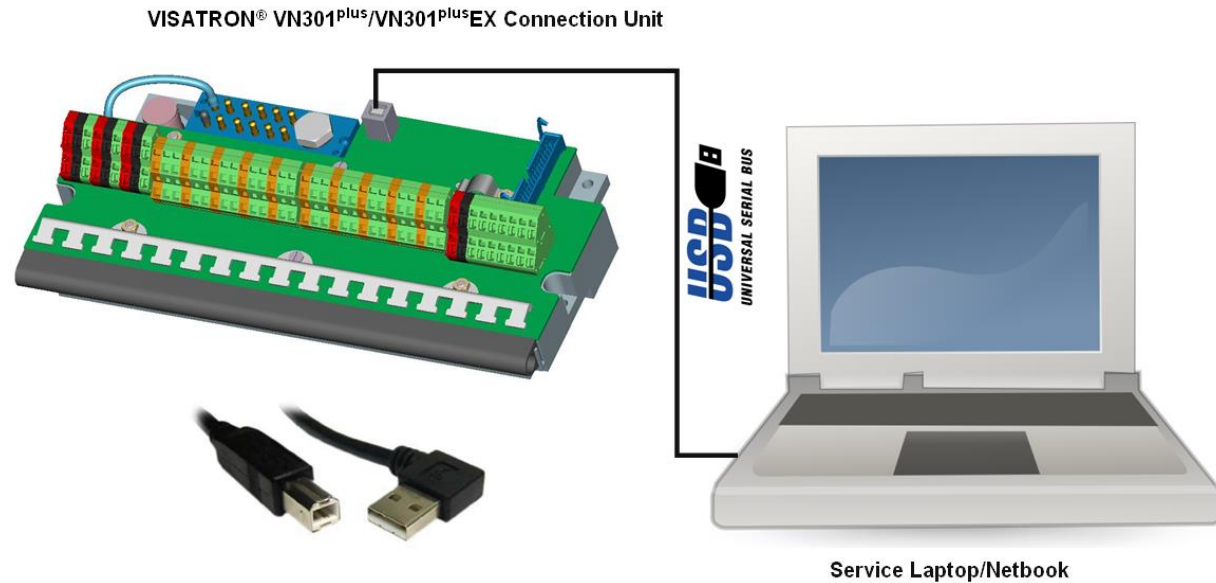


Figure 17: VISATRON® VN301^{plus} /VN301^{plus}EX Central Unit to Service PC connection.

Table 1: List of Parameters.

Engine Name / Type	0 to 64 characters
No. of VN301 ^{plus} Central Units	1 or 2
No. of Sensors for Central Unit 1	1 to 10
No. of Sensors for Central Unit 2	1 to 10
Oil Mist Alarm limit Value	
sensitivity setting 1	0.75 mg/l Oil Mist concentration
sensitivity setting 2	0.9 mg/l Oil Mist concentration
sensitivity setting 3	1.1 mg/l Oil Mist concentration
sensitivity setting 4	1.2 mg/l Oil Mist concentration
sensitivity setting 5	1.3 mg/l Oil Mist concentration
sensitivity setting 6	1.5 mg/l Oil Mist concentration
sensitivity setting 7	2.0 mg/l Oil Mist concentration
Date	jjjj.mm.dd
Time	hh.mm.ss

8 Operation instructions

8.1 VN301^{plus}EX Sensor Unit, operation in accordance with regulations

For the VN301EX (Ex) II -/2G Ex op is IIB T4 -/Gb) Sensor Unit the operation temperature is:

System operation Temperature: 5°C to 70°C.

For safe operation it must be ensured that no engine atmosphere emit into the machine room. Potential explosive engine atmosphere may cause an explosion hazard when emitting.



- During engine operation the Sensor Unit has to be connected to the base plate. Otherwise explosive atmosphere may emit from the engine causing an explosion hazard.



- During engine operation the Sensor Unit base plate has to be connected to the suction manifold. Otherwise explosive atmosphere may emit from the engine causing an explosion hazard.



- During engine operation the Sensor Unit suction manifold has to be connected to the engine wall. Otherwise explosive atmosphere can emit from the engine causing an explosion hazard.



- During engine operation the cable connector of the Sensor Unit has to be connected to the sensor. Otherwise explosive atmosphere may emit from the engine causing an explosion hazard.



- To perform a Sensor Unit mist test during engine operation the mist inlet screw has to be opened. Keep the opening time as short as possible, explosive atmosphere may emit causing an explosion hazard.

8.2 Normal operation

In

Figure 18 the display of the VISATRON® VN301^{plus} /VN301^{plus}EX Central Unit for this example in combination with 8 sensors is shown during normal operation.

The 8 sensors are installed at Compartment 1 to Compartment 8. The sensor operation (displayed at lower right) is indicated by the green lamp, the same is shown at the sensor itself (ready).

The VISATRON® VN301^{plus} /VN301^{plus}EX system is operating, displayed by the green “system ready” lamp at upper right.

The sensor sensitivity and the relative oil mist concentration of the sensor with the highest relative oil mist concentration are displayed at lower left.



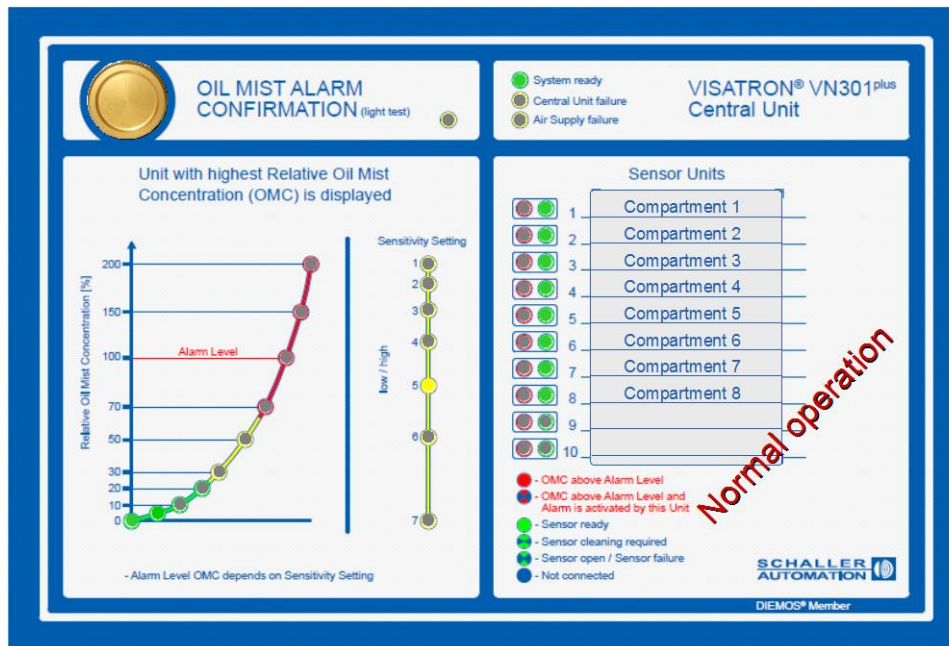


Figure 18: Display of the VISATRON® VN301^{plus} / VN301^{plus}EX during normal operation (no oil mist alarm, no failure)

8.3 Light test

When pushing the Oil Mist Alarm Confirmation button (located at upper left) during normal operation all lamps are lightened and blinking for 2 seconds for light test, than the previous situation is displayed again.

Light test can only be performed in the absence of an Oil mist Alarm!

During Oil mist Alarm this button confirms the Alarm.

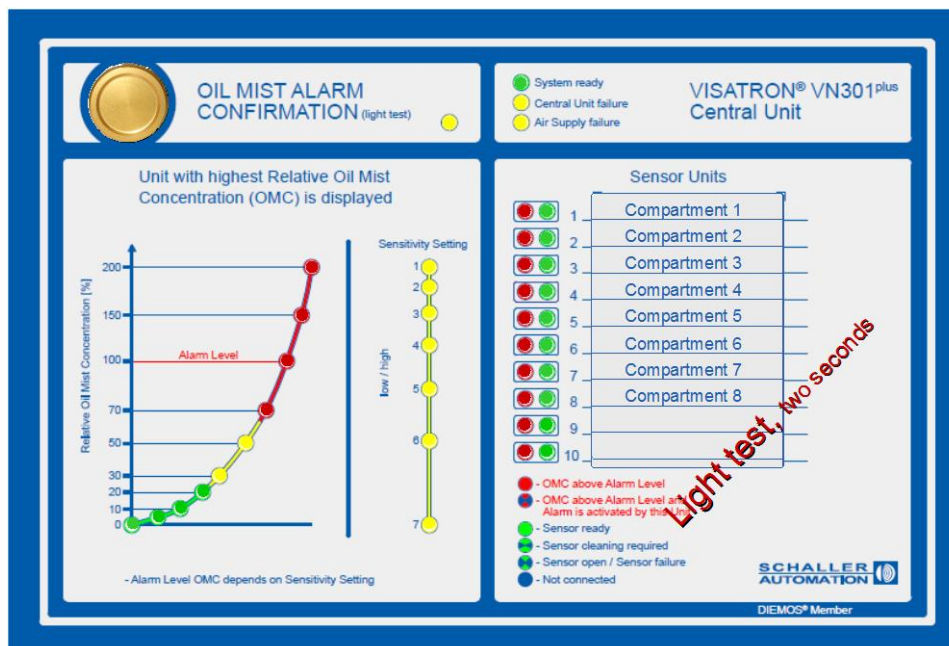


Figure 19: Display of the VISATRON® VN301^{plus} /VN301^{plus}EX System performing a light test. All lamps are lightened for 2 seconds after pushing the Oil Mist Alarm Confirmation button once.

8.4 Sensor OMC- and sensitivity check, Supply pressure check

To get into the Sensor OMC- and sensitivity check mode you have to push the Oil Mist Alarm Confirmation button twice. After the first push the light test is triggered, within the light test procedure, immediately push the button the second time, now the Sensor OMC- and sensitivity check mode is active. This mode is left automatically, if you do not push the Oil Mist Alarm Confirmation button for after 20 seconds.

If you enter the Sensor OMC- and sensitivity check mode all sensor ready lamps are switched off with one exception, the sensor with the highest relative oil mist concentration. For this sensor the relative oil mist concentration and the sensor sensitivity is displayed lower left on the Central Unit.

For example in Figure 20 the situation is shown for sensor 6 with 5% relative oil mist concentration and sensitivity setting 5.

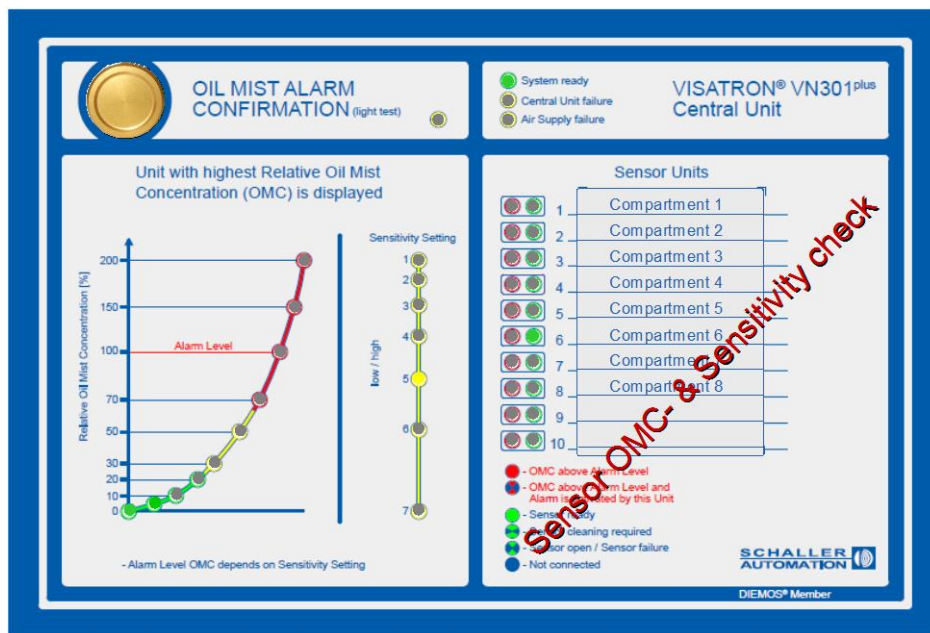


Figure 20: Display of the VISATRON® VN301^{plus} /VN301^{plus}EX System performing a Sensor OMC- and sensitivity check, pushing the Oil Mist Alarm Confirmation button twice.

Pushing the Oil Mist Alarm Confirmation button again, the next sensor is displayed. Repeating pushing the button within 20 seconds will scroll through the sensors connected.

After pushing again, the situation is shown for sensor 7 in Figure 21. This sensor has a deviating sensitivity 6 and an actual relative oil mist concentration of 0%.

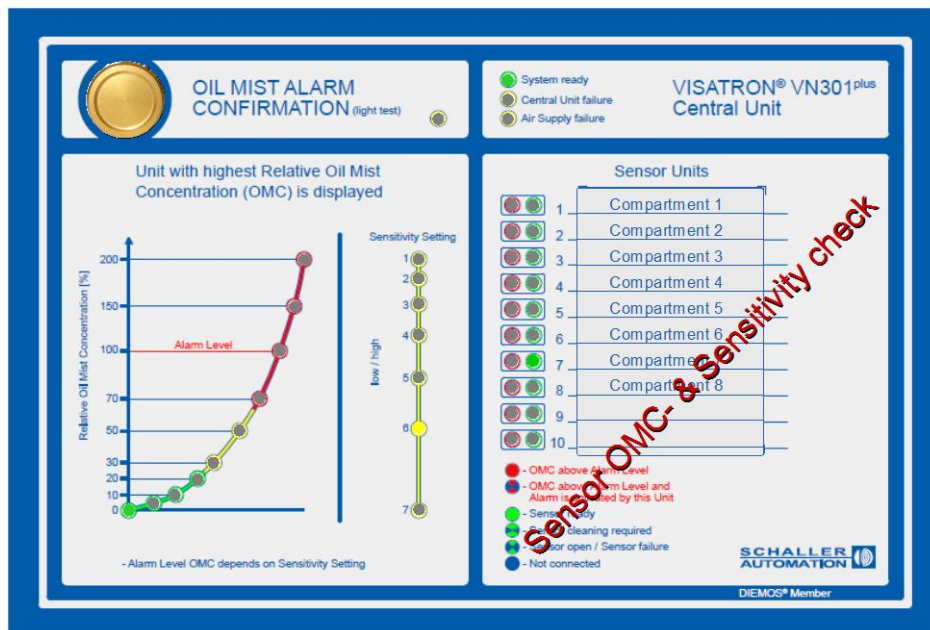


Figure 21: Display of the VISATRON® VN301^{plus} / VN301^{plus}EX System performing a Sensor OMC- and sensitivity check. The next sensor is displayed by pushing the Oil Mist Alarm Confirmation button within 20 seconds.

The actual supply pressure of the central unit is displayed “between” the last and the first installed sensor, in this example by pressing the Oil Mist Alarm Confirmation button once after the view of compartment eight.

The supply pressure display mode is indicated by the blinking of the Air Supply failure LED lamp. The actual level of the supply pressure is displayed by OMC graph on the left side. The nominal pressure, 2,5 bar, is indicated by the 50% OMC LED lamp. Each LED above or under the 50% OMC LED lamp indicates a deviation of approximately 0,25bar. The pressure regulator is located on the right side of the central unit. To adjust the supply pressure, first lift the blue adjustment knob of the pressure regulator. To increase the pressure, turn the blue dial counter wise and vice versa. After adjusting, the adjustment knob should be locked by pushing it down.

The example in Figure 20 shows the situation for an actual pressure of approximately 2 bar.

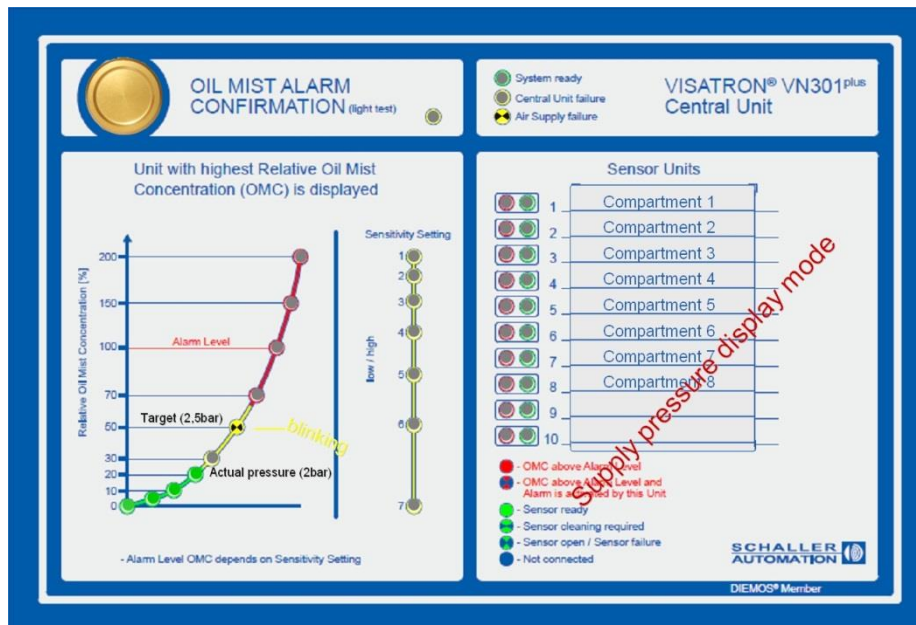


Figure 22: VISATRON® VN301^{plus} /VN301^{plus}EX System Supply pressure display mode

8.5 Oil Mist Pre- Alarm

In case of a high relative oil mist concentration of at least one sensor the LED bar (positioned lower left) will get lightened. At 70 % relative oil mist concentration the Pre Alarm relay is switched on. The 70% LED lamp is red blinking.

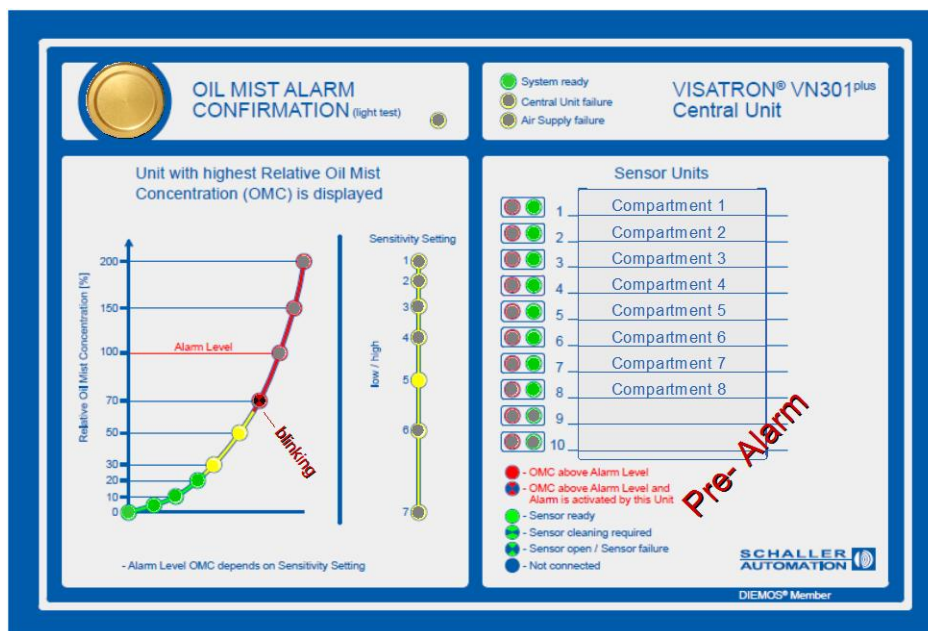


Figure 23: VISATRON® VN301^{plus} /VN301^{plus}EX System Pre- Alarm at 70% relative Oil Mist Concentration, blinking red light.

8.6 Oil Mist Alarm



Danger of life

Make sure that the oil mist concentration inside the engine has fallen under the Alarm level (<50% relative oil mist concentration) before approaching the engine.

Use the monitoring device Remote Indicator II (which must be installed at a safe location, e.g. ECR) to check for the actual oil mist alarm concentration.



The sensor who initially initiated the alarm is indicated by blinking red lamp (failure location)



Confirm the oil mist alarm by pressing the Oil-Mist Alarm Confirmation pushbutton on VISATRON® VN301^{plus} Central Unit.

In case of engine failure the relative oil mist concentration will rise over the alarm level.

The Alarm lamp will display the sensor by blinking red light which initially exceeded the alarm concentration level.

Subsequently further sensors might exceed the alarm concentration. These alarms are indicated by permanent red alarm light.

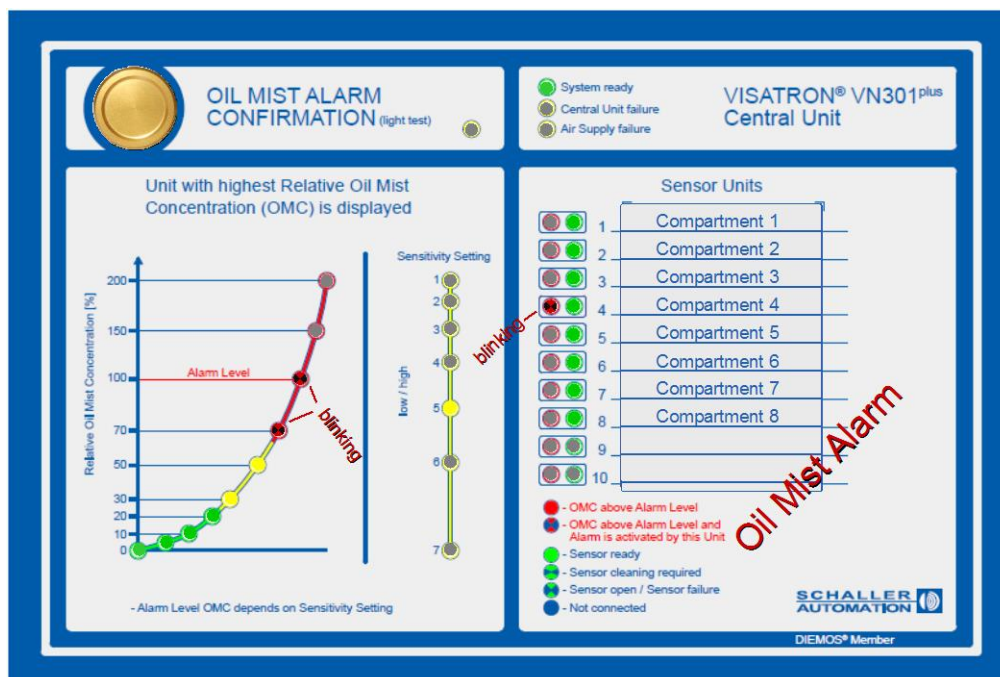





Figure 24: VISATRON® VN301^{plus} / VN301^{plus}EX Oil Mist Alarm. The alarm is initiated by sensor 4 (blinking red light).

For the example in



Figure 24 the alarm was initiated by sensor 4 (blinking red light), subsequently the sensors 3, 5 and 6 exceeded the alarm level, indicated by permanent light.

8.7 Oil Mist Alarm Confirmation

	<p>Danger of life</p> <p>Make sure that the oil mist concentration inside the engine has fallen under the Alarm level (<50% relative oil mist concentration) before approaching the engine.</p> <p>Use the monitoring device Remote Indicator II (which must be installed at a safe location, e.g. ECR) to check for the actual oil mist alarm concentration.</p>
	<p>The sensor who initially initiated the alarm is indicated by blinking red lamp (failure location)</p>
	<p>Confirm the oil mist alarm by pressing the Oil-Mist Alarm Confirmation pushbutton on VISATRON® VN301^{plus} Central Unit.</p>

Use the monitoring device Remote Indicator II (which must be installed at a safe location, e.g. ECR) to check for the actual oil mist alarm concentration. When the actual oil mist concentration inside the engine has fallen under the Alarm level (<50% relative oil mist concentration) you can approach the engine.

Confirm the oil mist alarm by pressing the Oil-Mist Alarm Confirmation button on VISATRON® VN301^{plus} Central Unit.

The situation with reduced oil mist concentration (50%) before and after Oil Mist Alarm Confirmation (push button) is shown in

Figure 25 for the example described in paragraph 8.6.

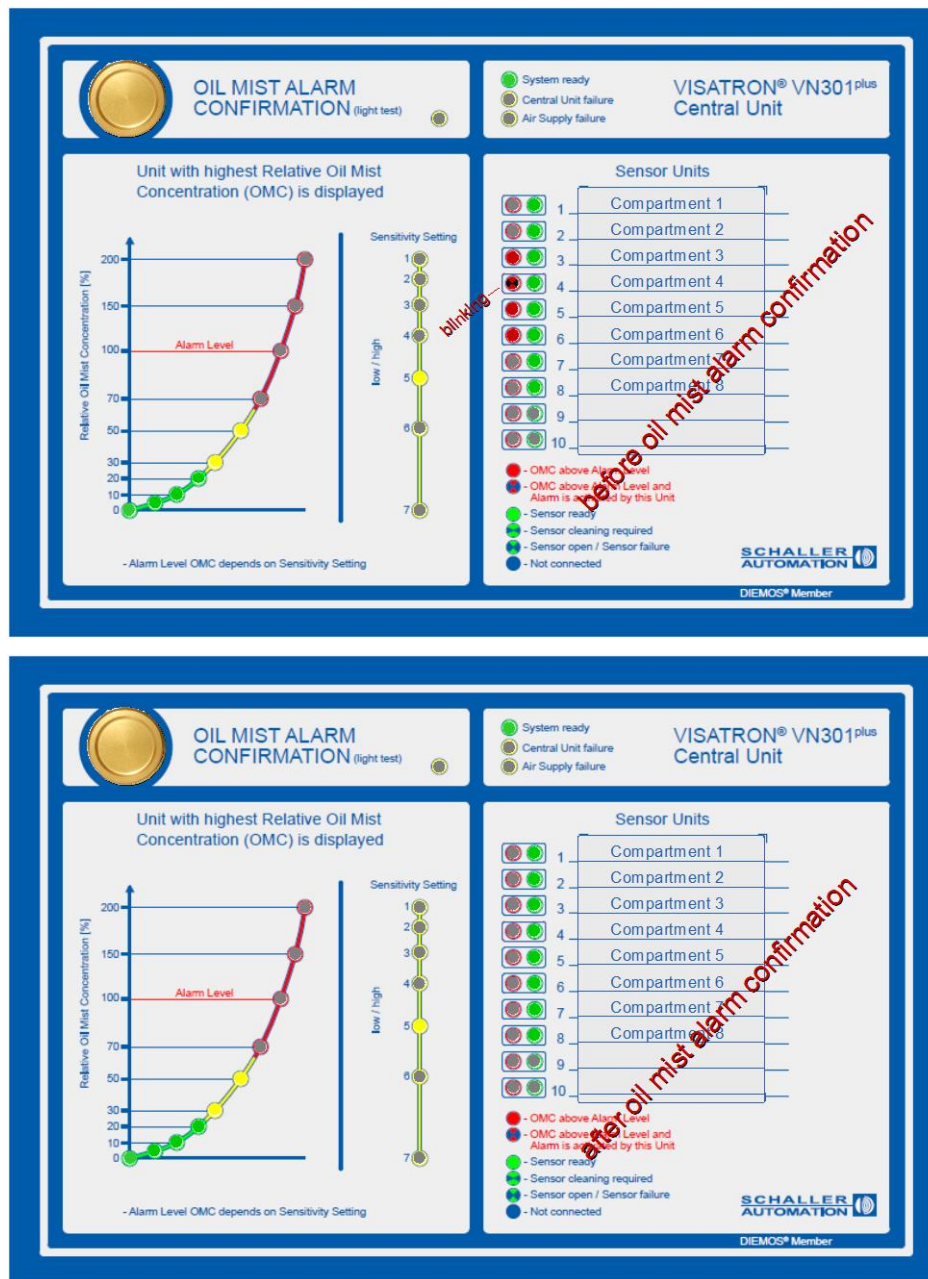


Figure 25: VISATRON® VN301^{plus} /VN301^{plus}EX Oil Mist Alarm Confirmation. Upper: Before approaching the engine, relative oil mist concentration below 70%. Lower: After oil mist alarm confirmation.

8.8 Failure behaviour

The “system ready relay” is switched of in case of malfunction of any component of the VISATRON® VN301^{plus}/VN301^{plus}EX system. Then the operator is legally bound to eliminate the failure as soon as possible.

In case of Oil Mist generation and alarm, respectively a limited functionality of the failed VISATRON® VN301^{plus} /VN301^{plus}EX system is used for Alarm generation. This functionality is possible if at least one sensor is still working.

Example:

Sensor No. 4 is defect (sensor failure), „System ready“ is switched off. The sensors No. 1, 2, 3, 5, 6 and 7 are still in operation. A bearing failure happens in the compartment monitoring by sensor 7. The generated Oil mist (due to heat dissipation) is firstly detected by sensor 7 and rises above the pre- alarm and alarm value. The pre- alarm and alarm relays and in addition the ready relay is switched on, ignoring the failure of sensor 4, to prevent the imminent danger coming from the rising oil mist concentration.

After failure elimination (e.g. bearing change) and “Alarm Confirmation” system ready is switched off again, because sensor 4 still fails.

8.9 Failure readout, Service PC**8.9.1 Sensor defect**

A sensor defect is indicated by:

- Sensor Unit; the green ready lamp is blinking (short time on, long time off)
- Central Unit; the green ready lamp of the defect Sensor No. is blinking (short time on, long time off)

The operator is legally bound to eliminate the failure as soon as possible. This can be done easily by changing the sensor showing the failure signal. Schaller Automation recommends therefore the operator to keep in storage one to two Sensor Units as spare parts.

In case of “dual fuel” engines with the VN301^{plus}EX system installed the change of a sensor has to be done as quick as possible, because the disassembling of the sensor creates an opening in the wall of the engine, which may allow potentially explosive atmosphere to be emitted in the area outside of the engine. To minimize this hazard, it is recommended to change in a first step the cable connector from the defect sensor to the “new” one and directly afterwards change the sensors as quick as possible as mentioned before.



- Sensor change has to be as quick as possible, because the disassembling of the sensor creates an opening in the wall of the engine, which may allow potentially explosive atmosphere to be emitted in the area outside of the engine causing an explosion hazard.



9 Maintenance

9.1 Cleaning the section of measurement

Required cleaning is indicated by blinking (long on, short off) green light at VISATRON® VN301^{plus} / VN301^{plus}EX Sensor- and Central Unit. There still is some reserve (20%) before the contamination limit is reached. With this there is enough time to clean the sensor before the sensor fails (indicated by blinking lamp, equal time on /off).

For cleaning disassemble the Sensor Unit from sensor base plate loosening the 4 vertical base plate screws. Clean the glass measurement windows (**Figure 26**) using a cotton stick soaked with cleaning fluid.

Allowed cleaning fluids are:

- gasoline used for cleaning proposes or
- alcohol



- Do not disassemble the Sensor Unit from base plate during engine operation. Explosive atmosphere may emit from the engine causing an explosion hazard.

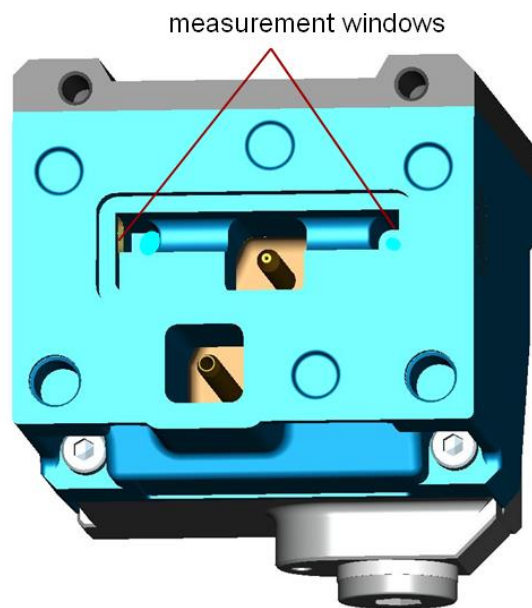


Figure 26: VISATRON® VN301^{plus} / VN301^{plus}EX Sensor Unit bottom view showing the windows from the section of measurement.



9.2 Maintenance procedures



CAUTION! Maintenance work has to be done when engine is stopped.

Quarterly or after 2000 operating hours, whatever comes first

1	Check pressure setting in the central unit: under 2,25 bar → adjust pressure between 2,25 bar and 2,75 bar → okay over 2,75 bar → adjust pressure	See chapter 8.4 page 29
---	--	----------------------------

Half-yearly or after 4000 operating hours, whatever comes first

2	Perform quarterly maintenance procedure 1	
3	Clean glass lenses in the Sensor units	See chapter 9.1 page 35
4	Exchange air filter in pressure regulator unit	

Yearly or after 8000 operating hours, whatever comes first

5	Perform half-yearly maintenance procedure 2 - 4	
6	Perform functional test of all sensors with test smoke	See chapter 9.3. page 37

Bi-yearly or after 16000 operating hours, whatever comes first

7	An inspection of the entire OMD installation onboard has to be executed by service staff being trained and authorized for this job by Schaller Automation	
---	---	--

9.3 Spare parts

Schaller Automation recommends to hold on stock per engine:

- a) 1x of...
- | | |
|-------------------------|----------------------------|
| sensor, part no. 153080 | horizontal connection * |
| sensor, part no. 153070 | vertical connection * |
| sensor, part no. 153060 | horizontal connection EX * |
| sensor, part no. 153050 | vertical connection EX * |

* = whatever applies to your installation

- b) 1x connecting hybrid cable, length 30m, part no. 273230
Cable to be cut to right length!



9.4 Sensor mist test

To perform a Sensor mist test open the mist inlet screw on sensor top (Figure 27) and insert the mist inlet tube. Now mist can be blown into the Sensor e.g. using the Mist Generator (Figure 28).



- To perform a Sensor Unit mist test during engine operation the mist inlet screw has to be opened. Keep the opening time as short as possible, explosive atmosphere may emit causing an explosion hazard.
- Attention: You will stop or slow down the engine

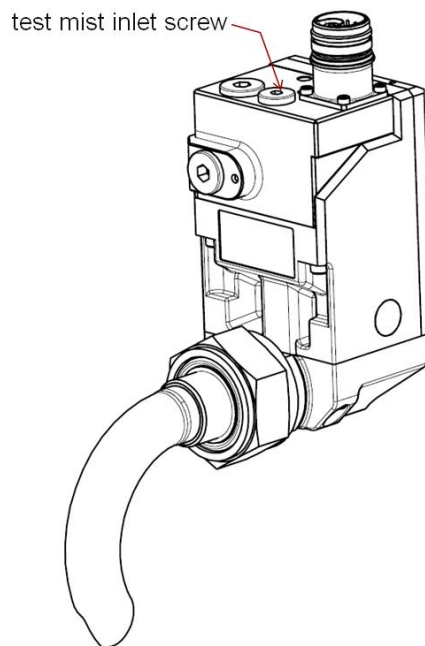


Figure 27: VISATRON® VN301^{plus} /VN301^{plus}EX mist test. Open mist inlet screw for sensor mist test and insert mist inlet tube.



Figure 28: VISATRON® VN301^{plus} /VN301^{plus}EX Mist Generator. Tubule consisting of ethylenediamine and acetic acid for mist generation, hand pump.



10 Technical data

Table 2: Technical data

VN301^{plus} /VN301^{plus}EX Sensor Unit	
Dimensions	See drawings
Weight	Sensor Unit: 850g Suction manifold: 350g
Max. cable length Sensor Unit	30m
Engine mount Sensor Unit	G3/4 M27x1.5
IP Protection Class	IP 65
VN301^{plus} /VN301^{plus}EX Central Unit	
Power supply	18 Volts – 31.2 Volts DC, max. 3A
Nominal voltage	24 Volts DC
Power supply cable entry, cable diameter	M20, 6 – 12 mm Ø
Relay Outputs	2 x 'High Oil Mist Alarm' 1 x 'Ready' 1 x 'Oil Mist Pre-Alarm' (max. 60 Volts DC/ 45 Volts AC, 60W, 45VA, 1A)
Relay Outputs cable entry, cable diameter	M25, 11 – 17 mm Ø
Communication interface to Remote Indicator II	3 wire RS485, galvanically isolated
Remote Indicator cable entry, cable diameter	M16, 4,5 – 10 mm Ø
Communication cable recommendation	LAPPKABEL UNITRONIC-FD CP (TP) plus UL-CSA, 2 x 2 x AWG20, max 400 m length



Environmental conditions	
Operating temperature	5 - +70 °C
Storage temperature	-25 – +80 °C
Max. vibrations	4 g (25-100Hz)
Air pressure reducer inlet pressure	4 – 12 bar
Air quality	ISO8473-1:2010 – “6-4-4”
Air pressure reducer inlet threat	G1/4
Air consumption	100l/h per Sensor Unit
Relative humidity	up to 95%
Weight (with protection cover)	7kg
IP Protection Class	IP 65
Approval of classes	
	Type approved for closed areas, designed for installation on combustion engines, environmental category D (GL), IACS UR M67 conform, list of type approvals see www.schaller.de



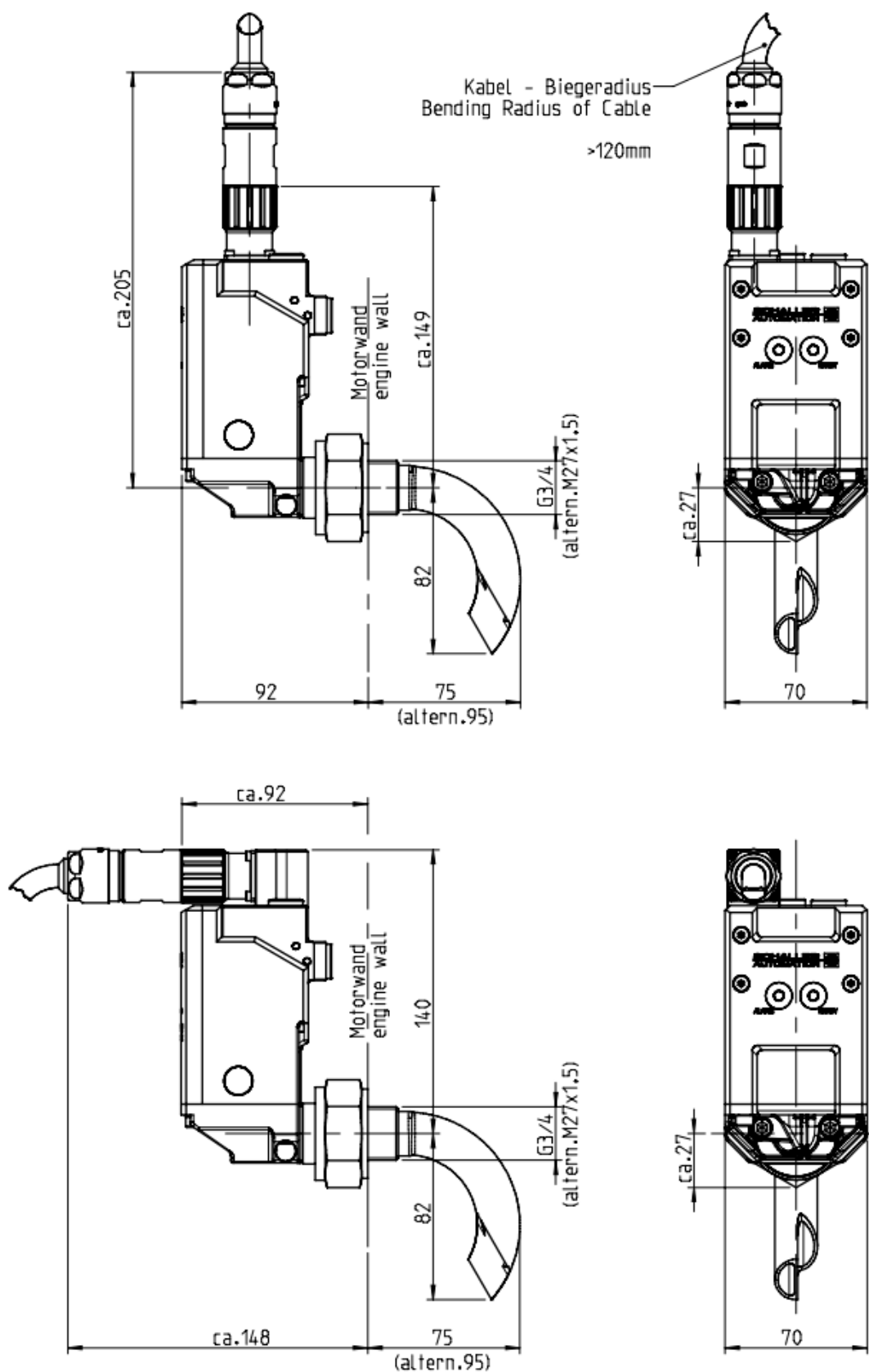


Figure 29: Mechanical dimensions of VN301^{plus} / VN301^{plus} EX Sensor Unit.

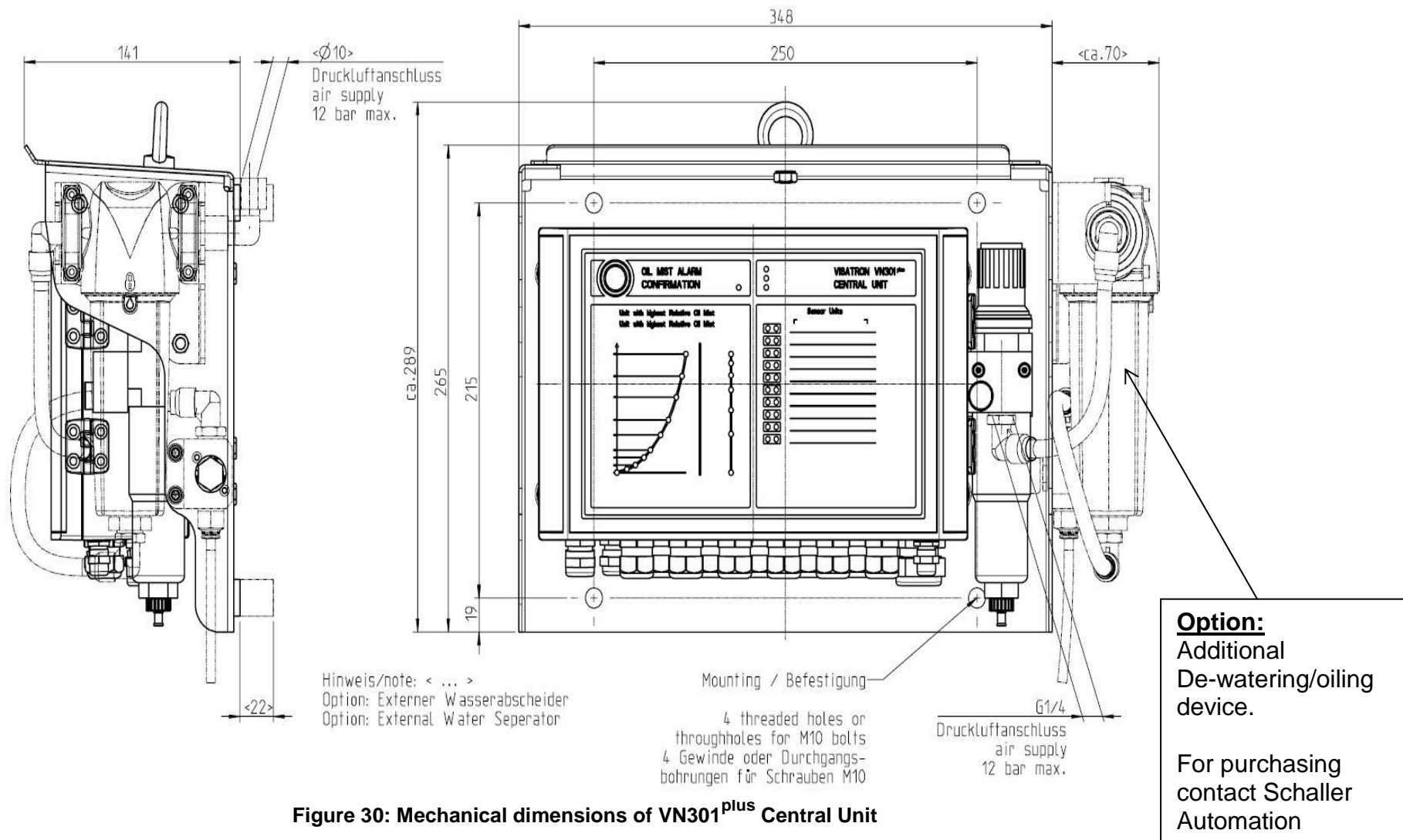


Figure 30: Mechanical dimensions of VN301^{plus} Central Unit



11 Service Partners

Schaller Automation maintains a worldwide network of service partners in following countries:

Australia
Brazil
Canada
Chile
China
Denmark
Germany
Greece
Italy
Japan
Korea

Netherlands
Norway
Poland
Singapore
Spain
Taiwan
Turkey
United Arabian Emirates
United Kingdom
United States of America

For an up-to-date list of our representatives including address and contact details please visit our website:

www.schaller.de

or call our technical support centre at the German headquarter:

Tel. +49 6842 508 0

