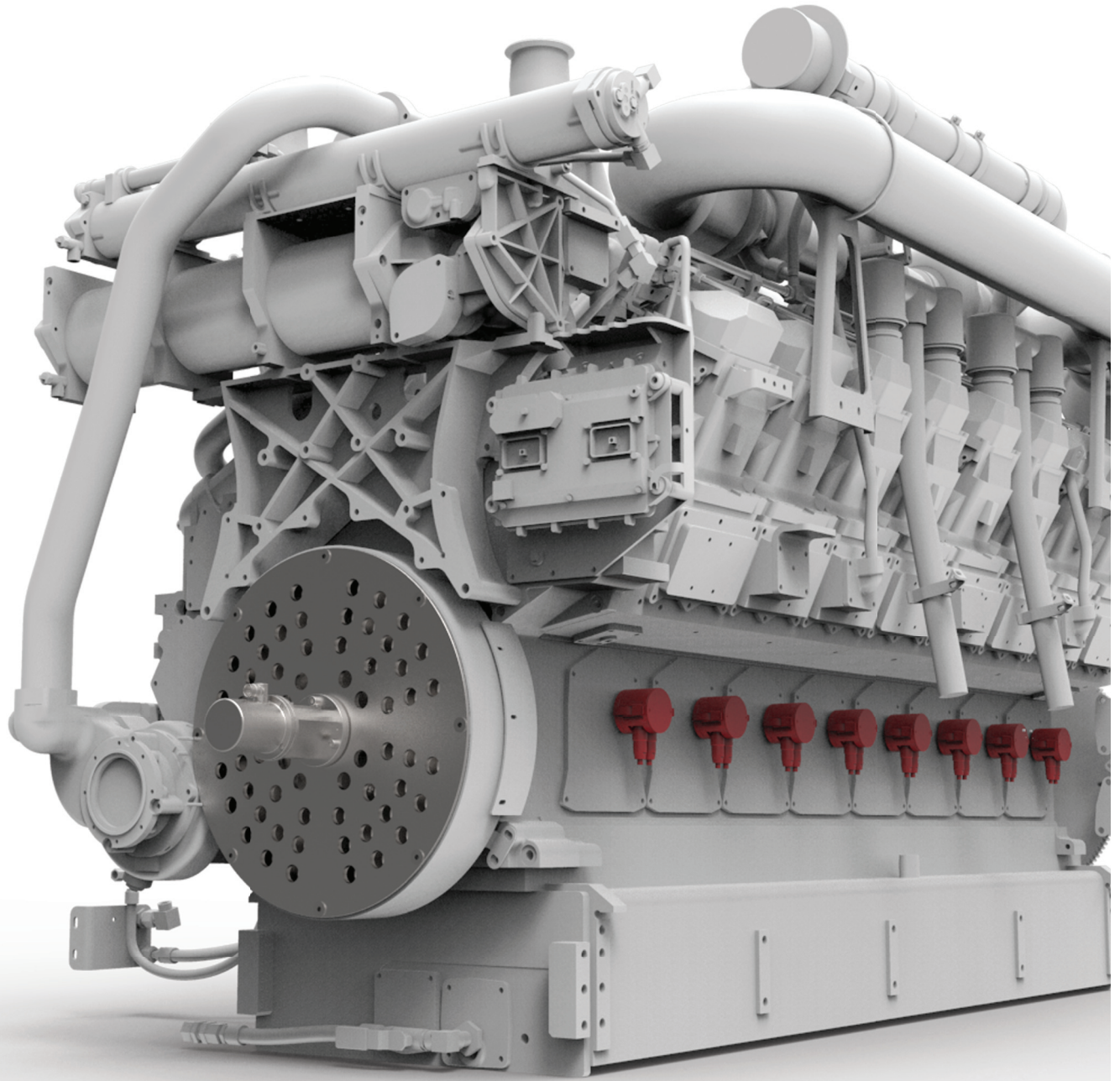



UserManual





SiCOMS[®]

**Oil mist Concentration monitoring
Diesel- and  -Version**

Part No.: 2 900 00 00000
Release: 121210
(revision 210330)

Declaration of Conformity

EMC-Directives: 2014/30/EU (Diesel- and -Version)
2014/34/EU (-Version only)


Manufacturer motcom® GmbH
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We declare on our own responsibility, that the products

Product description SiCOMS® / OCom
Oil mist Concentration monitoring

Type designations SiCOMS® / Ocom
SiCOMS Ex / OCom Ex

are in compliance with following norms:

Diesel- and -Versions EN 55011:2018-05/CISPR 11:2015 mod.+A1:2017
EN 55032/CISPR 22
EN 61000-4-2, EN 61000-4-3, EN 61000-4-4
EN 61000-4-5, EN 61000-4-6, EN 61000-4-8

 - Version only EN IEC 60079-0:2012 (General requirements)
EN IEC 60079-11 (Intrinsic safety)

Notified body DEKRA EXAM GmbH
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Certificate BVS 13 ATEX E 116 X

66130 Saarbrücken, Germany, 2021, the 30th of March



Dipl.-Ing. Dieter Lott
Managing Director



Note: This Installation Manual is applicable for SiCOMS® and OCom. To simplify this manual we often named figures and pictures with OCom, but always follow the instruction and information for SiCOMS too.

It is recommended to read this manual before commencing the repair, assembly or commissioning of the oil mist detector system!



Caution: The manufacturer's warranty will become void if these instructions are not followed!

Unless notified, these operation instructions are applicable for:

SiCOMS® / OCom
SiCOMS® Ex / OCom Ex



In case of a SiCOMS® / OCom alarm, the operator should take appropriate actions to prevent an explosion or damages from the engine.

The recommended measures of the engine manufacturer are to be followed.

**If the system is installed on a ship, special cases while maneuvering may occur (like docking maneuver) which may override the local safety system!
So, the engine might not be stopped if an alarm has been triggered.**



The explosion protection (Ex) design is only provided by the SiCOMS® Ex / OCom Ex Version. The use of SiCOMS® / OCom Ex Version with gas engines requires special safety measures!

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1. System Description

1.1. Components

1.1.1. OCom Principle

The **OCom** is an advanced oil mist detection system especially constructed to meet the requirements of large diesel engines, like ship engines or power plant engines. While developing of OCom motcom GmbH has used the latest technical knowledge and practical experience.

The issue of highly ignitable oil mist produced when lubricants or fuel come in contact with hot surfaces within the engine has become one of the most significant risks for engine builders and operators. Mist concentration of 50 mg/l and higher is sufficient for an explosion to occur, resulting in large-scaled engine damages and in severe cases in the loss of lives. The presence of oil mist inside the engine can also indicate a damage of sliding surfaces, because the lubricant film can vapour in areas where moving parts begin to rub against each other.

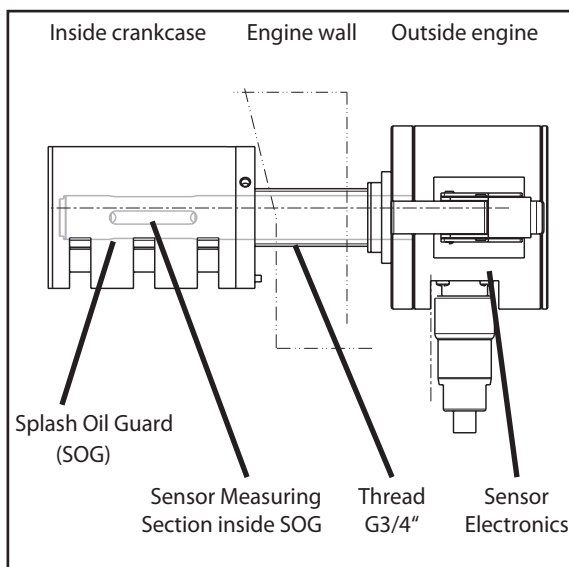


Fig. 1.1. Exemplary assembly of the OCom System

The main topics of oil mist detection are:

1. Prevention of larger damages in engines. If the oil mist is detected early, minimal maintenance and repair works are often sufficient to solve the problem, allowing to avoid high repair- and breakdown costs for the engine.
2. Protection of the engine against explosion. Before the concentration of oil mist reaches the LEL, Lower Explosion Level (50 mg/l), the oil mist detector will trigger an alarm.

OCom is also capable of detecting water vapour. Due to water vapour, corrosion on major parts inside the engine may occur which will damage the engine.

Oil mist detection systems are also part of rules applied world-wide which are administered by the IACS, the International Association of Classification Society. These rules are called UR, Unified Requirements, and oil mist detection systems are part of UR M10 and UR M67. These Unified Requirements are realized and used in the national rules of the Classification Societies, like the Germanischer Lloyd Hamburg, Germany.

Based on a widely-used principle of light measurement, OCom does not have the disadvantages of some older OMD systems. The OCom is a pipe-free system, with sensors mounted directly at the engine wall, it allows quick and exact measurement of oil mist concentration in each engine compartment. A local control device, the OCom Evaluator, processes and displays measurement data received from the sensors. The data can also be monitored on an optional PC.

The light measurement can be performed in two different ways:

1. **Transmission:** Light emitted by a light source (LED) passes through the measuring section and is measured by a semi-conductor receiver diode. The wave length of the light can be between 600nm and 960nm. Oil mist reflects and refracts light, therefore lowering the intensity that can be detected by the receiver. The concentration of oil mist in the measuring section correlates to the intensity of light detected by the receiver. This measuring principle is employed by OCom.
2. **Remission:** Light of a LED is emitted into a measuring section and the light reflecting on the mist is measured via an optical semi-conductor. The extent of the oil mist concentration in the measuring section correlates to the reflection on the mist.

The OCom Evaluator as well as the optional PC monitoring software have a warning system which allows to raise an alarm when the measured data indicates high oil mist concentration in the engine.

Advantages of the OCom System

1. The oil mist is measured inside the engine where it develops. Therefore, the response time from the development of oil mist until the system raises an alarm is very short.
2. The measured data is displayed on the Evaluator which can be mounted near the engine or at any other place. The measured data can also be shown on a Remote Monitoring Unit and/or a PC. This eliminates the risk of being near the faulty engine.
3. If one of the sensors gets dirty, the operator will be alerted immediately. The sensor can be cleaned easily without stopping the engine.
4. Easy handling.
5. Immediate localization and indication of the compartment where the oil mist developed.

1.1.2. OCom System Overview

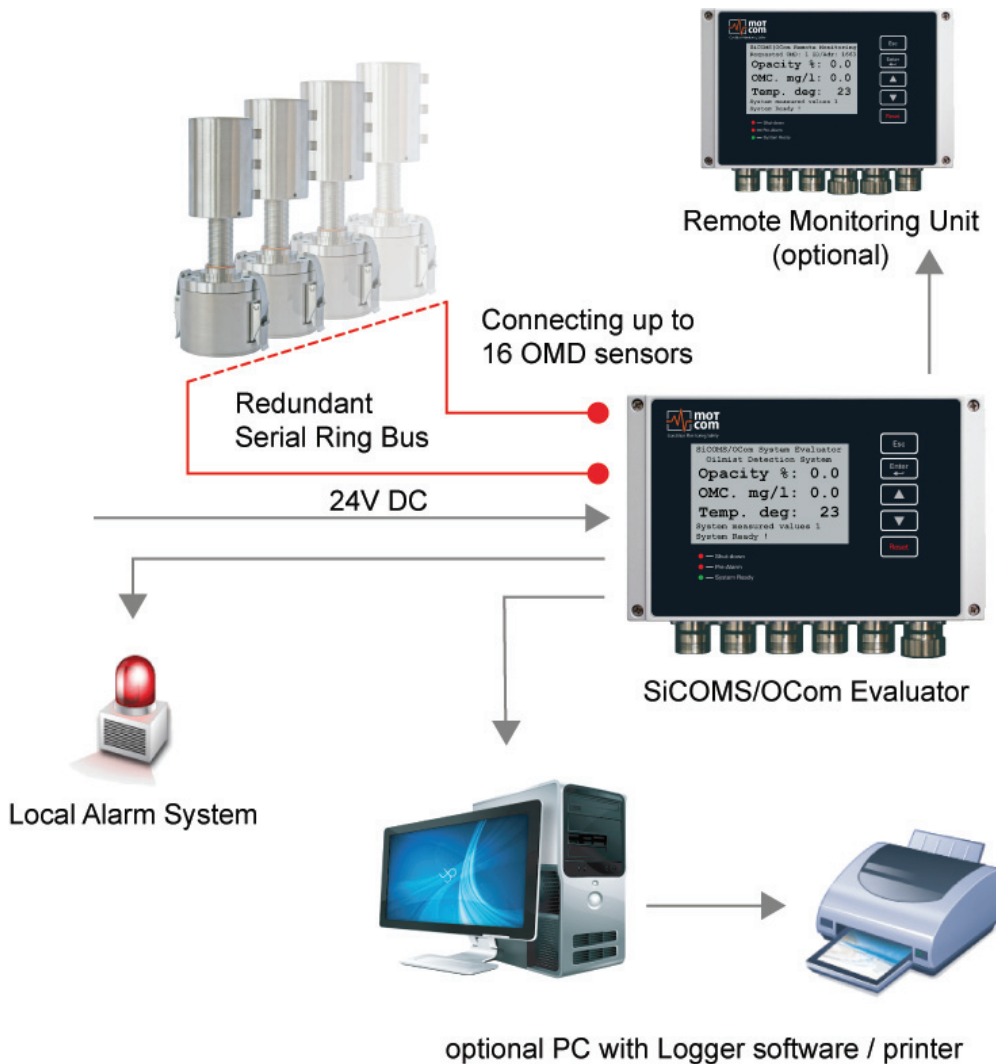


Fig. 1.2. OCom System

Main components of OCom system:

1. Evaluator
2. 1....16 sensors
3. 1....16 SOG
4. Cables sensor - sensor
5. Cables sensor - Evaluator
6. Cables for power supply

1.1.3. OCom System Components

1.1.3.1. OCom Evaluator

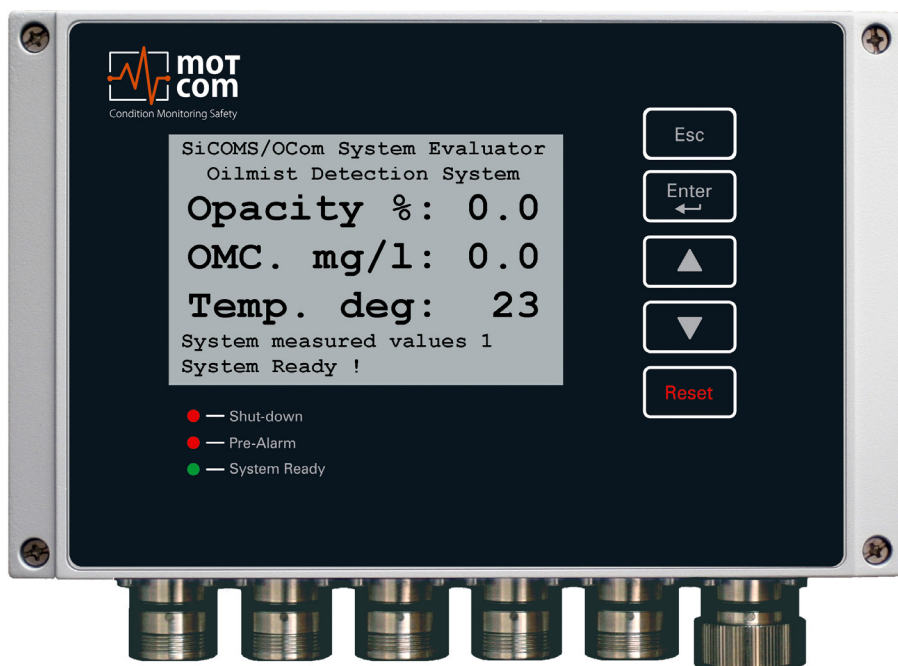







Fig. 1.3. OCom Evaluator

The Evaluator consists of a metallic case, a liquid crystal display (LCD), three LEDs (Shut-down, Pre-Alarm, System Ready), four control keys ( ,  ,  ,  and one reset button  .

The electronics and the display of the OCom Evaluator are installed in a closed, shock-proofed, water, dust and EMC resistant aluminium case, protection class IP 66.

The Evaluator can be mounted close to the engine or in the engine control room. The Evaluator operates reliably at temperatures between 0°C to 70°C and at relative humidity up to 80%.

The installation of the Evaluator is performed via 2 assembly rigs. If required, the Evaluator can be mounted vibration-free. In either case the connecting cable must be relaxed (e.g. using a loop) without putting any strain on the connectors / plugs.

The Evaluator displays the measurement values and OCom parameter values on its LCD display. It also provides test procedures that can be executed for OCom diagnostics.

The control keys of the Evaluator are implemented as membrane buttons. This type of buttons must not be operated using sharp items, including knives, screw-drivers or ball-pens.

If necessary, the keypad can be wiped with a mild cleaning agent. Never use solvents!

After successful installation and testing by service technicians approved by motcom GmbH, the settings of the Evaluator should not be changed. The Evaluator does not require regular maintenance.



Note: Firmware updates for the Evaluator will be available and may be applied to your system only by service technicians approved by motcom GmbH.

Firmware updates are free of charge. Please contact motcom GmbH or an authorized representative for details and further information.

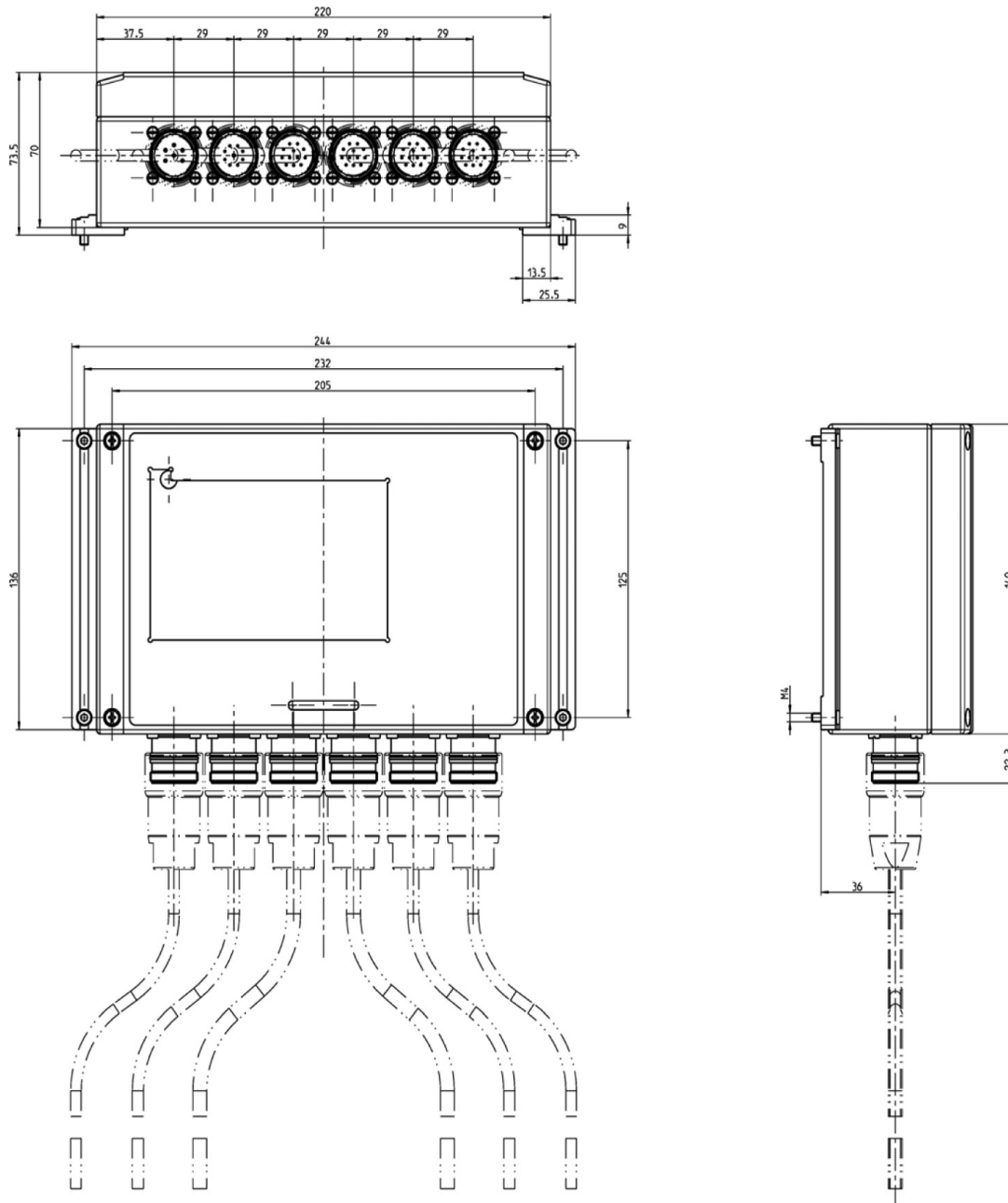


Fig. 1.4. Evaluator Dimensions

For the exact dimensions, please see under 8.4 Drawings

1.1.3.2. Connectors and pin-out of the OCom Evaluator

Connectors of the Evaluator						
	1	2	3	4	5	6
Pin	Power Supply	Relays	Serial Data Link	OCom OUT	OCom IN	Reserved
1	+24V (brown)	1st Alarm Relay NO	TxD / 232	OCom OUT - 1	OCom IN - 1	
2	0V (black)	1st Alarm Relay COM	RxD / 232	OCom OUT - 2	OCom IN - 2	
3		1st Alarm Relay NC	CAN-H	OCom OUT - 3	OCom IN - 3	
4		2nd Alarm Relay NO	CAN-L	OCom OUT - 4	OCom IN - 4	
5		2nd Alarm Relay COM	RS485 +	OCom OUT - 5	OCom IN - 5	
6		2nd Alarm Relay NC	RS485 -	OCom OUT - 6	OCom IN - 6	
7		Ready Relay NO	RxD + RS485	OCom OUT - 7	OCom IN - 7	
8		Ready Relay COM	RxD - RS485	OCom OUT - 8	OCom IN - 8	
9		Pre Alarm Relay COM	GND	OCom OUT - 9	OCom IN - 9	
10		Pre Alarm Relay NC	GND	OCom OUT - 10	OCom IN - 10	
11		Pre Alarm Relay NO	GND	OCom OUT - 11	OCom IN - 11	
12		Ready Relay NC	GND	OCom OUT - 12	OCom IN - 12	
Cable Part No.	2xAWG 20 92000200000	12xAWG 20 92001200000	12xAWG 20 92001200000	12xAWG 20 92001200000	12xAWG 20 92001200000	
Connector Part No.	93000610000	93001220000	93001210000	93001220000	93001210000	

Table 1.1. Connections of Evaluator

1.1.3.3. OCom Sensor and SOG

OCom performs compartment specific oil mist monitoring and lubrication oil temperature measurements.

The measuring unit of OCom for a compartment consists of a finger-shaped optical sensor with system redundancy, and a multiple chamber Splash Oil Guard (SOG) which prevents the sensor from being soiled with splash oil, but allows the oil mist and water vapour to enter the sensor light beam within milliseconds. So, the reaction time of each sensor and the whole system is less than one second.

The SOG is mounted from the inner side of the engine wall into already existing drilling of the crankcase. The sensor is pushed into the installed SOG. So, the OCom sensor installation is very simple. This also means that **the optical measuring section is positioned inside the crankcase area where oil mist could occur. No piping is needed!**

The OCom sensors are interconnected via two redundant serial bus interfaces. If necessary, a sensor can be easily dismantled, for example for cleaning, while the engine is running without affecting the system's functionality.

OCom does not have any movable mechanical parts and hence does not undergo any wear and tear.

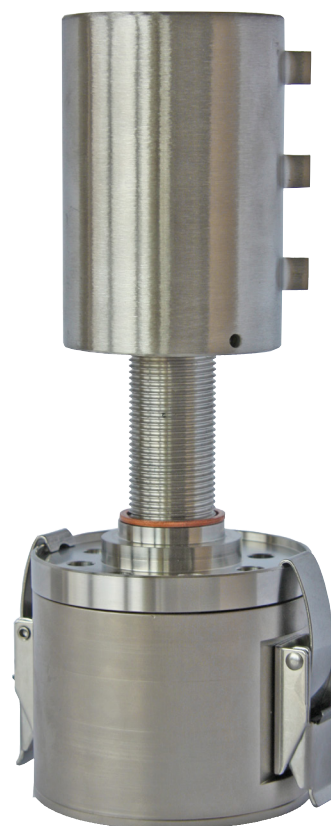


Fig. 1.5. OCom sensor with SOG

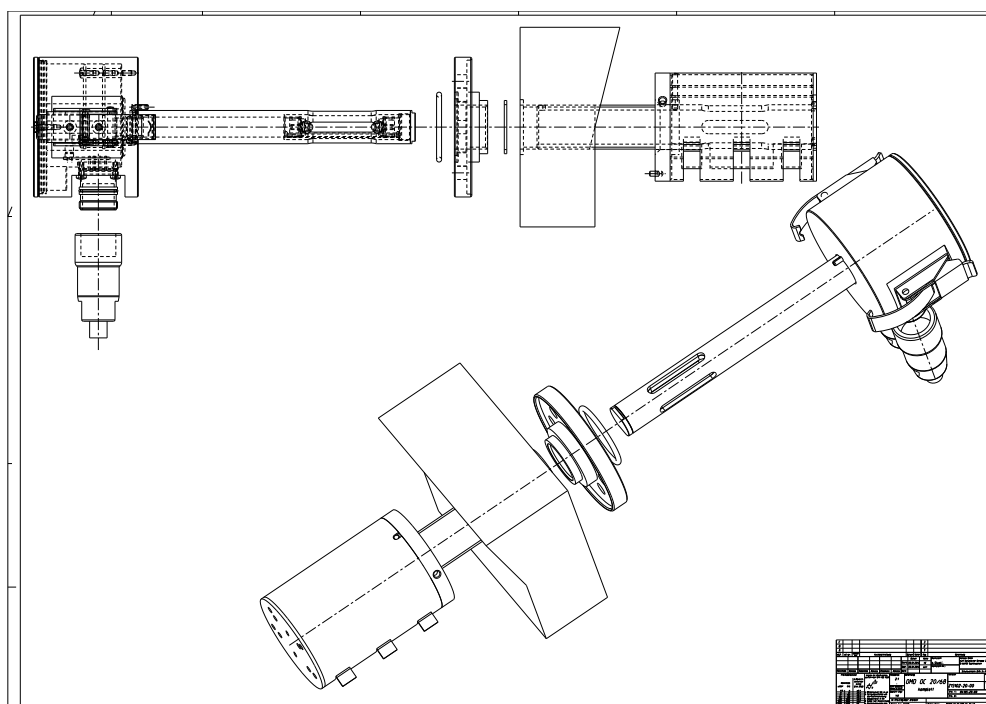


Fig. 1.6. Installation of SOG and sensor

The sensor and alarm system's reaction time is in the range of less than one second.

The SOG and the sensors are specific for each engine. Due to differences in each engine design which result in different wall thicknesses different SOG and sensor lengths are required. The needed length will be determined by personell of motcom GmbH or an authorized partner.



If the SOG and the sensor are installed near or in a section with a high splash oil concentration the usage of the Diffusor add-on is required (also refer to chapter 2.2. Installation Position on page 2.2).



Fig. 1.7. SOG with Diffusor

Important for users of Gas Engines



The OCom Ex consists of an appropriate component (electronic system) and an intrinsically safe component (sensor). These components build a mechanical unit.

The OCom Ex is mounted to the engine wall, separating the crank case with its Ex-category 2G requirements, from the non explosive engine room.

The cylindrical aluminium housing containing the electronic system is an assembly of circuit boards and electronic components.

Two plug connectors for connection of the non intrinsically safe electric circuits (current supply and RS 485 interface) and the electronic system of a further sensor are mounted to the cylinder barrel of the cylindrical housing.

The cylindrically shaped high-grade steel housing of the sensor consists of an optical system and a temperature sensor. The electronic components, except the optical measuring section, are embedded in explosion proof pottant.

The housing of the sensor and the electronic system are connected to each other by a threaded pipe. The multi-core connecting cable of the intrinsically safe electric circuits of the sensor is led through the threaded pipe and connected to circuit board LPT 2 of the electronic system.

1.1.3.4. Technical Data of OCom Sensor and Evaluator

Power Supply: 24V DC +30/-25%

Operating Current:

max. 1.5 A

Up to 16 (sixteen) OCom sensors can be connected

Sensitivity: Adjustable in 10 steps from 0,2mg/l to 10 mg/l (LEL 50 mg/l refer Chapter 1.)

Sensitivity Level	1	2	3	4	5	6	7	8	9	10
Sensitivity mg/l	0.2	0.3	0.5	0.7	1.0	1.5	2.5	4.0	7.0	10.0

Relay-Outputs: Contact load for all relays:

max. 60V AC, 1A, 60VA / max. 60V DC, 1A, 60W

Alarm 1:

1 relay with 2 ground-free switch-over contacts, usually configured as main alarm

Wire break protection with 33 kOhm resistors (standard)

Alarm 2:

1 relay with 1 ground-free switch-over contact, usually configured as pre alarm

Ready:

1 relay with 1 ground-free switch-over contact, energized if system is fault-free

Interface:

Serial Interface:

- RS485 for standardized industrial, bidirectional communication
- RS232 for setup and configuration

Communication Protocol:

- Modbus
- CAN Bus (optional)

User interface: LCD Display 240*128 dots

1 LED red "Shut-down"

1 LED red "Pre-Alarm"

1 LED green "System Ready"

Connection cable:

for example:

- Scherer Kabel GmbH 12 AWG 20C UL black
- Metrofunk 12 AWG 20C UL black
- Huber + Suhner Radox MFHS-EMC

Ambient temperature in service:

0°C - 70°C for OCom Evaluator

0°C - 85°C for OCom Sensor Electronics

-10°C - 120°C for OCom Sensor Measuring Section

Ambient temperature in Storage:

-25°C - 85°C

Protection:

IP65

1.1.3.5. Important for users of Gas Engines



for non intrinsically safe electric circuits

rated voltage for power supply DC 24V, $U_m = DC 30V$

rated voltage for RS 485 interface DC 24V, $U_m = DC 30V$

optical radiation

wavelength 880 nm

optical power of LED $P_0 < 12 \text{ mW}$

radiant intensity of LED $< 0,6 \text{ mW/mm}^2$

Environment Conditions $0^\circ\text{C} < T_a < +85^\circ\text{C}$

1.1.4. Intended Purpose

The use of a PC with the OCom is only permitted by using equipment approved by motcom GmbH, i.e. interface converter, plugs, etc.

motcom GmbH can only provide technical support if motcom GmbH approved equipment is used.

The purpose of this manual is to instruct the operator how to make the best use of the OCom System and also to alert them of safety issues that may arise.

All products mentioned in this manual are to be handled only by personnel with appropriate electrical and PC knowledge, such as international ISO standards.

Any damages, either human or material, caused by the use of the products depicted in this manual for any purpose other than that intended, is solely the responsibility of the user and not of the manufacturer.

1.1.5. Materials Included

To the scope of supply of a OCom System belongs one evaluator for each engine, one sensor for each compartment with the appropriate SOG (Splash Oil Guard) , cables in the correct length, provided with the necessary plug-in connections as well as all seals, O-rings and small articles for the assembly.



Fig. 1.8.Scope of delivery for OCom System

2. Installation

2.1. General

Installation and commissioning of OCom is conducted or supervised by personnel from motcom GmbH or its authorized representatives.

A training for the on-site operation personnel and/or the commissioning data on a CD are available on request.

The wiring diagram and schematic given here are guidelines only. The actual wiring will be adapted to the existing alarm and monitoring system on-site.

Important for users of Gas Engines

The OCom Ex has to be installed to the engine wall in the manner specified, that the appropriate component (electronic system) sits in the non explosive engine room outside the crank case and the intrinsically safe component (sensor) sits inside the crank case with its Ex-category 2G requirements.



For non intrinsically safe electric circuits (current supply and RS 485 interface) U_m of DC 30V is compulsory.

Power supply unit used for connecting the OCom system to 230V line voltage including devices communicating through RS485 interface must meet the following requirements:

- it must have safe galvanic isolation

For further installations instructions refer to the Installation Manual.

2.2. Installation Position

The position for the OCom sensors and SOG in the engine wall must be chosen carefully. Using existing drilled holes, for example used by an old oil mist detection system, the installation is easy.

Anyway, the splash oil concentration inside the engine is a very important factor and must be taken into consideration:

Each engine type has got its own characteristics which influence the splash oil concentrations inside the engine. The areas of high splash oil concentration “follow” the rotation of the crankshaft. During engine work splash oil forms discoidal zones with very high splash oil concentration (also called “splash discs”).

In an in-line engine two “splash discs” appear between the con rod and the crankweb. In a V-engine a third “splash disc” appears between two con rods.



It is important to choose the installation position **outside** the “splash discs”!

In a four-stroke engine the sensors must be installed on the side where splash oil hits the sensors on the top. Otherwise, the OCom Diffusor has to be installed to the SOG.

Two-stroke engines have no definite rotational direction, so the splash oil is not always hitting the top of the SOG! Also the other different characteristics of an two-stroke engine compared to a four-stroke engine require the usage of the Diffusor on two-stroke engines!

In Fig. 2.1. you can see an example for installation for a four-stroke diesel generator set. The left top position of the crankcase was found here the best for oil mist monitoring.



Fig. 2.1. Example of Installation for Sensors and SOG

3. Commissioning

3.1. Pre-Commissioning Checks

Check for the following:

- correct wiring as given in Chapter 2.3.
 - correct power supply on OCom Evaluator
 - OCom Evaluator display is on
- For more detailed information, please have a look at the Installation Manual!

3.2. Data Sampling

As soon as a OCom Evaluator is powered up, it starts the initial self check procedure and shows the “System Ready” Status if all pre-set conditions are fulfilled. This self check procedure is carried out in a certain cycle.

Regardless of the green ready LED status of the OCom Evaluator, if working OCom sensors are connected, the OCom Evaluator samples the signals from the OCom sensors with a certain sampling rate, converts them into digital signals, analyzes, evaluates and displays them on its LCD display.

These data including the detected events are continuously made available through the RS485 interface. A connected Remote Monitoring Unit and/or PC can use the output for remote monitoring and further processing.

It is also possible to set up all OCom Evaluator parameters from the PC using a terminal application with ANSIW emulation (e.g. Windows Hyper Terminal).

3.3. Alarm Setting and Triggering

There are 3 alarm relays integrated in the OCom Evaluator:

- 1st Alarm relay: always assigned to main alarm, additionally programmable as pre alarm or temperature main or pre alarm
- 2nd Alarm relay: programmable as main alarm or pre alarm or both and/or temperature main or pre alarm
- 1 Ready relay: indicates the system status

The OCom has a self check procedure which is carried out in a certain cycle. If any one of the conditions for the System Ready status is not detected the OCom Evaluator switches off the green READY LED and the ready relay drops out. An error code and a text error message are shown on the LCD display of the Evaluator and also in the event window of OMD Logger on the optional monitoring PC.

OCom enables to set different alarm sensitivity levels by defining different oil mist concentration thresholds as alarm condition. Oil mist concentration alarm levels are encoded as numbers from 1 to 10 (the higher the number is the less sensitive is the system). Please also refer to the table below.

The temperature alarm level is given in degree Celsius.

Sensitivity Level	1	2	3	4	5	6	7	8	9	10
Sensitivity mg/l	0.2	0.3	0.5	0.7	1.0	1.5	2.5	4.0	7.0	10.0

Alarm sensitivity levels must be set at the OCom Evaluator. If alarm conditions are fulfilled, the firmware of the OCom Evaluator triggers the corresponding alarm.

In case of an alarm triggering, it is shown:

- by the LED indicators on the OCom Evaluator
- by the optional OCom Logger software on the monitoring PC
- by alarm indicators of the engine alarm devices, depending on wiring

3.3.1. Alarm Resetting

- In case of a Pre-Alarm triggered:

If the conditions for a Pre-alarm are not confirmed after pre-set time period, the Pre-Alarm will be reset automatically by the system.

- In case of a Main-Alarm triggered:

The Main Alarm will not be reset automatically by the system even after the conditions that led to it are not met any more. Main Alarm can only be reset manually at the OCom Evaluator by pressing the RESET button for 3 seconds.

- In case of a Temperature Alarm triggered:

Temperature Alarm is not being reset automatically by the system either! It must be reset by pressing the RESET button at the Evaluator for 3 seconds



Attention: Main-Alarm cannot be reset through the OCom Logger software, but only at the OCom Evaluator by pressing the RESET-Button for 3 seconds.

3.3.2. Error Resetting

- In case of a System Not Ready status:

Only if all conditions for System Ready status are re-established (e.g. the problem indicated on the LC-Display of OCom Evaluator is fixed by the operator), the System Ready status will be reactivated automatically by the system.

Exceptional case: In case of a communication error, the Evaluator has to be restarted to reactivate the System Ready status!

3.4. Settings & Parameters / Using the Evaluator

3.4.1. Basic Usage of the Evaluator

Using the Evaluator is very simple. It has got one large 240x128 LCD, four navigation buttons (**Esc** , **Enter** , **▲** , **▼**) , one reset button **Reset** and three LEDs indicating the system status.

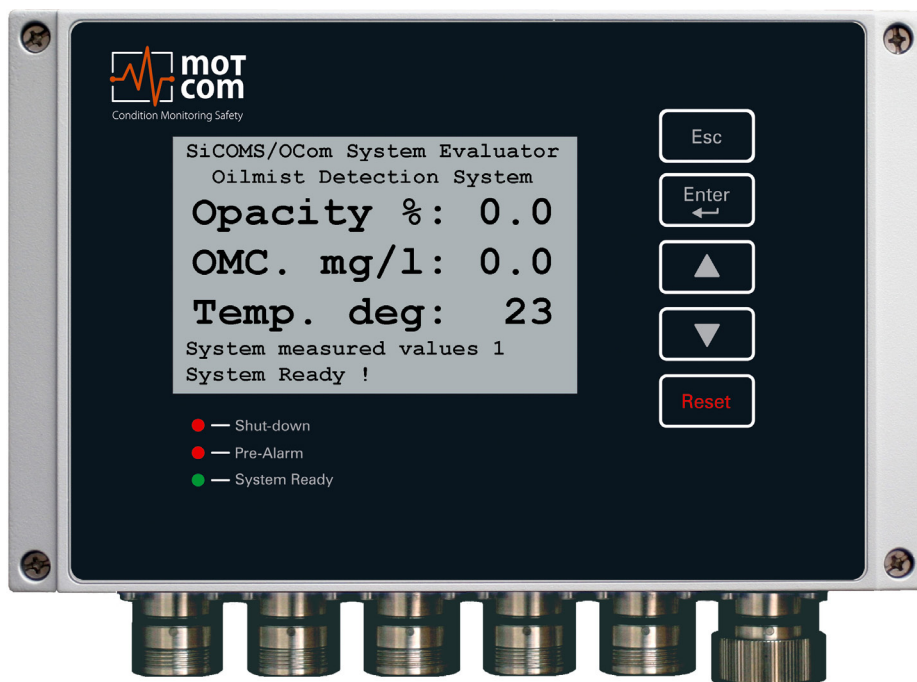


Fig. 3.1.View of the Evaluator with the default screen

On this sample picture you see the Evaluator displaying in fig. 3.2., page 3.4, which is the default screen while the system is running. On the following pages, each screen is described and the possible actions are given.

Please have a look at the description on the next page 3.4

3.5. Menu structure

Viewing and setting system parameters with the help of Evaluator

As soon as Evaluator is powered up, the initial info screens are shown for several seconds, and then the display switches to default screen:

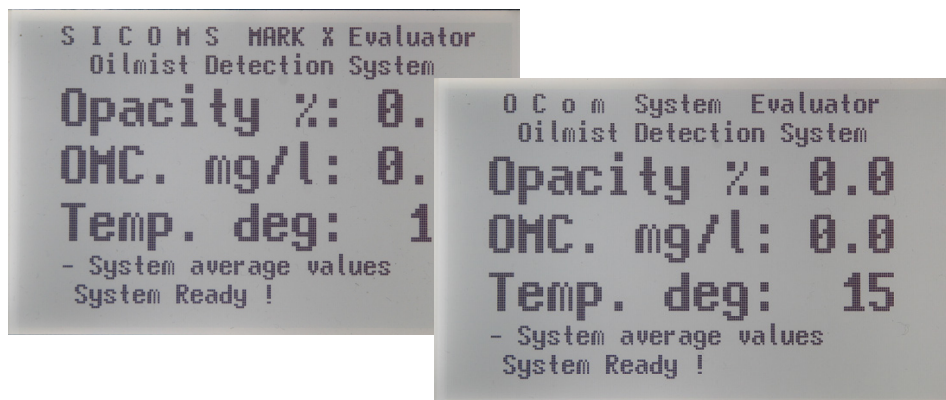


Fig. 3.2. Example for default screen

The OMD system information and settings are organised in a tree-like menu. The user can move between menu elements and change some system settings using the Evaluator navigation buttons:

- [▲] move one menu item forward
- [▼] move one menu item backward
- [Enter] enter a sublevel, or confirm a selected system value
- [Esc] go to the upper menu level, or cancel the change of system value.
 If [Esc] is pressed on the default screen, restart request appears.
- [Reset] reset alarm status. If Evaluator indicates alarm, press the [Reset] button
 and hold for 3 sec to reset the alarm status.

The OCom Evaluator menu structure is shown below:

3.5.1. Default screen

Press [Enter] to switch to the sublevel:

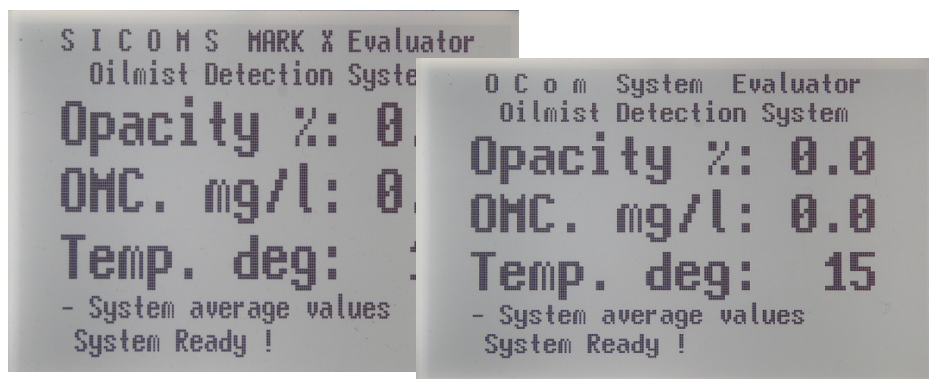


Fig. 3.3. OCom Evaluator default screen: system average values

The screen shows system average values for all connected OMD sensors:

- Opacity in percents
- Oil mist concentration in mg/l
- Temperature in C°

If the “COT TD measure ena. “ option in menu 3.5.5.2.1 is set to “On” the next menu that appears on pressing [▲] at this level is 3.5.2, otherwise it is 3.5.3.

3.5.2. COT temperature

Depending on sensor mounting position the OMD system can measure crankpin oil temperature, COT.

Press [Enter] to switch to the sublevel:



3.5.2.1. COT measured temperature

```

SiCOMS / OCOM System Evaluator
Oilmist Detection System
average temperature: 21.6
COT measured temperature:
 21.3° 21.8° 21.0° 22.3°
*****° *****° *****° *****°
*****° *****° *****° *****°
*****° *****° *****° *****°
- COT temperature values
System Ready !
  
```

Fig. 3.4. COT measured temperatures

COT measured temperatures are displayed here in a table:

[value for S1]	[value for S2]	[value for S3]	[value for S4]
[value for S5]	...		
...			
...	[value for S16]

where [value for S_n] is the current temperature value at sensor *n* in °C or a placeholder "*****" if the sensor *n* is not connected.

The average temperature for all connected sensors is indicated above the table.

3.5.2.2. COT temperature deviation

```

SiCOMS / OCOM System Evaluator
Oilmist Detection System
average temperature: 21.6
COT temperature deviation:
- 0.3° 0.2° - 0.6° 0.7°
*****° *****° *****° *****°
*****° *****° *****° *****°
*****° *****° *****° *****°
- COT temperature values
System Ready !
  
```

Fig. 3.5. COT temperature deviations

COT temperature deviation from the average temperature for each connected sensor is displayed in the same form as described in 3.5.2.1.

3.5.3. Sensor values

Press [Enter] to switch to the sublevel:



3.5.3.1. Detailed values for the 1st sensor

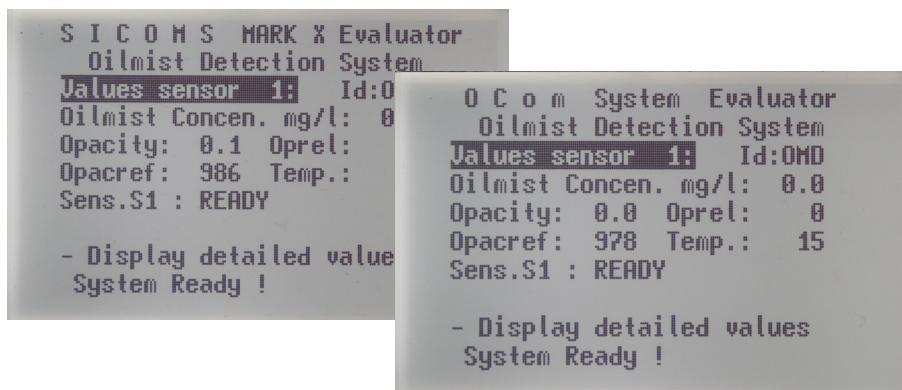


Fig. 3.6. Detailed values for the selected sensor

Displays measured values and status for a selected OMD sensor:

Values sensor 1:	Number of sensor, here 1. Range of possible values: 1 to 16
Id:	Sensor identifier
Oilmist Concen. mg/l:	Oil mist concentration in mg/l
Opacity:	Opacity in percents
Ocrel:	Oil mist concentration relative to alarm level in percents
Opacref:	Opacity reference value for calculating opacity and relative opacity, given in digits
Temp.:	Sensor average temperature in °C
Sensor S1:	Sensor status, for example: Ready, LT Dirty, Error RS485

(Screen at Fig. 3.6. is repeated for each connected sensor.)

3.5.4. Graphic display

Displays some measured sensor values graphically in a bar diagram. Each sensor from 1 to 16 is represented by an empty bar, the values for connected sensors are displayed as the contents filling the corresponding bars.



Press [Enter] to switch to the sublevel:

3.5.4.1. Opacity relative to Alarm in %

The bargraph shows opacity relative to alarm in %.

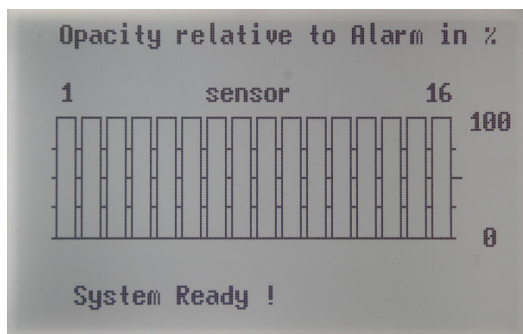


Fig. 3.7. Graphic display, opacity relative to alarm in %

3.5.4.2. Sensor temperature in degree C

The bargraph displays sensor temperature in °C.

3.5.4.3. Oilmist concentration in mg/l

The bargraph shows oil mist concentration in mg/l.

3.5.5. OMD System setup

Press [Enter] to switch to the sublevel.



If one of the sublevels of this menu is entered, pressing [Esc] at this level restarts the Evaluator. This is necessary to apply the changes, if any, made to the settings.

3.5.5.1. Parameter setup

View and change system parameters.

Press [Enter] to switch to the sublevel:



3.5.5.1.1. Number of sens.

Number of connected OMD sensors in the range of 1 to 16. Default is 16.

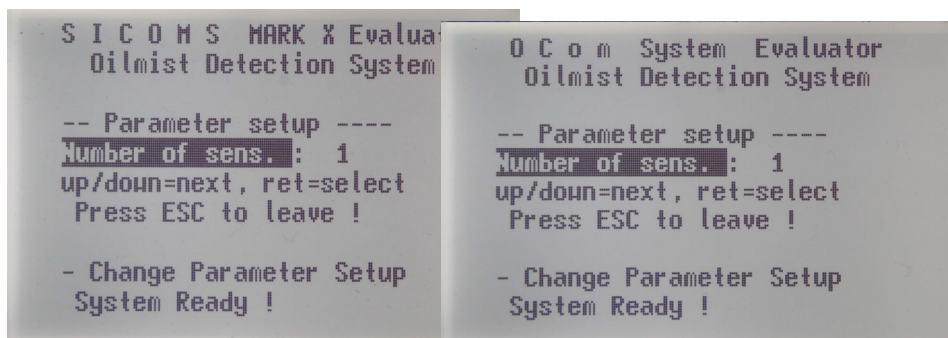


Fig. 3.8. Parameter setup: number of connected OMD sensors

To change displayed value: press [Enter], the value field becomes highlighted. Use [▲] and [▼] buttons to increase or decrease the number in the field or to select one of provided text values. When the desired value appears in the field, press [Enter] again.



The value will be successfully changed then if the correct PIN was entered before in “Setup CPU” menu. Otherwise, the selected screen will display “P??” as shown below:

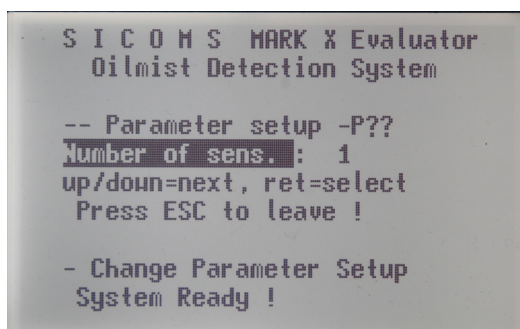


Fig. 3.9. Parameter setup: correct PIN is not entered before setup.

Refer to Fig. 3.5.5.4.7. “PIN for Setup” for PIN setting instructions.

3.5.5.1.2. OMC Alarm-Level

Main alarm level for oil mist concentration in the range of 1 to 10. Default is 7, which corresponds to 2.5 mg/l.

3.5.5.1.3. OMC Alarm-Level2

Main alarm level for oil mist concentration at an alternative sensor location (f.i. a sensor in the gear box) in the range of 1 to 10, or Off. "Off" value means that main alarm for this location is disabled which is default.

3.5.5.1.4. Sensor Almlevel2

Sensor number at the alternative location (see the previous section, 3.5.5.1.3); possible values: 1 to n where n is the number of connected sensors.

3.5.5.1.5. OMC PreAlm-Level

Pre-alarm level for oil mist concentration in percents of main alarm level. Range of possible values: 20% to 100%. Default value is 70%.

3.5.5.1.6. Tmp Alarm-Level

Temperature main alarm level in °C. Range of possible values: 10°C to 130°C with step 10°C, or Off. If "Off" is entered, temperature alarm is disabled. Default: 110°C.

3.5.5.1.7. Tmp PreAlm-Level

Temperature pre alarm level in °C. Range of possible values: 20°C to 130°C. Default is 100°C.

3.5.5.1.8. Tmp Alarm-Level2

Main temperature alarm level for an alternative sensor location (f.i. a sensor in the gear box) in the range of 20°C to 130°C with step 10°C. If "Off" is entered for OMC Alarm-Level2, temperature alarm is also disabled. Default: 110°C.

3.5.5.1.9. Tmp PreAlmLevel2

Temperature pre alarm level for an alternative sensor location (f.i. a sensor in the gear box) in °C. Range of possible values: 20°C to 130°C. Default is 100°C.

3.5.5.1.10. Readjust time s

Time in seconds assigned for readjusting the reference value if signal intensity at light measuring sections becomes higher. Range of possible values: 1 to 600 sec. Default is 1 sec.

3.5.5.1.11. O mainalm relcfg

Relay configuration for opacity main alarm. Possible values: R1, R1 + 2 (R1 = Relay 1, R1 + 2 = both Relay 1 and Relay 2). Default is R1.

3.5.5.1.12. O prealm relcfg

Relay configuration for opacity pre alarm. Possible values: OFF, R1, R2, R1 + 2 (R1 = Relay 1, R2 = Relay 2, R1 + 2 = both Relay 1 and Relay 2). Default is R2.

3.5.5.1.13. T mainalm relcfg

Relay configuration for temperature main alarm. Possible values: OFF, R1, R2, R1 + 2 (R1 = Relay 1, R2 = Relay 2, R1 + 2 = both Relay 1 and Relay 2). Default = R1.

3.5.5.1.14. T prealm relcfg

Relay configuration for temperature pre alarm. Possible values: OFF, R1, R2, R1 + 2 (R1 = Relay 1, R2 = Relay 2, R1 + 2 = both Relay 1 and Relay 2). Default is R2.

3.5.5.1.15. Time prealm off

Time in seconds for automatic reset of pre-alarm. Range of possible values: 1 to 60 seconds. Default is 5 sec.

3.5.5.1.16. Invert Sensoradr

- On – assign the sensor numbers in reverse order. This can be used to match sensor numbers to engine compartment numbers.
- Off – keep the default sensor numbers (default).

3.5.5.1.17. Max. OP increase

Maximal transmission signal change per sampling interval. This is used as a filter for signal disturbances, f.i. carbon particles. Possible values: 10 to 1000, given in digits pro sampling. Default: 60.

3.5.5.1.18. Mainalm dly sec

Time delay in seconds before the system triggers main alarm. This setting helps to avoid triggering main alarm when the main alarm level is exceeded only for a short time. Default: 3 sec.

3.5.5.1.19. Prealarm dly sec

Time delay in seconds before the system triggers pre alarm. This setting helps to avoid triggering pre alarm when the pre alarm level is exceeded only for a short time. Default: 3 sec.

3.5.5.1.20. Time dirty Error

Time delay before the system will change sensor status to “Dirty” when the corresponding conditions are met. Possible range: 1 - 240, default: 10 sec.

3.5.5.1.21. Digits TRS dirty

Threshold for transmission value in digits. If the transmission decreases below this limit, the system interprets this as contamination at the light measurement section (LED becomes “dirty”). Possible range: 250 - 800, default: 400.

3.5.5.1.22. Default values: Set?

Reset all settings to factory defaults.



Attention: This will delete all specific settings for the system after which the system might stop working correctly. At least the number of connected sensors has to be corrected after reset to factory defaults.

3.5.5.2. COT measure setup



Press [Enter] to switch to the sublevel:

3.5.5.2.1. COT TD measure ena.

On – enable COT temperature difference measurement (COT temperature menu 3.5.2 is displayed).

Off – disable COT measurements and hide the COT temperature menu.

3.5.5.2.2. TD no. first sensor

The number of first sensor that is used in COT temperature difference measurement.

3.5.5.2.3. TD no. of sensors

The total number of sensors involved in COT temperature difference measurement.

3.5.5.2.4. COT TD alarm enable

On – enable alarm activation if COT TD alarm condition is met.

Off – COT TD alarm will be not activated.

3.5.5.2.5. TD Alarm in 1/10 C

Difference between sensor temperatures and the average sensor temperature in 1/10 of °C that activates COT TD main alarm. Possible range: 10 - 150, default: 50.

3.5.5.2.6. TD PreAlm in 1/10 C

Difference between sensor temperatures and the average sensor temperature in 1/10 of °C that activates COT TD pre-alarm. Possible range: 10 - 150, default: 40.

3.5.5.2.7. TD Almlnh in 1/10 C

Temperature threshold in 1/10 of °C. If the average sensor temperature is lower than this limit, COT TD alarm triggering is inactive. Possible range: 10 - 800, default: 300.

3.5.5.3. Setup Alminhibit

View and change alarm inhibit parameters.

Press [Enter] to switch to the sublevel:



3.5.5.3.1. Alm. Inhibit Hyst

Alarm inhibit hysteresis in °C. Defines how much the sensor temperature is allowed to drop after reaching the threshold for alarm inhibit without affecting the alarm status. Possible values: 1°C to 15°C. Default: 2°C

3.5.5.3.2. Almlnh. S1 ena.

Alarm inhibit for sensor 1. "On" means enabled, "Off" – disabled. Default: "Off".

3.5.5.3.3. Almlnh. S1 temp

Temperature threshold for alarm inhibit for sensor 1 in the range of 2°C to 80°C. No alarm will be triggered if sensor temperature has not reached the threshold after engine start. Default: 10°C.

3.5.5.3.4. Almlnh. S2 ena.

Alarm inhibit for sensor 2. "On" means enabled, "Off" – disabled. Default: "Off".

3.5.5.3.5. Almlnh. S2 temp

Temperature threshold for alarm inhibit for sensor 2 in the range of 2°C to 80°C. No alarm will be triggered if sensor temperature has not reached the threshold after engine start. Default: 10°C.

...

(Menu items “Almlnh. S[n] ena.” and “Almlnh. S[n] temp.” are repeated for each sensor up to S16)

3.5.5.4. Setup CPU

View and change Evaluator communication and display parameters.



Press [Enter] to switch to the sublevel:

3.5.5.4.1. LCD brightness

Brightness of Evaluator LCD display in the range of 5 to 100. The greater the value, the higher is the brightness. Default is 30.

3.5.5.4.2. Bargraph at OMALM

Optionally display the bar graph if an alarm is triggered by the system.

ON – display the bar graph, which is default.

OFF – display the default screen (Fig. 3.1.)

3.5.5.4.3. Modbus enable

Status of Modbus interface.

ON – enabled, OFF – disabled.

3.5.5.4.4. Modbus address

Modbus address of the Evaluator in the range of 0 to 99

3.5.5.4.5. Modbus extern

ON – The Modbus data will be sent out via connector 3

OFF – The Modbus data will be used internally, i.e. for installed CAN interface.



For internal use Modbus address has to be set to “1”!

3.5.5.4.6. Modbus LRC calc.

Modbus LRC calculation method. Possible values:

- 0 - disabled
- 1 - ASCII (default)
- 2 - binary.

3.5.5.4.7. PIN for Setup

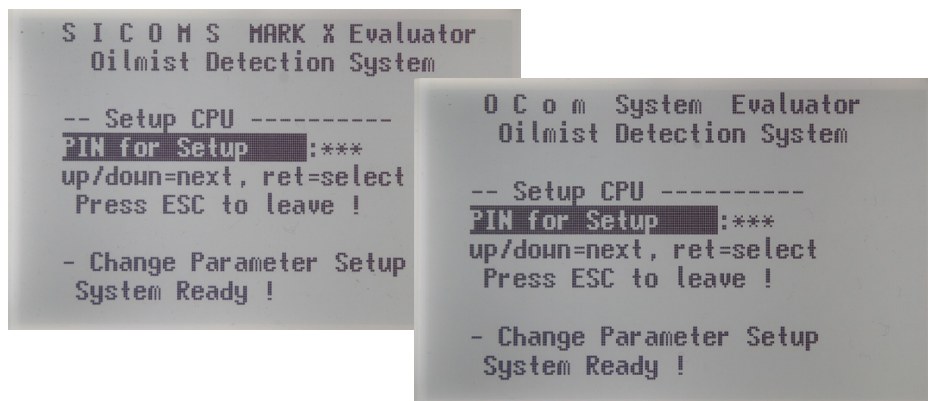


Fig. 3.10. PIN for Setup

The user must enter this PIN in order to be able to change system values and to use “Test & Service” menu.

To enter PIN: press [Enter], the PIN field becomes highlighted. Use [▲] and [▼] buttons to increase or decrease the value. When the correct PIN appears in the value field, press [Enter] again. The screen at Fig. 3.9. appears then, and the system parameters can be changed now. If wrong PIN was entered, text in the PIN field will be changed to “P??”.

3.5.5.4.8. Software Info

Pressing [Enter] button displays information on the firmware version of the Evaluator. Exit by pressing [Esc] button.

3.5.5.5. Test & Service

View and change Evaluator test options and perform service procedures.

 Press [Enter] to switch to the sublevel:

PIN for Setup must be entered in “Setup CPU” menu (see 3.5.5.4.7) before using Test & Service menu.

Otherwise, the following warning appears:

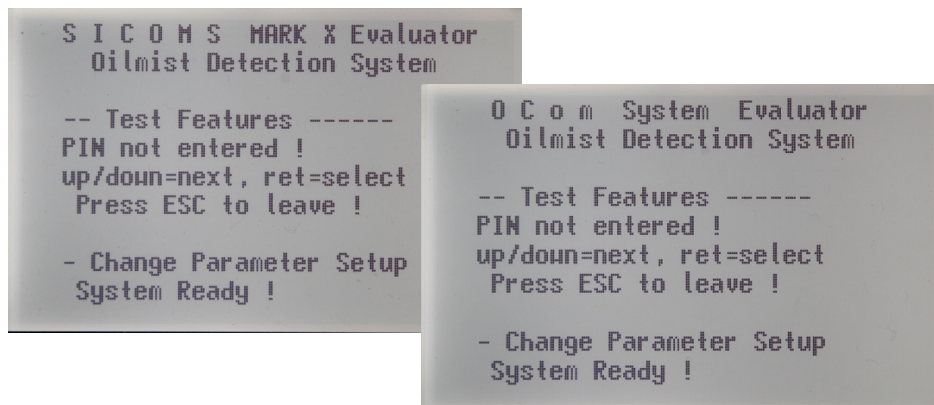


Fig. 3.11.Test & Service: PIN warning

3.5.5.5.1. Sys. Ready Relay

The Ready Relay can be switched on and off manually for testing purposes.

3.5.5.5.2. Mainalarm Relay

The Relay 1 (usually used as Main Alarm relay) can be switched on and off manually for testing purposes.

3.5.5.5.3. Alarm2/Pre Relay

The Relay 2 (often used as pre-alarm relay) can be switched on and off manually for testing purposes.

3.5.5.5.4. Sensor cleaning

OFF – default. System works in accordance with specification.

ON – as soon as ON is selected, the system enters a special maintenance mode where alarms will not be triggered until the system restarts. This is used when sensors need to be pulled out of the engine and cleaned.
After cleaning press [Esc] button; sensors will be calibrated automatically and then the system restarts.

Attention

By pressing [Esc] button the Evaluator will recalibrate the whole sensor chain. This requires that all sensors of the chain are cleaned (not only several sensors)!



3.5.5.5.5. Temp. calibration

OFF – default. System works in accordance with specification.

ON – as soon as ON is selected, the screen awaits user input of calibration temperature. Press [▲] or [▼] buttons to set the correct temperature of the sensor environment. Initial value is 60°C. Possible range: 20°C - 90°C.

Pressing [Esc] leaves the current sensor temperature unchanged.

On pressing [Enter] the system calibrates sensor temperatures, the message “Calibrating temperature busy!” appears. After successful calibration the system restarts automatically.

3.5.5.5.6. Hardware values

The screen displays some information about Evaluator hardware.

4. Performance / Maintenance Tests

4.1. Function Test

Following the initial installation of OCom sensors, evaluator and all mounting parts, all construction units and all connections are controlled.

All parameters and data for the operation of the engine are checked for correct adjustment (please refer to the respective data sheet provided by the motcom GmbH).

Please note that a start of the OCom system is only permitted, if the installation of the OCom system has been carried out in accordance with the instructions, technical descriptions and the manuals.

After connecting the 24V DC power supply to the evaluator of the OCom system the evaluator runs through a self-test.

After some time the measured values are shown on the screen of the evaluator.

The green ready light at the evaluator is on.

The procedure after an intermediate stop is described.

This description assumes that the plant was already in operation once and was originally installed and put into operation by the employees of the Company motcom GmbH.

All cables, sensors and the Evaluator are installed again in such a way, as they were installed before putting out of operation.

All parameters and settings are stored in a permanent memory (EEPROM), it is not necessary to restore them.

In case of using and installing new parts and units of the OCom system all settings and parameter are stored during production and final inspection at motcom GmbH.

If there is an alarm indicated or the ready lamp is off you find references for the error correction in the manual, especially in Chapter 5.

For error diagnostics it could be helpful:

- To check all cables and connections, especially the male / female connections.
- To replace the cables systematically
- To replace sensors and to use spare sensors

A full OMD check of the OCom system is performed by using an oil mist generator. While running or stopping engine it is possible to inject oil mist into the crankcase to test the alarm device and the alarm level of the OCom system. This test is carried out by motcom GmbH at the test bench of the engine to obtain the operation licence for this type of engines. Only in case of an older engine this test is carried out on an engine in operation.

5. Troubleshooting

Error code and Error description

If a failure is detected at the OCom, the green ready LED of the Evaluator turns off. If there's at least one OCom sensor online and functioning at this time, the green ready LED will blink as an indicator for reduced system operation. In this case, the system is still able to raise opacity alarm. If none of the installed OCom sensors is online, the green ready LED switches off.

OCom Evaluator error messages can be grouped in the following types:

5.1. Failure in OCom Sensors

The display shows "Err.Sens.xx: nnnn [text error message]"

with xx: sensor number, for example 01

nnnn: error code (refer to the following table)

Error codes	Error description	Help
0001	must value for IR transmitter LED too high (> 3000)	IR track must be cleaned and sensor must be recalibrated. If the error persists after recalibration, it means that the IR transmitter system is defect. Sensor must be exchanged and repaired by the manufacturer.
0002	must value for IR transmitter LED too low (> 1000)	
0004	calibration of IR measuring track is false	IR track must be cleaned and sensor must be recalibrated. If the error persists after recalibration, it means that the IR measuring track has not the right IR transmission and is defect. Sensor must be exchanged and repaired by the manufacturer.
0008	Transmission of IR measuring track too high (Opbzw > 1170)	
0010	("LT dirty") Transmission of IR measuring track too low (Opbzw < 400)	
0020	Transmission of IR measuring track too high. If transmitter LED is off, this means that receiver is receiving IR noise from other equipment, which can only be if the sensor is not mounted in the SOG !!	Sensor cannot be operated in this environment (IR noise) without SOG. Insert sensor in the SOG and restart evaluator.

Table continues on next page ...

Error codes	Error description	Help
0040	Temperature of the IR track/sensor front too low (< -7 °C)	Check the displayed temperature value for this sensor in the “Sensor values” menu of the evaluator. If the value is -99 or 999, the built-in temperature chip is defect, the sensor must be exchanged and repaired by the manufacturer. If the displayed value is feasible at the actual environment of sensor, the sensor is used out of specified temperature range. The error is reset automatically when the sensor temperature is back within the specification range.
0080	Temperature of the IR track/sensor front too high (> 117 °C)	
0100	Temperature of sensors CPU too high (> 95 degree)	The sensor CPU temperature is too high. The housing of the sensor must be cooled using airstream.
0200	Temperature of sensors CPU too low (< -5 degree)	The sensor CPU temperature is too low. The housing of the sensor must be heated up using airstream.
0400	Sensor is in power-up mode after system restart	Disappears automatically after approx. 10 seconds

If multiple errors are detected, the error code is calculated as the hexadecimal sum of individual error codes. Text message for the first detected error code is shown after the sum error code.

5.2. Communication Failure

The display shows “Err.Sens.xx Stat: nn”

with xx: sensor number, for example 01

 nn: error code (refer to the following table)

Error code	Error description	Help
01	Sensor does not respond via interface “loop out” (connector 4)	Restart system by pressing the ESC button
02	Sensor does not respond via interface “loop in” (connector 5)	
03	Sensor does not respond at all	
13	Sensor will not be read any longer	
20	Sensor initialising error	
(connectors see paragraph 1.1.3.2)		

If multiple errors are detected, the error code is calculated as the hexadecimal sum of individual error codes. For example:

The message “Err.Sens.02 Stat: 33” includes the error codes 13 and 20. The meaning of the error message is: sensor 02 cannot be initialised and will not be read.

If the failure persists after restarting, the sensor causing the failure can be detected using the menu “Sensor values”:

Start menu “Sensor values”, select one sensor after another:

The circuit is broken between sensors when sensor status switches from 01 to 02:

E.g.: Sensor 01: Status 01

 Sensor 02: Status 01

 Sensor 03: Status 01

 Sensor 04: Status 02

The circuit is broken here between sensor 03 and sensor 04. Check wiring.

5.3. Evaluator Failure

The display shows "OCom - Error nnnn!"
 with nn: error code (refer to the following table)

Error code	Error description	Help
0001	No sensor detected	<ul style="list-style-type: none"> • Check cables • Is the number of sensors set up correctly?
0002	Date and time invalid in real-time clock	<ul style="list-style-type: none"> • Set date and time • If the error occurs again, replace Evaluator
0004	Failure in event memory	Read out memory and reinitialise the Evaluator

If multiple errors are detected, the error code is calculated as the hexadecimal sum of individual error codes.

5.4. EEprom Parameters Failure

The display shows "CPU Error nnnn!"
 with nn: error code (refer to the following table)

Error code	Error description	Help
01xx	Failure within the CPU parameters	Check CPU parameters (display brightness, ...)
02xx	Failure within the OCom parameters	Check OCom parameters (number of sensors, sensitivity, ...)
04xx		Check manufacturing data

If multiple errors are detected, the error code is calculated as the hexadecimal sum of individual error codes.

6. Repair

Before any attempts to repair or dismount the OCom devices because of an assumed defect or failure you should contact motcom GmbH or its authorized partners.


Based on experience, many failures can be cleared easily by fault diagnostics on-site. In most cases a repair is not necessary.

Dismounting may only be performed on demand by motcom GmbH or its authorized service representatives.

A repair of OCom components is done exclusively by motcom GmbH. Defective parts should be sent to motcom GmbH including detailed failure description.

Please get in contact with the headquarter of motcom GmbH for further assistance.

Attention

Do not use Diesel-only parts for your -certified version of OCom! Make sure to order appropriate spare parts for your system!

-version parts are specially marked (see example on page 7.3)!



Marking



II (2) G [Ex ia] IIA
II 2G Ex ia IIA T4


(electronic system)
(Sensor)

7. Spare Parts

⚠ Only the original parts supplied and approved by motcom GmbH should be used; otherwise a proper working system could not be assured.

Attention

Spare parts marked with  may only be used on Diesel and HFO engines!

Spare parts marked with  may only be used on Gas and Dual Fuel engines!

Spare parts with both markings may be used on all engine types!

7.1 Main Spare Parts

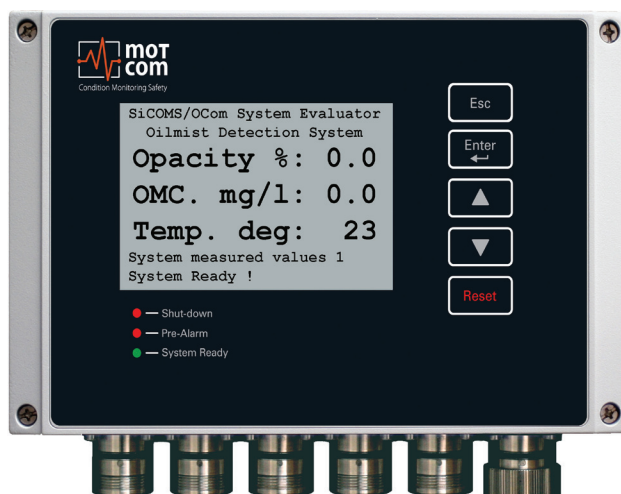


Fig. 7.1. OCom Evaluator



Fig. 7.2. OCom Diffusor for
SOG size 65



Fig. 7.3. OCom Diffusor for
SOG size 53

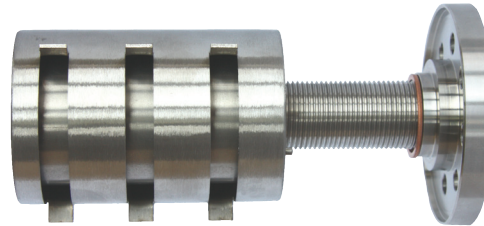


Part No.
2 600 03 10000



**Fig. 7.4. OCom sensor (for Diesel+HFO engines)
Size 20 (for use with SOG size 65)**

Part No.
2 600 01 20000



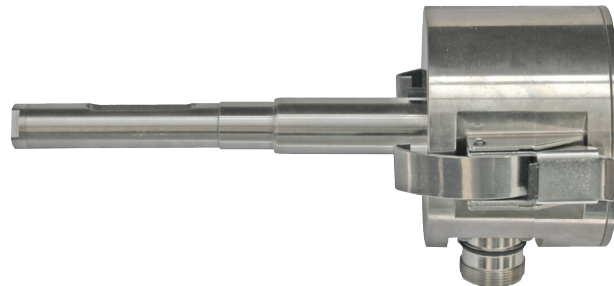
**Fig. 7.5. OCom Splash Oil Guard (SOG)
Size 65 (for use with sensor size 20)**

Part No.
2 600 01 10000

OCom sensor complete with SOG :

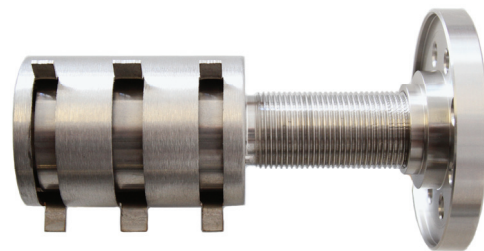
Part No 2 600 03 10000 + Part No 2 600 01 20000

Part No.
2 600 03 30002



**Fig. 7.6. OCom sensor (for Diesel+HFO engines)
Size 16 (for use with SOG size 53)**

Part No.
2 600 01 50024

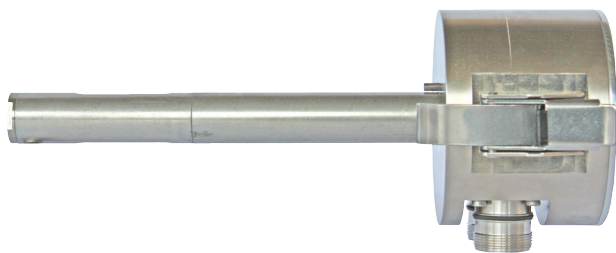



**Fig. 7.7. OCom Splash Oil Guard (SOG)
Size 53 (for use with sensor size 16)**

Part No.
2 600 01 30002

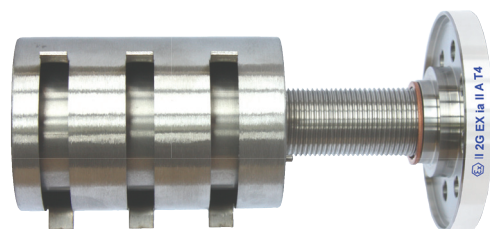
OCom sensor complete with SOG :

Part No 2 600 03 30002 + Part No 2 600 01 50024



**Fig. 7.8. OCom  sensor (for Gas and Dual Fuel engines)
Type SiSe/OC 20 EX (for use with SOG size 65)**

Part No.
2 600 04 10000



**Fig. 7.9. OCom  Splash Oil Guard SOG))
Size 65 (for use with SiSe/OC 20 EX)**

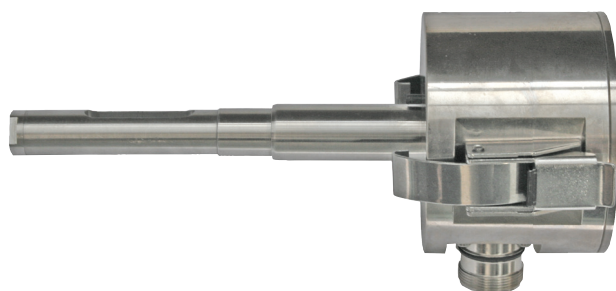
Part No.
2 600 02 20000




OCom sensor complete with SOG :

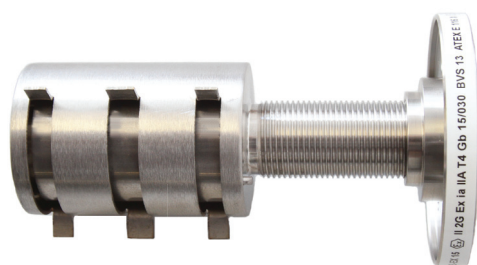
Part No 2 600 04 10000 + Part No 2 600 02 20000

Part No.
2 600 02 10000



**Fig. 7.10. OCom  sensor (for Gas and Dual Fuel engines)
Type SiSe/OC 16 EX (for use with SOG size 53)**

Part No.
2 600 04 30002



**Fig. 7.11. OCom  Splash Oil Guard (SOG)
Size 53 (for use with SiSe/OC 16 EX)**

Part No.
2 600 02 50024



OCom sensor complete with SOG :

Part No 2 600 04 30002 + Part No 2 600 02 50024

Part No.
2 600 02 30002

7.2. Accessories

Part No.
2 600 01 90000



also available for Gas
and Dual Fuel Sensors

Part No.
2 600 02 90000



Fig. 7.12. Cleaning Kit Diesel for Sensor and SOG

Part No.
2 600 01 90010



also available for Gas and
Dual Fuel Sensors

Part No.
2 600 02 90010



Fig. 7.13. Optical glasses for Diesel Sensor



Part No.
9 020 20 00000



Technical drawings of the 12V 100Ah battery unit, showing front, side, and top views with dimensions and callouts.

- Top View:** Shows the battery unit with dimensions 350mm (width) and 200mm (depth). Callouts 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 8

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Fig. 7.17.Junction Box

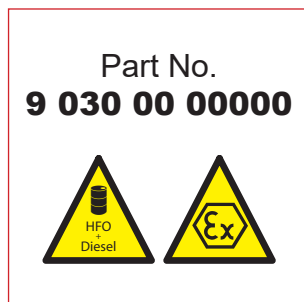
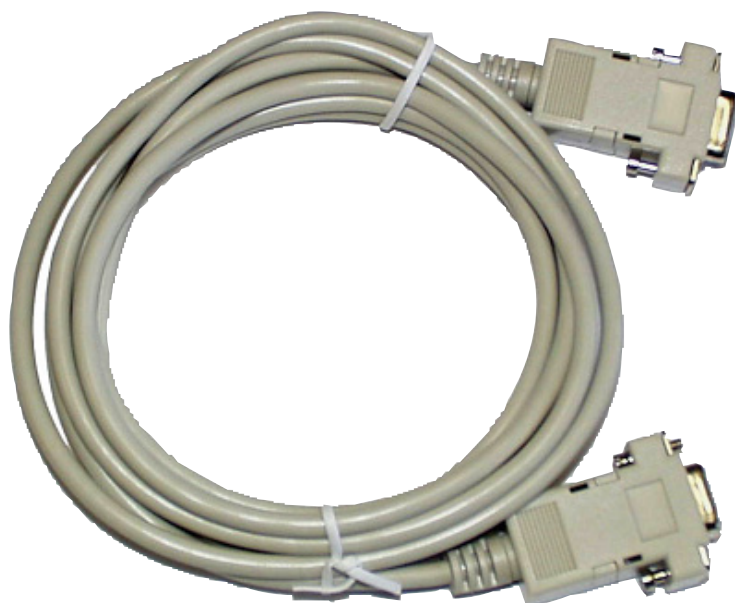


Fig. 7.18.Communication Interface Splitter



Part No.
9 100 20 00000



Fig. 7.19. RS-232 Connection cable for PC to external RS-485 converter



Part No.
9 200 04 22000



Fig. 7.20. 2 x 2 twisted pair communication cable

Part No.
9 200 02 00000



Fig. 7.21. 2 core power cable

Part No.
9 200 12 00000

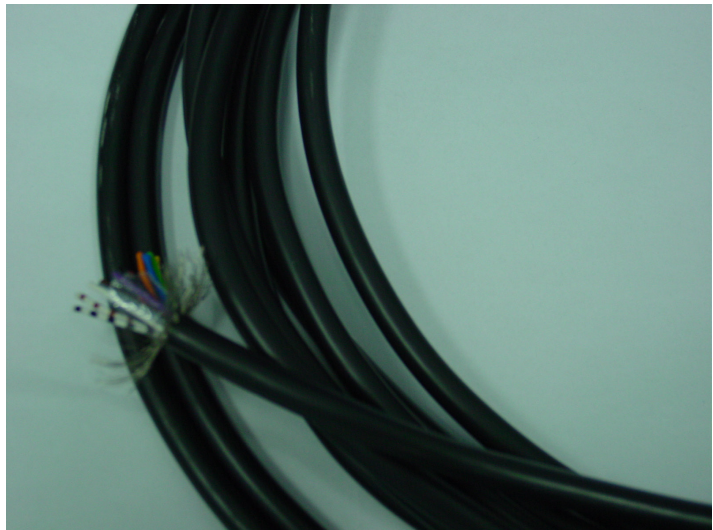


Fig. 7.22. 12 core communication cable

Part No.
9 301 09 10000



Fig. 7.23. Sub-D9 connector

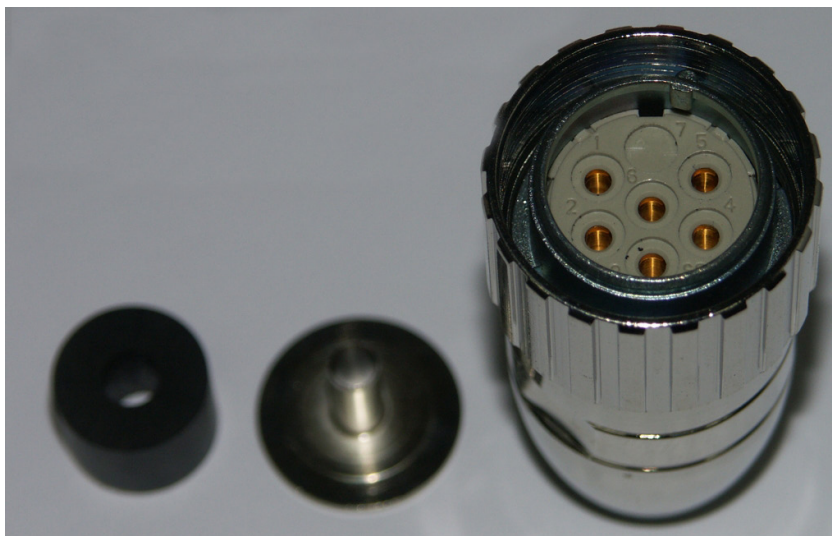


Fig. 7.24. 6-pol. female connector

Part No.
9 300 06 10000



Fig. 7.25. 12-pol. male connector

Part No.
9 300 12 20000

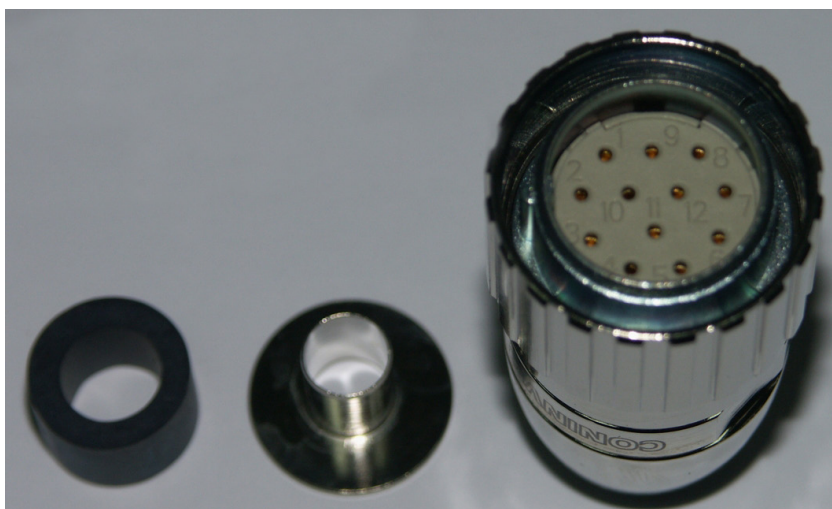


Fig. 7.26. 12-pol. female connector

Part No.
9 300 12 10000



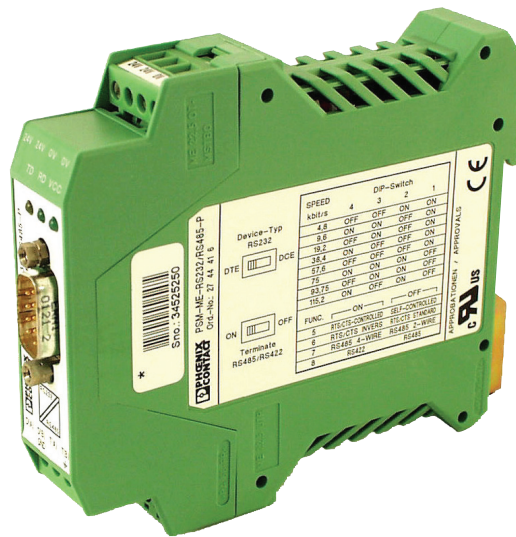
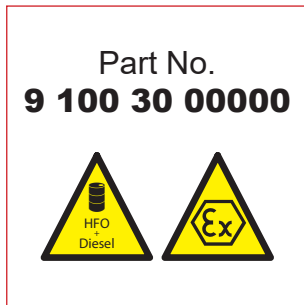


Fig. 7.27. RS-485 Converter (external mounting)



Fig. 7.28. Power supply unit 24V/24W (external mounting)

Mounting position for



- Part No 9 100 30 00000
- Part No 9 110 40 00000

on horizontal DIN rail NS 35 in acc. with EN 60715

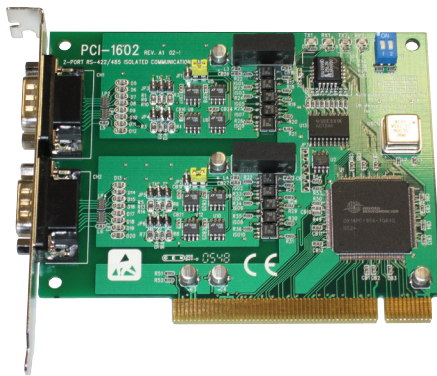


Fig. 7.29. RS 485 Converter Advantec PCI Card 1602B for mounting inside PC

Part No.
9 100 40 00000

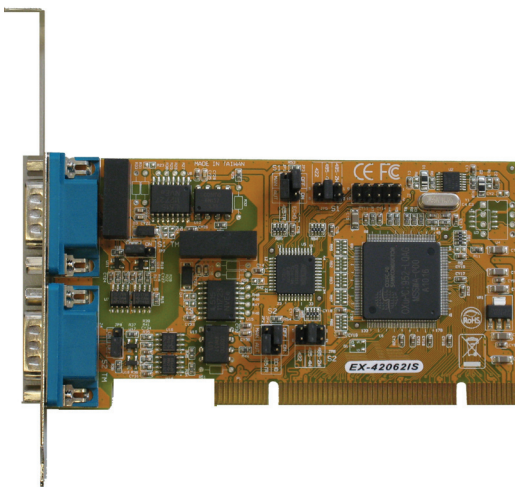


Fig. 7.30. RS 485 Converter PCI Card EX-42062IS for mounting inside PC

Part No.
9 100 40 00010

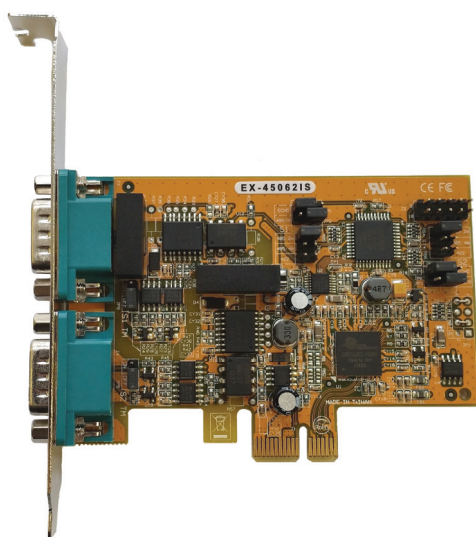


Fig. 7.31. RS 485 Converter PCIe Card Version EX45062IS for mounting inside PC

Part No.
9 100 40 00020



Part No.
1 700 10 01000

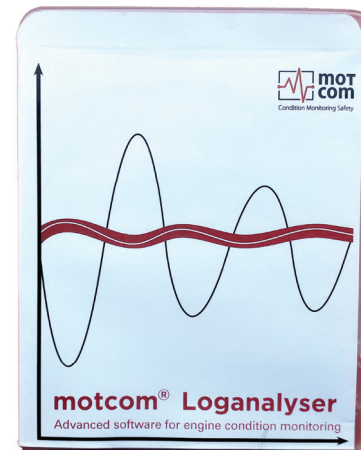


Fig. 7.32. motcom Loganalyser Software

8. Attachments

8.1. Connection Assembly Instructions

8.1.1. Preparing the Cable

For RS485-Converter
(Part No. 9 200 04 22000)

As an example of using 2 X 2 wire twisted cores (Fig 8.1):

- Signal cable: Use a shielded cable, consisting of 2 X 2 wire twisted pair stranded cores, with each core having a nominal section area of 0.25mm² and overall cable diameter of 8 to 12mm.
- The recommended cable is Metrofunk 2 X 2 AWG 22, (motcom GmbH Part No. 9 200 04 22000 - 2 x 2 twisted pair) this is used as an example to show how the connection is made. This cable has 2 twisted pairs of black/brown and black/red.
- Cut away the outer insulation approx. 25mm from the end of the cable and pull back the braided shield.
- Cut the braided shield 10mm from the end as shown in Fig. 8.1.
- In this example: Select a twisted pair black/brown and the red wire of the other twisted pair black/red, and cut away the insulation approx. 5 mm from the end of these 3 wires and solder them to the pins of the plug (as shown in Fig. 8.3, Pos. 6)
- Cut off the unused wires (in this example, the black wire)

Pay attention to the assembly instructions, especially the cable shielding to avoid electromagnetic interference!

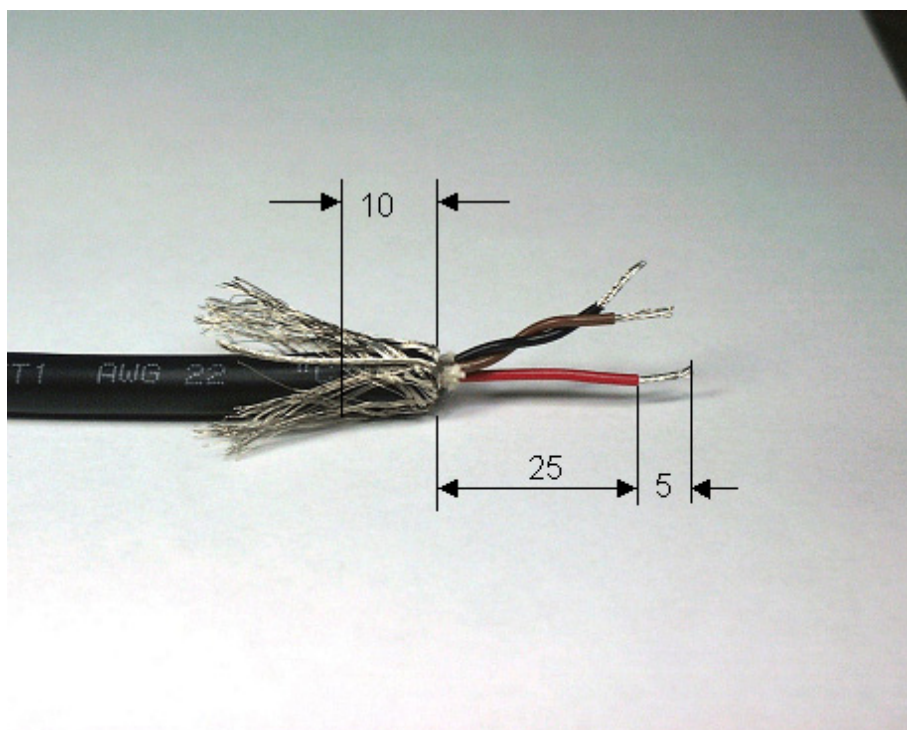


Fig. 8.1.Preparing the cable

8.1.2. Connecting the RS-485 converter (Part. No. 9 100 30 00000)

Preparing and Connecting the Cable to the Converter (Fig. 8.2):

- At the free end of the signal cable, the same wires of the twisted pair black/brown and a red wire of the other twisted pair black/red, should be used. Please refer to the Section “Preparing the Cable”, page 8.1.
- Cut away the outer insulation approx. 40mm from the end of the cable and pull back the braided shield (as shown in Fig. 8.1).
- Cut the braided shield 10mm from the end (see Fig. 8.1)
- Cut away the insulation approx. 5mm from the end of these 3 wires.
- Connect the 3 wires to the terminals on the RS-485/RS-232 converter (as shown in Fig. 8.2).

RS 485 B: brown wire from the black/brown twisted pair to terminal D(B).
RS 485 GND: red wire from the black/red twisted pair to Ground terminal.
RS 485 A: black wire from the black/brown twisted pair to terminal D(A).



Note: If and only if a connection between the PC and OMD could not be established, please swap the signal cables between D(A) and D(B).

- Cut off the unused wires (black wire).

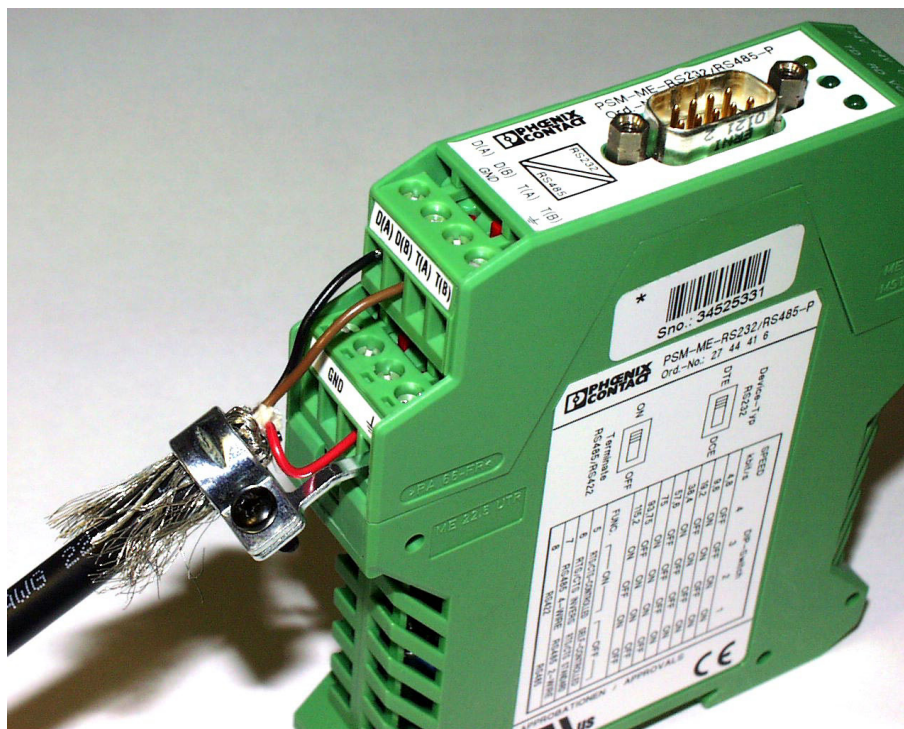


Fig. 8.2. Connecting the RS485-converter

8.1.3. Assembling the plug

(Part. No. 9 300 12 10000 and 9 300 12 20000)

- Push the components over the cable starting with the adapter (Pos. 1), coupling nut (Pos. 2) and the seal/strain relief element (Pos. 3),
- Cut away the outer insulation approx. 23mm from the end of the cable.
- Push back the braided shield.
- Push the shielding disc (Pos. 4) over the wires and press it against the braided shield.
- Cut back excess of braided shield close to the shielding disc.
- Cut away the plastic foil, filling material and inner insulation.
- Cut away insulation of wires approx. 3.5mm from the end and twist them.
- Solder brown wire of brown/black pair into pin No. 2 on plug.
- Solder red wire of red/black pair into pin No. 3 on plug.
- Solder black wire of brown/black pair into plug's Pin No. 4.
- Cut off black wire of red/black pair.
- Add the distance ring (Pos. 5) between the shielding disc (Pos. 4) and insert ring (Pos. 6).
- Push taper sleeve (Pos. 7) over the insert ring (Pos. 6) and distance ring (Pos. 5). **Make sure the Coding rib is on the right position!**
- Push in cable with shielding disc (Pos. 4) and seal and strain relief element (Pos. 3).

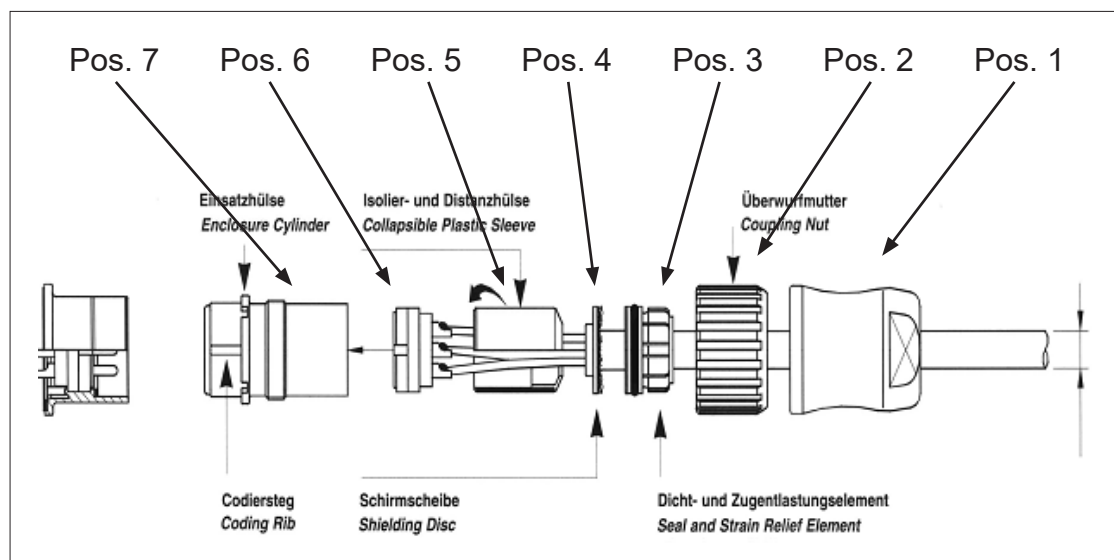


Fig. 8.3. Mounting the plug part. no. 9 300 12 10000 and 9 300 12 20000

8.1.4. Connection Cable - RS485 PCI Card to Evaluator

- Cut away the outer insulation approx. 23mm from the end of the cable

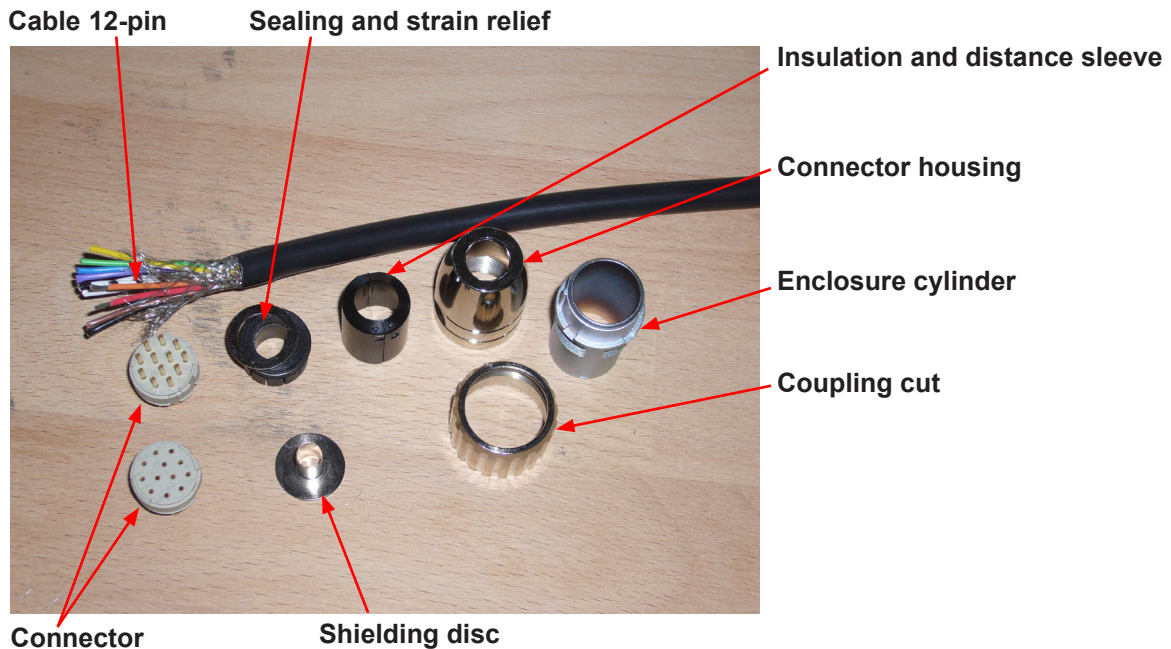


Fig. 8.4.Step 1

- Push back the braided shield
- Push the sealings over the wires

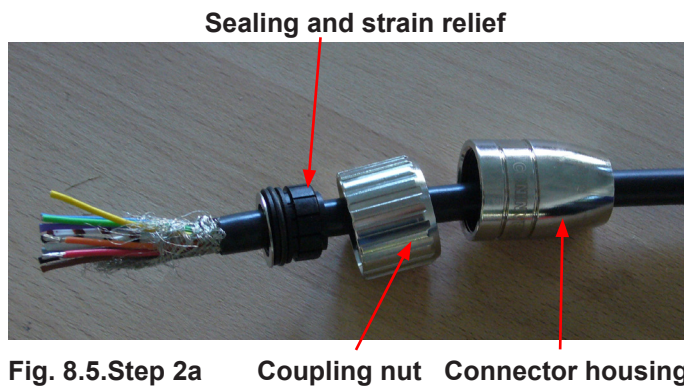


Fig. 8.5.Step 2a

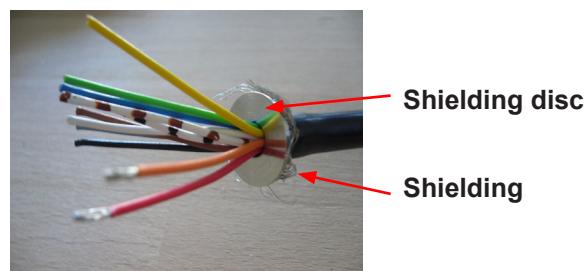


Fig. 8.6.Step 2b

- Solder wires as shown in Fig 8.7.

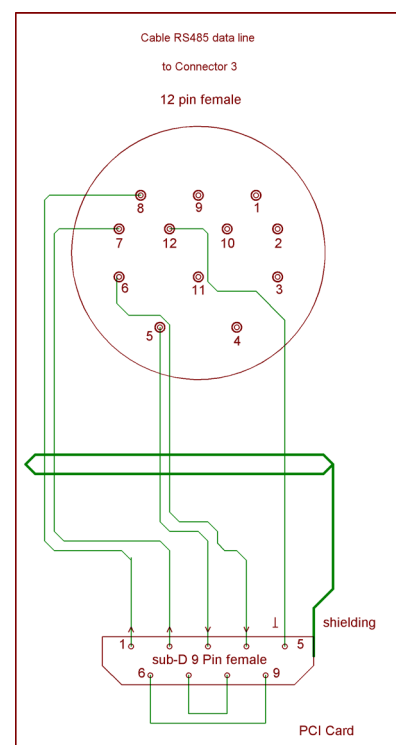
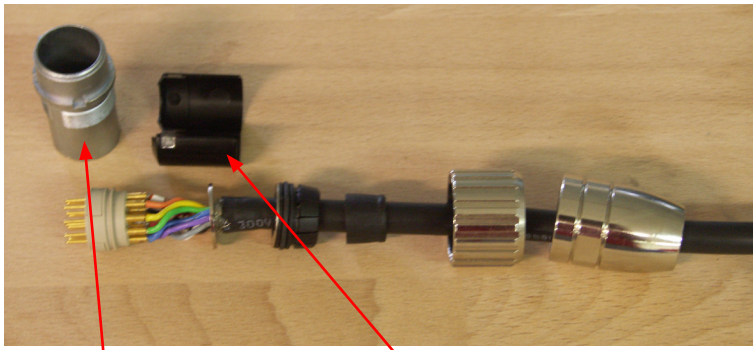


Fig. 8.7.Step 3

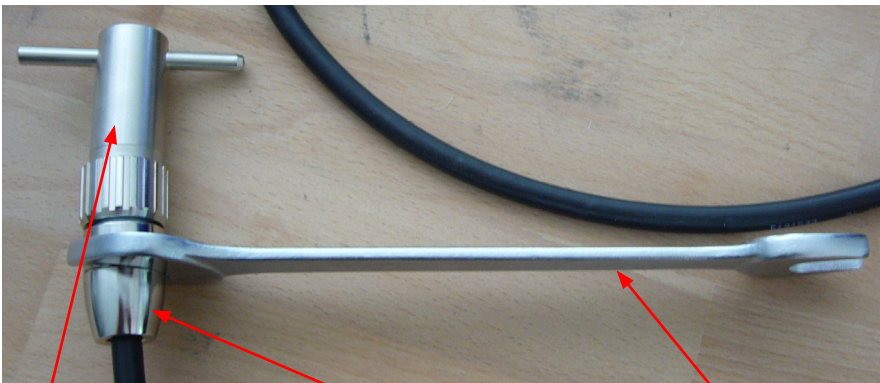


Enclosure cylinder

Insulation and distance sleeve

Fig. 8.8. Step 4

- After soldering, pull the insulation and distance relief over the wires
- Pull the enclosure cylinder over the soldered wires
- Finally, seize the connector housing by using the installation wrench and a flat wrench No. 22



Installation wrench

Connector housing

Flat wrench No. 22

Fig. 8.9. Step 5

Assemble the Sub-D9 connector on the other side of the cable. (Fig 8.7.) Below, you've got two pictures of the connector before and after assembly.



Fig. 8.10. Sub D9 connector before assembly



Fig. 8.11. Sub D9 connector after assembly

8.2. Installation Procedure of Mechanical Components

Installation / disassembly procedures are relevant to all designs of the mechanical parts and engines (the illustrations may represent the latest on-site installed assembly).



Attention: The list shown here is an excerpt of the main installation manual.



Mechanical installation Procedure on individual Engines

- Locate the installation position for the sensors
Indicate where inside the engine is the suitable place for the SOG (Splash Oil Guard) installation and operating of the SOG, **not less than 170 mm vertical space**, pay attention to moving parts and mechanical components. Indicate the space outside of the engine, place for cables in the cable conduit, place for dismantling parts of the engine without bothering the OCom sensors.
- Mark the position with a center punch
- Protect the engine, engine crankcase and oil-circulation system against bore chips
- Pre-drilling with a diameter of about 8 to 10 mm
- Fine-drilling with a diameter of **24.2 mm** for the **G3/4" DIN ISO 228-1** tapped through hole
- Cutting the thread **G3/4" DIN ISO 228-1**
- Cleaning the surface 20mm around the hole (metallic blank)
- Clean hole and thread of SOG until free from oil with motcom GmbH cleaning kit
- Use richly Loctite 2701 or the older product Loctite 270 for sealing and fastening the SOG
- Take the SOG and screw it from the inner side of the crankcase into the hole until 16 mm of the thread overlap the outside surface. The mark TOP and the kerf are on top. This position is important for the correct working of SOG. Fig. 8.12.
- Clean thread G3/4" and counter nut inner thread until free from oil
- Use richly Loctite 2701 or the older one 270 for sealing and fastening the counter nut.
- Use copper ring 27x32x1,5 DIN 7603A and fasten the counter nut.
- Install finger sensor using the o-ring 36x2 mm. Fig. 8.15.
- Connect all cables: starting at the evaluator to the first sensor, from first to second sensor, and so on from one sensor to the next and at last from last back to the evaluator. Fig. 2.2.
- Connect relay cables to alarm system as stated in manual from manufacturer
- Connect power supply 24 V DC, refer to manual for voltage tolerance and needed current
- Continue with chapter "3. Commissioning".

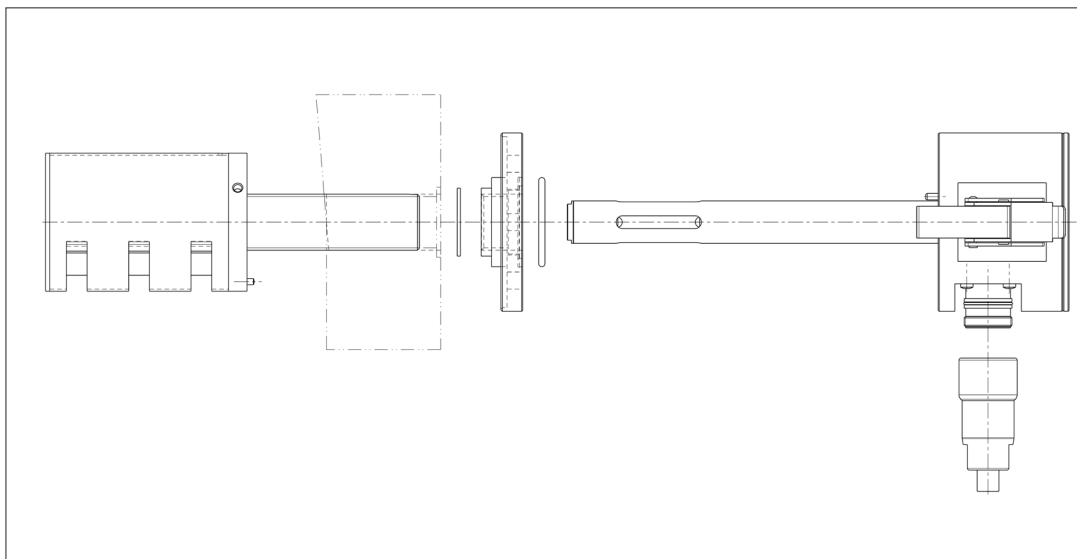


Fig. 8.12.Installation Step 1

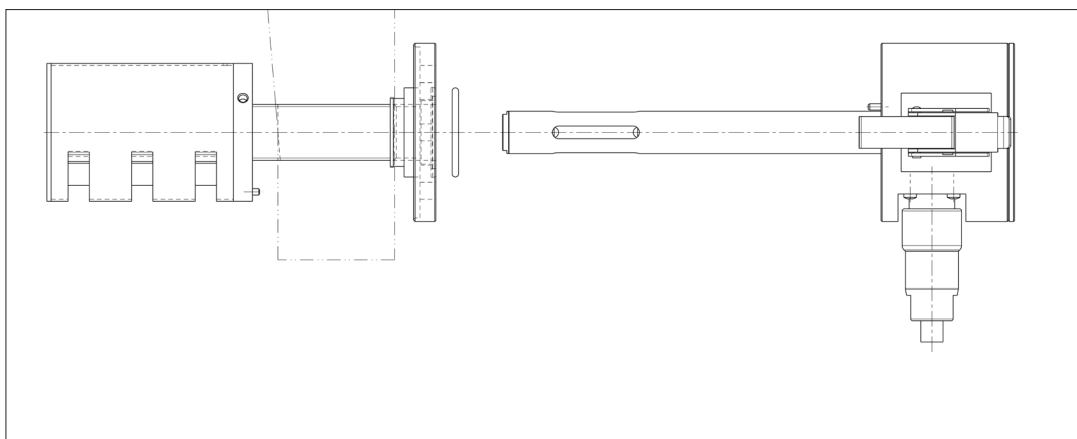


Fig. 8.13.Installation Step 2

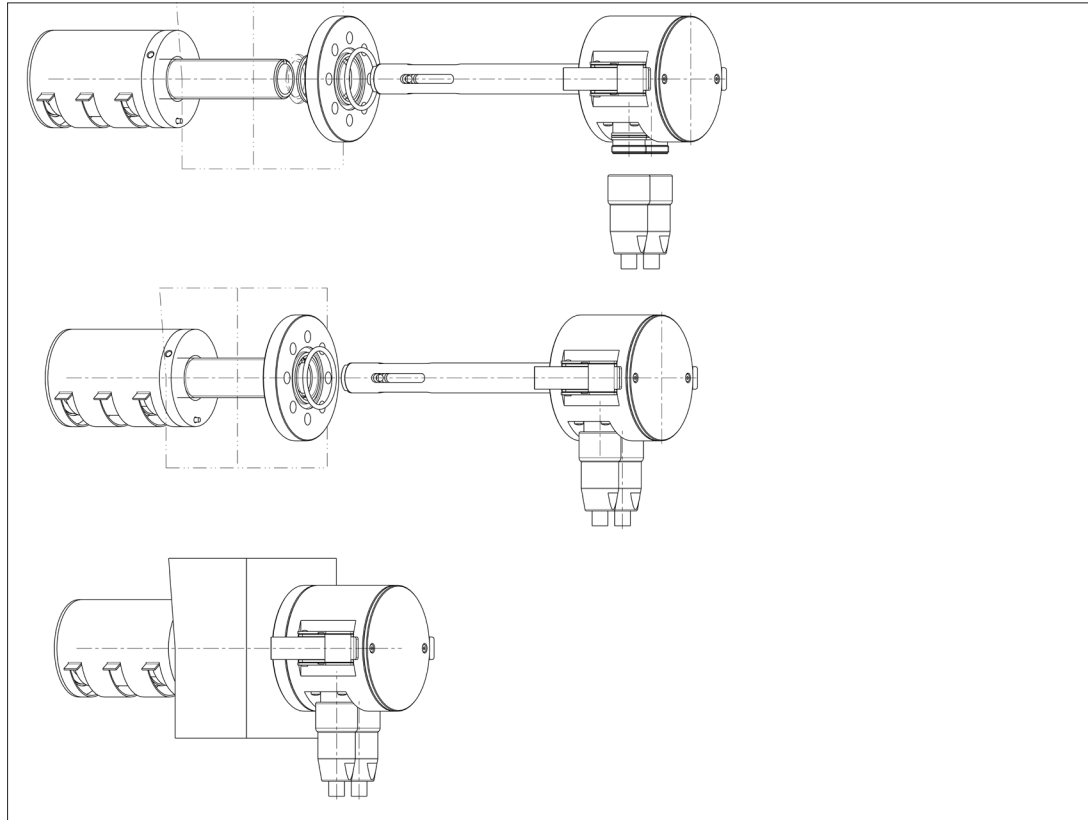


Fig. 8.14. Installation 3-D view

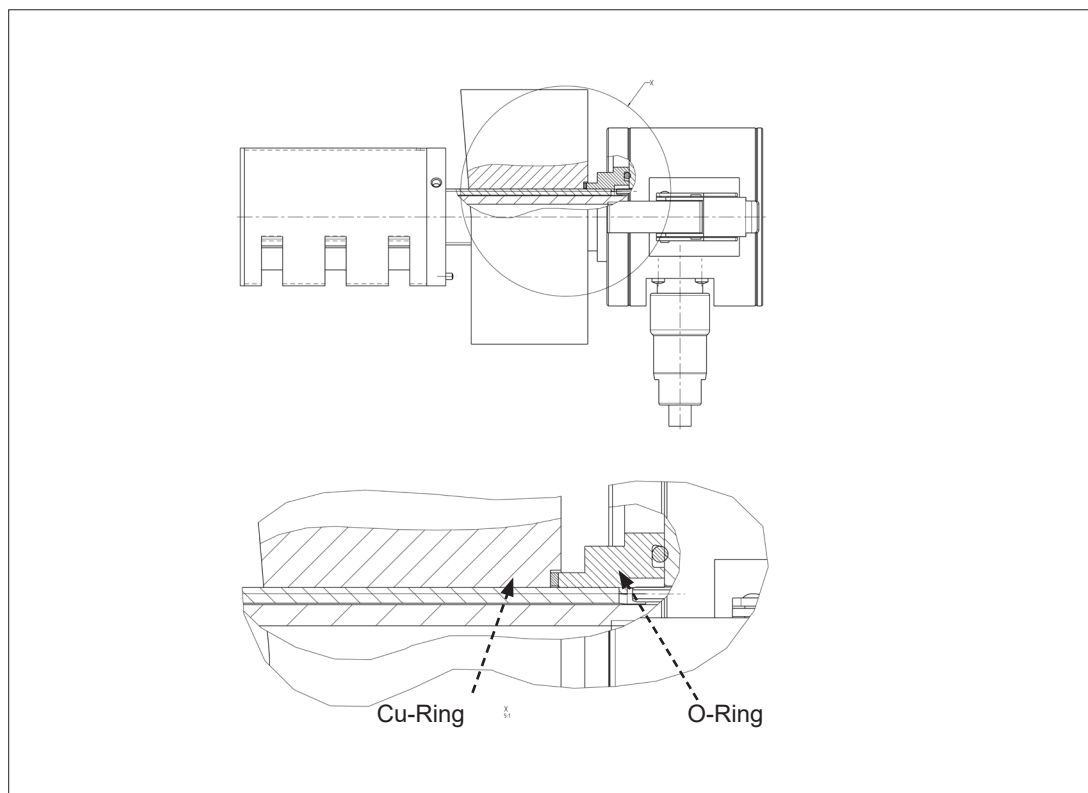


Fig. 8.15. Position of Seals

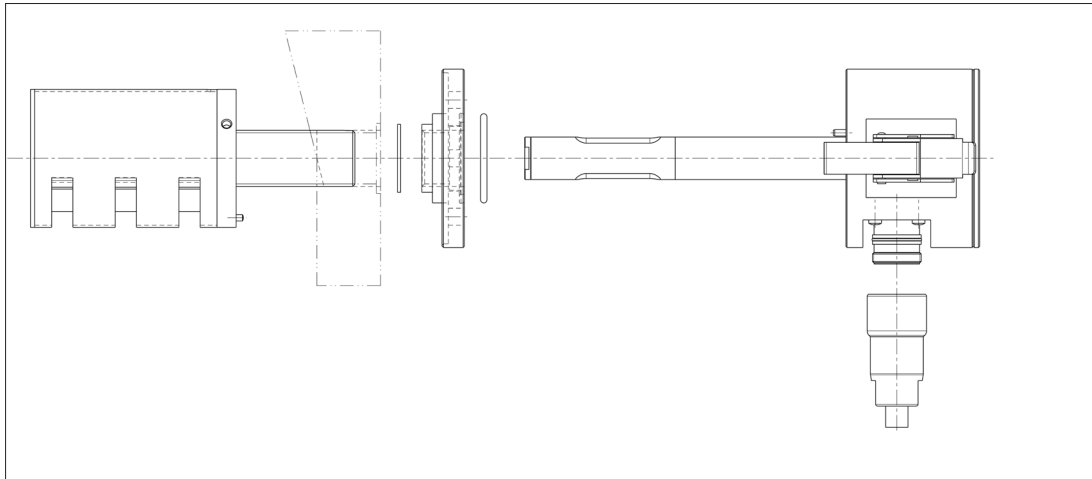


Fig. 8.16. Installation Step 1

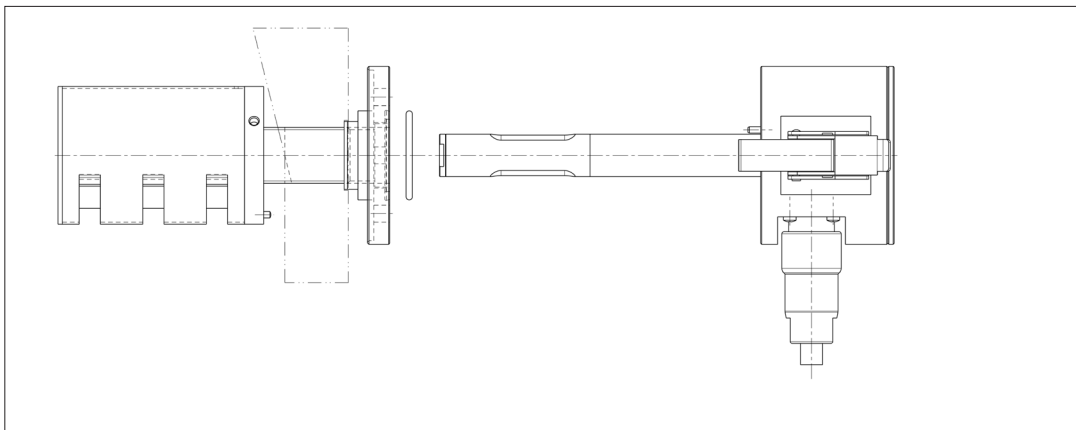


Fig. 8.17. Installation Step 2

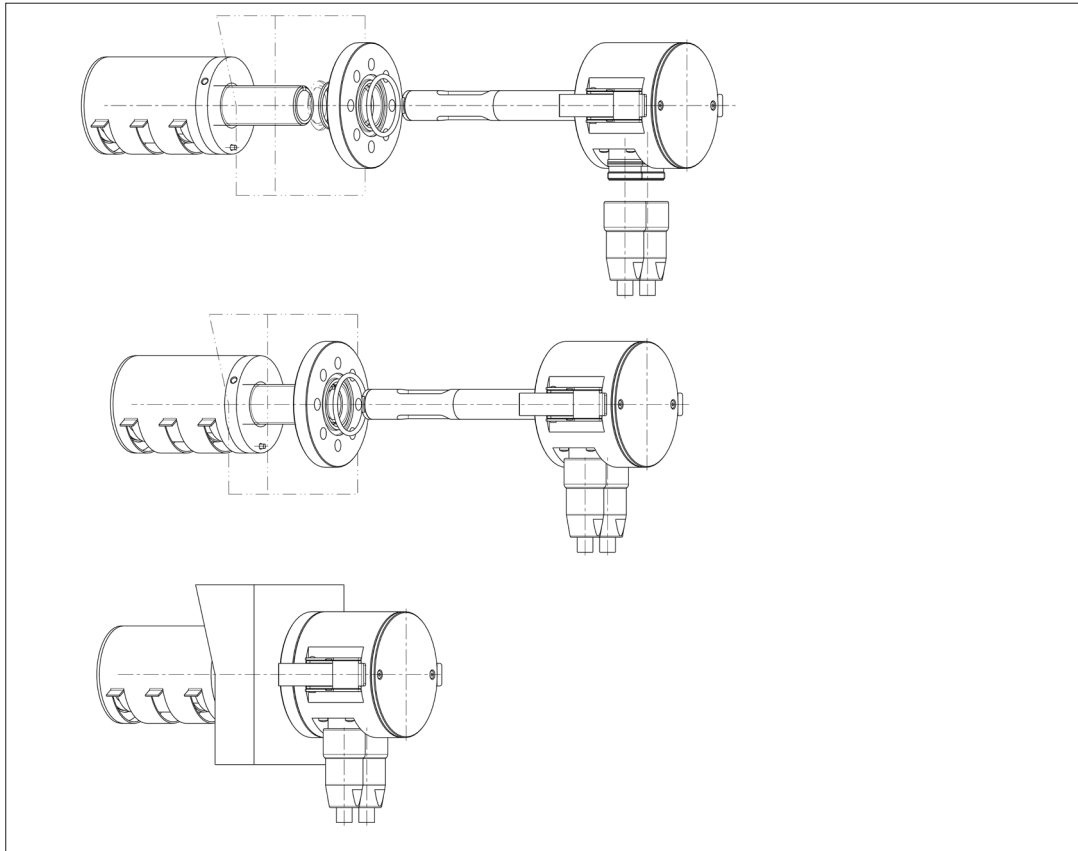


Fig. 8.18. Installation 3-D view

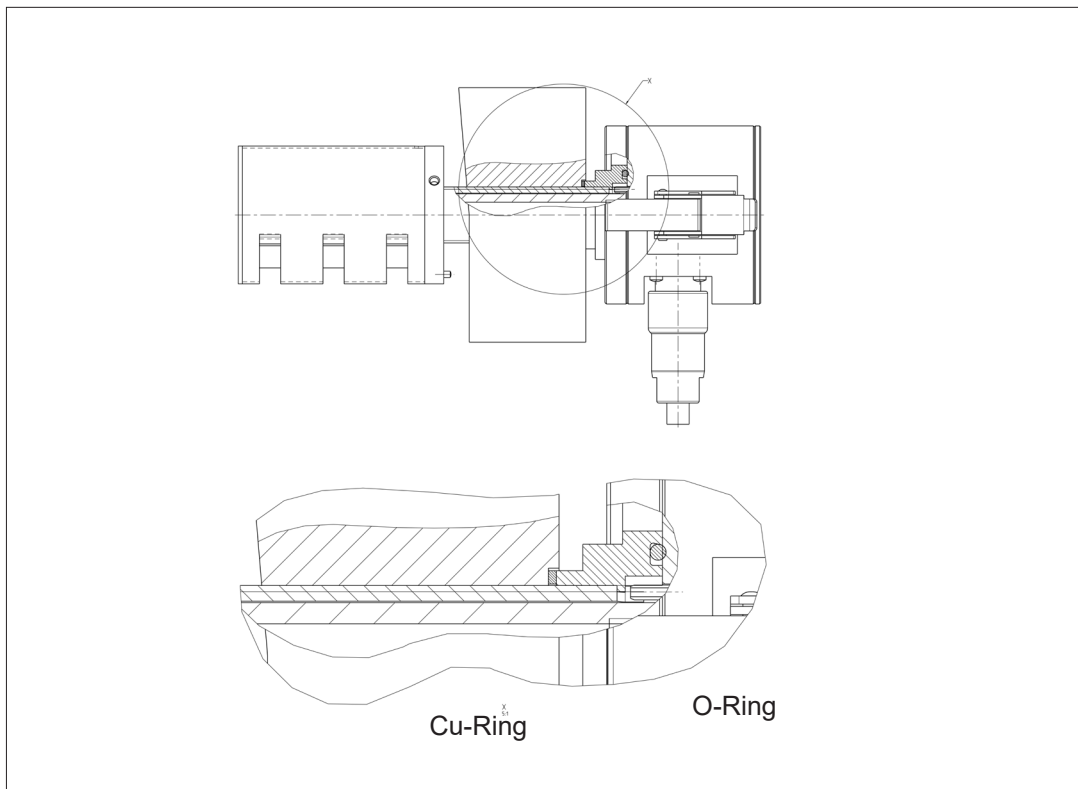


Fig. 8.19. Position of Seals

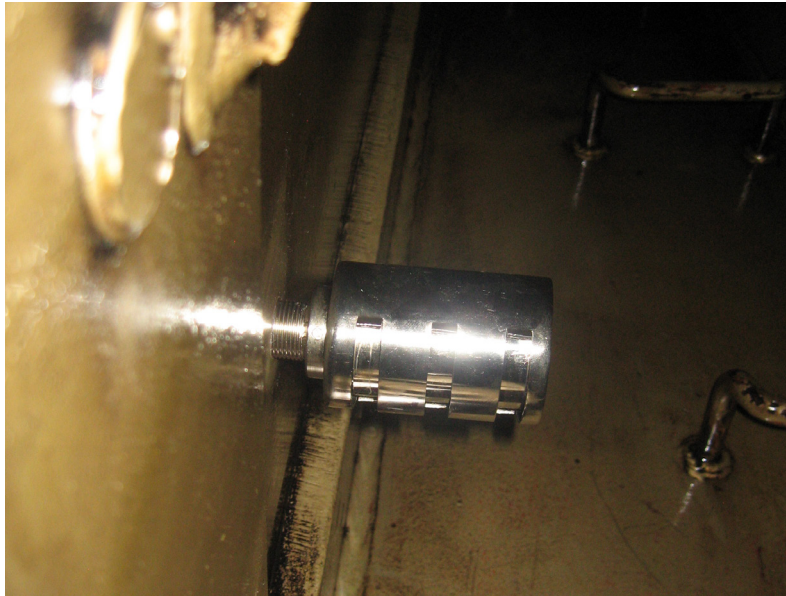


Fig. 8.20. Position of SOG inside the Crankcase



Fig. 8.21. Position of Counter Nut



Fig. 8.22. Installed Sensor of OCom System on a 4 stroke engine

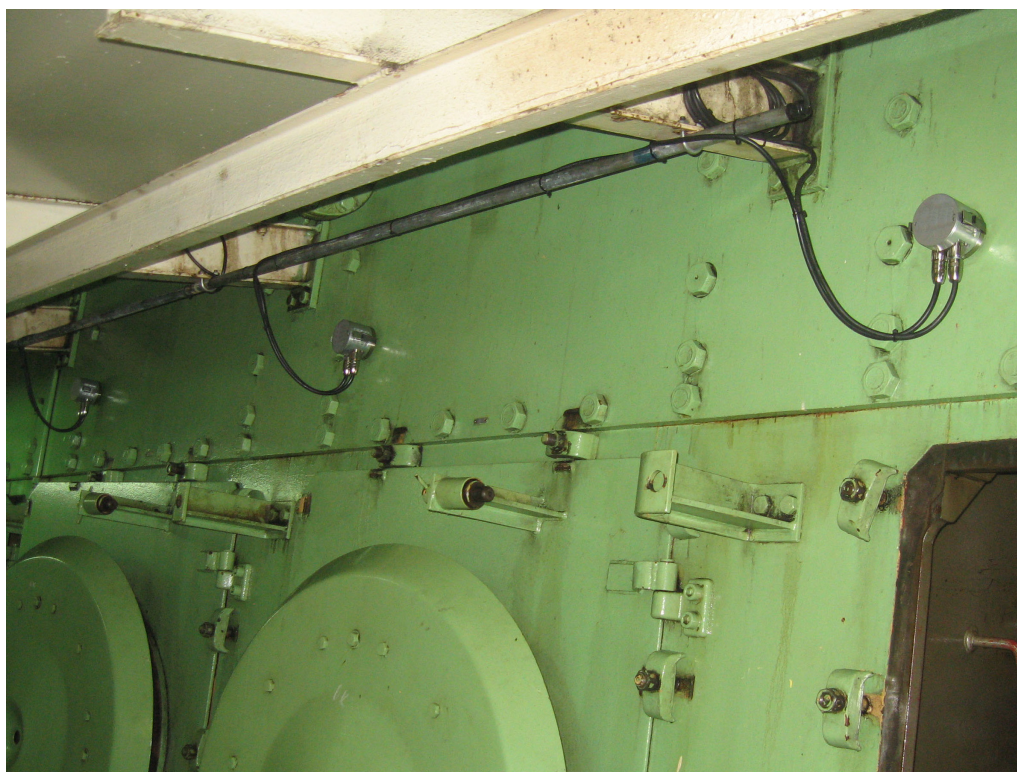
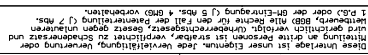
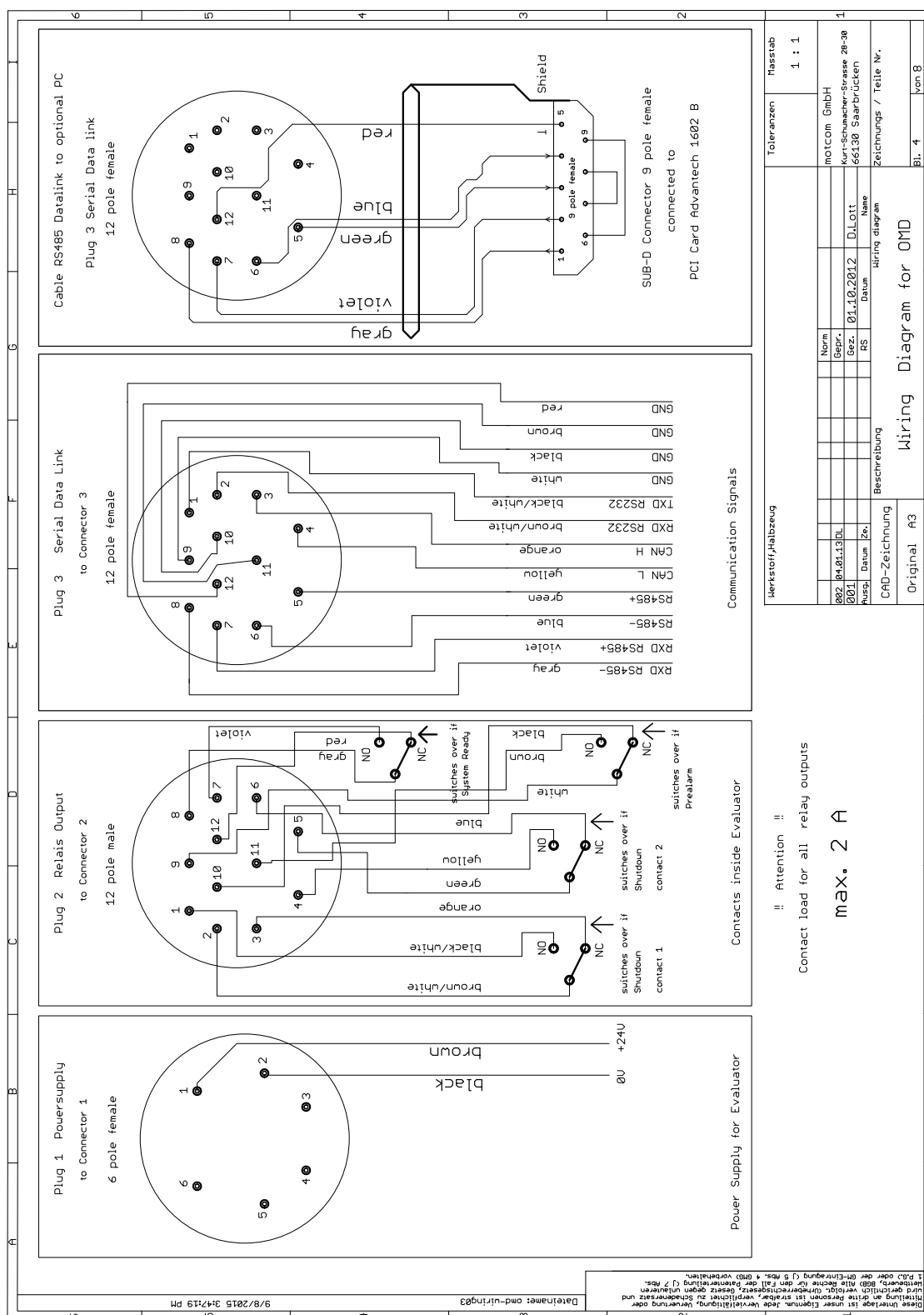
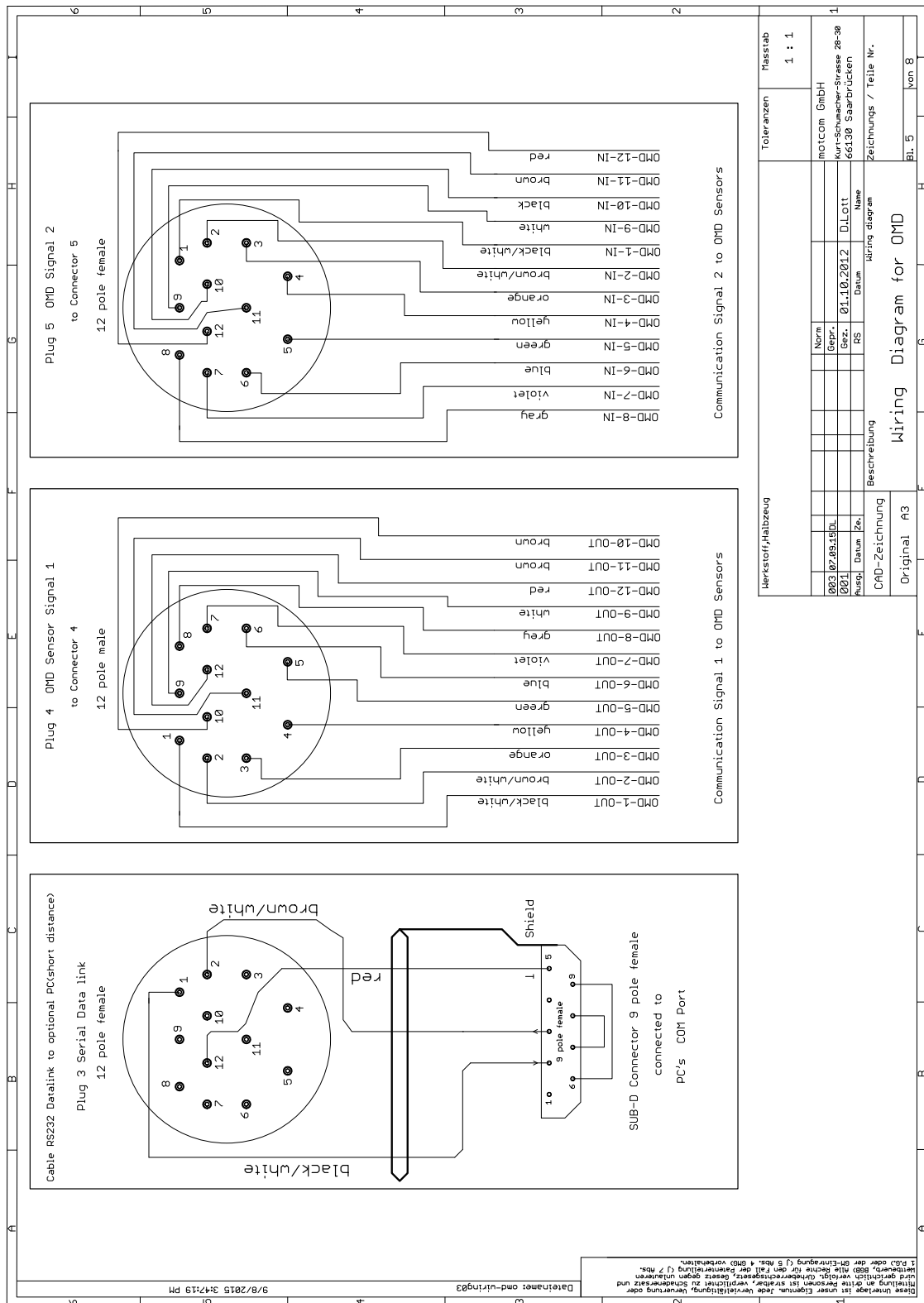


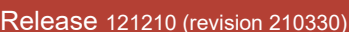
Fig. 8.23. Installed Sensor of OCom System on a 2 stroke engine

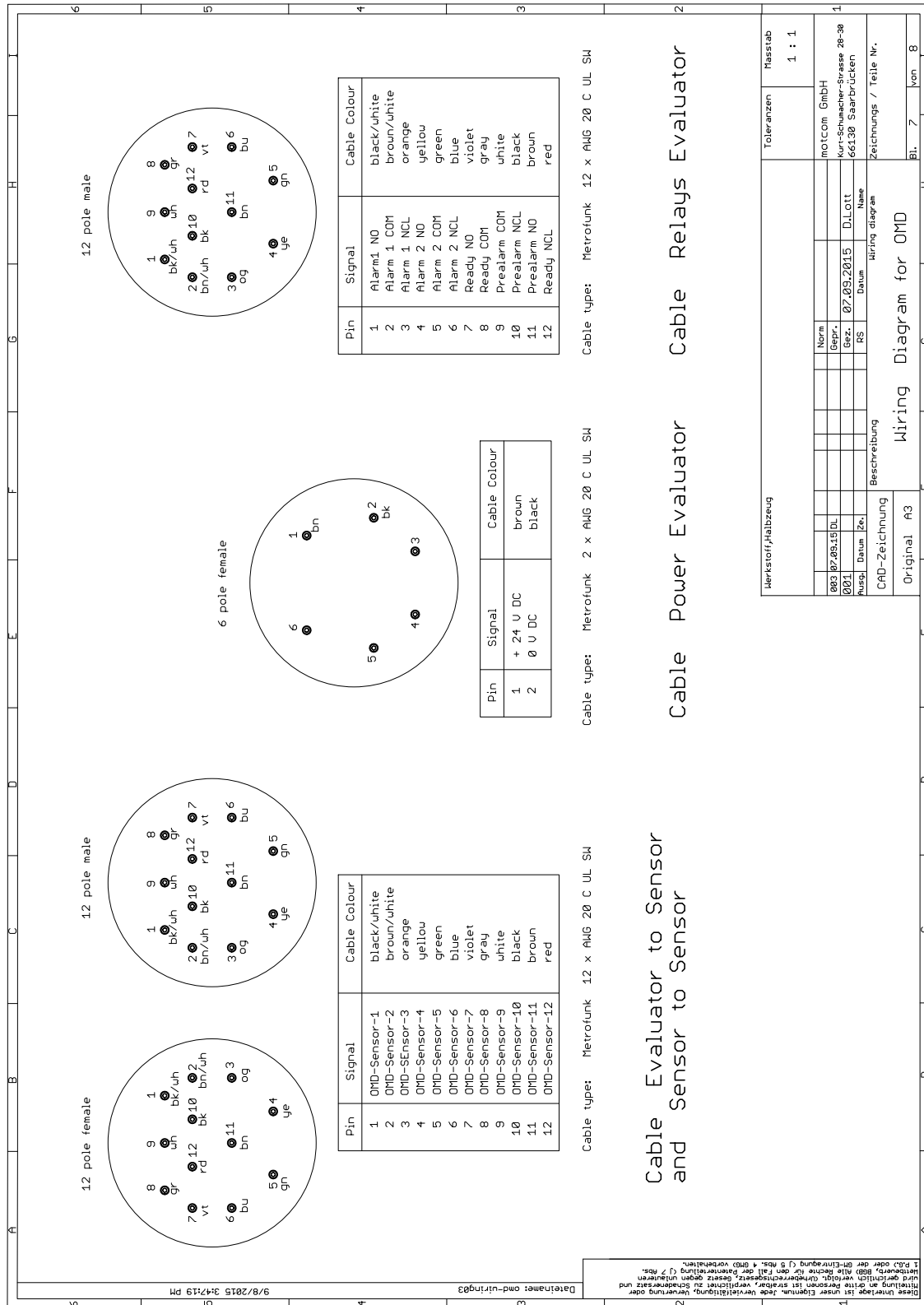
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Technical drawing of a mechanical assembly, showing three views: a top view, a side view, and an isometric view.

Top View Dimensions:

- Overall width: 98.7
- Overall height: 98.7
- Distance between mounting points: 98.7
- Mounting point diameter: $\varnothing 12$

Side View Dimensions:

- Overall height: 131.5
- Base diameter: 104
- Base thickness: 39.5
- Internal diameter: 8
- Internal diameter: 28.5
- Internal diameter: 30
- Internal diameter: 58
- Internal diameter: 67

Isometric View:

The isometric view shows the assembly from a 3D perspective, highlighting the cylindrical components and the mounting points.

Table:

UNO DC 20/10		PUBBLICAZIONE 10/10	
PUBBLICAZIONE 10/10		PUBBLICAZIONE 10/10	
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72
73	74	75	76
77	78	79	80
81	82	83	84
85	86	87	88
89	90	91	92
93	94	95	96
97	98	99	100

Signature: [Signature]

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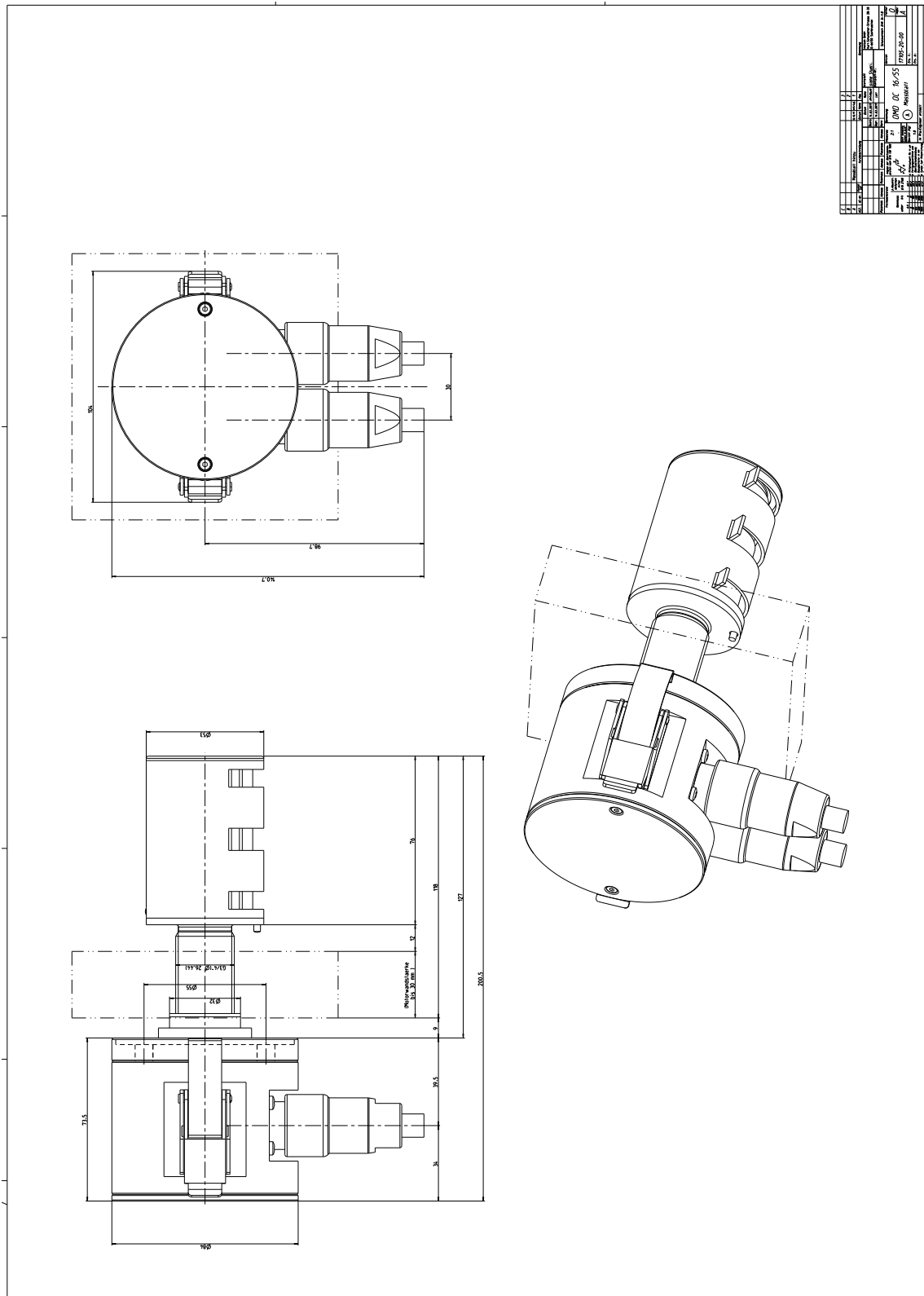


Fig. 8.25. OCom Sensor Type SiSe OC 16-55

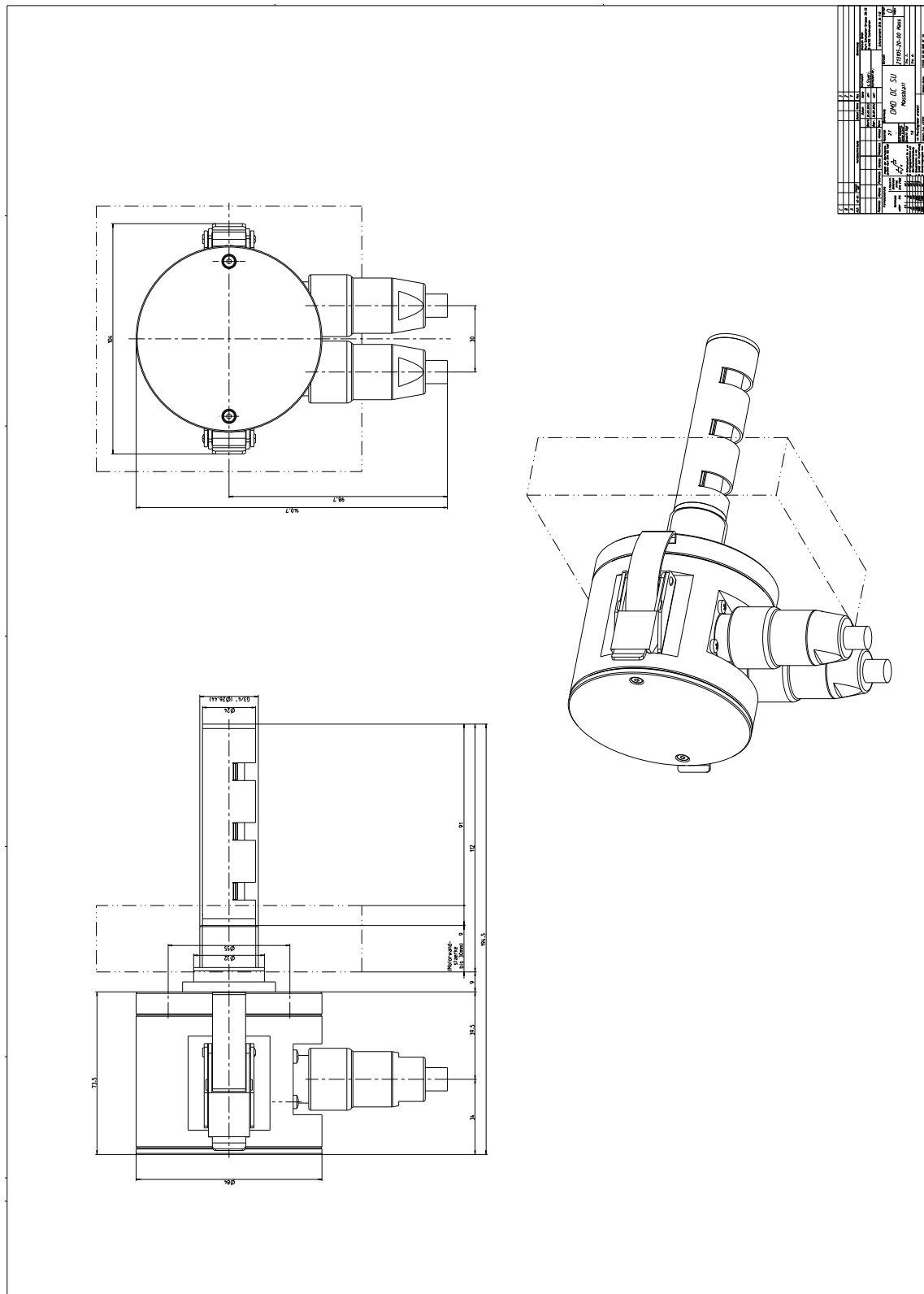


Fig. 8.26. OCom Sensor Type SiSe OC 14-37

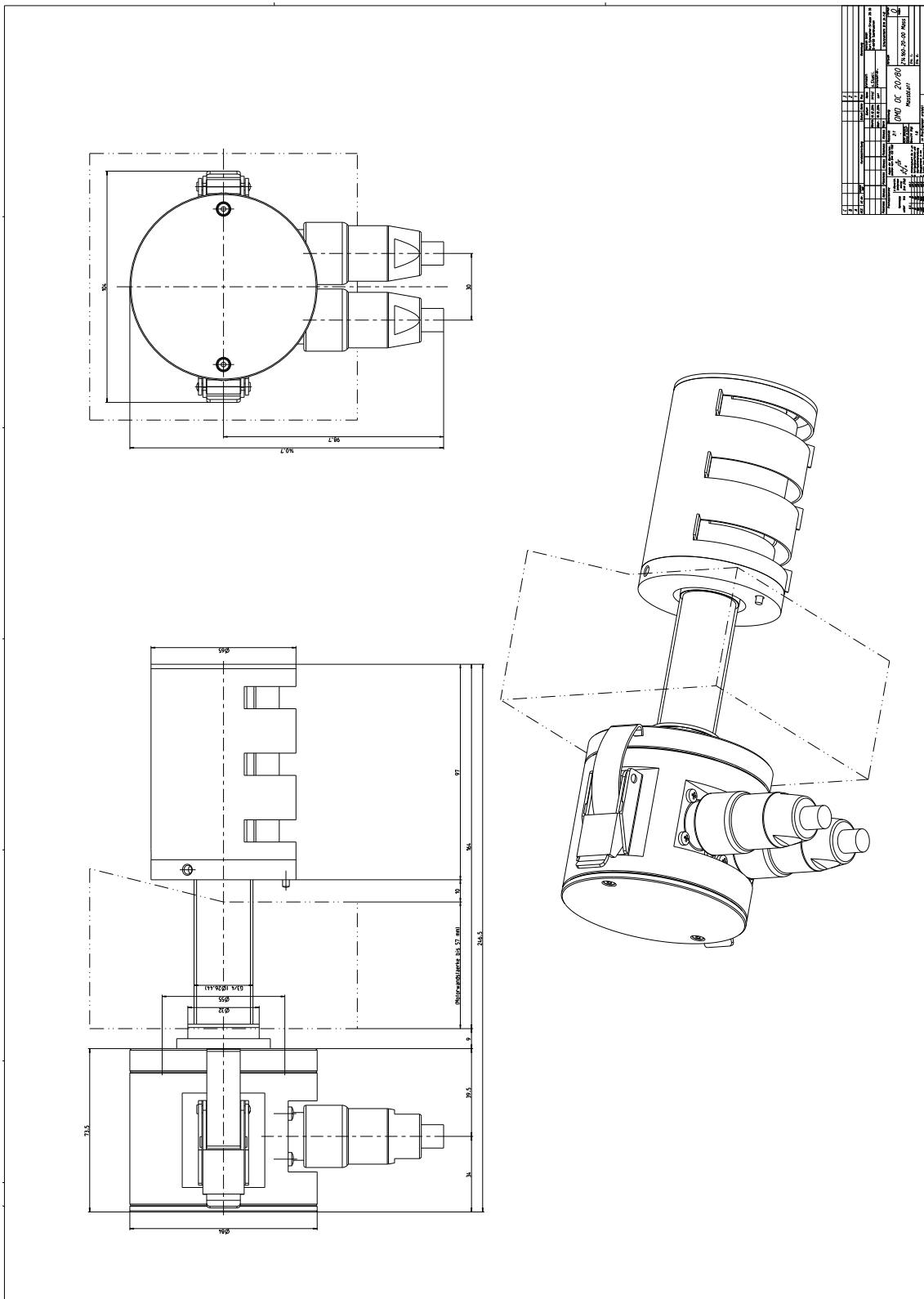


Fig. 8.27. OCom Sensor Type SiSe OC 20-80



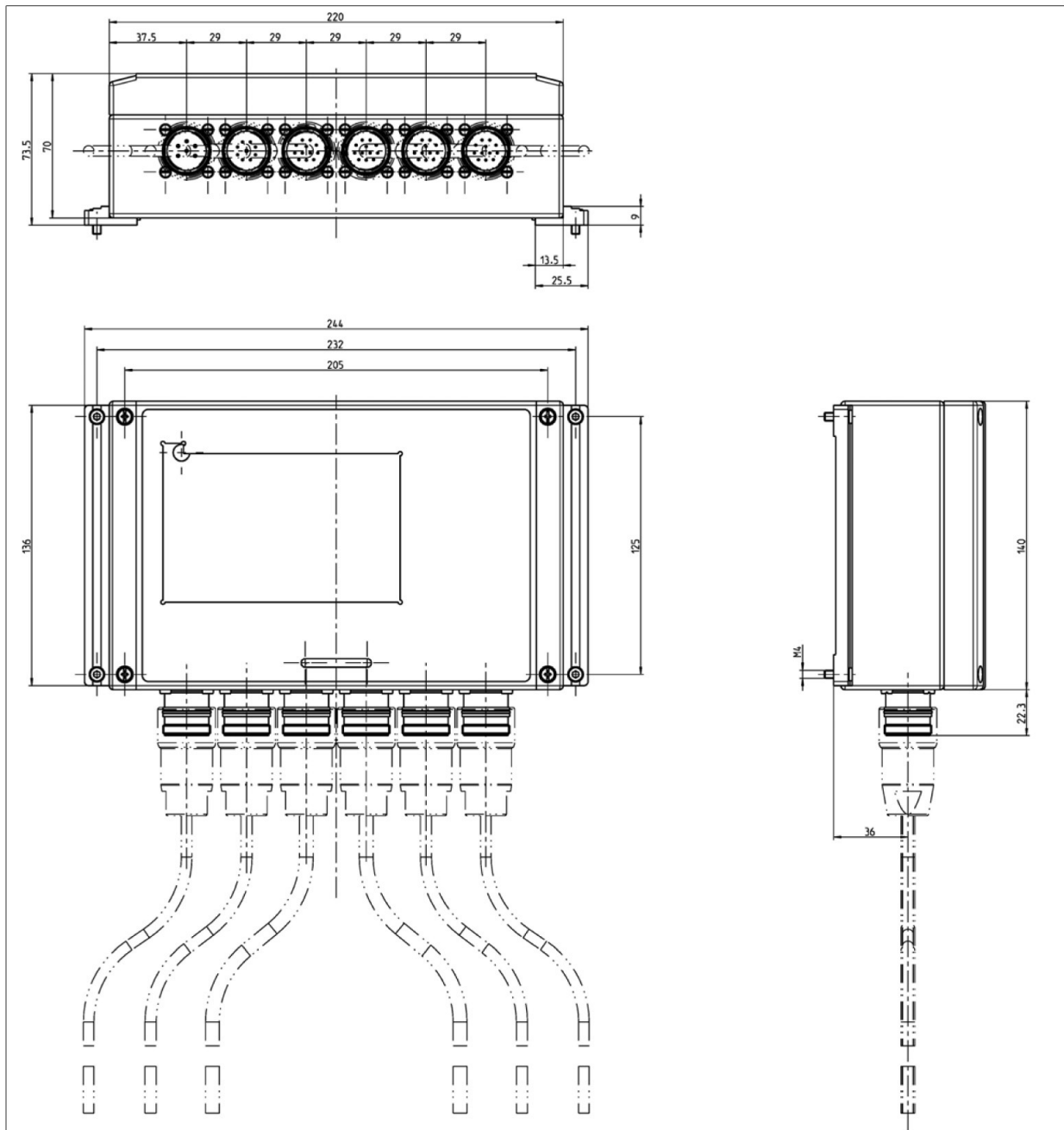


Fig. 8.29. OCom Evaluator

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