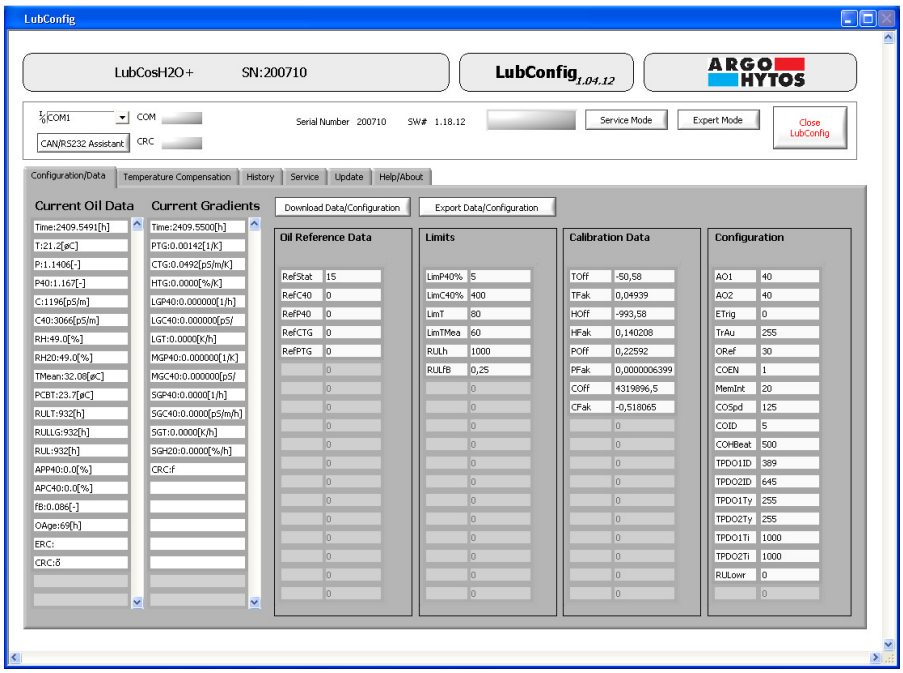


PC configuration software for condition sensors

LubMon Config

SCSO 800-1100

Version 1.00.12

1. Table of contents

2. Introduction

LubMon Config is a program based on National Instruments' (NI) LabVIEW for configuring, reading, displaying and saving data from the following condition sensors:

- **LubCos H2O**
- **LubCos H2Oplus II**
- **LubCos Level**
- **OPCom II**

Scope of functionality:

- Easy, intuitive handling provided by a graphic user interface
- Readout of measurement data and gradients, oil reference data and limit values, as well as calibration and configuration data
- Display of temperature compensation curves
- Readout of data from the sensor memory and export in .csv format with headers for measurement series and unit labelling
- Simple switching from CAN operation to RS232
- Password protected option to setup the sensor

3. System requirements

- Windows XP or later
- Processor: Minimum Pentium 200 MHz or comparable processor is recommended
- Pentium III, 600 MHz Celeron or comparable processor
- RAM: Minimum 64 MB, 256 MB recommended
- Screen resolution: Minimum 1024 × 768 pixels

In addition, the system requirements for the NI-Runtime-Engine must be taken into account.

4. Quick start

The steps that must be executed for commissioning **LubMon Config** with an ARGO-HYTOS condition sensor are described below. The following components are necessary for this:

1. PC/laptop with RS232 connection, or alternatively a USB connection, that serves as the measurement computer.
2. Oil condition sensor **LubCos** or **OPCOM II**
3. Sensor cable (order number: SCSO 100-5030)
4. Power supply including rubber connector (order number: SCSO 100-5080)
5. Software **LubMon Config** (www.argo-hytos.com)
6. In addition for connection via USB: USB to RS232 converter with associated driver software (order no: SCSO 100-5040)

The components must be prepared as follows:

A) Software installation LubMon Config

1. Unzip the **LubMon Config.zip** file on your computer.
2. Prior to running **LubMonPClight.exe**, the LabVIEW Runtime Engine (V2010) must be installed. The software is located in the "full setup" file, which can be downloaded from the ARGO-HYTOS download area (www.argo-hytos.com). If the LabVIEW Runtime Engine is already installed, only the executable file is required.

B) Software installation of the driver for the USB to RS232 converter for data acquisition via USB (if you are not using a converter please continue with point D)

3. Now connect the USB to RS232 converter to your PC/laptop.
4. If the USB to RS232 converter is not recognised by the PC, the appropriate driver must be installed. To do this follow the installation instructions provided by the operating system or on the supplied driver CD.

C) Sensor connection for data acquisition via USB

5. Connect the sensor cable to the sensor with the M12 connector.
6. Connect the cable's D-sub connector to the appropriate serial interface of the USB to RS232 converter.
7. Connect the USB connector of the USB to RS232 converter to a suitable interface on your PC/laptop.
8. Connect the power supply unit and the sensor cable.
9. Now properly connect your power supply unit to the line voltage via the rubber connector for non-heating apparatus. Your sensor is now ready for operation.

D) Sensor connection for data acquisition via RS232

10. Connect the sensor cable to the sensor with the M12 connector.
11. Connect the D-sub connector of the cable to the appropriate serial interface of your PC/laptop.
12. Connect the power supply unit and the sensor cable.
13. Now properly connect your power supply unit to the line voltage via the rubber connector for non-heating apparatus. Your sensor is now ready for operation.

E) Start the software

14. **LubMon Config** can be started by double-clicking on the **LubMon Config.exe** file.
15. Select the serial interface (COM) to which you have connected the sensor on the computer. If you are not using a USB to RS232 converter, this is usually COM 1.
16. If you are using a USB to RS232 converter, a new virtual COM port will be created. Select this COM port. If necessary you can check the assignment of the virtual COM port in the Windows Device Manager.
17. The incoming data as well as the identification of the sensor are displayed on the left side of the window. The data can be visualised on the right side of the window in a diagram.

5. User interface

Upon starting LubMon Config, a user interface window is opened (comp. fig. 1). The current measurement data and sensor configuration can be read in this window. Experienced users can also use the password protected "Expert Mode" to change data.

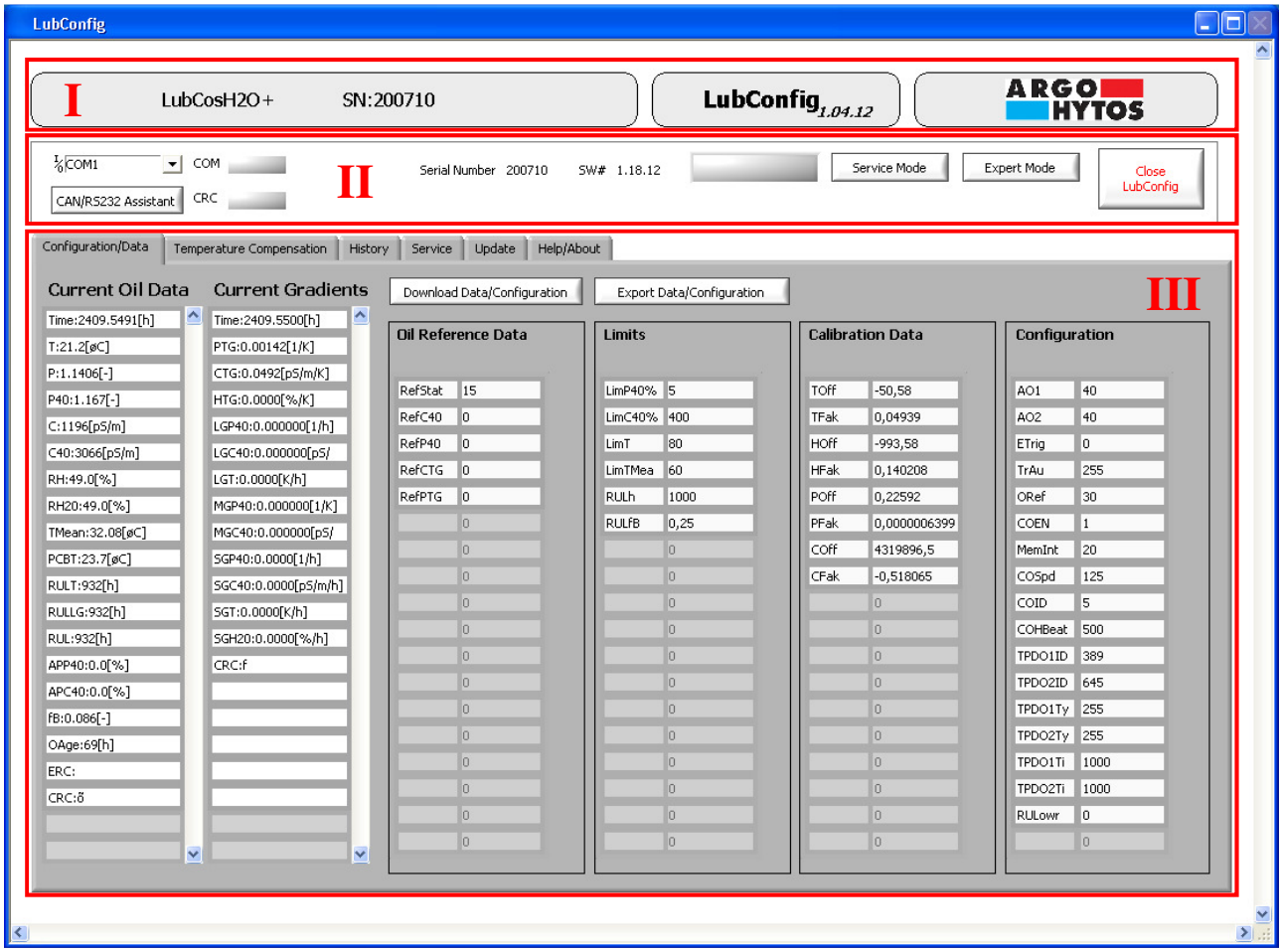


Fig. 1: User interface LubMon Config

The user interface can be divided into the following three areas (I-III, fig. 1):

5.1. Area I: Header

The header displays the connected sensor type (in fig. 1: *LubCos H2O+*) and the sensor serial number. In addition, the version number of the LubMon Config program in use is displayed (here: *1.04.12*).

5.2. Area II: Communications settings and program mode

On the left side the COM interface to which the sensor is connected can be selected. Transfer errors and checksum errors are indicated by the two signal lights to the right. For sensors that are normally operated in CANopen mode and are only connected to a PC using LubMon Config for data configuration or readout, the "CAN/RS232" button can be used to change the communication mode temporarily. To do so, follow the instructions in the pop-up window (see fig. 2).

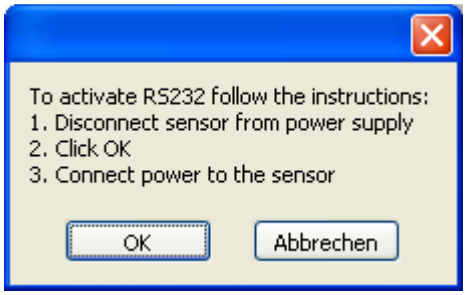


Fig. 2: Instructions - Switching from CANopen mode to RS232 mode

In the middle the serial number and software version of the connected sensor are displayed. By clicking on the button it is also possible to switch to "Service Mode" or "Expert Mode" to make changes to sensor configuration or calibration data. Since this is not relevant for normal users and also risks permanently destroying the calibration and configuration data, these areas are password-protected.

On the right you will also find the "Close LubMon Config" button that can be used to exit the program.

5.3. Area III: Configuration area

The configuration area forms the largest part of the user interface. Several tabs divide the configuration area into *Configuration/Data*, *Temperature Compensation*, *History*, *Service*, *Update* and *Help/About* (see fig. 3).

5.3.1. Configuration/Data

Current sensor measurement values and configuration data are read out by clicking *Download Data/Configuration*. By doing so the following data is displayed from right to left in list form:

- Current Oil Data,
- Current Gradients,
- Oil Reference Data,
- Limits,
- Calibration Data and
- Configuration.

The composition of this data is dependent on the connected sensor. The meaning of the individual parameters is described in the user manual for the given sensor.

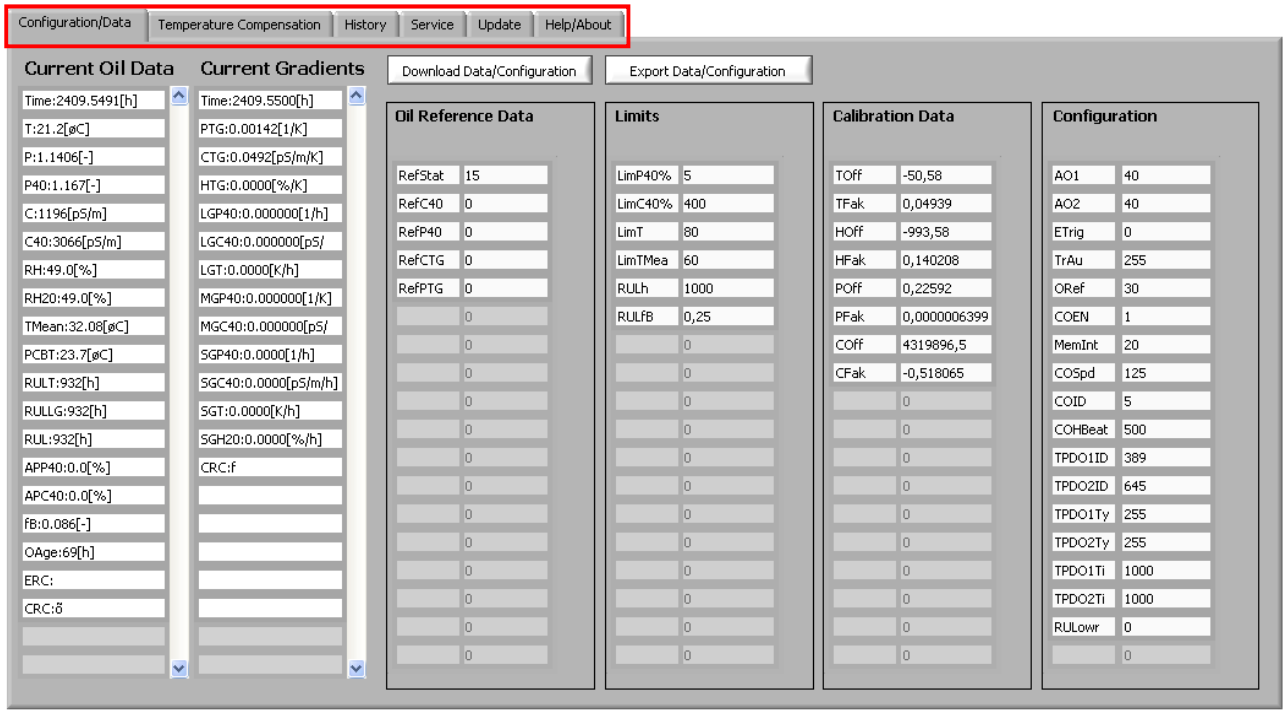


Fig. 3: "Configuration/Data" tab

The data readout will be exported as a .csv and a .xml file (Button *Export Data*) allowing them e.g. to be further processed in a spread sheet application (see also Chapter 6) or for potential subsequent transfer back to the sensor.

5.3.2. Temperature Compensation

On the "Temperature Compensation" tab a temperature histogram as well as a diagram with the support points distributed across the temperature range is displayed (for H2Oplus II these are permittivity, conductivity as well as relative humidity in tabular form).

The temperature histogram shows the dwell time in the respective temperature classes. The higher the value, the longer the sensor was operated in this temperature range.

The temperature support points are used to calculate the temperature-compensated values of e.g. permittivity (P40) or conductivity (C40). To do so, the sensor saves the values of P and C in various temperature classes and weights them according to the dwell time in the given class (max. 255). The regression line can be used to compute back to the reference temperature (40°C). LubMon Config can be used to display this data (see fig. 3: right and centre diagrams).

Fig. 4: "Temperature Compensation" tab

For relative humidity on the other hand, only the humidity-temperature gradient and weighting are displayed in tabular form, but no diagram.

The display settings for the graphs can be opened by clicking the associated legend symbol (see fig. 5).

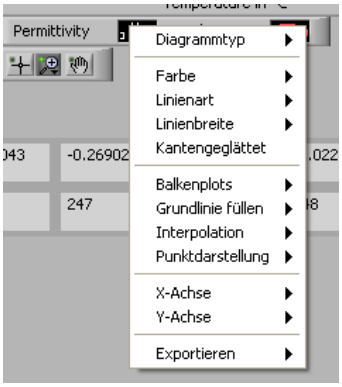


Fig. 5: Graph display

There are also various zoom functions available. These can be selected by clicking the magnifying glass symbol.

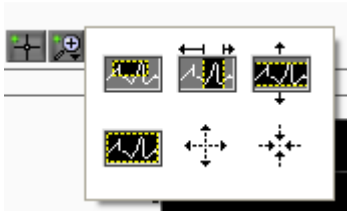


Fig. 6: Zoom functions

5.3.3. History

Given that the connected sensor supports the "store historical data" function (e.g. H2Oplus II or Visplus), these can be read out in the *History* area.

Click *Get Available History* to load the quantity and time period of the history records currently available from the sensor. These will then be displayed in the upper part of the window (see fig. 7). In this example, the sensor has recorded data from the start (0 hours) until the present time (325 hours). Thus, 1001 of the 6779 total available records were used.

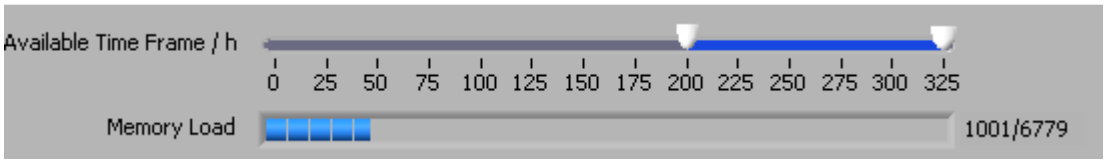
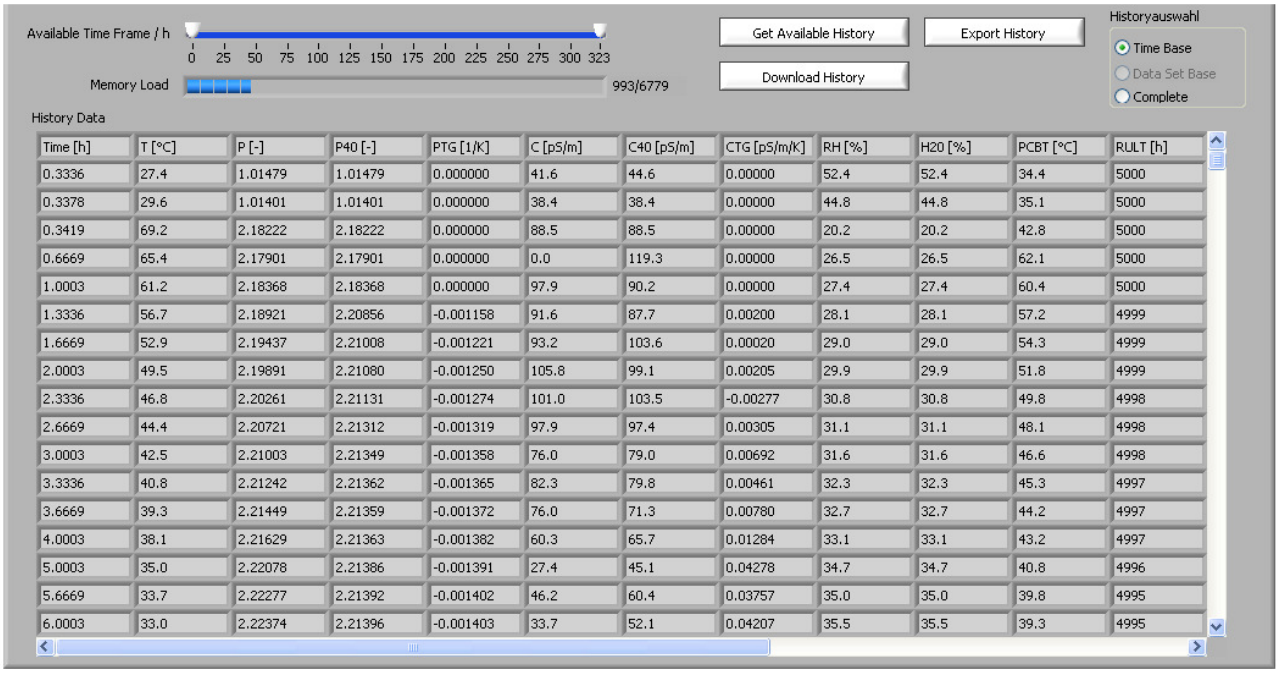


Fig. 7: Time range of history data and number of records

The history selection function in the upper right can be used e.g. to select the setting *Time Base* (see fig. 8). This means that only the data configured using the "*Available Time Frame"* scale is read out from the history (in fig. 7 records are selected from 200 hours until the last dataset at 325 hours). The readout process itself is started by clicking at the *Download History* button. After the download is finished the data is displayed in the table below. The uppermost line indicates the allocation of the respective value to the measurement parameters as well as its unit.

If the entire history is to be loaded from the sensor, this can be done by making a corresponding selection on the time scale, or using the *Complete* setting in the history selection.



Time [h]	T [°C]	P [-]	P40 [-]	PTG [1/K]	C [pS/m]	C40 [pS/m]	CTG [pS/m/K]	RH [%]	H20 [%]	PCBT [°C]	RULT [h]
0.3336	27.4	1.01479	1.01479	0.000000	41.6	44.6	0.00000	52.4	52.4	34.4	5000
0.3378	29.6	1.01401	1.01401	0.000000	38.4	38.4	0.00000	44.8	44.8	35.1	5000
0.3419	69.2	2.18222	2.18222	0.000000	88.5	88.5	0.00000	20.2	20.2	42.8	5000
0.6669	65.4	2.17901	2.17901	0.000000	0.0	119.3	0.00000	26.5	26.5	62.1	5000
1.0003	61.2	2.18368	2.18368	0.000000	97.9	90.2	0.00000	27.4	27.4	60.4	5000
1.3336	56.7	2.18921	2.20856	-0.001158	91.6	87.7	0.00200	28.1	28.1	57.2	4999
1.6669	52.9	2.19437	2.21008	-0.001221	93.2	103.6	0.00020	29.0	29.0	54.3	4999
2.0003	49.5	2.19891	2.21080	-0.001250	105.8	99.1	0.00205	29.9	29.9	51.8	4999
2.3336	46.8	2.20261	2.21131	-0.001274	101.0	103.5	-0.00277	30.8	30.8	49.8	4998
2.6669	44.4	2.20721	2.21312	-0.001319	97.9	97.4	0.00305	31.1	31.1	48.1	4998
3.0003	42.5	2.21003	2.21349	-0.001358	76.0	79.0	0.00692	31.6	31.6	46.6	4998
3.3336	40.8	2.21242	2.21362	-0.001365	82.3	79.8	0.00461	32.3	32.3	45.3	4997
3.6669	39.3	2.21449	2.21359	-0.001372	76.0	71.3	0.00780	32.7	32.7	44.2	4997
4.0003	38.1	2.21629	2.21363	-0.001382	60.3	65.7	0.01284	33.1	33.1	43.2	4997
5.0003	35.0	2.22078	2.21386	-0.001391	27.4	45.1	0.04278	34.7	34.7	40.8	4996
5.6669	33.7	2.22277	2.21392	-0.001402	46.2	60.4	0.03757	35.0	35.0	39.8	4995
6.0003	33.0	2.22374	2.21396	-0.001403	33.7	52.1	0.04207	35.5	35.5	39.3	4995

Fig. 8: "History" tab

The *Export History* button saves the downloaded history data to a .csv file for further processing, e.g. in a spread sheet application to display as a graph (see also Chapter 6 – Exporting files).

5.3.4. Service

Without entering a password for the service mode, the service area can only be used to read out, not to write data. In that case the buttons for changing the service configuration data are greyed and deactivated.

If the service mode is set the assignment of the analogue outputs, the CAN operating mode settings as well as limit values for the oil measurement data can be set. In addition, it is possible to notify the sensor that it has been placed in a new oil medium by activating the Service Mode (*Set new oil*). History data can also be deleted in Service Mode (*Delete History*).

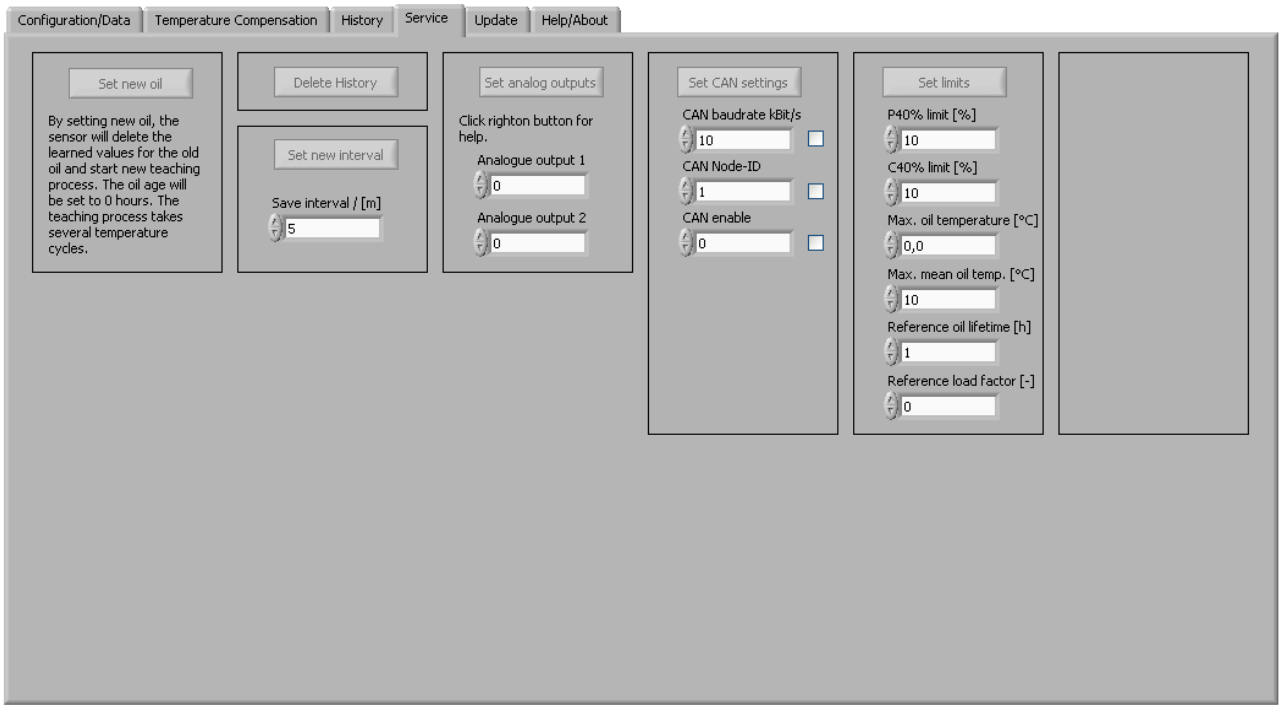


Fig. 9: "Service" tab

5.3.5. Update

This area is currently not yet supported.

5.3.6. Help/About

This area contains the supported sensor types and the change log containing information about changes from version to version.

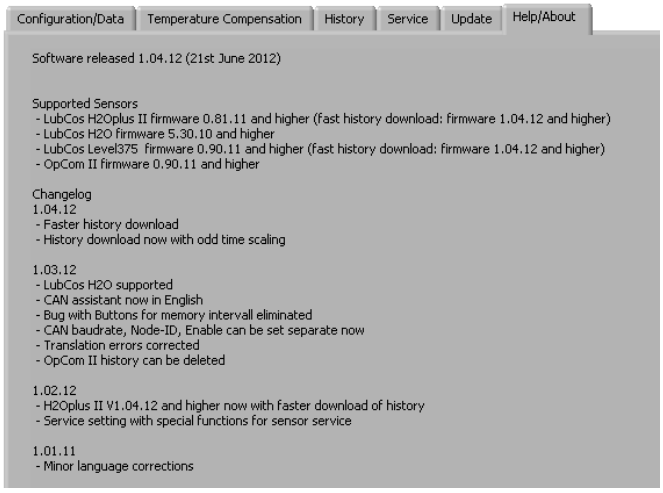


Fig. 10: "Help/About" tab

6. Communication

Communication with the sensor takes place via a serial COM interface. Sensors configured for CANopen can rapidly be switched over to RS232 operation using the method described in Chapter 5.2, allowing them to be read and configured using **LubMon Config**.

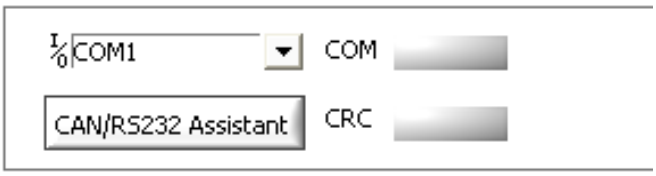


Fig. 11: Selection of COM interface and switchover from CAN to RS232

Interface parameters for the COM port such as the baud rate or the stop bit cannot be changed, and do not need to be. Their implementation in the program is fixed. The interface parameters of the program for the COM port are as follows by default:

- Baud rate: 9600
- Data bits: 8
- Parity: none
- Stop bits: 1
- Flow control: None

Note:

Additional virtual COM ports can be created using USB serial converters. This makes it possible to connect several sensors to a PC despite only one physically available COM port. Note that most commercially available USB serial converters require a driver to be installed. If the driver is installed correctly, the new virtual COM port can be selected in the LubMon Config user interface.

7. Exporting files

The current measurement values as well as the history data and displayed graphs can be exported as .csv files. These files contain the individual values separated by commas, and can be saved to a folder on a disk.

The data can then be opened and edited, e.g. in Microsoft Excel. This way, the history data can be used to generate graphs illustrating the measurement results. The procedure used to open a .csv file in Excel is detailed below:

Start e.g. Microsoft Excel 2010 and open the previously saved file. Make sure that "All files" or "Text files" is selected as the file type in the "Open" window (comp. Fig. 10).

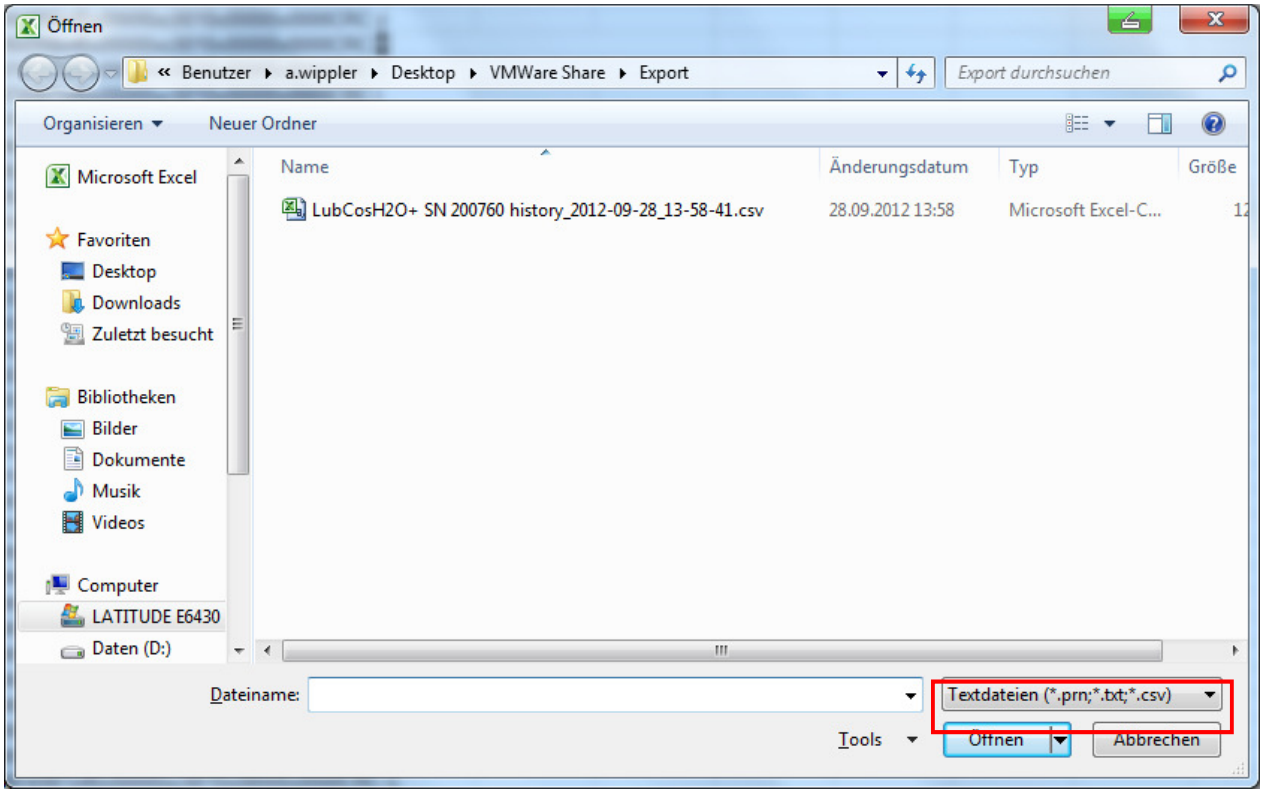


Fig. 12: Opening .csv files

After opening the file, the values are still stored continuously in the chart (see fig. 11) This can be changed by selecting the first column and clicking "Text in columns". The data in the .csv files is separated with tabulators, which is the default setting of MS Excel. It is possible to select different import options by clicking on “Next”, or otherwise complete the process by clicking on "Finish".

Now the data will be displayed in correct tabular form with separated columns (see fig. 12).

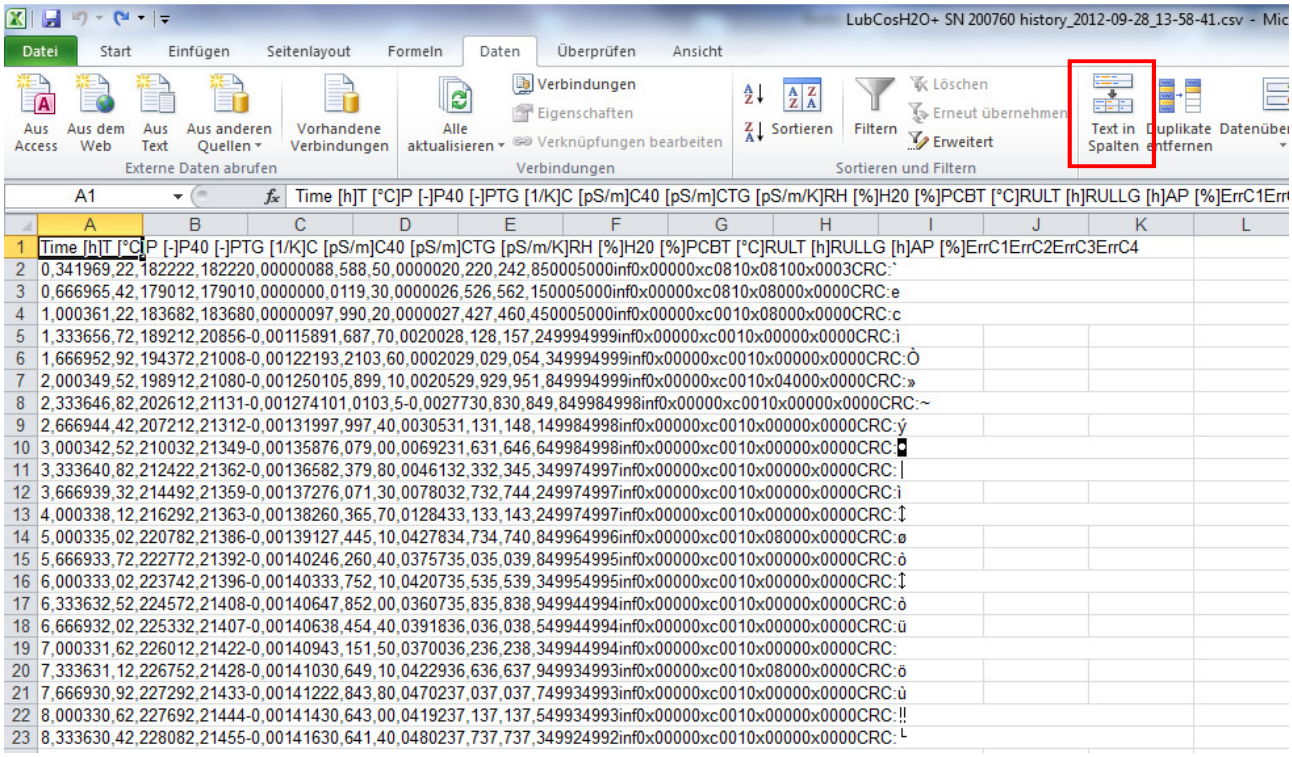


Fig. 13: Opened .csv file with history data

The data is displayed in tabular form with separated columns (see fig. 12) and can be illustrated e.g. using graphs.

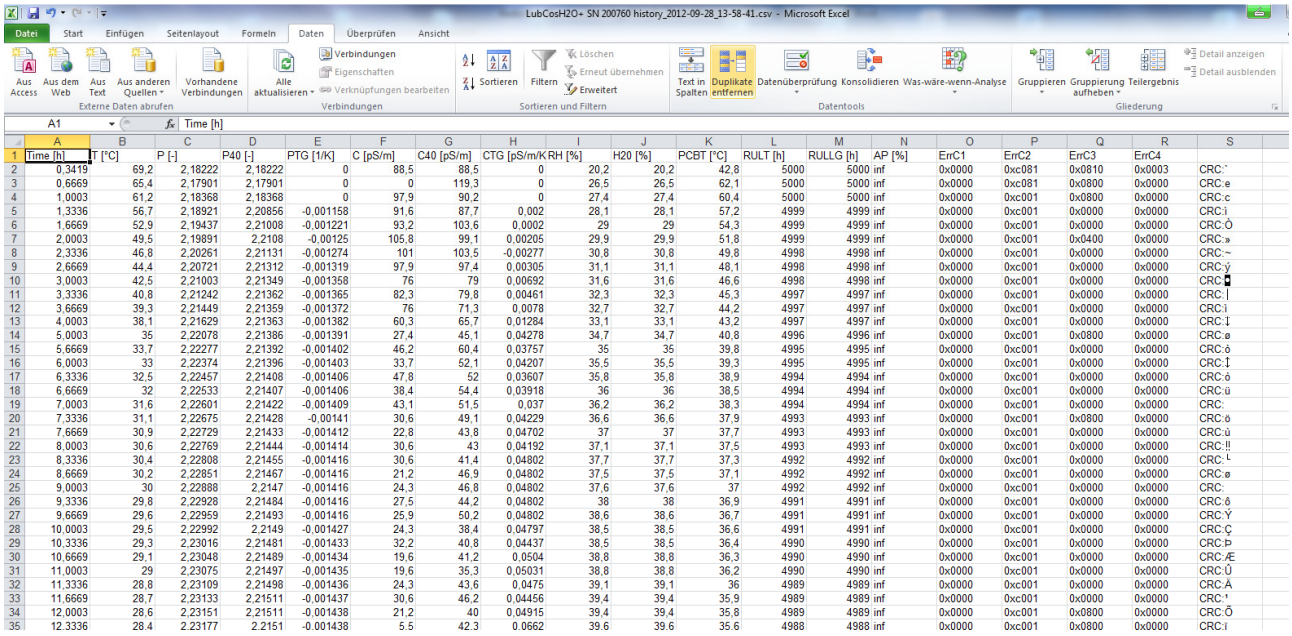


Fig. 14: Tabular display of history data

8. Troubleshooting

Error: *No sensor communication with LubMon Config*	
Cause	***Step***
▪ Cable is not correctly connected	▪ First ensure that the electrical connections of the sensor, i.e. the data cable and power cable, have been properly established. Ensure that the connection is configured as described.
▪ Wrong cable or cable is defective	▪ Use only the data cables recommended by ARGO-HYTOS.
▪ Wrong COM port selected	▪ Check and correct the selection of the COM port (e.g. COM1)
▪ No communication with the sensor	▪ Please check that no other program is running that uses the same serial interface.
▪ Sensor RS232 interface not activated	▪ Activate the RS232 interface temporarily or permanently using "LubMon Config" or a terminal program (e.g. Windows Hyperterminal). More detailed information is available in the documentation for the given sensor.

9. Accessories

Power supply unit

Description: Power supply unit for connecting to prefabricated data cable SCSO 100-5030

Order number: SCSO 100-5080

Line socket

Description: 8-pin, shielded M12 cable socket suitable for cable diameters of 6 to 8 mm, protection class IP67, temperature range -40°C to 85°C

Order number: SCSO 100-5010

Pre-assembled data cable

Description: Shielded sensor cable, protection class IP67, temperature range -20 °C to 85 °C, oil-resistant, page 1 - extrusion die sensor plug, page 2 - 8 single-strand

Order number: SCSO 100-5020

Pre-assembled data cable for computer connection / D-Sub connector 9-pin

Description: Shielded sensor cable, protection class IP67, temperature range -20°C to 85°C, oil-resistant, page 1 -extrusion die sensor plug, page 2-9-pin D-sub socket / hollow connector for power supply (power supply unit must be ordered separately!)

Order number: SCSO 100-5030

USB/serial adapter

Description: Adapter for conversion of serial RS232 interface to "Universal Serial Bus" (USB). With the Universal Serial Bus it is possible to address multiple sensors concurrently.

Order number: SCSO 100-5040

10. Contact address

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