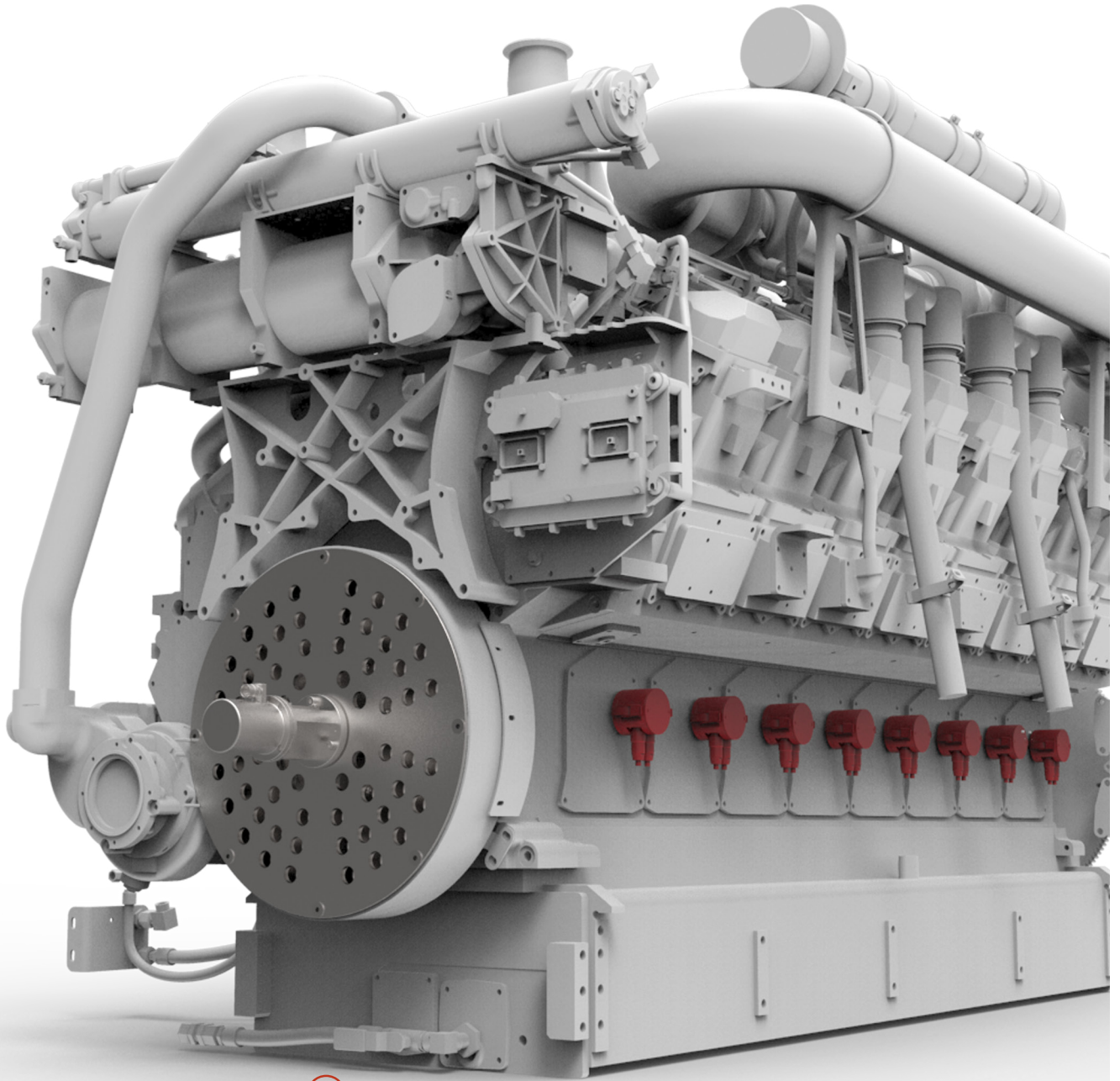


UserManual



SiCOMS[®]

**Single Compartment Oil Mist Online Detection
System Diesel- and -Version**

Part No.: 2 900 00 00000
Release: 251030

Table of revision

Version	Chapter	Changes	Release
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Imprint

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1 General

1.1 About this User Manual

These operating instructions describe the SiCOMS® / SiCOMS® EX system. By means of the nameplates of each item the SiCOMS® / SiCOMS® EX system can be clearly identified.

The operating instructions are to be kept available with the SiCOMS® system at all times.

The operating instructions contain important notes regarding system operation which are intended to ensure safe, appropriate and economical system operation at all times.

The operating instructions must be completely read by each operator before starting to work for the first time. The operator has to ensure that all operating personnel has fully understood the contents of these operating instructions.



The Single Compartment Oil Mist Online Monitoring System is sold under the names SiCOMS® / SiCOMS® EX and OCom / OCom EX.



For simplification, only SiCOMS® is used throughout this manual.

1.2 Warranty

It is mandatory to read this manual before commencing the repair, assembly or commissioning of the Single Compartment Oil Mist Online Monitoring System.

Caution:

The manufacturer's warranty will become void

- if any of the instructions presented within this manual are not followed!
- use of inadmissible operating media,
- faulty connection,
- preceding work that is not included in the scope of supplies and services,
- non-use of original spare parts and accessories,
- failure to perform required maintenance work.

Please see our Terms and Conditions of Delivery and Performance, available online at: www.motcomgmbh.com.

1.3 Copyright

These operating instructions may be used only by authorised personnel. They may only be given to third parties with the written consent of motcom GmbH.

All documents are protected under copyright law.

Forwarding and duplication of documents, in whole or in part, is not permitted unless authorised in writing.



All documents, drawings, data, and programs remain the exclusive property of motcom GmbH.

They are provided for the agreed purpose only and must not be used for any other purpose.

1.4 Safety instructions

Operation, maintenance and repair of the system and its components may only be carried out by authorised and qualified personnel.

The qualified personnel must have been trained to become:

Technical officer / chief engineer
Engine / Ship mechanic

or possess an equivalent level of training.



Notes regarding system operation which are intended to ensure safe, appropriate and economical system operation at all times.



These notes contain important information and serve to ensure trouble-free functionality.

In case of a SiCOMS® 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 () design is only provided by the SiCOMS® Ex Version. The use of SiCOMS® Ex Version with gas engines requires special safety measures!



1.5 Declaration of Conformity

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

Manufacturer motcom® GmbH
Kurt-Schumacher-Str. 28-30
D - 66130 Saarbrücken / Germany
Phone +49 681 8837904-0
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We declare on our own responsibility, that the products

Product description SiCOMS®
Single Compartment Oil Mist Online Monitoring System

Type designations SiCOMS®
SiCOMS® Ex only with sensors type SiSe/OC**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 60079-0:2018
VDE 0170-1:2019-09 (General requirements)
EN 60079-11:2012 (Intrinsic safety)

Notified body DEKRA Testing and Certification GmbH
Dinnendahlstr. 9
44809 Bochum / Germany
Phone +49 234 3696-105

Certificate BVS 13 ATEX E 116 X

66130 Saarbrücken, Germany, the 30th of October 2025



Dipl.-Ing. Dieter Lott
Managing Director

1.6 Scope of delivery

The main components of a SiCOMS® system are:

- 1.....16 sensors SiSe/OC xx-xx
- 1.....16 SOG (Splash Oil Guard)



Fig. 1.1 SiCOMS® sensor SiSe/OC20-68 incl. SOG (Splash Oil Guard) and Diffusor

- SiCOMS® Evaluator

Serves as a local control and for evaluation and display of all values. It can transmit all data via RS485 interface to a computer running the SiCOMS® Data_Logger software (optional) for enhanced visualisation and data storage

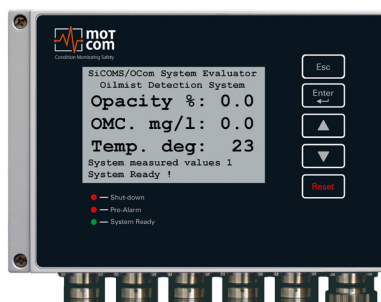


Fig. 1.2 SiCOMS® Evaluator

- SiCOMS® Cable and connector set specific to the engine / installation



Fig. 1.3 Cable ready to use

- User Manual incl. CD with Software and instruction manuals

Optional

- Data Logger PC or Notebook, completely installed with:
 - Operating System Windows® 1x, 64 Bit
 - OMD Logger Software
 - CD incl. Software installation files and a soft copy of the User Manual
- Software
motcom® Loganalyser software, an auto analysis tool for SiCOMS® Logfiles.



Fig. 1.4 CD with motcom® Loganalyser software

- Vibration Damping Module

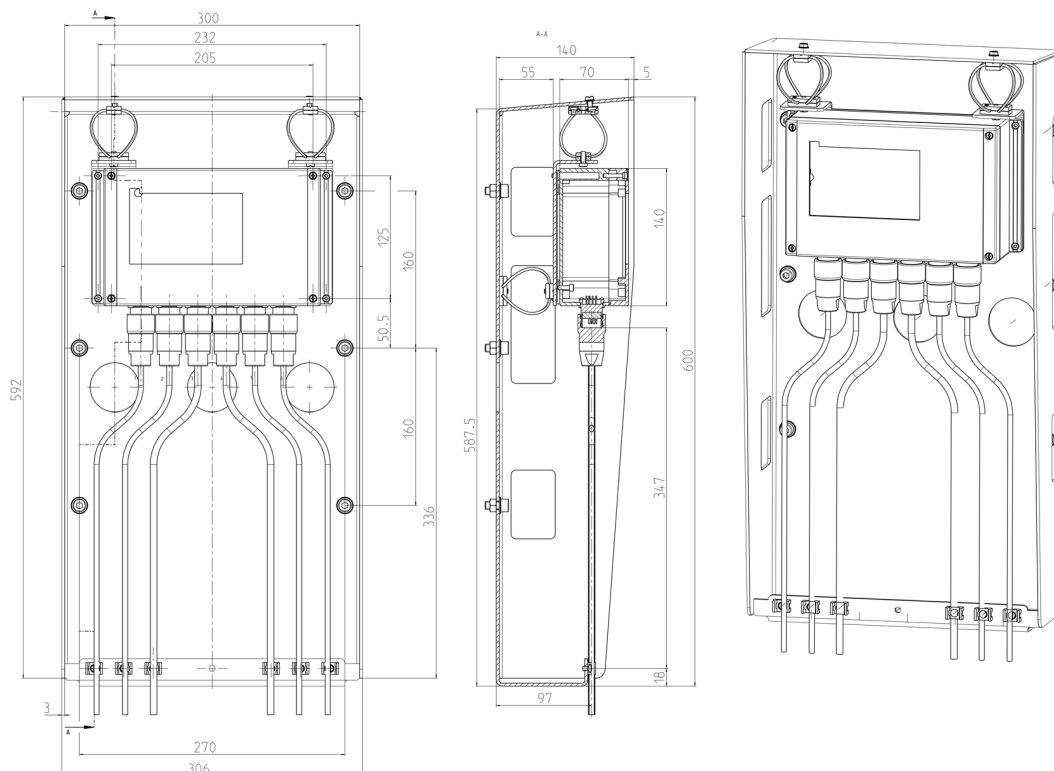


Fig. 1.5 Dimensioned drawing

- Inlay Module

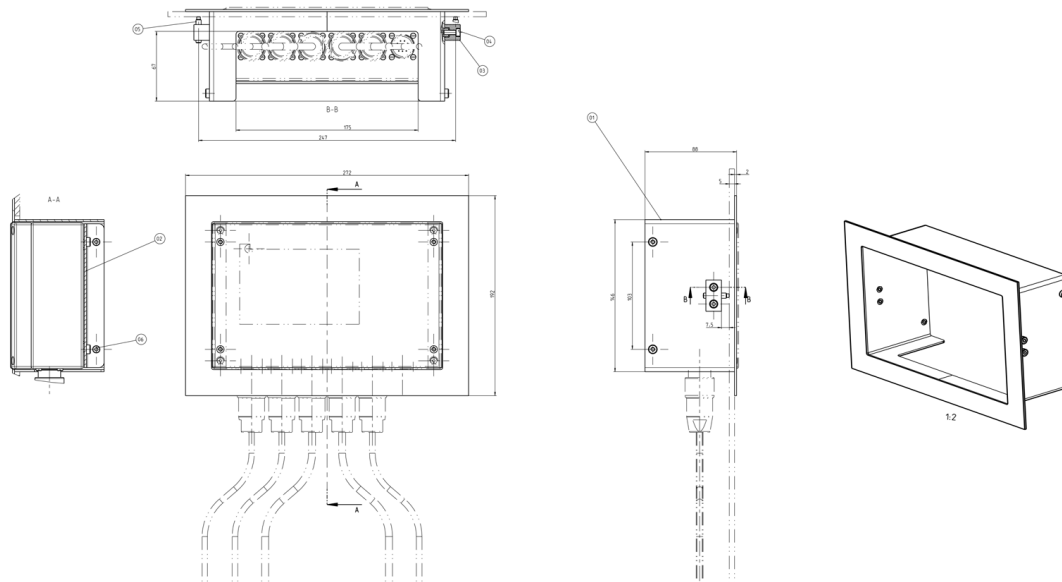


Fig. 1.6 Dimensioned drawing

1.7 List of Nomenclature / Abbreviation

Abbreviation	Description
SiCOMS®	Single Compartment Oil Mist Online Monitoring System
Evaluator	Control Device
IPxx	International Protection
LED	Light Emitting Diode
LCD	Liquid Cristal Display
PC	Personal Computer
PCIe	Peripheral Component Interconnect Express
RS485 / EIA-485	Recommended Standard 485

2 General Technical Data

2.1 Technical Data of Sensor and Evaluator

In this chapter we will give you an overview of the main technical data, ordering options and a brief block-wiring diagram. For a detailed pin layout and technical drawings, please refer to Chapter 12 Appendix.

Power Supply:	24V DC +30/-25% Operating Current: max. 3.0 A Up to 16 (sixteen) SiCOMS® 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:	LC Display 240*128 dots monochrom, TFT 480x272 dots, 16bit color 1 LED red "Shut-down" 1 LED red "Pre-Alarm" 1 LED green "System Ready"									
Connection cable:	UL/cUL 12 x AWG 20 Style 2464/1581 300 V 80°C									
Environment conditions only for Diesel version	Operational ambient temperature range:: 0°C - 70°C for SiCOMS® Evaluator 0°C - 85°C for SiCOMS® Sensor Electronics -10°C - 120°C for SiCOMS® Sensor Measuring Section Storage ambient temperature range: -25°C - 85°C Protection: IP65									

Certified by major classification societies

2.2 Important for use in EX zones



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 mW

radiant intensity of LED < 0,6 mW/mm²

Environment Conditions:

Sensor Electronics 0°C < T_a < +65°C

Sensor Measuring Section 0°C < T_a < +90°C

2.3 Connection Diagram

The connection for power supply, relay output, data link and connection of SiCOMS® sensors is shown in figure 2.1. It is possible to connect up to 16 sensors to one evaluator. For more information please refer Chapter 12 Appendix.

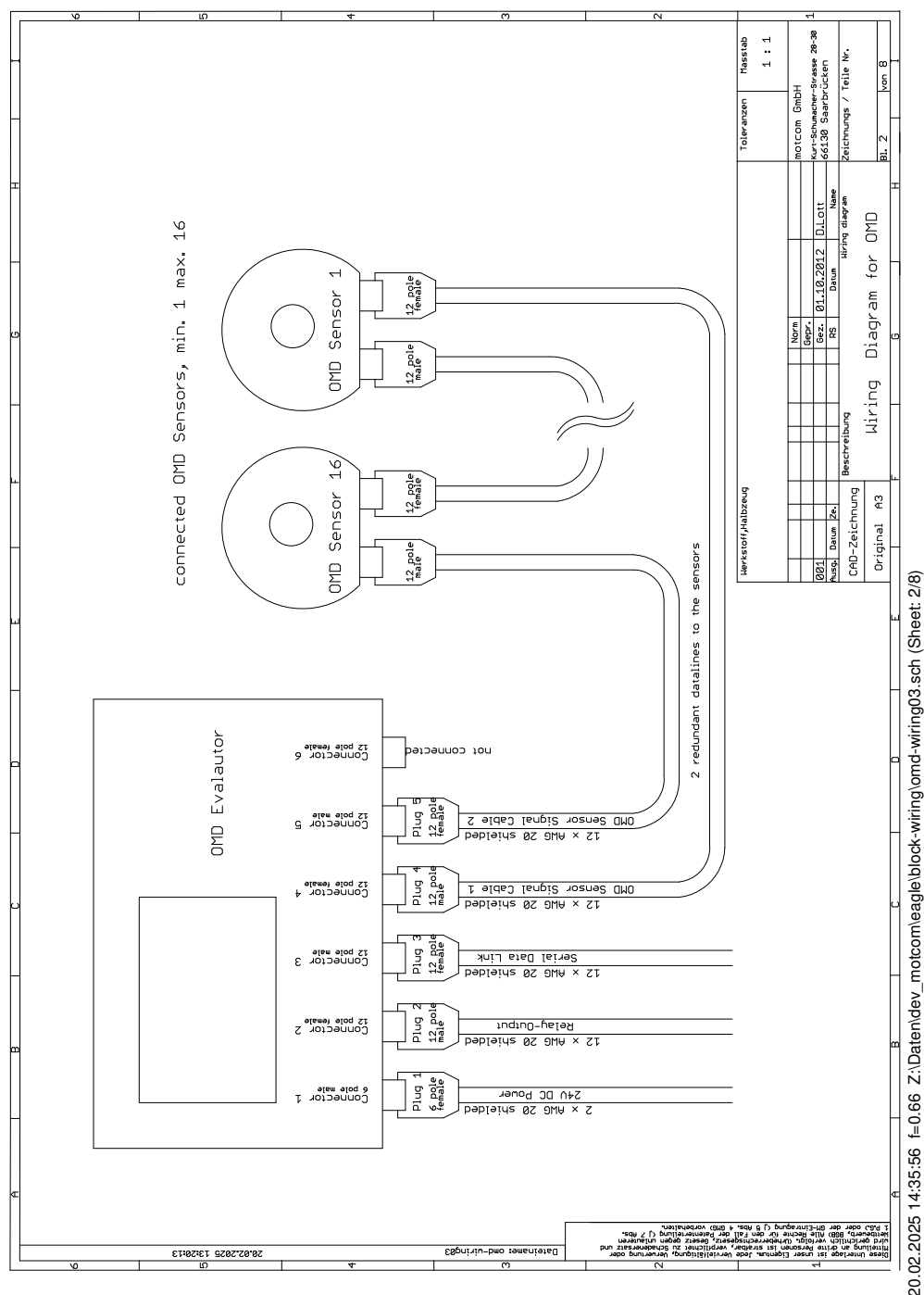


Fig. 2.1 Basic principle of connections

3 System Overview

The SiCOMS® system from motcom GmbH for each engine consists of:

- 1 Evaluator serves as a local control and for evaluation and display of all values. It can transmit all data via RS485 interface to a computer running the SiCOMS® OMD_Logger software (optional) for enhanced visualisation and data storage.
- 1....16 SiCOMS® sensors, installed in the engine cover with the appropriate...
- 1....16 SiCOMS® Splash Oil Guards (SOG)
- 1 cable set
 - sensor-sensor
 - sensor-Evaluator
 - Evaluator-sensor
 - power supply

for mounting the SiCOMS® sensor and connectors with the correct length, provided with the necessary plug-in connections as well as all seals, O-rings and small articles for the assembly

- 1 User and Installation Manual incl. CD with Software and Instruction Manuals

Optional:

- 1 Data Logger PC/Notebook complete installed with SiCOMS® OMD_Logger Software (able to connect with external Data Server over Modbus TCP/IP, see Fig. 3.1) and one CD including Software installation files and a soft copy of this User Manual,

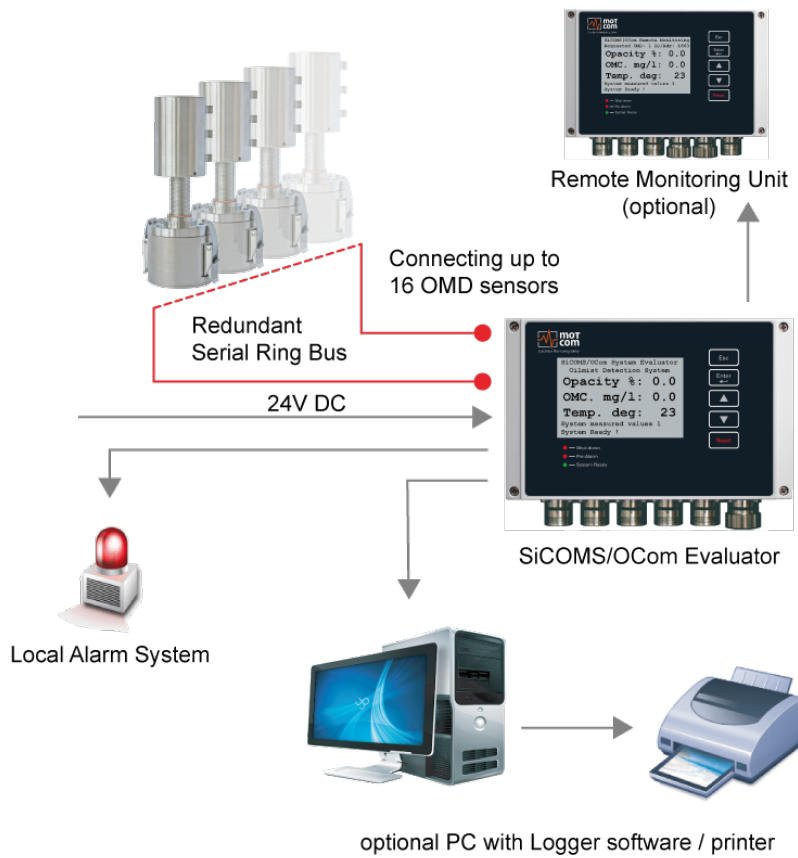


Fig. 3.1 System connection overview

3.1 SiCOMS® sensor and SOG

SiCOMS® performs compartment specific oil mist monitoring and lubrication oil temperature measurements.

The measuring unit of SiCOMS® 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 SiCOMS® 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 SiCOMS® 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.



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

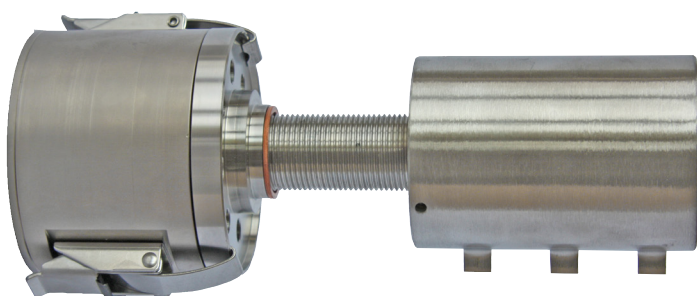


Fig. 3.2 SiCOMS® sensor with SOG



Fig. 3.3 SOG with counter nut and diffuser

Example for an Installation of SOG and sensor

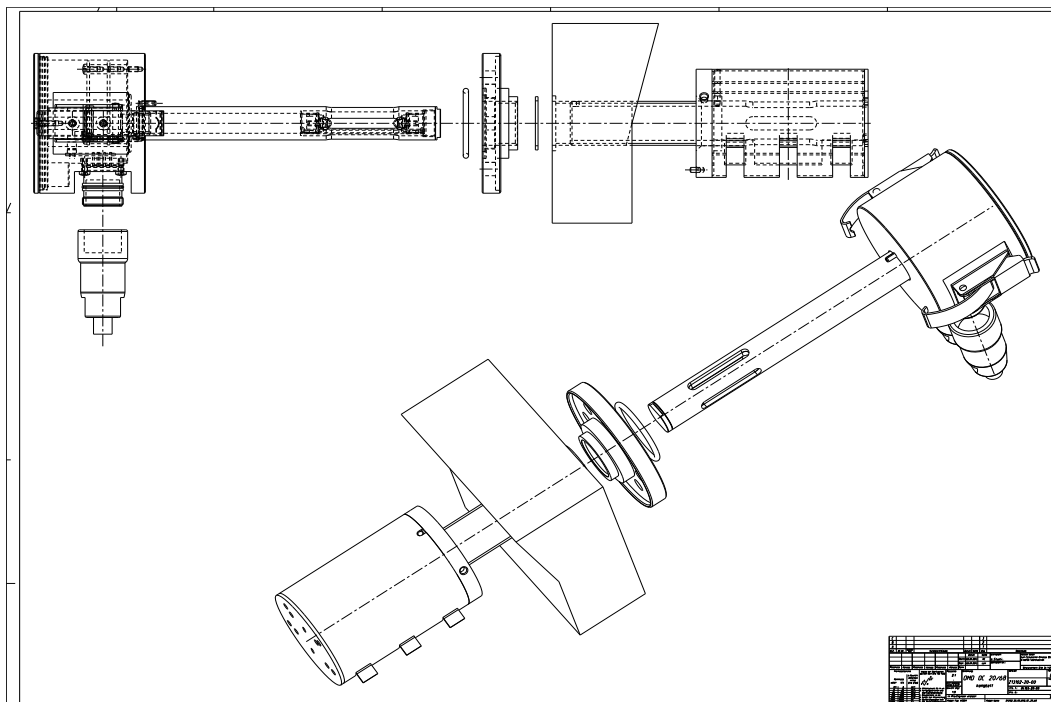


Fig. 3.4 Installation of SOG and sensor

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 5.2 Installation Position).

Wrong installation of the sensors cause the system to malfunction!

A guarantee in the event of damage is excluded by motcom GmbH!



3.2 Evaluator

The Evaluator (Fig.3.5) consists of a IP66 compliant, shock resistant metallic case, a LCD, three LEDs (Shut-down, Pre-Alarm, System Ready), four control keys (**Esc** , **Enter** , **▲** , **▼**) and one reset button **Reset** .

The Evaluator can be operated between 0°C to 70°C and 0-80% relative humidity, suitable for installation close to the engine. It displays all measurement values and parameters and is used for diagnostics of the SiCOMS® system.

The installation of the Evaluator is performed via two assembly rigs. If required, the Evaluator can be mounted vibration-free.



Strain on plugs and cables must be avoided at any time.

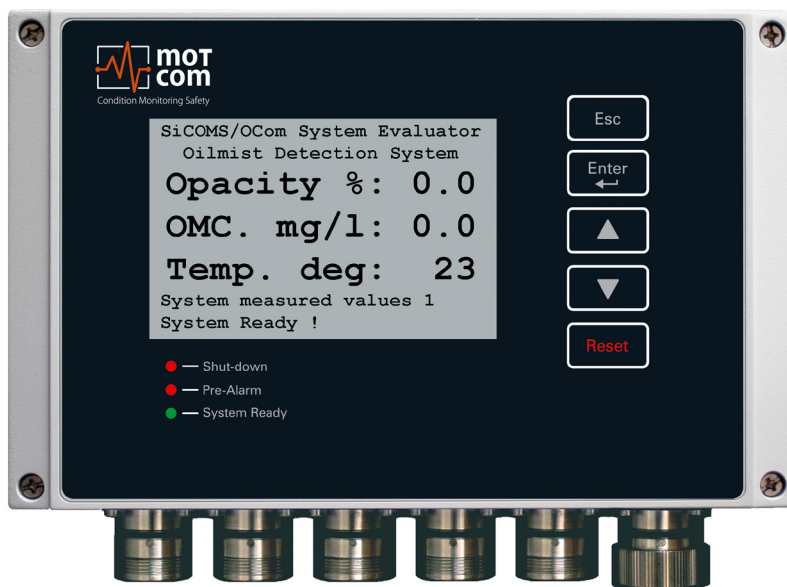


Fig. 3.5 SiCOMS® Evaluator

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

For exact dimensions, please refer to Chapter 12 Appendix

The control keys of the Evaluator are made as film-press buttons. Do not press them with any sharp items like knives, screw-drivers or ball-pens. Just touch the buttons with a slight pressure by a fingertip.



The keypad can be wiped with a mild cleaning agent. Please never use a solvent!

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



Note: Available Firmware updates are only to be applied by approved service technicians.

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



3.3 Cable and connector set



The cable and connector set is tailor-made for each type of engine (for an example see Fig. 3.6) and contains 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. 3.6 Cable with assembled connectors - ready to use-

3.4 Optional Data Logger PC with Data_Logger Software

The SiCOMS® Data_Logger Software enables the user to:

- monitor the measurement remotely on a computer
- store the recorded data in daily/hourly log-files
- display measured signals to allow trained engine operators to localize the damaged part(s)



The Data_Logger Software handles up to six SiCOMS® systems.

The Data_Logger Software does not replace the interconnection of the Evaluator with the engine safety and alarm system



To ensure proper functionality, only motcom GmbH approved PC installations are supported to operate with a SiCOMS® system.

The SiCOMS® folder should be utilized by the operator to be familiar with the software and any safety issues that may arise.



All products mentioned in this manual are to be handled only by trained and instructed personnel.

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



Requirements for the optional PC



The monitoring computer should have the following minimum requirements:

- Intel Core I5, 11th Gen or equivalent
- DVD RW DL Drive
- min. 8GB DDR4 RAM *
- min. 256 GB SSD M.2.P for OS
- min. 1 TB SSD for recording data (approx. 100MB per day per SiCOMS® system) *
- Windows Professional 10 or 11
- Mouse, Keyboard
- at least 3 free PCI/PCIe slots *
- Display resolution full HD
- RS485 Interface (RS232 via optional converter) **



*) depending on number of SiCOMS® applications running in parallel on the same PC

**) The RS485 cable length must not exceed 400 m

motcom GmbH provides optionally either the necessary hardware to convert the RS485 signal of the Evaluator into a standard RS232 PC-signal or a PCI/PCIe card installed in the computer (see Chapter 10 Spare Parts).

4 Functional Description

The SiCOMS® 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 SiCOMS® 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.

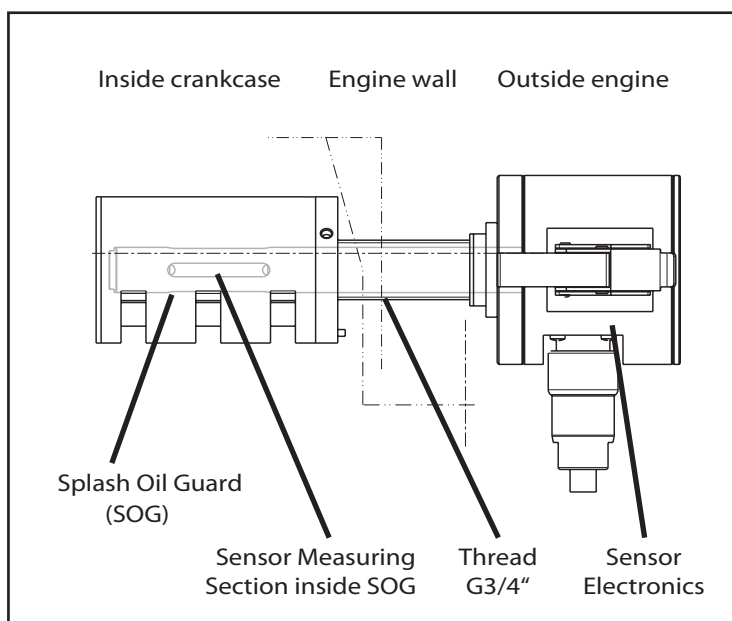


Fig. 4.1 Exemplary assembly of the SiCOMS® sensor

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.

SiCOMS® 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.

Based on a widely-used principle of light measurement, SiCOMS® does not have the disadvantages of some older OMD systems. The SiCOMS® 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 SiCOMS® 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 SiCOMS®.



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 SiCOMS® 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.

Important for users of Gas Engines



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

The SiCOMS® 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.



Advantages of the SiCOMS® 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.

4.1 Operating Elements/Settings & Parameters

The Evaluator has an LC-Display with a resolution of 240x128 dots, five control buttons and three LEDs that indicate the current system status.

As soon as the Evaluator is powered up, the initial info screens are shown for several seconds, and then the display switches to default screen (shown in Fig.4.2).

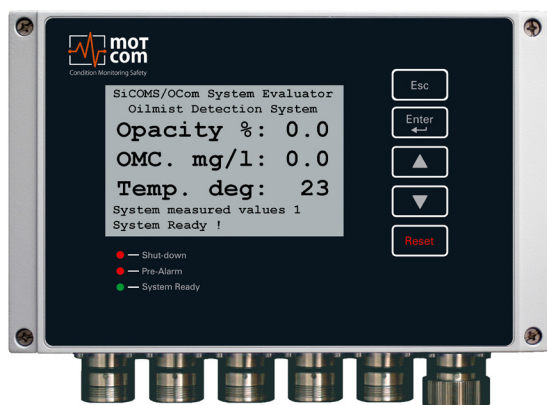


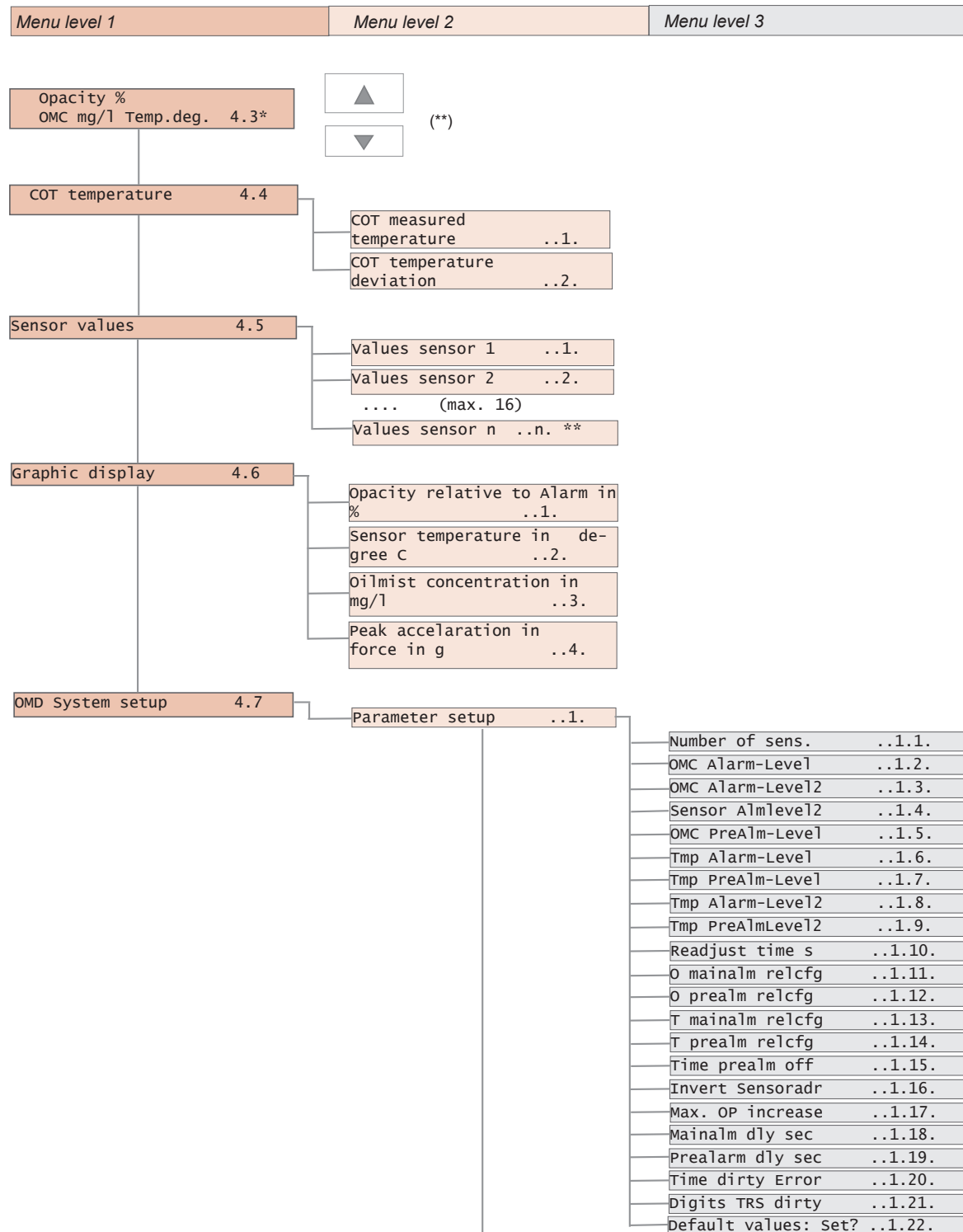
Fig. 4.2 Evaluator default screen:current SiCOMS® measured values

Evaluator button	Symbol in text	Button function
	[Esc]	go to the upper menu level, or cancel the change of system value. If [Esc] is pressed after entering the sublevel of menu items "Setup Parameter" or "Setup CPU", the Evaluator will restart
	[Enter]	enter a sublevel, or confirm a selected system value
	[▲]	move one menu item forward or increase value
	[▼]	move one menu item backward or decrease value
	[Reset]	reset alarm status If Evaluator indicates alarm, press the [Reset] button and hold for 3 sec to reset the alarm status

The SiCOMS® system information and settings are organised in a tree-like menu. The user can view the menu elements on the LC-display, move between them and change some system settings using Evaluator buttons. Changing of system settings is only possible if the PIN is entered before, otherwise the system settings are readonly.

4.2 Menu Structure

With this menu structure we want to give a complete overview of the levels, followed by explanations and tables on the next pages



please see next page

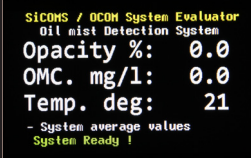
Menu level 1	Menu level 2	Menu level 3
	COT measure setup ..2.	- COT TD measure ena. ..2.1. - TD no. first sensor ..2.2. - TD no. of sensors ..2.3. - COT TD alarm enable ..2.4. - TD Alarm in 1/10 C ..2.5. - TD PreAlm in 1/10 C ..2.6.
	Setup Alminhibit ..3.	- Alm. Inhibit Hyst ..3.1. - AlmInh. S1 ena. ..3.2. - AlmInh. S1 temp ..3.3. - AlmInh. S2 ena. ..3.4. - AlmInh. S2 temp ..3.5. ... - AlmInh. S16 ena ..3.32. - AlmInh. S16 temp ..3.33.
	Setup CPU ..4.	- LCD brightness ..4.1. - Bargraph at OMALM ..4.2. - Modbus enable ..4.3. - Modbus address ..4.4. - Modbus extern ..4.5. - Modbus LRC calc. ..4.6. - PIN for Setup ..4.7. - Software Info ..4.8.
	Test & Service ..5.	- Sys. Ready Relay ..5.1. - Mainalarm Relay ..5.2. - Alarm2/Pre Relay ..5.3. - Sensor cleaning ..5.4. - Temp. calibration ..5.5. - Hardware values ..5.6.

Note:

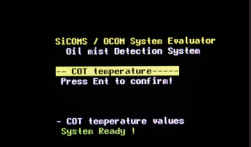
* - The numerical indexes correspond to the chapter numbers from this User Manual.

** - n is the number of connected sensors

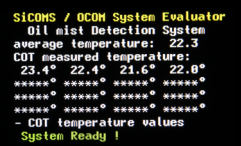
4.3 System measured values (default screen)

Menu level 1	Menu level 2	Menu level 3	Descriptions
 Default screen			The screen shows system average values for all connected OMD sensors: - Opacity in percent - Oil mist concentration in mg/l - Temperature in C° If the "COT TD measure ena." option in menu xxx is set to "On" the next menu that appears on pressing button "up"

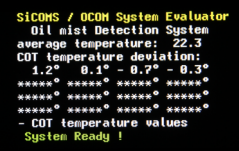
4.4 COT temperature

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

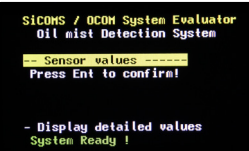
4.4.1 COT measured temperature

	 COT measured temperatur		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 <i>n</i> in °C or a placeholder "*****" if the sensor <i>n</i> is not connected. The average temperature for all connected sensors is indicated above the table
--	--	--	--

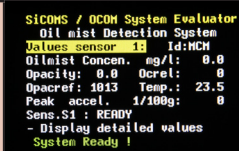
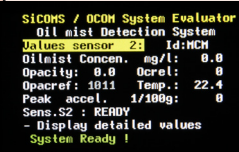
4.4.2 COT temperature deviation

Menu level 1	Menu level 2	Menu level 3	Descriptions
	 COT temperature deviations		COT temperature deviation from the average temperature for each connected sensor is displayed in the same form as described in 4.4.1

4.5 Sensor values

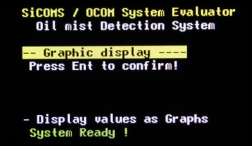
			Detailed values for the selected sensor 1....16
---	------	--	---

4.5.1 Detailed values for the 1st sensor

	Values sensor 1		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
	Values sensor 2		
	Detailed values for the selected sensor		

Menu level 1	Menu level 2	Menu level 3	Descriptions
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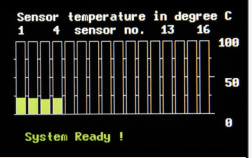
4.6 Graphic display

			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.
---	--	--	--

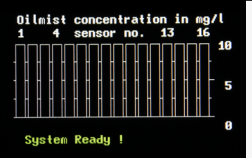
4.6.1 Opacity relative to Alarm in %

			The bargraph shows opacity relative to alarm in %. 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.
---	--	--	--

4.6.2 Sensor temperature in degree C

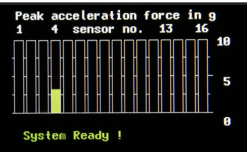
			The bargraph displays sensor temperature in °C.
---	--	--	--

4.6.3 Oilmist concentration in mg/l

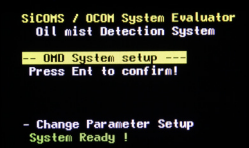
			The bargraph shows oil mist concentration in mg/l
---	--	--	--

Menu level 1	Menu level 2	Menu level 3	Descriptions
--------------	--------------	--------------	--------------

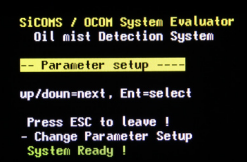
4.6.4 Peak acceleration force in g

			The bargraph displays peak acceleration force in g
	Peak acceleration force in g		

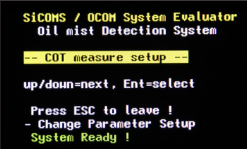
4.7 OMD system setup

			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.
--	--	--	---

4.7.1 Parameter setup

			View and change system parameters.. Press [Enter] to switch to the sublevel: PIN for Setup must be entered in "Setup CPU" menu before changing parameter. Otherwise, the following warning appears: P??
	Parameter setup		

4.7.2 COT measure setup

			Press [Enter] to switch to the sub level. PIN for Setup must be entered in "Setup CPU" menu before changing parameter. Otherwise, the following warning appears: P??
	COT measure setup		

Menu level 1	Menu level 2	Menu level 3	Descriptions
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4.7.3 Setup Alminhibit

	<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup Alminhibit --- up/down=next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre>		View and change alarm inhibit parameters Press [Enter] to switch to the sublevel: PIN for Setup must be entered in "Setup CPU" menu before changing parameter. Otherwise, the following warning appears: P??
--	--	--	--

4.7.4 Setup CPU

	<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup CPU ----- up/down=next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre>		View and change Evaluator communication and display parameters.
--	---	--	--

4.7.5 Test & Service

	<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Test & Service ---- up/down=next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre>		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 before using Test & Service menu. Otherwise, the following warning appears: P??
--	---	--	---

Table 1 Setup Parameter Details 4.7.1 ..1-22

Level 1	Level 2	Level 3	Descriptions
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Number of sens. : 4 up/down=next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready !	Number of connected OMD sensors in the range of 1 to 16. Default is 16.
		Number of sens	
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- OMC Alarm-Level : 6 up/down=next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready !	Main alarm level for oil mist concentration in the range of 1 to 10. Default is 7, which corresponds to 2.5 mg/l.
		OMC Alarm-Level	
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Sensor AlmLevel2 : 1 up/down=next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready !	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.
		OMC Alarm-Level2	
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Sensor AlmLevel2 : 1 up/down=next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready !	Sensor number at the alternative location (see the previous section); possible values: 1 to n where n is the number of connected sensors.
		Sensor Almlevel2	
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- OMC PreAlm-Level : 70 up/down=next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready !	Pre-alarm level for oil mist concentration in percents of main alarm level. Range of possible values: 20% to 100%. Default value is 70%.
		OMC PreAlm-Level	
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Tmp Alarm-Level : 110 up/down=next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready !	Temperature main alarm level in °C. Range of possible values: 10°C to 130°C with step 10°C, or 0 = Off. If "Off" is entered, temperature alarm is disabled. Default: 110°C.
		Tmp Alarm-Level	
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Tmp PreAlm-Level : 100 up/down=next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready !	Temperature pre alarm level in °C. Range of possible values: 20°C to 130°C. Default is 100°C.
		Tmp PreAlm-Level	

Level 1	Level 2	Level 3	Descriptions
		SICOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Tmp Alarm-Level2: 110 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! Tmp Alarm-Level2	Main temperature alarm level for an alternative sensor location (e.g. 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.
		SICOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Tmp PreAlm-Level2: 100 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! Tmp PreAlm-Level2	Temperature pre alarm level for an alternative sensor location (e.g. a sensor in the gear box) in °C. Range of possible values: 20°C to 130°C. Default is 100°C.
		SICOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Readjust time s: 1 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! 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.
		SICOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- O mainalm relcfg: R1 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! 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.
		SICOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- O prealm relcfg: R2 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! 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.
		SICOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- T mainalm relcfg: R1 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! 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.
		SICOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- T prealm relcfg: R2 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! 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.
		SICOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Time prealm off: 5 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! Time prealm off	Time in seconds for automatic reset of pre-alarm. Range of possible values: 1 to 60 seconds. Default is 5 sec.

Level 1	Level 2	Level 3	Descriptions
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Invert Sensoradr: Off up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! 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). Attention: By pressing [Enter] to confirm the selection, the Evaluator will be restarted.
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Max. OP increase: 460 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! 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.
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Mainalm dly sec: 3 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! 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.
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Prealarm dly sec: 3 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! 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.
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Time dirty Error: 10 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! 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.
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Digits TRS dirty: 400 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! 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.
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- Parameter setup ---- Default values: Set? up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! 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.

Table 2 COT measure setup Details 4.7.2 ... 1-6

Level 1	Level 2	Level 3	Descriptions
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- COT measure setup -- COT TD measure enable:On up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! COT TD measure enable	On – enable COT temperature difference measurement (COT temperature menu xxxx is displayed). Off – disable COT measurements and hide the COT temperature menu.
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- COT measure setup -- TD no. first sensor: 1 up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! TD no. first sensor	The number of first sensor that is used in COT temperature difference measurement.
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- COT measure setup -- TD no. of sensors: 4 up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! TD no. of sensors	The total number of sensors involved in COT temperature difference measurement.
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- COT measure setup -- COT TD alarm enable:On up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! COT TD alarm enable	On – enable alarm activation if COT TD alarm condition is met. Off – COT TD alarm will be not activated.
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- COT measure setup -- TD Alarm in 1/10 C: 40 up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! 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.
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- COT measure setup -- TD PreAlm in 1/10 C: 30 up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! 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
		SiCOMS / OCOM System Evaluator Oil mist Detection System -- COT measure setup -- TD Alminh in 1/10 C: 200 up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! TD Alminh 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.

Table 3 Setup Alminhibit Parameters Details

Level 1	Level 2	Level 3	Descriptions
		<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup Alminhibit---- Alm.Inhibit Hyst: 2 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre> 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
		<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup Alminhibit---- AlmInh. S1 ena:Off up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre> Alminh. S1 ena.	Alarm inhibit for sensor 1. "On" means enabled, "Off" – disabled. Default: "Off".
		<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup Alminhibit---- AlmInh. S1 temp: 10 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre> Alminh. 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.
		<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup Alminhibit---- AlmInh. S2 ena:Off up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre> Alminh. S2 ena.	Alarm inhibit for sensor 2. "On" means enabled, "Off" – disabled. Default: "Off".
		<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup Alminhibit---- AlmInh. S2 temp: 10 up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre> Alminh. 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 "AlmInh. S[n] ena." and "AlmInh. S[n] temp." are repeated for each sensor up to S16)

Table 4 Setup CPU Details 4.7.4 1-8

Level 1	Level 2	Level 3	Descriptions
		<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup CPU ----- LCD brightness : 30 up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre> 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.
		<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup CPU ----- Bargraph at OALM: ON up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre> Bargraph at OALM	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
		<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup CPU ----- Modbus enable : ON up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre> Modbus enable	Status of Modbus interface. ON – enabled, OFF – disabled.
		<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup CPU ----- Modbus address : 1 up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre> Modbus address	Modbus address of the Evaluator in the range of 0 to 99
		<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup CPU ----- Modbus extern : OFF up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre> 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"!
		<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup CPU ----- Modbus LRC calc : 1 up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre> Modbus LRC calc	Modbus LRC calculation method. Possible values: 0 - disabled 1 - ASCII (default) 2 - binary.
		<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup CPU ----- PIN for Setup : *** up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre> 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 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??".
		<pre> SiCOMS / OCOM System Evaluator Oil mist Detection System -- Setup CPU ----- Software Info : up/down-next, Ent-select Press ESC to leave ! - Change Parameter Setup System Ready ! </pre> Software Info	Firmware version of the Evaluator (read-only).

Table 5 Test & Service Details 4.7.5 1-6

Level 1	Level 2	Level 3	Descriptions
		SICOMS / OCOM System Evaluator Oil mist Detection System <pre>-- Test & Service ----- Sys. Ready Relay :OFF up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready !</pre> Sys. Ready Relay	The Ready Relay can be switched on and off manually for testing purposes.
		SICOMS / OCOM System Evaluator Oil mist Detection System <pre>-- Test & Service ----- Mainalarm Relay :OFF up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready !</pre> Mainalarm Relay	The Relay 1 (usually used as Main Alarm relay) can be switched on and off manually for testing purposes.
		SICOMS / OCOM System Evaluator Oil mist Detection System <pre>-- Test & Service ----- Alarm2/Pre Relay :OFF up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready !</pre> Alarm2/Pre Relay	The Relay 2 (often used as pre-alarm relay) can be switched on and off manually for testing purposes.
		SICOMS / OCOM System Evaluator Oil mist Detection System <pre>-- Test & Service ----- Sensor cleaning :OFF up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready !</pre> 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 <u>the whole sensor chain</u>. This requires that <u>all sensors</u> of the chain are cleaned (not only several sensors)!
		SICOMS / OCOM System Evaluator Oil mist Detection System <pre>-- Test & Service ----- Temp. calibration:OFF up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready !</pre> 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.
		SICOMS / OCOM System Evaluator Oil mist Detection System <pre>-- Test & Service ----- Hardware values : up/down-next, Ent=select Press ESC to leave ! - Change Parameter Setup System Ready !</pre> Hardware values	The screen displays some information about Evaluator hardware.

5 Installation

Installation and commissioning of SiCOMS® 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.

5.1 Important for users of Gas Engines

The SiCOMS®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 SiCOMS® system to 230V line voltage including devices communicating through RS485 interface must meet the following requirements:

- it must have safe galvanic isolation
- the current circuits of the power supply and of the RS485 interfaces have to be carried by an engineered safety barrier. Special instructions/requirements constituted in the certificates of these engineered safety barriers have to be necessarily carried out.

For further installations instructions refer to the Installation Manual.

5.2 Installation Position



The position for the SiCOMS® 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 SiCOMS® 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 a two-stroke engine compared to a four-stroke engine require the usage of the Diffusor on two-stroke engines!

In Fig. 5.1. 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. 5.1 Example of Installation for Sensors and SOG

5.3 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 SiCOMS® 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. 5.2 Installation Step 1
- 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. 11.15
 - 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. 12.2 Basic principle of connections
 - 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 "6 Commissioning".

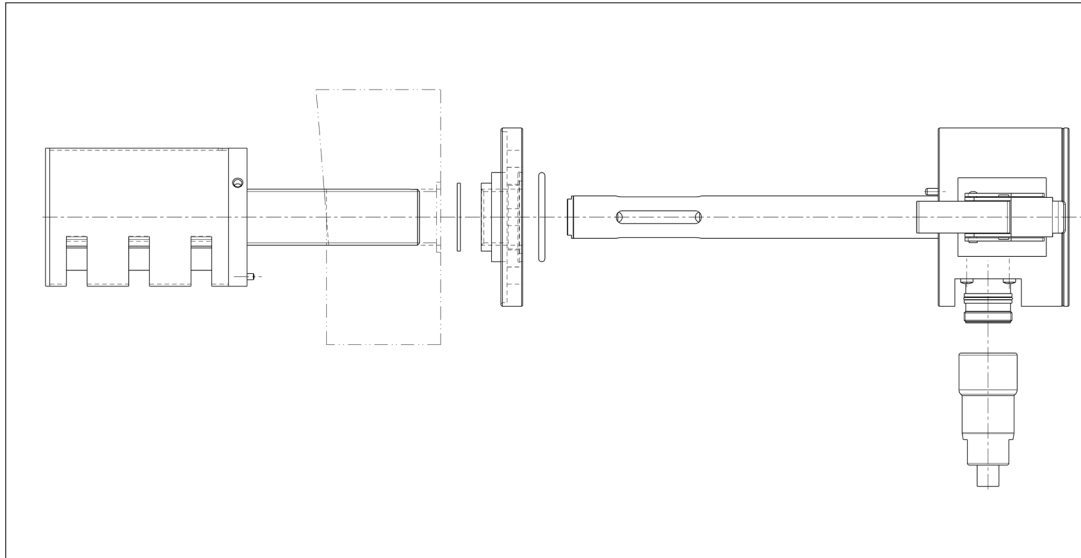


Fig. 5.2 Installation Step 1

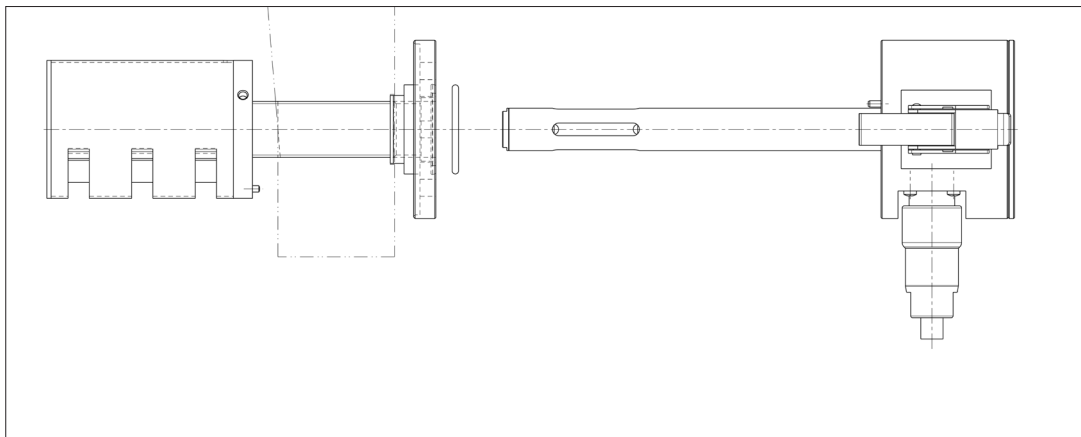


Fig. 5.3 Installation Step 2

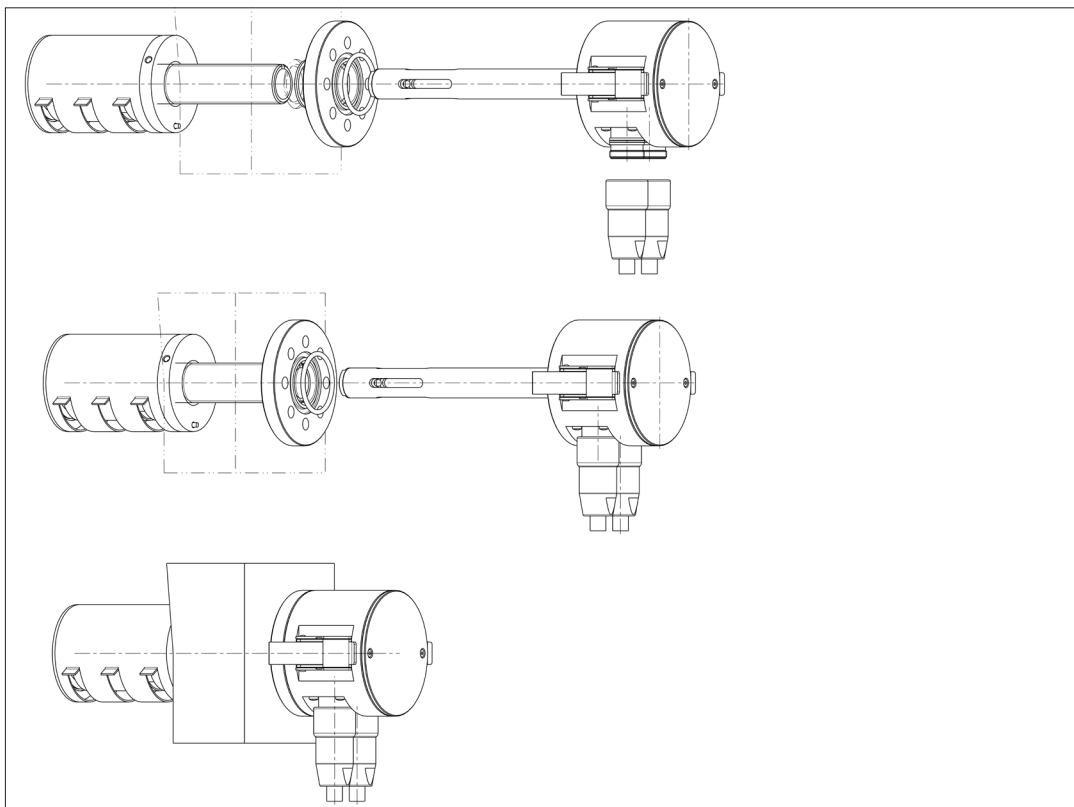


Fig. 5.4 Installation 3-D view

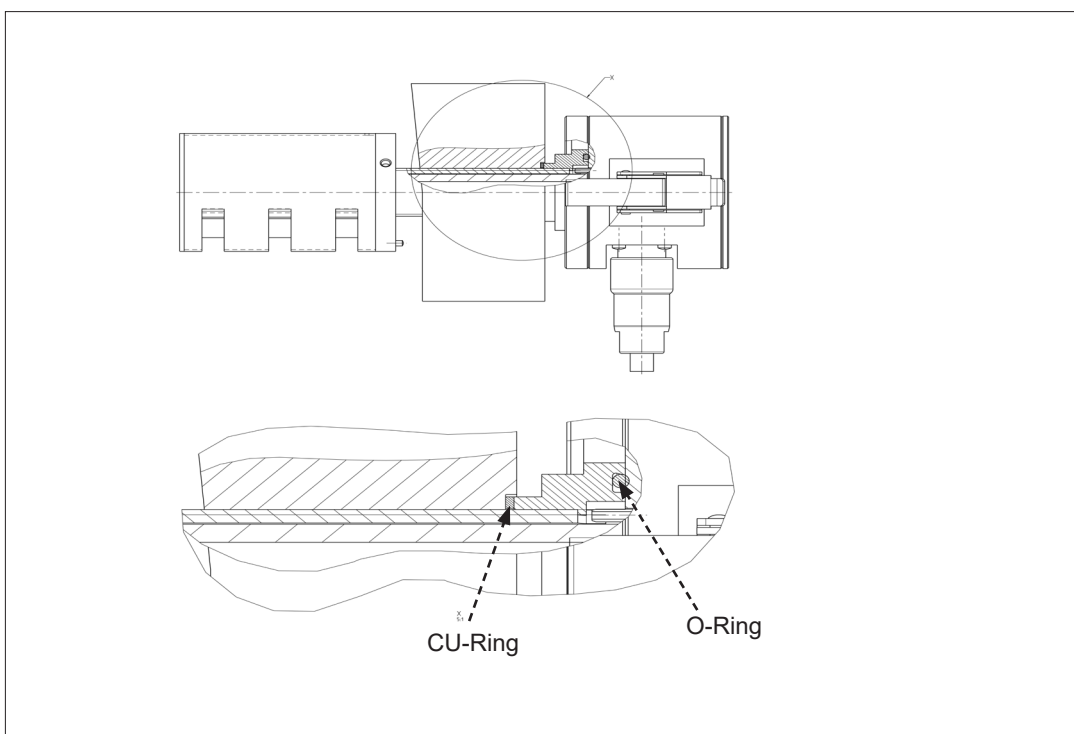


Fig. 5.5 Position of Seals

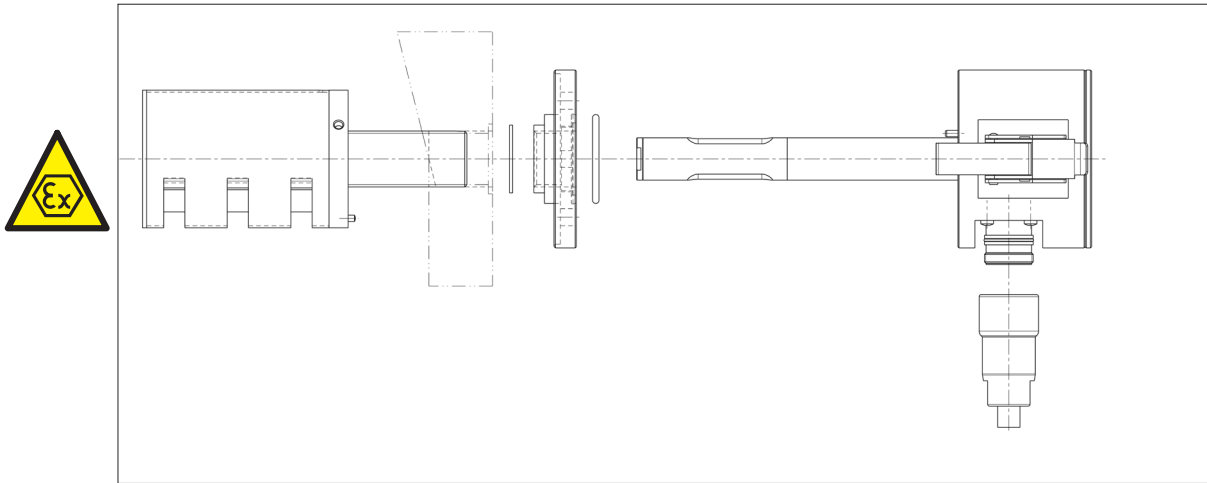


Fig. 5.6 Installation Step 1

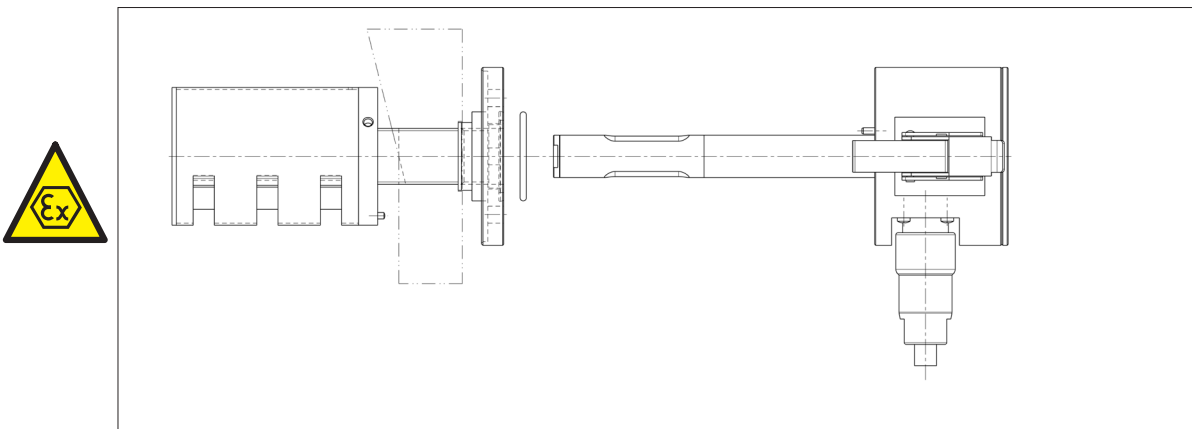


Fig. 5.7 Installaation Step 2

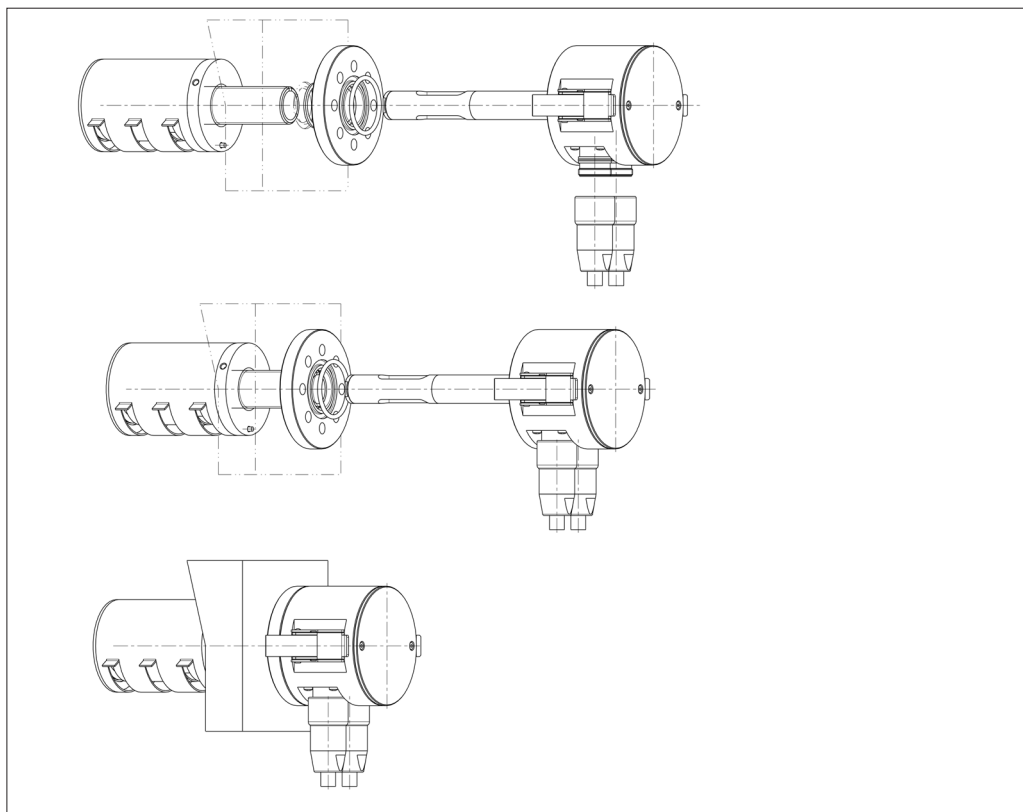


Fig. 5.8 Installation 3-D view

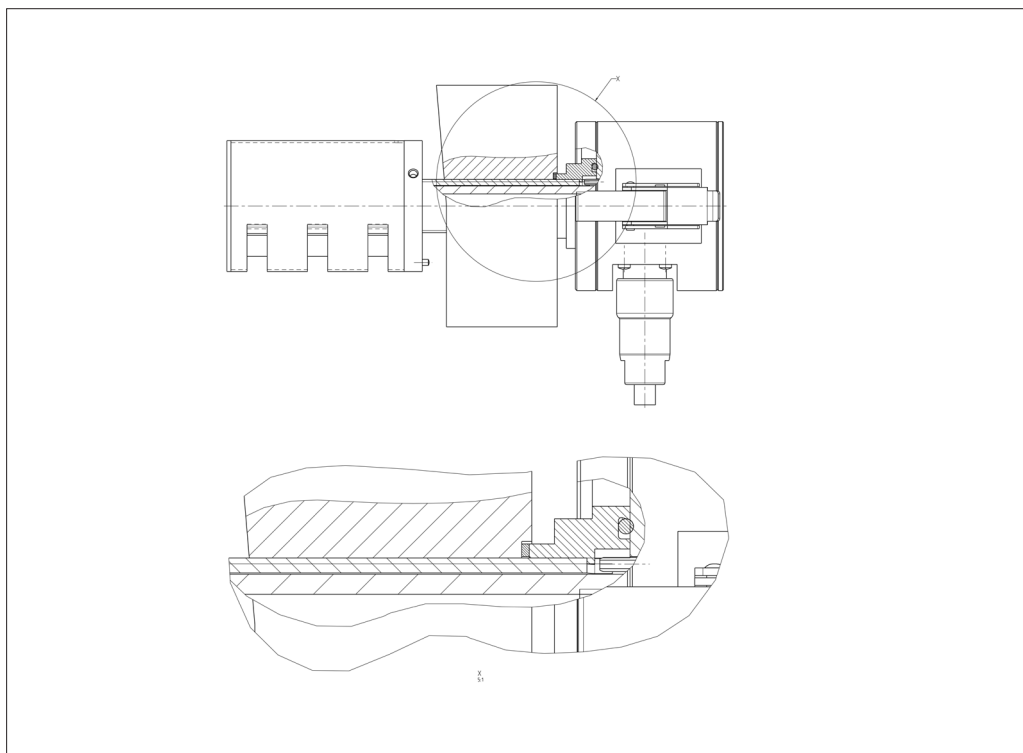


Fig. 5.9 Position of seals



Fig. 5.10 Position of Counter Nut

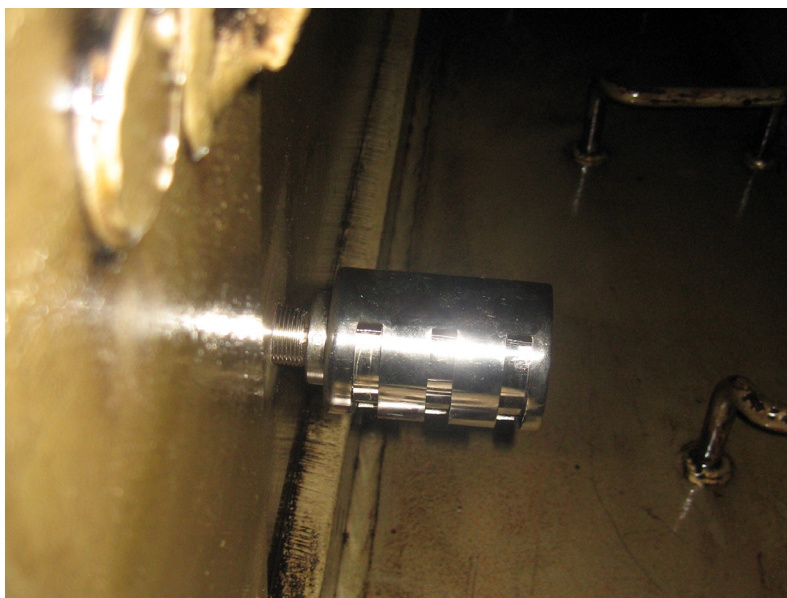


Fig. 5.11 Position of SOG inside the Crankcase



Fig. 5.12 Installed Sensor of SiCOMS® System on a 4 stroke engine

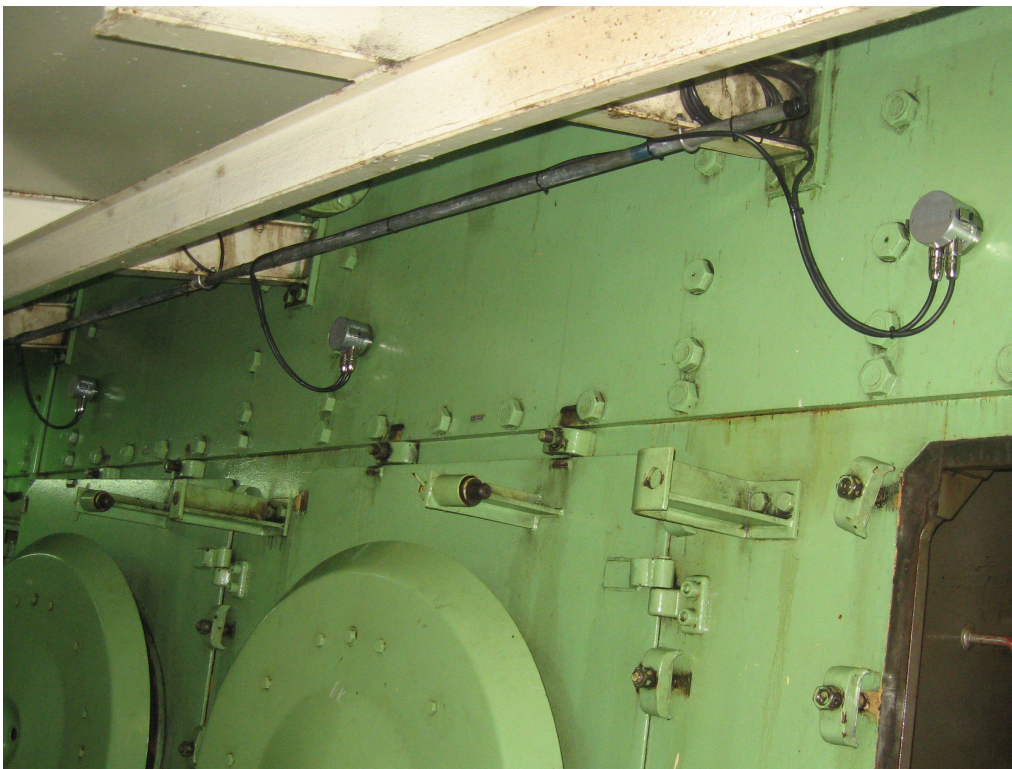


Fig. 5.13 Installed Sensor of SiCOMS® System on a 2 stroke engine

6 Commissioning

6.1 Pre-Commissioning Checks

Check for the following:

- correct wiring as given in Chapter 2.3.
- correct power supply on SiCOMS® Evaluator
- SiCOMS® Evaluator display is on

For more detailed information, please have a look at the Installation Manual!

6.2 Data Sampling

As soon as a SiCOMS® 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 SiCOMS® Evaluator, if working SiCOMS® sensors are connected, the SiCOMS® Evaluator samples the signals from the SiCOMS® sensors with a certain sampling rate, converts them into digital signals, analyzes, evaluates and displays them on its LCD.

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 SiCOMS® Evaluator parameters from the PC using a terminal application with ANSIW emulation (e.g. Windows Hyper Terminal).

6.3 Alarm Setting and Triggering

There are 3 alarm relays integrated in the SiCOMS® 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 SiCOMS® 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 SiCOMS® 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 of the Evaluator and also in the event window of OMD Logger on the optional monitoring PC.

SiCOMS® 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 SiCOMS® Evaluator. If alarm conditions are fulfilled, the firmware of the SiCOMS® Evaluator triggers the corresponding alarm.

In case of an alarm triggering, it is shown

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

6.4 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 SiCOMS® 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 SiCOMS® / OCom Logger software, but only at the SiCOMS® Evaluator by pressing the RESET-Button for 3 seconds.



6.5 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 SiCOMS® 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!



7 Performance / Maintenance Tests

Following the initial installation of SiCOMS® 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 SiCOMS® system is only permitted, if the installation of the SiCOMS® 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 SiCOMS® 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.

Hereinafter the procedure after an intermediate engine stop and possible partly disassembling of the system is described.



This description assumes that the engine 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 SiCOMS® 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 8.

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 SiCOMS® 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 SiCOMS® 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.



8 Troubleshooting

Error code and Error description

If a failure is detected at the SiCOMS®, the green ready LED of the Evaluator turns off. If there's at least one SiCOMS® 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 SiCOMS® sensors is online, the green ready LED switches off.

SiCOMS® Evaluator error messages can be grouped in the following types:

8.1 Failure in SiCOMS® 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 (Opacref > 1170)	
0010	("LT dirty") Transmission of IR measuring track too low (Opacref < 400)	Sensor must only be cleaned, NOT calibrated !!

Table continues on next page ...

Error codes	Error description	Help
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.
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.

8.2 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 Appendix Fig 12.11)		

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.

8.3 Evaluator Failure

The display shows “OMD - Error nnnn!”
with nnnn: error code (refer to the following table)

Error code	Error description	Help
0001	No sensor detected	• Check cables • Is the number of sensors set up correctly?
0002	Date and time invalid in real-time clock	• 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.

8.4 EEprom Parameters Failure

The display shows “CPU Error nnxx!”
with xx error code (refer to the following table)

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

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

9 Repair

Before any attempts to repair or dismount the SiCOMS® 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 SiCOMS® 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.

A guarantee in the event of damage is excluded by motcom GmbH!

Attention

Do not use Diesel-only parts for your -certified version of SiCOMS®!



Make sure to order appropriate spare parts for your system!

-version parts are specially marked, see example in Chapter 10.

Marking



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

(electronic system)
(Sensor)

10 Spare Parts

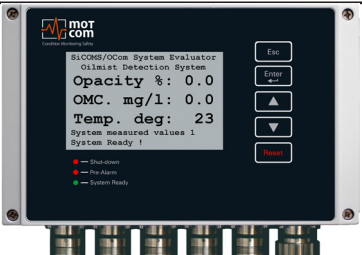
 Only the original parts supplied and approved by motcom GmbH should be used; otherwise a proper working system could not be assured.

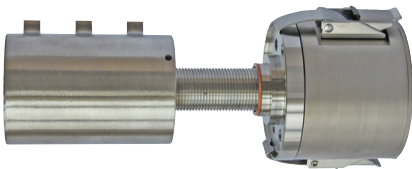
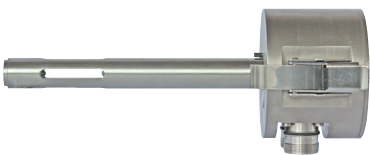
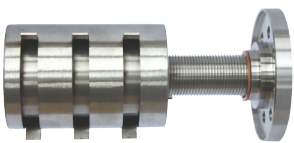
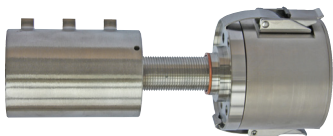
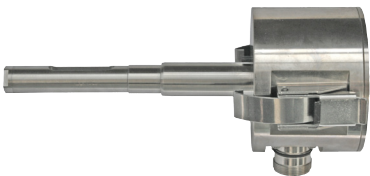
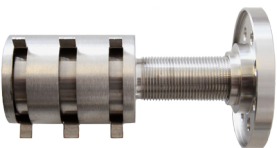
Attention

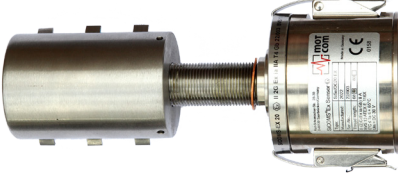
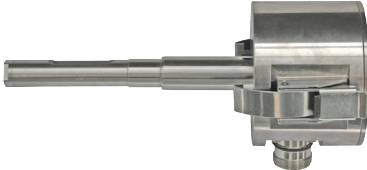
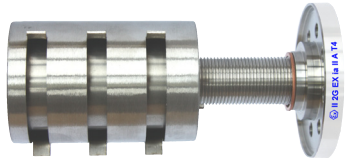
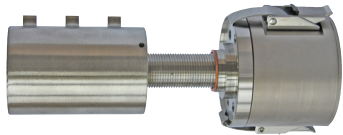
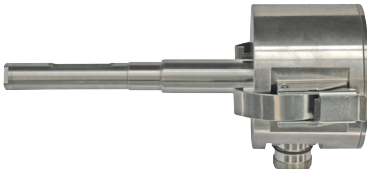
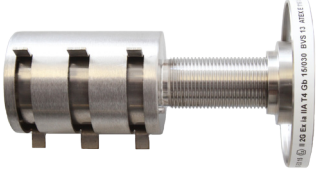
Spare parts marked with  may only be used on Diesel and HFO engines!

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

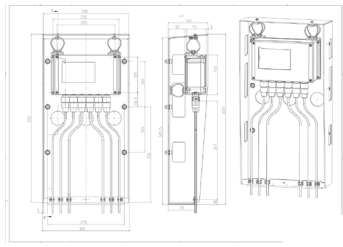
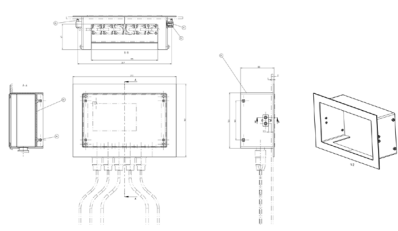
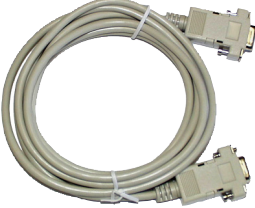
Spare parts with both markings may be used on all engine types!

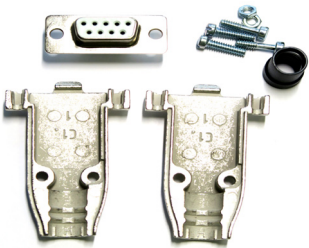
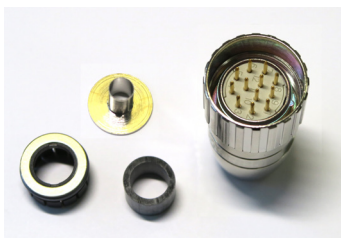
Picture	Description	Part No
	SiCOMS® Evaluator	2 020 10 00000  
	SiCOMS® Diffusor for SOG size 65	2 600 01 50650  
	SiCOMS® Diffusor for SOG size 53	2 600 01 50530  

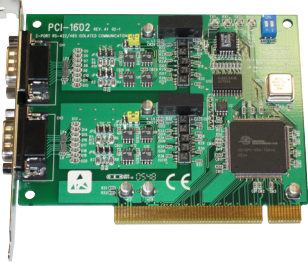
Picture	Description	Part No
	SiCOMS® sensor 20 complete with SOG Part 2 600 03 10000 Part 2 600 01 20000	2 600 01 10000 
	SiCOMS® sensor size 20 Diesel + HFO engines use with SOG size 65	2 600 03 10000 
	SiCOMS® Splash Oil Guard (SOG) size 65 use with sensor size 20	2 600 01 20000 
	SiCOMS® sensor 16 complete with SOG Part No 2 600 03 30002 Part No 2 600 01 50024	2 600 01 30002 
	SiCOMS® sensor size 16 Diesel + HFO engines use with SOG 53	2 600 03 30002 
	SiCOMS® Splash Oil Guard (SOG) size 53 use with sensor size 16	2 600 01 50024 

Picture	Description	Part No
	SiCOMS® sensor 20 EX complete with SOG Part No 2 600 04 10000 Part No 2 600 02 20000	2 600 02 10000  
	SiCOMS® sensor size 20 EX Gas + Dual Fuel engines usw with SOG 65	2 600 04 10000  
	SiCOMS® Splash Oil Guard (SOG) size 65 EX use with sensor size 20 EX	2 600 02 20000  
	SiCOMS® sensor size 16 EX complete with SOG Part No 2 600 04 30002 Part No 2 600 02 50024	2 600 02 30002  
	SiCOMS® sensor size 16 EX Gas + Dual Fuel engines use with SOG size 53	2 600 04 30002  
	SiCOMS® Splash Oil Guard (SOG) size 53 use with sensor size 16 EX	2 600 02 50024  

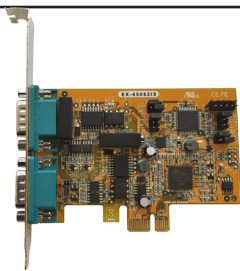
Picture	Description	Part No
	Cleaning Kit Diesel for Sensor and SOG	2 600 01 90000 
	also available for Gas + Dual Fuel sensors	2 600 02 90000 
	Optical glasses for Diesel Sensor	2 600 01 90010 
	also available for Gas + Dual Fuel sensors	2 600 02 90010 
	Remote Monitoring Unit	2 020 00 00000  

Picture	Description	Part No
	Vibration Damping Module	9 020 20 00000  
	Inlay Module	9 020 40 00000  
	Junction Box	9 020 30 00000  
	Communication Interface Splitter	9 030 00 00000  
	RS232 connection cable for PC to external RS485 converter	9100 20 00000  

Picture	Description	Part No
	2 core power cable	9 200 02 00000  
	12 core communication cable	9 200 12 00000  
	Sub D9 connector	9 301 09 10000  
	6pol female connector	9 300 06 10000  
	12pol female connector	9 300 12 10000  
	12pol male connector	9 300 12 20000

Picture	Description	Part No
	RS485 Converter (external mounting)	9 100 30 00000  
	Power supply unit 24V/24W (external mounting)	9 110 40 00000  
	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	
	RS485 Converter Advantec PCI Card 1602B for mounting inside PC	9 100 40 00000  
	RS485 Converter PCI card EX-42062IS for mounting inside PC	9 100 40 00010  



Picture	Description	Part No
	RX485 Converter PCIe Card Version EX45032IS for mounting inside PC	9 100 40 00034  
	motcom® Loganalyser Software	1 700 10 01000

11 Connection Assembly Instructions

11.1 Connection Cable - RS485 PCI Card to Evaluator

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

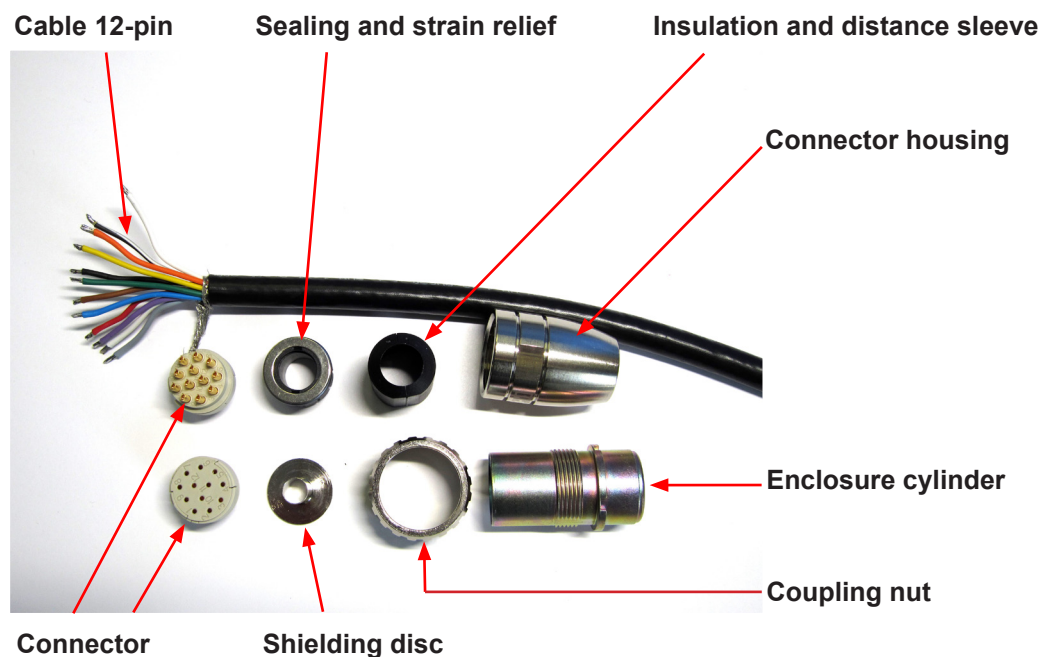


Fig. 11.1 Step 1

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

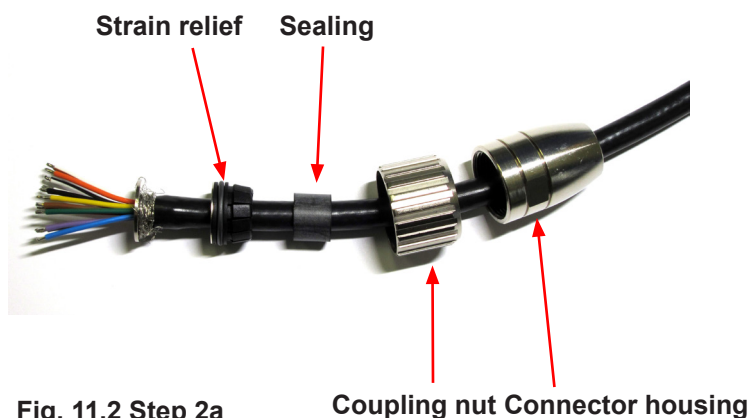


Fig. 11.2 Step 2a

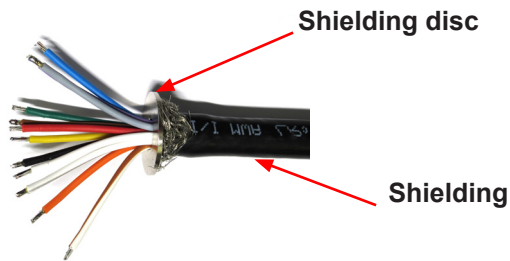


Fig. 11.3 Step 2b

Pin	Signal	Cable Colour	used
1	TXD_RS232	black/white	
2	RXD_RS232	brown/white	
3	CAN_H	orange	
4	CAN_L	yellow	
5	RS485+	green	x
6	RS485-	blue	x
7	RXD_RS485+	violet	x
8	RXD_RS485-	gray	x
9	opt. Modbus+	white	
10	opt. Modbus-	black	
11	GND	brown	
12	GND	red	x

Cable type: 12 x AWG 20 C UL SW

Table 11.1 Pin connection

- solder wires to pins as shown in table 11.1

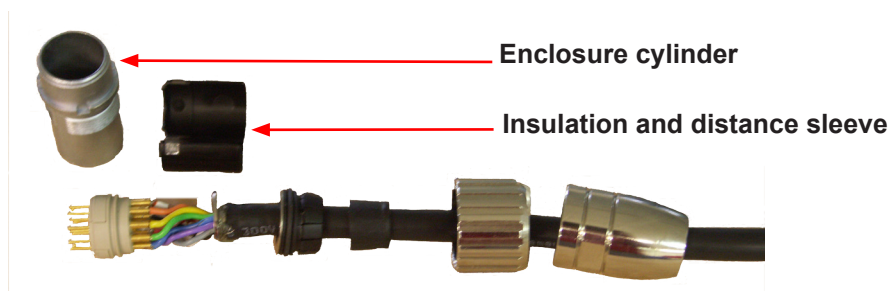


Fig. 11.5 Step 4



- 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

For the correct assembling of the plug follow Chapter 11.2 Assembly of the plug M23

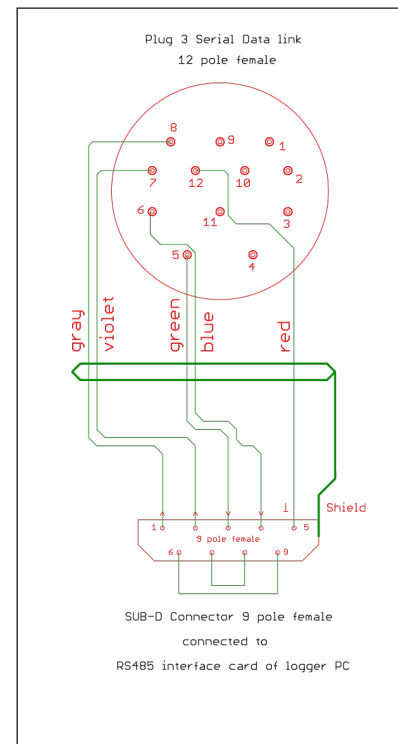


Fig. 11.4 Step 3 Pin connection

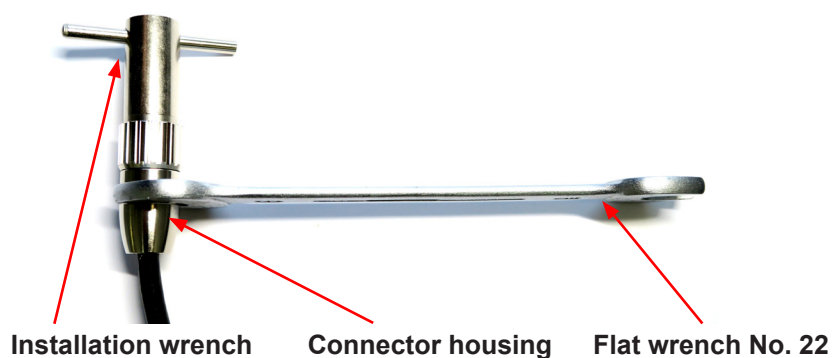


Fig. 11.6 Step 5

Assemble the Sub-D9 connector on the other side of the cable. (Fig 11.8).

Below, you've got two pictures of the connector before and after assembly.

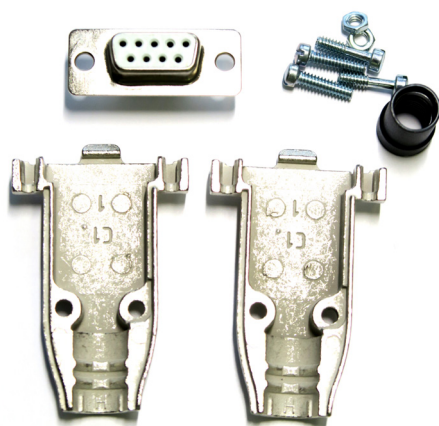


Fig. 11.7 Sub D9 connector before assembly



Fig. 11.8 Sub D9 connector after assembly

11.2 Assembly of the plug M23

- 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 green wire into pin No. 5 on plug.
- solder blue wire into pin No. 6 on plug.
- solder violet wire into pin No. 7 on plug.
- solder grey wire into pin No. 8 on plug.
- solder red wire into pin No. 12 on plug.
- cut off all unused wires.
- 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).

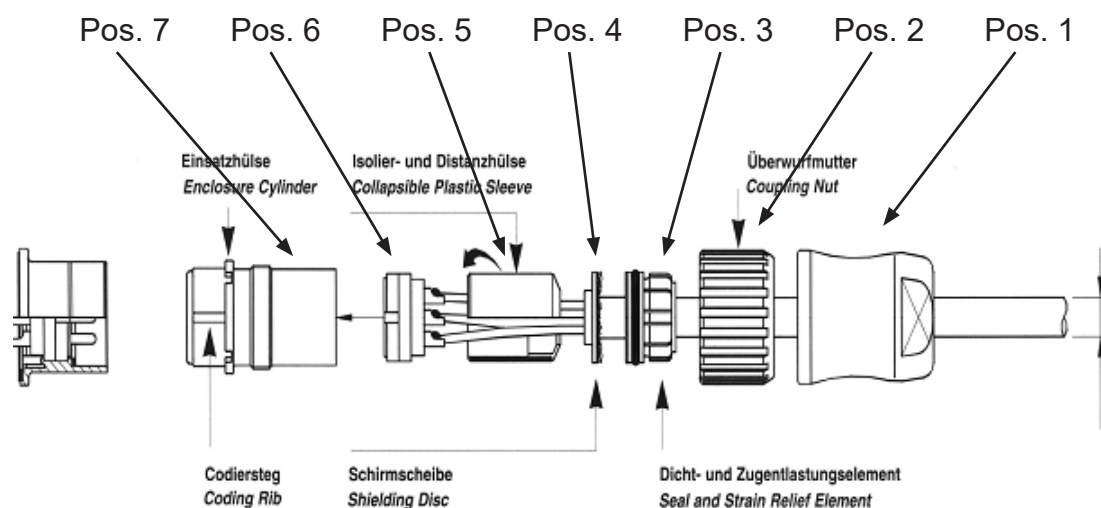


Fig. 11.9 Mounting the plug part no 9 300 12 10000 and 9 300 12 20000

Fig. 12.1 Basic principle of connections SiCOMS®

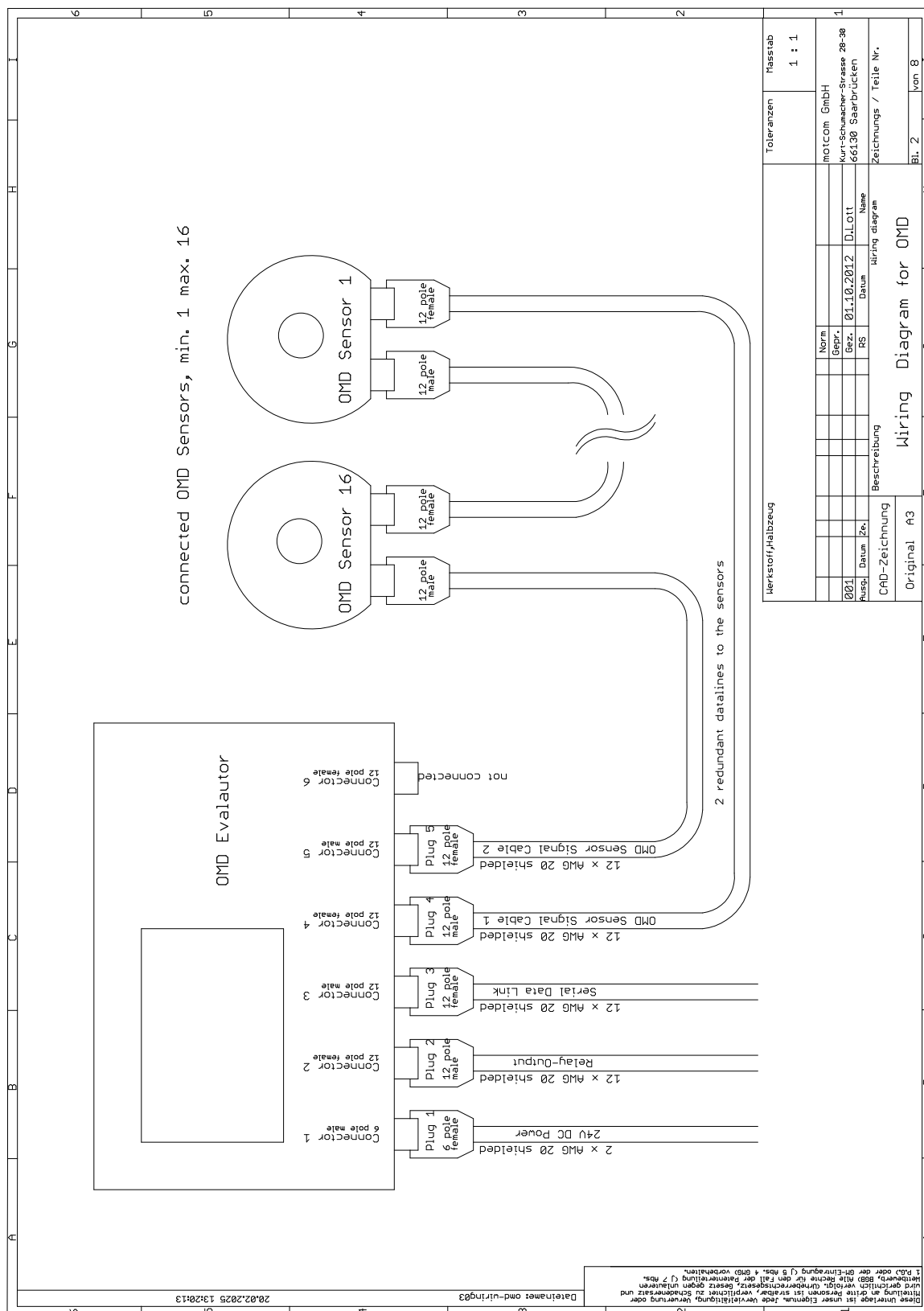
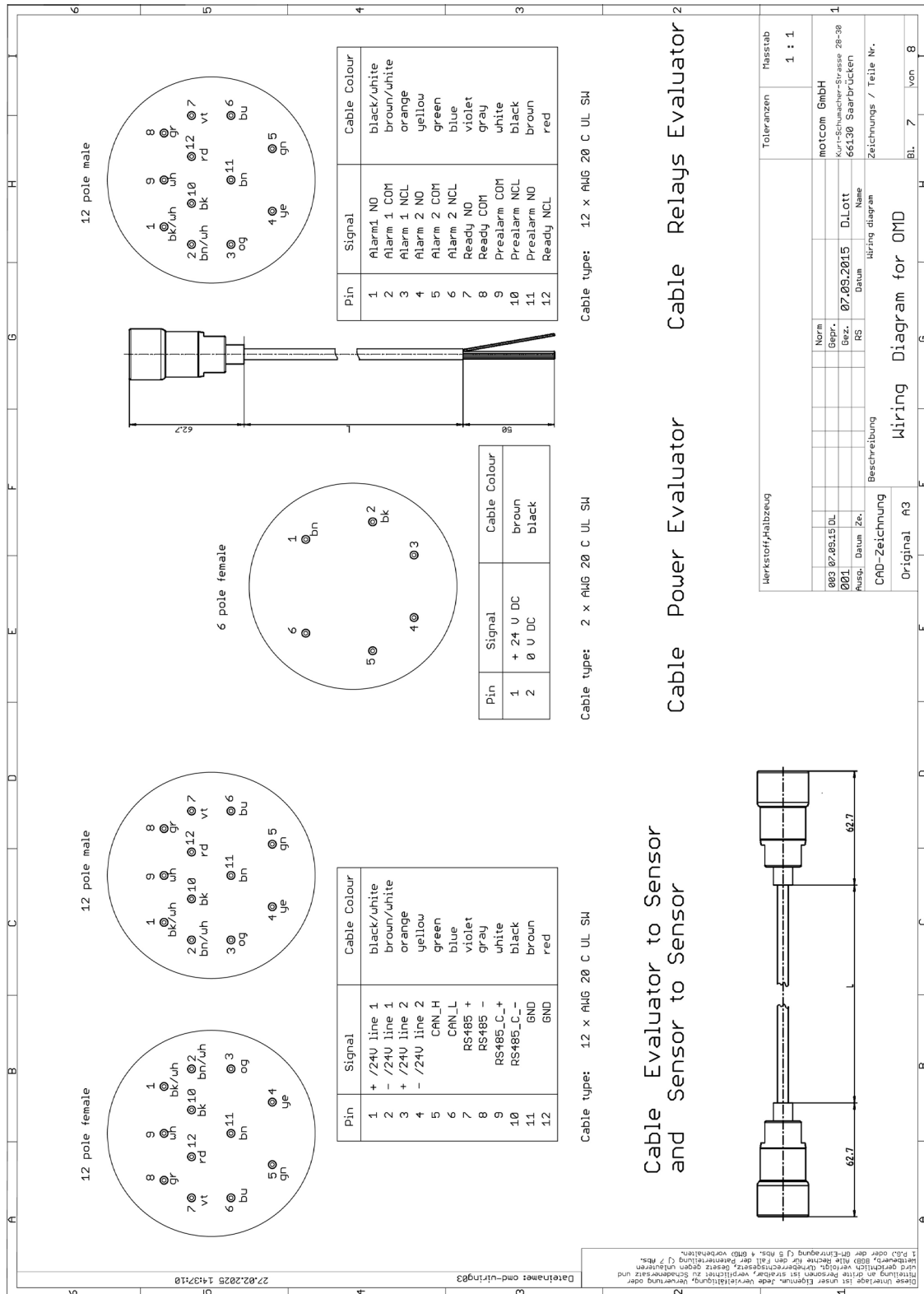


Fig. 12.1 Basic principle of connections SiCOMS®





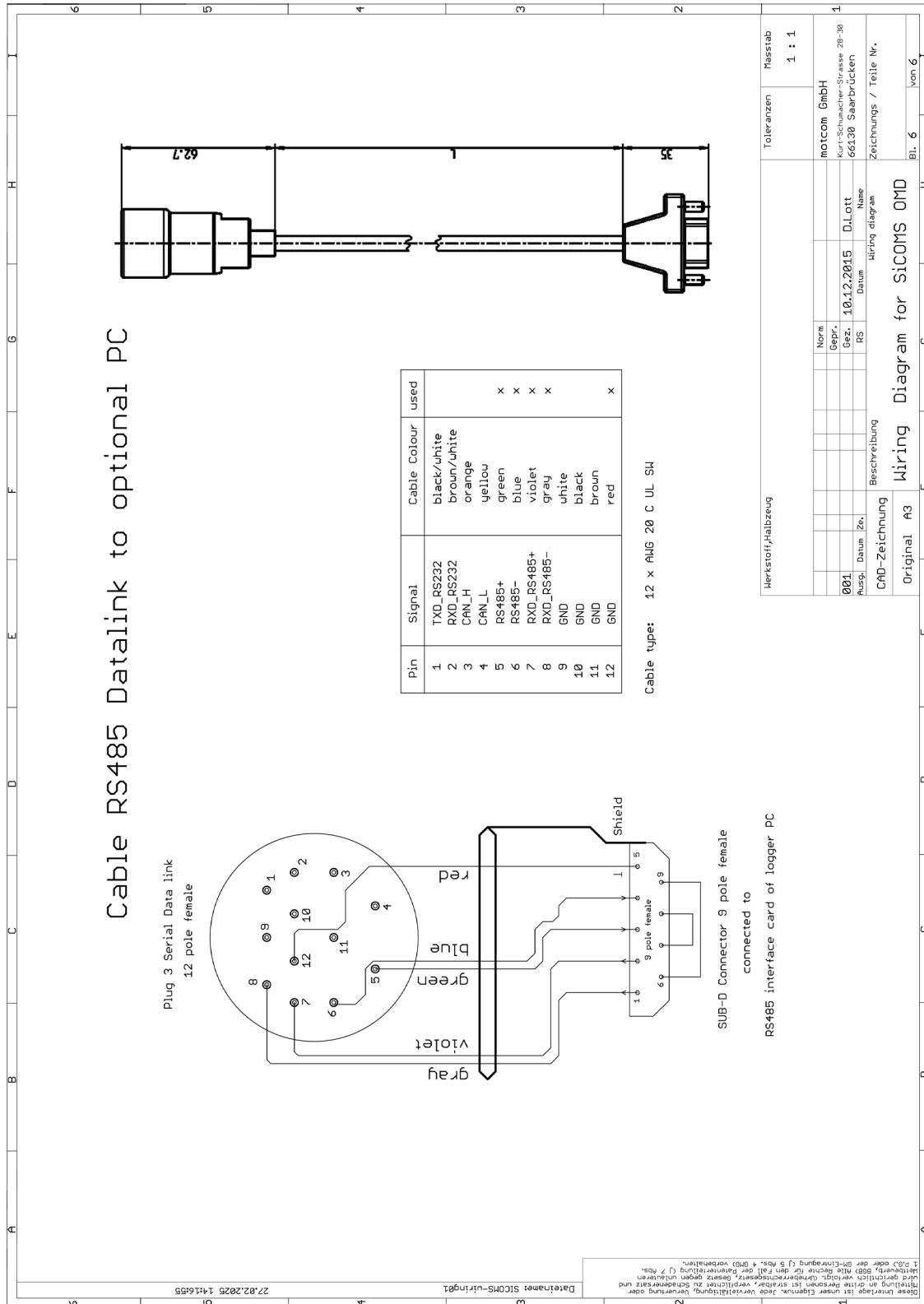


Fig. 12.4 RS485 Datalink to optional PC









Release 251030



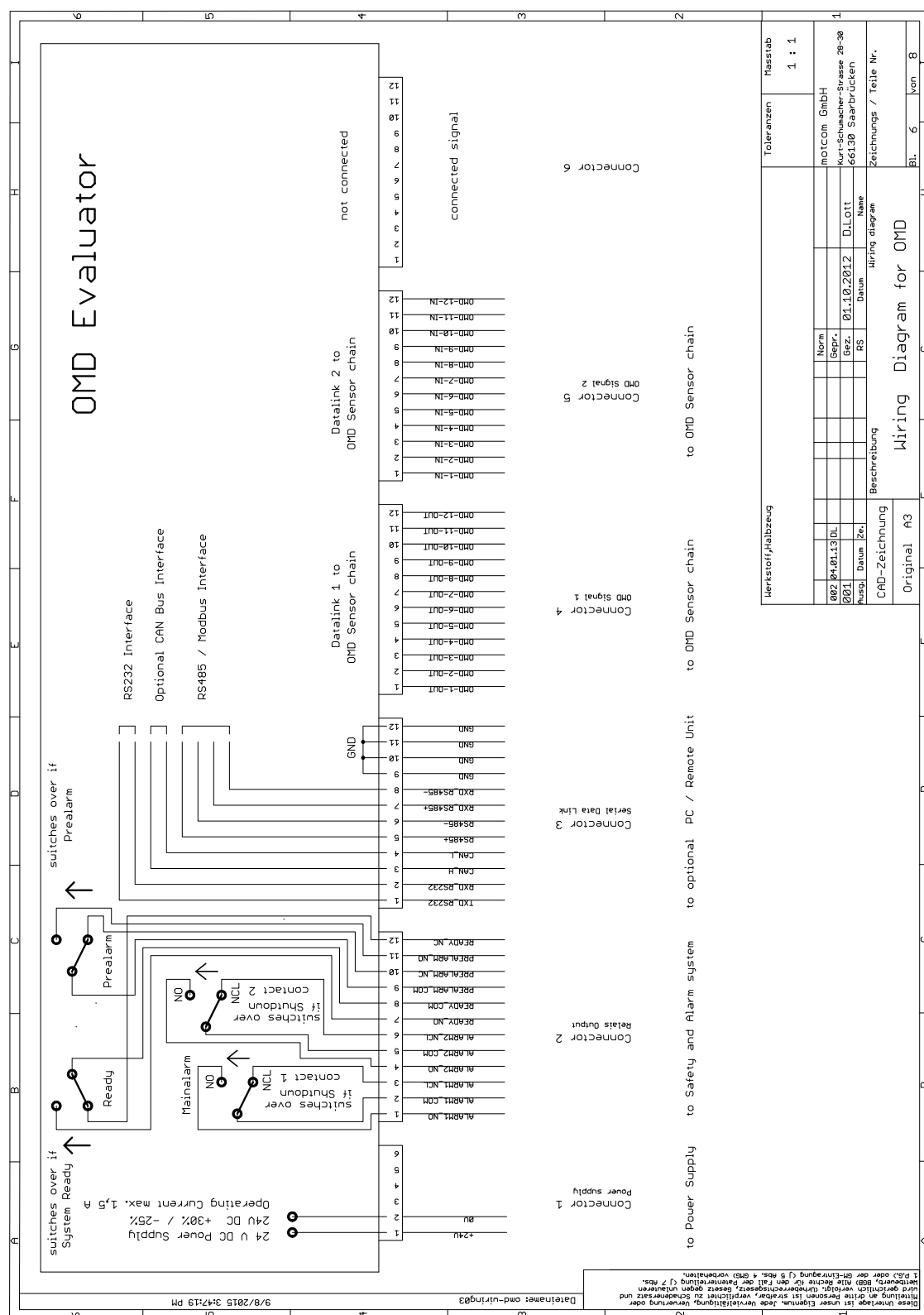


Fig. 12.10 Connectors and pin-out of the SiCOMS® Evaluator
(see also next page)

See previous pages for further information like wire colors

Connectors of the Evaluator						
Pin	1	2	3	4	5	6
	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	

Fig. 12.11 Pin assignment of Evaluator connectors

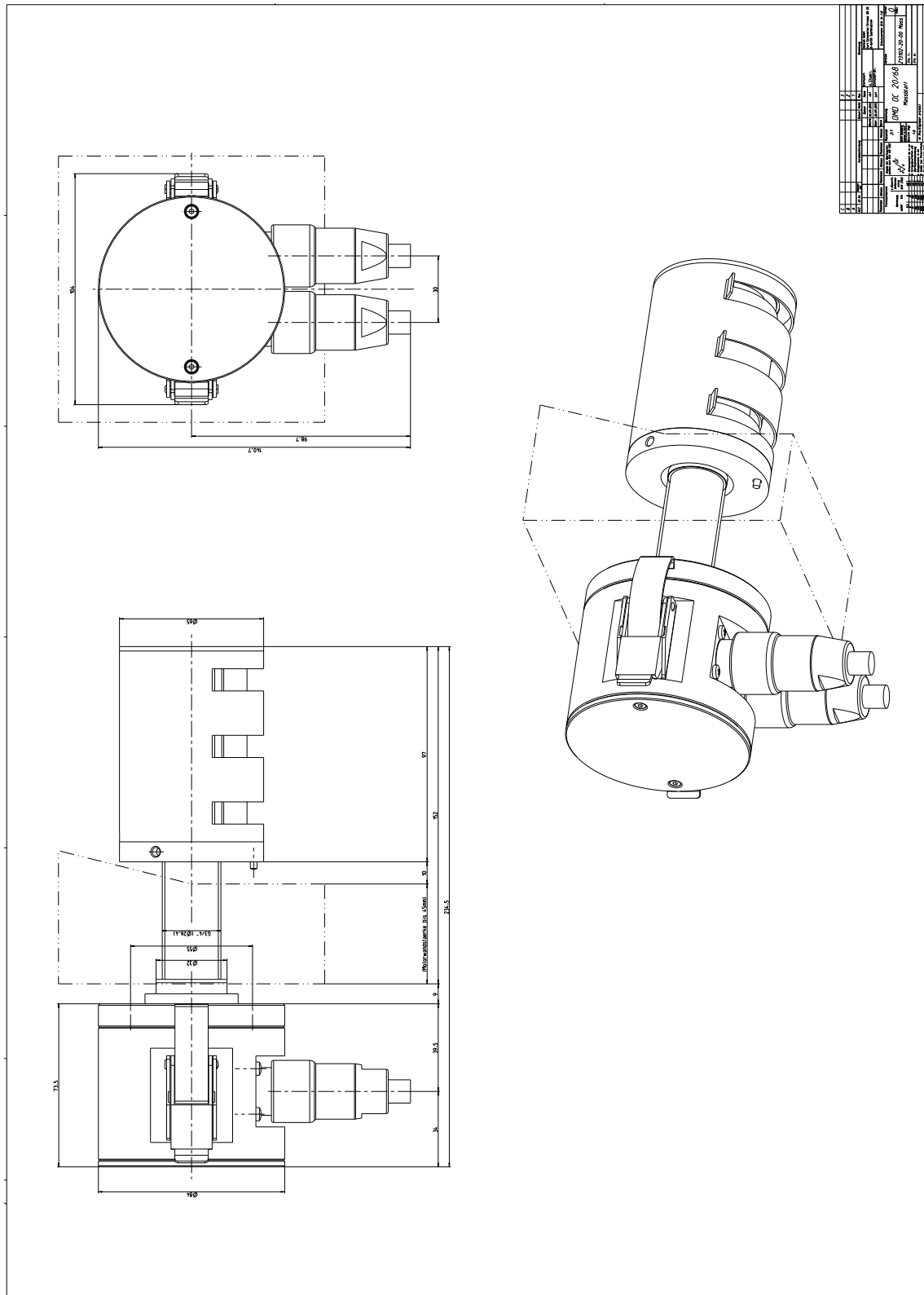


Fig. 12.12 Dimensions SiCOMS® sensor Type SiSe OC 20-68



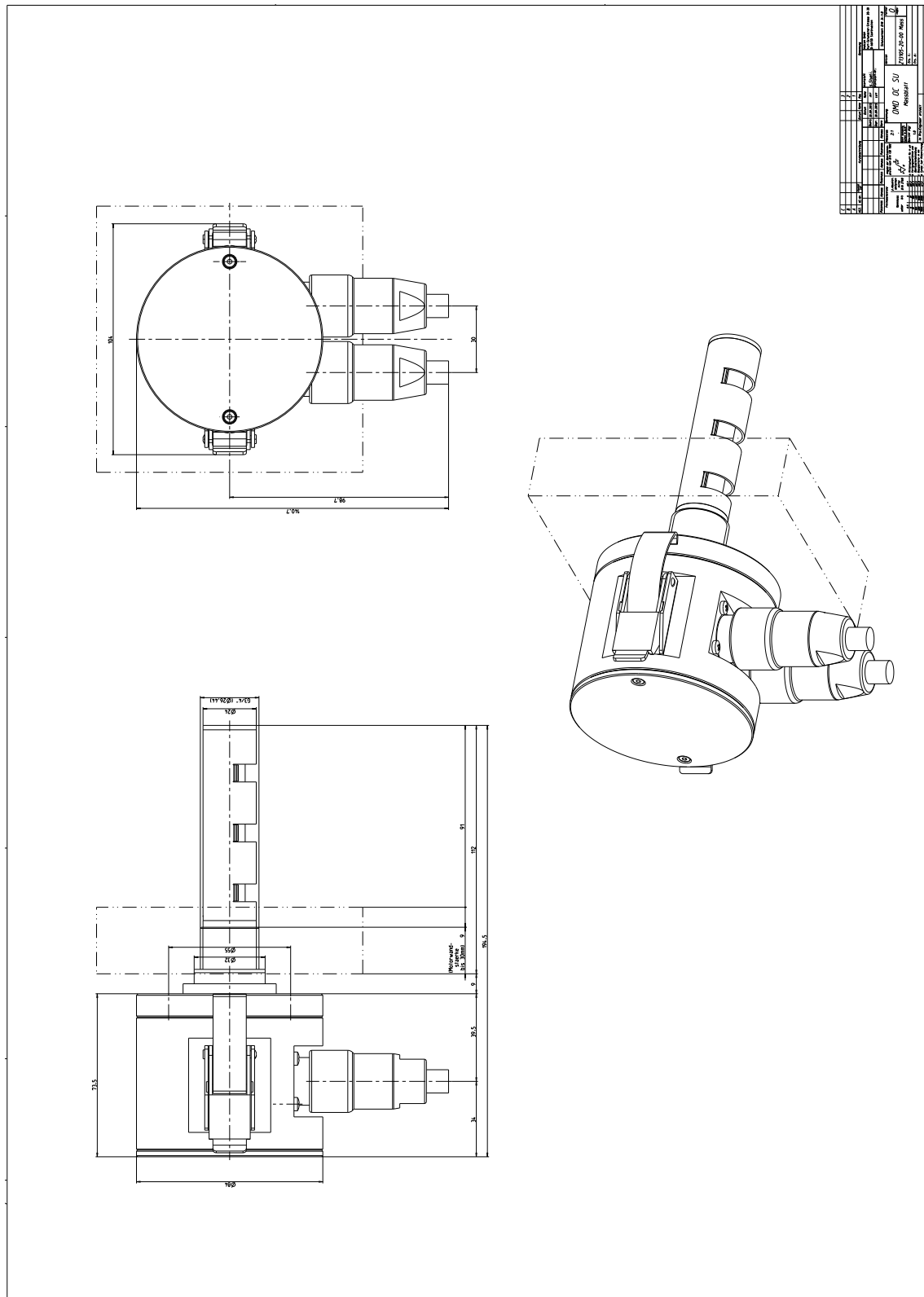


Fig. 12.14 Dimensions SiCOMS® sensor Type SiSe OC 14-37

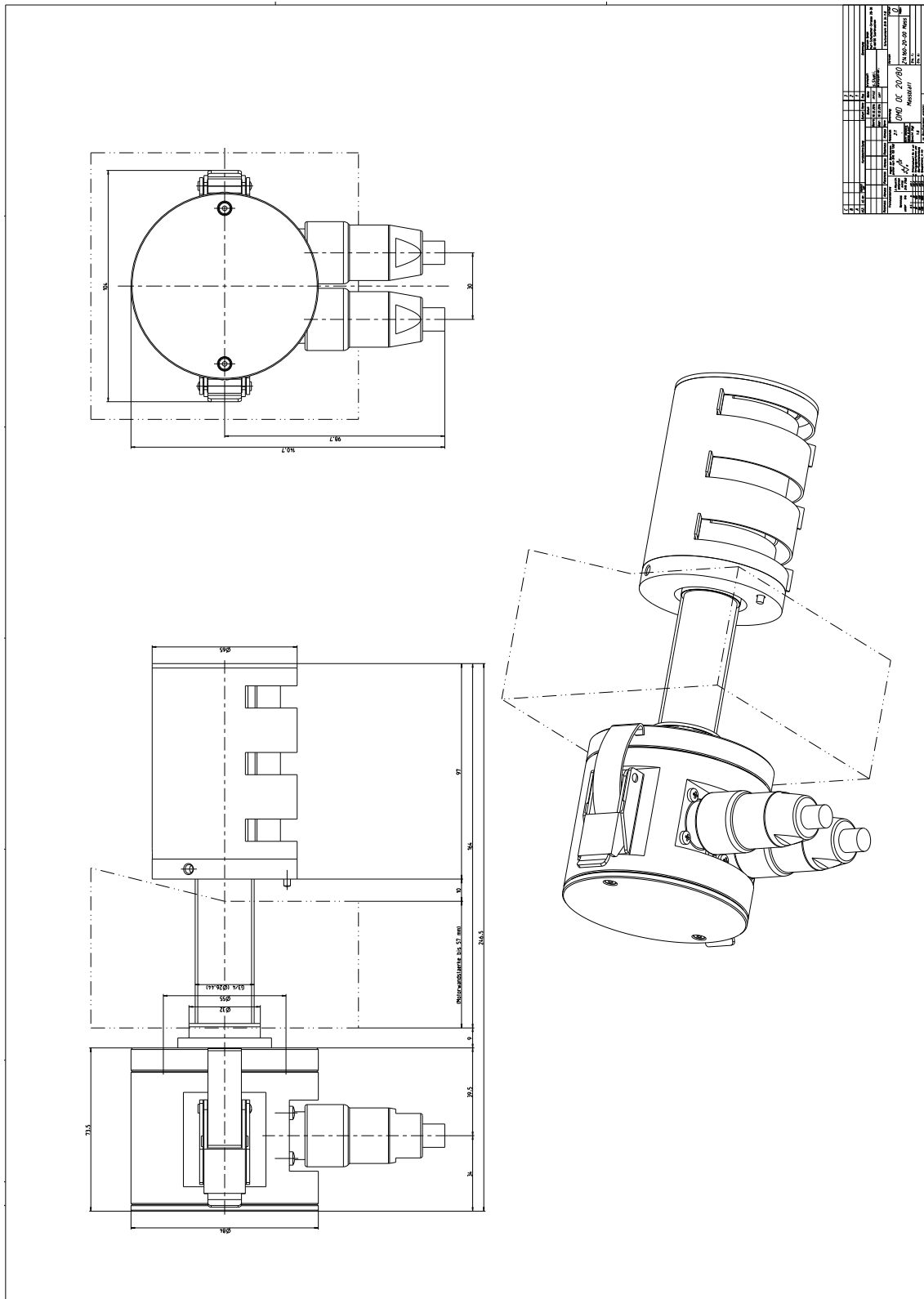


Fig. 12.15 Dimensions SiCOMS® sensor Type SiSe OC 20-80

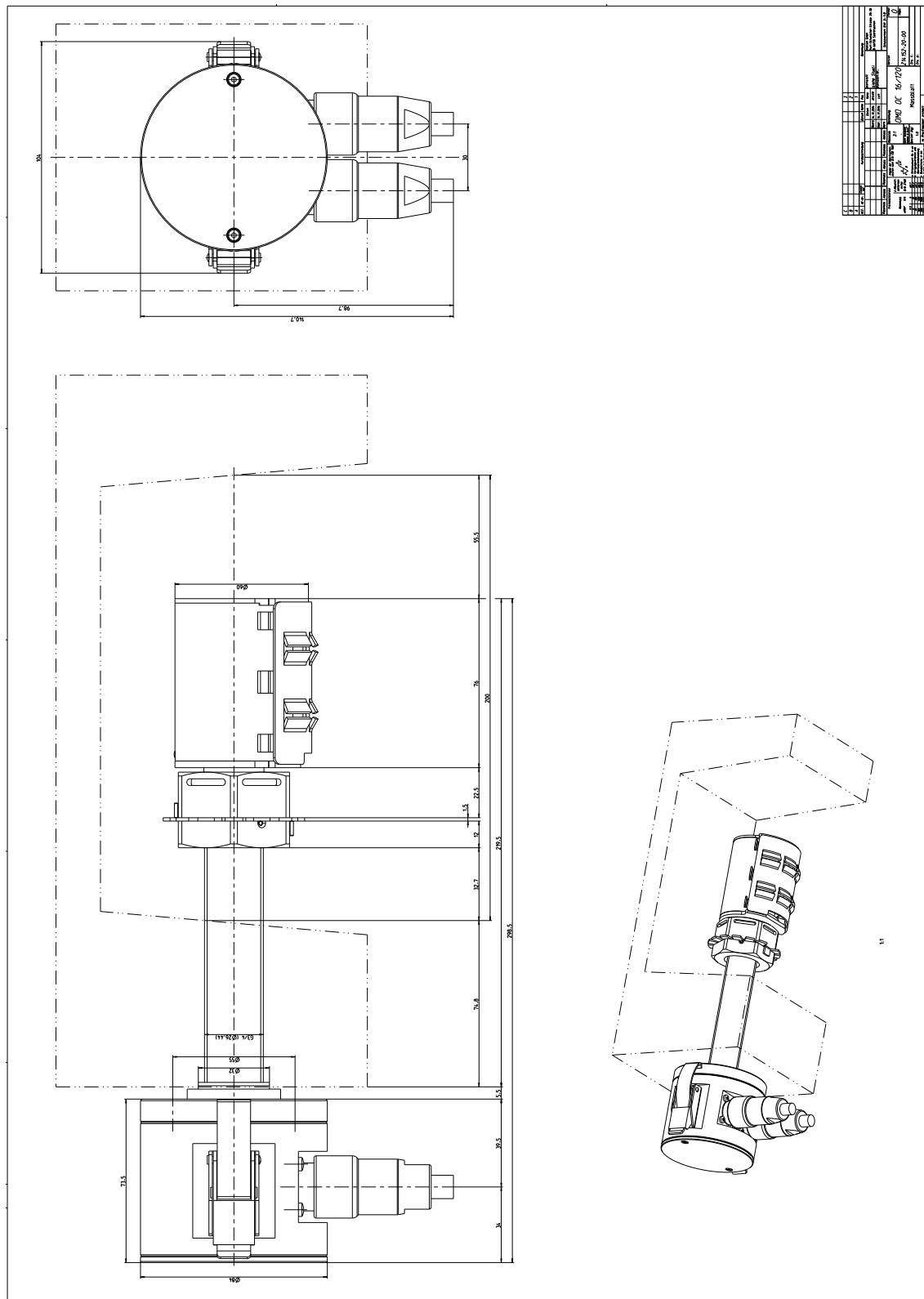


Fig. 12.16 SiCOMS® sensor Type SiSe OC 16-120
example of a special size for a certain installation place

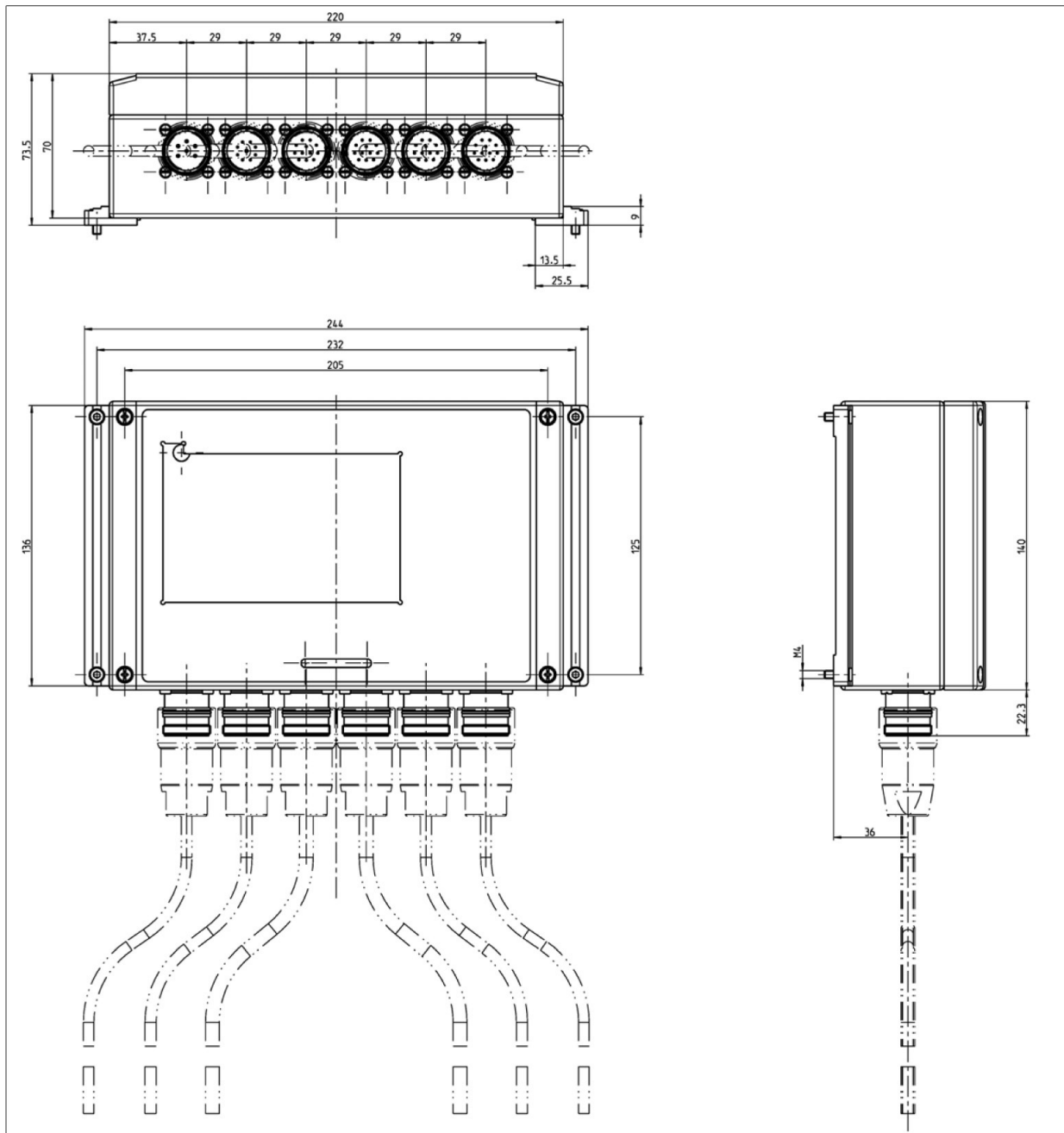


Fig. 12.17 Evaluator Dimensions

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