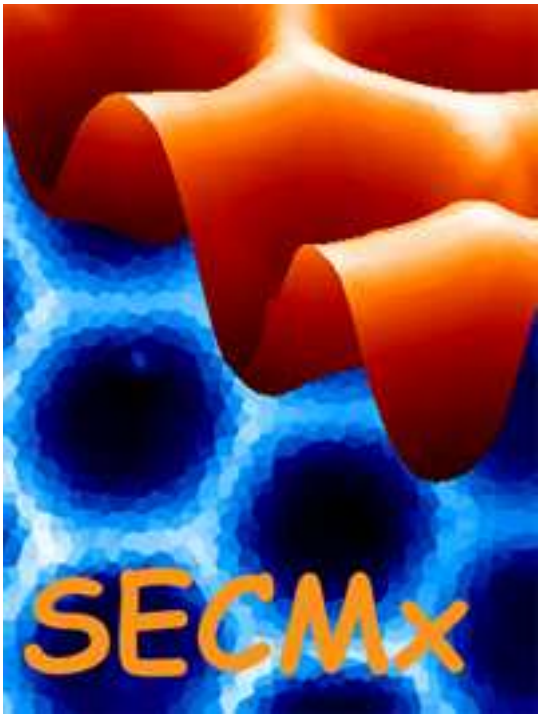

Manual SECMx, version 14

Part I: Installation

Last change 16 August 2021

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Setting up the hardware and the software overview

Install all hardware. If they come with programs from external vendors make sure that the hardware is running properly.

- Install SECMx
- Edit the users.ini file
- Edit the deviced_*.ini fiels that control which drivers are loaded
- Start SECMx and make the settings to indicate how hardware is connected
- Test the SECMx hardware for proper operation with your hardware

1.1 Preparation of the PC

1.1.1 Operating System

Software requirements: Windows XP, Windows 7, Windows 10
SECMx is designed for a 32 bit Windows operating system and runs most stable under Windows XP. It is likely that it runs under Windows 10 (32 bit system), but this has not been tested extensively. Limitations may occur with specific hardware components while most components operate without problems.

1.1.2 Energy saving options and processor frequency

It his highly recommended to disable energy saving option of the operating system such as automatic shutdown or slowing down of processors, hard drives etc. This may causes unexpected and unpredictable results during long measurements etc.

1.1.3 Required third party software

For displaying help files and manuals, an Acrobat reader or another PDF reader must be installed and registered at the operating system.

1.1.4 Region-specific settings

It is highly recommended to adjust the regional settings to have the dot "." as the decimal sign and the comma "," as grouping sign of digits within large numbers. This settings corresponds to the standard English number system. Other regional settings can remain on the preferred setting for the country in which the program is used. In order to make the setting (for Windows 7), Start/System settings/Time, Language Region/Region and Language/Date, time and number formats/More settings (Fig. 1).

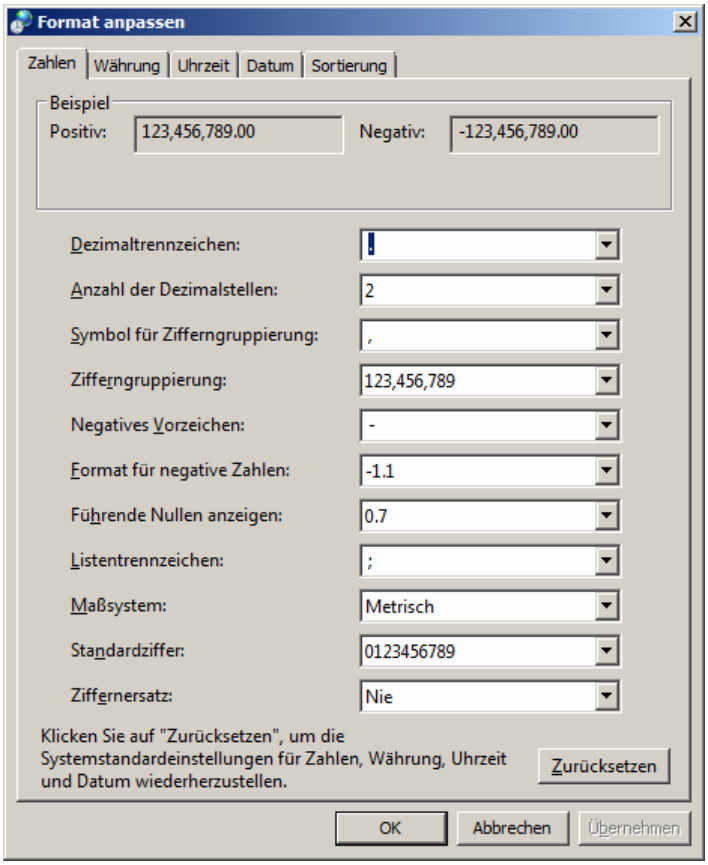


Fig. 1: Recommended settings for number formats.

1.1.5 Window design

Some windows in SECMx contain many elements on small space to leave ample area on a screen for graphic display. Windows have been optimized for what is called classical design. Very restricted effort has been spend to make the forms adapting to other Window layouts, font size etc.

To set the Window layout (Windows XP):
Move the mouse pointer over an empty area of the Windows Desktop, right-click.
Select "Eigenschaften" (Properties).
In the ListBox Design, select "Windows - klassisch" (Windows classic).
You may select other background colors or pictures. The points is in the size of menu bars.

If you try under Windows 7 (German) right-click on empty area of the Desktop, select "Anpassen" (Adjust). Select "Windows - klassisch" (Windows classic). You may select other background colors or pictures. The points is in the size of menu bars.

2 Installation of hardware

If your specific hardware is not listed below, it may not require special attention. Follow the instruction of the hardware vendor.

Hardware components are group and described according to the following classes
- Analog-digital (AD) and digital-analog (DA) converters
- Analog potentiostats
- Digital potentiostats
- Positioning systems
- Light sources

For each piece of hardware, there is a separate file showing details of the hardware connections and the required settings in the software. The description below is meant as an overview.

2.1 AD and DA boards from Measurement Computing

Installing hardware
These insertion boards are distributed in Germany by Plug-In Electronic. The are operated by the use of the Universal Library. This is a product of Measurement Computing and is installed on the PC by the program InstaCal that comes with the boards (file cbw32.dll contained in the InstaCal folder).
The following cards are currently supported
CIO DAS 1602/16
CIO DA02
DAS 1602/16
DDA04
DDA08

There have been different versions of InstaCal. The current procedure on installing the cards differs from previous versions of SECMx and from the general scheme of other devices.

Please follow those guidelines if you install a new SECMx.
- Follow the instruction of measurement computing and insert the boards, install InstaCal, assign the board numbers and test the functionality of the boards.
- If everything is o.k., deinstal InstaCal.
- Install SECMx, but do not start the program.
- In the installation folder of SECMx you will find an install file of InstaCal 6.01 **mcdac.exe**. Start this installation file and install InstaCal 6.01 on your PC.
- Test the functionality of your boards with InstaCal 6.01.
- Calibrate your cards. Follow the instruction of the InstaCal program.
- This version of the Universal Library is used by SECMx. Note the board numbers assigned by InstaCal to your boards (typical Board number = 1, 2, ...) . You will need them when editing the device_*.ini files.

The following files are needed for operating the cards

cbw32.dll (it is in the InstaCal installation path. This files should not any more be contained in the SECMx folder.)

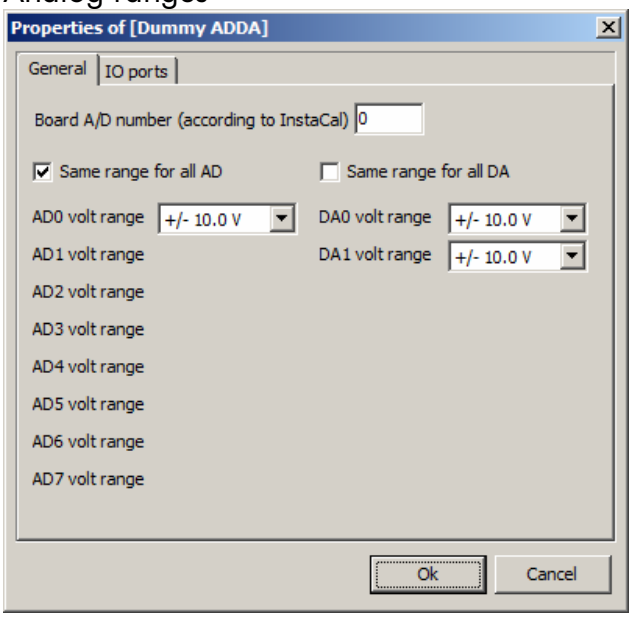
CIO DAS 1602/16	drv_cio_das1602_16.dll
CIO DA02	drv_cio_das02_16.dll
DAS 1602/16	drv_das1602_16
DDA04	drv_dda4.dll
DDA08	drv_dda8.dll

After installation of SECMx

The following settings must be made in SECMx

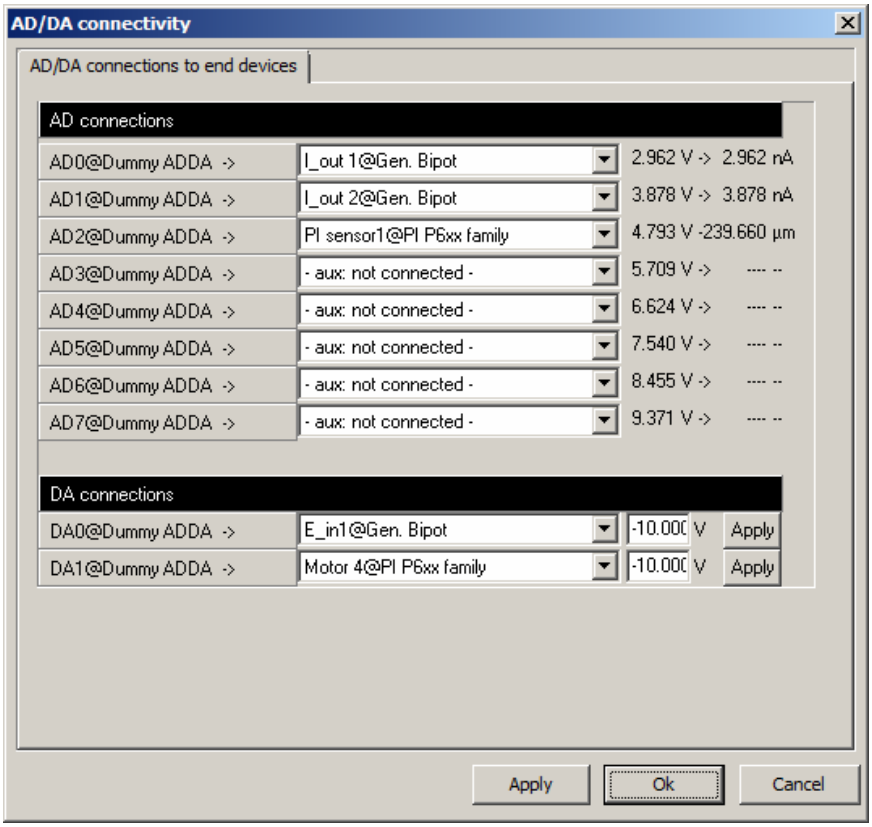
Hardware/Devices/[name of the board]

Analog ranges



Hardware/Devices/AD-DA connectivity

For each AD and DA channel the connected device must be selected. The selction must represent the wire connection between the AD and DA boards and external devices



2.2 Analog potentiostats

Installing hardware

Connect the output of the device to the AD channel of an AD card

Connect the input of the device to an DA channel of an AD/DA card or an DA card. Usually a dedicated DA card provide the better signal quality and should be prefrred if available.

Do this after installing the AD card, the software and SECMx.

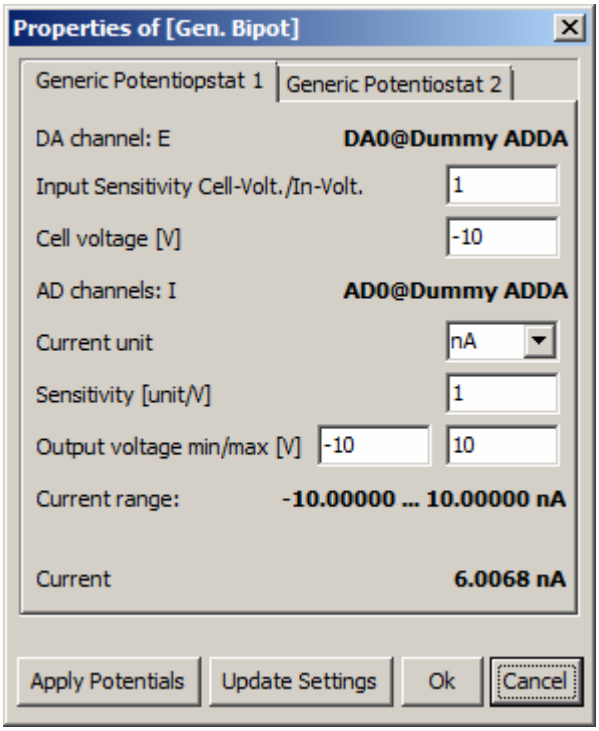
After installation of SECMx

Analog potentiostats accept an voltage as the desired electrode potential and provide a voltage (typically -10 V ... + 10V) that is proportional to the measured current. In addition they may provide another signal monitoring which measurement range is adjusted (by hardware at the instrument). This voltage is read by an AD card. The desired potential is either provided by an AD card, the potential is set at the instrument or by a separate software. In general, every potentiostat that provides an analog voltage that is proportional to the current can be used with SECMx.

There is one driver that can operate every connected analog device. This driver manages the transformation between the voltage to the measured quantity. The user must provide the sensitivity for the current measurement range as well as the unit (e.g. 1 nA/V, "nA")

drv_gen_bipot.dll

Hardware/Devices/[name of the analogue device]



While this is in principal sufficient for all possible potentiostats that have analog input and outputs, there are more drivers that provide device-specific functionalities. In particular range settings can be detected by SECMx or even set from SECMx.

Schramm mP3	drv_schramm_mp3.dll
Schramm mBIP2	drv_schramm_mBIP2.dll
Jaissle PG10	drv_jaissle_pg10.dll
npi	drv_npi.dll
CH Instruments 7001	drv_ch_in.dll
CH Instruments 6xx	drv_ch_in_600.dll

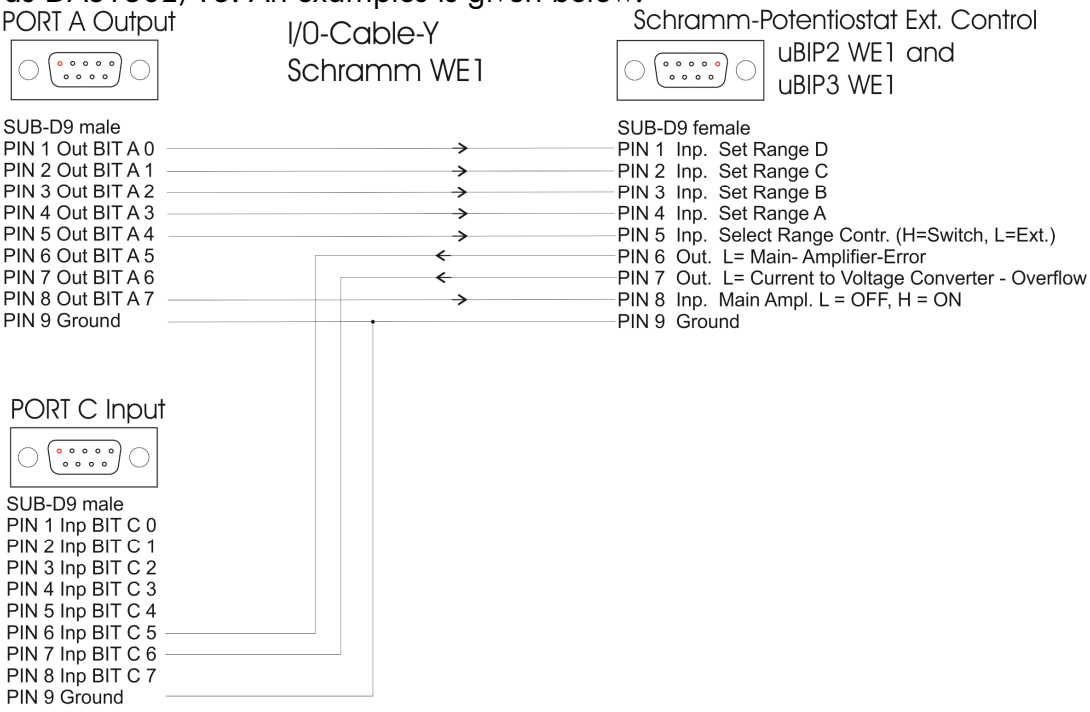
The corresponding device settings are similar to the generic potentiostat. Instead of an free unit and sensitivity only those sensitivities of the specific instrument are available from a list box.

Most digital potentiostats provide an analog voltage that can be connected as input signal to an AD card.
This applies to products like Autolab, Palmsens (that can also be operated as digital potentiostat, CHI series, Biologic, ... Typically you may need a separate PC to operate the potentiostat. The voltage signal that is proportional to the current is read by an AD card as the signal for SECMx. User must enter the current range in SECMx each time the change the settings at the external potentiostat.

2.2.1 Schramm mP3

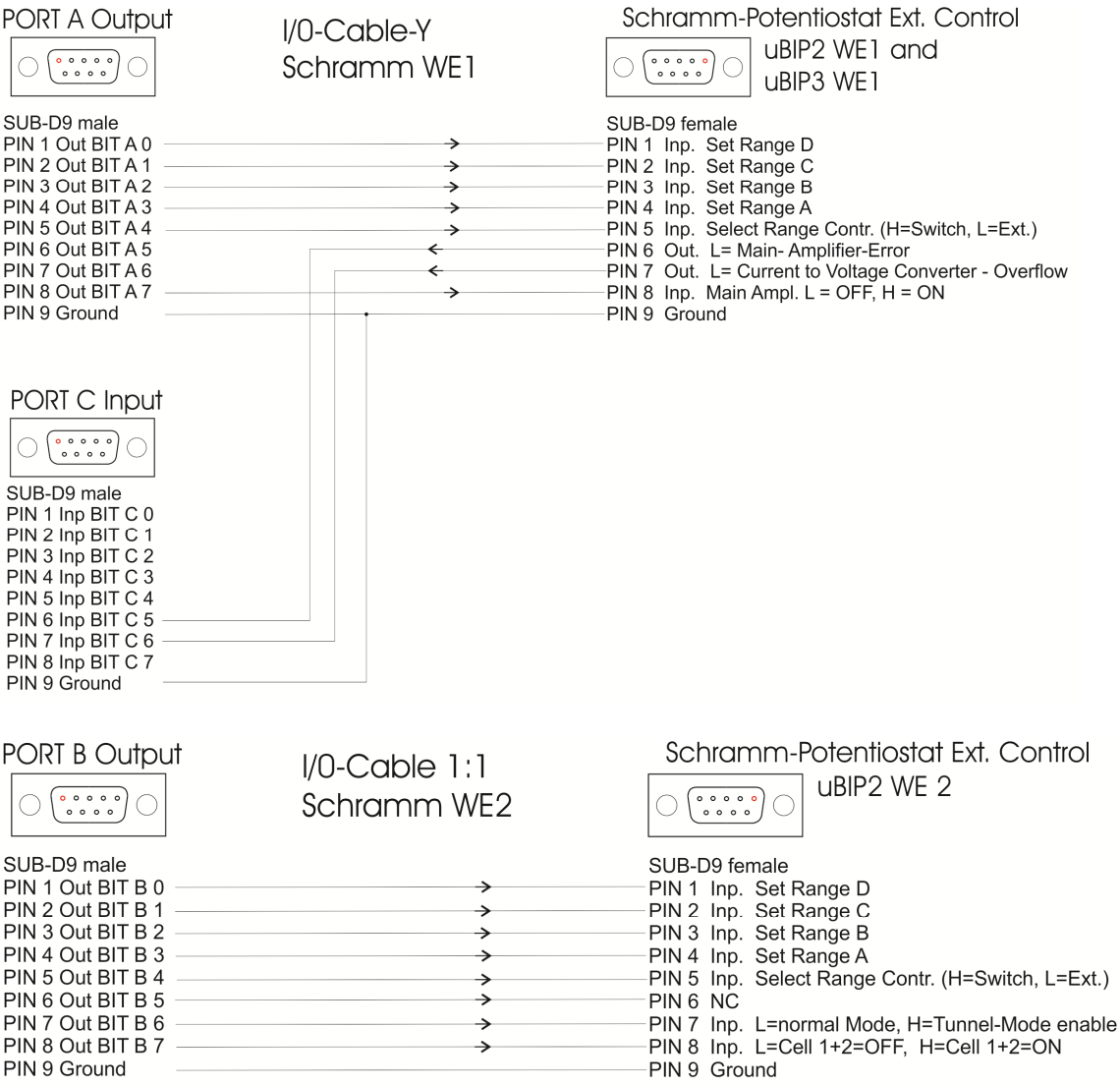
Input: Analog voltage from DA. this is used as the cell potential (-10 V .... +10 V)
Output: Analog voltage proportional to current
Range monitor (0 V / 1 V / 2 V / ...) for the measurement ranges (1 µA /V / 500 nA/V / ....)

Digital Input/outputs: The should be connected to the digital ports of an I/O card such as DAS1602/16. An examples is given below.



2.2.2 Schramm mBIP2

Input1: Analogue voltage from DA for UME. This is used as the cell potential (-10 V .... +10 V)
Input2: Analogue voltage from DA for sample. This is used as the cell potential (-10 V .... +10 V)
Output1: Analog voltage proportional to current at UME
Output2: Analog voltage proportional to current at sample
Range monitor1 (0 V / 1 V / 2 V / ...) for the measurement ranges (1 µA /V / 500 nA/V / ...) at the tip
Range monitor2 (0 V / 1 V / 2 V / ...) for the measurement ranges (1 mA /V / 500 µA/V / ...) at the sample
Digital Input/outputs: The should be connected to the digital ports of an I/O card such as DAS1602/16. An examples is given below.



2.2.3 Jaissle PG10

Excitation signal 1 ("Sollspan. Ring"): Should be connected to a DA output channel. It is the desired electrode potential for the sample (labelled "Ring", -10 V .... +10 V). The polarity is inverted. (A voltage from +1.0 V leads to an electrode potential of -1 V vs. reference electrode.)
Excitation signal 2 ("Sollspan. Scheibe"): Should be connected to a DA output channel. It is the desired electrode potential for UME (labelled "Scheibe", -10 V .... +10 V). The polarity is non-inverted. (A voltage from +1.0 V leads to an electrode potential of +1 V vs. reference electrode.)

Signal1 ("I Ring"): Analog voltage proportional to current at sample ("Ring"). It should be connected to an AD channel. The voltage is inverted to the IUPAC convention (1 nA corresponds to -0.1 V at the 10 nA range).
Signal2 ("I Scheibe"): Analog voltage proportional to current at UME ("Scheibe"). It should be connected to an AD channel. The voltage corresponds to the IUPAC convention (1 nA corresponds to +0.1 V at the 10 nA range).

Range monitor1 ("Bereich Ring"): (0 V / 1 V / 2 V / ...) for the measurement ranges ("Ring"). The ranges are labeled 10 nA (-1nA/V), 100 nA (-10 nA/V) ... 10 mA (-1 mA/V).
Range monitor2 ("Bereich Scheibe"): (0 V / 1 V / 2 V / ...) for the measurement ranges UME ("Scheibe"). The ranges are labeled 10 nA (1nA/V), 100 nA (10 nA/V) ... 10 mA (1 mA/V).

2.2.4 npi

Input: Analog voltage from DA. this is used as the cell potential (-10 V ... +10 V). This value is divided by 10 and applied to the working electrode (- 1V ... + 1 V). Example: An analog voltage of +5 V will lead to an electrode potential of +0.5 V.
Output: Analog voltage proportional to current
Range monitor (0 V / 1 V / 2 V / ...) for the measurement ranges (1 µA/V / 500 nA/V / ...).

2.3 Other devices that accept and provide analog voltages

For other devices there is a generic driver that performs conversions of voltages, units etc. (e.g. for a temperature sensor). The driver can handle up to 8 different devices.

drv_gen_ana_in.dll

For devices that accept an voltage (like the piezoelectric actuator, or a light source), there is a driver where user may provide conversion factors and units. The driver can handle up to 8 different devices.

drv_gen_ana_out.dll

2.4 Digital potentiostats

Digital potentiostats have an own microprocessor. SECMx sends commands to this microprocessor and accepts digital data from these devices via an RS232, USB or an Ethernet connection. The integration of a digital potentiostat requires that the protocol to operate the microprocessor is made available by the producer.

The required steps for operation depend on the specific devices. Typically the SECMx must connect to the microprocessor. This runs automatically during startup or must be initiated by the user as described below.

2.4.1 Ivium Compactstas

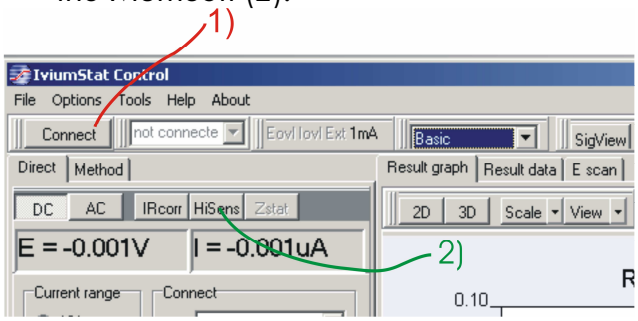
Installing hardware
Install the IviumSoft hardware. Pay attention to the IviumSoft version and the version of the firmware. They must be compatible.

After installation of SECMx
The following files are required

drv_ivium_bipot.dll
IVIUM_remdriver.dll
drv_ports.dll

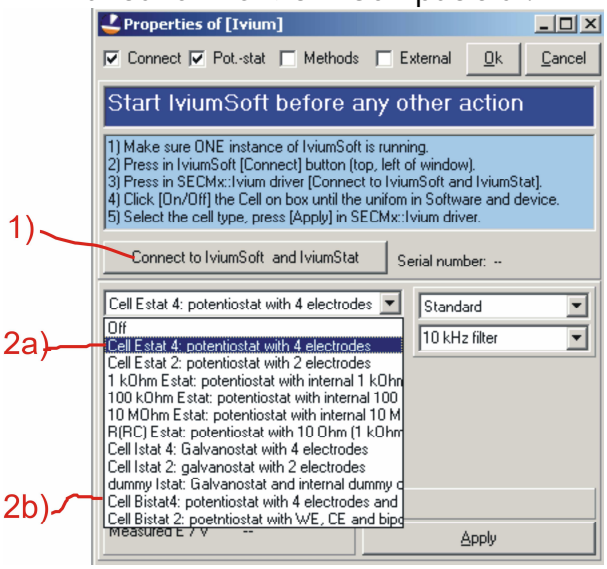
For each program start of SECMx

1) Start the IviumSoft software, press ***Connect*** (1), select the high sensitivity option in the IviumSoft (2).

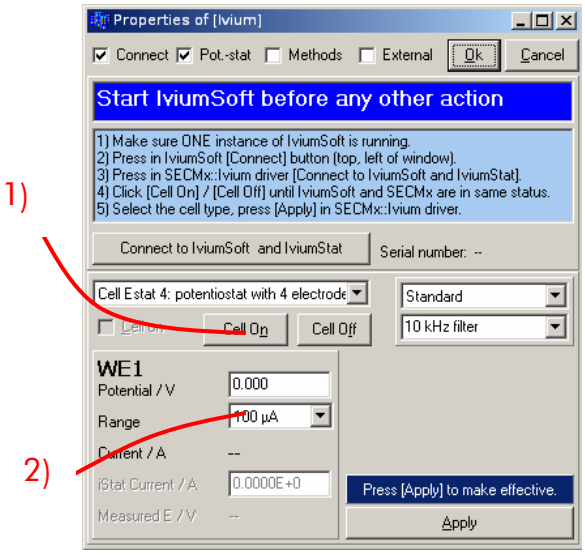


2) Start the SECMx software, select the appropriate user profile.

3) If during the loading process the window of the Ivium driver pops up, press ***Connect***. (1). Select the cell type you need. In most cases you will use the monopotentiostat option (2a). If you want to use the bipotentiostat select (2b). The electrode you want to use for potential programs from the IviumSoft should be WE1 (in most cases this will be the microelectrode). For more details see the manual of the Ivium CompactStat.



4) Switch on the electrochemical cell (1). Check that the corresponding option control in the IviumSoft will also switch. Then select the current range (2). Select the filter and the potential at which no reaction occurs. Press ***Apply*** and then ***Ok***.



2.4.2 Ivium CompactStat with extension WE32 for operation of up to 32 probe electrodes

Installing hardware

Install the IviumSoft hardware. Pay attention to the Ivium Soft version and the version of the firmware. They must be compatible.

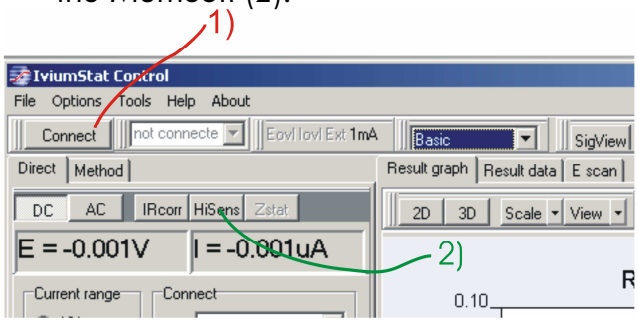
After installation of SECMx

The following files are required

drv_ivium_we32.dll
IVIUM_remdriver.dll
drv_ports.dll

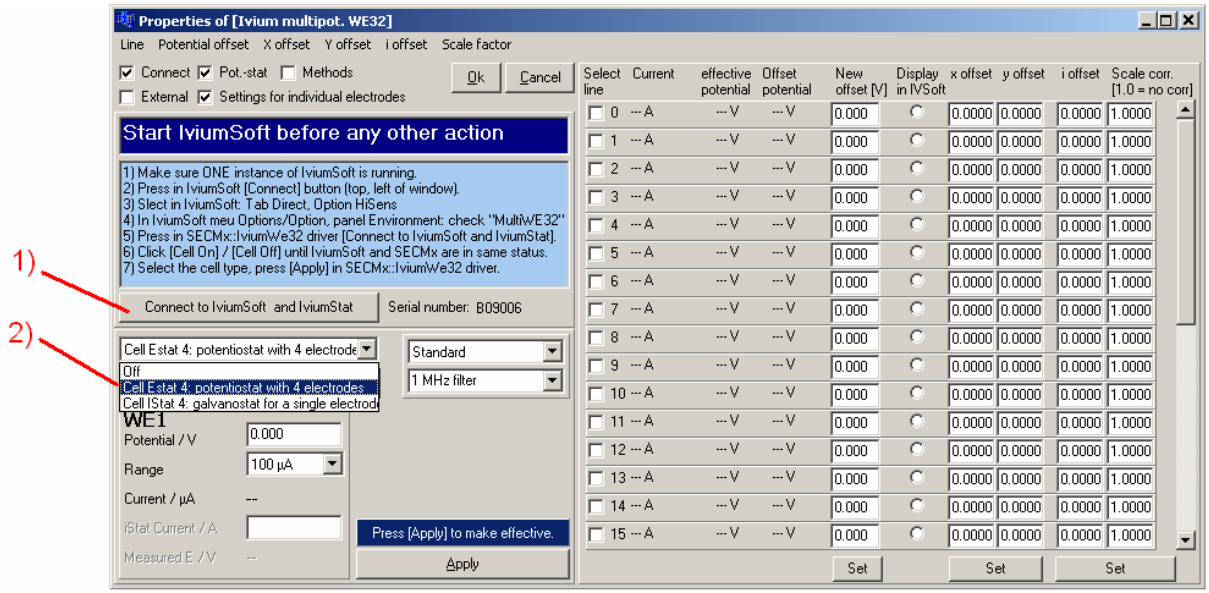
For each program start of SECMx

1) Start the IviumSoft software, press ***Connect*** (1), select the high sensitivity option in the IviumSoft (2).



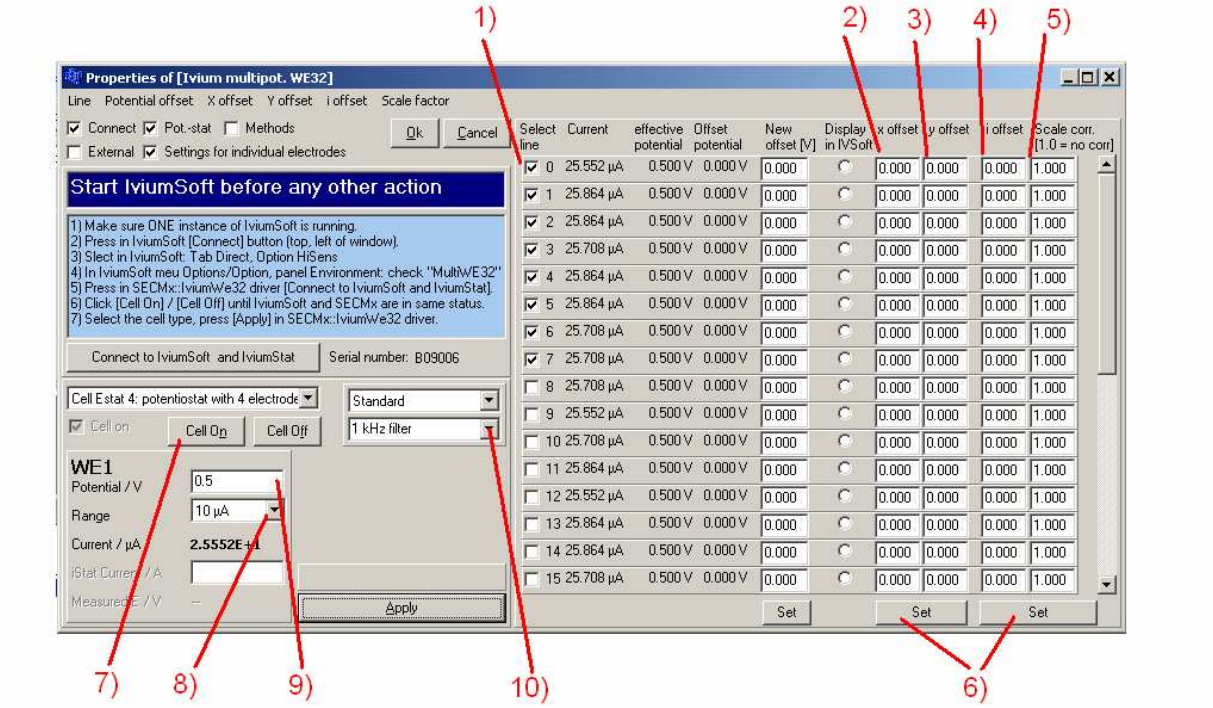
2) Start the SECMx software, select the appropriate user profile.

3) If during the loading process the window of the Ivium driver pops up, press ***Connect***. (1). Select the cell type you need (2).



4) If you use an array of microelectrodes you have to check in column **Select line** which Ivium channels/lines you have connected to the channels of the microelectrode array (1). Please note that the channel numbering of SECMx is from **0** to **31** in contrast to Ivium MultiWE32 (from **1** to **32**!). Example: Channel/Line 0 in SECMx means channel 1 in Ivium MultiWE32 and channel/line 23 in SECMx means channel 24 in Ivium MultiWE32. The tips of the array may have positional offsets on the sample and differences in electrochemical response (for instance due to slight variations in their size or working distance):
   - *x* position offset (2) (***x offset***, *x offset*[*i*] = 0 means the *i*-th electrode has the same *x* coordinate as electrode[0]),
   - *y* position offset (3) (***y offset***, *y offset*[*i*] = 0 means that electrode *i* has the same *y* coordinate as electrode[0]),
   - current offset (4) (***i offset***, *i offset*[*i*] = 0 means that no offset is applied to the values coming from sensor *i*),
   - correction factor of the sensitivity (scale factor) (5) (*Scale corr.*, *Scale corr.*[*i*] = 1.0 means no correction is applied for electrode *i*).

   Only the original measured data are shown in SECMx and are saved in the files! The correction values are written additionally in the saved data files. The saved data files are treated in MIRA afterwards. In MIRA the original measured values are corrected then with the offsets and scale factors. It is easily possible and intended to change the offsets and scale factors in SECMx via ***Hardware/Setup Devices*** and afterwards do fine tuning of the correction values in MIRA. Please read also the MIRA manual. After entering the offsets and scale corrections click the corresponding **Set** buttons (6). Now switch on the electrochemical cell (7). Check that the corresponding option control in IviumSoft and the red LED at the CompactStat will also switch on. Then select the current range (8). Enter the potential (9) and select the filter (10). Press ***Apply*** and then ***Ok***.



2.4.3 Gamry Reference 600

Installing hardware

The Gamry Framework must be installed and it must be of the same version as the drv_gamry_family.dll was made for.

The following files are required

Gamry Reference 600 (2 devices as bipotentiostat) drv_gamry_family.dll and Gamry Framework installed

drv_ports.dll

During the loading process, the potentiostats are automatically detected if they are powered on

2.4.4 Gamry PCI insertion board

Installing hardware

The Gamry Framework must be installed and it must be of the same version as the driver was made for.

If you use one potentiostat, use drv_gamry_mono.dll

If you use two potentiostats connected as monopotentiostat, use drv_gamry_bipot.dll

The following files are required

drv_gamry_bipot.dll or drv_gamry_mono.dll

During the loading process, the potentiostats are automatically. They are powered on with the PC.

2.4.5 PalmSense

The communication is over an RS232. Note that the bipotentiostat version also contains two analog outputs over which the current can be read by SECMx. This is faster than transferring each current value in a line scan via the RS232. The potential is set via an command set over RS232.
The following files is required

drv_palmsens.dll
drv_ports.dll

During the first start of the software, you need to tell SECMx at which COM-Port the PalmSense system is attached. Select from the menu ***Hardware/Setup Port connectivities***. If you have connected the PalmSense controller to COM1, select in the drop down list for COM1 "PalmSense". This information is stored in the devices.ini file. It means that this setting must be made for each devices_xxx.ini file one time.

2.5 Positioning systems and tilt tables

2.5.1 Märzhäuser

Installing hardware

Set up the Märzhäuser positioning system and the Corvus control box according to the instructions of Märzhäuser. Test the functionality of the system with the program provided by Märzhäuser

Make at least the following checks
a) Do all axis move?
b) If you request a movement of 1000 μm, is the measured translation 1.0 mm?
c) Can you read the absolute position of the x and y motors? (z motor does not has an encoder)

After installation of SECMx

The following files are required

drv_maerzh.dll
Wp2Comm.dll
drv_ports.dll

During the first start of the software, you need to tell SECMx at which COM-Port the Märzhäuser positioning system is attached. Select from the menu ***Hardware/Setup Port connectivities***. If you have connected the Corvus controll box to COM1, select in the drop down list for COM1 "Märzhäuser". This information is stored in the devices.ini file. It means that this setting must be made for each devices_xxx.ini file one time.

Repeat the test from SECMx.

2.5.2 mechOnics

Installing hardware

Please set up the mechOnics positioning according to the instructions of mechOnics. Test the functionality of the system with the program provided by mechOnics

Make at least the following checks
a) Do all axis move?
b) If you request a movement of 1000 μm, is the measured translation 1.0 mm?
c) Can you read the absolute position of the x, y and y motors?

After installation of SECMx
The following files are required

```
drv_mechonics.dll
ezusb.sys (from mechonics)
PlxApi.dll (from mechonics)
Servo3AxUSB2.dll (from mechonics)
ezusbw2000.sys  (from mechonics)
drv_ports.dll
```

Repeat the test from SECMx.

After each restart of SECMx
A window appears after reach restart. You must move the motor once over the reference position. The motor might go to the positive or negative hard limit. If the SECM cell is not large enough, this may distroy the UME. It is a good idea to mount the electrode afterwards.

2.5.3 SPI motors

Installing hardware
Please set up the SPI robot control software according to the instructions of SPI. Test the functionality of the system with the program provided by SPI

Make at least the following checks
a) Do all axis move?
b) If you request a movement of 1000 μm, is the measured translation 1.0 mm?
c) Can you read the absolute position of the x, y and z motors?

After installation of SECMx
The following files are required

```
drv_spi.dll
drv_ports.dll
```

There are SPI motors with different resolution (0.01 μm and 0.02 μm). The resolution can be edited in the Setup window of the device ***Hardware/Setup Devices/SPI -XYZ.*** Alternatively, the resolution can be given in the device_*.ini file

```
[Device#7]
DllName=drv_spi.dll
Name=SPI-XYZ
Configuration code= 2
```

Code	Hardware	Resolution

1	SPI	0.01 µm
2	SPI	0.02 µm
all other	SPI	0.01 µm

During the first start of the software, you need to tell SECMx at which COM-Port the SPI positioning system is attached. Select from the menu ***Hardware/Setup Port connectivities***. If you have connected the SPI controller to COM1, select in the drop down list for COM1 "SPI". This information is stored in the devices.ini file. It means that this setting must be made for each devices_xxx.ini file one time.

Repeat the test from SECMx.

2.5.4 Actuators from PhysikInstrumente (PI)

The actuators controlled with the E662 or E665 are treated like an analog device and must be connected to an DA card (0... + 10 V). If the position is to be read they must be connected to an AD channel. No special installation or third party software is required.

After installation of SECMx

Previously, there had been a number of different drivers for piezoelectric actuators from PhysikInstrumente and the corresponding controllers. This has been replaced by one driver.

drv_pi_p6xx_family.dll

This applies to all actuators that are controlled by an analog voltage and can read the real position by a capacitive sensor. During initial setup or after resetting the device_*.ini files, user must select the Motor/controller combination they wish to use.
After the particular motor was selected once, the setting is saved in the ini file and loaded during the start of the experiment. Experienced user can also specify the motors by a code in the ini file in the section of that driver

```
[Device#7]
DllName=drv_pi_p6xx_family.dll
Name=PI P6xx family
Number of actuators [1 .. 9]=3
Configuration code=6|6|4
```

The configuration code lists for each axis x|y|z the index of the motor(s) operated in this dimension.

Code	Hardware	Travel range for a driving voltage 0...10V
0	undefined	used as place holder
1	E665 + P-620.1cd	50 µm
2	E665 + P-620.2cd	50 µm (this must be listed two times)
3	E662 + P-780.20	80 µm
4	E665 + P-780.20	80 µm
5	E665 + P-621.1cd	100 µm

6	E665 + P-621.2cd	100 µm (this must be listed two times)
7	E665 + P-622.1cd	250 µm
8	E665 + P-622.2cd	250 µm (this must be listed two times)
9	E665 + P-625.1cd	500 µm
10	E665 + P-625.2cd	500 µm (this must be listed two times)
11	E665 + P-628.1cd	800 µm
12	E665 + P-628.2cd	800 µm (this must be listed two times)
13	E665 + P-629.1cd	1500 µm
14	E665 + P-629.2cd	1500 µm (this must be listed two times)

Examples
10|10|7 *xy* table with 500 µm travel range for *x* and *y* axis, 250 µm motor for *z*
||3 single motor for *z* axis, range 80 µm
10|10|9:3 *xy* table 500 µm range, *z* actuator 500 µm *and* another actuator with 80 µm

2.5.5 NEXACT drives from PhysikInstrumente

This actuator system communicates with an RS232 connection to the PC. One connection is required for several motors that are chained ("daisy chain"). The controller is E861, one controller is required for each axis.

After installation of SECMx
The following file is required

```
drv_pi_e861_n661.dll
PI_GCS2_DLL.dll
```

During the first start of the software, you need to tell SECMx at which COM-Port the NEXACT daisy chain is attached. Select from the menu ***Hardware/Setup Port connectivities***. If you have connected the E681 controller to COM1, select in the drop down list for COM1 " E861 N661". This information is stored in the devices.ini file. It means that this setting must be made for each devices_xxx.ini file one time.

2.5.6 Positioning system from OWIS

Installing hardware
Insert the SM32 card in the PC and connect the motors according to the instruction from OWIS

After installation of SECMx
The following file is required:

```
drv_owis.dll
SM32.dll
PCISM32.dll
PlxApi.dll
```

2.5.7 ZABER tilt table

Installing hardware

Install and connect the ZABER tilt table and install the software as described by the materials obtained from ZABER company. You may need to install an USB to serial converter. Test the tilt table with the software from ZABER.

After installation of SECMx
The following file is required
drv_zaber.dll
drv_ports.dll

2.6 Shear force system from Anfatec

Installing hardware
The shear-force mode runs on a second PC that comes with the shear force system and is preinstalled. It does not require further installation.

After installation of SECMx
The actuator is a piezoelectric actuator from PhysikInstrumente. The input voltage of the piezo controller (E665 or E662) is connected to the shear force system. The position monitor of the E665 or E662 is connected to one AD channel. The driver for the piezoelectric actuator is required.
drv_pi_p6xx.family.dll

2.7 Light source from Zahner

Installing hardware
The light source is powered by a potentiostat. This potentiostat is controlled via a RS232 interface. There are different LED available that can be manually exchanged. For each LED a calibration file is required.
Install the program PP from Zahner and test its functionality of the device.

After installation of SECMx
The following file is required
drv_zahner_xpot.dll
drv_ports.dll
xpotobj.bin
*.is_ files (one for each LED)
PP2xxdll.dll

During the first start of the software, you need to tell SECMx at which COM-Port the Zahner XPOT is attached. Select from the menu ***Hardware/Setup Port connectivities***. If you have connected the XPOT controller to COM1, select in the drop down list for COM1 "Zahner XPOT with LED". This information is stored in the devices.ini file. It means that this setting must be made for each devices_xxx.ini file one time.

3 Installing SECMx

3.1 Installation file

Execute the program SECMxSetup.exe.
The program will unpack all necessary files and place them in a directory, for instance to C:\programs\SECMx\. There you need to make further settings before or during the first start of the software.

At the end of the installation process the program **timer_calibrator.exe** is executed. If this is prevented by safety settings on your machine, please start it manually. This program must have been executed once.

In case some problems occur, the most important settings are listed and explained below.

3.2 Setting Rights for SECMs

There are rights (full control, Vollzugriff) required for all files SECMx older. Depending on the guideline for administration of the PC, you may be required to set those rights manually. This may require administrator rights or the help of a system administrator. It is a good idea to check the right settings after installation. The Figure below shows the right settings for the operation system Win 7 and Win 10.

Recommended right settings:

- Locate the folder SECMx, right-click, select Properties in order to access the form for access rights. Use the Tab Security.

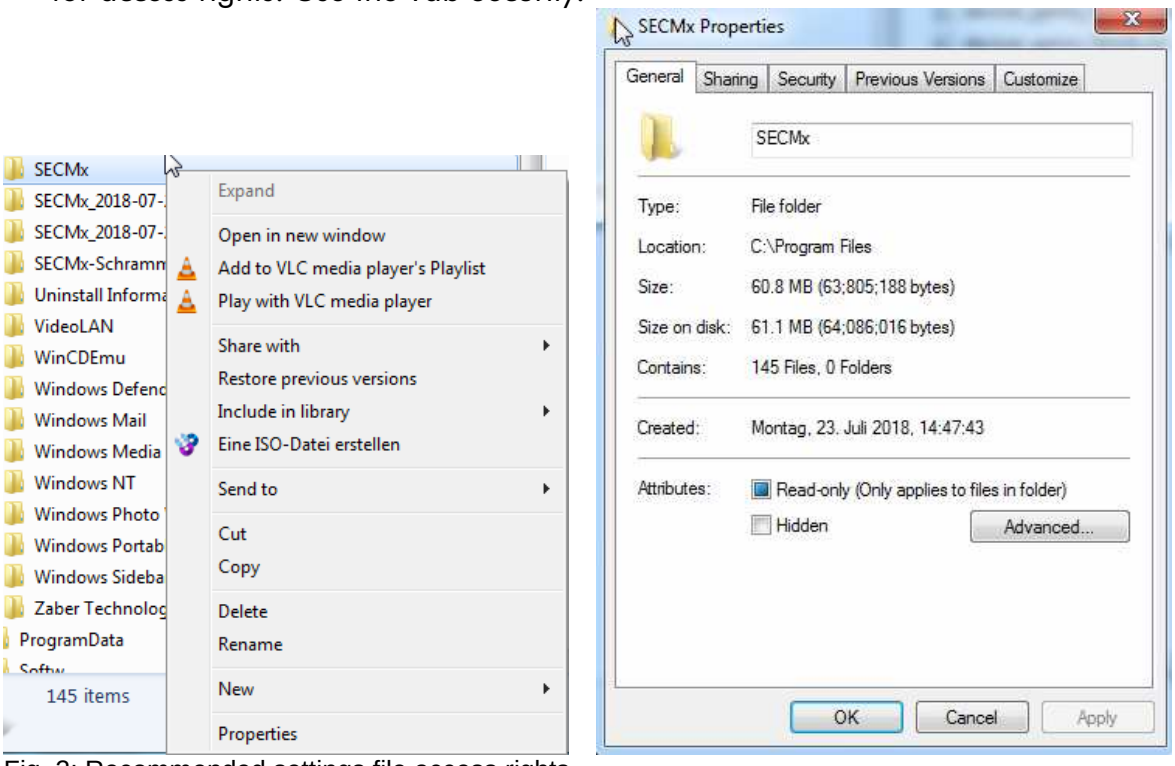


Fig. 2: Recommended settings file access rights.

- Select the Tab Security, press the button [Advanced].
- The window in Fig. 3 appear.
- Press [Change Permission].
- In the new window press Add (Hinzufügen) and add Everyone (Jeder), allow full control (Vollzugriff).
- Close the Window. Afterwards the access right should look like in Fig. 4.

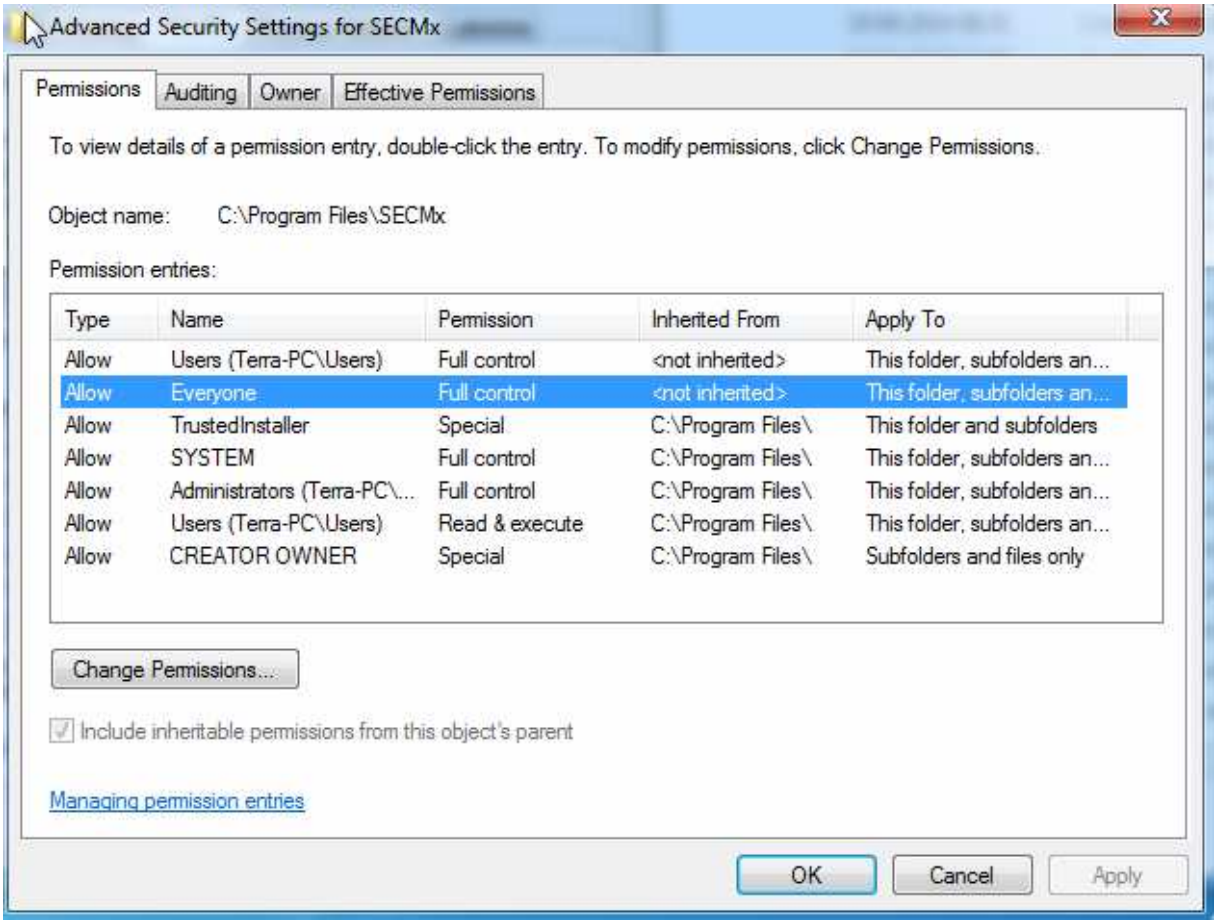


Fig. 3: Window for advanced setting of file access rights.

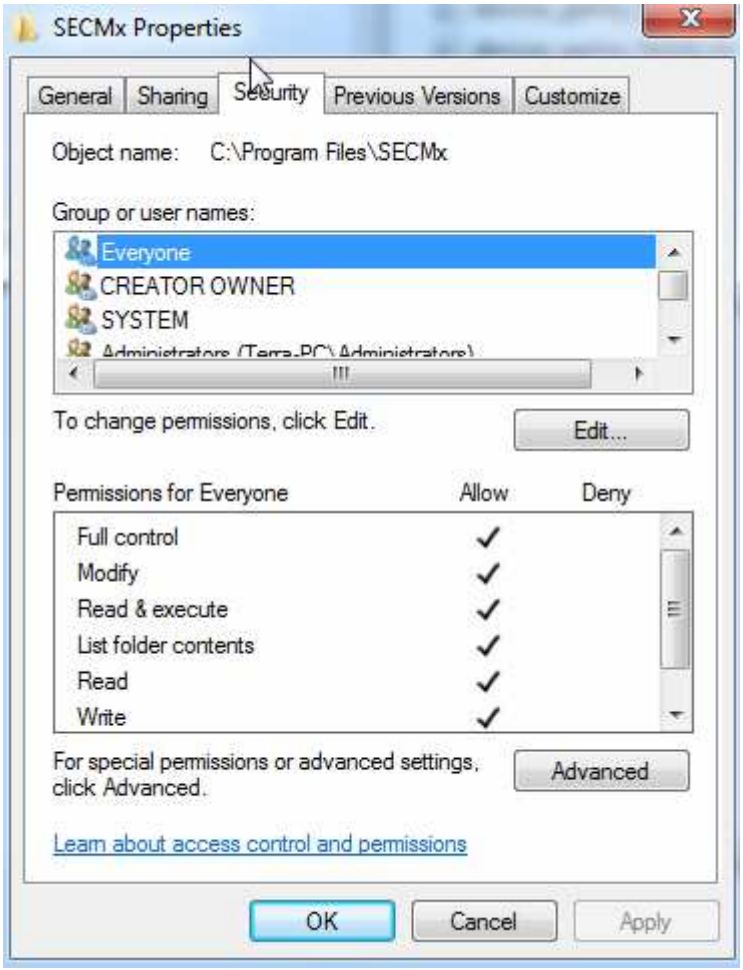


Fig. 4: Correct file access rights.

3.3 Required files

The directory MUST contain the files in red and may contain more files depending on the hardware:

```
borlndmm.dll
cc3260.dll
cc3260mt.dll
dclusr.bpi, dclusr.lib, dclusr.res, dclusr60.bpl
devices.ini
devices_all.ini
devices_dummy.ini
SECMxApp.exe
users.ini
```

In the system directory there should be

```
rtl60.bpl
vcl60.bpl
```

The directory will contain more files that are required for driving other hardware (see Section 1.2). You should keep all of them, in case you want to use different configurations in the future.

The files have the following function

borlndmm.dll, cc3260.dll, rtl.bpl, vcl.bpl	Borland utility
devices_xxx.ini	INI file that defines the devices connected and the last valid settings that will change during operation. Each user may have an own device_*.ini file (e.g. device_user1.ini, device_user2.ini, etc)
SECMxApp.exe	Main control program
users.ini	Ini files for user
user0.ini	Settings of last experiment of user 0. This file is not required during startup. It can be deleted. In each run it will be regenerated.

There are some more files which can be of interest

drv_dummy_motors.dll	Driver that emulates a positioning system
drv_dummy_adda.dll	Driver that emulates an AD/DA card
drv_dummy_tilt.dll	Driver that emulates a tilt table.
drv_dummy_dig_bipot_g.dll	Driver that emulates a digital bipotentiostat (Gamry)
drv_dummy_in.dll	Driver that emulates a digital Ivium bipotentiostat
drv_dummy_in_multi.dll	Driver that emulates a multipotentiostat for 32 electrodes
drv_dummy_tilt.dll	Driver that emulates a tilt table

These drivers can be used to track errors in hardware and software. They emulate devices without performing any external action. This can be used also in order to practice with the software or to check the behavior of the software. For normal operation, they are not required.

3.4 The file devices.ini

The file devices.ini, devices_xxx.ini and so on contain the connected devices and the last settings. These become the default settings if the software is restarted. In this way users will automatically return to their preferred instrument configuration.

Normally, you do not need and you should not edit this file. However, if errors occur (for instance after power supply interruption during operation) it might be necessary to reset the entire instrument into the starting configuration.

The file should look like this. (Exact content varies with hardware)

```
[GENERAL]
nDevices=46

[Device#0]
DllName=drv_dummy_adda.dll
Name=Dummy ADDA
BoardNumber =0

[Device#1]
DllName=drv_ports.dll
Name=Ports
```

```
[Device#2]
DllName=drv_das1602_16.dll
Name=DAS1602/16
BoardNumber=1

[Device#3]
DllName=drv_dda4.dll
Name=DDA4
BoardNumber=2

[Device#4]
DllName=drv_dda8.dll
Name=DDA8
BoardNumber=3

[Device#5]
DllName=drv_cio_dac02_16.dll
Name=CIO_DAC02/16
BoardNumber =1

[Device#6]
DllName=drv_cio_das1602_16.dll
Name=CIO-DAS1602/16
BoardNumber =0

[Device#7]
DllName=drv_dummy_in.dll
Name=Dummy digital bipot

[Device#8]
DllName=drv_dummy_in_multi.dll
Name=Dummy multi poten.

[Device#9]
DllName=drv_dummy_dig_bipot_g.dll
Name=Dummy Gamry (Bi)Potentiostat

[Device#10]
DllName=drv_dummy_dig_bipot_b.dll
Name=Dummy Biologic (Bi)Potentiostat

[Device#11]
DllName=drv_npi.dll
Name=npi

[Device#12]
DllName=drv_schramm_mP3.dll
Name=Schramm µP3

[Device#13]
DllName=drv_schramm_mBIP2.dll
Name=Schramm µBiP2

[Device#14]
DllName=drv_jaissle_PG10.dll
Name=Jaissle PG10

[Device#15]
DllName=drv_ch_in.dll
Name=CHI-701

[Device#16]
```

```
DllName=drv_ch_in_600.dll
Name=CHI-6xx

[Device#17]
DllName=drv_gen_bipot.dll
Name=Gen. Bipot

[Device#18]
DllName=drv_gen_ana_out.dll
Name=Analog acceptor

[Device#19]
DllName=drv_gen_ana_in.dll
Name=Analog input

[Device#20]
DllName=drv_palmsens.dll
Name=PalmSense Bipot

[Device#21]
DllName=drv_ivium_bipot_plus.dll
Name=Ivium

[Device#22]
DllName=drv_dummy_in_multi.dll
Name=Dummy multi poten.

[Device#23]
DllName=drv_ivium_we32.dll
Name=Ivium multipot. WE32

[Device#24]
DllName=drv_gamry_bipot.dll
Name=Gamry Bipot

[Device #25]
DllName=drv_biologic_bipot.dll
Name=Biologic Bipot

[Device#26]
DllName=drv_gamry_bipot_r600.dll
Name=Gamry Reference 600 Bipot

[Device#27]
DllName=drv_gamry_family.dll
Name=Gamry (Bi)Potentiostat Family

[Device#28]
DllName=drv_zahner_xpot.dll
Name=Zahner XPOT with LED

[Device#29]
DllName=drv_dummy_com1.dll
Name=Dummy COM device
Virtual=1

[Device#30]
DllName=drv_dummy_com2.dll
Name=Dummy COM device (2)

[Device#31]
DllName=drv_dummy_motors.dll
Name=Dummy Motors
```

```
[Device#32]
DllName=drv_owis.dll
Name=Owis-XYZ

[Device#33]
DllName=drv_pi_p6xx_family.dll
Name=PI P6xx family
Number of actuators [1 .. 9]=3
Configuration code=10|10|7

[Device#34]
DllName=drv_pi_e861_n661.dll
Name=E861 N661

[Device#35]
DllName=drv_mechonics.dll
Name=mechOnics-XYZ

[Device#36]
DllName=drv_maerzh.dll
Name=Maerzhaeuser-XYZ

[Device#37]
DllName=drv_spi.dll
Name=SPI-XYZ

[Device#38]
DllName=drv_dummy_tilt.dll
Name=Dummy Tilt Table

[Device#39]
DllName=drv_zaber.dll
Name=Zaber Tilt Table
```

It is certainly a good idea to keep versions of the original devices_xxx.ini files under a different name. For instance you can copy devices.ini to devices.001 BEFORE you start SECMx for the first time.

3.5 The file users.ini

The file users.ini contains the user names and the ini files used for this user. This allows different users to have different preferences for the instrument settings. The installation program generates a file that contains three users (typical configuration, all devices and only virtual devices). The data path points to a Windows path that exists on each machine. You may want to change these files to make it specific to certain users. If you use older installations you may copy the ini files from that installation to the new installation. In the inifiles devices_xxx.ini, please delete all lines except, Name=, DllName= and BoardNumber= as shown in section 1.3. After the first start, you need to go to the corresponding windows to make the appropriate settings for the connections of the instruments.
DO NOT USE the files user_alfons.ini, user_barbara.ini or any other StdIni file **from a previous version**. The installation path should initially not contain any user_xxx.ini file. These files are created during operation and contain the last settings of the

experiments. Because the way of storing changes between versions, they cannot be used from older versions.

```
[GENERAL]
nUsers = 3

[User#0]
Name = Alfons
StdIni = C:\Program Files\SECMx_11\user_alfons.ini
DevIni = C:\Program Files\SECMx_11\devices_all.ini
DefPath = C:\SECM_DATA\Alfons\

[User#1]
Name = Barbara
StdIni = C:\Program Files\SECMx_11\user_barbara.ini
DevIni = C:\Program Files\SECMx_11\devices_all.ini
DefPath = C:\SECM_DATA\Barbara\

[User#2]
Name = Guest
StdIni = C:\Program Files\SECMx_11\user_guest.ini
DevIni = C:\Program Files\SECMx_11\devices_all.ini
DefPath = C:\SECM_DATA\Guest\
```

The file user.ini has to be edited when a new user is added (the red parts were added/changed to have the new user "Guest".

With these preparations you are ready to start SECMx.

4 Installation Checklist

☐ Hardware components installed and external programs?
☐ Functionality of hardware programs with external programs?

☐ PDF reader installed on the machine?
☐ SECMx installation?
☐ timer_calibrator.exe executed?

<u>After installation of SECMx</u>
☐ file device_*.ini edited to include the physically present hardware
☐ users.ini edited to assign the files for user preferences and location of data files?
☐ Are rights properly asigned.

<u>After first start of SECMx or after program update (must be performed for each user in users.ini)</u>
☐ Set connection of AD and DA channels in Hardware/AD-DA connectivity
☐ Connect a battery to the AD channels, is the reading of the voltage correct in window Hardware/AD-DA connectivity?
☐ Apply 0.2 V, 0.4 V etc. to the DA channels, measure with a multimeter in window Hardware/AD-DA connectivity. Is the output voltage correct?
☐ Set connection of COM1, COM2 etc. in Hardware/Port connectivity

- ☐ Set digital input output ports (recommended for Schramm potentiostats)
- ☐ For positioning devices: Hardware/Devices select the positioning system. Do all axis move? If you request a movement of 1000 µm, is the measured translation 1.0 mm? Can you read the absolute position of the x and y motors? (z motor does not has an encoder)

[these settings are save in device_*.ini]

After each restart of SECMx

- ☐ For digital potentiostats, set the potential of the working electrode, switch the cell on
- ☐ For DA channels, apply zero volt before connecting an electrochemical cell.
- ☐ For mechOnics motor, go to the reference position