DataApex
Clarity™
CHROMATOGRAPHY SOFTWARE

SPARK MIDAS

Clarity Control Module   ENG

Contents

To facilitate the orientation in the **Spark Midas** 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 Spark Holland Midas control module

This manual describes the setting of the **Spark Holland Midas** autosampler. The control module enables direct control of the instrument over serial line.

Fig. 1: Spark Holland Midas

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

Note: It is recommended to check the user manual of the autosampler for its operating principles and restrictions.

2 Requirements

2 Requirements

- **Clarity** Installation with AS Control module (p/n A26).

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Caution: Minimal firmware version required is **2.05**.

- Free serial COM port in the PC.

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

- Straight serial DB9F-DB9M cable (p/n SK02) for newer models of the Midas autosampler (with the Multi Link Ports, see **Fig. 3** on pg. **4**.). Older models require the serial cross DB9F-DB25M cable (p/n SK03).

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

3 Installation Procedure

3.1 Hardware - Wiring

Commands for the autosampler are communicated with **Clarity** through the Serial straight DB9F-DB9M (p/n SK02) or Serial cross DB9F-DB25M (p/n SK03) cable, depending on the connectors on the **Spark Midas** autosampler. The autosampler which has the Multi Link port switches uses the Serial straight DB9F-DB9M cable, while the older versions without the Multi Link port settings use the Serial cross DB9F-DB25M cable.

Note: Typical connections of a set with Autosampler can be found in the **Getting Started** manual (chapter **Device Setup and Wiring**).
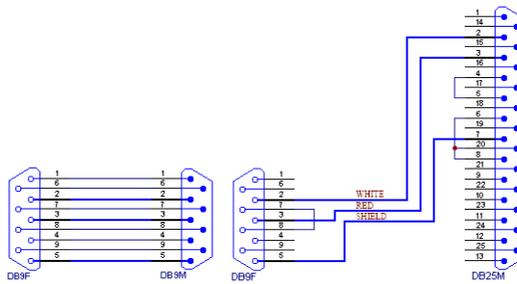
Typical serial cables used are shown in the picture:

Fig. 2: Serial straight DB9F-DB9M and Serial cross DB9F-DB25M cables

3.2 Spark Midas setup - communication

The **Spark Midas** autosampler has to be set in the *SERIAL MODE* in order to function correctly with its **Clarity Control module**. This is done by pressing the *Serial* Soft Function key from the main menu on the sampler keyboard. In addition, the *ID* of the **Spark Midas** autosampler must be the same that will be later set in **Clarity**. To find out or change the autosampler *ID*, perform the following steps:

- Press the System button on the **Spark Midas** autosampler keyboard.
- Press the Menu button on the **Spark Midas** autosampler keyboard.
- Press the Serial soft function key on the **Spark Midas** autosampler keyboard.
- Check or change the device identifier ID.

Note: Available values are *60 - 69* (default value is *60*).

If the **Spark Midas** autosampler has the Multi Link Port present, its configuration must be set according to the following image:
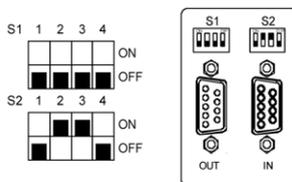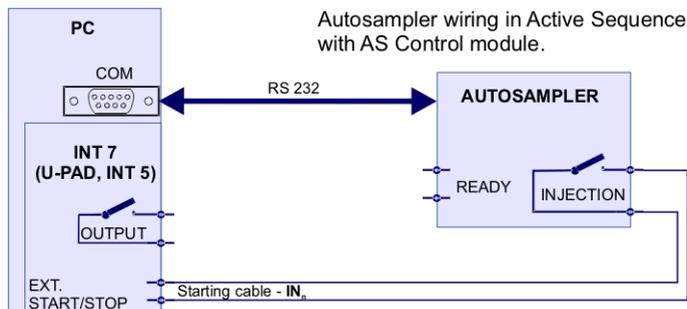

Fig. 3: Multi Link Port settings

3.2.1 Connections

- For the start synchronization with LC the *Start* output must be connected with **Clarity Starting cable IN**.

Fig. 4: Wiring of an autosampler with AS Control module

- Do not connect the digital output cable **OUTnR**.
- The starting cable **INn** must be connected.

Note: **Clarity** standard cable (along with further details on wiring) is described in the **Clarity Getting Started** manual.

- The **Spark Midas** autosampler accessories include the **Start marker** cable (15 pin Sub D connector to 2 free leads). Connect the leads on this cable to leads on the **Clarity Starting cable INx** cable extension.
- Consult the user manual for **Spark Midas** autosamplers for details about wiring and connectors on the device.
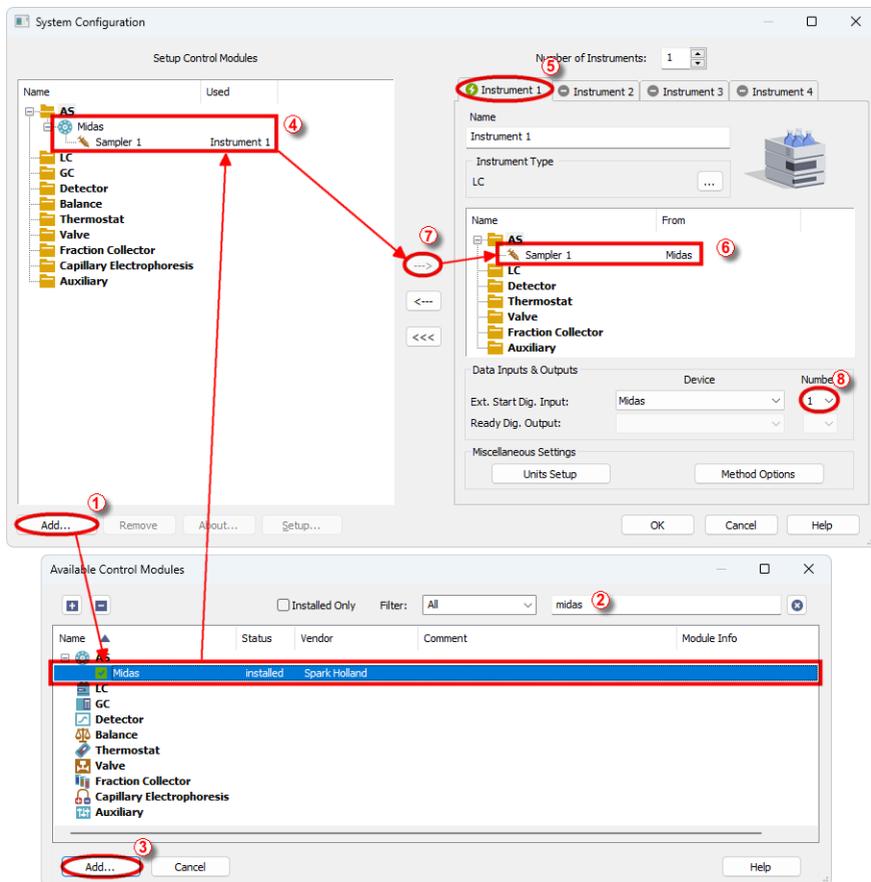
3.3 Clarity Configuration

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 **Fig. 5** 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 **Midas** sampler and press the *Add* ③ button.

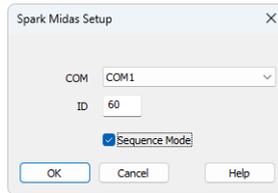The Spark Midas Setup dialog will appear.

Fig. 6: Spark Midas Setup

- Fill in the *COM* and *ID* fields and press the *OK* button. The *ID* must match the device identifier set previously in the autosampler setup, as described in the chapter **"Spark Midas setup - communication"** on pg. **4**.

Note: The Spark Midas Setup dialog is more closely described in the chapter **"Spark Midas Setup"** on pg. **18**.

The **Midas** autosampler item will appear in the *Setup Control Modules* list of the *System Configuration* dialog.

- Drag and drop the **Midas** icon from the *Setup Control Modules* ④ list on the left side of the *System Configuration* dialog to the desired *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 card according to the wires being used for synchronization.

4 Using the control module

New Method Setup - AS tab appears in the *Method Setup* dialog, enabling the setting of the **Spark Midas** autosampler control method.

4.1 Method Setup - AS

The *Method Setup - AS* dialog consists of four sub-tabs assigned for the various parts of the **Spark Midas** autosampler method. These sub-tabs are Mode, Time and Temp., Mix Table, Timed Events and System Settings. Additional buttons allow to display the Hardware Configuration dialog of the **Spark Midas** autosampler or to read the instrument method from the **Spark Midas** autosampler. The method is sent to the autosampler every time the *Send Method* or *OK* button is pressed. Other actions in different windows may also cause the sending of the instrument method to the controlled devices including the **Spark Midas** autosampler - most notable cases being pressing the *Send Method* button in the *Single Run* dialog or starting a new injection from the *Sequence* window (each injection is preceded with sending the instrument method).

To read the **Spark Midas** method from the autosampler it is necessary to use the *From AS* button available from all sub-tabs of the *Method Setup - AS* dialog. If the injection method is already established in the sampler, it is advisable to download it to **Clarity** using the *From AS* button and save it as a **Clarity** method.
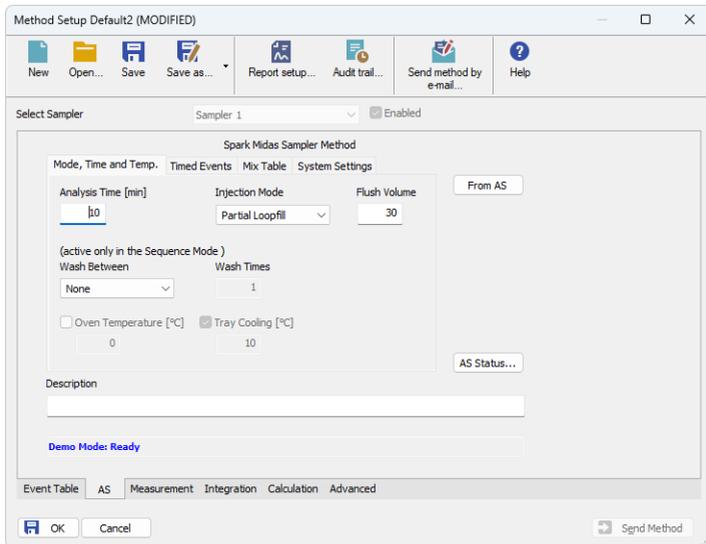
4.1.1 Mode, Time and Temp.

Fig. 7: Method Setup - AS Control - Mode, Time and Temp.

This is the main tab defining the basic **Spark Midas** autosampler method.

Analysis Time [min]
Sets the time after which the autosampler will start to inject next sample.

Note: In case the sample preparation is not used ([Mix Table](#) tab is not used), each injection is sent from **Clarity Sequence Table** by separate command and the *Analysis Time* field is not used, injections are controlled by **Clarity**. However, with the sample preparation on, the *Analysis Time* parameter is used to start the preparation in advance, before the previous analysis is finished. Careful timing is thus necessary so that the next injection is not started before the previous analysis ends.

Injection Mode
Allows to set the injection mode by selecting one of the possibilities:

None - in this mode, injection from the autosampler is disabled.

Partial Loopfill - in this mode, only a part of the sample loop volume will be transferred into the column. Maximum injected volume iis equal to the half of the *Loop Volume*.

Flush Loop - in this mode, the full sample loop will be transferred to the column. Only the value set in the *Loop Volume* field of the[Method Setup - AS - System](#) dialog is allowed for setting in the *Inj. Vol.* column in the **Sequence Table** in the *Sequence* window.

µl Pick up - defined volume of the sample will be injected into the column, preceded and followed by the transport liquid. Maximum injected volume is calculated as: (*Loop Volume* - 3* *Tubing Volume*)/2

The *Vial Type* is hard-set to *Standard* in the *Prep Mode*.

Flush Volume

Defines the volume of the sample that will be used for flushing the sample loop and tubing before the sample is aspired. Possible values range from *0* to *9999* µl, default value is *30* µl. This option is only available for the *Partial Loopfill* and *Flush Loop* injection modes.

Caution: Setting the *Flush Volume* parameter to less than twice the volume of the needle and tubing will cause worse performance.

Wash Between

Defines the time when the wash should be performed. Possible values are:

None - no wash will be performed.

Between Series - the wash will be performed only after each finished sequence. The option is only available if the *Sequence Mode* option is checked in the Spark Midas Setup dialog.

Between Vials - the wash will be performed after each sample measured. The option is only available if the *Sequence Mode* option is checked in the Spark Midas Setup dialog.

Between Injection - the wash will be performed after each injection.

Wash Times

Defines the number of syringe volumes used for performing the wash. Acceptable values are *0 - 9* (in the .

Oven Temperature [°C]

Allows to enable the oven temperature function and set the temperature for the oven (in the range range *0 - 60* °C, the instrument can only control temperatures at least *5 °C* above ambient temperature or more). The **Spark Midas** autosampler will wait with the injection until the set temperature ± *2 °C* is reached. This option is grayed-out if the **Spark Midas** sampler doesn't have the function built-in.

Caution: To enable the use of the thermostat oven, the *Init Oven Setpoint* item from theTimed Events tab must be filled-in too. If it is not, the temperature oven will switch off as soon as the analysis is started.

Tray Cooling [°C]

Allows to enable the tray cooling function and set the temperature for the cooling (in the range *4 - 15* °C, the instrument cooling capacity is *20 °C* below ambient temperature). This option is grayed-out if the **Spark Midas** sampler doesn't have the function built-in.
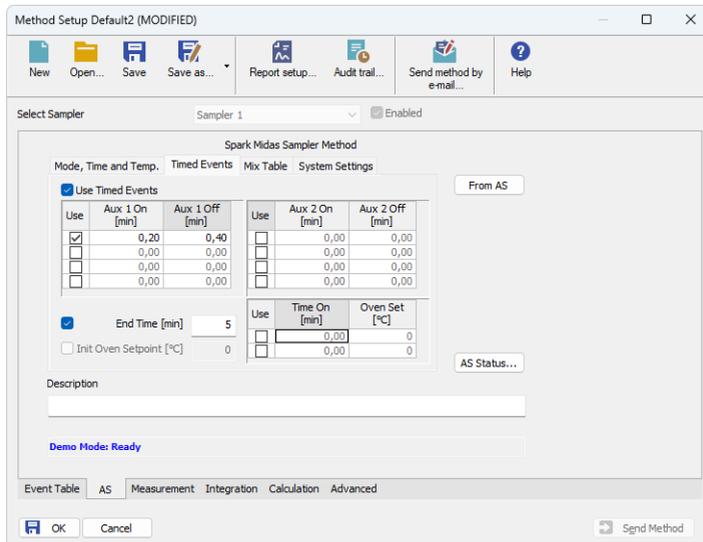
4.1.2 Timed Events

Fig. 8: Method Setup - AS Control - Timed Events

The *Timed Events* tab allows the control of two auxiliary contacts and the setting the oven temperature setpoints.

Note: All times filled in on this tab (either for the *End Time* parameter or in the tables) have to be in the interval *0 - 239.99* min.

Use Timed Events
Checking this checkbox enables the *Timed Events* tab to be filled in and used.

Aux Event Tables
These two tables define the dime when the **Aux 1** (or **Aux 2**, respectively) outputs of the **Spark Midas** autosampler switch *ON* and *OFF*. Each output can be switch maximum four times on and off. The time entered into the *Aux 1(2) Off* column must be greater than the value entered into the *Aux 1(2) On* column on the same row.

End Time [min]
Sets the end time for **Timebase** program. If no value is filled in, the **Spark Midas** autosampler will automatically generate the *End Time* equal to the *Analysis Time* parameter programmed on the Mode, Time and Temp. sub-tab. If the *Analysis Time* is also not used, the autosampler will use internal default value.

Note: Events set for times higher than the value in the *End Time* field will not proceed.

Init Oven Setpoint [°C]
Sets the initial oven temperature. Values in the range range *0 - 60* °C are available, but the instrument can only control temperatures at least *5 °C* above ambient temperature or more. The temperature values in the Oven temperature table to the

right follow the same criteria. This field (along with the appropriate temperature table) is only enabled when the autosampler has the oven installed.

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Caution: To enable the use of the thermostat oven, the *Oven Temperature* from the Mode, Time and Temp. tab must be filled-in too. If it is not, the temperature oven will switch off as soon as the analysis is started.
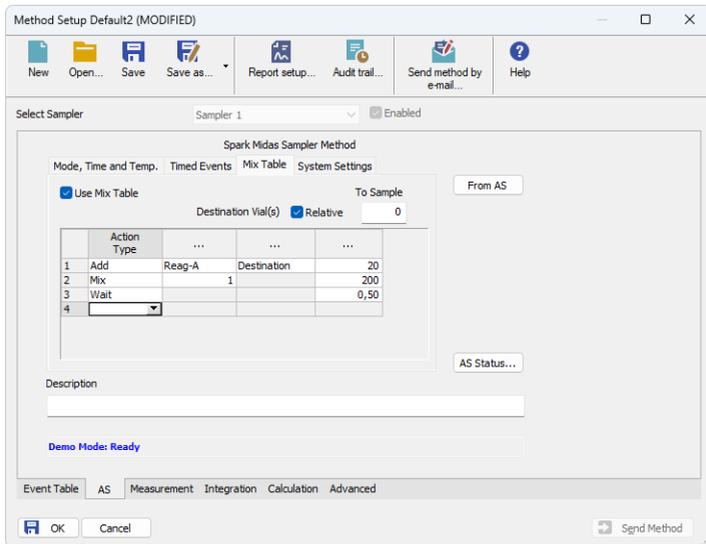
4.1.3 Mix Table

Fig. 9: Method Setup - AS Control - Mix Table

The *Mix Table* tab allows setting of the *Mix Table* for the derivatization or dilution of the samples.

Use Mix Table
Checking this checkbox enables the *Mix Table* tab to be filled in and used.

Destination Vial (s)
Specifies which vials will be used as *Destination* vials. The context of the editable field change with the checked or unchecked *Relative* checkbox.

> **Relative**
> When this checkbox is checked, the editable field is marked *To Sample* and the destination vial will be counted as the current vial number plus the number entered into the *To Sample* field. This is advantageous when the sequence uses more than one line and does not rune in the *Spark Midas Sequence Mode*, when it is possible to resume the half-measured sequence without using the same (and possibly already used) destination vials. For more details see the chapter **Spark Midas Setup** on pg. **18**.

Note: When destination vials are used for the sample preparation, without the *Spark Midas Sequence Mode*, it is not possible to use more than one injection from a single row of the **Sequence Table** as it would use the same destination vial.

When this checkbox is not checked, the editable field is marked *First Vial No* and the first destination vial will be the one specified in the field. With

each injection without the method sent to the **Spark Midas** autosampler, the destination vial used is incremented by one. However, when a method is set to the autosampler (which is done before each injection in **Clarity** that does not use the *Spark Midas Sequence Mode*), the counter of the next destination vial is reset to the *First Vial No*. This option should be used in case the *Spark Midas Sequence Mode* is used. For more details see the chapter **Spark Midas Setup** on pg. **18**.

Mix Table

Mix part of the sampler method (defined on the *Method Setup - AS - Mix Table* sub-tab) governs the pre-preparation of sample before the injection. The table column headings are context-based, that is they change according to the action selected in the first column on the actual row. These operations are:

Add - aspirates specified volume defined in the *Amount [μl]* column from the source selected in the *From* column to the syringe (maximally up to the volume of the syringe) and dispenses the aspired liquid to the vial specified in the *To* column. Available vials include *Sample*, *Reag-A*, *Reag-B* and *Wash* for the *From* column, and *Sample* and *Destination* vials for the *To* column.

Mix - aspirates and dispenses the sample from the destination vial back to the destination vial. The number of the mix cycles is defined in the *Repeat* column, the amount of sample aspirated is set in the *Amount [μl]* column. If no destination vial is used, aspirates and dispenses from and to the sample vial instead.

Wait - causes the sampler to wait for the specified time interval. The desired interval is entered into the *Time [min.]* column in minutes.
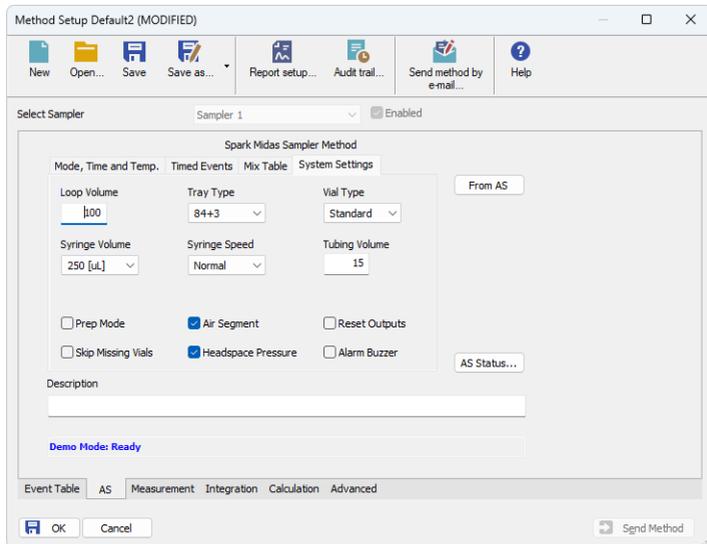
4.1.4 System Settings

Fig. 10: Method Setup - AS Control - System Settings

Tab defining various aspects of the **Spark Midas** autosampler operation.

Loop Volume [µl]
Defines the value of the loop volume used for the injection (in µl). Possible values range between *0* and *5000* µl. When using *Flush Loop Injection Mode* from the Method Setup - AS - Mode, Time and Temp. tab, only the *Loop Volume* value is allowed to be entered to the **Sequence Table** in the *Sequence* window. The *Loop Volume* is hard-set to *10000* in the *Prep Mode*.

Tray Type
Defines the type of the tray used with the **Spark Midas** autosampler. Available options are *24*, *84+3* (standard type) or *96*. The *Tray Type* is hard-set to *24* in the *Prep Mode*.

Vial Type
Defines the types of vials used in the autosampler. Available options are *Standard* or *2.5 ml*, from whose the latter can be only used for the *84+3* or *96* tray type. The *Vial Type* is hard-set to *Standard* in the *Prep Mode*.

Syringe Volume
Defines the volume of the syringe installed in the autosampler. Possible values are *250 µl* or *1000 µl*. The *Syringe Volume* is hard-set to *2500 µl* in the *Prep Mode*.

Syringe Speed
Sets the syringe speed from the set of predefined values *(Low*, *Normal*, *High*).

Tubing Volume [µl]
Defines the volume of the tubing between the needle and injection valve. This value is used for the calculation of flush and transport volumes.

Prep Mode
Defines the volume of the tubing between the needle and injection valve. This value is used for the calculation of flush and transport volumes.

Air Segment
Sets whether the *5 µl* air segment should be used during the injection. This feature is disabled in the *Prep Mode*.

Headspace Pressure
When checked, the sampler uses the pressure to facilitate the transfer of the sample into the sample loop. The pressure will only be used when the vials are airtight.

Skip Missing Vials
Sets the behavior of the sampler during the sequence if empty vial is met. While checked, empty vial will be skipped and the sequence will continue on, while in other case the missing vial will stop the sequence, issuing an error message.

Reset Outputs
While checked, forces the digital outputs to be reset after the sequence has ended.

Alarm Buzzer
Sets the sound signalization on. See **Midas** manual for more details.
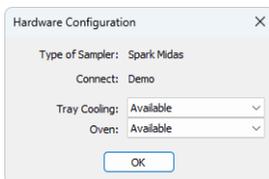
4.2 Hardware Configuration

Fig. 11: Hardware Configuration

The *AS Status* button in the Method Setup - AS displays the *Hardware Configuration* dialog. In the full version, this dialog displays autosampler model, automatically detected communication parameters and the presence of *Tray Cooling* and *Oven* options.

In the demo version the presence of the *Tray Cooling* and the *Oven* can be set to demonstrate the possibilities of the sampler with selected configuration.

Type of Sampler
Control module will automatically detect the **Spark Midas** autosampler.

Connect
Shows the communication parameters in the format: [COMX, <baud rate>, <parity>,<data bits>,<stop bits>] or, in the demonstration regimes, [Demo] or [Offline].

Tray Cooling
Shows whether the **Spark Midas** sampler is equipped with the tray cooling option.

Oven
Shows whether the **Spark Midas** sampler is equipped with the oven option.

4.3 Spark Midas Setup

Spark Midas Setup dialog (accessible through the *System Configuration* dialog) allows to manually set the parameters needed for the communication with the **Spark Midas** autosampler.
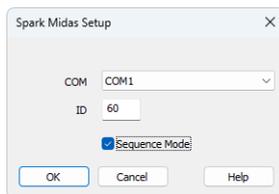

Fig. 12: Spark Midas Setup

COM

Sets the COM Port used for the communication between the sampler and the **Clarity**.

ID

Sets the device identifier of the **Spark Midas** autosampler. The number listed here must be the same as the one set in the sampler. For more details see the chapter **Spark Midas setup - communication** on pg. **4**.

Sequence Mode

This option governs the mode of the operation with the **Spark Midas** autosampler control module. While checked, The whole sequence is sent to the autosampler in one package (ne method sending prior each injection will be from then on performed). The sequence can use only one line in the sequence table, but multiple injections from the same row may be readily used.

While not checked, the operation will be governed by **Clarity** - the method will be sent to the autosampler prior each injection and each injection will thus be considered a single one-injection series by the autosampler. This prevents the use of washing between samples and few other features.

5 Report Setup

Fig. 13: Spark Midas report preview

All autosampler-specific settings (that means the data from all sub-tabs of the Method Setup - AS tab) are reported as a part of the data displayed by the use of *Injection Control* checkbox of the **Report Setup - Method** dialog.

6 Troubleshooting

When the remedy for some problem cannot be discovered easily, the recording of communication between **Clarity** and the autosampler 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=SparkMidas_%D.txt
reset=off
```

Note: Instead of COM1 type the correct serial port used to communicate with the **Spark Midas** autosampler. This port number is displayed when the *AS Status* button in the Method Setup - AS dialog is invoked or in the Spark Midas Setup dialog.

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

▌ An error message "Cannot establish communication with …" appears when opening Clarity Instrument.

Solution: Check the power cable (**Spark Midas** sampler must be switched on), communication cable and communication settings (the autosampler must be in Serial mode, i.e. the "Serial mode" inscription must be shown on the Autosampler display). If it is not, switch it on.

▌ An error message "AS Error" appears during the Clarity operation.

Solution: The communication has been interrupted. Check the communication cable as it is most probably disconnected. This message may also occasionally appear after aborting the *ACTIVE* Sequence.

▌ Injection volume set in the *Sequence* window is not accepted.

Solution: Either you are using the *Flushed Loop* option and the injection volume doesn't the one of the installed injection loop, or you are trying to enter the volume that is greater than the half of the installed *Loop Volume* in the *Partial Loopfill* injection mode.

▌ The Spark Midas autosampler does not start with the injection.

Solution: Check the Freeze input active settings in the I/O configuration of the **Spark Midas** autosampler. When set to *HIGH*, the injection will not start until the respective input is closed. For more details on how to check the I/O configuration see the **Spark Midas** manual.

▌ The Spark Midas temperature oven switches off when the analysis is started.

Solution: Both the *Oven Temperature* field on the Mode, Time and Temp. tab and the *Initial Oven Setpoint* field on the Timed Events tab must be correctly filled to use the temperature oven.