

# L-EMF DAQ 3.0

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## Version 3.0 PREFACE

Version 3.0 of L-EMF DAQ comes with several new features, like Data Rate Adjustment, Pausing, Test Mode, easier Setup and last but not least massively improved performance. Now it should be possible to run fast acquisitions even on rather slow machines while other processes are still running on the same machine, etc. Rate Adjustments effectively helps to suppress noise with highest input impedance EMF 16 models, the other new features strongly increase the ease of use.

If you upgrade from a previous version of L-EMF DAQ, you may install version 3.0 in parallel to any other versions without interferences; or you may uninstall the previous version and reinstall version 3.0 in the place of the old version. In this case, existing setup data will be converted to the 3.0 format and reused. NOTE: You may run the new Version 3.0 at a higher speed (less Speed Reduction) than older ones without encountering Scan Rupture or Performance Errors. Therefore please readjust your DAQ performance to get the maximum out of your new version 3.0.

This manual has been updated from previous versions: Not all of the shown images may comply with the new version's look and content in certain cases where the understanding is not affected. This may seem inconvenient, but it allowed us to get ready with the version much faster and therefore to not let you wait any longer for the long time promised 3.0.

tz @ t&t, Zurich, Switzerland in August 2004

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\* **Version 3.0** is the third major release of *L-EMF DAQ for Windows*. Up to now it has been run and tested successfully for many thousands of hours in dozen of labs all over the world. If you may encounter any problems, please feel free to report any problems and inconveniences promptly, so that they can be addressed in the next release. By registering your copy of *L-EMF DAQ 3.0 for Windows* you will get later update releases free of charge (chapter **16**, p.32).

**T&T**

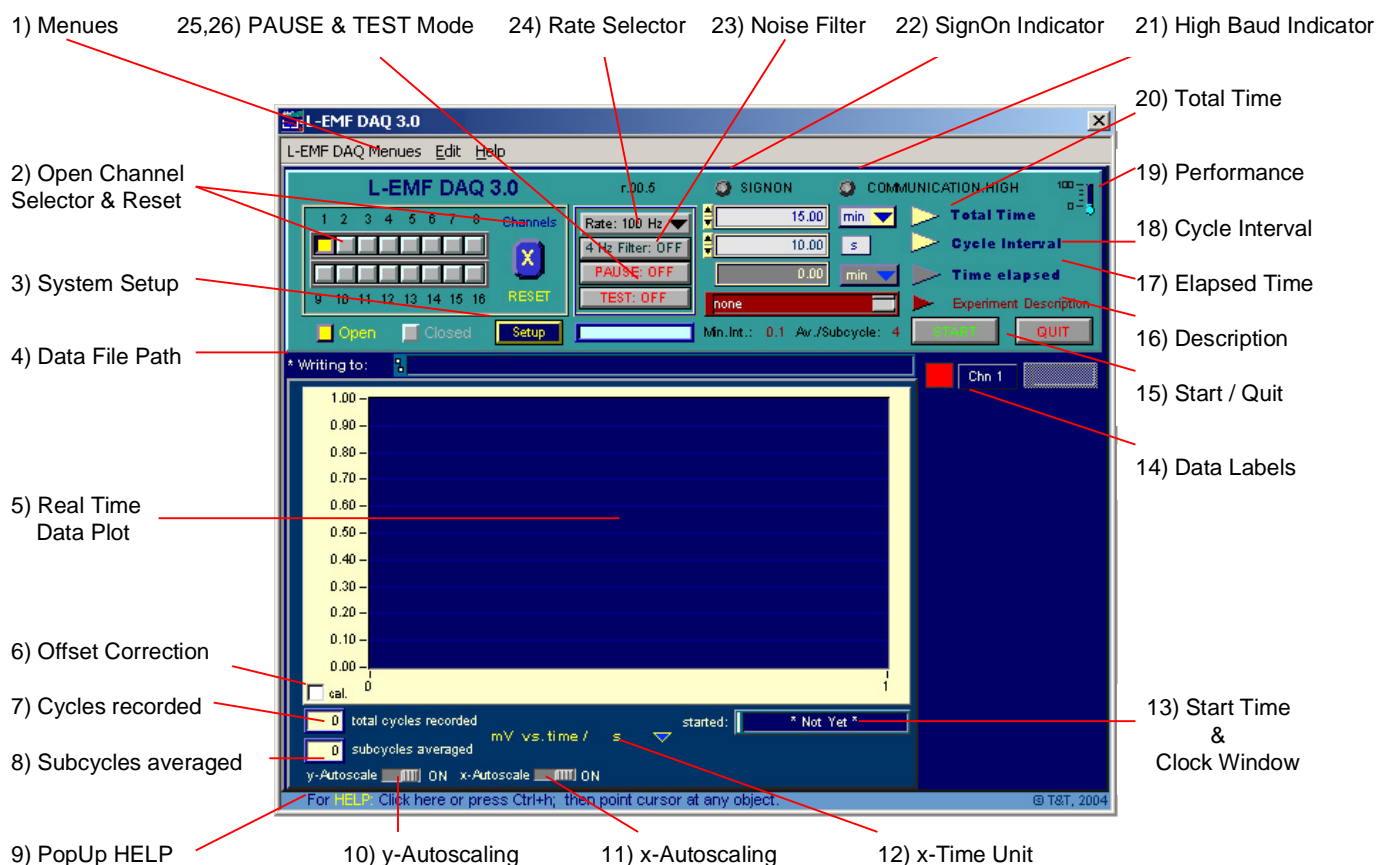


## 2. *L-EMF DAQ 3.0 for Windows*

*L-EMF DAQ 3.0 for Windows* is a simple and easy to use Data Acquisition and Instrument Controller Software to drive the *Lawson Labs, Inc. EMF 16 Data Recorder*.

Initially it was designed as an EMF Data Acquisition Software for scientists and researchers working in the field of *Ion Selective Electrodes*, meanwhile it is used in various fields of applications.

In combination with a 16-channel *Lawson Labs, Inc. EMF 16 Data Recorder* it may be used as a generally applicable and user-friendly *mVoltage Recorder Software for any purpose*.



### 3. Minimal System Requirements

Minimal system requirements to run *the L-EMF DAQ 3.0 for Windows Installer* and to use the *L-EMF DAQ 3.0 for Windows*:

- *Windows 95, 98, etc. or NT, 2000 or XP* installed.
- Any program, able to read pure .txt-files, or most recommended, any spreadsheet program, such as *Microsoft© Excel* to best review and handle recorded spreadsheet data.

### 4. Minimal Hardware Requirements

Minimal hardware requirements to run *the L-EMF DAQ 3.0 for Windows Installer*, the *L-EMF DAQ 3.0 for Windows* and the *Lawson Labs, Inc. EMF 16 Data Recorder*.

- min. *486 PC* or better, with:
- *CD or floppy drive*.
- min. *32 MB RAM*.
- *Hard disk* (the faster it is, the higher the DAQ performance).
- at least *10 MB free hard disk space* for the *L-EMF DAQ 3.0* installation. Additional free space is needed to record data.
- A free *serial port* to connect *the Lawson Labs, Inc. EMF 16*
- min. *14" 800x600 Monitor* or better.

## 5. Getting Started

The **combination** of the *L-EMF DAQ 3.0 for Windows Software* and the *Lawson Labs, Inc. EMF 16 Data Recorder* is a powerful and easy to use EMF data acquisition **unit**. It makes no sense at all to run the *L-EMF DAQ 3.0 for Windows Software* alone.

Therefore make sure that you connect a *Lawson Labs, Inc. EMF 16 Data Recorder* to one of your serial ports (e.g. Com 1 or 2) before you install and run the *L-EMF DAQ 3.0 for Windows Software*.

- **Connecting the *Lawson Labs, Inc. EMF 16 Data Recorder*:**

**! IMPORTANT !:** Connect the separate “**EARTH**” cable from the back of the *Lawson Labs, Inc. EMF 16 Data Recorder* to a **good** earth ground (e.g. a water tap or the protective ground of your electricity network).

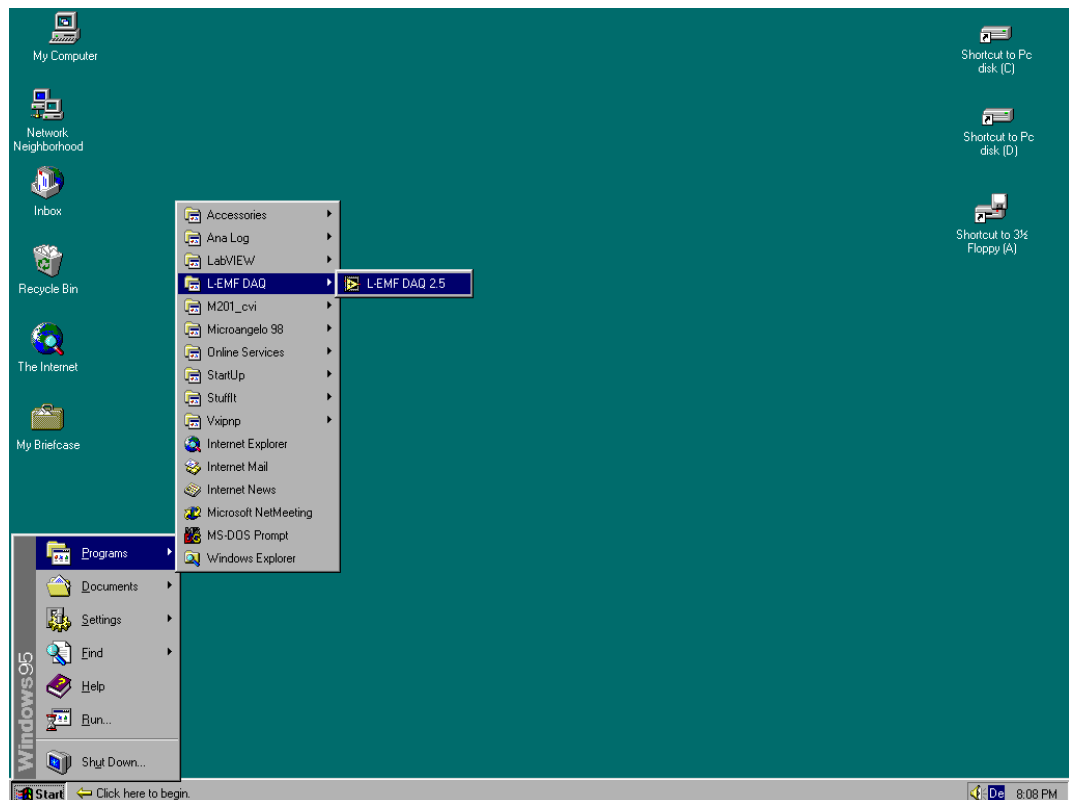
- Connect the serial connection cable to the Recorder and to a Com port of your PC. Make sure the Com port is configured according to the instructions of Lawson Labs, Inc.!
- Connect the power adapter to the recorder.
- StartUp your PC.

## 6. Installation

- After having carefully read this manual, open the “Install” directory which you find on your *L-EMF DAQ 3.0 for Windows* disk.

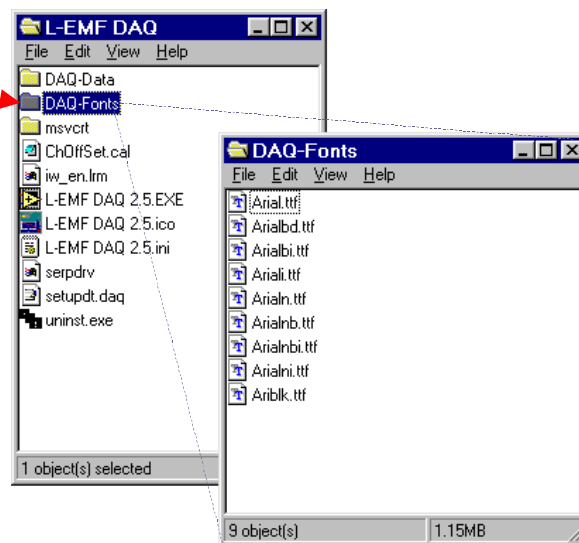
-> Run “*Setup.exe*”.

- Define a path for the directory, where all necessary parts of the *L-EMF DAQ 3.0 for Windows* will be stored. Finish Installation.
- *L-EMF DAQ 3.0 for Windows* can easily be started from *Start Menu/Programs/L-EMF DAQ 3.0* now:



- Start *L-EMF DAQ 3.0* and compare the front panel you see to the picture given in “**2. L-EMF DAQ 3.0 for Windows**”, p.5. If your front panel looks differently, e.g. if some text is shifted or of wrong size, then make sure that *all fonts* you find in the “DAQ-Fonts” subdirectory of *L-EMF DAQ 3.0*’s main directory are installed in your System’s Fonts directory. Make sure, that *older* fonts of the same type are overwritten by the new ones. Then restart your PC.

Install the content of this folder into *your System’s Fonts folder* if you don’t have them already. Replace older fonts of the same names.



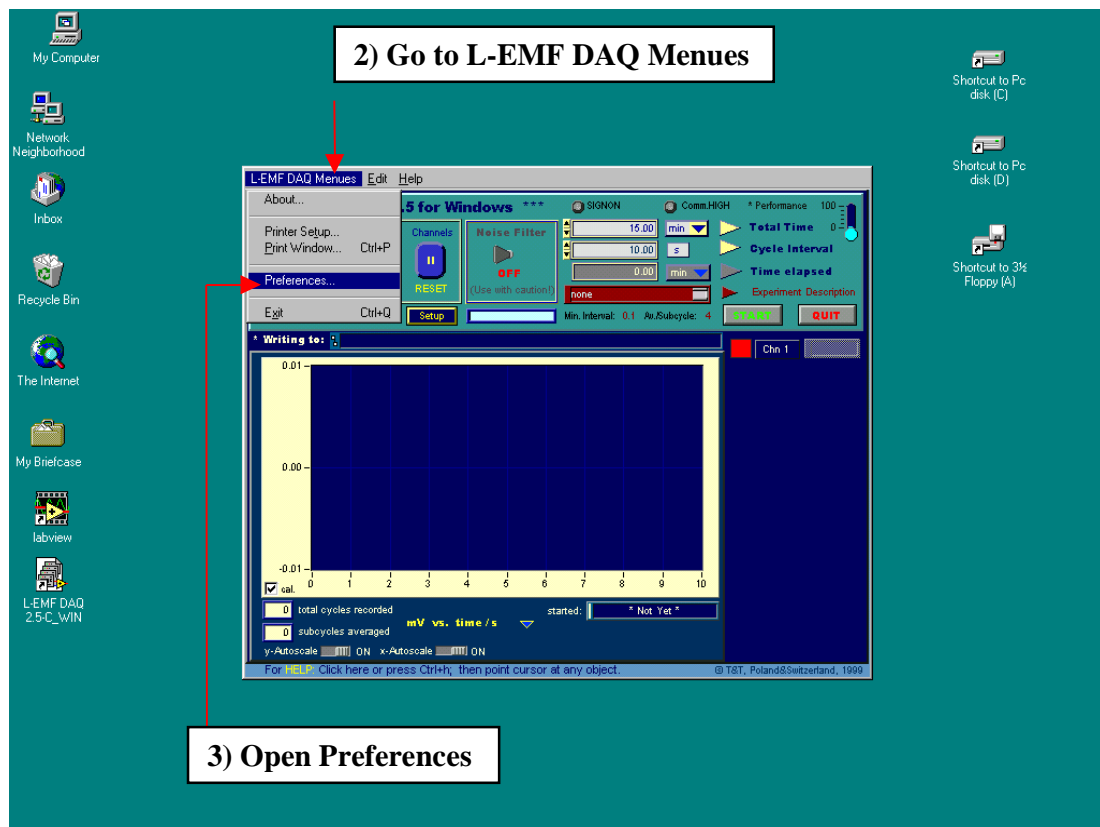
If *L-EMF DAQ 3.0* still looks unreadable now, then reduce the screen resolution settings in the Display Control Panel of your System<sup>§)</sup>.

<sup>§)</sup> Customers asked to adjust *L-EMF DAQ 3.0* to be still fitting onto old 14“ 800x600 screens. Therefore, small numbers might be badly readable on big screens with high resolution chosen...

## 7. Default Directory\* for recorded data

Choose a **Default Directory** to save your data – it will help you to easily save and find your recorded data. Without this step, *L-EMF DAQ 3.0* will always be dragged to its own main directory as a **Default Directory** first, when you are going to choose a data saving path.

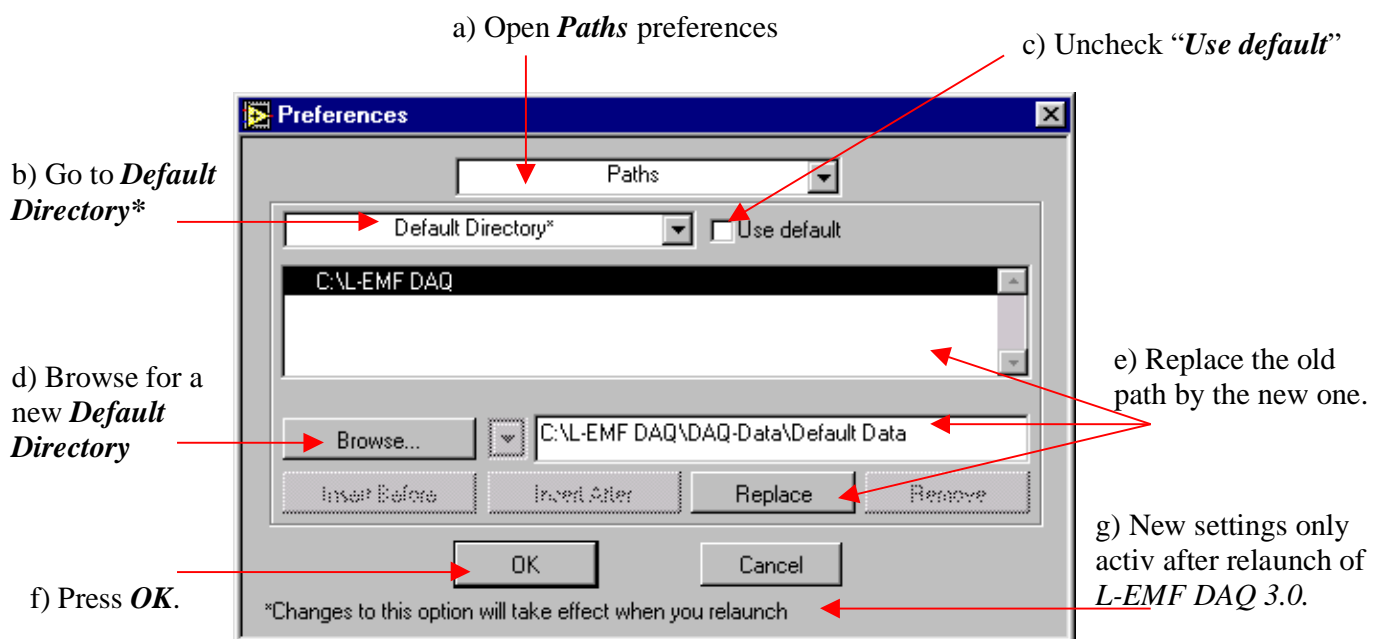
- 1) Start *L-EMF DAQ 3.0*.
- 2) Go to the *L-EMF DAQ 3.0* – Menues.
- 3) Open *Preferences*.



- 4) Open the *Preferences/Paths/Default Directory\** Window (a, b).
- 5) Uncheck (“*Use default*”) (c). Browse for a new directory of your choice to be used as your *Default Directory* for data recording (d).
- 6) Open the directory of your choice, press “Select current directory”. Press “Replace” to replace the old *Default Directory* – path (e).

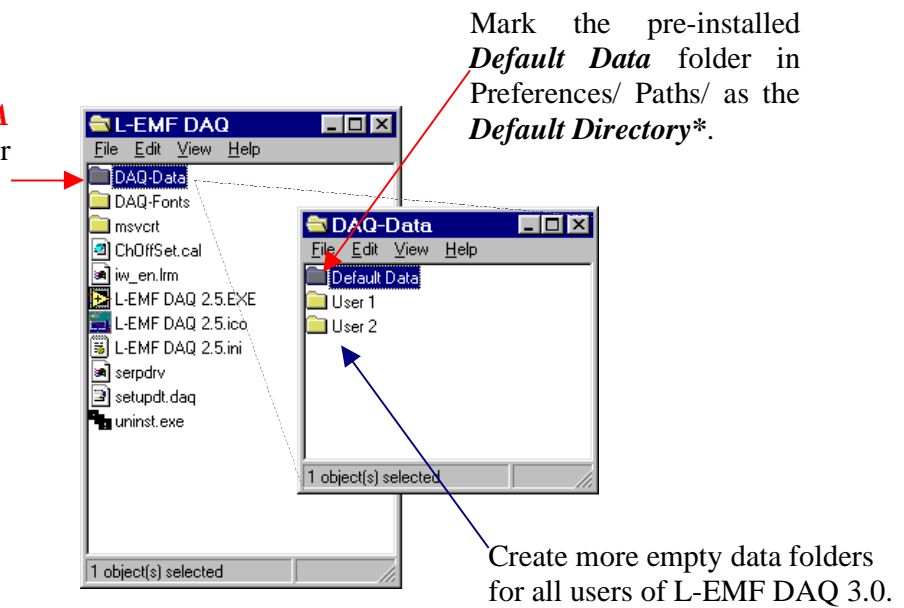
Press **OK** (f).

New settings will be active after relaunch of *L-EMF DAQ 3.0* only:  
Quit and Restart *L-EMF DAQ 3.0* (g).



• **Hint:** Use the *Default Data* folder inside the *DAQ-Data* folder (pre-installed in the *L-EMF DAQ 3.0* parent folder) instead of any folder on any drive.

Pre-installed **DAQ-DATA** folder can be used for default data storage.





## 8. SETUP

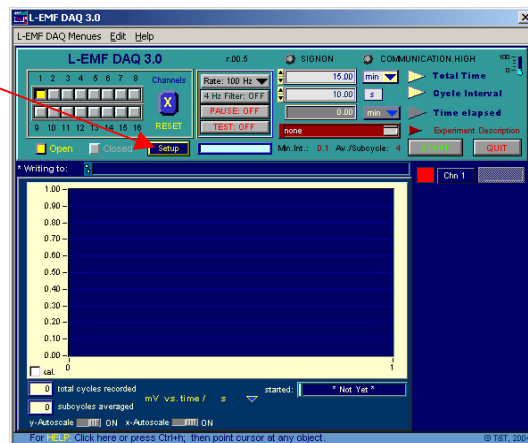
All important information to configure the *Lawson Labs, Inc. EMF 16 Data Recorder* and the communication settings are hidden in a separate *SETUP* panel to prevent them from unqualified access. Read the *Lawson Labs, Inc. EMF 16 Instructions* to get a deeper insight into some of the available parameters.

The Setup-Information is protected by an “Administrator-Password”. After installation the default “Administrator-Password” is “*lawson*”. It can be changed by the user inside the Setup.

Some elements of Setup are explained either later in this manual or in the PopUp Help of *L-EMF DAQ 3.0*.

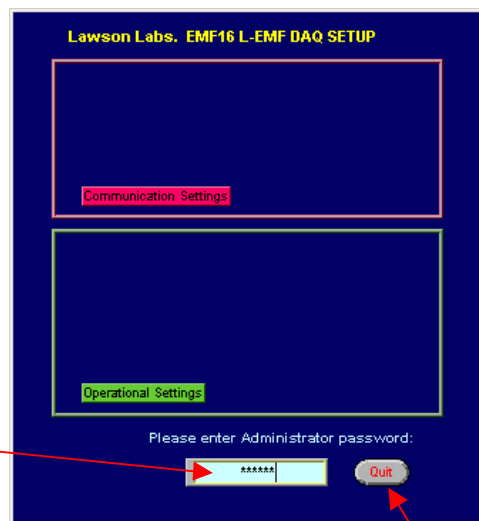
All Setup-Information is stored in a “setup.daq” file in the parent directory of *L-EMF DAQ 3.0*.

**SETUP**



## 1) Open Setup

Enter the default password “**lawson**” here. Then hit the **Return** Button.



To return without opening Setup, click “Quit”-button.

## 2) Choose Serial Port

Choose the serial port to which a *Lawson Labs, Inc. EMF 16 Data Recorder* is connected:

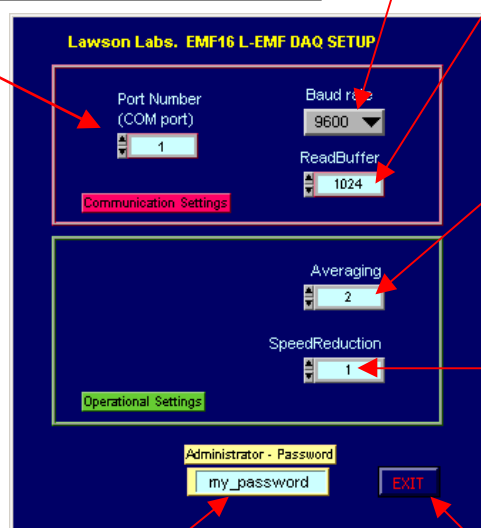
Port No.:	PC	Mac
1	Com1	Modem Port
2	Com2	Printer Port
3	...	-

Adjust baud rate: If you encounter repeated communication problems, switching to a lower baud rate may help in certain cases.

A bigger buffer may cure some performance problems, while a smaller one may save some memory...

Averaging (= 2<sup>^</sup> Averaging’): More averaging smooths noise but in exchange slows down sampling speed...

Use to adjust the L-EMF DAQ sampling performance (please read chapter 10, p.17).



Change password.

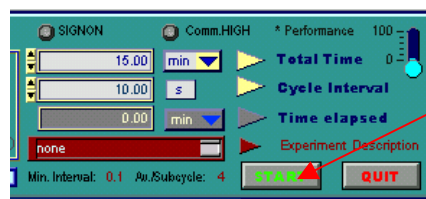
To return to main panel, hit “**EXIT**”. Setup data will be saved in file “setup.daq”.

## 9. Recording Data **Files**

*L-EMF DAQ 3.0* is designed to write all recorded data permanently to a disk drive while an experiment is in progress. In this way you will never lose any data which has already been recorded, even if the electrical power breaks down in one moment etc.

Always when you start recording data with *L-EMF DAQ 3.0*, it will first ask you for a data-file name and a directory to store the data.

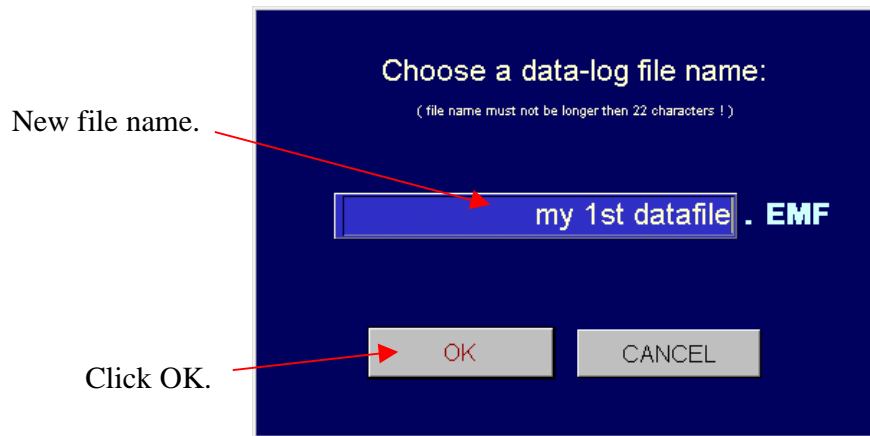
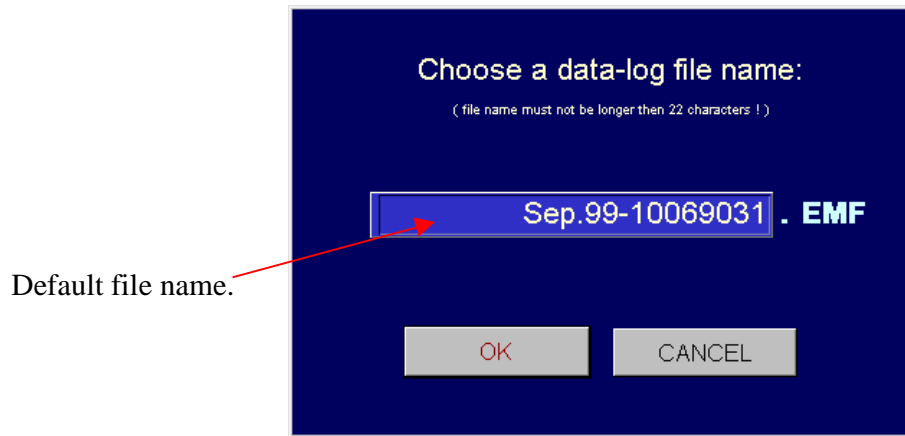
The data-file name must not be longer than 22 characters. For easy recognition of recorded EMF data, always the extension .EMF will be added to each filename.



Click to start an experiment.

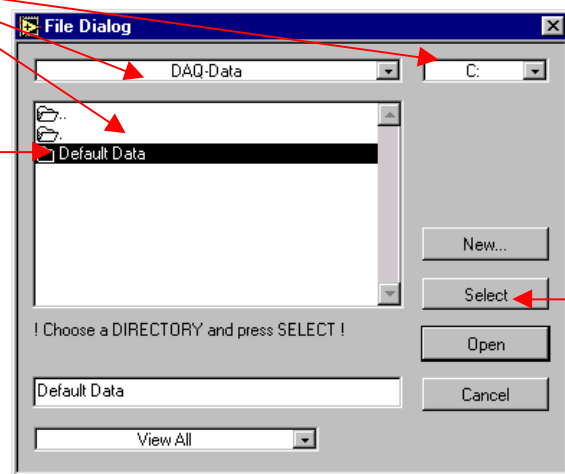
If you do not enter a data file name, a default name is always provided by *L-EMF DAQ 3.0*. It contains date information as well as an ascending number that changes every 5 minutes. By using the default file name, you will never record two files with the same name, unless you restart your experiment within the same 5 minutes.

You can always replace the default name by a more descriptive name of your choice.



a) Choose a directory on any drive to save your data to.

b) Mark directory. →



c) Press “Select”.

## 10. Performance Adjustment

Because of the continuous data recording to disk, the performance of the *Lawson Labs, Inc. EMF 16 Data Recorder* plus *L-EMF DAQ 3.0 for Windows* EMF data acquisition **unit** mainly depends on the disk access time of your PC's harddisk.

If you have a quick new PC, then you are fine anyway. If your PC, or rather your hard-disk type, is somewhat slower, then performance may need some adjustments for the system to work satisfactory.

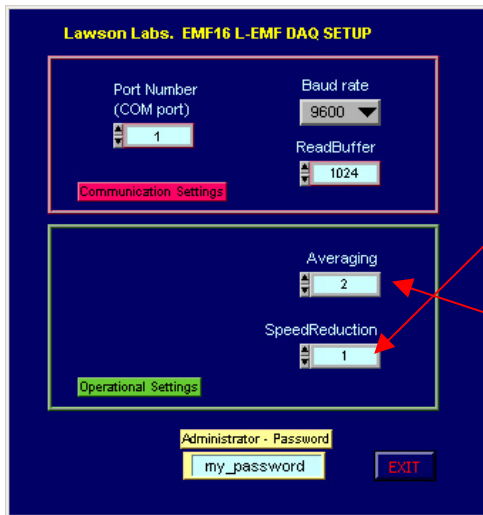
### • Check performance:

Run a test experiment with the given parameters:

**ONLY Chn 1 open.**      **Rate 100 Hz**      **Filter OFF.**      **Total Time = 1 min.**      For Cycle Interval type 0, then Return -> minimal cycle interval will appear.

**! Observe Performance Meter !**  
**Must be 100% or more after 50 cycles!**  
**! NOT sufficient in this example!**

**Min. Interval** is displayed here.  
If performance is too low -> Increase it by increasing the "**SpeedReduction**" in the **SETUP**.



If your performance is low ->

Increase "**SpeedReduction**" to adjust it.

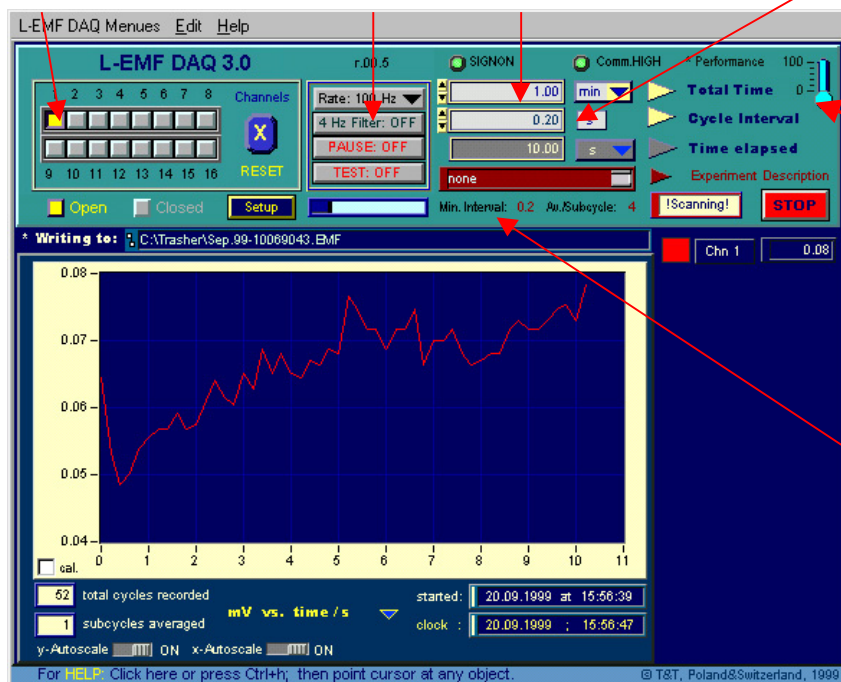
If you run into errors due to insufficient performance, L-EMF DAQ 3.0 will automatically adjust the "**SpeedReduction**" parameter.

*Alternative:* You may increase the **Averaging** number to reduce noise while scanning longer and thus sampling and writing data less often to disk. Usually numbers higher than 5 (which means, that 32 scans are averaged) should be avoided!

### • ReCheck performance with changed "Speed Reduction":

Run a test experiment with the given parameters:

**ONLY Chn 1 open.**      Rate **100 Hz.**      Filter **OFF.**      Total Time = **1 min.**      For Cycle Interval type 0 and Return -> minimal cycle will appear.



**! Observe Performance Meter !**  
**Must be 100% or more after 50 cycles!**  
**! Fully sufficient in this example**

New **Min. Interval** is displayed here.

## 11. Offset Calibration

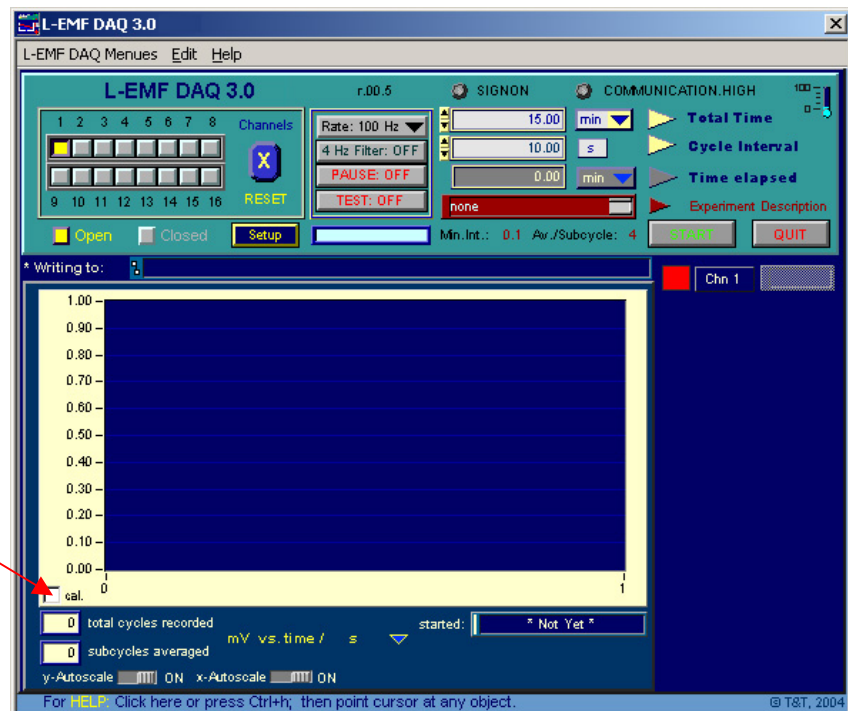
Although that the *Lawson Labs, Inc. EMF 16 Data Recorder* performs an internal hardware calibration before each experiment. Additionally you should perform an external Offset Calibration for the individual channels of your recorder from time to time.

Therefore make sure, that NO Offset Calibration is applied while you perform an Offset Calibration. An applied Offset Calibration is indicated if the “**Cal.**” Box is checked.

To remove an older Offset Calibration, delete the file called “syscal.EMF” from the parent directory of *L-EMF DAQ 3.0 for Windows* and relaunch *L-EMF DAQ 3.0 for Windows*.

**NO** Offset Calibration applied, if this box is unchecked.

Offset Calibration applied, if this box is checked.



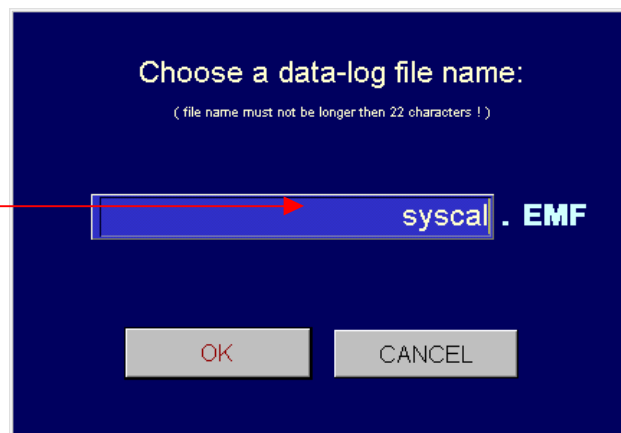
• **Perform Offset Calibration:**

**Ground** all channels of your *Lawson Labs, Inc. EMF 16 Data Recorder* and shortcut them to the reference channel as well. The channels should read the individual channel Offsets close to 0 Volts now.

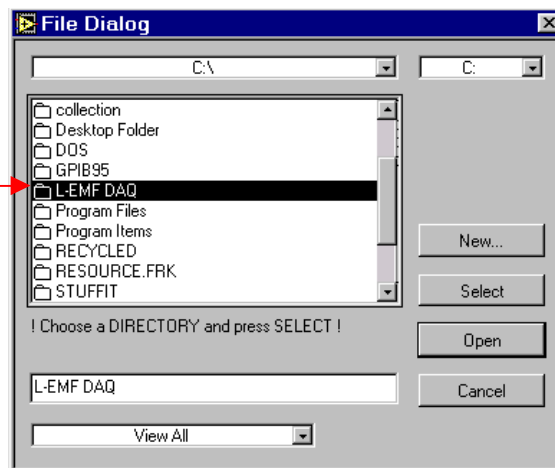
Record for at least 1/2 hour or more a data file called “*syscal.EMF*” into your *L-EMF DAQ 3.0 for Windows*’ parent directory. It is important that the file will have exactly this name.

Afterwards relaunch *L-EMF DAQ 3.0 for Windows*; a checked “**Cal.**” Box will now indicate the applied Offset calibration. Individual channel Offsets can be viewed now by opening the file ChOffSet.cal

Record for 1/2 hour  
a file with ***exactly***  
this name!



Make sure, that you save  
“*syscal.EMF*” into  
*L-EMF DAQ 3.0*’s  
parent directory!

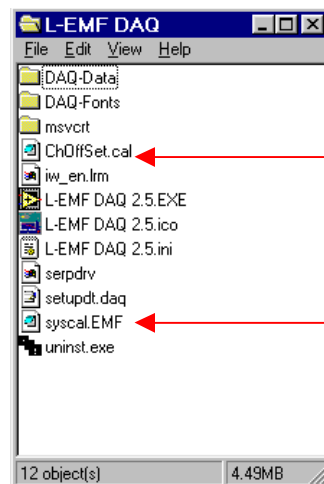
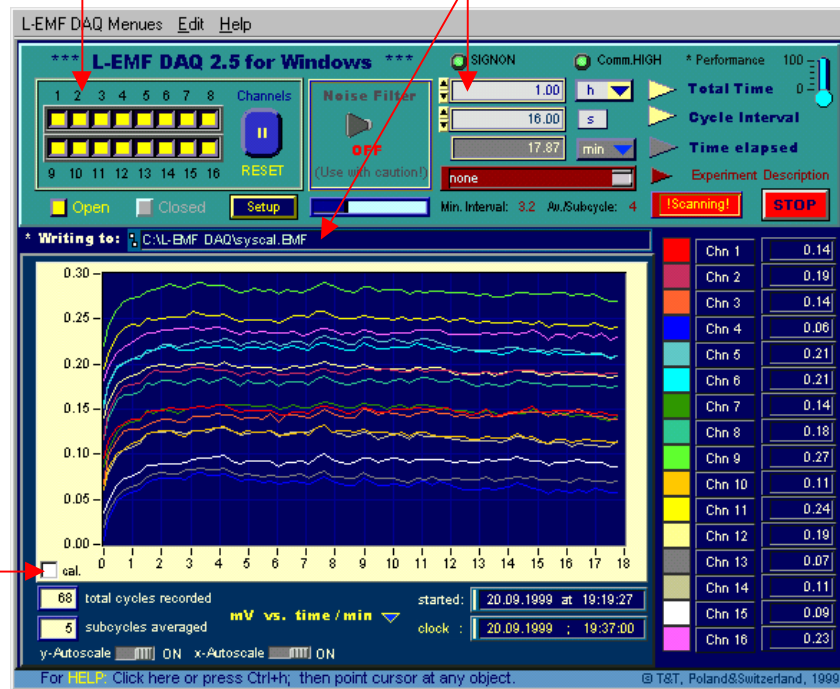




Open all channels.

Record a data file “*syscal.EMF*” for at least 1/2 h

Make sure, *no* Offset calibration is applied during an Offset calibration!.



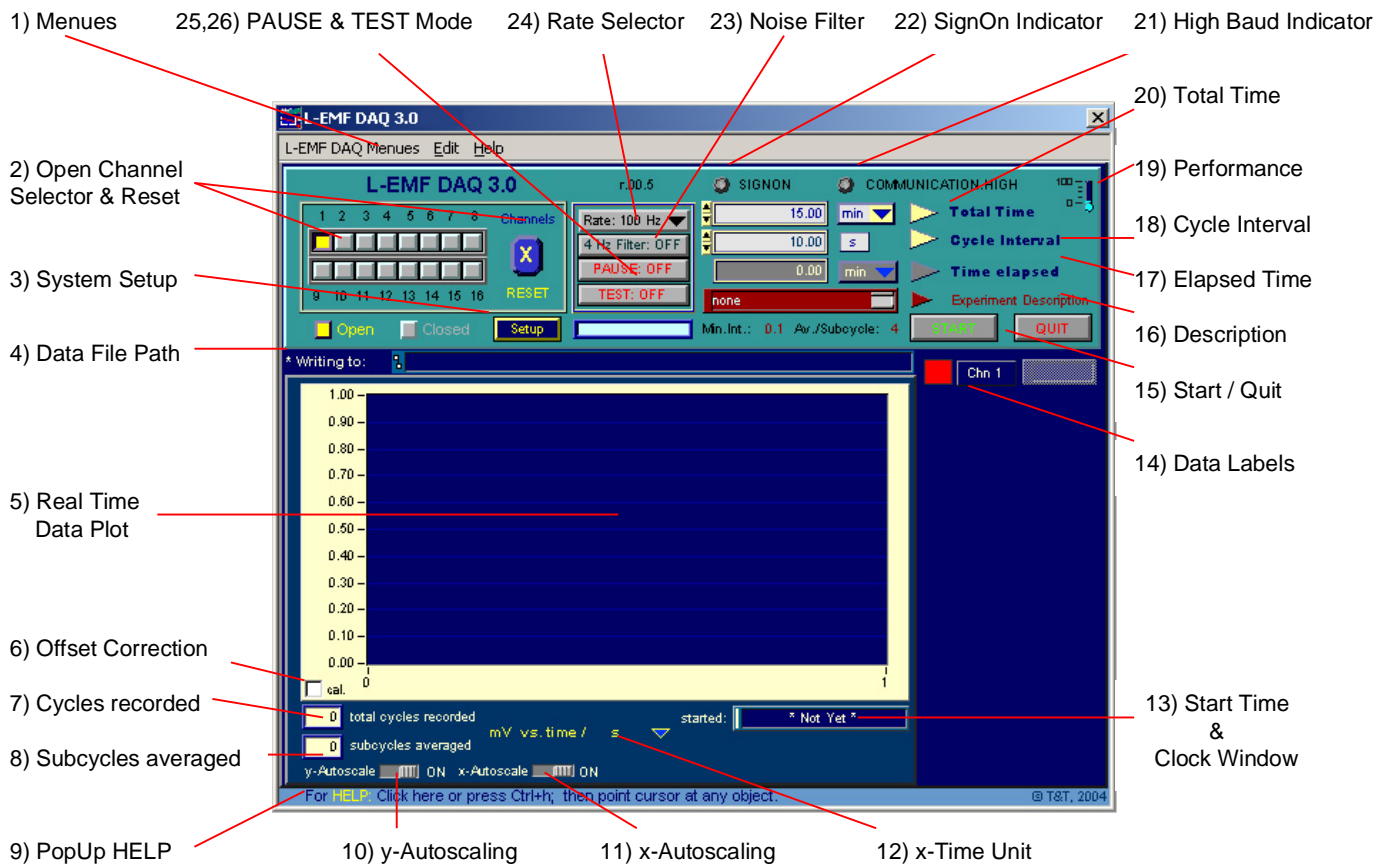
Applied individual Offset corrections.

Recorded Offset calibration file “*syscal.EMF*”.

## 12. Operation / Recording data

As soon as you once successfully went through steps 1-11, you will not often have to deal with them anymore.

The daily operation of the *L-EMF DAQ 3.0 for Windows* is easy:

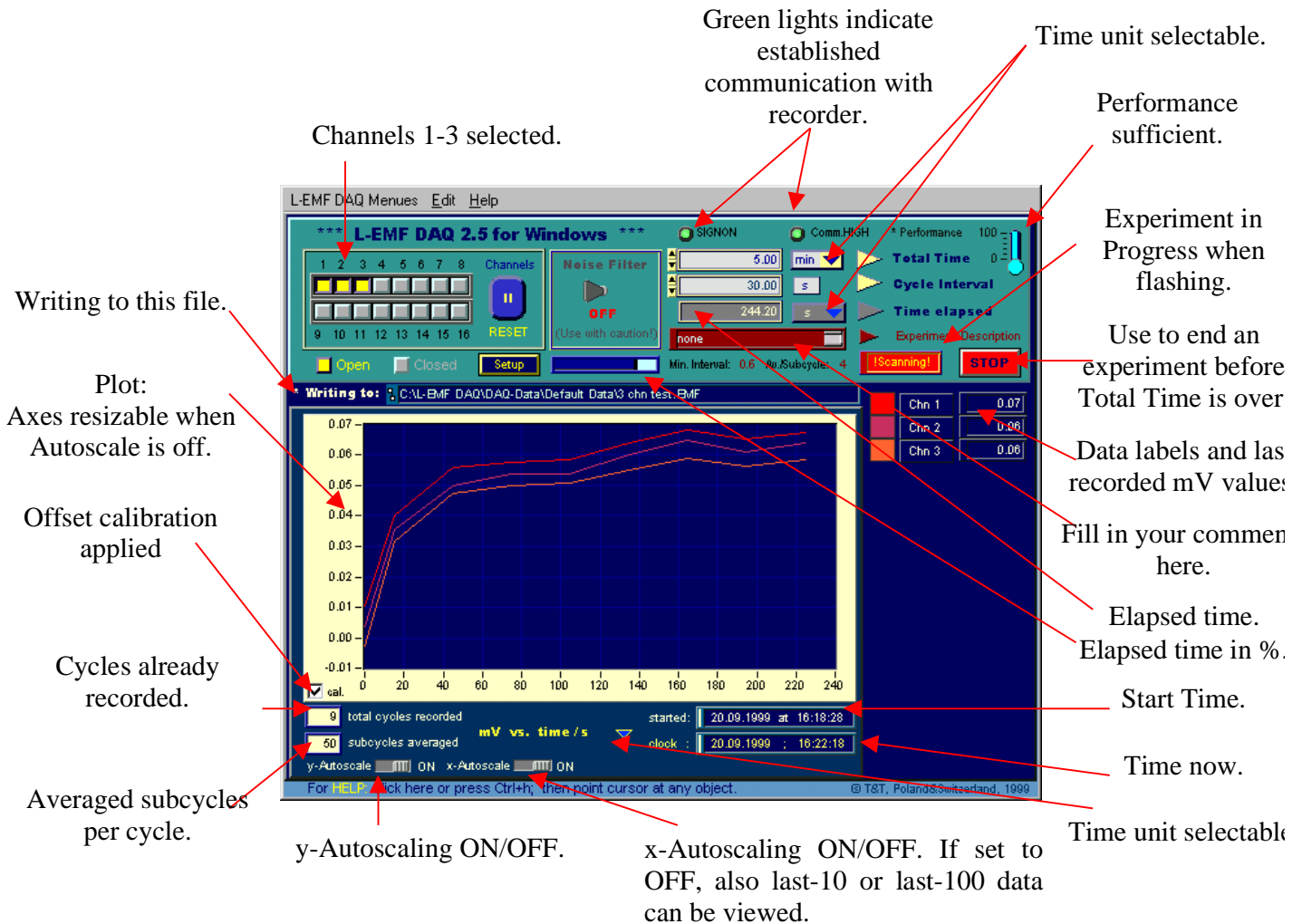


### Operation Scheme:

**Open the channels** you want to operate (2) – Select instrument internal **Data Rate** (24)\* – Select instrument internal **Filter** mode (23)\* – Enter the **Total Time** of your experiment (20) – Enter the

\*) Adjustment of the internally applied data rate may help to reduce line current frequency noise, but increases the minimal cycle interval to a certain extent. Application of the 4 Hz low-pass filter may help to reduce serious noise problems, but in exchange massively increases the minimal cycle interval. Contact LawsonLabs Inc. (lawsonlab@lawsonlabs.com) for recommendations on best use of the two functions.

**Cycle Interval** (18) – Choose, if you want to start in **TEST** mode or in Acquisition mode (default) (26)\*\*\*) - Press **START** (15) – select data file name and directory in Acquisition mode -> data is written to **Data File Path** (4) – green **SIGNON** light indicates, that the recorder has been waking up from sleep mode (22) - green **COMMUNICATION.HIGH** light indicates, that communication has been established at the desired baud rate (21) – **Performance Meter** at 100% indicates sufficient performance – your experiment is in progress...



For short time pausing of the data logging in progress, the **PAUSE** button (25) **\*\*\***) may be clicked; an indicator will display the duration of the pausing.

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**\*\***) In **TEST** mode no data is recorded to disk. **CAUTION:** All data will be lost after the end of an experiment in **TEST** mode. Therefore it is called 'TEST' mode and is intended for short testing of a setup e.g. Always run in acquisition mode, if you want to reuse the sampled data. A message will pop up when starting up in test mode, to remind you, that you are starting up in **TEST** mode.

**\*\*\***) Pausing an experiment will **NOT** prolong it's total acquisition time. It will simply pause the logging of data to display and log file for the duration of the **PAUSE**.

Please check the following, if you encounter stability problems:

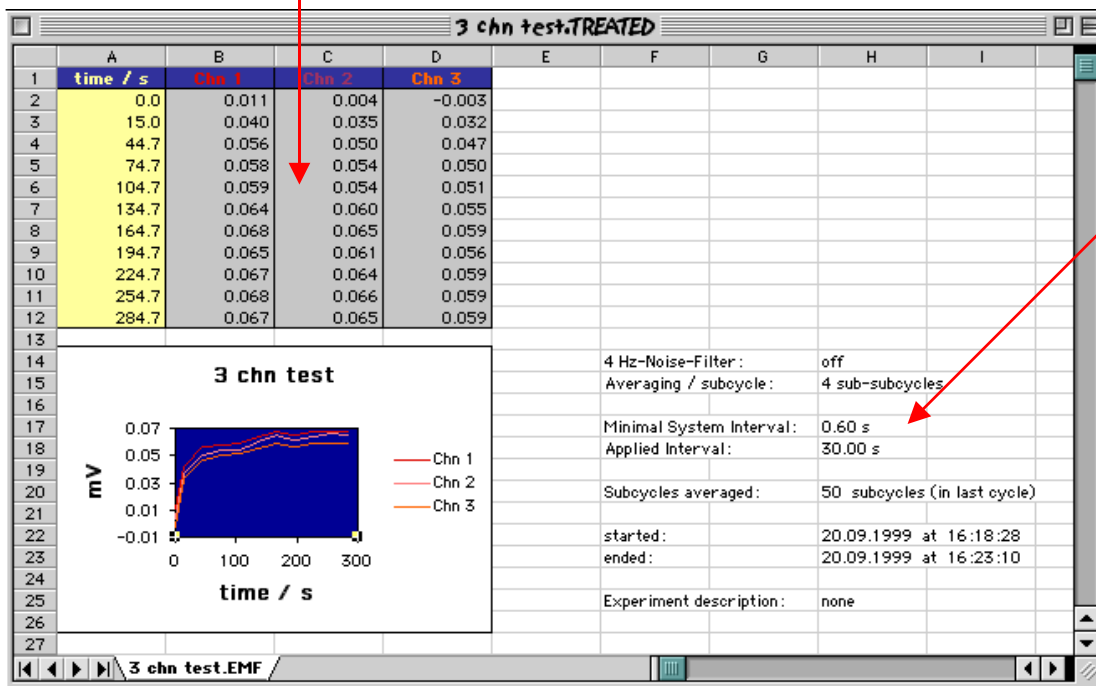
• **IMPORTANT:**

- Make sure that there are ***no other applications*** and ***no network activities*** that can slow down the performance from the background while an experiment is in progress! Otherwise a performance error or a scan rupture could occur.
- Make sure the you select the ***shortest possible beep*** from your System – beep length cannot be controlled from *L-EMF DAQ 3.0* – and may cause some troubles, if they are to long...!

The *recorded data files* can easily be viewed and treated with any application able to read .txt files on any platform.

For best data reviewing and treatment use an application able to read *tab-delimited spreadsheet text*, such as Microsoft© Excel.

Tab-delimited  
spreadsheet text  
data.



Log-part of the  
data file:

Key parameters are  
logged to each  
recorded data-log  
file.

Each recorded data file contains the recorded time(s)/mV array as well as a Log-part at the lower right end of the mV data. The key parameters of the experiment as well as the experiment description are logged. The experiment description can be entered throughout the whole experiment.

- **Notice:** If some averaging is applied within the cycles, then also the time is averaged (except very 1<sup>st</sup> data point at time = 0). Therefore you may observe “uneven” times.

## 13. PopUp Help

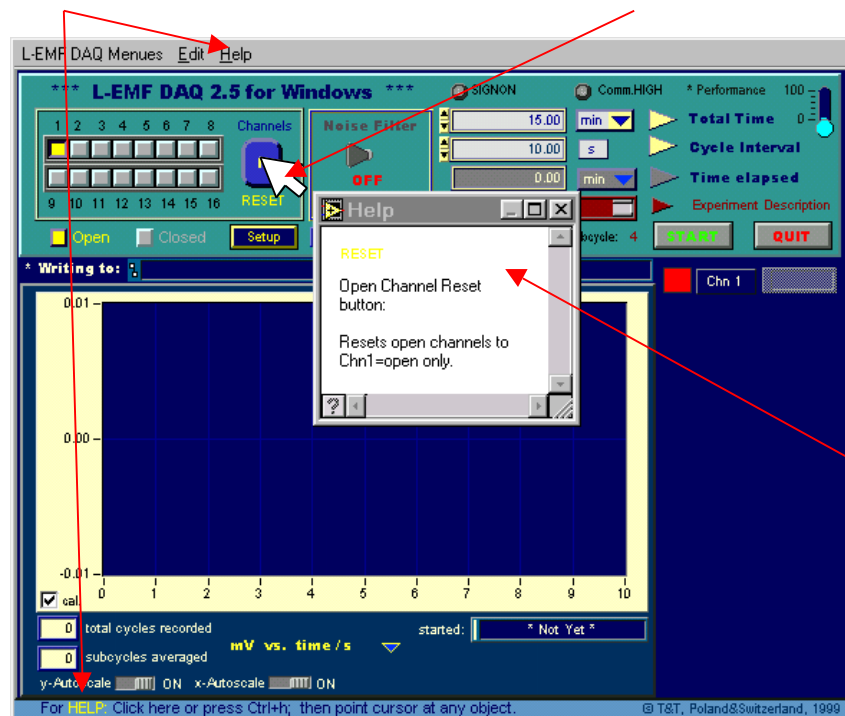
*L-EMF DAQ 3.0* comes with a PopUp Help which explains all its objects. You just have to open the PopUp Help and point at any object with the cursor. You have several possibilities to open the PopUp Help:

- Open PopUp Help from the **“Help”-Menu**.
- Open PopUp Help from the yellow **“HELP”**-text below the graph (works only when there is no experiment in progress).
- Open PopUp Help by pressing **<ctrl+h>**; works at any time.

Drag the PopUp Help window close to the object of your interest and point cursor at the object: Description of the object is displayed.

Activate PopUp Help here or press <ctrl+h>.

Move Cursor to an object.



PopUp Help Window.  
Can be moved and resized.

## 14. Errors and Troubleshooting

For problems caused by the hardware, contact the hardware manuals provided by Lawson Labs, Inc.

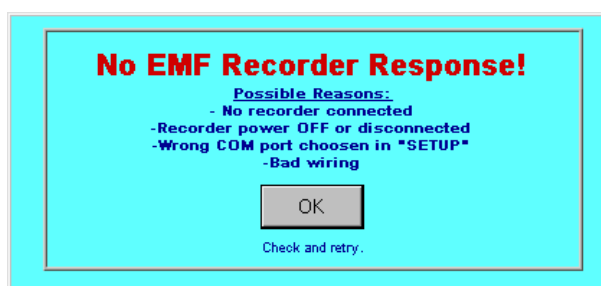
There are prompts and alert beeps for all *known* possible errors and troubles. Prompts give you an idea about the reason of an error.

After each *known* error the hardware will be reset and the program will exit it self in a controlled way. Program hanging or freezing *should* not occur with *known* errors. If, nevertheless, there is a freezing of *L-EMF DAQ 3.0*, cycling the power of the recorder might help in most cases.

**! After an error of any kind restarting of *L-EMF DAQ 3.0*, the PC *and* the recorder (cycle the power) is strongly recommended !**

- ***Known Errors and Troubleshooting:***

- **“No Recorder Error”**



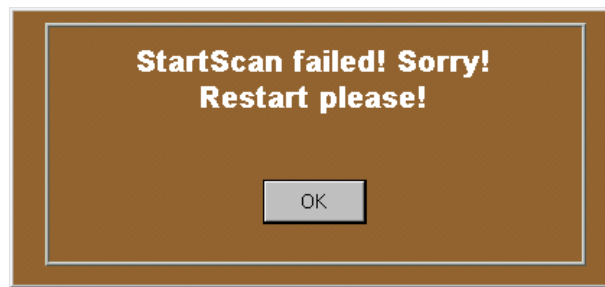
***Possible Reason:***

- no or badly connected recorder
- recorder power OFF or disconnected
- wrong COM port selected
- wrong COM port configuration

***Troubleshooting:***

- properly connect a recorder
- make sure recorder is powered
- select COM port in SETUP
- configure COM port (Windows)

- “StartScan failed Error”



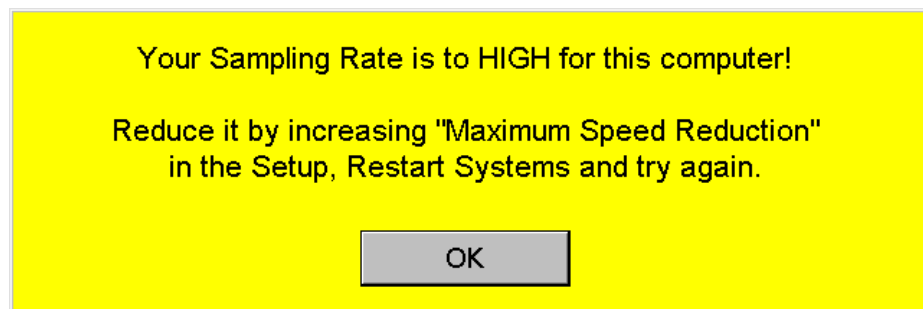
***Possible Reason:***

- loss of power while scan start
- bad serial communication
- too much background activity on your PC
- wrong COM port configuration

***Troubleshooting:***

- properly power the recorder
- properly wire the serial cables
- QUIT all other applications
- configure COM port (Windows)

- “Sampling Rate to HIGH Error”



***Possible Reason:***

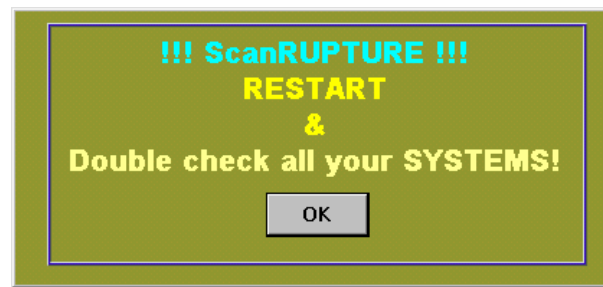
- ***Performance lower then 100% !!!***
- bad serial communication
- ***too much background activity*** on your PC
- harddisk full or heavily fragmented

***Troubleshooting:***

- ***Adjust Performance (10, p.17)***
- properly wire the serial cables
- QUIT all other applications
- clean up harddisk



- “ScanRUPTURE Error”



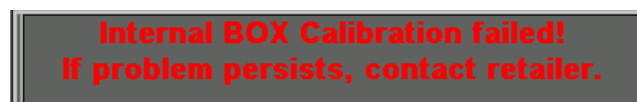
***Possible Reason:***

- loss of power while scanning
- bad serial communication
- *too much background activity* on your PC
- wrong COM port configuration

***Troubleshooting:***

- properly power the recorder
- properly wire the serial cables
- QUIT all other applications
- configure COM port (Windows)

- “Internal BOX calibration failed Error”

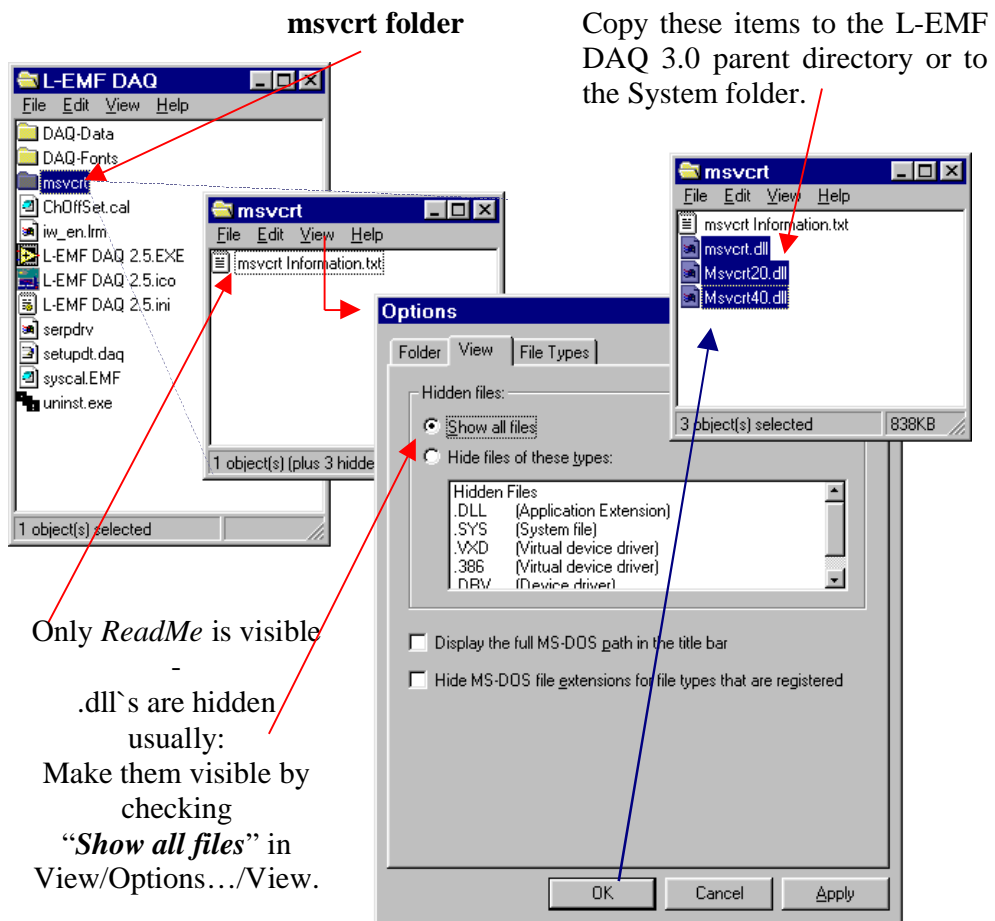


If you observe this prompt – usually together with a ScanStart Error - then the internal box calibration failed by any reason. It may be caused by a single event (like discharge, fields, loss of power...) which caused the internal hardware calibration to fail. In this case, a restart (cycle power) of all components might cure the problem and you are fine. The two files ‘offsetCalib.daq’ and ‘fScaleCalib.daq’ show the results of the most recent instrument internal offset and full scale calibration. Check if the values are within ranges (0.0 & 5.0mV) and if message ‘OK.’ was written. If values and/or OK-messages are bad, a calibration error occurred as indicated. If the problem persists, your hardware might be damaged and you should contact your retailer for advice.

- “msvcrt.dll missing Error”

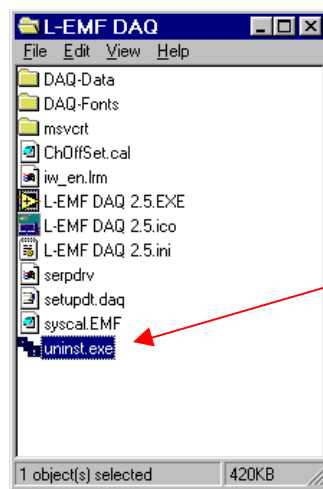
msvcrt.dll's should usually be provided by your Windows System. They can get lost or overwritten, or be of an incompatible version if you are unlucky.

If your System protests, that any kind of “*msvcrt.dll*” was missing, then copy the msvcrt.dll's which came with your *L-EMF DAQ 3.0* (for troubleshooting purposes only) to *L-EMF DAQ 3.0*'s parent directory or to your System folder and then restart your PC.



## 15. Uninstall

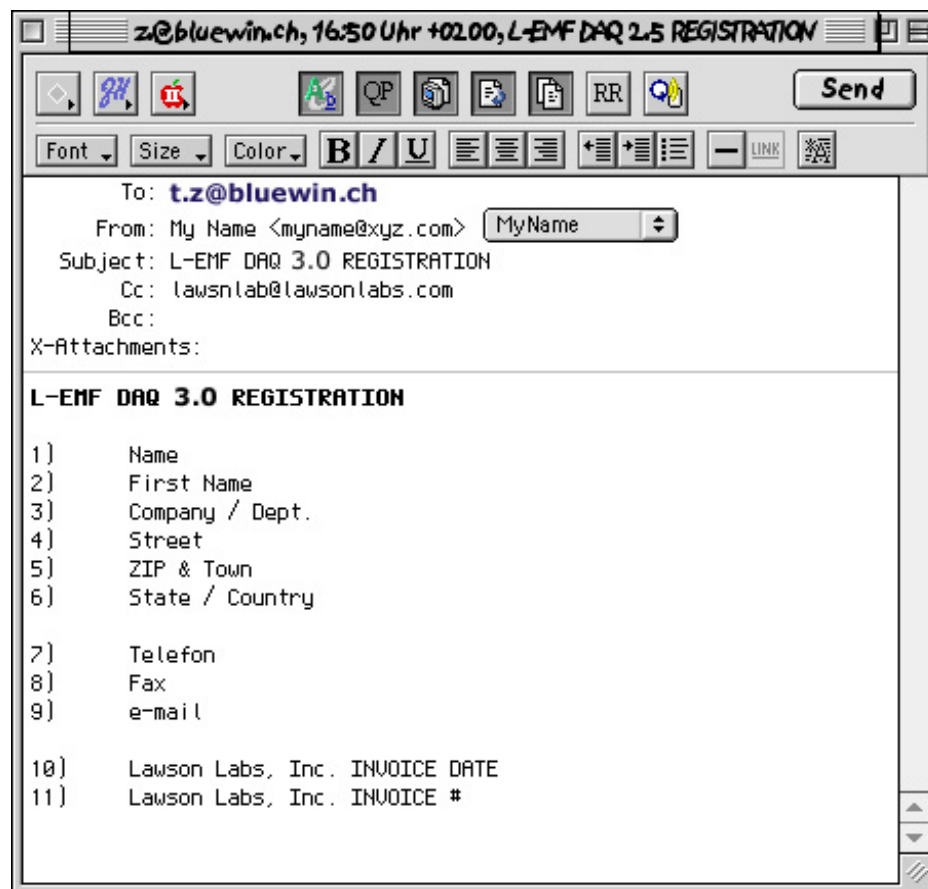
If one day you'd decide to get rid of *L-EMF DAQ 3.0 for Windows* by any reason, it easily can be ***uninstalled*** by running the ***Uninstaller*** which came with your *L-EMF DAQ 3.0*.



Run the ***Uninstaller*** to get rid of *L-EMF DAQ 3.0 for Windows*.

## 16. Registration

In order to be obtain free updates and support, please register your copy of *L-EMF DAQ 3.0 for Windows* by submitting a registration form of the following kind via *e-mail*:



The screenshot shows an email client window titled "z@bluewin.ch, 16:50 Uhr +0200, L-EMF DAQ 2.5 REGISTRATION". The email header includes:

- To: **t.z@bluewin.ch**
- From: My Name <myname@xyz.com> (with a dropdown menu showing "MyName")
- Subject: L-EMF DAQ 3.0 REGISTRATION
- Cc: lawsnlab@lawsonlabs.com
- Bcc:
- X-Attachments:

The body of the email contains the following registration form:

**L-EMF DAQ 3.0 REGISTRATION**

- 1) Name
- 2) First Name
- 3) Company / Dept.
- 4) Street
- 5) ZIP & Town
- 6) State / Country
- 7) Telefon
- 8) Fax
- 9) e-mail
- 10) Lawson Labs, Inc. INVOICE DATE
- 11) Lawson Labs, Inc. INVOICE #

The authors look forward to any kind of feedback. Report any kind of problems, inconveniences, incompatibilities, failures and/or success to one of the following support and contact addresses:

**t.z@bluewin.ch or lawsnlab@lawsonlabs.com**