



## TELEDYNE FOXY R1 - R2

Clarity Control Module

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: JaKa

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To facilitate the orientation in the **Teledyne Foxy R1 - R2** 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:

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**Note:** Notifies the reader of relevant information.

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

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**■ 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 Teledyne Foxy R1 - R2 Control Module

This manual describes the setting of the **Teledyne Foxy R1 - R2** fraction collector. The control module enables direct control of the instrument over serial line or LAN



*Fig 1: Teledyne Foxy R1 - R2 fraction collector*

Direct control means that the fraction collector can be completely controlled from the **Clarity** environment. The Instrument method controlling the analysis conditions will be saved in the measured chromatograms.

The control is performed via the **UNI Ruby** control module and the **Teledyne Foxy R1 - R2** script

## 2 Requirements

- **Clarity** Installation USB with appropriate control license allowed - LC Control (p/n A24).
- Free LAN or COM port in the PC.

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*Note:* Modern computers usually have only one (if any) serial (COM) port installed. To use more devices requiring the RS232 port, the **MultiCOM** adapter (p/n MC01) is available.

- Serial DB9F-DB9M straight cable (p/n SK02) or crossover cable (SK08).

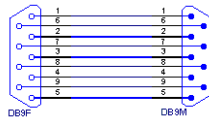
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*Note:* Cables are not part of **Clarity** Control Module. It is strongly recommended that you order the required cables together with the Control Module.

# 3 Installation Procedure

## 3.1 Teledyne Foxy R1 - R2 fraction collector communication

The **Teledyne Foxy R1 - R2** is controlled either by serial (RS232) communication with a standard serial DB9F-DB9M straight cable (p/n SK02) described in the picture below or by LAN communication using a standard crossover cable (p/n SK08).



*Fig 2: DB9F-DB9M straight*

## 3.2 Clarity Configuration

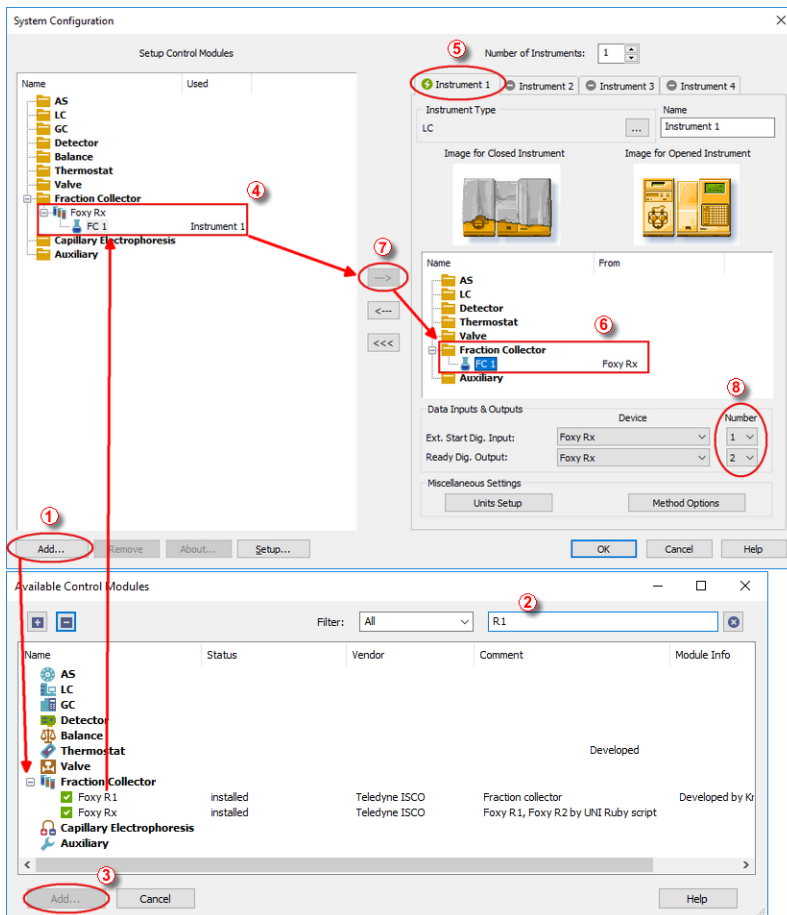



Fig 3: How to Add Teledyne Foxy R1 / R2 Control Module

- Start the **Clarity** station by clicking on the  icon on the desktop.
- Invoke the **System Configuration** dialog accessible from the **Clarity** window using the *System - Configuration...* command.
- Press the **Add** button (1) on Fig 3 on pg 4.) to invoke the **Available Control Modules** dialog.
- You can specify the search filter (2) to simplify the finding of the driver.



- Select the correct item and press the **Add** (③ on **Fig 3** on pg 4.) button. Each device with already created UNI profile should have its own item named accordingly in the **Available Control Modules** dialog.
- The **DataApex UNI Setup** dialog will appear.

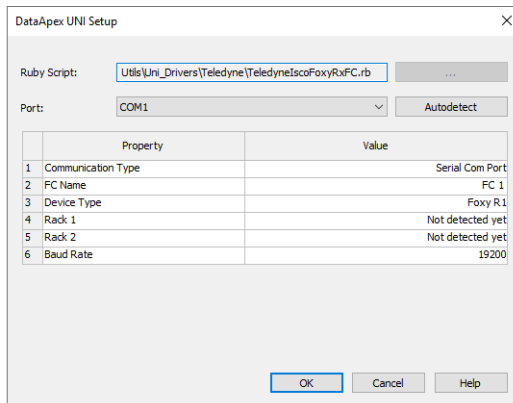


Fig 4: Teledyne Foxy R1 / R2 Setup

- Set the correct communication *Port* and click on the *AutoDetect* button to establish communication with the device.
- You may fill in the custom *Device Name*.

**Note:** The **DataApex UNI Setup** dialog is described in detail in the chapter "**DataApex UNI Setup**" on pg 17.

- The **Teledyne Foxy R1 - R2** item (④) will appear in the *Setup Control Modules* list of the **System Configuration** dialog.
- Drag the appropriate item from the *Setup Control Modules* list on the left side to the desired *Instrument* tab (⑤) on the right side (⑥), or click on the **---** button (⑦).
- Set the *Ext. Start Dig. Input* and *Ready Dig. Output* numbers (⑧) for your acquisition card according to the wires used for synchronization.

## 4 Using the control module

After adding and setting up the new device one or more new tabs will appear in the [Method Setup](#) dialog depending on the type of the instrument. A new **Teledyne Foxy R1 - R2** fraction collector section enabling the monitoring of the current fraction collector state will be also created in the [Device Monitor](#) window.

## 4.1 Method Setup - FC - Fraction Table

The [Method Setup - FC - Fraction Table](#) tab is used for setting the automatic fraction collection program of the **Teledyne Foxy R1 - R2** fraction collector. The actions of the fraction collector can be displayed in [Data Acquisition](#) window or [Chromatogram](#) window, click the right mouse button on the graph, choose *Properties...* to open the [Graph Properties](#) dialog and check the [Show Events](#) option.

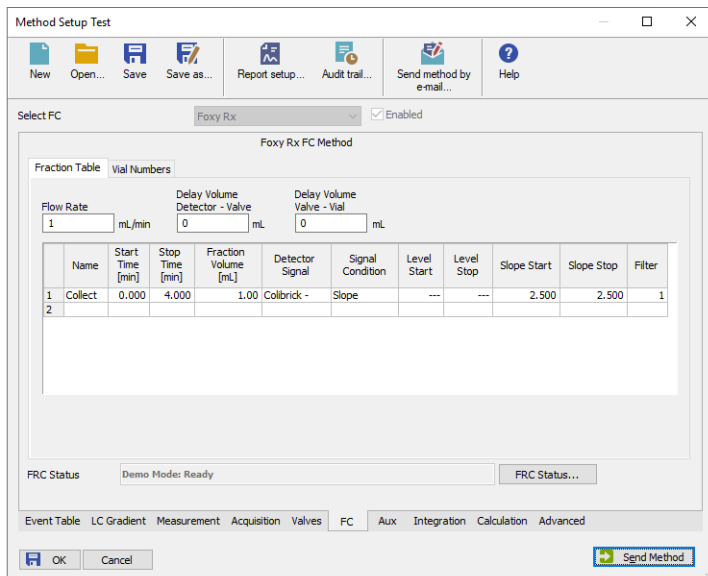


Fig 5: Method Setup - FC - Fraction Table

### Flow Rate

Sets the flow rate of the liquid phase going to the fraction collector. This parameter, together with the *Fraction Volume* parameter from the *Fraction Table*, helps to prevent collection vial overflowing. Flow rate units are taken from the [Units Setup](#) dialog.

### Delay Volume Detector - Valve

Sets the volume of the tubing between the detector and waste/collect valve of the fraction collector. Volume units are devised from the *Flow Rate Units* set in the [Units Setup](#) dialog.

The delayed volume is displayed in the [Data Acquisition](#) window as a vertical line trailing the signal front.

### Delay Volume Valve - Vial

Sets the volume of the tubing between the waste/collect valve and the vial in the fraction collector tray. Volume units are devised from the *Flow Rate Units* set in the [Units Setup](#) dialog. If the fraction collector has no

waste/collect valve, this field should be left empty and the total tubing volume between the detector and fraction collector tray should be typed into the *Delay Volume Detector - Valve* field.

### Fraction Table

Allows to set the fraction collector behavior. The table rows are run in time order, the time intervals should not overlap. If time interval on any row ends while the fraction collector is collecting, the collection will be terminated. Fraction collection based on negative peaks is not supported - in case you would like to perform such fraction collection it is necessary to invert the detector signal prior to setting up the method.

#### Name

This name will be displayed in the **Special Results** table for all fractions collected in the given interval.

#### Start Time [min]

Beginning of the time interval where the *Signal Condition* will be evaluated. See the description of *Signal Condition* below.

#### Stop Time [min]

End of the time interval where the *Signal Condition* will be evaluated. When the *Stop Time* is reached, the fraction collection will be terminated regardless on the current *Signal Condition* state. See the description of *Signal Condition* below.

#### Fraction Volume

Collected amount can be collected to one or more vials/fractions. The *Fraction Volume* value should be lower or equal to the vial volume to prevent vial overflow. If the collected volume exceeds the set value, the vial will be automatically changed. *Fraction Volume* units are devised from the *Flow Rate Units* set in the [Units Setup](#) dialog.

#### Detector Signal

Selects the detector used for triggering the collection of fractions according to the *Signal Condition* in the fraction table. Each row of the table can be related to a different detector signal. Only the signals that are enabled using the *Enabled* checkbox on the [Method Setup - Acquisition](#) tab of the particular detector will work in the *Fraction table*.

#### Signal Condition

*Signal Condition* is evaluated within time interval set for each row in the *Fraction Table*. If these conditions are met more than once in a given time interval, the fraction collection will be performed more than once swapping the vial after each collection stop. If the start conditions are not met in the interval defined on fraction table row, the fraction collection will not occur in given time interval.

*None* - The fractions are collected in the defined time interval ruled by *Start Time* and *Stop Time* regardless of signal course.

*Level* - The fraction collection:

- starts when the detector signal increases above the *Level Start*
- stops when the detector signal decreases below the *Level Stop*

*Slope* - The fraction collection:

- starts when the first derivative of the detector signal increases above the *Slope Start*
- stops when the first derivative of the detector signal first decreases and then increases above the negative of the *Slope Stop*. Following image displays the course of the first derivative of the signal and demonstrates *Slope Stop* activation. Read carefully the values of the slope in all *End Fraction* points and the course of the first derivative before it reaches these *End Fraction* points.
- it is necessary to know that for fraction collection stop that should be caused by *Slope Stop* value is applied a multiplying coefficient 1.05 to the entered slope value (entered value 0.100 recalculated to 0.105)
- this multiplication of *Slope Stop* value (i.e. inflection point on the falling edge of the peak) is applied in order to have correct end of the fraction where the *Slope Stop* condition is fulfilled
- for easier understanding how *Slope Stop* value is applied in chromatogram refer to next image

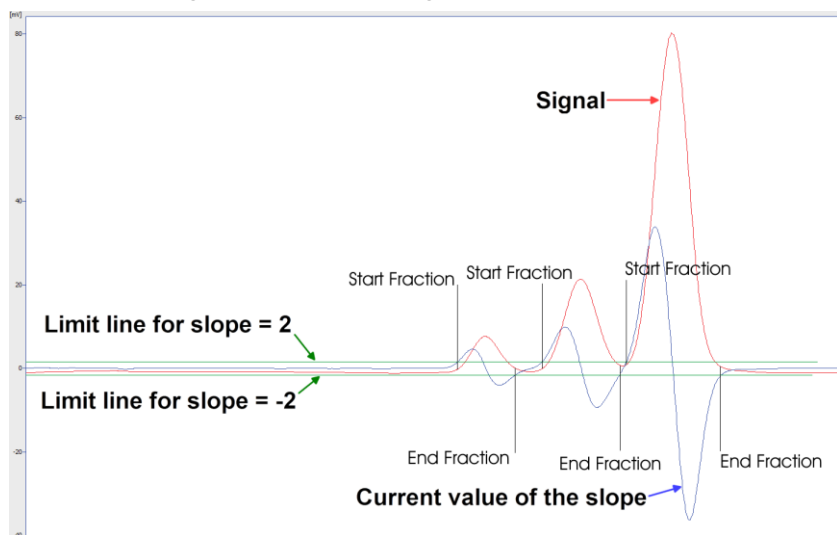


Fig 6: First derivative course

**Note:** It is strongly recommended not to use *Slope Signal Condition* for fraction collection based on noisy detector signal.

*Start L+S End L+S* - The fraction collection:

- starts when both start signal conditions are fulfilled simultaneously, detector signal increases above *Level Start* value and also the first derivative of the detector signal increases above *Slope Start* value. If only one of the start signal conditions is fulfilled the fraction collection will not start.
- stops when both stop signal conditions are fulfilled simultaneously, detector signal decreases below *Level Stop* value and also the first derivative of the detector signal first decreases and then increases above the negative of the *Slope Stop* value. If only one of the stop signal conditions is fulfilled the fraction collection will not stop.

*Start L+S End L or S* - The fraction collection:

- starts when both start signal conditions are fulfilled simultaneously, detector signal increases above *Level Start* value and also the first derivative of the detector signal increases above *Slope Start* value. If only one of the start signal conditions is fulfilled the fraction collection will not start.
- stops when any of the stop signal conditions is fulfilled (whatever occurs first), detector signal decreases below *Level Stop* value or the first derivative of the detector signal first decreases and then increases above the negative of the *Slope Stop* value. If none of the stop signal conditions is fulfilled the fraction collection will not stop before *Stop Time* is reached.

*Start L or S End L+S* - The fraction collection:

- starts when any of the start signal conditions is fulfilled (whatever occurs first), detector signal increases above *Level Start* value or the first derivative of the detector signal increases above *Slope Start* value. If none of the start signal conditions is fulfilled the fraction collection does not start.
- stops when both stop signal conditions are fulfilled simultaneously, detector signal decreases below *Level Stop* value and also the first derivative of the detector signal first decreases and then increases above the negative of the *Slope Stop* value. If only one of the stop signal conditions is fulfilled the fraction collection does not stop.

*Start L or S End L or S* - The fraction collection:

- starts when any of the start signal conditions is fulfilled (whatever occurs first), detector signal increases above *Level Start* value or the first derivative of the detector signal increases above *Slope Start* value. If none of the start signal conditions is fulfilled the fraction collection does not start.

- stops when any of the stop signal conditions is fulfilled (whatever occurs first), detector signal decreases below *Level Stop* value or the first derivative of the detector signal first decreases and then increases above the negative of the *Slope Stop* value. If none of the stop signal conditions is fulfilled the fraction collection does not stop before *Stop Time* is reached.

### Filter

Sets the data filter on the detector signal defined on the given row of the fraction table. Default value of *1* means no filtering of data will be performed, value of *X* means each *X* data points received will be averaged to 1 point used for fraction start/end conditions detection. The reaction to the fulfilled start/stop signal condition will be delayed the higher the *Filter* value is set, mainly on detectors with low data rate.

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*Note:* Filter settings influence the value that should be set to the *Slope Start* and *Slope Stop* columns. To get the correct trigger value for the *Slope Start* or *Slope Stop* using the *Show Slope/Level* tool in the [Chromatogram](#) window, it is necessary to set the *Global Bunching* value in the **Integration Table** to the same value as the desired filter.

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*Note:* The values coming from *Detector Signal* are evaluated in bunch approximately every 300 milliseconds with respect to Start of Stop values inserted in *Fraction Table*. It means that the positions of fraction collection Start and Stop events in consecutive chromatograms with exactly the same signal curve can differ  $\pm 300$  milliseconds. In case of usage of the detector with high sampling rate (for example 50 Hz) the difference of fraction collection events between two consecutive chromatograms with exactly the same signal curve can be up to  $\pm 15$  datapoints (50 Hz is 50 datapoints per second, thus 15 datapoints per 300 milliseconds).

## 4.2 Method Setup - FC - Vial Numbers

The **Method Setup - FC - Vial Numbers** tab is used for setting the behavior of the **Teledyne Foxy R1 - R2** fraction collector.

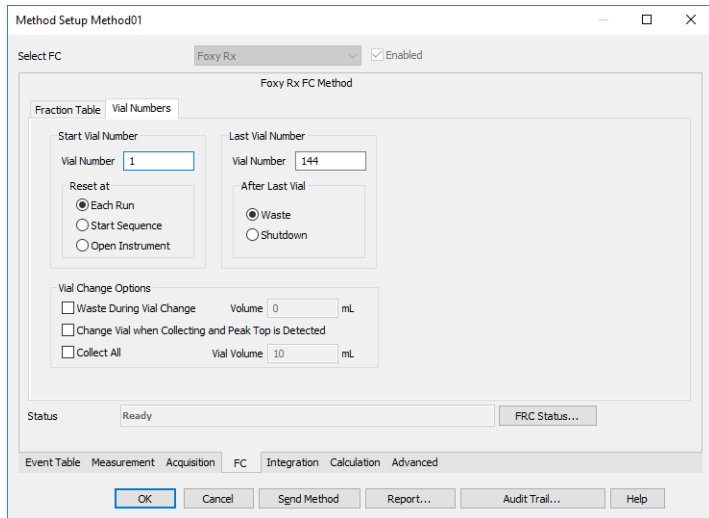


Fig 7: Method Setup - FC - Vial Numbers

### Start Vial Number

#### Vial Number

Sets the number of the vial where the first collected fraction will be stored. The current vial number is incremented each time the *Next* signal is activated. The vial number is stored in the *Results Table*.

#### Reset at

Specifies the conditions of the current vial number setting to *Start Vial Number* in three different situations:

- Each Run - the vial number is reset at the start of each acquisition.
- Start Sequence - the vial number is reset only at the start of a sequence.
- Open Instrument - the vial number is reset only once, when the Instrument is opened.

### Last Vial Number

#### Vial Number

Sets the number of the last available vial.

#### After Last Vial

Specifies the action executed when current vial number exceeds the *Last Vial Number*.



- Waste - the acquisition continues, but the fraction table is ignored and the samples are automatically discarded.
- Shutdown - the acquisition is immediately stopped and the analysis aborted.

## Vial Change Options

### Waste During Vial Change

This option prevents spilling when the vial is changed during collection. It temporarily stops the fraction collection before changing the vial and restarts it again when the vial is swapped. The vial is changed in the middle of the wasting interval; the volume wasted during vial change can be specified in the *Volume* field. Volume units are the ones set in the [Units Setup](#) dialog. This functionality is not applicable (even if checked) when *Collect All* option is selected.

### Change Vial when Collecting and Peak Top is Detected

If enabled, the vial is automatically swapped when the peak top is detected during collection. Be aware this option is not applied if the active row in the [Fraction Table](#) is set to *None* in the *Signal Condition* column.

### Collect All

When checked, fractions are collected during the whole course of the analysis, regardless of the settings in the [Fraction Table](#). The FC module then sends the *Next Vial* command **only**, which makes this mode of operation suitable for a fraction collector without a waste position. *Collect All* mode does not permit *Waste During Vial Change*.

The maximum amount of eluent collected in a single vial is limited by the value in *Vial Volume* field. Once this volume is filled, it begins collecting into the next successive vial.

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**Note:** With Collect All option the valve is not controlled.

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**Warning:** Once error message "*Vial number exceeded last vial number*" is displayed, it means that the FC was already at the last position when command *Next Vial* was received. Collecting stops at position which is equal to the **Last Vial Number - 1** because it's the last possible position to collect (due to Waste). Correct appropriately your method.

### 4.3 Hardware Configuration

The **Hardware Configuration** dialog (invoked by using the *FC Status* button from the Method Setup - LC **Method Setup - FC Method Setup - Valves** dialog) displays the configuration of the **Teledyne Foxy R1 - R2**, namely the communication type and its parameters.

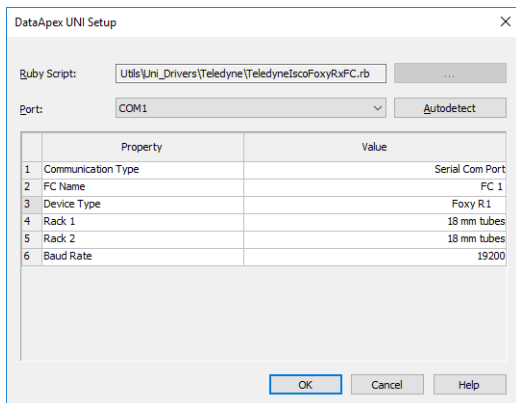



Fig 8: Hardware Configuration Teledyne Foxy R1 / R2

## 4.4 Device Monitor

The window with the fraction collector status can be invoked by the *Monitor - Device Monitor* command from the [Instrument](#) window or using the  *Device Monitor* icon.

### Device Monitor - Fraction Collector

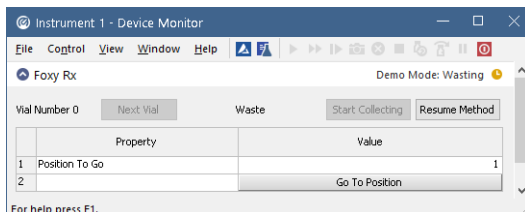


Fig 9: Device Monitor - Teledyne Foxy R1 / R2 Fraction Collector

#### Next Vial

Moves the collection vessel one vial forward. Using this button while the collector is performing its program set on the [Method Setup - FC - Fraction Table](#) tab during an analysis run immediately overrides the automatic collection program. To return to the automatic program, use the *Resume Method* button.

#### Collect / Waste

The description on the button changes according to the state in which the fraction collector is - while it is collecting, the *Stop Collecting* button forces the fraction collector to stop collecting, while it is in a waste cycle, the *Start Collecting* button will force the collector to start collecting. Using any of the two actions while the collector is performing the program set on the [Method Setup - FC - Fraction Table](#) tab during an analysis run, immediately overrides the automatic collection program. To return to the automatic program, use the *Resume Method* button.

#### Position To Go

Allows to set the position to which the fraction collector should be switched. The switching itself is performed using the *Go To Position* button.

#### Resume Method

Resumes the actions of the automatic fraction table set on the [Method Setup - FC - Fraction Table](#) tab. If the fraction collector is collecting at that moment, it will start a waste cycle and then resume the function of the fraction table.

## 4.5 Data Acquisition window

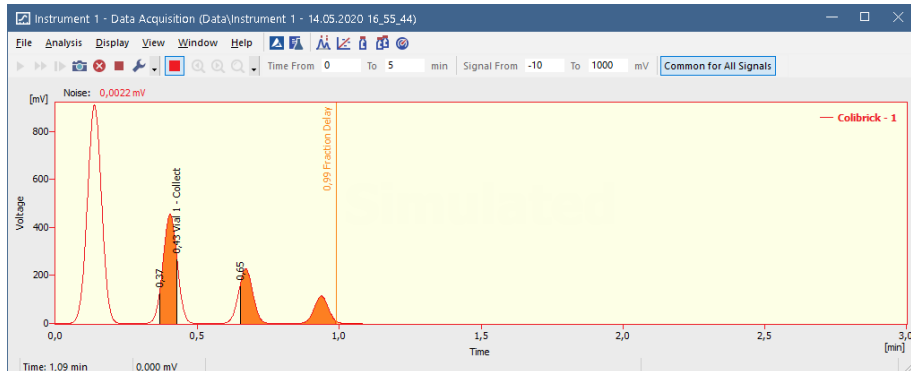


Fig 10: Data Acquisition window

The [Data Acquisition](#) window can display the fractions in the graph using the background color and also the start and stop fraction events and marker of the Fraction Delay. To see the fractions and markers right click on the graph, select *Properties...* to open the [Graph Properties](#) dialog and check the [Show Events](#) checkbox.

When the Fraction Delay is set, there will be two colors present in the graph - lighter and darker red. The lighter red color shows the expected duration of the fraction (which **Clarity** only presumes based on data points it got so far), while the darker red color shows the placement of the real fractions.

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**Note:** The Fraction Delay in the picture will appear if the *Delay Volume* field in the [Method Setup - FC - Fraction Table](#) dialog is set to a nonzero value.

## 4.6 DataApex UNI Setup

The appearance of the **DataApex UNI Setup** dialog depends on the presence of the selected Ruby Script - if the script is not present, only the *Ruby Script* field is visible.

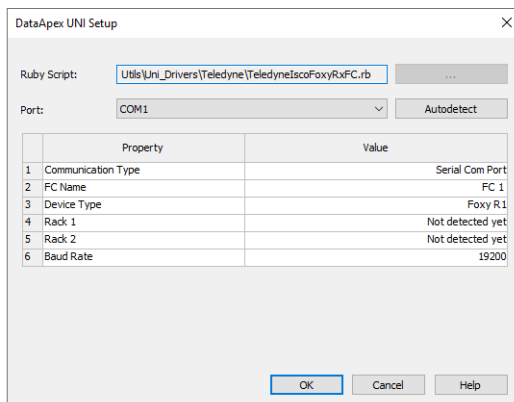


Fig 11: Teledyne Foxy R1 / R2 Setup

### Ruby Script

Displays the selected Ruby Script. The correct TELEDYNEISCOFOXYRXFC.RB script for the **Teledyne Foxy R1 - R2** instrument can be found in the UTILS/UNI\_DRIVERS/TELEDYNE subdirectory (accessible through the  button) of the **Clarity** installation folder (C:\CLARITY\BIN by default).

### Port

Defines the communication port used, possible values dependent on the type of communication of the device and/or available ports in the PC.

### AutoDetect

It is used for verifying the device communication over the serial port selected above.

### Communication Type

Here you can select either the Serial or TCP/IP communication protocol. If the TCP/IP communication is selected the port 23 shall be used for such communication.

### Instrument Name

Allows you to set the custom name of the instrument. This name (entered into the *Value* column) will be used throughout the **Clarity** station.

### Device Type

Displays the subtype of the fraction collector.

**Baud Rate**

Sets the Baud Rate communication parameter for the **Teledyne Foxy R1 - R2** fraction collector. Available values are *110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 56800* and *115200* baud.

**Rack Selection**

Allows the user to select the correct rack type installed on the **Teledyne Foxy R1 - R2** fraction collector. The **Teledyne Foxy R1 - R2** fraction collector may support up to two racks depending on the model, but both settings can be read from the fraction collector itself by using the *Autodetect* button.

## 5 Report Setup

The fraction collector section on the method report can be enabled by checking the *Instrument Control* checkbox on the **Method** tab of the **Report Setup** dialog.

Print Preview

Print Print to PDF Send PDF Close

Foxy R1

Configuration

Property	Value
Communication Type	Serial Com Port
FC Name	FC 1
Device Type	Foxy R1
Rack 1	12/13 mm tubes
Rack 2	none
Baud Rate	19200

Fraction Collector Method

Flow Rate 1 mL/min

Delay Volume Detector-Valve 0.1 mL Delay Volume Valve-Vial 0 mL

Start Vial Number 1 Reset at Each Run

Last Vial Number 144 After Last Vial Waste

Vial Change Options

Waste During Change No Volume ---

Change Vial at Peak Top No Vial Volume ---

Collect All No

Fraction Table

	Name	Start Time [min]	Stop Time [min]	Fraction Volume [mL]	Detector Signal	Signal Condition	Level Start Value	Level Stop Value	Slope Start Value	Slope Stop Value	Filter
1	Collect	0,200	3,000	1,00	Calbrick - 1	Level	150,000	300,000	---	---	1

Page 1

Fig 12: Report Setup

All of the parameters set in the **Method Setup - FC - Fraction Table** and **Method Setup - FC - Vial Numbers** tabs are reported, as well as the custom *FC Name* and other parameters set in the **DataApex UNI Setup** dialog.

## 6 Troubleshooting

When the solution to a problem cannot be found easily, a recording of the communication between **Clarity** and the fraction collector will significantly help **DataApex** support.

The data recording can be enabled by adding or amending the COMMDRV.INI file in the **Clarity** installation directory (C:\CLARITY\CFG by default). The file can be edited in any text editor (e.g. Notepad). The following section should be edited or added:

```
[COM1]
echo=on
textmode=on
filename=CommDrvCOM1_%D.txt
reset=off
```

---

**Note:** Instead of COM1, type the communication port used to communicate with the **Teledyne Foxy R1 - R2** fraction collector. This port number is displayed when the *FC Status* button in the [Method Setup - FC](#) dialog is invoked.

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**Note:** %D (or %d) in the filename parameter means that the log will be created separately for each day. The *reset=off* parameter disables deleting the content of the log each time the station is started during the same day.

The created \*.TXT files will be of great help in the diagnosis of not documented errors and communication issues.