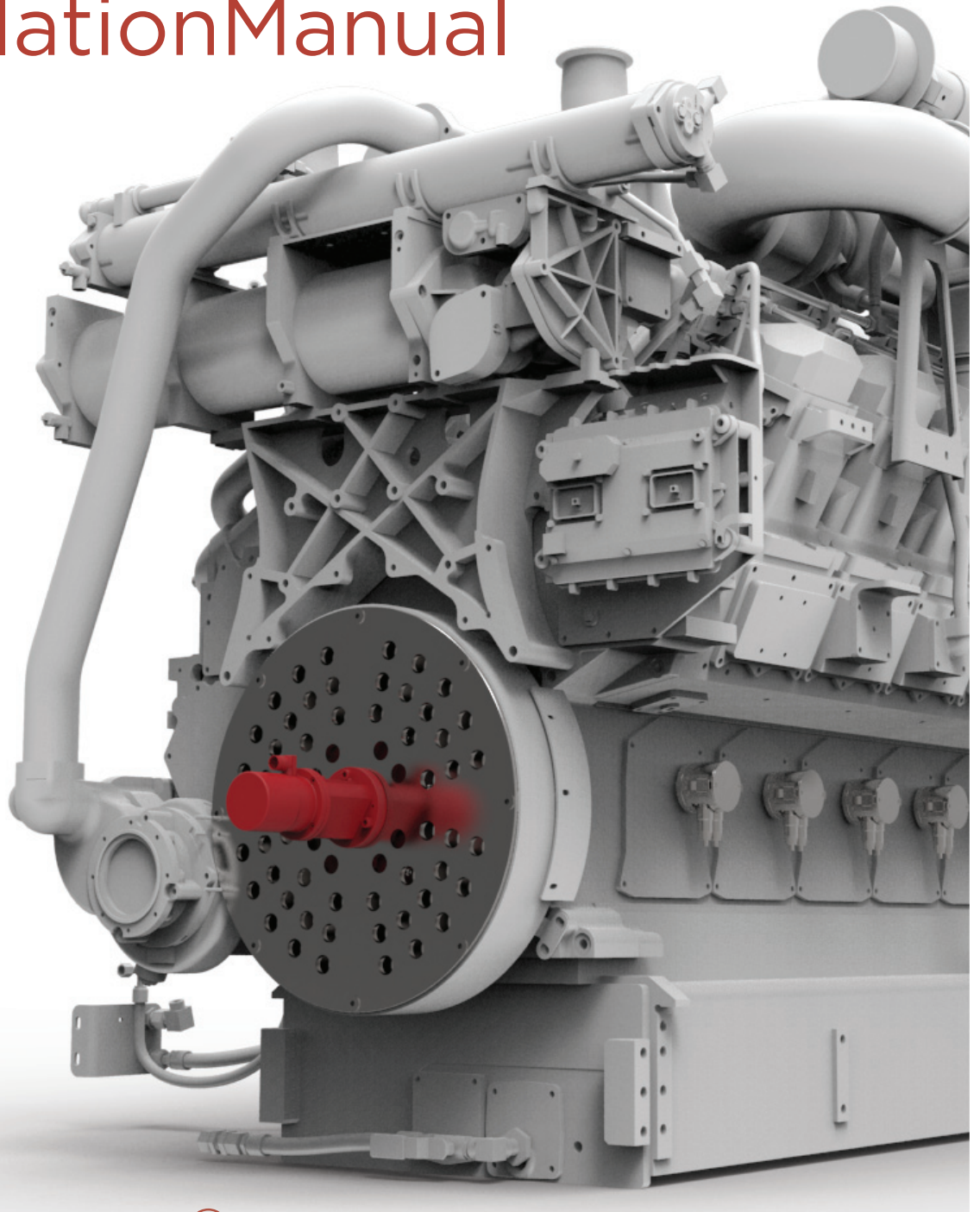


InstallationManual



BeCOMS[®] **BCom | Bearing Condition Monitoring**

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1 General

1.1 About this User Manual

These instructions describe the installation of a BeCOMS® system. By means of the nameplates of each items the BeCOMS® system can be clearly identified.

The installation instructions are to be kept available with the BeCOMS® system at all times.

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

The installation 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 Bearing Condition Monitoring System is sold under the names BeCOMS® and BCom.

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



1.2 Warranty

It is mandadory to read this manual before commencing the repair, assembly or commissioning of the Bearing Condition 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 installation 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

Installation, 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.

1.5 Declaration of Conformity

EMC-Directives: 2014/30/EU

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We declare on our own responsibility, that the products

Product description motcom®
Bearing Condition monitoring

Type designations BeCOMS® / BCom

are in compliance with following norms:

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

66130 Saarbrücken, Germany, the 26th of January 2023



Dipl.-Ing. Dieter Lott
Managing Director

1.6 Scope of delivery

- BeCOMS® Slip Ring Encoder (SRE)

Is installed with a vibration damper on the free end of the crankshaft via a mechanical adapter set

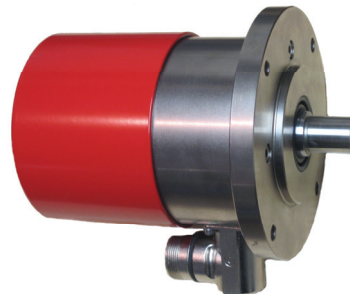


Fig. 1.1 Slip Ring Encoder (SRE)

- BeCOMS® 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 BeCOMS® Data_Logger software (optional) for enhanced visualisation and data storage. The Data_Indicator and motcom Analysis software serves as an offline analysis tool

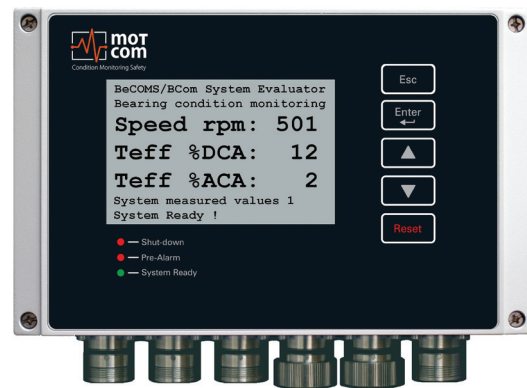


Fig. 1.2 Evaluator

- Mechanical adapter parts and cable for mounting the SRE at the engine

Consisting of:

- 1 engine cover
- 2 adapter disc
- 3 intermediate housing
- 4 cover
- 5 Adapter flange
- 6 Centering tool
- 7 Adapter shaft

cable and connectors

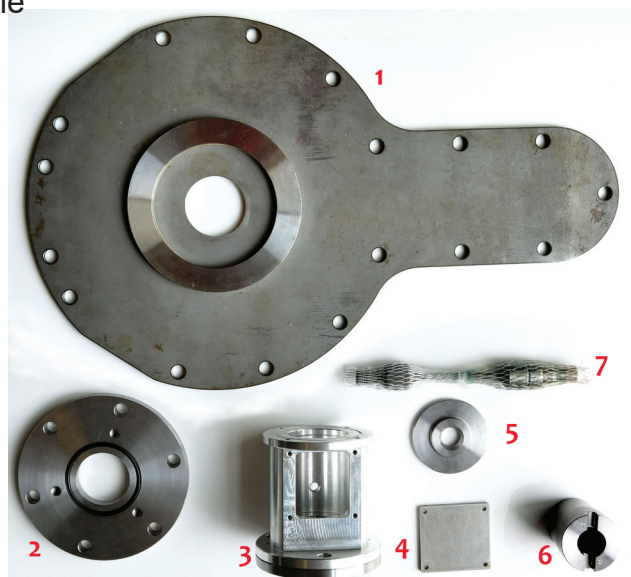


Fig. 1.3 Mechanical Parts and assembled cable

- User Manual incl. CD with Software and instruction manuals

Optional

- Data Logger PC or Notebook, completely installed with:
 - Operating System Windows® 1x, 64 Bit
 - BeCOMS®Data_Logger Software
 - CD incl. Software installation files and a soft copy of this User Manual

- Software
motcom® Loganalyser software, an auto
analysis tool for BeCOMS® Logfiles.



1.7 List of Nomenclature / Abbreviation

Abbreviation	Description
BeCOMS®	Bearing Condition 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
SRE	Slip Ring Encoder

2 General Technical Data

2.1 Technical Data of Slip Ring Encoder 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 6 Appendix.

Power Supply:	24V DC +30/-25%
	Operating Current: max. 2.0 A
Sensitivity:	Adjustable in 5 steps
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
	Communication Protocol: • Modbus • CAN Bus (optional)
User interface:	LC Display 240*128 dots 1 LED red "Shutdown" 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	Operational ambient temperature range:
Conditions:	0°C - 70°C for BCom Evaluator 0°C - 85°C for SRE
	Storage ambient temperature range: -25°C - 85°C
	Protection: IP65 for sensor IP66 for Evaluator (DNV-RU-SHIP Pt.4 Ch.9)

2.2 Connection Diagram

The SRE sensor needs to be connected to the Evaluator connector 6 (see Fig. 2.1).

Ports 1-3 are reserved for 24V power supply, relay output and serial data link, respectively.

For connector details please refer to Chapter 6 Appendix.

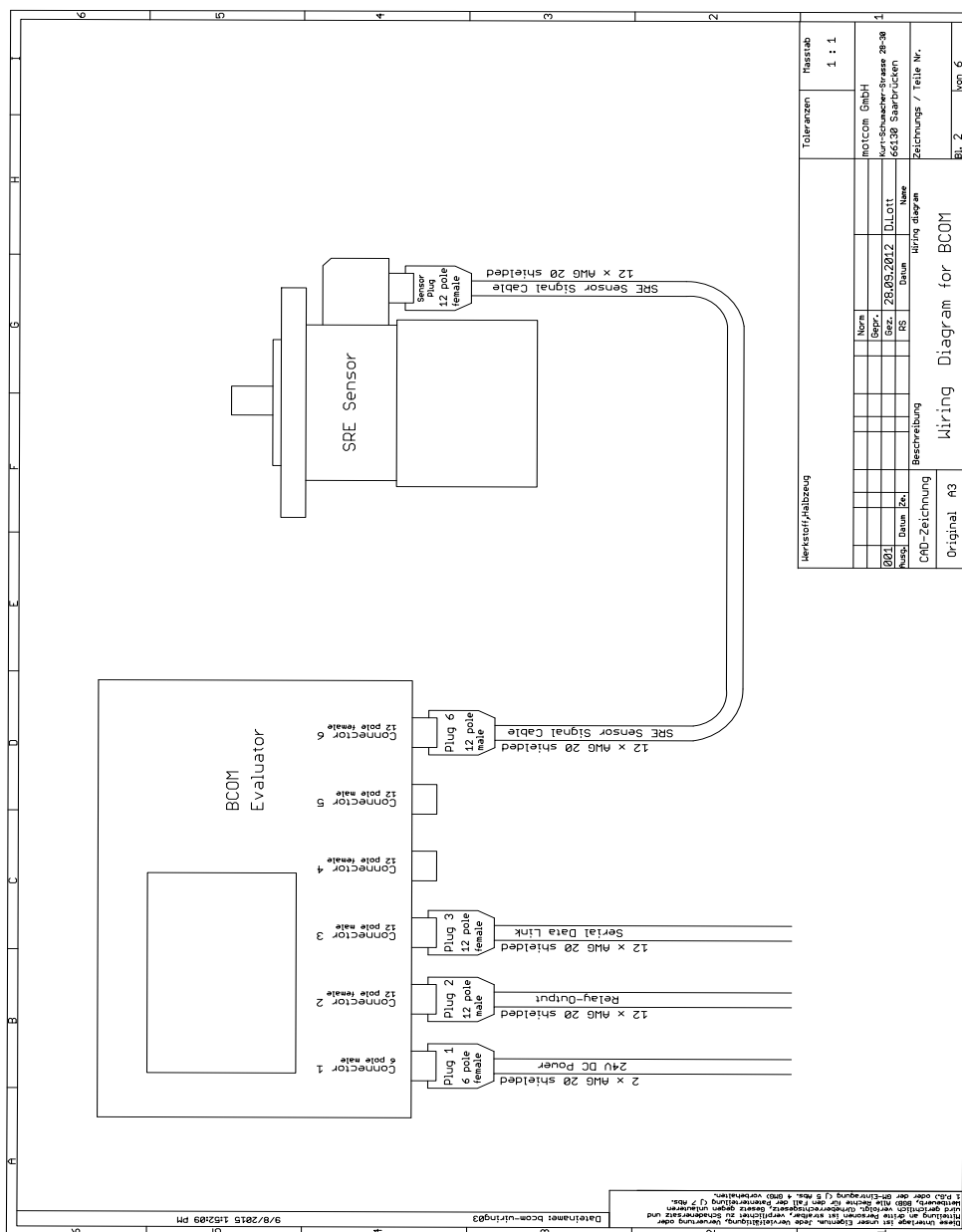


Fig. 2.1 Basic principle of connections

3 System Overview

The BeCOMS® System from motcom consists of:

- one Slip Ring Encoder (SRE), installed with a vibration damper on the free end of the crankshaft via a mechanical adapter set
- one 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 BeCOMS® Data_Logger software (optional) for enhanced visualisation and data storage. The Data_Indicator and motcom Analysis software serves as an offline analysis tool
- one Set of mechanical parts and cable for mounting the SRE at the engine consists of engine cover, adapter disc, intermediate housing and cover, cable and connectors
- one User Manual incl. CD with Software and instruction manuals

Optional:

- one Data Logger PC/Notebook complete installed with BeCOMS® Data_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,

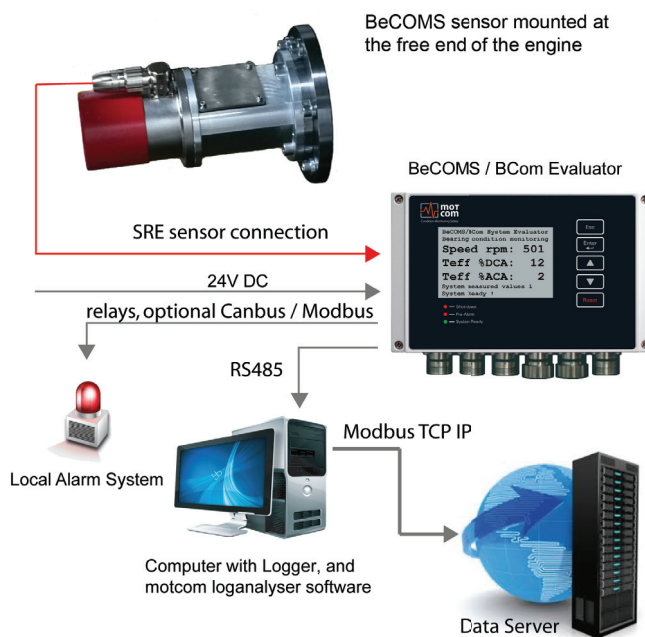


Fig. 3.1 System connection overview

3.1 Slip Ring Encoder SRE

The SRE (ref. Fig. 3.2) is the core part of the detection system as it detects the thermovoltage and rotational signal, ultimately delivering the data for monitoring of the engine.

The SRE is adapted to a specific engine with a custom mounting board/flange. This ensures high compatibility across engine types and an easy dismount of the SRE for maintenance. The SRE's highly rugged design ensures a trouble-free operation under typical conditions (refer to Chapter 2 General Technical Data) and its redundant thermovoltage read-out satisfies even high security demands.



Info: The shaft and the mounting flange are determined, designed and manufactured by motcom GmbH or by its authorized partners for each engine type. Only in this case correct operation and trouble-free transmission of measurement signals are guaranteed.

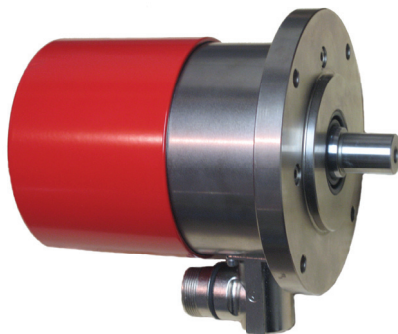


Fig. 3.2 Slip Ring Encoder (SRE)

The connector-set for the socket at the SRE: Art. No. 9 300 12 10000 has the wiring assignment as listed in Fig 6.5, Chapter 6 Appendix, for the connector-set with the Art. No. 9 30012 20000.

3.2 Evaluator

The Evaluator (Fig.3.3) 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 0-70°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 BeCOMS® 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.

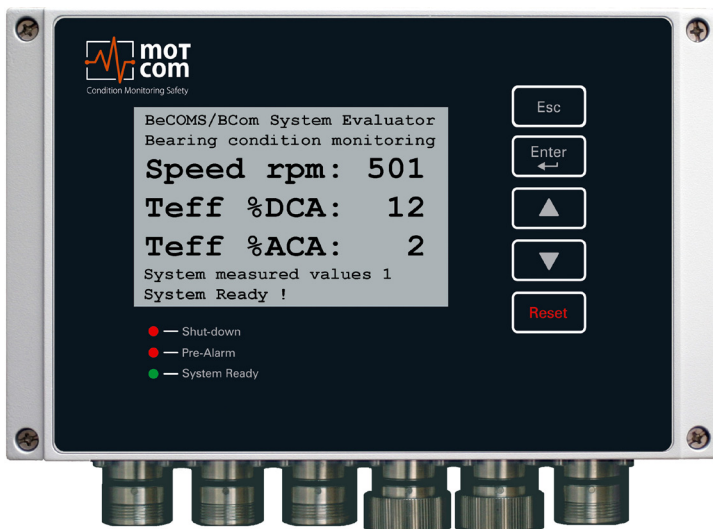


Fig. 3.3 Evaluator

For exact dimensions, please refer to Chapter 6 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 Mechanical Adapter and Cable

Attention The adapter is tailor-made for each type of engine (for an example see Fig. 3.4); the individual parts must not be removed by untrained / non-motcom personnel. Alignment errors cause high wear and tear and consequential damage. As a result, the shaft and the SRE are damaged, which leads to the failure of the BeCOMS® system.



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

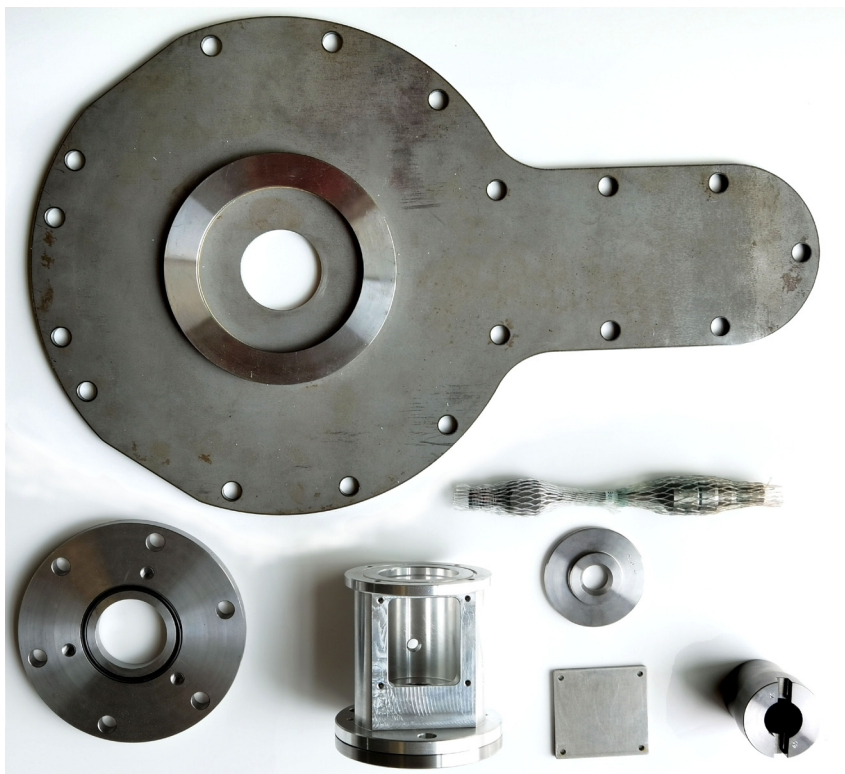


Fig. 3.4 Mechanical parts and assembled cable



4 Installation of the BeCOMS® SRE sensor and the mechanical adapter set at the diesel engine

For each installation of the BeCOMS® the adapter is tailor-made for a particular type of engine; the individual parts must not be removed by untrained / non-motcom personnel.



This adapter set consists of standard parts (for all engine types the same) and specific parts which are engine type dependant. All adapter sets have the function to connect the sensor's housing conductive with the engine block and to connect the sensor's shaft conductive with the free end of the crankshaft. The two connections must be electrical isolated to each other. All adapter sets consist of basically the same components but some in engine specific versions. On the next page is a sample assembly drawing of a typical adapter set:

01	Intermediate housing	22	Radial cylinder roller bearing
02	Adapter flange	23	Radial shaft seal
03	Isolation washer	26	O-ring
04	Engine seal	27	O-ring
05	Cover	50-52	Cylinder screws
06	Adapter shaft	55	Cylinder screws
07	Cover seal	57	Centering sleeve
08	Isolation bush	59	Washer
09	Intermediate flange		
10	Engine cover		
14	Adapter flange		
20	SRE		
21	Flexible coupling		

Table 4.1 Mechanical parts, shown in Fig. 4.1 and 4.2 on next pages

Alignment errors cause high wear and tear and consequential damage / failure on the shaft and BeCOMS® SRE.



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

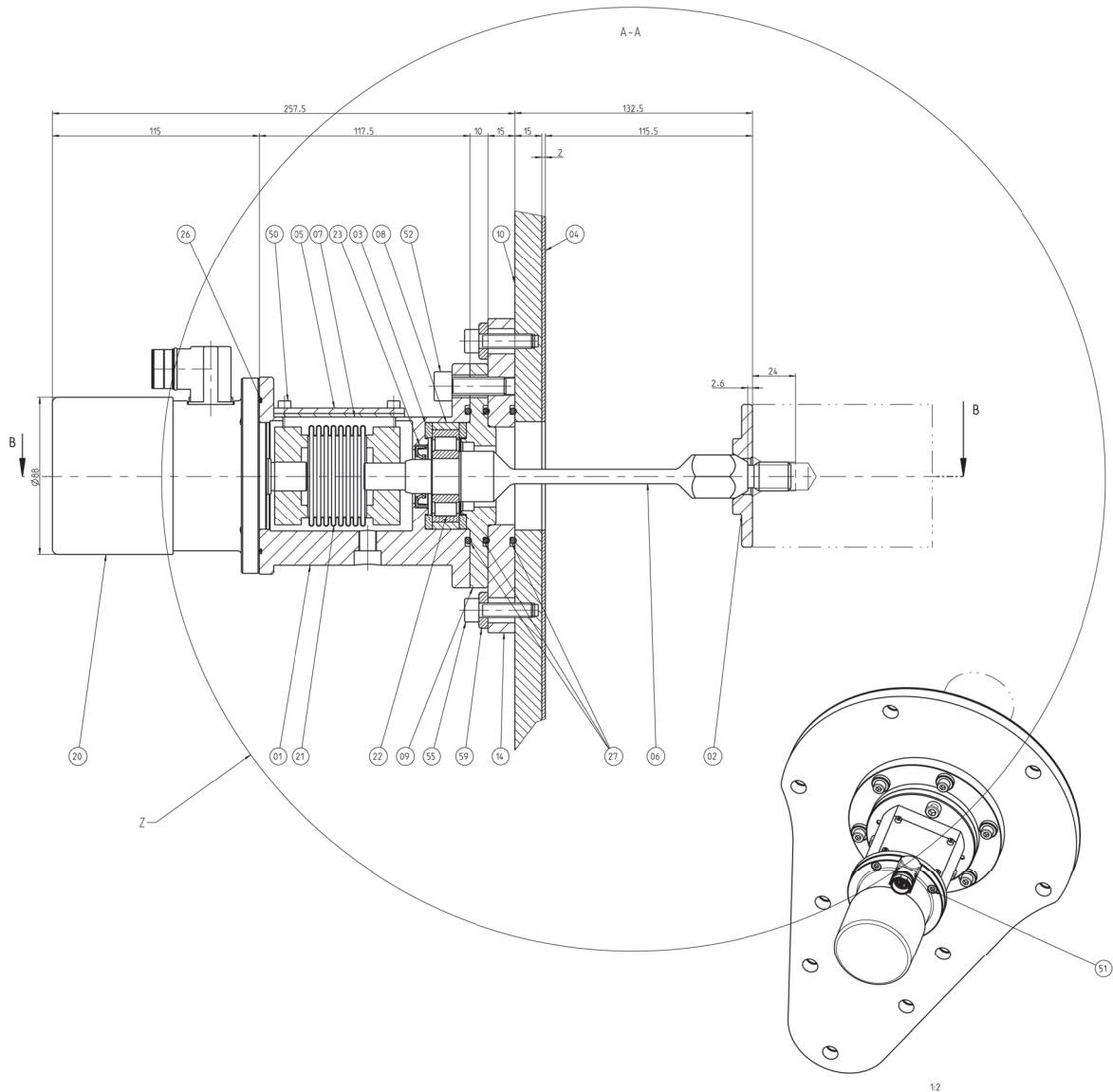


Fig. 4.1 Assembly drawing shows an example of the adaptation with all the required individual parts



Most of the BeCOMS® adapter sets look like the sample above, but engine cover, adapter shaft and shaft flange can have different dimensions and forms depending on the individual engine type. For some few engine types stronger modifications of the parts are necessary, but the installation always follows the same rules as the sample above.

4.1 Steps of the mechanical adapter and BeCOMS® SRE installation

1. Installation of adapter shaft and shaft flange:

- removing of the original engine cover
- cleaning of the existing threads in the crankshaft / damper which will be used for shaft installation
- screwing in the shaft together with the flange in the crankshaft, checking whether it can be done smoothly
- securing the shaft thread with Loctite 243 and tightening the shaft with required torque (see table below)

Required tool is a crow's foot wrench in the right size

Shaft thread type	Required min.torque
M16 x 2,0	230 Nm
M16 x 1,5	240 Nm
5/8 -11 UNC	180 Nm
M20 x 2,5	300 Nm
M24 x 1,5	320 Nm
M24 x 2,0	320 Nm
M30 x 1,5	350 Nm
M30 x 2,0	350 Nm

Table 4.1 Required torques

- installing the new / modified engine cover together with a new gasket

Important !! Check that the shaft will not be bended during the installation of the engine cover



2. Installation of centering flange and centering of the shaft:

- installing the centering flange 17144_00_08 with 6 screws at the engine cover, o-ring sealing must be installed between engine cover and centering flange

Important !! The centering flange must be movable in the screw holes



- use centering tool 14128_00_05 to center the flange with the end of the shaft
- tighten the 6 screws and remove the centering tool. The mechanics is now ready to install the sensor with the intermediate housing.

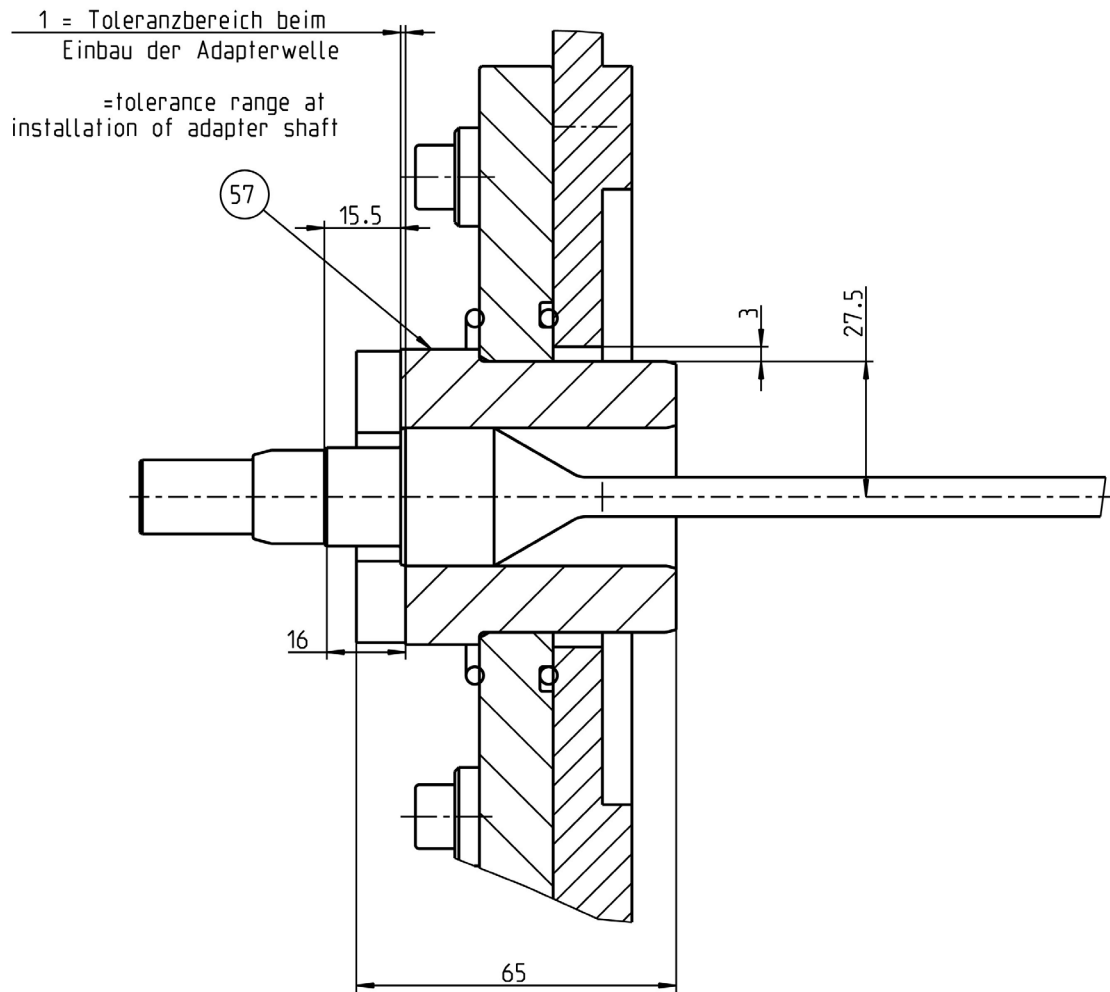


Fig. 4.2 Installation of adapter shaft

- older mechanical adapter sets have different looking centering tools, but the principle of centering is always the same. All current sets use centering tool 14128_00_05

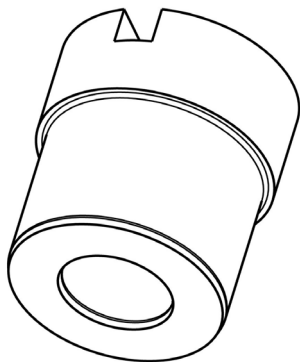


Fig. 4.3 Centering tool z14128_00_05

3. Installation of intermediate housing and sensor:

- the intermediate housing must now be assembled if not delivered preassembled. The sealing rings, the isolation washers, the NU304 bearing and the plate must be installed (see assembly drawing Fig. 4.1) but not the cover.
- the housing can now be screwed at the centering ring. Be careful during installation of the housing to damage not the shaft sealings in the housing.
- the steel coupling must be installed first on the sensor

Important !! Tighten the clamping screw with 14Nm !



- now the sensor can be fitted to the shaft and the housing, check before fixing the o-ring sealing between sensor and housing. Check that there is no gap between sensor and housing before the 4 screws are tightened. Do not squeeze the coupling. Fix the 4 screws first then fix the second clamping screw of coupling with 14 Nm.
- depending on installation type (1. NU304 bearing is lubricated by engine's oil, 2. by grease filling or 3. by oil level inside of the intermediate housing) fill 80 ml lubrication oil (only if 3.) in the housing
- close the cover of the housing, the mechanics is now complete

4. Installation steps using the example of a MAK M25 engine:

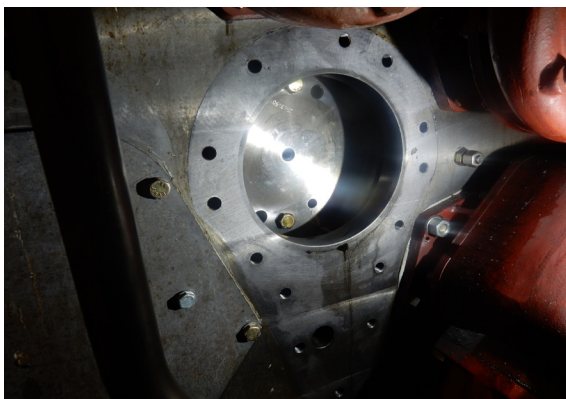


Fig. 4.4 Existing thread in the damper

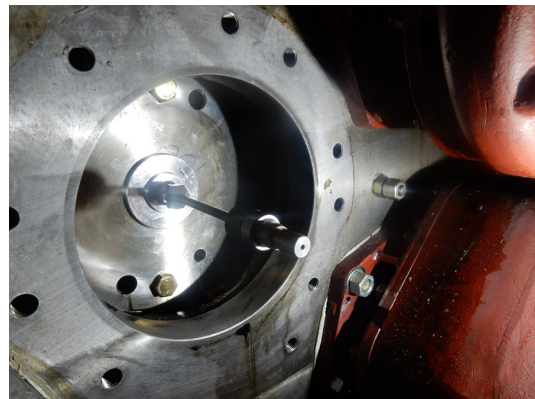


Fig. 4.5 installed adapter shaft (06) with shaft flange (02)

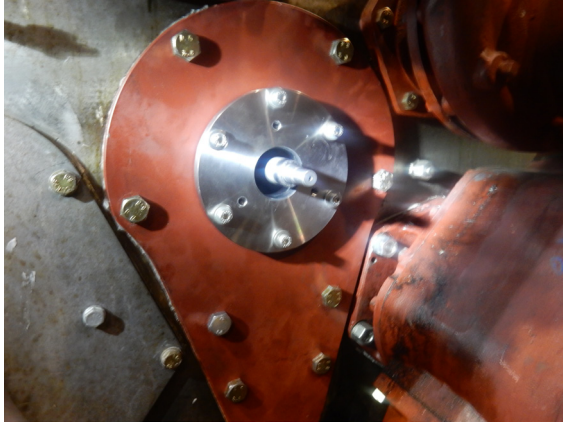


Fig. 4.6 Centering flange(14) installed on the cover

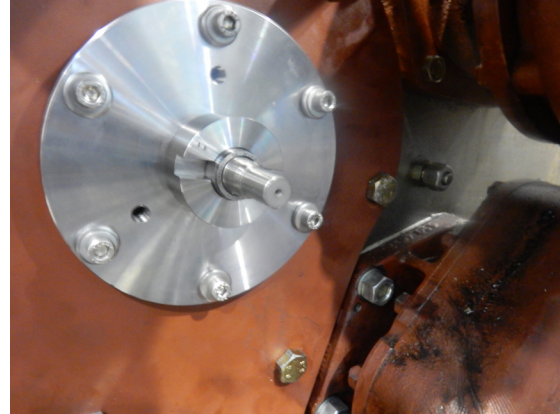


Fig. 4.7 Centering flange with centering tool 14128_00_05

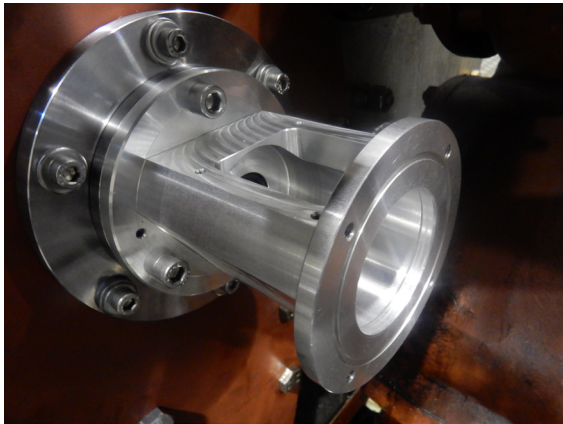


Fig. 4.8 Intermediate housing(01) on centering flange



Fig. 4.9 Steel coupling (21) first installed at sensor

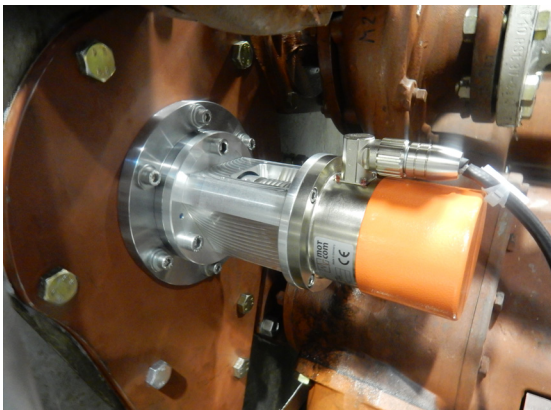


Fig. 4.10 Installed SRE sensor

4.2 Steps of the electrical and software installation

1. Electrical installation:

- position the BeCOMS® Evaluator at the wished place
- connect the 24V DC power to connector 1 of Evaluator (see Fig. 2.1)
- solder a cable from BeCOMS® SRE Sensor to connector 6 of the Evaluator. Connect Sensor and Evaluator, if wished, solder cable from connector 2 of the Evaluator to the inputs of the engine's alarm system. It is possible to connect shutdown, pre-alarm and system ready as potential free switching over relay contacts to the alarm system.

Now you can switch on 24V power. The system is checking during startup the sensor and it's connection and should show Ready state now. The system is operating in standalone mode now. It must be configured and synchronized

- solder a RS485 connection cable (see Fig. 2.1) from connector 3 of the Evaluator to the RS485 interface of the wished PC. (RS485 adapter must be installed as PCI, PCIe or USB adapter) or to the preinstalled motcom Data Logger PC.
- if no Data Logger PC is used in the engine control room , for service purposes (like parameter setup) the RS232 interface of connector 3 can be used for short distances. A different RS232 cable (**shown in the User Manual**) must be soldered and connected to a service laptop.

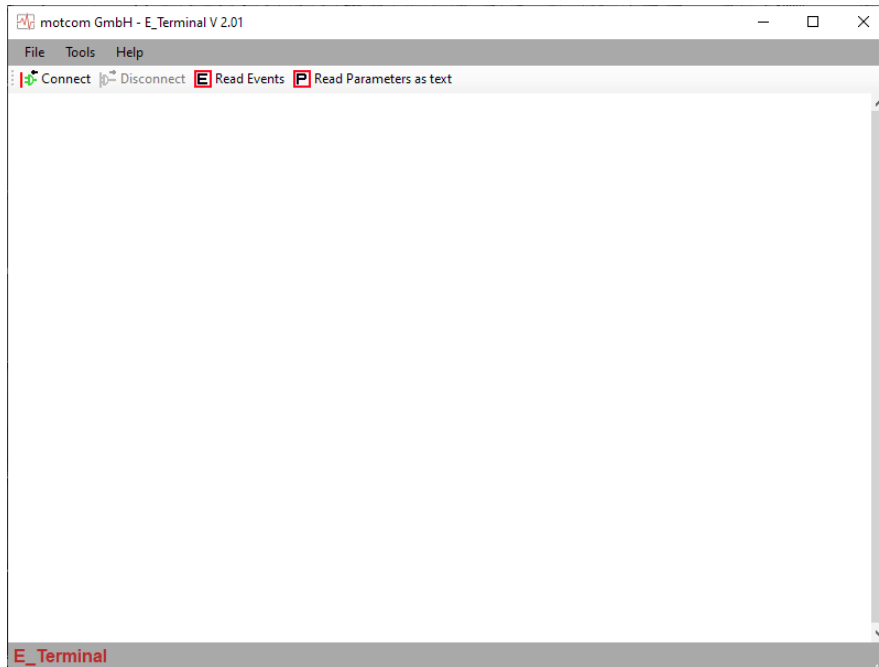
2. Software installation:

- install the software in the PC from the CD (located in the folder with users manual) and check the connection to the Evaluator, first with the E-Terminal software. If running, the Data Logger software can be set up later to the same comport. For a service laptop install only E-Terminal software to setup parameters.

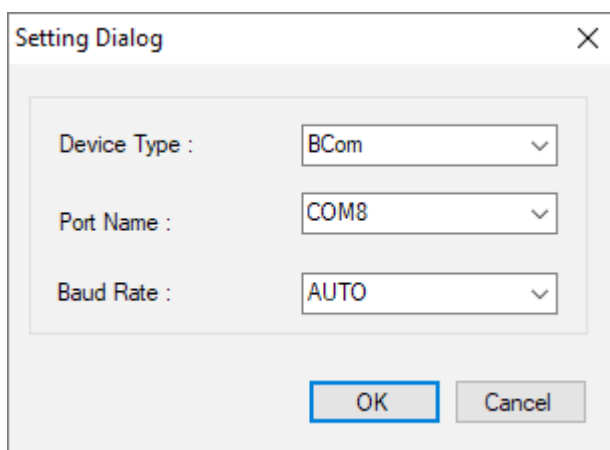
3. Parameter setup:

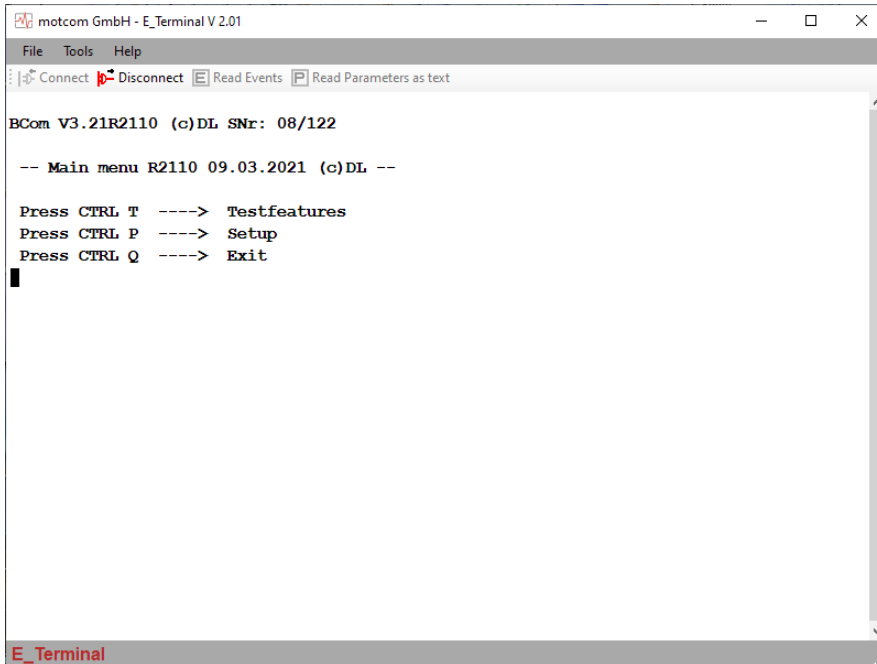
- setup the engine's parameters via E-Terminal to the correct values 2/4 stroke, firing angle, firing order, number of cylinders
- store the parameter in the Evaluator

After start of E-Terminal software this window appears. Press connect to establish the connection to the evaluator.



In the setting dialog window select as device type “BCom” and select the right COM port. Then press ok.





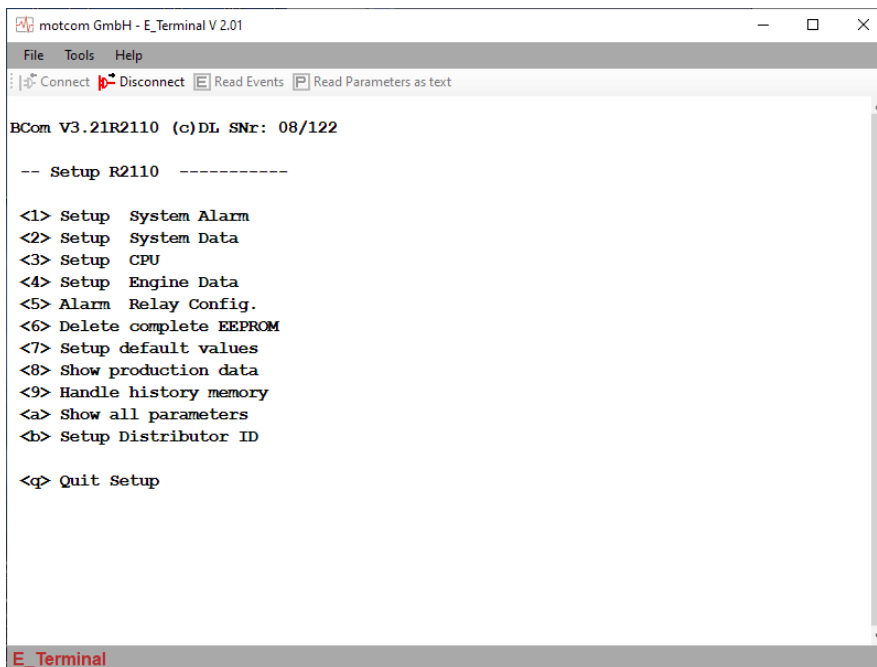
```
motcom GmbH - E_Terminal V 2.01
File Tools Help
: Connect Disconnect Read Events Read Parameters as text

BCom V3.21R2110 (c)DL SNr: 08/122

-- Main menu R2110 09.03.2021 (c)DL --

Press CTRL T ----> Testfeatures
Press CTRL P ----> Setup
Press CTRL Q ----> Exit
```

The main menu of the Evaluator’s firmware appears. Press “CTRL P” . After the input of the password the setup menu appears.



```
motcom GmbH - E_Terminal V 2.01
File Tools Help
: Connect Disconnect Read Events Read Parameters as text

BCom V3.21R2110 (c)DL SNr: 08/122

-- Setup R2110 -----

<1> Setup System Alarm
<2> Setup System Data
<3> Setup CPU
<4> Setup Engine Data
<5> Alarm Relay Config.
<6> Delete complete EEPROM
<7> Setup default values
<8> Show production data
<9> Handle history memory
<a> Show all parameters
<b> Setup Distributor ID

<q> Quit Setup
```

Press for <4> to enter engine data setup.

```

motcom GmbH - E_Terminal V 2.01
File Tools Help
Connect Disconnect Read Events Read Parameters as text

BCom V3.21R2110 (c)DL SNr: 08/122

-- <4.1> ENGINE Data -----
Nominal revolutions : 600
Typ 2/4 stroke      : 4
Config. V=2 L=4     : 2
Number of Cylinders : 16

| <4.2> Firing order |
|--1--|--2--|--3--|--4--|--5--|--6--|--7--|--8--|--9--|--10--|--11--|--12--|
| 01 | 03 | 05 | 07 | 09 | 02 | 04 | 06 | 08 | 10 | 12 | 16 |
|--13--|--14--|--15--|--16--|--17--|--18--|--19--|--20--|--21--|--22--|--23--|--24--|
| 14 | 11 | 13 | 15 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |

| <4.3> Firing angle |
|--1--|--2--|--3--|--4--|--5--|--6--|--7--|--8--|--9--|--10--|--11--|--12--|
| 0 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
|--13--|--14--|--15--|--16--|--17--|--18--|--19--|--20--|--21--|--22--|--23--|--24--|
| 45 | 45 | 45 | 45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Press <1> if values are OK
Press <2> to change values
E_Terminal

```

The correct values for all engine specific data must be setup and be stored by pressing <1> in the Evaluator.



Important !! With incorrect engine data setup the BeCOMS® system does not work properly !

All other parameters have factory default values. They can be modified on individual wishes but system works with default values.

After parameter setup, the sensor must be synchronized to firing TDC of cylinder 1. This can only be done through the setup menu of the Evaluator itself using the front panel buttons.

- after parameter input and synchronizing the system is ready for run. Start Data_Logger software to collect and visualize the data.

Check all functions



4. Synchronizing the BeCOMS® SRE sensor with the firing TDC 1 of the diesel engine

After first installation or after every dismantling and reassembly of the BeCOMS® system's SRE sensor, a synchronization of the sensor with the firing TDC of cylinder 1 must be done. To do this, the engine must be moved first in the firing TDC position of cylinder 1 by using the turn gear or by manual force. This movement must be done in normal rotating direction.

It is important that the firing TDC is chosen at four-stroke engines, that is, when inlet and outlet valves are closed. Then the following instructions must be executed to firing TDC of cylinder 1::



First move the engine mechanically to this position. Then open the menu for impulse offset in the Evaluator menu. Use the default Pin of 92 to enter parameter setup and 75 to enter offset menu. Start offset detection, then turn the engine in rotation direction until impulse counting stops. restart evaluator.




1. In the normal screen on the LCD. Press the up  /down  buttons to enter the Parameter setup menu.

```
BeCOMS / BCom System Evaluator
Bearing Condition Monitoring
Speed rpm: 610
Teff %DCA: 65
Teff %ACA: 0
Metered values display 1
System Ready !
```

```
BeCOMS / BCom System Evaluator
Bearing Condition Monitoring
-- Setup Parameter-----
up/down=next, ret=select
Press ESC to leave !
Change of parameters
System Ready !
```

2. Press the  button and then press the up  / down  buttons to 'setup CPU' menu.





```
BeCOMS / BCom System Evaluator
Bearing Condition Monitoring
-- Setup CPU -----
up/down=next, ret=select
Press ESC to leave !
Change of parameters
System Ready !
```

3. Press the  button, then press the up  / down  buttons to go to 'PIN for Setup' to put in the PIN no: 92 for access to changing the settings (all settings can be changed once this pin is entered, for older firmware, the PIN is 97).

```
BeCOMS / BCom System Evaluator
Bearing Condition Monitoring

-- Setup CPU -----
PIN for Setup :***
up/down=next, ret=select

Press ESC to leave !
Change of parameters
System Ready !
```

4. Press the  button. This will allow entry to input the pin as shown . In order to input the numbers press the up  / down  buttons. (preferably down as it count down from 99). As once seen in the LCD screen you have the input the 92 pin number.



Press the  button to enter the value into the Evaluator.

Next press  to leave the menu.

```
BeCOMS / BCom System Evaluator
Bearing Condition Monitoring

-- Setup CPU -----
PIN for Setup : 92
up/down=up/down, ret=confirm

Press ESC to leave !
Change of parameters
System Ready !
```




5. Next go into the 'Setup Parameter' menu (by selecting with up  / down  buttons).

```
BeCOMS / BCom System Evaluator
Bearing Condition Monitoring

-- Setup Parameter-----

up/down=next, ret=select


Press ESC to leave !
Change of parameters
System Ready !
```



6. Press the  button, then press the up  / down  buttons to go to 'PIN impulse Offs'.


```
BeCOMS / BCom System Evaluator
Bearing Condition Monitoring

-- Setup Parameter-----
PIN Impuls Offs.:***
up/down=next, ret=select

Press ESC to leave !
Change of parameters
System Ready !
```

7. Press the  button. This will allow entry to input the pin as shown. This PIN is 75 (or 69 for older firmware).



Press the up  / down  buttons to set the desired value (preferably down as it count down from 99). As once seen in the LCD screen you have the input the 75 pin number.

Press the  button to enter the value into the Evaluator. This will allow you to access the 'IS impulse offset' menu to activate the counting.

```
BCom system evaluation unit
Bearing Condition Monitoring

-- Setup Parameter-----
PIN Impuls Offs.: 75
up/down=up/down, ret=confirm
Press ESC to leave !

Change of parameters
System Ready !
```


8. Press in the 'Setup Parameter' menu the up  / down  buttons to go to 'IS Impulse Offset' (ST impulse Offset for older firmware).

You will see the current offset number eg 123 in the next picture)

```
BeCOMS / BCom System Evaluator
Bearing Condition Monitoring

-- Setup Parameter-----
IS Impuls Offset: 123
up/down=next, ret=select


Press ESC to leave !
Change of parameters
System Ready !
```


9. Press the  button. This will select the 'IS impulse Offset' value.

```
BeCOMS / BCom System Evaluator
Bearing Condition Monitoring

-- Setup Parameter-----
IS Impuls Offset: 123
up/down=next, ret=select

Press ESC to leave !
Change of parameters
System Ready !
```

Press again  button. This is the value for 'IS impuls offset' reset to 0. Now, the discovery of the offsets can be started. In order to turn the engine, it must now be done manually or with the turn gear in direction of rotating. The number on the LC display counts up and stops at a certain value, even if the engine's rotation is turned on. This value is the current 'impulse offset' value between ignition cylinder 1 and the synchronous impulse of the SRE sensor.




NOTE: During motoring of the engine, only rotate the engine in the correct operating direction.



Do not stop and reverse the engine. This will only increase the impulse offset as it would be looking for the reference in another direction therefore increasing numbers. This will input a wrong offset value.



10. Once the impulse offset value is captured into the Evaluator, leave the setup to its original monitoring screen by pressing the  button twice.

11. To verify that the new impulse offset was taken over, can the Logger software in the menu 'setup-> setup preferences' of the currently submitted value be looked up.



5 Optional Data Logger PC with Data_Logger Software

Attention This chapter only applies if you are running a BeCOMS® **Advanced** or BeCOMS® **Professional** system!



The BeCOMS® 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 BeCOMS® 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 BeCOMS® system.

The BeCOMS® 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.



The Data_Logger and Data_Indicator Software comes pre-installed with the supplied Data Logger PC. The programs must be configured correctly according to the system specific configuration on site after BeCOMS® commissioning. Please refer to BeCOMS® Data_Logger and Data_Indicator manual for information.



5.1 Installation of Data Logger PC Logger PC with Windows 10 operating system and BeCOMS® Software



In case of a later installation of a PC or Laptop by the operator himself, the following must be observed:

Requirements for the optional PC

1. The monitoring computer should have the following minimum requirements:

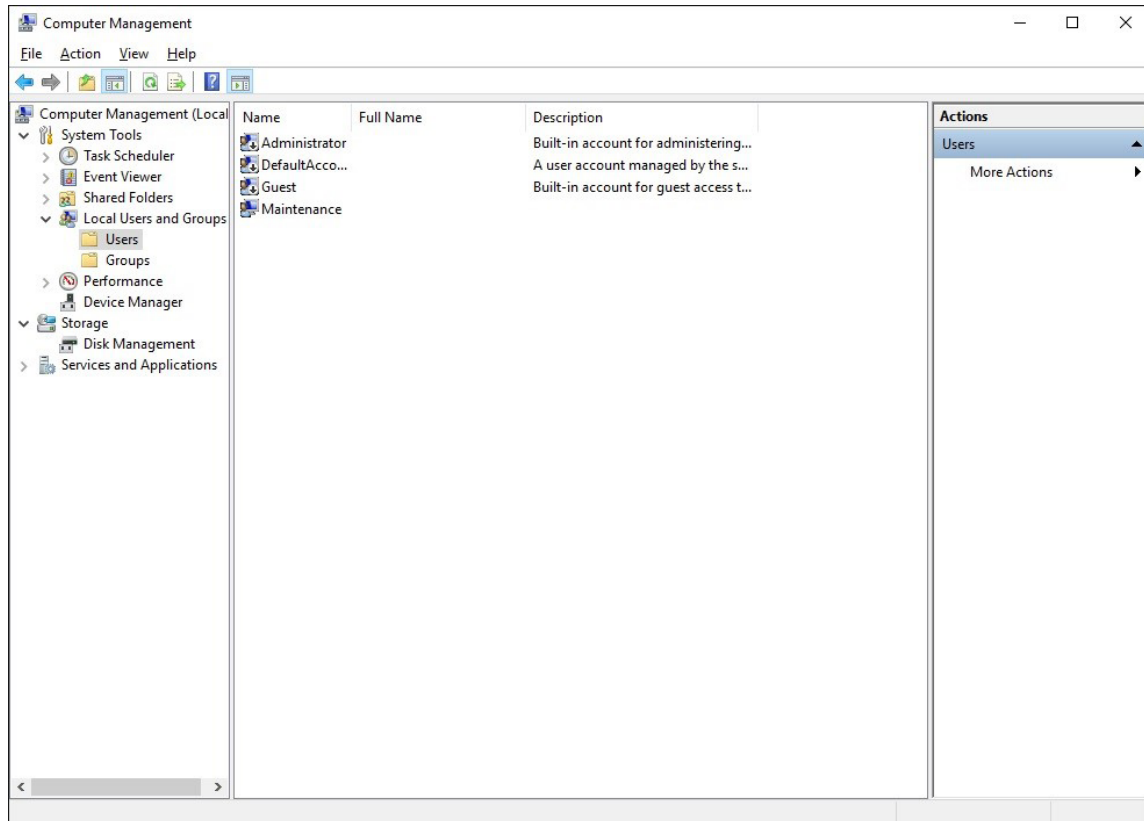
- Intel Core I5, 11th Gen or equivalent
- DVD RW DL Drive
- min. 8GB DDR4 RAM *
- min. 256 GB SSD M2.P for OS
- 1 TB SSD for recording data (approx.100MB per day/BeCOMS® system)*
- Operating System Windows 10, 11Pro
- Mouse, Keyboard
- at least 3 free PCI/PCIe slots *
- Display resolution full HD
- RS485 Interface (RS232 via optional converter) *



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

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

2. Install Microsoft Windows 11 Pro operating system on the PC and install all available updates and newer versions (version should be now 22H2 or higher), or if Win 11 Pro (version 22H2 or higher) is already installed, follow step 3.
3. Login on Windows 11 with a user profile with administrator rights. Click Windows Start Button right in the left bottom corner. Click “Computer Management” -> “Local users and Groups” -> “users”

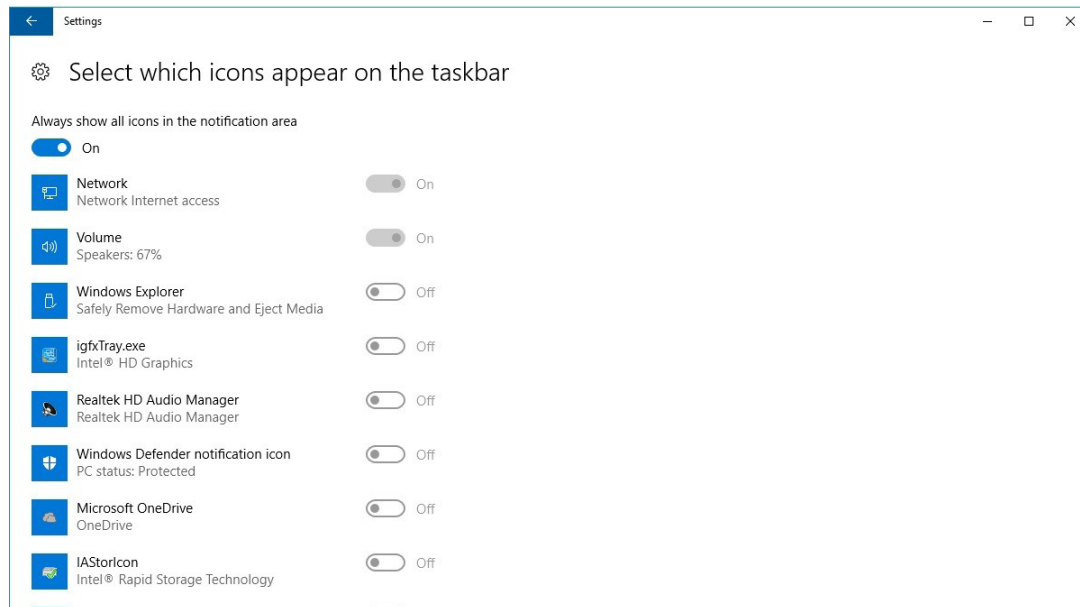
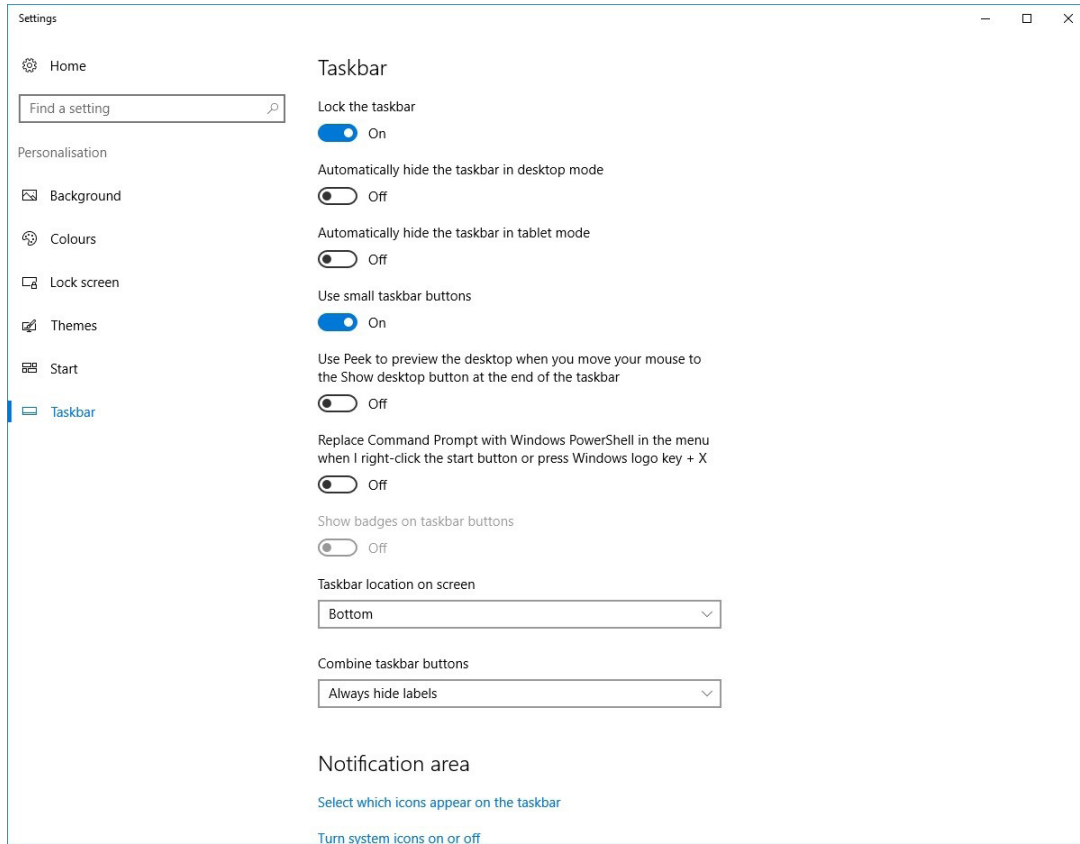


Activate user profile administrator (in Win 11 normally deactivated).

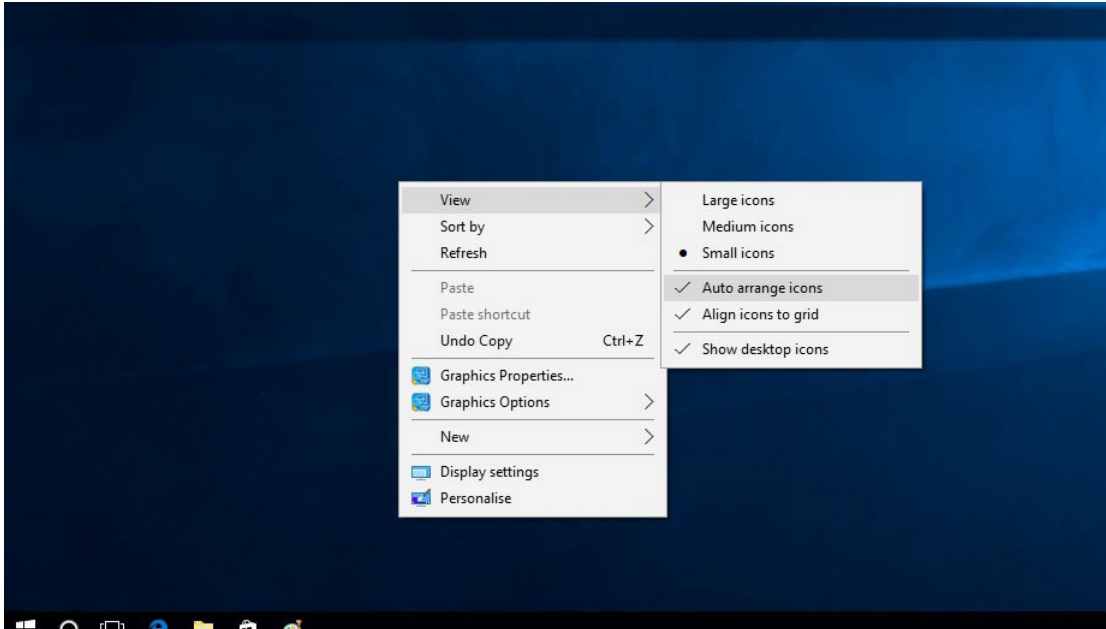
Close all windows and logoff with current user and logon with administrator profile. Change password of administrator to “password you want“ by pressing <CTRL, Alt, delete> and clicking button “change a password”.

Then click ok button to go on with administrator profile. Click right in the taskbar and select settings. Click on “Taskbar” tab in the left area of the window and switch “Use small taskbar buttons” on. Then click on “Select which icons appear on the taskbar” in the notification area. Switch “Always show all icons in the notification area” to on.

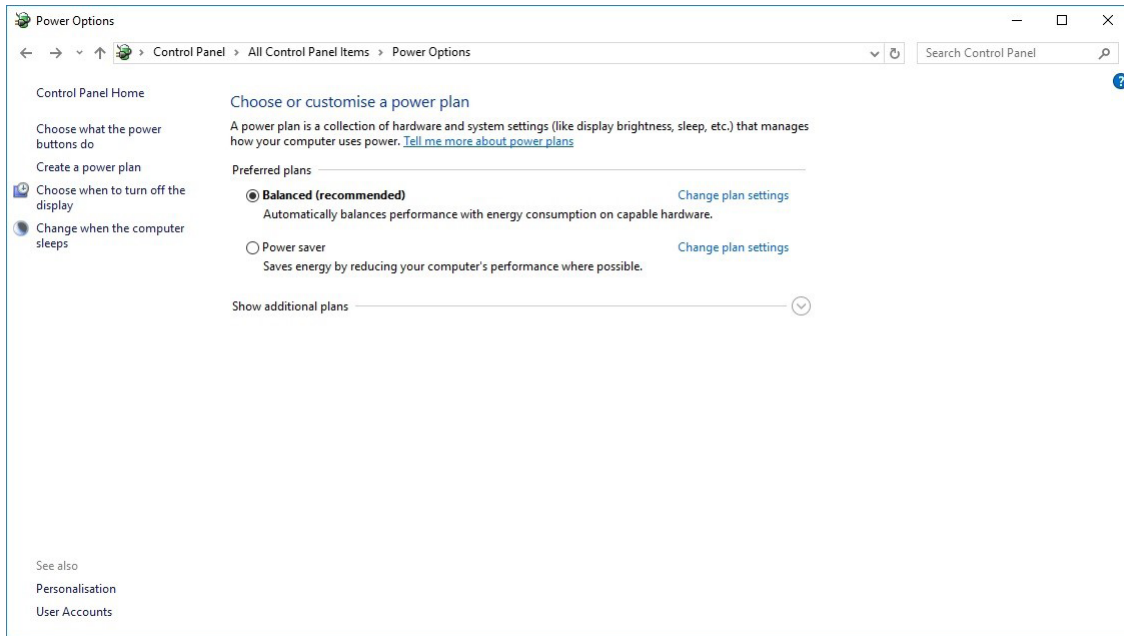
Close window.



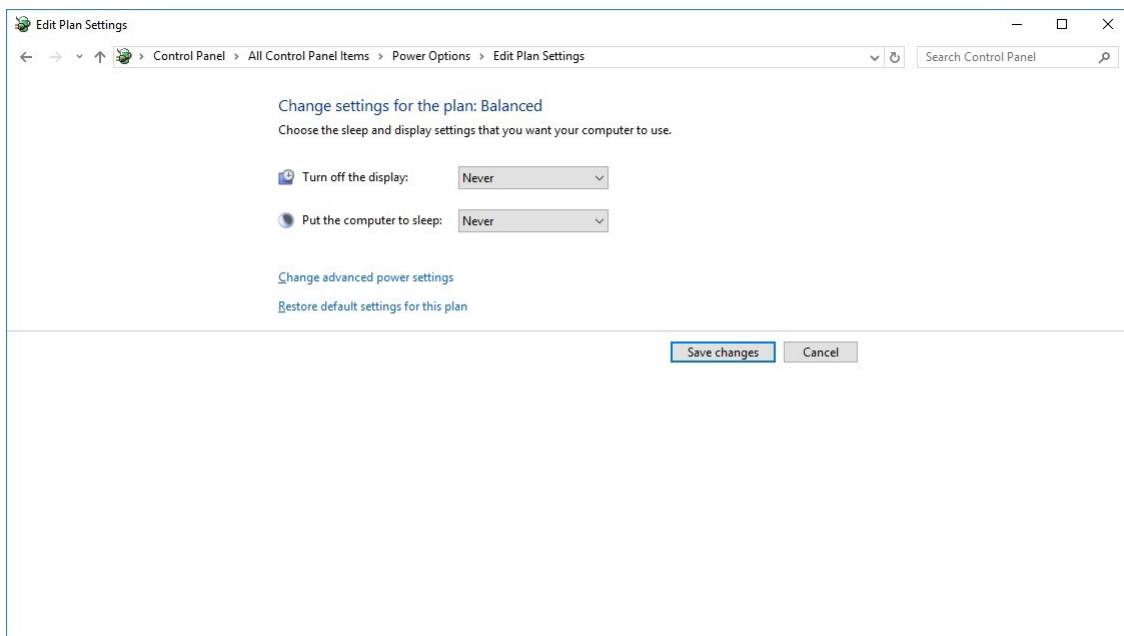
Click right on the desktop and select View. Activate “small icons” and “auto arrange icons”.



Go to “Right click Start -> power options”. Click change plan settings of selected “Balanced” .

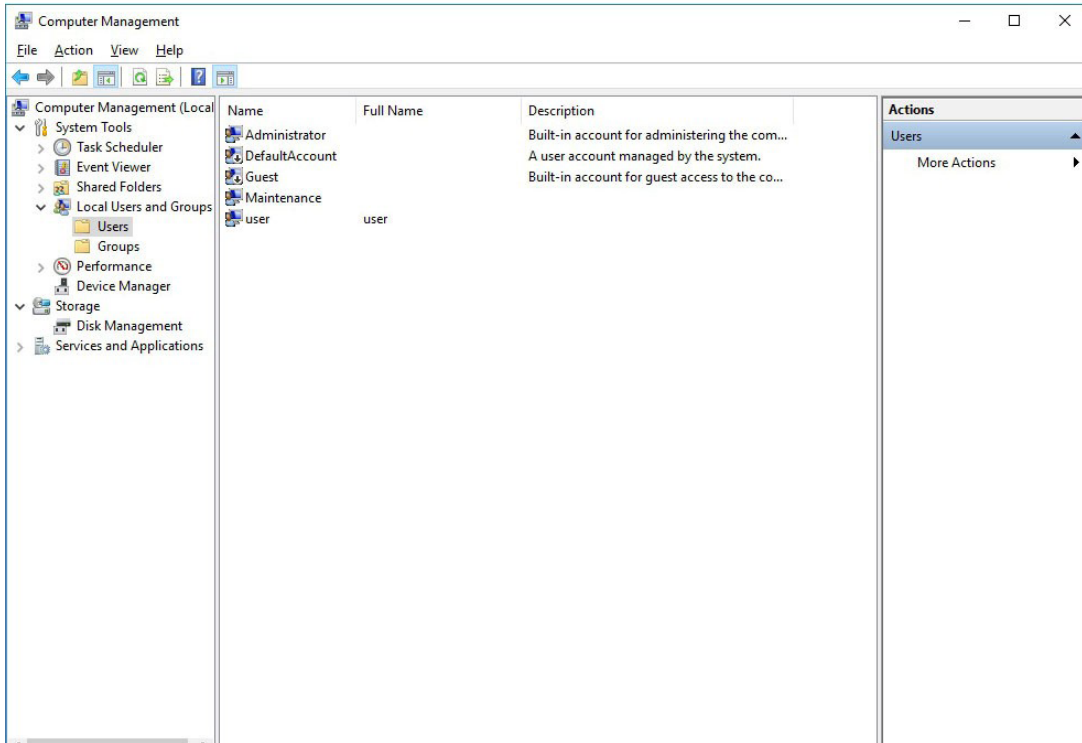


Switch “Turn off the display” and “Put the computer to sleep” to “never”

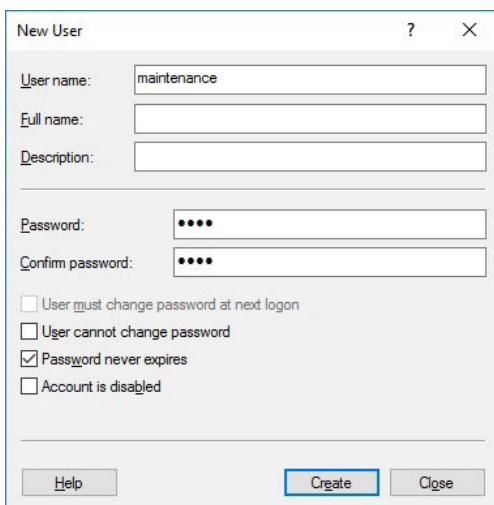


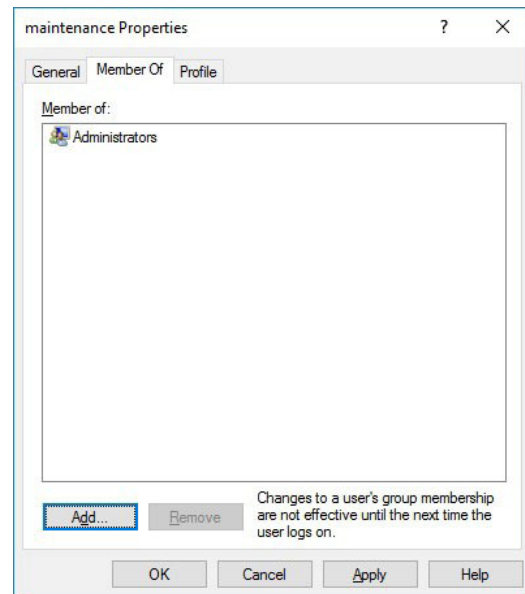
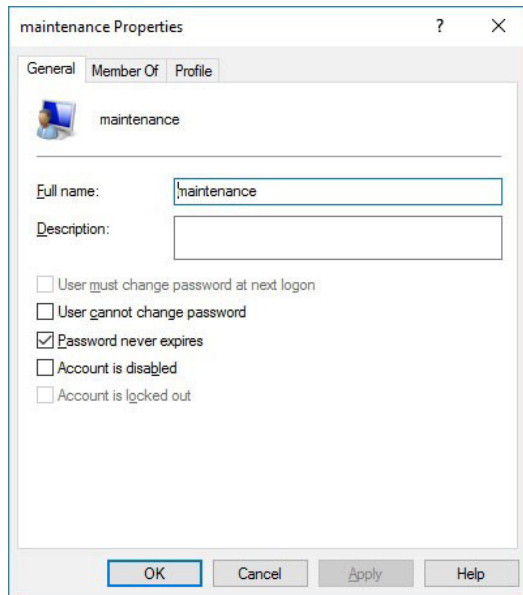
Save changes and close window.

Go to “Right click Start -> Computer Management -> Local Users and Groups -> Users” again.



Delete all users except Administrator, Guest and Default account. Create new user “maintenance” with password “bcom” and administrator rights. Create new user “user” with user rights and no password. (For all this users select the option “password never expires”).





Close all windows.

RS485 card installation:

Copy drivers for PCI / PCIe 485 cards into a new folder on the hard disk (f.i. c:\download). If necessary, follow the instructions of the card manufacturer to install the drivers.

Shutdown computer and plug off power cord. Open computer housing and mount the wished number of RS485 cards (Fig. 5.1, 5.2 next page) into the PCI slots. Close computer housing, plug in power cord and restart computer.

Different RS485 card can be used, but they must have the following specifications:

- Surge protection must be implemented
- ports must be galvanic isolated
- card must have 9 pin sub d male connectors with ISO pin configuration on the slot bracket

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.

motcom GmbH has tested EX-42062IS PCI and EX-45062IS PCIe card.

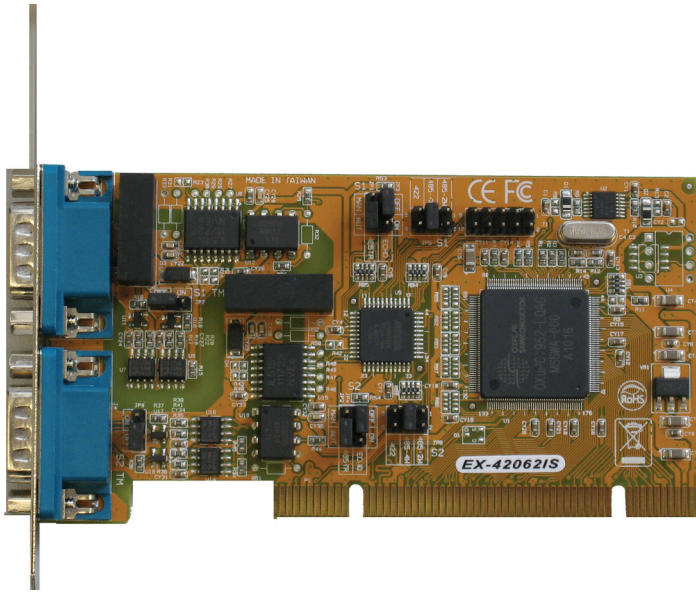


Fig. 5.1 EXSYS EX-42062IS PCI card

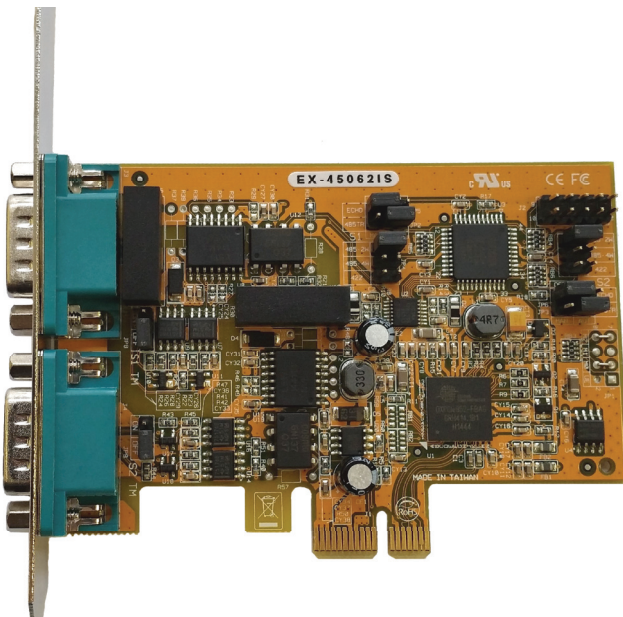
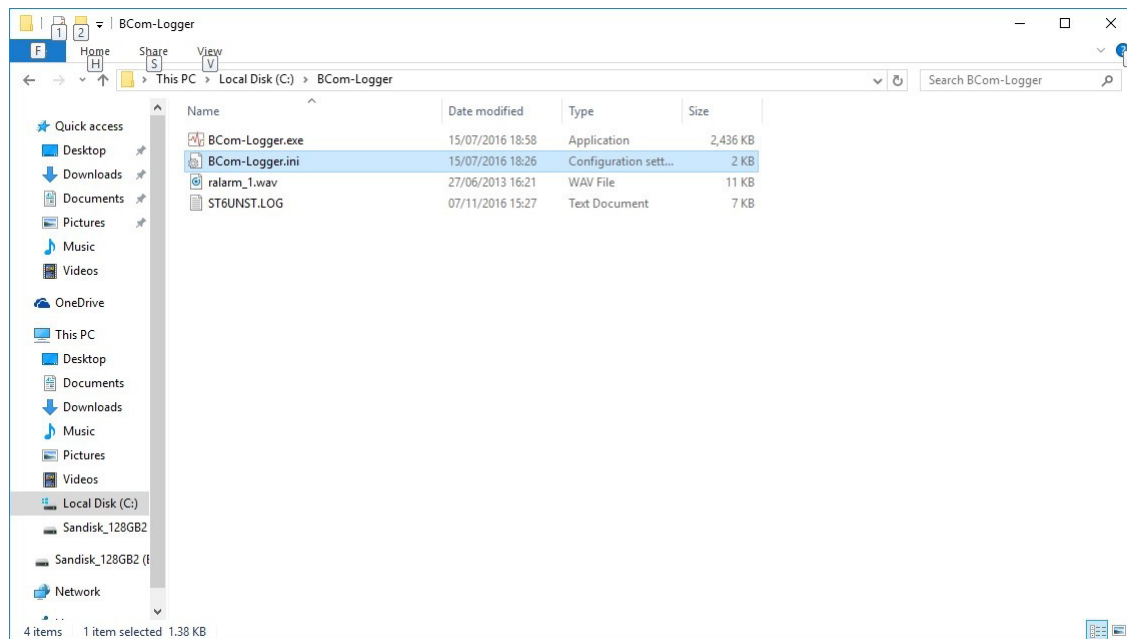


Fig. 5.2 EXSYS EX-45062IS PCIe card

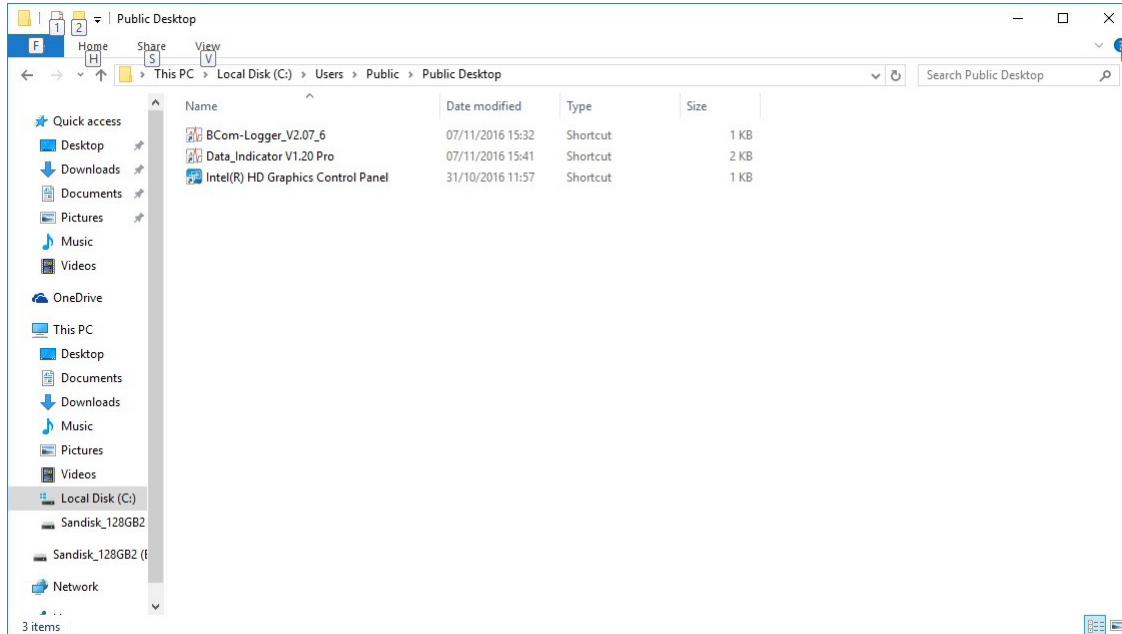
Login with administrator profile. System detects the hardware and select driver install automatic.

After installing driver of RS485 card, install BCom Logger-, Data_Indicator-, and if wished motcom loganalyser (for BCom Logger you must remember the Win 11 (as well as Win 10) feature of separate .ini files for each user in a hidden space of the user data, if the program is installed in the default Program Files folder. This means, every user has his own .ini file and the version inside of Program Files folder IS NOT USED !! Every user can modify and store his own settings ! But normally we want have a global .ini file for all users. So you must install BCom Logger software in another folder, for example c:\bcom-Logger. If you do this, the .ini file inside is a global file for all user like usual in XP)

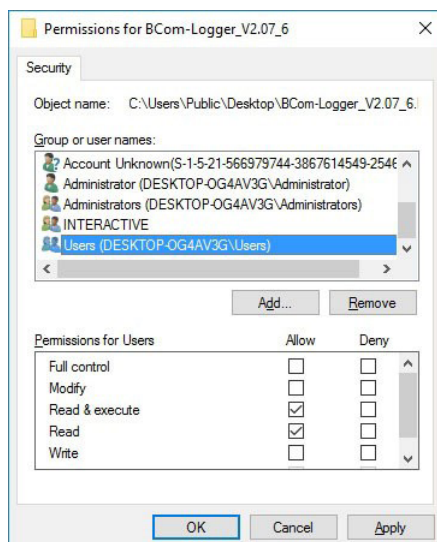


Create shortcuts for BCom Logger, Data_Indicator on administrator's desktop.

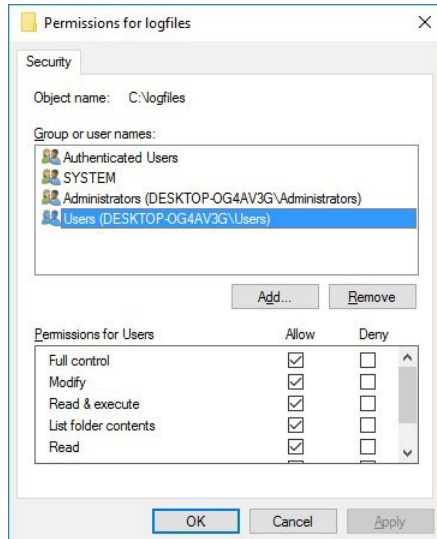
Open Start -> file explorer and open drive c:. Go to users -> administrator -> desktop.
Cut all new generated icons and paste them to users-> Public -> public desktop.



Select these icons and check that their permissions for users to read and execute are set by right click and then properties -> security.

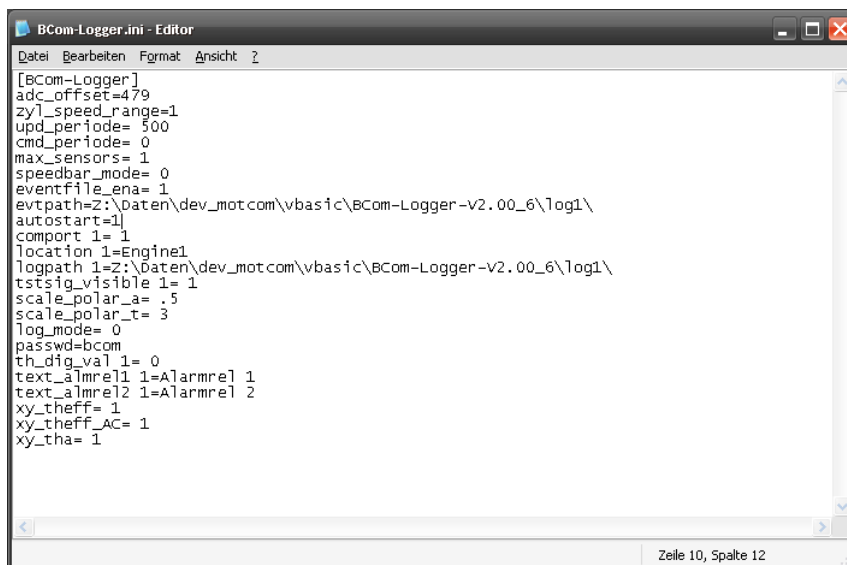


Close all windows. Open Computer and create a folder “logfiles” on the harddrive. Insert for this folder the permissions for users to Read, Read & Execute, Modify, List Folder Contents and Write by clicking “logfiles” right and “->Properties -> Security”.



Create a shortcut of logfiles folder and copy it to c:\ -> users-> Public -> public desktop.

Open BCom-Logger.ini file in “\bcom-Logger” with editor and set autostart=0 to autostart=1. Save BCom-Logger.ini file.



Start BCom logger program. Select “Setup->Setup preferences”.
Insert the wished numbers of connected BCom, COM Ports, locations.
Select as logfile path the created logfile folder. Select “Setup-> Setup Password” and change password for stopping data-logging to “sre”.

Log off administrator.

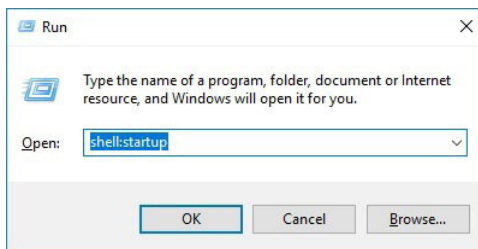
Log on with maintenance and customize taskbar in the same as administrator. Set as password “bcom”. Check the function of logger and data_indicator software over the desktop icons (must appear, generated by the public desktop with the first logon).

Log off maintenance.

Logon with user account.

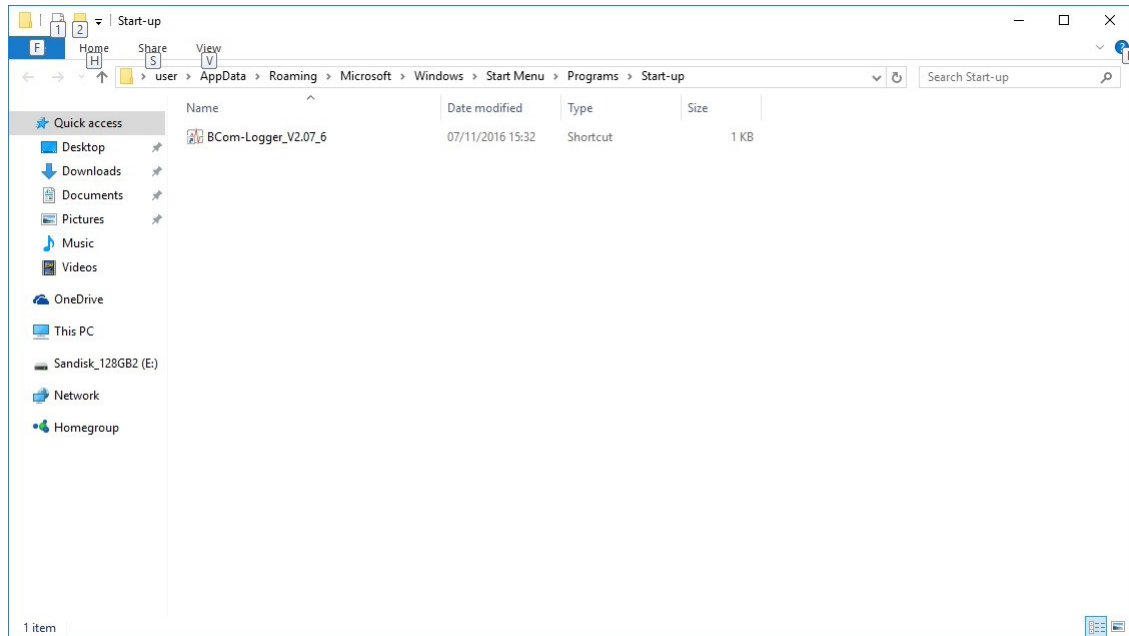
Check the function of logger and data_display software over the desktop icons (must appear, generated by the public desktop with the first logon).

Click “right Start” -> “run” and type in “shell:startup”



Press “ok”, the startup window appears.

Copy the “Bcom logger icon” to startup of user account:



Log off user.

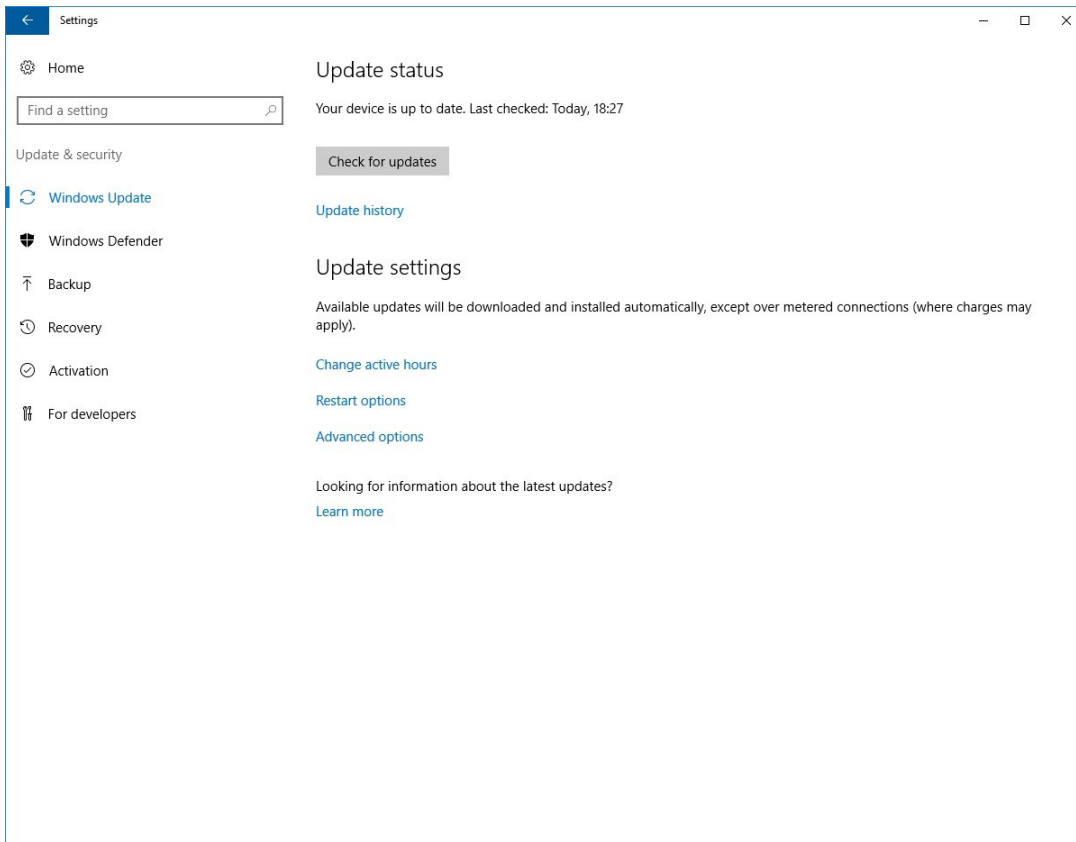
4. Advanced steps (some require internet connection)

Log on with administrator profile.

Install the latest operating system updates:

Go to Start-> settings -> update and security. Click “Check for updates”. When the updates list is generated, the download and installation starts automatically. If restart is required after installation, click “restart now”.

Sometimes it is necessary to repeat the applying updates; follow the indication at the Windows Update screen.



If required, download language packs for additional languages. In Windows 11 go to Control Panel / Language. Click “Add a language” to select and install additional languages.

Apply the required languages to the system (Control panel / Language, select a language in the list, click Options, then click “Make this the primary language” to enable it as a display language).

Install an antivirus program.

Before installing the Logger PC at the customer’s site, a functional test with connected BCom system and running BCom Logger program is performed over 24 hours. If applicable, motcom loganalyser is also running in online monitoring mode during the test.

Installation is now finished. PC should work properly. Fill out equipment card and works certificate.

5.2 Data Sampling

As soon as the Evaluator is powered up, it starts the initial self check procedure and shows the 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 Evaluator, if a working SRE is connected to it, the Evaluator samples the signals from the SRE at a certain sampling rate. After that, the Evaluator converts them into digital signals, analyzes, evaluates and displays them on its LC-display.

These data including detected events are continuously made available through the RS485 interface to the installed PC with Data_Logger software for remote monitoring and further processing. It is also possible to set up some Evaluator parameters from the PC using standard Windows HyperTerminal application.

Depending on the configuration, the Data_Logger software can manage up to 6 BeCOMS® systems on a single computer. The measured values and events will be monitored and displayed continuously on the computer, and stored in a distinct directory on the hard disk for each connected BeCOMS® system.

5.3 Compressing Data Files

To compress daily data files with the file extension *.log to *.rar

* symbolizes the name of the data file, which is usually given systematically as follows:

YYYYMMDD_EngineXXX, i.e. 20220117_EngineXXX,

whereas

YYYY: year, i.e. 2022

MM: month, i.e. 01

DD: day, i.e. 17

of the BeCOMS® set on the Engine XXX



using “WinRAR” follow these instructions:

- 1) Click on the desired data file which is to be compressed with the right button of the mouse. A menu should pop up (refer to Fig. 6.2).
- 2) Click on the option “Add to Archive” from the option list.
- 3) Click “OK” (refer to Fig. 6.3.) and the data file *.log will be automatically compressed and a new file *.rar with the same prefix-file name will be created.
- 4) Each log file can be compressed into a single file by repeating the steps 1&2 by selecting the log files *.log one by one.
- 5) If multiple log files are to be compressed into a single rar-file, repeat the above steps 1&2 by selecting all desired log files at once.

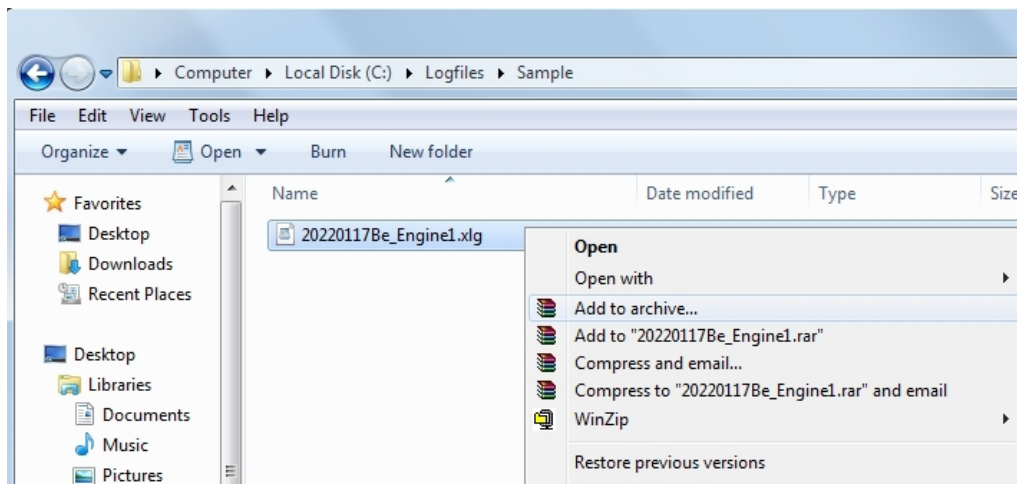


Fig. 5.3 Screenshot of Explorer with Compression menu

Remarks:

Standard settings of the application software “WinRAR” to compress the data files may not be modified:

- 1) Archive format: RAR
- 2) Update mode: Add and update files
- 3) Archiving option: no tag selected
- 4) Compression method: best
- 5) Volume size: not limited
- 6) The original of the data files, which have been compressed, will not be deleted automatically.

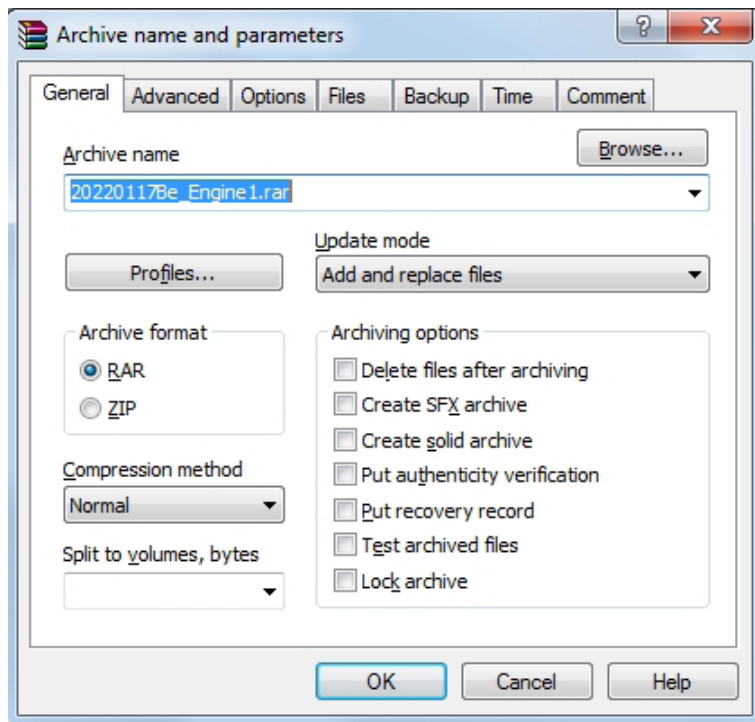


Fig. 5.4 Screenshot “WinRAR” compression software

5.4 Capturing the Graphic Screens

To capture and archive the window screens with the graphical trends of the BeCOMS® signals in daily graphic files with the file extension *.doc using “MS-Word” proceed as follows:

- 1) Preparing/creating a new daily screen file with the file extension *.doc
 - * symbolizes the name of the daily screen file to be chosen, which should be normally named systematically as follows:
YYYYMMDD_EngineXXX, i.e. 20220117_EngineXXX, whereas
MM: month, i.e. 01
DD: day, i.e. 17
YYYY: year, i.e. 2022
 - Let the new created file open in “MS-Word”
- 2) Change the focus to the BeCOMS® monitoring application (so that you can get a clear screen without unnecessary windows at the back ground of BeCOMS® monitoring application).
- 3) Select the part of the diagram you want to save.
- 4) Press the “alt” and “Print Scrn” button of the keyboard once.
- 5) Then change back to MS-Word so the YYYYMMDD_EngineXXX.doc will be shown again.
- 6) Point to the position you want to insert the captured screen.
- 7) Click the right button of the mouse and click “Paste” from the menu by clicking the left button of the mouse.
- 8) Then the captured screen will be inserted in the doc-file, please resize it according to your need and if necessary please add remarks to the just inserted graphic clips.
- 9) Please repeat the steps 2 to 8 until you have saved all the graphic parts you want (Hint: It is better to keep the graphic curves parts in chronological sequence).
- 10) Then save and close the YYYYMMDD_EngineXXX.doc



To reduce the file size; the YYYYMMDD_EngineXXX.doc files can also be compressed using the same method described in Chapter 6.10 Archiving the Compressed Files on page 6.11.

5.5 Archiving the Compressed Files

To move the compressed data-files *.rar from the daily directory to the monthly archive directory or other storage media (D:\Archive_monthly_data YY.MM, whereas MM: month, i.e. 01; YY: year, i.e. 22,) proceed as follows:

- 1) Select all the data-files *.rar to be moved by marking the first data-files *.rar by
 - a. pointing to the first data-file *.rar to be moved and
 - b. pressing the left button of the mouse once and then press the “Shift-button” of the keyboard, hold it and move the mouse pointer to the last data-files *.rar to be moved and
 - c. press the left button of the mouse once again and release the “Shift-button”. All the selected data-files *.rar change the colour.
- 2) Then click the right button of the mouse.
- 3) Select (by pointing and click the left button) the option “cut” from the pop-up option list.
- 4) Move the pointer to the monthly archive directory (D:\Archive_monthly_data YY.MM) and select it by clicking the left button of the mouse once.
- 5) Then click the right button of the mouse.
- 6) Select (by pointing and click the left button) the option “paste” from the pop-up option list.
- 7) All the selected data-files *.rar will be moved to the monthly archive directory.

5.6 Manual Data Analysis for Compartment Localization

As described in Chapter 4 Functional Description the faulty parts will produce higher thermovoltage signal due to high pressure during firing in the affected cylinders. BeCOMS® Data_Logger software displays the polar log data superposed with the cylinder numbers. This allows a trained engine operator to recognise the following possible causes of the high thermosignal:

- friction between the rotating crankshaft and its bearings. In this case it is possible to identify:
 - compartment where the failure has occurred,
 - the bearings that are affected
- other moving parts not related to the rotating crankshaft. Having experience with this certain engine type, the operator can identify:
 - the exact parts that cause the high thermosignal.

To get reliable failure localization results, a continuous time interval should be analysed in the logfile recorded on the day when failure was registered.

Attention

A general description cannot be given at this point, because the form of thermovoltage signals in BeCOMS® varies depending on the type of engine and application.



In the training session after the commissioning, the engine operators will be trained intensively to perform the localization of faulty compartment and parts specific to their engines.

If no such trained person is available, or if he or she was not able to find the problem, please contact motcom GmbH or its representatives for further analysis of your measurement data.

Please do not send the log file immediately in your first email to us. You will get further information after contacting us.



5.7 Alarm Setting and Triggering

There are 3 alarm relays integrated in the Evaluator:

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

The BeCOMS® has a self test function which is carried out in a certain cycle. If any one of the conditions for System Ready status is not detected the Evaluator switches off the GREEN READY LED and the Ready relay opens. Error code and text error message are shown on the LCD of the Evaluator and also in the event window of Data_Logger on the monitoring computer.

BeCOMS® enables to set different alarm sensitivity levels by defining different thermovoltage signal thresholds as alarm condition. Thermosignal alarm levels are encoded as numbers from 1 to 5 (the higher the number is the less sensitive is the system).

Over-speed alarm level is given in RPM.

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



The BeCOMS® monitoring software on the computer does **only registering, recording, displaying and storing data!**

For example, the following set of conditions should be met in BeCOMS® in order to trigger a Main Alarm:

- 1) The GREEN READY LED has to be on.
- 2) The measured thermovoltage signals should be higher than the pre-set alarm level over a certain period of time.
- 3) The increase of these measured signals over time should be higher than a certain value.
- 4) The engine rotation speed should be higher than pre-set minimal value.

If Evaluator triggers a Main Alarm it does not necessarily mean that the affected parts have been damaged irreparably.

Depending on the pre-set alarm level and on wiring to the engine site alarm devices, Main Alarm alerts the operator that the tolerated level has been exceeded, indicating that further investigation of BeCOMS® signals is needed, and may initiate an engine shutdown.

By selecting the appropriate sensitivity level, the operator defines up to which extend he would allow moving parts to be affected by friction.

With this information of fault on early stage, the operator is aware of the progressing problem and has enough time for making decisions on engine maintenance and repair.

In case of an alarm triggering, it is shown

- by the LED indicators on the Evaluator
- by the Data_Logger software on the monitoring computer
- by alarm indicators of the engine alarm devices, depending on wiring



5.8 Alarm Resetting

- In case of a Pre-Alarm triggered:

If the conditions for a Pre-alarm does not persists 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 Evaluator by pressing the RESET button for 3 seconds.

- In case of Over-speed Alarm triggered:

Over-speed 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 Data_Logger Software, but only at the Evaluator by pressing the RESET-Button for 3 seconds.

5.9 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 LCD of Evaluator is fixed by the operator), the System Ready status will be reactivated automatically by the system.



Exception

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



Restart of Evaluator **cannot** be done through the Data Logger Software, it must be done by using the Evaluator

5.10 BeCOMs® Data_Logger measurement data storage and management (optional)

BeCOMs® Data_Logger is a PC program for displaying and storing the measured data.

For detailed information on Logger software please refer to the BeCOMs® Data_Logger user manual.



Data_Indicator software is used for reading and analysing the BeCOMs® data files.

For further information please refer to the BeCOMs® Data_Indicator user manual.



The daily data files created by BeCOMs® Data_Logger have an approximate size of 100MB per BeCOMs® set. To save hard disk space, older files can be deleted, compressed and/or archived on CD. By compressing a daily log-file with WinRAR, WinZip or other suitable software, the size of the file can be reduced to approx. 10MB.

WinRAR shareware is usually pre-installed on the monitoring PC.

6 Appendix

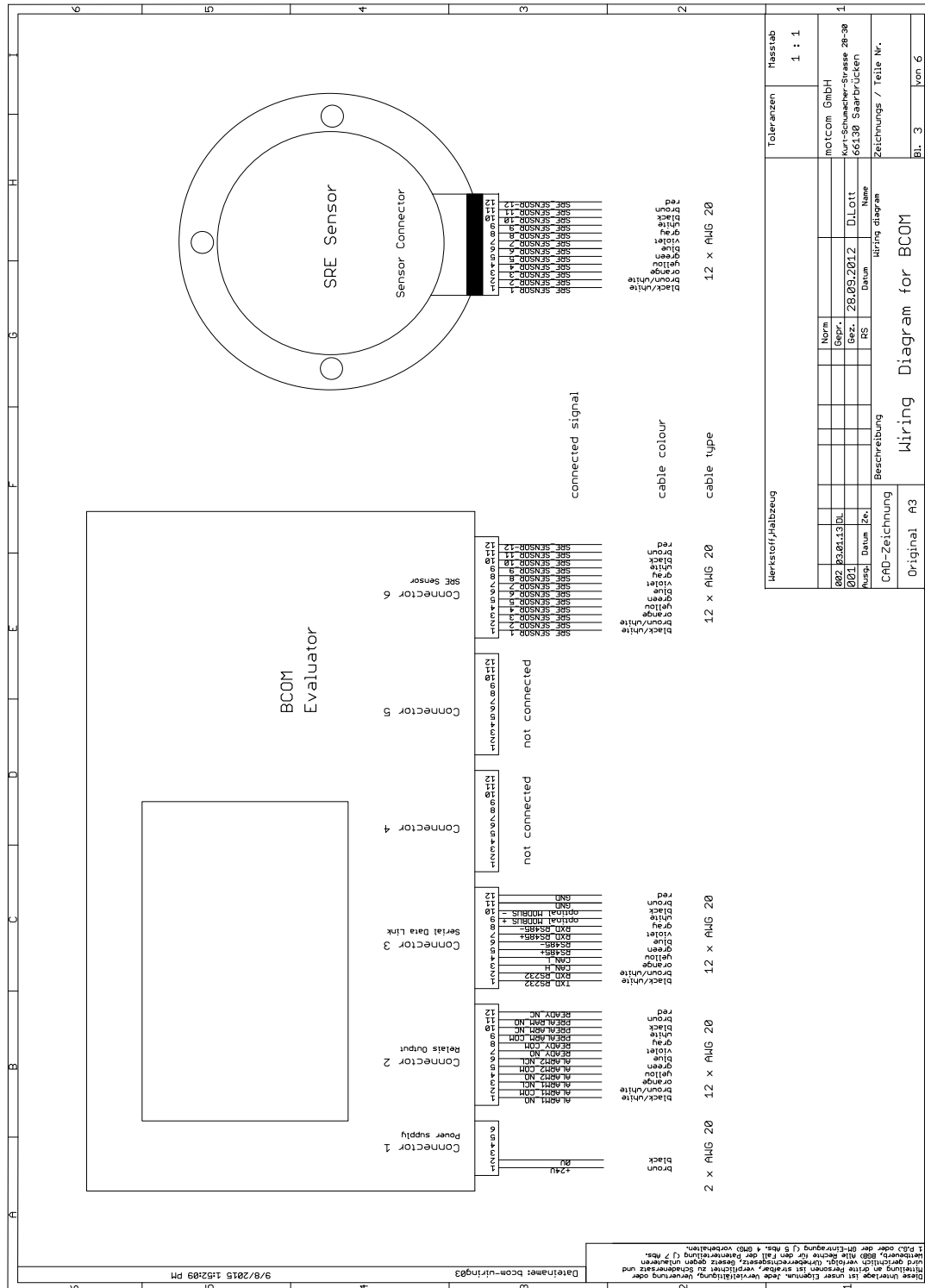


Fig. 6.1 Cable connection

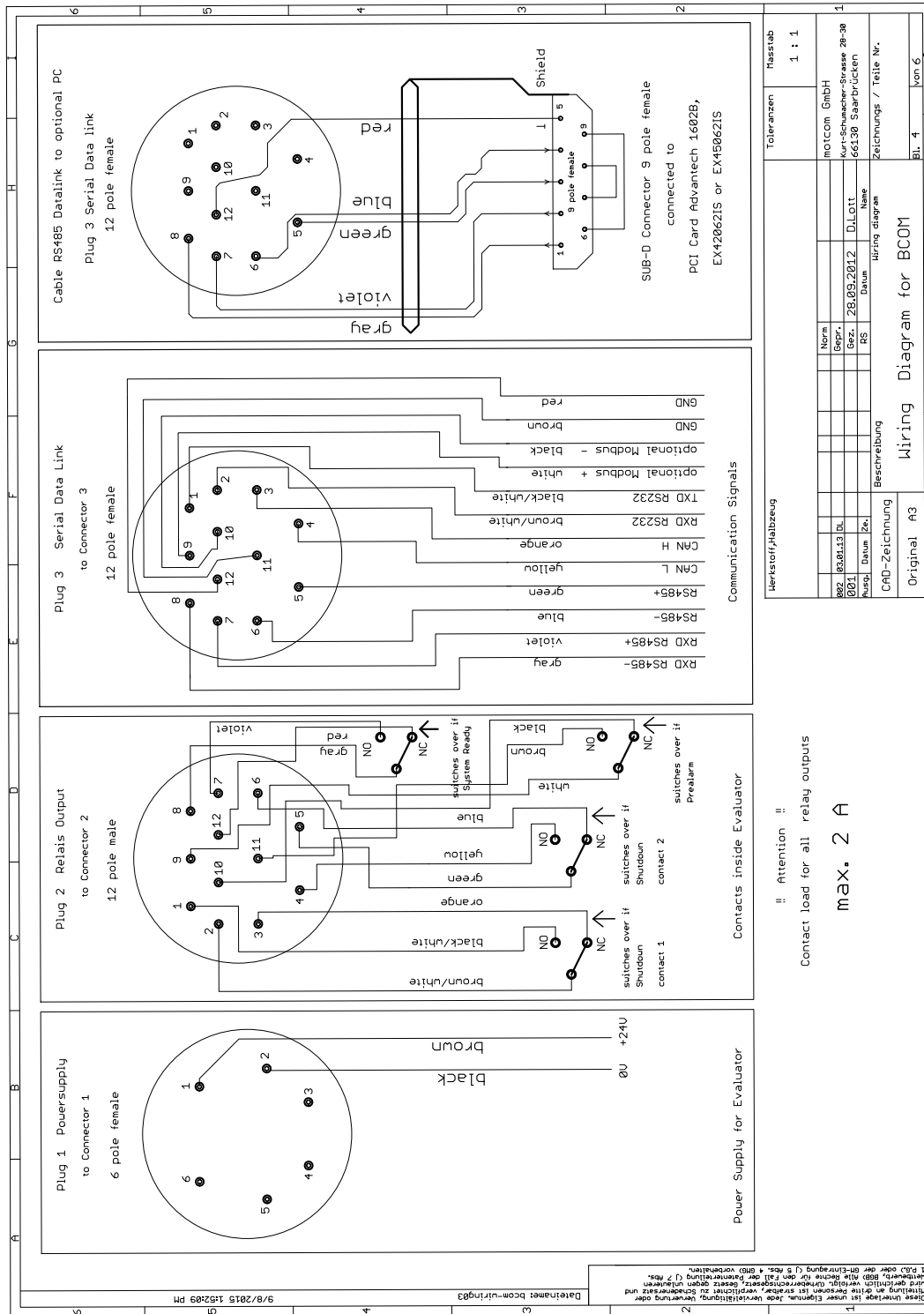


Fig. 6.2 Pin configuration 1-2

2015 5:47:40 PM f=0.65 Z:\Daten\dev_motcom\ea\block-wiring\bcom-wiring03.sch (Sheet: 4/6)

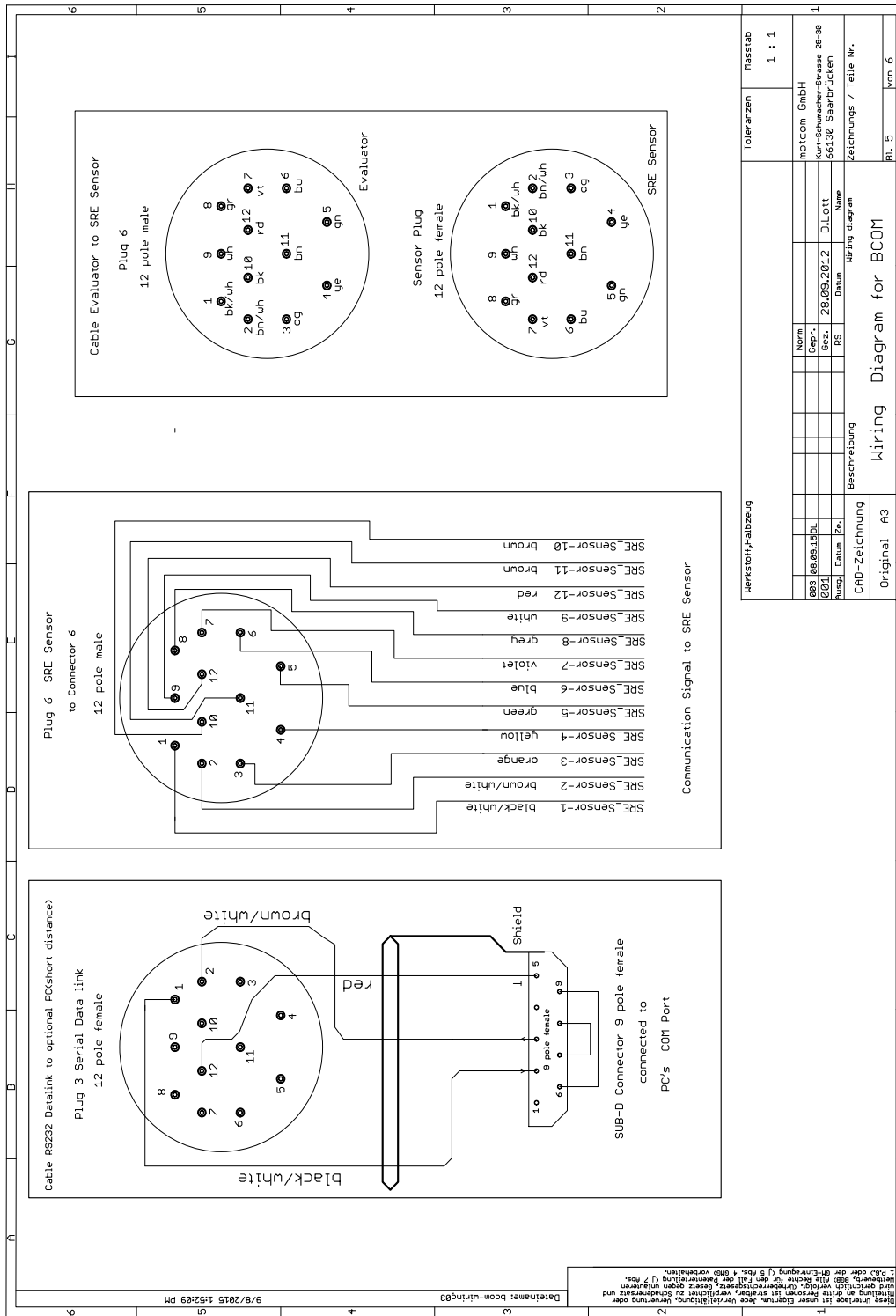


Fig. 6.3 Pin configuration 2-2

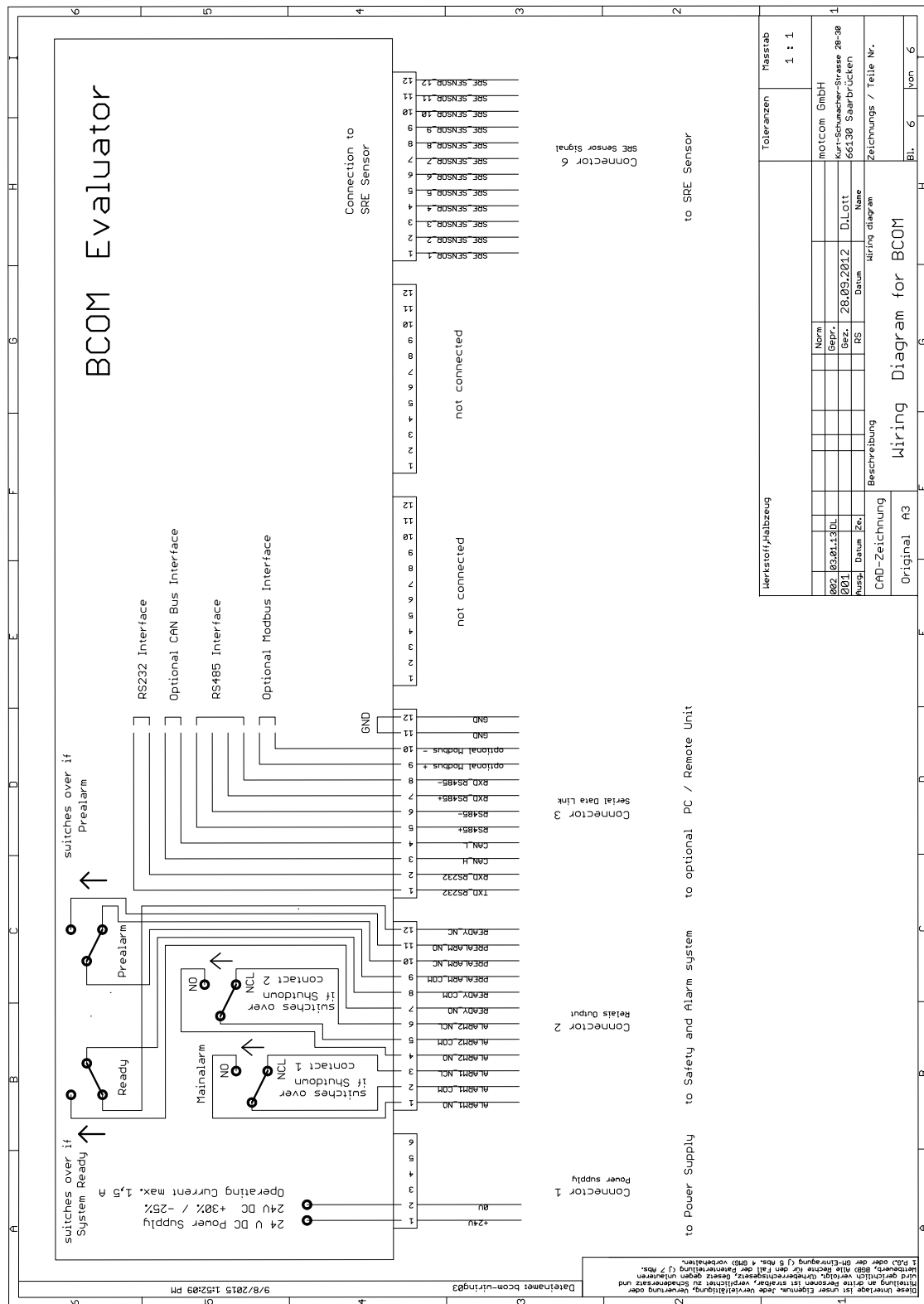


Fig. 6.4 Connectors and pin-out of the BeCOMS® Evaluator (see also next page)

See previous pages for further information like wire colors

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

Fig. 6.5 Pin assignment of Evaluator connectors

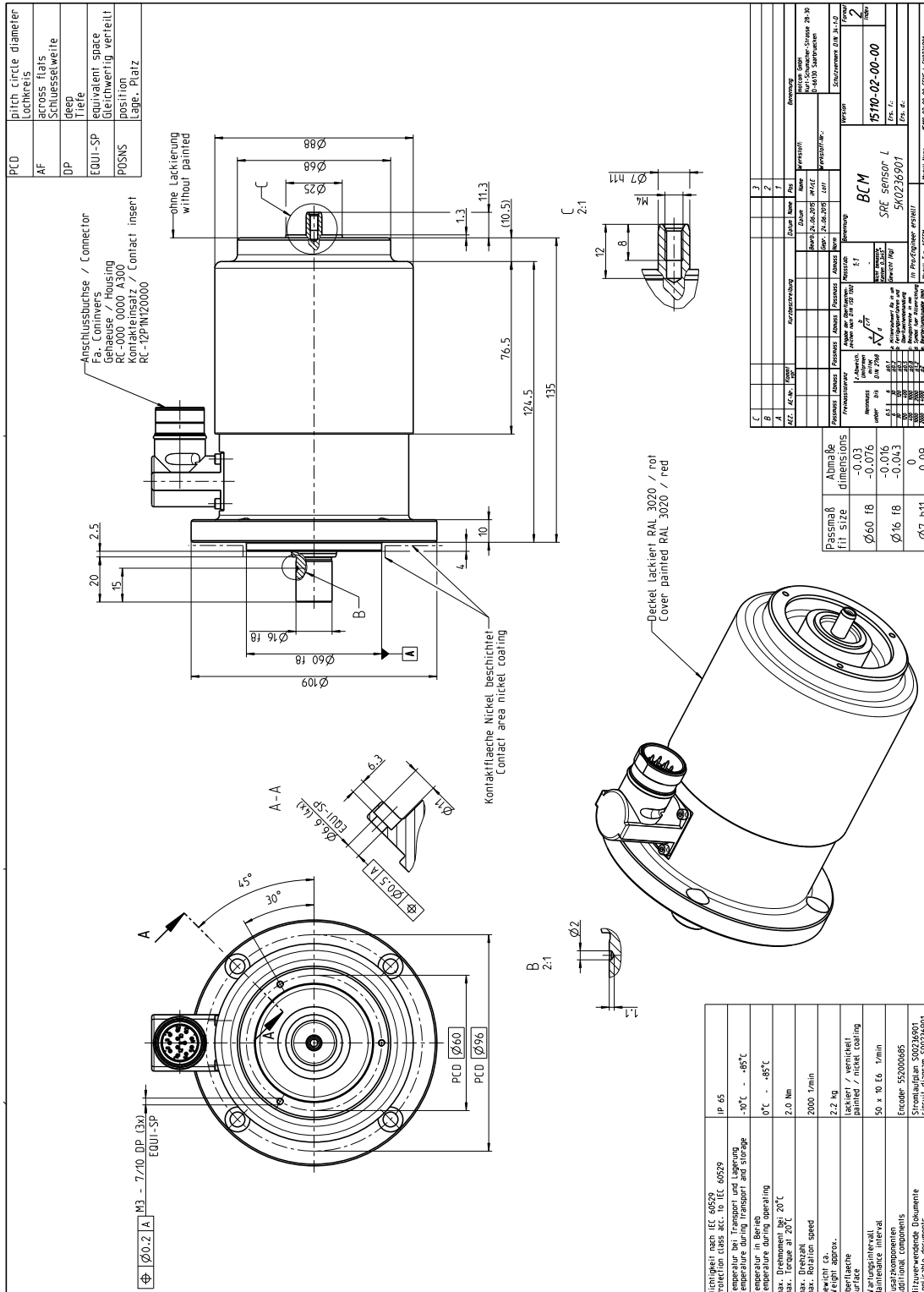


Fig. 6.7 Dimension Slip Ring Encoder (SRE) with throughout shaft

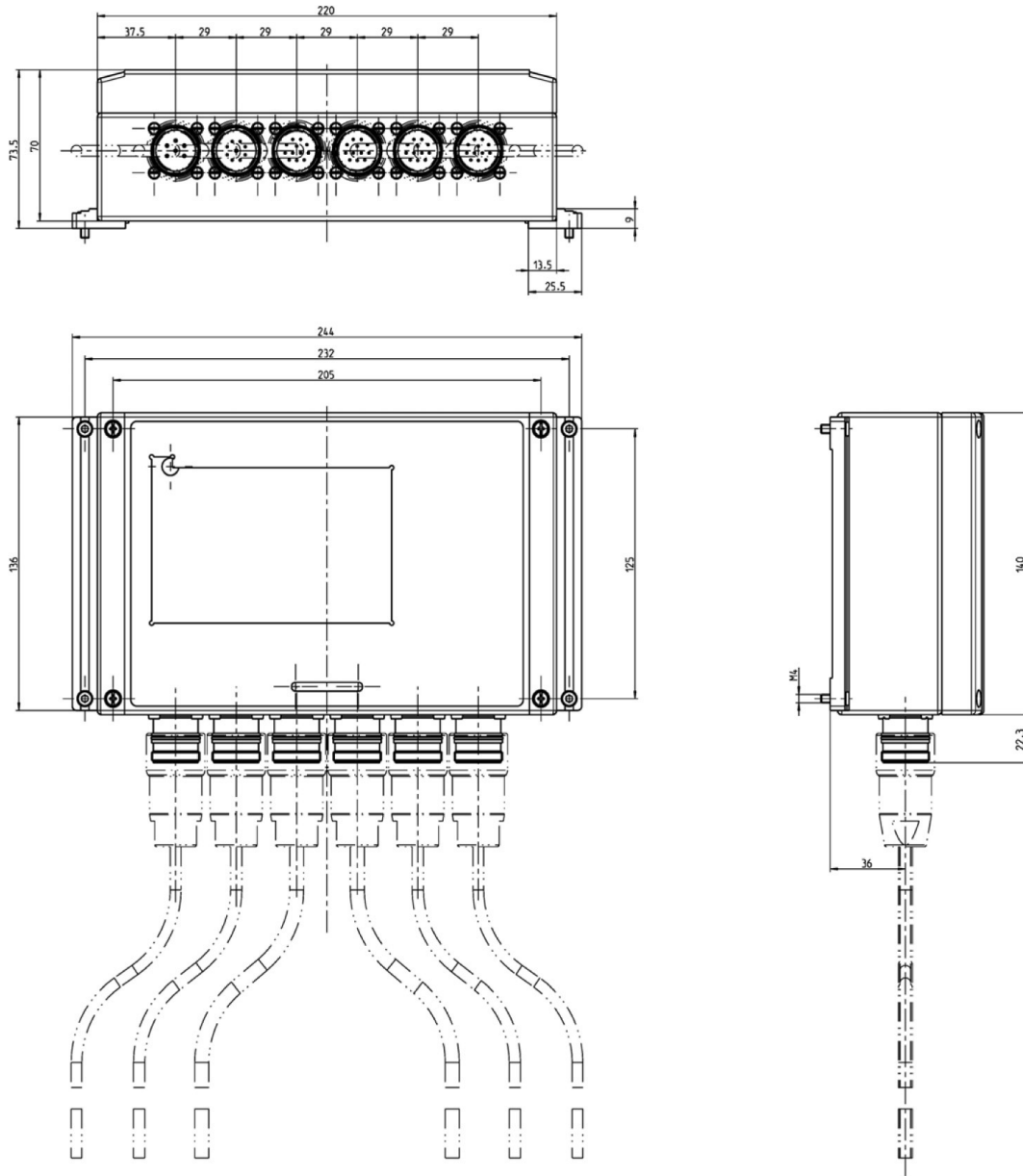


Fig. 6.8 Dimensions Evaluator

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