A/ Software installation

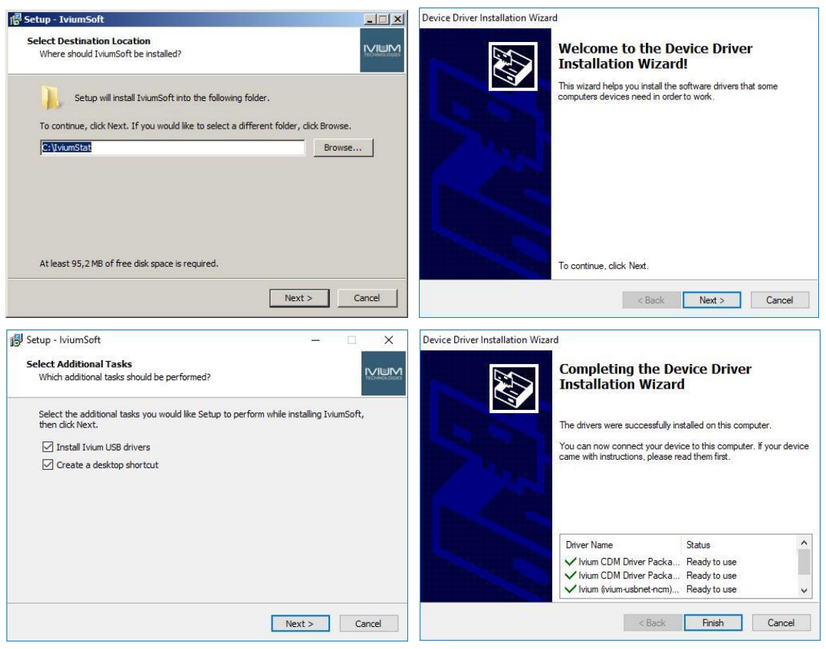
1) Install IviumSoft:

An IviumSoft installation CD is supplied with your instrument. If your computer does not have a CD drive, you can copy the contents of the CD to a USB flash drive on another computer, or download the full IviumSoft installation package from the Ivium website at: www.ivium.com/support.

Execute the "IviumSoftSetup.exe". IviumSoft will be installed on your C-drive (default) in the "IviumStat" directory. This directory will include example data files, drivers, Labview example and the IviumSoft Helpfile/ Manual. Also a shortcut to IviumSoft will be placed on your desktop.

During the installation, all necessary instrument drivers are installed.

If your unique Windows settings do not allow the drivers to be installed, you will be notified in a pop-up message. In this case contact your IT department.



B/ Connecting your instrument

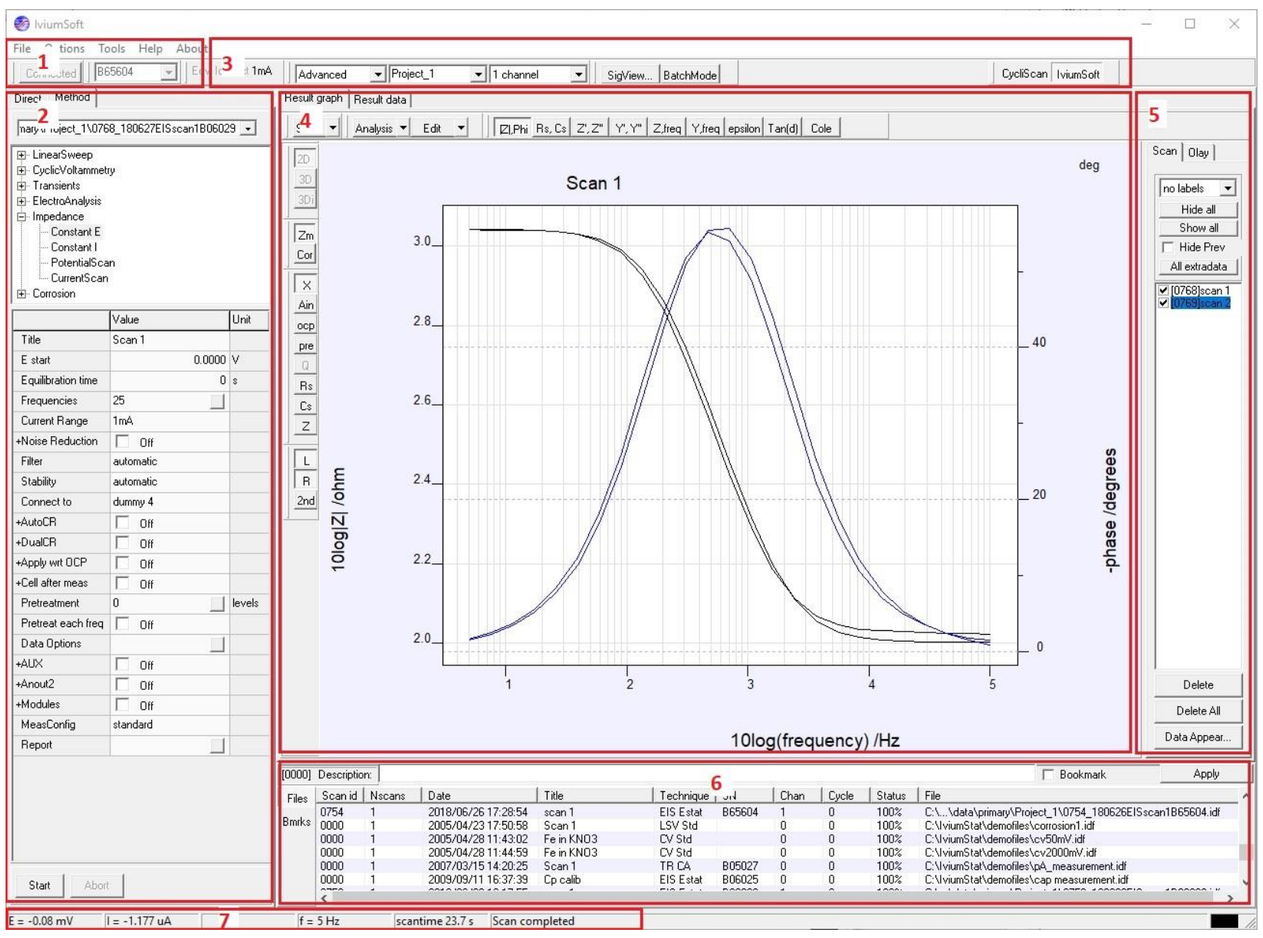
First power up your intrument:

- ❑ pocketSTAT: connect the USB cable to the computer
- ❑ CompactStat: connect the USB cable, or connect the power supply and USB cable
- ❑ All other: connect the power-supply or -cable, and connect the USB cable; then switch on the instrument.

Then start your IviumSoft.
All Ivium potentiostats and battery testers have a unique serial number which can be found on its serial number tag. Once the potentiostat is powered up, this number will appear in the top-left of your IviumSoft. If multiple potentiostats or a multichannel instrument are connected, all (channels) will be shown and can be selected from the drop-down menu. Once selected, the instrument/channel can be connected to the IviumSoft by clicking the adjacent "Connect" button. Upon connection the instrument/channel and IviumSoft will be synchronised, and the appropriate functions in IviumSoft will be (de)activated. Your instrument is now ready for use.

C/ Software – user interface

1. **Device & software control**
2. **Operating parameters**
3. **Advanced parameters**
4. **Measurement results**
5. **Legend panel**
6. **Data file history list**
7. **Status bar**



1. Device & software control

The menu bar:

File - Data and method file management.
Options - Setting the device and data handling options, incl. FRA options
Tools - Device maintenance and special operations
Help - Gives access to the HTML help file/user manual
About - Shows IviumSoft version, corresponding .dll [no#] and firmware version

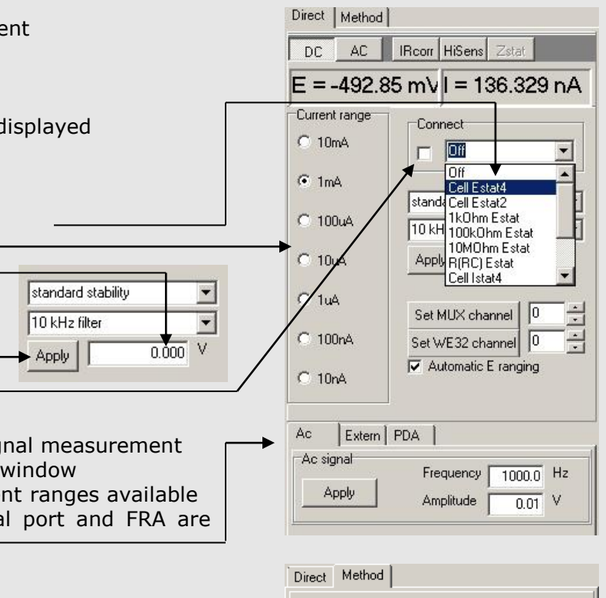
To start:
a. In the drop down menu select the device by Serial Number.
b. To operate this instrument, click "Connect".

2. Operating parameters

"Direct" mode: for direct control of the instrument

- Intended for diagnostic purposes
- Actual potential and current are displayed
- When not controlled, the open cell potential is displayed (within specified accuracy)

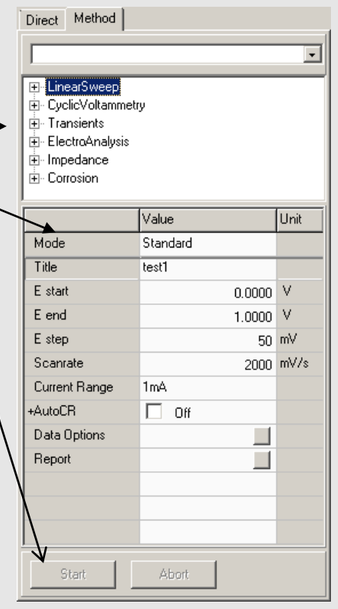
Example:
a. Select configuration, i.e. "Cell Estat4".
b. Select current range
c. Insert value
d. Press "Apply"
e. Check connect-box: cell on/off



f. Above:
DC/AC - to toggle between AC/DC signal measurement
IRcorr - will open IR-drop correction window
HiSens - will make hi-sensitivity current ranges available
g. Below: direct control of the peripheral port and FRA are possible.

"Method" mode: for executing electrochemical methods.

Example:
a. Select desired method from the tree:
Expand method group and select method.
b. The relevant method parameters are listed and accessible in the window below.
c. Once the desired parameters are set the measurement can be started by clicking the "Start" button at the bottom of the window.
d. Clicking the "Abort" button will abort the measurement immediately at the next data point.
e. When preconditioning before measurement is set up, directly after clicking "Start" a "Continue" button will appear. Clicking this will terminate the preconditioning and proceed to start the method.
f. Data is continuously saved during the measurement. Upon finishing and/or aborting the measurement, a data file is generated with an automatically generated file name.
g. A method with desired parameters can be saved for future use by selecting "File" in the menu bar and choosing "Save method".
h. From Menu > File previously saved methods and data files can be loaded. When loading a data file also the corresponding method is loaded. Clicking "Start" will re-run the same experiment.

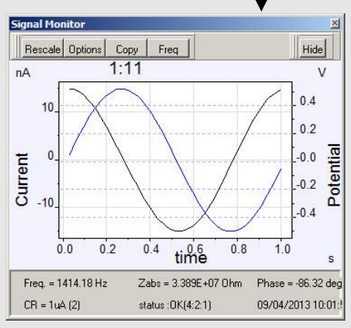


3. Advanced parameters

- In "Method" mode, by default the basic parameters are shown. Selecting "Advanced" from the drop down menu will add a number of advanced method parameters.
- The "Project window" shows the active Project directory in which data files are automatically stored. Select your Project directory from the drop down menu. When typing a new Project name in the window, it will automatically be created when the next data file is stored.

- Indicators: the grey indicators will light up red when the corresponding parameter reaches an overload. The black indicator shows the actual current range in use (useful when automatic current ranging is active).
- "SigView" opens a window that shows voltage and current signal trace during an AC measurement, as well as for saved impedance data points. Can be used to verify the quality of the signal and to check for e.g. overload/oscillation situations.
- "BatchMode" opens the batch programming window. This can be used for automating and sequencing measurements, scheduling events, etc. For instructions, refer to the help file/manual under:

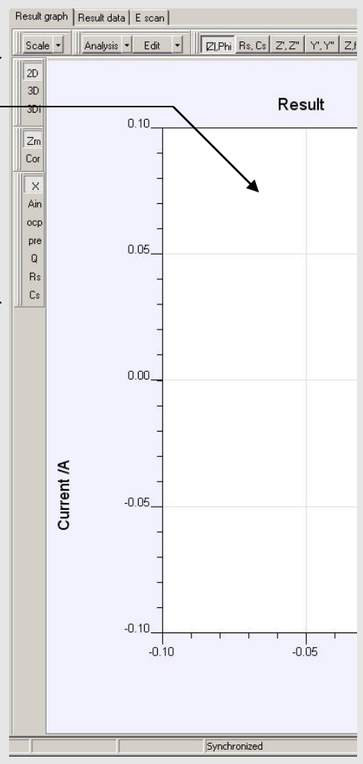
Instrument control > Batch Mode



- Toggle between IviumSoft and CycliScan: the dedicated battery testing module in IviumSoft. For CycliScan see other side of this document (section D).

4. Measurement results

- When a measurement is started the data is shown real time in the result graph. A right mouse click on the graph will give the user a number of options, including changing the graph colour and background, as well as copying the graph to clipboard.
- The buttons to the left allow additional data to be displayed. Data is by default displayed "2D"; "3D" and "3Di" display may also be chosen. Clicking the "Cor" button after the measurement has finished, will start the correction mode, allowing the user to change individual data-points. "X" shows the primary data, "Ain, ocp, pre, Q, Rs, Cs" will all open a secondary graph that shows the corresponding data when available: optional analog inputs, ocp-measurement before scan, pre-treatment data, etc.
- The "Scale" button allows the scale of the graph to be adjusted via the drop down menu; clicking on the button itself will auto-scale the graph.
- "Analysis" will make a number of analysis methods available to the data in active memory.
- "Edit" will allow smoothing of the scan data.
- The buttons at the top of the graph activate different representations of (impedance) measurement data.
- The tabs "Result graph" and "Result data" above the graph enable switching between graphical and numerical representation of the scan data. "E scan" will show the data for analysis when an impedance-scan method has been carried out.



5. Legend panel

Three tabs:

1) "Scan" shows the list of scans that have just been measured or loaded from memory.
"Hide all"/"Show all" will respectively hide and show all scans in the list.
In the list of scans, checking/unchecking the box next to the scan will show/hide individual scans. Note that the scan that is highlighted blue is the scan in active memory. This is the one that is evaluated in "Analysis", or has the numerical data shown in "Result data", etc. Clicking on a different scan will select that one (highlight it), making it available for analysis, saving, etc.
Checking the box before "Hide previous" will hide all previous scans, except the latest (useful when a large number of scans is listed).
"All extra data" will show the extra data, for example OCP measurement, of all scans in the list.
"Delete" will remove the selected scan from the view screen only*.
"Delete all" will remove all scans from the view screen only*.
Data is always automatically stored in a datafile and cannot be permanently deleted from the Legend panel
"Data appear" will allow user to change the appearance of the data: lines, colours, symbols.

2) "Olay" will allow the user to load data from file and overlay it so that it can be compared to the scan data that was just recorded. Several scans can be overlayed at the same time. All the same options apply as in the scan-tab. Overlayed data is not available for analysis.

3) The "Chan" tab shows when analog inputs are sampled (advanced method parameter), it allows the user to show/hide analog channels in the second graph.

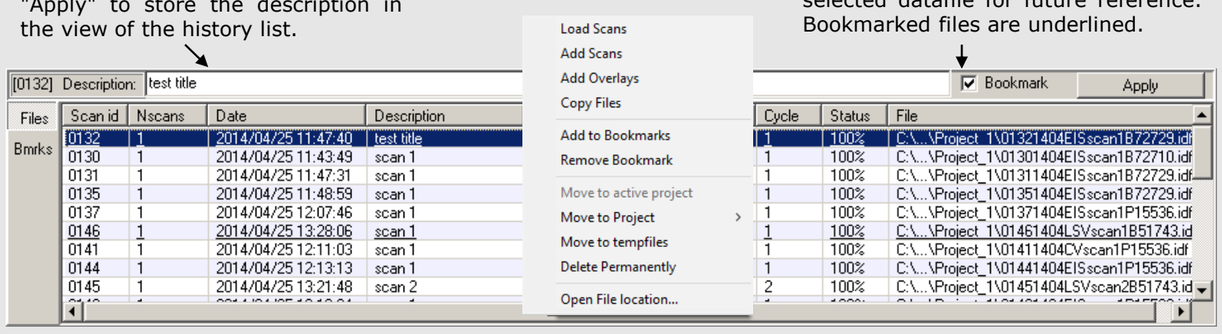
Note that:
- A scan in the list can be selected (highlighted in blue), but not be visible in the graph, and vice versa.
- When different electrochemical methods are used, the data cannot always be represented in the same graph (i.e. CV and EIS data). For this reason, the format of the most recent scan in the Legend panel is automatically displayed and only compliant scans are shown. Non-compliant scans are hidden. Holding the [ctrl] while clicking a scan will change the graph format to show that data.
- Starting a CV-scan will automatically clear the graph of all present scans; All other techniques/methods will add the new scan to the Legend panel.

6. Data file history list

All Ivium experimental data is continuously saved and a datafile is generated upon completion or user-abort of a measurement. The datafile name is automatically generated based on a unique scan id, instrument S/N, date, etc. After the data is saved to file in the active project, it will be added to the history list of most recent data files at the bottom of the user interface.

After an experiment is completed and the datafile is stored, the user can enter a description and click "Apply" to store the description in the view of the history list.

Checking the bookmark box and pressing "Apply" will bookmark the selected datafile for future reference. Bookmarked files are underlined.



Double clicking on a file in the history list will load that file into the result window. Holding the [Shift] key will allow multiple data files to be selected simultaneously. A right mouse click will open a pop-up:

- Load Scans: will load selected scans into the result window.
- Add Scans: will add selected scans to the result window and the scans already there.
- Add Overlays: will load selected scans to the result window but into the Olay tab, in stead of the Scan tab.
- Copy files: will copy data file to clipboard, for example for easy pasting into an e-mail, or a file directory.
- Add to/Remove Bookmark(s): will add/remove the selected scan to/from the bookmarks for future reference. Book marked scans can be identified by their underline. All bookmarked files in the history list can be shown by clicking [Bmrks] to the left of the history list.
- Move to active project: will move the data file to the active project (see 3. Advanced parameters).
- Move to project: allows to move the data file to any available project.
- Move to tempfiles: will move the data file to the tempfile directory. Data files in the "tempfile" project are displayed in red.
- Delete permanently: will delete the data file permanently.
- Open file location: opens the location of the data file in Windows explorer.

Data Storage: Data files are stored in a Library\project structure. In the menu "File>Data Explorer" data files in all libraries and projects can be explored, with a list of method parameters and result graph preview. In the menu "Options>Datahandling Options" the data storing options can be specified, such as: timed intermediate saving, automatic storage of a file copy to another designation (i.e. network drive), temp file properties, etc.

7. Status bar

The Status bar is located at the bottom of the user interface. Depending on the status of the instrument (idle, running a method, etc.) and/or the method that is running, a series of parameters is shown.

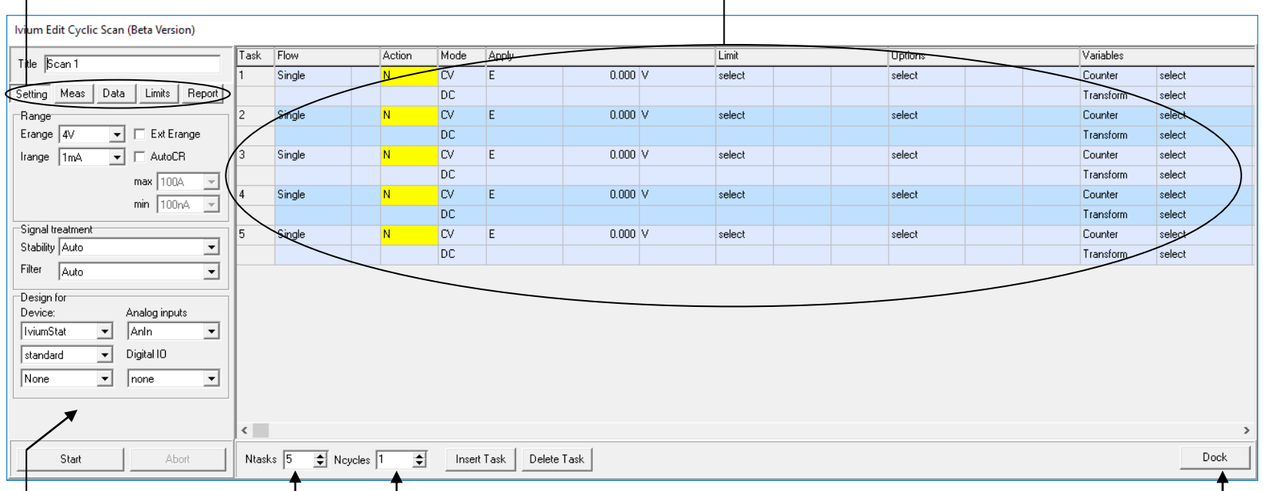
In the case of a CV scan (see figure above) it shows the real time E, I, number of acquired data points so far, cycle number, elapsed runtime of the scan and the notification that a measurement is in progress (or completed). When, for example, an OCP measurement is included in the method, the measured final reference OCP value is also shown in the status bar. During an impedance measurement the real time E and I, the current frequency of the datapoint measured and the percentage of progress are displayed.

D/ Ivium CycliScan

IviumSoft contains an integrated module especially designed for setting up battery cycling that can be activated from the menu Options>Datahandling options. Toggling to "CycliScan" in the top menu bar, or selecting "CycliScan from the transient techniques, will open an editing window and hide the method tree. The editing window can be undocked from IviumSoft to enlarge the result graph. For a detailed description and all possibilities of CycliScan please refer to the IviumSoft Help file.

Setting: Instrument E/I range settings
Meas: Data acquisition settings
Data: Battery data (capacity,density,etc.)
Limits: Global safety limits (E,I,Temp,etc.)
Report: Data and time stamp, remarks and notes

Task field:
Build your battery test routine here.
Charge/discharge, CC, CV, CR, CP, OCV, EIS, LSV, local limits, loops, go-to, profile, pulse, etc.

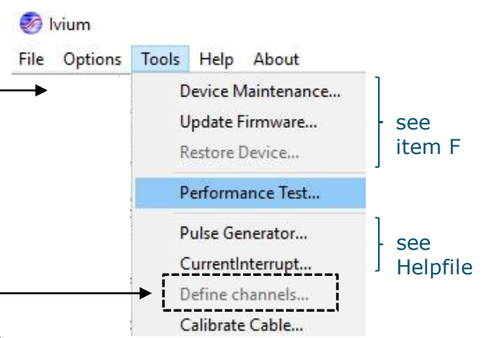


Number of tasks per scan — Number of cycles the scan is repeated — Dock or Undock the Edit window

Design a scan for this instrument; checks settings against instrument capability when instrument is not connected.

E/ Special operations

From the top "Tools" menu, a list of special operations will open:

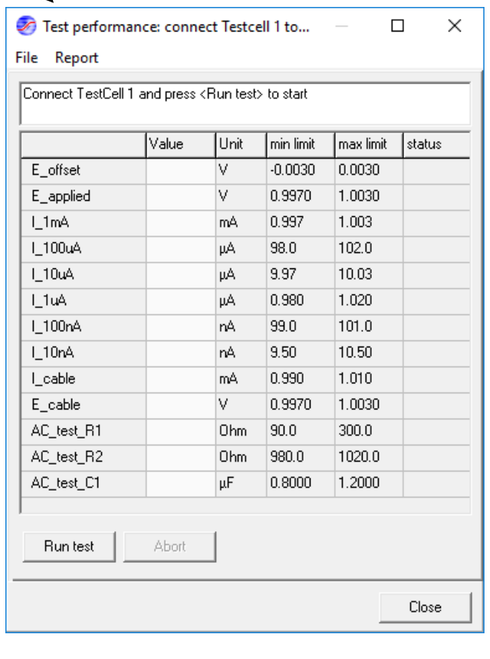


"Performance test" *(only available when an instrument is connected)*

"Performance test" will open a pop-up window that allows a self-diagnostic test of the instrument. This test is intended for occasional use, for example to determine if the calibration is still correct or whether the instrument is in proper working order. At a service request you can be asked to run this test by an Ivium service engineer to determine if the problem is hardware related. The performance test can only be executed when the instrument is in the "standard" configuration (= no extended range or other options activated).

To perform the test, connect the cell cable to Testcell1, uncheck all options in the menu "Options>Options", and press "Run test" in the pop-up. All status reports should read "Pass". If one or more reads "Fail" after repetitive runs, the instrument may need calibration. This cannot be done by the user, you should contact your supplier.

The test report is stored in your\IviumStat directory as a text file with the file name: [Serial number].ipt



"Define channels"

"Define channels" is only available for multichannel instruments such as the Ivium-n-Stat and OctoStat: it will open a pop-up window that allows the user to assign an easy designation (rather than the serial number) to each channel. Details on how to do this can be found in the IviumSoft Help: IviumSoft > Tools menu.

"Calibrate cable"

This function will allow you to calibrate your specific cell cable only if you have the Ivium calibration cell. Cell cable calibration is especially useful for EIS on low impedance objects at higher frequencies to compensate for inductance effects. Contact Ivium for more information.

F/ Device control & Software/Firmware upgrade

IviumSoft upgrade

IviumSoft is frequently updated with new features, and new versions are published on our website at: www.ivium.com/support. Here the new version can be downloaded as .zip file. The .zip file contains the full IviumSoft installation suite.

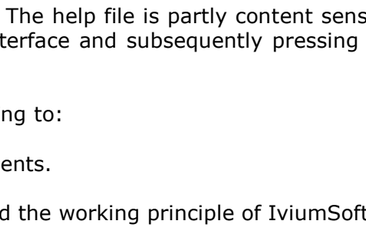
To upgrade the IviumSoft, download the latest version of the software from: www.ivium.com/support. Unzip the file and run the IviumSoftSetup.exe. Following the instructions will install the latest version of IviumSoft and drivers, but will leave your existing Ivium data- and other files intact.

Now your IviumSoft has been upgraded. After this proceed to upgrade the firmware of your instrument.

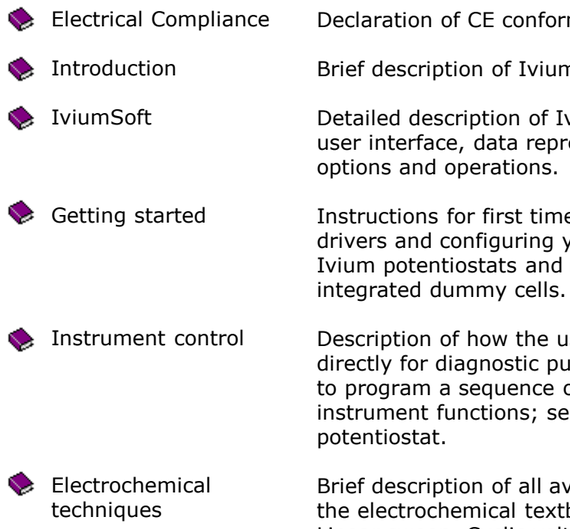
Firmware upgrade

Ivium instruments are equipped with an internal microPC that operates the electronics, and is used to store data during a HiSpeed experiment. The firmware that runs on the microPC is specific to the version of IviumSoft. For correct communication (and operation) these versions need to match, that is why IviumSoft has the correct version of firmware embedded. To upgrade the firmware of your instrument:

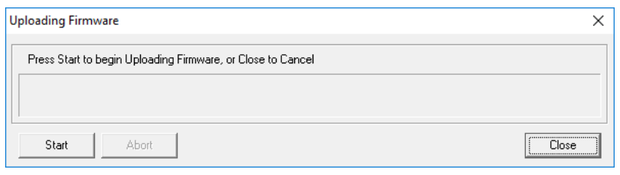
1. Connect to your instrument in the IviumSoft and go to "Tools>Device maintenance"



2. In the pop-up window click on "Firmware upgrade"



3. In the second pop-up click "Start", let the file upload, and when finished (successfully uploaded) click "Close".



4. After this, click "Reboot device".

5. Then close IviumSoft and restart your instrument.

For more instructions, how to recover from a failed firmware upgrade, or how to restore your instrument to factory settings, please refer to the help file/manual: Trouble shooting

G/ Manual in Help-file

In addition to the brief overview of the IviumSoft user interface that is given in this Quick guide, in-depth information is given in the digital help file/manual that is included in your IviumSoft. There you will find instructions on the installation of potentiostats and modules, their instrument specifications, and how to operate them. In addition detailed information on how to use IviumSoft and all its functions regarding operating all electrochemical techniques and measurement methods, data representation and evaluation, etc., is described.

To access the digital help file/manual open your IviumSoft and press "F1". The help file is partly content sensitive so indicating with your cursor an area or subject in the IviumSoft user interface and subsequently pressing "F1" will open the helpfile on the relevant subject.

In the help file/manual the subjects are structured in main chapters according to:

Electrical Compliance	Declaration of CE conformity of Ivium instruments.
Introduction	Brief description of Ivium, our instruments and the working principle of IviumSoft.
IviumSoft	Detailed description of IviumSoft: how to operate the software, instructions on the user interface, data representation and options, how to select and set instrument options and operations.
Getting started	Instructions for first time installation: IviumSoft and Ivium equipment, instrument drivers and configuring your Windows system, product-specific information for all Ivium potentiostats and modules, how to connect the electrodes and internal integrated dummy cells.
Instrument control	Description of how the user can control Ivium potentiostats through IviumSoft: directly for diagnostic purposes or via user selectable electrochemical methods; how to program a sequence of events in the Batch programming mode; special instrument functions; sequence of execution of the various commands by the potentiostat.
Electrochemical techniques	Brief description of all available electrochemical techniques (for detailed descriptions the electrochemical textbooks should be consulted), grouped by: Linear sweep, Cyclic voltammetry, Transients (CA, CP, ECN, MixedMode: versatile combination of transients and sweeps), Electroanalysis, Impedance, Corrosion.
Measurement Results	How to access and represent the measured data (graphic and numeric), as well as the various available data evaluation techniques and possibilities.
Data files	How and where data files are stored and accessed; the structure of projects and libraries; the handling of very large data files and automatic saving of data.
Special functions	Special operations for (instrument) diagnostics and maintenance, preparatory techniques and use of the peripheral port signals and functions.
Software upgrade	Instructions for IviumSoft upgrade.
Control via other software	Description on the software development driver and dll for control via other software such as Labview, C++, VB, etc.
Trouble shooting	How to solve some of the most frequently encountered issues and how to restore your potentiostat.
Instrument specifications	Specifications of all Ivium instruments, modules, accessories and their compatibility.
Method parameters	Detailed description of all method parameters.

NOTE 1:
It may be that when you open the help file the content is not visible, or you see a cryptic browser message like "Navigation to the webpage was cancelled" or "Action cancelled". This is caused by Windows and can be fixed simply by changing a setting: In Windows explorer navigate to your IviumStat directory where the help file is located. Right-mouse-click on the 'IviumSoft.chm' file and choose 'Properties' at the bottom of the list. This opens a pop-up. In the bottom panel of the pop-up click "Unblock" and OK. Close the pop-up window. Now the content in the IviumSoft help will be available.

NOTE 2:
The help file/manual covers current IviumSoft and instruments and operations. If you have specific operating or instrument specification questions regarding older versions of Ivium instruments, please contact Ivium.

NOTE 3:
A (printable) PDF-version of the digital IviumSoft Help is available in the 'Manuals and Release Notes' directory in the 'IviumStat' installation directory on your PC. This PDF is updated as often as feasible; the latest information is always available in the help file.

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