DataApex

Clarity™

CHROMATOGRAPHY SOFTWARE

ANTEC DECADE II

Clarity Control Module   ENG

Contents

To facilitate the orientation in the **Antec DECADE II** 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 Antec DECADE II Control Module

This manual describes the setting of the **Antec DECADE II, Decade SDC, Decade MD and Roxy Potentiostat Electrochemical** detector. The control module enables direct control of the instrument over serial line.

Fig. 1: Antec DECADE II detector

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

2 Requirements

- **Clarity** installation with LC Control module (p/n A24).
- Free serial COM port in the PC.

Note: Modern computers usually have only 1 (if any) serial (COM) port installed. To use more devices requiring the RS232 port, the **MultiCOM** adapter (p/n MC01) is available.

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

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

- For ROXY Potentiostat, firmware version 5.11 or lower.

3 Installation Procedure

3.1 Hardware - Wiring

The **DECADE II** detector is controlled by serial (RS232) communication. It uses standard serial straight cable DB9F-DB9M wiring described in the picture.
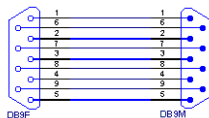

Fig. 2: Serial straight cable DB9F - DB9M

3.2 DECADE II digital inputs and outputs

The **DECADE II** detector is, besides the 9-PIN RS232 connector, equipped with several other connectors allowing the use of various digital inputs and digital outputs. The connectors are placed on the back panel of the instrument and shown in the picture below:
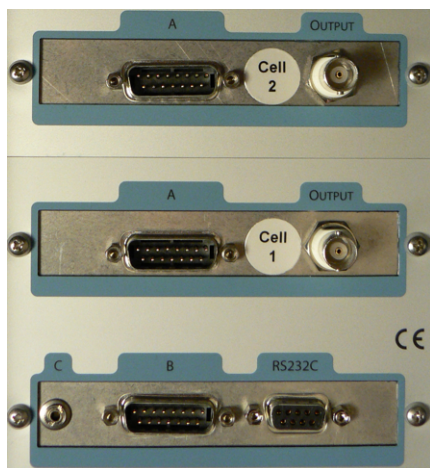

Fig. 3: Back panel of the DECADE II detector

There are three types of digital input/output connectors installed. **Type A** is a 15-pin DB15M connector placed on each sensor board, **Type B** is a 15-pin DB15M connector placed only on the control board, **Type C** is standard 2.5 mm STEREO jack placed on the control board. Moreover, each sensor board provides an additional coaxial cable (BNC) connector for the possibility of separate analog signal acquisition.

Both Type A and Type B connectors have the same orientation and organization of pins, put individual pins serve for different purposes.
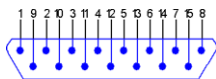
Fig. 4: DB15M connector

The use of digital inputs and outputs in **Clarity** is described in the topic concerning Antec Detector Setup dialog (for more details see also chapter **Antec Leyden Detector Setup** on pg. **18**).

The meanings of individual pins are as follows:

Tab. 1: Connector A - I/O contacts

Pin No.	Pin Name	I/O	Function
1, 2, 3	Relay 1	Out	Contact between 1 (common) and 2 (default) or 3.
4, 5, 6	Relay 2	Out	Contact between 4 (common) and 5 (default) or 6.
7	Cell On	In	Trigger to switch the cell on.
8	Reset	In	Resets a running time file.
9	Overload	Out	Active when the signal gets out of range.
10	AUX1	Out	Free programmable TTL output.
11	AUX2	Out	Free programmable TTL output.
12	Cell Off	In	Trigger to switch the cell off.
13	Start	In	Starts a time file.
14	Auto Zero	In	Sets the output voltage to zero or offset voltage value.
15	Common	---	Ground

Inputs 7, 8, 12, 13 and 14 are level triggered. When active, output status 9, 10 and 11 is low (default is high).

Tab. 2: Connector B - I/O contacts

Pin No.	Pin Name	I/O	Function
1, 2, 3	Common	---	Ground
4	Free TTL input	In	
5	Mark	In	Baseline spike of 10% height of the detector range, duration 0.1 s.
6	Status I	In	Reads status of electric valve, pos B (inject).
7	Status L	In	Reads status of electric valve, pos A (load).
8 - 11	Common	---	Ground
12	Free TTL output	Out	
13	Inject Marker	Out	In combination with manual valve connected to the connector C sends the status of the manual valve; high: "load", low: "inject".

Pin No.	Pin Name	I/O	Function
14	To I	Out	Forces electric injector to "inject".
15	To L	Out	Forces electric injector to "load".

Inputs 4 - 7 and outputs 12, 14 and 15 are level triggered.

Note: Level triggered TTL input contacts require a minimum TTL *LOW* pulse duration of 100 ms. If multiple activations are required, the next pulse should be given after at least 100 ms TTL *HIGH*. When the input is kept *LOW*, only one activation will occur. The default value for the TTL output is *HIGH* (5 V).
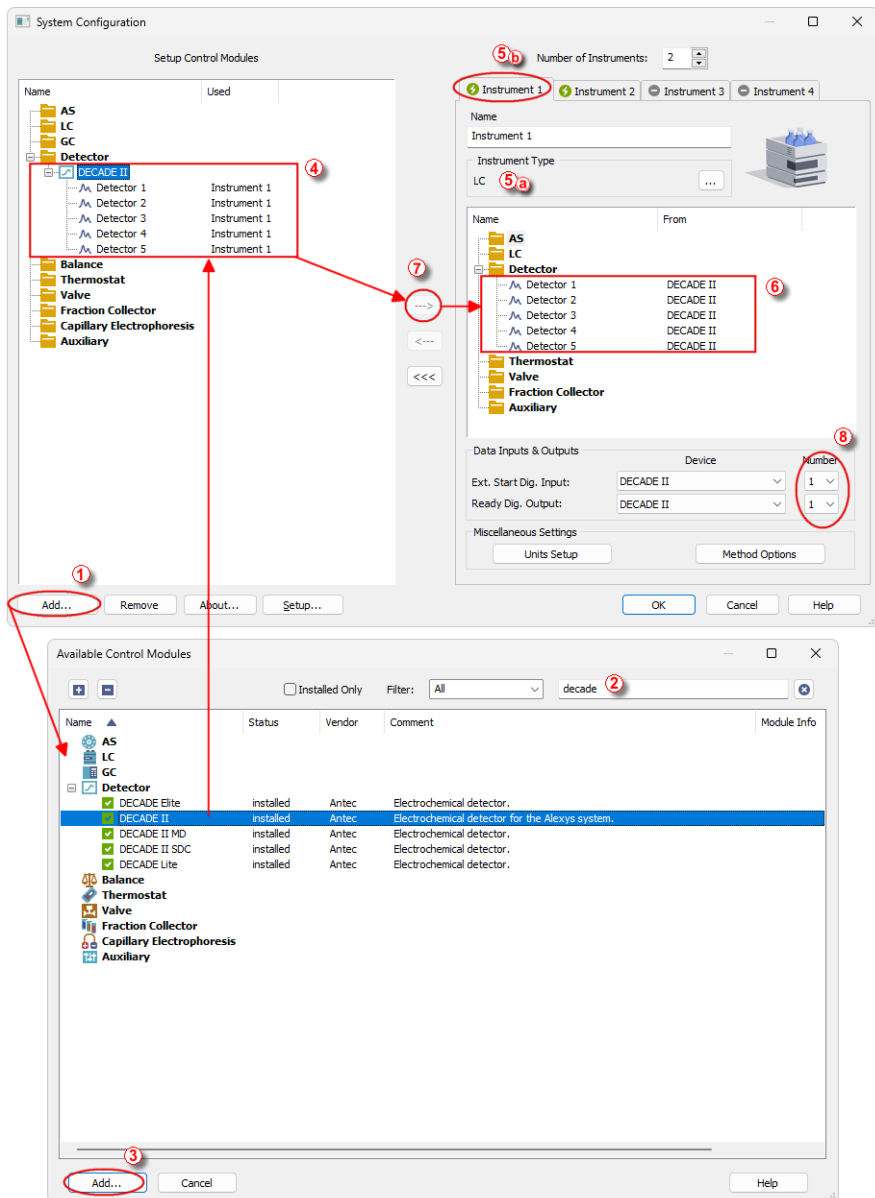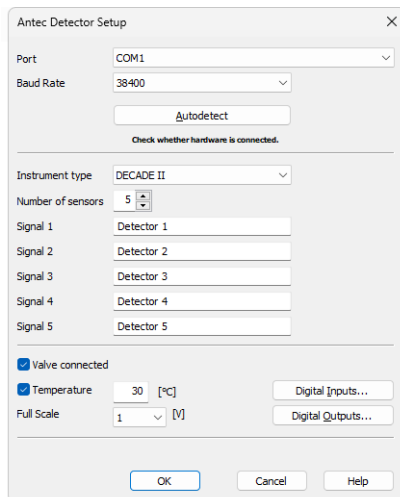
3.3 Clarity Configuration

Fig. 5: System Configuration

- 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 (see **3.3** on pg. **6**.) to invoke the *Available Control Modules* dialog.
- You can specify the searching filter ② to simplify the finding of the driver.
- Select the **Antec DECADE II** detector and press the *Add* ③ button.

The Antec Leyden Detector Setup dialog will appear.

Fig. 6: Antec Leyden Detector Setup

- Select the correct type of the *Communication* and fill in the appropriate *COM Port* or *IP Address*, then press the *Autodetect* button. You can also choose your detector from the list after pressing *Find Device* button. If the communication is correct, model type including the number of configured cells will appear below the *Autodetect* button. Press the OK button to close the Antec Detector Setup dialog.

Note: The Antec Detector Setup dialog is more closely described in the chapter **"Antec Leyden Detector Setup"** on pg. **18**.

The **Antec DECADE II** item will appear in the *Setup Control Modules* list of the *System Configuration* dialog.

- Change the *Instrument Type* ⑤ ⓐ on the desired *Instrument* tab ⑤ ⓑ to LC and drag the **Antec DECADE II** item from the *Setup Control Modules* list on the left ④ to the *Instrument* tab on the right ⑥, or use the ⟶ button ⑦.

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

4 Using the control module

New Acquisition tabs (one for each detector signal assigned to the Instrument) are created in the *Method Setup* dialog. They can be accessed by switching to the desired signal in the *Select Detector* section on the top of the dialog.

Note: Detector does not support the *Start - Restart* option in the *External Start Options* section which can be found in the lower right part of the **Method Setup - Measurement** tab.

4.1 Method Setup - Acquisition

The *Method Setup - Acquisition* tab for each signal of the **DECADE II** detector has three sub-tabs: Main, where basic information on the signal is set, Output sub-tab with other signal properties and the Time Table sub-tab containing the *Time table* governing the time program of the detector.

In the right section on all *Method Setup - Acquisition* sub-tabs for **DECADE II** detectors two buttons are placed:

From Det

Pressing the button loads all detector parameters as they are set in the **DECADE II** detector. These parameters are set in appropriate fields of the *Method Setup - Acquisition* dialog.
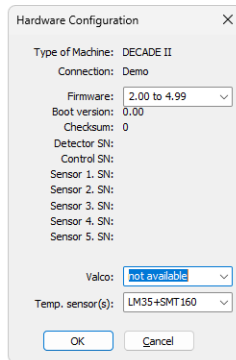
Det Status

Fig. 7: Hardware Configuration

After pressing the *Det Status* button the *Hardware Configuration* dialog opens. It displays the detector type, serial port through which it is connected, used firmware version, serial numbers of all sensor boards that are installed and other information.
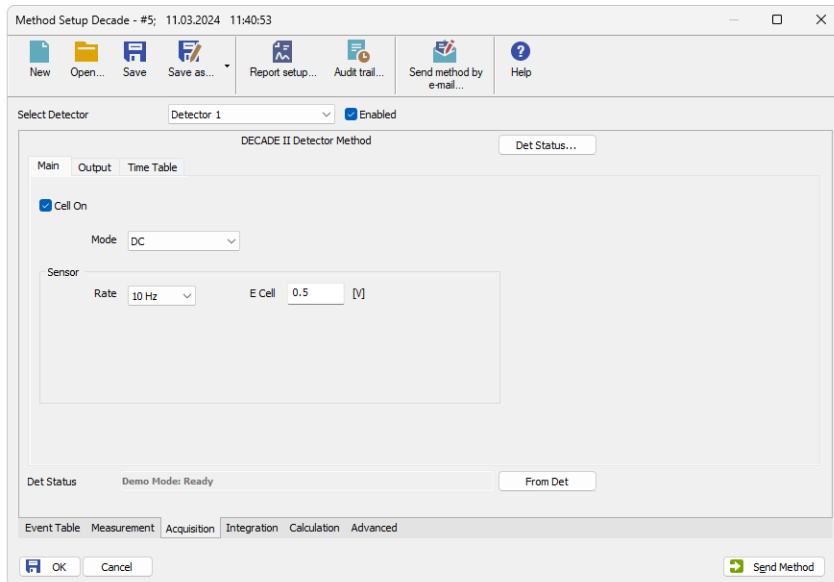
4.1.1 Method Setup - Acquisition - Main

Fig. 8: Method Setup - Acquisition - Main

The *Main* sub-tab of the *Method Setup - Acquisition* dialog is used to specify the operation mode of the particular detector and its other parameters.

Cell On

This checkbox enables to switch the particular cell off. The cell is on by default. The analysis cannot be performed while the cell is off, to be able to start it it is necessary to disable the particular detector in the top part of its Method Setup - Acquisition tab.

Mode

The **DECADE II** detector can work in two operation modes - *DC* and *Pulse*. The selection of the mode influences the parameters which can be set in the *Sensor* section.

Sensor

This section differs for the *DC* mode and the *Pulse* mode. In both modes it is used for specifying the sampling *Rate*, the pulse mode uses it for specifying the profile of the pulses in addition.

Rate

Defines the sampling rate of the detector. Possible values range between *1* and *10* Hz. In case of the *Pulse* mode, the Rate can be set as *1/(t1+t2+t3)* too - the actual sample rate is shown after the selection field.

E Cell

Defines the potential set on the measurement cell. This parameter is usable only in the *DC* mode.
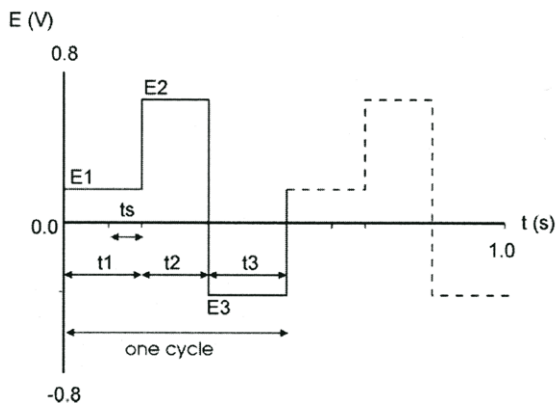
Fig. 9: Pulse mode

E1

Defines the measurement potential.

t1

Sets the time for which the measurement potential will be maintained.

E2 (E3)

Sets the potential value for the *t2* (*t3*) time interval.

t2 (t3)

Defines the duration of the interval for which the *E2* (*E3*) potential will be set.

Note: The potential set during the t2 and t3 time intervals is used to renew the surface of the electrodes.

ts

Sets the sampling time. The time difference between *t1* and *ts* values is used to establish the correct value of *E1*.

4.1.2 Method Setup - Acquisition - Output
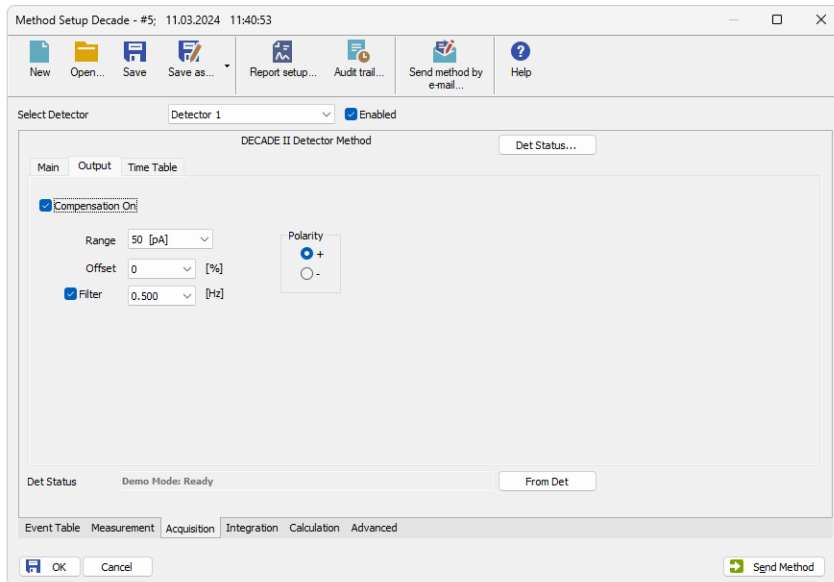
Fig. 10: Method Setup - Acquisition - Output

This sub-tab contains other signal parameters of the particular detector. These are:

Compensation On
This checkbox releases or applies an Autozero offset. When unchecked, any applied autozero offset will be released and the uncompensated cell current will be applied to the output.

Range
Sets the range of the detector. The range can be also changed later as a part of the time program of the detector on the Method Setup - Acquisition - Time Table sub-tab.

Offset
Sets the y-axis offset of the given signal. This offset is set in percentage of the signal range.

Filter
The Filter checkbox allows to use the noise filter for the particular signal. The connected box serves for specifying the cut-off frequency of the filter (possible values range between *0.001* and *0.5* Hz).

Polarity
Sets the polarity of the signal. This parameter may be used for simple switching of negative peaks to positive values.

4.1.3 Method Setup - Acquisition - Time Table
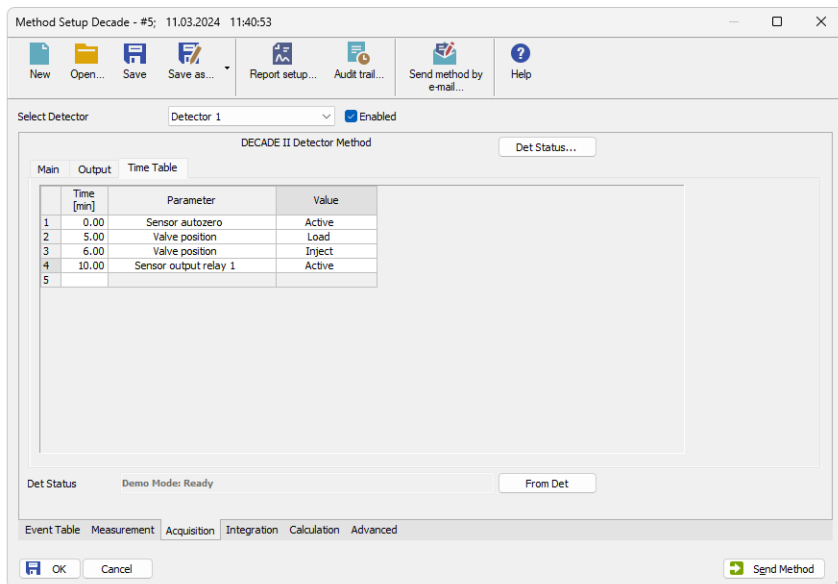
Fig. 11: Method Setup - Acquisition - Time Table

The Time table allows to set timed events on the given detector. The following parameters and outputs can be programmed in the time table:

Valve position, *Sensor range*, *Sensor filter*, *Sensor autozero*, *Sensor offset*, *Sensor E cell*, *Sensor output aux 1(2)*, *Sensor output relay 1(2)*, *Control output free TTL*, *Control output inject*.

Some events set in the Time table will alter the original values possibly set on the Method Setup - Acquisition - Main or Method Setup - Acquisition - Output sub-tabs , others govern the digital outputs of given detector or controller board set in the Antec Leyden Detector Setup dialog.

After entering the desired *Time* for the event (in minutes), it is possible to fill in the *Parameter* field with any possibility from the drop-down list. Add the desired value of the parameter in the *Value* column (if applicable).

4.2 Method Setup - Event Table
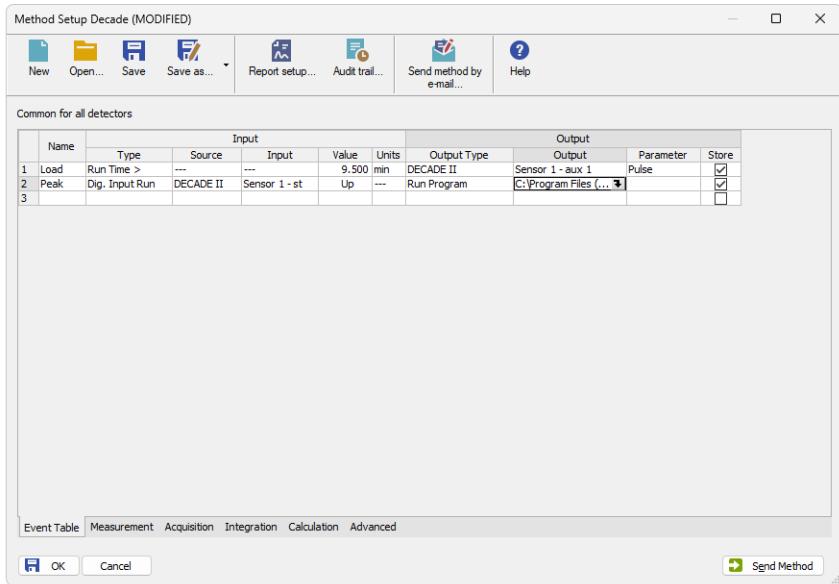
Fig. 12: Method Setup - Event Table

Both the inputs and outputs of the **DECADE II** detector can be used in the **Event Table**, either as the input conditions or for the output reaction.

4.3 Method Setup - Advanced

The **DECADE II** detector also provides auxiliary signals, which can be added to the resulting chromatograms in the *Method Setup - Advanced* dialog.

Fig. 13: Method Setup - Advanced

Check the checkbox in the *Store* column to save the particular auxiliary signal to the chromatogram.

4.4 Device Monitor

The window with the detector status can be invoked by the *Monitor - Device Monitor* command from the *Instrument* window or using the ⊘*LC Monitor* icon. It displays the actual signal belonging to all signals configured on the Instrument, as well as other information such as the detector temperatures. Each detector has its own section in the *Device Monitor* window.

Fig. 14: Device Monitor

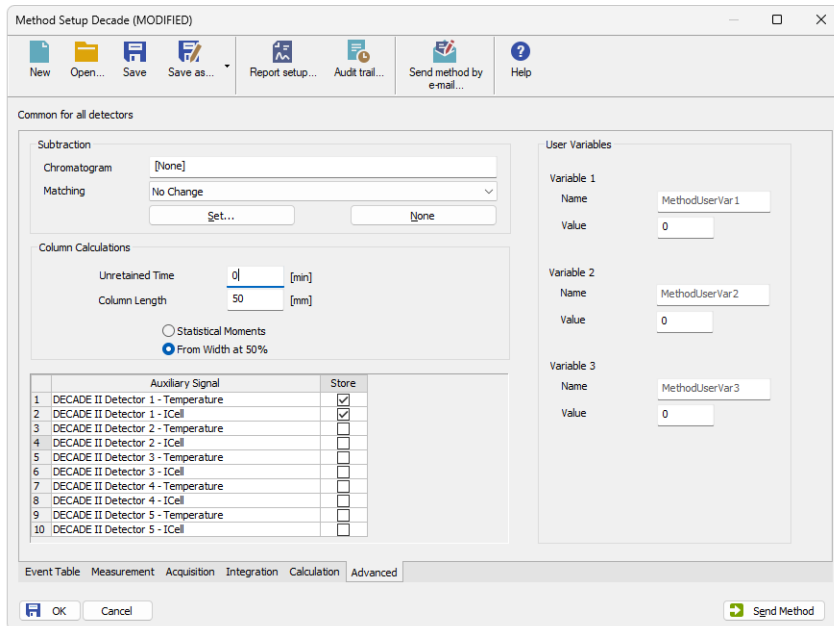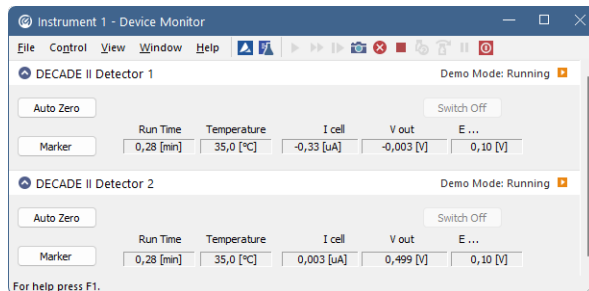The detector can be monitored and partially controlled from the *Device Monitor* window. Available control commands and fields are:

Auto Zero
This button performs the autozero operation - the output signal of the detector is set to zero.

Switch Off/Switch On
This button switches the cell *OFF* or *ON*, depending on the previous status of the cell.

. . . .

Caution: Clarity requires the cell to provide data, so if the cell is off, button says *Switch On*, it will trigger *NO DATA* error or (in case there is some other detector giving data) *STOPPING* state. Be aware of the fact the External start will start data acquisition even though the cell might be off (button says *Switch On*).

Marker
Invoking this button generates a marker peak in the chromatogram. This function is useful only for analogue plotters as an analysis start marker.

Run Time
Displays the run time of the analysis.

Temperature
Shows the actual temperature in the detector oven of the **DECADE II**.

I cell
Shows the cell current of the detector flow cell. The value corresponds to the uncompensated cell current shown on the LCD display of the detector.

V out
Shows the value of the output signal.

E cell

Shows the value of voltage set in the *E cell* field of the Method Setup - Acquisition - Time Table sub-tab.

This value field is only present in the *DC* mode, it is replaced by the *E1* field in the *Pulse* mode.

E1

Shows the value of voltage set in the *E1* field of the Method Setup - Acquisition - Time Table sub-tab.

This value field is only present in the *Pulse* mode. It is replaced by the *E cell* field in the *DC* mode.

4.5 Antec Leyden Detector Setup

Fig. 15: Antec Leyden Detector Setup

Port
 Selection of the communication port.

Baud Rate
 Enables to select from between several possible Baud Rates. The recommended value is *38400*.

Autodetect
 This button is used to test the connection to the **DECADE II** detector using the previously set *Port* and *Baud Rate*. Obtained data about the detector are then set in the dialog.

Instrument Type
 Shows the type of the connected **Antec** detector.

Number of Sensors
 Displays the number of sensor boards (detectors) that are present in the **DECADE II** detector.

Signal 1 (..5)
 Fields belonging to particular detectors enable to set the relevant detector names.

Valve Connected
 Enables to control the connected valve.

Temperature
 Sets the operation temperature of the **DECADE II** detector oven.

Full Scale
 Sets the detector analog output scale. Possible values are *1V* or *10V*.

Digital Inputs...

Displays the *Digital Inputs* dialog which sets the events performed after particular digital inputs of the **DECADE II** detector are invoked. The **Antec DECADE II** supports up to 31 inputs (depending on the number of individual sensor boards in the instrument), of which any 8 can be used in the **Clarity** station.
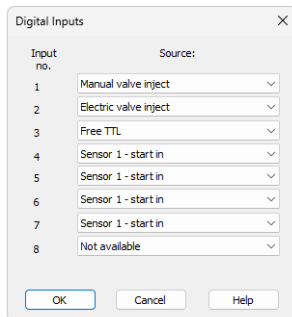

Fig. 16: Digital Inputs

Possible events are:

Not available - digital input with this number is not used.

Manual valve inject - monitors the signal which indicates the status of the manual valve (if connected) with the position sensor (connector C).

Electric valve inject - monitors the signal which indicates that the electric valve (if installed) is in the inject position.

Electric valve load - monitors the signal which indicates that the electric valve (if installed) is in the load position.

Mark - triggering this input creates the baseline spike of 10% height of the range set and the duration of 0.1 s.

Free TTL - monitors the signal level on the free TTL input.

Door - sensor in the instrument front door signals when the door are open.

Sensor 1(..5) - autozero - monitors the TTL signal which sets output signal of the particular cell to 0.

Sensor 1(..5) - start in - monitors the signal which starts a new time file of the particular detector. **Clarity** doesn't use time files.

Note: To be able to start the analysis in **Clarity** when this signal occurs, it is necessary to set the same signal as *Start IN* signal in the *System Configuration* dialog.

Sensor 1(..5) - cell off - monitors the signal which turns off the corresponding flow cell.

Sensor 1(..5) - reset - aborts the time file of the particular detector. **Clarity** doesn't use time files.

Sensor 1(..5) - cell on - monitors the signal which turns on the corresponding flow cell.

Digital Outputs...

Displays the *Digital Outputs* dialog which sets the events triggered by particular signals of the **DECADE II** detector. The **DECADE II** supports up to 24 outputs (depending on the number of individual sensors in the instrument), of which any 8 can be used in the **Clarity** station.
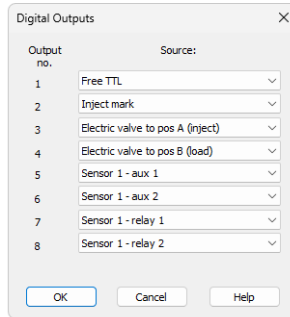
Fig. 17: Digital Outputs

Possible events are:

Not available - digital output with this number is not used.

Free TTL - free TTL output on the controller board.

Inject mark - output reacting on the state of the signal level of connected manual or electric valve (if any). *HIGH* state corresponds to the *LOAD* state of the valve, *LOW* state corresponds to the *INJECT* state of the valve.

Electric valve to pos A (inject) - sends the signal which forces the electric valve to inject.

Electric valve to pos B (load) - sends the signal which forces the electric valve to inject.

Sensor 1(..5) - aux 1(2) - output providing a free TTL output contact. Two such outputs are available on each detector board.

Sensor 1(..5) - relay 1(2) - output functioning as a relay contact. Two such outputs are available on each detector board.

Caution: It is highly recommended to set all unnecessary inputs and outputs to the *Not available* state, as it will significantly speed up the communication.

4.6 Digital Outputs Control

The **Antec DECADE II** converter contains eight digital TTL outputs from which the first five are also designed as relay contacts. To set the desired events to actual outputs on the back of the **Antec DECADE II** detector use the Digital Outputs dialog described on pg. **20**.
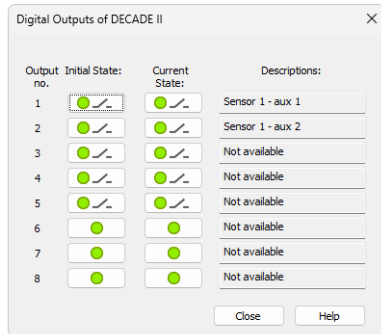

Fig. 18: Digital Output Control

This dialog allows to change the *Initial* and *Actual* state of the digital outputs of the **Antec DECADE II**. The digital outputs may be also controlled from the *Method Setup - Event Table* tab.

5 Report Setup

All of the detector settings accessible on the Method Setup - Acquisition tab for the given signal are reported. To do so, the *Instrument Control* parameter on the *Method* tab of the *Report Setup* dialog must be checked.

Fig. 19: Report Setup

6 Troubleshooting

When the remedy for some problem cannot be discovered easily, the recording of communication between **Clarity** and the detector can significantly help the **DataApex** support to discover the cause of the problem.

The 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). Following section should be edited or added:

```
[COM1]
echo=on
textmode=on
filename=AntecDecadeII_%D.txt

reset=off
```

Note: Instead of COM1 type the correct serial port used to communicate with the **Antec DECADE II** detector. This port number is displayed when the *Det Status* button in the Method Setup - Acquisition dialog is invoked.

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 greatly help in diagnosis of unrecognized errors and problems in communication.

6.1 Specific Problems

▌ **The Antec DECADE II detector can't be added to the** *System Configuration* **dialog. The** *Autodetect* **function will issue the** *Cannot establish communication!* **error message.**

Description: There might be problems with wrong communication cable, correct settings of the communication port or wrong communication parameters were probably sent to the detector during the *Autodetect* test.

Solution: Try the following procedures:
- Check the communication cable used. It should be serial **straight** DB9F-DB9M cable (DataApex p/n SK02).
- If the cable is correct, try to check the COM port settings. Make sure that **DECADE II** detector is connected to the same COM port as is set in the Antec Leyden Detector Setup dialog. Try to connect another device to the same port and test if it communicates.
- If nothing helped so far, it is necessary to reset the detector to factory defaults.

Note: The following suggested procedure only works for the **DECADE II** detector, not for the **DECADE II SDC** detector, which doesn't have the keyboard/display interface. To reset the **DECADE II SDC** detector it is necessary to use the DECADE II dialog software. See Antec documentation on how to do so.

- Switch the detector off.
- Press and hold the $\boxed{\text{F5}}$ button on the front panel of the detector and switch the detector on. Release the $\boxed{\text{F5}}$ button after the detector is initialized.
- Enter the config dialog on the detector screen (by pressing the $\boxed{\text{F1}}$ button).
- Press and hold the $\boxed{\text{Enter}}$ button for approximately 10 seconds. The *Reset to factory settings?* question will emerge.
- Press the $\boxed{\text{F2}}$ button (Yes) and wait for appr. 10 seconds. The detector will reset to factory default settings.
- It is possible that the contrast of the display will cause the display to be unreadable. It might be readable from the side, or use the $\boxed{>}$ button and then hold the $\boxed{-}$ button to decrease the contrast value until the display is readable again.

▌ **Shifted data in chromatogram (Incoming data contain parts with timestamps missing).**

Description: There might be problems with detector firmware or with communication jamming.

Solution: You can set what to do with missing timestamps by editing OTHERS.INI file. "others.ini File Setup" below for details.

6.2 OTHERS.INI File Setup

In the OTHERS.INI file (by default located in the C:\CLARITY\CFG directory) user can create section [DecadeII] containing keys, which are influencing the way Clarity deals with missing timestamps in incoming data. The section can contain following keys:

timestamps
Defines what action the control module will do in case missing timestamps problem appears.

Values:

0 - to ignore missing timestamps (Default)

1 - to record missing timestamps into chromatogram audit trail

2 - to calculate and record missing timestamps

start
Defines when the module will start do action from "timestamps"

Values:

0 - Starts from first timestamp, and first expected timestamp is 1 (Default)

1 - the first timestamp will store and starts from second timestamp

2..X - the X timestamp will store and starts from X+1 timestamp

length
Defines maximal count of missing timestamps, which are considered as error
Values:
0 – any number of missing timestamps are considered as error (Default)
1..X - number of missing timestamps exceeding this value will not be considered as
error

Example of section (can be directly copied/pasted to OTHERS.INI):

[DecadeII]

; What to do with missing timestamps
; 0 - Ignore, 1 - Record in audit trail, 2 - Calculate and record
timestamps = 0

; When to start executing action set in previous key
; 0 - From first missing, X - From X+1 missing
start = 0

; Maximal count of missing timestamps considered as error
; 0 - Any number, X - number of missing timestamps exceeding this value
will not be considered as error
length = 0