DataApex
Clarity™
CHROMATOGRAPHY SOFTWARE

HT200H

Clarity Control Module   ENG

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Contents

To facilitate the orientation in the **HT200H** 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 HT200H Headspace control module

This manual describes the setting of the **HT200H Headspace** autosampler. The control module enables direct control of the instrument over serial line.

Fig. 1: HT200H Headspace

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: Sample preparation conditions are all the options from the Method Setup - AS - Basic/Advanced dialogs.

2 Requirements

- **Clarity** Installation with AS Control module (p/n A26).
- Free serial port in the PC (fast - 16550 UART).

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).

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 Autosampler Setup - communication

The autosampler communicates with PC using straight RS232-compliant DB9F-DB9M cable. When using 3-core cable, pins 7-8 must be connected on autosampler side. Correct COM port settings on the PC side are **9600, n, 8, 1.**
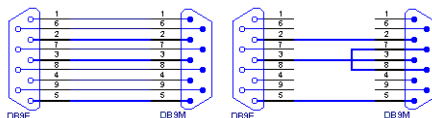

Fig. 2: Serial cable DB9F-DB9M and 3-core cable

For synchronization with GC the DB15F connector (labeled GC) is used on autosampler side.

Note: If serial communication cannot be established and all parameters of communication are correctly set (speed, parity, etc.), then we recommend to remeasure the cable according to the **Fig. 1** on pg. **1**. or **Fig. 2** on pg. **3**. (especially pin connection 2 and 3).

3.1.1 Connections

Besides the serial **RS-232** cable, following connections must be made to the **autosampler IN/OUT connector:**

Fig. 3: Autosampler IN/OUT connector

- The GC **Start Output** must be connected to **Clarity IN** cable.

The designations of pins on the HT200H sampler are dependent on model number and are described in following table:

Tab. 1: HT200H - designations of pins:

Connection	Clarity cable	15 pin connector	PIN
Start	IN (red)	SAMPINS_NO	3 (close) or 15 (open)
	IN (shield)	SAMPINS_COM	6
Ready	OUT (red)	GC_READY NON	9
	OUT (red)	GC_READY	4
	OUT (shield)	GND	5

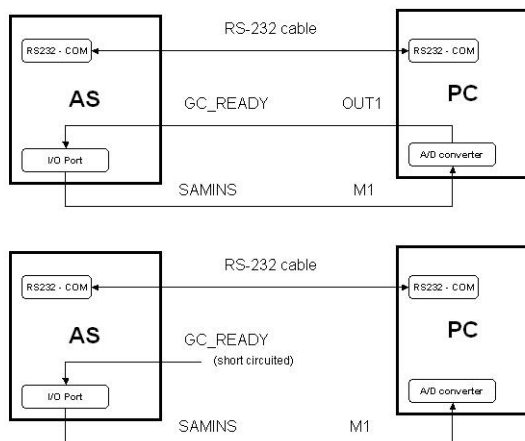Refer to HTA manual for description of cables supplied with the autosampler.

Fig. 4: HT200H scheme of connection

Note: Typical wiring of controlled instruments is described in the **Clarity Getting Started** manual.
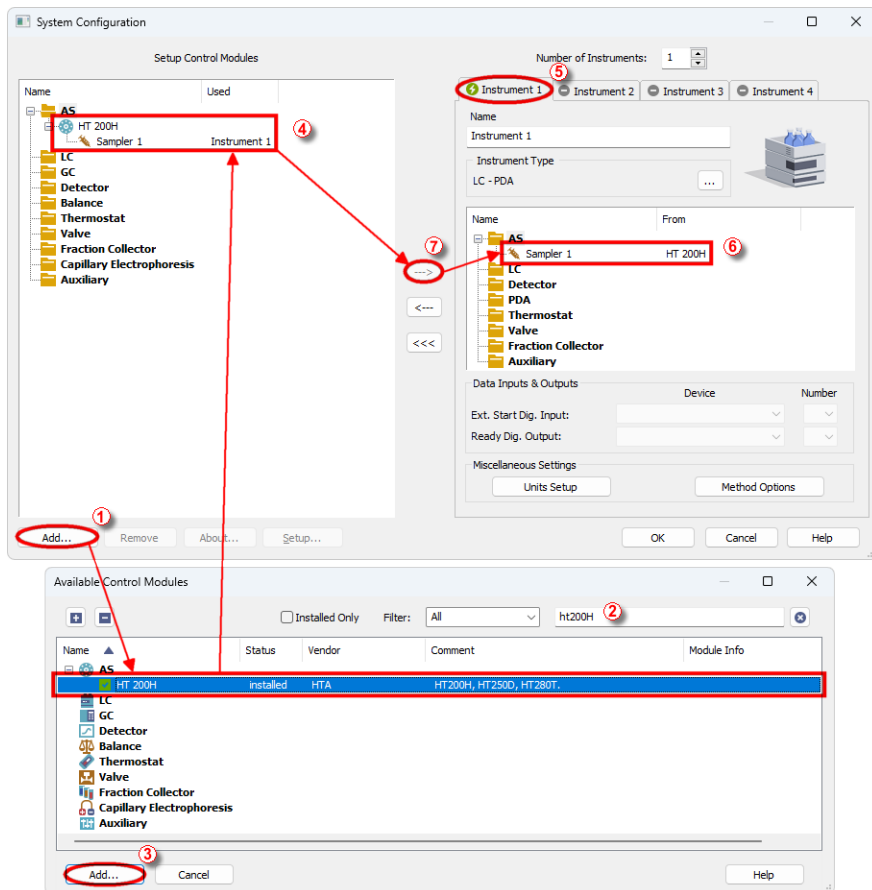
3.2 Clarity Configuration

Fig. 5: How to add HT200H to 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 **3.2** on pg. **5**.) to invoke the *Available Control Modules* dialog.
- You can specify the searching filter ② to simplify the finding of the driver.
- Select the **HT 200H** and press the *Add* ③ button.
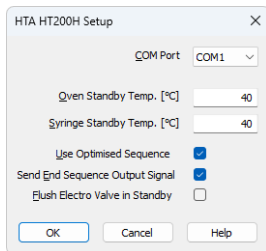- The HT200H AS Setup dialog will appear.

Fig. 6: HT200H AS Setup

- Fill in the *COM Port* and other autosampler options and press the *OK* button.

Note: Other fields from this dialog are described later in the manual(for more details see the chapter **HT200H AS Setup** on pg. **11**)..

The HT200H Headspace Sampler will appear in the *Setup Control Modules* ③ list of the *System Configuration* dialog.

- Drag the sampler icon from the *Setup Control Modules* list on the left side to the desired *Instrument* tab on the right side ⑤ (or use the ⟶ button ④ to do so)

Set the *Start* and *Ready* input and output numbers for your acquisition card according to the wires used for synchronization.

4 Using the control module

New Method Setup - AS tab appears in the *Method Setup* dialog, enabling the setting of the AS control method.
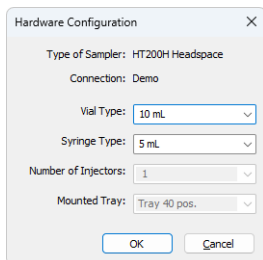
4.1 Hardware Configuration

Fig. 7: Hardware Configuration

In the full version, this dialog displays automatically detected communication port settings and some parameters of the sampler, like vial and syringe type, number of injectors and tray size.

Note: In demo version parameters can be set according to real possibilities of the sampler, which means there are two sizes of vials 10 and 20 ml and two sizes of syringes, 2.5 and 5 ml. Number of injectors and tray size are fixed for recent version of HT200H.

4.2 Method Setup - AS

The *AS Status* button displays the Hardware Configuration dialog described on pg. **7**.

Sending injection method to sampler

The injection method is sent to the autosampler:

- Automatically by the **Clarity Sequence.**
- Automatically in cases specified in the *Instrument Method Sending* dialog accessible from the *System Configuration* dialog using the icon
- Manually using the *Send Method* button in the Single Analysis dialog.

Downloading injection method from sampler

The *From AS* button in the *Method Setup - AS* dialog serves for downloading the injection method from the sampler.

Caution: If you have injection methods already established in the sampler, it is advisable to download them to **Clarity** using the *From AS* button and save them as a **Clarity** method.

4.2.1 Method Setup - AS -Basic
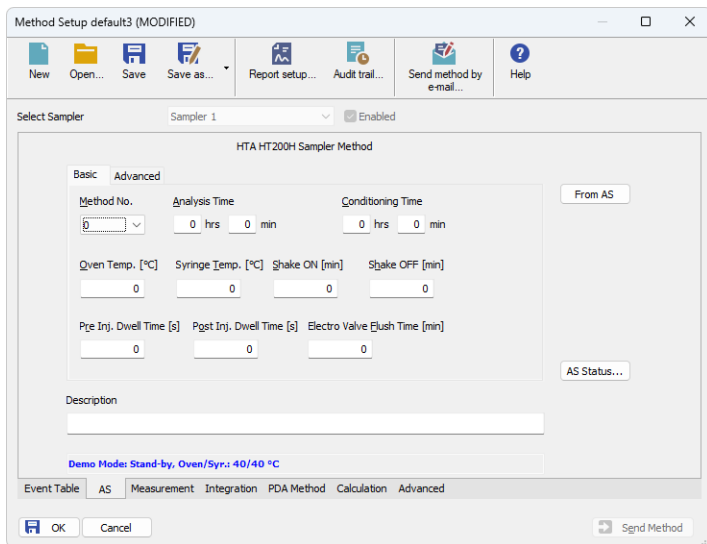
Basic and washing parameters of the method.

Fig. 8: Method Setup - AS Control - Basic

Method No.
Internal method number under which the method is stored in sampler. When reading method from sampler current number is used. Methods saved into the sampler remain stored in the device even after closing **Clarity**.
Valid range: 0 - 9

Analysis Time
Estimated duration of analysis - sampler uses this value to optimize sample preparation times.
Valid range: *00:02 - 23:59*.

Conditioning Time
Duration of sample conditioning.
Valid range: *00:00 - 23:59*.

Oven Temperature / Syringe Temperature
Temperature of oven and syringe during analysis.
Valid range: *40 - 150 ± 1 °C*.

Shake On / Off Time
Times in which oven shaker is turned on/off during sample conditioning. When conditioning time is longer than shaker times, shaker cycles on and off.
Valid range: *0 - 9.9 ± 0.1 min*
Setting times to *0* turns shaker off.

Pre / Post Injection Dwell Time
Time that sampler waits prior to and after injection with syringe in injector in order to equilibrate.

Valid range: *0 - 99 ± 1 s*.

Electro Valve Flush Time
The time syringe is flushed with gas after injection.

Valid range: *0 - 9.9 ± 0.1 min*.

4.2.2 Method Setup - AS - Advanced
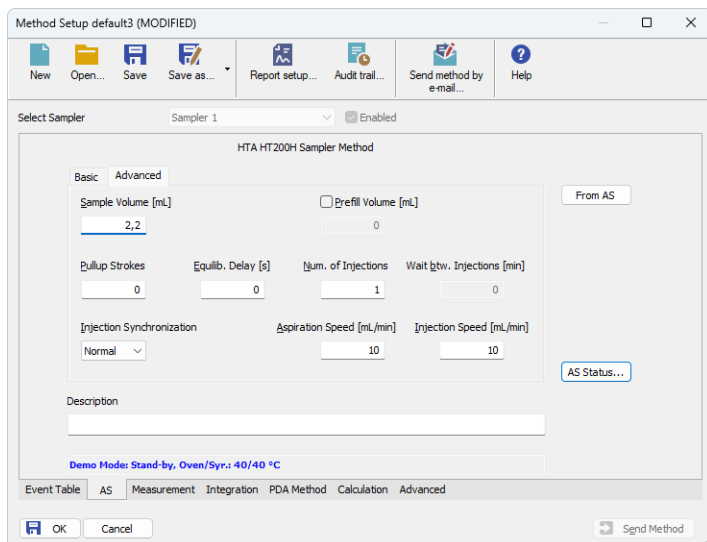
Volume and speed settings.

Fig. 9: Method Setup - AS Control - Advanced

Sample Volume
Volume of a sample to be injected. During acquisition *Sample Volume* from **Sequence** table is used instead of this value. This field is used only for transferring of injection method between sampler and **Clarity** station.

Valid range: *0 - 4.5 ± 0.01 ml*

Prefill Volume
When checked, the specified volume of air is injected into the sample prior to aspiration.

Valid range: *0 - 4.5 ± 0.01 ml*

Pullup Strokes
Number of pullup strokes of the plunger prior to sample aspiration - useful for mixing the sample.

Valid range: *0 - 15*

Equilibration delay
The time the syringe stays in sample during each pullup stroke.
Valid range: *0 - 60 ± 1 s*

Number of Injections
When GC is equipped with proper trapping system, multiple injections can be used to increase total volume of sample used for analysis.
Valid range: *1 .. 15*

Wait between Injections
If multiple injections are used, sampler waits for given time between consecutive injections with syringe in injector in order to equilibrate.
Valid range: *0 - 99 ± 1 min*

Injection Syncro
Type of synchronization with GC - controls precise moment when Injected signal is sent to GC.

Tab. 2: Possible values for Injection Synchro:

Synchronization	Output (signal to GC)	Start injection (signal from GC)
Normal	At the beginning of the syringe plunger movement	At the reception of the GC Ready signal
A-start	When sensor touches the injector	At the reception of the GC Ready signal
Delayed	At the end of the syringe plunger movement	At the reception of the GC Ready signal

Fill speed
Speed of sample aspiration.
Valid range: *0.1 - 100 ± 0.01 ml/min*

Injection speed
Speed of sample injection.
Valid range: *0.1 - 100 ± 0.01 ml/min*

4.3 HT200H AS Setup

The *HT200H AS Setup* dialog sets the fundamental options of the control module.

Note: It is accessible from the *System Configuration* dialog by doubleclicking the *HT200H Headspace Sampler* item.
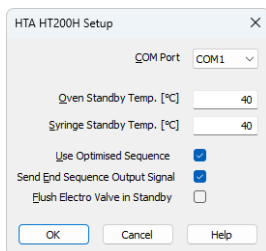

Fig. 10: HT200H AS Setup

COM Port
Sets the COM Port used for communication between the sampler and the PC.

Note: For more details see the chapter **Installation Procedure** on pg. **3**..

Oven/Syringe Standby Temp.
Oven/syringe temperature in standby mode.

Valid range: *40 - 150 °C*

Use Optimized Sequence
When checked, samples are prepared in advance to speed up analysis - For more details see the chapter **Installation Procedure** on pg. **3**.

This checkbox is checked by default.

Send End Sequence Output Signal
When checked, sampler sends signal to AUX pins of the IN/OUT connector (opens pins 8 and 14 and closes pins 11 and 14 on the **IN/OUT** connector).

Note: "Autosampler Setup - communication" on page 3.

This checkbox is unchecked by default.

Flush Electro Valve in Standby
When checked, autosampler flushes electro valve and syringe with gas in standby mode.

This checkbox is unchecked by default.

4.4 Device Monitor

Device Monitor of the **HT200H Headspace** displays the status information from the autosampler.
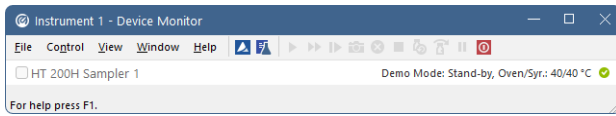

Fig. 11: Device Monitor of the HT200H Headspace

5 Sequence

To use the autosampler in the **Clarity** sequence, following conditions must be met:

- The sequence must be saved
- The sequence must be set as **Active Sequence**
- All used methods must have the *External Start* enabled and the *Autostop* time set
- The **Use Optimized Sequence** checkbox in the HT200H AS Setup dialog to be checked (when using the paralel sample preparation).
- Method Setup - AS dialog in the used methods must be filled

The required values for starting vial (*SV*), ending vial (*EV*), number of injections from vial (*I/V*) and injected volume are set in the sequence table.

The *Sample Volume* field from the Method Setup - AS dialog is used only in **Single Run** injections.
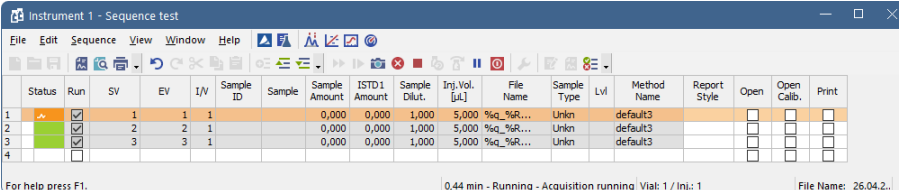
Standard sequence operation

After sequence start, the AS control method will be sent to the sampler and the datastation will wait for the injection signal from sampler. After receiving it, the run starts and after finishing, the method for next injection will be sent to the sampler.

Note: The headspace sampler can prepare next samples in advance while measuring the current sample. This function is enabled in the **Optimized Sequence Mode** described in the following chapter.

5.1 Optimized Sequence Mode

In *Optimized Sequence Mode* the samples are prepared in advance in order to shorten total analysis time. While sampler injects and waits for analysis of one sample, it prepares and conditions subsequent samples in parallel. All rows that are being prepared are already locked (protected against editation) in the **Clarity Sequence** table.

In the following example while sampler is injecting vial 63, vials 2 and 3 are already being prepared:

Fig. 12: Sequence table

The **Optimised Sequence Mode** requires the **Use Optimized Sequence** checkbox in the HT200H AS Setup dialog to be checked.

Tips for using Optimized Sequence Mode

To take full advantage of this mode, several guidelines should be followed when preparing sequence in the **Clarity** station:

- Use single **injection per vial.**

Note: Multiple injections from one vial are not supported in the Optimized Sequence Mode and the conditioning time is not optimized in that case.

- Use the same **Injection Volume** and **Method Name** in consecutive rows as much as possible. Each change of method or injection volume (which is part of injection method of the sampler) forces sampler to discontinue optimization due to different preparation conditions defined in the injection method.
- Use consecutive vial numbers. The sampler optimizes only samples from continuous sequence of vials. This continuous sequence can be spanned across multiple rows of **Clarity Sequence table** (in order to change values that do not affect behaviour of the sampler, e.g. **File Name, Sample ID,** etc.).
- Note that on 40-positions tray that the sampler uses, vial numbering is discontinuous, eg. vials *00 - 03* are followed by vials *10 - 13*, then by *20 - 23*, etc. This is still considered continuous sequence regarding optimization.
- Note that **Clarity** does not support discontinuous numbering of vials, thus sequence *00 - 23* must be divided into at least three rows in the **Clarity Sequence table** (*00 - 03*, *10 - 13* and *20 - 23*).

Caution: Pause command invokes abort of autosampler, which causes break of Sequence optimalization.

5.2 Single Run

The AS control is usually used in the *Sequence* measurement.

For *Single Run* operation, the selected method should be sent to the sampler using the *To AS* button from the Method Setup - AS dialog.

In case the **OUT** wire is connected to the sampler, the initial state of the respective digital output must be set to *LOW* in the *Digital Outputs* dialog accessible from the *Clarity* main window *System* menu.

The vial numbers must be entered and the injection started from the Sampler keyboard.

The *Analysis Time* set in the Method Setup - AS dialog governs the injection cycle

Note: That means: if it is shorter then the *Autostop Time* in the **Method Setup - Measurement** dialog, the sampler can inject next sample before the previous run acquisition has been finished.

The *Sample Volume* field in the Method Setup - AS dialog is used for injection.

6 Troubleshooting

Flush Time is 10x higher then the time specified in the method.

This is a bug caused by incorrect description of the communication protocol.

Solution: Upgrade to **Clarity** version 2.4.1.53 or later.

Incorrect Wash vials positioning in HT250D autosampler.

There is a firmware bug in the HT250D used in standard mode that causes problems with wash vials positioning.

Solution: Ask SMI for help - upgraded firmware is available. **Clarity** version 2.1.4.67 or higher is needed after firmware upgrade.