DataApex
Clarity™
CHROMATOGRAPHY SOFTWARE

COLIBRICK A/D CONVERTER

Clarity Hardware   ENG

Sections of the manual connected only to the **Clarity Full** version are marked with the ✓Full version icon.

Contents

To facilitate the orientation in the **Colibrick A/D Converter** manual and **Clarity** chromatography station, different fonts are used throughout the manual. Meanings of these fonts are:

Open File (italics) describes the commands and names of fields in **Clarity**, parameters that can be entered into them or a window or dialog name.

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

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

[Chromatogram](#) (blue underlined) marks clickable links referring to related chapters.

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

Note: Notifies the reader of relevant information.

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

▌**Marks the problem statement or trouble question.**

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

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

1 Colibrick acquisition device

This manual describes the use of the **Colibrick A/D Converter** with the **Clarity** software ver. **4.0 and newer**.

Colibrick is an external 24- bit A/D converter that measures the voltages of chromatographic and electrochemical detectors. It is designed for acquisition of data from any chromatograph for the **Clarity** station. **Colibrick** uses the **USB** communication channel and thus is directly powered from the **PC**. The unit can be connected or disconnected anytime without the need to switch the computer off.

Fig. 1: Colibrick A/D Converter

Brief technical overview

- 1, 2 or 4 data acquisition channels completely independent and isolated from the USB ground.
- 4 digital inputs with status indication by LED.
- 8 digital outputs, 4 of them also designed as relay contacts, each has its status indicated by LED.
- USB interface.
- Excellent reliability and temperature stability.

1.1 Front panel of the Colibrick device

The front panel contains LED indicators indicating the status of the device.

Fig. 2: Front panel of the Colibrick

Ready (orange) LED status
Indicates correct installation.

Data (blue) LED status
Indicates connection to the chromatography data station.

Digital Input (green) LEDs status
LED ON - the input status is High (logical "1") or not connected.
LED OFF - the input status is Low (logical "0") or connected to the ground (GND).

Digital Output (red) LEDs status
LED ON - the output status is High (logical "1"), the relay contact is opened.
LED OFF - the output status is Low (logical "0"), the relay contact is closed.

Note: The above mentioned is valid if the device is used within the specifications stated in Colibrick A/D Converter datasheet.

1.2 Rear panel of the Colibrick device

The rear panel contains the **USB** connector for connecting to the **PC** and the **INT7 compatible connector** for connecting to the chromatograph.

Fig. 3: Rear panel of the Colibrick

1.3 A/D converter types in general

Prior to collecting and processing the chromatographic signal by a computer, the analog signal of the detector must be first converted to a digital form by an analog/digital (A/D) converter.

In principle there are three types of A/D converters – sampling, integrating and ΔΣ (**Delta-Sigma** - with continuous integration).

The **Colibrick** converter uses Delta-Sigma integration.

Advantages of the Colibrick A/D converter
- No loss of input signal during integration. There are no time delays during which the converter fails to integrate the input signal.

- No continuous servicing of the input analog switches, which would otherwise cause errors (offset, noise).
- Substantially smaller amounts of data entering the computer due to individual data items already representing partial integrals.
- Parameters generally based on the INT9 A/D cards.

2 Requirements

The **Colibrick** external **USB A/D Converter** can be used with the **Clarity** software installed on PC using the OS described in the following table.

The PC must have a free **USB** slot.

2.1 USB Connections Guidlines

The Colibrick is highly sensitive to voltage drops in the USB cable. Standard USB ports often provide power at the lower limit required for proper operation. Even a small voltage drop can lead to unstable operation or malfunction. Therefore, when installing the Colibrick, please follow the recommendations below.

2.1.1 Cable Requirements

- Use a high-quality USB cable with low resistance, proper wire thickness, and good shielding to ensure stable power and reliable data transmission. Poor-quality cables may lead to voltage drops, communication errors, or unstable operation.
- The recommended maximum length for passive USB cables is 2–3 meters. Longer passive cables may cause communication errors, even if the cable is of high quality.
- For distances beyond 2–3 meters (up to approximately 20 meters), always use an active USB 3.0 extension cable. Active cables include a built-in signal repeater that ensures stable communication and sufficient power over longer distances.

2.1.2 Laptop Connections

- USB ports on laptops running on battery may provide insufficient power, which can cause voltage drops and unstable operation of the Colibrick. Using an active cable can help mitigate these issues.
- When connecting to a laptop, standard USB-C–to–USB-A cables cannot be used; a Power Delivery–capable cable is required.
- Using a USB-C (laptop side) to USB-A hub (Colibrick side) with adequate power delivery can also help ensure stable operation when using short cables. For longer distances, use an active cable.

2.1.3 Multiple Devices

- Connecting multiple devices to adjacent USB ports may cause voltage drops, especially on laptops, potentially leading to improper device operation. Using an active USB cable can help prevent this issue.
- Avoid connecting Colibrick through standard USB-A hubs, because they usually do not provide sufficient power.

Tab. 1: Hardware and Software Compatibility

Software	Windows			
	11	**10***	**8.1***	**7^{SP1}***
Clarity	Yes (from 8.7)	Yes (from 6.2)	Yes (from 4.0.3)	Yes (from 4.0)
Clarity Lite	Yes (from 8.7)	Yes (from 6.2)	Yes (from 4.0.3)	Yes (from 4.0)

* Both 32 and 64-bit version are supported.

Tab. 2: Hardware and Software Compatibility with obsolete Windows OS:

Software	Windows	
	Vista^{SP2} (32 and 64-bit)	**XP^{SP3}**
Clarity	Yes (from 4.0 to 7.2)	Yes (from 4.0 to 7.4.1)
Clarity Lite	Yes (from 4.0 to 7.2)	Yes (from 4.0 to 7.4.1)

3 Installation

Ensure that you have *Administrator* access rights in your **Windows OS** before you proceed with the installation.

3.1 The Colibrick device

- Install the **Clarity** software.

. . . .
Caution: Install **Clarity** before inputting any devices.

The drivers were copied to your computer and installed automatically during the installation of the **Clarity** software.

. . . .
Note: The **Colibrick** device is detected by its S/N. If you later replace one by another, it is also necessary to reconfigure it in the **Clarity** System Configuration dialog.

3.2 Standard cable for Clarity station

Fig. 4: Cables for the Clarity station package

The standard **Clarity** station package includes a cable set composed of signal, starting and digital output cables for connecting the **Clarity** to the chromatograph and an **USB** cable for connecting the **Colibrick** to the computer.

- **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 (analog ground).

- **Starting (marker) cables**

The cables, labeled "**IN1**" to "**IN4**"(according to the number of channels), are ended with a RCA connector. Each starting cable has one cable with free leads [red (+), shielding (digital ground)] for direct connection to the chromatograph or to 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.

3.3 Connection with chromatograph

Connect the cables according to one of the following diagrams in the **Fig. 5** on pg. **7**. Use a symmetrical connection only if you are sure that the chromatograph/detector is equipped with a symmetrical output – it is necessary to read through the instructions for the corresponding chromatograph.
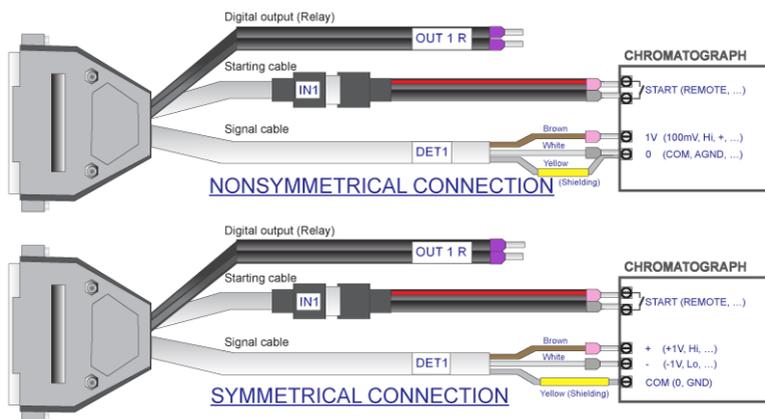

*Fig. 5: Connecting **Clarity** to chromatograph*

Note: Since **INT7** converter all **DataApex** A/D converters use the same standard **INT7 Connector**. A description of the INT7 connector can be found in the chapter **"Tables and specifications"** on pg. **35**.

3.3.1 Connection of signal cables

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

Caution: The shielding must be connected. It works not only as the shielding, but also as the analog 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 detector output of the chromatograph with the largest possible level of signal, usually indicated as **INTEGRATOR** (signal approx. 1 V). The level of the signal on the output marked **RECORDER** is only about 10 mV. For easier

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

Note: This **SV9 Terminal Board** is not suitable for applications with small signals or with high electromagnetic interference. This is because the **SV9 Terminal Board** uses leads and screw contacts that are not shielded.

3.3.2 Connection of starting cables

Starting input reacts to a change of the TTL logical level (5 V/ 0 V) or to an external event. This event can be created by any suitable device such as button or relay.

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

For schemes and hints describing the typical autosampler wiring, please see the **Connecting Autosamplers** chapter of the **Getting Started Manual**.

3.4 Clarity Configuration ✓Full version

Note:brick   Please note there is no *System Configuration* window in **Clarity Lite**. **Clarity Lite** will use the first A/D converter detected and assign a predefined configuration file for it.
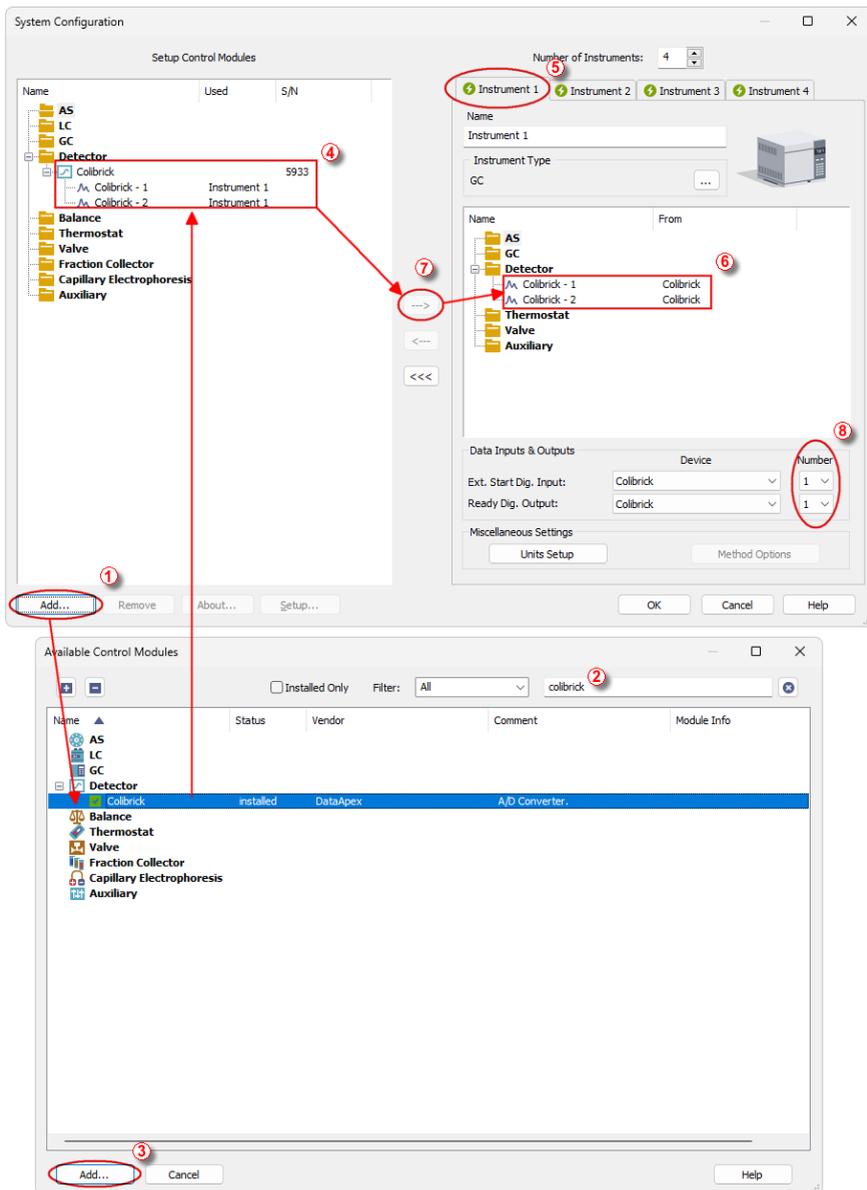

Fig. 6: System Configuration

- Start the **Clarity** station with the 🔼 icon on the desktop.
- Invoke the *System Configuration* dialog using the *System - Configuration...* command or via 🖋 icon.
- Press the *Add* button ① (See **Fig. 6** on pg. **9**.) to invoke the *Available Control Modules* dialog.
- You can specify the searching filter ② to simplify the finding of the driver.
- Select the **Colibrick** and press the *Add* ③ button.

The DataApex Colibrick Setup dialog will appear.
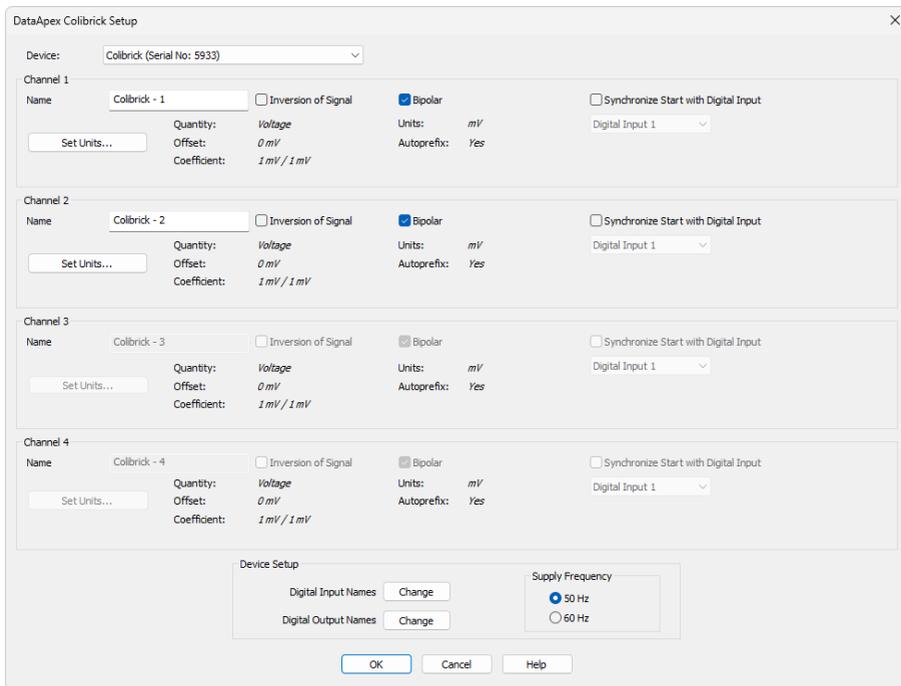
Fig. 7: DataApex Colibrick Setup

- Enter the detector names in *Name* fields for individual channels, set signal units.

. . . .
Note: A detailed description of this dialog can be found in the chapter **"DataApex Colibrick Setup"** on pg. **14**.

- Press the *OK* button.

The **Colibrick** will appear in the *Setup Control Modules* list ④ of the *System Configuration* dialog.

- Drag and drop the **Colibrick** icon from the *Setup Control Modules* list ④ on the left side of the *System Configuration* dialog to the chosen *Instrument* ⑤ tab on the right side ⑥ (or use the ⟶ button ⑦ to do so).

- Set the *Ext. Start Dig. Input* and *Ready Dig. Output* numbers ⑧ for your acquisition device according to the wires being used for the Start synchronization.

Note: A detailed description and configuration of this functions can be found in the **Reference guide** and **Getting Started** manuals.

Note: The configuration dialog of the **Colibrick** device ([DataApex Colibrick Setup](#)) can be displayed any time by double-clicking on its icon or using the *Setup* button.

3.4.1 Measuring on multiple instruments

Clarity allows to measure on multiple Instruments using a single **Colibrick** device, see **Fig. 8** on pg. **11**. After you add the **Colibrick** to the *Setup Control Modules list* , select an Instrument you wish to use ① and drag the individual detector signal - **FID** ② to the selected Instrument ③ . Then switch to another Instrument ④ , select the **UV-VIS** signal ④ and drag it to another Instrument. The Instrument to which the particular signal is connected is listed to the right (② and ⑤) of the detector name in the *Setup Control Modules* section.
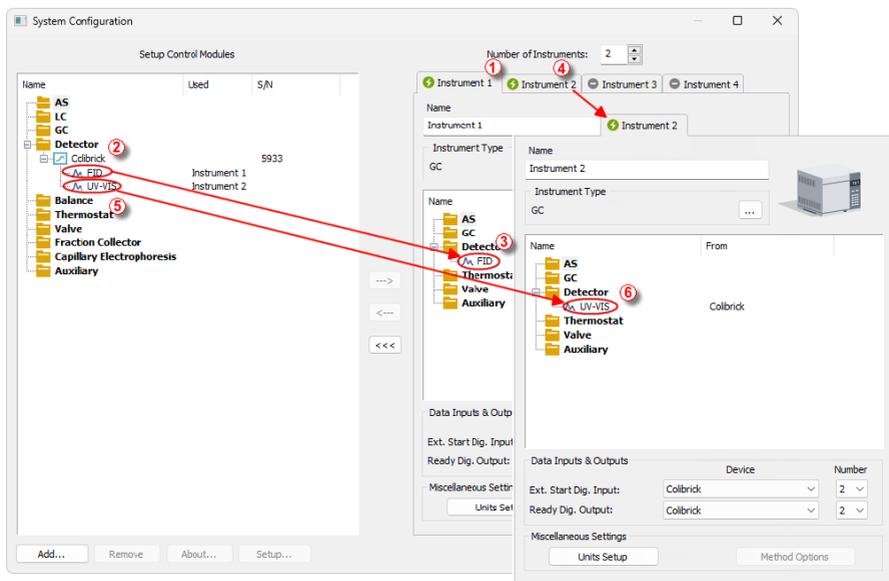

Fig. 8: System Configuration – multiple instruments

Note: Each independent **Clarity Instrument** must have separate *Ext. Start Dig. Input* and *Ready Dig. Output* pins configured according to the actual wiring.

Note: More Instruments (more than the amount purchased) can be set . You will not be able to measure on the surplus Instruments (indicated by a blue symbol of the curve on the tab), but you may use them e.g. for "offline" preparation of methods.

3.4.2 Using multiple Colibrick converters

When using multiple **Colibricks**, after plugging the device into a USB port, the device will be detected automatically. After that, please, repeat the **Colibrick** configuration in **Clarity** described in the chapter **"Clarity Configuration"** on pg. **8**.
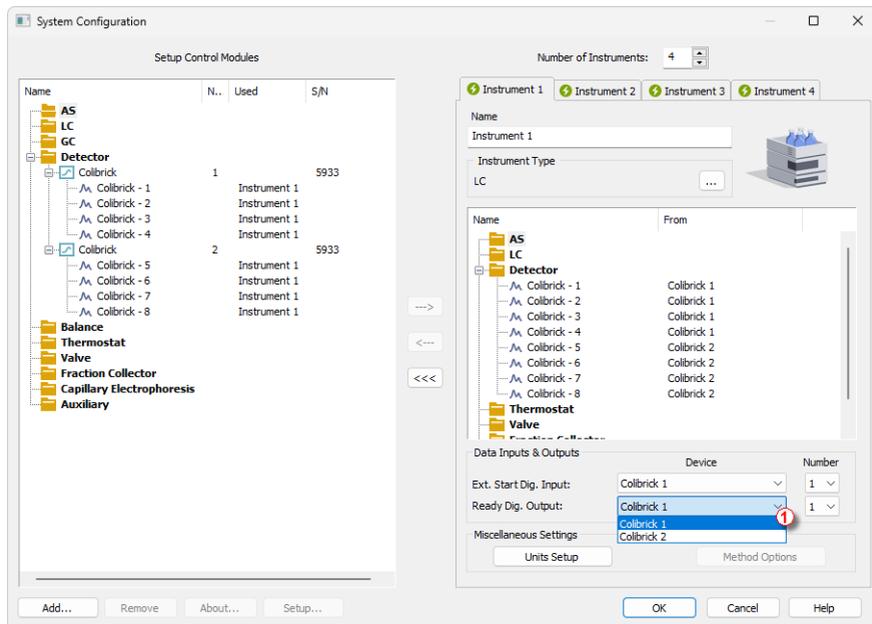
Fig. 9: System Configuration – multiple Colibricks

Individual converters can be assigned to multiple Instruments and combined together arbitrarily. In the example described in **Fig. 9** on pg. **12**., all signals from **Colibrick 1**, as well as all signals from **Colibrick 2** are assigned to the *Instrument 1*.

Where there are several converters assigned to the same Instrument, it is necessary to select which converter will be used for *Ext. Start Dig. Input* and *Ready Dig. Output* signals ① .

All added A/D converters (e.g. **Colibrick**) must have their drivers properly installed. There must be a correct number of items in the Windows OS *Device Manager*, otherwise you will not be able to add it in the *System Configuration* dialog and configure its detectors to Instruments.

Note: A maximum of four **Colibrick** converters can be configured and used in **Clarity** simultaneously.

4 Using the Colibrick

There are generally two places for setting the parameters of the **Colibrick A/D Converter** in **Clarity**:

- The DataApex Colibrick Setup dialog for setting the parameters that are set with respect to the type of connected signal.
- The *Method Setup – Acquisition* tab for setting the parameters related to the type of analysis.

4.1 DataApex Colibrick Setup ✓Full version

The *DataApex Colibrick Setup* dialog is accessible from the System Configuration dialog. The *DataApex Colibrick Setup* dialog sets the parameters of the **Colibrick** converter and since it depends on the type of connected signal, it is not going to be changed often.

Fig. 10: DataApex Colibrick Setup

Device

Shows the serial number of selected **Colibrick**. If more than one **Colibrick** converter is attached to the PC, this field defines which **Colibrick** will be added and configured first or, in case of removing one **Colibrick** from the configuration, for specifying which one is still connected.

Channel 1 (to 4)

For each channel of the **Colibrick A/D Converter** the name of the signal can be edited in the *Name* field and the *Set Units...* button can be used to change other signal parameters. Effects of these changes can be seen in other fields of the respective *Channel 1 (2) section*.

Name

This field will be used to describe the signal in the ***Chromatogram*** window.

Inversion of Signal

Inverts the polarity of the signal from the detector. This function can also be used for easy correction of inversely connected wires.

Bipolar

Both positive and negative voltages will be measured. Unchecking the *Bipolar* option will improve the resolution of the signal by 1 bit. On the other hand, it will also restrict the measuring of negative signals (i.e. below zero).

Set Units...

Invokes the *Detector Units* dialog that can be used for converting the voltage measured by **Colibrick** to the units of the detector. Such units will then be shown throughout **Clarity** instead of default mV. Setting is specific for each **Colibrick** channel (signal).
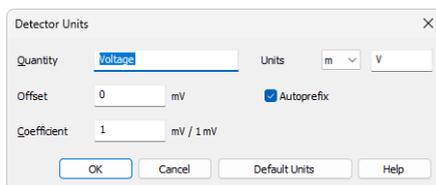

Fig. 11: Detector Units

- **Quantity** – Field for entering a name for the y‑axis in the graph of the measured signal.
- **Units** – Field for entering the unit symbol, along with the prefix.
- **Offset** – Designed to be used when actual zero value is represented by non-zero analog output. It describes what value should be deducted from measured value to receive the real value i.e., when actual zero of the detector is represented by 500 mV output signal, *Offset* should be set as 500 mV.
- **Coefficient** – Allows you to enter the coefficient between the selected units and mV (default).
- **Autoprefix** – Allows you to enter the unit prefix. In the graphs units will be scaled automatically, while in the tables units with the prefix entered will be used.

Synchronize Start with Digital Input

Maps the **Colibrick A/D Converter** channel to selected *External Start Digital Input*. It enables a faster and more accurate synchronization of channels with the start signal.

Especially for short analyses the necessary time delays at the start of the acquisition are significant. When measuring multi-detector chromatograms it will minimize the time shift between detector signals and thus improve the detection of peaks.

Note: *Synchronize Start with Digital Input* reflects the settings of the *Contact Closure/Opening* of the *External Start/Stop* option in the Method Setup - Measurement dialog.

Caution: Turn this function *ON* only in case one of the digital inputs of the configured **Colibrick** is also set in the *Ext. Start Dig. Input* option in the System Configuration dialog.

Device Setup

This section allows to modify the naming of digital inputs and outputs and change the Mains Supply Frequency Suppression settings.

Digital Input Names

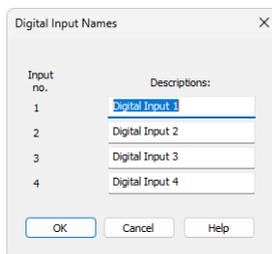Allows to change the names of digital inputs.

Fig. 12: Digital Input Names

Digital Output Names

Allows to change the names of digital outputs. These names will be used in the *Digital Output Control* dialog in the chapter **"Digital Inputs and Outputs"** on pg. **20**.
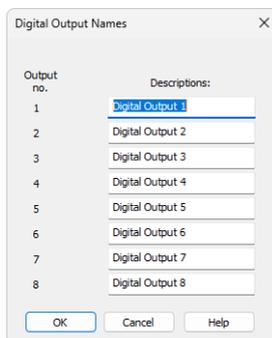

Fig. 13: Digital Output Names

Supply Frequency

Allows to change the Mains Supply Frequency Suppression. It is used for suppressing the interference on the specified frequency level. This setting influences the sampling frequency as well.

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Note: In the most parts of the Americas, the 60 Hz Mains frequency is usual, while the rest of the world tends to use the 50 Hz Mains frequency (pre-set as default). The 50 Hz frequency is common in countries using 230 V power supply, while the 60 Hz is connected to the 117 V power supply.

4.2 Method Setup

Parameters of the *Method Setup – Acquisition* and *Method Setup – Measurement* dialogs depend on the type of analysis (measuring conditions), so they can be specific for various types of analyses. This is the reason for them to be a part of the method. The *Method Setup* dialogs are accessible from the *Instrument* window using the *Method* command.

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Caution: The parameters cannot be changed during analysis.
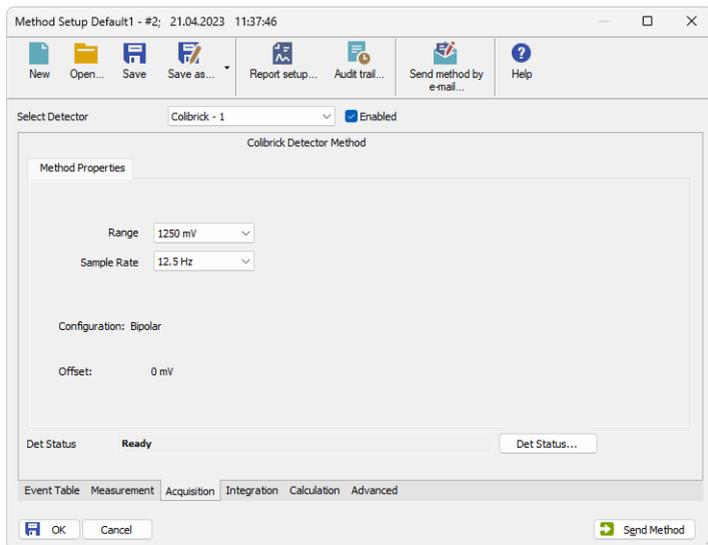
4.2.1 Method Setup - Acquisition

Fig. 14: Method Setup - Acquisition (Colibrick)

Select Detector

Selects the detector whose parameters are set. If there is only one detector (channel) configured on the **Clarity** Instrument, this control is not accessible.

Range

Selects the input voltage range (in mV). The selected range corresponds to the maximum output voltage of the detector that the A/D converter can still process. In case the detector unit conversion is set in Detector Units dialog, the range will be shown in detector units according to the conversion, while the corresponding original range in mV will be shown next to the field.

Available ranges for **Colibrick** converter are *156.26*, *1250* and *12123 mV*.

Note: When in Data Acquisition window the detector range exceeds the tolerance limit by ± 1.285%, the string OVER will be displayed.

Sample Rate

Depending on *Supply Frequency* filter selected in the *System Configuration –* DataApex Colibrick Setup dialog, see the chapter **"DataApex Colibrick Setup"** on pg. **14**. The available sampling rates are *6.25*, *12.5*, *25*, *50*, *100*, *200* and *400* samples per second (for 50 Hz supply frequency filter) or *7.5*, *15*, *30*, *60*, *120*, *240* and *480* samples per second (for 60 Hz supply frequency filter).

Higher sampling rate allows for the measurement of narrower peaks, but it also means a larger amount of data which affects the size of the resulting chromatogram and the speed of its processing.

Sample rate sufficient for successful peak detection is about 20 samples per narrowest peak.

A higher sampling rate also increases the amount of noise and you need to set the *Peak Width* parameter accordingly in the **Integration Table** on the *Method Setup - Integration* tab.

Note: *Range* and *Sampling Rate* are set individually for each detector.

Det Status...

Displays the Hardware Configuration dialog.

Offset

Displays detector's offset set in *System Configuration –* DataApex Colibrick Setup. It is displayed only when offset is different than default value (0 V).
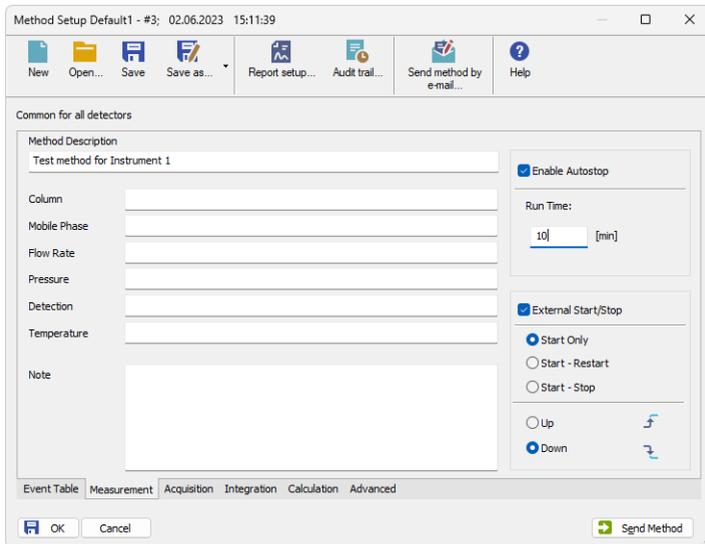
4.2.2 Method Setup - Measurement

Fig. 15: Method Setup - Measurement

External Start/Stop

Enables control from an external signal.

Note: The input used for an external start from a chromatograph can be set in the *System Configuration* dialog, see **Fig. 6** on pg. **9**.

Start Only

The external signal only starts an analysis. Triggering the input will not influence the acquisition in progress.

Start - Restart

The external signal terminates the analysis in progress and at the same time starts a new one. The first signal starts the analysis; the second signal terminates it and at the same time starts a new one - the so-called continuous measurement.

Start - Stop

The external signal starts and stops an analysis. The first signal starts the analysis; the second signal stops it.

Down

The station reacts to changes in voltage in relevant controlling input from high (> 3 V) to low (< 0.7 V), or to contacts closed in the relay.

Up

The station reacts to changes in voltage in relevant controlling input from low (< 0.7 V) to high (> 3 V), or to contacts opened in the relay.
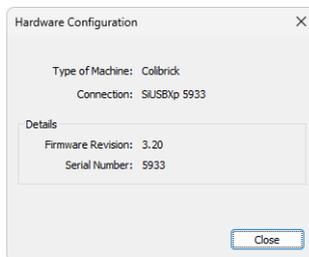
4.2.3 Hardware Configuration

Fig. 16: Hardware Configuration

This dialog is invoked by pressing the *Det Status...* button in the Method Setup - Acquisition dialog. *Hardware Configuration* dialog displays the connection and the details of the connected and selected Colibrick - its firmware revision and serial number.

4.3 Digital Inputs and Outputs

The **Colibrick A/D Converter** is equipped with eight **digital TTL outputs** and four of them are also designed as relay contacts.
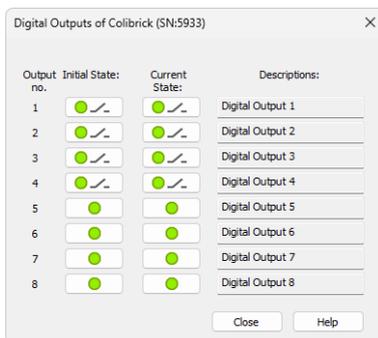
Fig. 17: Digital outputs of Colibrick

These outputs can be controlled from the following places in **Clarity**:

- Standard assignment of external *Ext. Start Dig. Input* and *Ready Dig. Output* can be changed in the System Configuration dialog - ⑧ in the **Fig. 6** on pg. **9**.

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Note: The assigned input and output is then automatically used in the *ACTIVE* sequence for synchronization with the autosampler or injection valve.

- *Digital Outputs of Colibrick* dialog accessible from the *Clarity* window
- The *Device Monitor* window accessible from the *Instrument* window

- The *Event Table* dialog accessible from the *Instrument* window using the *Method* command

4.4 Device Monitor

The *Device Monitor* window can be invoked by the *Monitor - Device Monitor* command from the *Instrument* window or using the **Device Monitor** 👓 icon. It displays the states of digital inputs and enables the user to monitor and change the states of digital outputs.

Fig. 18: Device Monitor - Colibrick

Input no.
Lists the numbers of individual inputs.

Current State
Indicates the current status of the particular input. Green light corresponds to logical one (*HIGH*), light switched off (gray icon) to logical zero (*LOW*).

Descriptions
Shows the description indicating the meaning of individual input. The names of all digital inputs can be set in the DataApex Colibrick Setup dialog.

Output no.
Lists the numbers of individual outputs.

Current State
Indicates the current status of the particular output which also works as relays. Green light corresponds to logical one (*HIGH*), light switched off (gray icon) to logical zero (*LOW*). The state of any output can be changed by clicking on the *Current State* button of the particular output.

Descriptions
Shows the description indicating the meaning of individual output. The names of all digital outputs can be set in the DataApex Colibrick Setup dialog.

5 Troubleshooting

If you do not find an answer for your problem here, use the www.dataapex.com website where the Support menu will allow you to navigate through the frequently asked questions (FAQ), the **Clarity** email conference archive or contact to **DataApex** helpdesk.

5.1 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. 3: List of windows and dialogs

Windows and Dialogs	
Clarity	pg. **28**.
Data Acquisition	pg. **30**., pg. **31**., pg. **31**., pg. **32**., pg. **33**.
Instrument	pg. **28**.
Method Setup	pg. **28**.
Sequence	pg. **28**.
Single Analysis	pg. **28**.
System Configuration	pg. **28**., pg. **30**., pg. **23**.

Tab. 4: List of Error messages

Error Messages	
Cannot establish communication with Colibrick detector X	pg. **23**.
DataApex Colibrick (SN XX) Device not found	pg. **23**.
Disabled (in the status line)	pg. **28**.
Simulated (in Data Acquisition)	pg. **30**.

Note: To find solutions for Error Messages not listed above, check the **Clarity Getting Started** Guide or visit our web pages www.dataapex.com.

5.2 Problems with Colibrick

The most common problems with **Colibrick** are problems with its driver. They are generally indicated by following symptoms:

- Blinking LEDs of the **Colibrick**.
- **Colibrick** cannot be added to the *Setup Control Modules* in the *System Configuration* dialog.
- **Clarity** will issue an Error Message "Cannot establish communication with DataApex Colibrick" when opening the *Instrument* window.
- Double-clicking on the device will not invoke the DataApex Colibrick Setup dialog.
- **Clarity** will issue an Error Message "DataApex Colibrick (SN:XX) Device not found" when starting **Clarity**.
- The *Data Acquisition* icon in the *Instrument* window is not active (this problem may also have another cause). For more details see the chapter **Data Acquisition - non-functional** on pg. **28**.

When one of the above mentioned problems occurs, first check if the **Colibrick** is correctly plugged in the USB port. Then check the **Colibrick** driver (see the chapter **"How to check the proper installation of the Colibrick driver"** on pg. **24**.) and proceed according to the suggested solutions.

5.2.1 Colibrick's orange/blue LED is blinking

Status: Orange and/or blue LED on the Colibrick is blinking and sometimes it cannot be added in the System Configuration.

Reason: Blinking of the orange (READY) and/or blue (DATA) LED is caused by decrease in voltage on the **Colibrick** and that is why sometimes it cannot be added in the *System Configuration*.

Solution: Check whether your **Colibrick** is connected to the PC via USB Hub. If so we recommend to connect **Colibrick** directly to the PC, this will ensure that the voltage will not suddenly decrease when other device is plugged in.

Another option is to try a different USB cable. We have found out that USB cables of low quality are responsible for observed behaviour. For longer distances, we recommend use of active USB 3.0 extension cable, which maintains stable voltage.

5.2.2 How to check the proper installation of the Colibrick driver

Open the *Device Manager* (go to Control Panel - Hardware and Sound - Devices and Printers - Device Manager).

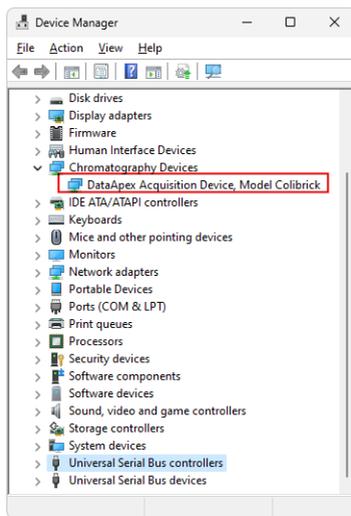In the *Device Manager* window look up the resulting list for the item "**Colibrick (DataApex)**".

Fig. 19: Device Manager in Windows 11

Error status of the driver may be one of the following:

Status 1: The "Chromatography Device – Colibrick (DataApex)" item does not appear.

Reason: The driver has not been installed.

Solution: Reinstall the driver manually as described in the chapter **"Installation and re-installation of the Colibrick driver"** on pg. **25**.

Status 2: The driver is installed, but there is a yellow exclamation mark or a question mark over its icon, or it is not behaving as expected.

Reason: The driver is probably **installed incorrectly**.

Solution: Reinstall the driver manually as described in the chapter **"Installation and re-installation of the Colibrick driver"** on pg. **25**.

Status 3: The item does appear, but is displayed with a cross symbol.

Reason: The driver is disabled.

Solution: Double-click the item to invoke the *General* tab and activate the driver by clicking on the *Enable this device* button.

▌ Status 4: The item does appear and there are no error symbols around it.

Reason: A driver for a different type of Windows operating system was possibly installed thereby replacing the correct driver.

Solution: Uninstall the incorrect driver and install the correct one as described in the chapter **"Installation and re-installation of the Colibrick driver"** on pg. **25**.

5.2.3 Manual installation

5.2.3.1 Installation and re-installation of the Colibrick driver

- Connect the **Colibrick** with a cable to a **USB** port on the computer.
- **Windows 11, 10, 8.1** and **7** do not install the driver automatically. Use the *Device Manager* in the *Control Panel*.
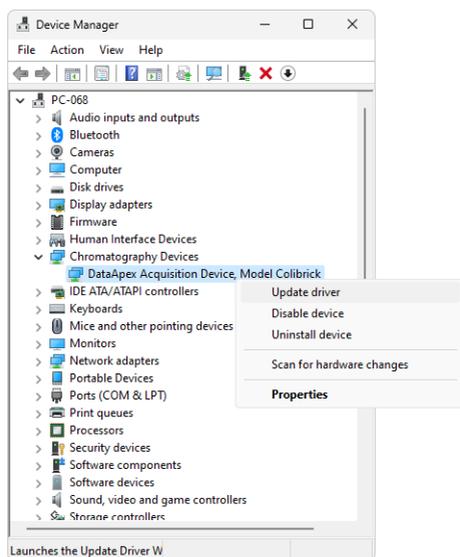

Fig. 20: Step 1 of Updating the driver

- Right‑ click on the **Colibrick (DataApex)** item and click the *Update Driver Software…* item.
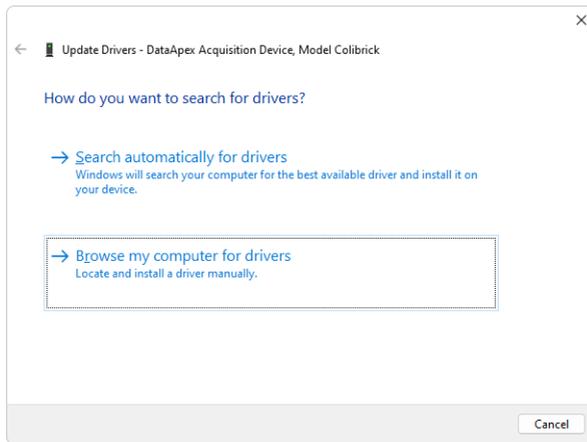
Fig. 21: Step 1 of the Installation Wizard

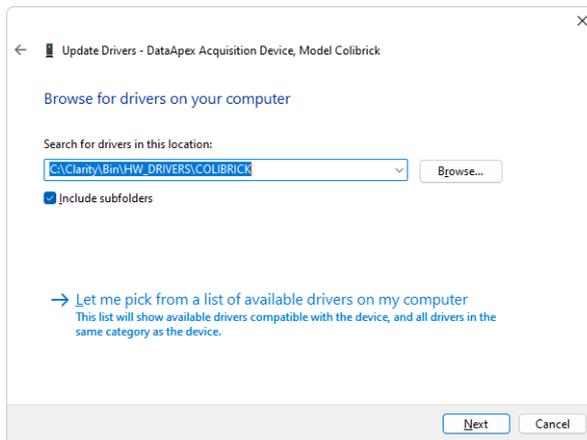- Click the *Browse my computer for driver software* button.

Fig. 22: Browse for driver dialog

- Browse for the **Colibrick** driver location. In the example above, the **Clarity** installation is located in the C:\CLARITY directory. Then click *Next*.
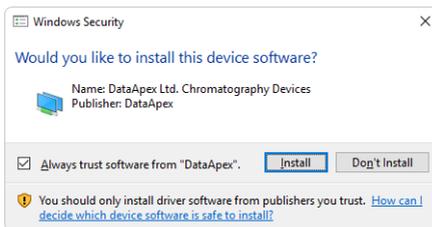
Fig. 23: Windows Security dialog

- Windows Security dialog may appear. Check the *Always trust software from "DataApex"* option and click the *Install* button and wait until the driver is installed.
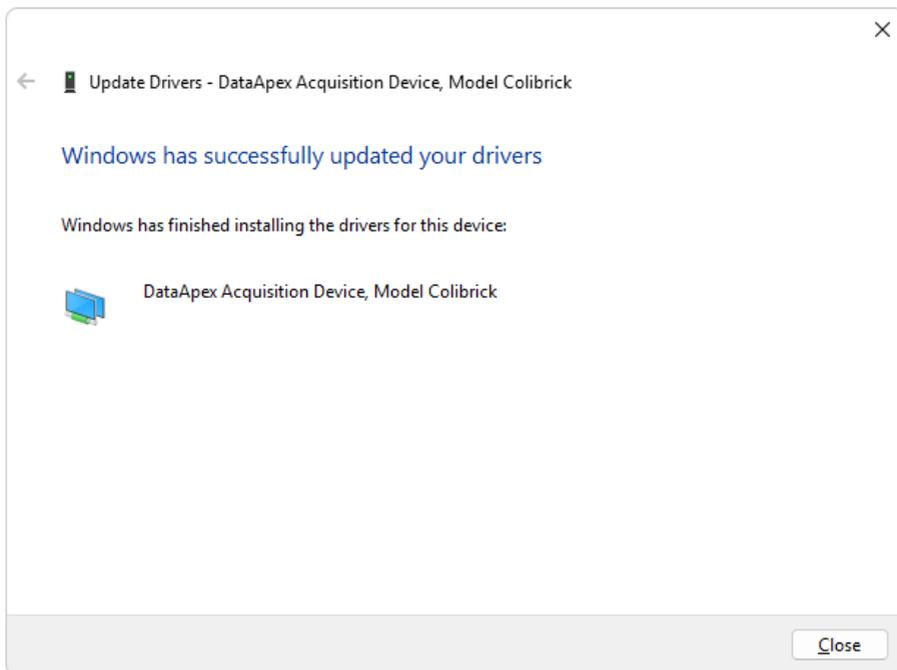
Fig. 24: Last window of the Installation Wizard

- Last window of the Wizard informs you about the installation status and you can see also name of the driver which will be displayed in the **Device Manager**.

5.2.3.2 Reinstallation of drivers using the System Restore Point

Use the **System Restore Point** to uninstall the incorrect drivers.

- Click on the *Windows Start* menu and type "System Restore" in the search field, then click on the found item in.

- In the *System Restore* dialog use the *Choose a different restore point* option and press the *Next* button.
- In the next dialog select a restore point from a time before the incorrect driver was installed.

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Caution: Any software or hardware that was installed after the moment of the selected restore point will be removed from your system.

- Reinstall **Clarity** and then restart the PC.
- **Windows** should now correctly identify and install the drivers.

5.3 Problems upon collection of data
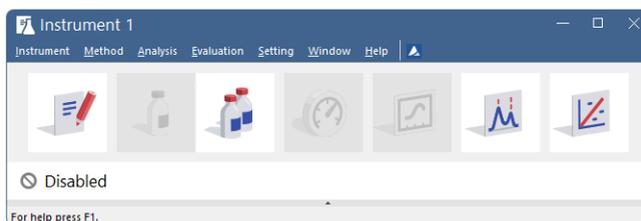
5.3.1 Data Acquisition - non-functional

Fig. 25: Disable data acquisition

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

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

Fig. 26: 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 key with the **Clarity** full licence.

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 media to install the full version.

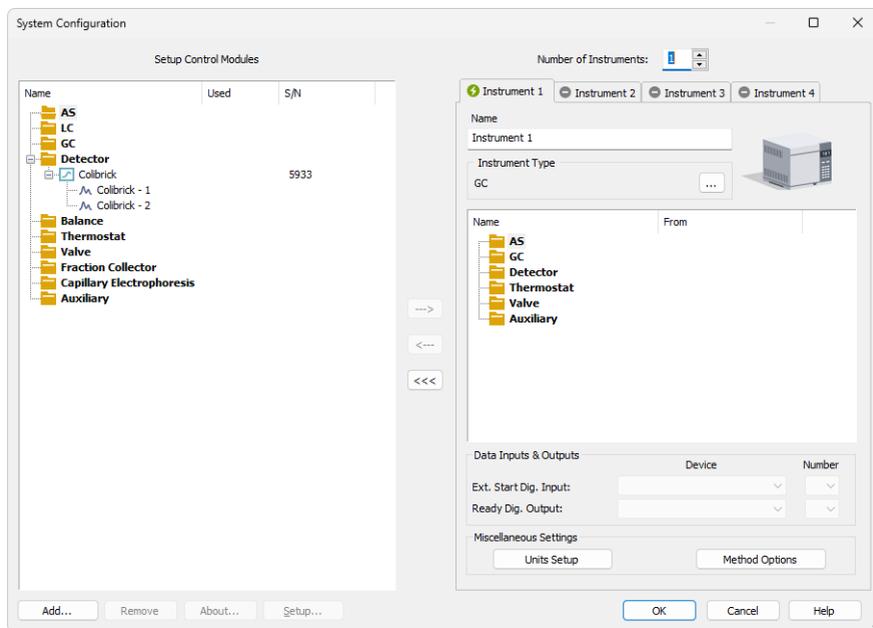▌**Reason 2: The Detector is not allocated to the Clarity Instrument.**

Fig. 27: 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 side list *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 side 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 **"Clarity Configuration"** on pg. **8**.

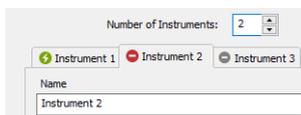**▌Reason 3: You have a license purchased for data collection for fewer Instruments.**

Fig. 28: Small number of Instruments purchased

Solution: a) Open the *System Configuration* dialog from the *Clarity* window using the *System - Configuration...* command and check the tab of the corresponding Instrument - **Instrument X**. If the symbol in the tab header is red, this indicates the Instrument cannot be used for data acquisition.

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

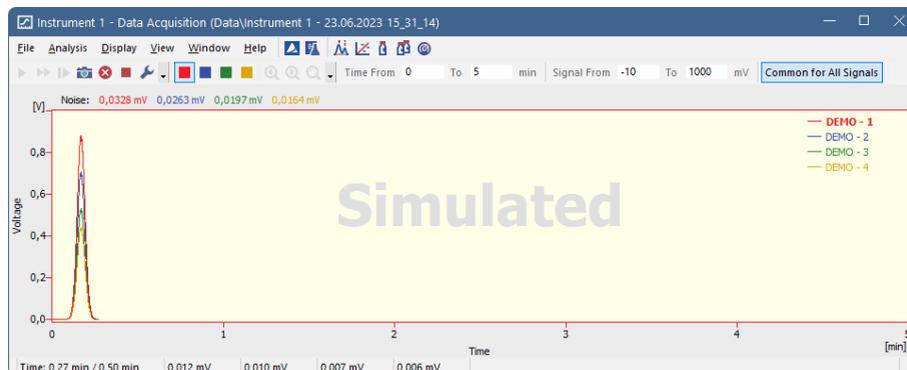## 5.3.2 Data Acquisition - Simulated

Fig. 29: 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: a) Open the *System Configuration* dialog from the *Clarity* window using the *System - Configuration...* command and check the tab of the corresponding Instrument - **Instrument X**. If it only has the detector signals from the **DataApex DEMO** detector, it is necessary to reconfigure it. You can find more information how to add a detector in the chapter **"Clarity Configuration"** on pg. **8**.

b) 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, install the full version and enter the user code you have been provided. Also make sure that the detector is properly configured.

5.3.3 Signal is drifting

Fig. 30: A signal drift

The chromatogram baseline is not a straight line. The signal increases or decreases during the time of analysis.

▌ **Reason 1: The instability of the analysis conditions.**
Solution: Check the analysis conditions, the detector settings, the column and solvents for impurities.

▌ **Reason 2: Improper connection of the A/D converter.**
Solution: If you are using the A/D converter, check whether the cable shielding is properly connected. For more information see **3.3** on pg. **7**.

5.3.4 Signal is cut at the top

Fig. 31: 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: a) If you are using an A/D converter, decrease the sensitivity of the detector directly on the device.

b) 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.**

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.**

Solution: Check whether the cable shielding is properly connected. For more information see **3.3** on pg. **7**.

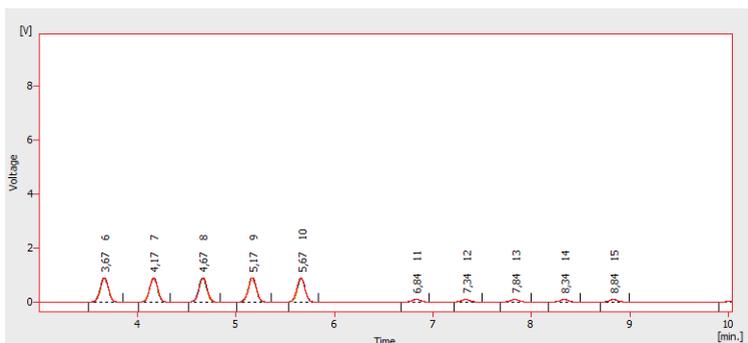## 5.3.5 Small peaks in the chromatogram

Fig. 32: 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: a) If you are using an A/D converter, increase the sensitivity of detector directly on the device.

b) 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.

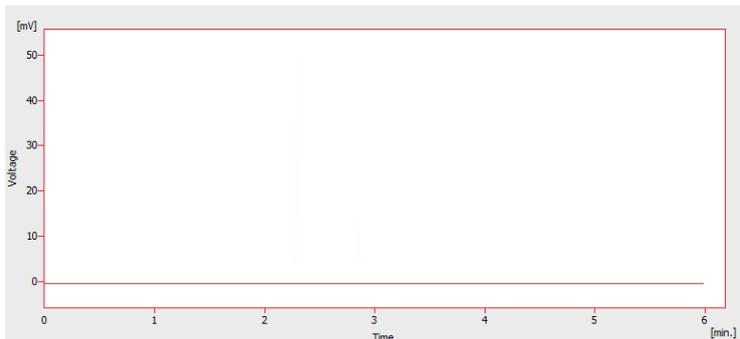▌**Reason 2: A high range set for the A/D converter.**

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.**
Solution: Check whether the cable shielding is properly connected. For more information see **3.3** on pg. **7**.

5.3.6 No peaks in the chromatogram

Fig. 33: 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 cabels. For more information see **3.3** on pg. **7**.

▌**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.

5.3.7 No data from acquisition

The errors "*No data from acquisition for 30 sec*" and "*Switching power for the ADC timed out*" may indicate a communication problem with Colibrick. Possible causes are listed below.

▎Reason 1: These messages are often caused by insufficient power supplied to the Colibrick external USB A/D converter. The Colibrick is highly sensitive to voltage drops in the USB connection.

Solution: a) Use a better quality USB cable with low resistance, proper thickness, and good shielding.

b) Keep passive USB cables ≤ 2–3 meters; for longer distances, use active USB 3.0 extension cables.

c) Avoid standard USB-A hubs; use a USB-C to USB-A hub with proper power delivery if needed.

d) Close unnecessary programs, avoid running heavy tasks during acquisition, and disable or properly configure antivirus and file-monitoring software that may interfere with Clarity. Uninstall any known conflicting programs to prevent interruptions.

To see other options for solving these power problems and more information, see the Requirements chapter of this manual and this FAQ available on official **Clarity** web.

6 Tables and specifications
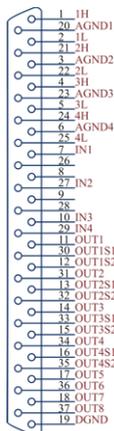
6.1 Description of the INT7 connector (Male)

Fig. 34: Connector pins

Tab. 5: Description of the connector pins:

| Pin	Description
1H	+ Input of the 1st channel
1L	- Input of the 1st channel
AGND	Ground of the analog channels
IN1	Digital input (of the 1st channel). Used as an External Start (marker) of the 1st channel.
OUT1	1st Digital output. Digital outputs are controlled by *Event Table*, *ACTIVE* sequence, Device Monitor dialog and Digital outputs of DataApex Colibrick dialog.
DGND	Ground of the digital inputs and outputs.
OUT1S1 **OUT1S2**	Digital outputs - 1st relay contact. Contact is closed when output is at a *LOW* level.
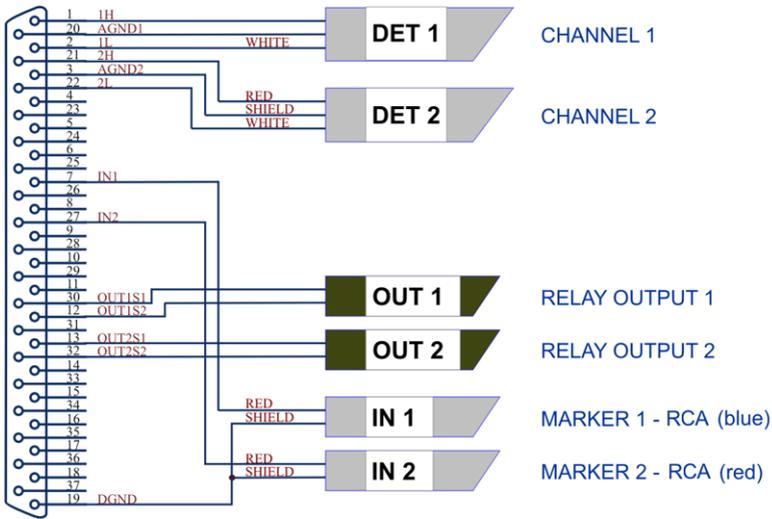
Fig. 35: Standard Colibrick cable for two detectors

6.2 Parameters of digital inputs and outputs

Digital Outputs

The board contains eight digital TTL outputs (*OUT1* to OUT8) with maximum current load per output *20 mA* at both levels, maximum total current load for all outputs *100 mA*. Four of the digital outputs are also designed as relay contacts (*OUT[1...4]S1/OUT [1...4]S2*). The maximum permissible switching current is *0.5 ADC*, max. contact resistance *150 mΩ*, max. voltage *100 V*. The relay is on-state (closed) at level *LOW* of a relevant digital output.

Digital Inputs

The **Colibrick** A/D converter contains four digital TTL inputs (*IN1* to IN4).

To suppress contact bouncing the digital inputs are equipped with monostable toggles that prolong any change affecting the input to at least *200 ms* (to ensure that the station is able to detect it). A pulse with duration of at least *1 ms* is necessary to excite the toggles.

6.3 Colibrick - CE conformity declaration

CE CONFORMITY DECLARATION

We, **DataApex**

Lety 24

CZ – 252 29 Dobrichovice

declare under our sole responsibility that

the product:

A/D Converter

type:

Colibrick

to which this declaration relates is in conformity with the following standards

CISPR 22   **Am1:2005**

CISPR 24   **Am1+Am2:1997**

Complementary information: Ref. Certif. No. **CZ-2258**

Place of issue: Prague   Manufacturer representative: L. Siska

Date of issue: 8.3.2012   Position: hardware production manager

Fig. 36: CE Conformity declaration - Colibrick

6.4 Technical Data

*Tab. 6: Technical data of the **Colibrick** device:*

Parameter	Description
Converter type:	24-bit δΣ (delta – sigma)
Analog inputs:	differential
Number of channels:	1, 2 or 4 fully independent and isolated
Input range:	unipolar and bipolar, each channel independently 156.26, 1 250 or 12 123 mV
Input impedance:	1 MΩ
Sample rate:	6.25, 12.5, 25, 50, 100, 200, 400 samples per second for 50 Hz mains frequency filter 7.5, 15, 30, 60, 120, 240, 480 samples per second for 60 Hz mains frequency filter
Non-linearity:	< 0.003%
Crystal inaccuracy:	50 ppm (may cause shift of the signal in milliseconds during 1-hour analysis or in seconds during a week-long analysis)
Digital inputs:	4 TTL (5 V)
Digital outputs:	8 TTL (5 V) maximum current load 20 mA, maximum total current load for all outputs 100 mA 4 of them also as relay contacts - normally open (i.e. contact closure) max. current 0.5 ADC, max. voltage 100 VDC, max. switching power 10 VA, max. resistance 150 mΩ
Dimensions:	105 x 124 x 22 mm
Weight:	290 g
Power supply:	from the PC via the USB cable

Tab. 7: Typical noise free resolution for various acquisition speeds and input ranges:

	12 123 mV	1 250 mV	156 mV
6.25 Hz	21 bit	21 bit	20 bit
25 Hz	21 bit	21 bit	20 bit
100 Hz	19 bit	19 bit	19 bit
200 Hz	16 bit	16 bit	16 bit
400 Hz	16 bit	16 bit	16 bit

6.5 Disposal and Recycling

Electrical and electronic equipment must **not be** disposed of as unsorted municipal waste.

It should be collected separately to ensure proper treatment and recycling. Please return used equipment to designated collection points.