MSDA_XE

MANUAL

release date: 2013-06-19

TriOS Mess- und Datentechnik GmbH
Bürgermeister-Brötje-Str. 25
D- 26180 Rastede
Germany
Fon: +49 (0) 4402 69670-0
Fax: +49 (0) 4402 69670-20
support@trios.de
http://www.trios.de/

Content

1 INTRODUCTION 7
2 KEY 8
3 INSTALLATION 9
3.1 System Requirements 9
3.2 License Agreement and Limited Product Warranty 10
3.3 Installation Steps 12
4 FIRST USE 13
4.1 New Device Assistant 13
4.2 Import Files 13
4.3 Port Configuration 14
4.3.1 Serial Port 14
4.3.2 Network Port 16
4.4 Scan for Devices 17
4.5 Open Example Desktops 17
5 MAIN WINDOW 18
5.1 GPS Position 19
5.2 Window Tool Bar 20
5.3 Window Naming 20
5.4 Selected Window Bar 21
5.5 Main Menu 21
6 BASIC WINDOWS AND ELEMENTS 24
6.1 Device Manager 24
6.2 Database Data Sender Window 25
6.3 Chart Window 25
6.4 Data Table Window 25
6.5 Open / Close Options Panel 26
6.6 Enable / Disable Windows 26
6.7 Database Entry 26
6.8 Interactive Windows 28
6.9 Trace Window 31
7 DEVICE CONTROL WINDOWS 32

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.1 General 32
7.1.1 Select device 32
7.1.2 Single and Automatic Measurements 33
7.1.3 Storing of Data 36
7.2 RAMSES (SAM + SAMIP) 38
7.2.1 Introduction 38
7.2.2 Measurement 39
7.2.3 Calibration 40
7.2.4 Outputs 41
7.3 Fluorometer (microFlu / enviroFlu) 42
7.3.1 Introduction 42
7.3.2 Measurement 42
7.3.3 Internal Averaging 43
7.3.4 Custom Calibration 44
7.3.5 EPROM Calibration Values 44
7.3.6 Calibration 45
7.3.7 SolidCAL 46
7.4 UV Photometer (ProPS) 47
7.4.1 Introduction 47
7.4.2 Configuration 48
7.4.3 Profiling Mode 49
7.4.4 Calibration – Zero line 50
7.5 VIPER (VIS Photometer) 51
7.5.1 Introduction 51
7.5.2 Measurement Configuration 52
7.5.3 Calibration – Zero line 53
7.5.4 LED Temperature Calibration 53
7.6 OSCAR 54
7.6.1 Introduction 54
7.6.2 Measurement Configuration 54
7.6.3 Zero settings – Blank Reference 56
7.6.4 Zero settings – Reflectivity 56
7.6.5 LED Light 58
7.7 Data Logger (DSP) 59
7.7.1 Introduction 59

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.7.2 Configuration 60
7.7.3 Scheduler 61
7.7.4 Data Import 62
7.8 Global Positioning System (GPS – NMEA) 64
7.8.1 Installation 64
7.8.2 Integration in MSDA_XE 65
7.8.3 Position stamp in all measured data. 67
8 DEVICE CALIBRATION 68
8.1 Ramses Calibration (FieldCAL) 68
8.1.1 Introduction 68
8.1.2 Background 69
8.1.3 Calibration with FieldCAL 69
8.2 Fluorometer Calibration (SolidCAL) 72
9 DATABASE DATA SENDER WINDOW 74
9.1 Introduction 74
9.2 Data Structure 75
9.3 Working in the Grid 76
9.4 Button Functions 78
9.5 Layout Manager 79
9.6 Data Export 80
9.7 Send Data 82
10 VIEWING WINDOWS 83
10.1 Chart 83
10.1.1 Introduction 83
10.1.2 Integrate Inputs 85
10.1.3 Working with the Mouse 86
10.1.4 Working on a Subchart 87
10.1.5 Working on an Input 89
10.1.6 Working on an Axis 93
10.1.7 Exporting / Printing of the Chart 96
10.1.8 Buttons in the Chart Window 99
10.1.9 Configuration Dialog 100
10.1.10 Dynamic Text 102
10.1.11 Text/Table 103

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

10.2 Data Table 103
11 PROCESSING WINDOWS 105
11.1 Spectrum Calibration 105
11.1.1 Introduction 105
11.1.2 Calibration 105
11.1.3 Additional 106
11.2 Absorption 107
11.2.1 Introduction 107
11.2.2 Configuration 107
11.3 UV A / UV B / PAR 109
11.3.1 Introduction 109
11.3.2 Configuration 109
11.4 Value Calculator 110
11.4.1 Introduction 110
11.4.2 Loading templates 110
11.4.3 Customizing of Values 113
11.4.4 Outputs 115
12 SPECIAL WINDOWS 116
12.1 Timer 116
13 DATABASE MANAGEMENT 117
13.1 Database File 117
13.2 Import/Export Device.ini-files 117
13.3 Import Data Files 118
14 CONFIGURATION DIALOG 119
14.1 Start / Exit 119
14.2 Database 120
14.3 Devices 121
14.4 GPS Position 121
14.5 Sample Export 122
14.6 Messages 122
14.7 Missions 124
15 FREQUENTLY ASKED QUESTIONS 125
15.1 Why has the BACK spectrum the integration time of 8192 ms? 125

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

15.2 Error message: No reaction on measurement of device …after … sec 125

16 CONTACT 126

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

1 Introduction

This manual gives an overview about the functions and features of the measurement and data handling software TriOS MSDA_XE. The abbreviation MSDA_XE means **M**ulti **S**ensor **D**ata **A**cquisition System - E**X**tended **E**dition.

This software enables the control of all sensor types, produced by TriOS. These includes the Radiometer RAMSES, fluorometer microFlu and enviroFlu-HC as well as photometer ProPS, VIPER and OSCAR, to handheld devices and GPS modules.

Sensors can be connected to the software via serial interface or network connection. It is possible to control the device manually for single measurements or programme serial measurements and measurement campaigns with customizable intervals. Intelligent comments and both time stamps and position data allow easy data handling and labelling of huge data amounts.

A powerful database grid with filter options and diverse export formats allow the analysis and processing of hyperspectral measurement data with third party software. Internal processing tools can be used to subtract or recalibrate datasets. This can be done online or offline after the campaigns, with the stored data in the database and be visualized with a graph tool.

The software works with several windows, which all have a certain task to do. Each window can be linked to each other for data flow. This works like the sender and receiver principle. For instance a sensor control window, which gets data from the sensor can be linked to a chart window, which automatically plots the received datasets. This makes the software highly flexible and powerful.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

2 Key

The following symbols / formats are used in the manual.

[Window-Name]

Menu-Entry

Link

Important Note !

Hint !

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

3 Installation

3.1 System Requirements

Operating system	**Microsoft Windows XP**
	Well configured and proper running
	We do not guarantee a proper running of MSDA_XE in Microsoft Windows 2000 / Microsoft Windows Vista and Micrrosoft Windows 7.
Free Memory	Minimum 1 GByte RAM. For Windows Vista or Windows 7 2GByte RAM or more is recommended.
	If the system must swap memory to the hard disc it won't run properly.
CPU Speed	The computer must handle your other real time application and MSDA_XE parallel[1]. Depending on the configuration 1 GHz CPU speed is the minimum. 2 GHz is recommended.
Free disk space	100 MByte and additional space for database, depending on the application up to several GByte.
Display resolution	1024x768 or higher

For longer measurement campaigns and continuous measurements it is recommended to deactivate automatic update functions in Windows, as they might reboot the system and data get lost.

For the installation of MSDA_XE, administrator rights are necessarily needed. In Windows Vista and Windows 7 write permission for the installation folder is also needed. Under some circumstances you might need administrator rights to run the software in Windows Vista and Window 7, too.

[1] If the computer has no time to read the FIFO buffer (16 byte) of the COM-port data might get lost.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

3.2 License Agreement and Limited Product Warranty

Please read this document carefully before installing TriOS GmbH MSDA_XE Software, any of its packages, or any software included with this product, on your computer. This document contains important information about your legal rights. By installing any or all of the software included with this product, you agree to the following terms and conditions.

GENERAL

As used herein, "EULA" means an end user license agreement, and "Software Program" means the MSDA_XE program.

BEFORE INSTALLATION

CAREFULLY READ THE FOLLOWING TERMS AND CONDITIONS BEFORE INSTALLING THE SOFTWARE PROGRAM. INSTALLING THE SOFTWARE PROGRAM INDICATES YOUR ACCEPTANCE TO THE TERMS AND CONDITIONS SET FORTH IN THIS DOCUMENT AND OF THE END USER LICENSE AGREEMENT ASSOCIATED WITH THE SOFTWARE PROGRAM. IF YOU DO NOT AGREE WITH THESE TERMS AND CONDITIONS, DO NOT INSTALL THE SOFTWARE PROGRAM.

THE SOFTWARE PROGRAM, INCLUDING DOCUMENTATION, APPEARANCE, STRUCTURE AND ORGANIZATION, ARE PROPRIETARY PRODUCTS OF TRIOS GMBH AND OTHERS AND ARE PROTECTED BY COPYRIGHT AND OTHER LAWS. TITLE TO THESE PROGRAMS, OR TO ANY COPY, MODIFICATION OR MERGED PORTION OF ANY OF THESE PROGRAMS, SHALL AT ALL TIMES REMAIN WITH THE AFOREMENTIONED, SUBJECT TO THE TERMS AND CONDITIONS OF THE APPLICABLE EULA RELATED TO THE SOFTWARE PROGRAM UNDER CONSIDERATION.

THIS LICENSE AGREEMENT DOES NOT ALLOW YOU TO COPY, MODIFY AND DISTRIBUTE THE SOFTWARE.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

LIMITED WARRANTY

EXCEPT AS SPECIFICALLY STATED IN THIS AGREEMENT OR IN AN EULA, THE SOFTWARE PROGRAMS ARE PROVIDED AND LICENSED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, AND FITNESS FOR A PARTICULAR PURPOSE.

TriOS GmbH does not warrant that the functions contained in the Software Programs will meet your requirements or that the operation of the Software Programs will be entirely error free or appear precisely as described in the accompanying documentation.

ANY WARRANTY OR REMEDY PROVIDED UNDER THIS AGREEMENT EXTENDS ONLY TO THE PARTY WHO PURCHASES TRIOS GMBH MSDA_XE FROM TRIOS GMBH OR A TRIOS GMBH AUTHORIZED DISTRIBUTOR.

LIMITATION OF REMEDIES AND LIABILITY

To the maximum extent permitted by applicable law, the remedies described below are accepted by you as your only remedies, and shall be available to you only if you or your dealer registers this product with TriOS GmbH in accordance with the instructions provided with this product within ten days after delivery of the Software Program to you.

TriOS GmbH's entire liability, and your exclusive remedies, shall be: if the Software Programs media are defective, you may return them within 30 days of delivery to you along with a copy of your receipt and TriOS GmbH will replace them. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT WILL TRIOS GMBH BE LIABLE TO YOU FOR ANY DAMAGES, INCLUDING LOST PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES, ARISING OUT OF THE USE OR INABILITY TO USE THE SOFTWARE PROGRAMS, EVEN IF TRIOS GMBH OR A DEALER AUTHORIZED BY TRIOS GMBH HAD BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

GENERAL

If any provision of this Agreement is held to be unenforceable, that shall not effect the enforceability of the remaining provisions. This Agreement shall be governed by the laws of Germany, without regard to any conflict of laws provisions.

Copyright © 2011 TriOS GmbH. All rights reserved. All trademarks are the property of their respective owners.

3.3 Installation Steps

Installation files and manuals can be found on the installation CD. When delivered together with a TriOS sensor, the Device.ini and calibration files are included as well.

Either an Auto start menu will start, or the file SETUP.EXE will start the installation programme manually. The installation programme copies all necessary file to a customizable directory. Except generating entries in the start menu, the installation program does not modify the Windows system.

After the installation finished the programme entries can be found in the Windows start menu.

MSDA_XE	Start program
Manual_msda_xe	Main manual in PDF-format (Acrobat Reader necessary!)
Quick Start Manual	Quick start with basic functions in PDF-format
Website	Link to www.trios.de
Release Notes	Last changes
Scripting	Help system for MSDA_XE scripting system
Uninstall	Program for deinstallation of MSDA_XE (All data generated of the running MSDA_XE will be preserved – especially the database.)

The latest Software version can be found on http://www.trios.de.
Click: Downloads -> Software PC -> msda_xe_setup.exe -> DOWNLOAD

4 First use

4.1 New Device Assistant

At the first program start after installation a wizard will be shown which will guide through the integration of the needed sensor files to the software. To open the wizard once again choose **Help/New Device Integration** in the main menu.

The wizard will ask for a path to the driver files. The file is build of the device type and its serial number plus extension “ini”.

These files are store usually on a CD which has been delivered together with the sensor. If you miss them the sensor files can be requested at support@trios.de by giving the sensors serial number.

Please read the next chapters for manual sensor installation.

4.2 Import Files

Select **Database/Import files** in the Main menu and select all files (*.ini and *.dat). Each file will be indicated with the serial number of the corresponding sensor.

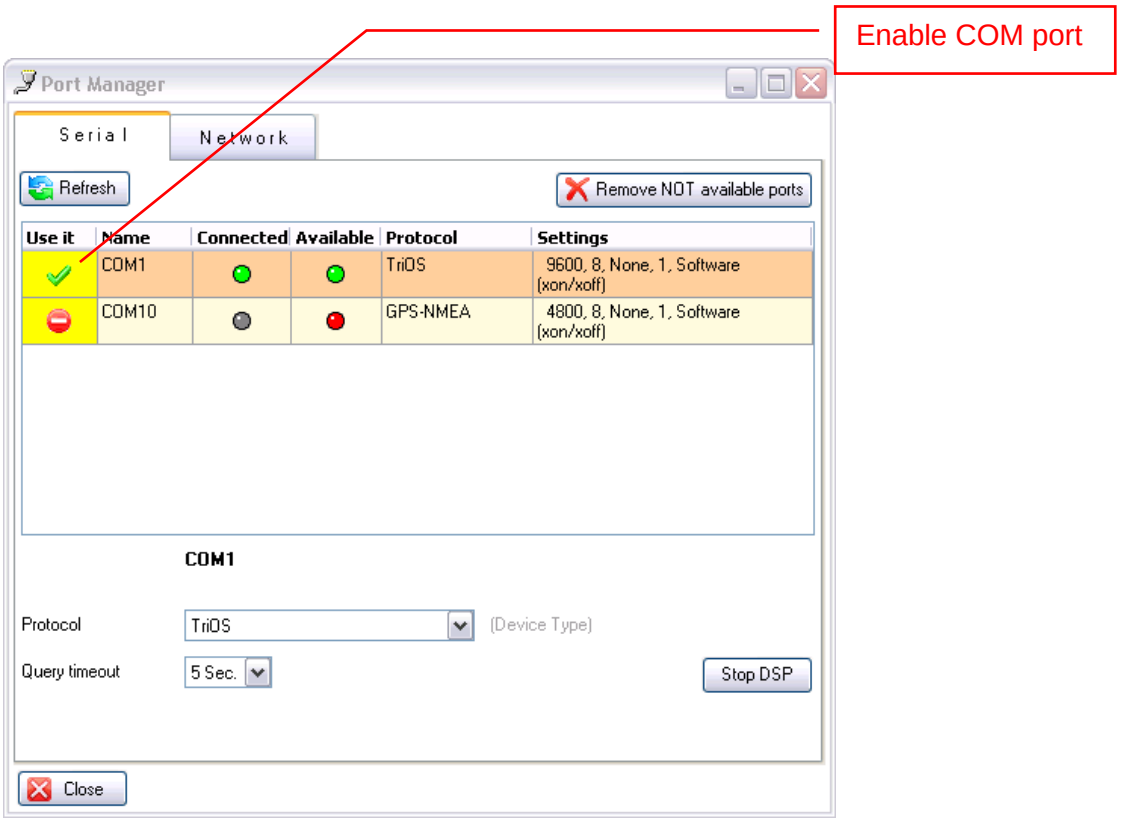
Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

4.3 Port Configuration

The ports where TriOS sensors are connected have to be activated. Choose **Options/Port Manager** in the Main menu to open the Port Manager. You can connect devices to the serial or the network port. With USB-to-serial adapters USB ports can be used as well.

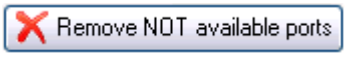
4.3.1 Serial Port

COM ports can be activated and protocols can be changed within the Port Manager.



All ports, which are not used or unavailable are marked red. After connecting a device via serial connection, press the Refresh button. The port can be activated by clicking on the red sign in the “Use it” column.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

	Search for all ports in windows system
	Remove not hardware available ports from the list
	Port should be used from MSDA_XE or not. Click in the yellow field to change it. If connection is successful the connected-column gets a green bubble. In connection is not successful you get an error message and the bubble stays red.
Name	Name of port
Available	Hardware found in windows system
Connected	MSDA_XE controls this port, now. This is only possible if the port is available and use it is activated, of course.
Protocol	Type of device connected at port: TriOS all TriOS-Devices except Merlin GPSNMEA Global Position System Device with NMEA protocol
Settings	Baud rate, Data bits, Parity, Stop bits, Handshake
Query time out	How long the software waits for a query answer. If time is over, device is switched to offline from the Device Manager.

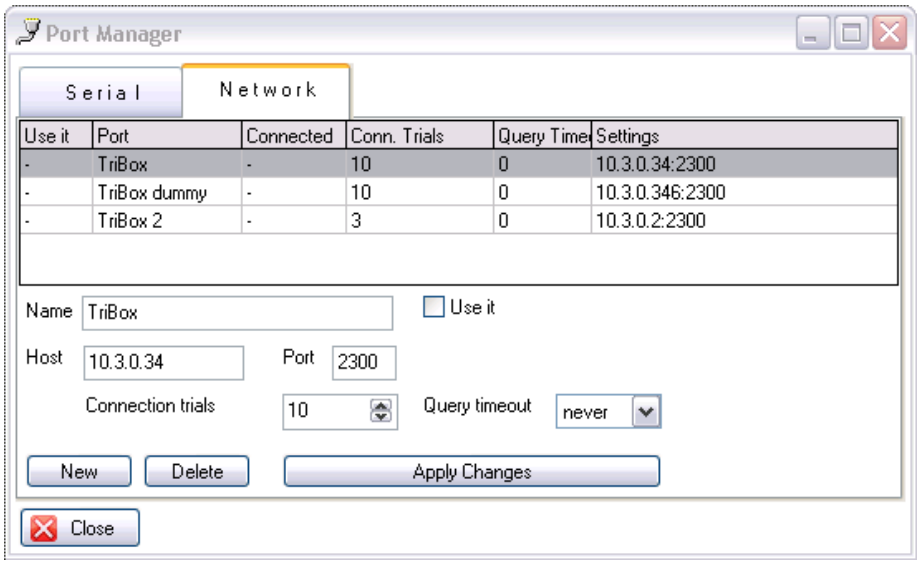
Standard configuration for TriOS sensors is:

9600 baud, 8 data bits, NO parity, 1 stop bits, Software flow control.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

4.3.2 Network Port

When using the network version of the TriOS integrated power supply **(IPS104net)**, you can add a matching IP address and a port number (see also the IPS104net manual).



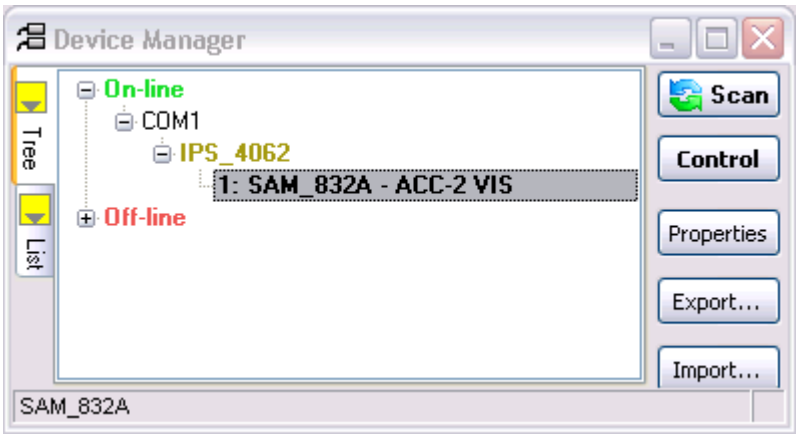
Network	
Name	Free selectable unique name
Host	IP address of IPS104net (see IPS104net manual)
Port	Port number of IPS104net (see IPS104net manual)

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

4.4 Scan for Devices

After connecting the sensors, like described in the sensor manual, press the

button in the Device Manager. The software sends query commands to all connected ports and waits for answers of the connected devices. Getting an answer it integrates the responding device – you can see the device entry under the On-line node in the device manager. For more details read chapter 6.1 Device Manager).



By marking the corresponding sensor and press the

button a control window will open. For each connected sensor one control window is needed.

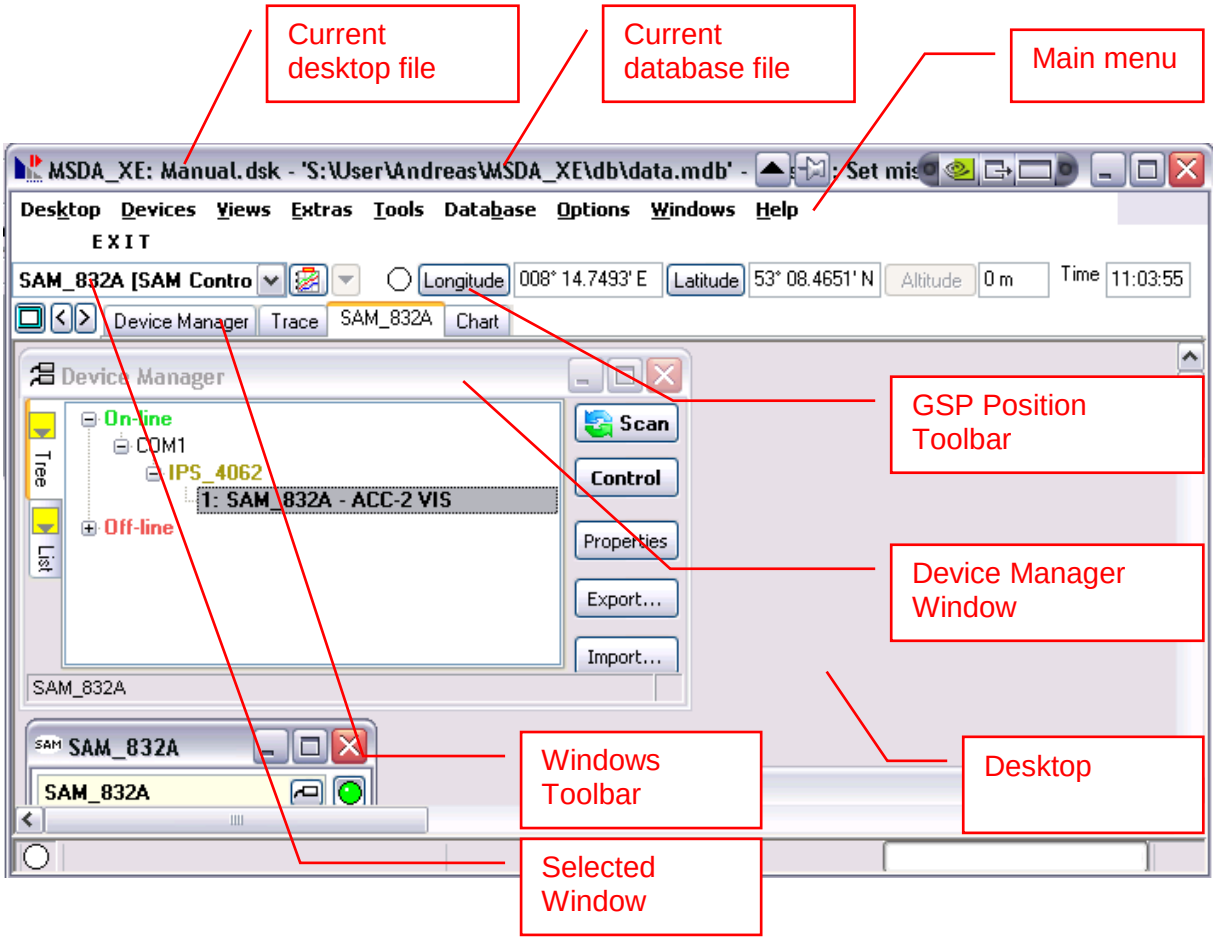
4.5 Open Example Desktops

Some preconfigured sample desktops for different sensor types will be installed with the software. Press **Desktop/Open Example** in the main menu and choose the file that matches with your device type configuration. Please read the manual of the used sensor as well as the sensor specific chapter in this manual.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

5 Main Window

Start program in the Windows start menu: **Programs/MSDA_XE\MSDA_XE**

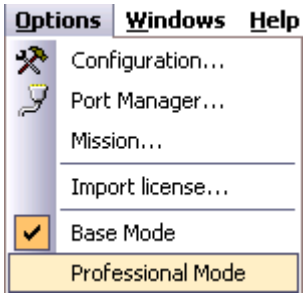


The main menu and its submenus in the current MSDA_XE may have a more simple look than shown in this documentation. The shown entries are restricted to the basic functions you need for your integrated devices. If you imported a device.ini of a new type more functions will be activated.

Additional you can activate advances functions with the **Professional Mode**. Nevertheless only functions for imported device types are visible.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Press **Options / Professional Mode** to activate the **Professional Mode**.



The MSDA_XE application is a “Multi-Document-Interface” system. That means that you can open multiple windows within a main window. The windows work separately or can work together with each other to process complex tasks. The collection of all windows in the main window build the desktop. Different desktops for different tasks can be created and stored respectively reloaded from files (*.dsk). To manage the desktops use the **Desktop** entry in the main menu.

For example you can configure a desktop only for measurement tasks eventually only for different device sets. After finishing the measurements mission you can create an other desktop to process the previous measured data.

5.1 GPS Position

If a GPS device is connected, measured positioning data is displayed at the top of the desktop. New incoming positioning data is marked by the green circle on the left. It is also possible to set data manually. The units are degrees and minutes. Use N, E, W, S for North, East, West or South.

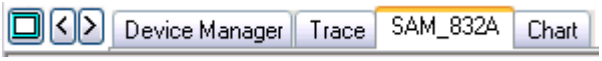
Each manual input must be confirmed by clicking on the corresponding button or pressing the return key in the text field.

The

field does **not** show the GPS time but the current system time!

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

5.2 Window Tool Bar



For each opened window a tabulator page will be shown in the window tool bar. This is comparable with tabbed browsing in internet browsers. Either a top level window will be indicated by a top level tabulator or the corresponding window will be shown, when the tab is clicked. Clicking a top level tabulator again will minimize the corresponding window.

In the context menu for the tabulators, which can be found on the left, each window can be selected or organized.

The tabulators can be shifted with the buttons and renamed.

If you have a multi monitor computer system you can use all monitors for MSDA_XE. The hot key F6 docks the selected window out of the main window. This window you can move to an other monitor. The next F6 key will dock it in.

5.3 Window Naming

Each window will have an unique name by its purpose. If more than one window of a single type is created, it will be numbered; e.g. Chart_1, Chart_2, Chart_3. It is possible to rename most of the windows with meaningful names to organize them. Right click on the tab will open its context menu and enables the **Rename** function. Additionally F7 will open a dialogue for renaming the marked window.

Some windows can not be renamed, as they are fixed or named automatically with the serial number of the device.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

5.4 Selected Window Bar

In addition to the Window Tool Bar the selected window is shown in a second bar with following functions.

	This button opens a new empty chart
	Show a list of all outputs of this window
	Creates a specific chart window to show the data of this window. To use this function you must create a chart template at first. See **Fehler! Verweisquelle konnte nicht gefunden werden.**. If you have more than one chart template defined for this window type you get a list of it and can choose one entry of the list.

5.5 Main Menu

Following menu entries are available in the standard configuration.

Desktop	
Global Comments	Change comment of all device control windows
New	Close all windows
Open	Open a stored desktop file.
Reopen	History of last used desktops
Save	Save current desktop
Save as	Save current desktop with new name
Open examples	Open saved desktop file from Example directory
Exit	Close program

Devices	
Device Manager	Show Device Manager Window as top level window
Further entries …	You can open a control window for each TriOS device type. Only entries of integrated device types are visible.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Processing	Open data calculation windows
Spectrum	Submenu for computing each spectrum type
Calibration	Calibrate spectra (see chapter 11.1 Spectrum Calibration)
Absorption	Calculate absorption spectra (see chapter 11.2 Absorption)
UV-A UV-B	Parameters from spectra (see chapter 11.3 UV A / UV B / PAR)
Absorptions	Submenu for computing absorption spectra

Views	
Chart	Graphic representation of data (see chapter 10.1 Chart)
Table	Tabular and textual representation of data (see chapter 10.2 Data Table)
Table Advanced	Pure table view from special data types
Text	Pure textual view for any data type
HTML	Browser window (only used for special tasks)

Extras	
Timer	Send signal to trigger measurement of different devices simultaneously (see chapter 12.1 Timer)
File Auto Importer	Automatic data import from external programms. (See Advanced Manual)

Tools	
File conversion	Data file conversion for the last program version of MSDA. The MSDA program is no more supported from TriOS. (See Advanced Manual)
Calculator	Window to interact with the internal scripting-interface of MSDA_XE. You can use it as an comfortable mathematical term evaluator, too.
Spectrum Generator	Generate spectra by formula
Hex Commander	Examine data transfer at serial interface

Database	
Data	Show all data in database and sends data to other windows for further computing (see chapter 9 Database Data Sender)
Device	Show all stored devices entries in the database
Import Files	Import data, device and license files

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Configuration	Shows the database page of the global configuration dialog

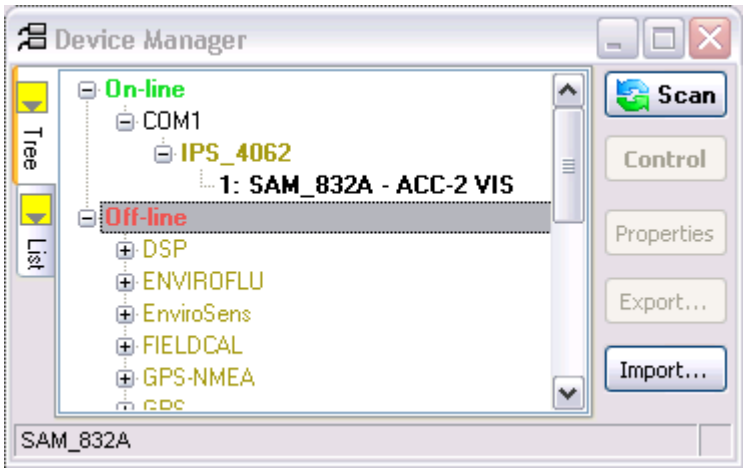
Options	
Configuration	General program configurations (see chapter 0 Configuration)
Port Manager	Configuration of serial interface (see chapter 4.3 Port)
Missions	Shows the mission page of the global configuration dialog
Import License	Activate special program function (contact TriOS)
Base Mode	Restrict programme to base functionality
Professional Mode	Enhance programme to more functionality

Help	
New Device Integration	Start the assistant for new device integration
Quick Start Manual	Opens PDF viewer for the Quick Start manual
Manual	Opens PDF viewer for the manual
Command Line Parameter	Simple text to show the command line parameter of MSDA_XE
Release Notes	Simple text to show the release notes of MSDA_XE
Scripting Interface	Opens a help system for the MSDA_XE scripting interface.
About	Program and system information: - Version - License - FPU Performance

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

6 Basic Windows and Elements

6.1 Device Manager



Device Manager - IPS_4062 is connected to interface COM1. SAM_83A2 device is connected to the 1st channel of IPS.

The device manager shows all devices represented by their database entry. With the "import" button new devices can be imported. The entries are separated in two parts:

1. On-line Devices

These are connected devices. They are detected by the software.

2. Off-line Devices

These devices are off-line. They are represented only by their database entry.

By sending a SCAN-command, all interfaces activated in the Port Manager (see chapter 4.3 Port Configuration) will be checked for connected devices.

Scan	Check for connected devices
Control	Open the appropriate device control window
Properties	Show properties of selected device
Export...	Export device properties – save it as a device.ini-file.
Import...	Import of new devices or modification of existing devices from file

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Usually the control windows are opened directly from the device manager by pressing the Control-button. This will open a control window fitting to the sensor type and is linked automatically to the incoming data.

The Device Manager window cannot be closed, but only be minimized.

6.2 Database Data Sender Window

All measurement and calibration data are stored in a database. The datasets can be displayed in the DBSender window. The shown entries can be filtered by the device generate the data and further properties. This window is the starting point to process stored data offline.

For the detailed functions, see chapter 9 Database Data Sender.

6.3 Chart Window

MSDA_XE has a charting module integrated. In the chart window you can see graphs of your measured data. Graphs can be generated on-line from your current measurement data or off-line from data stored in the database.

For the detailed functions, see chapter 10.1 Chart

6.4 Data Table Window

The Data Table Window shows measurement data in a table format. You can copy the table data to the windows clipboard for custom processing in f.e. Microsoft Excel.

For the detailed functions, see chapter 10.2 Data Table

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

6.5 Open / Close Options Panel

A blue arrow can be found in the left part of most windows. It opens/closes the [More …] panel. Use it to switch between the compact size and the options view size of the window.

▲ [More ...]	Click arrow to open / close [More …] panel.

6.6 Enable / Disable Windows

Device windows and processing windows have to be enabled before they can process and send new data to the next control window.

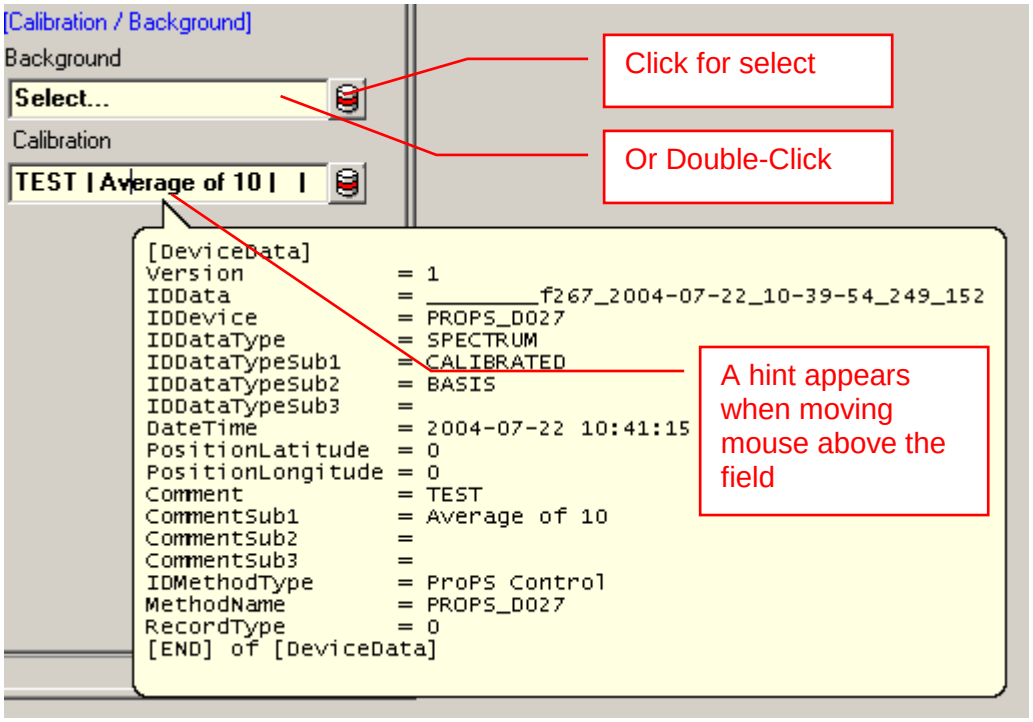
	Window is disabled
	Window is enabled

For proper use, all windows must be enabled!

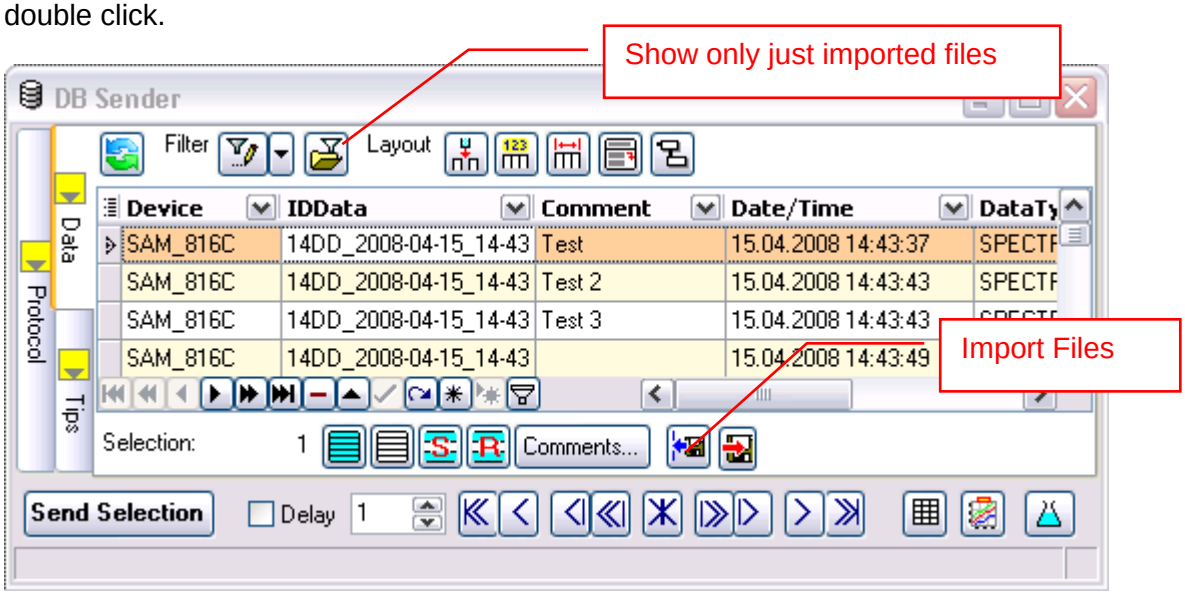
6.7 Database Entry

Some windows or functions need to be linked to database entries. As example the selection of “Background” and “Calibration” entries for a spectrometer are shown below.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010



A dialog for selection opens. Via an automatic filter, only those entries will be shown that are valid in the Database Entry field (in this case only BACK – spectra of a specific device). The fitting spectrum can be selected and confirmed with Ok, or chosen by an double click.



You can also import files in this dialog. In the following, only data imported will be shown.

For further functions in this dialog, see chapter 9 Database Data Sender.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

6.8 Interactive Windows

A powerful feature of the MSDA_XE software is the correlation of different windows on the desktop and their interaction in an extensive application. It works after the sender and receiver principle.

Some windows generate data (output data) that can be sent to other windows. Some windows can receive data (input data) and react on it. To use this function, corresponding input and output data of different windows must be connected with each other. Since there is no restriction on the number of connected windows, you can construct a network that meets your requirements.

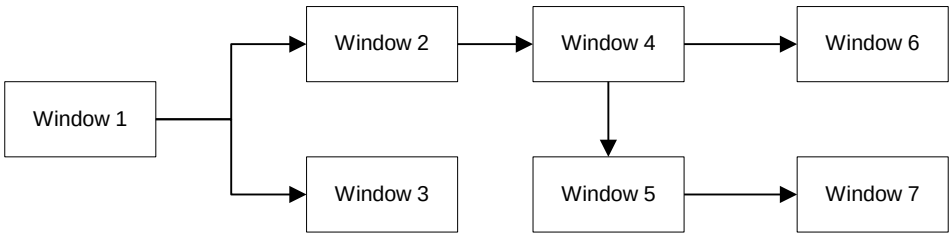


Fig.: Example of a window network

If a current window in this data stream network sends data to the next window connected, data will be computed there and be sent to the next window and so on. Therefore, all current windows must be opened on the desktop at the same time.

For proper use, connected windows mustn't be closed.

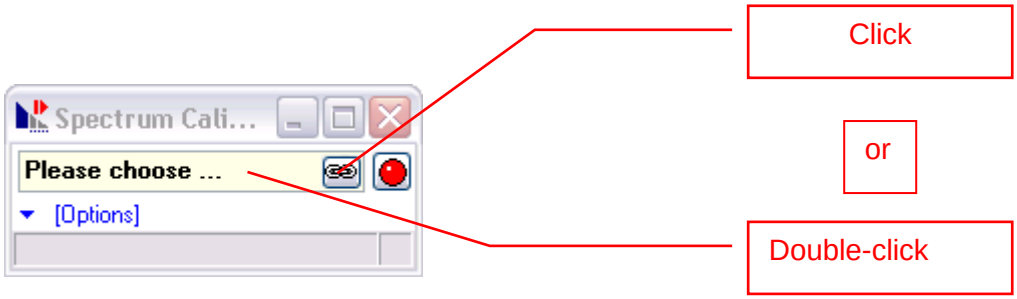
Please have a look at the following example:

The focus is to calibrate a RAW spectrum which is stored in the database.

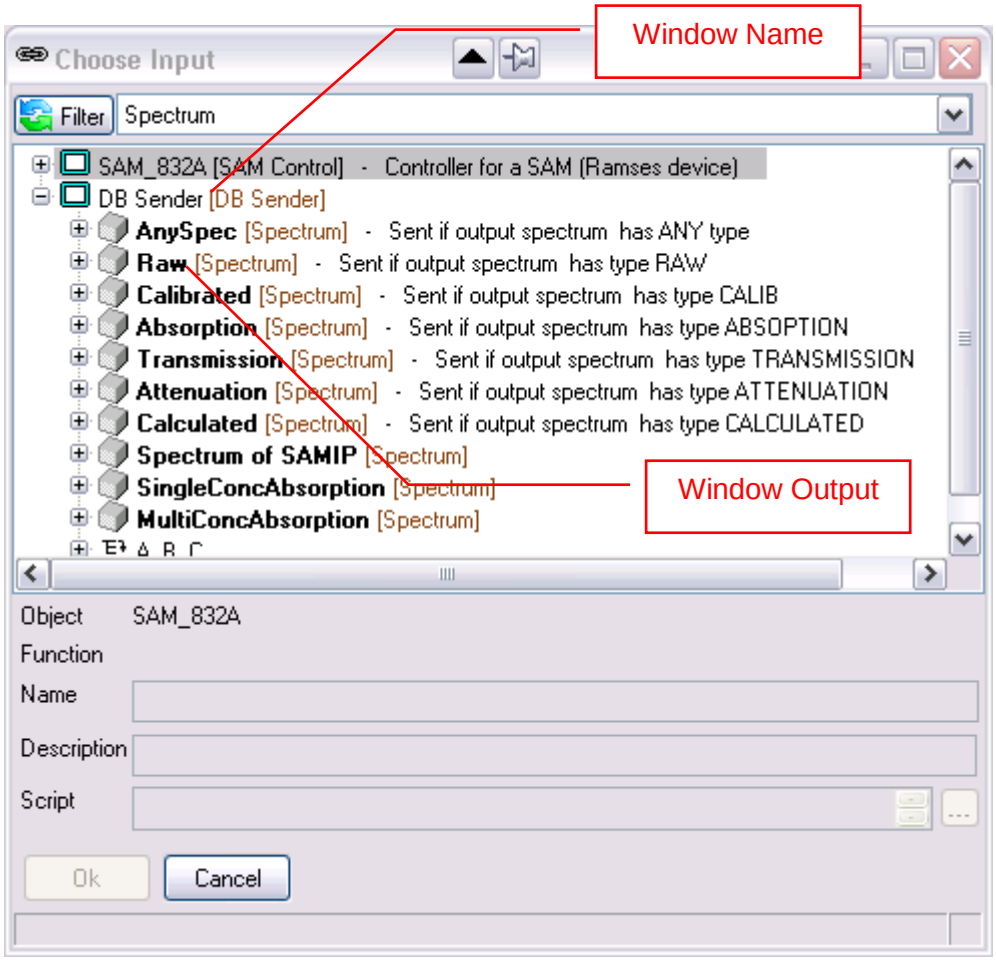
At first the **Database** needs to be opened, by pressing **Database / Data** in the main menu. The [DataBaseSender] window appears. Additionally the [Spectrum Calibration] window needs to be opened by pressing **Processing** the main menu (Professional mode needs to activated).

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

The corresponding window appears. The output spectrum of [DataBaseSender] must be connected or linked with the input of [Spectrum Calibration].

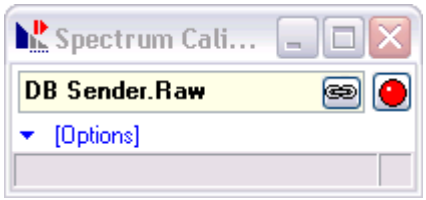


Click the button or double-click on the field to change the input. The dialog below will open.



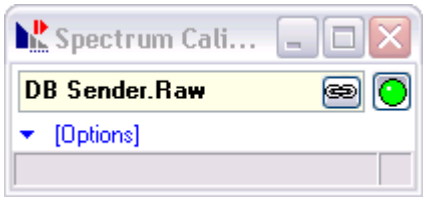
Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Select the RAW spectrum input and press Ok. If you have not selected any input, the Ok-button is disabled.



The input name (output window name – output data name) appears in the text field.

After the windows are linked the [Spectrum Calibration] window needs to enabled by pressing the red dot in the upper right corner.



The window is enabled, when the dot shine green. It indicates that the window is properly configured and will work if [DataBaseSender] sends RAW data. Select one or more raw spectra (IDDataTypeSub1=RAW) in the [DataBaseSender] and press [SEND SELECTION]. In the right bottom corner of [Spectrum Calibration], a purple flash will indicate the data processing.

A window can be disabled at any time, by pressing the red dot. Input data and settings will not be modified and any current computing will be stopped. [Enable] is only possible if the window is properly configured. If some settings are wrong following message will appear:

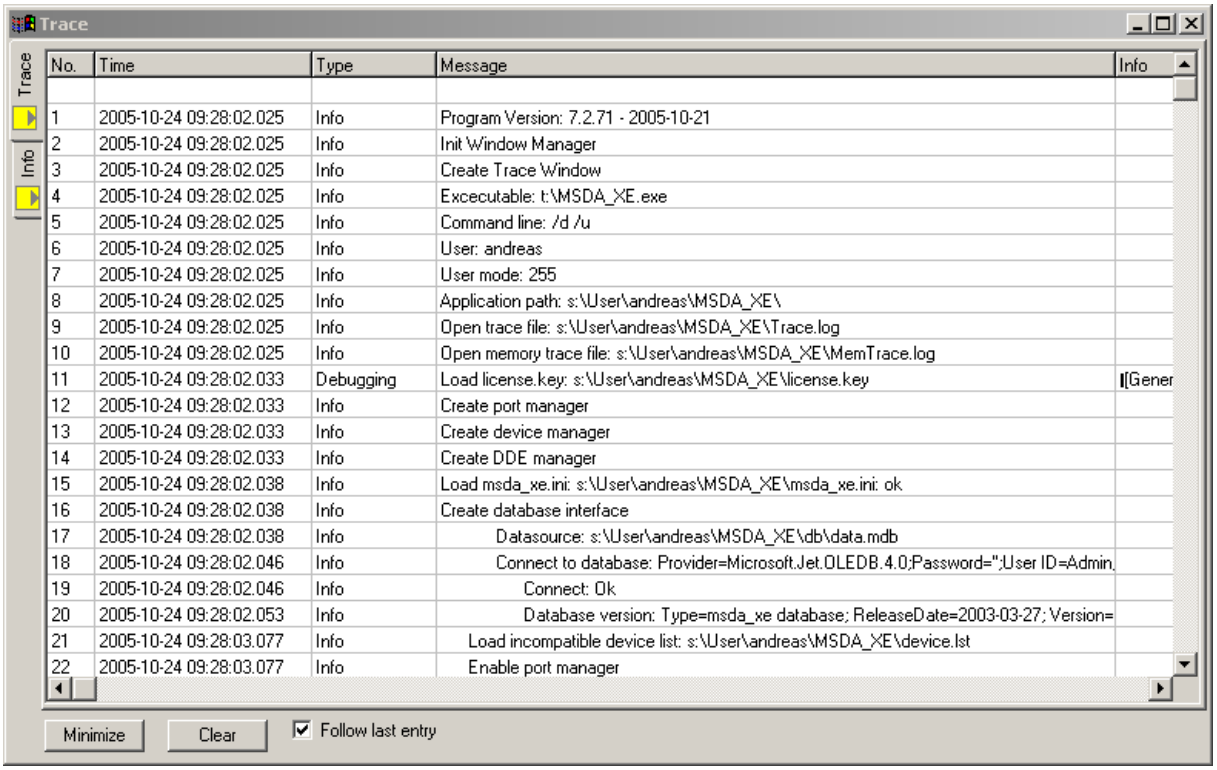
If an output generating window is closed, the connected input window will be disabled automatically.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

6.9 Trace Window

Program processes are recorded in the [Trace] window.

The content of the table below and further information is automatically stored in the „MSDA_XE/trace.log“ file. If you have problems with the software, you should send this file to our support department (email: support@trios.de).



No	Consecutive number
Time	Date and time of entry
Type	Type of entry
Message	Entry
Info	Additional entry of several lines On the Tab-page this entry can be viewed formatted in several lines.
Clear	Deletes all entries (Runs automatically as soon as 1000 entries exist.)
☑ Follow last entry	Cursor automatically goes to entry last added.

In the configuration dialog, you can set the message types to be shown here. (**Menu: Options/Configuration/Messages**)

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

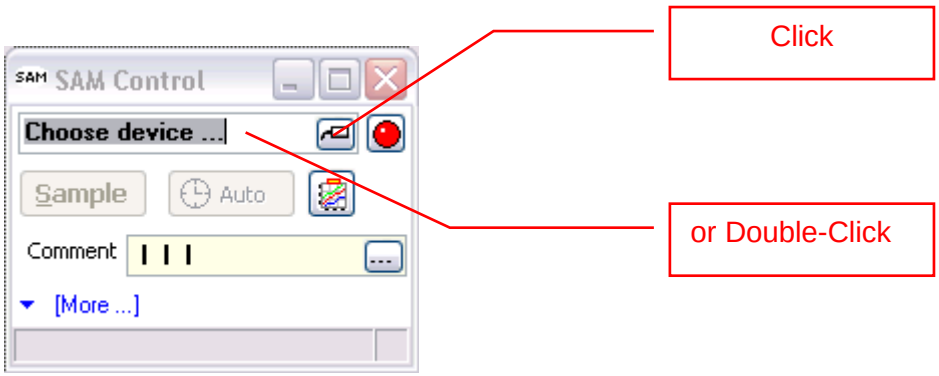
7 Device Control Windows

7.1 General

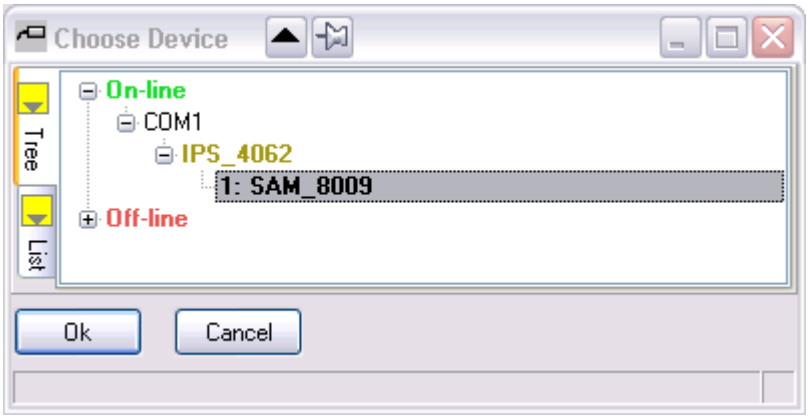
A device must be controlled with a special window on the desktop. Although the control windows are different for each sensor type, some functions are identically.

7.1.1 Select device

Usually device control windows are opened directly from the device manage by pressing the Control-button. This will open a fitting control window with the corresponding sensor input. If you open a device control from the **main menu / devices**, the window and the settings have to be configured manually:



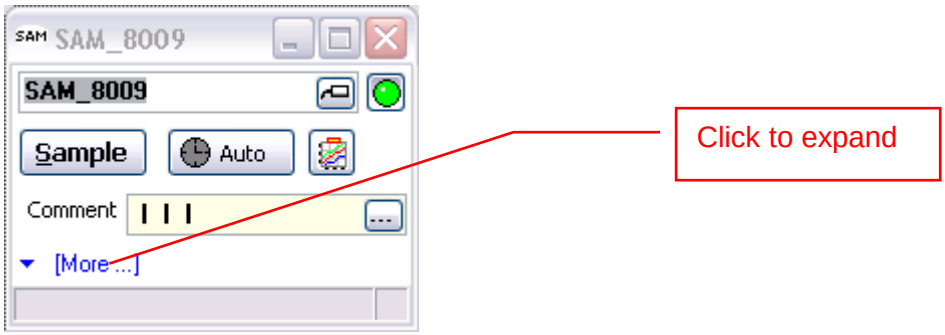
Double-click on the text field will open following dialog appears.



Select device and click “Ok”.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Activate the control window by pressing the button. Activated windows will show a -button. This enables the window and indicates that all is configured well. It is not possible to enable windows, which are configured wrong.



After the configuration of the input, the window name will show the serial number of the device.

If you have another window on the desktop configured with the same device it gets red. One device can only be controlled by one window.

7.1.2 Single and Automatic Measurements

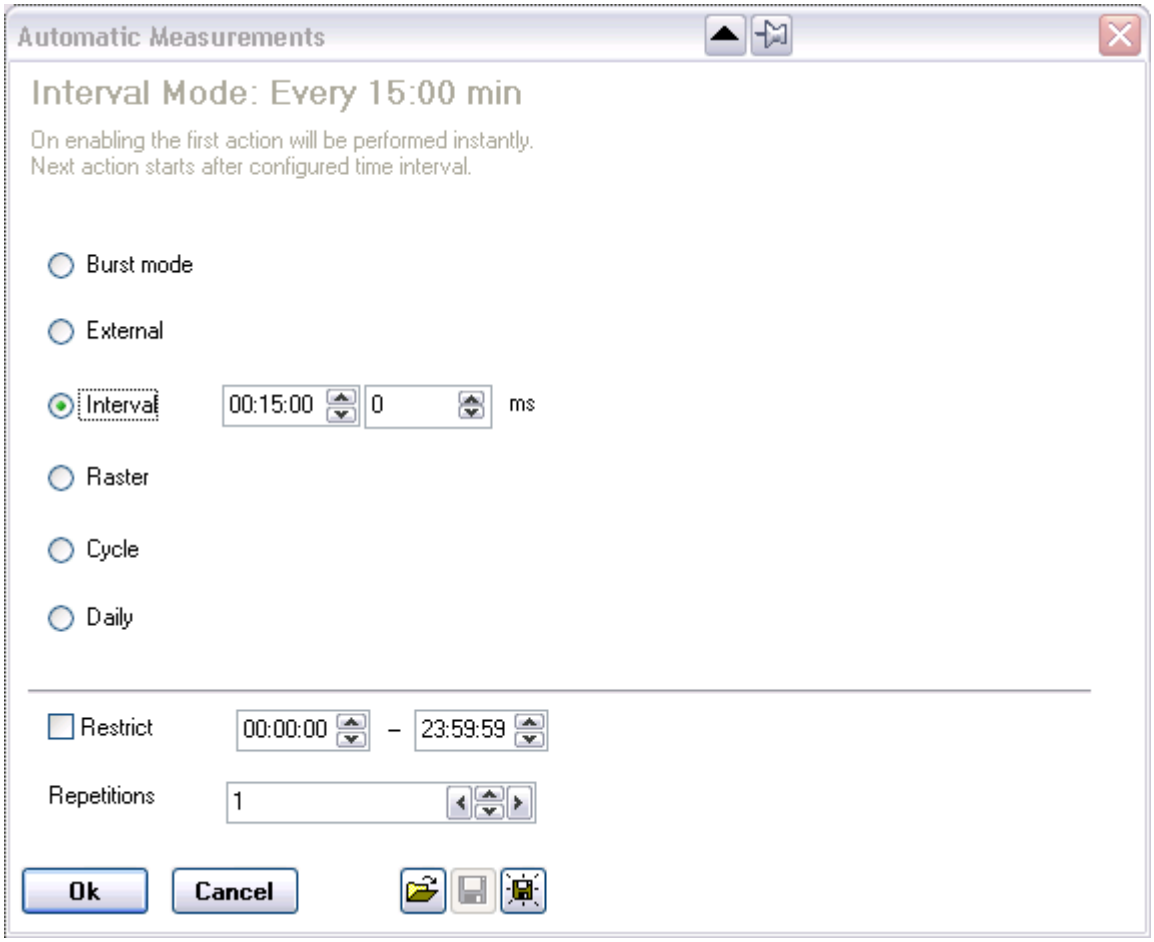
At the top of each device control window the sample buttons are placed.

With the sample button a single measurement can be triggered. The Auto button will activate automatic measurements, which offer many timer modes and intervals. Some controls support graphs to show the measured data online. The chart button opens a chart window with the appropriate input of the incoming data.

In the advanced panel you will find the settings for the automatic measurements.

Press “Configure” to open the following dialog.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010



Right mouse click on the AUTO button will open the windows as well.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Six modes of automatic measurements are available.

Burst	Measurement as fast as possible. Immediately after a measurement is finished, the next measurement is triggered.
External	Measurement is triggered from another window (see also Chapter 12.1 Timer).Click on to choose input. You can use the external mode to synchronize measurements for different devices if you connect several device control windows with one [Timer]-Window. All measurements of all connected devices are triggered now by this timer window.
Interval	Repetitive measurement in intervals. First measurement starts immediately after automatic is enabled.
Raster	Repetitive measurement in intervals with “even” time raster. First measurement starts at first raster time. E.g. Raster = 15 min.: 8:00, 8:15, 8:30, 8:45, 9:00, 9:15, ...
Restriction	If active, the measurements will be started within the configured time range.
Cycle	The cycle is for programming a fixed time table. Time intervals with different raster and duration can be programmed. The cycle will stop automatically, when all entries in the table are finished
Daily	Similar to “Cycle”. The measurement time table will be started every day

In some timer-modes restrictions can be activated. This will limit automatic measurement to a certain day time.

E.g. 8:00 – 18:00 active from 8:00 – 18:00
E.g. 18:00 – 8:00 active from 18:00-24:00 AND from 0:00 – 8:00

Repetitions larger than one will trigger multiple measurements for one timer event.

Automatic measurements needs to be started with the

button.

When the measurement shall be triggered externally the

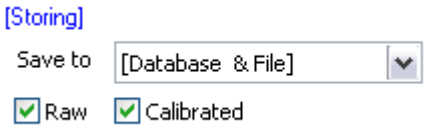
button needs to be activated. If this button is off, the device control window will ignore external triggers.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.1.3 Storing of Data

7.1.3.1 Saving

In default the software stores each data set in the database with a time stamp. Although, when the Database Sender is not opened. Besides the database, it is possible to save the measured data in single files on the computers hard disc.



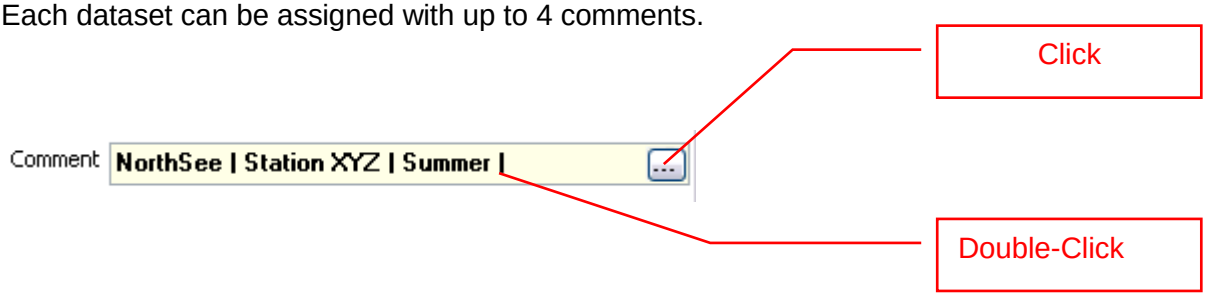
Is it is strictly recommend to activate database storing.

MSDA_XE can only import data in the *.dat format. Therefore it can happen, that a reimport is not possible, if the data are saved in another format.

When the device control window sends more than one output data, like the RAMSES sends RAW and CALIBRATED spectra, the type of saving can be configured.

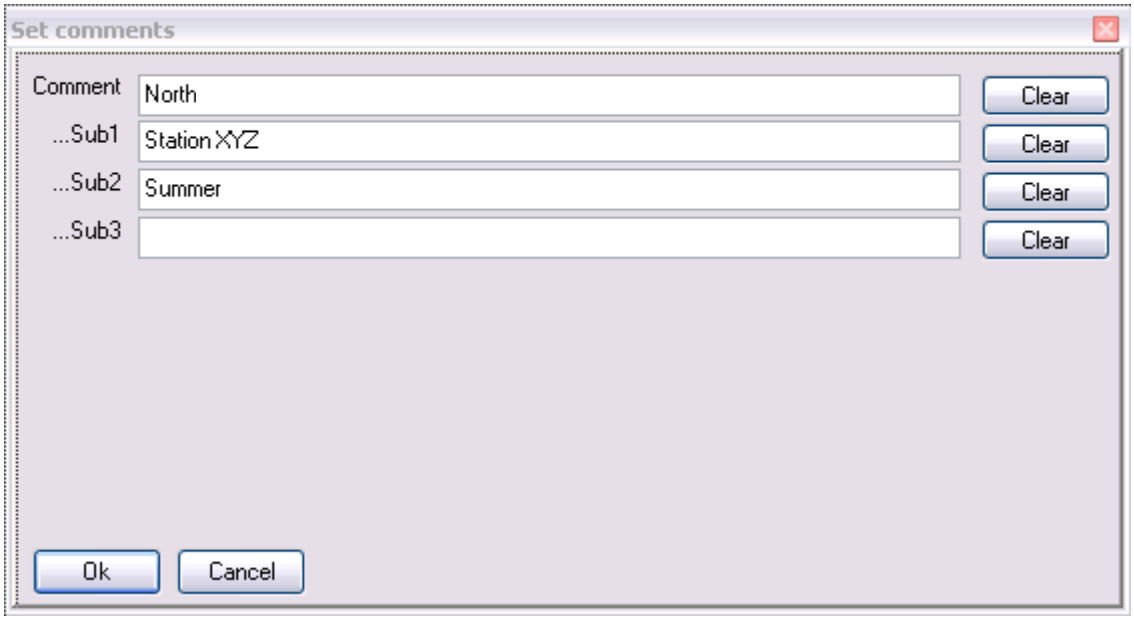
7.1.3.2 Comments

Each dataset can be assigned with up to 4 comments.



Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Within the following dialog box the comments can be changed. The comments can be used later on to sort data in the database or allocate them missions or application sites.



Edit comments and click Ok. Every upcoming measurement is named with this comments.

Global comments for all assigned sensors can be set in the main menu: Desktop / Global Comments.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.2 RAMSES (SAM + SAMIP)

TriOS produces two types of RAMSES sensors:

1. A pure spectrometer

2. A spectrometer with additional **Inclination** and/or **Pressure** sensor

Both device types and respectively both window types are described in this chapter.

7.2.1 Introduction

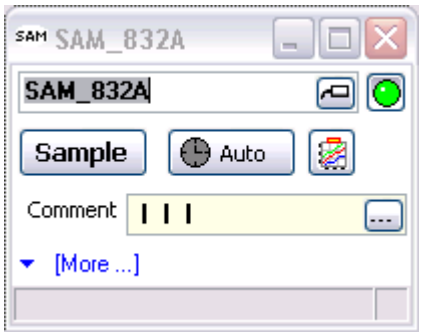
The abbreviation SAM stands for Spectrum Acquisition Module. The SAM device measures light intensities for 255 wavelengths. With the calibration files the software will compute the RAW readings of the spectrometer to physical units. The data necessary for wavelength assignment is included in the device *.ini file. For computing the intensity over wavelength the background (BACK) and calibration spectra (CAL) are needed. For each RAMSES two calibration files – one for air measurements and one for water measurements – will be delivered. All files shall be imported in the database.

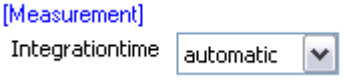
7.2.1.1 Introduction – Inclination / Pressure

The SAMIP device is a spectrometer which has additionally a **P**ressure - and an **I**nclination Sensor. As the IP module is a sensor itself, it will be shown in the device manager as well:

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.2.2 Measurement

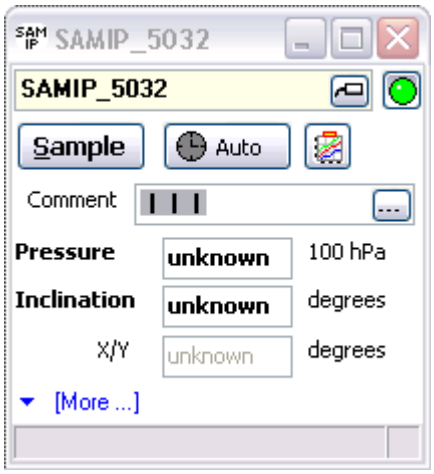




To get maximal resolution in the measurement values the RAMSES has an integration-time automatic. The automatic integration time is set as default and will search for the best fitting integration time between 4 and 4096 ms. In the manual mode integration times between 4 and 8192 ms are available.

7.2.2.1 Measurement data – Inclination / Pressure

Beside the normal RAMSES functions the SAMIP window contains additional functions and displays:



[Inclination / Pressure]	Results from measurement
Pressure	100 hPa correspond to 1 m water depth
Inclination	Angle to the vertical direction in degrees.
X/Y	The sensor has two inclination sensors which are orientated orthogonal to each other.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

	The software calculates the inclination value to the vertical axis of the sensor.

7.2.3 Calibration

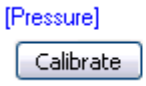
When both device ini-file and calibration files are imported, the device control window will search for the right calibration files in the database.

Other calibration files can be imported and selected by the button.

The “Calibration” entry is used for measurements in air. The “Alternative Calibration” usually is used for measurement in water. Take care, that the correct file is used for different application places.

7.2.3.1 Calibration – Inclination / Pressure

Within the calibration tab the pressure sensors can be calibrated to the surroundings.



This shall be done shortly above the water surface. The calibration data is stored in the database and will use for all further measurement.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.2.4 Outputs

The RAMSES window delivers two types of spectra:

IDDateType	IDDataTypeSub1	Meaning
Spectrum	RAW	Spectrum not calibrated, RAW counts from the spectrometer
Spectrum	CALIBRATED	Spectrum calibrated

The button opens a chart window to show this data.

7.2.4.1 Output – Inclination / Pressure

IDDateType	IDDataTypeSub1	Meaning
Spectrum	RAW	Spectrum not calibrated
Spectrum	CALIBRATED	Spectrum calibrated
Inclination		Inclination
Pressure		Pressure
SAMIP	RAW	SAMIP master data with link to spectrum, inclination and pressure
SAMIP	CALIBRATED	SAMIP master data with link to spectrum, inclination and pressure

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.3 Fluorometer (microFlu / enviroFlu)

7.3.1 Introduction

The microFlu and the enviroFlu devices work in the same way in terms of the control and data handling. Thus, they are described in the same chapter and both are handled here as Flu-device.

A Flu-device is able to perform measurements with different amplifications. Samples with low fluorescence should be measured with high amplification, samples with high fluorescence signal therefore with low amplification (from now on: Low and high channel). The sensors are delivered with fixed low amplification with default settings.

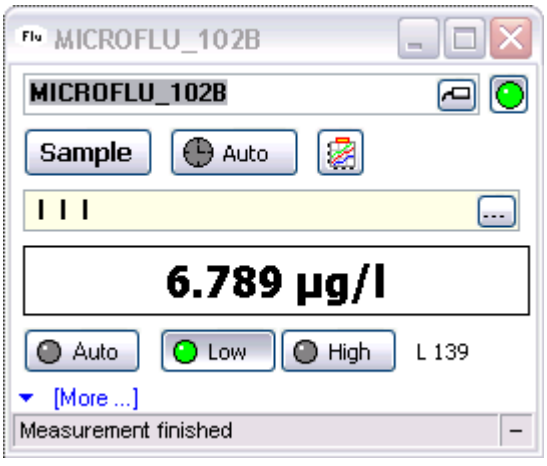
The Flu-device supports an internal averaging of samples which can be configured, but shall stay untouched.

A special feature of the device is the “continuous mode”. In this mode the measurements must no be triggered by software (MSDA_XE). The device itself triggers measurements if the unit gets power and must not be connected to a computer. In this mode the measurement interval is as fast as possible.

The configuration above and additional calibration values are stored permanently in the device EPROM from TriOS. These values can be changed with MADA_XE for custom applications but this function is blocked in the normal installation. If you want to activate it contact TriOS.

7.3.2 Measurement

Device control window of microFlu.

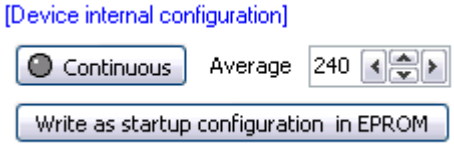


Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Amplification / Concentration	
Auto	Automatic amplification
Low	Low amplification
High	High amplification
6.789 µg/l	Measurement result calculated in µg/l
L 139	Amplification of sample (L-low, H-high) and raw measurement value

7.3.3 Internal Averaging

The internal averaging can be changed in the advanced settings. Changing the average can lead to uncontrolled and unreliable measurements.



Average 240	Internal averaging of the Flu device
Continuous	Device triggers measurements via its hardware. The sensor starts measurements immediately after powering up. If enable no measurements commands needs to be send to the sensor anymore. This is a default setting and needed for usage without computer.
Write as startup configuration in EPROM	Configuration is stored as start up configuration in the Flu-EPROM (Amplification, average and continuous mode)

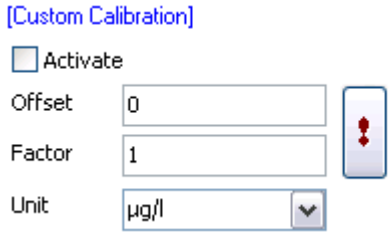
The device can trigger it measurements itself within the continuous mode.

If used with a computer each measurement can be triggered by the software as well.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.3.4 Custom Calibration

The measurement values of a Flu-device can be scaled with the Custom Calibration function.



When the custom calibration is activated the software uses following formular:

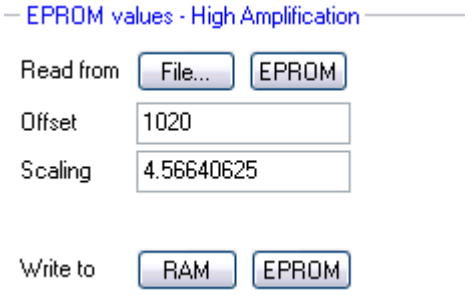
Custom Value = (Origin Value – Offset) * Factor

Default values are Offset = 0 and Scaling = 1

needs to be crossed, to work with the custom calibration.

7.3.5 EPROM Calibration Values

At the Calibration tab the calibration factors for the low and high channels can be seen and changed if necessary. Please read the sensors manual carefully, as once the values are overwritten, they could not be recovered.



	Open a file dialog to choose an Flu.ini file to read out its calibration values.
	Writes the current shown values (Offset, Scaling) to the device RAM for temporary check calibrations. The RAM values are used for the current measurement calibration. After device power off this values will be lost.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

As soon as the device is supplied with power, the configuration is read from the EPROM and copied to the device RAM. The configuration in the device RAM defines the current device properties. If power supply is stopped, RAM information will be lost.

7.3.6 Calibration

Each TriOS fluorometer is delivered with a factory calibration. The calibration factors are stored on the internal EPROM of the sensor. It is possible to overwrite the existing calibration by own factors, which have to be determined after the calibration instructions (read hardware manual).

Although it is possible to calibrate the sensor, it is recommended to send the sensors in regularly for a technical check up and recalibration.

EPROM **(read)**	Read calibration parameters from device.
File...	Import calibration parameter from device.ini file. If EPROM -Button not visible, parameter of file are written to EPROM automatically. Else you must write it to EPROM with this button.
Offset	Value for offset (medium giving no signal).
Scaling	Scaling term to calculate concentration from raw measurement value .
Square	Square term to calculate concentration from raw measurement value. (This field is only available for special devices.)
RAM	Set calibration parameters temporarily in the sensor (until power off)
EPROM **(write)**	Store calibration parameters permanently in the sensor.

To enable all feature of this page you must import the license Flu_Advanced.lic.

The existing calibration can be overwritten irrevocable with this function!

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.3.7 SolidCAL

TriOS SolidCAL standards were developed to check the calibration of Flu – sensors.

For the detailed functions, see chapter 8.2 Fluorometer Calibration (SolidCAL

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.4 UV Photometer (ProPS)

7.4.1 Introduction

The abbreviation ProPS means **Pro**cess **P**hotometer **S**ystem.

A ProPS measurement cycle consists of two single measurements.

1. Light measurement with lamp on
2. Dark measurement with lamp off

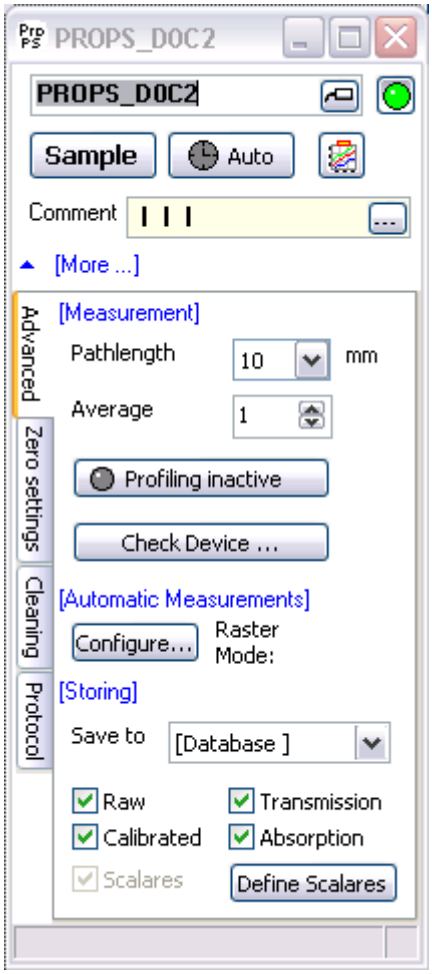
Equally like in the RAMSES the spectrometer automatically switch to the correct integration time. Both measurements (light and dark) will be performed with the same integration time.

Please read the hardware manual of ProPS carefully, as the correct setting of the optical pathlength is essential for a good measurement.

Like every photometer system the sensor needs a base line to calculate transmission or absorption spectra. TriOS delivers the ProPS with one water basis for each pathlength. The calibrated water bases are saved in a file and needs to be imported to the database.

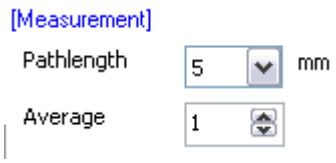
For performing individual calibration, see Chapter 7.4.4 Calibration.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010



7.4.2 Configuration

The pathlength entry must fit to the actual physical pathlength of the sensor. For the ProPS CW version pathlengths of 10, 20, 40 and 60mm and for the ProPS WW pathlengths of 1, 2, 5 and 10mm are available.



Path length	Optical path length used at the ProPS
Average	An average is calculated with a certain number of spectra It is recommended to use an average of 1 for online measurements

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

The physical path length at the sensor and the software settings needs to be identical.

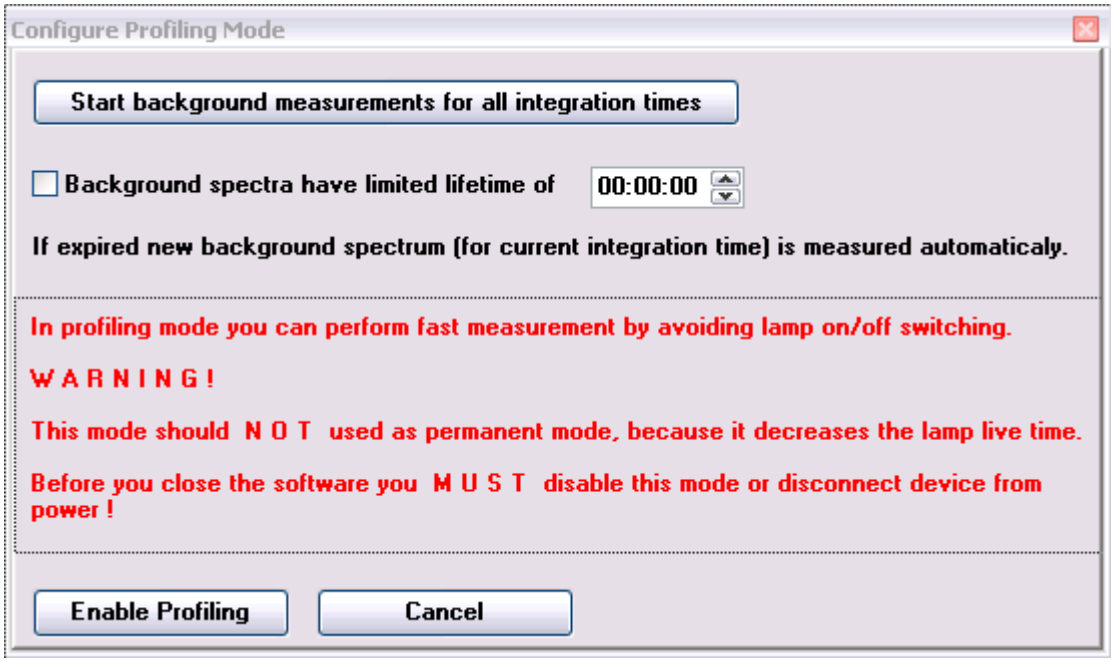
7.4.3 Profiling Mode

It is possible to run the ProPS in profiling mode, which enables very fast measurements for vertical profiles. In this mode the dark measurements are done for all integration times before the measurement starts. During the measurements the lamp stays activated.

For the profiling mode a special license is needed and can be requested at the support department of TriOS.

The

button will activate the mode. Following dialog will appear.



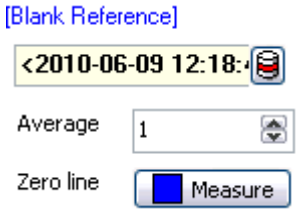
	Measurement of all dark spectra
	If enabled the dark-spectra will be refreshed after configured time automatically.
	Enable this mode

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

The profiling mode reduces the lamp life time. After usage it needs to be deactivated manually to save lamp life time.

7.4.4 Calibration – Zero line

It is possible to measure new zero lines for the ProPS. For the measurement of water bases it is recommended to use ultra pure water (Milli-Q).



[Reference]	
<2010-06-09 12:18:40>	Select an existing reference (factory) calibration (recommended)
Average 1	An average is calculated for a certain number of spectra.
Measure	Click to measure a reference (e.g. pure water) spectrum. It will be stored automatically and used for further measurements.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.5 VIPER (VIS Photometer)

7.5.1 Introduction

A VIPER measurement cycle consists of two single measurements.

1. Measurement with light on
2. Measurement with light off

The dark measurement is carried out automatically with the same integration time as the light measurement and is necessary for calibration.

Similar to the ProPS, every VIPER device requires additional data for transmission and absorption calculations – the water basis.

A basis calibration with clear water is required. These files are delivered with your device and have to be imported into the database. For performing individual calibration, see Chapter 7.5.3 Calibration – Zero line.

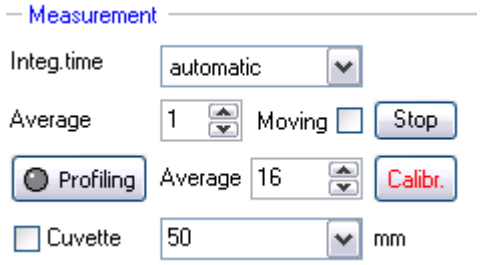
The VIPER produces its light with multiple diodes (LEDs) which can be switched separately. Measurements can be performed with one or several LEDs. This restricted light measurement should be used only for special applications and will be a part of advanced data processing in the future software versions.

It is recommended to switch on all LEDs.

On	Enable all LEDs.
Off	Disables all LEDs
Ok	The green bubbles do NOT indicate the current LED-state in the device. It defines the LEDs which should be used in the light measurements. The Ok button applies the current LED configuration in the device. Therefore this button should be used only for hardware testing.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.5.2 Measurement Configuration

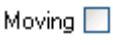
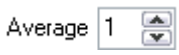
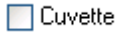


As the VIPER has a quite high measurement rate it is possible to average over an adjustable number of measurements with just one measurement command. The average spectrum will be calculated, when the software gets the maximal data count. In normal mode the next measurement starts with 0. In the “moving average” mode the software calculates a moving average for every new spectrum (first in – first out). This function will only work, when the measurements are triggered by a timer.

In contrast, it the

button will clear all previous measured spectra and restarts the average process.

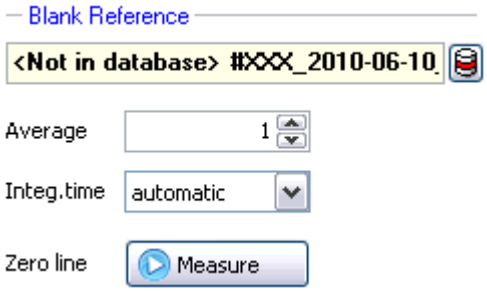
To perform measurements with a higher measurement interval, the “profiling” mode can be used. This mode will measure dark spectra for each integration time before the real measurement. During the real measurement only light spectra will be measured, which will speed up the measurement by a factor of 2.

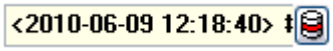
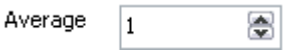
	Custom integration time
	Measurement average
	Perform a moving average
	Enable profiling mode. At the first enabling after program start it will measure the dark spectra measurements.
	Average for the dark spectra calibration
	Refresh the dark spectra calibration. Do not perform it during a measurement cycle
	The viper is not submerged in the sample media. The optical path is restricted by a cuvette.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

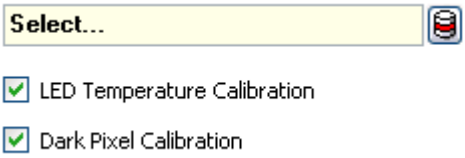
	Path of the cuvette. This value will be stored in the spectral data for later processing.

7.5.3 Calibration – Zero line



	Select an existing reference calibration.
	An average is taken for the zero line calibration.
	Integration time taken for the calibration.
	Click to measure the zero line (e.g. water) spectrum. It will be stored automatically and used for further measurements.

7.5.4 LED Temperature Calibration



The correction of the temperature drift of the LED should always be enabled to get more precise measurement data. The necessary data for the calibration is delivered together with your device.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.6 OSCAR

7.6.1 Introduction

A OSCAR measurement cycle consists of two single measurements.

1. Measurement with light on
2. Measurement with light off

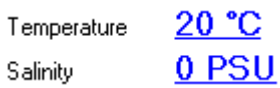
The dark measurement is carried out automatically with the same integration time as the light measurement and is necessary for calibration.

Similar to the ProPS, every OSCAR device requires additional data for transmission and absorption calculations – the water basis.

A basis calibration with clear water is required. These files are delivered with your device and have to be imported into the database. For performing individual calibration, see Chapter Calibration – Zero line.

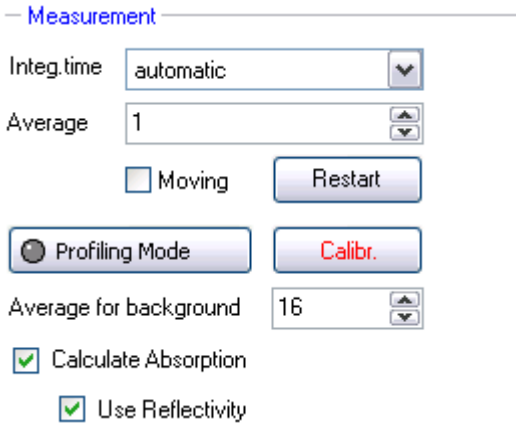
The OSCAR measurement principle is much distinguished to absorption-meter with a linear light path. The cavity reflects the scatter light back in the sample media (again and again) and you get no constant optical path-length. Therefore the calculation of the absorption coefficients is a complex task. It based on the reflectivity values of the inner surface of the cavity for every measured wavelength. This reflectivity spectrum is needed as additional calibration data for the OSCAR.

7.6.2 Measurement Configuration



The calibration of the measurement data integrates the temperature and the salinity of the sample media. These values must be entered before you start a measurement. Click on the blue text. This additional data will be attached at every measured data record.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

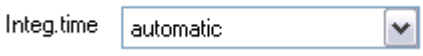
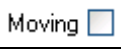
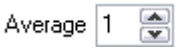
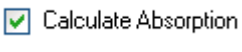


Is it possible to average over an adjustable number of measurements with just one measurement command. The average spectrum will be calculated, when the software gets the maximal data count. In normal mode the next measurement starts with 0. In the “moving average” mode the software calculates a moving average for every new spectrum (first in – first out). This function will only work, when the measurements are triggered by a timer.

In contrast, the

button will clear all previous measured spectra and restarts the average process.

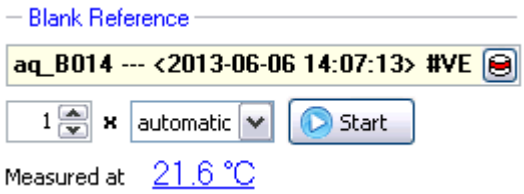
To perform measurements with a higher measurement interval, the “profiling” mode can be used. This mode will measure dark spectra for each integration time before the real measurement. During the real measurement only light spectra will be measured, which will speed up the measurement by a factor of 2.

	Custom integration time
	Measurement average
	Perform a moving average
	Enable profiling mode. At the first enabling after program start it will measure the dark spectra measurements.
	Average for the dark spectra calibration
	Refresh the dark spectra calibration. Do not perform it during a measurement cycle
	Calculate absorption spectrum. Should be only disabled if no reflectivity spectrum for calibration is

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

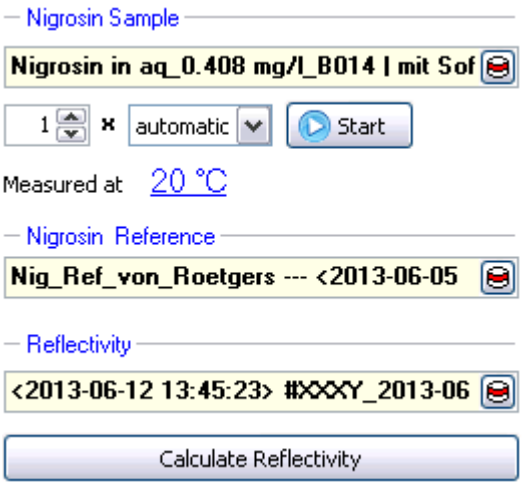
	available to avoid an error message.
☑ Use Reflectivity	Should be always enabled. In the disabled state no physical correct absorption values will be calculated. It is only for testing

7.6.3 Zero settings – Blank Reference



<2010-06-09 12:18:40> #	Select an existing reference calibration.
1	An average is taken for the zero line calibration.
automatic	Integration time taken for the calibration.
Start	Click to measure a zero line (e.g. water) spectrum. It will be stored automatically and used for further measurements.
Measured at 21.6 °C	Shows the media temperature of the Blank Reference measurement. You can change this temperature after a measurement by click on the blue temperature field.

7.6.4 Zero settings – Reflectivity



For the reflectivity calibration, a standard sample media with sufficient absorption over the full wavelength range of the OSCAR samples is needed. The usual media for this task is Nigrosin solution. For more information read the documentation for the OSCAR.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

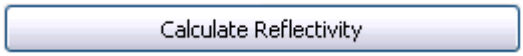
This media must be measured with a photometer (e.g. Viper) **and** with the OSCAR at nearly the same temperature.

1. Nigrosin Sample

   Measure the media with the OSCAR

2. Nigrosin Reference

   Measure the media with a photometer and set this entry in the database entry field.

3. 

   Click the button to start the calculation. New entry will be shown in the field above.

If you have measured the media temperature after a Nigrosing Sample measurement, you can correct the temperature of this sample with click on the temperature field.

The Nigrosin Reference can be measured with the Viper sensor from TriOS. In this case the data (spectrum) was stored in the database and has the correct format. It can be used as it is. Click on the button at the database entry and choose the correct entry.

If you have measured the spectrum with a different spectrometer its data must be imported in the database. Copy the data in a text table format in the windows clipboard:

Wavelength1 Absorption1

Wavelength2 Absorption2

Wavelength2 Absorption3

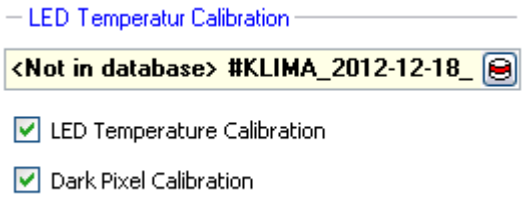
... and so on …

The wavelength values must be in the nano-meter unit. Click on

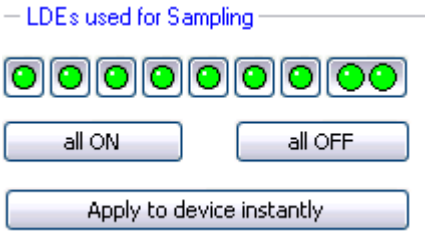
and answer the pathlength-question. The next dialog shows the data in the TriOs format. Set the “Comment” fields for better identifying and click “OK” to accept the data.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.6.5 LED Light



The correction of the temperature drift of the LED should always be enabled to get better more precise data. The necessary data for the calibration is delivered together with your device.



The OSCAR produces its light with multiple diodes (LEDs) which can be switched separately. Measurements can be performed with one or several LEDs. This restricted light measurement should be used only for special applications and will be a part of advanced data processing in the future software versions.

It is recommended to switch all LEDs on.

all ON	Enable all LEDs.
all OFF	Disables all LEDs
Apply to device instantly	The green bubbles do NOT indicate the current LED-state in the device. It defines the LEDs which should be used in the light measurements. The OK button applies the current LED configuration in the device. Therefore this button should be used only for hardware testing.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

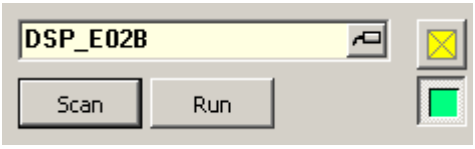
7.7 Data Logger (DSP)

7.7.1 Introduction

The Data Logger has the abbreviation DSP which means **D**ata **S**torage with Power **P**ack.

Depending on the configuration the DSP can handle two to four RAMSES. It contains a power pack for powering the sensors and triggers measurements following a programmed time table. The measurement data is stored in its internal memory card with timestamp. Measurements can be triggered in profiling mode about every 10 seconds or with a daily timetable.

In contrast with all other device controls, the DSP Control has no [Single]- or [Auto]-Button. It is not possible to trigger measurements for connected devices directly via software. Instead, it has a [Run] button to enable its internal measurement protocol. This function is only necessary for testing. Before working with the DSP it is recommended top scan for connected devices.

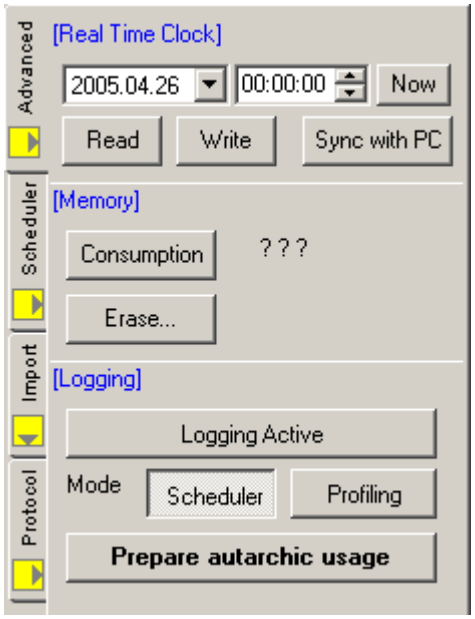


Scan	Find connected devices. It will remove all detected old devices and integrates connected devices after their query answer.
Run	Start / Stop internal measurement trigger

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.7.2 Configuration

Please read the manual of the DSP for a more detailed instruction.



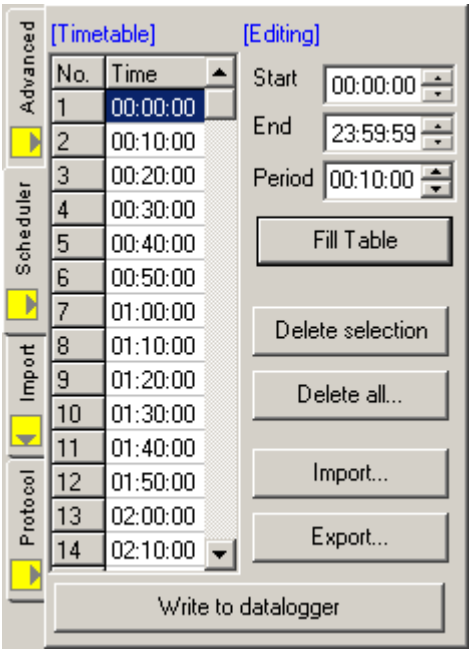
[Real Time Clock]	
2005.04.26 00:00:00	Date and time fields to show and edit DSP internal clock
Read	Read clock from DSP and shows data in fields
Write	Write date and time field to DSP
Sync with PC	Write current computer date and time to DSP
Now	Set date and time field to computer data.
[Memory]	
Consumption	Read memory usage and show its data
Erase...	Erase all memory. Attention: All data will be lost.
[Logging]	
Logging Active	Enable storage of measurement data in memory card
Scheduler	Enable measurement trigger via scheduler
Profiling	Enable profiling measurement about every 10 seconds

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Prepare autarchic usage	Should be carried out after DSP has completely been configured and before disconnected from computer. See instruction in message box.

7.7.3 Scheduler

To run the DSP in scheduler mode, the daily timetable needs to be programmed with a start and end time and the interval.



[TimeTable]	Show current times of measurement
[Editing]	Input of daily start and end time
Start	Interval start
End	Interval end
Period	Measurement interval. Must be larger or equal to 1 minute.
Fill Table	Insert time from Start to End with Period in timetable Time distance smaller than 1 minute is erased automatically
Delete selection	Erase selected entries in timetable
Delete all...	Erase all timetable entries
Import...	Import timetable from file
Export...	Export timetable to file
Write to datalogger	Write all timetable entries to DSP.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

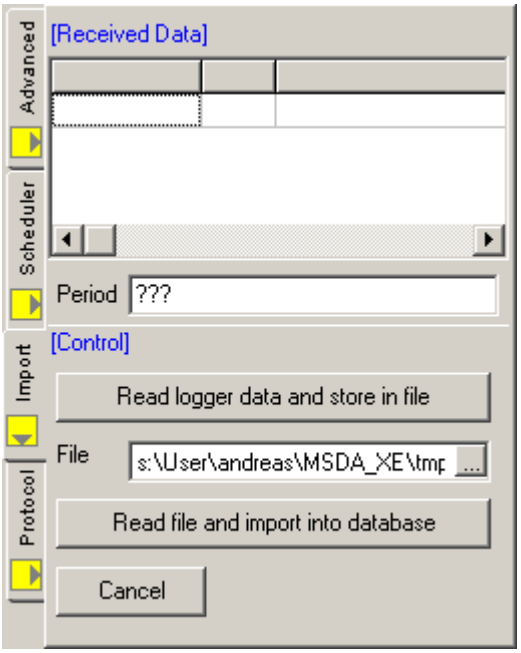
The DSP starts when the first time table entry is reached. E.g. if the DSP is activated at 8:00 o'clock, but the first entry is 7:00 o'clock the first measurement will start at 7:00 o'clock tomorrow.

7.7.4 Data Import

Data import consists of two steps:

1. Read logger data from DSP and write to file.
2. Import file in database.

For each sensor data, which is imported to the database, the corresponding device file needs to be installed at the database. An error message in step 1shows, that the device file is missing.



Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

[Received Data]	
Table	Count of data records per device
Period	Period of imported data
[Control]	
Read logger data and store in file	Start DSP data sending stored data
File	Name of file that buffers the received device data. File has DAT-format. Thus, it can be used as normal import file in other places of MSDA_XE, too.
Read file and import into database	Start the import of the DAT file into the database
Cancel	Stop MSDA_XE to accept data sent from DSP. It is not possible to stop the process of sending via the DSP. You must disconnect it temporarily from power supply.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

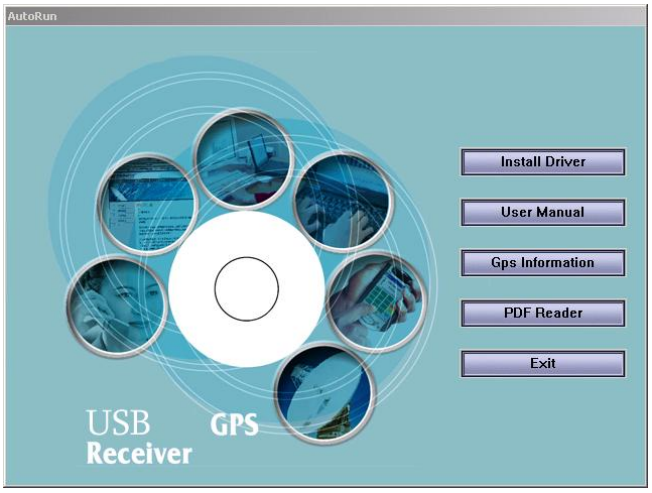
7.8 Global Positioning System (GPS – NMEA)

Our software supports the NAVILOCK GPS device with the NMEA protocol. This device can be connected via USB to a computer and emulates a serial port.

The GPS-NMEA has no control window, it works automatically. Nevertheless it is explained here in “Device Control Windows” chapter.

7.8.1 Installation

Insert installation CD in your CD-ROM-drive and wait for next window. If your CD autostart function is disabled start “auto.exe”.



Press

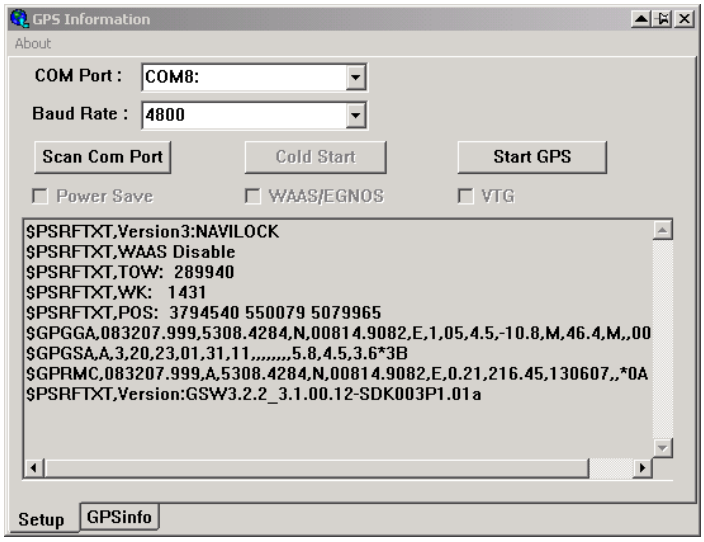
and follow instructions to install driver.

Press

and follow instructions to install the test software.

Plug in device and wait for integration in windows. Start the program “GPS Information”.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

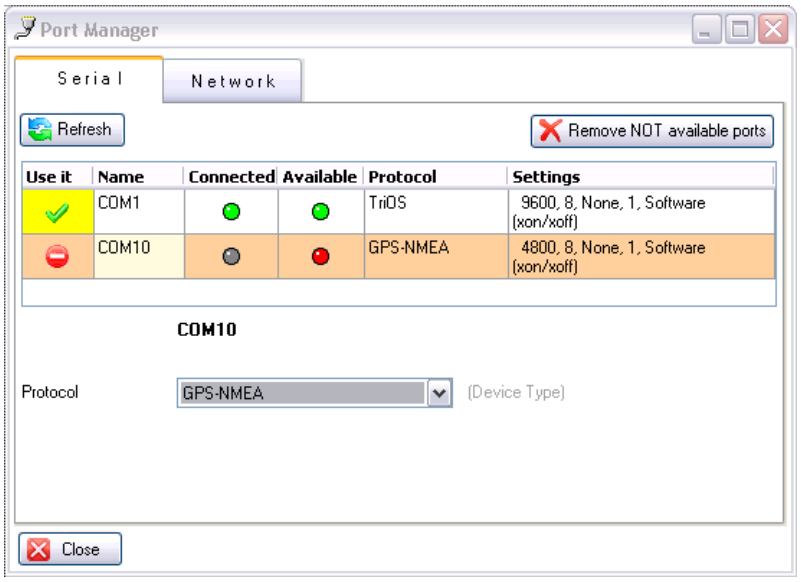


Choose the correct (new) COM Port and press Start GPS. If you see data the device is Ok.

7.8.2 Integration in MSDA_XE

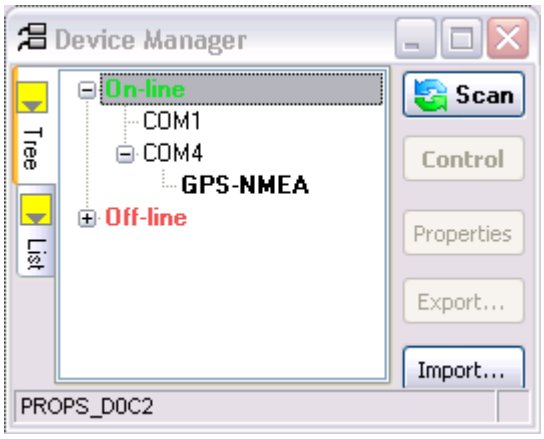
As the device can only be controlled from one program at the same time, please close the GPS Information program!

Start MSDA_XE and choose **Options/Port Manager** from the main menu.



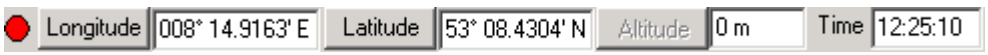
Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

The new COM port of the GPS-NMEA device shall be listed in the window. If not, check connection and press “Scan for available Ports”. Select the new COM port. Choose “GPS-NMEA” as protocol and “Use it” to activate the port. When the port settings are correct, the GPS-NMEA device shall be listed in the device manager.



If the GPS-NMEA device is plugged into the PC after program start, press “Scan” in the Device Manager to integrate the device.

The received values from the GPS device will be shown at the top of the main window.

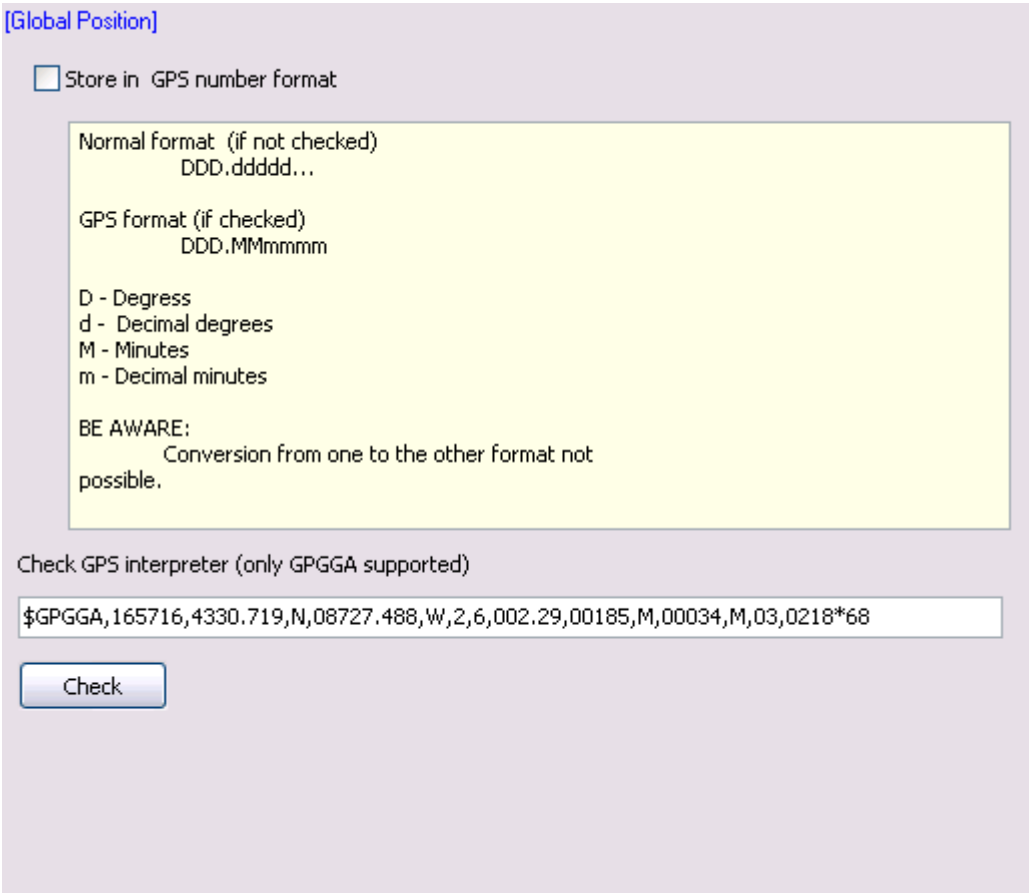


The displayed time is the sytem time and not the GPS time.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

7.8.3 Position stamp in all measured data.

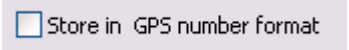
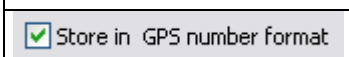
The current position data can be stored in all measured data from other devices.



The software can handle 2 different formats for the GPS position.

When the

field is unchecked the data will be stored in decimal degree. Example for the position 53° 08.4289'E, 8° 14.9238'N

Setting:	Stored format:	
	53.140481 ; 8.24873	calculated to decimal degrees
	53.084289 ; 8.149238	degrees, minutes, seconds transferred to a decimal number

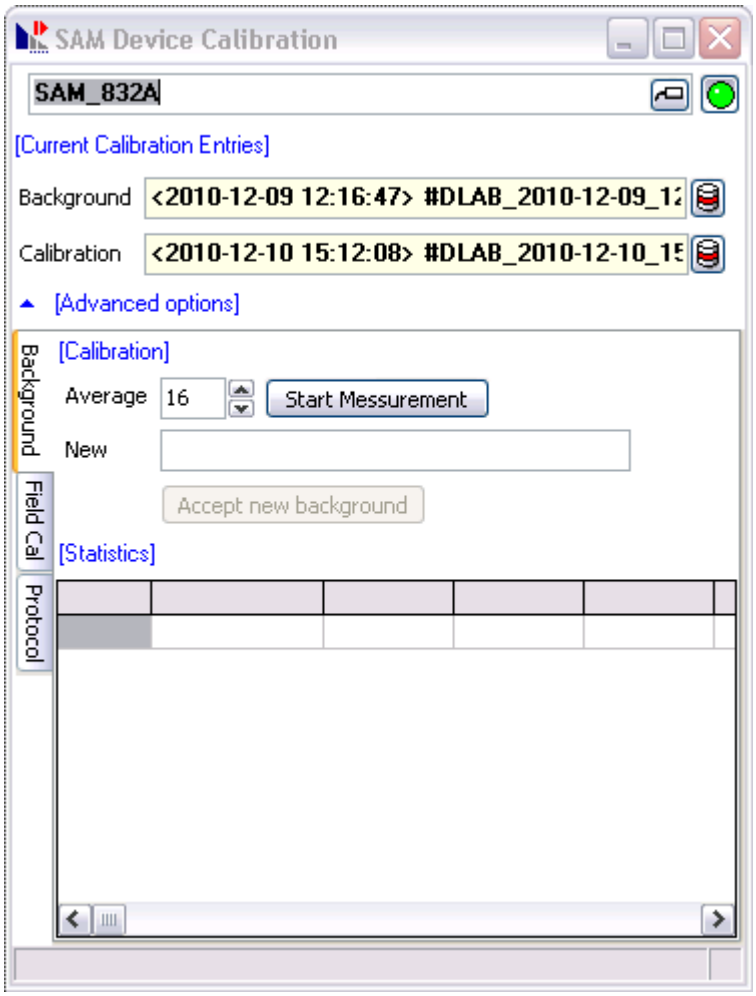
Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

8 Device Calibration

8.1 Ramses Calibration (FieldCAL)

8.1.1 Introduction

In the top of the window the current entries for background- and intensity calibration are listed.



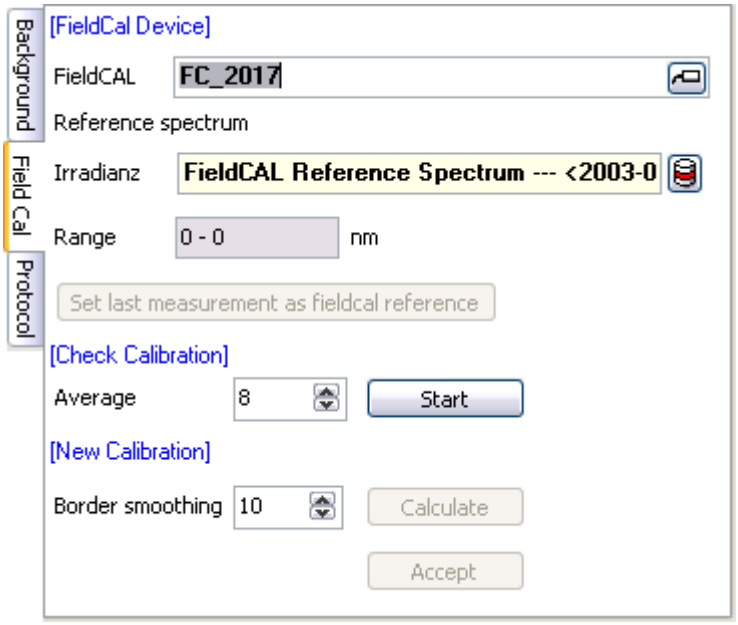
In the two tab pages below, the device can be checked with the FieldCAL and new background spectra can be measured.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

8.1.2 Background

Within the background-tab new background files can be measured. It is recommended to use the averaging 16.

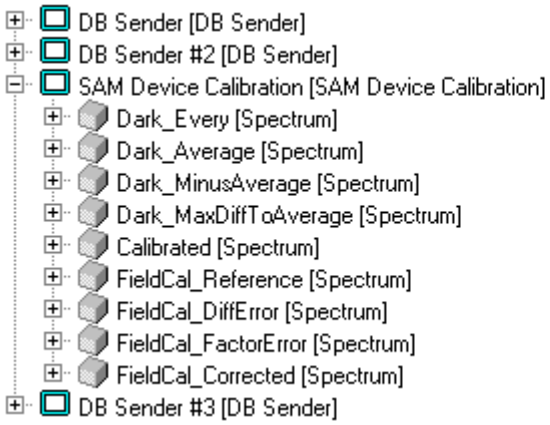
8.1.3 Calibration with FieldCAL



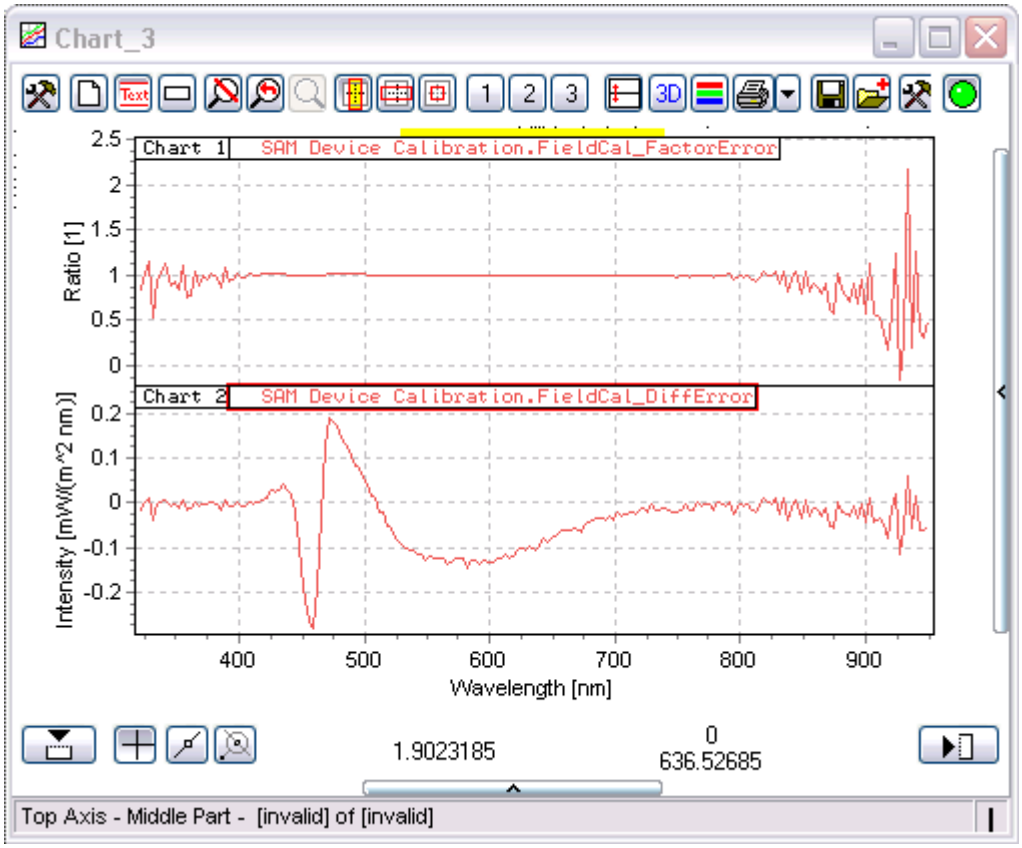
The FieldCAL device is delivered with two spectra which must be imported in the database. One spectrum represents the intensity for radiance sensors the other for irradiance sensors.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

The window has the following outputs:



Create a chart with the input “FieldCal_FactorError” and FieldCAl_DiffError.



Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

[Check Calibration]	
Average	Number of spectra taken for average.
Start	Start a measurement. The FieldCal_FactorError spectrum (Measurement divided by FieldCal reference spectrum) is sent. The deviation of the current calibration can be shown in a chart (1 means no difference). It is also possible to compare the calibrated and the FieldCAL_reference spectra directly.
[New Calibration]	
Border smoothing	As the lamp of the FieldCAL do not have the full wavelength range the RAMSES have, the exact check of the device can only be done for the range of the FieldCAL lamp. Outside of this range, the new calibration is estimated from the border of the legal range. To get a smoothed new calibration with no steps a number of “Border smoothing” values is used to estimate the outside values.
Calculate	Calculates a new calibration spectrum. Compare the spectra FieldCal_Reference and FieldCal_Corrected in chart to see the effect of the new calibration.
Accept	Accept the new calibration and store it in the database.

Read the FieldCAL manual for more information. To stabilize the FieldCAL lamp, turn the instrument on 1 minute before usage.

The line of the subchart FieldCAL_FactorError should show a straight line between 420 and 750nm, like shown in the chart picture. If this is not the case, the tested RAMSES needs to be send in for a high quality recalibration following NIST standards.

The performed field calibration can be saved and used for the connected RAMSES. Press [Calculate] and after the calculation [Accept] to save the file.

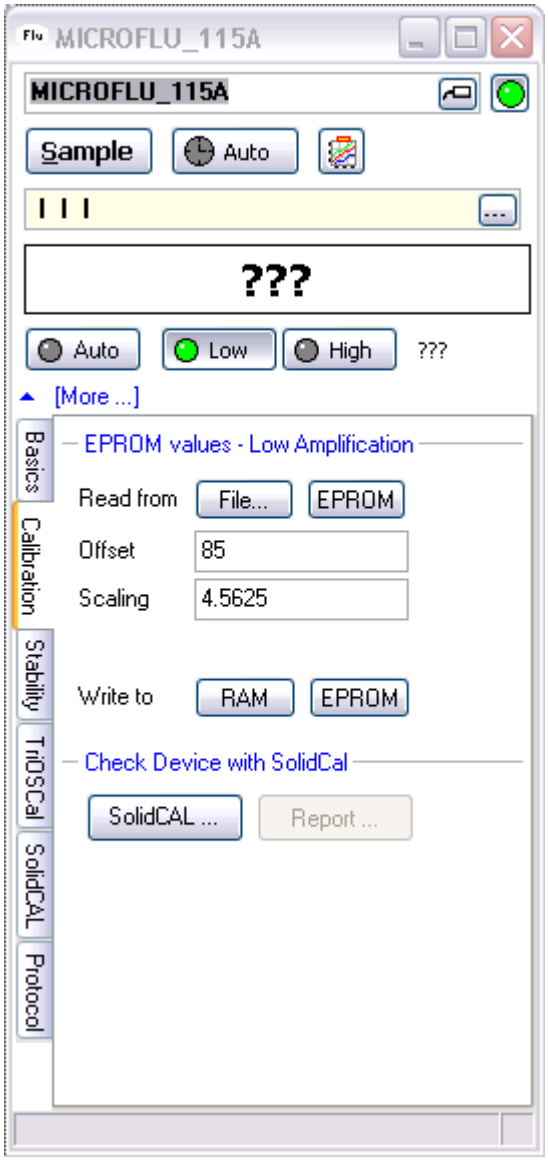
The FieldCAL does not replace a factory calibration. The calibration at TriOS laboratories follows NIST standards.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

8.2 Fluorometer Calibration (SolidCAL)

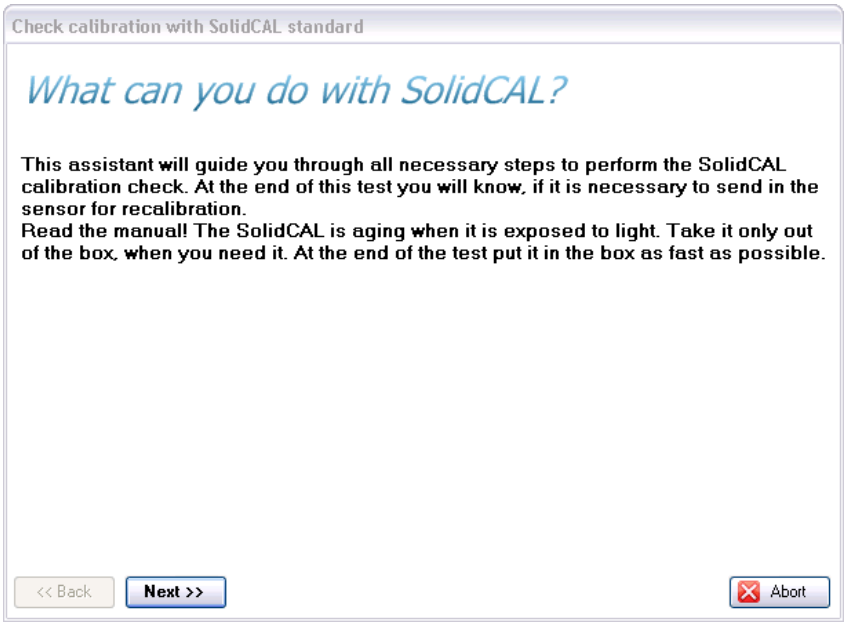
TriOS SolidCAL standards were developed to check the calibration of Flu – sensors. This can be done directly at the installation and no high tech laboratory equipment is needed. If the test with the standards fail, the sensors needs to be send for a check up and factory recalibration. Before the usage of the SolidCAL, it is recommended to read the manual of the hardware manual of SolidCAL.

To start the check with SolidCAL open the control window for you Flu-device (Micro- or EnviroFlu) and choose the calibration tab page.



Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

With SolidCAL ... a wizard will be started, that guides through the checking process.

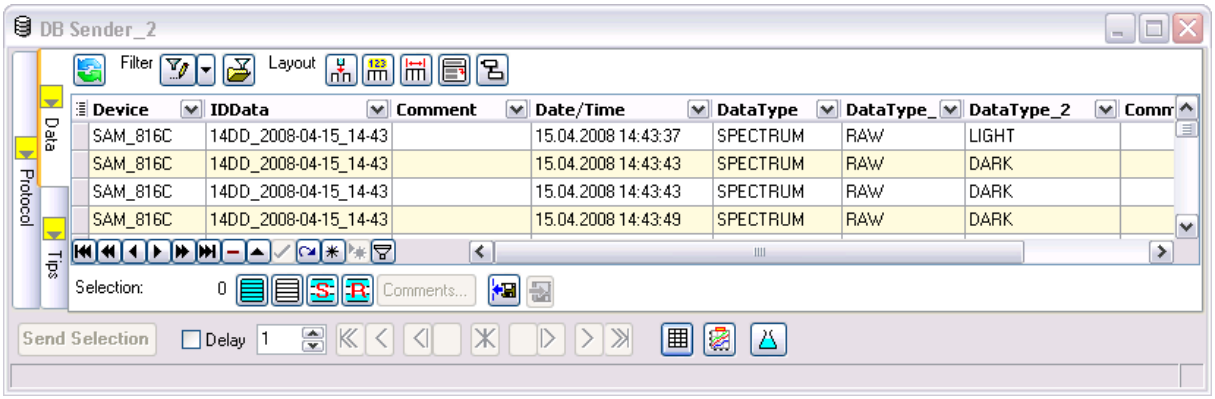


Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

9 Database Data Sender Window

9.1 Introduction

All measurement and calibration data are stored in a Microsoft Access database. The datasets can be displayed in the DBSender window, which can be opened with **Database/Data** in the main menu.



From this window, the data can be send to other windows for processing or visualization or can be exported in several formats:

DataTable	Collect data in a grid structure and copy it into a spread sheet program (Excel).
Spectrum Calibrator	Calibrate a RAW spectrum, transform to a custom wavelength raster
Chart	Make a graph of the data
Linear Substance Analysis	Calculate concentration values from absorption spectra

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

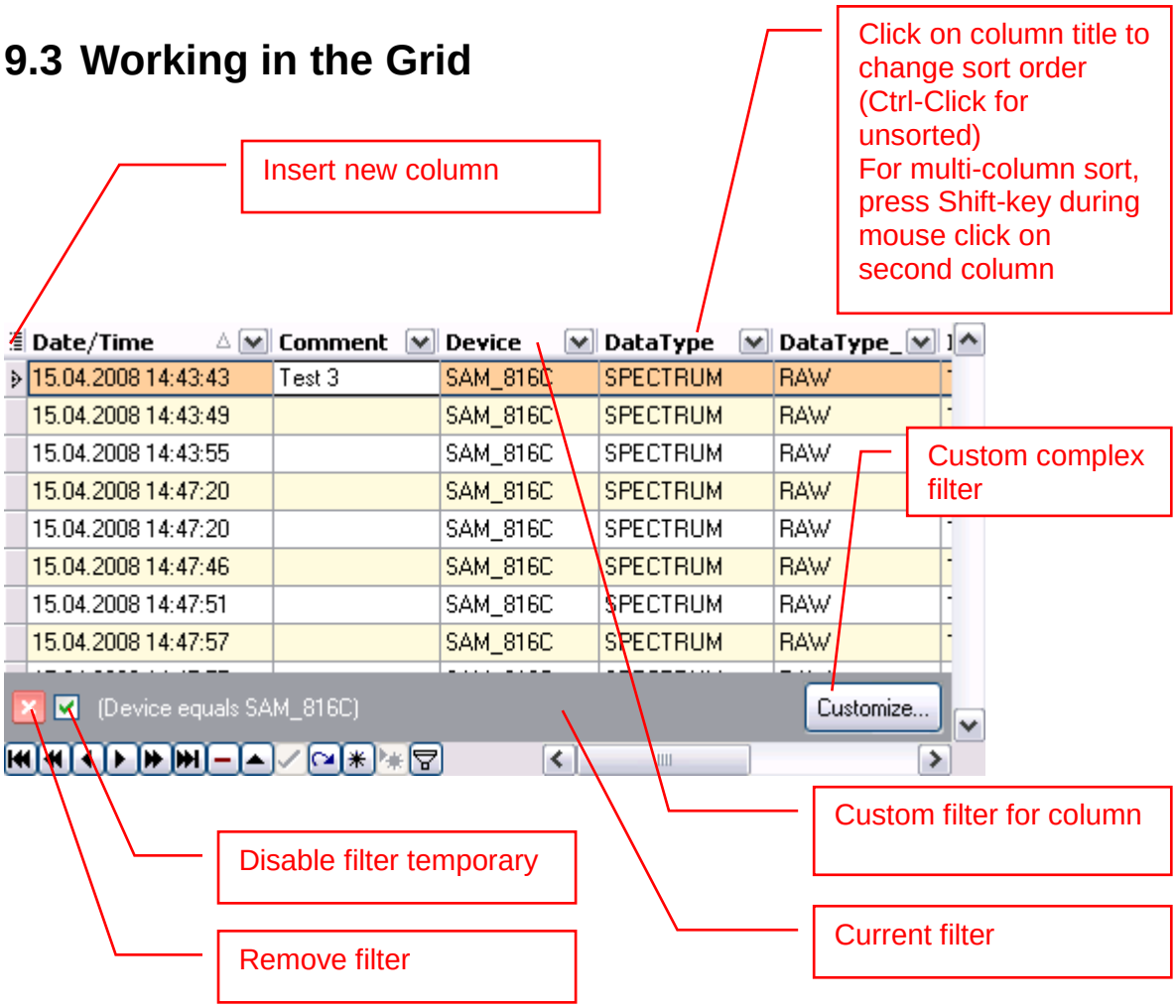
9.2 Data Structure

All data generated by MSDA_XE has the same framework with identical fields.

Field Name	Meaning
IDData	Unique database primary key The key is generated via current date and time. For example: 2003-03-07_16-01-43_529_001 means that the data is generated on March 3rd 2003 at 7:01:43 and 529 milliseconds. Appendix _001 is a consecutive number which generates unique primary keys for data being generated in the same millisecond. In MSDA_XE you can define another key in addition to the primary key. E.g.: Test_2003-03-07_16-01-43_529_001 The supplement (Test) enables an exchange between different databases or MSDA_XE versions, whereby the uniqueness of the primary key and its assignment to MSDA_XE versions will be kept.
DateTime	Time of measurement For computed data, the timestamp will be taken from the source data (in general, time of measurement).
Device	serial number of the device that generates measurement data.
Longitude	GPS position at time of measurement.
Latitude	GPS position at time of measurement.
DataType	Its entry describes the type of data, e. g: Spectrum: spectrum data GPS: positioning data MicroFlu: MicroFlu **or** EnviroFlu data
DataType_1	Further specification of data type. E.g.: RAW: Raw spectrum CALIBRATED: calibrated spectrum ABSORPTION: absorption spectrum For further explanations on each type, see the corresponding chapters.
DataType_2	For further specifications see above.
DataType_3	For further specifications see above.
MethodType	Type of window which generated these data. E.g.: SAMCtrl for Spectrometer Control ABSORPTION for method of computing absorptions
MethodName	Window name of the method.
Comment	You can insert any comment. E.g.: NORTH SEA
Comment_1	E.g.: Sunshine/Rain
Comment_2	E.g.: Low Tide/Tide
Comment_3	E.g.: Full Moon/New Moon

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

9.3 Working in the Grid



Action	Meaning
Click on column title	This will alter the sorting (Unsorted -> ascending <-> descending) Deletes sorting of all columns before.
Ctrl-click on column title	To unsorted
Shift-click on column title	Short column with preserving of the sorting of other columns
Drag and drop column title onto other column	Move column
Drag and drop column title into grid	Remove column Insert column with the top-left button in the grid
Click on the title dropdown button	This will open a list with all entries of this column. Choose an entry and filter by this entry. If you choose the (Custom…) entry you get a dialog to configure complex filter conditions (AND OR NOT etc.)

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

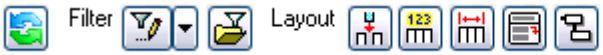
Action	Meaning
Click on row	Select the row – removes previous selections
Ctrl-click on row	Select the row – preserves previous selections
Shift-click on row	Selects the range from previous clicked row to current row – removes previous selections
Ctrl-shift-click	Selects the range from previous clicked row to current row – Preserves previous selections
Key Shift cursor	Select range
Key Page up/down	Scroll a page step

The only fields, which are editable are the comment fields. They can be changed by clicking on them and type text or numbers in it.

The other fields are read only. Mark one of it and find the first matching entry by typing letters.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

9.4 Button Functions



Top buttons

Bottom buttons

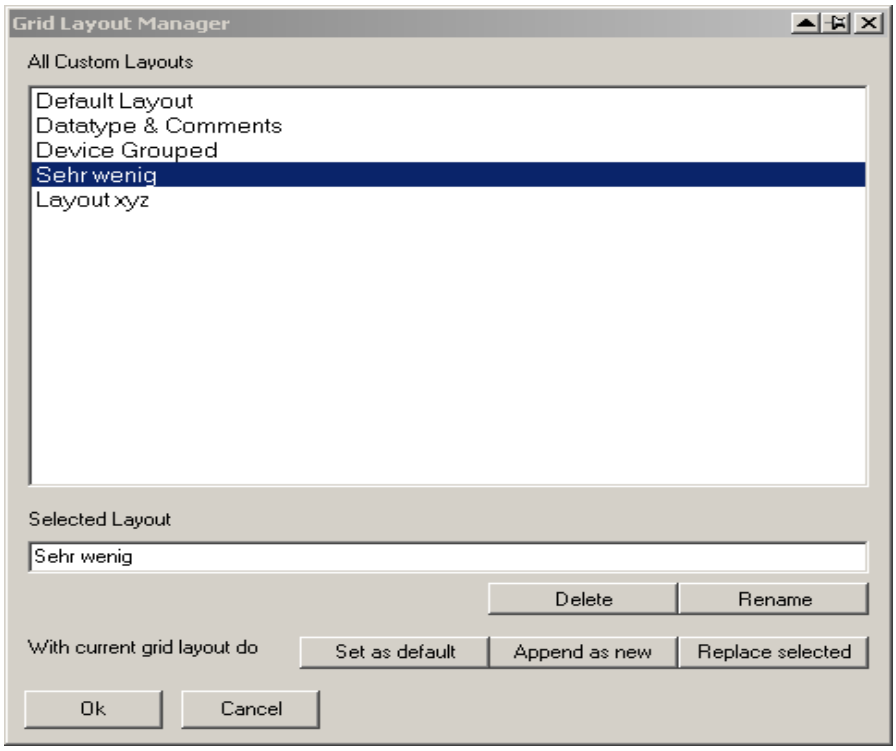
	Refresh grid. This is required, when new data was imported. They will be shown after the refreshing.
[Filter]	
	Dialog for filter configuration (SQL-knowledge required)
	Show the just imported data
[Layout]	
	Show window with list of columns removed before. To insert the columns again, drag and drop the line to its final position.
	Open Layout Manager See chapter below: Layout Manager
	Columns will be resized in order to display all columns in window
	Rows will be resized in order to display all data in fields in multiple text lines
	Show grouping panel
[Selection]	
Selection: 3	Counter of selected data
	Select all rows. Hotkey Ctrl-A
	Deselect all rows
	Store selection of rows
	Reset stored selection of rows
Comments...	Change comment of selected rows See next chapter.
[Files]	
	Import data from file Afterwards is activated automatically.
	Export selected data rows. See chapter below.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

9.5 Layout Manager

The layout manager can be opened with the button.

The layout specifies the visible columns, its width, order, sorting and grouping. With the layout manager personal layouts can be stored or opened. The first entry in the list, the default layout, defines the grid look in newly opened windows.



All custom layouts	List of generated layouts
Selected Layout	Selected layout in the list
Delete	Deletes selected layout (Default Layout cannot be deleted)
Rename	Renames selected layout (Default Layout cannot be renamed)
Set as default	Replaces the default layout with the current layout in grid
Append as new	Append new layout of the current layout in grid. Afterwards a renaming is required.
Replace selected	Replaces the selected layout with the current layout in grid
Ok	Changes the grid layout to the selected layout.
Cancel	Close dialog

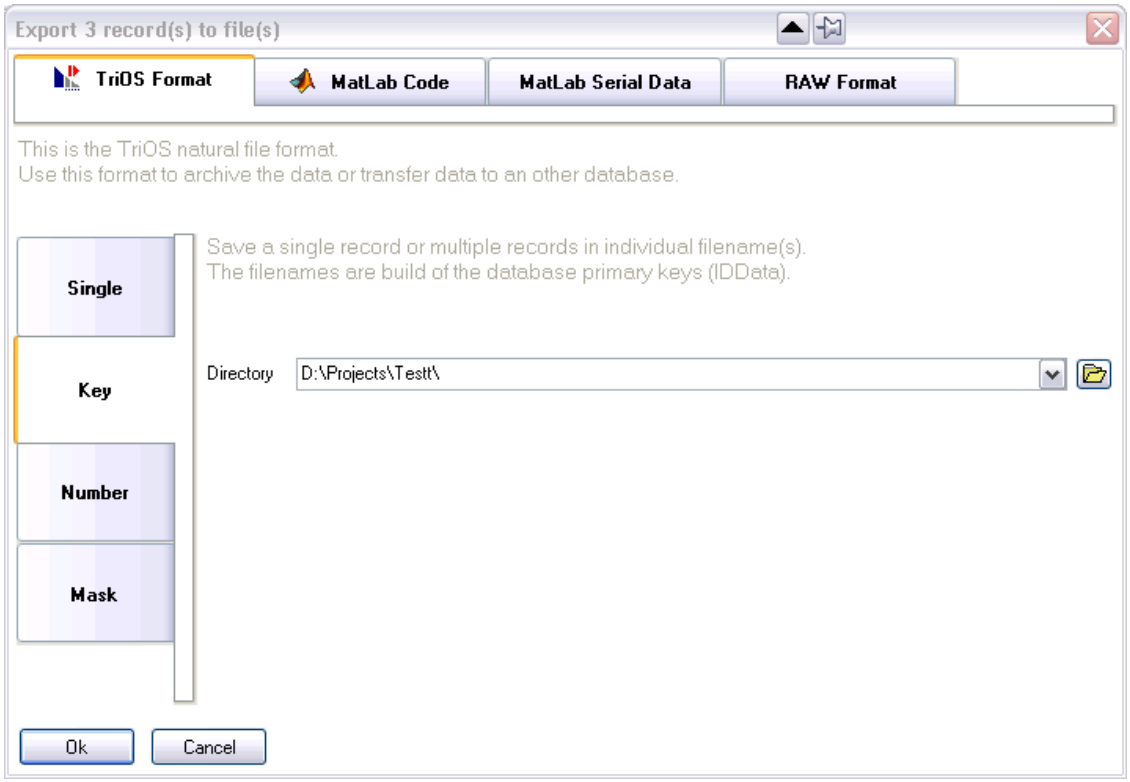
Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

9.6 Data Export

MSDA_XE includes a powerful data export function. Different export formats allow archiving as well as export for further data processing with other programs or with custom built algorithms.

Only the TriOS *.dat format is suitable for MSDA_XE. It is necessary to use this format, when the same data shall be reimported in a MSDA_XE data base.

The exporting function works with the currently selected data. The selection can be done with the mouse for single datasets or the complete dataset can be marked. Start the export with the button. Following dialog will appear:



Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

The main export formats are:

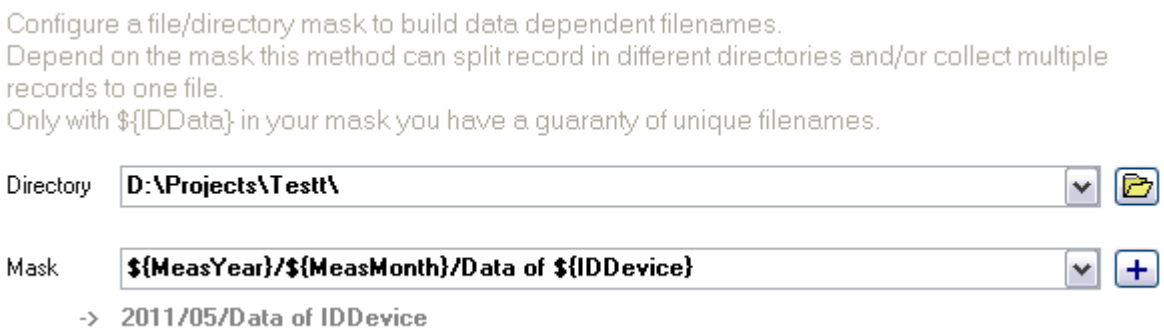
TriOS Format	*.dat files
MatLab Code	Generating MatLab code files.
MatLab Serial Data	Data files. To read the data, it is necessary to program MatLab code.
RAW	A simple compact text format.

The file naming and number of files must be configured:

Single	All data will be collected in one file. The file name needs to be configured
Key	Every data record in a separate file. File name is build of the unique database primary key. The export directory needs to be configured.
Number	Every data record in a separate file. Filename is build of a base filename and a number (Name_00001). This enables the transfer of the grid sorting to the alphabetical order of the files. The base file name needs to be configured
Mask	Directory / file name generated from properties of the exported data. See below for more information.

In the mask tab page the storing and the files names can be configured. The button will open a list of the possible properties.

A click inserts a property in the mask field at its current cursor position. The field below the mask settings will visualize the current setting.



E.g. the mask *${MeasYear}/${MeasMonth}/Data of ${IDDevice}* creates a new directory for every year and for every month. The data will be collected by the device name.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

9.7 Send Data

With the bottom panel of the window selected data can be sent to other windows for processing or visualization.

	Opens a data table with direct connection to the DBSender.
	Expand a menu to open new chart with direct connection to the DBSender. Selection: spectrum, micro/enviroFlu data or time series. The data will only be shown, if the corresponding data type is selected and sent to the chart.
	Opens a dialog to define a substance concentration for a spectrum. This works only for the spectra type “absorption” and with the license “Linear Substance Analysis”.
	The button will start the sending of the selected data. The marker jumps from the first to the last selected row and will send the data to all connected windows.
	The player panel is used to process data step by step. Look at the tool tips to see the functions.
	The data handling and sending can be slowed down by the delay function.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

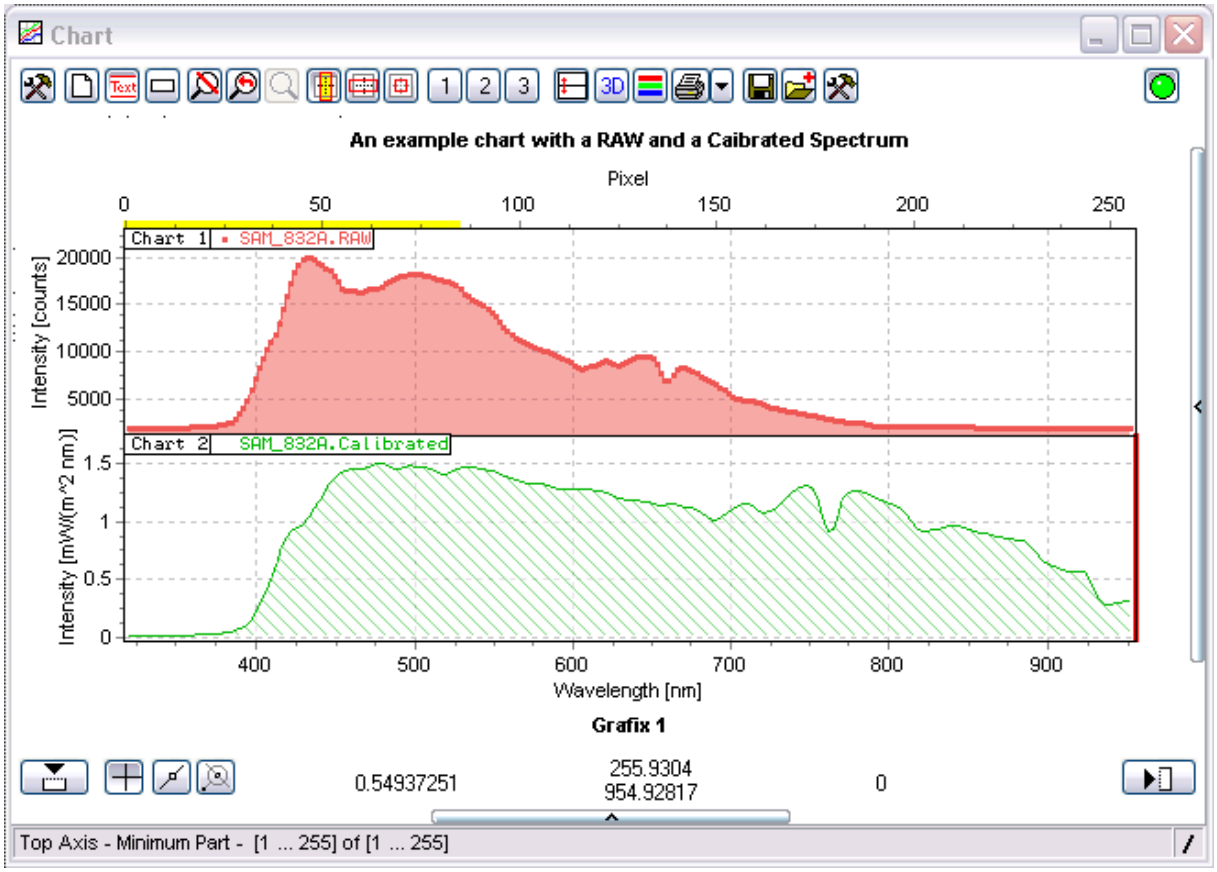
10 Viewing Windows

10.1 Chart

10.1.1 Introduction

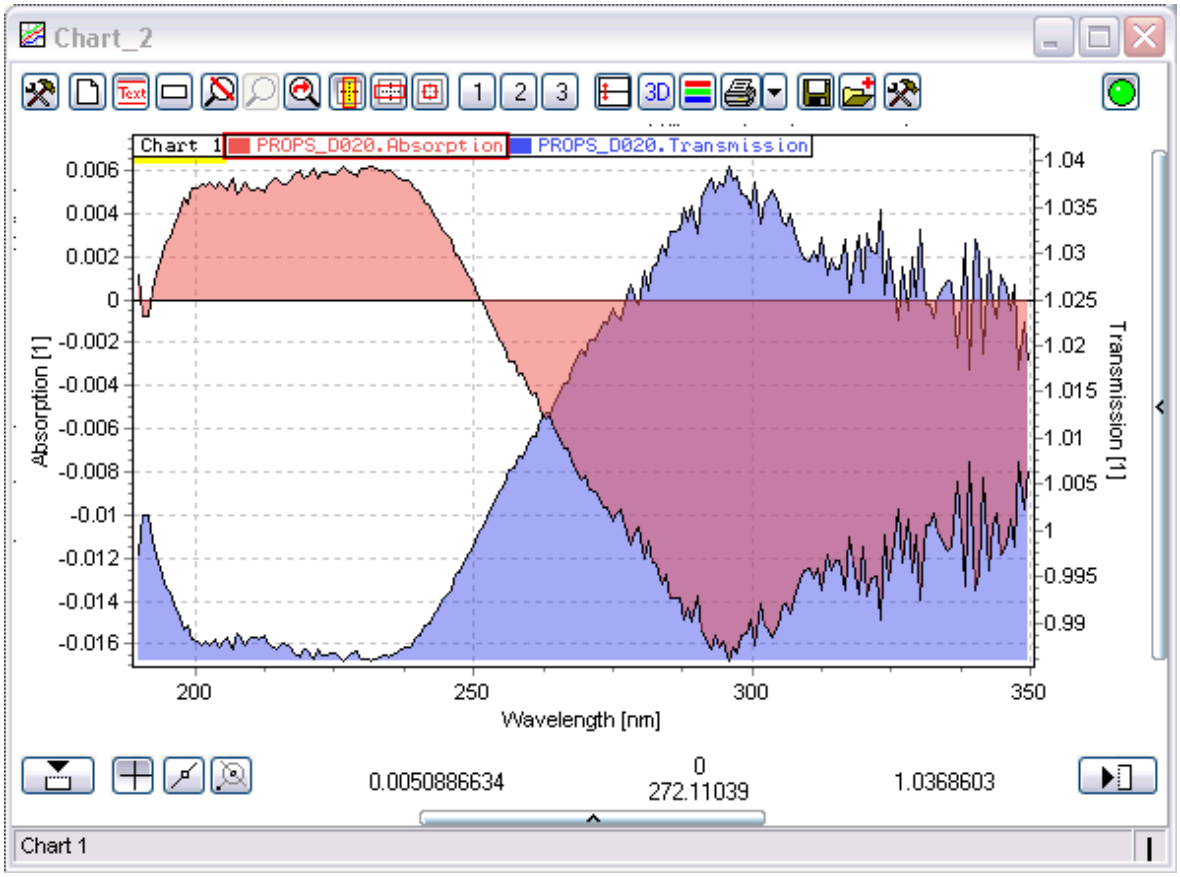
The chart window can visualize different data types. Similar to other windows, it needs to be connected with data-sending methods or windows. The chart itself receives the data. The chart window can be opened with **View/Chart** from the main menu.

An exemplary chart window with two data inputs, different y-axes and split into two horizontal sub-charts is shown below.



Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Next picture shows a chart window with two inputs in one sub-chart with same x-axis (bottom) but different y-axes (left/right) and a origin line for the left y-axis.

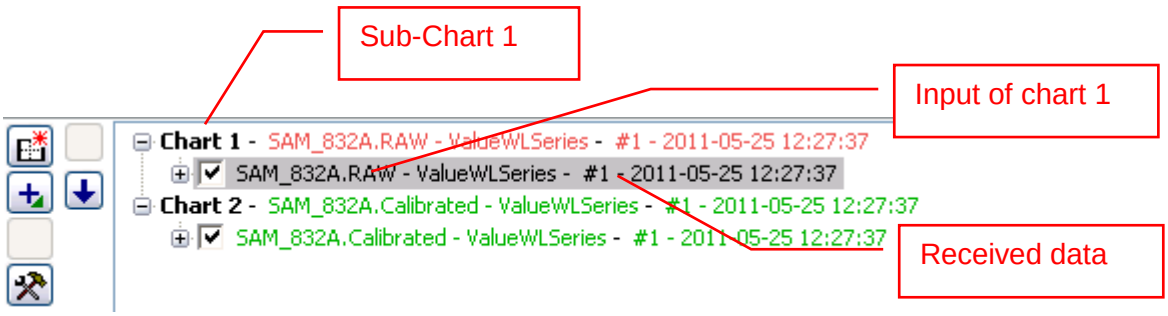


Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

10.1.2 Integrate Inputs

Unlike other windows, the chart window is able to compute input data of several inputs at the same time. Press the button to show or hide the input configuration panel. In this panel the inputs can be switched invisible, arrange or sort them.

The functions described below can be done with mouse actions, context menus and hot-keys in the chart panel as well.



	Add a new sub-chart
	Add a new input to chart. Input is added to current selected sub-chart
	Delete selection. Function works with all types of selection e.g. sub-chart, input or overlay series (see later)
	Open configuration window. Here you can customize layout, overlay etc. – see below
	Move selection up/down. Changing the order of the sub-charts or move an input to another sub-chart

Each received spectrum will be drawn in the chart. If a new dataset is sent the old one will be substituted by the new one, except the overlay number is larger than 1.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

10.1.3Working with the Mouse

The kind of mouse actions depends on the selected element in the graph. When the mouse is moved over the different parts of the charts the elements name is shown in the foot line of the window. In most cases the marked element is highlighted yellow. Selected elements are highlighted with a red rectangle.

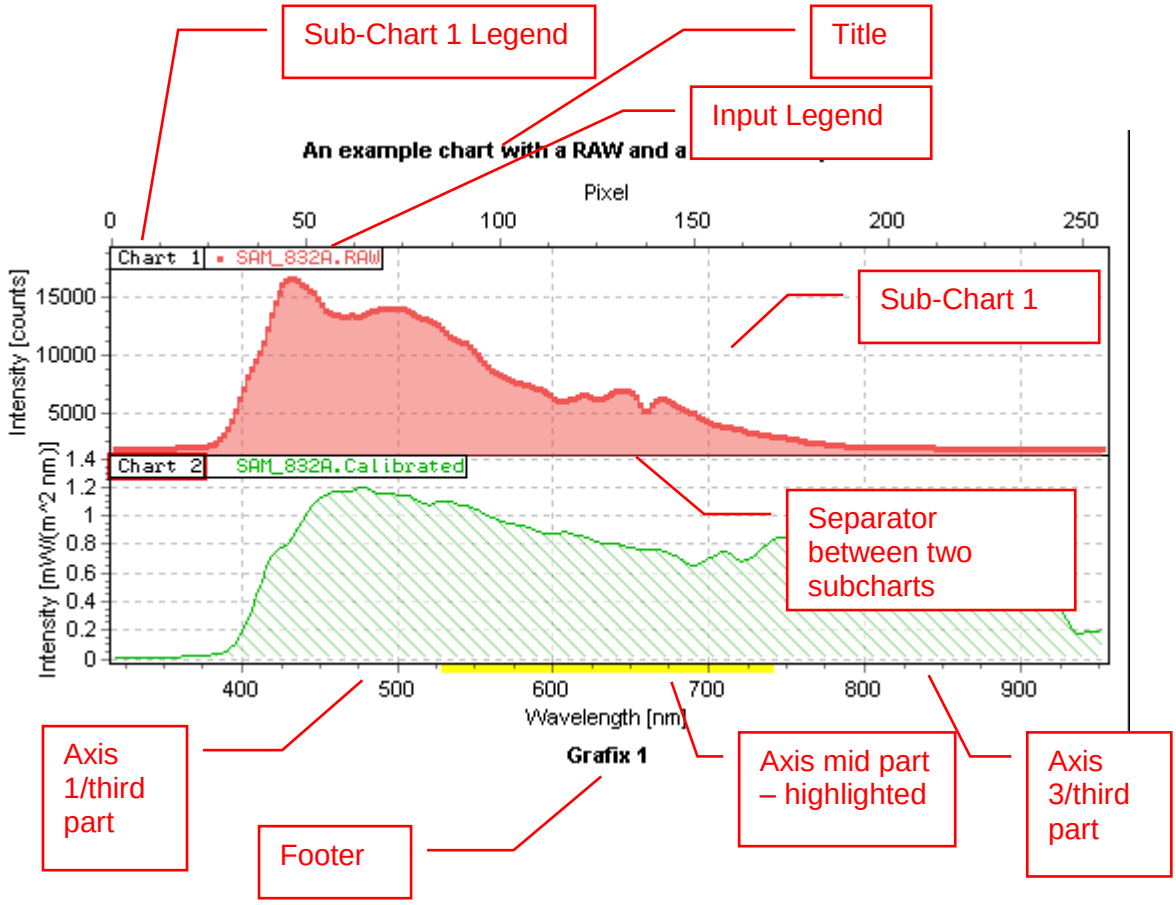


Chart 1	Select a sub-chart by click on its legend entry or click anywhere in the sub-chart.
SAM_832A.RAW	Clicking on the input legend for selecting the input.
Axis	Select an axis by clicking outside the inner chart frame. Every axis is logically separated in 3 parts: The first third, the mid third and the last third. The axis range and zoom can be changed by drag and drop the different parts of the axis.
Footer/Title	Customizable with double click

All chart elements have general hot-keys:

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

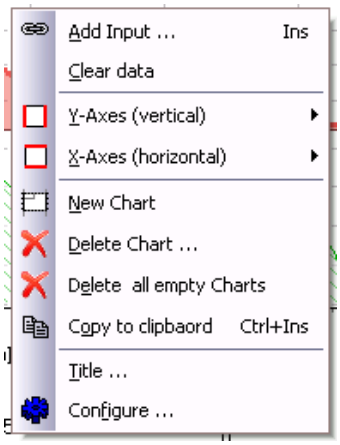
F-11 or F-12 key	Open the configuration dialog.
Delete key	Deletes the element

Particular chart elements have specific hot-keys, context menus and drag-and-drop functionality, which is described in the next chapters.

10.1.4Working on a Subchart

10.1.4.1 Context menu

A subchart can be marked by clicking on it. The right mouse will open the context menu.



Add Input (Insert-key)	Opens a dialog to choose an input. New input data will be shown in the selected subchart at the left and the bottom axes.
Clear data	Clears the data (graph) of all inputs in the subchart. Inputs stay configured. The chart will show data again, after dataset were sent to this window.
Y-Axes	Sub menu to change Y-Axes of all subchart inputs.
X-Axes	Sub menu to change X-Axes of all subchart inputs.
New Chart	Inserts a new subchart above the currently marked.
Delete Chart (Del-key)	Delete the current chart.
Delete all empty charts	Delete all subcharts without any input
Copy to clipboard	Copy bitmap to clipboard. See Exporting / Printing of the Chart
Configure (F-12 key)	Opens a configuration dialog

10.1.4.2 Resizing

You can change the height the subchart consumes relative to the full chart.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Move separator (mouse wheel)	Select the separator between two subcharts and move it vertically to resize all charts above and below.
Ctrl + move separator	Resize the chart above and below only (2 subcharts). Works only when more than 2 subcharts are available.

Changing the axis properties can be done by drag and drop of the three different parts from the marked axis.

Middle	Moves both - top and bottom separator
Botton	Moves only the top separator
Top	Moves only the bottom separator

10.1.4.3 Drag and Drop

The single sub charts can be moved by drag and drop their legend entry.

Drop it on the top axis	Subchart move to the top position
Drop it on the bottom axis	Subchart moves to the bottom position
Drop it on a separator	Subchart moves between two subcharts.

10.1.4.4 Zoom

The zoom of the single sub charts can be changed with mouse zoom. Press and move the mouse to define a new zoom window. The new zoomed axes are shown by a yellow rectangle. The type of zoom (horizontal / vertical / both) depends on the current state of the zoom mode buttons . By releasing the mouse the zoom is applied. The zoom can be cancelled with the ESC-key before releasing the mouse button. With the buttons the different zoom steps can be switched or deleted.

	Deletes all zooms and shows all data
Backspace key	Applies previous zoom
Ctrl-Backspace key	Applies next zoom (only available if you have pressed previous zoom before)

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Pressing the following hot-keys and the mouse movement will fore the type of zoom independent of the zoom configuration buttons:

CTRL – horizontal

ALT – vertical

CTRL-ALT – both

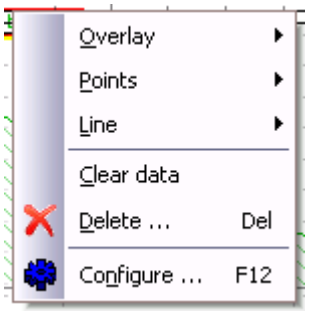
The current zoom settings can be stored in three buffers by right click on one of the three buttons (

). Used buffers are marked with a red number and can be applied by a left click.

10.1.5Working on an Input

10.1.5.1 Context menu

Already send data can be selected by clicking on its sub chart legend. Right mouse click opens a context menu:



Overlay	Submenu to configure overlays
Points	Quick points customizing, See Configuration Dialog
Line	Quick line customizing, See Configuration Dialog
Clear data	Clears the data (graph). Input stay configured. Next received data will be shown in the chart.
Delete (Delete-key)	Deletes input from the subchart.
Configure	Opens a configuration dialog.

An input supports a lot of hotkeys which are described in the Configuration Dialog chapter.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

10.1.5.2 Drag and Drop

Inputs can be dragged to other positions or sub charts with drag and drop.

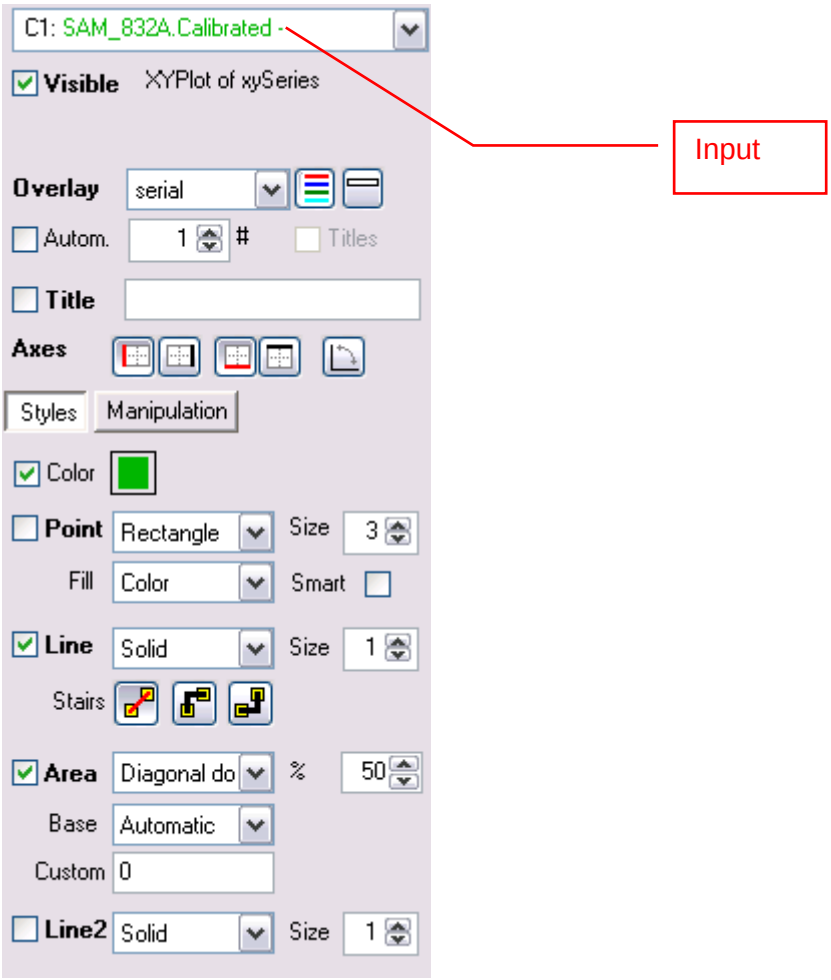
Drop it on the top/bottom axis	Input get other horizontal axis
Drop it on chart	Input moves to this chart as last input
Drop it on an input	Input move at the position just before the input. Input can be dropped in its own subchart or in an other subchart.
Drop it on an vertical axis	Input get other vertical axis. Input can drop in its own subchart or in an other subchart.
Drop it on an separator	New subchart with this input will be inserted.

The order of the inputs within a sub chart may be important for a good look of the graph. The last inputs will be drawn over the first one and may cover other graphs.

10.1.5.3 Configuration Dialog

The configuration dialog for a chart can be opened with F12 after selecting an input. This function enables to change the graphic style, overlays, etc. of the input.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010



The following table describes the functions of the window. The shown hotkeys will work in the chart if an input is selected.

C2: SAM_832A.RAW -	Name of input
Visible XYPlot of xySeries	Visibility and current plot type of the input.
Overlay	
5 **(1 .. 9 Key)**	Number of allowed datasets to be displayed in one chart coming from one input. When the maximal number is reached the first dataset will be deleted.
	Changing overlay colour (one colour or changing)
	Activating overlay legend. Overlay legend and the button at the bottom of the chart enables the highlighting of the selected plot.
Title	Renaming the legends title
Axes	Selection of the used axes for this input.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

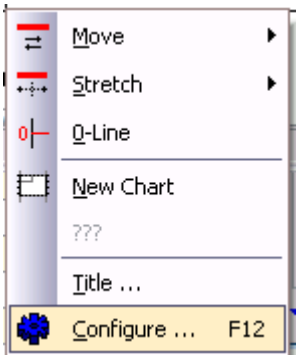
Styles	
☑ Color ■	Show plot in custom colour
Point	
☐ **Point** **(key-p)**	Show points
Rectangle ▾	Point style
Size 3 ▲▼ (+/- key)	Point size.
Smart ☐	Smart point size. Automatic decreasing of point size, if the point density is to high, or the points overlap each other.
Fill Color ▾	Changing the filling colour of the points.
Line	
☑ **Line** **(l-key)**	Show a line between successive points
Solid ▾ (shift- "/" or "*" numpad-key)	Line style
Size 1 ▲▼ (shift- +/- numpad key)	Line thickness
Stairs	Line direction between points
Area	
☐ **Area** **(a-key)**	Show a colour filled area
Diagonal do ▾	Area style
% 50 ▲▼ **(ctrl- +/-)**	Colour density:. 0% - background, 100% - full color.
Base Automatic ▾ (ctrl -/ * - numpad-key)	Origin of the area. Automatic: • If the data has only positive values the minimum of the values will been taken. • If the data has only negative values the maximum of the values will been taken. • If the data has positive and negative values 0 will been taken.
Line2	Line from the x-Axis to every data point (Volume series)
☐ **Line2**	Show line
Solid ▾	Line style
Size 1 ▲▼	Line thickness

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

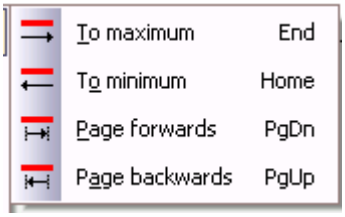
10.1.6 Working on an Axis

10.1.6.1 Context menu

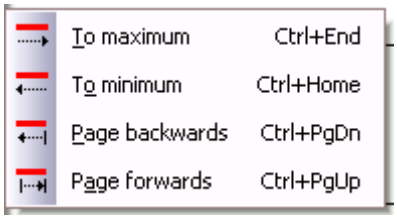
Right click on the axis opens a context menu:



Move:



Stretch:



Move	Sub menu for the moving of the axis. (Changes minimum and maximum by the same value)
Stretch	Sub menu for stretching. (Changes only minimum or maximum)
0-line	Marks axis origin with a line.
Configure	Opens a configuration dialog.

Look at the hotkeys shown in the menu entries.

An axis marker can be added to the chart by pressing the m-key at the wanted axis position. Pressing the button again, will delete the marker line again.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

10.1.6.2 Drag and Drop

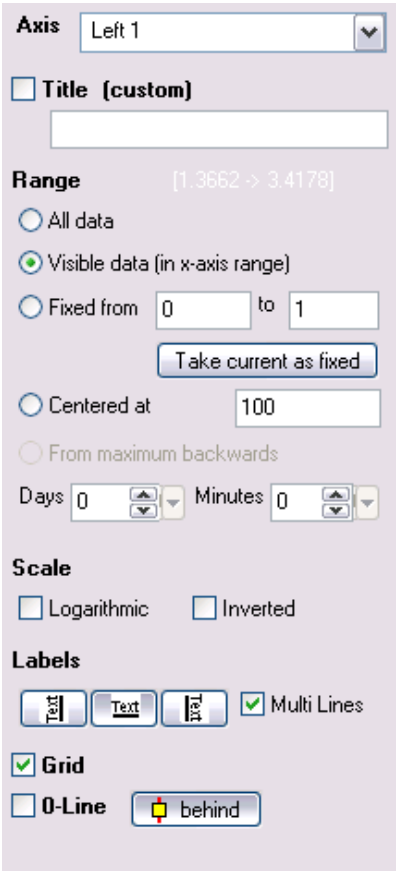
The chart axes can be moved or zoomed with drag and drop on the needed axis or marking the axis and turning the mouse wheel. The zoom result depends on the current relative mouse position in the axis, which is divided in three fields. The **third fields** represent the minimum, middle and the maximum of the axis. Yellow colour will mark the selected area.

Mouse down and move	Moves/resizes axis
Mouse wheel	Moves/resizes axis
CTRL-key mouse wheel	Increases/ decreases size of axis symmetric (independent of third part selection)
ALT-key mouse wheel or (CTRL-ALT)	Increases/ decreases size of axis asymmetric, so that axis point at current mouse position is fixed. Check it out. (Independent of third part selection)
Additional the SHIFT-Key	Speeds up all actions above
Double-Click	Open configuration dialog for the axis.

10.1.6.3 Configuration Dialog

The configuration dialog is opened by F12 with marked axis or double click on it.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010



Axis Left 1	Currently selected axis
Title (custom)	Renaming of the axis
Range	Configuration of the axis range shown in unzoomed mode
All data	Axis gets the range of all data shown on this axis
Visible data (in x-axis range)	Default configuration.
Fixed from 0 to 1	Fixed axis range.
Take current as fixed	Apply current axis range (maybe zoomed) as fixed range
Centered at 100	Axis range symmetric to the configured value. E.g. 100 is always the mid of the axis. Axis minimum / maximum is calculated of the full data range on this axis, that all data will be shown.
From maximum backwards Days 0 Minutes 0	This feature works only for timestamp axes (time series). E.g. Show only the last 3 hours of data.
Logarithmic	Logarithmic scale (only for positive values)

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Inverted	Inverting the axis
Text Text Text	Text orientation of labels
Multi Lines	Multi line labels. This feature has only effect for axis with a timestamp scale. The date- and the time part will be shown in two lines.
0-Line	Shows a line at the axis origin.
behind	Shows 0-Line behind all drawn series.

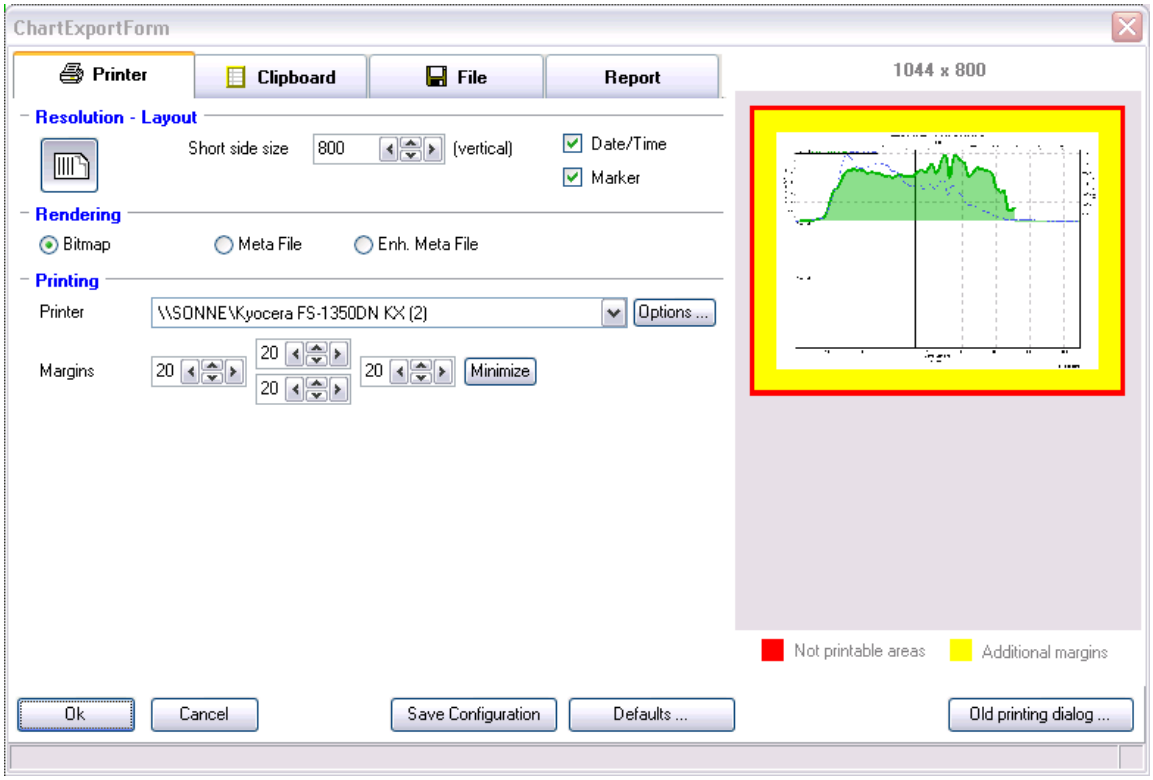
Press the Enter-key in the text fields to apply its changes!

10.1.7 Exporting / Printing of the Chart

The shown graphs of the chart can be exported in different file formats, to the clipboard or can be printed. The button will open the smaller print dialog.

[Chart Configuration / Export …] will open the print and export dialog.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010



The layout and the size of the print can be changed in this window and its tabs.

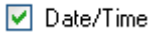
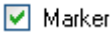
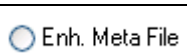
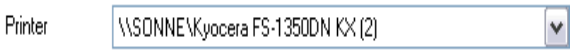
At the right side of the dialog a preview of the export is shown.

The tabs at the top define the main export format.

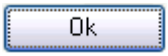
Printer	Print to paper
Clipboard	Copy to the clipboard.
File	Save to file

Most main export formats have the same additional configurations which are described in the next table.

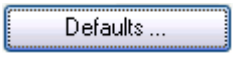
Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Resolution/Layout	
	Orientation: Landscape / Portrait
	Target size in pixel of the short side. It is the width for portrait or the height for landscape format.
	Turn on/off timestamp shown at the botton right of the chart
	Turn on/off axis marker if configured
Aspect Ratio	Invisible for printing – aspect ratio will be calculated from the paper size
	Size in pixel of the second side.
	Size of second side defined by a factor. E.g. factor 1 gives a square chart.
	List of common used formats (DIN-A, letter etc.)
Rendering	
	Export as bitmap with lower resolution than most printers have.
	Picture will be rendered in high resolution. Transparent areas will be filled.
	Similar to “Meta file” but other algorithm.
File Storing	Configuration of the file name and format
	File type. For the Jpeg file type you can configure the quality (compression).
	Export file name
Printing	Only visible for printing
	Selected printer.
	Printer options.
	Margins in mm. The margins are highlighted yellow in the preview. The margins shall be bigger than the non-printable areas (red frame)
	Sets all margins to the minimal allowed value.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

The export will start with the 

button, which stores the settings and will close the window as well. When the Ok-button is clicked with pressed Ctrl-Key, the dialog don't closes.

will save the configuration, which is needed for instance, when the window is cancelled. 

will store the settings as default values, so every new opened chart window will have these settings.

10.1.8 Buttons in the Chart Window

10.1.8.1 Buttons in the Top Panel

	Drop down menu for configuration
	Clears the chart – all received data will be removed, but the input configuration is saved.
	Turn on/off reconfigured text fields. Off will show the original text
Space-key	Quick customization of visibility. Hot-key: Space Marked sub chart can be switched visible or invisible
SHIFT-BACKSPACE	Zoom off - automatic scaling of axes shows all data points
Backspace	Previous zoom
	Next zoom – only enable if "Previous zoom" button was pressed
	Mouse zoom mode: Horizontal – manipulate x-axes
	Mouse zoom mode vertical – manipulate y-axes
	Mouse zoom mode horizontal and vertical – manipulate x- and y-axes
	Three zoom buffers. Right click stores actual zoom setting. Left click will restore the setting. Used buffers are marked red.
	Resize all sub charts to the same height
	Pseudo 3D view
	Colour / gray scale

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

	Print chart. Preview is shown. Here you can modify margins and resolution. Drop down menu offers “copy to clipboard” or “save to file”. See Exporting / Printing of the Chart
	Save chart layout as template
	Enables data receiving. If red, chart will be fixed and no data will be received.

10.1.8.2 Buttons in the Bottom Panel

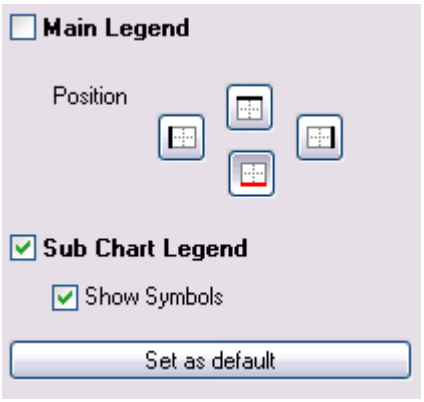
	Show input configuration panel
	Activate cursor tool. X / Y Coordinates are shown at the bottom.
	Selected input will be highlighted.
	Tool to find the nearest point to the mouse cursor. Coordinates will be shown at the bottom Works only with the currently selected series.

10.1.9 Configuration Dialog

The configuration dialog will open by marking the graph element to be configured and pressing F12 or double clicking on the element. The open configuration dialog will change accordingly to the marked chart element. The button opens the configuration menu as well.

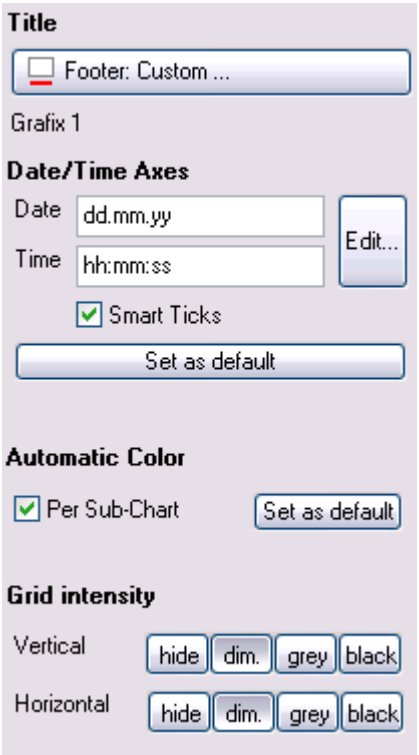
Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

10.1.9.1 Legend



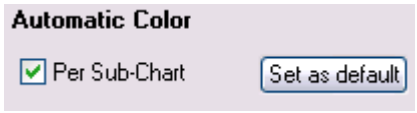
The main legend shows all input names in one legend. If the sub chart legend is enabled (recommended) each sub chart will be listed in the legend.

10.1.9.2 General



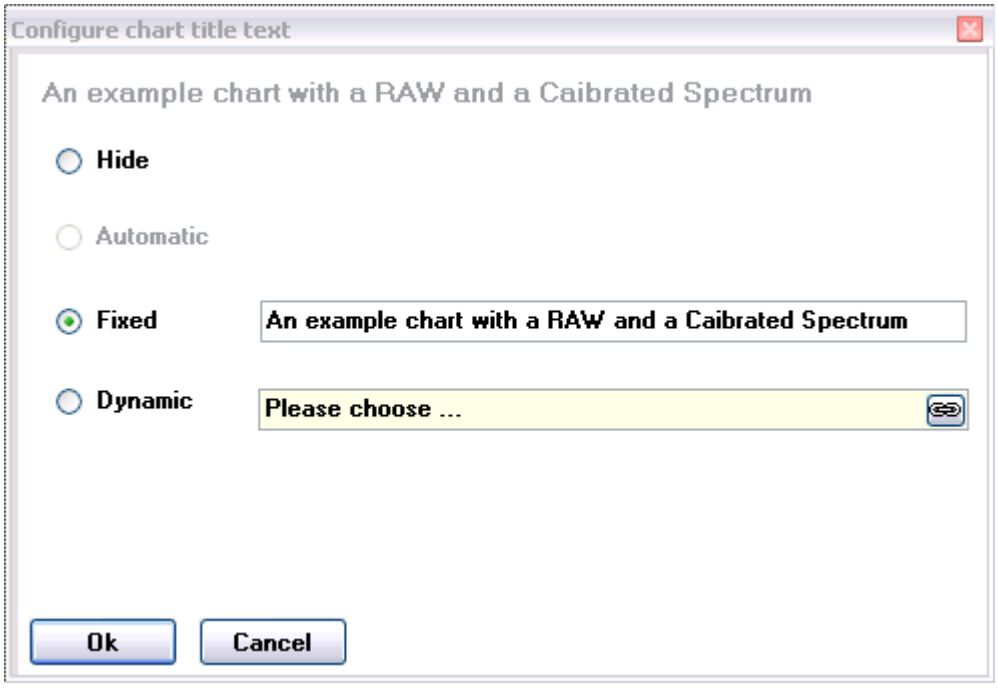
Footer: Custom ...	Custom footer dialog

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

	Format of date/time labels. More information at [Edit].
	Activates smart labelling. Will add monthly raster instead of 30 days.
	Colour iteration style.
	Visibility of grid line

10.1.10 Dynamic Text

Some text fields shown in the chart can be configured:

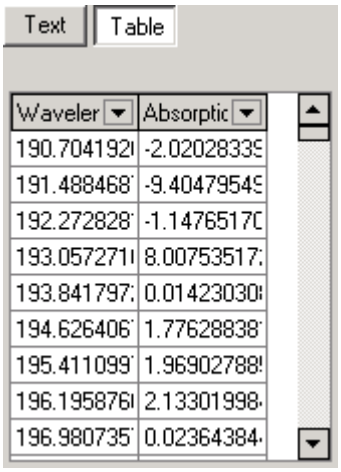


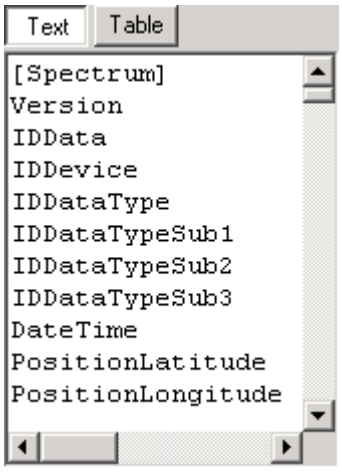
In the “Dynamic” mode the text will be calculated by an textual property of any textual output of another window.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

10.1.11 Text/Table

Table and text information of the selected dataset can be displayed in the right panel of the chart.





If the "Nearest Point Tool" **is activated, the row of the marked point will be selected in the table.**

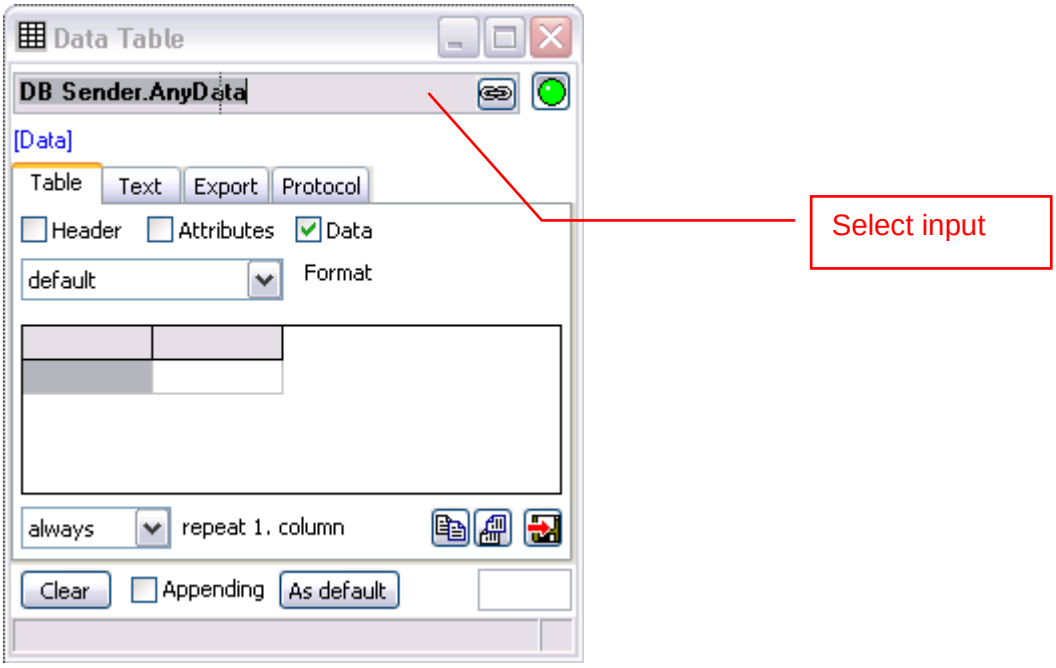
10.2 Data Table

This window show data in a table format to copy table data to the clipboard and past it in a spread sheet program (f.e. Microsoft Excel).

Choose **View/Data Table** in the Main menu to open and configure a table.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

MSDA_XE Manual



Data Table	
[Copy]	Copy data to clipboard
[Copy transposed]	Copy data to clipboard transposed
	Save as tab separated text file
Clear **[Clear]**	Clear table, but keep input configuration
Appending	If activate, will append data to columns, and not write every dataset in the first column
never repeat 1. column	Settings for repetition of first column
Header Attributes Data	Setting which part of the data set is recorded

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

11 Processing Windows

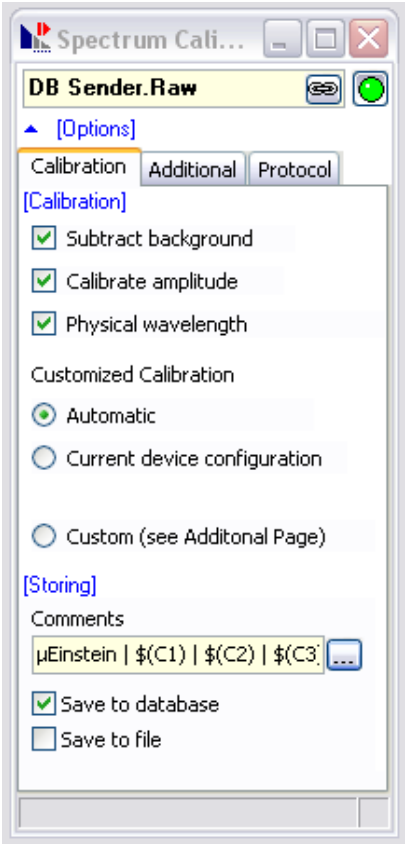
11.1 Spectrum Calibration

11.1.1 Introduction

The Device Control Window (for SAM and SAMIP) automatically computes calibrated spectra that will be stored in the database. If the storing function was not activated or a special calibration is desired it can be performed in the spectrum calibration window. This window also contains functions for wavelength manipulation and for conversion to µE (micro Einstein).

11.1.2 Calibration

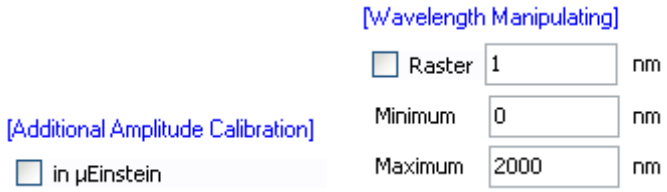
RAW spectra from the DB Sender or directly from the RAMSES window is taken to compute new calibrations. Depending on the data to be processed, the input needs to be [DB Sender.RAW] or [SAM_XXXX.RAW] (XXXX = serial number). If the processed data needs to be saved, activate “Save to database” and give an appropriate comment.



Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

Calibration	Calculating calibrated spectra with physical units from RAW spectra
Subtract background	Subtract BACK spectrum
Calibrate amplitude	Activate amplitude calibration in physical units.
Physical wavelength	Convert pixel to nm
Custom	- If specific BACK- and CAL-Spectra are needed for the calibration, this function has to be applied - needed for converting to µEinstein - needed for calculation of equidistant wavelength steps
Automatic	The calibration will be performed with the instruments default calibration and dark spectra
Current device configuration	The calibration will be performed with the current instruments settings
Calibration Data	CAL Spectrum
Storing	Change the datasets comments for easier data handling
Save to database	Processed spectrum is saved to database with the new comment
Save to file	Processed spectrum is saved to a file with the new comment

11.1.3 Additional



Additional Amplitude calibration	
in µEinstein	Amplitude calibration to µEinstein (only possible if “Calibrate amplitude” is activated or input spectrum is calibrated, yet.)
Wavelength Manipulation	
Raster	Interpolate spectrum into nm raster
Minimum / Maximum	Limit of processing

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

11.2 Absorption

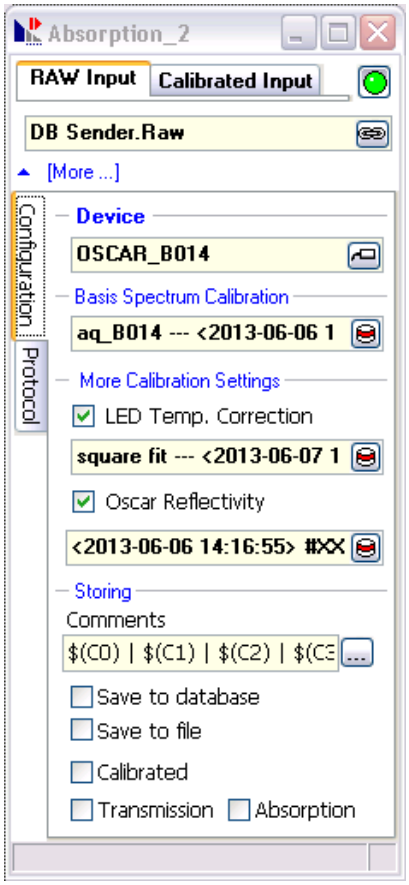
11.2.1 Introduction

This window determines transmissions and absorption spectra with a stored basis spectrum. The basis spectrum (or zero line named) is either delivered by TriOS with the factory calibration or can be measured in the ProPS, VIPER or OSCAR control window by the used.

This calculation works with two possible input types: RAW or calibrated. The raw spectrum mode works only, if a RAW-LIGHT spectrum is sent to the window. As there is always a dark spectrum fitting to the light spectrum, this method searches for the corresponding other spectrum in the database and combines them.

When a calibrated spectrum is sent to the absorption window, the absorption will be calculated directly.

11.2.2 Configuration



Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

At first you have to configure the device of which uncalibrated data should be processed. Press the button. You get a dialog that shows all matching devices from the database. Depend on the device type the windows shows different setting.

Basis Spectrum Calibration	for PROPS, VIPER, OSCAR
LED Temp. Correction	for VIPER, OSCAR (only for RAW input)
OSCAR Reflectivity	for OSCAR

The correct settings for it will be set automatically directly after you have configured the device. To apply custom calibrations you can change this settings.

The “LED-Temperature Correction” should always be enabled. It counts in the temperature drift of the sensors to get more precise measurement data. The needed calibration data for this task is measured by the TriOS laboratory. You get this data in form of a data file which must be imported to the database. Only in special cases this calibration part should be disabled.

The “Oscar Reflectivity” must be enabled, too. Without this function the simple transmission/absorption calculation for sensors with a linear path will be applied. This makes no physical sense for the OSCAR and should be used only for testing. The calibration data for this task is a spectrum which describes the reflection of the cave surface for all spectrometer wavelengths of the sensor. This data is calculated in the TriOS laboratory or can be measured in the OSCAR control window by the user.

Activate the RAW or CALIBRATED tab-sheet and choose as input the RAW or CALIBRATED spectrum output of a database window. Select or filter the suitable data and send. The absorption calculator accepts only spectral data which matches the configured sensor else you get an error message.

When the new computed data shall be saved, select “Save to database” or “Save to file”. A significant comment shall be used for easier data handling.

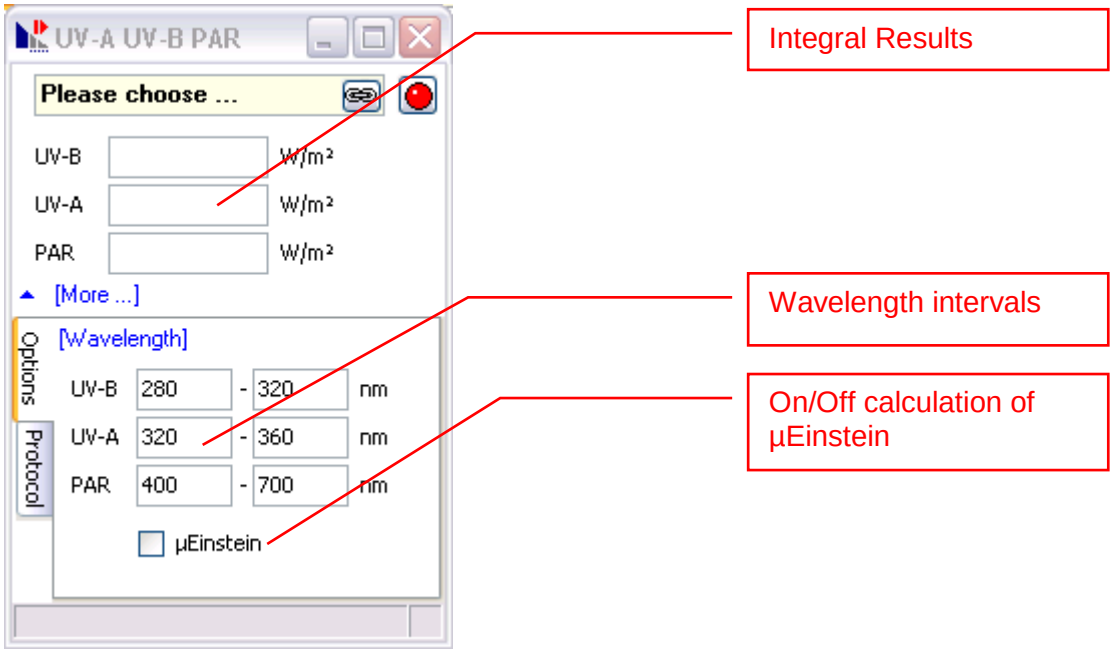
Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

11.3 UV A / UV B / PAR

11.3.1 Introduction

This method calculates integrals from a spectra over three adjustable wavelength ranges. These values can be converted to µEinstein as well.

11.3.2 Configuration



To export the integrals it is possible to create a table with the input “UV-A UV-B PAR.Results”.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

11.4 Value Calculator

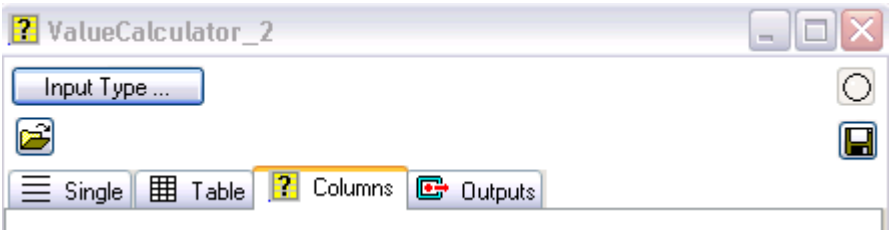
11.4.1 Introduction

With this windows you can extract and collect custom values from measurement data. These values will be defined via a scripting language. TriOS delivers a standard set of Value-Scripts to perform common calculation tasks for ProPS and Viper spectra. These sets can be loaded as “ready to use” in the desktop. The collected values can be combined to series and be shown as graphics in the chart window.

For creating your own custom values you can manipulate TriOS scripting code or create new code. How to write code is described in the “Advanced Manual” in the chapter “Calculator”.

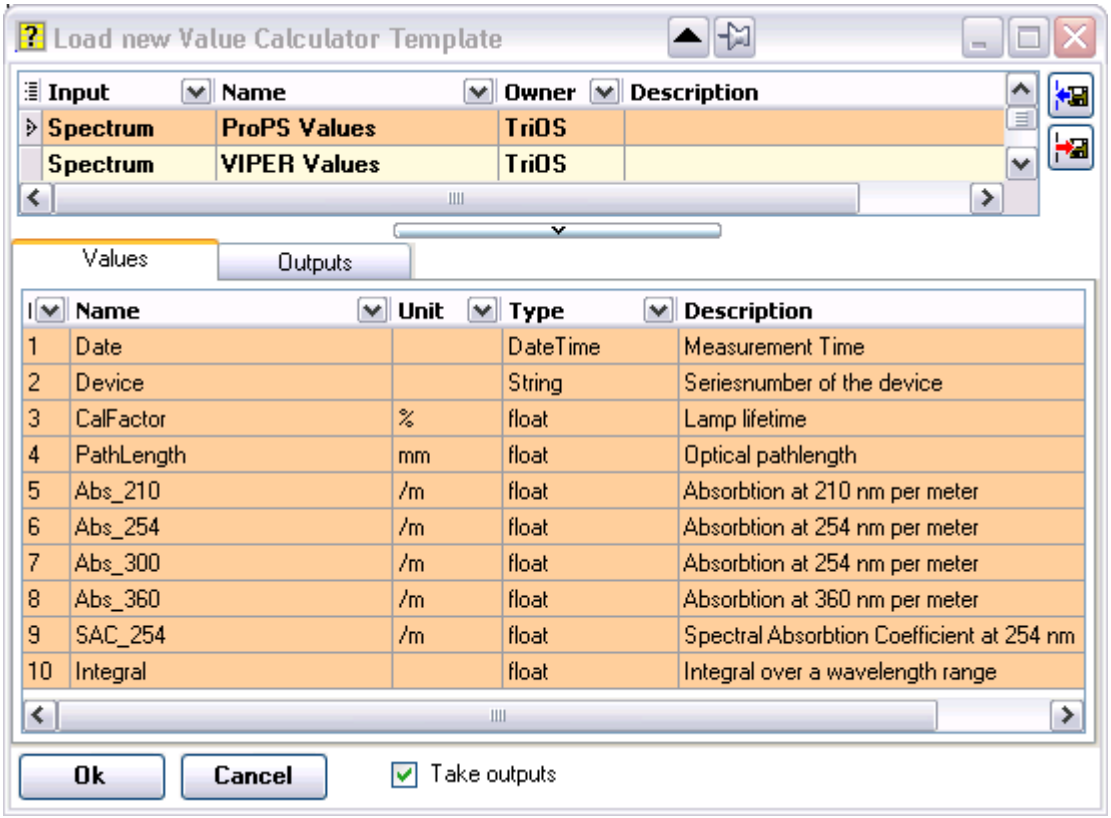
11.4.2 Loading templates

Open an Value Calculator from the main menu: **Tools/Value Calculator**



Press the Button to open the Value-Calculator-Loading-Dialog:

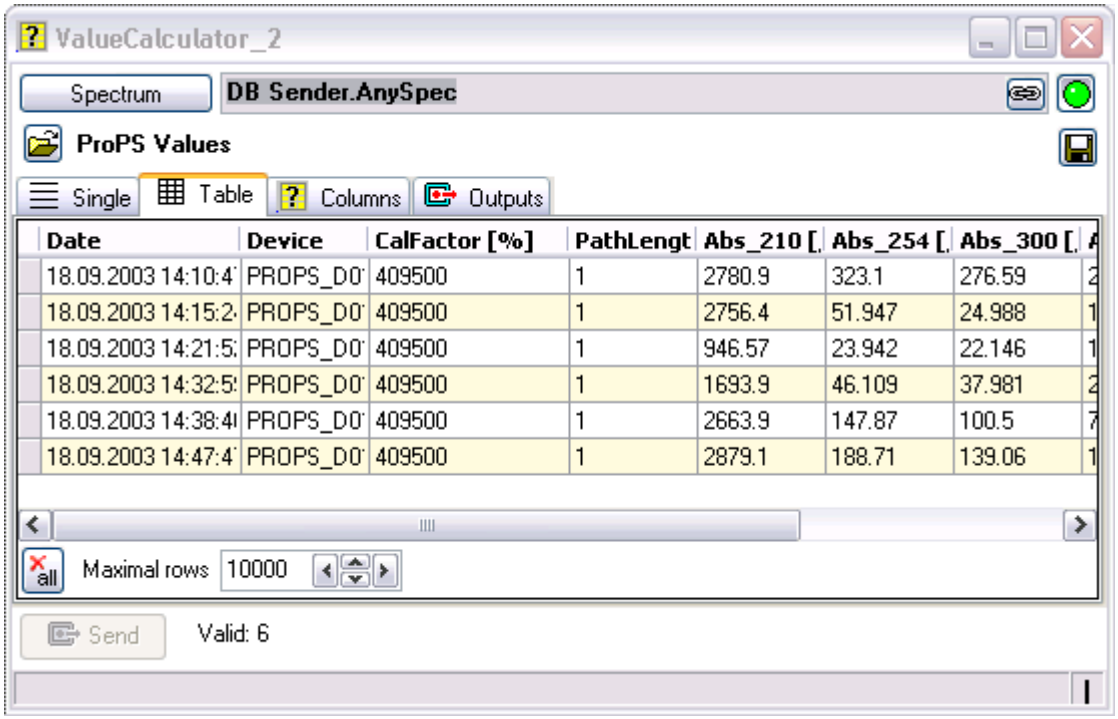
Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010



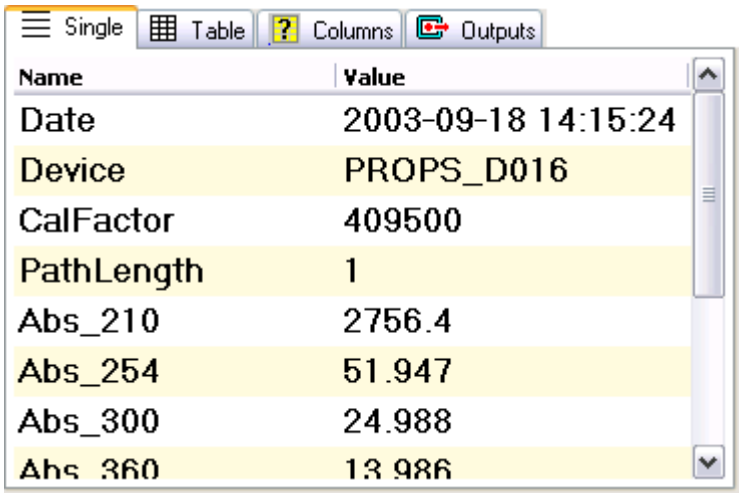
The top table shows all available Value-Calculator templates and the bottom table its corresponding values. By changing the selection of the values you can pick values for your need. Configured outputs are shown at the second tab page can be loaded, too.

Select an entry and press “Ok” to load the template.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010



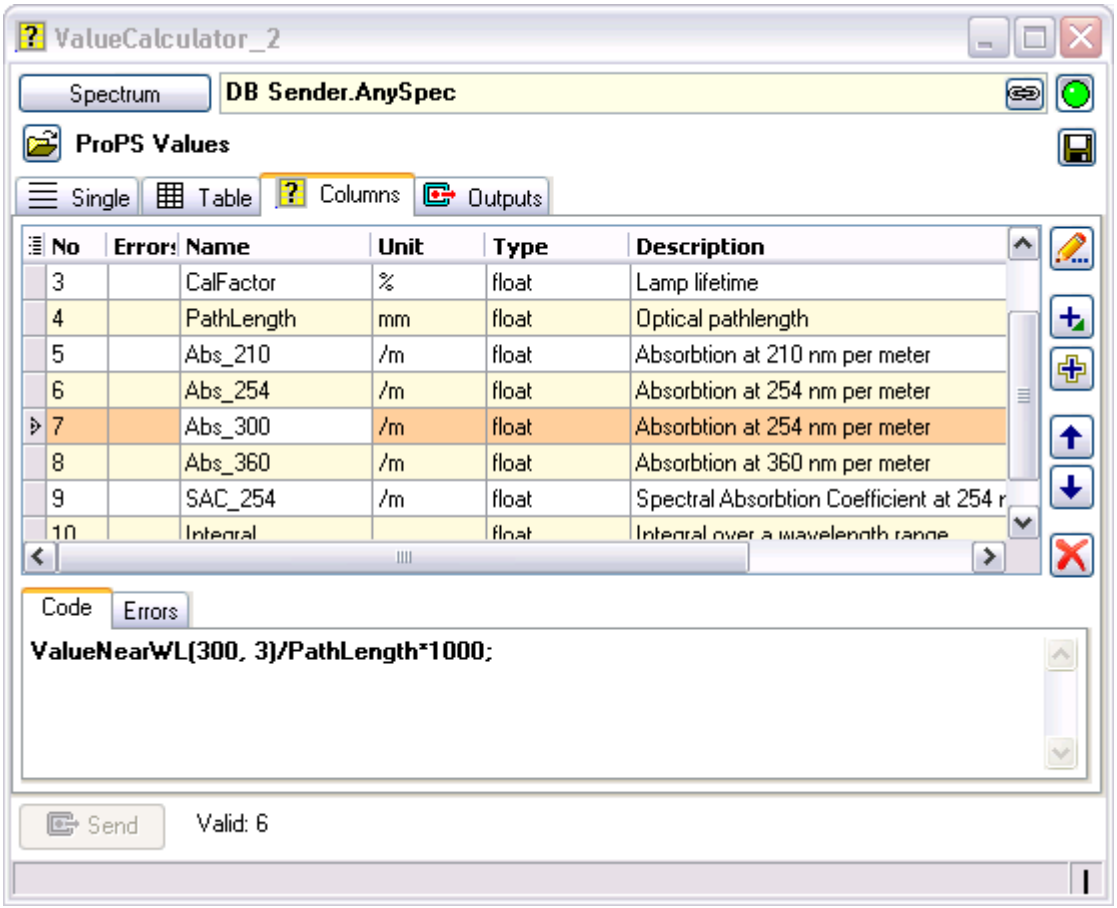
The Spectrum button-text shows now the input datatype. Press button, configure a input of this type. Enable the window (Red-Button) and send some data to it. The table page shows all extracted and collected data. The single page shows only the values of the last record.

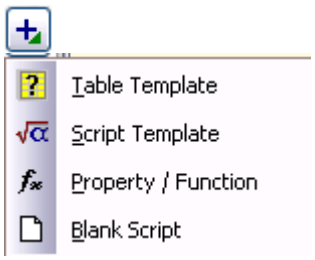


Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

11.4.3 Customizing of Values

The Columns page shows the definitions of the values.

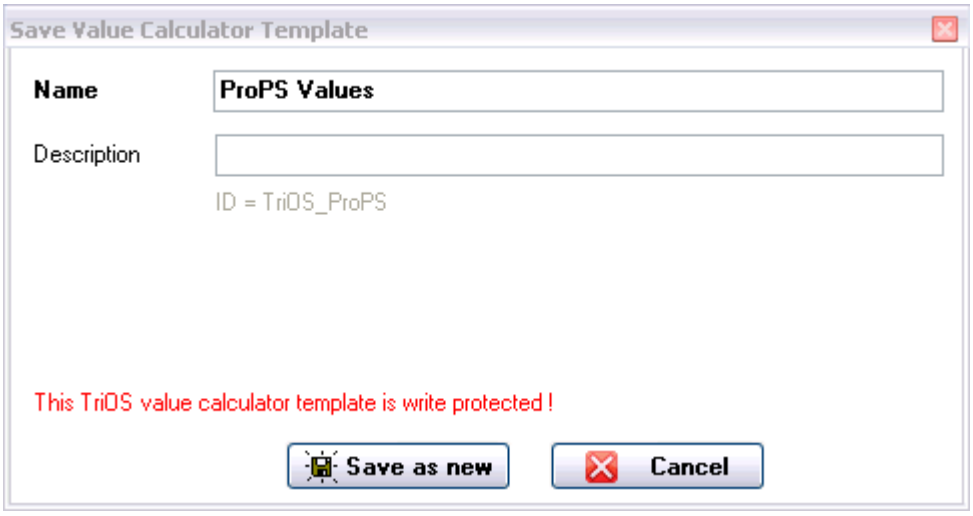


or double-click on table row, code page or row in Single page	Edit selected value. See Advanced Manual
	Append new value(s) **Pick values from an other value calculator template** **Define a value via a script template** **Define a simple value by a wizard. The wizard shows all available properties and function of the input.** **This function is available if the Valcue Calculator has received once.** **Define a new value via custom code.** **See Advanced Manual**
	Clone selected values.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

(Ctrl-Up)	Move selected values up
(Ctrl-Down	Move selected values down
	Delete selected values

Value Calculators definitions can be save as templates for later usage. Press the button to show the saving dialog.

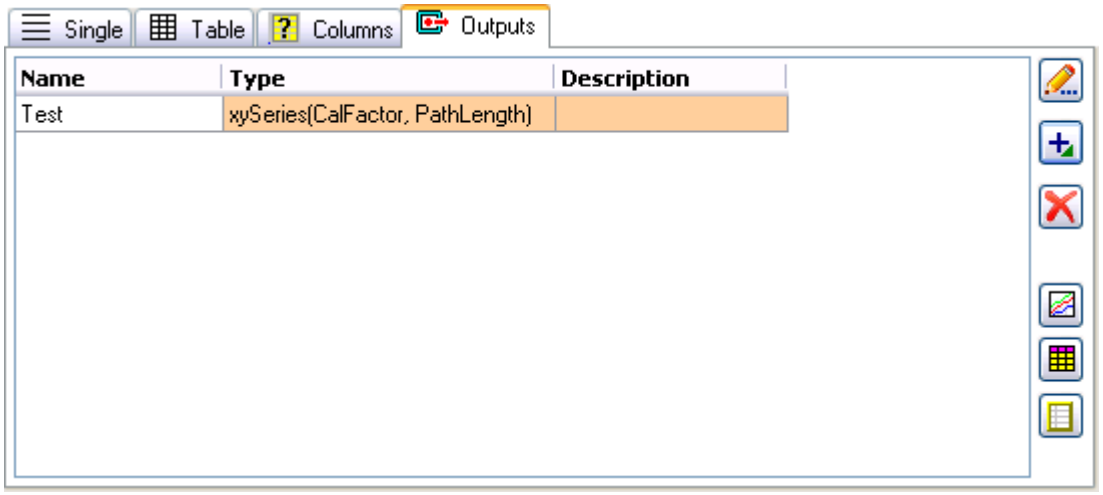


Value Calculator templates based on manipulated TriOS templates cannot be saved directly. You must give it an other name and Save as new.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

11.4.4 Outputs

Column of values can be collected to different serial outputs.



or double-click	Edit selected output.
Timeseries XY-Series Distribution	Append a new output. Only entries possible to build from the values types are shown. Timeseries: You need a “DateTime” and a values of the type numerical (“float”, “integer” or “bool”). XY-Series: You need one numerical column a least. Distribution: You need one numerical column a least. Set in the opening dialog the values to build the output.
	Erase selected output
	Show selected output in a new chart window
	Show selected output in a new table window
	Copy selected output to the clipboard as a text table, for pasting into Excel.
Send	Send all outputs to next window (a Chart for example)

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

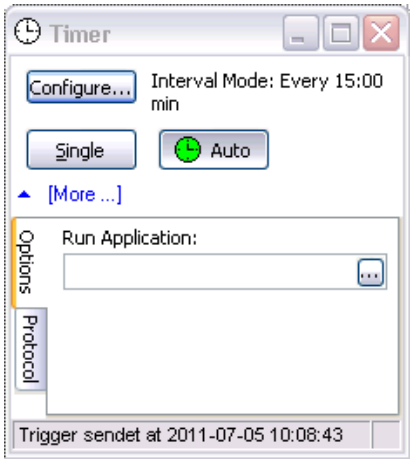
12 Special Windows

12.1 Timer

The global timer of the Timer window can be used to trigger several connected sensors simultaneously by one measurement command. The Timer can be opened with **Extras / Timer** from the main menu.

The timer is active for the sensor control windows, in which the external trigger is configured with the input “Timer.Trigger” and set to [Auto].

Beside the trigger of the measurement, the Timer can start an external application.



Timer	Can be used for more than one control simultaneously.
Configure...	Configure automatic (Raster, Interval, Daily,…)
Single	Trigger single measurement for all connected sensor windows
Auto	Switch global trigger on / off
Run Application	Start an external application on every trigger event

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

13 Database Management

13.1 Database File

All data MSDA_XE works with (device-configurations, measurement and calculation data) are stored in a database. It is a Microsoft Access database, which consists of one file with the extension "*.mdb". After first installation MSDA_XE works by default with the database file "C:\Programs\TriOS GmbH\MSDA_XE\DB\data.mdb".

Beside the easier data handling by dividing different measurement campaigns in more than one database it is necessary to switch the database, when it's size exceeds 600 Mbyte. Larger databases are possible, but data handling will slow down.

Because a Microsoft Access database consist of only one file it is easy create an new database. Locate the file "C:\Programs\TriOS GmbH\MSDA_XE\DB\empty.mdb" in the explorer, make a copy of it (in the same or any other folder) and give it a "good" name. Then MSDA_XE must be configured to load this database after restart (see chapter 14.2 Database).

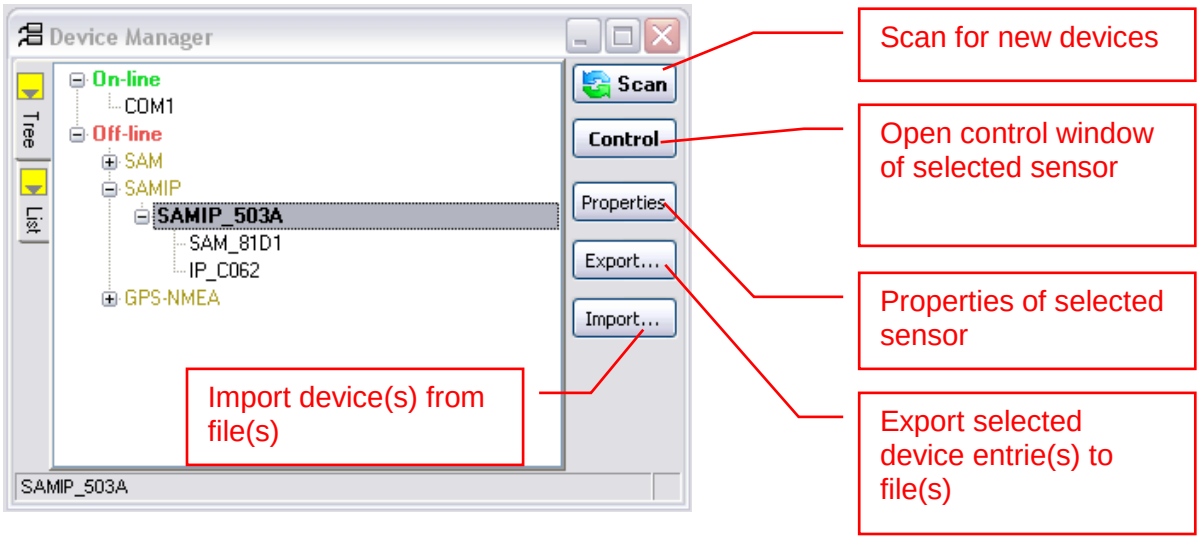
With the change of a database it is necessary to import all necessary files, like device or calibration files again.

13.2 Import/Export Device.ini-files

Each TriOS sensor has a device file. This is file contains information about the sensor type and it's calibration coefficients. It has the extension "*.ini". Choose **Database/Device** in the Main menu to import and to open the file selector. More than one file can be selected and imported at the same time.

If the device files for a specific sensor are lost, please contact TriOS for the files. The serial number of the sensor is needed for that.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

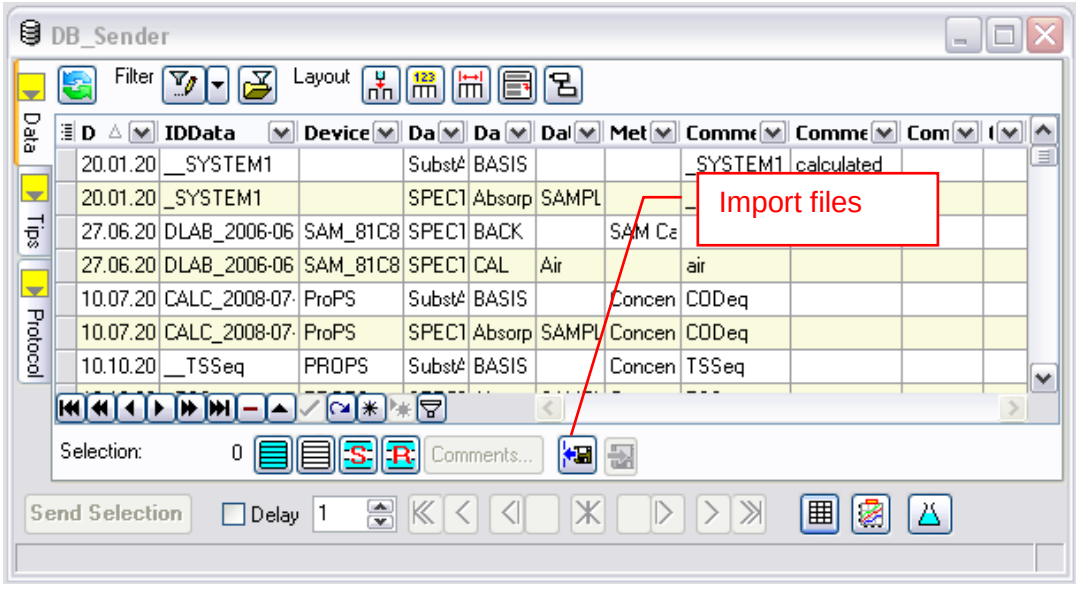


Each file is indicated with the serial number of the sensor. For example: The microFlu sensor with serial number 1124 requires file MICROFLU_1124.ini.

Sensors with sub-devices like the SAMIP will have an ini-file with the suffix *ALL.ini, which contains all sensors and sub-devices.

13.3 Import Data Files

The reimport of exported spectra or data from another database can be done with the database sender. Please choose **Database/Data** in the Main menu to open the DBSender. You can select several files and import them at the same time.

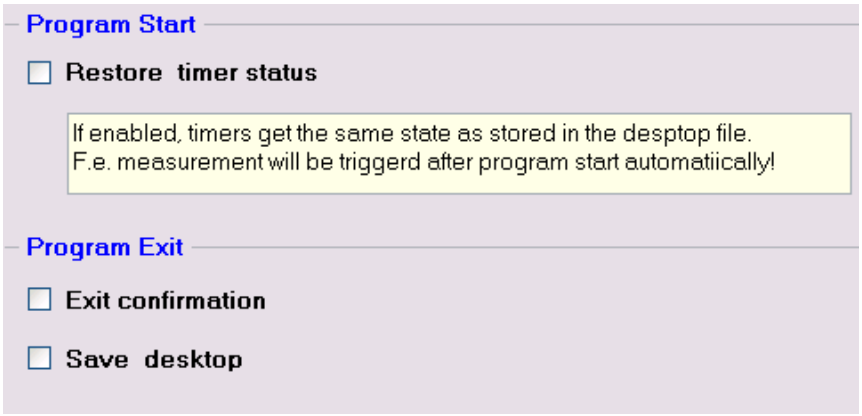


Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

14 Configuration Dialog

Choose **Options/Configuration** in the Main menu to open the main configuration window. The single tabulators and their function are described in the following chapter.

14.1 Start / Exit



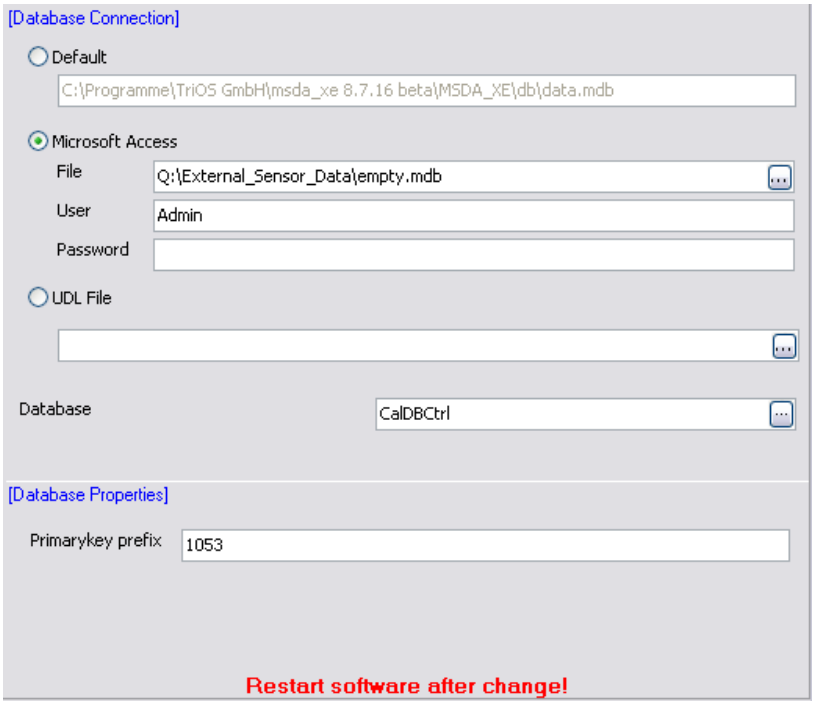
Restore timer status	Will start with the same timer settings automatically. While disabled the automatic timers are switched off after the start
Exit confirmation	Turn on/off exit confirmation
Save desktop	Automatic saving of desktop before program exits

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

14.2 Database

Beside the standard database, which is stored in the folder c:\programs\TriOS GmbH\MSDA_XE\DB\data.mdb, other databases can be connected with the software.

Main menu: **Database / Configuration**:



Database Connection	
Default	c:\programs\TriOS GmbH\msda_xe\db\data.mdb
Microsoft Access	Select other folder and database
UDL	Database connection via Microsoft Database Connection file
Database Properties	
Primary Key Prefix	Prefix for new database entries

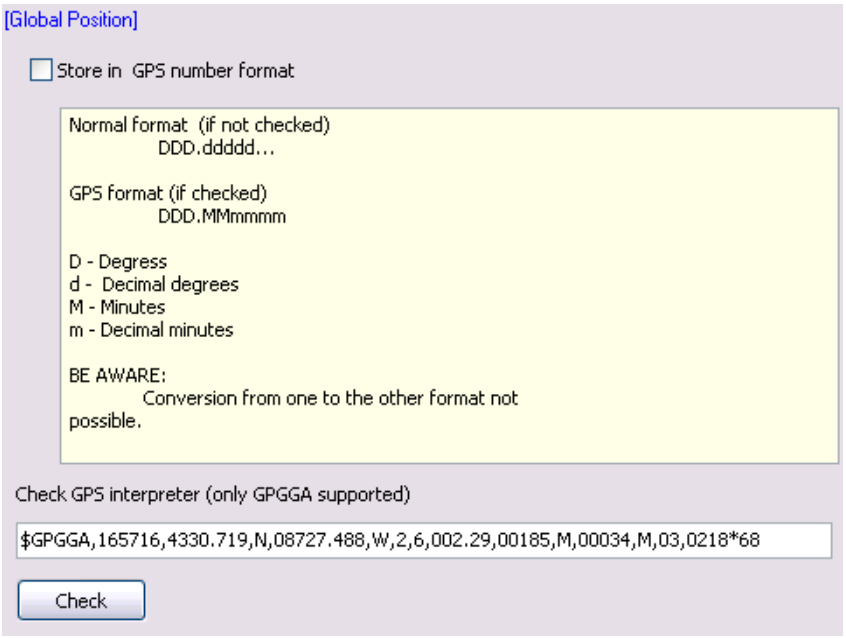
After changing the database settings a software restart is necessary.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

14.3 Devices

Period in which MSDA_XE waits for measurement data from device (hh:mm:ss). If the time is exceeded an error message will appear. Default value is 60 seconds.

14.4 GPS Position



The software can handle 2 different formats for the GPS position.

When the field is unchecked the data will be stored in decimal degree. Example for the position 53° 08.4289'E, 8° 14.9238'N:

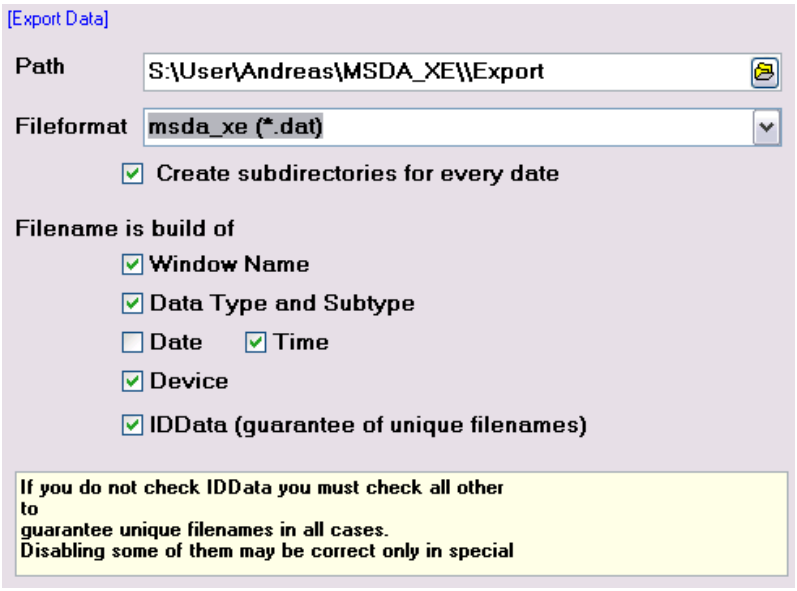
Setting:	Stored format:	
☐ Store in GPS number format	53.140481 ; 8.24873	calculated to decimal degrees
☑ Store in GPS number format	53.084289 ; 8.149238	degrees, minutes, seconds transferred to a decimal number

If other GPS modules are used, the output can be checked with GPGGA interpreter.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

14.5 Sample Export

Beside the saving of data in the database, it is possible to store them in files on the hard disc. The spectra or measurement data will be exported only, when the corresponding settings at the control windows are done. The tab sample export only defines the storing path.

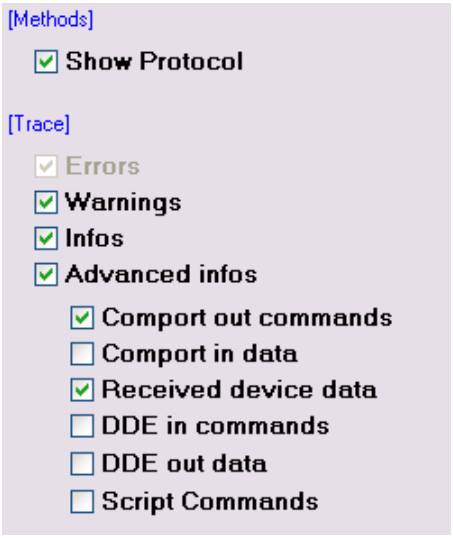


Export Data	
Path	Select the destination path. This path is used for all control windows with the **save to file** option activated.
Fileformat	msda_xe (*.dat) - internal data exchanging format (ASCII) Matlab (*.mlb) - Matlab compatible format (ASCII) Raw (*.raw) - internal data format (binary)
Create subdirectories	One directory for every day will be created

14.6 Messages

Configure messages, that will appear in the [Trace]-window (6.9 Trace Window) These messages will stored in the “trace.log” file as well. If problems occur with the software, this file might be requested by our support or software departments, as it is needed for debugging.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

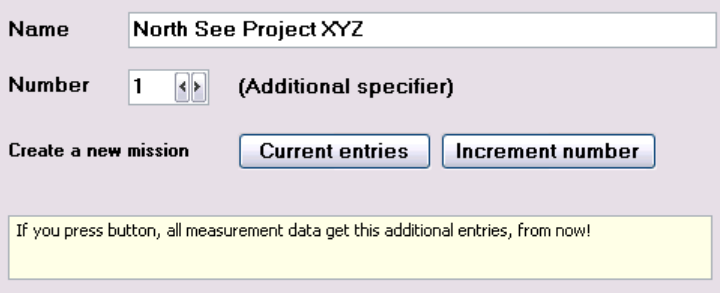


Methods	
Show Protocol	No entries in the protocol page of all windows. Should always be activated. This function should only be deactivated in high performance applications.
Trace	
Errors	Always activated
Warnings	
Advanced Info	Activate entries checked below
Comport out frames	Data sent from software to comport
Comport in frames	Data received from comport
Received device data	Textual representation of all measurement data received (all data frames of one measurement received).

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

14.7 Missions

To collect measurement data to groups every data has two entries: A Mission name and a number. The datasets can be sorted by these fields in the DBSender.



Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

15 Frequently asked Questions

15.1 Why has the BACK spectrum the integration time of 8192 ms?

The BACK spectrum holds 255 linear functions to calculate the background for all integration times. The actual integration time in the back spectrum has no meaning and is used nowhere. The same applies to the CAL spectrum.

15.2 Error message: No reaction on measurement of device …after … sec

Temporary communication problem with the device. No answer received, after command was sent by the computer. Please disconnect the device and the IPS for around 10s from the line power. Reconnect the cables and perform a device scan with device manager. If no communication is possible, please contact TriOS.

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010

16 Contact

We are always working to improve our products. Please check our website for updates.

You have found an error in this program, or you would like to see some additional features enabled in a future version?

Feel free to contact our support team: support@trios.de

Our website: www.trios.de

TriOS Mess- und Datentechnik GmbH

Bürgermeister-Brötje-Str. 25

D- 26180 Rastede

Germany

fon +49 (0) 4402 69670 - 0

fax +49 (0) 4402 69670 -20

Schutzvermerk nach DIN ISO 16016 / Copyright reserved
TriOS Layout_1010