

GETTING STARTED

Clarity Software

ENG

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Phone: +420 251 013 400
Fax: +420 251 013 401
clarity@dataapex.com
www.dataapex.com

DataApex Ltd.
Petrzilkova 2583/13
158 00 Prague 5
The Czech Republic

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Author: MP

Contents

1 Brief Description	1
1.1 Hardware and software requirements	1
2 Installation	2
2.1 Language selection	2
2.2 Software Installation	2
2.3 Hardware Installation	4
2.3.1 HW key installation	4
2.3.2 Installation of the Colibrick A/D Converter	4
2.4 Device wiring	5
2.4.1 Standard cable for Colibrick	5
2.4.2 Chromatograph	6
2.4.3 Autosampler	7
2.5 Clarity Configuration	8
3 Qualification procedures	11
3.1 Installation Qualification - IQ	11
3.2 Operational Qualification - OQ	13
3.3 Performance Qualification - PQ	14
4 Program structure and control	15
5 Tour through the Clarity station	17
5.1 Running the Single Analysis	18
5.1.1 Instrument window	18
5.1.2 Single Analysis dialog	19
5.1.3 Data Acquisition window	20
5.1.4 Chromatogram window	22
5.2 Running the Sequence measurement	24
5.2.1 Sequence window	24
5.3 Calibration window	27
5.3.1 Creating new calibration	27
5.3.2 Linking the calibration to a chromatogram	29
5.3.3 Linking the calibration to the method	29
5.4 Linking the calibration to a series of already measured chromatograms	30
6 Connecting Autosamplers (AS)	32
6.1 AS + GC set - Active Sequence	34
6.2 AS + LC set - Active Sequence	38
6.3 AS + GC set - Passive Sequence	40
6.4 AS with Clarity control module - Active Sequence + A/D converter	42
6.5 AS with Clarity control module - Active Sequence + digital acquisition	44
7 Troubleshooting	45
7.1 Locate your problem	46
7.2 Problems at station start	47
7.2.1 Missing HW key	47
7.2.2 Clarity is unable to find HW key	48
7.2.3 Wrong User Code	49
7.2.4 Wrong Software Version	49

7.2.5 Trial Expired	50
7.2.6 Trial Extension Failed	51
7.2.7 Access to Audit Trail was denied	51
7.2.8 DEMO (in the window header)	51
7.2.9 User accounts file load error	52
7.3 Problems upon collection of data	53
7.3.1 Data Acquisition - non-functional	53
7.3.2 Data Acquisition - Simulated	55
7.3.3 Signal is drifting	56
7.3.4 Signal is cut at the top	57
7.3.5 Small peaks in the chromatogram	58
7.3.6 No peaks in the chromatogram	59
7.3.7 Other Error Messages	60
7.4 HW key	61
7.4.1 ROCKEY4 ND HW key not detected	61
7.5 System Files (systeminfo.txt file)	62
7.6 Sleep Mode	63
7.7 Switching Users in Windows OS	63
7.8 Apparently large font and items	64

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:

Instrument (blue text) marks the name of the window to which the text refers.

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 (when you already are in the topic describing the window).

WORK1 (capitals) indicates the name of the file and/or directory.

ACTIVE (capital italics) marks the state of the station or its part.

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 analog output and from selected chromatographs with digital output. In the maximum configuration, it is possible to measure on up to four chromatographs simultaneously, with up to 32 detector signals. 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**.

The **Clarity** station automatically processes all data acquired using **CSW** stations (previous **DataApex** chromatography stations).

1.1 Hardware and software requirements

Basic Hardware and Software Compatibility:

You have purchased a license for **Clarity** Chromatography Station. This software is currently compatible with the majority of **Microsoft Windows** operating systems, starting with **Windows 7**.

Latest and more detailed information about hardware and software compatibility can be found in the datasheet **D016** or on the Internet page <http://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.
- In case of controlled instrument, free suitable communication port as described in the manual for the applicable control module.

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 insert any devices, such as HW key or **Colibrick**, before installing **Clarity**!

2.1 Language selection

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

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

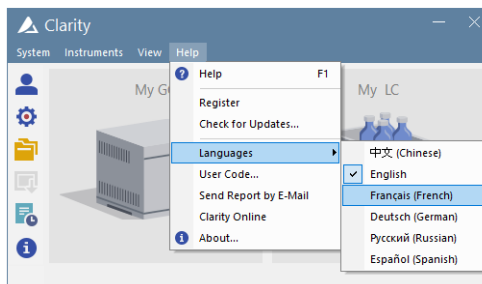


Fig 1: Switching Clarity into different language

2.2 Software Installation


On administered systems right mouse click on the installation file and select "Run as Administrator" to install Clarity.

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

Ensure you have Administrator access rights in your system before you proceed with the installation. **Clarity** users must have read/write access to the **Clarity** folders (C:\CLARITY and all subfolders). Otherwise, installation process will be terminated by the operating system.

We recommend to switch off *User Account Control* (UAC) in **Windows** before the installation. In **Windows 7**, 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 - towards the *Never notify* selection.

- 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 software installation wizard will take you through the installation process, including the creation of a **Clarity** item in the *Start - Program* menu and a **Clarity** icon  on the Desktop.

Note: If you want to try all the functions of the program, not only those your User Code allows you to, leave the *User Code* field empty and press the *Skip* button. After the installation, the program will be started in a fully functional Trial version for 30 days or 100 starts. 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 .

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

2.3 Hardware Installation

The following chapters describe the installation of **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 of drivers. Drivers are installed automatically after inserting the key into the **USB** port. The HW key number is displayed during installation.



Fig 2: Rockey4 ND (No Drivers required) HW key

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

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

2.3.2 Installation of the Colibrick A/D Converter

Caution: Install **Clarity** before attaching 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 operating system will automatically detect it and the device will be ready in a moment.

Note: Multiple **Colibricks** are distinguished by their unique serial numbers. So even when plugged into a different **USB** port, **Clarity** will automatically assign 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 packages, which use the **Colibrick** A/D converters, include a **cable** set composed of signal, starting and digital output for connecting **Clarity** to the chromatograph and a **USB** cable for connecting the **Colibrick** to the computer.

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

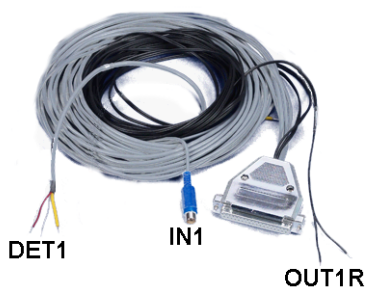


Fig 3: Standard Colibrick cable for one detector

Signal cables

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

Starting (marker) cables

The cables, labeled "**IN1**" to "**IN4**" (according to the number of channels), are ended with an RCA connector. Each starting cable has one cable with free leads [red (+), shielding (digital ground)] for direct connection to the chromatograph or a valve and one cable ended with a button for those cases where there is not a starting contact available and it is necessary to perform a manual start.

Digital output cables

Relay contacts, labeled "**OUT 1R**" to "**OUT 4R**" (according to the number of channels), are ended with free leads. They are used for synchronizing autosamplers in the active sequence without an AS Control module.

At the **Colibrick** end, the cable ends on a female CANNON SUB D 37-pin connector.

2.4.2 Chromatograph

Connect cables according to one of the diagrams in **Fig 4** 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.

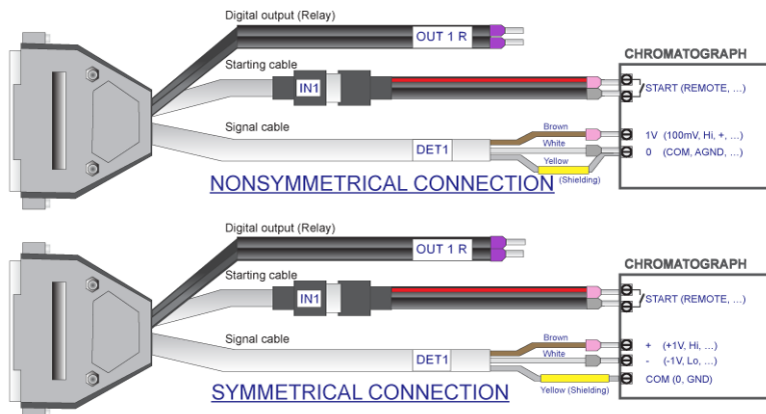


Fig 4: Connection of a Clarity station with a chromatograph

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

Connection of signal cables:

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

Caution: The shielding must be connected. It works not only as the shielding, but also as the analogue ground against which the measurement takes place. In the case of asymmetrical output of a detector (only two leads/terminals/pins/screws), the shielding must be connected to the white lead! No lead of the signal cable may remain unconnected.

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

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

Connection of starting cables:

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

The input implicitly reacts to a change from *HIGH* to *LOW* (or closing of a contact). The input function may be changed 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).

2.4.3 Autosampler

The most typical autosampler connections are described in the chapter "[Connecting Autosamplers \(AS\)](#)" on pg 32. 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

If you chose one of the A/D converters during the installation process, **Clarity** is automatically preconfigured for analogue data acquisition with no control modules.

The following chapter explains how to set number and type of instruments, 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.
- Invoke the **System Configuration** dialog using the *System – Configuration...* command or via  icon. See **Fig 5** on pg **9**.

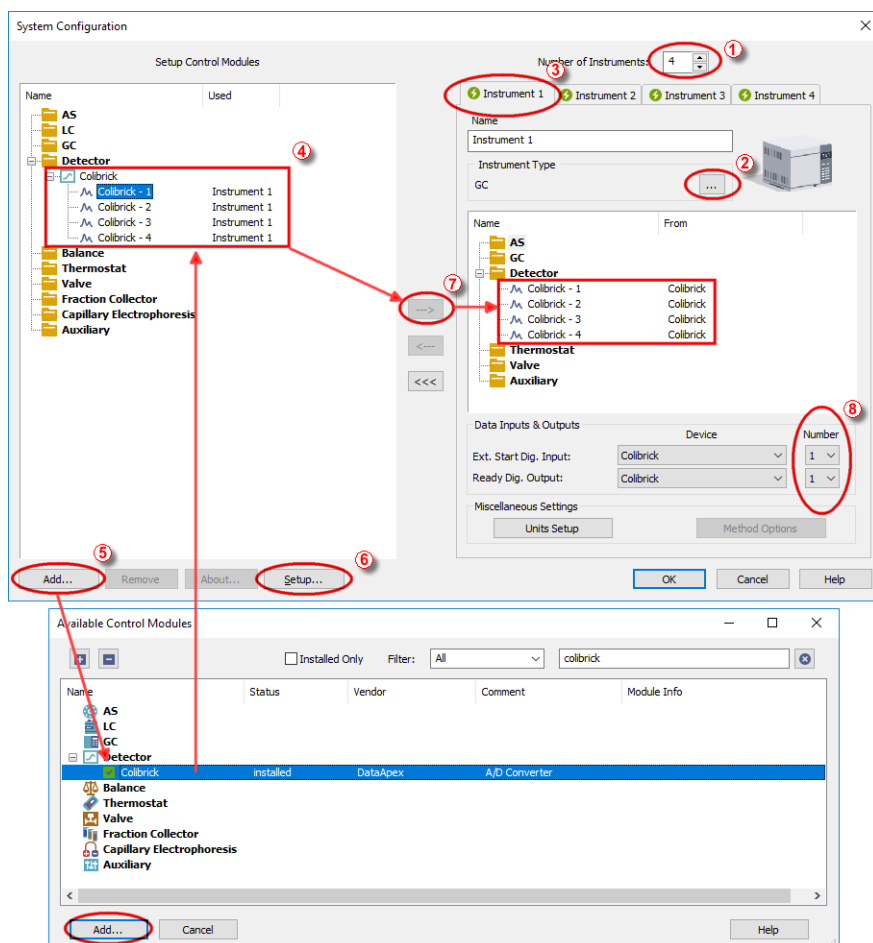


Fig 5: System Configuration dialog

- 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. Each Instrument, defined by the Instrument tab ③, can have different configuration.
- Depending on your hardware configuration, drag and drop the equipment from the *Setup Control Modules* list of installed equipment on the left to

the selected **Clarity Instrument X** tab on the right. Alternatively, select the device ④ and press the **-->** button ⑦.

- For proper setting of *Numbers* in *Data Inputs & Outputs* group ⑧ see the chapter "**Connecting Autosamplers (AS)**" on pg 33..

Note: If necessary, add further equipment to the list on the left using the *Add* button ⑤ in the lower left-hand section of the dialog.

- The configuration dialog of the corresponding converter or equipment is displayed by double-clicking on its name or icon or pressing the *Setup* button ⑥:

Fig 6: Dialog for the setting of 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 using this dialog. A more accurate description can be found in the **Colibrick** manual.

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

3 Qualification procedures

The quality of analytical data is an important issue in many laboratories. 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 confirming that the software has been installed successfully and that the files are in the correct version. The Installation Qualification is an integral part of the **Clarity** installation procedure.

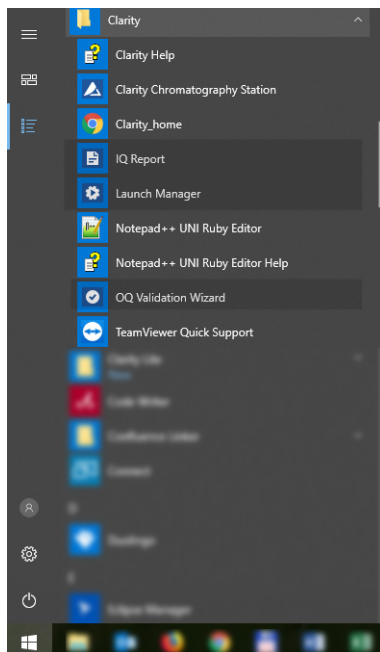


Fig 7: Start menu path to IQ report in Windows 10

How to use the Installation Qualification

- Install **Clarity** according to the instructions of the **Installation Wizard**.
- Locating the **IQ Report** 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.
- If the installation has been correctly performed, the status should read: "*Installation Qualification Test: Passed*".

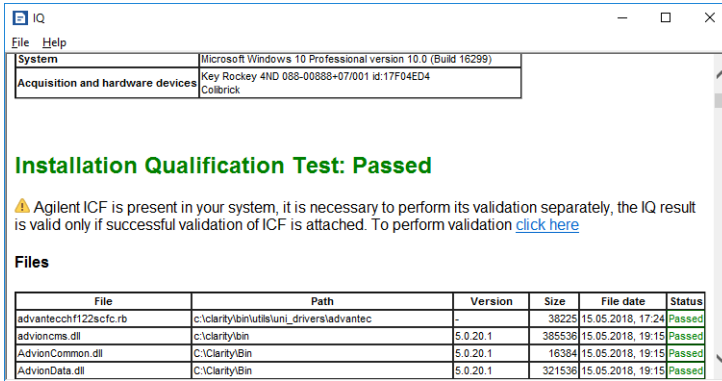


Fig 8: IQ window

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

Note: The most common reason for a "Failed" result is the installation of an upgrade over an existing full version of Clarity. This itself does not produce any errors but since some of the files are preserved from the original installation, the checksums will not match.

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

3.2 Operational Qualification - OQ

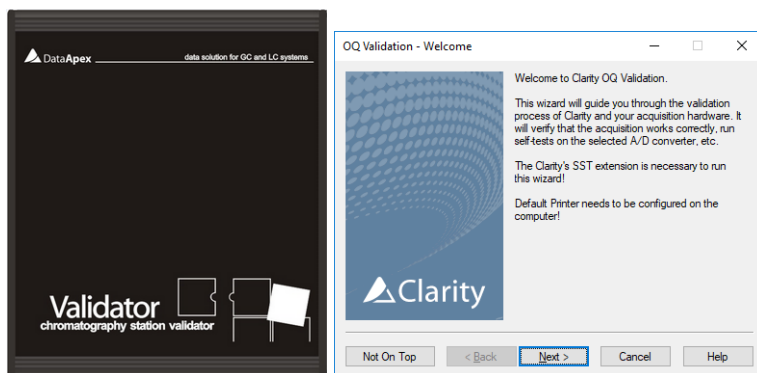


Fig 9: DataApex Validator 2 and OQ Validation Wizard

The **Operational Qualification (OQ)** is a procedure confirming 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 when using **Validator**.

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 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 acquired dataset is compared with expected values. This way of validation proves the entire chain of acquisition from analog signal input to result calculation is valid.

2. Validation with a Virtual detector

For systems with digital acquisition this is the only feasible way of validation. The input of signal is simulated via a **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 a digital signal is processed correctly after being received from a detector. **Virtual detector** is a part of **Clarity** software, meaning no extra hardware or control module is needed for this type of validation.

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

The **Validation kit** (p/n: **CVK**), as well as **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)** is used.

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 or the *Login* button you will be prompted to enter your *User Name*, proceed by pressing the *OK* button. The dialog about Method Setup adaptation may be displayed. Press *Yes* and adapt the Method in the **Method Setup** dialog. In case you are using **Demo1**, just click on the *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 so-called Instruments. All detectors connected to the same Instrument share a common time base.

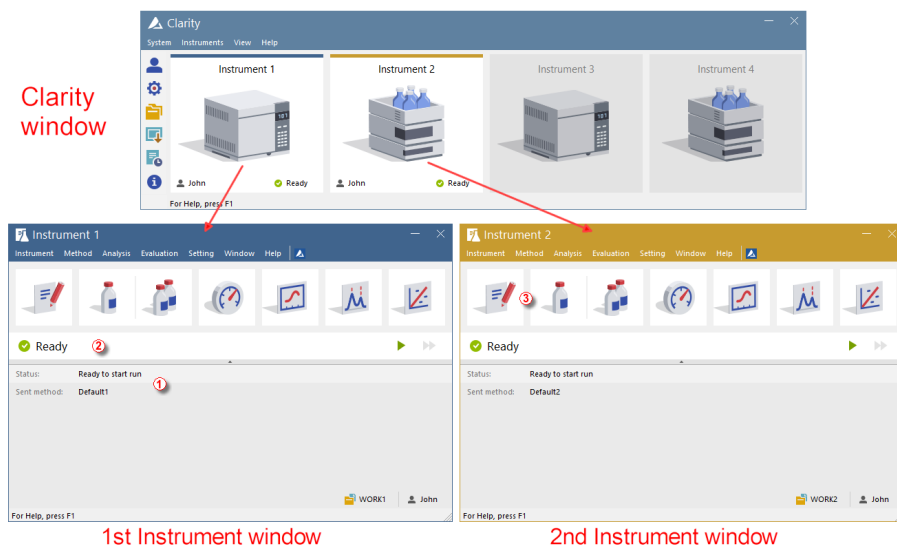


Fig 10: Clarity Instrument windows

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

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 from **Fig 10** on pg 15., **Instrument 1** and **Instrument 2** are opened, hence respective instrument windows are displayed.

Each **Instrument** window contains information table ①, status line ② and buttons ③ for Method Setup, Single Analysis, Sequence, Device Monitor, Data Acquisition, Chromatogram and Calibration. Instruments are distinguished by the color of the **Instrument** window header and by 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 step by step on how to perform a single analysis (the chapter "**Running the Single Analysis**" on pg 18.) and a sequence measurement (the chapter "**Running the Sequence measurement**" on pg 24.). They are shown as a succession of steps which should be performed in a given order. Some sections may be skipped, as their output files have been included already as examples. You will be informed about it in those sections. Also the whole process has *Note* sections - the procedures described in the Notes are optional and you do not need 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, of course, but the files mentioned in this guide will not be present.

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

5.1 Running the Single Analysis

The software includes a simple project using 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.

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

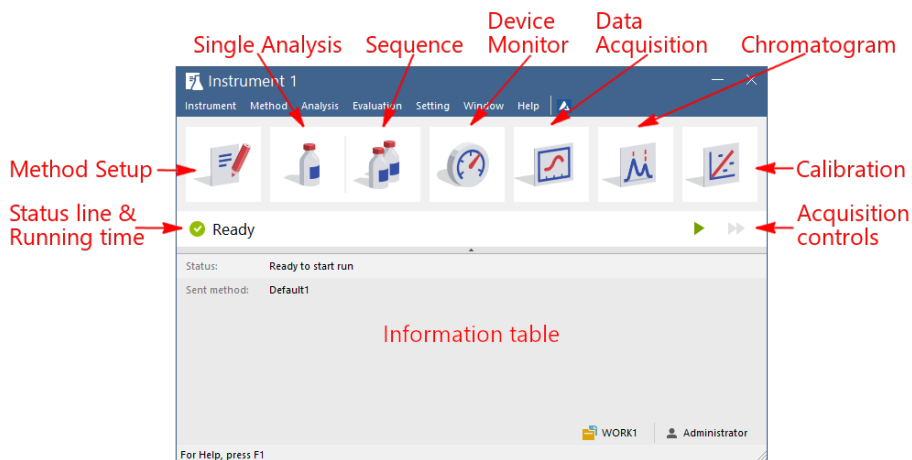



Fig 11: Instrument window

- The **Instrument** window will open; **Fig 11** on pg 18. shows the most important icons in the **Instrument** window. During the tour, we will review all windows opened by these icons.
- 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.

5.1.2 Single Analysis dialog

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

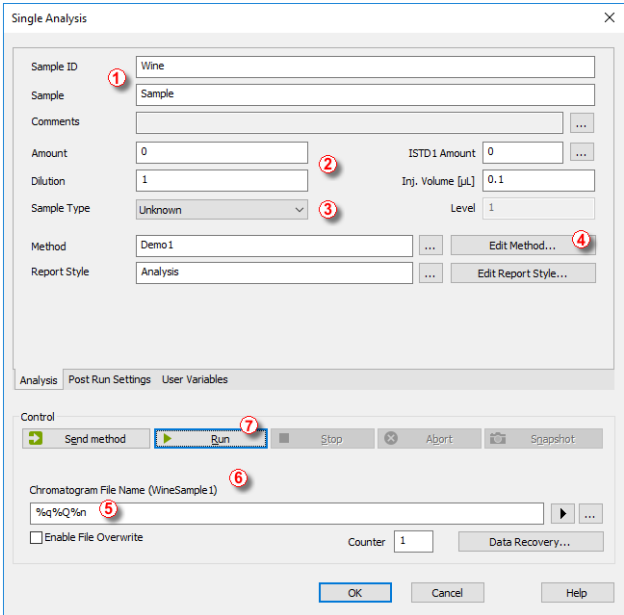


Fig 12: Single Analysis dialog


- 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 19., as typical analysis settings. Once this is selected as described, your instrument window will be the same as shown in **Fig 11** on pg 18.
- *Sample ID* and *Sample* fields ① are only informational, whereas the data in *Amount*, *Dilution*, *ISTD Amount* and *Inj. Volume* fields ② are used for further calculations.
- Choosing the *Standard* from the *Sample Type* combobox and entering a value in the *Level* field ③ 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* is enabled and *Run Time* set to 7.5 minutes). Return to the **Single Analysis** dialog by pressing 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.

- 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 more 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 20.).
- 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 18.). The acquisition is now signaled by the **RUNNING** state and the actual run time shown there.
- To see the data acquisition in process and possibly control it, click the **Data Acquisition**  icon (see **Fig 11** on pg 18.) 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.

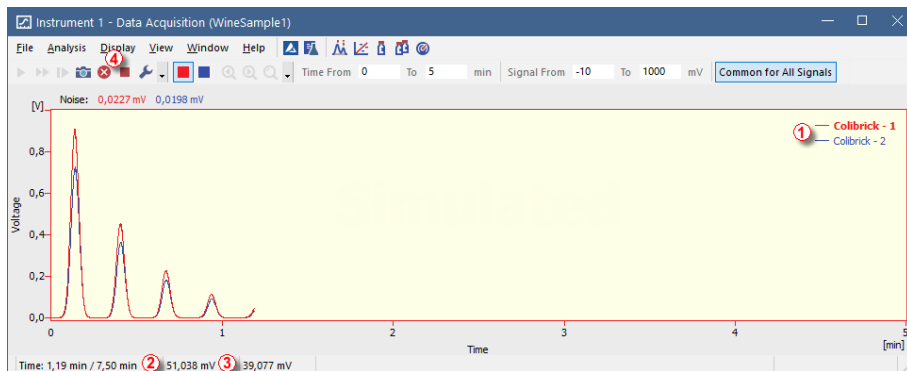








Fig 13: Data Acquisition window

- In the **Status bar** on the bottom of the **Data Acquisition** window, the time of the analysis ② can be seen, as well as 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  allow you to cancel the analysis. If it is 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 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 22.).
- After 7 minutes 30 seconds (the 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 Run](#) window at [Post Run Settings](#) tab. Other postrun actions including export of data or running external program can be set there as well.

5.1.4 Chromatogram window

- The **Chromatogram** window can also be opened 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. In the latter case, 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 halves: the **Graph** (upper) pane and the **Results** (lower) pane.
- Enlarge any part of the chromatogram by selecting the area to enlarge while holding the left mouse button. Return to the view of the entire chromatogram by double-clicking in the graph.

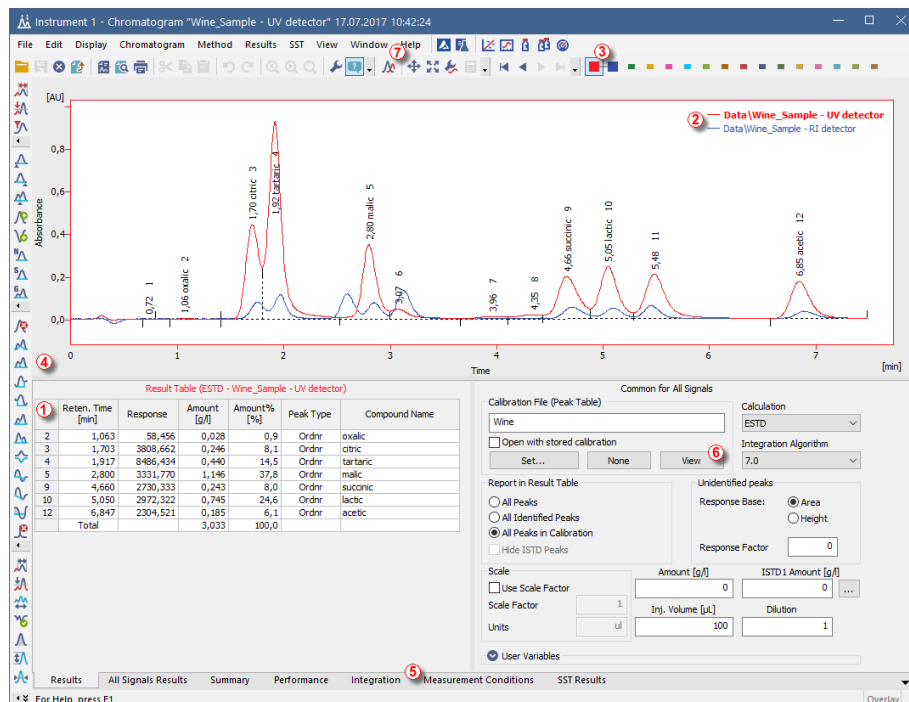






Fig 14: Chromatogram window

- Click anywhere in the **Result table** . The peak (or peaks) corresponding to the row you just clicked onto will change color according to the color of the signal.

- Only one signal of the chromatogram can be active at the time. The active signal can be recognized from the legend section ② in the upper right corner of the graph (the active signal is set in bold), from icons in the *Overlay* toolbar ③ (the active signal has the debossed  icon) or from the graph outline color and table headers color. 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. Change the color of the currently active signal to another one by clicking on the desired color in the *Overlay* toolbar. All parts of the **Chromatogram** window will change color.
- You can change the integration of peaks by using the interactive icons on the toolbars on the left side of the **Chromatogram** window ④ or directly on the **Integration** tab ⑤. Any changes made either way will change the **Integration table** and can be copied to the template method.
- To add permanent color to the peak, 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 5.3.1 on pg 27.). In the row corresponding to the peak to be colored, select the desired color by clicking in the field and selecting the  icon. Pick desired color and click OK. 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 the method** on pg 29).


5.2 Running the Sequence measurement

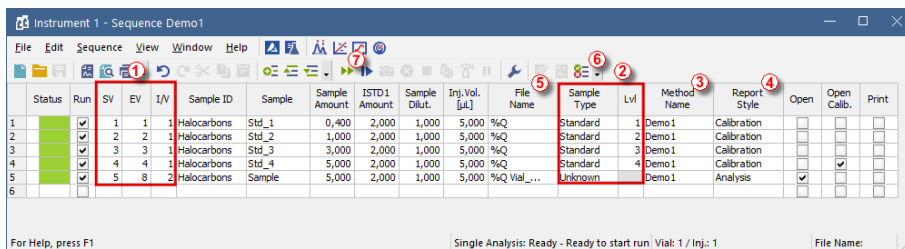
This chapter and prepared **DEMO1** project will lead you through **Sequence**, **Calibration** and **Method Setup** windows used for automated measurement and preparation of template methods.

Sequence operation allows automated measurement of large number (depending on PC and autosampler configurations) of samples for 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 already measured sequences.

Note: It is not necessary to have the **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** for automated sending of vial positions, injection volumes, etc., without the need to program the AS itself from the instrument panel.

5.2.1 Sequence window

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












Status	Run	SV	EV	I/V	Sample ID	Sample	Sample Amount	ISTD1 Amount	Sample Dilut.	Inj. Vol. [µL]	File Name	Sample Type	Lvl	Method Name	Report Style	Open	Open Calib.	Print
1	<input checked="" type="checkbox"/>	1	1	1	Halocarbons	Std_1	0,400	2,000	1,000	5,000	%Q	Standard	1	Demo1	Calibration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input checked="" type="checkbox"/>	2	2	1	Halocarbons	Std_2	1,000	2,000	1,000	5,000	%Q	Standard	2	Demo1	Calibration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input checked="" type="checkbox"/>	3	3	1	Halocarbons	Std_3	3,000	2,000	1,000	5,000	%Q	Standard	3	Demo1	Calibration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input checked="" type="checkbox"/>	4	4	1	Halocarbons	Std_4	5,000	2,000	1,000	5,000	%Q	Standard	4	Demo1	Calibration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	<input checked="" type="checkbox"/>	5	8	2	Halocarbons	Sample	5,000	2,000	1,000	5,000	%Q	Unknown	Demo1	Analysis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6	<input checked="" type="checkbox"/>															<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Fig 15: 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 seen, the first four rows each present 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 already were any data in the calibration).


- The *Method Name* column  sets the template method used for measuring the sample. The *Report Style* column  sets the print style used for reporting the measurement. Each row can have its own template method and report style; it is thus possible to measure according to several template methods in one sequence.
- In the *File Name* column  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. It is possible to combine several of these variables with plain text or symbols to create a unique file name for each chromatogram. The complete set of available variables can be seen after clicking in the field and selecting the  icon.
- To check the correctness of the sequence press the  icon . **Clarity** station will change all symbols at the beginning of the row to green field () meaning the row is ready or issue an error/warning  message listing what should be corrected on which row to be able to proceed.




Note: For demonstration purposes only, try to make a mistake and check the sequence once more. For example, on the row **3** change the text in the *Sample* column to *Std_1*, you can see immediately that a warning sign appeared on the corresponding rows - 1 and 3. After pressing the  icon, warning message appears telling 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 . The state of the *ACTIVE* sequence will change to *WAITING FOR INJECTION* and as soon as the *Ready* signal from the autosampler is detected, the measurement will start.

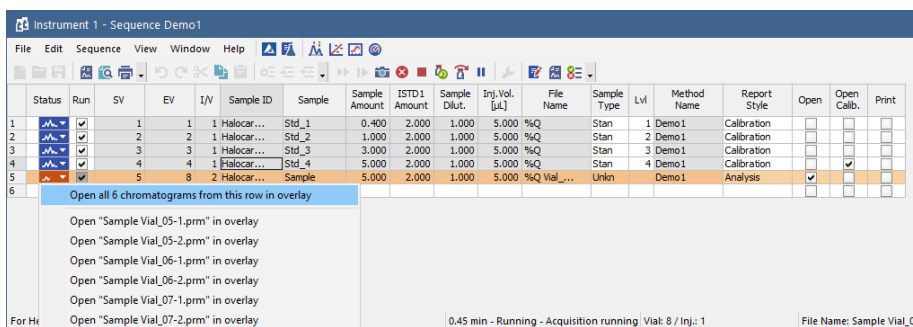
Note: Even if the autosampler is not connected, the **Clarity** will get the *Ready* signal, thus starting the sequence. However, it is not possible to generate separate demo data for each chromatogram, as all chromatograms would be the same. There are examples of the resulting files in the project folder. 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-click the sequence will stop immediately). All data measured will be saved. Or abort the measurement with *Abort*  button (does not produce any chromatogram).

- Already measured rows will change *Status* from green field () to icon with small chromatogram (). During measuring the icon is orange. If there is a chromatogram resulting from this row, small triangle will appear in the icon - . Left mouse click on the triangle will reveal 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 26. For more details about [Sequence](#) invoke the *Help* using *F1* key.

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.



Status	Run	SV	EV	I/V	Sample ID	Sample	Sample Amount	ISTD1 Amount	Sample Dilut.	Inj. Vol. [µL]	File Name	Sample Type	Lvl	Method Name	Report Style	Open	Open Calib.	Print
	1	1	1	1	Halocar...	Std_1	0.400	2.000	1.000	5.000 %Q	Stan	1	Demo1	Calibration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	2	2	2	1	Halocar...	Std_2	1.000	2.000	1.000	5.000 %Q	Stan	2	Demo1	Calibration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	3	3	3	1	Halocar...	Std_3	3.000	2.000	1.000	5.000 %Q	Stan	3	Demo1	Calibration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	4	4	4	1	Halocar...	Std_4	5.000	2.000	1.000	5.000 %Q	Stan	4	Demo1	Calibration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	5	8	2	Halocar...	Sample	Sample	5.000	2.000	1.000	5.000 %Q Vial_...	Unkn	Demo1	Analysis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	6	Open all 6 chromatograms from this row in overlay																

Open "Sample Vial_05-1.prm" in overlay
 Open "Sample Vial_05-2.prm" in overlay
 Open "Sample Vial_06-1.prm" in overlay
 Open "Sample Vial_06-2.prm" in overlay
 Open "Sample Vial_07-1.prm" in overlay
 Open "Sample Vial_07-2.prm" in overlay

For Hi 0,45 min - Running - Acquisition running: Vial: 8 / Inj.: 1 File Name: Sample Vial_C

Fig 16: Opening chromatograms in overlay

- On the right side of the [Sequence Window](#) you can check at each row whether corresponding chromatogram should be opened, printed or loaded into the calibration window.



5.3 Calibration window


The following section describes how to make a calibration.



To demonstrate the functions of calibration, 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 new calibration file. Save the calibration under CALIBDEMO for example.

Note: To save the calibration now, it would be necessary to change its name (no calibration can be saved under the name NONAME.CAL) and fill in at least the first compound name. Then the calibration can be saved using the *Save Calibration*  icon ②, *File - Save* or *File - Save As...* command.

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

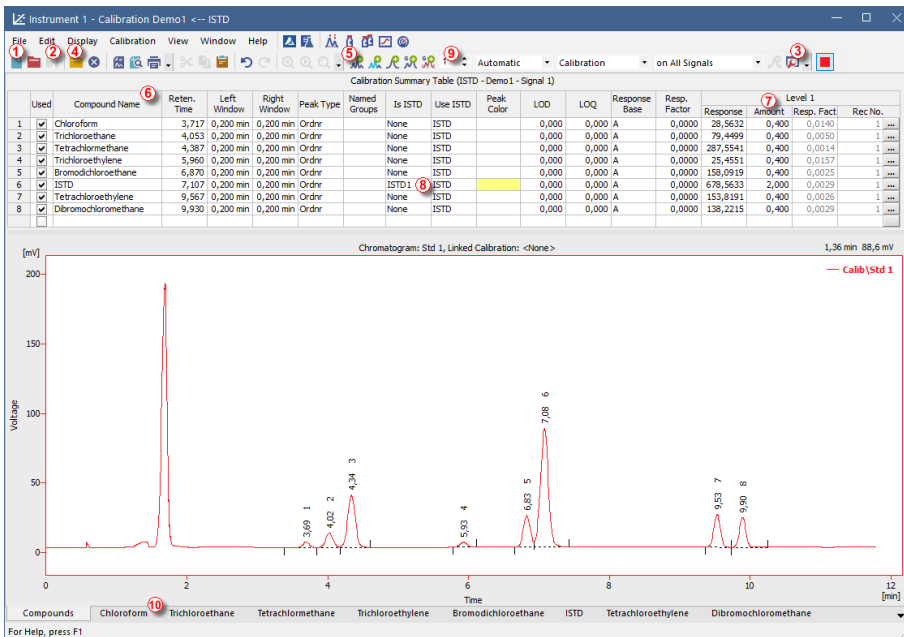







Fig 17: Calibration window - loaded standard

- Use the **Add All** icon (blue) ⑤ to move all identified peaks to the calibration table. The Calibration table appears in the **Calibration** window, ready to be completed as seen on **Fig 17** on pg 28.
- As it can be seen in the calibration, individual peaks are now identified according to their retention times only. Click and edit the fields in the **Compound Name** column ⑥ to those seen on **Fig 17** on pg 28. You may also set the peak color for specific peak, for example the ISTD peak, in the **Peak Color** column can be yellow.
- Fill the **Amount** column ⑦ with the concentration of the particular compounds. In this standard mixture, all compounds except for the peak number 6 have amount of 0.4.
- Peak number 6 is marked as 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 set. On the tabs of the individual compounds ⑩ (named according to the **Compound Name** field) the graph with single-point linear calibration can be seen.
- Proceed to setting 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. Set the calibration level in the **Current Level** field ⑨ to 2 and use the **Add All** icon ⑤

icon (blue) . Fill in the *Amount* column with 1.0 values (except for peak 6, in which value of 2 should be used again).

- Set the third calibration level accordingly using the STD 3.PRM file and *Amount* of 3.0 and the fourth level (file STD 4.PRM, *Amount* 5.0) except for the ISTD peak (always *Amount* = 2). On the tabs of the individual compounds , the linear four-point calibration can be seen. Save the calibration file now using the *Save Calibration*  icon; calibration is saved into the default directory.


5.3.2 Linking the calibration to a chromatogram

- Any chromatogram can be linked to a calibration file thus automatically giving 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 too, but they will be used later.
- The data are uncalibrated and no information about the names of individual compounds is available; 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 chapter (it should be in the default directory under the name CALIBDEMO.CAL). Any peaks present in the calibration are now identified with their names in the chromatogram.

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

5.3.3 Linking the calibration to the method

If you have a large number of chromatograms, linking the calibration to each file separately would be a time-consuming process. To avoid this, the calibration may be linked to the resulting chromatograms automatically.

- Return to the **Instrument** window and use the *Method - Calculation...* command to open the **Method Setup** dialog directly on the **Calculation** tab . 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.

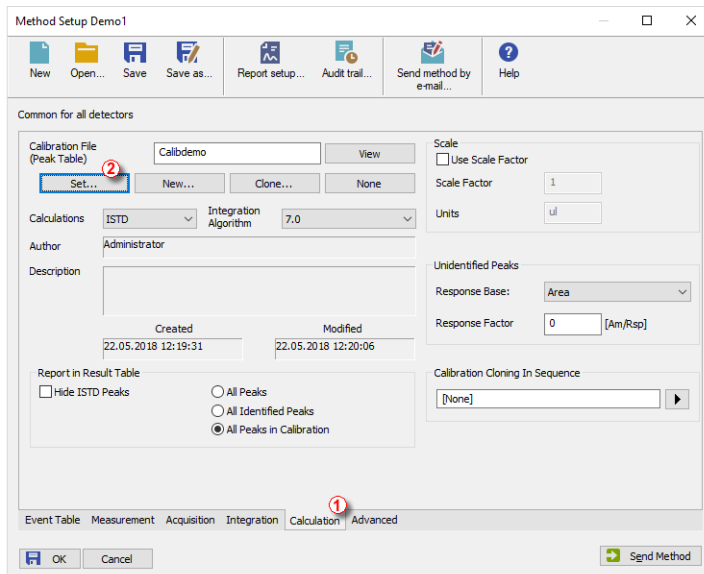


Fig 18: Method Setup - Calculation dialog

- 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 applies and saves this change to the template method.
- Any chromatograms measured with this template method in the future will have the actual calibration linked.

5.4 Linking the calibration to a series of already measured chromatograms

In case you have already measured chromatograms and you want to change/update the calibration linked to it, it can be done with a single click using the **Batch** reprocess.

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 in already measured chromatograms.

- Go to the **Instrument** window and use the **Analysis - Batch...** command.

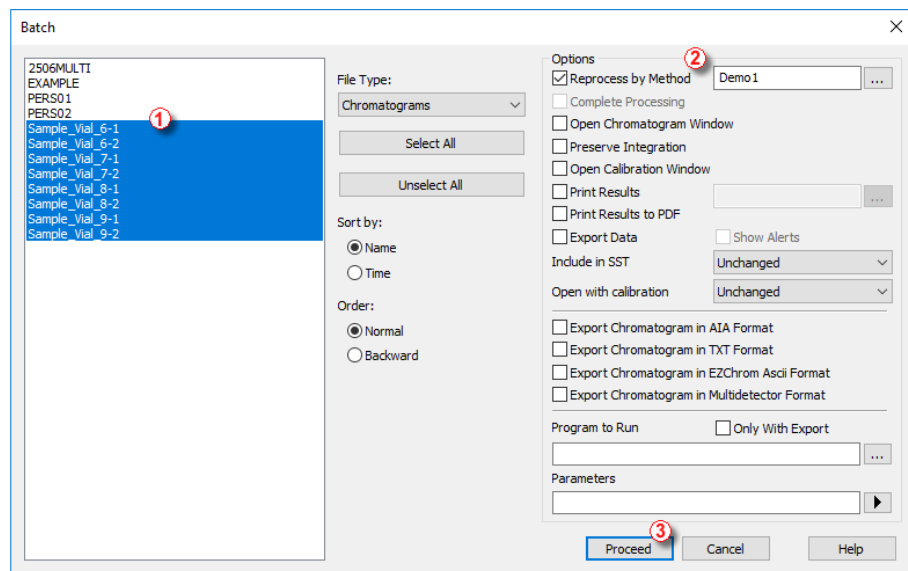




Fig 19: Batch dialog with selected chromatograms

- Select files to be reprocessed in the left part of the dialog ①; multiple files can be selected by left-clicking them while holding the **Ctrl** or **Shift** key. Mark 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 that should be used for reprocess and click the *Proceed* ③ button. All selected chromatograms will now have the calibration according to the current method linked to it.

Note: When using *Reprocess by Method*, always make sure that the method you want to reprocess by is opened in the *Instrument* window. Moreover, chromatograms to be batch processed need to be saved in the current project directory.

- 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 the 5.1.4 on pg 22.) 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.

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

In *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.

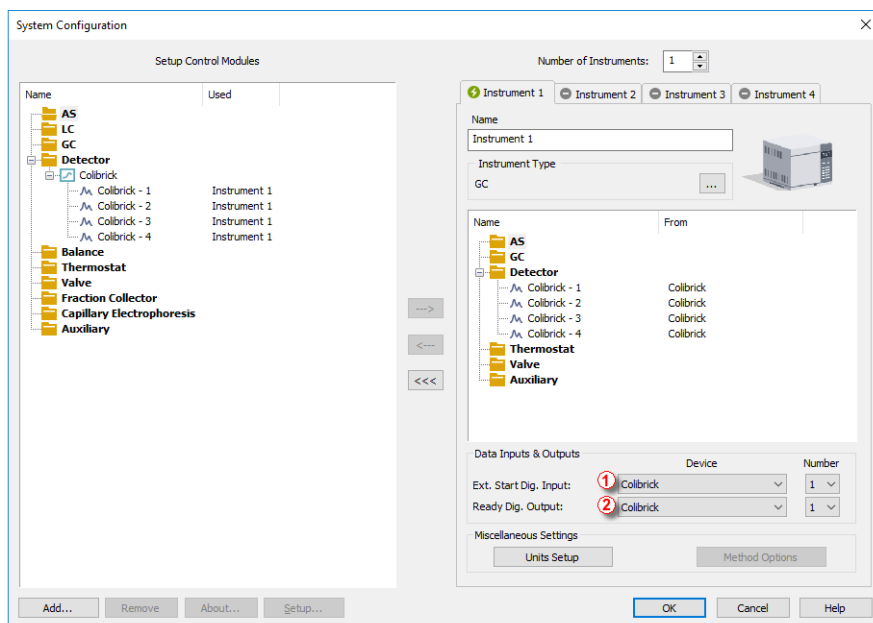
In *PASSIVE* sequence the start is controlled by the autosampler. **Clarity** only waits for external start signal from the autosampler and then starts the sequence and data acquisition.

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 [System Configuration](#) dialog by *External Start Digital Input* and *Ready Digital Output* functions. The [System Configuration](#) dialog is accessible from the **Clarity** main window through *System - Configuration...* command.

Data Inputs & Outputs group:

External Start Digital Input ① should be set to the device and its specific pin that gives **Clarity** 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.



6.1 AS + GC set - Active Sequence

In GC systems the sample cycle is typically controlled by the GC. With the commonly used temperature gradient, the time for the necessary cool down of the system varies. 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 in two groups:

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

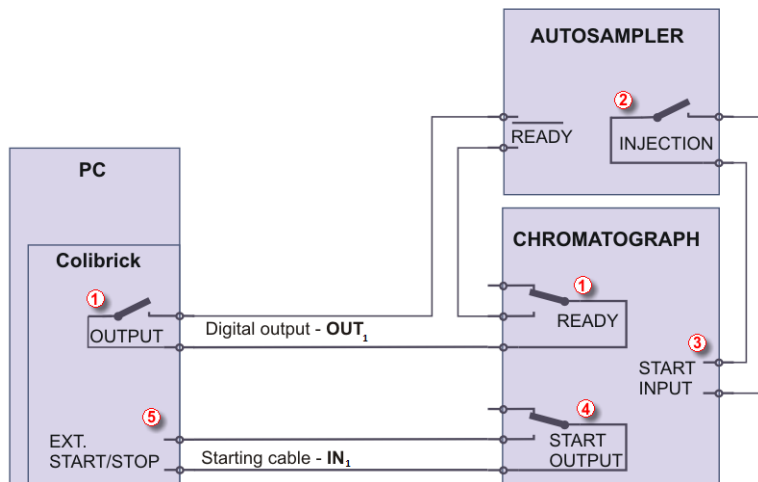


Fig 21: Wiring of the autosampler - variant A

The injection will start only after both serially connected contacts (**Clarity** and the 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**. The [Digital Outputs of Colibrick](#) dialog is accessible from the **Clarity** main window through *System - Digital Outputs...* command.

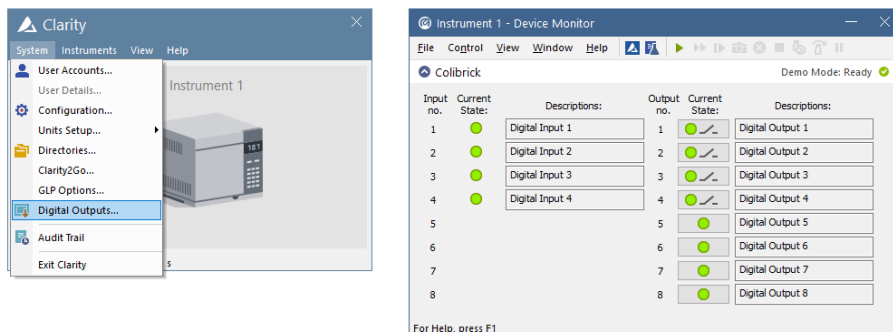


Fig 22: Digital Outputs

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 33. Use the following settings.

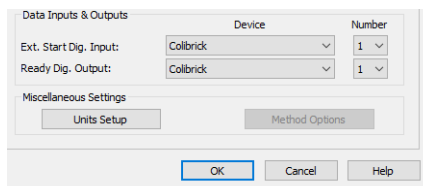


Fig 23: System Configuration GC set

Variant B - started by opening the contacts

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

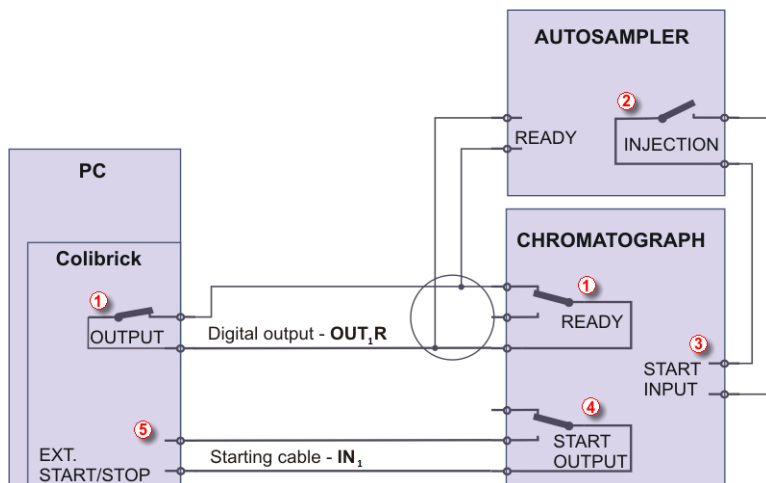


Fig 24: Wiring of the autosampler - variant B

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 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 is same as for Variant A.

6.2 AS + LC set - Active Sequence

In LC systems the autosampler typically governs the timings. The eventual gradient of the pump or 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 an autosampler and the **OUT_nR** cable plugged into the synchronization input (READY) of an autosampler.

An 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** to be started or stopped by **Clarity**.

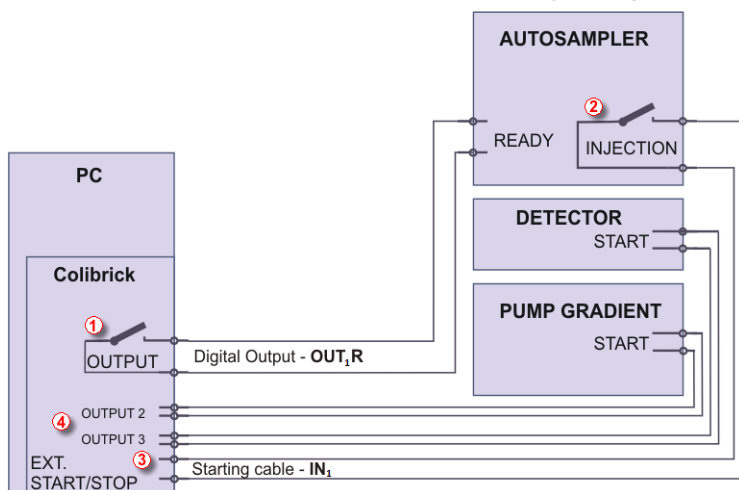


Fig 25: Wiring of an autosampler in a LC set without an **AS Control** module

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 **33**. Use the following settings.

The dialog box is titled "Data Inputs & Outputs". It has two main sections: "Data Inputs & Outputs" and "Miscellaneous Settings".

Data Inputs & Outputs:

	Device	Number
Ext. Start Dig. Input:	Colibrick	1
Ready Dig. Output:	Colibrick	1

Miscellaneous Settings:

Buttons: Units Setup, Method Options

Buttons: OK, Cancel, Help

Fig 26: System Configuration LC set

Events to start additional detectors and pumps from **Clarity** must be set in the **Event Table** accessible from **Method Setup** dialog. In the most typical case, shown on the fig **Fig 25** on pg **38**., use the setting as displayed in **Fig 27** on pg **39**.

The dialog box is titled "Method Setup Demo1 (MODIFIED)". It has a menu bar with icons for New, Open..., Save, Save as..., Report setup..., Audit trail..., Send method by e-mail..., and Help.

Common for all detectors

	Name	Type	Input				Output			
			Source	Input	Value	Units	Output Type	Output	Parameter	Store
1	Start detector	Acq Begin	---	---	---	---	Colibrick	Digital Output 2	Pulse	<input type="checkbox"/>
2	Start pump	Acq Begin	---	---	---	---	Colibrick	Digital Output 3	Pulse	<input type="checkbox"/>
3										<input type="checkbox"/>

Event Table | Measurement | Acquisition | Integration | Calculation | Advanced

Buttons: OK, Cancel, Send Method

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_nR** 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 autosampler and **Clarity** to ensure next injection will be performed after previous run is finished.

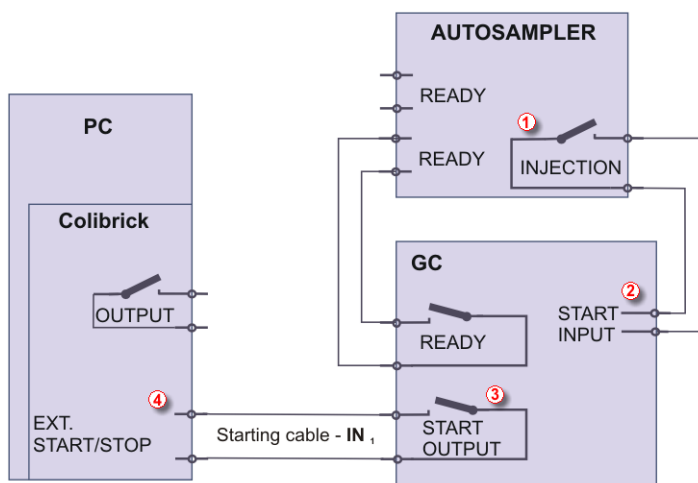
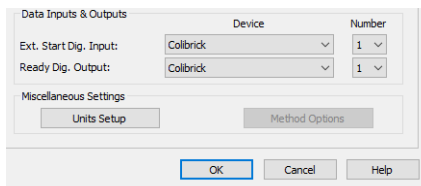


Fig 28: Wiring of an autosampler in Passive Sequence

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 **33**. Use the following settings.



Data Inputs & Outputs		
	Device	Number
Ext. Start Dig. Input:	Colibrick	1
Ready Dig. Output:	Colibrick	1

Miscellaneous Settings

Units Setup Method Options

OK Cancel Help

Fig 29: System Configuration 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 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_nR** 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 communication line.

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 acquisition will be given ③.

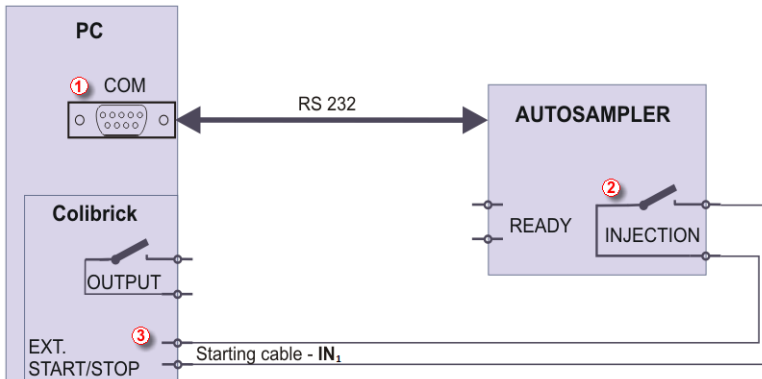


Fig 30: Wiring of an autosampler with AS Control module + A/D converter

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 **33**. Use the following settings.

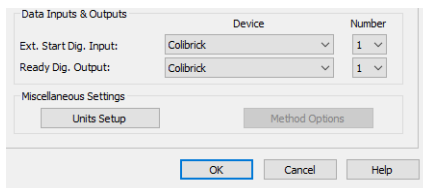


Fig 31: System Configuration AS+A/D converter

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

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

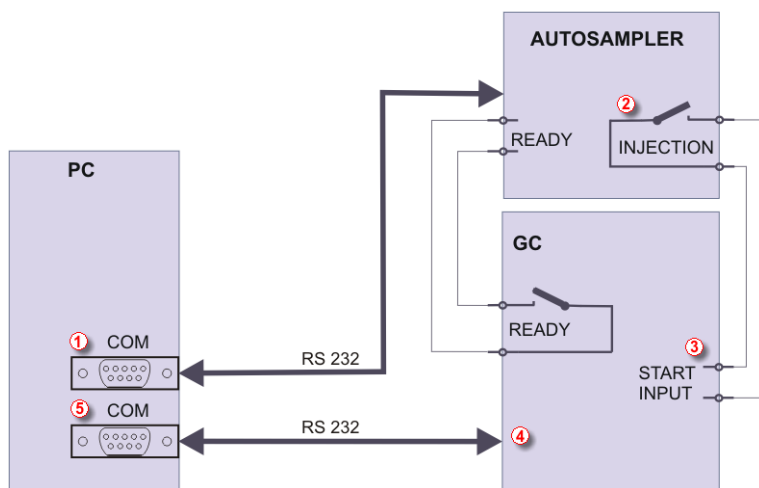


Fig 32: Wiring of the autosampler with AS control module and digital acquisition

The start output for specific autosamplers can be set in the bottom-right corner of the [System Configuration](#) dialog, see [Fig 20](#) on pg 33. Refer to the corresponding **Clarity Control** manual for wiring to your instruments.

7 Troubleshooting

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

Note: You may find other Error Messages and solutions for problems connected to particular hardware in their respective manuals.

DataApex also provides remote support to registered customers in case of complicated issues. In the *Windows Start* menu - *Programs* - *Clarity* please find the **TeamViewer QuickSupport** application.

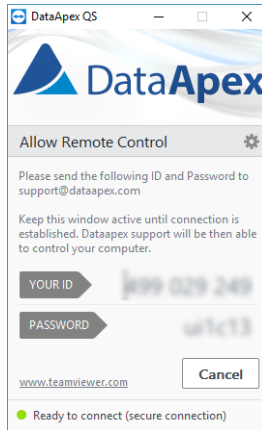


Fig 33: TeamViewer QuickSupport application

Before using the **TeamViewer QuickSupport** application, user is advised to contact **DataApex Technical Support** (support@dataapex.com) first for troubleshooting via this option.

This function serves as a last option while troubleshooting a problem.

7.1 Locate your problem

When troubles occur, the fastest way to find a solution is to search for it in the following index via the **Dialogs**, the window in which the problem occurred, **Error Messages** that appear or according to the used **Hardware**. The name of the window is visible in its header.

Note: Names of individual **Clarity** Instruments appear in the header instead of the common term "Instrument".

Tab 1: List of windows and dialogs

Windows and Dialogs	
Clarity	pg 47., pg 48., pg 49., pg 51., pg 53., pg 55., pg 52.
Data Acquisition	pg 55., pg 56., pg 57., pg 58., pg 59.
Instrument	pg 53.
Method Setup	pg 53.
Sequence	pg 53.
Single Analysis	pg 53.
System Configuration	pg 53., pg 55.

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 50.
Access to Audit Trail was denied	pg 51.
Wrong Software Version	pg 49.
Wrong User Code	pg 49.
DEMO (in the window header)	pg 51.
Disabled (in the status line)	pg 53.
Installation did not pass Windows Logo Testing	pg 2.
Other Error Messages	pg 60.
Simulated (in Data Acquisition)	pg 55.
User accounts file load error	pg 52.

Tab 3: List of hardware

Hardware	
HW key	pg 47., pg 48.

Note: You may find other Error Messages and solutions for problems connected to specific hardware in their respective manuals.

7.2 Problems at station start

Chapters containing problems at station start.

7.2.1 Missing HW key

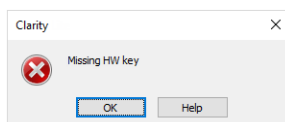


Fig 34: Missing HW key error dialog

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

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 "**Universal Serial Bus Controllers**" - "**Rockey4**" item. It can be also in some cases found directly in the root folder of device manager. If it is not there, unplug and plug in the HW key to the **USB** port. If it does not help, see FAQ at www.dataapex.com website, where the Support menu will navigate you to FAQ (frequently asked questions) - Hardware key re-installation.

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

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.

7.2.2 Clarity is unable to find HW key

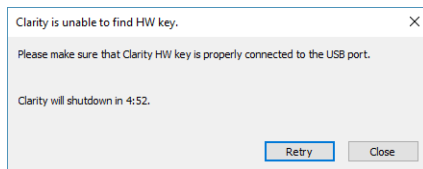


Fig 35: Clarity is unable to find HW key

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

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

- Solution:*
- Click on the *Retry* button to reestablish the communication between Clarity and the key.
 - 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 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 un-check 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 local System Administrator.

7.2.3 Wrong User Code

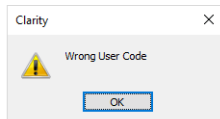


Fig 36: Wrong User Code error dialog

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, dialog to enter the correct **User Code** will pop-up. Upon submitting correct **User Code** Clarity will start. Otherwise Clarity will not start and you will be asked to enter the correct **User Code** again. The 16 digit **User Code** can be found on the back side of the plastic card provided with **installation USB**.

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

If necessary, contact the manufacturer or your distributor to request this code. You will need to provide the serial number (S/N) of the workstation.

7.2.4 Wrong Software Version

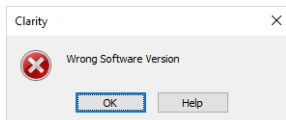


Fig 37: Wrong Software Version error dialog

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

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

Solution: Ensure you are using 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.

7.2.5 Trial Expired

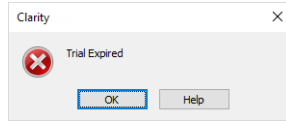


Fig 38: Trial Expired error dialog

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.

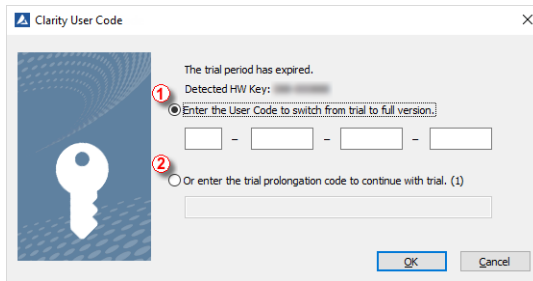


Fig 39: Clarity User Code

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

Solution: Same as for Reason 1.

7.2.6 Trial Extension Failed

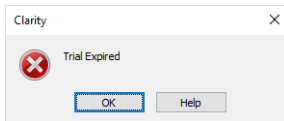


Fig 40: Trial extension failed error message

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.

7.2.7 Access to Audit Trail was denied

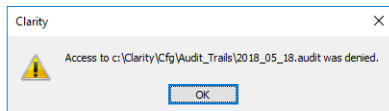


Fig 41: Denied access to C:\ directory

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

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

Solution: Note that this solution requires user with administrator privileges. Right mouse 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*.

7.2.8 DEMO (in the window header)

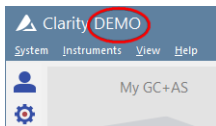


Fig 42: Clarity DEMO

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.

7.2.9 User accounts file load error

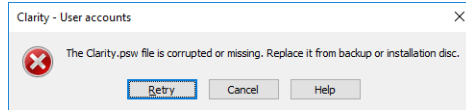


Fig 43: User accounts file load error

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: As a remedy 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.

7.3 Problems upon collection of data

Chapters containing problems upon collection of data.

7.3.1 Data Acquisition - non-functional

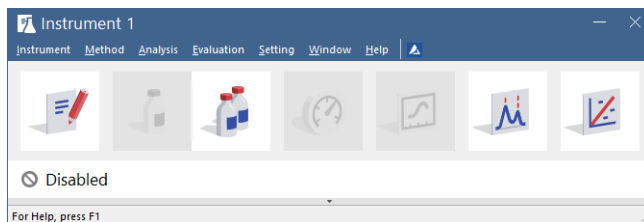


Fig 44: Data Acquisition disabled

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 Clarity Offline or Clarity Demo version, which does not enable the measurement of the chromatograms.

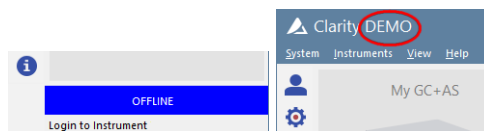


Fig 45: Clarity Offline and Clarity DEMO

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 case of the **Clarity Offline** station remove the HW key with the **Offline** license and insert a key with **Clarity** full license. In case of **Clarity Demo** use the **Windows Start menu** to locate the **Clarity Demo** group in the *All Programs* section and select the *Remove Clarity* item there. Then use the correct **Clarity** installation USB to install the full version.

Reason 2: Problems with the A/D converter - Colibrick (INT9, INT7, U-PAD2).

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 3: The detector is not allocated to the Clarity Instrument.

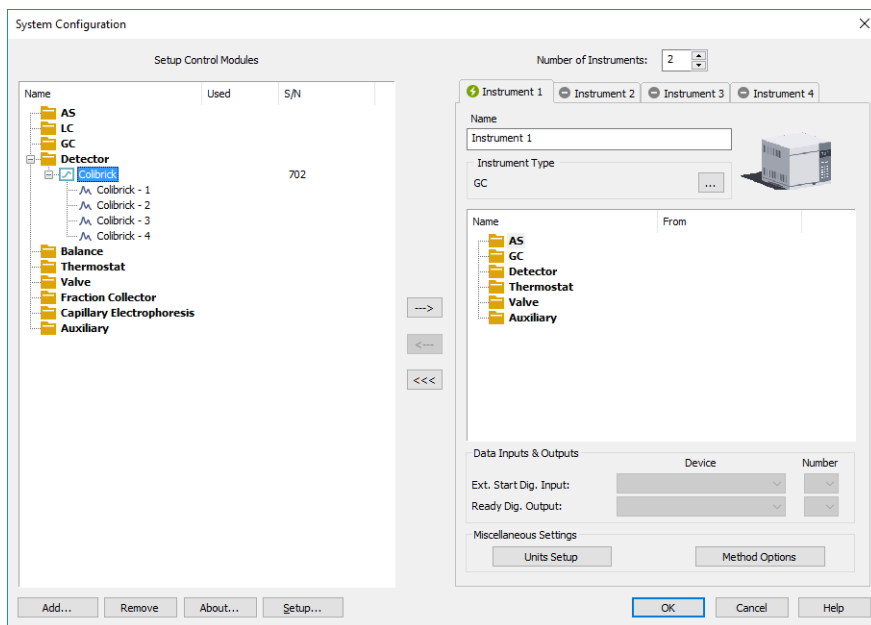


Fig 46: Detector not allocated to the Instrument

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 an 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 on the [System Configuration](#) dialog can be found in the chapter "System Configuration" in the [Reference guide](#).

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

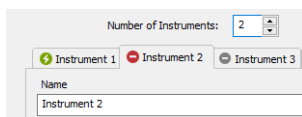



Fig 47: Small number of Instruments purchased

- 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**.  icon indicates the Instrument cannot be used for data acquisition.
 - Check your serial number (S/N) using the command [Help - About...](#) from the main [Clarity](#) window.

7.3.2 Data Acquisition - Simulated

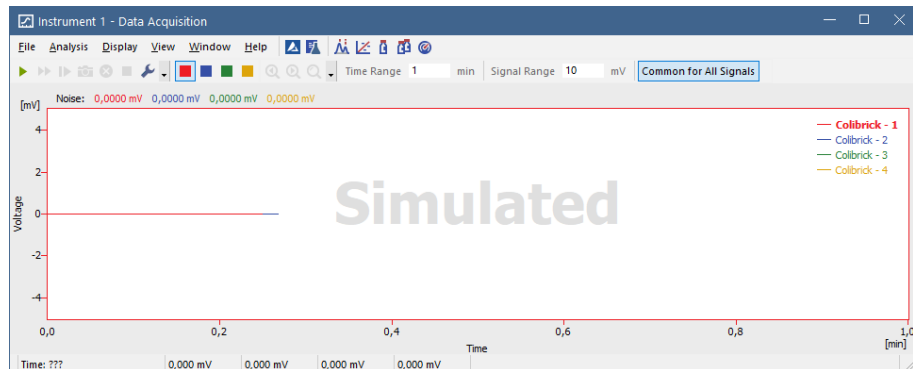


Fig 48: Data Acquisition Simulated

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

Reason: 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 only has detector signals from the **DataApex DEMO** detector, it is necessary to configure it. You can find more information how to add a detector in the chapter "[Clarity Configuration](#)" on pg 8.
 - Make sure that you have installed a full version of **Clarity**. If this is not the case, inscription *DEMO* is in the header of the main window. If so, uninstall the demo software, install the full version and enter the user code you have been provided. Also make sure that the detector is properly configured.

7.3.4 Signal is cut at the top

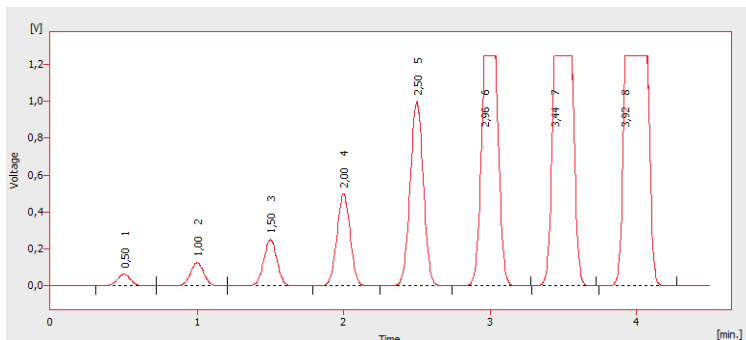


Fig 50: A saturated signal

The signal is saturated and therefore cut at the top. There are three possible causes.

Reason 1: A high sensitivity/amplification of the detector.

- Solution:*
- If you are using an A/D converter, decrease the sensitivity of the detector directly on the device.
 - If you are using direct control with digital acquisition (not using any A/D converter), decrease the sensitivity in the [Method-Acquisition...](#) dialog accessible from the [Instrument](#) window.

Reason 2: A low range set for the A/D converter (Colibrick, Int9, U-PAD2, ...).

- Solution:* Set a higher range in the [Method-Acquisition...](#) dialog accessible from the [Instrument](#) window.

Reason 3: An improper connection of the A/D converter (Colibrick, Int9, U-PAD2, ...).

- Solution:* Check whether the cable shielding is properly connected. For more information see [Fig 4](#) on [pg 6](#).

7.3.5 Small peaks in the chromatogram

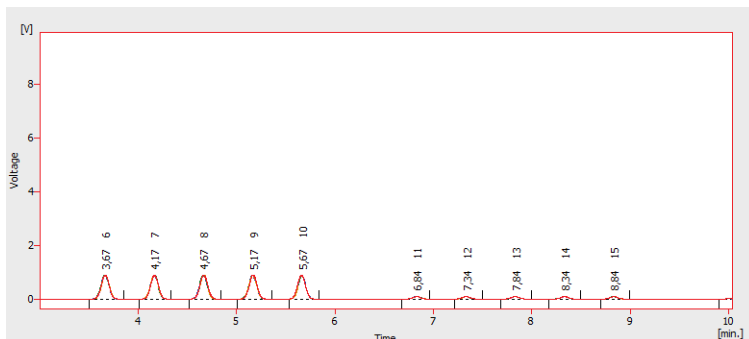


Fig 51: The small peaks in the chromatogram

The detector response is low. There are three possible causes.

Reason 1: A low sensitivity/amplification of the detector.

- Solution:**
- If you are using an A/D converter, increase the sensitivity of detector directly on the device.
 - If you are using direct control with digital acquisition (not using any A/D converter), increase the sensitivity in the [Method-Acquisition...](#) dialog accessible from the [Instrument](#) window.

Reason 2: A high range set for the A/D converter (Colibrick, Int9, U-PAD2, ...).

- Solution:** Set a lower range in the [Method-Acquisition...](#) dialog accessible from the [Instrument](#) window.

Reason 3: An improper connection of the A/D converter (Colibrick, Int9, U-PAD2, ...).

- Solution:** Check whether the cable shielding is properly connected. For more information see [Fig 4](#) on pg 6.

7.3.6 No peaks in the chromatogram

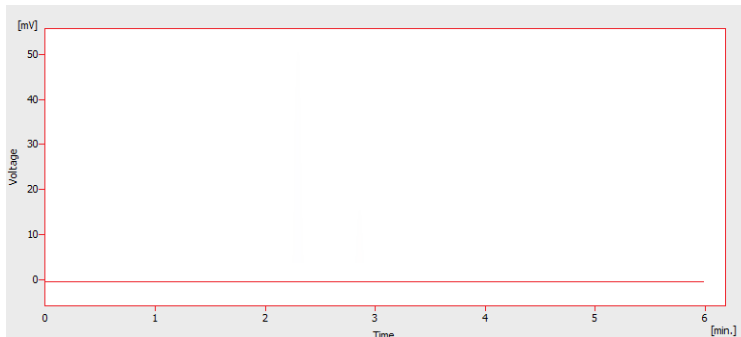


Fig 52: No peaks in the chromatogram

There is no response from the detector at all. There are four most common causes.

Reason 1: The problem with A/D converter connection to the detector.

Solution: Check connections and cables. For more information see **Fig 4** on pg **6**.

Reason 2: The analytical conditions problem.

Solution: Check the system for wrong injection or wrong conditions (temperature, FID flame, etc).

Reason 3: The chromatograph problem.

Solution: If a voltmeter is available, connect it to the chromatograph and check voltage changes during an analysis with a real sample.

Reason 4: The A/D converter failure.

Solution: You can perform a simple test. Connect an AA battery to white and red cable and switch the range of the A/D converter to 10 V and check whether the voltage is about 1.5 V.

7.3.7 Other Error Messages

You can find the description of other Error Messages and possible problems and solutions to them in other manuals. Here is the list of known possible Error Messages with reference to their descriptions:

Tab 4: Other Error Messages

Error Message	Hardware	Note:
Board Malfunction	INT7, INT9	
Cannot create detector	INT7, INT9	
Cannot find driver file \\.\CSWINT70	INT7	
Cannot find driver file \\.\CSWINT91	INT9	
Cannot load device driver	Colibrick, U-PAD2	
Cannot find first board	INT7, INT9	
Cannot find second board	INT7, INT9	
Card not found	INT7	only older stations
Error Occurred During Setup	INT7, INT9, Colibrick, U-PAD2	
Cannot establish communication with DataApex U-PAD	Colibrick, U-PAD	

Note: Some of these Error Messages can also appear if using hardware other than those listed above. The remedy for such Error Message should be the same for any device installed. **Clarity** Hardware manuals can be found on the **DataApex** website (www.dataapex.com).

7.4 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) - Hardware key (re)installation.

7.4.1 ROCKEY4 ND HW key not detected



Fig 53: 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 the **ROCKEY4** was successful.

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

Caution: In 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).

7.5 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.

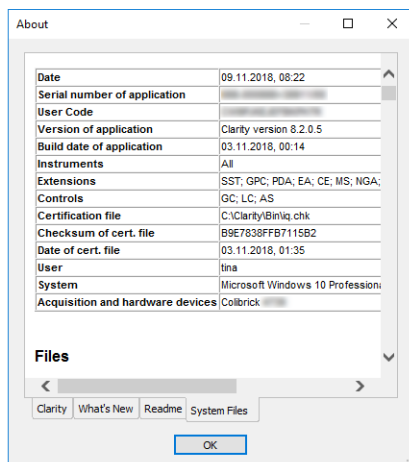


Fig 54: Help - About - System Files

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

Serial number of application, User Code

Lists the serial number of the application and User Code used. These data are very helpful in 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

Microsoft Windows 7 Professional 64-bit version 6.1 Service Pack 1 (Build 7601)

Files

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

CSWAS300.DLL , C:\CLARITY\BIN\, 6.0.0.286, 17.02. 2015
 CSWINT7.DLL , C:\CLARITY\BIN\, 6.0.0.286, 17.02. 2015
 CLARITY.EXE, C:\CLARITY\BIN\, 6.0.0.286, 17.02. 2015

...

The sections **Version of application**, **Instruments**, **Extensions** and **Controls** show information on installed parts of the **Clarity** station. It

shows 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 installed files in version and location. If there were any discrepancies, this may cause some problems.

7.6 Sleep Mode

An active **Clarity** station (with **Instrument** window opened) prevents the PC from entering 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 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.

7.7 Switching Users in Windows OS

Switching User profiles in **Windows** may cause communication error between Clarity - the A/D converter - the HW key. It is thus recommended not to switch users on the computer while **Clarity** is running.

7.8 Apparently large font and items

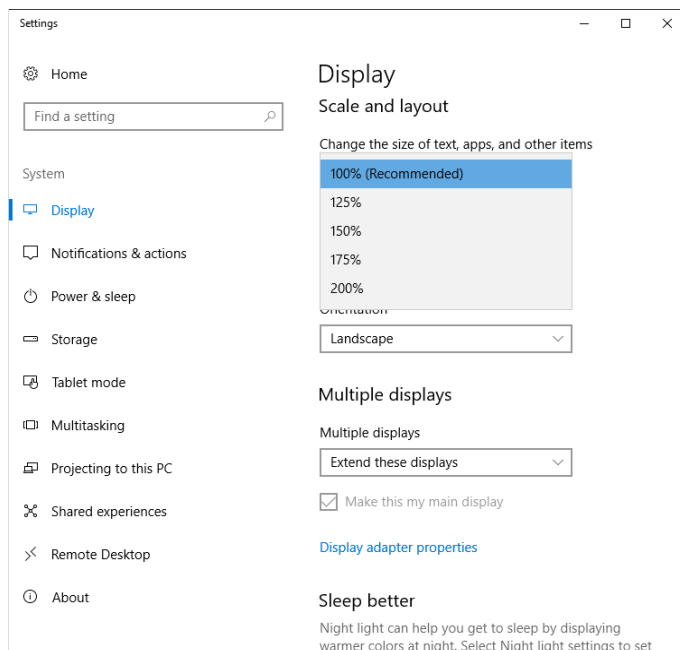


Fig 55: Setting of text size in Windows Control Panel - Display

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.

Reason: Windows 8 and later may be preset to display larger text and other items in windows and dialogs. It may also happen when you set larger font manually in Windows 7.

Solution: Change the size of all items in *Windows Control Panel - Appearance and Personalization - Display* to *Smaller - 100% (default)*. See Fig 55 on pg 64.