



HT3X00A

Clarity Control Module

ENG

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To facilitate the orientation in the **HT3x00A** 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 HT3X00A Control module

This manual describes the setting of **HT3000A**, **HT3100A**, **HT3200A**, **3000A**, **3100A**, **3200A**, **HT2800T**, and **2800T** autosamplers. For **HT2800T** and **2800T** autosamplers, the setting in this manual is relevant to the liquid mode only. The control module enables direct control of the instrument over LAN (All samplers are further referred to as **HT3x00A** in this manual). Direct control means that the autosampler can be completely controlled from the **Clarity** environment. Instrument method, controlling for example the vials and further device specific functions (e.g. washing), will be saved to the measured chromatograms.



Fig. 1: HT3000A autosampler

2 Requirements

- **Clarity** Installation with AS Control module (p/n A26).
- Free LAN port in the PC (for connection to both the autosampler and to the Internet, two LAN cards might be necessary) or in the local network.
- LAN cross cable (p/n SK08) for direct connection of the autosampler to PC or local network.

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

Caution: The recommended firmware version in the autosampler is at least **1.14**. Latest version of firmware for updating can be obtained from the vendor of the autosampler or directly from HTA company.

3 Installation Procedure

3.1 Autosampler setup - communication

The **HT3x00A** autosampler communicates with PC via LAN using the LAN cable, either directly or using the local network. The cable used might differ from LAN cross cable (p/n SK08) used for direct connection to LAN straight cable used for the connection via local network, however, modern switches usually can use the LAN cross cable as well.

3.1.1 3000A, 3100A, 3200A and 2800T protocol settings

Protocol version for **3000A**, **3100A**, **3200A** and **2800T** (in liquid mode) samplers must be set to "-". This is achieved by navigating the autosampler display/remote display menu through the *Run menu > Settings > Setup > Configuration > Run, Protocol Version* parameter must be set to "-" to ensure the compatibility with **Clarity** control module.

3.1.2 Additional connections

The **HT3x00A** control module can send and receive synchronization signals via standard communication line, however, some of the non-controlled instruments must be synchronized separately using the synchronization wiring. For that occasion, **HT3x00A** sampler has a 15-pin I/O connector on the rear panel. The exact wiring depends on the type of the device to be synchronized and its inner settings, the description of PINs on the **HT3x00A** autosamplers can be found in the following table:

Tab. 1: HT3x00A - designation of pins

PIN	I/O	Meaning	Description
1	Output	+5 Volts	Exit = Max. 20 mA
2	Input	FREE3-IN	Signal input (true low); Low-level = 0÷0.5 V Hi-level = 4÷12 V
3	Output	SAMPINS-NO	Exit = Relay contact (open by default)
4	Input	GC READY	Signal input (true high); Low-Level = 0÷0.5 V Hi-level = 4÷12 V
5		GND	Ground
6	Output	SAMPINS-COM	Relay common contact
7	Output	FREE1-NC	Exit = Relay contact (closed by default)
8	Output	ENDSAMP-NC	Exit = Relay contact (closed by default)
9	Input	GC READY	Signal input (true low); Low-Level = 0÷0.5 V Hi-level = 4÷12 V
10	Output	FREE1-NO	Exit = Relay contact (open by default)
11	Output	ENDSAMPL-NO	Exit = Relay contact (open by default)

PIN	I/O	Meaning	Description
12	Input	FREE2	Signal input (true low); Low-Level = 0÷0.5 V Hi-level = 4÷12 V
13	Output	FREE1-COM	Relay common contact
14	Output	ENDSAMPL-COM	Relay common contact
15	Output	SAMPINS-NC	Exit = Relay contact (closed by default)

Legend - relay contact: NC = normally closed, NO = normally open, COM = common contact

Some operation modes of the **HT3x00A** sampler may need particular synchronization connections to be made - in particular, the *EA* operation mode needs to have the SYNC IN (pins 2, 5) connection made, the *Twin (Trigger)* mode expects the SYNC IN (pins 2, 5) and SYNC OUT (pins 7, 10, 13) connections to be made. The end of sample preparation is announced by the sampler on pins 8, 14 and 11, while the injection itself is announced on pins 15, 6 and 3.

3.2 Clarity Configuration

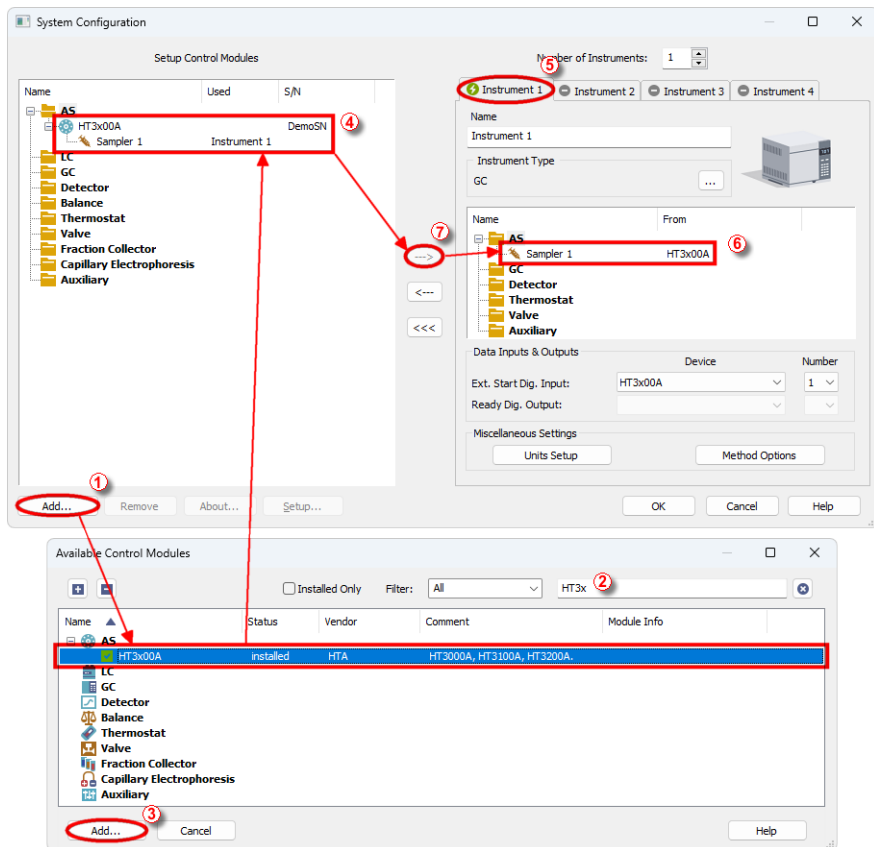



Fig. 2: System Configuration

- 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. 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 **HT3x00A** sampler and press the **Add** (3) button.

The [HTA HT3x00A Setup](#) dialog will appear.

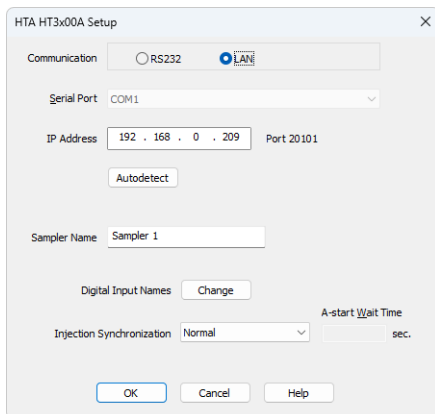


Fig. 3: HTA HT3x00A Setup

- Select the correct type of the *Communication* and fill in the appropriate *Serial Port* or *IP Address* field, then press the *Autodetect* button. If the communication is correct, the [Hardware Configuration](#) dialog showing the autosampler configuration appears.

Note: The [HTA HT3x00A Setup](#) dialog is more closely described in the chapter "[HT3x00A Setup](#)" on pg. 17.

The **HT3x00A** autosampler item will appear in the *Setup Control Modules* list of the *System Configuration* dialog.

- Drag and drop the **HT3x00A** 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. If you wish to synchronize the **Clarity** start with the autosampler via digital communication, you can set the **HT3x00A** in the *Ext. Start Dig. Input* drop-down menu, using the *1* as an input *Number*. In such case it is necessary to change the behavior on the *Method Setup - Measurement* tab later from *Down* to *Up*, else the start signal will be delayed by pulse length (approximately 2 seconds).

4 Using the control module

New [Method Setup - AS](#) tab appears in the *Method Setup* dialog, enabling the setting of the **HT3x00A** autosampler control method. It consists of three sub-tabs with content varying according to the autosampler model and installed options.

4.1 Method Setup - AS

The *Method Setup - AS* dialog consists of three sub-tabs assigned for the various parts of the **HT3x00A** autosampler method. These sub-tabs are [Basic & Washing, Filling](#) and [Internal Standard & Synchro](#). Additional buttons allow to display the [Hardware Configuration](#) dialog of the **HT3x00A** autosampler or to read the instrument method from the **HT3x00A** 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 **HT3x00A** 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 **HT3x00A** 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 Basic & Washing

This is the main tab defining the AS control method. It defines the basic settings of the **HT3x00A** method and specifies the wash procedure.

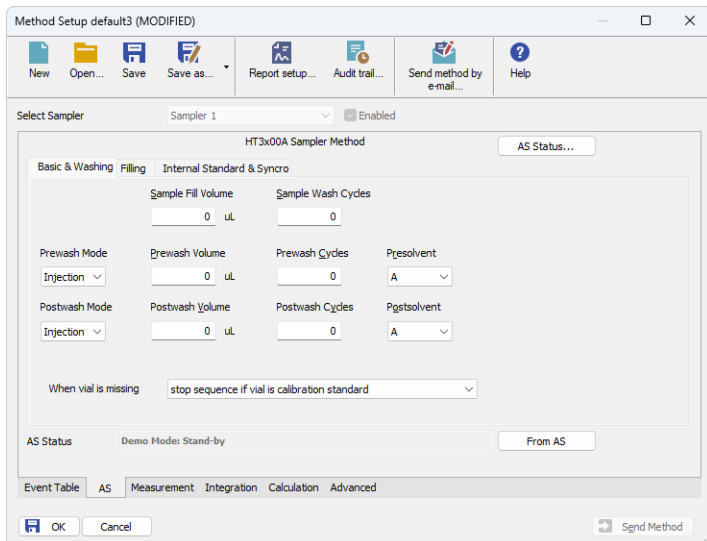


Fig. 4: Method Setup - AS - Basic & Washing

Sample Fill Volume

Sets the volume of the sample sucked into the syringe for each *Sample Wash Cycle* and *Bubble Elimination* stroke. Available value range is between 0 uL and 10 uL.

Sample Wash Cycles

Defines the number of times for flushing the syringe by the sample (as opposed to flushing with solvent) before injection is made. Available options are 0 - 15.

Prewash Mode

Defines the wash procedure prior to the analysis. This function enables to set the options under which the autosampler will perform the wash - it may be either before each *Injection*, before each *Sample* vial or before each *Step*.

Prewash Volume

Defines the volume of the solvent (in uL) used for the *Prewash*. Available value range is between 0 uL and 10 uL.

Prewash Cycles

Sets the number of *Prewash* cycles performed. Valid range is between 0 and 15 cycles.

Presolvent

Allows to select the solvent used for the *Prewash*. A combination of two solvents, as well as setting just one solvent for the wash, is supported.

Note: *Presolvent* vial is not defined in the **HTA 3x00** autosampler method, but rather is sent to the autosampler with each particular injection. Thus, when the method is sent to the autosampler, this parameter is not sent there, and when the method is read from the autosampler, this parameter is read just from local hidden variable in **Clarity**.

Postwash Mode

Defines the wash procedure after the analysis. This function enables to set the options under which the autosampler will perform the wash - it may be either after each *Injection*, after each *Sample* vial or after each *Step*.

Postwash Volume

Defines the volume of the solvent (in uL) used for the *Postwash*. Available value range is between 0 uL and 10 uL.

Postwash Cycles

Sets the number of *Postwash* cycles performed. Valid range is between 0 and 15 cycles.

Note: *Postsolvent* vial is not defined in the **HTA 3x00** autosampler method, but rather is sent to the autosampler with each particular injection. Thus, when the method is sent to the autosampler, this parameter is not sent there, and when the method is read from the autosampler, this parameter is read just from local hidden variable in **Clarity**.

Postsolvent

Allows to select the solvent used for the *Postwash*. A combination of two solvents, as well as setting just one solvent for the wash, is supported.

When vial is missing

Defines the behavior of **Clarity Sequence Table** when missing vial is detected by the autosampler. The possible options are *stop sequence*, *stop sequence when vial is standard* or *continue sequence*.

4.1.2 Filling

The *Method Setup - AS - Filling* tab allows to set the parameters for the injection of the **HT3x00A** autosampler itself.

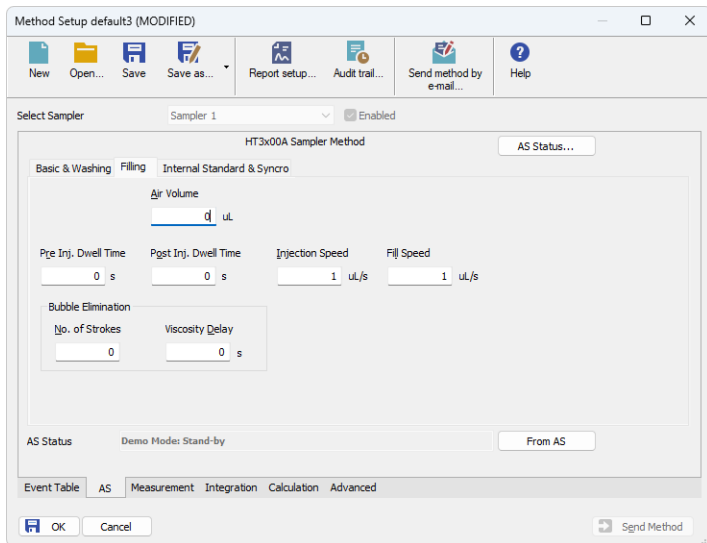


Fig. 5: Method Setup - AS - Filling

Air Volume

Sets the volume of the air bubble that can be sucked into the syringe after the sample is sucked in, preventing the liquid in the syringe contaminate other samples. The valid range is 0 - 15 uL.

Pre Inj. Dwell Time

Sets the time for how long will the syringe wait in inlet before injecting to equilibrate its temperature. Available values are 0 - 99 s.

Post Inj. Dwell Time

Sets the time for how long will the syringe wait in inlet after injecting to allow the whole sample to be vaporized. Available values are 0 - 99 s.

Injection Speed

Sets the injection speed on the scale 0.01 - 100. For detailed information refer to table below.

Fill Speed

Sets the speed of the syringe filling on the scale 0.01 - 100. For detailed information refer to table below.

Bubble Elimination

This section defines the bubble elimination process.

No. of strokes

Sets the number of pull-up strokes of the plunger prior to sample aspiration. The volume of each stroke is defined by the *Sample Fill Volume* parameter on [Basic & Washing](#) tab. Available values are 0 - 15.

Viscosity Delay

Sets the time for which the syringe stays submerged in the sample after the plunger has been raised. This helps viscous samples to fill the syringe before the sample is pushed out. Available values are 0 - 15 s.

Tab. 2: Limits for injection speed for various syringes:

Syringe Type (µL)	Injection Speeds (µL/s)	Sample Volumes (µL)	Speed Resolution (µL/s)	Volume Resolution (µL)
0,5	0,01 - 5,0	0,05 - 0,5	0,01	0,05
1	0,01 - 10,0	0,01 - 1,0	0,01	0,01
5	0,01 - 50,0	0,01 - 5,0	0,01	0,01
10	0,1 - 100,0	0,1 - 10,0	0,1	0,1
25	0,1 - 250,0	0,1 - 25,0	0,1	0,1
50	0,1 - 500,0	0,1 - 50,0	0,1	0,1
100	1,0 - 1 000,0	1,0 - 100,0	1,0	1,0
250	1,0 - 2 500,0	1,0 - 250,0	1,0	1,0
500	1,0 - 5 000,0	1,0 - 500,0	1,0	1,0

4.1.3 Internal Standard & Syncro

The *Method Setup - AS - Internal Standard & Syncro* tab allows to set the injection mode of the **HT3x00A** autosampler in respect to the ISTD usage.

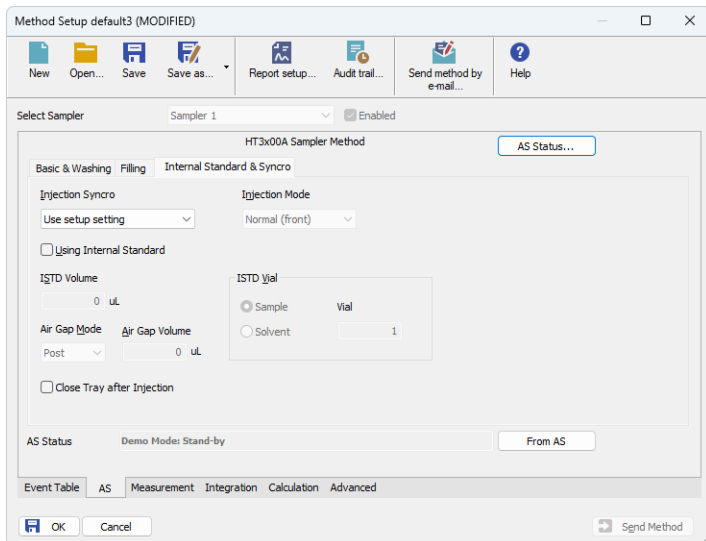


Fig. 6: Method Setup - AS - Internal Standard & Syncro

Injection Syncro

Sets the operation mode of the autosampler and its start event synchronization.

Note: For more information on exact moments of the sampler synchronization, please check the **HT3x00A** autosampler hardware manual provided by the **HTA** company.

Tab. 3: Possible values for Injection Synchronization:

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.
Trigger	At the beginning of the syringe plunger movement.	At the reception of the GC Ready. After ending the sample preparation it emits a SYNC-OUT 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.
EA	At the beginning of the syringe plunger movement.	At the contemporaneous reception of the GC Ready signal and of the SYNC-IN signal.
Normal without Ready	At the beginning of the syringe plunger movement.	At the end of the analysis time set in the autosampler method.
Normal with Data System (for special application only)	Refer to the HT3x00A autosampler hardware manual provided by the HTA company.	Refer to the HT3x00A autosampler hardware manual provided by the HTA company.

When two injectors are configured, parameter Injection mode can be specified to one of following values:

Injection Mode

Sets the mode of the operation in case the two injectors are defined on the **HT3x00A** autosampler. The following options are available:

Normal (front) - injection into the front injector; this is the default mode for one injector.

Rear - injection into the rear injector.

Confirmation - injection of one sample into both injectors.

High throughput - injection of different samples into both injectors.

A-start Wait Time

Sets the injection delay if the *A-start Injection Syncro* method is used. The available time range for this field is 0 - 25.5 s.

Using Internal Standard

Enables or disables the use of the ISTD added to the injections. While unchecked, the whole following section is disabled and the ISTD operation is not performed.

ISTD Volume

Defines the volume of the internal standard drawn with every sample into the syringe and injected on the column. Values are set in μl and their range also depends on the setting of the *Air Gap Volume*, see that item for explanation.

Air Gap Mode

Defines the position of air gap during the ISTD operations. During the ISTD operation, the order of things being sucked into the syringe while *Post* option is set here is ISTD, air gap, sample and another air gap. In case *Double* option is set, the order of items sucked is air gap, ISTD, air gap, sample and another air gap.

Air Gap Volume

Defines the volume of the air bubble. The available values vary according to the *Air Gap Mode* selected and *ISTD Volume* selected, but it holds true that the total of all air gaps and the *ISTD Volume* must be in the range 0 - 9.9 μl .

ISTD Vial

Sets the vial which holds the reservoir of the ISTD to be added to the samples. The ISTD may be either in one of the sample vials or in the solvent vials, as switched by the particular radiobuttons.

Close Tray after Injection

With this checkbox checked the AS will close the tray after each injection. This option is not available for **HT3100A**.

4.2 Hardware Configuration

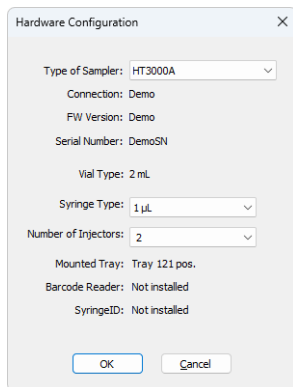


Fig. 7: Hardware Configuration

The *AS Status* button in the [Method Setup - AS](#) dialog displays the *Hardware Configuration* dialog. In the full version, this dialog displays autosampler model, automatically detected communication parameters, firmware revision and the presence of several optional parts of the **HT3x00A** autosampler.

In the demo version the presence of the particular options can be set to demonstrate the possibilities of the sampler with selected configuration.

Type of Sampler

Shows the **HT3x00A** autosampler type as automatically detected by the control module.

Connection

Shows the communication parameters as detected from the sampler.

FW Version

Shows the firmware revision loaded into the **HT3x00A** autosampler.

Serial Number

Shows the serial number of the given autosampler unit.

4.3 Device Monitor

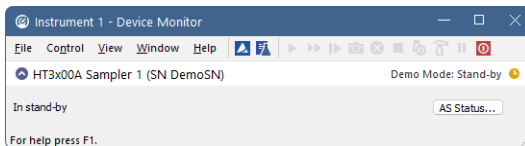


Fig. 8: HT3x00A Device Monitor

The Device Monitor window for the **HT3x00A** autosampler enables to monitor the status of the **HT3x00A** autosampler and display its configuration.

AS Status

Opens the [Hardware Configuration](#) dialog described in the chapter "**Hardware Configuration**" on pg. 15.

4.4 HT3x00A Setup

HTA HT3x00A Setup dialog (accessible through the *System Configuration* dialog) allows to manually set the parameters needed for the communication with the **HT3x00A** autosampler.

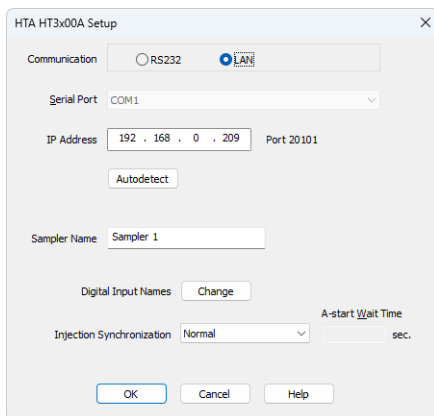


Fig. 9: HTA HT3x00A Setup

Communication

Sets the type of the communication for the **HT3x00A** autosampler from the possible options - *RS232* or *LAN*. The selection then influences the fields available in the *HTA HT3x00A Setup* dialog.

Serial Port

In case of serial (*RS232*) communication sets the COM Port used for the communication between the **HT3x00A** autosampler and **Clarity**.

IP Address

In case of LAN communication sets the IP address of the **HT3x00A** autosampler connected to the computer via network.

Autodetect

When pressed, checks whether there is the **HT3x00A** autosampler present using the selected *Communication* option, with the given *Serial Port* or *IP Address*. The result of the autodetection is then displayed in the [Hardware Configuration](#) dialog or an error message, depending on the success of the detection.

Sampler Name

Allows to set the custom name of the **HT3x00A** autosampler, which will be then shown in the *Device Monitor* window, in the reports and on other places in **Clarity**.

Digital Input Names

Pressing the *Change* button opens the *Digital Input Names* dialog which allows to set the custom name for the virtual **HT3x00A** digital input. This input allows to start **Clarity** run by the signal of the **HT3x00A** autosampler simulated over the communication line instead of the usual synchronization wiring.

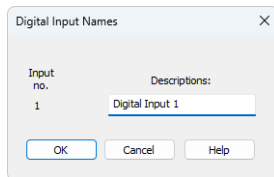


Fig. 10: Digital Input Names

Injection Synchronization

Sets the default synchronization mode between the autosampler and the analyzer or other instruments during the execution of one or more injections. It can be set to different one in each method in the [Method Setup - AS - Internal Standard & Syncro](#) tab.

Tab. 4: Possible values for Injection Synchronization:

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.
Trigger	At the beginning of the syringe plunger movement.	At the reception of the GC Ready. After ending the sample preparation it emits a SYNC-OUT 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.
EA	At the beginning of the syringe plunger movement.	At the contemporaneous reception of the GC Ready signal and of the SYNC-IN signal.
Normal without Ready	At the beginning of the syringe plunger movement.	At the end of the analysis time set in the autosampler method.
Normal with Data System (for special application only)	Refer to the HT3x00A autosampler hardware manual provided by the HTA company.	Refer to the HT3x00A autosampler hardware manual provided by the HTA company.

A-start Wait Time

Set the delay between the A-start event and actual sending the signal to the GC. This delay cannot be set when setting the *A-start* option in the [Method Setup - AS - Internal Standard & Syncro](#) tab.

5 Report Setup

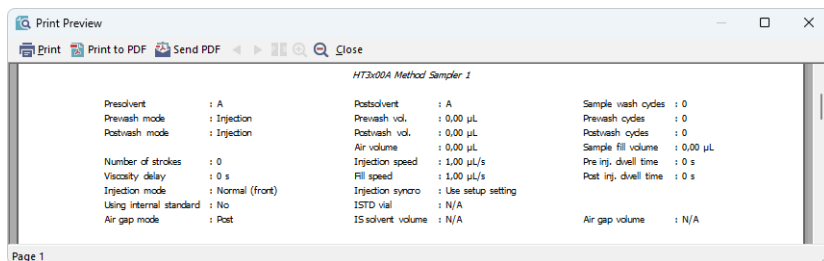


Fig. 11: HT3x00A report preview

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:

```
[TCP_IP x.x.x.x:20101]
echo=on
textmode=on
filename=HT3x00A_%D.txt
reset=off
```

Note: Instead of x.x.x.x type the correct IP address used to communicate with the **HT3x00A** autosampler. This information is displayed when the *AS Status* button in the [Method Setup - AS](#) 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. Note that the file size may be quite significant, so in case the error occurs on a regular basis, it might be better to set the *Reset=on*, start **Clarity**, invoke the error, close **Clarity** and send the diagnostics file (the file will be once more reset during the next start of **Clarity**).