ULISS

(Universal Laboratory ICP Sampling Software)

User manual

Version 1.1

Dear user,

Thank you for choosing this SRA Instruments product.

This manual contains all the necessary information for the correct use of your software. Should you need further information or if you encounter any problems, please contact our After Sales Service:

Hotline: +33 (0)4 78 44 22 09
E-mail : service@sra-instruments.com

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1. Presentation

ULISS is a software that works in parallel with Agilent's ICP Expert software. Dedicated to an online (continuous) operation, ULISS software makes it possible to start analyses in a few clicks with a sample management done by a multi-position valve.

The results are visible in ULISS and are sent to a PLC via the Modbus industrial communication protocol.

2. Configuration

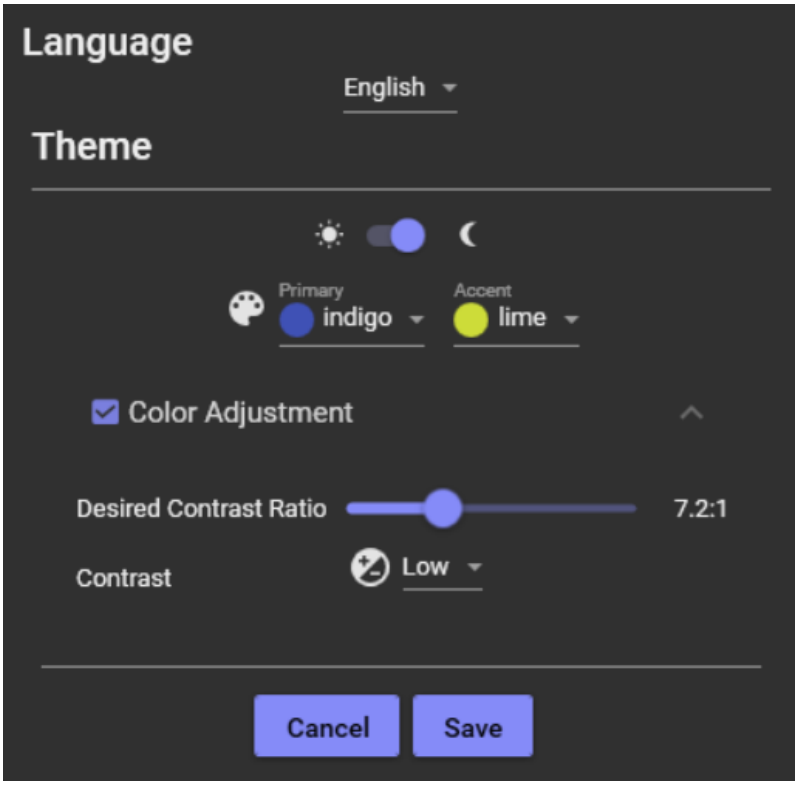
For the installation of ULISS, please refer to the document *ULISS Installation Guide.*

For ULISS configuration, the instrument must be configured in ICP Expert first

2.1 User interface customization

By default the software is set to "English" with a dark theme. These settings can be changed by clicking on the configuration button available at the top right of the application:

In the next screen you can change the language and theme of the application. Click on "Save" to take into account these settings.



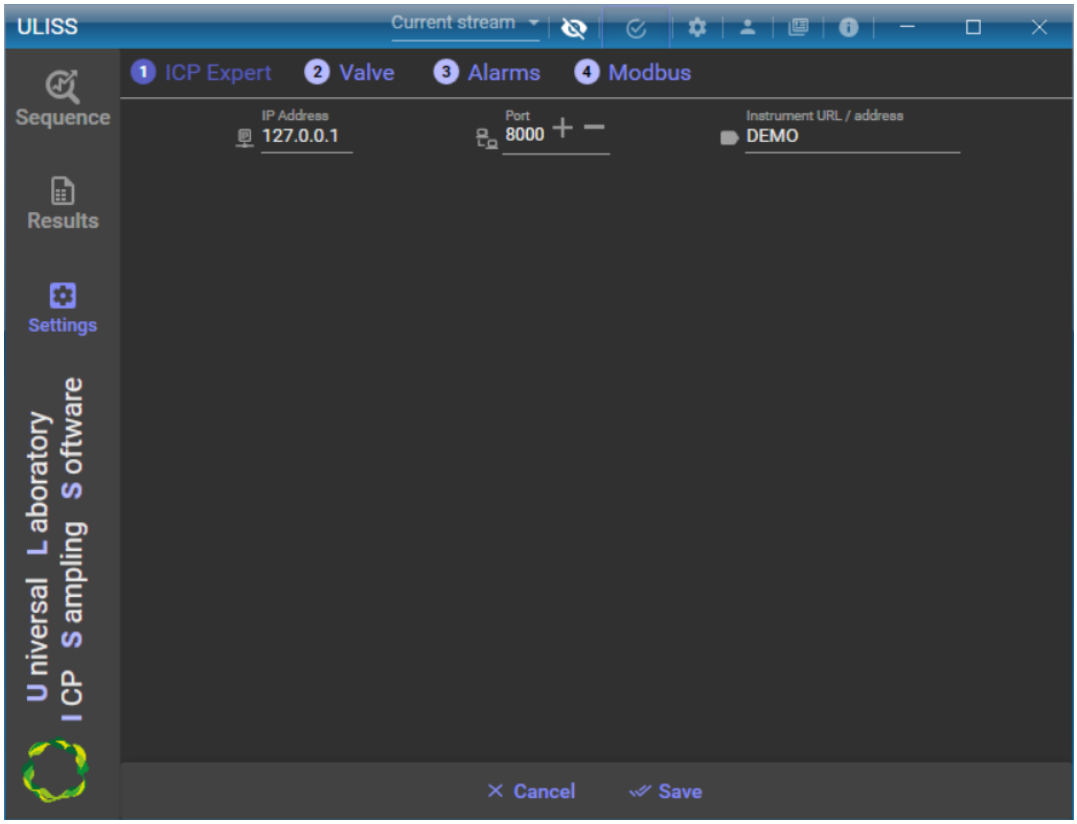
2.2 Configuring the connection with ICP Expert

ULISS is a software that runs in parallel with Agilent's ICP Expert software thus a connection between the two software is necessary for the proper functioning of the solution.

To configure this connection, select the "Settings" tab and then "ICP Expert".

The required fields are:

- IP address: corresponds to the IP address of the PC on which ICP Expert is running
- Port: the connection port of the ICP Expert server
- URL instrument / address: the name of the ICP instrument

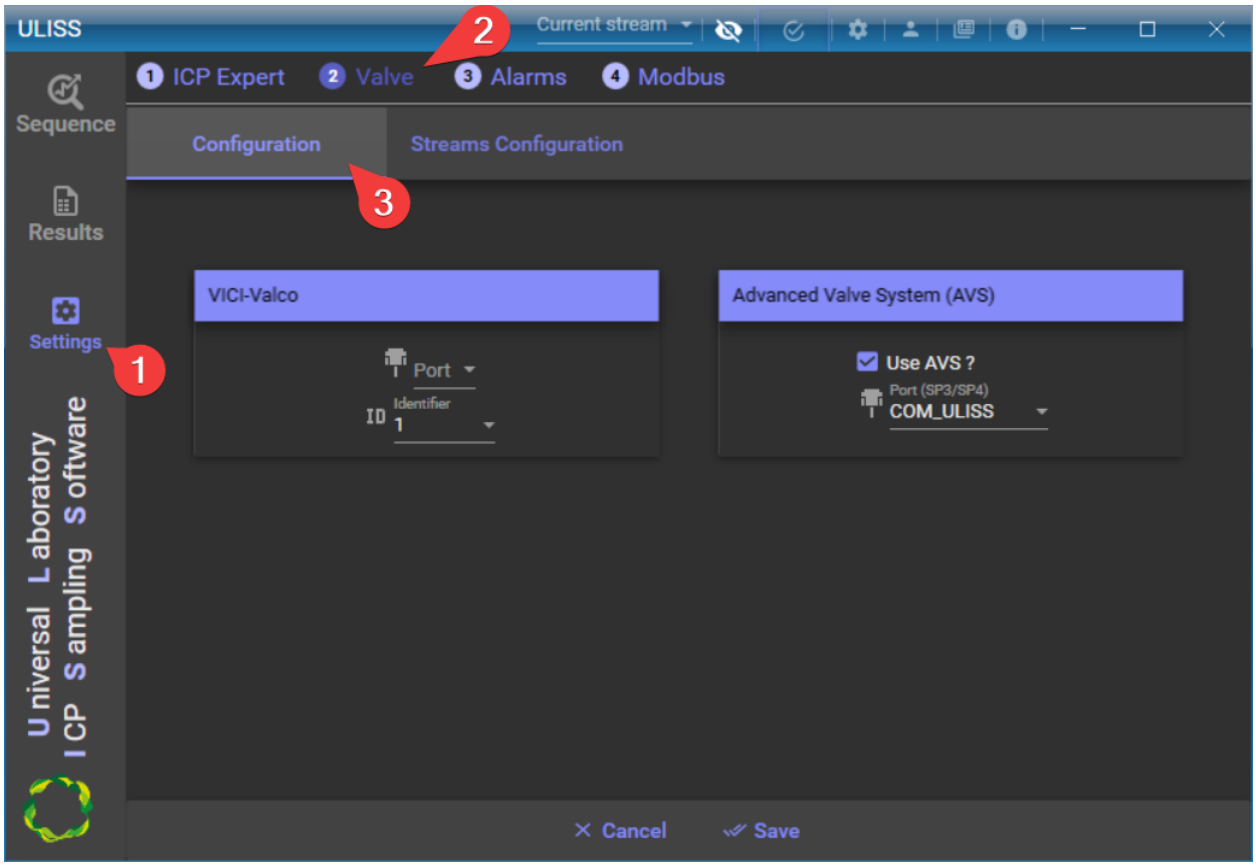


2.3 Valve configuration

A Valco VICI valve is used to transfer the sample to be analyzed to the ICP, in order to ensure continuous analyses and automation of the system.

2.3.1 Connection with the valve

To access it, click on the "Settings" menu, then on the "Valve" and "Configuration" tabs.



You can change two parameters for the Valco VICI valve:

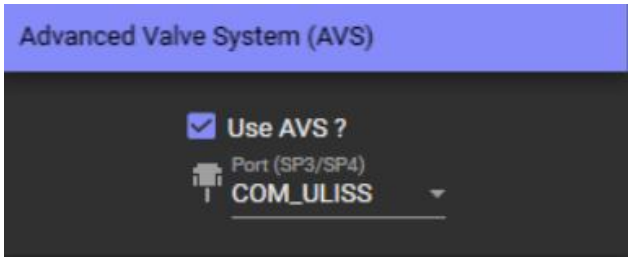
- The serial port: This is the port to which the valve is connected.
- The valve identifier: Ranging from * to 9. The identifier corresponds to the address of the valve; you must enter the correct identifier, otherwise the valve will not be recognized.

After entering these parameters, click on the "Save" button.

2.3.2 Configuring the use of the Advanced Valve System (AVS)

Using the Advanced Valve System (AVS) implies that the virtual communication ports have been successfully configured during the software installation.
The communication ports "SPS4" and "ULISS" had to be created.

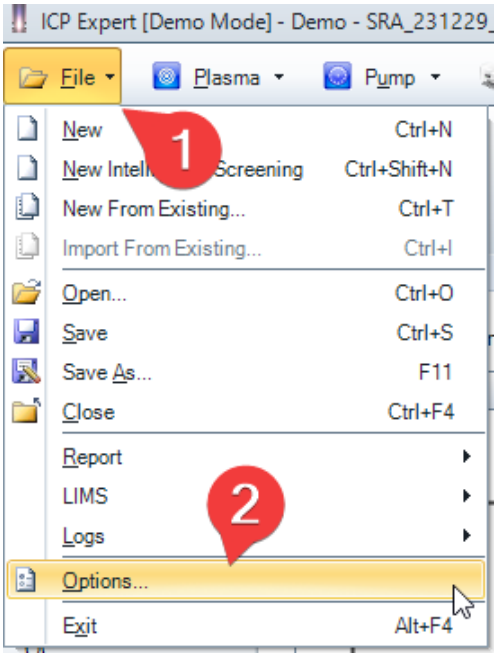
To replace the autosampler with the Valco valve, check "Use AVS" and select the "COM_ULISS" communication port.



After entering these settings, click on the "Save" button.

In ICP Expert, you must select the communication port for the autosampler.

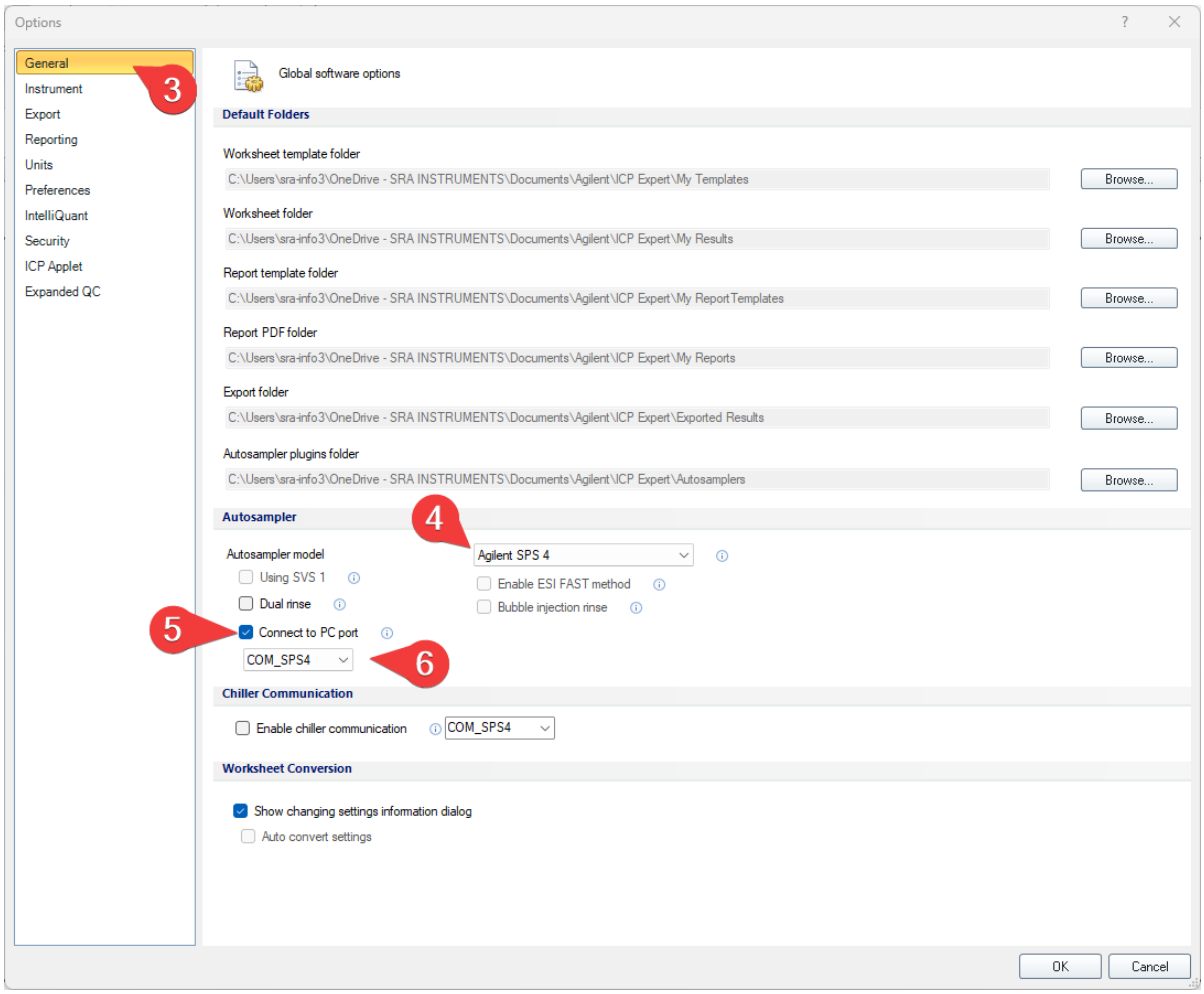
To do this, open ICP Expert, click on "File > Options"



In the "Options" window, go to the "General" tab.

In the "Autosampler" section, select the "Agilent SPS 4" model, check "Connect to PC port" and select the "COM_SPS4" port.

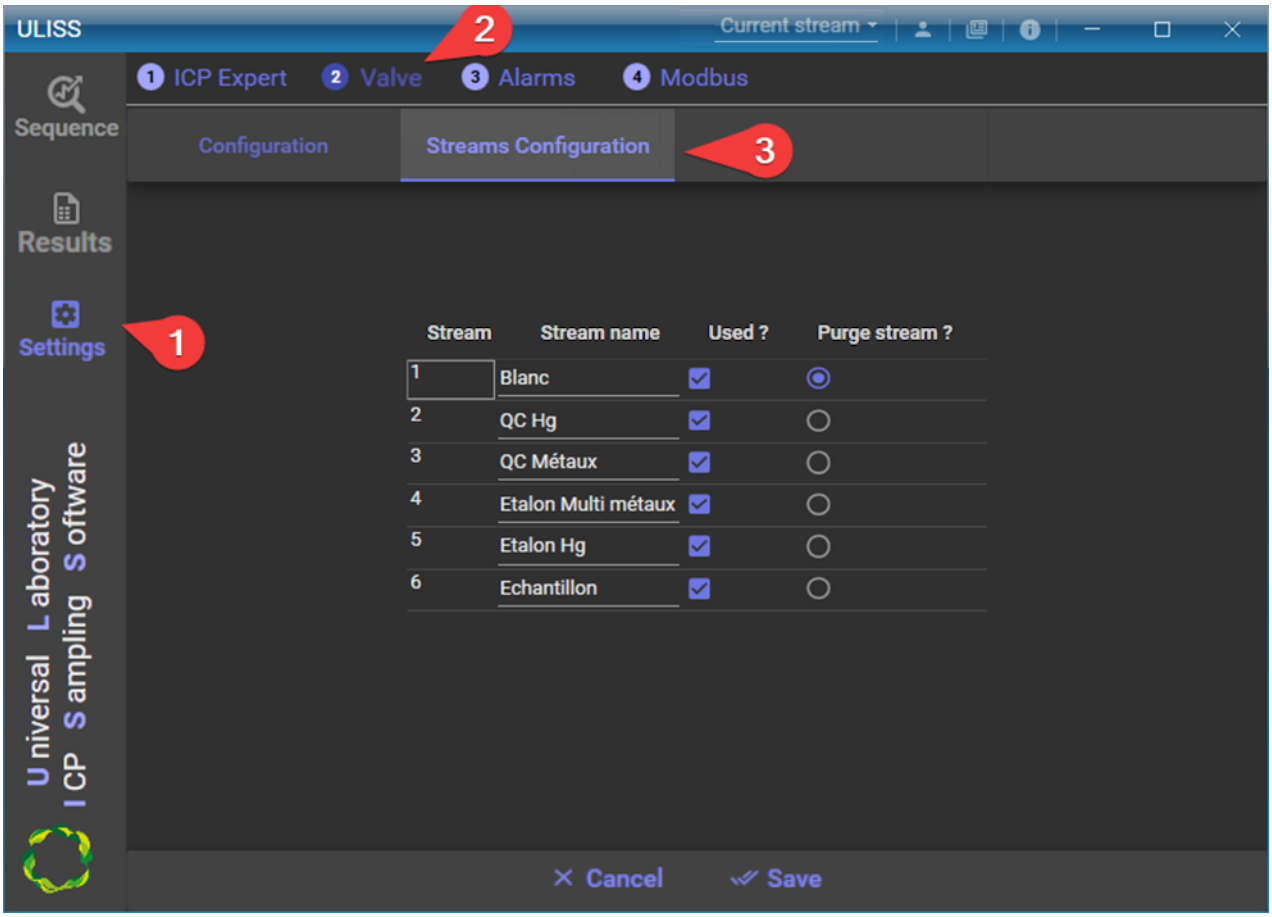
To validate the data, click on "OK".



This configuration enables the retrieval of all the commands from the autosampler (SPS4 com port) and the changing of the Valco valve positions in operation (via the ULISS com port).

2.3.3 Configuring the streams

After configuring the valve identification parameters and saving them, if a valve is present on the chosen serial port and identifier, you will have access to the stream configuration settings, in the "Streams configuration" tab.



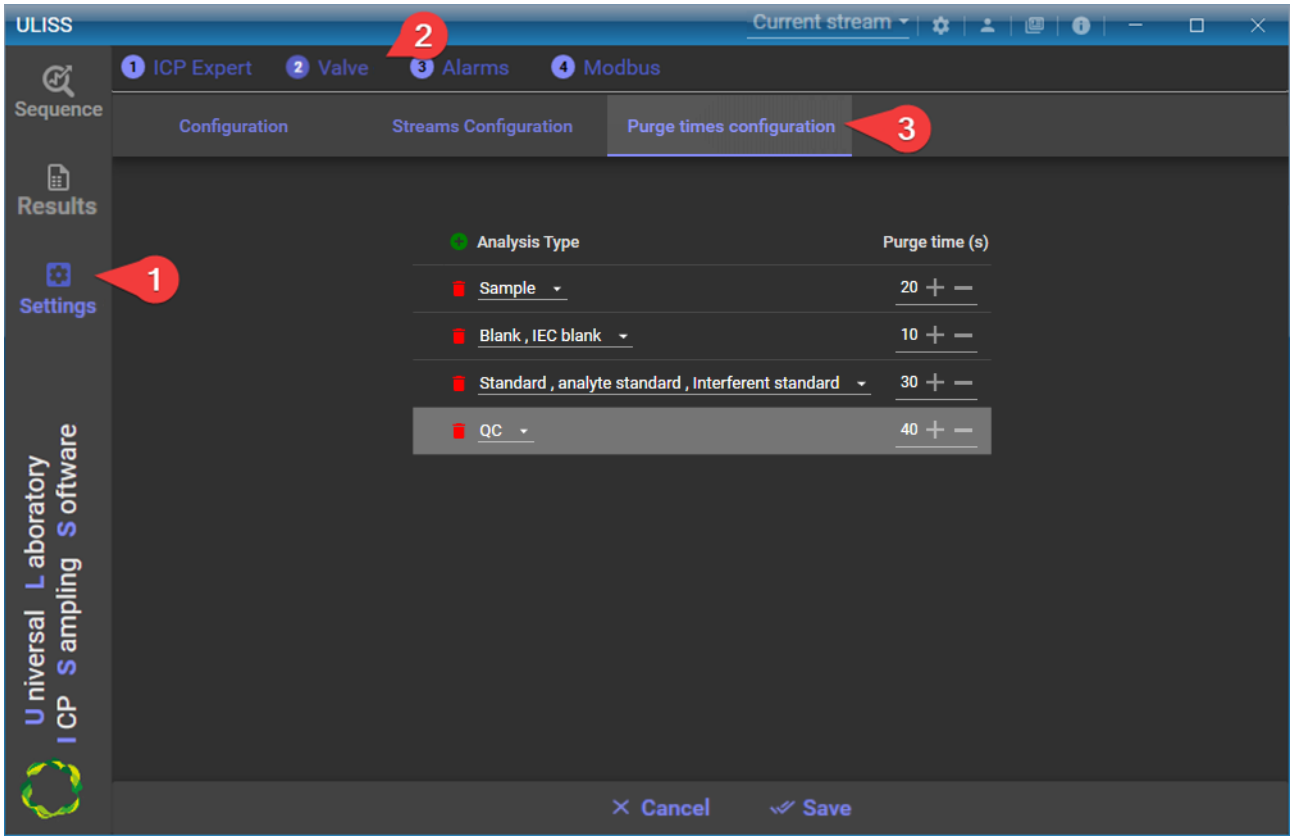
In this interface, it is possible to configure each of the valve's streams:

- Stream: This is the position of the valve.
- Stream name: Used to name the stream; it is this name that will be displayed in the selection of the stream in the sequence.
- Used ? : Defines whether a stream is used or not, so that only the streams used in the control of the valve will be visible.
- Purge stream (sec) : Used to define, if necessary, a purge stream which will be the stream automatically selected at the end of the analyses.

If the option "replace the autosampler with the Valco valve" is checked, the stream column is prefixed with "1:"

2.3.4 Configuring purge times

Purge times are used to save sample by automatically selecting the stream defined as a purge.
To configure these times, click on the "Settings" menu, then the "Valve" tab and "Purge times configuration".



Purge times can be set by type of analysis.

To add a purge time, click on the "+" button and define the following fields:

- Type of analysis: This is the type of analysis (blank, sample, standard, QC)
- Purge time (sec): Sets the duration for which the purge stream will be selected at the end of the analyses.

After entering these settings, click on the "Save" button.

2.4 Configuring alarms

All elementary data are associated with a quality code. This quality code is determined by the software according to the context of the acquisition (analyzer status, faults, exceeding thresholds, calibration ...). The quality code determines whether or not the values are taken into account during statistical processing by the software.

Below is an example of applicable quality codes:

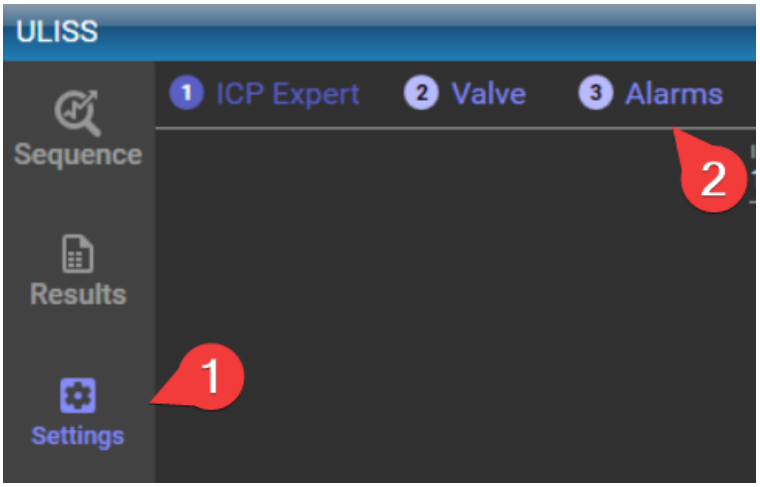
Valid codes

Code	Title	Explanation
E	Usable	Data that can be used without reservation
A	Attention	On detection of conditions that may raise doubts about the quality of a data
H	Out of field	For measurement of data outside the valid calibration range
D	Drifting	Drift at the end of a quality control

Invalid codes

Code	Title	Explanation
I	Unusable	On detection of a hardware malfunction (Communication error with an equipment or linked to a logic input)
M	In maintenance	By indication of an operator on site (Command on the software interface)
G	Out of range	For data in measurement out of a range fixed by the operator
N	Not acquired	Quality code similar to a fault, it can be assigned according to the state of a logic input

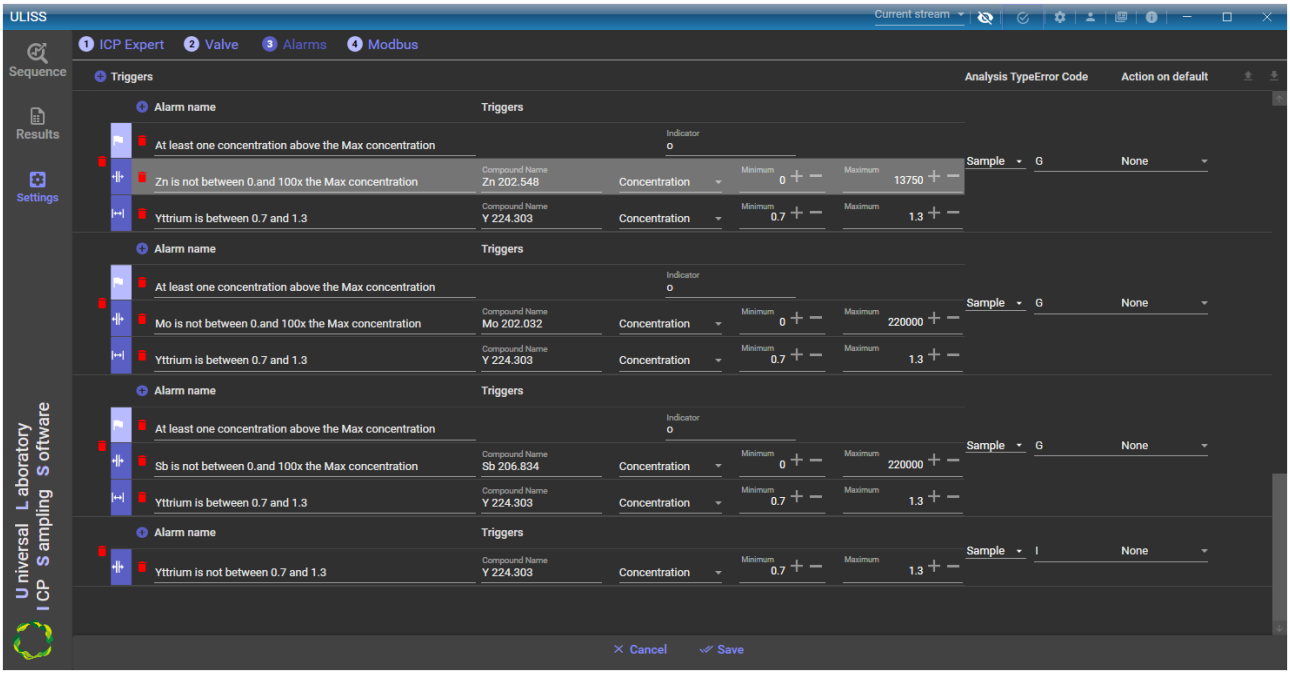
To configure the alarms, select the "Settings" tab and then "Alarms".



Alarms can perform several checks:

- Check that a result is within a range of values
- Check that a result is outside a range of values
- Check that at least one of the elements contains an error indicator (returned by ICP Expert)
- Check that no element contains an error indicator (returned by ICP Expert)

Checks can be grouped; if all checks are true, then the return code will be assigned to the result.



The fields required for alarms are as follows:

- Alarm name: Description or name of the alarm
- Return code: Code to be reported in the results in case of a fault.
- Action(s) to execute in case of a fault: Once the analysis is complete, if the alarm is in default and an action has been configured, then it(they) will be carried out.
    - Stopping the current sequence
    - Stopping the current sequence + Stopping the plasma
    - Stopping the current sequence + Stopping the plasma + Stopping the pump
- Checks:
    - Check on range of values:
        - Compound name
        - Type of value (Concentration, SD Concentration, RSD% Concentration, Intensity, SD Intensity, RSD% Intensity)
        - Minimum value
        - Maximum value
    - Check on error indicator:
        - Indicator: indicator returned by ICP Expert (if *, all indicators will be handled as a default)

Here is the list of indicators returned by ICP Expert:

- **-- : All replicas have been excluded**
- **#### : The signal is out of range**
- **Error : Unable to calculate background correction.**
- **Error: There is no FACT model.**
- **Error : Unable to calculate the ratio of the internal standard**
- **n : Correction not applied**
- **Noncal : Not calibrated**
- **! : The solution has been remeasured**
- **e : The solution measurement has been edited**
- **i : Internal standard not yet executed**
- **x : Model incomplete**
- **b : Interferent out of range**
- **u : Concentration below range**
- **o : Concentration above the range**

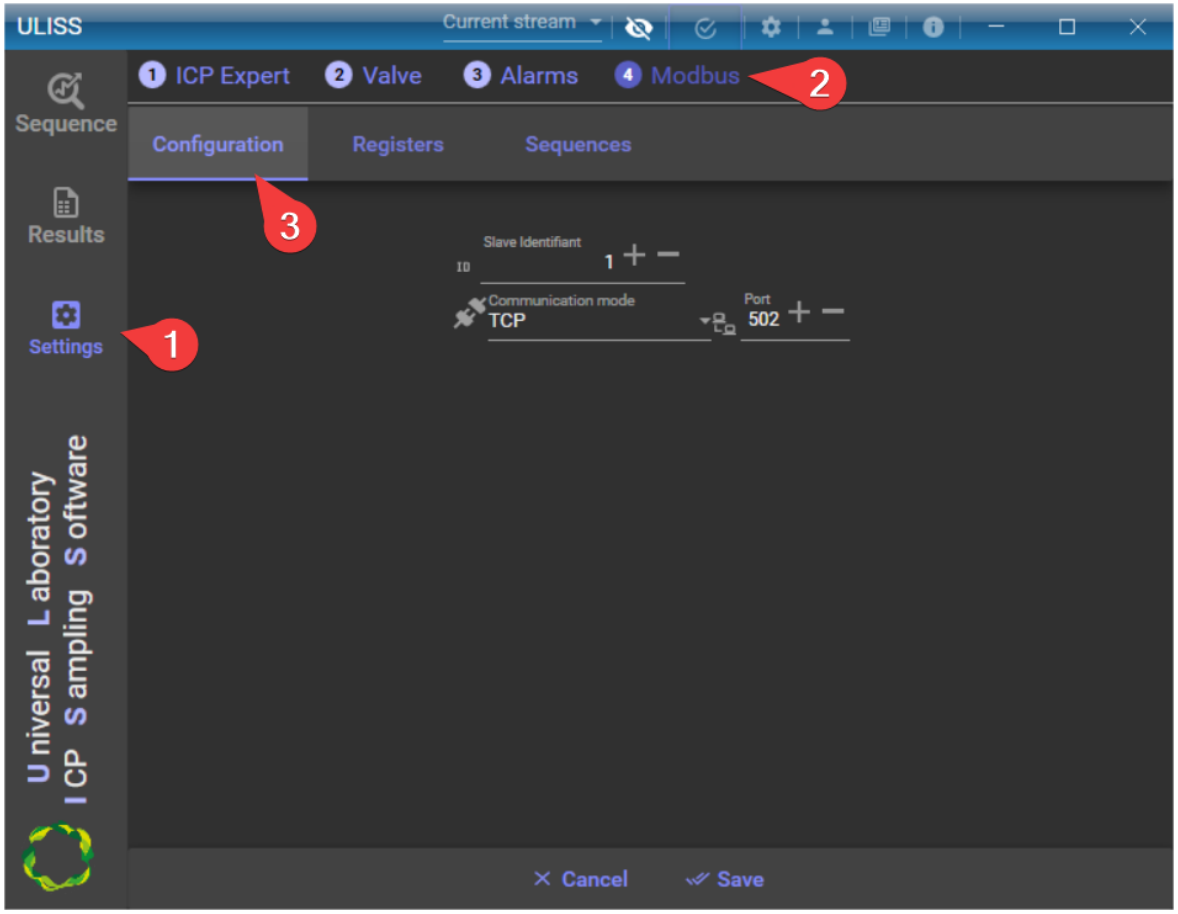
Once you've selected the desired settings, click on the "Save" button to save them.

2.5 Modbus configuration

The Modbus protocol is used to exchange data between ULISS and a remote (Modbus compatible) device.

2.5.1 Configuring communication

To configure the parameters used for Modbus, click on the "Settings" menu, then "Modbus" and "Configuration" to access the communication and data transport parameters.



You can change 3 parameters:

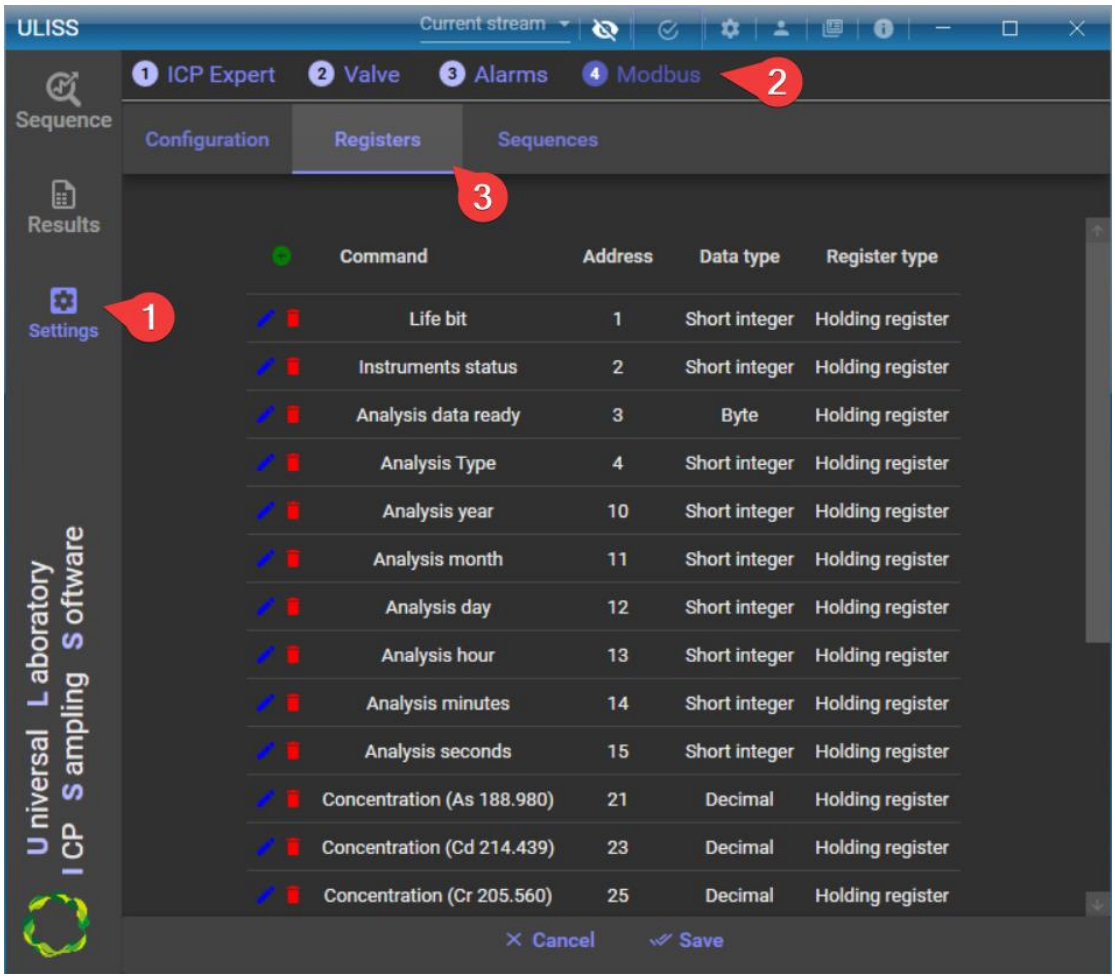
- The slave number: this is the identifier of the slave that will receive/send the data sent via Modbus.
- The communication mode: TCP or Serial are the two possible communication modes.
- Port:
  - If the communication mode is TCP: the TCP port number.
  - If the communication mode is "serial": the serial port of the PC.
- The transmission mode: RTU or ASCII, this is the form in which the data will be transmitted.

After choosing the desired settings, click on the "save" button to save the parameters.

2.5.2 Configuring registrers

Once the communication configuration has been saved, it is necessary to define the registers that will be used to exchange the results and the different states of the system, and any other data to be transmitted.

Click on the "Settings" menu, the "Modbus" tab and then "Registers".



Several actions are available from this menu:

1. Add a register with the button ⊕
2. Delete a register with the trash can button
3. Modify with the pencil

The changes are taken into account directly for the current session but you must use the "Save" button if you want them to be kept when you restart the application.

The variables that can be used are:

- The year of the analysis
- The month of the analysis
- The day of the analysis
- The hour of the analysis
- The minutes of the analysis
- The seconds of the analysis
- Data ready: this variable is set to 1 to indicate that the results of the analysis are available. It is up to the remote device to reset it to 0 when it has read these values.
- The concentrations of each compound (the name of the compound to be monitored must be entered manually).
- The intensity of each compound (the name of the compound to be monitored must be entered manually).
- Selected stream: In the case of a multi-path application, this value indicates the number of the stream currently selected in the application.
- Top injection : This value is set to 1 each time an analysis is started (to be reset to 0 five seconds later)
- Type of analysis: This value indicates the type of analysis performed
  - 0 : blank
  - 1 : IEC blank
  - 2 : standard
  - 3 : sample
  - 4 : QC
  - 5 : IEC analyte standard
  - 6 : IEC interferent standard
- Life bit: This variable is used to monitor the transmission. Its value is updated every second.
- Status: This variable is used to monitor the cycle of the ICP. It can have the following values:
  - 0 : Offline
  - 1 : In error
  - 2 : Not ready for analysis
  - 3 : Open lock
  - 4 : Ready for analysis
  - 5 : Under analysis
  - 6 : Online
- Plasma Status: This variable is used to monitor the status of the plasma. It can have the following values:
  - 0 : OFF
  - 1 : On
  - 2 : Ready for ignition
  - 3 : Ready for turn off
  - 4 : Failed to ignite
  - 5 : Failed to turn off
- Pump Status: This variable is used to monitor the status of the pump. It can have the following values:
  - 0 : Off
  - 1 : Slow speed
  - 2 : Fast speed
- Start a sequence: This variable is used to launch analyses; it can take several values:
  - 0 : No analysis requested, or stop the analysis.
  - 1 : Start the sequence only once (to be combined with the sequence number register)
  - 2 : Launch of the sequence continuously (to be combined with the sequence number register)
- Sequence number: This variable is used to indicate the sequence to be launched (to be combined with the "Start a sequence" register). You have to define an index for each sequence.

- Ignite the plasma:
  - 0 : Turn off the plasma
  - 1 : Ignite the plasma
- Change the speed of the pump:
  - 0 : Pump Off
  - 1 : Slow speed
  - 2 : Fast speed
- Compound alarm: The alarm value is set to 1 when there is a fault, it is reset to 0 after an analysis without fault.
- Quality code: Returns the quality code converted to ASCII character

For each register, you must define:
- **Its address**
- **The type of value: float, short integer, or bit**

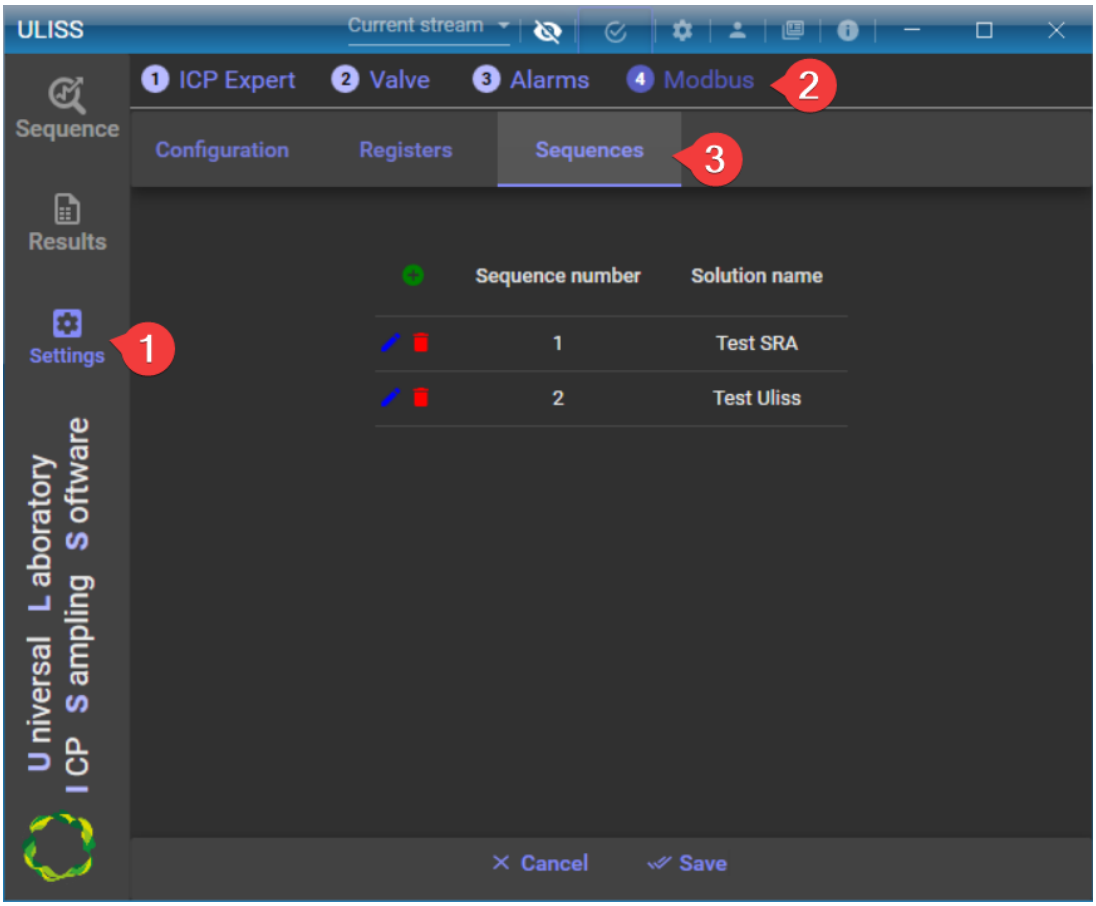
For concentrations and intensities you can define:
- **The coefficient: If the "value type" is defined as "Short integer" and it is still necessary to send the decimals, a coefficient must be defined.**

  For example, if you want to have two digits after the decimal point, the trick is to set the coefficient to 100. The value will then be multiplied by 100 before being sent and the received value will be divided by 100 to obtain a value with two decimal places.

2.5.3 Configuring sequence indexing

In order to launch a sequence via Modbus, it is necessary to define a sequence indexing table which will assign a number to each sequence created in the ICP Expert software.

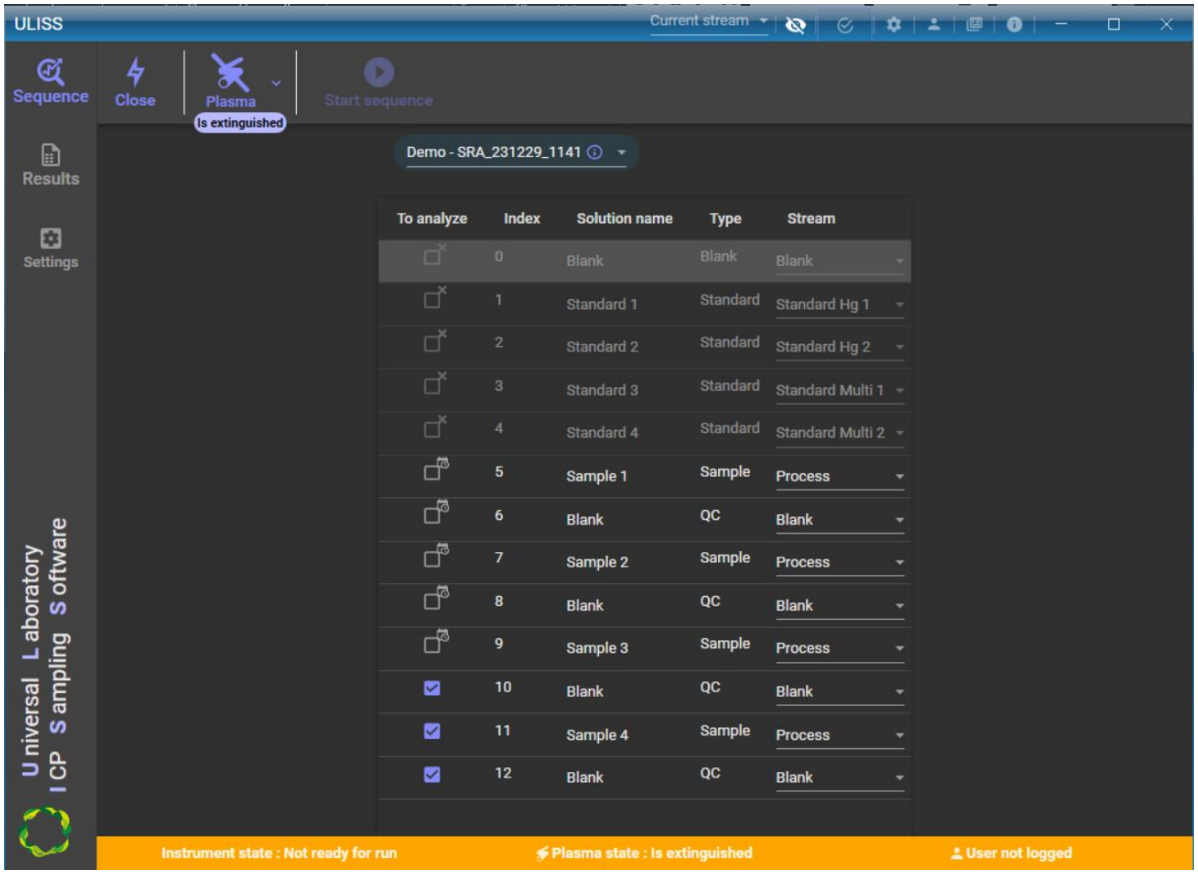
This number will be used in the "Sequence number" register to identify the correct sequence, and the "Start a sequence" register will be used to launch the sequence.


ULISS
Current stream
1 ICP Expert
2 Valve
3 Alarms
4 Modbus
2
Sequence
Results
Settings
1
Configuration
Registers
Sequences
3
Sequence number
Solution name
1
Test SRA
2
Test Uliss
Universal Laboratory ICP Sampling Software
Cancel
Save

3. Use

3.1 Sequence

The "Sequence" tab is the main tab of ULISS. It is in this tab that it is possible to connect/disconnect to ICP Expert, to manage the plasma, the pump speed, to choose a sequence to analyze and to start/stop a sequence.

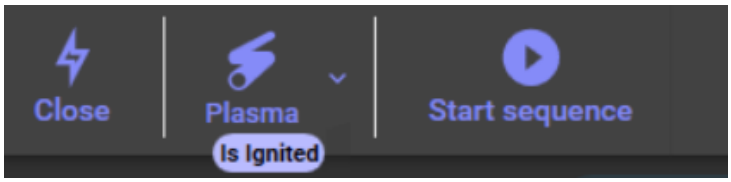


The horizontal bar at the bottom of the window displays the status of the instrument, the state of the plasma and the pump. The color of the status bar depends on the status of the instrument:

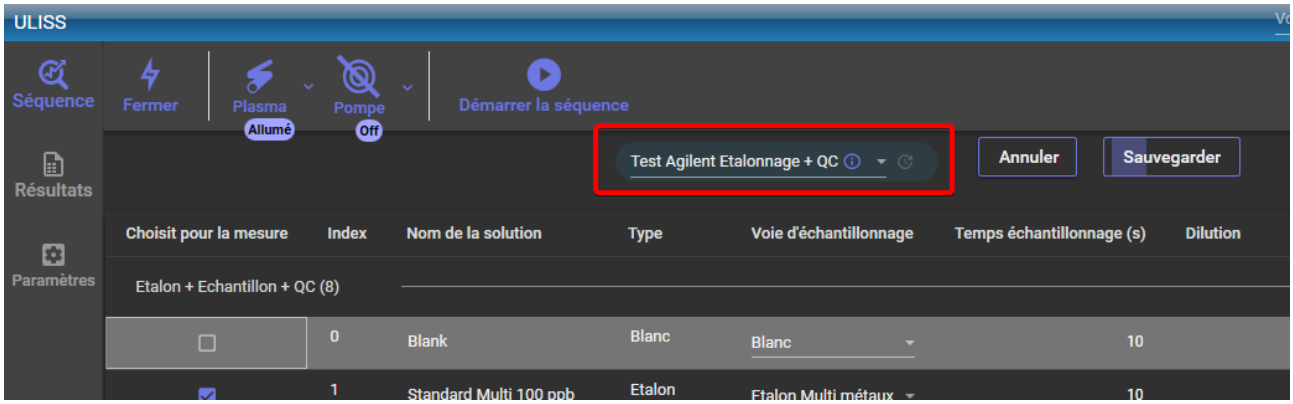
- Open lock: Grey
- Offline: Grey
- Error : Orange
- Not ready to analyze: Yellow
- Ready: Green
- Online: Green
- Under analysis: Blue

The menu below enables the following actions:

- Connection/Disconnection with ICP Expert
- Plasma management: On/Off
- Sequence management: Start/Stop



The selection of the current sequence is done through the menu (framed in red in the following image).



ICP Expert worksheets must be saved in the default location. If they are saved to another location on the computer disk, they will not be identified by ULISS.

Here are the columns available for a sequence:

- To analyze: Determines if the analysis will be to analyze or not
- Index: Identifier of the analysis (read only)
- Solution name: Corresponds to the name of the analysis
- Sample type: Defines the type of analysis: Blank, sample, standard or QC
- Sample stream: Defines the sample stream for the analysis
- Sampling time (s): Defines the time (in seconds) that the sample stream must be held before starting the analysis (not displayed if AVS is used)
- Dilution : The dilution factor is a number by which all calculated concentrations are multiplied, resulting in the final concentration shown on the "Results" page.
- LIMS identifier: Corresponds to an identifier for interfacing with a LIMS
- Customer : Optional field to indicate the customer
- Customer Ref: Optional field to indicate the customer reference
- Sample Site: Optional field to indicate the location of the sample
- Sample Date: Optional field to indicate the date of the sample

The display of the columns can be modified by right-clicking on the column header and checking the columns to be displayed.

As soon as an analysis in the sequence is modified, the "Cancel" and "Save" buttons appear.

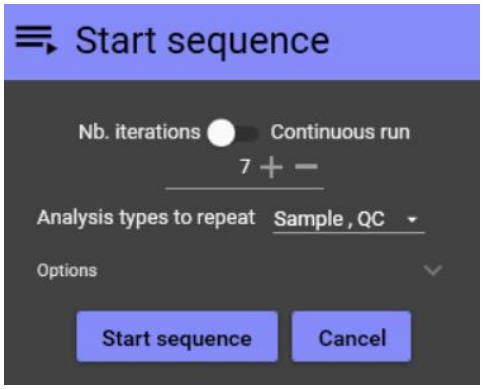
3.2 Launching the sequence

3.2.1 Starting up

There are two analysis modes:

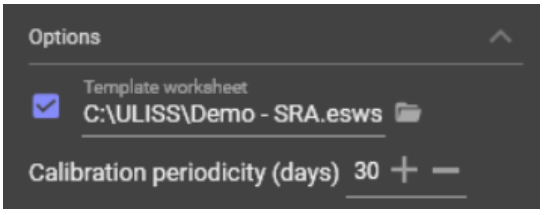
- The "continuous" mode which loops the sequence until a request to stop the sequence is made.
- The "repetition" mode which repeats the sequence a defined number of iterations.

In these two modes, the sequence performs only the types of analysis defined in the displays below.

Continuous analysis mode	Defined number of repetitions of the sequence
	

By expanding the options, you can specify the following fields:

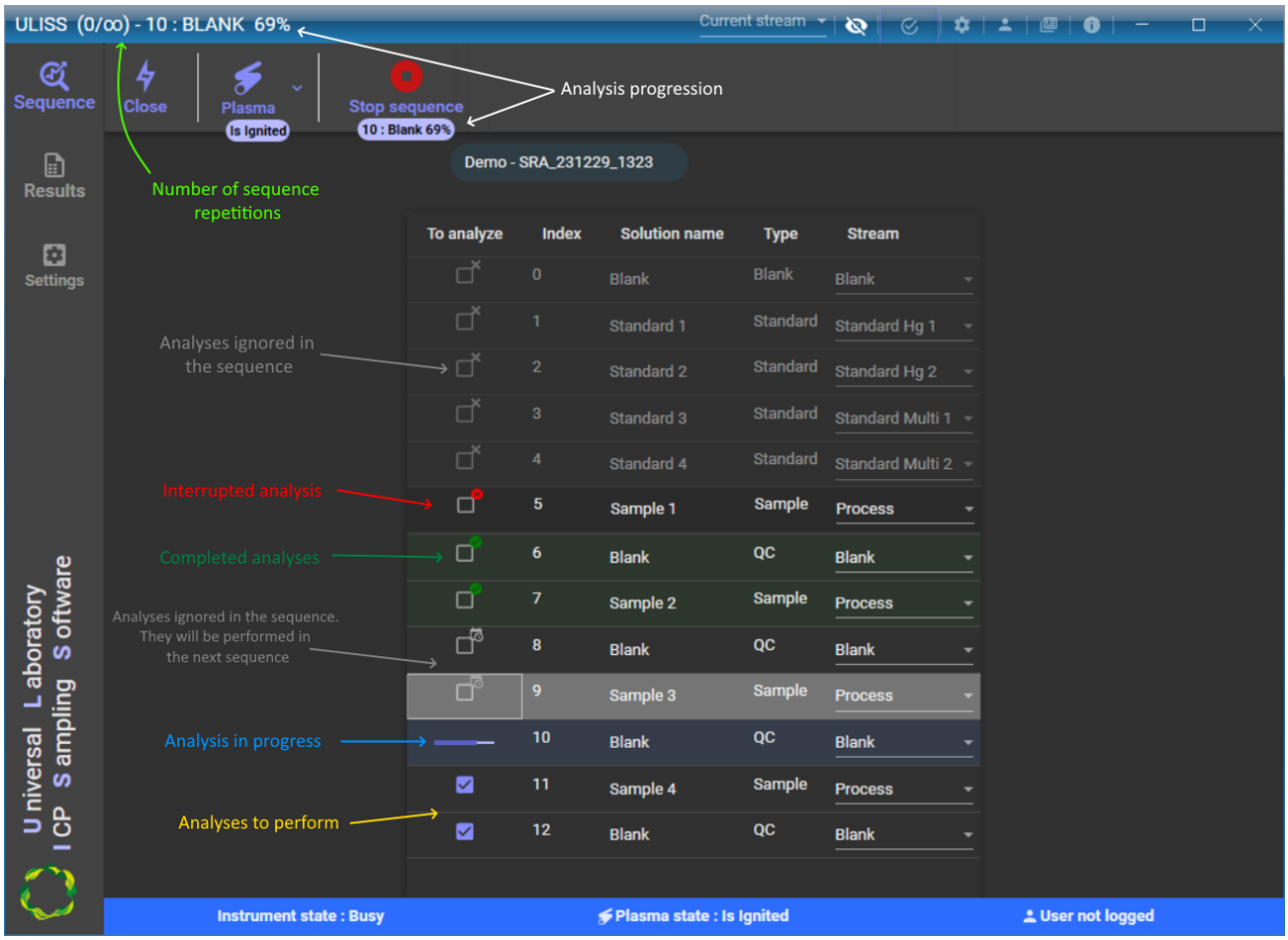
- Worksheet template: If this option is checked and the template location is entered, ULISS will use this template for each worksheet startup or each new worksheet iteration.
- Calibration periodicity: Allows worksheet calibration to be updated at regular intervals. This field is visible if the "Worksheet template" option is checked.



Worksheet results are saved in the "Results" folder (in the ULISS installation folder), sorted by subfolder with the current date in YYMMDD format (example: C:\ULISS\Results\231011).

3.2.2 Indicators

The indicators are useful to know the status of the sequence or analysis in progress. Below is an example of the available indicators.



3.3 Results

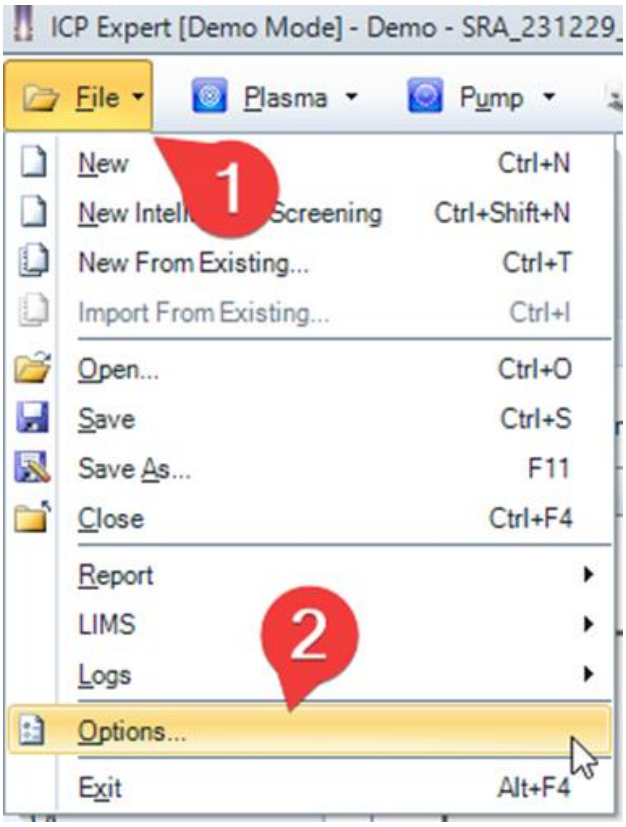
The "Results" tab contains all the results of the analyses performed since the launch of the application.

Within the limit of 500 results

3.3.1 Configuring the result file in ICP Expert

To retrieve the results of the analysis, ULISS reads the results file automatically generated by ICP Expert after each analysis. To generate it, it is necessary to have previously correctly configured this option in ICP Expert.

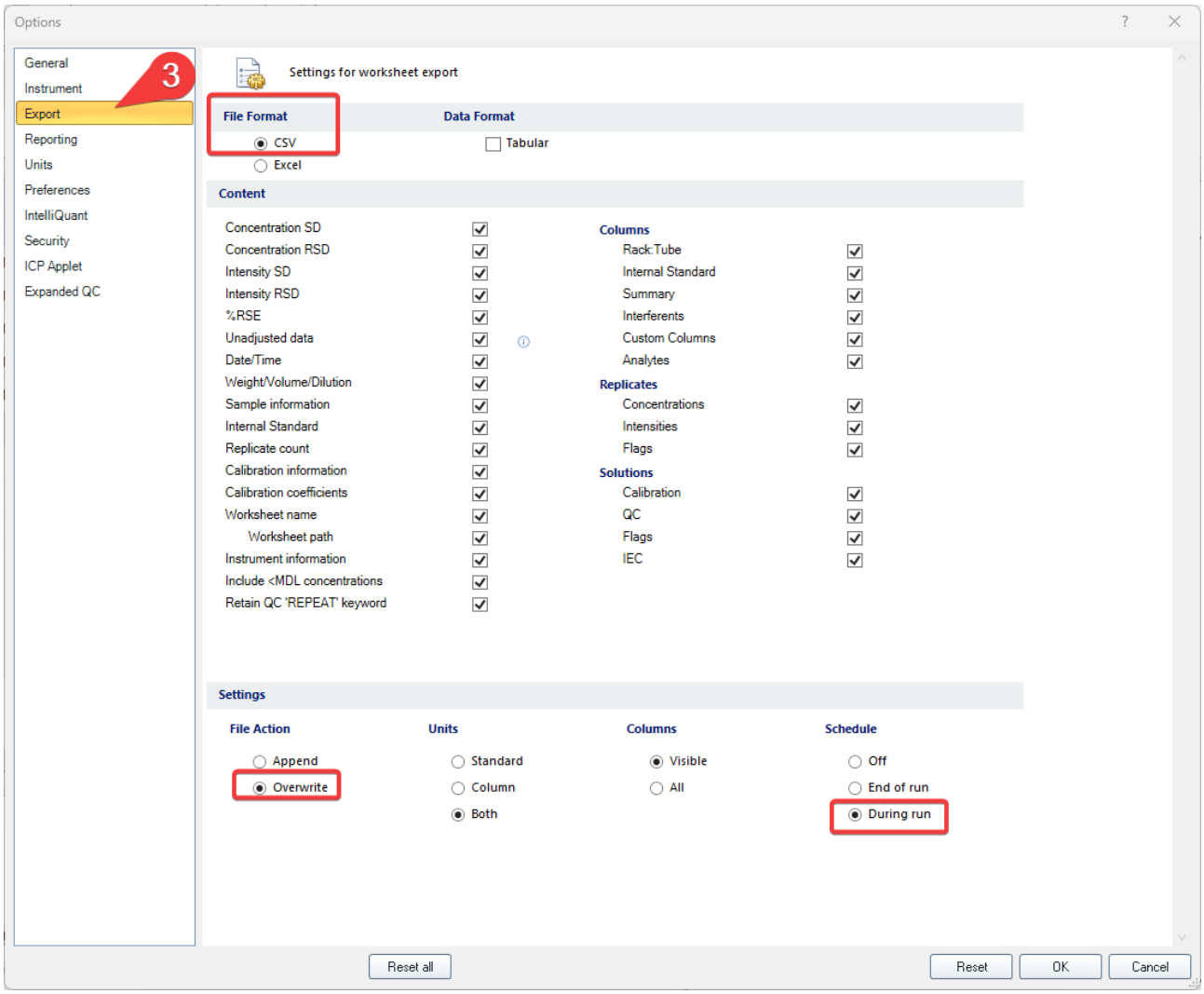
To configure the generation of the results file, open ICP Expert, open a worksheet, click on "File > Options".



Select the "Export" tab and check the following fields:

- File format: CSV
- File action: Overwrite (will always use the same file to write the results, previous results will be replaced by new ones)
- Program: During analysis

Do not check "Data format: Tabular"



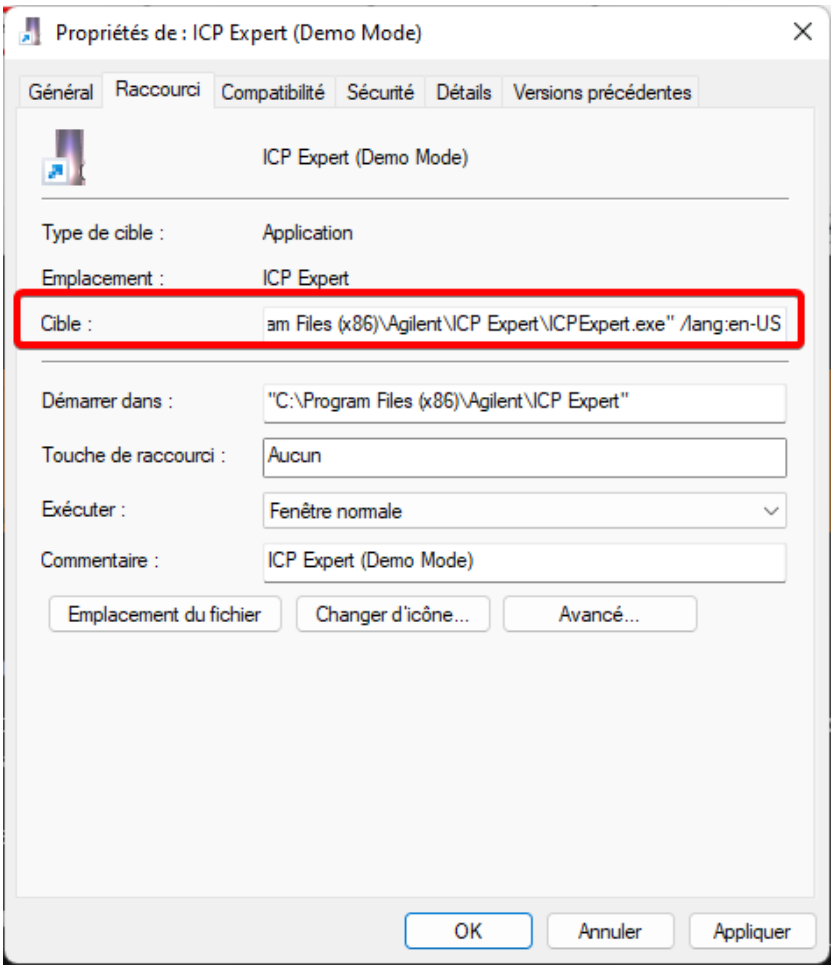
Once the options are checked, click on "OK" to save.

The result file generated by ICP Expert must be generated in the following languages:

- **French**
- **English**

Any other language is not supported by ULISS

To force the language of ICP Expert, click on the ICP Expert software shortcut and add the argument "/lang:en-US" to set English and "/lang:fr-FR" to set French.

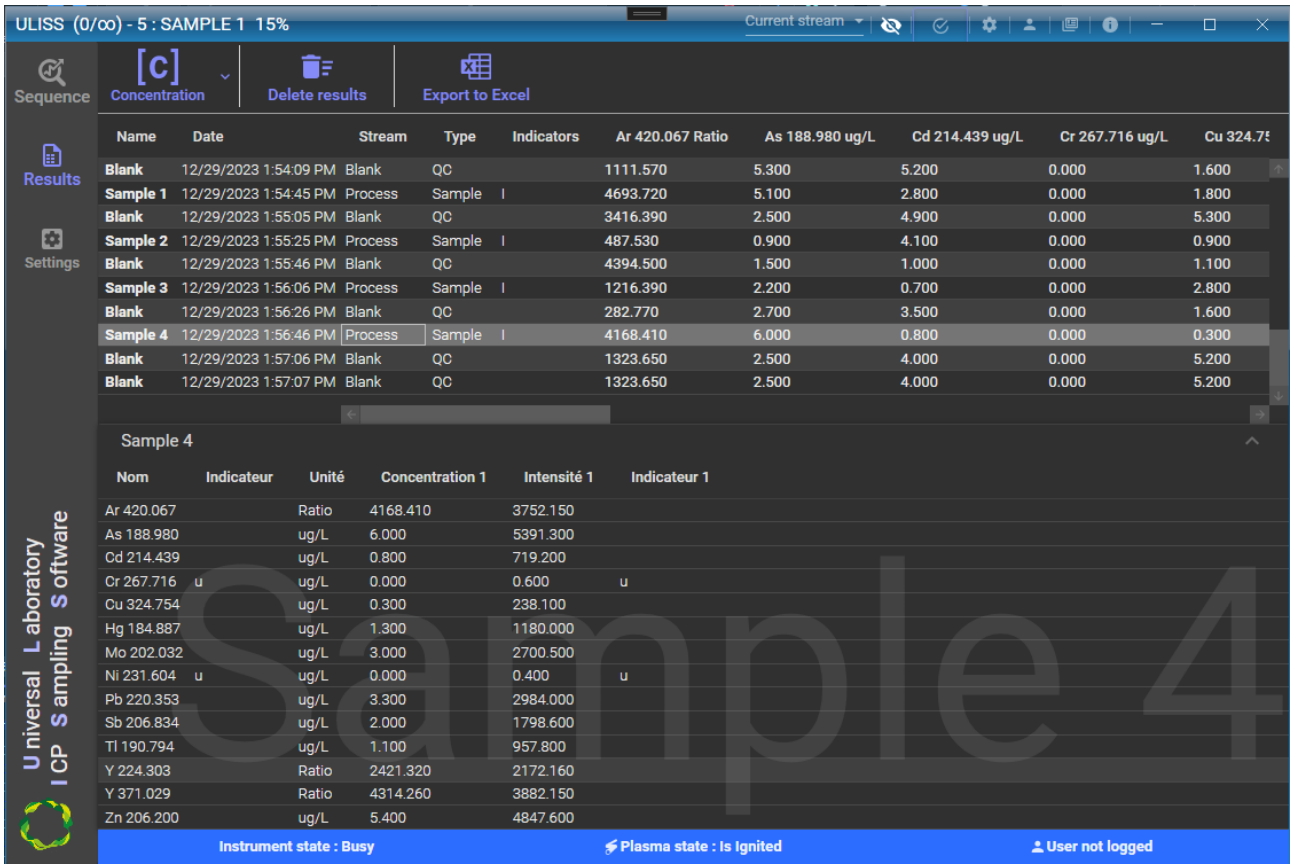


3.3.2 Displaying the results

The results are displayed sequentially in a table : as soon as a new result is available, it is automatically added to the table.

The following display is divided into two parts:

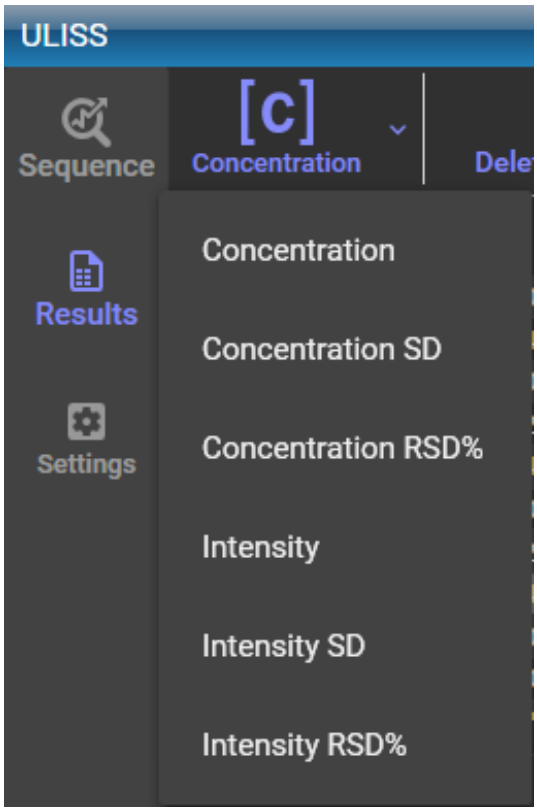
1. At the top: the result list which contains all available results.
2. At the bottom: the results of the analysis selected in the top table ; contains the detailed results of all compounds, replicates results, indicators for each element.



The following columns are available in the results table:

- Name of the analysis
- Date of analysis
- Sample stream
- Nb. Replicates
- Type of analysis
- Indicator
- Values of the elements

This table displays only one type of value. It can be modified by selecting it from the following list:



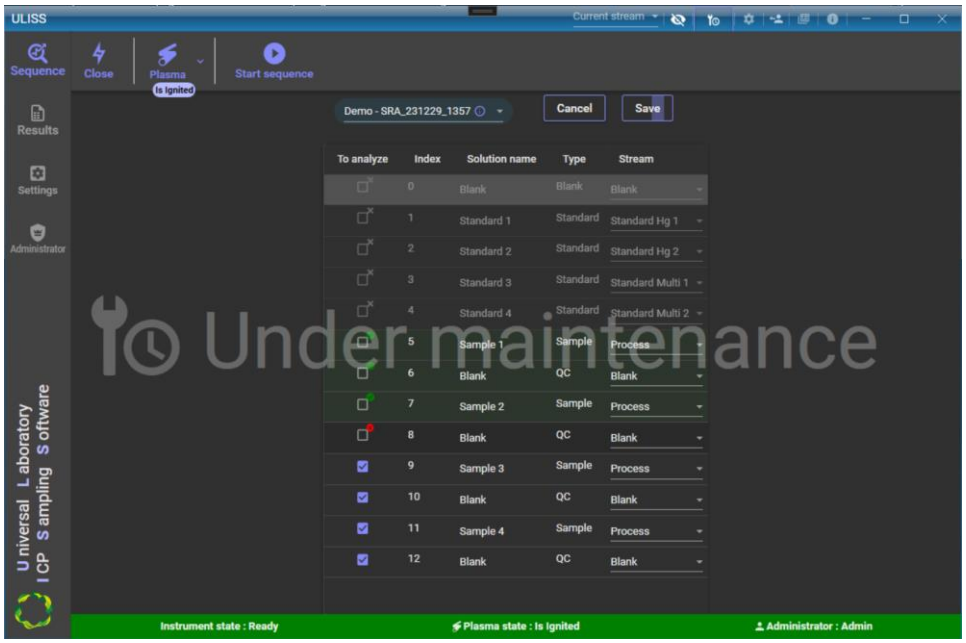
It is possible to delete one or more results from the table by selecting the results to be removed and clicking on "Delete Results".

3.4 Maintenance mode

The maintenance mode is a crucial feature to communicate that the ICP instrument is undergoing maintenance.
During this period, if any results are transmitted to the PLC via Modbus, it is essential to note that the PLC must not consider or integrate these results into its operations. Activating maintenance mode effectively signals to the PLC that the incoming data should be temporarily disregarded, preventing any unintended consequences or disruption to the overall control process.
This ensures a seamless and controlled maintenance experience, enabling technicians to carry out necessary tasks on the ICP instrument without impacting the accuracy or reliability of the data processed by the PLC.

Users must be careful to activate the maintenance mode when maintenance activities are in progress and to deactivate it once the maintenance is successfully completed to restore normal system functionality.

To activate the “Maintenance mode”, click on the following button  , once activated, a watermark will be displayed.



To deactivate the “Maintenance mode”, click on the following button  , the watermark will be cleared.

4. Access rights management

The ULISS software integrates a rights management mechanism for user access to the different functions of the system. A set of predefined profiles describes the authorized actions for the main functions of the system at different levels (consultation, control, modifications, configuration, administration).

A list of predefined users, each with a login and a password, is associated with a profile. This list of users can be modified (deleted, modified, added) by a user with access rights to the administration functions.
To access the system from the local computer, a user must identify himself with his name and password.

The following profiles are defined as standard, with their rights listed in the table below:

- ✓ Not connected : profile loaded by default when the application is launched
- ✓ Operator
- ✓ Technician
- ✓ Manager
- ✓ Administrator

Functions & profiles

- Not connected: All rights by default but can be changed by the administrator.

- Operator
  - Launching of simple programs in charge of executing a predefined action with the objective of starting or restarting the measuring device (sampling line and analyzer).

- Technician (In addition to the above rights):
  - Creating analytical methods
  - Configuring elements of existing methods
  - Configuring quality elements (Calibration and QC)

  - Consulting historical data, measurement data
  - Data export

- Manager (In addition to the above rights):
  - Saving and restoring system data
  - Configuring the supervision

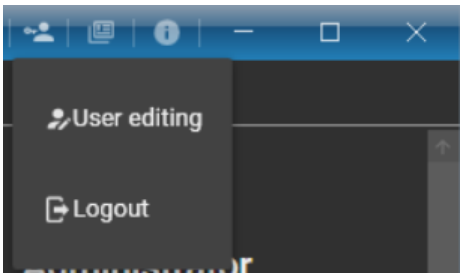
- Administrator (In addition to the above rights):
  - Full system configuration

4.1 Authentication

To connect, click on the connection button available at the top right of the application 
A dialog box will open in order to enter your login and password.

Once both fields are filled in correctly, the authentication button gives you access to the features available for your profile.

It is possible for any type of user to change his or her password or to log out by clicking on the corresponding button at the top right of the window.



4.2 Access rights

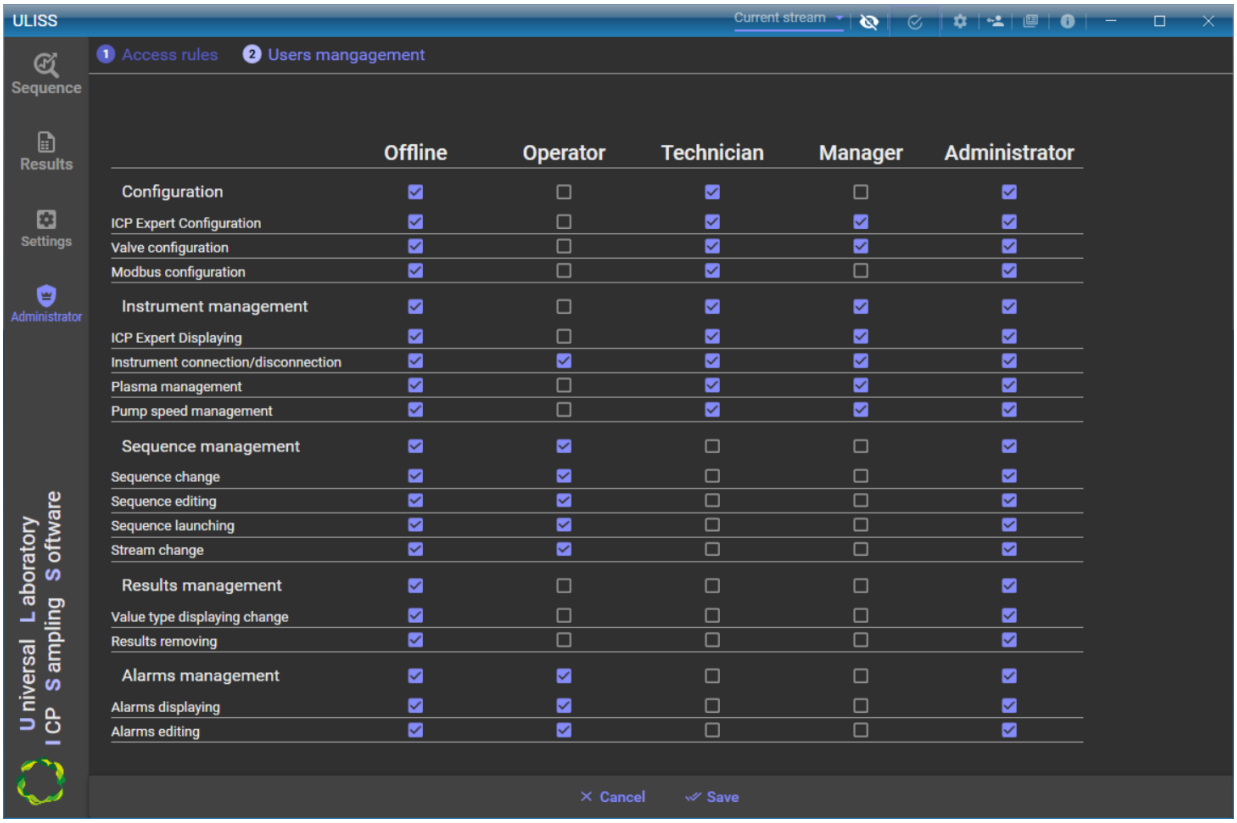
Here is the list of accesses available in the ULISS software. For each of these accesses, there is a check mark authorizing or not the access to the function in the software:

- Configuration group:
  - ICP Expert connection configuration
  - Valve connection configuration
  - Modbus configuration
- Instrument management group:
  - ICP Expert display
  - Connection/disconnection
  - Plasma ignition
  - Change of pump speed
- Sequence management group
  - Sequence change
  - Sequence editing
  - Sequence launching
  - Change of sample stream

- Results group:
  - Changing the type of value to be displayed
  - Deleting the results
- Alarm group:
  - Consulting the alarms
  - Editing the alarms

To change the software access, you must log in as an **administrator**; this is the only profile that can make these changes.

Once logged in as administrator, select the tab dedicated to the Administrator, then "Access rights".



Click on "Save" to keep your settings in memory.