DataApex
Clarity™
CHROMATOGRAPHY SOFTWARE

GETTING STARTED

Clarity Software ENG

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Contents

To facilitate the orientation in the **Getting Started** manual and **Clarity** chromatography station, different fonts are used throughout the manual. Meanings of these fonts are:

Open File (italics) describes the commands and names of fields in **Clarity**, parameters that can be entered into them or a window or dialog name.
WORK1 (capitals) indicates the name of the file and/or directory.
ACTIVE (capital italics) marks the state of the station or its part.
Chromatogram (blue underlined) marks clickable links referring to related chapters.

The bold text is sometimes also used for important parts of the text and the name of the **Clarity** station. Moreover, some sections are written in format other than normal text. These sections are formatted as follows:

Note: Notifies the reader of relevant information.

Caution: Warns the user of possibly dangerous or very important information.

Marks the problem statement or trouble question.

Description: Presents more detailed information on the problem, describes its causes, etc.

Solution: Marks the response to the question, presents a procedure how to remove it.

1 Brief Description

Clarity Chromatography Station is an effective tool for the acquisition, processing, and evaluation of data from any gas or liquid chromatograph with an analog output, and from a wide range of directly controlled chromatographs with a digital output.

In the maximum configuration, it is possible to measure on up to four chromatographs simultaneously, with up to 32 detector signals on each one.

The station is equipped with support tools for automatic cooperation with chromatographs and autosamplers.

Clarity meets the requirements of **FDA**'s directive **21 CFR Part 11**.

1.1 Hardware and software requirements

Basic Hardware and Software Compatibility:

Latest information about hardware and software compatibility can be found in the datasheet **D016** or on the web page www.dataapex.com under section *Products - Clarity - Compatible Windows OS and Hardware*.

Verify that you have:

- A free **USB** port for the **HW key**.
- A free **USB** port for the **installation USB**.
- In case of analog acquisition using an A/D converter, another free **USB** port.

Note: The HW key does not have to be connected and the A/D converter must not be connected during installation, so the installation medium can be plugged in instead of one of them. Meaning you need 1 or 2 free USB ports.

- The Microsoft .NET framework version 4.7.2 or higher installed on the PC.
- In case of a controlled instrument, a free suitable communication port as described in the manual for the applicable control module.

Note: For configuring Clarity in regulated environment, Windows Pro/Professional Edition is required. Please refer to the manual M132: Clarity in Regulated Environment.

Note: When using discontinued hardware such as: INT5, INT7, INT9, CB11, CB20, U-PAD, U-PAD2 or Net-PAD, consult the separate manual for requirements and compatibility issues.

2 Installation

Verify that the package is complete according to the packing list.

Caution: Do not connect any devices, such as **Colibrick**, before installing **Clarity**!

2.1 Language selection

Clarity is available in **English** and the following languages: **Chinese**, **French**, **German**, **Spanish**, and Russian.

You can select the preferred language at the beginning of the installation process or change it later using *Help - Languages* menu command from the main *Clarity* window.

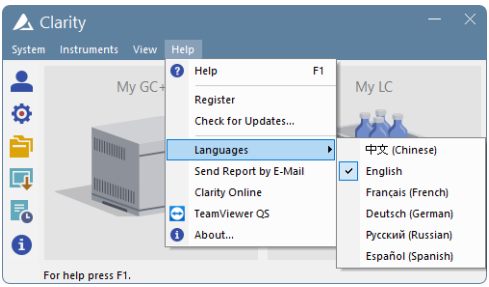

Fig. 1: Switching Clarity into different language

2.2 Software Installation

Setting the Windows environment:

- Ensure you have Administrator access rights in your system before you proceed with the installation. The preferred option is to choose *Run as administrator* under the intended Windows User Account. This ensures that the Windows user has a read/write access to the **Clarity** folders (C:\CLARITY and all subfolders) necessary for operating **Clarity**. Otherwise, the operating system will terminate installation, or **Clarity** will not function properly.
- We recommend to switch off *User Account Control* (UAC) in **Windows** before the installation. In **Windows**, go to *Start - Control Panel - User Accounts - User Accounts* and click on the *Change User Account Control settings*. In the UAC dialog, move the slider down to select the *Never notify* option.
- Ensure that Windows is up-to-date. In case there are pending Windows updates, Clarity installation will be terminated with the following message:

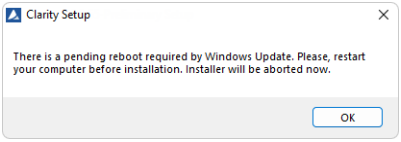

Fig. 2: Pending Windows Update message

Installing Clarity:

- Insert the **Clarity** installation medium into the PC or download the latest **Clarity** version from www.dataapex.com/downloads.
- If the installation does not start up on its own, select the INSTALL.EXE file and run it.
- The installation wizard will take you through the installation process, including the creation of a **Clarity** shortcut in the *Start* menu and a **Clarity** icon on the Desktop.
- Enter the User code provided during the purchase of your station or start without the User code to activate Trial mode.

Trial mode:

- Select *Enter User Code later* option in the *Clarity User Code* dialog and click the *Next* button. When no User code is provided, **Clarity** will start in the so called Trial mode. Trial mode is valid for 30 days or 100 station starts (whatever comes first), and enables all the functions **Clarity** can offer. When the Trial period expires, you will be asked to fill in your User Code number you received with your station, or enter the trial prolongation code. If none is supplied, Clarity will not start.

Caution: **It is highly recommended NOT to install the Clarity software into the PROGRAM FILES directory.**

Note: If you are installing Clarity in a regulated environment or if you want Clarity to comply with the GLP, please refer to the manual M132: Clarity in Regulated Environment, accessible on www.dataapex.com.

2.3 Hardware Installation

The following chapters describe the installation of the **HW key** and a brief installation of the **Colibrick** A/D converter (not included in case of direct control of the chromatograph).

A detailed description of the hardware and its installation, including troubleshooting, is available in separate manuals (see www.dataapex.com/downloads).

Caution: Install **Clarity** (including the **HW key**) before connecting any external devices to the PC.

2.3.1 HW key installation

Clarity is shipped with a HW key which does not require any installation. Drivers are installed automatically after inserting the key into the **USB** port. The HW key number is displayed during installation.

The HW key needs to be present in the PC when using Clarity.

Fig. 3: Rockey4 ND (no Drivers required) HW key

Caution: Older versions of HW keys require a different installation procedure. Please see the FAQ located at www.dataapex.com under the section *Support - FAQ*.

2.3.2 Installation of the Colibrick A/D Converter

Caution: Install **Clarity** before connecting the **Colibrick** to the **USB** port. Drivers will be installed automatically during the installation of **Clarity**.

- Install **Clarity** from the provided medium or get the latest version from www.dataapex.com/downloads.
- Connect the **Colibrick** with a cable to a **USB** port on the computer.
- After connecting the **Colibrick**, the device will be automatically detected by the operating system.

Note: Multiple **Colibricks** can be distinguished by their unique serial numbers. Therefore, even when plugged into a different **USB** port, **Clarity** will automatically assign the appropriate **Colibrick** to the corresponding *Instrument*. There is no need to restart the **PC**.

2.4 Device wiring

The wiring strongly depends on the particular configuration. The **Clarity** station package with the **Colibrick** A/D converters contains a **cable set** composed of signal, starting, and digital output cables for connecting **Clarity** to a chromatograph, and a **USB** cable for connecting a **Colibrick** to a computer.

The following subsections contain information regarding the A/D converter wiring. Using directly controlled detectors eliminates the necessity of having an A/D converter - in this case, continue in the chapter **"Clarity Configuration"** on pg. **8**. See www.dataapex.com/controls for a list of digitally controlled instruments.

2.4.1 Standard cable for Colibrick

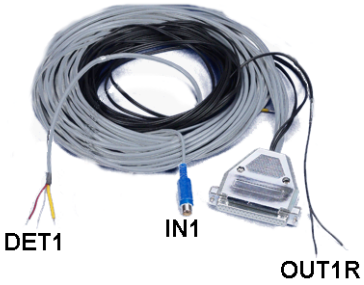

Fig. 4: The standard Colibrick cable for one detector

Signal cables

The cables labeled as "**DET1**" to "**DET4**" (corresponding to the number of channels) are supplied without connectors with stripped and tinned endings - red/brown (+), white (-), and shielding (analogue ground).

Starting (marker) cables

The cables labeled as "**IN1**" to "**IN4**" (corresponding to the number of channels) come with an RCA connector. Each starting cable contains two more cables: one with either free leads [red (+), shielding (digital ground)] for a direct connection to the chromatograph, or a valve for a valve-mediated connection, and one equipped with a push-button for the cases when there is not a starting contact available and it is necessary to perform a manual start.

Digital output cables

Relay contacts labeled as "**OUT 1R**" to "**OUT 4R**" (corresponding to the number of channels) terminate with free leads. These are used for the autosampler (AS) synchronization in an active sequence without the AS Control module.

Each **Colibrick** comes with a female CANNON SUB D 37-pin connector.

2.4.2 Chromatograph

Connect cables according to one of the diagrams in **Fig. 5** on pg. **6**. Use a symmetrical connection only if you are sure that the chromatograph/detector is

equipped with a symmetrical output - it is necessary to read the instructions for the corresponding chromatograph.

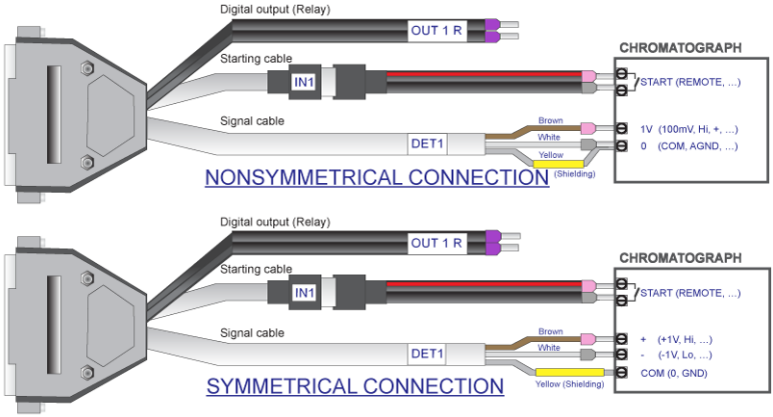

Fig. 5: Possible types of connection between the Clarity station and a chromatograph

Note: Since the introduction of the **INT7** converter, all **DataApex** A/D converters use the same standard **INT7 Connector**.

Connecting the signal cables:

Signal inputs of the **Colibrick** are symmetrical: red/brown (+), white (-), yellow shielding (= analogue ground/copper braiding).

Caution: The shielding must be connected since it also serves as the analogue ground for the measurement. In the case of an asymmetrical detector output (only two leads/terminals/pins/screws), the shielding must be connected to the white lead! No lead of the signal cable can remain unconnected.

Try to connect the signal cable to the chromatograph detector output with the largest possible level of signal. This one is usually labeled as **INTEGRATOR** (signal approx. *1 V*). The level of the signal on the output marked as **RECORDER** is only about *10 mV*.

For an easier modification of the wiring, we supply a **SV9 Terminal board** (p/n **SV9**) with screw contacts.

Connecting the starting cables:

The starting input reacts to a change of the TTL logical level (*5 V*) or to a connection by any contact (button, contact of relay). It can be used for a remote start from a chromatograph, or from a valve with a contact closure when injecting manually.

The input implicitly reacts to a change from *HIGH* to *LOW* (or closing of a contact). By switching the *Down* item to *Up* in the *Ext. Start/Stop* section from the *Method Setup - Measurement* dialog (accessible from the *Instrument* window using the *Method - Measurement* command), the input function may be changed.

2.4.3 Autosampler

The most typical autosampler connections are described in the chapter **"Connecting Autosamplers (AS)"** on pg. **33**. The start synchronization configuration through *Ext. Start Dig. Input* and *Ready Dig. Output* functions is included.

The autosamplers controlled directly using an **AS Control** module (p/n **A26**) are described in their corresponding manuals.

2.5 Clarity Configuration

The following chapter explains how to set the instrument number and type, how to assign **Colibrick** channels to a specific instrument, and how to name those channels and set units.

The configuration of particular control modules is described in the corresponding **Clarity Controls** manuals.

- Start the **Clarity** station with the  icon on the desktop.
- Open the *System Configuration* dialog using the *System – Configuration…* command or via the  icon. See **Fig. 6** on pg. **9**.

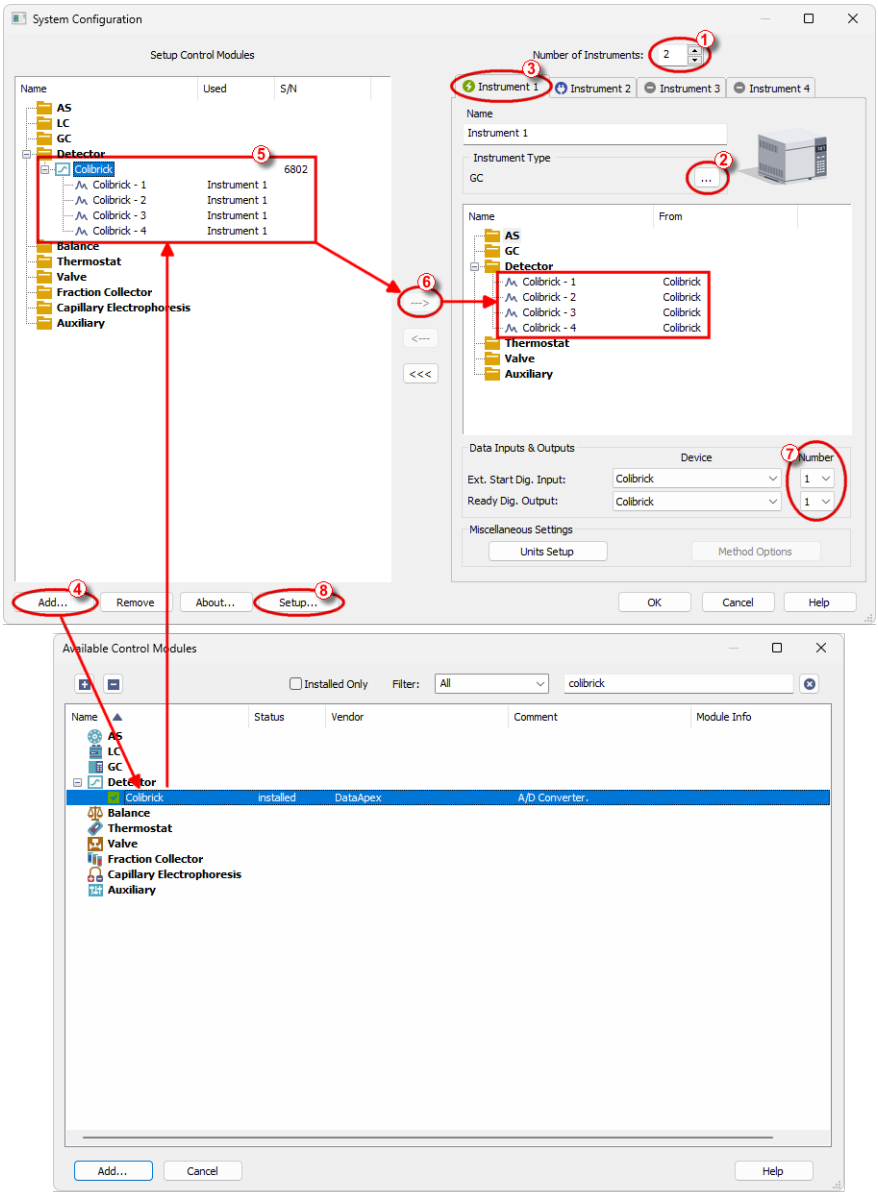

Fig. 6: System Configuration dialog

- Set the *Number of Instruments* field ① .

Note: You can set a larger number of Instruments than you have purchased. You will not be able to measure on the surplus Instruments (indicated by a blue icon on the tab) but you may use them e.g. for “offline” evaluation of chromatograms from other projects.

- Set the corresponding type of chromatograph (GC/LC/EA/GPC...) using the ... button ② .
- Instruments can be selected on the Instrument tab ③ . Each instrument can have a different configuration depending on your hardware configuration.
- Add devices to the list on the left using the *Add* button ④ in the lower left corner of the dialog. After adding a device, a setup dialog will appear. This dialog varies for each device; an example for a **Colibrick** is shown below.
- To modify the instrument configuration, drag and drop the equipment from the *Setup Control Modules* list on the left to the selected *Instrument* tab on the right. Alternatively, select the device ⑤ and press the --> button ⑥ .
- For the proper setting of *Numbers* in the *Data Inputs & Outputs* group ⑦ see the chapter **"Connecting Autosamplers (AS)"** on pg. **34**.
- The setup dialog of each device can be invoked again by double-clicking on its name or by selecting it and clicking the *Setup* button ⑧ :

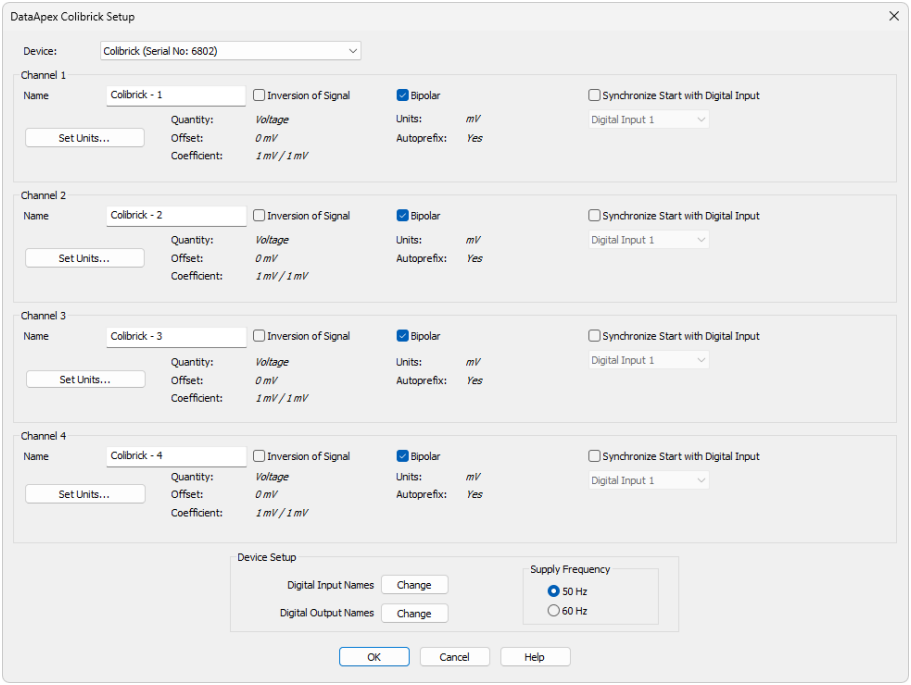

*Fig. 7: Dialog for the setting of a **Colibrick** converter*

- Check and/or change the settings of the converter (e.g. set the names of the detectors, signal polarity, etc.).

Note: You can change the signal units and offset using this dialog. A more accurate description can be found in the **Colibrick** manual.

- Click the *OK* button to save the changes in the configuration.

3 Qualification procedures

Many laboratories place great importance on the quality of their analytical data. One of the requirements for ensuring the reliability of generated results is the validation of all instrumentation and procedures that are used to acquire data. For chromatography data stations, usually three levels of validation (qualification) are relevant:

- Installation Qualification
- Operational Qualification
- Performance Qualification

3.1 Installation Qualification - IQ

The **Installation Qualification** (**IQ**) is a procedure that confirms the successful installation of the software and verifies the correctness of the file versions. **IQ** is an integral part of the **Clarity** installation procedure.

How to use the Installation Qualification

- Install **Clarity** according to the instructions of the **Installation Wizard**.
- Locate the**IQ Report**: this is dependent on your operating system. You can search for  **IQ Report** in the search field of the *Windows Start* menu.
- Click on the **IQ Report** program and the *IQ* window will be opened.

Note: **IQ** can also be started by using IQ.EXE located by default in C:\CLARITY\BIN.

- If the installation has been performed correctly, the status should read: "*Installation Qualification Test: Passed*".

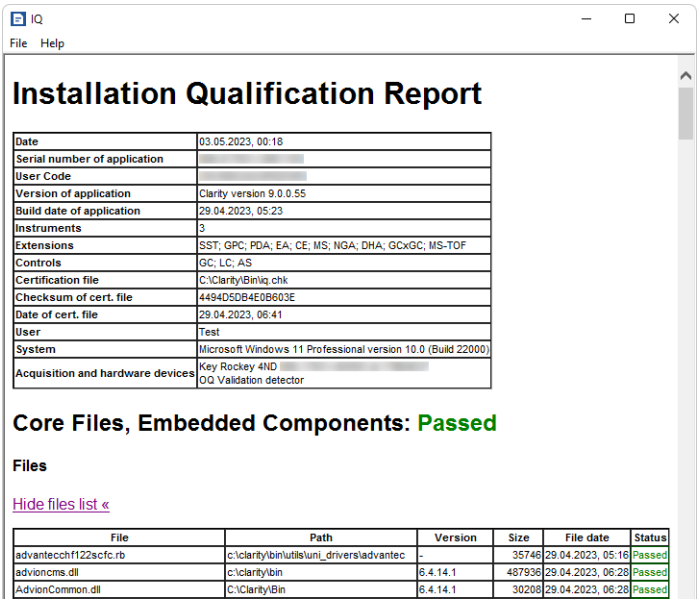

Fig. 8: The IQ window

- If the **Installation Qualification** fails, it is recommended to uninstall and then re- install Clarity. If it fails again, contact the DataApex support (support@dataapex.com).

Note: The most common reason for a "Failed" result is when an upgrade is installed over an existing full version of Clarity. While this process does not generate any errors, it can lead to checksum mismatches because some files are retained from the original installation.

- The **Installation Qualification** report can then be printed, copied to a clipboard, sent by an email, etc.

3.2 Operational Qualification - OQ

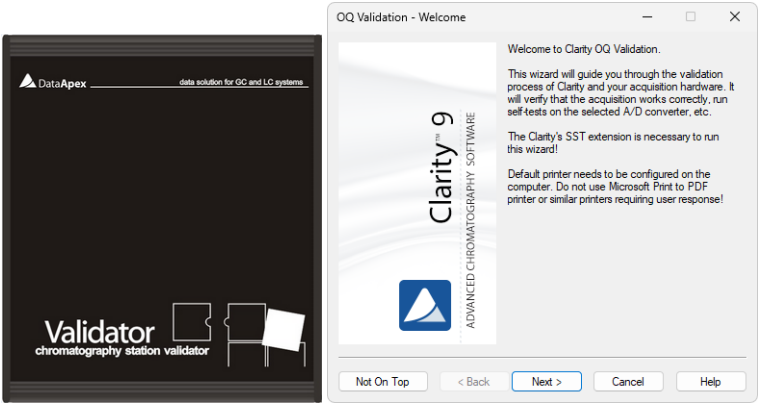

Fig. 9: DataApex Validator 2 and OQ Validation Wizard

The **Operational Qualification** (**OQ**) is a procedure designed to confirm that the data station is performing according to the manufacturer's specifications. The **Operational Qualification** is provided by the **Validation Kit** (optional), which consists of a precise peak generator and a set of methods and reports used in the validation process. The **System Suitability Test (SST)** module, an optional Extension of **Clarity**, is necessary for running **OQ**.

How to use the Operational Qualification

To perform **OQ**, run the *OQ Validation Wizard* from the CLARITY\BIN\OQ_VALIDATION folder. The Wizard will guide you through the procedure of the **OQ** validation.

It is possible to perform **OQ** in two different ways:

1. Validation with an A/D converter

Colibrick or any other DataApex A/D converter and a **Validator** peak generator (a part of the **Validation Kit**, p/n **CVK**) are required for this type of validation. The **Validator** generates a signal which is received by the A/D converter, and the acquired dataset is compared with expected values. This validation protocol ensures the validity of the entire acquisition chain, starting from analog signal input and ending with result calculation.

2. Validation with a Virtual detector

For systems with digital acquisition, this is the only feasible manner of validation. The input signal is simulated via the **Virtual detector** control module, which is able to simulate signal input into **Clarity** in exactly the same way as a real chromatographic instrument would do. This will ensure that digital signals are processed correctly after being received from a detector. **Virtual detector** is a part of the **Clarity** software, meaning no extra hardware or control module is needed for this type of validation.

Note: **OQ** validation takes approximately 50 minutes to complete and during this time, it is not possible to perform analysis using **Clarity**.

The **Validation kit** (p/n: **CVK**) as well as the **SST Extension** (p/n: **A22**) can be purchased separately. The validation process is described in more detail in the **Validation Kit** manual (M039).

3.3 Performance Qualification - PQ

The **Performance Qualification** (**PQ**) is a procedure confirming that the analytical system is fit for a given type of analysis. The overall system performance is tested against the requirements of the manufacturer's specification. For this purpose, a dedicated **Clarity** Extension, the **System Suitability Test** (**SST**) can be used. **PQ** must be done based on the Standard Operating Procedures (SOPs), devices, and procedures used directly on site, therefore, DataApex cannot provide any pre-prepared **PQ** procedures.

The **SST** module (p/n **A22**) can be purchased separately.

4 Program structure and control

Clarity has a hierarchic structure. Upon clicking the *Clarity* icon, the main *Clarity* window will be displayed with names of the configured Instruments.

After clicking on the chromatograph picture, you will be prompted to log in by entering your *User Name* and selecting a project (this can be later changed). Proceed by pressing the *OK* button. The dialog about Method Setup adaptation may be displayed. Click *Yes* and adapt the Method in the *Method Setup* dialog. In case you are using *Demo1*, just click on *OK*. Alternatively you can press *Help* to learn more about method adaptation. Now the ***Instrument*** window will be displayed.

Note: The **Clarity** station works with the so-called Instruments. All detectors connected to the same Instrument share a common time base.

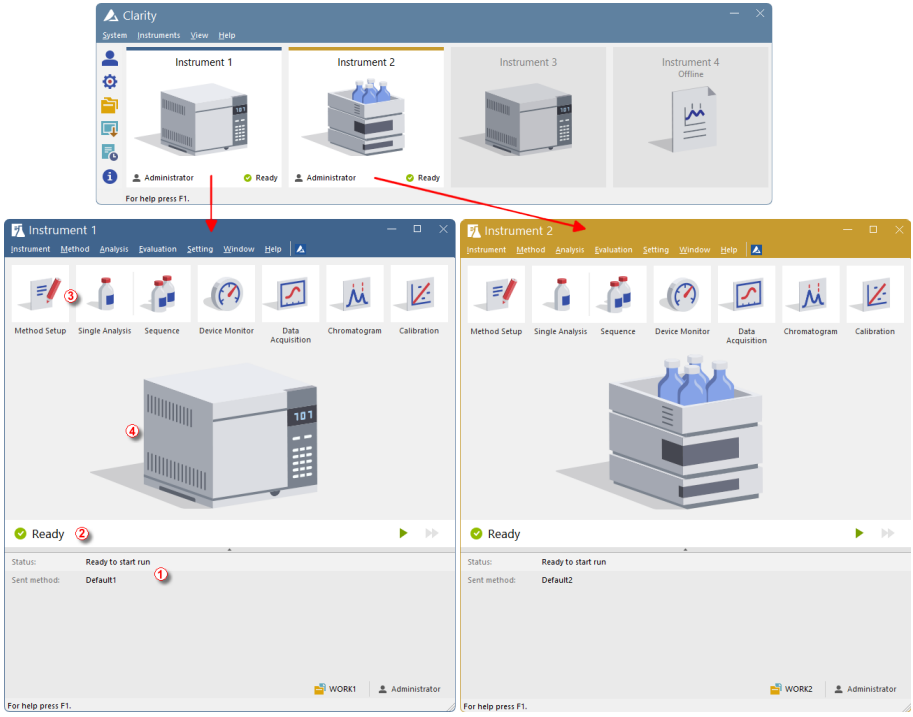

Fig. 10: Clarity Instrument windows

The main *Clarity* window is designed to configure chromatography station, select access rights, and choose basic directories for data saving. It also shows the status of the logged-in instruments.

The *Instrument* window is used for acquisition and processing of data using the connected chromatograph. Up to four independent *Instrument* windows can be

displayed. As you can see on the example in **Fig. 10** on pg. **16**., *Instrument 1* and *Instrument 2* are opened, hence the respective instrument windows are displayed.

Each ***Instrument*** window contains an information table ① , a status line ② , tiles for Method Setup, Single Analysis, Sequence, Device Monitor, Data Acquisition, Chromatogram, and Calibration ③ , and lastly an instrument image ④ . Instruments are distinguished by the color of the *Instrument* window header and by the instrument name, which is displayed in the header of each *Instrument* window. The name in the header of the *Instrument* window is identical to the name displayed above the corresponding chromatograph in the main ***Clarity*** window.

All relevant dialogs for performing actions in the ***Instrument*** window can be easily accessed using appropriate commands from the menu or by clicking on their icons.

5 Tour through the Clarity station

The following two sections will guide you through a single analysis (the chapter **"Running the Single Analysis"** on pg. **19**.) and a sequence measurement (the chapter **"Running the Sequence measurement"** on pg. **25**.). The sections provide step-by-step instructions which should be performed in the given order. Some sections may be skipped, as their output files have been already included as examples. You will be accordingly notified in those sections. Furthermore, *Note* sections included throughout the following describe optional procedures, and it is not necessary to perform them in order to reach the goal.

The **Clarity** software is intuitive and easy to master without much training. The first analysis can be run in less than one minute after installing the station and configuring the hardware.

This tour assumes that the station is in its default configuration and that nothing has been modified in the demo projects. It is possible to test the **Clarity** functions on other projects, but the files mentioned in this guide will not be present.

Note: Although this tour through the station is aimed at **Clarity** beginners, it assumes that users have a basic knowledge of chromatography principles and basic processes such as calibration.

Note: Pressing **F1** or the *Help* button shows the help page specific to the window or dialog. In the help, the *Index* tab serves for a keyword search and the *Search* tab serves for full-text searching.

5.1 Running the Single Analysis

The software includes a simple project, which employs basic functions. It shows how to start a Single Analysis, monitor the Data Acquisition and process the resulting Chromatogram.

5.1.1 Instrument window

- Start the **Clarity** station. The main window will appear, showing up to four configured Instruments.
- Open any **Instrument** on which you want to test the **Single Analysis** by using the *Instrument - Login to Instrument X* command or by clicking on its icon. The *Login Dialog* will open.
- In the displayed *Login* dialog with the pre-selected *Administrator* choose option *DEMO2* in the *Select Project:* combobox and press the *OK* button. The *Administrator* account does not need a password; proceed by pressing the *OK* button.
- You can also load the desired demo project to the *Instrument* window by using the *Instrument - Project...* command, then use the *Open...* button and select the **DEMO2** project. This will load all the necessary files.

Note: You can create your own User accounts from the main *Clarity* window using the *System - User Accounts...* command.

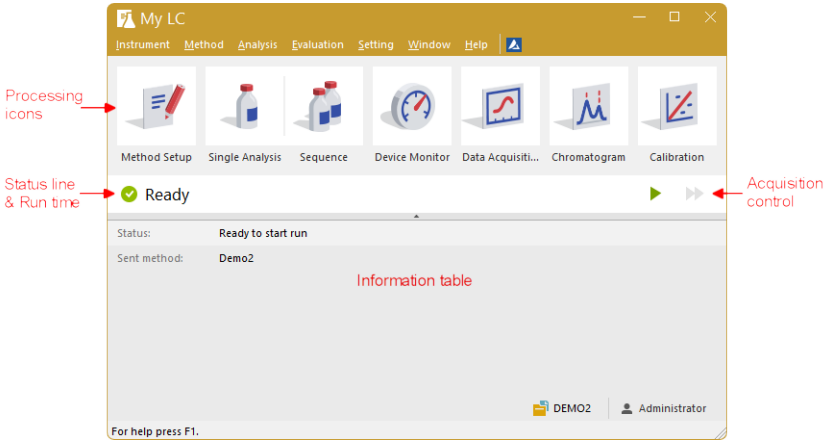

Fig. 11: Instrument window

- The *Instrument* window will open; **Fig. 11** on pg. **19**. shows the most important icons in the *Instrument* window. During the tour, we will review all windows opened by these icons.

5.1.2 Single Analysis dialog

Use the *Single Analysis* button in the ***Instrument*** window to open the ***Single Analysis*** dialog.

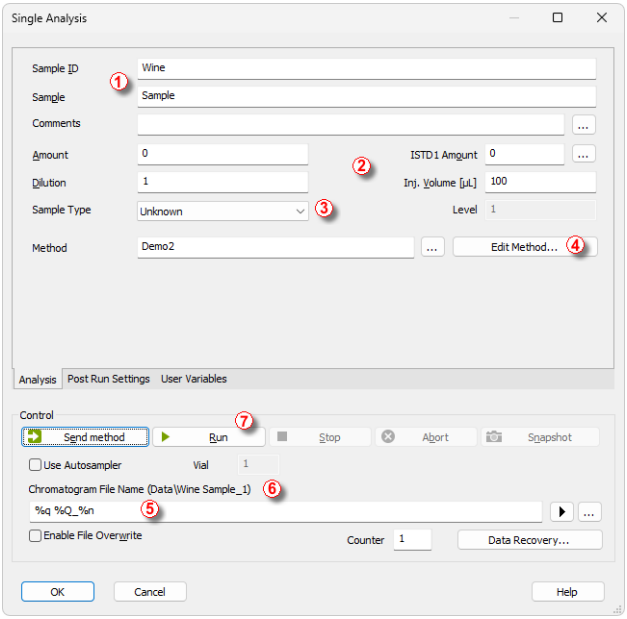

Fig. 12: The Single Analysis dialog

- The fields in the *Analysis* section contain information about the sample. You may set the values in the fields as shown in **Fig. 12** on pg. **20**., as typical analysis settings.
- *Sample ID* and *Sample* fields ① are only informational.
- Values in *Amount*, *Dilution*, *ISTD Amount* and *Inj. Volume* fields ② are used for further calculations.
- Choosing the *Standard* from the *Sample Type* menu ③ and entering a value in the *Level* field would mark this sample as the calibration standard and save the chromatogram into the CALIB subdirectory.
- The measurement of the sample will be performed according to the actual modification of the template method opened in the ***Instrument*** window. The *Edit Method...* button ④ serves to change the parameters of the actual template method. Click the button to open the ***Method Setup*** dialog and check the setting of the *Autostop* parameter (*Autostop* should be enabled) and *Run Time* (7.5 minutes). Return to the ***Single Analysis*** dialog by pressing the *OK* button.

- *Chromatogram File Name* ⑤ field is used for entering the file name of the resulting chromatograms. It is possible to use plain text together with variables adding the time, date, sample name or other parameters to create a unique chromatogram name. The resulting name can be seen just above the field ⑥ in parentheses.

Note: The complete set of available variables is shown after clicking the field and selecting the ▸ icon.

- For the demonstration purposes, you may set the values in the fields as shown in **Fig. 12** on pg. **20**. as typical analysis settings. Once this is performed, your instrument window will be the same as shown in **Fig. 11** on pg. **19**.
- After the parameter setup, you can run the analysis by clicking the *Run* button ⑦ . The ***Single Analysis*** dialog will close now. If you open it again, you will see three additional buttons (*Stop*, *Abort*, *Snapshot*) that will allow you to stop or abort the analysis or take snapshots (see the chapter **"Data Acquisition window"** on pg. **21**.).
- Close the ***Single Analysis*** dialog and return to the ***Instrument*** window.

5.1.3 Data Acquisition window

- In the ***Instrument*** window look at the *Status line* (see **Fig. 11** on pg. **19**.). The acquisition is now signaled by the *RUNNING* state and the actual run time shown there.
- To see the data acquisition in process and control it if necessary, click the *Data Acquisition* icon (see **Fig. 11** on pg. **19**.) to enter the ***Data Acquisition*** window.
- Depending on your station's configuration, one or more signals may be displayed. The number of detectors (signals) and their names can be seen in the upper right corner of the graph ① .

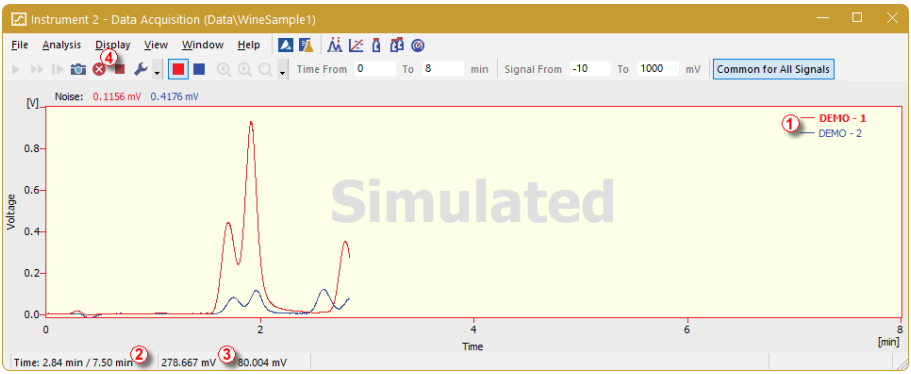

Fig. 13: The Data Acquisition window

- In the *Status bar* on the bottom of the ***Data Acquisition*** window, the elapsed time of the analysis ② can be seen, as well as the value of the signal for each detector ③ and its units.

Note: If the detector range is exceeded, the OVER string in red lettering will be displayed in the part of the status bar corresponding to the detector.

- *Stop* and *Abort* icons ④ allow you to cancel the analysis. If stopped, **Clarity** will save all the data acquired so far and stop the analysis. Abort cancels the acquisition without saving any data.
- *Snapshot* icon creates the preview of the already measured data. After clicking on it, the ***Chromatogram*** window will open with the chromatogram file corresponding to the part of the data already measured (more information on the ***Chromatogram*** window can be found in the chapter **"Chromatogram window"** on pg. **23**.).
- After 7 minutes and 30 seconds (the run time set in the template method used for the measurement), the analysis will automatically stop and the ***Chromatogram*** window will open.
- The ***Chromatogram*** window opens automatically because the station is set to do so. These settings are available in the ***Single Analysis*** window at the ***Post Run Settings*** tab. You can also configure additional post run actions, such as exporting data or executing external programs, in this tab.

5.1.4 Chromatogram window

- The *Chromatogram* window can be opened also manually by clicking on the *Chromatogram* icon in the *Instrument* window.
- Here you can evaluate your previously acquired data or open our sample chromatogram to get familiar with the basic functions which will be covered in this chapter.
- Use the *File - Open Chromatogram...* command or click the open icon and select the WINE_SAMPLE.PRM file and press the *OK* button.
- The *Chromatogram* window is divided into two parts: the *Graph* (upper) pane and the *Results* (lower) pane.
- Magnify any part of the chromatogram by selecting the area while holding the left mouse button. Restore the entire chromatogram view by double-clicking in the graph.

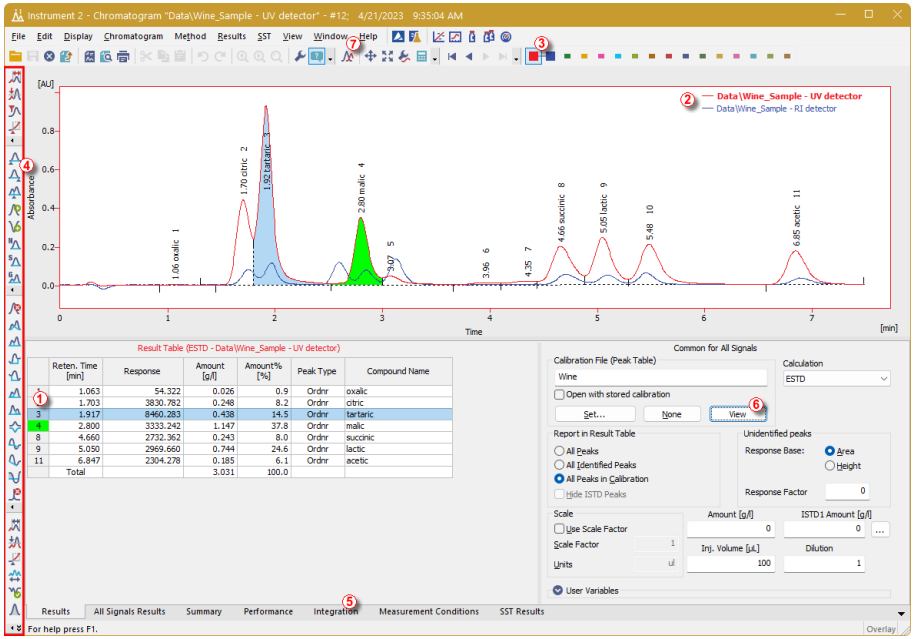

Fig. 14: The Chromatogram window

- Clicking on a cell in the *Result table* ① will color the peak (or peaks when selecting multiple cells) corresponding to the row(s) you just selected.
- Only one detector signal can be active at a time. The active signal can be identified in three ways: first, in the legend section at the upper right corner of the graph ② , where the active signal is displayed in bold text; second, in the

*Overlay*toolbar ③ , where it is marked with a debossed icon  ; and finally, by noting the color of the graph outline and table headers. Try to change the active signal by double clicking on its name in the legend section. You will notice that the **Result table** has changed.

- To change the color of the active signal click on the desired color in the *Overlay* toolbar. All parts of the *Chromatogram* window will change color.
- You can change the integration of peaks using the interactive icons on the toolbars on the left side of the *Chromatogram* window ④ or directly in the *Integration* tab ⑤ . Any changes made either way will change the **Integration table** and can be copied to the template method.
- To add color to a peak permanently, click the *View* button ⑥ in the right side of the *Results* tab. This will get you to the linked calibration file. There, in the *Calibration Summary Table*, find the *Peak Color* column (see **Fig. 17** on pg. **28**.). In the row corresponding to the peak to be colored, select the desired color by clicking in the field and selecting the  icon. Pick the desired color and click *OK*. You will be asked to save the changes upon closing the *Calibration* window. Return to the *Chromatogram* window by using the  icon in the menu bar. The selected peak is now colored according to the color selected in the *Calibration* window.

Note: After copying the **Integration table** contents to the template method, new chromatograms will be automatically integrated according to the changed parameters. Already measured results can be reprocessed (for more details see the chapter **Linking the calibration to a method** on pg. **30**).

5.2 Running the Sequence measurement

This chapter and the prepared **DEMO1** project will guide you through *Sequence*, *Calibration*, and *Method Setup* windows used for automated measurement and preparation of template methods.

Sequence operation allows automated measurement of large number (depending on PC and autosampler configurations) of samples using chromatographs equipped with autosamplers. **Clarity** provides the possibility to select an *ACTIVE* (start controlled by the station) or *PASSIVE* (start controlled by the autosampler) sequence. It is also possible to re-process the already measured sequences.

Note: It is not necessary to have the **Autosampler (AS) Control** module to use the autosampler; start synchronization can be performed even without it. However, the control module can add direct control from **Clarity**, enabling automated actions such as sending vial positions, injection volumes, etc., all without requiring programming the AS through the instrument panel.

5.2.1 Sequence window

- In the main *Clarity* window, open the **Instrument** on which you want to test the functions of Sequence.
- In the displayed *Login* dialog with the pre-selected *Administrator*, choose the option *DEMO1* in the *Select Project:* and press the *OK* button.
- Use the *Sequence* button in the *Instrument* window to enter the *Sequence* window.

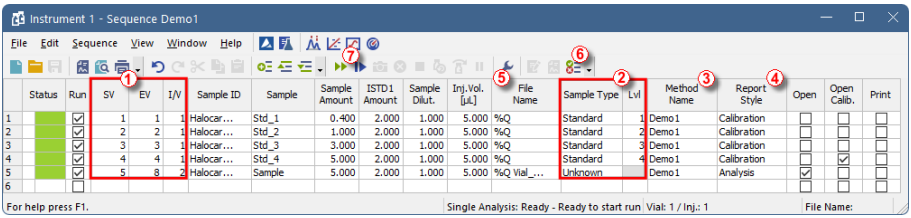

Fig. 15: The Sequence window

- Look at the *Sequence Table*. Each row of this table defines one or more analyses, depending on the fields *SV* (Starting vial), *EV* (Ending vial) and *I/V* (Injections per vial) ① . As shown, the first four rows each represent a single measurement (*SV* and *EV* is the same, *I/V* is *1*), while row 5 represents eight analyses (*SV* is *5*, *EV* is *8*; thus measuring 4 samples from 4 successive vials and as *I/V* parameter is *2*, each sample will be measured twice).
- Also note that in the fields *Sample Type* and *Lvl* ② , the first four samples are marked as standards on levels 1-4. Chromatograms measured from those rows will be automatically used for creating the calibration (or its recalibration, if there had already been some data in the calibration).

- The *Method Name* column ③ sets the template method used for measuring the sample.
- The *Report Style* column ④ sets the print style used for measurement reporting . Each row can have its own template method and report style; thus, it is possible to measure according to several template methods within one sequence.
- In the *File Name* column ⑤ , the name of the resulting chromatogram file is specified. It is possible to use variable parameters to form the chromatogram filename, for example **%Q** means that the file name will use the text from the *Sample* field. The complete set of available variables can be listed after clicking in the field and selecting the icon. It is possible to combine several of these variables with plain text or symbols to create a unique file name for each chromatogram.
- To verify the sequence setup, click on the icon ⑥ . The **Clarity** station will change all symbols at the beginning of the row to green fields ( ), meaning the rows are ready, and display an error/warning message if a problem is detected. The error/warning message is accompanied with a list of corrections for each case, guiding you on what needs to be fixed before proceeding.

Note: For demonstration purposes only, try to make a mistake and check the sequence once more. For example, change the text in the *Sample* column to *Std_1*in row **3**. Immediately, you can seet that a warning sign appeared on the corresponding rows - *1* and *3*. After pressing the icon, the warning message appears, informing that there are two rows which would produce chromatogram with the same file name. Holding the mouse above either field will display the tooltip with the cause of the problem. Set the sequence back to its original state and continue to the next step.

- Start measuring the sequence using the icon ⑦ . The state of the *ACTIVE* sequence will change to *WAITING FOR INJECTION*. As soon as the *Ready* signal from the autosampler is detected, the measurement will start.

Note: Even if the autosampler is not connected, **Clarity** will get the *Ready* signal, thus starting the sequence. However, it is not possible to generate separate demo data for each chromatogram, as all chromatograms would be the same. For the demonstration purposes, there are examples of the resulting files in the project folder. You may stop or abort the sequence now or later either from the ***Data Acquisition*** window or directly from the ***Sequence*** window. Close the ***Sequence*** window before proceeding.

- After the first row of the *Sequence table* (controlling one analysis) is measured, the Instrument will once again switch to the *WAITING FOR*

INJECTION state, and the autosampler will start a new measurement by sending the *Ready* signal. Stop the sequence from the *Data Acquisition* window or ***Sequence*** window at any time by pressing the *Stop* button (single-click means that the currently measured Chromatogram will finish and the sequence will stop subsequently, after double-clicking, the sequence will stop immediately). All data measured will be saved. Instead of stopping, you can also abort the measurement with the *Abort* button (does not save any data nor produce any chromatogram).

- Already measured rows will change their *Status* from green field ( ) to icon with small chromatogram ( ). During the measurement, the icon is orange. A small triangle will appear in the icon if a chromatograph is produced by the particular measurement in the row. Left mouse click on the triangle will reveal the option to open the chromatogram(s). You can click on the name of the chromatogram to open it or select option to open all chromatograms in overlay as seen in **Fig. 16** on pg. **27**.

Note: It is possible to edit the sequence even during the measurement. However, if it pauses due to an error, it is necessary to resume the measurement.

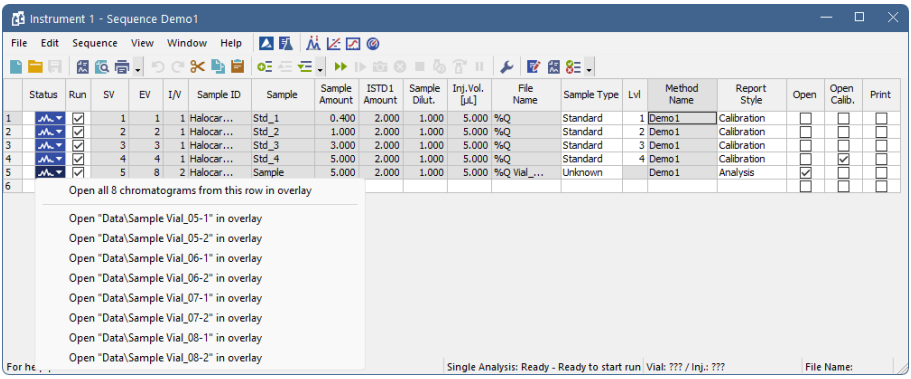

Fig. 16: Opening chromatograms in overlay

- At each row on the right side of the *Sequence Window*, you can select whether the corresponding chromatogram will be opened, printed, or loaded into the calibration window.

5.3 Calibration window

The following section explains how to create a calibration.

To demonstrate the functions of the *Calibration* window, load the prepared demo project: in the *Instrument* window click the *Instrument - Project...* menu invoking the *Project Setup* dialog. In this dialog click on the *Open...* button and choose the **DEMO1** project.

Note: If you wish to use prepared demo calibration instead of creating a new one, in the *Calibration* window, open (via the *File - Open...*command) the calibration file DEMO1.CAL and test the functions of the *Calibration* window on it. In this case you can skip the following section and continue with the chapter **"Linking the calibration to a chromatogram"** on pg. **29**.

5.3.1 Creating new calibration

- Use the Calibration button in the *Instrument* window to open the *Calibration* window.
- Use the *New Calibration* icon ① to create a new calibration file. Save the calibration under a name of your choosing.

Note: The calibration can be saved either using the *Save Calibration* icon ② , *File - Save*, or *File - Save As...* command (no calibration can be saved under the name NONAME.CAL).

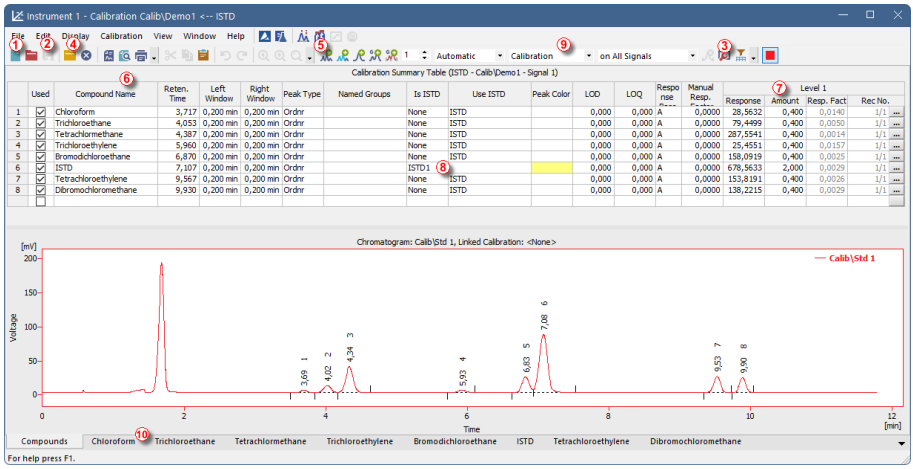

Fig. 17: The Calibration window - loaded standard

- Use the *Calibration Options* icon ③ and change the *Display Mode* (top right corner of the dialog) to *ISTD*, then press the *OK* button.

Now, the calibration standards need to be imported into the calibration. This is done in a series of successive steps:

- Use the *Open Standard* icon (yellow) ④ to open the STD 1.PRM data file. The lower part of the *Calibration* window now displays the chromatogram of the calibration standard.
- Use the *Add All* icon (blue) ⑤ to move all identified peaks to the Calibration Summary Table. The Table appears in the *Calibration* window, ready to be completed as shown on **Fig. 17** on pg. **28**.
- As demonstrated in the Calibration Summary Table and the Chromatogram, individual peaks are now identified according to their retention times only. To label the peaks, click and edit the fields in the *Compound Name* column ⑥ to the names shown on **Fig. 17** on pg. **28**. You may also set the color of a specific peak in the *Peak Color* column, for example, try to set the ISTD peak color to yellow. Note that the changes made will not immediately affect the current chromatogram.
- Fill the *Amount* column ⑦ with the concentration of the particular compounds. In this standard mixture, all compounds except for the peak number 6 (ISTD) have the amount of *0.4*.
- Peak number 6 is marked as the ISTD peak. In the *Is ISTD* column change its type to ISTD1 ⑧ and then set its amount in the *Amount* column to *2*.

The first calibration level is now established. On the tabs of the individual compounds ⑩ (labeled according to the *Compound Name* field), graphs with a single-point linear calibration can be viewed.

- Proceed to establishing the other calibration levels: the operation is quite simple and straightforward - use the *Open Standard* icon (yellow) ④ again to open another calibration standard named STD 2.PRM. Make sure that *Calibration* ⑨ is selected and use the *Add All* icon (blue) ⑤ (response will be added to first empty *Level*). Fill in the *Amount* column with *1.0* values (except for the ISTD peak 6, in which the value of *2* should be used again).
- Set the third calibration level analogously using the STD 3.PRM file and the *Amount* of *3.0*, and subsequently the fourth level (file STD 4.PRM, *Amount 5.0*). Again, the ISTD peak should always have the *Amount* of *2*. As the result, on the tabs of the individual compounds ⑩, the linear four-point calibration graphs can be viewed. Now, save the calibration file using the *Save Calibration* icon and choose the directory for saving the calibration.

5.3.2 Linking the calibration to a chromatogram

Any chromatogram can be linked to a calibration file, thus automatically providing calibrated results.

- In the *Instrument* window use the *Chromatogram* icon to open the *Chromatogram* window.
- Use the *Open Chromatogram* icon to open chromatogram data based on the calibration you have just created. Use the SAMPLE_VIAL_6-1.PRM file saved in the default directory. Other files in the directory are uncalibrated as well and they will be used later.

Upon opening the chromatogram, the data are uncalibrated and no information about the names of individual compounds is available; the peaks in the *Result Table* are just described according to their retention times. To change this, the appropriate calibration should be linked to these data.

- Select the *Results* tab (it should be opened automatically) and look at the section on the right side of the screen. Use the *Set...* button in the *Calibration File (Peak Table)* section to select the calibration file created in the previous section (it should be in the default directory). Any peaks present in the calibration are now identified and the corresponding compound names are shown in the chromatogram.

Note: In case you skipped the process of making your own calibration, please use the DEMO1.CAL instead.

5.3.3 Linking the calibration to a method

If you have a large number of samples to be measured and subsequently evaluated using a particular calibration, linking the calibration to each chromatogram separately would be a time-consuming process. To avoid this, you can link the calibration to a method used for the measurement beforehand.

- Return to the *Instrument* window and use the *Method - Calculation...* command to open the *Method Setup* dialog directly on the *Calculation* tab ① as shown on **Fig. 18** on pg. **31**. Alternatively, you can use any command from the *Method* menu and then move to the *Calculation* tab. All of these sections (and some others) are part of the template method; thus they are present within the same dialog but on different tabs.
- Use the *Set...* button ② to select the calibration file and link it to the method.
- Exit the *Method Setup* dialog using the *OK* button. Clicking this button saves this change to the template method.
- Any chromatograms measured using this template method in the future will be automatically linked to the chosen calibration.

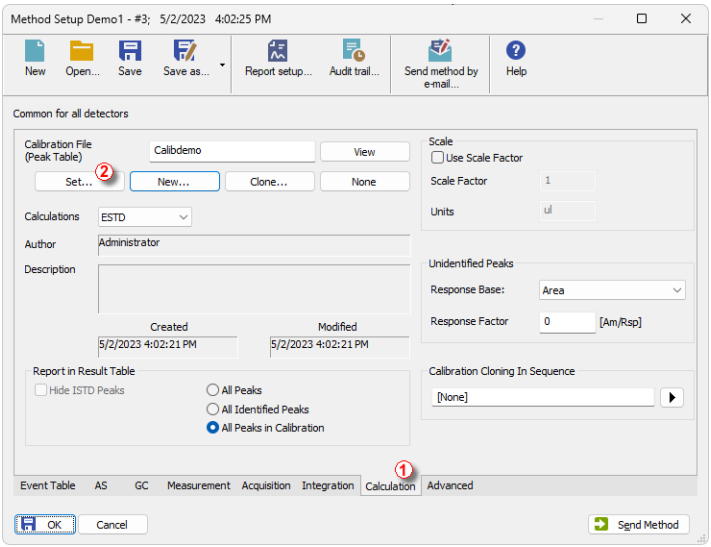

Fig. 18: Method Setup - the Calculation tab

5.4 Linking the calibration to a series of already measured chromatograms

If you have already measured chromatograms and wish to change or update the linked calibration, you can do so easily using the *Batch* reprocessing feature.

This command is especially useful when you have a large number of already measured chromatograms and you want to modify them.

Steps below will describe how to change the calibration of already measured chromatograms.

- Go to the ***Instrument*** window and use the *Analysis - Batch...* command.
- Select the files to be reprocessed in the left part of the dialog ① (**Fig. 19** on pg. **32**.); multiple files can be selected by left-clicking them while holding the **Ctrl** or **Shift** key. For the demonstration, select all files with the names SAMPLE_VIAL_X-Y in the DATA directory to be reprocessed, check the *Reprocess by Method* ② checkbox, select the method to be used for the reprocessing, and in *Calibration* part of the Options select the *Update*. Click the *Proceed* ③ button. All the selected chromatograms will now be linked to the calibration based on the current method.

Note: Chromatograms to be batch reprocessed need to be saved in the current project directory.

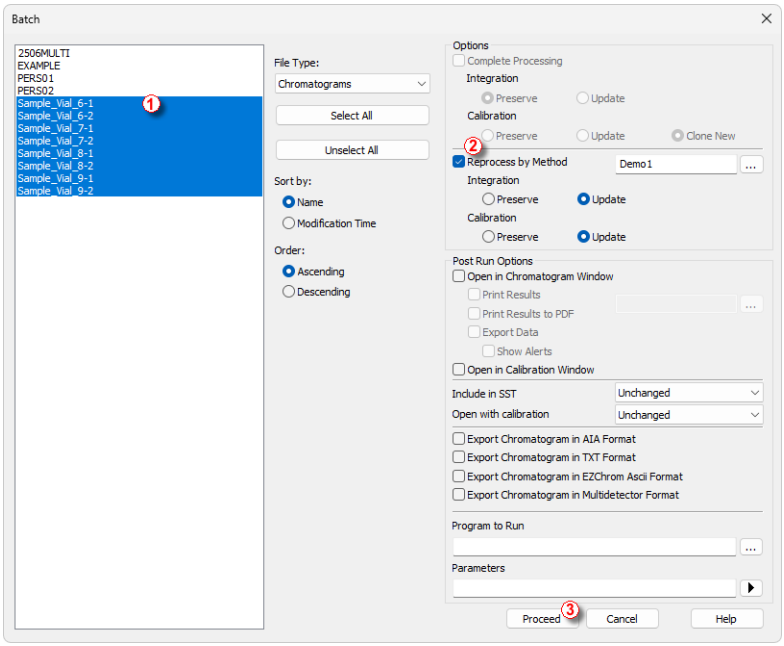

Fig. 19: Batch dialog with selected chromatograms

- After the reprocessing is complete, open the ***Chromatogram*** window and load any reprocessed file (e.g. SAMPLE_VIAL_7-2.PRM) and look at the *Result Table*. All peaks present in the calibration are now identified and calibrated.
- Multiple chromatograms may be displayed at once. Switch to the *Overlay* mode by pressing the *Overlay* button found on the *Overlay* toolbar (⑦ in **Fig. 14** on pg. **23**.) and then use the *File - Open Chromatogram...* command or the *Open Chromatogram* icon. It is now possible to select several files to be opened in the ***Open Chromatogram*** dialog. You can click the *Overlay* button again to close all the chromatograms except the currently selected one.

6 Connecting Autosamplers (AS)

This chapter describes the most common wiring of autosamplers. The configuration varies depending on the type of chromatograph (GC or LC), sequence mode (*ACTIVE* or *PASSIVE*), and presence of optional control modules in your **Clarity** station.

Typical configurations are:

- AS + GC set - ACTIVE sequence
- AS + LC set - ACTIVE sequence
- AS + GC set - PASSIVE sequence
- AS with Clarity control module - ACTIVE sequence + A/D converter
- AS with Clarity control module - ACTIVE sequence + digital acquisition

All of the aforementioned configurations are described in more detail in the following chapters. If your device configuration does not correspond to any of these cases, contact us at support@dataapex.com.

In an *ACTIVE* sequence, the start is controlled by the station. **Clarity** sends the permission signal to the autosampler and waits until the sampler acknowledges the injection. Data acquisition will be started after the confirmation signal has been sent back to **Clarity** and the permission to another injection is disabled.

In a *PASSIVE* sequence, the start is controlled by the autosampler. **Clarity** waits for an external start signal from the autosampler and only after receiving the signal, it starts the sequence and data acquisition.

The START synchronization between **Clarity** and the autosampler is controlled via cable pins for inputs and outputs, or by serial (RS 232) / USB / LAN port communication.The communication line is defined in the *System Configuration* dialog, which is accessible from the *Clarity* main window through the *System - Configuration…* command. The *System Configuration* dialog operates the communication line via the *External Start Digital Input* and *Ready Digital Output* functions, as described in the following text.

Data Inputs & Outputs group:

- **External Start Digital Input** ① should be set to the device and its specific pin that gives **Clarity** the information about injection being performed. Subsequently, **Clarity** starts Data Acquisition.
- **Ready Digital Output** ② defines the device and its specific pin through which **Clarity** informs other parts of the system that sequence can be run.

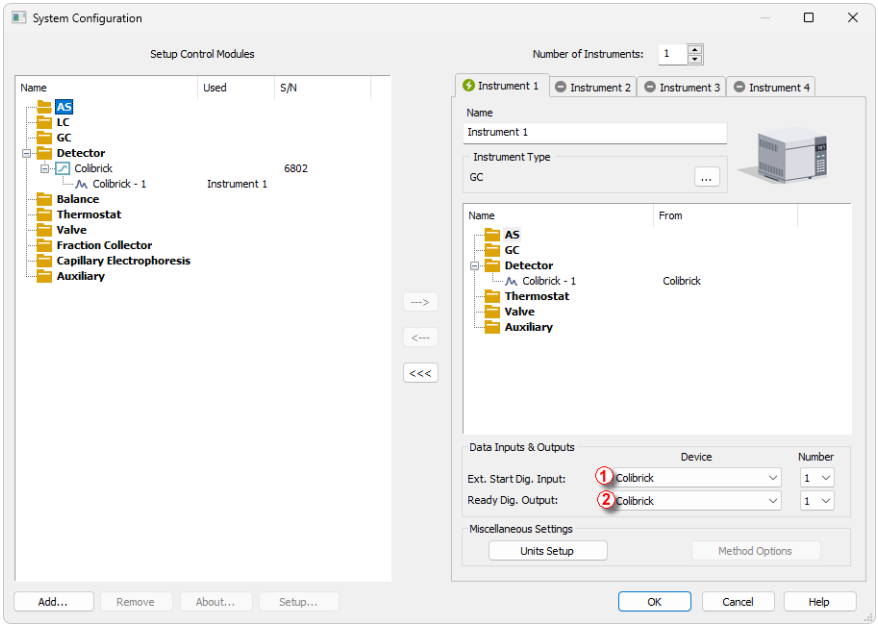

Fig. 20: System Configuration

6.1 AS + GC set - Active Sequence

In GC systems, the sample cycle is typically controlled by the GC, as the cool-down time of different systems varies due to the generally used temperature gradient. The sampler is thus synchronized with the GC by a signal wire (READY), allowing the next injection only after the GC gets to the READY state. The autosampler performs the injection and starts the GC using another signal wire (START). Any autosampler that is used in the **Active Sequence** without an **AS Control** module must be synchronized by cable with **Clarity** as well as with the chromatograph. The **IN_n** starting cable should be plugged into the synchronization output (INJECTION) of the autosampler or GC. The **OUT_nR** cable should be connected to the synchronization input between GC and autosampler.

All commonly used autosamplers may be divided into two groups:

- Variant A: Autosamplers started by **closing** the contacts on the input ($\overline{\text{READY}}$).
- Variant B: Autosamplers started by **opening** the contacts on the input (READY).

Variant A - started by closing the contacts

The first diagram shows the wiring of an autosampler that will initiate the injection after its input contact has been closed.

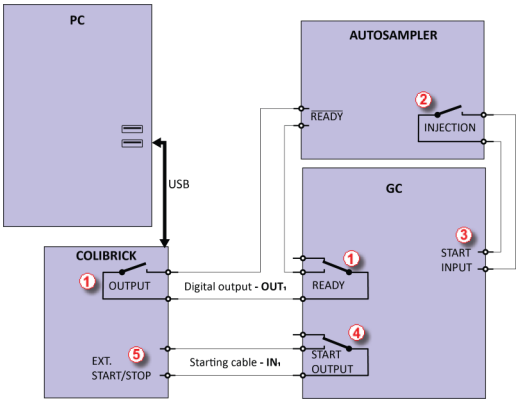

Fig. 21: Wiring of the autosampler - variant A

The injection will start only after the both serially connected contacts (**Clarity** and GC) has been closed ① . After an injection, the autosampler will close the INJECTION contact ② and thus the command to start the temperature gradient program will be given ③ . At the same time, the chromatograph will close the START contact ④ , and thus the command to start acquisition will be given ⑤ .

If the chromatograph does not have a START OUTPUT contact, then the starting cable **IN_n** must be connected directly to the INJECTION output on the autosampler (this way, in fact, parallel to the START INPUT contact of the chromatograph).

To have the contact on the **Colibrick** A/D converter opened in the initial state, it is necessary to set the *Output Initial State* item to *HIGH* in the ***Digital Outputs of Colibrick*** dialog as shown on **Fig. 22** on pg. **37**.. This dialog is accessible from the *Clarity* main window through the *System - Digital Outputs…* command.

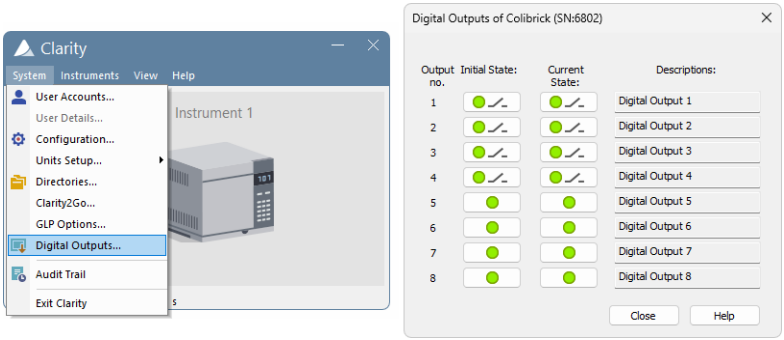

Fig. 22: The Digital Outputs dialog

The start output, mapping of **Clarity** to individual digital outputs of the **Colibrick** A/D converter, can be set in the bottom-right corner of the *System Configuration* dialog, see **Fig. 20** on pg. **34**. Use the following settings.

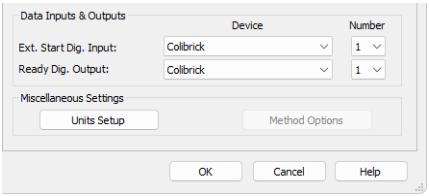

Fig. 23: System Configuration for a GC set

Variant B - started by opening the contacts

In the second diagram, there is an autosampler wiring that conversely waits for output contacts to be opened. This requires different connection (marked by a circle).

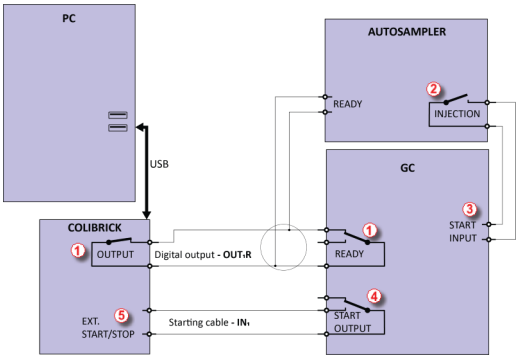

Fig. 24: Wiring of the autosampler - variant B

The **OUTPUT** and **READY** contacts are connected in parallel, and the autosampler will start its operation after both contacts have been opened ① . After an injection, the autosampler will close the INJECTION contact ② and thus the command to start the temperature gradient program will be given ③ . At the same time, the chromatograph will close the START contact ④ and thus the command to start acquisition will be given ⑤ .

If the chromatograph does not have a START OUTPUT contact, then the starting cable $\mathbf{IN_n}$ must be connected directly to the INJECTION output of the autosampler.

To have the contact on the **Colibrick** A/D converter closed in the initial state, it is necessary to set the *Output Initial State* item to *LOW*.

External Start Digital Input and *Ready Digital Output* settings in the *System Configuration* dialog are the same as for Variant A.

6.2 AS + LC set - Active Sequence

In LC systems, the autosampler typically governs the timings. The eventual pump gradient and detector programs are set independently. Any autosampler that is used in the **Active Sequence** without an **AS Control** module must be synchronized with **Clarity** by cables. The **IN_n** starting cable should be plugged into the synchronization output (INJECTION) of the autosampler, and the **OUT_nR** cable should be plugged into the synchronization input (READY) of the autosampler.

The autosampler will initiate the injection after its input contact has been closed ① . After the injection, the autosampler will close the INJECTION contact ② , and the command to start acquisition will be given directly back ③ . When using additional devices (Detectors, LC Pumps, etc.) it is recommended to connect these devices independently to other digital outputs of the A/D converter ④ . Each device will then need a dedicated row in the **Event Table** (**Fig. 27** on pg. **40**.) to be started or stopped by **Clarity**.

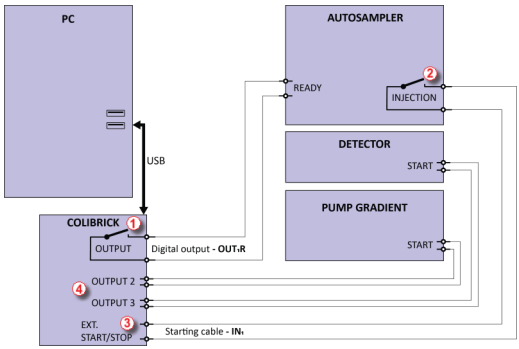

Fig. 25: Wiring of the autosampler in an LC set without the AS Control module

Note: The labels on the input and output contacts may vary depending on the type of the autosampler.

Note: When the detector or pump start inputs are connected in parallel to the **Clarity** start input, make sure to ground the device properly.

The start output, mapping of **Clarity** to individual digital outputs of the **Colibrick** A/D converter, can be set in the bottom-right corner of the *System Configuration* dialog, see **Fig. 20** on pg. **34**. Use the following settings.

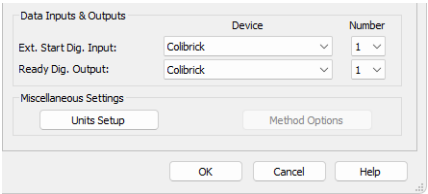

Fig. 26: System Configuration LC set

Events to start additional detectors and pumps from **Clarity** must be set in the *Event Table* accessible from the *Method Setup* dialog. In the most typical setup (shown in **Fig. 25** on pg. **39**.) use the setting as displayed in **Fig. 27** on pg. **40**.

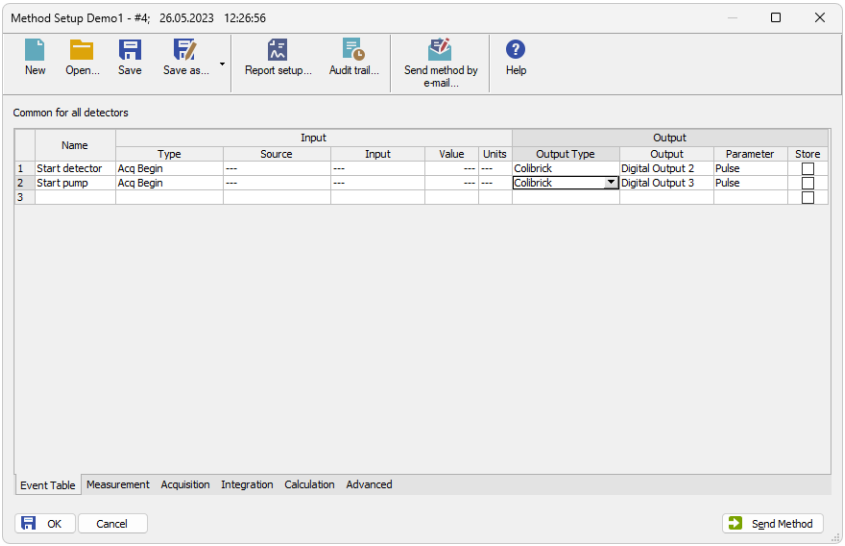

Fig. 27: Event Table for starting detector and pump from Clarity

6.3 AS + GC set - Passive Sequence

The autosampler used in the **Passive Sequence** does not need the **OUT$_n$R** digital output cable to be connected. All timings are controlled by the chromatograph and autosampler. **Clarity** performs only one analysis for each start signal received. Synchronization includes only external start of data acquisition in **Clarity** using the **IN$_n$** starting cable.

The sequence must be started in **Clarity** before the autosampler. The autosampler initiates the injection after manual start on the device. The sampler is synchronized with the GC by a signal wire (READY), allowing the next injection only after the GC gets to the *READY* state. After an injection, the autosampler will close the INJECTION contact ① and thus the command to start GC will be given ② . At the same time, the chromatograph will close the START contact ③ and thus the command to start acquisition will be given ④ .

Caution: It is necessary to set timings in the autosampler and **Clarity** to ensure the next injection will be performed after the previous run is finished.

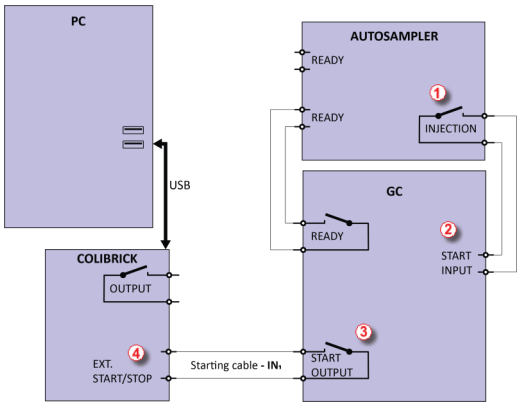

Fig. 28: Wiring of the autosampler in Passive Sequence

Passive Sequence must be used for example in the sets with Headspace autosamplers (without **AS Control** module).

Caution: It is not recommended to use the **Passive Sequence** together with the Control modules.

The start output, mapping of **Clarity** to individual digital outputs of the **Colibrick** A/D converter, can be set in the bottom-right corner of the *System Configuration* dialog, see **Fig. 20** on pg. **34**. Use the following settings.

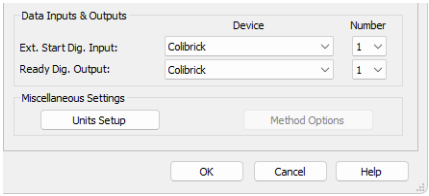

Fig. 29: System Configuration for Passive Sequence

6.4 AS with Clarity control module - Active Sequence + A/D converter

When using the optional **AS Control** (p/n **A26**) module, all communication is performed through a separate data cable (usually a serial cable connected to a COM port).

Caution: Refer to the corresponding **Clarity Control** manual (found on your installation media or at www.dataapex.com) for the wiring specific to your instruments.

The following diagram shows a directly controlled autosampler with external digital acquisition by the **Colibrick** A/D converter. In this case the digital output cable **OUT$_n$R** does not need to be connected. For any controlled autosampler in **Clarity**, the synchronization via starting cable is possible. Some autosamplers, however, do not need the connection of the starting cable, but can send the start of an injection over the communication line.

The autosampler initiates an injection after **Clarity** receives the command sent through a serial cable ① . After the injection, the autosampler will close the INJECTION contact ② and thus the command to start acquisition will be given ③ .

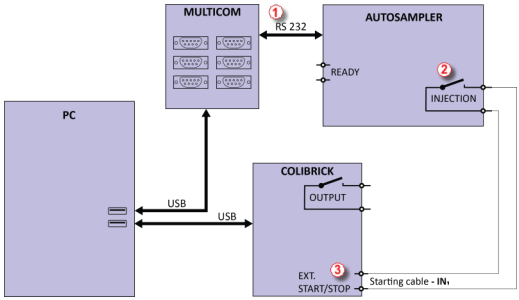

Fig. 30: Wiring of the autosampler with AS Control module + A/D converter

The start output, mapping of **Clarity** to individual digital outputs of the **Colibrick** A/D converter, can be set in the bottom-right corner of the *System Configuration* dialog, see **Fig. 20** on pg. **34**. Use the following settings.

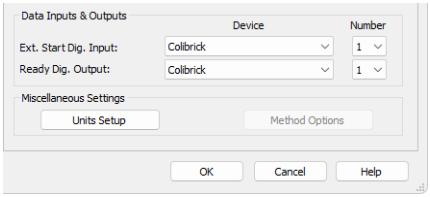

Fig. 31: System Configuration AS + A/D converter

6.5 AS with Clarity control module - Active Sequence + digital acquisition

When using optional **AS Control** module in combination with digital acquisition detectors (e.g., the Agilent 6890 module), the connection should be as follows.

All communication with **Clarity** is performed through separate data cables (usually a serial cable connected to a COM port). The autosampler initiates the injection after **Clarity** receives the command sent through a serial cable ① . After the injection, the autosampler will close the INJECTION contact ② and thus the command to start the temperature gradient program will be given ③ . At the same time, the chromatograph will send the command ④ through a serial cable to start acquisition ⑤ .

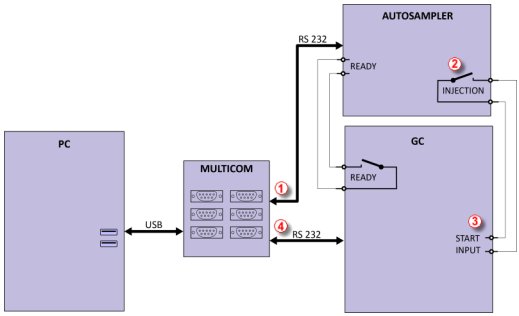

Fig. 32: Wiring of the autosampler with AS Control module and digital acquisition

The start output for specific autosamplers can be set in the bottom-right corner of the *System Configuration* dialog, see **Fig. 20** on pg. **34**. Refer to the corresponding **Clarity Control** manual for the wiring to your instruments.

7 Troubleshooting

7.1 Locate your problem

When troubles occur, the fastest way to find a solution is to read the context help (accessible by pressing F1). You can search the help using keywords such as the name of the **dialog** or **window** where the problem occurred, the text of **error messages** that appeared, or the used **hardware**. The following tables contain a summary of the most frequent errors, while the rest of this chapter contains information on how to solve them.

Note: Names of the individual **Clarity** Instruments appear in the window headers instead of the common term “Instrument”.

Tab. 1: List of windows and dialogs

Windows and Dialogs	
Clarity	pg. **47**., pg. **48**., pg. **49**., pg. **52**., pg. **54**., pg. **56**., pg. **53**.
Data Acquisition	pg. **56**.
Instrument	pg. **54**.
Method Setup	pg. **54**.
Sequence	pg. **54**.
Single Analysis	pg. **54**.
System Configuration	pg. **54**., pg. **56**.

Tab. 2: List of Error Messages

Error Messages	
Clarity is unable to find HW key	pg. **48**.
Missing HW key	pg. **47**.
TRIAL Expired	pg. **51**.
Access to Audit Trail was denied	pg. **52**.
Wrong Software Version	pg. **50**.
Wrong User Code	pg. **49**.
DEMO (in the window header)	pg. **52**.
Disabled (in the status line)	pg. **54**.
Installation did not pass Windows Logo Testing	pg. **2**.
Simulated (in Data Acquisition)	pg. **56**.
User accounts file load error	pg. **53**.

Tab. 3: List of hardware

Hardware	
HW key	pg. **47**., pg. **48**.

7.2 Alternative Ways for Troubleshooting

If you do not find your answers here, use the www.dataapex.com website where the *Support* menu will navigate you to video tutorials and frequently asked questions (FAQ). Alternatively, you can contact your distributor or the **DataApex** helpdesk via e-mail. Please note that we can request the collection of some configuration files. In case you have an e-mail client installed, you can collect these files using the *Help - Send Report by E-mail* menu in the main **Clarity** window.

Importantly, solutions to problems connected to particular **hardware** can be found in their respective manuals.

As the last option when troubleshooting a problem, **DataApex** also provides remote support via **TeamViewer QuickSupport** to registered customers in case of complicated issues (paid sevice). For troubleshooting via this option, the user must first contact **DataApexTechnical Support** (support@dataapex.com). The **TeamViewer QuickSupport** application can be downloaded by clicking *Help - TeamViewer QS* in the main *Clarity* window. The application is ready to be used directly after downloading.

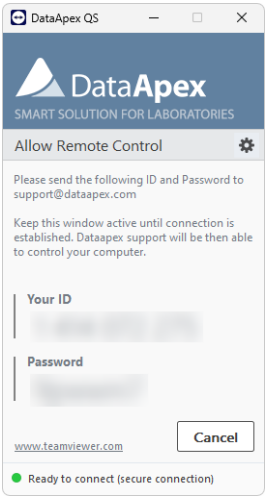

Fig. 33: TeamViewer QuickSupport application

7.3 Problems at station start

Chapters containing problems at station start.

7.3.1 Missing HW key

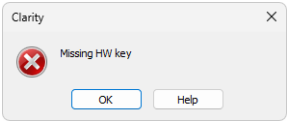

Fig. 34: Missing HW key error dialog

If you try to start **Clarity** without the key, an error message saying "Missing HW key" is displayed and **Clarity** will not start. The key must be plugged into a **USB** port and its driver must be properly installed. Under normal circumstances, **USB** drivers are automatically installed upon inserting the key into a **USB** port.

Reason 1: Your HW key may not be installed properly.

Solution: In *Windows Control Panel - System and Security*, select the *System* icon, access the *Device Manager* tab, and look for the "**Universal Serial Bus Controllers**" - "**Rockey4**" item. In some cases, it can be found also directly in the root folder of the device manager. If it is not there, unplug and plug in the HW key again to the **USB** port. If this does not help, see FAQ (frequently asked questions) at www.dataapex.com website, where the Support menu will navigate you to FAQ - HW key does not function.

Reason 2: Your HW key may not be connected correctly.

Solution: Check the functionality of the following:

- See whether the **USB port** is working (e.g., try to connect a different device, etc.).
- See whether the **HW driver** is installed. In such case, the green LED on the key should be on.

7.3.2 Clarity is unable to find HW key

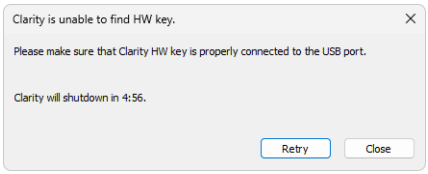

Fig. 35: Clarity is unable to find HW key

Clarity has lost communication with the HW key. Window with **"Clarity is unable to find HW key"** error message is displayed. The user has 5 minutes to try to reestablish the communication between Clarity and the key. Once this time elapses, Clarity will automatically shutdown.

Retry
Check for the **HW key** again and continue running **Clarity** in case it was detected.

Close
Close **Clarity** Chromatography Station.

There are two possible explanations for this error message:

Reason 1: The key was removed while *Clarity* was running.

Solution: a) Click on the *Retry* button to reestablish the communication between Clarity and the key.
b) Unplug the key and plug it in again. Click on the *Retry* button to reestablish the communication.

Reason 2: The USB port in which the key is plugged in entered the sleep mode.

Solution: Go to *Start - Control Panel - Hardware and Sound - Device Manager* , locate **Universal Serial Bus Controller**. On each **USB Root Hub** item right-click and choose *Properties*. Click on the *Power Management* tab and uncheck the box for "Allow the computer to turn off this device to save power".

Caution: Another way to forbid **USB** ports from entering the sleep mode is in **BIOS**. This option is however recommended only for **advanced** users and is usually performed by the local System Administrator.

7.3.3 Wrong User Code

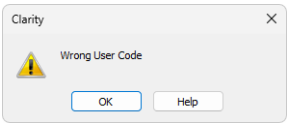

Fig. 36: Wrong User Code error dialog

The **User Code** of the workstation does not match the code in the HW key.

Reason: You have probably entered a wrong User Code.

Solution: Once you click the *OK* button, the dialog for entering a correct **User Code** will pop-up. Upon submitting a correct **User Code**, Clarity will start. Otherwise, Clarity will not start and you will be asked to enter the correct **User Code** again. The **User Code** can be found on the back of the plastic card provided with the **installation USB**.

Note: The ***User Code*** dialog does not distinguish between upper case and lower case letters. However, be careful not to confuse the letter "l" with the number "1".

If necessary, contact the manufacturer or your distributor to request the code (be prepared to provide the serial number (S/N) of the workstation).

7.3.4 The User Code is not valid for the version x.y

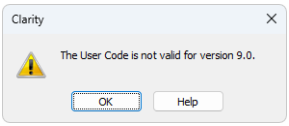

Fig. 37: The User Code not valid for version error dialog

The **User Code** filled in **Clarity** is not valid for the version of the software you have installed.

Reason: You have probably entered a User Code for a different version.

Solution: You have to enter the User Code for your current version. For example, when you purchase additional extensions/control licenses, a new User Code is generated for your station. The new User Code is valid only for the most recent Clarity major upgrades, so you will probably need to install the latest version of the software.

Note: The ***User Code*** dialog does not distinguish between upper case and lower case letters. However, be careful not to confuse the letter "l" with the number "1".

If necessary, contact the manufacturer or your distributor to request the code (be prepared to provide the serial number (S/N) of the workstation and purchase the upgrade if it was not purchased before).

7.3.5 Wrong Software Version

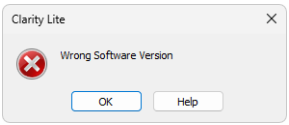

Fig. 38: Wrong Software Version error dialog

The **User Code** is not valid for the version of **Clarity** you are running.

Reason: You have probably installed a different application than you had previously obtained. For example, you installed Clarity Lite instead of Clarity.

Solution: Ensure you are using the correct version of the application. If not, install the correct one. If necessary, contact the manufacturer or your distributor to check your version of software. You will need to provide the serial number (S/N) of the workstation.

7.3.6 Trial Expired

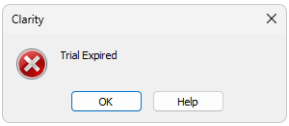

Fig. 39: Trial Expired error dialog

Clarity does not accept the User Code. There may be two reasons for this error.

Reason 1: Your Clarity station just ended its trial period.

Solution: a) Enter the correct *User Code*, which switches Clarity from trial into full mode ① .

b) Switch to section ② and enter the trial prolongation code to continue with trial mode. Trial prolongation codes must be requested from your distributor or DataApex.

Once a correct *User Code* or trial prolongation code has been supplied, click on the *OK* button to start Clarity.

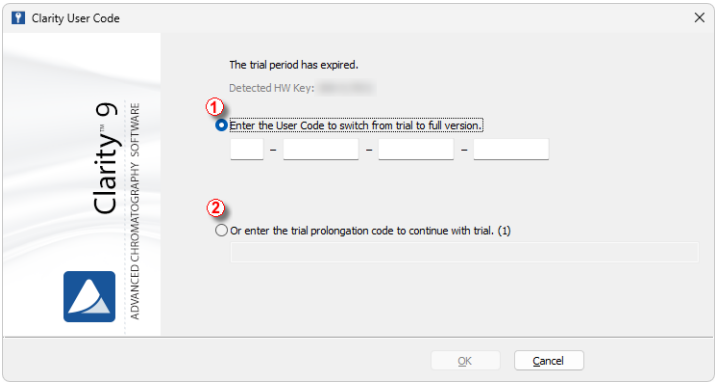

Fig. 40: Clarity User Code

Reason 2: The file CLARITY.SNO is empty or missing by an error.

Solution: Same as for Reason 1.

7.3.7 Trial Extension Failed

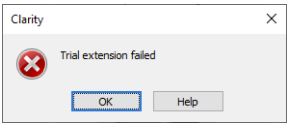

Fig. 41: Trial extension failed error message

Trial period failed to be extended.

Reason: Clarity could not extend the trial period.

Solution: To rectify this situation, please contact our support for further instructions.

7.3.8 Failed to create Audit Trail

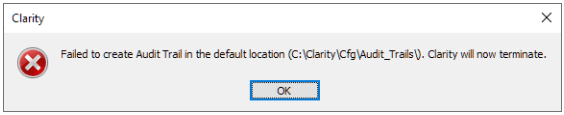

Fig. 42: Denied access to C:\ directory

Clarity has restricted access to create or write to audit trail. The Clarity user needs to have read and write access rights, otherwise Clarity will not start.

Reason: You probably have limited access rights to the C:\CLARITY directory.

Solution: Note that this solution requires user with administrator rights. Right-click on the C:\CLARITY directory and choose *Properties*. In the *Clarity Properties* on the *Security* tab locate User/Group of Users and click *Edit*. Provide Administrator password, when prompted. In the next dialog, grant the User/Group of User permissions by checking the *Allow* option for: *Read & Write*, *List folder contents*, and *Read*.

7.3.9 DEMO (in the window header)

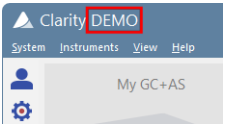

Fig. 43: Clarity DEMO

The DEMO inscription is displayed in the header of the *Clarity* window without any further description.

Reason: You have installed the Clarity Demo version.

Solution: Uninstall this version and install the full version of the **Clarity** software.

7.3.10 User accounts file load error

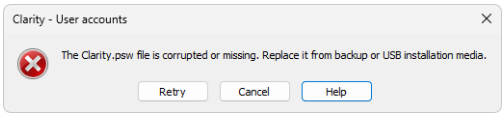

Fig. 44: User accounts file load error

The **Clarity - User accounts** error message pops-up when starting **Clarity**.

Reason: Clarity has detected that the CLARITY.PSW file storing account information is either corrupted or missing.

Solution: To fix this, you need to restore the CLARITY.PSW file from backup or replace with empty one from the installation USB, subfolder PGM. In the latter case, it is necessary to recreate all user accounts.

7.4 Problems upon collection of data

Chapters containing problems upon collection of data.

7.4.1 Data Acquisition - non-functional

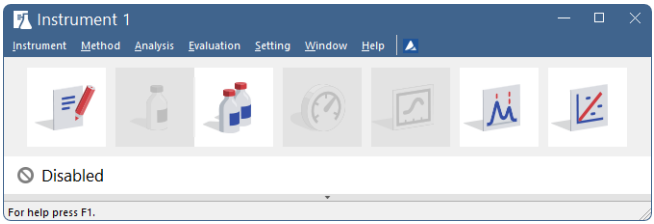

Fig. 45: Data Acquisition disabled

The **"Disabled"** label appears, and the *Analysis - Single* and *Analysis - Data Acquisition* menu commands are non-functional. Other manifestations of this error are also: *Method Setup - Acquisition* tab missing, *Method - Acquisition* command non-functional, *Run*, *Stop*, and *Abort* commands non-functional in the windows *Single Analysis* and *Sequence*. There are four possible causes:

Reason 1: You are using the Clarity Offline version, which does not enable the measurement of chromatograms.

Fig. 46: Clarity Offline

Solution: Check whether there is a blue band with the text **OFFLINE** on the main *Clarity* window under the instrument icons or the title **DEMO** in the window header.
In the case of the **Clarity Offline** station, remove the HW key with the **Offline** license and insert a key with the **Clarity** full license.

Reason 2: The detector is not allocated to the Clarity Instrument.

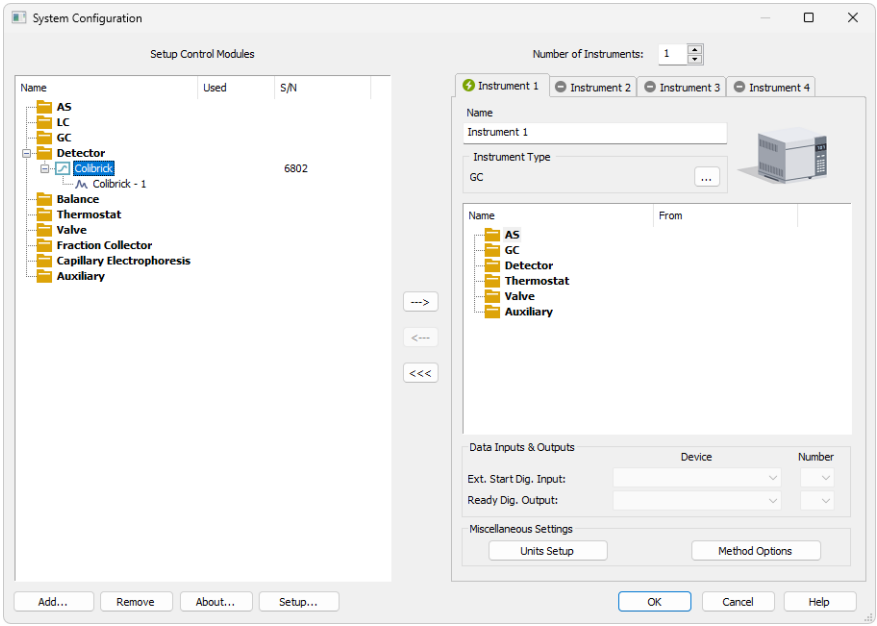

Fig. 47: Detector not allocated to the Instrument

Solution: Open the *System Configuration* dialog from the *Clarity* window using the *System - Configuration...* command and check the tab of the corresponding Instrument - **Instrument X**. If it has no allocated detectors, add them.
In the left-hand list of *Setup Control Modules*, select the correct detector and drag it to the corresponding instrument on the right.
If the appropriate detector is not in the left-hand list *Setup Control Modules*, add it using the *Add* button and repeat the previous step.

Note: More information about the *System Configuration* dialog can be found in the chapter "System Configuration" in the **Reference guide**.

Reason 3: Problems with the A/D converter (Colibrick).

Solution: This state may be caused by several different problems. Consult a more detailed troubleshooting guide about the A/D converter in its corresponding manual.

Reason 4: You have a license purchased for data collection for fewer Instruments.

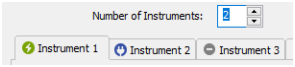

Fig. 48: Small number of Instruments purchased

Solution: a) Open the ***System Configuration*** dialog from the ***Clarity*** window using the *System - Configuration...* command and check the tab of the corresponding Instrument - **Instrument X**. icon indicates the Instrument cannot be used for data acquisition.

b) Check your serial number (S/N) using the command *Help - About...* from the main ***Clarity*** window.

7.4.2 Data Acquisition - Simulated

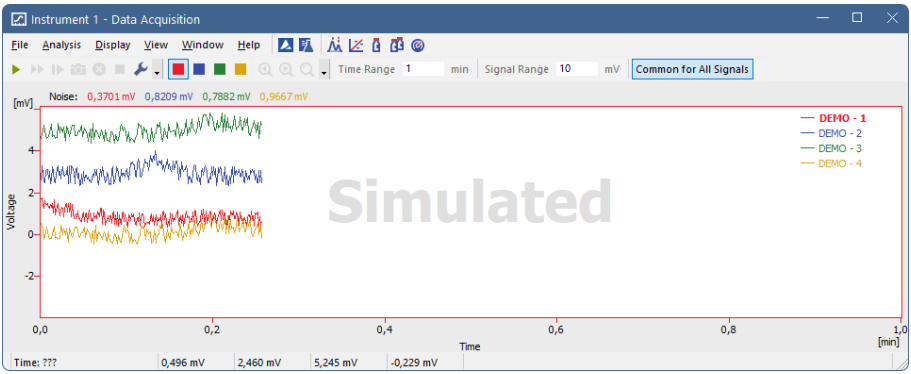

Fig. 49: Data Acquisition Simulated

The title "**Simulated**" is displayed. The corresponding Instrument only displays the simulated curve (from the CHANNX.DTA file) in the ***Data Acquisition*** window.

Reason 1: You are using Clarity Demo version.

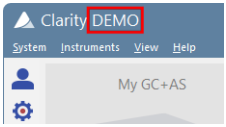

Fig. 50: Clarity DEMO

Solution: Then use the correct **Clarity** installation to install the full version.

Reason 2: A DEMO detector is allocated to the Instrument.

Solution: Open the *System Configuration* dialog from the *Clarity* window using the *System - Configuration...* command and check the tab of the corresponding Instrument - **Instrument X**. If it obtains detector signals only from the **DataApex DEMO** detector, it is necessary to reconfigure it. You can find more information on how to add a detector in the chapter **"Clarity Configuration"** on pg. **8**.

7.5 HW key

The Getting Started Guide describes the **Rockey4 ND** HW key which does not require driver installation.

To (re)install or troubleshoot older versions of HW keys such as **Rockey USB**, **Rockey LPT** and **Sentinel**, please visit www.dataapex.com website where the Support menu will navigate you to FAQ (frequently asked questions) - HW key does not function.

7.5.1 ROCKEY4 ND HW key not detected

Fig. 51: ROCKEY4

ROCKEY4 ND (no driver) has not been detected by **MS Windows**. If it is not detected, it will trigger the following error: Missing HW key.

Reason: ROCKEY4 ND HW key not detected.

Solution: Make sure that the **USB** port in which the **ROCKEY4 ND** is plugged in functions properly. Otherwise use a different **USB** port.

ROCKEY4 ND does not need manual installation of drivers.

Insert the **ROCKEY4 ND** into the **USB** port and start **Clarity**. If no error is displayed, the automatic installation of **ROCKEY4** was successful.

Proper functioning of the HW key is indicated by a steady green LED on the key.

Caution: In the case of using **Windows 8.1** or later, make sure the version of **Clarity** is at least 4.0.4.987, but preferably the latest version.

If you suspect the HW key is damaged, please contact **DataApex** Support (www.dataapex.com).

7.6 Apparently large font and items

Font and other items in Clarity windows and dialogs are quite large and do not fit columns in tables, etc.

Note: Since Clarity version 7.2, majority of problems caused by larger fonts have been resolved. Update to the latest Clarity available. If the update has not worked for your particular problem, continue with the solution below. Version 9.0 resolved the majority of issues with 4K resolutions.

Reason: Windows 8 and later may be preset to display larger text and other items in windows and dialogs.

Solution: Change the size of text and other items to smaller default size. Location of this setting is depended on used Windows OS, typically it can be found under the *Display* or *Accessibility* section.

7.7 Sleep Mode

An active **Clarity** station (with *Instrument* window opened) prevents the PC from entering the sleep mode. This is intentional; otherwise, **Clarity** will not be able to ensure reliable data acquisition.

However, certain types of BIOS may cause problems when the PC enters the sleep mode even when the *Instrument* window is opened. In such case, it is recommended to disable the Power Saving features in both Windows OS (for all users) and BIOS.

7.8 Switching Users in Windows OS

Switching User profiles in **Windows** may cause communication error between Clarity, the HW key, or any other connected HW. It is thus recommended not to switch users on the computer while **Clarity** is running.

7.9 System Files (systeminfo.txt file)

The C:\CLARITY\CFG\SYSTEMINFO.TXT file contains valuable diagnostic information. Its contents can also be displayed in the **Clarity** *Help – About – System Files* dialog.

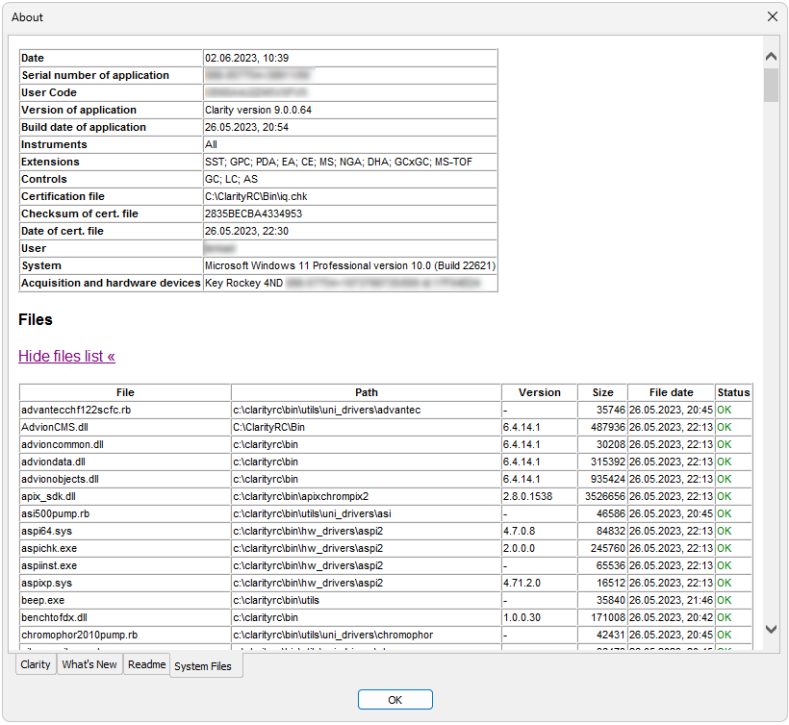

Fig. 52: Help - About - System Files

The file contains the following information (these are examples of how the listings can look like):

Serial number of application, User Code

Lists the serial number of the application and the User Code used. These data are very helpful when troubleshooting any problems.

Version of application, Instruments, Extensions, Controls

Shows the actual version of the software and all functions allowed by the user code entered.

System

Displays the version of used Microsoft Windows.

Files

The section below the first table lists the state and versions of all present and registered files in the **Clarity** station.

The sections **Version of application**, **Instruments**, **Extensions**, and **Controls** show information about the installed parts of the **Clarity** station. They show the version of **Clarity** and the date of the build, serial number of the station, number of Instruments allowed, Extensions available, purchased control modules, type and serial number of the HW key, and list of A/D converters/detectors connected to the computer and configured in the station.

The registered file entries should match the installed files in version and location. If there are any discrepancies, problems may occur.